GREATER LYNCHBURG TRANSIT COMPANY OPERATIONS AND MAINTENANCE FACILITY

419 BRADLEY DRIVE
LYNCHBURG, VA 24501

Bid Documents

SPECIFICATIONS

Volume 1 of 2

September 24, 2014

Prepared For: Greater Lynchburg Transit Company
1301 Kemper Street
Lynchburg, VA 24501

Submitted by: Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc.
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Alexandria, VA 22314

wendel

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DIVISION 00
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ADVERTISEMENT FOR BIDS

Sealed bids for "GLTC Operations & Maintenance Facility", will be received by the City of Lynchburg, Procurement Division, City Hall, Lynchburg, VA, until 3:00 p.m., March 3, 2015, and then publicly opened and read, in the Bidder's Room, Third Floor, City Hall.

This transit bus and para transit storage and maintenance project includes a one-story approximately 50,500 GSF combined Administration, Operations, Maintenance and Service building; a detached one-story road salt storage and general storage building; a detached gasoline dispensing island with canopy covering. Site work on the total 11.750 acre site and adjoining portion of the Bradley Drive public right-of-way.

Contract Documents may be viewed and printed directly from the City's Procurement website: http://www.lynchburgva.gov/current-solicitations.

An optional Pre-Bid Conference will be held at 10:00 a.m., February 11, 2015, in the GLTC Transfer Station, 800 Kemper Street, Lynchburg, VA 24505.

All requests for clarification of or questions regarding this Advertisement for Bids or for additional information must be made in writing, by facsimile (434) 845-0711 or email to stephanie.suter@lynchburgva.gov and received by 2:00 p.m., February 20, 2015. All posted clarifications or addenda must be signed and accompany any bid submitted.

BID FORM

Stephanie Suter
Buyer-Procurement Division
City of Lynchburg
Third Floor, City Hall
900 Church Street
Lynchburg, Virginia 24504

Dear Ms. Suter:

The undersigned, as bidder, hereby declares that the only persons interested in this bid as principal, or principals, is or are named herein and that no person other than herein mentioned has any interest in this bid or in the Construction Agreement to be entered into; that this bid is made without connection with any other person, company, or parties making a bid; and that it is in all respects fair and in good faith, without collusion or fraud.

The undersigned, having visited and examined the site and having carefully studied all the Contract Documents, including without limitation, all drawings and specifications pertaining to "GLTC Operations & Maintenance Facility" for theGreater Lynchburg Transit Company, hereby proposes to furnish all labor, equipment, materials, and services and to perform all operations necessary to execute and complete the Work required for the project, in strict accordance with the Contract Documents, The City of Lynchburg Manual of Specifications and Standard Details as applicable, latest edition, and, together with Addenda numbered _____ through _____ issued during bidding period and hereby acknowledged, subject to the terms and conditions of the Construction Agreement for the lump sum of

_____DOLLARS

($_____), which shall be referred to hereinafter as the Base Bid.

It is understood and agreed that the Owner, in protecting its best interests, reserves the right to reject any or all bids or waive any defects. Any changes, erasures, modifications, deletions in the bid form, or alternate bids not specified in the Advertisement for Bids may make the bid irregular and subject to rejection.

Contractors will indicate a unit price for each item listed below. All unit prices shall only apply to changes in the Work. The listed bid items are to contain all necessary costs required for completion of the Work in accordance with the Contract Documents.

We are properly equipped to execute all work of the character and extent required by the Contract Documents, and we will enter into the Construction Agreement for the execution and completion of the Work in accordance with the Contract Documents; and we further agree that, if awarded the Construction Agreement, we will commence the Work on the date stated in the "Notice to Proceed" and will maintain a work force large enough to execute the Work and all obligations no later than the completion date stated in the Contract Documents.

Enclosed herewith is the following Security, offered as assurance that the undersigned will enter into the Construction Agreement for the execution and completion of the Work in accordance with the Contract Documents:

Bidder's Certified Check issued by_____(name of bank) in the amount of:

$ _____(5% of Base Bid amount)

Bidder's Bid Bond for 5% of Base Bid Amount Issued by _____
(name of surety authorized to do business in Virginia).

The undersigned hereby agrees, if awarded the Construction Agreement, to execute and deliver to the Owner within ten (10) days after his receipt of the Notice of Award, a performance bond and a payment bond, in forms satisfactory to the Owner, from sureties authorized to do business in Virginia satisfactory to the Owner, in the amount of one hundred (100) percent of the Base Bid.

The undersigned further agrees that, in case of failure on his part to execute the said Construction Agreement within the ten (10) days after written notice being given on the award of the Construction Agreement or the failure to deliver the required performance and payment bonds within the ten (10) days, the monies payable by the Security accompanying this bid shall be paid to the Greater Lynchburg Transit Company as liquidated damages for such failure; otherwise the Security accompanying this Bid shall be returned to the undersigned.

Attached herewith are completed Statement of Experience and Statement of Resources forms which include the information requested.

The undersigned further certifies that this bid is not the result of, or affected by, any act of collusion with another person engaged in the same line of business, or any act punishable under the Virginia Governmental Frauds Act, or other law.

This bid remains valid and may not be withdrawn for a period of 90 days from this date.

CURRENT VIRGINIA CLASS A CONTRACTOR'S LICENSE/ REGISTRATION NO.:_____

Respectfully submitted,

_____
CONTRACTOR

_____
DATE

_____

_____
ADDRESS

BY:_____

ITS:_____
(Title)

ELECTION OF ESCROW ACCOUNT PROCEDURE FOR RETAINAGE

If determined to be the successful low bidder(s), the above signed elects to use the Escrow Account Procedure for retainage.

_____

Write “Yes” or “No” on above line

If the successful bidder elects to use the Escrow Account Procedure for Retainage, the "Escrow Agreement" form shall be executed and submitted to the Greater Lynchburg Transit Company within fifteen (15) calendar days after notification. If the "Escrow Agreement" form is not submitted within the fifteen (15) day period, the Contractor shall forfeit his rights to the use of the Escrow Account Procedure.

Company_____

Authorized Signature_____

EQUAL OPPORTUNITY REPORT STATEMENT

The Bidder shall complete the following statement by checking the appropriate blank as follows.

The Bidder has_____ has not _____ participated in a previous contract subject to the nondiscrimination clause prescribed by Executive Order 10925, dated March 6, 1961, or Executive Order 11114 dated June 22, 1963.

In conjunction with the Greater Lynchburg Transit Company's policy to utilize Minority and Disadvantaged Business Enterprises ("DBE") wherever possible, the Bidder has solicited quotations for labor, material and/or services from the following Minority and Disadvantaged Business Enterprises:

NAME OF FIRM	PERSON(S) CONTACTED	DATE

Of those listed above, we intend, at this time, to utilize the following in the completion of the Work required by this Construction Agreement:

_____

_____

_____

"This firm assures that it will give its best efforts to utilize not less than 4% Minority and Disadvantaged Business Enterprises whenever possible."

CERTIFIED BY: _____(Signature)

_____(Typed/Printed name & Title)

BIDDER'S NAME: _____

TAXPAYER IDENTIFICATION NUMBER:_____

_____This firm will perform all construction with its own employees and, therefore, is not required to solicit quotations from DBEs.

FAILURE TO DOCUMENT AND REPORT DBE CONTACTS ON THIS FORM MAY BE A BASIS FOR REJECTION OF THE BID AS NONCONFORMING.

STATEMENT OF EXPERIENCE

Proposer: _____

_____

How Long In Business:_____ At Current Address: _____

Principals: _____Title:_____

_____Title:_____

_____Title:_____

Type of Work Normally Performed:_____

_____

Projects of this type previously completed:

1._____

_____ Amount $_____

2._____

_____ Amount $_____

3._____

_____ Amount $_____

Reference (for Projects listed above):

1._____

_____ Tel.No._____

2._____

_____ Tel.No._____

3._____

_____ Tel No._____

STATEMENT OF AVAILABLE RESOURCES

Equipment:_____

_____

_____

Number of Personnel Currently Employed:_____

Number of Personnel Available for Project:_____

Other Pertinent Information:_____

_____

_____

_____

_____

_____

_____

_____

CORPORATE STATUS FORM

ALL PROSPECTIVE FIRMS MUST RESPOND TO THE FOLLOWING

If a limited liability company, limited liability partnership or a limited partnership, indicate by checking one: _____Limited liability company

_____Limited liability partnership

_____Limited partnership

Have you registered with the Virginia State Corporation Commission, to conduct business in Virginia?
☐ Yes ☐ No

Name and address of organizer: _____

_____

_____

_____

List who is authorized to execute contracts:

_____

If conducting business under an assumed (fictitious) business name, fill out the following information:

Names of persons or entities owning business using assumed business name:_____

Owners' addresses: _____

Registration date: _____ Expires: _____

If conducting business as a sole proprietorship, general partnership, or joint venture, fill out the following information:

Names of all persons liable for obligations of the business: _____

Addresses of such persons: _____

Questions to Bidders/Offerors

Bidders/Offerors are to respond to the following question: Have any of the individual(s), owner(s), and/or principal officer(s) of the firm submitting the bid ever been convicted of (1) a felony, or (2) a misdemeanor involving moral turpitude?

YES _____ NO _____

If yes, list individual or officer and title and give details.

_____

_____

_____

_____

_____

_____

_____

_____

NOTE: Answering yes to this question will not necessarily exclude your company from consideration but will be used to weigh the relationship between the offense and the contract to be performed.

Is your firm currently involved in litigation or a dispute involving arbitration?

YES _____ NO _____

If yes, for litigation list the litigation by case name, name of court, case number, and jurisdiction, and for arbitration, list the organization administering, if any, its contact information, any case number assigned, the arbitrators, and the location of the arbitration. For litigation and arbitration, briefly describe the claims and status, and give contact information for the opposing party or parties.

_____

_____

_____

_____

CONSTRUCTION AGREEMENT

This Construction Agreement (the "Contract") made and entered into on the _____ day of _____, 2015, by and between _____, party of the first part, hereinafter referred to as Contractor, and theGreater Lynchburg Transit Company, a public, nonprofit corporation of the Commonwealth of Virginia, party of the second part, hereinafter referred to as the Owner .

That the Contractor, for the consideration hereinafter fully set out, hereby agrees with the Owner as follows:

1. That the Contractor shall furnish all labor, materials, tools, and equipment and perform all Work required by the Contract Documents (as defined in the General Conditions hereto).

2. That the Contractor shall commence Work within ten (10) days after Notice to Contractor to Proceed with the Work under Contract ("Notice to Proceed"), and shall substantially complete the Work no later than MM/DD/YY. Owner and Contractor recognize that time is of the essence of this Contract and that the Owner will suffer financial loss if the Work is not completed within the times specified in the Notice to Proceed, plus any extensions thereof. They also recognize the delays, expense and difficulties involved in providing the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for certain losses Owner is expected to suffer due to delay (but not as a penalty) Contractor shall pay $ for each day that expires after the time specified for completion. If the Contractor is subject to liquidated damages, the Owner has the right, but not the obligation, to withhold the liquidated damages from the Contractor's regular payments or retainage. Rights and obligations relating to these liquidated damages are set out more fully in the General Conditions.

4. The Owner hereby agrees to pay the Contractor for the faithful performance of this Contract in accordance with the Contract Documents, subject to additions and deductions as provided in the Contract Documents, in lawful money of the United States, as follows:

_____Dollars

($_____)

5. The Owner shall make partial payment on a monthly basis to the Contractor in accordance with the Contract Documents on the basis of a duly certified and approved estimate of work performed during the preceding calendar month by the Contractor, less five percent (5%) of the amount of such estimate which may be retained by the Owner until all Work has been performed strictly in accordance with the Contract Documents and until such Work has been accepted by the Owner.

6. Within ninety (90) days after submission by the Contractor of evidence satisfactory to the Owner that all payrolls, material bills and other costs incurred by the Contractor in connection with the construction of the Work have been paid in full, satisfaction of all the requirements of the Contract Documents, and acceptance of such Work by the Owner, final payment on account of this Contract shall be made.

7. It is further mutually agreed between the parties hereto that if, at any time after the execution of this Contract, the performance bond provided for its faithful performance and the payment bond, the Owner shall deem the surety or sureties upon such bonds or either of them to be unsatisfactory, or if for any reason, such bonds cease to be adequate to cover the performance of the Work, the Contractor shall, at his own sole expense, within five (5) days after the receipt of Notice from the Owner so to do, furnish an additional bond or bonds in such form and amount, and with such surety or sureties as shall be satisfactory to the Owner. In such event, no further payment to the Contractor shall be deemed to be due under this Contract until such

new or additional security for the faithful performance of the Work shall be furnished in manner and form satisfactory to the Owner.

8. Contractor agrees to fulfill all requirements of state, Federal, and municipal laws which may be applicable to this project.

9. This Contract is subject to the General Conditions accompanying it, and all the documents defined by the General Conditions to be the Contract Documents are a part of this Contract.

This Contact is executed in two counterparts, each of which shall, without proof or accounting for the other counterparts, be deemed an original contract.

IN WITNESS WHEREOF, _____ has caused its name to be subscribed to this Contract by _____, its _____, and its corporate seal to be hereunto affixed and attested by _____, its _____, said officers being duly authorized therefore; and the Greater Lynchburg Transit Company has caused its name to be hereunto subscribed by Karen Walton, General Manager, and its corporate seal to be hereunto affixed and attested by its Secretary of the Board, said officers being duly authorized therefore, all as to the day and year first above written.

CONTRACTOR

BY: _____

ITS: _____

(SEAL)

_____

ATTEST:

_____

GREATER LYNCHBURG TRANSIT COMPANY

(SEAL)

BY:_____

General Manager

_____

ATTEST:

_____

Clerk of Council

GREATER LYNCHBURG TRANSIT COMPANY
STANDARD PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: That_____ _____, the Contractor ("Principal"), whose principal place of business is located at _____ _____and_____ _____("Surety"), are held and firmly bound unto theGreater Lynchburg Transit Company, the Owner ("Obligee"), in the amount of

_____Dollars ($_____) for the payment whereof Principal and Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has, entered into a Construction Agreement with Obligee for certain work on a construction project known as_____, which contract (the "Contract") is by reference expressly made a part hereof;

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall promptly and faithfully perform said Contract in strict conformity with the plans, specifications and conditions of the Contract and its Contract Documents, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Provided, that any alterations which may be made in the terms of the Contract, or in the Work to be done under it, or the giving by the Obligee of any extension of time for the performance of the Contract, or any other alterations, extensions or forbearance on the part of either or both of the Obligee or the Principal to the other shall not in any way release the Principal and the Surety, or either of them, their heirs, executors, administrators, successors or assigns, from their liability hereunder, notice to the Surety of any such alterations, extensions, or forbearance being hereby waived.

No action shall be brought on this bond unless brought within one year after: (a) completion of the Contract and all Work thereunder, including expiration of all warranties and guarantees, or (b) discovery of the defect or breach of warranty or guarantee if the action be for such.

The Surety represents to the Principal and to the Obligee that it is legally authorized to do business in the Commonwealth of Virginia.

Signed and sealed this_____day of_____, 2015.

_____(SEAL)
Contractor/Principal

By:_____

Witness:_____ Title:_____

_____(SEAL)
Surety

By:_____
Attorney -in-Fact

My Power of Attorney is recorded in the Clerks Office of the Circuit Court of_____,
Virginia in Deed Book_____, Page_____, and has not been revoked.

_____
Attorney-in-Fact

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA
(or, alternatively, Commonwealth or State of_____)

CITY/COUNTY OF_____to wit:

I, the undersigned notary public, do certify that_____personally appeared before me in the jurisdiction aforesaid and made oath that he is the attorney-in-fact of_____, the Surety, that he is duly authorized to execute on its behalf the aforesaid Bond(s) as its act and deed.
Given under my hand this_____day of_____2015.

_____(SEAL)
Notary Public

My Commission expires:_____

APPROVED:

_____
City Attorney/Designee Date

GREATER LYNCHBURG TRANSIT COMPANY
STANDARD LABOR AND MATERIAL PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: That _____

_____, the Contractor ("Principal") whose principal

place of business is located at_____

_____and_____

_____("Surety") are held and firmly bound unto theGreater Lynchburg

Transit Company, the Owner ("Obligee") in the amount of_____

Dollars ($_____) for the payment whereof Principal and Surety bind themselves, their

heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS,

Principal has by written agreement dated_____entered into a Construction Agreement

with Obligee for _____.

which contract (the “Contract”) is by reference expressly made a part hereof;

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall promptly make payment to all claimants as hereinafter defined, for labor performed and material furnished in the prosecution of the Work provided for in the Contract and its Contract Documents, then this obligation shall be void~~,~~; otherwise it shall remain in full force and effect, subject, however, to the following conditions.

The Principal and Surety, jointly and severally, hereby agree with Obligee as follows:

1. A claimant is defined as one having a direct contract with the Principal or with a subcontractor of the Principal for labor, material, or both for use in the performance of the Contract. A "subcontractor" of the Principal, for the purposes of this bond only, includes not only those subcontractors having a direct contractual relationship with the Principal but also any other contractor who undertakes to participate in the Work which the Principal is to perform under the aforesaid Contract, whether there are one or more intervening subcontractors contractually positioned between it and the Principal (for example, a subcontractor). "Labor" and "material" shall include, but not be limited to, public utility services and reasonable rentals of equipment, but only for periods when the equipment rented is actually used at the Work site.

2. Subject to the provisions of paragraph 3, any claimant who has performed labor or furnished material in accordance with the Contract Documents in the prosecution of the Work provided in the Contract, who has not been paid in full therefore before the expiration of ninety (90) days after the day on which such claimant performed the last of such labor or furnished the last of such materials for which he claims payment, may bring an action on this bond to recover any amount due him for

such labor or material, and may prosecute such action to final judgment and have execution on the judgment. The Obligee need not be a party to such action and shall not be liable for the payment of any costs, fees or expenses of any such suit.

3. Any claimant who has a direct contractual relationship with any subcontractor of the Principal from whom the Principal has not required a subcontractor payment bond, but who has no contractual relationship, express or implied, with the Principal, may bring an action on this bond only if he has given written notice to the Principal within one hundred eighty (180) days from the day on which the claimant performed the last of the labor or furnished the last of the materials for which he claims payment, stating with substantial accuracy the amount claimed and the name of the person for whom the Work was performed or to whom the material was furnished. Notice to the Principal shall be served by registered or certified mail, postage prepaid, in an envelope addressed to the Principal at any place where his office is regularly maintained for the transaction of business. Claims for sums withheld as retainages with respect to labor performed or materials furnished shall not be subject to the time limitations stated in this paragraph 3.

4. No suit or action shall be commenced hereunder by any claimant.

   a. Unless brought within one year after the day on which the person bringing such action last performed labor or last furnished or supplied materials, it being understood, however, that if any limitation embodied in this bond is prohibited by any law controlling the construction hereof, the limitation embodied within this bond shall be deemed to be amended so as to be equal to the minimum period of limitation permitted by such law.

   b. Other than in a Virginia court of competent jurisdiction, with venue as provided by statute, or in the United States District Court for the district in which the project, or any part thereof is situated.

5. The amount of this bond shall be reduced by and to the extent of any payment or payments made in good faith hereunder.

6. This bond is intended to comply with the requirements and to afford all the benefits of a payment bond consistent with the requirements of Virginia Code § 2-2-4337 and § 2-2-4341. To the extent that those sections as they are in effect as of the date of issuance of this bond confer any requirements on Principal or Surety, or confer any additional benefits on any claimant (as the term “claimant” is used within either the meaning of those sections or this bond), those requirements and benefits shall be deemed to be incorporated into and be part of this bond.

Signed and sealed this_____ day of_____.

_____(SEAL)
Contractor/ Principal
By:_____

Witness:_____ Title:_____

_____(SEAL)
Surety
By:_____
Attorney-in-Fact

Typed Name:_____

My Power of Attorney is recorded in the Clerks Office of the Circuit Court of_____ Virginia in Deed Book_____, Page_____, and has not been revoked.

_____
Attorney-in-Fact

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA

(or, alternatively, Commonwealth or State of_____)

CITY / COUNTY OF_____

I, the undersigned notary public, do certify that_____personally appeared before me in the jurisdiction aforesaid and made oath that he is the attorney-in-fact of _____, the Surety, that he is duly authorized to execute on its behalf the foregoing bond pursuant to the Power of Attorney noted above, and on behalf of said Surety, acknowledged the aforesaid bond(s) as its act and deed.

Given under my hand this_____day of _____.

_____(SEAL)

Notary Public

_____

My Commission expires:_____

APPROVED:

_____
City Attorney/Designee Date

ESCROW AGREEMENT

THIS AGREEMENT ("Agreement"), made and entered into this ____ day of _____, 2015 by,

between and among the Greater Lynchburg Transit Company (“Owner”)_____ ("Contractor"), and

_____

(Name of Bank)

_____

(Address of Bank)

a trust company, bank, or savings and loan institution with its principal office located in the Commonwealth of Virginia (hereinafter referred to as "Bank" or "Escrow Agent"), and _____

_____ ("Surety") provides:

I.

The Owner and the Contractor have entered into the Construction Agreement (“Contract”) with respect to City Project No. and Name:GLTC Operations & Maintenance Facility("the Contract"). This Agreement is pursuant to, but in no way amends or modifies, the Contract. Payments made hereunder or the release of funds from escrow shall not be deemed approval or acceptance by the Owner of performance by the Contractor or Surety.

II.

In order to assure full and satisfactory performance by the Contractor of its obligations under the Contract, the Owner may, pursuant to the Contract Documents, retain certain amounts otherwise due the Contractor. The Contractor has, with the approval of the Owner, elected to have these retained amounts held in escrow by the Bank. This Agreement sets forth the terms of the escrow. The Bank shall not be deemed a party to, bound by, or required to inquire into the terms of, the Contract or any other instrument or agreement between the Owner and the Contractor.

III.

The Owner may from time to time pursuant to this Agreement pay to the Bank amounts retained by the Owner under the Contract. Except as to amounts actually withdrawn from escrow by the Owner, the Contractor shall look solely to the Bank for payment of funds retained under the Contract and paid by the Owner to the Bank.

The risk of loss by diminution of the principal of any funds invested under the terms of this Agreement shall be solely upon the Contractor.

Funds and securities held by the Bank pursuant to this Agreement shall not be subject to levy, garnishment, attachment, lien, or other process whatsoever. Contractor agrees not to assign, pledge, discount, sell or otherwise transfer or dispose of his interest in the escrow account or any part thereof, except to the Surety.

IV.

Upon receipt of checks or warrants drawn by the Owner General Manager and made payable to it as escrow agent, the Bank shall promptly notify the Contractor, negotiate the same and deposit or invest and reinvest the proceeds in "Approved Securities" within the meaning of this Agreement in accordance with the written instruction of the Contractor. In no event shall the Bank invest the escrowed funds in any security that is not an "Approved Security."

V.

The following securities, and none other, are Approved Securities for all purposes of this Agreement:

(1) United States Treasury Bonds, United States Treasury Notes, United States Treasury Certificates of Indebtedness or United States Treasury Bills,

(2) Bonds, notes and other evidences of indebtedness unconditionally guaranteed as to the payment of principal and interest by the United States,

(3) Bonds or notes of the City,

(4) Bonds of any political subdivision of the City, if such bonds carried, at the time of purchase by the Bank or deposit by the Contractor, a Standard and Poor's or Moody's Investors Service rating of at least "A", and

(5) Certificates of deposit issued by commercial Banks located within the Commonwealth, including, but not limited to, those insured by the Bank and its affiliates,

(6) Any bonds, notes, or other evidences of indebtedness listed in Section (1) through (3) may be purchased pursuant to a repurchase agreement with a Bank, within or without the City, having a combined capital, surplus and undivided profit of not less than $25,000,000 provided the obligation of the Bank to repurchase is within the time limitations established for investments as set forth herein. The repurchase agreement shall be considered a purchase of such securities even if title, and/or possession of such securities is not transferred to the Escrow Agent, so long as the repurchase obligation of the Bank is collaterized by the securities themselves, and the securities have on the date of the repurchase agreement a fair market value equal to at least 100 percent of the amount of the repurchase obligation of the Bank, and the securities are held by a third party, and segregated from other securities owned by the Bank.

No security is an Approved Security hereunder if it matures more than five years after the date of its purchase by the Bank or deposit by the Contractor.

VI.

The Contractor may from time to time withdraw the whole or any portion of the escrowed funds by depositing with the Bank Approved Securities in an amount equal to, or in excess of, the amount so withdrawn. Any securities so deposited or withdrawn shall be valued at such time of deposit or withdrawal at the lower of par or market value, the latter as determined by the Bank. Any securities so deposited shall thereupon become a part of the escrowed fund.

Upon receipt of a direction signed by the Owner’s General Manager, the Owner shall authorize the Bank to pay the principal of the fund, or any specified amount thereof, to the account of the Greater Lynchburg Tranist Company. Such payment shall be made in cash as soon as is practicable after receipt of the direction.

Upon receipt of a direction signed by the Owner's General Manager, the Owner shall authorize the Bank to pay and deliver the principal of the fund, or any specified amount thereof, to the Contractor, in cash or in kind, as may be specified by the Contractor. Such payment and delivery shall be made as soon as is practicable after receipt of the direction.

VII.

For its services, hereunder the Bank shall be entitled to a reasonable fee in accordance with its published schedule of fees or as may be agreed upon by the Bank and the Contractor. Such fee and any other costs of administration of this Agreement shall be paid from the income earned upon the escrowed fund, and, if such income is not sufficient to pay the same, by the Contractor.

VIII.

The net income earned and received upon the principal of the escrowed fund shall first be paid or applied to pay the Bank's fee and any other costs of administration and such income shall be deemed a part of the principal of the fund. After all of the Bank's fees and other costs of administration have been paid from such income, the net income earned thereafter may then be paid over to Contractor in installments.

IX.

The Surety undertakes no obligation hereby but joins in this Agreement for the sole purpose of acknowledging that its obligations as surety for the Contractor's performance of the Contract are not affected hereby.

WITNESS the following signatures, all as of the day and year first above written.

GREATER LYNCHBURG TRANSIT COMPANY CONTRACTOR:

BY: _____ BY: _____

General Manager Officer, Partner, or Owner (Seal)

SURETY:

By: _____

Its: President (Seal)

ATTEST:

_____

Secretary

By: _____

Attorney-in-Fact

AFFIDAVIT AND ACKNOWLEDGEMENT OF ATTORNEY-IN-FACT

COMMONWEALTH OF VIRGINIA
(or, alternatively, Commonwealth or State of _____)
CITY / COUNTY OF _____

I, the undersigned notary public, do certify that _____personally appeared before me in the jurisdiction aforesaid and made oath that he is the attorney-in-fact of _____, the Surety, that he is duly authorized to execute on its behalf the foregoing bond pursuant to the Power of Attorney noted above, and on behalf of said Surety, acknowledged the aforesaid bond(s) as its act and deed.
Given under my hand this_____day of _____.

_____(SEAL)
Notary Public

My Commission expires: _____

APPROVED:

_____
City Attorney/Designee Date

INSTRUCTIONS TO BIDDERS

DESCRIPTION OF WORK
The Work included under this Contract shall consist of all labor, materials, equipment, and the performance of all work necessary to complete the project known as "GLTC Operations & Maintenance Facility," as described in the Contract Documents.

This Work shall be performed in accordance with the Contract Documents.

1. General: Subject to Owner's right to waive informalities, to be valid for consideration, bids must be completed and submitted in accordance with these instructions to bidders. All individual bid unit price items must be filled in, regardless of the quantity shown.

2. Plans and Specifications: The Contract Documents for the GLTC Operations & Maintennce Facility, may be downloaded from the City's website: http://www.lynchburgva.gov/current-solicitations. The Manual of Specifications and Standard Details, for the City of Lynchburg may be downloaded from the City's website: http://www.lynchburgva.gov/manual-specifications.

   The successful bidder shall be issued, without charge, five sets of sets of plans and specifications.

   Bidding documents will be provided as indicated in the Advertisement for Bids.

3. Qualification of Bidders: Each bidder must be prepared to submit within five calendar days of the Owner's request written evidence of his qualifications for the project, including, without limitation, financial data, previous experience, resources, personnel and evidence of authority to conduct business in the jurisdiction where the project is located.

4. Examination of Bid Documents and Site:

   4.1 Before submitting bids, each bidder must examine bid documents, including, without limitation, all the Contract Documents, thoroughly; familiarize himself with Federal, state and local laws, ordinances, rules, codes, and regulations affecting the Work; and correlate his observations with requirements of the bid documents.

   4.2 Bidders are requested and expected to visit the site of the project to alert themselves to local and special conditions which may be encountered during construction of the project such as: labor and transportation, handling and storage of materials, the availability of materials, and site access. Failure to make such investigations shall not relieve the successful bidder from performing and completing the Work in accordance with the Contract Documents.

      a. An optional pre-bid conference will be held at the time and place stated in the Advertisement for Bids.

5. Clarification:

   5.1 No oral clarification of the bid documents will be made to any bidder. To be given consideration, requests for clarification must be received in time to allow preparation of a written response at least ten (10) days prior to date fixed for opening of bids. Clarifications will be issued in the form of written addenda to the bid documents and posted to the Procurement Website within five (5) days of the bid opening. Only clarifications by formal written addenda will be binding.

   (1) All communications in regard to clarifications and any other matters related to this project shall be addressed to: Stephanie Suter, Procurement Division, 900 Church Street, Lynchburg, VA 24504, Fax: 434-845-0711, email: stephanie.suter@lynchburgva.gov.

6. Substitutions:

6.1 Substitutions of material or equipment or both may be offered by the Contractor with his bid and only during bidding provided that:

a. No major changes in the construction or design intent of the project would be required. Changes required to accommodate substituted items shall be made by the Contractor at no additional cost or time delay.

b. Features of quality, capacity, construction, performance, appearance, size, arrangement, and general utility, including economy of operation of substitutes offered, either parallel or exceed those of specified products.

c. The provisions of the General Conditions are met and any other guarantees required by the specification sections, shall apply in full force and effect to the performance of such substitute products~~,~~ approved for incorporation into the Work.

6.2 Technical data covering the proposed substitution shall be furnished not later than 10 days prior to bid submission.

7. Bid Submission:

7.1 Submit bids using forms furnished in the Project Manual and fill in all blank spaces on the form. Repeat notation "Contractor's Current Virginia License No._____" on outside of inner envelope containing bid and bid security, and place this envelope within another envelope addressed to:

City of Lynchburg
Procurement Division
900 Church Street
Third Floor, City Hall
Lynchburg, VA 24504

Bidders shall include the following with their bid submission:

- Bid Form
- Alternates Form
- Unit Prices Form
- Statement of Experience
- Statement of Available Resources
- Equal Opportunity Report Statement
- Corporate Status Form
- Questions to Offeror Form
- Bid Bond or Cashiers Check Equivalent
- Certification and Restriction on Lobbying
- Government-wide Debarment and Suspension (Nonprocurement)
- Buy America Certification

7.2 Both the inner and outer envelopes shall have noted thereon:

a. "Sealed Bid Enclosed for GLTC Operations & Maintenance Facility";

b. The bidder's name and address;

c. Repeat notation "Current Registered Virginia Contractor No. ____" on the outside envelope.

7.3 Each bid must be accompanied by a cashier's check payable to the Owner drawn on a bank satisfactory to the Owner, or a Bid Bond, in the amount of five percent (5%) of the amount of the total base bid, with the Owner as obligee, as assurance that the successful bidder will enter into the Contract within ten (10) days after Notice of Award.

If the successful bidder defaults by failure to enter into the Contract and to provide required performance and payment bonds, the certified check or Bid Bond accompanying the successful bid shall be collected by the Owner, not as a penalty but as liquidated damages for delays and such additional expenses as may be incurred by the Owner for reasons of such default.

7.4 Contractors will indicate a lump sum bid on the bid form. The lump sum bid shall contain all necessary costs required for completion of the Work. Any changes, erasures, modifications, or deletions in the bid form, or alternate bids not specified in the bid may make the bid irregular and subject to rejection.

7.5 Receipt deadline for bids will be as stated in the Advertisement for Bids. All bids will be received in the Procurement Division Office, Third Floor, City Hall. It is the responsibility of the bidder to ensure bids are received and time stamped by the deadline for bids. Late bids will not be accepted.

7.6 Any bidder may withdraw or modify its bid, by a writing containing the original signature of the bidder, which writing must be received by the Owner prior to the date and time set for submission of bids. Withdrawal or modification must be in writing and be delivered by one of the following means: (i) hand delivery by the bidder itself, a courier, or other delivery service; (ii) by mail (no consideration shall be given to any postmark); or (iii)by marking(s) on the exterior of the bid submission envelope, but only if the marking is dated and includes the original signature of the bidder.

Written modifications of bids should not reveal the bid price contained in the previously submitted sealed bid, but should simply provide the desired addition, subtraction or modification, so that the final price or terms of the bid will not be known to the Owner until the sealed bids are opened. Modifications shall be on the interior envelope and sealed prior to submittal.

7.7 Bids will be opened publicly in accordance with the Advertisement for Bids.

7.8 Withdrawal of bid after bid opening: To withdraw a bid after bid opening, a bidder must satisfy the substantive requirements of Va. Code §2.2-4330. In addition, the following procedures shall apply:

a. The bidder shall give notice in writing of his claim of right to withdraw his bid within two business days after the conclusion of the bid opening procedure and shall submit original work papers with such notice.

b. The mistake may be proved only from the original work papers, documents and materials used in preparation of the bid and delivered as required herein.

8. Bonds and Damages:

8.1 Bonds shall be with a surety company acceptable to the Owner~~,~~ that is legally authorized to do business in Virginia and in a form acceptable to Owner.

8.2 A performance bond and a labor and material payment bond will be required in the amount of 100 percent of the bid.

8.3 Liquidated damages shall be as indicated in the Contract Documents.

9. Award of Contract:

9.1 The award of the Contract will be to the responsible bidder submitting the lowest responsive base bid.

Selection of the successful bidder will include a serious evaluation of whether the bidder has conscientiously attempted to meet Minority and Disadvantaged Business Enterprise goals. A requirement of the Contract bidder will be that a genuine concerted effort will be utilized to meet the Contract goal of 4%.

9.2 Before the Contract is awarded, the bidder submitting the lowest responsive bid must satisfy the Owner that it has the requisite organization, capital, equipment, ability, resources, personnel, management, business integrity, and at least five years experience in the type municipal work for which it has submitted a bid. Each bidder shall, with his bid, submit a list of at least five projects of similar size and dollar value completed within the last five years, giving location, dollar value, year completed, and the name(s) of the owner(s) and architect/engineers(s). The bidder shall verify to the Owner that it has the sufficient and qualified personnel to provide for the Contact Work. Failure by the lowest responsive bidder to sufficiently satisfy the Owner of its ability to meet any of the above requirements may serve as grounds for rejection of the bid.

9.3 The Owner reserves the right to cancel the Advertisement for Bids, reject any and all bids, waive any and all informalities, and disregard all conforming, nonconforming, conditional bids or counter bids.

9.4 Unless canceled or rejected, a responsive bid from the lowest responsible bidder shall be accepted as submitted, except that if the responsive bid from the lowest responsible bidder exceeds available funds, pursuant to Section 18.1-9 of the Lynchburg Public Procurement Code, the Owner may negotiate with the apparent low bidder to obtain a contract price within available funds.

a. Procedures for Negotiations: If the Owner wishes to negotiate with the apparent low bidder to obtain a contract price within available funds, negotiations shall be conducted in accordance with the following procedures:

1. If the using agency wishes to conduct negotiations pursuant to this section, it shall provide the procurement administrator with a written determination that the bid from lowest responsive, responsible bidder exceeds available funds. This determination shall be confirmed in writing by the director of finance or his designee. The using agency shall also provide the procurement administrator with suggested measures to bring the proposed purchase within budget through negotiations with the lowest responsive, responsible bidder, including reductions in scope, changes in quality, value engineering, changes in terms and conditions, or changes in schedule.

2. The procurement administrator shall advise the lowest responsive, responsible bidder, in writing, that the proposed purchase exceeds available funds. He shall further invite proposed measures, such as a reduction in scope, change in quality, value engineering, changes in terms or conditions, or changes in schedule for the proposed purchase, and invite the lowest responsive, responsible bidder to amend its bid based upon the proposed measures to bring the purchase within available funds.

3. Following any successful negotiations, the lowest responsive, responsible bidder shall submit a proposed addendum to its bid, which addendum shall include the specific changes in the proposed purchase, the reduction in price, and the new contract value. The addendum shall be reviewed by the purchasing agency, Owner, and City Attorney for acceptability.

4. If an addendum is acceptable to the Owner, the Owner may award a contract within funds available to the lowest responsive, responsible bidder based upon the amended bid.

5. If the Owner and the lowest responsive, responsible bidder cannot negotiate a contract within available funds, all bids shall be rejected.

9.5 Protests of Award or Decisions to Award of Contract

a. The following are the exclusive procedures for a bidder or offeror to protest the Owner's award or decision to award a contract.

1. Any protest to award a contract shall be in writing and shall be delivered so that it is received by the Owner not later than ten (10) business days after announcement of the award or decision to award, whichever comes first. Otherwise any such protest shall be deemed to be waived.

2. Except for a protest of an emergency or sole source procurement, a protest of an Owner award or decision to award a contract may only be made by a person who submitted a bid for the procurement at issue and who was reasonably likely to have its bid accepted but for the Owner's decision. In the case of an emergency or sole source procurement, a protest may only be made by a person who can show that he was reasonably likely to have submitted a successful bid +if the procurement had been other than emergency or sole source.

3. Protests shall only be granted if (1) the protester has complied fully with Sec. 18.1-6 of the Lynchburg Public Procurement Code and there has been a violation of law, the Lynchburg Public Procurement Code, or mandatory terms of the solicitation that clearly prejudiced the protestor in a material way, or (2) a statute requires voiding of the decision.

4. The Owner shall issue a written decision on a protest within ten (10) days of its receipt by the Owner.

5. If the protest is denied, the protestor may only appeal the denial or otherwise contest or challenge the procurement by then filing suit in the Lynchburg Circuit Court, Lynchburg, Virginia, and serving the Owner with such suit within ten (10) days of such denial. Otherwise, the Owner's decision shall be final and conclusive, and the protester's right to appeal the denial or to otherwise contest or challenge the procurement shall be deemed to be waived.

6. Strictly following these procedures shall be a mandatory prerequisite for protest of the Owner's award or decision to award a contract. Failure by a bidder to follow these procedures strictly shall preclude that bidder's protest and be deemed to constitute a waiver of any protest.

b. A protest may not be based upon the alleged non-responsibility of a person to whom the OwnOner awards or makes a decision to award a contract.

10. Bidders are referred to the General Conditions for the meanings of capitalized terms.

End of Instructions to Bidders

GENERAL CONDITIONS

ARTICLE 1	CONTRACT DOCUMENTS AND DEFINITIONS
ARTICLE 2	ARCHITECT/ENGINEER
ARTICLE 3	OWNER
ARTICLE 4	CONTRACTOR
ARTICLE 5	SUBCONTRACTORS
ARTICLE 6	WORK BY OWNER OR BY SEPARATE CONTRACTORS
ARTICLE 7	MISCELLANEOUS PROVISIONS
ARTICLE 8	CONTRACT TIME
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ARTICLE 10	PROTECTION OF PERSONS AND PROPERTY
ARTICLE 11	INSURANCE FOR CONTRACTS
ARTICLE 12	CHANGES AND MODIFICATIONS IN THE WORK
ARTICLE 13	CLAIMS AND DISPUTE PROCEDURE
ARTICLE 14	UNCOVERING AND CORRECTION OF WORK
ARTICLE 15	TERMINATION OF THE CONTRACT

GENERAL CONDITIONS

ARTICLE 1 CONTRACT DOCUMENTS AND DEFINITIONS

1.1 DEFINITIONS

1.1.1 CONTRACT AND CONTRACT DOCUMENTS:
The Contract Documents include: (1) the Construction Agreement (the "Contract"), its General Conditions, its Special Conditions (if any) and its attachments (if any); (2) the Owner's Invitation for Bid dated February 3, 2015, and any addenda; (3) the Contractor's bid dated March 3, 2015; (4) the Contract plans, drawings, and specifications and any addenda; and (5) any Modifications and any Field Orders. Any soils, geotechnical or other reports, surveys and analyses which may be made available to the Contractor for review or information under this Contract~~,~~ are not adopted by reference into, nor are they part of the Contract Documents.

1.1.2 MODIFICATION:
A Modification is (1) a written amendment to the Contract signed by both parties (Project Manager for Greater Lynchburg Tranist Comapny and authorized agent for the Contractor), (2) a written Change Order signed by the Project Manager and an authorized agent for the Contractor, or (3) a written Construction Change Directive signed by the Project Manger. Modifications may be made to the Contract and Contract Documents without notice to any surety for the performance or payment bonds for the Work. Any Modification that increases the Contract Sum by more than $50,000 or that causes total expenditures for the Contract to exceed the amount budgeted for the Contract may only be made with the specific approval of the Project Manager.

1.1.3 WORK:
"Work" means the construction and services required by the Contract Documents and includes all services, plant, labor, materials, supplies, equipment and other things necessary for Contractor to carry out and complete the requirements of the Contract Documents. "Work" includes material suitably stored and protected. "Work" also includes any portion of the Work, whether completed or not.

1.1.4 PROJECT:
The Project is the total construction of which the Work performed by Contractor under the Contract Documents may be the whole or a part.

1.1.5 FURNISH, INSTALL & PROVIDE:
The terms "Furnish" or "Install" or "Provide", unless specifically limited in context, mean furnishing and incorporating a specified item, product or material into the Work, including all necessary labor, materials, equipment to make the item and the Work ready for use.

1.1.6 EXTRA WORK:
The term "Extra Work" as used herein, refers to and includes work required by the Owner, which, in the judgment of the Owner involves changes in or additions to the Work required by the Contract Documents in their then-existing form.

1.1.7 NOTICE OF AWARD:
"Notice of Award" is the written notice of the Owner's acceptance of the Contractor's bid given by the Owner to Contractor as the successful bidder.

1.1.8 NOTICE:
"Notice" means written notice made in the manner specified in this paragraph.

1.1.8.1 "Notice" shall be deemed to have been given to the Owner if sent to the following persons by the means indicated in 1.1.8.3 and either such Notice actually was received by such persons or adequate proof of receipt is made:

GLTC	Procurement Division	City Attorney
	3rd Floor, City Hall	3rd Floor, City Hall
1301 Kemper Street	900 Church Street	900 Church Street
Lynchburg, Virginia 24504	Lynchburg, Virginia 24504	Lynchburg, Virginia 24504

1.1.8.2 "Notice" shall be deemed to have been given to the Contractor if sent to the following person by the means indicated in 1.1.8.3 and either such Notice was received by such person or the Contractor or adequate proof of receipt by such person or the Contractor is made:

(Insert Successful bidder authorized representatives name and address)

_____

1.1.8.3 "Notice" shall be sent by special courier, recognized overnight delivery service, or United States mail. With the exception of original bid documents, facsimile copies and e-mail shall be acceptable if the original is then sent by special courier, recognized overnight delivery service, or United States mail within three business days.

1.1.9 CHANGE DIRECTIVES:
If the parties cannot agree to a written amendment to the Contract or to a Change Order, Owner may, by issuance of a written "Construction Change Directive," direct Contractor to perform Work that Owner acknowledges, or that Contractor contends, to be a change to the Work required by the Contract Documents. A change order signed by the Owner that Contractor fails or refuses to sign shall be considered a "Construction Change Directive."

1.1.10 MISCELLANEOUS WORDS OR TERMS:
1.1.10.1 Whenever they refer to the Work or its performance, "directed", "required", "permitted", "ordered", "designated", "prescribed", and words of like import shall imply the direction, requirements, permission, order, designation or prescription of the Owner, and "approved", "acceptable", "satisfactory", "in the judgment of" and words of like import shall mean approved by or acceptable to or satisfactory to or in the judgment of the Owner.

1.1.10.2 The Contract Documents generally refer to the Owner, Contractor, Architect/Engineers, entities, and persons as if masculine in gender and singular in number. Such references are intended to include the feminine or neutral in gender and/or the plural in number when appropriate.

1.2 EXECUTION, CORRELATION AND INTENT OF CONTRACT DOCUMENTS

1.2.1 Two originals of the Contract shall be executed.

1.2.2 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work, including without limitation, all items reasonably inferable from the Contract Documents. The Contract Documents are complementary, and what is required by any one shall be as binding as if required by all. Words and abbreviations which have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings.

1.2.3 Anything shown on the drawings and not mentioned in the specifications or mentioned in the specifications and not shown on the drawings shall have the same effect as if shown or mentioned respectively in both. Technical specifications take priority over general specifications, and detail drawings take precedence over general drawings. Contractor shall promptly notify the A/E and Owner of any conflict or inconsistency in the Contract Documents, upon its discovery, and promptly submit an

explanation in writing of the conflict or inconsistency to the A/E, with a copy to the Owner. The A/E's decision thereon shall be final. In case of conflict or inconsistency between the drawings and the specifications, the specifications shall govern.

1.2.4 Should any labor, material, or equipment be required which is not denoted in the drawings and specifications, but which is, nevertheless, reasonably necessary for the proper carrying out of the intent of the Work, it is agreed that the labor, material, or equipment is implied, and the Contractor shall provide such labor and furnish such materials and equipment as fully as if they were completely delineated and prescribed, without additional cost to the Owner.

1.2.5 The Contractor may be furnished additional instructions and detail drawings to carry out the Work included in the Contract Documents. The additional drawings and instructions thus supplied to the Contractor will coordinate with the Contract Documents and will be so prepared that they can be reasonably interpreted as a part thereof. The Contractor shall carry out the Work in accordance with the additional detail drawings and instructions.

1.2.6 The drawings and specifications are divided into sections for convenience and clarity only. The Contractor shall not construe this division as a division of the Work into various subcontractor units. The Contractor may subcontract the Work in such divisions as he sees fit, but he is ultimately responsible for furnishing all Work required by the Contract Documents.

1.2.7 The provisions of this Contract cannot be amended, modified, varied or waived in any respect that causes a change to the Contract Sum or Contract Time except by a Modification. **The Contractor is hereby given notice that no person has authority to orally waive~~,~~ or to release the Contractor from any of the Contractor's duties or obligations under or arising out of the Contract Documents.** Any waiver, approval or consent granted by Modification or Field Order to the Contractor shall be limited to those matters specifically and expressly stated thereby to be waived, approved or consented to and shall not relieve the Contractor of the obligation to obtain any future waiver, approval or consent.

1.3 OWNERSHIP AND USE OF DOCUMENTS

1.3.1 All plans, drawings, specifications, and documents relating to the Work are the property of the Owner and are to be used only for the Project.

ARTICLE 2 ARCHITECT/ENGINEER

2.1 DEFINITIONS

2.1.1 The term Architect/Engineer, hereinafter "A/E" or "Architect" or "Engineer", shall mean the consulting firm representing the Owneror their duly authorized representatives, lawfully licensed to practice in Virginia, that is responsible for the A/E Services specified herein.

2.1.2 Although the A/E is referred to throughout the Contract Documents as if singular in number and masculine in gender, A/E includes plural in number and feminine or neuter in gender, as appropriate.

2.2. ARCHITECT/ENGINEER SERVICES

2.2.1 The A/E will provide services as described in these General Conditions.

2.2.2 The A/E will advise and consult with the Owner. The Owner's instructions to the Contractor may be forwarded through the A/E. The A/E has authority to act on behalf of the Owner only to the extent provided in the Contract Documents, and the A/E does not have authority to approve a change to the Contract Sum or the Contract Time without written consent of the Owner.

2.2.3 The A/E may visit the site at intervals appropriate to the stage of construction to familiarize himself generally with the progress and quality of the Work and to determine in general if the Work is proceeding in accordance with the Contract Documents. Any visits or inspections by the A/E, any Owner's representative, or any consultant retained by the Owner are solely for the Owner's benefit and shall not confer any rights on Contractor or excuse Contractor from any obligation under the Contract Documents.

2.2.4 The A/E will immediately inform the Owner and Contractor whenever, in the reasonable opinion of the A/E, any of the Work is proceeding contrary to the requirements of the Contract Documents and will be unacceptable. Such notification by the A/E is solely for the benefit of the Owner and will not be a cause for the Contractor to claim either delay of the Work or any increase in the Contract Sum or Contract Time.

2.2.5 The A/E, the Owner and other governmental representatives shall at all times have access to the Project site and the Work regardless of its stage of progress. The Contractor shall provide facilities for such access so that the A/E, the Owner and other governmental representatives may perform their functions under the Contract Documents.

2.2.6 Where applicable, based on the A/E's observations and an evaluation of the Contractor's Applications for Payment, the A/E will recommend the amounts owing to the Contractor and will issue Certificates for Payment in such amounts, as provided in Article 9, Payments and Completion.

2.2.7 The A/E will be an interpreter of the requirements of the Contract Documents. The A/E will render interpretations necessary for the proper execution and progress of the Work, with reasonable promptness and in accordance with any time limit agreed upon. Either party to the Contract may make written request to the A/E for such interpretations. All interpretations of the A/E shall be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing and/or in the form of drawings.

2.2.8 The A/E will recommend to the Owner the rejection of Work that does not conform to the Contract Documents. Whenever, in his opinion, he considers it necessary or advisable for the implementation of the intent of the Contract Documents, he will have authority to require special inspection or testing of the Work in accordance with Subparagraph 7.6.2 whether or not such Work be then fabricated, installed or completed.

2.2.9 The A/E will review and approve or take other appropriate action upon Contractor's submittals such as Shop Drawings, Product Data, Samples and Manuals, but only for conformance with the design concept of the Work and with the information given in the plans, drawings, and specifications. Contractor shall ensure that all submittals are complete and have had included with them all correlated items that the A/E requires for his review. In the A/E’s and Owner’s sole discretion, the A/E may decline to review partial submittals or submittals for which correlated items have not been included. Contractor shall clearly note, both in a cover letter with any submittal and on the submittal itself, any deviation or inconsistency of anything submitted with the requirements of the Contract Documents. The A/E's approval of a specific item shall not indicate approval of an assembly of which the item is a component. The A/E's review and approval is for the sole benefit of the Owner and is not for the benefit of the Contractor. The A/E's review and approval shall in no way excuse Contractor from fully complying with the Contract Documents.

2.2.10 The A/E's acceptance of materials or products on behalf of the Owner shall not bar future rejection of such items (a) if they are subsequently found to be defective or inferior in quality or uniformity to the materials or products specified by the Contract Documents, (b) if such materials or products are not as represented by the Contractor, or (c) if such materials or products do not conform to the requirements of the Contract Documents.

2.2.11 As required, the A/E will conduct inspections to assist the Owner in determining the dates of Substantial Completion and Final Completion, will receive and forward to the Owner for the Owner's review written warranties and related documents required by the Contract Documents and assembled and submitted by the Contractor, and will recommend a final Certificate for Payment upon Contractor's full compliance with the requirements of Article 9, Payment and Completion.

2.2.12 All claims, disputes, or other matters or questions between the Contractor and Owner arising out of or relating to the A/E's interpretation of the Contract Documents or arising out of any other decisions, communications, or actions of the A/E relating to the performance of the Work shall be resolved as set forth in Article 12, Changes and Modifications in the Work, and Article 13, Claims.

2.2.13 In case of the termination of the employment of the A/E, the Owner shall appoint a new A/E, who shall have the same status under the Contract Documents as the former A/E.

ARTICLE 3 OWNER

3.1 DEFINITION

3.1.1 The Owner is the Greater Lynchburg Transit Company ("GLTC"). The term Owner means the Owner or its authorized representative. The General Manager, or his designee, is the authorized Owner's representative for this Contract. Notwithstanding the foregoing, the authority of the Owner's representative is subject to the limitations in the Lynchburg Public Procurement Code

3.1.2 The General Manager, will designate a single Owner's representative, with the title of Project Manager (PM), who will have the power to act, within the scope of his delegated authority, for and on behalf of the Owner, in accordance with the terms of the Contract Documents.

3.2 INFORMATION POSSESSED BY OWNER

3.2.1 The Owner, as a courtesy, may make available for the Contractor's reasonable review, at the Owner's offices or together with the Contract Documents, certain boring logs, geotechnical, soils and other reports, surveys and analyses pertaining to the Project site. Any such information provided to the Contractor is intended to be for the Contractor's convenience only, and its accuracy and completeness are not guaranteed or warranted by the Owner or the A/E, it being the Contractor's sole responsibility to verify the accuracy and completeness of such information. Such information is not incorporated by reference into or made a part of the Contract Documents.

3.2.1.1 Notwithstanding any information provided by Owner or anyone acting on the behalf of Owner, the Contractor assumes full responsibility for inspection of the site and for the means and methods of construction that he employs when performing the Work. The Owner shall not be liable for any additional work or costs arising as a result of any conclusions reached or assumptions derived by the Contractor from or based upon any such information that the Owner makes available for the Contractor's convenience.

3.3 OWNER-PAID PERMITS AND FEES

3.3.1 The Owner will, where applicable, pay for:

.1 Sewer availability fees;

.2 Water availability/meter connection fee;

.3 Electrical, natural gas, telephone, and cable TV permanent installation charges;

.4 Any easements required;

.5 Railroad flagging services; and

.6 Permits for work in Virginia Department of Transportation (VDOT) right-of-way. The Contractor is required to comply with the general requirement for work in the VDOT right-of-way as outlined in the The Manual of Specifications and Standard Details, latest edition, for the City of Lynchburg, and the VDOT Manual for this work. Upon completion of all work in the VDOT right-of-way, the VDOT Personnel will conduct an inspection and issue a punch list. The Contractor shall be responsible for completion of those items on the punch list and for obtaining the written release of the permit.

3.3.2. The Contractor's attention is directed to Article 4.7, Contractor-Paid Taxes, Permits, Fees, and Notices, describing other permits to be obtained and fees to be paid by the Contractor.

3.4 OWNER'S RIGHT TO STOP WORK

3.4.1 If the Contractor fails to correct defective Work as required herein or persistently fails to carry out the Work in accordance with the Contract Documents, the Owner, by a written order, may order the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the Owner to stop the Work shall not give rise to any duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity.

3.5 OWNER'S RIGHT TO CARRY OUT THE WORK

3.5.1 If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within seven (7) days after receipt of Notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to any other remedy he may have, rectify such deficiencies, including without limitation, by performing the Work or having the Work performed by other contractors, as outlined in Section 6.1, Owner’s Right to Perform Work and to Award Separate Contracts. In such case, an appropriate Change Order or Change Directive shall be issued by Owner deducting from the payments then or thereafter due the Contractor the cost of correcting such deficiencies, including compensation for the A/E's additional services made necessary by such default, neglect or failure. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor shall pay the difference to the Owner.

3.5.2 Neither the Owner nor the A/E nor their officers, agents, assigns or employees are in any way liable or accountable to the Contractor or his surety for the method by which Work performed by the Owner or performed by other contractors pursuant to this Article 3.5, or any portion thereof, is accomplished or for the price paid therefore. Notwithstanding the Owner's exercise of its rights under this Article 3.5, the Contractor and its surety shall have sole responsibility to maintain and protect the Work, including without limitation, that portion of the Work performed by or on behalf of Owner pursuant to this Article 3.5.

3.6 SUSPENSION OF WORK

3.6.1 The Owner shall have the authority to suspend the Work, in whole or in part, for such periods and such reasons as the Owner may deem necessary or, in its sole discretion, including without limitation:

.1 Unsuitable weather;

.2 Other conditions considered unfavorable for the suitable prosecution of the Work; and/or

.3. Other conditions considered adverse to the best interests of the Owner.

3.6.2 Any such suspension shall be made by Owner by written order to the Contractor. The Contractor shall obey immediately such order of the Owner and shall not resume the Work until so ordered in writing by the Owner. The Contractor shall be entitled to an extension of the Contract Time, subject to the provisions of Article 8, Contract Time, herein.

f. No such suspension of the Work shall be the basis of a claim by the Contractor for any increase in the Contract Sum or for any other damages, losses, costs or expenses if the suspension is for a reasonable time under the circumstances then existing and the cause thereof is beyond the control and is without the fault or negligence of the Owner or those acting on Owner's behalf.

3.6.4 In the event of suspension of Work, the Contractor will, and will cause his Subcontractors and others providing any of the Work through Contractor to, protect carefully his and their materials and Work against damage or injury from the weather and maintain completed and uncompleted portions of the Work as required by the Contract Documents. If, in the opinion of the Owner, any Work is damaged or injured by reason of failure on the part of the Contractor or any of his subcontractors to so protect same, such Work shall be removed and replaced at the expense of the Contractor.

3.7 USE AND OCCUPANCY PRIOR TO FINAL ACCEPTANCE BY OWNER

3.7.1 The Owner has the right to take possession of and use any completed or partially completed portions of the Work, notwithstanding that the time for completing the entire Work or any portions thereof may, or may not, have expired. The taking of possession and use by the Owner shall be in accordance with the provisions in Article 9.8, Substantial Completion and Guarantee Bond. If such prior use delays the Work, the Contractor may submit a request for a time extension in accordance with the requirements of Article 8, Contract Time.

3.8 RIGHT TO AUDIT AND PRESERVATION OF RECORDS

3.8.1 The Contractor shall maintain books, records and accounts that completely and accurately account for all of his costs and receipts relating to the Project in accordance with generally accepted accounting principles and practices. The Owner or its authorized representatives shall have the right to review, inspect, audit and/or copy the books, records, accounts and related documents, including without limitation, supporting documents, of the Contractor under any of the following conditions:

.1 If the Contract is terminated for any reason in accordance with the provisions of these Contract Documents, in order to arrive at equitable termination costs;

.2 If the Contractor and the Owner dispute the amount due the Contractor under the terms of this Contract;

.3 To check or substantiate any amounts invoiced or paid that are required to reflect the costs of the Contractor, or the Contractor's efficiency or effectiveness under this Contract or in connection with any extras, changes, claims, additions, backcharges, or other, as may be provided for in this Contract; and/or

.4 If it becomes necessary to determine the Owner's rights and the Contractor's obligations under the Contract or to ascertain facts relative to any Claim.

3.8.2 These provisions for review, inspection, audit and copying shall give the Owner unlimited access during normal working hours to the Contractor's books, records, accounts and supporting documents under the conditions stated above.

3.8.3 The Contractor shall make all his books, records, accounts, and all other documents relating to his costs and receipts under this Contract, including without limitation any supporting documents, available to the Owner and its representatives for review, audit, inspection and copying at any time during the period from entry into this Contract through three years after Final Payment or termination of this Contract, whichever occurs later.

3.8.4 Any payments made under this Contract shall not constitute a waiver of the Owner's rights to review, inspect, copy and audit. Payments shall not constitute a waiver or agreement by the Owner that it accepts as correct the billings, invoices or other charges upon which the payments are based. If the Owner's review and audit produces a claim against the Contractor, the Owner may pursue all its legal remedies, even though Owner has made all or part of the payments required by this Contract.

3.8.5 If any review or audit by the Owner or the Owner's representatives discloses an underpayment by the Owner, the Owner shall pay any amounts found by the audit to be owed to the Contractor. If such audit discloses an overpayment, the Contractor reimburse the Owner for the amount of the overpayment.

3.8.6 The Owner's right to review, inspect, audit and copy, and the Contractor's duty as to preservation of records shall terminate at the end of three (3) years after Final Payment or termination of this Contract, whichever occurs later. The Contractor shall include this "Right to Audit and Preservation of Records" clause in all his subcontracts, and he shall require the same to be inserted by all Subcontractors and lower-tier subcontractors in their subcontracts~~,~~ for any portion of the Work. Should Contractor fail to cause this clause to be included in any such subcontract or lower tier subcontract or otherwise fail to ensure the Owner's rights under this Article 3.8, Contractor shall be liable to Owner for all costs, expenses and attorney's fees that Owner may incur in order to obtain the information that would have otherwise been available to Owner under this Article 3.8, and the absence of such information shall create a presumption in the Owner's favor, which Contractor must overcome with clear and convincing evidence, that the missing information does not support the payment to Contractor or Contractor claim at issue.

3.8.7 Review, inspection, audit and copying pursuant to this Article 3.8 may be conducted by the Owner or its authorized representatives.

3.8.8 Documents subject to this Article 3.8 shall be made available to Owner and its representatives in whatever formats Owner requests, including without limitation, any electronic formats and/or in paper formats.

3.9 RIGHT TO REVIEW OTHER DOCUMENTS AND MATERIALS

3.9.1 In addition to the rights granted to the Owner under Article 3.8, Right to Audit and Preservation of Records or Documents, the Owner shall have the right to inspect, review and copy any and all of the Contractor's records or documents pertaining to or relating in any way to the Work, including, but not limited to, correspondence, memoranda, minutes, reports, intra- and inter-office communications, work papers, estimating sheets, progress reports, forecasts, audio or video recordings, computer disks, e-mails, films, or any other materials, regardless of physical form or characteristics, which were prepared by or in the possession of, or obtainable by, the Contractor. The Contractor shall make all such documents and records available to the Owner upon ten (10) days Notice to the Contractor of the Owner's intent to inspect and review such documents. The Contractor shall include this "Right to Review Documents and Other Materials" clause in all its subcontracts, and Contractor shall cause the same to be inserted by all Subcontractors and lower-tier subcontractors in their subcontracts for any portion of the Work. The Contractor hereby waives any right he may have to additional compensation or time extensions in the event he fails or refuses to preserve and produce records pertaining to any such claim as requested by the

Owner pursuant to this paragraph. In addition, the Owner may withhold all or any portion of any progress payments, which may be otherwise due, in the event Contractor refuses to comply with its obligations under this Article 3.9. The review, inspection and copying of documents and other records under this Article 3.9 may be conducted by the Owner or its authorized representatives.

3.9.2 Records and documents subject to this Article 3.9 shall be made available to Owner and its representatives in whatever formats Owner requests, including without limitation, any electronic formats and/or in paper formats.

ARTICLE 4 CONTRACTOR

4.1 DEFINITION

4.1.1 The Contractor is the person or entity identified in the Contract as such, and is generally referred to throughout the Contract Documents as if singular in number and masculine in gender but includes the feminine and neuter in gender, as appropriate. The term Contractor means the Contractor or his authorized representative.

4.1.2 This entire Contract is not one of agency by the Contractor for Owner but one in which the Contractor is engaged independently in the business of providing the services and performing the Work herein described as an independent contractor.

4.2 REVIEW OF CONTRACT DOCUMENTS

4.2.1 The Contractor shall not perform any portion of the Work at any time without having obtained and carefully reviewed the Contract Documents or, where required, approved Shop Drawings, Product. Data, Samples or Manuals for such portion of the Work.

4.2.2 The Contractor shall keep at the Project site at least two (2) copies of the drawings and specifications and shall at all times give the A/E, inspectors, and representatives of the Owner access thereto. Further, said drawings and specifications shall be the approved sets issued to the Contractor by the appropriate City permit agencies

4.3 CONTRACTOR'S REPRESENTATIONS

By entering into this Contract with the Owner, the Contractor represents and warrants the following, together with all other representations and warranties in the Contract Documents

4.3.1 That he is experienced in and competent to perform the type of work required and to furnish the plant, materials, supplies or equipment to be so performed or furnished by him;

4.3.2 That he is financially solvent, able to pay his debts as they mature, and possessed of sufficient working capital to initiate and complete the Work required by the Contract Documents;

4.3.3 That he is familiar with all federal, state, and local government laws, ordinances, permits, regulations and resolutions that may in any way affect the Work or those employed therein;

4.3.4 That such temporary and permanent Work required by the Contract Documents which is to be done by him will be satisfactorily constructed and fit for use for its intended purpose and that such construction will not injure any person, or damage any property;

4.3.5 That he has carefully examined the Contract Documents and the site of the Project and the Work and that from his own investigations, he has satisfied himself and made himself familiar with: (1) the nature and location of the Work, (2) the character, quality and quantity of materials likely to be encountered, including, but not limited to, all structures and obstructions on or at the project site, both natural and

man-made; (3) the character of equipment and other facilities needed for the performance of the Work, (4) the general and local conditions, including without limitation its climatic conditions, the availability and cost of labor and the availability and cost of materials, tools and equipment; (5) the quality and quantity of all materials, supplies, tools, equipment, labor and professional services necessary to complete the Work in the manner required by the Contract Documents; and (6) all other matters or things which could in any manner affect the performance of the Work;

4.3.6 That he will fully comply with all requirements of the Contract Documents;

4.3.7 That he will perform the Work consistent with good workmanship, sound business practice, and in the most expeditious and economical manner consistent with the best interests of the Owner;

4.3.8 That he will furnish efficient business administration, an experienced superintendent, and an adequate supply of workmen, equipment, tools and materials at all times;

4.3.9 That he will complete the Work within the Contract Time;

4.3.10 That his Contract Sum is based upon the labor, materials, systems and equipment required by the Contract Documents, without exception; and

4.3.11 That he has satisfied himself as to the feasibility and correctness of the Contract Documents for the construction of the Work.

4.4 SUPERVISION AND CONSTRUCTION PROCEDURES

4.4.1 The Contractor shall supervise and direct the Work, using his best skill and attention. He shall be solely responsible for all construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract; subject, however, to the Owner's right to reject means and methods proposed by the Contractor which are unsafe or otherwise not in compliance with the Contract Documents.

4.4.2 The Contractor shall be responsible to the Owner for the acts and omissions of Contractor's employees, Subcontractors and sub-subcontractors, suppliers, their agents and their employees, and of any other persons providing any of the Work through Contractor, and for their compliance with each and every requirement of the Contract Documents, in the same manner as if they were directly employed by the Contractor.

4.4.3 The Contractor understands and agrees that he shall not be relieved of his obligations to perform the Work in accordance with the Contract Documents either by the activities or duties of the Owner or the A/E in their administration of the Contract or by inspections, tests, or approvals required or performed under Article 7 by persons other than the Contractor.

4.4.4 Before starting a section of the Work, the Contractor shall carefully examine all preparatory work that has been executed by others to receive his Work to see that it has been completed. He shall check carefully, by whatever means are required, to ensure that his Work and adjacent, related work will finish to proper quality, contours, planes, and levels.

4.4.5 The Contractor understands and agrees that the Owner and A/E will not have any liability for or any responsibility to exercise any control over construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, and they will not be responsible for the Contractor's failure to carry out the Work in accordance with the Contract Documents. The Owner and the A/E will not have any liability for or any responsibility to exercise any control over the acts or omissions of the Contractor, Subcontractors, sub-subcontrators or any of their agents or employees, or any other persons performing any of the Work.

4.4.6 The Contractor shall use no plant, equipment, materials, or persons for this Work to which the Owner objects.

4.4.7 The Contractor shall not remove any portion of the Work or stored materials from the site of the Project without the Owner's prior, written approval.

4.5 LABOR, MATERIALS AND EQUIPMENT

4.5.1 The Contractor shall furnish all plant, labor, materials, supplies, equipment and other facilities and things necessary or proper for, or incidental to, the Work, and will perform all other obligations imposed on him by the Contract Documents. Final payment will not be made until the Work is so completed.

4.5.2 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for all labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.5.3 Work, materials, and equipment which are necessary in the construction but which are not specifically referred to in the specifications or shown in the drawings but implied by the Contract Documents shall be furnished by the Contractor at his own cost and expense. Such work and materials shall correspond with the general character of the Work as may be determined by the A/E subject to review as provided in Article 2.2.11.

4.5.4 The Contractor shall perform at least that percentage of the Work specified in the Contract to be Contractor self performed with forces that are in the direct employment of the Contractor. The Contractor shall submit to the Owner within thirty (30) days after award of the Contract a designation of the Work to be performed by the Contractor with his own forces. The percentage of the Work to be performed under subcontract shall be calculated by adding the amounts of all subcontracts and dividing this sum by the total Contract Sum.

4.5.5 The Contractor shall at all times enforce strict discipline, safety and good order among all persons providing any of the Work through him and shall not cause or allow to be used for the Work any unfit person or anyone not skilled in the task assigned to him. If any person providing any of the Work through the Contractor shall appear to the Owner to be incompetent or to act in a disorderly or improper manner, such person shall be removed immediately, at the request of the Owner, and shall not provide any of the Work except on written consent of the Owner.

4.5.6 No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage, or under a conditional sale or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the Work.

4.5.7 The Contractor shall provide approved and adequate sanitary accommodations. All wastes shall be covered, disinfected, incinerated or otherwise disposed of legally.

4.5.8 All equipment, apparatus and/or devices of any kind to be incorporated into the Work that are shown or indicated on the drawings or called for in the specifications or required for the completion of the Work shall be entirely satisfactory to the Owner as regards operation, capacity and/or performance. No approval, either written or verbal, of any drawings, descriptive data or samples of such equipment, apparatus, and/or device shall relieve the Contractor of his responsibility to turn over the same in good working order for its intended purpose at the completion of the Work in complete accordance with the Contract Documents. Any equipment, apparatus and/or device not fulfilling these requirements shall be

removed and replaced by Contractor with proper and acceptable equipment, apparatus, and/or device, or put in good working order satisfactory to the Owner by Contractor without additional cost to the Owner.

4.6 WARRANTY

4.6.1 The Contractor warrants to the Owner that all materials and equipment furnished under this Contract will be new unless otherwise specified, and that all workmanship will be of first class quality, free from faults and defects and in conformance with the Contract Documents and all other warranties and guaranties specified therein. Where no standard is specified for such workmanship or materials, they shall be the best of their respective kinds. All Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty is not limited by the provisions of Article 13, Uncovering and Correction of Work.

4.6.2 The Work included in this Contract is specified in the Contract Documents. The Contractor shall be required to complete the Work specified and to provide all items needed for construction of the Work, complete and in good order.

4.7 CONTRACTOR-PAID TAXES, PERMITS, FEES AND NOTICES

4.7.1 The Contractor shall pay all sales, consumer, use and other similar taxes for the Work or portions thereof provided by the Contractor which are legally enacted at the time bids are received, whether or not yet effective. Taxes to be paid by the Contractor shall include, but shall not be limited to, the Lynchburg City Business, Professional and Occupational License Tax (a gross receipts tax).

4.7.2 Except as provided in Article 3.3, Owner-Paid Permits and Fees, the Contractor will be responsible for obtaining and paying for all other fees, permits and licenses necessary for the proper execution of the Work, including but not limited to:

.1 Building Permit and inspections;

.2 Plumbing, Electrical, Mechanical Permits and inspections;

.3 Temporary water meter, temporary electrical and telephone installations and temporary utility usage;

.4 Temporary security lighting;

.5 All other permits necessary in order to perform the Work shall also be secured by the Contractor, and fees necessary in order to perform the Work shall be paid by him as part of this Contract at no additional cost to the Owner.

4.7.3 The Contractor shall give all notices and comply with all laws, ordinances, rules, regulations, codes, permits, resolutions and lawful orders of any public authority bearing on the performance of the Work; including but not limited to OSHA, Title 40.1 Labor and Employment Chapter 3 of the Code of Virginia, and Title VII of the Civil Rights Act of 1964, as amended. All safety violations shall be corrected immediately upon receipt of notice of violation.

4.8 COMPLIANCE

4.8.1 All demolition and excavation shall comply with all laws, ordinances, rules and regulations, and lawful orders of public authority, including without limitation, those for the prevention of accidents as issued by the Department of Labor and Industry of the Commonwealth of Virginia.

.1 IMMIGRATION REFORM AND CONTROL ACT OF 1986

The Contractor certifies that it does not, and will not during the performance of the Contract, employ illegal alien workers or otherwise violate the provisions of the federal Immigration Reform and Control Act of 1986.

4.8.2 To the extent of the Work indicated in the Contract Documents, the Contractor shall comply and the construction shall conform with all applicable and current editions or revisions of the following codes, specifications and standards. In case of conflict, the order of precedence shall be as hereinafter listed:

.1 Lynchburg Public Procurement Code;

.2 Contract Documents;

.3 The Virginia Uniform Statewide Building Code (“USBC”), as amended including, without limitation, The International Building Code ("IBC") and other codes incorporated by the USBC and IBC); and

.4 The Virginia Department of Transportation Road and Bridge Specifications and the Road Designs and Standards.

4.8.3 If the Contractor (or any person in a contract with the Contractor relating to the Work) finds an error, inconsistency, omission, ambiguity, discrepancy, conflict or variance in the Contract Documents, or between the Contract Documents and any provisions of law, ordinance, rule, or regulations or any of the codes, specifications and standards set forth in 4.8.2 herein, the Contractor has the obligation to promptly seek in writing a clarification thereof from the A/E, with a copy to the Owner, prior to the time of beginning any of the Work that is affected by such error, inconsistency, omission, ambiguity, discrepancy, conflict or variance. The Owner will welcome such a clarification request, and, if deemed necessary by the Owner, the Owner will issue a written instruction clarifying the matter in question. If the Contractor feels that the written clarification requires additional work, the Contractor shall follow the change process in Article 12, Changes and Modifications in the Work.

Should the Contractor fail to seek such a clarification thereof immediately upon the discovery of the need therefor, prior to the time the said Work is performed, the Contractor thereby assumes all risk of loss related to such error, inconsistency, ambiguity, discrepancy, conflict or variance which the Contractor (and any person in contract with Contractor relating to the Work) knew or should have known, using a normal, professional standard of care, existed prior to the time the Work was performed.

4.8.4 Any material or operation specified by reference to publications~~,~~ or published specifications of a manufacturer, a society, an association, a code, or other published standard, shall comply with the requirements of the referenced document which is current on the date of receipt of bids. If the Contractor observes that any of the Contract Documents are at variance with any such referenced publications, codes, published specifications, or published standards in any respect, he shall promptly notify the A/E in writing, with a copy to the Owner. The A/E will make such judgments as are necessary and notify the Contractor prior to the performance of the Work.

4.8.5 If the Contractor performs any Work contrary to any law, code, ordinance, regulation, publication, standard, permit, rule, regulation or resolution, he shall assume full responsibility therefore and shall bear all costs attributable thereto.

4.8.6 The Contractor is responsible for locating all underground structures such as water, oil and gas mains, water and gas services, storm and sanitary sewers and telephone and electric conduits that may be encountered during construction. The Contractor shall have Miss Utility locate all utilities on the site within the area of the Work and shall dig test holes, to determine the position of the underground

structures. The Contractor shall pay the cost of digging test holes and likewise he shall pay the cost of the services of the representatives of the owners of such utilities for locating the said utilities. The cost of determining the location of any and all utilities is to be included in the bid price. The Owner shall pay the owners of such utilities for fees or charges for relocation of gas, electric, telephone, cable or other lines and/or services indicated to be relocated by others.

4.8.7 If utilities are marked which are not shown on the plans, the Contractor shall immediately give Notice to the Owner and the A/E of such finding. The Owner and A/E shall provide a direction to the Contractor within a reasonable period of time if additional work is required as a result of the finding. If the Contractor believes that it requires additional work, the Contractor shall follow the change process in Article 12, Changes and Modifications in the Work.

4.9 ALLOWANCES

4.9.1 The Special Conditions, if any, will contain provisions for allowances, if applicable to this Contract.

4.10 SUPERINTENDENT

4.10.1 The Contractor shall employ and have present at the Project site a competent Superintendent and any necessary assistants to ensure adequate supervision of the Work. The Superintendent shall have full authority to represent the Contractor, and all communications given to the Superintendent shall be as binding as if given to the Contractor.

4.10.2 Such Superintendent shall be acceptable to the Owner and shall be one who will be continued in that capacity for duration of this Project, unless he ceases to be on the Contractor's payroll. The Superintendent shall not be employed on any other project during the performance of this Contract.

4.11 CONSTRUCTION SCHEDULE

4.11.1 The Contractor shall, within twenty (20) days after issuance of the Notice of Award, prepare and submit to the A/E and Owner for review, a reasonably practicable and feasible Construction Schedule, showing the method by which the Contractor will comply with Completion Date requirements as set forth in the Contract. Unless otherwise agreed in writing by Owner or indicated in the specifications, the Construction Schedule shall use the Critical Path Method ("CPM") and an industry-standard computer software program, such as Primavera, acceptable to Owner and A/E, and shall be provided in electronic and paper format. The Construction Schedule shall show in detail how the Contractor plans to execute and coordinate the Work. The Contractor shall use this schedule in the planning, scheduling, direction, coordination and execution of the Work. The Construction Schedule shall encompass all of the work of all trades necessary for construction of the Project and shall be sufficiently complete and comprehensive to enable progress to be monitored on a day-to-day basis. The Owner and A/E shall each be provided with a copy of all schedules, updates, reports and other documentation required herein, which shall be suitable for reproduction by the Owner, and, unless otherwise agreed by Owner, shall be in electronic and paper format. When required to assist the A/E with Project staffing requirements for the following week, the Contractor shall provide the A/E, on each Friday, with a detailed work schedule for the following week. The Contractor shall provide the A/E with at least a seventy-two (72) hour notice for the following items: (1) All traffic lane changes, (2) Work ready for inspection or testing, (3) _____. The Contractor may be charged for additional costs of inspection when material and workmanship are found to not be ready for inspection or testing at the time the Contractor calls for inspection or testing.

4.11.2 It is the sole responsibility of the Contractor to prepare, maintain, update, revise and utilize the Construction Schedule as outlined in this Article 4.11, Construction Schedule. The Construction Schedule shall be the sole overall schedule utilized by the Contractor in managing this Project; provided, however, that Contractor may, at its option, employ and utilize other schedules based upon and consistent with the Construction Schedule. In general, it is the intent of this paragraph 4.11.2 to allow the

Contractor to choose its own means, methods and construction procedures consistent with good practice and the Contract Documents.

4.11.3 If the Contractor should express an intention to complete the Work earlier than any required Milestone or Completion Date, including without limitation, in any schedule, the Owner shall not be liable to the Contractor for any delay or associated extra costs based upon the Contractor being unable to complete the Work before such earlier date. The duties, obligations and warranties of the Owner to the Contractor apply only to the completion of the Work on the Milestone and Completion Dates required by the Contract Documents and do not apply to early completion.

4.11.4 Submission to the Owner of the Construction Schedule is advisory only, does not satisfy any requirement for any notice required by the Contract Documents or the Lynchburg Public Procurement Code, and such submission shall not relieve the Contractor of the responsibility for accomplishing the Work within each and every required Milestone and Completion Date. Omissions and errors in the approved Construction Schedule shall not excuse performance that is not in compliance with the Contract Documents. Submission to the Owner and/or A/E in no way makes the Owner and/or A/E an insurer of the Construction Schedule's success or makes Owner and/or the A/E liable for time or cost overruns flowing from the Construction Schedule’s shortcomings. The Owner hereby disclaims any obligation or liability by reason of Owner and/or A/E approval or failure to object to the Construction Schedule, and any such approval or failure to object shall not be considered an admission by the Owner or the A/E that the Construction Schedule was reasonably practicable or feasible.

4.11.5 Contractor shall consult with and obtain information from principal Subcontractors necessary in preparation of the Construction Schedule, and for updates and revisions required therein. Contractor shall provide each principal Subcontractor with copies of the Construction Schedule and any revisions or updates affecting that Subcontractor's work. Contractor shall hold appropriate progress meetings with Subcontractors and shall direct and coordinate the work of Subcontractors consistent with and as required herein. Owner shall have the right to attend Subcontractor progress meetings but shall not be required to participate in such meetings or provide information to Subcontractors, except through the Contractor. Contractor shall keep up-to-date minutes of subcontractor progress meetings and shall provide same to Owner. The Contractor shall ensure that each Subcontractor, sub-subcontractor or supplier acknowledges and accepts the requirements of the Construction Schedule relating to their part of the Work.

4.11.6 If Contractor's Construction Schedule indicates that Owner, the A/E, or a separate contractor is to perform an activity by a specific date, or within a certain duration, Owner, the A/E, or any separate contractor shall not be bound to said date or duration unless Owner expressly and specifically agrees in writing to the same. The Owner's and/or A/E’s overall review and acceptance or approval of the schedule does not constitute an agreement to specific dates or durations for activities of the Owner, A/E, or any separate contractor.

4.11.7 The Contractor's Superintendent shall maintain at the Project site a current, updated Construction Schedule, indicating actual monthly progress for those portions of the Project on which Work has been or is being performed.

4.11.8 If an extension or contraction of any Milestone or Completion Date is authorized by any Change Order, the Contractor shall revise his Construction Schedule, Milestone and Completion Dates accordingly.

4.11.9 If, in the opinion of the Owner, the Construction Schedule does not accurately reflect the actual progress and sequence of the Contractor's performance of the Work, the Contractor shall revise the Construction Schedule, upon the Owner's request, and submit a revised Construction Schedule that accurately represents the progress and sequence of the Contractor's performance of the Work.

4.11.10 Contractor shall submit to the Owner the name of any scheduling consultant that Contractor may select or retain, prior to using such consultant. Contractor shall not utilize any particular scheduling consultant over the reasonable objection of the Owner to that consultant.

4.11.11 Contractor covenants, warrants, and guarantees that Contractor will not:

.1 Misrepresent to Owner its planning and scheduling of the Work;

.2 Utilize schedules materially different from those made available to the Owner or any subcontractors for the direction, execution and coordination of the Work, or which are not feasible or realistic;

.3 Prepare schedules, updates, revisions or reports that do not accurately reflect Contractor's actual intent or Contractor's reasonable and actual expectations as to:

(a) The sequences of activities,

(b) The duration of activities,

(c) The responsibility for activities,

(d) Resource availability,

(e) Labor availability or efficiency,

(f) Expected weather conditions,

(g) The value associated with the activity,

(h) The percentage complete of any activity,

(i) Completion of any item of work or activity,

(j) Project completion,

(k) Delays, slippages, or problems encountered or expected,

(l) Subcontractor requests for time extension, or delay claims of subcontractors, and

(m) If applicable, the float time available.

4.11.12 Contractor's failure to substantially comply with the foregoing covenants, warranties and guarantees of paragraph 4.11.11 shall be a substantial and material breach of contract which will permit Owner to terminate Contractor for default~~,~~ or withhold payments under the Contract Documents~~,~~ and shall entitle Owner to the damages afforded by these Contract Documents or applicable law.

4.11.13 Should Contractor fail to substantially comply with the provisions of the Contract Documents relating to scheduling and execution of the Work by the overall Construction Schedule, Owner shall have the right, at its option, to retain the services of scheduling consultants or experts (including attorneys if necessary in the opinion of the Owner) to prepare schedules, reports, updates and revisions of the schedule in accordance with the Contract Documents and to review and analyze same, in order to allow Owner and the A/E to evaluate the progress of the Work by Contractor, to determine whether Contractor is substantially complying with the Contract Documents, and to direct such action by the Contractor, as permitted by the Contract Documents, as required to ensure, under the Owner's schedule

prepared hereunder, that Contractor will complete the Work within the Contract Time. All costs and expenses and fees incurred by Owner in exercising its rights hereunder shall be charged to Contractor's account. If Contractor fails to substantially comply with the scheduling and execution of the Work requirements of the Contract Documents, Contractor hereby agrees, in such instance, to comply with such Owner-prepared schedules, if any, or directions, activity sequences and durations as Owner may reasonably require, without additional cost to the Owner (subject only to cost adjustments for such changes in the Work as Owner may direct), to ensure completion within the Contract Time.

4.11.14 The Construction Schedule shall be utilized by Owner, A/E and Contractor for submission, review and approval of monthly Payment Requests. The schedule must be updated by Contractor monthly with each progress payment application and submitted to the Owner and A/E for review with the progress payment application. Owner shall not be required to process and review Contractor's Application for Payment if Contractor has failed or refused to provide the scheduling update information required herein.

4.11.15 The type of schedule to be utilized on this Project, along with its particular elements, shall be as specified in the Contract Documents.

4.12 RESPONSIBILITY FOR COMPLETION

4.12.1 The Contractor shall furnish such manpower, materials, facilities and equipment and shall work such hours, including night shifts, overtime operations and Sundays and holidays, as may be necessary to ensure the performance of the Work within the Milestone and Completion dates specified in the Contract. If the Owner notifies the Contractor that it has become apparent that the Work will not be completed within required Milestone or Completion Dates and such is not due solely to circumstances for which Contractor has established entitlement to an extension to the Contract Time, the Contractor agrees that it will assume full responsibility to take some or all of the following actions, at no additional cost to the Owner (except for circumstances beyond the Contractors' control), in order to ensure, in the opinion of the Owner, that the Contractor will comply with all Milestone and Completion Date requirements:

.1 Increase manpower, materials, crafts, equipment and facilities;

.2 Increase the number of working hours per shift, shifts per working day, working days per week, or any combination of the foregoing; and

.3 Reschedule activities to achieve maximum practical concurrency of accomplishment of activities.

Failure of the Owner to notify the Contractor of the apparent delay shall not relieve Contractor of the obligation to finish the Work within the required Milestone or Completion date.

4.12.2 If the actions taken by the Contractor to remedy delays not due solely to circumstances for which Contractor has established entitlement to a time extension are not satisfactory, the Owner may direct the Contractor to take any and all actions necessary to ensure completion within the required Milestone and Completion Dates, without additional cost to the Owner. In such event, the Contractor shall continue to assume responsibility for his performance and for completion within the required dates.

4.12.3 If, in the opinion of the Owner, the actions taken by the Contractor pursuant to this Article or the progress or sequence of Work are not accurately reflected on the Construction Schedule, the Contractor shall revise such schedule to accurately reflect the actual progress and sequence of Work.

4.12.4 Failure of the Contractor to substantially comply with the requirements of this Article is grounds for a determination by the Owner, pursuant to Article 15, Termination Of The Contract, that the Contractor is failing to prosecute the Work with such diligence as will ensure its completion within the time specified.

4.12.5 The Owner may, at its sole discretion and for any reason, including when it is apparent to the A/E or Owner that the Work will not be completed within the required Milestone or Completion Dates, require the Contractor to accelerate the Construction Schedule by providing overtime, Saturday, Sunday and/or holiday work and/or by having all or any subcontractors designated by the Owner provide overtime, Saturday, Sunday, and/or holiday work. If the Owner requires overtime, Saturday, Sunday or holiday work by the Contractor's or his Subcontractor's own forces, and such requirement is not related in any way to the Contractor's apparent inability to comply with Milestone and Completion Date requirements, the Owner shall reimburse the Contractor for the direct cost to the Contractor of the premium time for all labor utilized by the Contractor in such overtime, Saturday, Sunday or holiday work (but not for the straight time costs of such labor), together with any Social Security and State or Federal unemployment insurance taxes in connection with such premium time. However, no overhead supervision costs, commissions, profit or other costs and expenses shall be payable in connection therewith.

4.12.6 This provision does not eliminate the Contractor's responsibility to comply with the City's noise ordinances, all VDOT permit requirements, and all other applicable laws, regulations, rules, ordinances, resolutions, and permit requirements.

4.13 DOCUMENTS AND SAMPLES AT THE SITE

4.13.1 The Contractor shall, at the Owner's direction, maintain at the site for the Owner one record copy of all drawings, specifications, addenda, Change Orders and other Modifications, and Field Orders in good order and marked currently to record all changes made during construction, and approved Shop Drawings, Product Data, Samples and Manuals. These shall be available to the A/E. These shall be delivered to the Owner upon completion of the Work.

4.14 SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND MANUALS

4.14.1 SHOP DRAWINGS are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or any Subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

4.14.2 PRODUCT DATA are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate a material, product or system for some portion of the Work.

4.14.3 SAMPLES are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

4.14.4 MANUALS are manufacturer's installation, start-up, operating, maintenance and repair instructions, together with parts lists, pictures, sketches and diagrams that set forth the manufacturer's requirements, for the benefit of the Contractor and the Owner.

4.14.5 The Contractor shall review, approve and submit, with reasonable promptness and in such sequence as to cause no delay in the Work or in the work of the Owner or any separate contractor, all Shop Drawings, Product Data, Samples and Manuals required by the Contract Documents.

4.14.6 By approving and submitting Shop Drawings, Product Data, Samples and Manuals, the Contractor represents that he has determined and verified all materials, field measurements, and field construction criteria related thereto, and that he has checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

Parts and details not fully indicated on the contract drawings shall be detailed by the Contractor in accordance with standard engineering practice. Dimensions on the drawings, as well as detailed drawings

themselves, are subject in every case to measurements of existing, adjacent, incorporated and completed Work, which shall be taken by the Contractor before undertaking any Work dependent on such data.

4.14.7 The Contractor shall not be relieved of responsibility for any deviation from the requirements of the Contract Documents by the Owner or A/E's approval of Shop Drawings, Product Data, Samples or Manuals under Article 2, Architect/Engineer, unless the Contractor has specifically informed the Owner and A/E in writing of such deviation at the time of submission and the Owner has given specific written approval to the specific deviation. The Contractor shall not be relieved from responsibility for errors or omissions in the Shop Drawings, Product Data, Samples or Manuals by the A/E's approval thereof.

4.14.8 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data or Samples, to revisions other than those requested by the Owner or A/E on previous submittals.

No portion of the Work requiring submission of Shop Drawings, Product Data, or Samples shall commence until the submittal has been approved by the Owner and A/E as provided in Article 2, Architect/Engineer. All such portions of the Work shall be in accordance with approved submittals.

4.14.9 For substances that are proposed for use in the Project that may be hazardous to human health, the Contractor shall submit to the A/E, for information only, information on precautions for safely using these substances, including Material Safety Data Sheets and certification of registration by the Contractor with authorities under the respective Virginia and Federal Toxic Substances Control Acts.

4.14.10 Unless otherwise modified by the Owner in writing, the Contractor shall label or stamp and number all Shop Drawings, Product Data, Samples or Manuals as prescribed by the Project Manager.

4.14.11 The Contractor shall submit a copy of each submittal, including the transmittal sheet (for shop drawings, product data, samples or manuals) to the Owner simultaneously with the Contractor's submission of said drawings, data, samples or manual packages to the A/E.

4.15 EQUAL PRODUCTS:

4.15.1 The term "Product" as used in the Contract Documents refers to materials, equipment, supplies, articles, fixtures, devices, types of construction, or products, as appropriate.

4.15.2 All products furnished shall, whenever specified and otherwise wherever practicable, be the standard products of recognized, reputable manufacturers. If the manufacturer cannot make scheduled delivery of an approved item, the Contractor may request approval of the A/E to use another brand, make, manufacturer, article, device, product, material, fixture, form or type of construction which the Contractor judges to be equal to that specified. An item need not be considered by the A/E for approval as equal to the item so named or described unless it (1) it is at least equal in quality, durability, appearance, strength, and design; (2) it will perform at least equally the specific function imposed by the general design for the work being contracted for or the material being purchased; and (3) it conforms substantially, even with deviations, to the detailed requirements for the item in the specifications. Approval shall be at the sole discretion of the A/E and will be based upon considerations of quality, workmanship, economy of operation, suitability for the purpose intended, and acceptability for use on the project. Any such approval must be in writing to be effective, and the decision of the A/E shall be final.

4.15.4 To obtain such approval of equal products other than those specified in Contract Documents, , the Contractor's request for approval of any equal product shall include the following:

.1 Complete data substantiating compliance of the proposed equal product with the Contract Documents;

.2 Accurate cost data on proposed equal product in comparison with product or method specified;

.3 Product identification including manufacturer's name, address, and phone number;

.4 Manufacturer's literature showing complete product description, performance and test data, and all reference standards;

.5 Samples and colors in the case of articles or products;

.6 Name and address of similar projects on which the product was used and date of installation;

.7 All directions, specifications, and recommendations by manufacturers for installation, handling, storing, adjustment, and operation.

4.15.5 The Contractor shall also submit with his request for approval a statement which shall include all of the following representations by the Contractor, namely that:

.1 He has investigated the proposed equal product and determined that it is equal or better in all respects to that specified and that it fully complies with all requirements of the Contract Documents;

.2 He will meet all contract obligations with regard to this substitution;

.3 He will coordinate installation of accepted equal products into the work, making all such changes and any required schedule adjustments, at no additional cost to the Owner, as may be required for the Work to be complete in all respects;

.4 He waives all claims for additional costs and additional time related to equal products. He also agrees to hold the Owner harmless from claims for extra costs and time incurred by subcontractors and suppliers, or additional services which may have to be performed by the A/E, for changes or extra work that may, at some later date, be determined to be necessary in order for the Work to function in the manner intended in the Contract Documents;

.5 He will provide the same warranty and guarantee, and perform any work required in accordance therewith, for the equal product that is applicable to the specified item for which the equal product is requested;

.6 Material will be installed, handled, stored, adjusted, tested, and operated in accordance with the manufacturers' recommendation and as specified in the Contract Documents;

.7 In all cases, new materials will be used unless this provision is waived in writing by, the Owner or unless otherwise specified in the Contract Documents;

.8 All material and workmanship will be in every respect, in accordance with that which in the opinion of the Owner, is in conformity with approved modern practice; and

.9 He has provided accurate cost data on the proposed equal product in comparison with the product or method specified, if applicable.

4.15.6 The Owner may require tests of all products proposed as equal products so submitted to establish quality standards, at the Contractor's expense. After approval of an equal product, if it is determined that the Contractor submitted defective information or data regarding the equal product upon which Owner's approval was based, and that unexpected or uncontemplated redesign or rework of the Project will be required in order to accommodate the equal product, or that the item will not perform or function as well as the specified item for which equal product was requested, the Contractor will be required to furnish the

original specified item or request approval to use another equal product. The Contractor shall pay all costs, expenses or damages associated with or related to the unacceptability of such an equal product and the resultant utilization of another item, and no time extension shall be granted for any delays associated with or related to such an equal product.

4.15.7 Equal products will not be considered for approval by the Owner if:

.1 The proposed equal product is indicated or implied on the Contractor's shop drawing or product data submittals and has not been formally submitted for approval by the Contractor in accordance with the above-stated requirements; or

.2 Acceptance of the proposed equal product will require substantial design revisions to the Contract Documents or is otherwise not acceptable to the Owner.

4.15.8 Except as otherwise provided for by the provisions of any applicable laws, the Contractor shall not have any right of appeal from the decision of the Owner disapproving any products submitted if the Contractor fails to obtain the approval for an equal product under this Article.

4.15.8 If the Contractor proposes a product which the Owner determines is not equal to the product named in Contract Documents but which the Owner nevertheless is willing to accept, Contractor shall provide, upon request by the Owner, an itemized comparison of the proposed substitution with the product specified and the cost differential which shall be credited to the Owner in a Change Order issued in accordance with Article 12, Changes and Modifications in the Work.

4.16 USE OF SITE

4.16.1 The Contractor shall confine his operations at the site to areas permitted by law, ordinances, permits, easements, right-of-way agreements and the Contract Documents. The Contractor shall not unreasonably encumber the site, in the opinion of the Owner, with any materials, equipment or trailers, nor shall Contractor block the entrances or otherwise prevent reasonable access to the site, other working and parking areas, completed portions of the Work and/or properties, storage areas, areas of other facilities that are adjacent to the worksite. If the Contractor fails or refuses to move said material, equipment or trailers within 24 hours of Notice by the Owner to so do, the Owner shall have the right, without further Notice, to remove, at the Contractor's expense, any material, equipment and/or trailers which the Owner deems are in violation of this paragraph.

4.17 CUTTING AND PATCHING OF WORK

4.17.1 The Contractor shall be responsible for all cutting, fitting or patching that may be required to complete the Work and to make its several parts fit properly and in accordance with the Contract Documents.

4.17.2 The Contractor shall not damage or endanger any portion of the Work or the work of the Owner or any separate contractors by cutting, patching or otherwise altering any work, or by excavation. The

Contractor shall not cut or otherwise alter the work of the Owner or any separate contractor except with the written consent of the Owner and of such separate contractor. The Contractor shall not unreasonably withhold from the Owner or any separate contractor Contractor's consent to cutting or otherwise altering the Work. The Owner shall not be required to accept Work with a cut, splice, or patch when such cut, splice or patch is not generally accepted practice for the particular work involved or is otherwise unworkmanlike in the opinion of the Owner.

4.18 SITE CLEAN UP

4.18.1 The Contractor at all times shall keep the Project site and adjacent areas free from accumulation of waste materials or rubbish caused by his operations. Before final payment is made, the Contractor shall remove all of his waste materials, rubbish, scrap materials, debris, tools, construction equipment, machinery, surplus materials, falsework, temporary structures, including foundations thereof and plant of any description, from the Project site and put the site in a neat, orderly condition.

4.18.2 If the Contractor fails to clean up as required herein at any time during the performance of the Work or at the completion of the Work, the Owner may, upon 24 hours notification, clean up the site at the Contractor's expense.

4.19 PATENTS, ROYALTIES, ETC.

4.19.1 The Contractor guarantees to save harmless the Owner, its officers, agents, servants and employees from liability of any kind or nature, including without limitation, cost, expense and attorney's fees, on account of suits and claims of any kind for violation or infringement of any patents or patent rights by the Contractor, or by anyone directly or indirectly employed by him, or by reason of the use of any art, process, method, machine, manufacture, or composition of matter patented or unpatented in the performance of this Contract in violation or infringement of any letter or rights. The Contractor agrees to pay all royalties, fees, licenses, etc. required in respect of the Work or any part thereof as part of his obligations hereunder without any additional compensation.

4.20 INDEMNIFICATION

4.20.1 It is hereby mutually covenanted and agreed that the relation of the Contractor to the Work to be performed by him under this Contract shall be that of an independent contractor and that as such he will be responsible for all damages, loss or injury, including death, to persons or property that may arise or be incurred in or during the conduct and progress of said work as the result of any action, omission or operation under the Contract or in connection with the Work, whether such action, omission or operation is attributable to the Contractor, subcontractor, any material supplier, or anyone directly or indirectly employed by any of them. The Contractor shall make good any damages that may occur in consequence of the Work or any part of it. The Contractor shall assume all liability, loss and responsibility of whatsoever nature by reason of his neglect or violation of any federal, state, county or local laws, regulations , codes or ordinances.

4.20.2 The Contractor shall indemnify, hold harmless and defend the Owner, its employees, agents, servants and representatives from and against any and all claims, suits, demands, actions (regardless of the merits thereof) and damages of whatever nature arising out of or resulting from the performance of the Work or the failure to perform the Work, including without limitation, jurisdictional labor disputes or other labor troubles that may occur during the performance of the Work.

4.20.3 The indemnification obligations under this Article shall not be affected in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under worker's or workman's compensation acts, disability benefit acts or other employee benefit acts.

4.20.4 The obligations of the Contractor under this Article 4.20 shall not extend to the errors or omissions of the A/E, his agents or employees, arising out of the preparation or approval of maps, drawings, opinions, reports, surveys, change orders, designs or specifications.

4.20.5 The obligations of the Contractor under this Article 4.20 shall not extend to the proportion of damages, loss or injury, including death, to persons or property that may arise or be incurred as the result of any action, omission or operation of the Owner, or Owner's separate contractor(s), and their employees, agents, servants, and/or representatives.

4.21 NON-DISCRIMINATION IN EMPLOYMENT

4.21.1 During the performance of this Contract, the Contractor agrees as follows:

.1 The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability, or any other basis prohibited by state law relating to discrimination in employment, except where there is bona fide occupational qualification reasonably necessary to the normal operation of the Contractor. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

.2 The Contractor, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, will state that such Contractor is an equal opportunity employer.

.3 Notices, advertisements and solicitations placed in accordance with federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

.4 The Contractor will include the provisions of the foregoing paragraphs 1, 2, and 3 in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

4.21.2 DRUG-FREE WORKPLACE REQUIRED:

As required by section 2.2-4312 of the Code of Virginia during the performance of the Contract, Contractor agrees to (i) provide a drug-free workplace for the contractor's employees; (ii) post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession, or use of a controlled substance or marijuana is prohibited in the Contractor's workplace and specifying the actions that will be taken against employees for violations of such prohibition; (iii) state in all solicitations or advertisements for employees placed by or on behalf of the Contractor that the Contractor maintains a drug-free workplace; and (iv) include the provisions of the foregoing clauses in every subcontract or purchase order of over $10,000, so that the provisions will be binding upon each subcontractor or vendor.

For the purposes of this Article 4.21, "drug-free workplace" means a site for the performance of Work done in connection with this Contract where Contractor's employees are prohibited from engaging in the unlawful manufacture, sale, distribution, dispensation, possession or use of any controlled substance or marijuana during the performance of the Contract.

4.22 CONTRACT SECURITY

4.22.1 The Contractor shall deliver to the Owner, within ten (10) working days from Notice of Award, two (2) originals of a Performance Bond and a separate Labor and Material Payment Bond, in a form acceptable to the Owner, and each in an amount required by the Contract Documents and the Virginia Public Procurement Act, as security for the faithful performance of the Contract, and the payment of all persons performing labor and furnishing materials in connection with this Contract. The Owner will not issue Notice to Proceed until the bonds are received. The amount of the Performance and Payment Bonds shall

be increased to the same extent the Contract Sum is increased due to Modifications. The form of bonds shall be acceptable to the Owner, and the surety shall be such surety company or companies as are acceptable to the Owner and as are authorized to transact business in the Commonwealth of Virginia. The cost of such bonds shall be included in the Contractor's bid amount.

4.22.2 The bonds shall irrevocably obligate the Contractor and surety to the full amount of the bonds unless and until all of Contractor's obligations under the Contract Documents have fully been fulfilled.

4.22.3 If, at any time, any surety or sureties for any bond relating to the Work becomes insolvent or is determined by the Owner to be unable to adequately secure the interest of the Owner, the Contractor shall, within (30) days after Notice from the Owner to do so, substitute an acceptable bond(s) in such form and sum and with such other sureties as obligors as may be satisfactory to the Owner. The premiums on such bond(s) shall be paid by the Contractor.

ARTICLE 5 SUBCONTRACTORS

5.1 DEFINITIONS

5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform or supply any of the Work at the site. Subcontractor means a Subcontractor or his authorized representative. The term Subcontractor does not include any separate contractor performing work pursuant to Article 6 or his subcontractors.

5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform or supply any of the Work at the site. The term Sub-subcontractor includes a Sub-subcontractor or an authorized representative thereof.

5.1.3 The A/E will not deal directly with any Subcontractor or Sub-subcontractor or materials supplier. Subcontractor, Sub-subcontractors or material suppliers shall route requests for information or clarification through the Contractor to the A/E, with a copy to the Owner.

5.2 AWARD OF SUBCONTRACT AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

5.2.1 The Contractor shall submit to the Owner with a copy to the A/E prior to the award of any subcontract for Work under this Contract and thirty (30) calendar days after the award of this Contract, the names of the suppliers of principal items, systems, materials, and equipment proposed for the Work; the names and addresses, business and emergency phones of the Subcontractors which he proposes to employ under this Contract, as well as such other information as may be requested by the Owner. The Owner will review each Subcontractor and supplier based upon his apparent financial soundness and responsibility, his known or reported performance on previous similar work, and his available plant, equipment and personnel to perform the Work. The Contractor shall not employ a Subcontractor or supplier to whom the Owner reasonably objects. The Owner's objection to a proposed Subcontractor or supplier shall not affect the Contract Sum.

5.2.2 The Contractor shall make no substitutions for any Subcontractor, person or entity previously selected unless first submitted to the Owner for review and approval.

5.3 SUBCONTRACTUAL RELATIONS

5.3.1 By an appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities which the Contractor, by these Contract Documents, assumes toward the Owner and the A/E. Said agreement shall preserve and protect the rights of the Owner and the A/E under the Contract Documents with respect to the Work to be performed by the

Subcontractor so that the subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the Contractor-Subcontractor agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by these Contracts Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with his Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract, copies of all of the Contract Documents, and identify to the Subcontractor any terms and conditions of the proposed subcontract which may be at variance with the Contract Documents. Each Subcontractor shall similarly make copies of such Contract Documents available to his Sub-subcontractor's. Each subcontract agreement shall insure that all appropriate provisions of the Contract Documents are complied with by the Subcontractor.

5.3.2 The provisions herein regarding the Owner's reasonable objection to any Subcontractor shall in no way affect the liability of the Contractor to Owner regarding performance of all obligations by or payment of Subcontractors. The Owner's failure to object to any given Subcontractor shall not relieve the Contractor of his obligation to perform or have performed to the full satisfaction of the Owner all of the work required by this Contract.

5.3.3 Neither this article nor any other provision of the Contract Documents shall be deemed to make the Owner a joint venture or partner with the Contractor or to place the Subcontractor and materialmen in privity of contract with the Owner.

5.4 QUALIFICATION SUBMITTALS

5.4.1 Specific qualification submittals may be required of the Contractor, Subcontractors, installers and suppliers for certain critical items of the Work. Required qualification submittals are set forth in detail in the Instruction to Bidders and shall be provided, collected and submitted by the Contractor to the A/E with copies to the Owner. All information required of a single Subcontractor, installer or supplier shall be contained in a single, complete submittal. The Contractor shall submit the required qualification information within ten (10) days after receipt of the Owner's request.

5.4.2 The Owner may reject any proposed Subcontractor, installer or supplier, or any qualification submittals related thereto, for the following reasons:

.1 The Contractor's failure to submit requested information within the specified time; or

.2 The Contractor's failure to provide all of the requested information; or

.3 The Contractor's submission of a Subcontractor, installer or supplier, or qualifications thereof, which are unacceptable in the judgment of the Owner.

5.4.3 Should the Owner have reasonable objection to any proposed Subcontractor, installer or supplier, the Contractor shall submit another firm for approval by the Owner at no additional cost to the Owner.

ARTICLE 6 WORK BY OWNER OR BY SEPARATE CONTRACTORS

6.1 OWNER'S RIGHT TO PERFORM WORK AND TO AWARD SEPARATE CONTRACTS

6.1.1 The Owner reserves the right to perform work related to the Project with his own forces, and to award separate contracts in connection with other portions of the Project or other work on the site.

6.1.2 When separate contracts are awarded for different portions of the Project or other work on the site, the term "contractor" in the contract documents in each case shall mean the contractor who executes each separate construction agreement.

6.2 MUTUAL RESPONSIBILITY

6.2.1 The Contractor shall afford other contractors and the Owner reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work and shall properly connect and coordinate the Work with such other work. The Contractor shall coordinate his Work with the Owner and other contractors and store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the Work as will not unduly interfere with the progress of the Work or the work of any other contractors.

6.2.1.1 If the execution or result of any part of the Work depends upon any work of the Owner or of any separate contractor, the Contractor shall, prior to proceeding with the Work, inspect and promptly report to the Owner in writing any apparent discrepancies or defects in such work of the Owner or of any separate contractor that render it unsuitable for the proper execution or result of any part of the Work.

6.2.1.2 Failure of the Contractor to so inspect and report shall constitute an acceptance of the Owner's or separate contractor's work as fit and proper to receive the Work, except as to defects which may develop in the Owner's or separate contractor's work after completion of the Work and which the Contractor could not have discovered by its inspection prior to completion of the Work.

6.2.2 Should the Contractor cause damage to the work or property of the Owner or of any separate contractor on the Project, or to other work on the site, or delay or interfere with the Owner's work on ongoing operations or facilities or adjacent facilities or said separate contractor's work, the Contractor shall be liable for the same; and, in the case of another contractor, the Contractor shall attempt to settle said claim with such other contractor prior to such other contractor's institution of litigation or other proceedings against the Contractor.

If such separate contractor sues the Owner on account of any damage, delay or interference caused or alleged to have been so caused by the Contractor, the Owner shall notify the Contractor, who shall defend the Owner in such proceedings at the Contractor's expense. If any judgment or award is entered against the Owner, the Contractor shall satisfy the same and shall reimburse the Owner for all damages, expenses, and other costs that the Owner incurs as a result thereof.

6.2.3 Should Contractor have a dispute with a separate contractor with whom the Owner has contracted regarding damage to the Work or the property of Contractor or to the Work or property of said separate contractor or with regard to any delays or interferences which either Contractor or said separate contractor has caused to the performance of the other's Work, Contractor agrees to attempt to settle such dispute directly with said separate contractor. Contractor agrees that it will not seek to recover from the Owner any damages, costs, expenses (including, but not limited to, attorney's fees) or losses of profit incurred by the Contractor as a result of any damage to the Work or property of the Contractor or for any delay or interference caused or allegedly caused by any separate contractor.

6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 If a dispute arises between the Contractor and separate contractors as to their responsibility for cleaning up as required by Article 4, Contractor, the Owner may clean up and charge the cost thereof to the contractor responsible as the Owner shall determine to be just.

ARTICLE 7 MISCELLANEOUS PROVISIONS

7.1 GOVERNING LAW

The provisions of this Contract shall be interpreted in accordance with the laws of the Commonwealth of Virginia.

7.2 PROVISIONS REQUIRED BY LAW DEEMED INSERTED

Each and every provision of law and clause required by law to be inserted in this Contract shall be deemed to be inserted herein, and the Contract shall be read and enforced as though it were included herein and if through mistake or otherwise, any such provision is not inserted or is not correctly inserted, then upon the application of either party, the Contract shall forthwith be physically amended to make such insertion.

7.3 SUCCESSORS AND ASSIGNS

The Owner and the Contractor each binds himself, his partners, successors, assigns and legal representatives to the other party hereto and to the partners, successors, assigns and legal representatives of such other party in respect to all covenants, agreements and obligations contained in the Contract Documents. Neither party to the Contract shall assign the Contract or sublet it without the written consent of the other, nor shall the Contractor assign any monies due or to become due to him hereunder, without the previous written consent of the Owner and the Contractor's surety.

In the event the Contractor desires to make an assignment of all or part of the Contract or any monies due or to become due hereunder, the Contractor shall file a copy of consent of surety, together with a copy of the assignment to the Owner and A/E. In the event the Contractor assigns all or any part of the monies due or to become due under this Contract, the instrument of assignment shall state that the right of assignees in and to any monies due to or to become due to Contractor shall be subject to prior liens and claims of all persons, firms and corporations that provided labor services or furnished material and equipment during the performance of the Work. The rights of assignees shall further be subject to the payment of any liens, claims, or amounts due to Federal, state, or local governments.

7.4 RIGHTS AND REMEDIES

7.4.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to, and not a limitation of, any duties, obligations, rights and remedies otherwise imposed or available by law, not inconsistent with the Contract Documents. No time limitations described in this Contract shall be construed to alter the applicable statutory period of limitations with regard to the enforcement of the obligations of the parties.

7.4.2 No action or failure to act by the Owner, A/E or Contractor shall constitute a waiver of any right or duty afforded any of them under the Contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

7.4.3 Contractor agrees that he can be adequately compensated by money damages for any breach of this Contract which may be committed by the Owner and hereby agrees that, no default, act, or omission of the Owner or the A/E, except for failure to make payments as required by the Contract Documents, shall constitute a material breach of the Contract entitling Contractor to cancel or rescind the provisions of this Contract or (unless the Owner shall so consent or direct in writing) to suspend or abandon performance of all or any part of the Work. Contractor hereby waives any and all rights and remedies to which he might otherwise be or become entitled, saving only its right to money damages.

7.5 SEVERABILITY

In the event that any provision of this Contract shall be adjudged or decreed to be invalid, such ruling shall not invalidate the entire agreement but shall pertain only to the provision in question and the remaining provisions shall continue to be valid, binding, and in full force and effect.

7.6 TESTS

7.6.1 If the Contract Documents, laws, ordinances, rules, regulations, codes, permits, resolutions or orders of any public authority having jurisdiction require any portion of the Work to be inspected, tested or approved, the Contractor shall give the Owner at least 24 hours notice of its readiness so that the Owner or the A/E or other representatives of the Owner may observe such inspection, testing or approval. The Contractor shall bear all costs of such inspections, tests or approvals conducted by public authorities. Site inspections, tests conducted on site or tests of materials gathered on site, which the Contract requires to be performed by independent testing entities, shall be contracted and paid for by the Contractor. Examples include, but are not limited to, the testing of cast-in-place concrete, foundation materials, soil compaction, pile installations, caisson bearings, and steel framing connections.

7.6.2 All materials and workmanship (if not otherwise designated by the specifications) shall be subject to inspection, examination or test by the Owner, A/E, and other representatives of the Owner, at any and all times during the manufacture and/or construction and at any and all places where such manufacture and/or construction are carried on. Special, full-sized and performance tests shall be as described in the specifications. Without additional charge, the Contractor shall furnish promptly all reasonable facilities, labor and materials necessary to make tests safe and convenient.

7.6.3 The selection of bureaus, laboratories and/or agencies for the inspection and tests of supplies, materials or equipment shall be subject to the approval of the Owner. Satisfactory documentary evidence, including but not limited to certificates of inspection and certified test reports that the material has passed the required inspection and tests must be furnished to the Owner, with a copy to the A/E, by the Contractor prior to the incorporation of the supplies, materials or equipment into the Work or at such times as to allow for appropriate action by the Owner.

7.6.4 Inspection or testing performed exclusively for the Contractor's convenience shall be the sole responsibility of the Contractor. Tests required by Contractor's or Subcontractor's error, omission or non-compliance with the Contract Documents, shall be paid for by the Contractor.

7.6.5 It is specifically understood and agreed that an inspection and approval of the materials by the Owner shall not in any way subject the Owner to pay for the said materials or any portion thereof, even though incorporated in the Work, if said materials shall in fact turn out to be unfit to be used in the Work, nor shall such inspection be considered as any waiver of objection to the Work on account of the unsoundness or imperfection of the material used.

ARTICLE 8 CONTRACT TIME

8.1 DEFINITION

8.1.1 Unless otherwise provided, the Contract Time is the period of time specified in the Contract Documents for Substantial Completion of the Work as defined herein, including authorized adjustments thereto. The Contractor shall complete his Work within the Contract Time.

8.1.2 The date of commencement of the Work is the date established in the Notice to Proceed

The Contractor shall not commence Work or store materials or equipment on site until written Notice to Proceed is issued or until the Contractor otherwise receives the Owner's written consent. The Contractor shall commence work no later than ten (10) days after the date established in the Notice to Proceed.

8.1.3 The date of Substantial Completion of the Work or designated portion thereof is the date determined by Owner when: (1) construction is sufficiently complete, in accordance with the Contract Documents, so the Owner can occupy or utilize the Work or designated portion thereof for the use for which it is intended; and (2) the Contractor has satisfied all other requirements for Substantial Completion which may be set forth in the Contract Documents.

8.1.4 The date of Final Completion of the Work is the date determined by the Owner when the Work is totally complete, to include punch list work, in accordance with the Contract Documents and the Owner may fully occupy and utilize the Work for the use for which it is intended.

8.1.5 The term “day” as used in the Contract Documents shall mean calendar days unless otherwise specifically designated.

8.2 PROGRESS AND COMPLETION

8.2.1 All time limits stated in the Contract Documents, including without limitation the date of Substantial Completion of the Work, are of the essence of the Contract.

8.2.2 The Contractor shall begin the Work on the date of commencement as defined herein. He shall carry the Work forward expeditiously with adequate forces and shall achieve Substantial and Final Completion as required by the Contract Documents.

8.3 CLAIMS FOR TIME EXTENSIONS

8.3.1 The time during which the Contractor is delayed in the performance of the Work by the acts or omissions of the Owner, the A/E or their employees or agents, acts of God, unusually severe and abnormal climatic conditions, fires, floods, epidemics, quarantine restrictions, strikes, riots, civil commotion or freight embargoes, or other conditions beyond the Contractor's control and which the Contractor could not reasonably have foreseen and provided against, shall be added to the time for completion of the Work (i.e., the Contract Time) stated in the Agreement; however, no claim by the Contractor for an extension of time for delays will be considered unless made in compliance with the requirements of this Article and other provisions of the Contract Documents.

8.3.2 The Owner shall not be obligated or liable to the Contractor for, and the Contractor hereby expressly waives any claims against the Owner on account of, any indirect or direct damages, costs or expenses of any nature which the Contractor, its Subcontractors, or Sub-subcontractor's or any other person may incur as a result of (1) any delays, reasonable or unreasonable, foreseeable or unforeseeable, which are either not caused by the acts or omissions of the Owner, its agents or employees or which arise from or out of (or due to) causes not within the control of the Owner, its agents or employees, or (2) any reasonable delay regardless of its cause, it being understood and agreed that the Contractor's sole and exclusive remedy in any such events shall be an extension of the Contract Time, but only as determined in accordance with the provisions of the Contract Documents.

8.3.3 The burden of proof to substantiate a claim for an extension of the Contract Time shall rest with the Contractor, including evidence that the cause was beyond his control. It shall be deemed that the Contractor has control over the supply of labor, materials, equipment, methods and techniques of construction and over the Subcontractors, Sub-contractors, and suppliers, unless otherwise specified in the Contract Documents.

8.3.4 In the event of changes in the Work, the Contractor must identify any additional time required in the Proposed Change Order. The Owner need not consider any time extensions for changes in the Work not included in the Proposed Change Order.

8.3.5 No time extensions will be granted as a result of the Contractor's improper or unreasonable scheduling or for the Contractor's failure to have Shop Drawings, Product Data, Samples or Manuals submitted in ample time for review under a reasonable and agreed upon schedule.

8.3.6 Delays by Subcontractors, Sub-subcontractors or suppliers will not be considered justification for a time extension, except for the same valid reasons and conditions enumerated herein.

8.3.7 The Contractor acknowledges and agrees that actual delays due to changes, suspension of work or excusable delays~~,~~ in activities which, according to the Construction Schedule, do not affect the Contract Time will not be considered to have any effect upon the Contract Time and therefore will not be the basis for a time extension.

8.3.8 The Contractor acknowledges and agrees that time extensions will be granted only to the extent that: (1) excusable delays exceed the available flexibility in the Contractor's schedule; and (2) Contractor can demonstrate that such excusable delay actually caused, or will cause, delay to the Contractor's schedule that will extend the Contract Time.

8.3.9 With respect to Suspensions of Work under Paragraph 3.6, Suspension of Work, herein, the Contractor shall be entitled to an extension of the Contract Time not to exceed the length of time that the Work was suspended (unless as determined under this Article and the other requirements of the Contract Documents that a further extension is justified and warranted) if the claim is submitted in accordance with the requirements of this Article, and if the suspension is not due to any act or omission of the Contractor, any Subcontractor or Sub-subcontractor or any other person or organization for whose acts or omission the Contractor may be liable. The Contractor's claim will be evaluated in accordance with the terms of this Article.

8.3.10 The Contractor shall not be entitled to any extension of time for delays resulting from any conditions or other causes unless it shall have given written Notice to the Owner, within seven (7) calendar days following the commencement of each such condition or cause, describing the occurrence, the activities impacted and the probable duration of the delay. The Contractor's complete claim submittal for a time extension shall be submitted no later than twenty (20) calendar days after cessation of the delay or within such other longer period as the Owner may agree in writing to allow.

8.3.11 No such extension of time shall be deemed a waiver by the Owner of his right to terminate the Contract for abandonment or delay by the Contractor as herein provided or to relieve the Contractor from full responsibility for performance of his obligations hereunder.

8.4 CHANGE ORDER WORK

8.4.1 The Contractor shall make every reasonable effort to perform Change Order work within the Contract Time and in such manner as to have minimum delaying effects on all remaining Work to be performed under the Contract. If, however, the Change Order work results in an unavoidable increase in the time required to complete the Work, an extension of the Contract Time may be granted to the Contractor for the Change Order work. The Contractor's request shall be determined in accordance with the provisions of Article 8.3, Claims for Time Extensions, herein and as follows:

.1 If the time required for performance of the Change Order work has an unavoidable, direct, delaying effect on the primary sequence of Work activities remaining after rescheduling (e.g., the critical path in CPM type scheduling), the overall Contract Time may be extended by the minimum number of days required for the Change Order work as mutually agreed upon by the Owner and the Contractor;

.2 If the time required for performance of the Change Order work does not have an unavoidable direct delaying effect on the primary sequence of Work activities but is ordered by the Owner at a time such that insufficient Contract Time remains for completion of the Change Order work (and any limited number of contingent work activities), the Contract Time may be extended by the minimum number of days required for the Change Order work as mutually agreed upon by the Owner and the Contractor but only for the Change Order work and contingent activities, All other unaffected Work shall be performed within the Contract Time;

.3 Failure of the Owner and the Contractor to agree on a Contract Time extension as specified in .1 and .2 above shall not relieve the Contractor from proceeding with and performing the Change Order work promptly, as well as in such manner as to have minimal delaying effects on all remaining Work to be performed under the Contract. Such disagreement shall be resolved as soon as practical by negotiation.

8.5 LIQUIDATED DAMAGES FOR DELAY

8.5.1 The damages incurred by the Owner due to the Contractor's failure to complete the Work within required Milestone Dates and the Contract Time, including any extensions thereof, shall be in the amount set forth in the Construction Agreement, for each consecutive day beyond the Milestone Dates or the Contract Time (Sundays and all holidays included) for which the Contractor shall fail to complete the Work.

8.5.2 The parties hereby agree that the amount of liquidated damages provided in this Contract is neither a penalty nor a forfeiture and is intended to compensate the Owner solely for the Owner's inability to use the Work for its fully intended purpose, and is not intended to, nor does said amount include: (1) any damages, additional or extended costs~~,~~ incurred by the Owner for extended administration of this Contract, or by the Owner's agents, consultants or independent contractors for extended administration of this Contract, or (2) any additional services, relating to or arising as a result of the delay in the completion of the Work. Owner shall be entitled to claim against Contractor for its actual damages ~~and~~for any damages not specifically included within the liquidated damages as set forth herein. Such damages shall be computed separately, and, together with liquidated damages, either deducted from the Contract Sum or billed to the Contractor, at the option of the Owner.

Contractor agrees that it will not challenge the per diem amounts of liquidated damages imposed pursuant to this Article 8.5 except as to whether Contractor is responsible for the delays, themselves, that have resulted in the assessment of liquidated damages. The Contractor waives any challenge as to the validity of any liquidated damages specified on the grounds that such liquidated damages allegedly are void as penalties or allegedly are not reasonably related to Owner’s actual damages.

Owner may, in its sole discretion, deduct from any payments otherwise due Contractor amounts of liquidated damages assessable under this Article 8.5. Owner’s failure to deduct liquidated damages assessable under this Article 8.5 from payments to Contractor shall not be deemed a waiver by Owner of any entitlement to such liquidated damages.

8.6 TIME EXTENSIONS FOR WEATHER

8.6.1 The Contract Time will not be extended due to inclement weather conditions that are normal to the general locality of Work site. The time for performance of this Contract includes an allowance for workdays (based on a 5-day workweek) which, according to historical data, may not be suitable for construction work.

.1 The following is the schedule of monthly anticipated normal inclement weather workdays for the Project location and will constitute the base line for monthly weather time extension evaluations.

ANTICIPATED NORMAL INCLEMENT WEATHER WORK-DAYS INCLUDED IN THE CONTRACT TIME OF PERFORMANCE											
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
7	7	7	7	9	7	7	7	6	6	6	7

8.6.2 The Contractor, in his planning and scheduling of the Work as required by the Contract Documents, shall allow for the normal inclement weather for the locality of the Work site. If the Contractor believes that the progress of the Work has been adversely affected and that it will directly result in a failure to meet

Substantial Completion within the Contract Time, by weather conditions above and beyond the amount normally expected, he shall submit a written request to the Owner, with a copy to the A/E, for an extension of time, pursuant to Paragraph 8.3, Claims for Time Extensions.

8.6.3 Such request shall be evaluated by the Owner in accordance with the provisions of the Contract Documents and shall include a comparison of actual weather statistics compiled by City of Lynchburg's Department of Public Works, for the time of year, locality of the particular Work site with the days claimed by the Contractor and the anticipated normal inclement weather as stated in subparagraph 8.6.1. The normal inclement weather expected has been included in the designated Contract Time for completion. The decision of the Owner shall be final.

8.6.4 The Contractor shall not be entitled to any money damages whatsoever for any delays resulting from inclement weather, whether normal or abnormal, foreseeable or unforeseeable. The Contractor and Owner stipulate and agree that, for delays due to weather as determined in 8.6.3, the Contractor's sole relief is a time extension granted in accordance with this Article 8.6, Time Extensions for Weather.

ARTICLE 9 PAYMENTS AND COMPLETION

9.1 CONTRACT SUM

9.1.1 The Contract Sum is stated in the Construction Agreement and, including authorized adjustments thereto, is the total amount payable by the Owner to the Contractor for the performance of the Work under the Contract Documents. The Contract Sum includes, but is not limited to, the Contractor's profit and general overhead and all costs and expenses of any nature whatsoever (including without limitation taxes, labor, equipment and materials), foreseen or unforeseen, and any increases in said costs and expenses, foreseen or unforeseen, incurred by the Contractor in connection with the performance of the Work, all of which costs and expenses shall be borne solely by the Contractor. The Contractor agrees to assume all increases in costs of any nature whatsoever that may develop during the performance of the Work.

9.2 SCHEDULE OF VALUES

9.2.1 For Lump Sum Price contracts, before the pre-construction meeting, the Contractor shall submit to the Owner and A/E a schedule of values allocated to the various portions of the Work, prepared on payment forms provided by the Owner and supported by such data to substantiate its accuracy as the Owner may require. This schedule of values, unless rejected by the Owner, shall be used as a basis for the Contractor's Applications for Payment.

9.2.2 Contractor may include in his schedule of values a line item for "mobilization" which shall include a reasonable amount for mobilization for the Contractor and his Subcontractors. The Contractor shall not front-end load his schedule of values.

9.3 APPLICATION FOR PAYMENT

9.3.1 The Contractor shall submit to the A/E three (3) originally executed, itemized Applications for Payment (and one (1) copy to the Owner) by the tenth of each month, along with any authorized change orders for that billing cycle. The Applications for Payment shall be notarized, indicate in complete detail all labor and material incorporated in the Work during the month prior to submission, and supported by such data substantiating the Contractor's payment request as the Owner may require. The Applications for Payment shall also contain Contractor’s certification that due and payable amounts and bills have been paid by the Contractor for Work for which previous Certificates of Payment were issued and payments received from the Owner.

9.3.2 Payment may be made for the value of materials, which are to be incorporated into the finished Work, and which are delivered to and suitably stored and protected on the Work site. The Contractor shall provide releases or paid invoices from the seller of such materials to establish, to the Owner's satisfaction, that the Owner has title to said material. Stored materials shall be in addition to the Work completed and shall be subject to the same retainage provisions as the completed Work. Material once paid for by the Owner becomes the property of the Owner and may not be removed from the Work site without the Owner's written permission.

9.3.3 The requirements for payment for materials stored off-site shall include, but are not limited to, those specified in Paragraph 9.3.2 and the additional requirements hereinafter specified. Material stored off-site under this provision shall be included in the definition of Work, Article 1, Contract Documents.

9.3.3.1 The requirements of Paragraph 10.2, Safety of Persons and Property, are fully applicable to materials stored off-site.

9.3.3.2 For purposes of administering this provision, the following definitions are provided.

a. Material stored NEAR the Work site: A storage location shall be considered near the Work site if it is not more than fifty (50) miles (approximately a one-hours drive) from the Work site.

b. Material stored DISTANT from the Work site: Locations beyond the limit of fifty (50) miles shall be considered distant.

9.3.3.3 All proposed off-site locations, regardless of whether they are near or distant, shall be approved by the Owner prior to any payment under this Article. The approval process will include an inspection of the proposed storage site, which may or may not coincide with any inspection of materials stored.

9.3.3.4 Prior to payment for any material stored off-site, said material shall be inspected to verify that it is properly stored; i.e., segregated, inventoried, identified as the property of the Owner and Contractor, and duly protected as required in Article 10.2, Safety of Persons and Property. This material shall be clearly identified and physically segregated from any other material or stock, in such a manner that it is clear, from casual observationthat said material is not a part of any other stock or stored material.

9.3.3.5 For materials stored distant to the Work site, the Contractor shall reimburse the Owner for all reasonable costs incurred by the Owner, to include but not limited to salary, transportation, lodging and per diem, for the Owner's or the A/E's employees to travel to and from the storage locations for the purpose of verifying that the material is properly stored. It is anticipated that such trips would occur whenever additional material is claimed for payment and/or at least every six (6) months until the material is delivered to the Work site.

9.3.3.6 Except for unusual circumstances, the Contractor will not be required to reimburse the Owner's costs for visits to storage locations near the Work site.

9.3.3.7 The Contractor shall hold the Owner harmless from any and all losses, additional costs, direct or indirect damages and/or delays, whatsoever, which may occur as a result of a failure of the Contractor to deliver (or have delivered), in a timely manner, materials (for which payment has been made) to the Work site for installation and incorporation into the Work.

9.3.3.8 The Contractor shall provide to the Owner a release of lien or other suitable certification by the seller of the materials, in addition to paid invoices, verifying that the Contractor has valid title to all materials for which payment is requested. The seller, however, shall not be required to waive his rights for recovery against Contractor or any surety if his contract is breached.

9.3.4 The Contractor warrants that title to all Work, materials and equipment covered by an Application for Payment will pass to the Owner, either by incorporation in the construction or upon the receipt of payment by the Contractor, whichever occurs first, free and clear of all liens, claims, security interests or encumbrances, hereinafter referred to as "liens". The Contractor further warrants that no Work, materials or equipment covered by an Application for Payment will have been acquired by the Contractor or by any other person performing Work at the site or furnishing materials and equipment for the Work that is subject to an agreement under which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or such other person.

9.3.5 The Contractor's Application for Payment shall provide that the payment request attests that all Work for which the request is made has been completed in full according to all the requirements of the Contract Documents. By submitting his Application for Payment, the Contractor also represents that he has no knowledge that any Subcontractors or suppliers have not been fully and timely paid and that, insofar as he knows, the only outstanding items for payment with respect to the Contract are those to be paid from the funds for which application is being made.

9.4 CERTIFICATES FOR PAYMENT

9.4.1 The A/E will, within seven (7) calendar days after the receipt of the Contractor's draft Application for Payment prior to the 10th day of the month, recommend a Certificate for Payment to the Owner, for such amount as the A/E determines is properly due, with his reasons for any withholding or adjusting a Certificate as provided in Paragraph 9.6, Payments Withheld.

9.4.2 After the Certificate for Payment is recommended by the A/E, the Owner will review it and make any changes deemed necessary by the Owner's representative. The recommendation of the Certificate for Payment by the A/E does not waive or limit the Owner's right to reduce the amount of the payment due to the Contractor as determined to be appropriate by the Owner.

9.4.3 The recommendation of a Certificate for Payment will constitute a representation by the A/E to the Owner, based on his observations at the site as provided in Article 2, Architect/Engineer, and the data comprising the Application for Payment, that the Work has progressed to the point indicated; that, to the best of his knowledge, information and belief: (1) the quality of the Work is in accordance with the Contract Documents (subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial or Final Completion, to the results of any subsequent tests required by or performed under the Contract Documents, to minor deviations from the Contract Documents correctable prior to completion, and to any specific qualifications stated in his Certificate); and that (2) the Contractor is entitled to payment in the amount certified. However, by recommending a Certificate for Payment, the A/E shall not thereby be deemed to represent that he has made exhaustive or continuous on-site inspections to check the quality or quantity of the Work or that he has reviewed the construction means, methods, techniques, sequences or procedures, or that he has made any examination to ascertain how or for what purpose the Contractor has used the moneys previously paid on account of the Contract Sum.

9.4.3.1.1 The Application for Payment shall be on a form approved by the Owner. Payment for stored material delivered but not incorporated in the work will be the invoiced amount only. Stored materials drawdown shall be approved by the Owner. Submit applicable invoices with Application for Payment. Monthly partial payment request shall be submitted in **TRIPLICATE** to Owner’s representative for approval by the 25th of the month so that the Owner can approve payment request by the first working day of the next month. Partial payments shall be made on a monthly basis on or before the end of the next month for which the Work was performed, in accordance with the Contract Documents.

9.4.3.1.2 The Owner shall pay to the Contractor 95 percent of the total amount due and the Owner shall retain five (5) percent of the amount due until all work has been performed strictly in

accordance with the Contract Documents and until such work has been accepted by the Owner.

9.5.1 The Owner shall make payment in the manner and within thirty (30) calendar days after receipt of the Certificate of Payment from the A/E based upon the Owner's approval or adjustment of said Certificate. The Contractor shall be paid the amount approved or adjusted by the Owner, less 5% retainage which is being held to assure faithful performance; provided however, that said retainage is not applicable to Time and Material Change Orders.

9.5.1.1 In relation to punch list or other uncompleted Work and in lieu of a portion of the above-specified five-percent 5% retainage, the Owner may, at its sole discretion, elect to retain fixed amounts directly relating to the various items of uncompleted Work. All amounts withheld shall be included in the Final Payment.

9.5.2 The Contractor shall, within seven (7) days after receiving payment from the Owner, do one of the following:

9.5.2.1 Pay all Subcontractors for the proportionate share of the total payment received from the Owner for Work performed by each Subcontractor under the Contract; or

9.5.2.2 Notify the Owner and Subcontractor(s), in writing, of his intention to withhold all or part of the Subcontractor's payment with the reason for nonpayment.

9.5.3 The Contractor shall make payment to Subcontractors as heretofore specified. Each payment shall reflect the percentage actually retained, if any, from payments to the Contractor on account of such Subcontractor's Work.

9.5.4 The Contractor shall provide the Owner with his social security number, if an individual, or his federal identification number, if a corporation, partnership, or other entity.

9.5.5 The Contractor shall pay unpaid Subcontractors interest on payments that are not made in accordance with this Article 9.5, Progress Payments. The rate of interest shall be in compliance with the Prompt Payment section of the Virginia Public Procurement Act of the Code of Virginia. The Contractor shall, by an appropriate agreement with each Subcontractor, require each Subcontractor to make payments to his Sub-subcontractors according to all the same requirements as provided in this Article 9.5 Progress Payments.

9.5.6 The Owner may, upon written request, furnish to any Subcontractor, if practicable, information regarding the percentages of completion or the amounts applied for by the Contractor and the action taken thereon by the Owner on account of Work done by such Subcontractor.

9.5.7 Neither the Owner nor the A/E shall have any obligation to pay or to see to the payment of any monies to any Subcontractor except as may otherwise be required by law.

9.5.8 No Certificate for Payment, nor any payment, nor any partial or entire use or occupancy of the Project by the Owner, shall constitute an acceptance of any Work not in accordance with the Contract Documents, nor shall it waive any right or claim by Owner based upon the Work, or any portion of the Work, including Work for which payment has been made, not conforming to the requirements of the Contract Documents.

9.6 PAYMENTS WITHHELD

9.6.1 The Owner may withhold the payment in whole or in part, if necessary to reasonably protect the Owner. If the A/E is unable to make representations as provided in subparagraph 9.4.3 and to recommend payment in the amount of the application, he will notify the Owner as provided in subparagraph 9.4.1. If

the Contractor and the Owner cannot agree on a revised amount, the Owner will promptly issue a Certificate for Payment for the amount for which he is able to make representations with respect to payment, due for Work performed. The Owner may also decline to certify or make payment because of subsequently discovered evidence or subsequent observations, and the Owner may nullify the whole or any part of any Certificate for Payment previously issued.

9.6.2 The Owner may withhold from the Contractor so much of any payment approved by the A/E, as may in the judgment of the Owner be necessary:

.1 To protect the Owner from loss due to defective work not remedied;

.2 To protect the Owner upon receipt of notice of the filing in court or in an arbitration proceeding as may be required in any third party contract, of verified claims of any persons supplying labor or materials for the Work, or other verified third party claims;

.3 To protect the Owner upon reasonable evidence that the Work will not be completed for the unpaid balance of the Contract Sum;

.4 To protect the Owner upon reasonable evidence that the Work will not be completed within the Contract Time established by this Contract; or

.5 To protect the Owner upon the Contractor's failure to properly schedule and coordinate the Work in accordance with or as required by the Contract Documents, or failure to provide progress charts, revisions, updates or other scheduling data as required by the Contract Documents, or upon the Contractor's failure to provide as-built drawings as required herein, or upon Contractor's failure to otherwise substantially or materially comply with the Contract Documents.

9.6.3 If required by the Contract Documents, the Contractor shall, concurrent with his submission of the Construction Schedule, submit a practicable and realistic payment schedule showing the dates on which the Contractor will submit each and every Application for Payment and the amount he expects to receive for each and every monthly progress payment. If during the performance of the Work, the Contractor expects to receive an amount for a monthly progress payment larger than that indicated on the payment schedule, the Contractor shall notify the Owner at least thirty (30) days in advance of that payment so that the necessary allocation of funds can be processed. If Contractor fails to submit a practicable and realistic payment schedule, the Contractor's Application for Payment shall be honored only to the extent that the Work is actually performed and that the proportion of payments made to the Contract Sum does not exceed the proportion of the Contract Time expired as of the time of the request.

9.7 FAILURE OF PAYMENT

If the Owner does not make payment to the Contractor within the thirty (30) calendar days after receipt of the Contractor's Application for Payment by the A/E through no fault of Contractor, and the Owner otherwise not being entitled under the Contract Documents or applicable law to withhold payment, then the Contractor may, upon fifteen (15) additional days' written Notice to the Owner and the A/E, stop the Work until payment of the amount owing has been received. In such event, the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, which shall be effected by appropriate Change Order as provided herein.

9.8 SUBSTANTIAL COMPLETION AND GUARANTEE BOND

9.8.1 Unless otherwise specified in Article 9.9, Final Completion and Final Payment, when the Contractor considers that the Work, or a designated portion thereof which is acceptable to the Owner, is substantially complete as defined in Article 8, Contract Time, the Contractor shall request in writing that the A/E and

the Owner perform a Substantial Completion inspection including a compilation of a punch list of items by the A/E on belahf of the Owner. Prior to such inspection the Contractor shall:

.1 If applicable, secure a Certificate of Occupancy for the Project or a designated portion thereof; and

.2 Submit five (5) copies each of the Operations and Maintenance Manuals to the A/E as specified and one (1) copy to the Owner.

9.8.2 The A/E on behalf of the Owner shall determine whether the Work is substantially complete and shall compile a punch list of items to be completed or corrected. The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

9.8.3 When the Owner on the basis of his inspection determines that the Work or a designated portion thereof is substantially complete, the A/E will then prepare a Certificate of Substantial Completion which shall establish the Date of Substantial Completion and shall state the responsibilities of the Owner and the Contractor for security, maintenance, heat, utilities, damage to the Work and insurance. The Certificate of Substantial Completion shall be submitted to the Owner and the Contractor for their written acceptance of the responsibilities assigned to them in such Certificate.

9.8.4 The Contractor shall have thirty (30) days from the Date of Substantial Completion to complete all items on the punch list to the satisfaction of the Owner. If the Contractor fails to complete all punch list items within the designated time, the Owner shall have the option to correct or conclude any remaining items by utilizing its own forces or by hiring others. The cost of such correction of remaining punch list items by the Owner or others shall be deducted from the final payment to the Contractor, and if the Owner has not retained sufficient funds to cover the cost, Contractor or its surety shall pay the difference within 30 days of a written demand by the Owner to do so.

9.8.5 Guarantees and warranties required by the Contract Documents shall commence on the Date of Final Completion of the Work, unless otherwise provided in the Certificate of Substantial or Final Completion, or the Contract Documents. Provided, however~~,~~ that if Contractor does not complete certain punch list items within the time period~~,~~ specified in 9.8.4, all warranties and guarantees for such incomplete Punch List items shall become effective upon issuance of final payment for the Work.

9.8.5.1 The Contractor shall guarantee for a term of one (1) year from the date of Final Completion or Final Payment, whichever comes later, (unless otherwise provided for in the Certificate(s) of Substantial or Final Completion or the Contract Documents): (1) the quality and stability of all materials equipment and Work; (2) all the Work against defects in materials, equipment or workmanship; and (3) all shrinkage, settlement or other faults of any kind which are attributable to defective materials or workmanship. The Contractor shall remedy at his own expense, when so notified in writing to do so by the Owner, and to the satisfaction of the Owner, the Work or any part thereof that does not conform to any of the warranties and guaranties described in the Contract Documents~~.~~ or that otherwise does not conform to the requirements of the Contract Documents

9.8.5.2 In order to make good the guarantee as herein required, the Contractor shall deposit with the Owner, after Substantial Completion but before Final Payment, a Guarantee Bond(s) issued by a surety licensed to do business in Virginia and otherwise acceptable to the Owner, for the faithful performance of the guarantee. Said Bond(s) shall be for a period of one (1) year from the date the guaranties and warranties commence and in the amount of five percent (5%) of the final gross value of the Contract.

9.8.5.3 The Contractor shall complete repairs during the guarantee period, within five (5) working days after the receipt of Notice from the Owner, and if the Contractor shall fail to complete such repairs within the said five (5) working days, the Owner may employ such other person or persons as it may deem proper to make such repairs and pay the expenses thereof out of any sum retained by it, provided nothing herein contained shall limit the liability of the Contractor or his surety to the Owner for non-performance of the Contractor's obligations at any time.

9.8.6 The issuance of the Certificate of Substantial Completion does not indicate final acceptance of the Work by the Owner, and the Contractor is not relieved of any responsibility for the Work except as specifically stated in the Certificate of Substantial Completion.

9.8.7 Upon Substantial Completion of the Work, or designated portion thereof, and upon application by the Contractor and certification by the A/E, the Owner shall make payment, adjusted for retainage and payments withheld, if any, for such Work or portion thereof, as provided in the Contract Documents.

9.8.8 Should the Owner determine that the Work or a designated portion thereof is not substantially complete, he shall provide the Contractor a written Notice stating why the Work or designated portion is not substantially complete. The Contractor shall expeditiously complete the Work and shall re-request in writing that the Owner perform a Substantial Completion inspection.

9.9 FINAL COMPLETION AND FINAL PAYMENT

9.9.1 A Certificate of Final Completion shall be issued by the A/E prior to final payment. At the Owner's sole option, this Final Completion Certificate may be issued without a Certificate of Substantial Completion. The Contractor, prior to application for Final Payment and within the time specified for completion of the Work, shall complete all Work, to include punch list items and provide operation and maintenance manuals and as-built data, for the Work, as completed and in place. Said Certificate of Final Completion shall be issued, even if a Certificate of Substantial Completion has been issued previously and temporary authority to operate the Work has been granted.

9.9.1.1 The Certificate of Final Completion shall certify that all Work has been completed in accordance with Contract Documents and is ready for use by the Owner.

9.9.2 For all projects where Substantial Completion Certificates have been issued for various portions of the Work, at differing times, the Contractor shall request and the Owner shall, prior to final payment, issue a Certificate of Final Completion which certifies that all required Work, including punch list items, has been completed in accordance with the Contract Documents.

9.9.3 Neither the final payment nor any remaining retainage shall become due until the Contractor submits to the A/E the following:

.1 An Application for Payment for all remaining monies due under the -Contract.

.2 Consent of surety to final payment;

.3 If required by the Owner, other data establishing payment or satisfaction of all such obligations, such as receipts, releases and waivers of claims arising out of the Contract, to the extent and in such form as may be designated by the Owner. If any Subcontractor refuses to furnish waiver of claims satisfactory to the Owner, the Contractor shall furnish a bond satisfactory to the Owner to indemnify Owner against any such claim. If any such claim remains unsatisfied after all payments are made, the Contractor shall refund to the Owner all monies that the latter may be compelled to pay in discharging such claim, including all costs and reasonable attorneys' fees;

.4 As-built drawings, operation and maintenance manuals and other project closeout submittals, as required by the Contract Documents;

.5 Construction releases as required by the Contract Documents from each property owner on whose property an easement for construction of the Work has been obtained by the Owner, such release to be in the forms to be provided by the Owner. This release is for the purpose of releasing the Owner and the Contractor from liability, claims, and damages arising from construction operations on or adjacent to the easement and includes proper restoration of the property after construction. It shall be the Contractor's sole responsibility to obtain all such releases and furnish them to the Owner; and

.6 A written certification that:

.1 The Contractor has reviewed the requirements of the Contract Documents,

.2 The Work has been inspected by the Contractor for compliance with all requirements of the Contract Documents,

.3 Pursuant to this inspection, the Contractor certifies and represents that the Work complies in all respects with the requirements of the Contract Documents,

.4 The Contractor further certifies and represents that all equipment and systems have been installed in accordance with the Contract Documents and have been tested in accordance with specification requirements and are operational, and

.5 The Contractor hereby certifies and represents that the Work is complete in all respects and ready for final inspection.

9.9.4 Upon receipt of the documents required in subparagraph 9.9.3 and upon receipt of a final Application for Payment, the A/E and Owner will promptly make a final inspection. When the A/E finds the Work acceptable under the Contract Documents and the Contract fully performed, he will issue within seven (7) days a final Certificate for Payment and a Final Certificate of Completion.

The Certificate of Completion will state that to the best of his knowledge, information and belief, and on the basis of his observations and inspections, the Work has been completed in accordance with the terms and conditions of the Contract Documents and that the entire balance designated in the final Certificate for Payment is due and payable. The final Certificate for Payment will constitute a further representation that the conditions precedent to the Contractor's being entitled to final payment as set forth in Subparagraph 9.9.3 have been fulfilled. The Owner shall review the Certificate of Payment and shall accept it and issue final acceptance, or reject it and notify the Contractor, within ten (10) days. Final payment to the Contractor shall be made within thirty (30) days after final acceptance. All prior estimates and payments, including those relating to Change Order work, shall be subject to correction by this final payment.

9.9.5 The making of Final Payment shall constitute a waiver of all claims by the Owner, except those arising from:

.1 Unsettled claims;

.2 Faulty, defective, or non-conforming Work discovered or appearing after Substantial or Final Completion;

.3 Failure of the Work to comply with the requirements of the Contract Documents;

.4 Terms of any warranties or guarantees required by the Contract Documents; or

.5 Fraud or bad faith committed by the Contractor or any subcontractor or supplier during performance of Work but discovered by Owner after Final Payment.

9.9.6 The acceptance of Final Payment shall constitute a waiver of all claims by the Contractor, except those previously made in writing and so identified by the Contractor~~,~~ as unsettled at the time of the final Application for Payment. No payment, however, final or otherwise, shall operate to release the Contractor or his sureties from any obligations under this Contract or the Performance, Payment, or Guarantee Bonds.

ARTICLE l0 PROTECTION OF PERSONS AND PROPERTY

10.1 SAFETY PRECAUTIONS AND PROGRAMS

10.1.1 The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. The requirement applies continuously throughout the Contract performance, until Final Payment is made, and is not limited to regular working hours.

10.2 SAFETY OF PERSONS AND PROPERTY

10.2.1 The Contractor shall take all reasonable precautions for the safety of, and shall provide all reasonable protection to prevent damage, injury or loss to:

.1 All persons performing any of the Work and all other persons who may be affected thereby;

.2 All the Work and all materials and equipment to be incorporated therein, whether in storage on or off the site, under the care, custody or control of the Contractor or any of his Subcontractors or Sub-subcontractor's. Machinery, equipment and all hazards shall be guarded or eliminated in accordance with the safety provisions of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable law; and

.3 Other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

10.2.2 The Contractor shall give all notices and comply with all applicable laws, ordinances, codes, rules, regulations, permits, resolutions and lawful orders of any public authority bearing on the safety of persons or property or their protection from damage, injury or loss.

The Contractor shall at all times safely guard the Owner's property from injury or losses in connection with the Contract. Contractor shall at all times safely guard and protect his Work and adjacent property as provided by law and the Contract Documents, from damage. All passageways, guard fences, lights and other facilities required for protection by local authorities or local conditions must be provided and maintained without additional cost to the Owner.

10.2.3 The Contractor shall erect and maintain, as required by existing conditions and progress of the Work, all reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent utilities.

10.2.4 When the use or storage of explosives or other hazardous materials or equipment is necessary for the execution of the Work, the Contractor shall exercise the utmost care and shall carry on such activities under the supervision of properly qualified personnel.

10.2.5 The Contractor is responsible for the proper packing, shipping, handling and storage (including but not limited to shipment or storage at the proper temperature and humidity) of materials and equipment to be incorporated in the Work, so as to insure the preservation of the quality and fitness of the materials and equipment for proper installation and incorporation in the Work, as required by the Contract Documents.

For example, but not by way of limitation, Contractor shall, when necessary, place material and equipment on wooden platforms or other hard and clean surfaces and not on the ground and/or place such material and equipment under cover or in any appropriate shelter or facility. Stored materials or equipment shall be located so as to facilitate proper inspection. Material and equipment that is delivered crated shall remain crated until ready for installation. Lawns, grass plots or other private property shall not be used for storage purposes without the written permission of the owner or lessee unless otherwise within the terms of the easements obtained by the Owner.

10.2.6 In the event of any indirect or direct damage to public or private property referred to in Paragraphs 10.2.1.2 and 10.2.1.3, caused in whole or in part by an act, omission or negligence on the part of the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable, the Contractor shall at his own expense and cost promptly remedy and restore such property to a condition equal to or better than existing before such damage was done. The Contractor shall perform such restoration by underpinning, replacing, repairing, rebuilding, replanting, or otherwise restoring as may be required or directed by the Owner, or shall make good such damage in a satisfactory and acceptable manner. In case of failure on the part of the Contractor to promptly restore such property or make good such damage, the Owner may, upon two (2) calendar days written Notice, proceed to repair, replace, rebuild or otherwise restore such property as may be necessary and the cost thereof, or a sum sufficient in the judgment of the Owner to reimburse the owners of property so damaged, will be deducted from any monies due or to become due the Contractor under the Contract. If insufficient monies remain due or will become due to pay such sum, Contractor or its surety shall, within 30 days of receipt of a written demand from Owner to do so, pay Owner such sum.

10.2.7 The Contractor shall designate a responsible member of his organization at the site whose duty shall be the prevention of accidents and the protection of material, equipment and other property. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner.

10.2.8 The Contractor shall not load or permit any part of the Work to be loaded so as to endanger the safety of any portion of the Work.

10.2.9 The Contractor shall give notice in writing at least forty-eight (48) hours before breaking ground, to all persons, Public Utility Companies, owners of property having structures or improvements in proximity to site of the Work, superintendents, inspectors, or those otherwise in charge of property, streets, water pipes, gas pipes, sewer pipes, telephone cables, electric cables, railroads or otherwise, who may be affected by the Contractor's operation, in order that they may remove any obstruction for which they are responsible and have representative(s) on site to see that their property is properly protected. Such notice does not relieve the Contractor of responsibility for any damages and claims. Nor does such notice relieve the Contractor from his responsibility to defend and indemnify the Owner from actions resulting from the Contractor’s performance of such work in connection with or arising out of the Contract.

10.2.10 The Contractor shall protect all utilities encountered while performing its work, whether indicated on the Contract Drawings or not. The Contractor shall maintain utilities in service until moved or abandoned. The Contractor shall exercise due care when excavating around utilities and shall restore any damaged utilities to the same condition or better as existed prior to starting the Work, at no cost to the Owner. The Contractor shall maintain operating utilities or other services, even if they are shown to be abandoned on the drawings, in service until new facilities are provided, tested and ready for use.

10.2.11 The Contractor shall return all improvements on or about the site and adjacent property which are not shown to be altered, removed or otherwise changed to conditions which existed prior to starting the Work.

10.2.12 The Contractor shall protect the Work, including but not limited to, the site, stored materials and equipment, excavations, and excavated or stockpiled soil or other material, intended for use in the Work, and shall take all necessary precautions to prevent or minimize damage to same and to prevent detrimental effect upon his performance or that of his Subcontractors, caused by or due to rain, snow, ice, run-off, floods, temperature, wind, dust, sand and flying debris. For example, but not by way of limitation, Contractor shall, when necessary, utilize temporary dikes, channels or pumping to carry-off, divert or drain water, and shall as necessary tie-down or otherwise secure the Work and employ appropriate covers and screens.

10.3 OBLIGATION OF CONTRACTOR TO ACT IN AN EMERGENCY

10.3.1 In case of an emergency that threatens immediate loss or damage to property and/or safety of life, the Contractor shall act to prevent threatened loss, damage, injury or death. The Contractor shall notify the Owner of the situation and all actions taken immediately thereafter. If the Contractor fails to act and any loss, damage, injury or death occurs that could have been prevented by the Contractor's prompt and immediate action, the Contractor shall be fully liable to the Owner or any other party for all costs, damages, claims, actions, suits, costs of defense, and all other expenses arising therefrom or relating thereto.

10.3.2 Prior to commencing the Work and at all times during the performance of the Work, the Contractor shall provide the Owner two, twenty-four hour (24) emergency phone numbers where his representatives can be contacted at any time.

ARTICLE 11 INSURANCE FOR CONTRACTS

11.1 CONTRACTOR'S INSURANCE

11.1.1 During the term of this Contract, the Contractor shall procure and maintain insurance coverages with insurance companies rated by A. M. Best Company as A – VIII or better. The company(ies) shall be authorized to do business under the laws of the Commonwealth of Virginia and be acceptable to the City of Lynchburg and shall provide the following minimum types of insurance:

a. **Commercial General Liability Insurance** – This will cover claims for Bodily Injury, Property Damage, Personal and Advertising Injury, Products and Completed Operations, which may arise from operations under the Contract, whether such operations be performed by the Contractor or by any Subcontractor or Independent Contractor, or by anyone directly or indirectly employed by any of them. Such insurance shall include coverages "X", "C" and "U" for explosion, collapse of other structures and underground utilities, as well as Contractual Liability Insurance covering the requirements outlined in the General Conditions. This insurance shall name the Owner, A/E and their respective employees as additional insureds ***by endorsement*** to the Commercial General Liability policy. Such policy shall not have a restriction on the limits of coverage provided to the additional insured. The additional insuredshall be entitled to protection up to the full limits of the Contractor's policy regardless of the minimum requirements specified in this Contract. If endorsements to the Commercial General Liability insurance policies cannot be made, then separate policies providing such protection shall be purchased by the Contractor.

1. The Policy shall have the following ***minimum*** limits:

$1,000,000 Each Occurrence Limit

$1,000,000 General Aggregate Limit
$1,000,000 Personal and Advertising Injury Limit
$1,000,000 Products and Completed Operations Aggregate Limit
$5,000 Medical Expense Limit

This insurance shall include the following provisions and /or endorsements:

1) The General Aggregate limit shall apply on a “per project” and on a “per location” basis;
2) Coverage shall apply to all liability arising from all premises and operations conducted by the Contractor, Subcontractors and independent contractors;
3) The Contractor agrees that liability arising from Products and Completed Operations will be covered. Such liability coverage will be maintained for two years after completion of the Work.
4) The Contractor shall require each of his Subcontractors to procure and maintain Commercial General Liability Insurance of the type specified in these Contract Documents in the minimum amounts required by the Owner and the Contractor (which shall be the amounts required by this paragraph 11.1.1. of Contractor unless otherwise agreed in writing by Owner), during the term of their subcontracts.

b. **Worker's Compensation and Employer's Liability Insurance** for the Contractor's employees engaged in the Work under this Contract, in accordance with statutory requirements of the Commonwealth of Virginia. The Contractor shall require each of his Subcontractors to provide Worker's Compensation and Employer's Liability Insurance for all of the Subcontractor's employees engaged on such subcontracts. If any class of employees engaged on Work under the Contract is not protected under the Worker's Compensation statute, the Contractor shall provide similar protection for these employees in amounts not less than the legal requirements. The amount of Employer's Liability Insurance for the Contractor and each of his Subcontractors shall be not less than:

$100,000 per employee for Bodily Injury.
$100,000 per employee for disease
$500,000 per policy for disease

The Worker's Compensation and Employer's Liability Insurance policy shall include an "all states" or "other states" endorsement.

c. **Commercial Automobile Liability Insurance**, including coverage for owned, hired, non owned and borrowed vehicles used in the work with ***minimum*** limits of $1,000,000 Combined Single Limit per occurrence. This insurance shall name the Owner, City, A/E and their respective employees as additional insureds ***by endorsement*** to the Commercial Automobile Liability policy. Such policy shall not have a restriction on the limits of coverage provided to the additional insured. The additional insured shall be entitled to protection up to the full limits of the Contractor’s policy regardless of the minimum requirements specified in this Contract.

d. **Umbrella Liability or Excess Liability** Insurance with the following minimum limits of:

$5,000,000 Each Occurrence
$5,000,000 Annual Aggregate

The following policies shall be scheduled as underlying policies:

Commercial General Liability
Commercial Automobile Liability
Employers Liability

This insurance shall name the Owner, City, A/E and their respective employees as additional insureds ***by endorsement*** to the Umbrella or Excess Liability policy. Such policy shall not have a restriction on the limits of coverage provided to the Greater Lynchburg Transit Company as an additional insured. The Greater Lynchburg Transit Company shall be entitled to protection up to the full limits of the Contractor's policy regardless of the minimum requirements specified in this Contract.

11.1.2 Proof of insurance for each type of coverage listed herein shall be provided within 10 days after issuance of the award letter for the Contract, and no Work shall proceed unless all such insurance is in effect. The Contractor shall not allow any Subcontractor to commence work on his subcontract until all such insurance of the Subcontractor has been so obtained and approved by the Contractor and found to be in accordance with the requirements set forth herein. The Contractor certifies by commencement of the Work that his insurance and that of Subcontractors is in effect and meets the requirements set forth herein.

11.1.3 The Contractor shall purchase and maintain required liability and all other insurance as is appropriate for the Work being performed and furnished. The insurance shall provide protection from claims which may arise out of or result from Contractor's performance and furnishing of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed or furnished by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

a. claims under Worker's Compensation, Employers Liability, disability benefits, and other similar employee benefit acts;

b. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

c. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

d. claims for damages insured by personal injury liability coverage which are sustained: (1) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor; or (2) by any other person for any other reason;

e. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

g. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance, or use of any motor vehicle.

11.1.4 The insurance required to be purchased and maintained by the Contractor shall:

a. include completed operations insurance;

b. with respect to any other insurance coverage written on a claims-made basis, remain in effect for at least 2 years after final payment (and Contractor shall furnish the Owner and A/E evidence satisfactory to the Owner of continuation of such insurance at final payment and 1 year thereafter);

c. contain a cross liability or severability of interest clause or endorsement. Insurance covering the specified additional insureds shall be primary insurance, and all other insurance carried by the additional insureds shall be excess insurance.

11.1.5 All of the aforesaid insurance policies must be endorsed to provide that the insurance company ***shall give 30 days written notice to the Owner*** if the policies are to be terminated or if any changes are made during the Contract period which will affect in any way the insurance provided pursuant to such policy. Before

starting the Work, the Contractor shall provide the Owner with a copy of each policy that he and each of his Subcontractors is required to carry in accordance with this Article 11, together with receipted bills evidencing proof of premium payment. These policies shall contain endorsements to the policies naming the Greater Lynchburg Transit Company as an additional insured as required.

11.1.6 Nothing contained herein shall effect, or shall be deemed to affect, a waiver of the Owner's sovereign immunity under law.

ARTICLE 12 CHANGES AND MODIFICATIONS IN THE WORK

12.1 CHANGES IN THE WORK

12.1.1 The Owner, without invalidating the Contract and without notice to the surety, may order a change to the Work consisting of additions, deletions or other revisions to the general scope of the Contract, or changes in the sequence of the performance of the Work. The Contract Sum and the Contract Time shall be adjusted accordingly. All such changes in the Work shall be authorized by Change Order, Modification, or Change Directive, and all Work involved in a change shall be performed in accordance with the terms and conditions of the Contract Documents. If the Contractor should proceed with a change in the Work upon an oral order, by whomsoever given, it shall constitute a waiver by the Contractor of any claim for an increase in the Contract Sum and/or Contract Time, on account thereof.

12.2 FIELD ORDER

12.2.1 A Field Order is a written order to the Contractor signed by the Owner’s designated representative, interpreting or clarifying the Contract Documents or directing the Contractor to perform minor changes in the Work. Any work relating to the issuance of a Field Order shall be performed promptly and expeditiously and without additional cost to the Owner and within the Contract Time, unless the Contractor submits a Proposed Change Order, defined below, which is approved by the Owner. Field Orders shall be numbered consecutively by date of issuance by the Owner.

12.3 OWNER CHANGE REQUEST

12.3.1 An Owner Change Request is a written request from the Owner to the Contractor that describes a proposed change in the Work. The Contractor is required to submit a complete proposal for the total cost and additional time, if any, necessary to perform the proposed change in the Work. Owner Change Requests shall be numbered consecutively by date of issuance by the Owner.

12.4 CONTRACTOR'S PROPOSED CHANGE ORDER

12.4.1 A Contractor's Proposed Change Order is a written request from the Contractor to the Owner requesting a change in the Contract Sum and/or Contract Time. A Contractor's Proposed Change Order is submitted as a proposal in response to a Owner Change Request or as a claim for an increase in the Contract Sum or Contract Time pursuant to the issuance of a Field Order, or as a result of unforeseen circumstances, such as an unknown site conditions.

Change Orders for unforeseen site conditions will only be entertained if the Contractor has not accepted responsibility for the unforeseen site conditions pursuant to other provisions in the Contract Documents. A Contractor's Proposed Change Order must be submitted within twenty (20) calendar days of the issuance of a Owner Change Request or a Field Order or the discovery of an unforeseen circumstance. The Contractor shall not be entitled to any adjustment to the Contract Time or Contract Sum if Contractor fails to comply strictly with the requirements of the preceding sentence. Contractor's Proposed Change Orders shall be numbered consecutively by date of issuance by the Contractor. The Contractor shall also indicate on the Proposed Change Order the number of the Owner Change Request

or the Field Order to which it responds. The Contractor understands and agrees to the Owner's provisions and policy regarding Change Orders as outlined in Article 1, section 1.1.2 of these General Conditions.

12.4.2 In the case of unit price items, it is understood and agreed by the Contractor that the estimates of the quantities in unit price items are approximate only and are presented solely for the purpose of comparing bids and may not represent the actual amount of work to be performed. The Contractor, therefore, understands and agrees that the Owner reserves the right to increase, decrease or eliminate entirely the quantity of work to be done under any item. If called upon to do more work under any unit price item named in the Bid Documents, he will perform all such additional work and accept as payment the unit price named in the proposal, subject to the 20% deviation limitations specified in subparagraph 12.4.2.2.

12.4.2.1 The Contractor's Proposed Change Order shall be determined by applicable unit prices, if any, as set forth in the Contract.

12.4.2.2 However, if changes in quantities are of an item increase the actual work to more than twenty percent (20%) of the original bid quantity for that item, or decrease quantities of that item more than 20% of the original bid quantity for that item, then the Owner or the Contractor shall have the right to request a decrease or an increase in the unit price for the item for quantities greater than 120% or less than 80% of the original bid quantity for that item.

12.4.2.3 It shall be understood that such unit prices shall constitute full payment for the extra work performed, including, but not limited to, “general conditions” costs, plant, materials, labor, equipment, overhead, profit, and safety requirements.

12.4.3 If no such unit prices are set forth, the Contractor's proposal shall be on a lump sum basis and shall be itemized and segregated by labor, equipment, and materials for the various components of the change in the Work (no aggregate labor total will be acceptable) and shall be accompanied by signed proposals of any Subcontractors who will perform any portion of the change in the Work and of any persons who will furnish materials or equipment for incorporation therein.

12.4.3.1 The portion of the proposal relating to labor, whether by the Contractor's forces or the forces of any of its Subcontractors, may include reasonably anticipated gross wages of job site labor, including foremen, who will be directly involved in the change in the Work (for such time as they will be so involved), plus separately identified payroll costs (including premium costs of overtime labor, if overtime is authorized, Social Security, Federal or State unemployment insurance taxes and fringe benefits required by collective bargaining agreements entered into by the Contractor or any such Subcontractor in connection with such labor).

12.4.3.2 The portion of the proposal relating to materials may include the reasonably anticipated direct costs to the Contractor or to any of its Subcontractors of materials to be purchased for incorporation in the change in the Work, plus transportation and applicable sales or use taxes.

12.4.3.3 The proposal may further include the Contractor's and any of his Subcontractor's reasonably anticipated equipment rental costs, except small hand tools, in connection with the change in the Work.

12.4.4 Base Cost is defined as the total of labor, material and equipment rentals as described in subparagraphs 12.4.3.1, 12.4.3.2 and 12.4.3.3. The actual net cost in money to the Owner for the change in the Work shall be computed as follows:

.1 If the Contractor performs the change in the Work without use of Subcontractors or sub-subcontractors, his compensation will be the Base Costs as described above, plus a maximum mark-up of 15% for overhead and profit.

.2 If the work is performed by a bona fide Subcontractor, the Subcontractor's compensation will be the Base Costs as described above plus a maximum mark-up of 15% for overhead and profit. The Contractor's compensation will be a maximum mark-up of five percent (5%) of the Subcontractors Base Costs for his overhead and profit.

.3 If the Work is performed by a bona fide Sub-subcontractor, the Subcontractor's compensation will be the Base Costs as herein described, plus a maximum mark-up of 15% for overhead profits. The mark-up of any Sub-subcontractor's work by the Contractor and all intervening tiers of Subcontractors shall not exceed a total of 10%.

12.4.5 The mark-up on the cost of labor, materials, and equipment described in Paragraphs 12.4.4.1, 12.4.4.2, and 12.4.4.3 shall be all the compensation to which the Contractor, Subcontractors and Sub-subcontractor are entitled for all indirect costs associated with or relating to the change in the Work including, but not limited to, labor and/or equipment inefficiency, changes in sequence, delays, interferences, impact on unchanged work, gross receipts tax, superintendent, small tools, reproduction, administration, insurance, unrelated safety requirements, temporary structures and offices, all other general and administrative, home office and field office expenses.

12.4.6 The Proposed Change Order may also include the cost of increases in premiums for the Payment Bond and the Performance Bond, provided coverage for the cost of the change in Work results in such increased costs. At the Owner's request, the Contractor shall provide proof of his notification to the surety of the change in the Work and of the surety's agreement to include such change in its coverage. The cost of the increase in premiums shall not be marked up.

12.4.7 In the event that it is necessary to increase the Contract Time in order to perform the change in the Work, the Contractor shall provide an estimate of the increase in the Contract Time as part of the Proposed Change Order. The Contractor's request for a time extension shall be evaluated in accordance with the criteria described in Article 8.3, Claims for Time Extensions.

12.4.8 If the Contractor's Proposed Change Order is rejected by the Owner as being within the scope of the Work required by the Contract Documents, the Owner may, at its sole option and discretion, direct the Contractor to perform the Work which is the subject of the said Proposed Change Order, with claimed compensation to be accounted for pursuant to 12.6 and to be subject to the procedures of Article 13. The Contractor shall then promptly proceed with said Work. Nothing herein shall excuse the timely performance by the Contractor of the Work because any Proposed Change Order is pending.

12.5 CHANGE ORDER

12.5.1 A Change Order is a written order to the Contractor signed by the Owner, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract Sum and/or the Contract Time. The Contract Sum and the Contract Time may be changed only by Change Order. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract Sum and/or the Contract Time. Change Orders shall be numbered consecutively by date of issuance by the Owner and shall, if applicable, indicate the number of the Field Order(s), Request for Proposal(s) and/or Proposed Change Order(s) to which they relate.

12.5.1.1 If the Owner determines that the Contractor's Proposed Change Order, submitted pursuant to Article 12.4 for a change in the Contract Sum or Contract Time, is acceptable, the Owner shall prepare and issue a Change Order which will authorize the

Contractor to proceed with the change in the Work with the adjustment to Contract Sum and Contract Time stated in the Proposed Change Order, or as otherwise may be agreed upon by the parties. The amounts stated in the Change Order for the adjustment to Contract Sum and Contract Time for the change in the Work shall be binding on the parties.

12.5.2 After issuance of the Change Order, the Contractor shall ensure that the amount of the Performance and Payment Bond coverage has been revised to reflect the increase in the Contract Sum due to the Change Order. Notwithstanding the foregoing, Contractor's failure to do so shall not release any surety from its obligations under any bonds.

12.6 CHANGE DIRECTIVE

12.6.1 If Owner and Contractor cannot agree as to whether something constitutes a change to the Work originally contemplated by the Contract Documents, or if they cannot agree as to the adjustment to the Contract Sum or Contract Time required for what Owner acknowledges to be a change to the Work constituting Extra Work, Owner may, in his sole discretion, issue a written Change Directive directing Contractor to perform such work. Contractor shall then promptly proceed with the work at issue. Owner may elect, in its sole discretion, to have the compensation or claimed compensation for such work accounted for on either a time and material basis or lump sum basis as described in 12.6.2 and 12.6.3.

12.6.2 If Owner elects to have the compensation and/or claimed compensation accounted for on a time and materials basis, the following procedures apply:

12.6.2.1 Change Directive work, the compensation or claimed compensation for which is being accounted for on a time and material basis shall be performed, whether by the Contractor's forces or the forces of any of its Subcontractors' or Sub-subcontractors', at actual cost to the entity performing the Work (without any charge for administration, clerical expense, supervision or superintendent of any nature whatsoever). The percent mark-ups for the Contractor, Subcontractors and Sub-subcontractor's shall be as described in subparagraphs 12.4.4 and 12.4.5.

12.6.2.2 Prior to starting the Change Directive work on a time and material basis, the Contractor shall notify the Owner in writing as to what labor, materials, equipment or rentals are to be used for the change or claimed change in the Work. During performance, the Contractor shall submit to the Owner daily time and material tickets, which shall list the categories and amounts of labor and equipment for which Change Directive compensation is to be charged for the previous work day. Such tickets shall specifically include the following information: location and description of the change in the Work, the classification of labor employed, including names and social security numbers of laborers, labor trades used, man hours, wage rates, insurance, taxes and fringe benefits, equipment and materials suppliers' quotations with detailed break-out and pricing, rental equipment hours and rates, and materials quantities and unit prices and such other evidence of cost as the Owner may require.

12.6.2.3 The Contractor shall commence submission of daily time and material tickets immediately upon commencement of the Change Directive work and continue to submit them until completion of the Change Directive work. The Owner may require authentication of all time and material tickets and invoices by persons designated by the Owner for such purpose.

12.6.2.4 No payment will be made to the Contractor for any portion of the Change Directive work that Owner acknowledges to be Extra Work unless and until such daily time and

material tickets and invoices are submitted. The submission of any such ticket or invoice shall not constitute an acknowledgment by the Owner that the items thereon were reasonably required for the Change Directive work.

12.6.2.5. For any work performed on a time and material basis, the Contractor shall submit its complete submission of the reasonable actual cost and time to perform the change in the Work within twenty (20) days after such Work has been completed. If Change Directive work includes both Work that Owner acknowledges to be Extra Work and work that Owner disputes to be Extra Work, Contractor shall clearly segregate its accounting for the two. The Owner shall review the costs and time submitted by the Contractor on the basis of reasonable expenditures and savings of those performing the Change Directive work. If such costs and time are acceptable to the Owner, or if the parties otherwise agree to the actual reasonable cost to perform the Change Directive work, a Change Order will be issued for the cost and time agreed upon. The amounts stated in the Change Order for the cost and time to perform the Change Directive work shall be binding upon the parties.

12.6.3 If Owner elects to have the compensation or claimed compensation accounted for on a lump sum basis, Owner may make a unilateral determination of a reasonable adjustment in Contract Sum and Contract Time due to the Change Directive. Any unresolved dispute about the reasonableness of Owner's unilateral determination shall be subject to Article 13, Claims and Dispute Procedure.

12.7 DECREASES AND WORK NOT PERFORMED (Deductive Change Orders)

12.7.1 Should it be deemed expedient by the Owner to decrease the dimensions, quantity of material or Work, or vary in any other way the Work required by the Contract Documents, the Owner may direct by written Change Order, such decreases to be made or performed without in any way affecting the validity of the Contract. The Contractor shall~~,~~ comply with the Change Order from the Owner. The difference in expense occasioned by such decrease shall be deducted from the amount payable under this Contract.

12.7.2 When Work is deleted from the Contract by Owner, the amounts to be credited to the Owner shall reflect the same current pricing as if the Work were being added to the Contract at the time the deletion is ordered, and Contractor shall provide documentation for a credit as specified in Article 12.5.4. If such deleted materials and equipment shall have already been purchased and stored on site and cannot be used in other projects, cannot be returned for credit or cannot be returned for credit at the price paid by the Contractor at the time of purchase, the Contractor shall be entitled, upon proper documentation and certification, to an adjustment in the pricing of the credit to avoid hardship to the Contractor. If necessary in order to establish such reasonable value, the Contractor may be required to submit a detailed breakdown of his original bid and all documents upon which Contractor's bid was based for the items or Work involved.

12.7.3 If Work is not performed, and such deletion of Work was not directed or approved by the Owner, the Owner shall ascertain the amount of the credit due.

12.8 CHANGES IN LINE AND GRADE

12.8.1 The Owner reserves the right to make such alterations in the line and grade of various structures or pipe lines shown on the drawings, as may be necessitated by conditions found during construction or that in the judgment of the Owner appears advisable. Such alterations shall in no way affect the validity of the Contract

12.8.1.1 In case of a unit price contract, if such changes increase the amount of the Work or materials, the Contractor will be paid according to the quantity of Work actually done at the prices established for such Work under the Contract.

12.8.1.2 In case of a lump sum contract, the price for the Work shall be determined as specified in Article 12.4, Proposed Change Order.

12.9 SUBSURFACE CONDITIONS FOUND DIFFERENT

12.9.1 Should the Contractor encounter subsurface and/or latent conditions at the site materially differing from those shown on the drawings or indicated in the specifications, he shall immediately give Notice to the Owner of such conditions before they are disturbed. The Owner shall thereupon promptly investigate the conditions and if he finds that they materially differ from those shown on the drawings or indicated in the specifications, he shall at once make such changes in the drawings and/or specifications as he may find necessary. Any increase or decrease of cost resulting from such changes shall be adjusted in the manner provided herein for adjustments as to extra and/or additional work and changes. Notwithstanding the foregoing, if the Contract Documents indicate elsewhere that excavation is to be on an unclassified basis, Contractor shall not be entitled to any adjustment to the Contract Sum or Contract Time based upon this 12.9.

12.10 OTHER CLAIMS

If the Contractor claims that additional cost or time is involved because of, but not limited to, (1) any written interpretation pursuant to Article 2, Architect/Engineer, (2) any order by the Owner to stop the Work pursuant to Article 3, Owner, where the Contractor was not at fault, (3) failure of payment by the Owner pursuant to Article 9 Payments and Completion, or (4) any written order for a minor change in the Work issued pursuant to Article 12.8, Changes in Line and Grade~~;~~, the Contractor shall make such claim as provided in Section 12, Changes and Modification in the Work~~.~~, and Article 13, Claims and Dispute Procedure.

ARTICLE 13 CLAIMS AND DISPUTE PROCEDURE

Any Claims by the Contractor arising under or relating to the Contract or the Contract Documents shall only be resolved as follows:

13.1. INITIAL NOTICE, SUBMISSION OF CLAIM, AND CONSIDERATION.

a. The Contractor shall give the Owner and the A/E written notice of any Claim within ten (10) days of the beginning of the occurrence of the event leading to the Claim. The written notice shall be a document from the Contractor addressed to the Owner's and A/E's officials or employees designated by the Contract Documents to receive such notice, or if no one is so designated, to the Owner's City Manager and to the A/E. The written notice shall clearly state the Contractor's intention to make a claim, shall describe the occurrence involved, and shall be transmitted in a manner to ensure receipt by the Owner and A/E within the ten (10) days. The Contractor shall submit the Claim and any supporting data to the Owner and A/E within thirty (30) days after the occurrence giving rise to the Claim ends. The burden shall be on the Contractor to substantiate that it has given written notice and submitted its Claim in accordance with this provision.

b. The Claim must (i) be certified under oath as true and correct by a principal of Contractor; (ii) must be for specific relief; (iii) if any money is sought, must specify the dollar amount sought; and (iv) must contain sufficient supporting documentation to reasonably allow its consideration, including without limitation, any documentation required by the Contract Documents. The burden shall be on the Contractor to substantiate the Claim.

c. The Contractor shall comply with all other terms and conditions of the Contract Documents, including without limitation, those in Articles 8 and 12, as applicable. No decision by the A/E on a claim shall be binding on the Owner, but such decision shall have whatever effect on the Contractor that the Contract Documents provide.

d. Following consideration by the A/E, and following initial, informal consideration by the Owner's General Manager or his designee, the parties shall endeavor to resolve any Claim through direct negotiations, and if such direct negotiations fail, and if the Owner requests, by non-binding mediation conducted pursuant to the Rules of the American Arbitration Association, with the site of the mediation being Lynchburg, Virginia.

e. Should the Claim remain unresolved for more than 60 days after it is submitted, then the General Manageror his designee shall, within no later than 90 days after the Claim's submission, render a written decision on the Claim on behalf of the Owner . The Contractor may not institute any legal action with respect to the Claim until after the General Manager or his designee renders his written decision or 90 days from its receipt by the City Manager has passed, whichever comes first. The only effect of the failure by the General Manager or his designee to render a decision within this 90-day period is to allow the Contractor to institute a legal action pursuant to this provision without having to wait for a decision on the Claim concerned.

13.2 APPEAL OF DENIAL OF CLAIM.

a. If the Owner denies in whole or part a Claim by Contractor or more than 90 days have passed since the Claim was received by the General Manager but no written decision has been issued, the Contractor may appeal denial of the claim by instituting an action in the Lynchburg Circuit Court, Lynchburg, Virginia, or if the subject or amount in controversy is within its jurisdiction, the Lynchburg General District Court, Lynchburg, Virginia, and may thereafter pursue all available appeals in Virginia state courts, to the extent they have jurisdiction.

b. The Contractor must initiate its appeal of the Claim within 180 days of the date it first has the right to do so or the Claim will be barred and the Owner’s decision will be binding and conclusive.

c. The Contractor may not amend its Claim on appeal to increase the amount of money sought.

d. In the event of any Claim arising, Contractor shall continue its performance diligently during such Claim's pendency and thereafter as if no Claim had arisen. During the pendency of any Claim in connection with the payments of moneys, Contractor shall be entitled to receive payments for non-disputed items, subject to any right of set-off by Owner.

13.3 Notwithstanding anything in the Contract Documents to the contrary, the Owner may, in its discretion, assert a Claim without first resorting to any procedures contained in the Contract Documents.

13.4 "Claim" means a "claim" as defined in the Lynchburg Public Procurement Code.

13.5 Notwithstanding anything in the Contract Documents to the contrary, Owner shall not be liable to Contractor for any damages or increase in the Contract Sum due to delays to Contractor, any Subcontractor, or any other person except due to extent required by Virginia Code § 2.2-4335.

ARTICLE 14 UNCOVERING AND CORRECTION OF WORK

14.1 UNCOVERING OF WORK

14.1.1 If any portion of the Work should be covered contrary to: (1) the request of the A/E or Owner; (2) requirements specifically expressed in the Contract Documents; or (3) the requirements of applicable

permits, it must, if required in writing by the Owner, be uncovered for the Owner's and A/E's observation and shall be replaced at the Contractor's expense.

14.1.2 If any other portion of the Work has been covered which the Owner has not specifically requested to observe prior to being covered, the Owner may request to see such Work and it shall be uncovered by the Contractor. If such Work be found in accordance with the Contract Documents, the cost of uncovering and replacement shall, by appropriate Change Order, be charged to the Owner. If such Work be found not in accordance with the Contract Documents, the Contractor shall pay such costs unless it is found that this condition was caused solely by the Owner, in which event the Owner shall be responsible for the payment of such costs. If such Work be found not in accordance with the Contract Documents and the condition was caused by a separate contractor, Contractor may proceed against said separate contractor as provided in Article 6, Work by Owner or by Separate Contractors.

14.2 WARRANTY AND CORRECTION OF WORK

14.2.1 The Contractor guarantees and warrants to the Owner all Work as follows:

.1 That all materials and equipment furnished under this Contract will be new and the best of its respective kind unless otherwise specified;

.2 That all Work will be of first-class quality and free of omissions and faulty, imperfect or defective material or workmanship;

.3 That the Work shall be entirely watertight and leakproof in accordance with all applicable industry customs and practices, and shall be free of shrinkage and settlement which are attributable to defective materials or workmanship;

.4 That the Work, including but not limited to, mechanical and electrical machines, devices and equipment shall be fit and fully usable for its intended and specified purpose and shall operate satisfactorily with ordinary care;

.5 That consistent with requirements of the Contract Documents the Work shall be installed and oriented in such a manner as to facilitate unrestricted access for the operation and maintenance of fixed equipment; and

.6 That the Work will be free of abnormal or unusual deterioration which occurs because of poor quality materials or workmanship.

14.2.2 All Work not conforming to guarantees and warranties specified in the Contract Documents, including substitutions not properly approved and authorized, may be considered defective. If required by the Owner, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment furnished and installed.

14.2.3 The Contractor shall within five (5) working days after receipt of written Notice from the Owner during the performance of the Work, reconstruct, replace or correct all Work rejected by the A/E or Owner as defective, as failing to conform to the Contract Documents, or as not in accordance with the guarantees and warranties specified in the Contract Documents , whether observed before or after Substantial Completion and whether or not fabricated, installed or completed. The Contractor shall bear all costs of reconstructing, replacing or correcting such rejected Work, including compensation for the A/E's additional services made necessary thereby.

14.2.4 If, within one (1) year after the Date of Final Completion of the Work or designated portion thereof or within one (1) year after acceptance by the Owner of designated equipment or within such longer period of time as may be prescribed by law or by the terms of any applicable special warranty required by the

Contract Documents, any of the Work is found to be defective, not in accordance with the Contract Documents, or not in accordance with the guarantees and warranties specified in the Contract Documents, the Contractor shall correct it within five (5) working days after receipt of a written Notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition pursuant to 14.3, Acceptance of Faulty, Defective or Non-Conforming Work. This obligation shall survive termination of the Contract. The Owner shall give such Notice within a reasonable time after discovery of the condition.

14.2.5 Subject to limitation as prescribed by law, if at any time deficiencies in the Work are discovered which are found to have resulted from fraud or misrepresentation, or an intent or attempt to defraud the Owner by the Contractor, any Subcontractor or supplier, the Contractor will be liable for replacement or correction of such Work and any damages which Owner has incurred related thereto, regardless of the time limit of any guarantee or warranty.

14.2.6 Any materials or other portions of the Work, installed, furnished or stored on site which are not of the character or quality required by the specifications, or are otherwise not acceptable to the Owner, shall be immediately removed and replaced by the Contractor to the satisfaction of the Owner, when notified to do so by the Owner.

14.2.7 If the Contractor fails to correct defective or nonconforming Work as required by Articles 13.2.3 and 13.2.4, or if the Contractor fails to remove defective or nonconforming Work from the site, as required by Article 13.2.6, the Owner may elect to either correct such Work in accordance with Article 3.5, Owner’s Right to Carry Out the Work, or remove and store materials and equipment at the expense of the Contractor. If the Contractor does not pay the cost of such removal and storage within ten (10) days thereafter, the Owner may, upon ten additional days written Notice, sell such Work at auction or at public or private sale and shall account for the net proceeds thereof, after deducting the costs of the sale and all of the costs that should have been borne by the Contractor, including compensation for the A/E's additional services made necessary thereby. If such proceeds of sale do not cover all costs indicated in the previous sentence, the difference shall be charged to the Contractor and an appropriate Change Order shall be issued. If the payments then or thereafter due the Contractor are not sufficient to cover such amount, the Contractor or its surety shall pay the difference to the Owner.

14.2.8 The Contractor shall bear the cost of making good all work of the Owner, separate contractors or others, destroyed or damaged by such correction or removal required under this Article.

14.3 ACCEPTANCE OF FAULTY, DEFECTIVE OR NON-CONFORMING WORK

If the Owner prefers to accept faulty, defective or nonconforming Work, he may do so instead of requiring its removal and correction, in which case a Change Order will be issued at Owner's option, to reflect a reduction in the Contract Sum in an amount to be determined by the Owner.

ARTICLE 15 TERMINATION OF THE CONTRACT

15.1 CONTRACTOR'S RIGHT TO STOP WORK OR TERMINATE CONTRACT

If the Work should be stopped under an order of any court or other public authority for a period of ninety (90) days through no fault of the Contractor or anyone providing services, materials or equipment through him, or if the Owner should fail to pay to the Contractor within thirty (30) days any sum for which a Certificate of Payment has been certified when no dispute exists as to the sum due and Owner has no right to withhold payment under any provision of the Contract Documents, then the Contractor may, upon ten (10) days written Notice to the Owner, stop Work or terminate the Contract and recover from the Owner payment for the cost of the Work actually performed, together with overhead and profit thereon, but profit on the Work performed shall be recovered only to the extent that the Contractor can demonstrate that he would have had profit on the entire Contract if he had completed the Work. The Contractor may not receive profit or any other type of compensation for parts of the Work not performed. The Contractor

may recover the reasonable cost of physically closing down the Site, but no other costs of termination. The Owner may offset any claims it may have against the Contractor against the amounts due to the Contractor. In no event shall termination of the Contract by the Contractor terminate the obligations of the Contractor's surety on its payment and performance bonds.

15.2 OWNER'S RIGHT TO TERMINATE CONTRACT FOR CAUSE

15.2.1 The Owner may terminate the Contract for cause based upon any of the following grounds:

.1 If the Contractor should be adjudged as bankrupt, or if he should make a general assignment for the benefit of his creditors, or if a receiver should be appointed on account of his insolvency.

.2 If the Contractor should refuse or should repeatedly fail, except in cases for which extension of time is provided, to supply enough properly skilled workmen or proper materials and equipment.

.3 If the Contractor should fail to make prompt payment to subcontractors or suppliers of material of labor.

.4 If the Contractor should disregard laws, ordinances, codes, regulations, or the written instructions of the Architect/Engineer or the Owner.

.5 If the Contractor be in substantial violation of any provision of the Contract Documents.

15.2.2 For termination for cause based upon the grounds in 15.2.1.1, Owner may terminate without prior notice and without giving Contractor any opportunity to rectify the basis for termination. For termination for cause based upon any other grounds, prior to termination of the Contract, the Owner shall give the Contractor and his surety Notice followed by a ten (10) day period during which the Contractor and/or his surety may rectify the basis for the Notice. If rectified to the satisfaction of the Owner within said ten (10) days, the Owner may rescind its notice of termination. If not, the termination for cause shall become effective at the end of the ten (10) day notice period. Notwithstanding the foregoing, the Owner may, in writing, postpone the effective date of the termination for cause, at its sole discretion, if it should receive reassurances from the Contractor and/or his surety that the basis for the termination will be remedied within a time and in a manner which the Owner finds acceptable. If at any time after such postponement, the Owner determines that Contractor and/or his surety has not or is not likely to rectify the causes of termination in an acceptable manner or within the time allowed, then the Owner may immediately terminate the Contract for cause, without the necessity of allowing any further opportunity by the Contractor and/or surety to rectify the basis for the Notice, by notifying the Contractor and his surety in writing of the termination. In no event shall termination for cause terminate the obligations of the Contractor's surety on its payment and performance bonds.

15.2.3 Upon termination of the Contract, the Contractor shall immediately cease Work, and the Owner may take possession of the site and of all materials, tools and equipment thereon and finish the Work by whatever method he may deem expedient. In such case, the Contractor shall not be entitled to receive any further payment until the Owner has finally completed the Work through its own resources or those of a subsequent contractor. If the Owner's damages, including the expense of finishing the Work, compensation for additional design, managerial and administrative services, any liquidated damages, and any claims by the Owner, shall exceed the unpaid balance of the Contract Sum, the Contractor shall pay the difference to the Owner, together with any other expenses of terminating the Contract and having it completed by others. If the unpaid balance of the Contract Sum exceeds Owner's damages, including the costs of finishing the Work, compensation for additional design, managerial and administrative services, any liquidated damages and any claims by Owner, together with any other expenses of terminating the Contract and having it completed by others, such excess shall be paid to the Contractor.

15.2.4 If it should be judicially determined that the Owner improperly terminated this Contract for cause, then the termination shall be deemed to be a termination for the convenience of the Owner, with Contractor's recovery limited to what is allowed for a termination for convenience under the Contract Documents.

15.2.5 Termination of the Contract under this Section is without prejudice to any other right or remedy of the Owner.

15.3 OWNER'S RIGHT TO TERMINATE CONTRACT FOR CONVENIENCE

15.3.1 Owner may terminate this Contract, in whole or in part, at any time without cause upon giving the Contractor written Notice of such termination. Upon such termination, the Contractor shall immediately cease Work and remove from the site all of its labor forces and such of its materials and equipment as Owner elects not to purchase or to assume in the manner hereinafter provided. Upon such termination, the Contractor shall take such steps as Owner may require to assign to the Owner the Contractor's interest in all subcontracts and purchase orders designated by Owner. After all such steps have been taken to Owner's satisfaction, the Contractor shall receive as full compensation for termination and assignment the following:

.1 Amounts due for Work performed in accordance with the Contract through the date of termination.

.2 Reasonable compensation for the actual cost of demobilization incurred by the Contractor as a direct result of such termination. The Contractor shall not be entitled to any compensation or damages for lost profits or for any other type of contractual compensation or damages other than those provided by the preceding sentence. Upon payment of the foregoing, Owner shall have no further obligations to Contractor of any nature.

15.3.2 In no event shall termination for the convenience of the Owner terminate the obligations of the Contractor's surety on its payment and performance bonds.

15.3.3 After receipt of a Notice of termination, the Contractor shall promptly submit to the Owner his termination claim. Such claim shall be submitted no later than forty-five (45) days from the effective date of termination. Upon failure of the Contractor to submit his termination claim within the time allowed, the Owner may determine, on the basis of information available to it, the amount, if any, due to the Contractor by reason of the termination.

15.4 CONTRACTOR'S RESPONSIBILITIES UPON TERMINATION

15.4.1 After receipt of a notice of termination pursuant to 15.3, Owner's Right to Terminate Contract for Convenience, the Contractor shall mitigate any damages to the extent reasonably possible.

15.4.2 In addition to the provisions of 15.4.1, the Contractor shall:

.1 At the option of the Owner, assign to the Owner, in the manner, at the time, and to the extent directed by the Owner, all of the right, title, and interest of the Contractor under the orders and subcontracts so terminated, in which case the Owner shall have the right, in its discretion, to settle or pay any or all claims arising out of the termination of such orders and subcontracts;

.2 Transfer title and deliver to the Owner in the manner, at the times, and to the extent, if any, directed by the Owner:

a) The fabricated or un-fabricated parts, work in process, completed Work, supplies, and other material and equipment procured as a part of, or acquired in connection with the performance of the Work terminated by the Notice of Termination, and

b) The completed or partially completed drawings, releases, information, manuals and other property which, if the Contract had been completed, would have been required to be furnished to the Owner;

.3 Complete performance of such part of the Work as shall not have been terminated by the Notice of Termination; and

.4 Take such action as may be necessary, or as the Owner may direct, for the protection and preservation of the property related to this Contract which is in the possession of the Contractor and in which the Owner has or may acquire an interest.

DOCUMENT - ALTERNATES FORM

1.1 BID INFORMATION

A. Bidder: _____.

A. Project Name: GLTC Operations & Maintenance Facility

B. Project Location: 419 Bradley Dr., Lynchburg Virginia 24501.

C. Owner: Greater Lynchburg Transit Company

D. Architect: Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

1.3 DESCRIPTION

A. The undersigned Bidder proposes the amount below be added to or deducted from the Base Bid if particular alternates are accepted by Owner. Amounts listed for each alternate include costs of related coordination, modification, or adjustment.

1. Lump Sum Fee Contract: Alternate price given below includes adjustment to Contractor's Fee.

B. If the alternate does not affect the Contract Sum, the Bidder shall indicate "NO CHANGE."

C. If the alternate does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

D. The Bidder shall be responsible for determining from the Contract Documents the affects of each alternate on the Contract Time and the Contract Sum.

E. Owner reserves the right to accept or reject any alternate, in any order, and to award or amend the Contract accordingly within 90 days of the Notice of Award unless otherwise indicated in the Contract Documents.

F. Acceptance or non-acceptance of any alternates by the Owner shall have no affect on the Contract Time unless the "Schedule of Alternates" Article below provides a formatted space for the adjustment of the Contract Time.

1.4 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Closed Mesh Fence Alternate.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.

2. _____ Dollars ($_____).

B. Alternate No. 2: Bus Operator (Driver) Training Area Asphalt Paving Alternate.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.

2. _____ Dollars ($_____).

C. Alternate No. 3: Bus Operator (Driver) Training Area Concrete Paving Alternate.

1. ADD____ DEDUCT____ NO CHANGE____ NOT APPLICABLE____.

2. _____ Dollars ($_____).

1.5 SUBMISSION OF BID SUPPLEMENT

Respectfully submitted this ____ day of _____, 2014.

Submitted By: _____
(Name of bidding firm or corporation)

Authorized Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President)

END OF DOCUMENT

Greater Lynchburg Transit Co.
GLTC Operations & Maint. Facility
Lynchburg, Virginia

DOCUMENT - UNIT PRICES FORM

1.1 BID INFORMATION

A. Bidder: _____.

B. Project Name: GLTC Operations & Maintenance Facility

C. Project Location: 419 Bradley Dr., Lynchburg Virginia 24501.

D. Owner: Greater Lynchburg Transit Company

E. Architect: Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc.

1.2 BID FORM SUPPLEMENT

A. This form is required to be attached to the Bid Form.

B. The undersigned Bidder proposes the amounts below be added to or deducted from the Contract Sum on performance and measurement of the individual items of Work.

C. If the unit price does not affect the Work of this Contract, the Bidder shall indicate "NOT APPLICABLE."

1.3 UNIT PRICES

A. Unit-Price No. 1: Removal of unsatisfactory soil material.

1. _____ Dollars ($_____) per unit.

B. Unit-Price No. 2: Replacement with unsuitable soil with select borrow.

1. _____ Dollars ($_____) per unit.

C. Unit-Price No. 3: Rock excavation and replacement with satisfactory soil material.

1. _____ Dollars ($_____) per unit.

D. Unit-Price No. 4: Broom Finish Concrete Sidewalk

1. _____ Dollars ($_____) per unit.

E. Unit-Price No. 5: Asphalt Paving

1. _____ Dollars ($_____) per unit.

F. Unit-Price No. 6: Concrete Paving

1. _____ Dollars ($_____) per unit.

G. Unit-Price No. 7: Concrete Curb

1. _____ Dollars ($_____) per unit.

H. Unit-Price No. 8: Pipe Bollard - Exterior

1. _____ Dollars ($_____) per unit.

I. Unit-Price No. 9: Pipe Bollard - Interior

1. _____ Dollars ($_____) per unit.

J. Unit-Price No. 10: Chain Link Fencing – 6' ht.

1. _____ Dollars ($_____) per unit.

K. Unit-Price No. 11: Decorative Metal Fence – 4' ht.

1. _____ Dollars ($_____) per unit.

L. Unit-Price No. 13: Chain Link Fencing Gate – 6' ht.

1. _____ Dollars ($_____) per unit.

M. Unit-Price No. 14: Topsoil and Seed

1. _____ Dollars ($_____) per unit.

1.4 SUBMISSION OF BID SUPPLEMENT

Respectfully submitted this ____ day of _____, 2014.

Submitted By: _____
(Insert name of bidding firm or corporation)

Authorized Signature: _____
(Handwritten signature)

Signed By: _____
(Type or print name)

Title: _____
(Owner/Partner/President/Vice President

END OF DOCUMENT

Federal Clauses

Fly America Requirements

Applicability – all contracts involving transportation of persons or property, by air between the U.S. and/or places outside the U.S. These requirements do not apply to micro-purchases ($3,000 or less, except for construction contracts over $2,000).

Contractor shall comply with 49 USC 40118 (the “Fly America” Act) in accordance with General Services Administration regulations 41 CFR 301-10, stating that recipients and subrecipients of Federal funds and their contractors are required to use US Flag air carriers for US Government-financed international air travel and transportation of their personal effects or property, to the extent such service is available, unless travel by foreign air carrier is a matter of necessity, as defined by the Fly America Act. Contractor shall submit, if a foreign air carrier was used, an appropriate certification or memorandum adequately explaining why service by a US flag air carrier was not available or why it was necessary to use a foreign air carrier and shall, in any event, provide a certificate of compliance with the Fly America requirements. Contractor shall include the requirements of this section in all subcontracts that may involve international air transportation.

Buy America Certification (Steel and Manufactured Products)

Construction Contracts and Acquisition of Goods or Rolling Stock (valued at more than $100,000)

Contractor shall comply with 49 USC 5323(j) and 49 CFR 661, as amended by MAP-21 stating that Federal funds may not be obligated unless steel, iron and manufactured products used in FTA-funded projects are produced in the United States, unless a waiver has been granted by FTA or the product is subject to a general waiver. General waivers are listed in 49 CFR 661.7, and include final assembly in the US for 15 passenger vans and 15 passenger wagons produced by Chrysler Corp., software, microcomputer equipment and small purchases (currently less than $100,000) made with capital, operating or planning funds. Separate requirements for rolling stock are stated at 5323(j)(2)(C) and 49 CFR 661.11. Rolling stock must be manufactured in the US and have a minimum 60% domestic content. A bidder or offeror shall submit appropriate Buy America certification to the recipient with all bids on FTA-funded contracts, except those subject to a general waiver. Proposals not accompanied by a completed Buy America certification shall be rejected as nonresponsive. This requirement does not apply to lower tier subcontractors.

Cargo Preference

Contracts involving equipment, materials or commodities which may be transported by ocean vessels. These requirements do not apply to micro-purchases ($3,000 or less, except for construction contracts over $2,000).

Contractor shall: a. use privately owned US-Flag commercial vessels to ship at least 50% of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners and tankers) involved, whenever shipping any equipment, material or commodities pursuant to the underlying contract to the extent such vessels are available at fair and reasonable rates for US flag commercial vessels; b. furnish within 20 working days following the loading date of shipments originating within the US or within 30 working days following the loading date of shipments originating outside the US, a legible copy of a rated, "on-board" commercial bill-of-lading in English for each shipment of cargo described herein to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590 and to the recipient (through contractor in the case of a subcontractor's bill-of-lading.); c. include these requirements in all subcontracts issued pursuant to this contract when the subcontract involves the transport of equipment, material or commodities by ocean vessel.

Seismic Safety

Construction of new buildings or additions to existing buildings. These requirements do not apply to micro-purchases ($3,000 or less, except for construction contracts over $2,000). Contractor agrees that any new building or addition to an existing building shall be designed and constructed in accordance with the standards required in USDOT Seismic Safety Regulations 49 CFR 41 and shall certify compliance to the extent required by the regulation. Contractor shall also ensure that all work performed under this contract, including work performed by subcontractors, complies with the standards required by 49 CFR 41 and the certification of compliance issued on the project.

Energy Conservation

All Contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)
Contractor shall comply with mandatory standards and policies relating to energy efficiency, stated in the state energy conservation plan issued in compliance with the Energy Policy & Conservation Act.

Clean Water

All Contracts and Subcontracts over $100,000
Contractor shall comply with all applicable standards, orders or regulations issued pursuant to the Federal Water Pollution Control Act, as amended, 33 USC 1251 et seq. Contractor shall report each violation to the recipient and understands and agrees that the recipient shall, in turn, report each violation as required to FTA and the appropriate EPA Regional Office. Contractor shall include these requirements in each subcontract exceeding $100,000 financed in whole or in part with FTA assistance.

Lobbying

Construction/Architectural and Engineering/Acquisition of Rolling Stock/Professional Service Contract/Operational Service Contract/Turnkey contracts over $100,000
Byrd Anti-Lobbying Amendment, 31 U.S.C. 1352, as amended by the Lobbying Disclosure Act of 1995, P.L. 104-65 [to be codified at 2 U.S.C. § 1601, et seq.] - Contractors who apply or bid for an award of $100,000 or more shall file the certification required by 49 CFR part 20, "New Restrictions on Lobbying." Each tier certifies to the tier above that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress, officer or employee of Congress, or an employee of a member of Congress in connection with obtaining any Federal contract, grant or any other award covered by 31 U.S.C. 1352. Each tier shall also disclose the name of any registrant under the Lobbying Disclosure Act of 1995 who has made lobbying contacts on its behalf with non-Federal funds with respect to that Federal contract, grant or award covered by 31 U.S.C. 1352. Such disclosures are forwarded from tier to tier up to the recipient.

Access to Records and Reports

Applicability – As shown below. These requirements do not apply to micro-purchases ($3,000 or less, except for construction contracts over $2,000)
The following access to records requirements apply to this Contract:

1. Where the purchaser is not a State but a local government and is an FTA recipient or a subgrantee of FTA recipient in accordance with 49 CFR 18.36(i), contractor shall provide the purchaser, the FTA, the US Comptroller General or their authorized representatives access to any books, documents, papers and contractor records which are pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions. Contractor shall also, pursuant to 49 CFR 633.17, provide authorized FTA representatives, including any PMO contractor, access to contractor's records and construction sites pertaining to a capital project, defined at 49 USC 5302(a)1, which is receiving FTA assistance through the programs described at 49 USC 5307, 5309 or 5311.

2. Where the purchaser is a State and is an FTA recipient or a subgrantee of FTA recipient in accordance with 49 CFR 633.17, contractor shall provide the purchaser, authorized FTA representatives, including any PMO Contractor, access to contractor's records and construction sites pertaining to a capital project, defined at 49 USC 5302(a)1, which receives FTA assistance through the programs described at 49 USC 5307, 5309 or 5311. By definition, a capital project excludes contracts of less than the simplified acquisition threshold currently set at $100,000.

3. Where the purchaser enters into a negotiated contract for other than a small purchase or under the simplified acquisition threshold and is an institution of higher education, a hospital or other non-profit organization and is an FTA recipient or a subgrantee of FTA recipient in accordance with 49 CFR 19.48, contractor shall provide the

purchaser, the FTA, the US Comptroller General or their authorized representatives, access to any books, documents, papers and record of the contractor which are directly pertinent to this contract for the purposes of making audits, examinations, excerpts and transcriptions.

4. Where a purchaser which is an FTA recipient or a subgrantee of FTA recipient in accordance with 49 USC 5325(a) enters into a contract for a capital project or improvement (defined at 49 USC 5302(a)1) through other than competitive bidding, contractor shall make available records related to the contract to the purchaser, the Secretary of USDOT and the US Comptroller General or any authorized officer or employee of any of them for the purposes of conducting an audit and inspection.

5. Contractor shall permit any of the foregoing parties to reproduce by any means whatsoever or to copy excerpts and transcriptions as reasonably needed.

6. Contractor shall maintain all books, records, accounts and reports required under this contract for a period of not less than three (3) years after the date of termination or expiration of this contract, except in the event of litigation or settlement of claims arising from the performance of this contract, in which case contractor agrees to maintain same until the recipient, FTA Administrator, US Comptroller General, or any of their authorized representatives, have disposed of all such litigation, appeals, claims or exceptions related thereto. Re: 49 CFR 18.39(i)(11).

FTA does not require the inclusion of these requirements in subcontracts.

Federal Changes

All Contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)
Contractor shall comply with all applicable FTA regulations, policies, procedures and directives, including without limitation those listed directly or by reference in the Master Agreement between the purchaser and FTA, as they may be amended or promulgated from time to time during the term of the contract. Contractor's failure to comply shall constitute a material breach of the contract.

Bonding Requirements

Applicability – For those construction or facility improvement contracts or subcontracts exceeding $100,000, FTA may accept the bonding policy and requirements of the recipient, provided that they meet the minimum requirements for construction contracts as follows:

a. A bid guarantee from each bidder equivalent to five (5) percent of the bid price. The "bid guarantees" shall consist of a firm commitment such as a bid bond, certifies check, or other negotiable instrument accompanying a bid as assurance that the bidder will, upon acceptance of his bid, execute such contractual documents as may be required within the time specified.

b. A performance bond on the part to the Contractor for 100 percent of the contract price. A "performance bond" is one executed in connection with a contract to secure fulfillment of all the contractor's obligations under such contract.
c. A payment bond on the part of the contractor for 100 percent of the contract price. A "payment bond" is one executed in connection with a contract to assure payment, as required by law, of all persons supplying labor and material in the execution of the work provided for in the contract. Payment bond amounts required from Contractors are as follows:
(1) 50% of the contract price if the contract price is not more than $1 million;
(2) 40% of the contract price if the contract price is more than $1 million but not more than $5 million; or
(3) $2.5 million if the contract price is more than $5 million.

d. A cash deposit, certified check or other negotiable instrument may be accepted by a grantee in lieu of

performance and payment bonds, provided the grantee has established a procedure to assure that the interest of FTA is adequately protected. An irrevocable letter of credit would also satisfy the requirement for a bond.

Bid Bond Requirements (Construction)

(a) Bid Security - A Bid Bond must be issued by a fully qualified surety company acceptable to (Recipient) and listed as a company currently authorized under 31 CFR, Part 223 as possessing a Certificate of Authority as described thereunder.

(b) Rights Reserved - In submitting this Bid, it is understood and agreed by bidder that the right is reserved by (Recipient) to reject any and all bids, or part of any bid, and it is agreed that the Bid may not be withdrawn for a period of [ninety (90)] days subsequent to the opening of bids, without the written consent of (Recipient).
It is also understood and agreed that if the undersigned bidder should withdraw any part or all of his bid within [ninety (90)] days after the bid opening without the written consent of (Recipient), shall refuse or be unable to enter into this Contract, as provided above, or refuse or be unable to furnish adequate and acceptable Performance Bonds and Labor and Material Payments Bonds, as provided above, or refuse or be unable to furnish adequate and acceptable insurance, as provided above, he shall forfeit his bid security to the extent of (Recipient's) damages occasioned by such withdrawal, or refusal, or inability to enter into an agreement, or provide adequate security therefor.
It is further understood and agreed that to the extent the defaulting bidder's Bid Bond, Certified Check, Cashier's Check, Treasurer's Check, and/or Official Bank Check (excluding any income generated thereby which has been retained by (Recipient) as provided in [Item x "Bid Security" of the Instructions to Bidders]) shall prove inadequate to fully recompense (Recipient) for the damages occasioned by default, then the undersigned bidder agrees to indemnify (Recipient) and pay over to (Recipient) the difference between the bid security and (Recipient's) total damages, so as to make (Recipient) whole.
The undersigned understands that any material alteration of any of the above or any of the material contained on this form, other than that requested, will render the bid unresponsive.
Performance and Payment Bonding Requirements (Construction)

The Contractor shall be required to obtain performance and payment bonds as follows:

(a) Performance bonds

1. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the (Recipient) determines that a lesser amount would be adequate for the protection of the (Recipient).

2. The (Recipient) may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price. The (Recipient) may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(b) Payment bonds

1. The penal amount of the payment bonds shall equal:
(i) Fifty percent of the contract price if the contract price is not more than $1 million.
(ii) Forty percent of the contract price if the contract price is more than $1 million but not more than $5 million; or
(iii) Two and one half million if the contract price is more than $5 million.

2. If the original contract price is $5 million or less, the (Recipient) may require additional protection as required by subparagraph 1 if the contract price is increased.

Performance and Payment Bonding Requirements (Non-Construction)

The Contractor may be required to obtain performance and payment bonds when necessary to protect the (Recipient's) interest.

(a) The following situations may warrant a performance bond:

1. (Recipient) property or funds are to be provided to the contractor for use in performing the contract or as partial compensation (as in retention of salvaged material).

2. A contractor sells assets to or merges with another concern, and the (Recipient), after recognizing the latter concern as the successor in interest, desires assurance that it is financially capable.

3. Substantial progress payments are made before delivery of end items starts.

4. Contracts are for dismantling, demolition, or removal of improvements.

(b) When it is determined that a performance bond is required, the Contractor shall be required to obtain performance bonds as follows:

1. The penal amount of performance bonds shall be 100 percent of the original contract price, unless the (Recipient) determines that a lesser amount would be adequate for the protection of the (Recipient).

2. The (Recipient) may require additional performance bond protection when a contract price is increased. The increase in protection shall generally equal 100 percent of the increase in contract price.
The (Recipient) may secure additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) A payment bond is required only when a performance bond is required, and if the use of payment bond is in the (Recipient's) interest.

(d) When it is determined that a payment bond is required, the Contractor shall be required to obtain payment bonds as follows:

1. The penal amount of payment bonds shall equal:
(i) Fifty percent of the contract price if the contract price is not more than $1 million;
(ii) Forty percent of the contract price if the contract price is more than $1 million but not more than $5 million; or
(iii) Two and one half million if the contract price is increased.
Advance Payment Bonding Requirements
The Contractor may be required to obtain an advance payment bond if the contract contains an advance payment provision and a performance bond is not furnished. The (recipient) shall determine the amount of the advance payment bond necessary to protect the (Recipient).
Patent Infringement Bonding Requirements (Patent Indemnity)
The Contractor may be required to obtain a patent indemnity bond if a performance bond is not furnished and the financial responsibility of the Contractor is unknown or doubtful. The (recipient) shall determine the amount of the patent indemnity to protect the (Recipient).

Warranty of the Work and Maintenance Bonds

1. The Contractor warrants to (Recipient), the Architect and/or Engineer that all materials and equipment furnished under this Contract will be of highest quality and new unless otherwise specified by (Recipient), free from faults and defects and in conformance with the Contract Documents. All work not so conforming to these standards shall be considered defective. If required by the [Project Manager], the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

2. The Work furnished must be of first quality and the workmanship must be the best obtainable in the various trades. The Work must be of safe, substantial and durable construction in all respects. The Contractor hereby guarantees the Work against defective materials or faulty workmanship for a minimum period of one (1) year after Final Payment by (Recipient) and shall replace or repair any defective materials or equipment or faulty workmanship during the period of the guarantee at no cost to (Recipient). As additional security for these guarantees, the Contractor shall, prior to the release of Final Payment [as provided in Item X below], furnish separate Maintenance (or Guarantee) Bonds in form acceptable to (Recipient) written by the same corporate surety that provides the Performance Bond and Labor and Material Payment Bond for this Contract. These bonds shall secure the Contractor's obligation to replace or repair defective materials and faulty workmanship for a minimum period of one (1) year after Final Payment and shall be written in an amount equal to ONE HUNDRED PERCENT (100%) of the CONTRACT SUM, as adjusted (if at all).

Clean Air

1) Contractor shall comply with all applicable standards, orders or regulations pursuant to the Clean Air Act, 42 USC 7401 et seq. Contractor shall report each violation to the recipient and understands and agrees that the recipient will, in turn, report each violation as required to FTA and the appropriate EPA Regional Office.

2) Contractor shall include these requirements in each subcontract exceeding $100,000 financed in whole or in part with FTA assistance.

Recycled Products

All contracts for items designated by the EPA, when the purchaser or contractor procures $10,000 or more of one of these items during the current or previous fiscal year using Federal funds. The contractor agrees to comply with all the requirements of Section 6002 of the Resource Conservation and Recovery Act (RCRA), as amended (42 U.S.C. 6962), including but not limited to the regulatory provisions of 40 CFR Part 247, and Executive Order 12873, as they apply to the procurement of the items designated in Subpart B of 40 CFR Part 247.

Davis-Bacon and Copeland Anti-Kickback Acts

Applicability -Construction contracts and subcontracts, including actual construction, alteration and/or repair, including decorating and painting, over $2,000

(1) Minimum wages - (i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination

(including any additional classifications and wage rates conformed under paragraph (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers. (ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:
(1) Except with respect to helpers as defined as 29 CFR 5.2(n)(4), the work to be performed by the classification requested is not performed by a classification in the wage determination; and (2) The classification is utilized in the area by the construction industry; and (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination; and (4) With respect to helpers as defined in 29 CFR 5.2(n)(4), such a classification prevails in the area in which the work is performed.
(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary. (C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary. (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof. (iv) If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, Provided, That the Secretary of Labor has found, upon the written request of the contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program. (v)(A) The contracting officer shall require that any class of laborers or mechanics which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefor only when the following criteria have been met: (1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and (2) The classification is utilized in the area by the construction industry; and (3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.
(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits,

where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination with 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary. (D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(v) (B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(2) Withholding - The recipient shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), all or part of the wages required by the contract, the grantee may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(3) Payrolls and basic records - (i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.
(ii)(A) The contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the recipient for transmission to the Federal Transit Administration. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5. This information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be purchased from the Superintendent of Documents (Federal Stock Number 029-005-00014-1), U.S. Government Printing Office, Washington, DC 20402. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. (B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following: (1) That the payroll for the payroll period contains the information required to be maintained under section 5.5(a)(3)(i) of Regulations, 29 CFR part 5 and that such information is correct and complete; (2) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations, 29 CFR part 3; (3) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable

wage determination incorporated into the contract. (C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (a)(3)(ii)(B) of this section.
(D) The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under section 1001 of title 18 and section 231 of title 31 of the United States Code. (iii) The contractor or subcontractor shall make the records required under paragraph (a)(3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the Federal Transit Administration or the Department of Labor, and shall permit such representatives to interview employees during working hours on the job. If the contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the contractor, sponsor, applicant, or owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(4) Apprentices and trainees - (i) Apprentices - Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator of the Wage and Hour Division of the U.S. Department of Labor determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.(ii) Trainees - Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll

at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.
(iii) Equal employment opportunity - The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements - The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts - The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the Federal Transit Administration may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment - A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements - All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards - Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of Eligibility - (i) By entering into this contract, contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1). (ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1). (iii) The penalty for making false statements is prescribed in 18 USC 1001.

Contract Work Hours & Safety Standards Act

Applicability – Contracts over $100,000

(1) Overtime requirements - No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of 40 hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of 40 hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages - In the event of any violation of the clause set forth in para. (1) of this section, contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable for liquidated damages. Such liquidated

damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in para. (1) of this section, in the sum of $10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of 40 hours without payment of the overtime wages required by the clause set forth in para. (1) of this section.

(3) Withholding for unpaid wages and liquidated damages - the recipient shall upon its own action or upon written request of USDOL withhold or cause to be withheld, from any moneys payable on account of work performed by contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours & Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in para. (2) of this section.

(4) Subcontracts - Contractor or subcontractor shall insert in any subcontracts the clauses set forth in this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. Prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in this section.

No Government Obligation to Third Parties

Applicability – All contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)

(1) The recipient and contractor acknowledge and agree that, notwithstanding any concurrence by the US Government in or approval of the solicitation or award of the underlying contract, absent the express written consent by the US Government, the US Government is not a party to this contract and shall not be subject to any obligations or liabilities to the recipient, the contractor, or any other party (whether or not a party to that contract) pertaining to any matter resulting from the underlying contract.

(2) Contractor agrees to include the above clause in each subcontract financed in whole or in part with FTA assistance. It is further agreed that the clause shall not be modified, except to identify the subcontractor who will be subject to its provisions.

Program Fraud and False or Fraudulent Statements or Related Acts

Applicability – All contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)
(1) Contractor acknowledges that the provisions of the Program Fraud Civil Remedies Act of 1986, as amended, 31 USC 3801 et seq. and USDOT regulations, "Program Fraud Civil Remedies," 49 CFR 31, apply to its actions pertaining to this project. Upon execution of the underlying contract, contractor certifies or affirms the truthfulness and accuracy of any statement it has made, it makes, it may make, or causes to be made, pertaining to the underlying contract or FTA assisted project for which this contract work is being performed. In addition to other penalties that may be applicable, contractor further acknowledges that if it makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submittal, or certification, the US Government reserves the right to impose the penalties of the Program Fraud Civil Remedies Act (1986) on contractor to the extent the US Government deems appropriate.
(2) If contractor makes, or causes to be made, a false, fictitious, or fraudulent claim, statement, submittal, or certification to the US Government under a contract connected with a project that is financed in whole or in part with FTA assistance under the authority of 49 USC 5307, the Government reserves the right to impose the penalties of 18 USC 1001 and 49 USC 5307(n)(1) on contractor, to the extent the US Government deems appropriate.
(3) Contractor shall include the above two clauses in each subcontract financed in whole or in part with FTA assistance. The clauses shall not be modified, except to identify the subcontractor who will be subject to the provisions.

Termination

Applicability – All Contracts over $10,000, except contracts with nonprofit organizations and institutions of higher learning, where the threshold is $100,000

a. Termination for Convenience (General Provision) the recipient may terminate this contract, in whole or in part, at any time by written notice to contractor when it is in the recipient's best interest. Contractor shall be paid its costs, including contract close-out costs, and profit on work performed up to the time of termination. Contractor shall promptly submit its termination claim to the recipient. If contractor is in possession of any of the recipient's property, contractor shall account for same, and dispose of it as the recipient directs.

b. Termination for Default [Breach or Cause] (General Provision) If contractor does not deliver items in accordance with the contract delivery schedule, or, if the contract is for services, and contractor fails to perform in the manner called for in the contract, or if contractor fails to comply with any other provisions of the contract, the recipient may terminate this contract for default. Termination shall be effected by serving a notice of termination to contractor setting forth the manner in which contractor is in default. Contractor shall only be paid the contract price for supplies delivered and accepted, or for services performed in accordance with the manner of performance set forth in the contract.
If it is later determined by the recipient that contractor had an excusable reason for not performing, such as a strike, fire, or flood, events which are not the fault of or are beyond the control of contractor, the recipient, after setting up a new delivery or performance schedule, may allow contractor to continue work, or treat the termination as a termination for convenience.

c. Opportunity to Cure (General Provision) the recipient in its sole discretion may, in the case of a termination for breach or default, allow contractor an appropriately short period of time in which to cure the defect. In such case, the notice of termination shall state the time period in which cure is permitted and other appropriate conditions
If contractor fails to remedy to the recipient's satisfaction the breach or default or any of the terms, covenants, or conditions of this Contract within ten (10) days after receipt by contractor or written notice from the recipient setting forth the nature of said breach or default, the recipient shall have the right to terminate the Contract without any further obligation to contractor. Any such termination for default shall not in any way operate to preclude the recipient from also pursuing all available remedies against contractor and its sureties for said breach or default.

d. Waiver of Remedies for any Breach In the event that the recipient elects to waive its remedies for any breach by contractor of any covenant, term or condition of this Contract, such waiver by the recipient shall not limit its remedies for any succeeding breach of that or of any other term, covenant, or condition of this Contract.

e. Termination for Convenience (Professional or Transit Service Contracts) the recipient, by written notice, may terminate this contract, in whole or in part, when it is in the recipient's interest. If the contract is terminated, the recipient shall be liable only for payment under the payment provisions of this contract for services rendered before the effective date of termination.

f. Termination for Default (Supplies and Service) If contractor fails to deliver supplies or to perform the services within the time specified in this contract or any extension or if the contractor fails to comply with any other provisions of this contract, the recipient may terminate this contract for default. The recipient shall terminate by delivering to contractor a notice of termination specifying the nature of default. Contractor shall only be paid the contract price for supplies delivered and accepted, or services performed in accordance with the manner or performance set forth in this contract.
If, after termination for failure to fulfill contract obligations, it is determined that contractor was not in default, the rights and obligations of the parties shall be the same as if termination had been issued for the recipient's convenience.

g. Termination for Default (Transportation Services) If contractor fails to pick up the commodities or to perform the

services, including delivery services, within the time specified in this contract or any extension or if contractor fails to comply with any other provisions of this contract, the recipient may terminate this contract for default. The recipient shall terminate by delivering to contractor a notice of termination specifying the nature of default. Contractor shall only be paid the contract price for services performed in accordance with the manner of performance set forth in this contract.
If this contract is terminated while contractor has possession of the recipient goods, contractor shall, as directed by the recipient, protect and preserve the goods until surrendered to the recipient or its agent. Contractor and the recipient shall agree on payment for the preservation and protection of goods. Failure to agree on an amount shall be resolved under the Dispute clause. If, after termination for failure to fulfill contract obligations, it is determined that contractor was not in default, the rights and obligations of the parties shall be the same as if termination had been issued for the recipient's convenience.

h. Termination for Default (Construction) If contractor refuses or fails to prosecute the work or any separable part, with the diligence that will insure its completion within the time specified, or any extension, or fails to complete the work within this time, or if contractor fails to comply with any other provisions of this contract, the recipient may terminate this contract for default. the recipient shall terminate by delivering to contractor a notice of termination specifying the nature of default. In this event, the recipient may take over the work and compete it by contract or otherwise, and may take possession of and use any materials, appliances, and plant on the work site necessary for completing the work. Contractor and its sureties shall be liable for any damage to the recipient resulting from contractor's refusal or failure to complete the work within specified time, whether or not contractor's right to proceed with the work is terminated. This liability includes any increased costs incurred by the recipient in completing the work.

Contractor's right to proceed shall not be terminated nor shall contractor be charged with damages under this clause if:

1. Delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of contractor. Examples of such causes include: acts of God, acts of the recipient, acts of another contractor in the performance of a contract with the recipient, epidemics, quarantine restrictions, strikes, freight embargoes; and

2. Contractor, within 10 days from the beginning of any delay, notifies the recipient in writing of the causes of delay. If in the recipient's judgment, delay is excusable, the time for completing the work shall be extended. The recipient's judgment shall be final and conclusive on the parties, but subject to appeal under the Disputes clauses.

If, after termination of contractor's right to proceed, it is determined that contractor was not in default, or that the delay was excusable, the rights and obligations of the parties will be the same as if termination had been issued for the recipient's convenience.

i. Termination for Convenience or Default (Architect & Engineering) the recipient may terminate this contract in whole or in part, for the recipient's convenience or because of contractor's failure to fulfill contract obligations. The recipient shall terminate by delivering to contractor a notice of termination specifying the nature, extent, and effective date of termination. Upon receipt of the notice, contractor shall (1) immediately discontinue all services affected (unless the notice directs otherwise), and (2) deliver to the recipient all data, drawings, specifications, reports, estimates, summaries, and other information and materials accumulated in performing this contract, whether completed or in process. If termination is for the recipient's convenience, it shall make an equitable adjustment in the contract price but shall allow no anticipated profit on unperformed services. If termination is for contractor's failure to fulfill contract obligations, the recipient may complete the work by contact or otherwise and contractor shall be liable for any additional cost incurred by the recipient.
If, after termination for failure to fulfill contract obligations, it is determined that contractor was not in default, the rights and obligations of the parties shall be the same as if termination had been issued for the recipient's convenience.

j. Termination for Convenience or Default (Cost-Type Contracts) the recipient may terminate this contract, or any portion of it, by serving a notice or termination on contractor. The notice shall state whether termination is for convenience of the recipient or for default of contractor. If termination is for default, the notice shall state the manner in which contractor has failed to perform the requirements of the contract. Contractor shall account for any property in its possession paid for from funds received from the recipient, or property supplied to contractor by the recipient. If termination is for default, the recipient may fix the fee, if the contract provides for a fee, to be paid to contractor in proportion to the value, if any, of work performed up to the time of termination. Contractor shall promptly submit its termination claim to the recipient and the parties shall negotiate the termination settlement to be paid to contractor. If termination is for the recipient's convenience, contractor shall be paid its contract close-out costs, and a fee, if the contract provided for payment of a fee, in proportion to the work performed up to the time of termination.
If, after serving a notice of termination for default, the recipient determines that contractor has an excusable reason for not performing, such as strike, fire, flood, events which are not the fault of and are beyond the control of contractor, the recipient, after setting up a new work schedule, may allow contractor to continue work, or treat the termination as a termination for convenience.

Government Wide Debarment and Suspension (Non Procurement)

The Recipient agrees to the following: (1) It will comply with the requirements of 2 C.F.R. part 180, subpart C, as adopted and supplemented by U.S. DOT regulations at 2 C.F.R. part 1200, which include the following: (a) It will not enter into any arrangement to participate in the development or implementation of the Project with any Third Party Participant that is debarred or suspended except as authorized by: 1 U.S. DOT regulations, "Nonprocurement Suspension and Debarment," 2 C.F.R. part 1200, 2 U.S. OMB, "Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)," 2 C.F.R. part 180, including any amendments thereto, and 3 Executive Orders Nos. 12549 and 12689, "Debarment and Suspension," 31 U.S.C. § 6101 note, (b) It will review the U.S. GSA "System for Award Management," https://www.sam.gov, if required by U.S. DOT regulations, 2 C.F.R. part 1200, and (c) It will include, and require each of its Third Party Participants to include, a similar provision in each lower tier covered transaction, ensuring that each lower tier Third Party Participant: 1 Will comply with Federal debarment and suspension requirements, and 2 Reviews the "System for Award Management" at https://www.sam.gov, if necessary to comply with U.S. DOT regulations, 2 C.F.R. part 1200, and (2) If the Recipient suspends, debars, or takes any similar action against a Third Party Participant or individual, the Recipient will provide immediate written notice to the: (a) FTA Regional Counsel for the Region in which the Recipient is located or implements the Project, (b) FTA Project Manager if the Project is administered by an FTA Headquarters Office, or (c) FTA Chief Counsel,

Contracts Involving Federal Privacy Act Requirements

When a grantee maintains files on drug and alcohol enforcement activities for FTA, and those files are organized so that information could be retrieved by personal identifier, the Privacy Act requirements apply to all contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)

The following requirements apply to the Contractor and its employees that administer any system of records on behalf of the Federal Government under any contract:

(1) The Contractor agrees to comply with, and assures the compliance of its employees with, the information restrictions and other applicable requirements of the Privacy Act of 1974, 5 U.S.C. § 552a. Among other things, the Contractor agrees to obtain the express consent of the Federal Government before the Contractor or its employees operate a system of records on behalf of the Federal Government. The Contractor understands that the requirements of the Privacy Act, including the civil and criminal penalties for violation of that Act, apply to those individuals involved, and that failure to comply with the terms of the Privacy Act may result in termination of the underlying contract.

(2) The Contractor also agrees to include these requirements in each subcontract to administer any system of records on behalf of the Federal Government financed in whole or in part with Federal assistance provided by FTA.

Civil Rights Requirements

Applicability – All contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)

The following requirements apply to the underlying contract:

The Recipient understands and agrees that it must comply with applicable Federal civil rights laws and regulations, and follow applicable Federal guidance, except as the Federal Government determines otherwise in writing. Therefore, unless a Recipient or Program, including an Indian Tribe or the Tribal Transit Program, is specifically exempted from a civil rights statute, FTA requires compliance with that civil rights statute, including compliance with equity in service:

a. Nondiscrimination in Federal Public Transportation Programs. The Recipient agrees to, and assures that each Third Party Participant will, comply with Federal transit law, 49 U.S.C. § 5332 (FTA's "Nondiscrimination" statute): (1) FTA's "Nondiscrimination" statute prohibits discrimination on the basis of: (a) Race, (b) Color, (c) Religion, (d) National origin, (e) Sex, (f) Disability, or (g) Age, and (2) The FTA "Nondiscrimination" statute's prohibition against discrimination includes: (a) Exclusion from participation, (b) Denial of program benefits, or (c) Discrimination, including discrimination in employment or business opportunity, (3) Except as FTA determines otherwise in writing: (a) General. Follow: 1 The most recent edition of FTA Circular 4702.1, "Title VI Requirements and Guidelines for Federal Transit Administration Recipients," to the extent consistent with applicable Federal laws, regulations, and guidance, and
2 Other applicable Federal guidance that may be issued, but (b) Exception for the Tribal Transit Program. FTA does not require an Indian Tribe to comply with FTA program-specific guidelines for Title VI when administering its projects funded under the Tribal Transit Program,

b. Nondiscrimination – Title VI of the Civil Rights Act. The Recipient agrees to, and assures that each Third Party Participant will: (1) Prohibit discrimination based on: (a) Race, (b) Color, or (c) National origin, (2) Comply with: (a) Title VI of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000d et seq., (b) U.S. DOT regulations, "Nondiscrimination in Federally-Assisted Programs of the Department of Transportation – Effectuation of Title VI of the Civil Rights Act of 1964," 49 C.F.R. part 21, and (c) Federal transit law, specifically 49 U.S.C. § 5332, as stated in the preceding section a, and (3) Except as FTA determines otherwise in writing, follow: (a) The most recent edition of FTA Circular 4702.1, "Title VI and Title VI-Dependent Guidelines for Federal Transit Administration Recipients," to the extent consistent with applicable Federal laws, regulations, and guidance. (b) U.S. DOJ, "Guidelines for the enforcement of Title VI, Civil Rights Act of 1964," 28 C.F.R. § 50.3, and (c) Other applicable Federal guidance that may be issued,

c. Equal Employment Opportunity. (1) Federal Requirements and Guidance. The Recipient agrees to, and assures that each Third Party Participant will, prohibit discrimination on the basis of race, color, religion, sex, or national origin, and: (a) Comply with Title VII of the Civil Rights Act of 1964, as amended, 42 U.S.C. § 2000e et seq., (b) Facilitate compliance with Executive Order No. 11246, "Equal Employment Opportunity," as amended by Executive Order No. 11375, "Amending Executive Order No. 11246, Relating to Equal Employment Opportunity," 42 U.S.C. § 2000e note, (c) Comply with Federal transit law, specifically 49 U.S.C. § 5332, as stated in section a, and (d) Comply with other applicable EEO laws and regulations, as provided in Federal guidance, including laws and regulations prohibiting discrimination on the basis of disability, except as the Federal Government determines otherwise in writing, (2) General. The Recipient agrees to: (a) Ensure that applicants for employment are employed and employees are treated during employment without discrimination on the basis of their: 1 Race, 2 Color, 3 Religion, 4 Sex, 5 Disability, 6 Age, or 7 National origin, (b) Take affirmative action that includes, but is not limited to: 1 Recruitment advertising, 2 Recruitment, 3 Employment, 4 Rates of pay, 5 Other forms of compensation, 6 Selection for training, including apprenticeship, 7 Upgrading, 8 Transfers, 9 Demotions, 10

Layoffs, and 11 Terminations, but (b) Indian Tribe. Title VII of the Civil Rights Act of 1964, as amended, exempts Indian Tribes under the definition of "Employer".

(3) Equal Employment Opportunity Requirements for Construction Activities. In addition to the foregoing, when undertaking “construction” as recognized by the U.S. Department of Labor (U.S. DOL), the Recipient agrees to comply, and assures the compliance of each Third Party Participant, with: (a) U.S. DOL regulations, “Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor,” 41 C.F.R. chapter 60, and (b) Executive Order No. 11246, “Equal Employment Opportunity,” as amended by Executive Order No. 11375, “Amending Executive Order No. 11246, Relating to Equal Employment Opportunity,” 42 U.S.C. § 2000e note,

d. Disadvantaged Business Enterprise. To the extent authorized by applicable Federal law, the Recipient agrees to facilitate, and assures that each Third Party Participant will facilitate, participation by small business concerns owned and controlled by socially and economically disadvantaged individuals, also referred to as “Disadvantaged Business Enterprises” (DBEs), in the Project as follows: 1) Requirements. The Recipient agrees to comply with: (a) Section 1101(b) of MAP-21, 23 U.S.C. § 101 note, (b) U.S. DOT regulations, “Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs,” 49 C.F.R. part 26, and (c) Federal transit law, specifically 49 U.S.C. § 5332, as stated in section a, (2) Assurance. As required by 49 C.F.R. § 26.13(a), (b) DBE Program Requirements. Recipients receiving planning, capital and/or operating assistance that will award prime third party contracts exceeding $250,000 in a Federal fiscal year must: 1 Have a DBE program meeting the requirements of 49 C.F.R. part 26, 2 Implement a DBE program approved by FTA, and 3 Establish an annual DBE participation goal, (c) Special Requirements for a Transit Vehicle Manufacturer. The Recipient understands and agrees that each transit vehicle manufacturer, as a condition of being authorized to bid or propose on FTA-assisted transit vehicle procurements, must certify that it has complied with the requirements of 49 C.F.R. part 26, (d) the Recipient provides assurance that: The Recipient shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of any DOT-assisted contract or in the administration of its DBE program or the requirements of 49 C.F.R. part 26. The Recipient shall take all necessary and reasonable steps under 49 C.F.R. part 26 to ensure nondiscrimination in the award and administration of DOT-assisted contracts. The Recipient's DBE program, as required by 49 C.F.R. part 26 and as approved by DOT, is incorporated by reference in this agreement. Implementation of this program is a legal obligation and failure to carry out its terms shall be treated as a violation of this agreement. Upon notification to the Recipient of its failure to carry out its approved program, the Department may impose sanctions as provided for under 49 C.F.R. part 26 and may, in appropriate cases, refer the matter for enforcement under 18 U.S.C. § 1001 and/or the Program Fraud Civil Remedies Act of 1986, 31 U.S.C. § 3801 et seq.,
(2) Exception for the Tribal Transit Program. FTA exempts Indian tribes from the Disadvantaged Business Enterprise regulations at 49 C.F.R. part 26 under MAP-21 and previous legislation,

e. Nondiscrimination on the Basis of Sex. The Recipient agrees to comply with Federal prohibitions against discrimination on the basis of sex, including: (1) Title IX of the Education Amendments of 1972, as amended, 20 U.S.C. § 1681 et seq., (2) U.S. DOT regulations, “Nondiscrimination on the Basis of Sex in Education Programs or Activities Receiving Federal Financial Assistance,” 49 C.F.R. part 25, and (3) Federal transit law, specifically 49 U.S.C. § 5332, as stated in section a,

f. Nondiscrimination on the Basis of Age. The Recipient agrees to comply with Federal prohibitions against discrimination on the basis of age, including: (1) The Age Discrimination in Employment Act (ADEA), 29 U.S.C. §§ 621 – 634, which prohibits discrimination on the basis of age, (2) U.S. Equal Employment Opportunity Commission (U.S. EEOC) regulations, “Age Discrimination in Employment Act,” 29 C.F.R. part 1625, which implements the ADEA, (3) The Age Discrimination Act of 1975, as amended, 42 U.S.C. § 6101 et seq., which prohibits discrimination against individuals on the basis of age in the administration of programs or activities receiving Federal funds, (4) U.S. Health and Human Services regulations, “Nondiscrimination on the Basis of Age in Programs or Activities Receiving Federal Financial Assistance,” 45 C.F.R. part 90, which implements the Age Discrimination Act of 1975, and

(5) Federal transit law, specifically 49 U.S.C. § 5332, as stated in section a,

g. Nondiscrimination on the Basis of Disability. The Recipient agrees to comply with the following Federal prohibitions pertaining to discrimination against seniors or individuals with disabilities: (1) Federal laws, including: (a) Section 504 of the Rehabilitation Act of 1973, as amended, 29 U.S.C. § 794, which prohibits discrimination on the basis of disability in the administration of federally funded programs or activities, (b) The Americans with Disabilities Act of 1990 (ADA), as amended, 42 U.S.C. § 12101 et seq., which requires that accessible facilities and services be made available to individuals with disabilities, 1 General. Titles I, II, and III of the ADA apply to FTA Recipients, but 2 Indian Tribes. While Titles II and III of the ADA apply to Indian Tribes, Title I of the ADA exempts Indian Tribes from the definition of “employer,” (c) The Architectural Barriers Act of 1968, as amended, 42 U.S.C. § 4151 et seq., which requires that buildings and public accommodations be accessible to individuals with disabilities, (d) Federal transit law, specifically 49 U.S.C. § 5332, which now includes disability as a prohibited basis for discrimination, and (e) Other applicable laws and amendments pertaining to access for elderly individuals or individuals with disabilities, (2) Federal regulations, including: (a) U.S. DOT regulations, “Transportation Services for Individuals with Disabilities (ADA),” 49 C.F.R. part 37, (b) U.S. DOT regulations, “Nondiscrimination on the Basis of Disability in Programs and Activities Receiving or Benefiting from Federal Financial Assistance,” 49 C.F.R. part 27, (c) U.S. DOT regulations, “Transportation for Individuals with Disabilities: Passenger Vessels,” 49 C.F.R. part 39, (d) Joint U.S. Architectural and Transportation Barriers Compliance Board (U.S. ATBCB) and U.S. DOT regulations, “Americans With Disabilities (ADA) Accessibility Specifications for Transportation Vehicles,” 36 C.F.R. part 1192 and 49 C.F.R. part 38, (e) U.S. DOJ regulations, “Nondiscrimination on the Basis of Disability in State and Local Government Services,” 28 C.F.R. part 35, (f) U.S. DOJ regulations, “Nondiscrimination on the Basis of Disability by Public Accommodations and in Commercial Facilities,” 28 C.F.R. part 36, (g) U.S. EEOC, “Regulations to Implement the Equal Employment Provisions of the Americans with Disabilities Act,” 29 C.F.R. part 1630, (h) U.S. Federal Communications Commission regulations, “Telecommunications Relay Services and Related Customer Premises Equipment for Persons with Disabilities,” 47 C.F.R. part 64, Subpart F, (i) U.S. ATBCB regulations, “Electronic and Information Technology Accessibility Standards,” 36 C.F.R. part 1194, and (j) FTA regulations, “Transportation for Elderly and Handicapped Persons,” 49 C.F.R. part 609, and (3) Other applicable Federal civil rights and nondiscrimination guidance,

h. Drug or Alcohol Abuse - Confidentiality and Other Civil Rights Protections. The Recipient agrees to comply with the confidentiality and civil rights protections of: (1) The Drug Abuse Office and Treatment Act of 1972, as amended, 21 U.S.C. § 1101 et seq., (2) The Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970, as amended, 42 U.S.C. § 4541 et seq., and (3) The Public Health Service Act, as amended, 42 U.S.C. §§ 290dd – 290dd-2,

i. Access to Services for People with Limited English Proficiency. Except as the Federal Government determines otherwise in writing, the Recipient agrees to promote accessibility of public transportation services to people whose understanding of English is limited by following: 1) Executive Order No. 13166, “Improving Access to Services for Persons with Limited English Proficiency,” August 11, 2000, 42 U.S.C. § 2000d-1 note, and (2) U.S. DOT Notice, “DOT Policy Guidance Concerning Recipients’ Responsibilities to Limited English Proficiency (LEP) Persons,” 70 Fed. Reg. 74087, December 14, 2005,

j. Other Nondiscrimination Laws. Except as the Federal Government determines otherwise in writing, the Recipient agrees to: (1) Comply with other applicable Federal nondiscrimination laws and regulations, and (2) Follow Federal guidance prohibiting discrimination.

k. Remedies. Remedies for failure to comply with applicable Federal Civil Rights laws and Federal regulations may be enforced as provided in those Federal laws or Federal regulations.

Breaches and Dispute Resolution

All contracts over $100,000
Disputes arising in the performance of this contract which are not resolved by agreement of the parties shall be decided in writing by the recipient's authorized representative. This decision shall be final and conclusive unless within ten (10) days from the date of receipt of its copy, contractor mails or otherwise furnishes a written appeal to the recipient's CEO. In connection with such appeal, contractor shall be afforded an opportunity to be heard and to offer evidence in support of its position. The decision of the recipient's CEO shall be binding upon contractor and contractor shall abide by the decision. FTA has a vested interest in the settlement of any violation of Federal law including the the False Claims Act, 31 U.S.C. § 3729.

Performance During Dispute - Unless otherwise directed by the recipient, contractor shall continue performance under this contract while matters in dispute are being resolved.
Claims for Damages - Should either party to the contract suffer injury or damage to person or property because of any act or omission of the party or of any of his employees, agents or others for whose acts he is legally liable, a claim for damages therefore shall be made in writing to such other party within ten days after the first observance of such injury or damage.

Remedies - Unless this contract provides otherwise, all claims, counterclaims, disputes and other matters in question between the recipient and contractor arising out of or relating to this agreement or its breach will be decided by arbitration if the parties mutually agree, or in a court of competent jurisdiction within the residing State.

Rights and Remedies - Duties and obligations imposed by the contract documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law. No action or failure to act by the recipient or contractor shall constitute a waiver of any right or duty afforded any of them under the contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

Disadvantaged Business Enterprise

Contracts over $3,000 awarded on the basis of a bid or proposal offering to use DBEs

a. This contract is subject to the requirements of Title 49, Code of Federal Regulations, Part 26, Participation by Disadvantaged Business Enterprises in Department of Transportation Financial Assistance Programs. The national goal for participation of Disadvantaged Business Enterprises (DBE) is 10%. The recipient's overall goal for DBE participation is listed elsewhere. If a separate contract goal for DBE participation has been established for this procurement, it is listed elsewhere.

b. The contractor shall not discriminate on the basis of race, color, religion, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR Part 26 in the award and administration of this contract. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the municicpal corporation deems appropriate. Each subcontract the contractor signs with a subcontractor must include the assurance in this paragraph (see 49 CFR 26.13(b)).

c. If a separate contract goal has been established, Bidders/offerors are required to document sufficient DBE participation to meet these goals or, alternatively, document adequate good faith efforts to do so, as provided for in 49 CFR 26.53.

d. If no separate contract goal has been established, the successful bidder/offeror will be required to report its DBE participation obtained through race-neutral means throughout the period of performance.

e. The contractor is required to pay its subcontractors performing work related to this contract for satisfactory performance of that work no later than 30 days after the contractor's receipt of payment for that work from the

recipient. In addition, the contractor may not hold retainage from its subcontractors or must return any retainage payments to those subcontractors within 30 days after the subcontractor's work related to this contract is satisfactorily completed or must return any retainage payments to those subcontractors within 30 days after incremental acceptance of the subcontractor's work by the recipient and contractor's receipt of the partial retainage payment related to the subcontractor's work.

f. The contractor must promptly notify the recipient whenever a DBE subcontractor performing work related to this contract is terminated or fails to complete its work, and must make good faith efforts to engage another DBE subcontractor to perform at least the same amount of work. The contractor may not terminate any DBE subcontractor and perform that work through its own forces or those of an affiliate without prior written consent of the recipient.

Prompt payment

Applicability – All contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)

The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than 30 days from the receipt of each payment the prime contract receives from the Recipient. The prime contractor agrees further to return retainage payments to each subcontractor within 30 days after the subcontractors work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the Recipient. This clause applies to both DBE and non-DBE subcontracts.

Incorporation of Federal Transit Administration (FTA) Terms

All contracts except micro-purchases ($3,000 or less, except for construction contracts over $2,000)

The preceding provisions include, in part, certain Standard Terms & Conditions required by USDOT, whether or not expressly stated in the preceding contract provisions. All USDOT-required contractual provisions, as stated in FTA Circular 4220.1F, are hereby incorporated by reference. Anything to the contrary herein notwithstanding, all FTA mandated terms shall be deemed to control in the event of a conflict with other provisions contained in this Agreement. The contractor shall not perform any act, fail to perform any act, or refuse to comply with any request that would cause the recipient to be in violation of FTA terms and conditions.

Other Federal Requirements

The following requirements are not federal clauses.

Full and Open Competition

In accordance with 49 U.S.C. § 5325(a) all procurement transactions shall be conducted in a manner that provides full and open competition.

Prohibition Against Exclusionary or Discriminatory Specifications

Apart from inconsistent requirements imposed by Federal statute or regulations, the contractor shall comply with the requirements of 49 USC 5323(h)(2) by refraining from using any FTA assistance to support procurements using exclusionary or discriminatory specifications.

Conformance with ITS National Architecture

Contractor shall conform, to the extent applicable, to the National Intelligent Transportation Standards architecture as required by SAFETEA-LU Section 5307(c), 23 U.S.C. Section 512 and as amended by MAP-21 23 U.S.C. § 517(d), note and follow the provisions of FTA Notice, "FTA National Architecture Policy on Transit Projects," 66 Fed. Reg.1455 etseq., January 8, 2001, and any other implementing directives FTA may issue at a later date, except to the extent FTA determines otherwise in writing.

Access Requirements for Persons with Disabilities

Contractor shall comply with 49 USC 5301(d), stating Federal policy that the elderly and persons with disabilities have the same rights as other persons to use mass transportation services and facilities and that special efforts shall be made in planning and designing those services and facilities to implement that policy. Contractor shall also comply with all applicable requirements of Sec. 504 of the Rehabilitation Act (1973), as amended, 29 USC 794, which prohibits discrimination on the basis of handicaps, and the Americans with Disabilities Act of 1990 (ADA), as amended, 42 USC 12101 et seq., which requires that accessible facilities and services be made available to persons with disabilities, including any subsequent amendments thereto.

Notification of Federal Participation

To the extent required by law, in the announcement of any third party contract award for goods and services (including construction services) having an aggregate value of $500,000 or more, contractor shall specify the amount of Federal assistance to be used in financing that acquisition of goods and services and to express that amount of Federal assistance as a percentage of the total cost of the third party contract.

Interest of Members or Delegates to Congress

No members of, or delegates to, the US Congress shall be admitted to any share or part of this contract nor to any benefit arising therefrom.

Ineligible Contractors and Subcontractors

Any name appearing upon the Comptroller General's list of ineligible contractors for federally-assisted contracts shall be ineligible to act as a subcontractor for contractor pursuant to this contract. If contractor is on the Comptroller General's list of ineligible contractors for federally financed or assisted construction, the recipient shall cancel, terminate or suspend this contract.

Other Contract Requirements

To the extent not inconsistent with the foregoing Federal requirements, this contract shall also include those provisions attached hereto, and shall comply with the recipient's Procurement Guidelines, available upon request from the recipient.

Compliance with Federal Regulations

Any contract entered pursuant to this solicitation shall contain the following provisions: All USDOT-required contractual provisions, as set forth in FTA Circular 4220.1F, are incorporated by reference. Anything to the contrary herein notwithstanding, FTA mandated terms shall control in the event of a conflict with other provisions contained in this Agreement. Contractor shall not perform any act, fail to perform any act, or refuse to comply with any grantee request that would cause the recipient to be in violation of FTA terms and conditions. Contractor shall comply with all applicable FTA regulations, policies, procedures and directives, including, without limitation, those listed directly or incorporated by reference in the Master Agreement between the recipient and FTA, as may be amended or promulgated from time to time during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

Real Property

Any contract entered into shall contain the following provisions: Contractor shall at all times comply with all applicable statutes and USDOT regulations, policies, procedures and directives governing the acquisition, use and disposal of real property, including, but not limited to, 49 CFR 18.31-18.34, 49 CFR 19.30-19.37, 49 CFR Part 24, 49 CFR 5326 as amended by MAP-21, 49 CFR part 18 or 19, 49 USC 5334, applicable FTA Circular 5010, and FTA Master Agreement, as they may be amended or promulgated during the term of this contract. Contractor's failure to so comply shall constitute a material breach of this contract.

Access to Services for Persons with Limited English Proficiency

To the extent applicable and except to the extent that FTA determines otherwise in writing, the Recipient agrees to comply with the policies of Executive Order No. 13166, "Improving Access to Services for Persons with Limited English Proficiency," 42 U.S.C. § 2000d 1 note, and with the provisions of U.S. DOT Notice, “DOT Guidance to Recipients on Special Language Services to Limited English Proficient (LEP) Beneficiaries,” 70 Fed. Reg. 74087, December 14, 2005.

Environmental Justice

Except as the Federal Government determines otherwise in writing, the Recipient agrees to promote environmental justice by following: (1)
Executive Order No. 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” February 11, 1994, 42 U.S.C. § 4321 note, as well as facilitating compliance with that Executive Order, and (2) DOT Order 5610.2, “Department of Transportation Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,” 62 Fed. Reg. 18377, April 15, 1997, and (3) The most recent and applicable edition of FTA Circular 4703.1, “Environmental Justice Policy Guidance for Federal Transit Administration Recipients,” August 15, 2012, to the extent consistent with applicable Federal laws, regulations, and guidance,

Environmental Protections

Compliance is required with any applicable Federal laws imposing environmental and resource conservation requirements for the project. Some, but not all, of the major Federal laws that may affect the project include: the National Environmental Policy Act of 1969; the Clean Air Act; the Resource Conservation and Recovery Act; the comprehensive Environmental response, Compensation and Liability Act; as well as environmental provisions with Title 23 U.S.C., and 49 U.C. chapter 53. The U.S. EPA, FHWA and other federal agencies may issue other federal regulations and directives that may affect the project. Compliance is required with any applicable Federal laws and regulations in effect now or that become effective in the future.

Geographic Information and Related Spatial Data

Any project activities involving spatial data or geographic information systems activities financed with Federal assistance are required to be consistent with the National Spatial Data Infrastructure promulgated by the Federal Geographic Data Committee, except to the extent that FTA determines otherwise in writing.

Federal Single Audit Requirements for State Administered Federally Aid Funded Projects Only

Non Federal entities that expend $500,000 or more in a year in Federal awards from all sources are required to comply with the Federal Single Audit Act provisions contained in U.S. Office of Management and Budget (OMB) Circular No. A 133, Audits of States, Local Governments, and Non Profit Organizations. Non Federal entities that expend Federal awards from a single source may provide a program specific audit, as defined in the Circular. Non Federal entities that expend less than $500,000 in a year in Federal awards from all sources are exempt from Federal audit requirements for that year, except as noted in '3052.215(a), but records must be available for review or audit by appropriate officials of the Federal and State agencies.

Catalog of Federal Domestic Assistance (CFDA) Identification Number

The municipal project sponsor is required to identify in its accounts all Federal awards received and expended, and the Federal programs under which they were received. Federal program and award identification shall include, as applicable, the CFDA title and number, award number and year, name of the Federal agency, and name of the pass through entity.

CFDA number for the Federal Transportation Administration

A Recipient covered by the Single Audit Act Amendments of 1996 and OMB Circular A-133, “Audits of States, Local Governments, and Non-Profit Organizations,” agrees to separately identify the expenditures for Federal awards under the Recovery Act on the Schedule of Expenditures of Federal Awards (SEFA) and the Data

Collection Form (SF-SAC) required by OMB Circular A-133. The Recipient agrees to accomplish this by identifying expenditures for Federal awards made under Recovery Act separately on the SEFA, and as separate rows under Item 9 of Part III on the SF-SAC by CFDA number, and inclusion of the prefix “ARRA” in identifying the name of the Federal program on the SEFA and as the first characters in Item 9d of Part III on the SF-SAC.

Federal Certifications

CERTIFICATION AND RESTRICTIONS ON LOBBYING

I, _____, hereby certify
(Name and title of official)

On behalf of _____ that:
(Name of Bidder/Company Name)

- No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any federal grant, the making of any federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any federal contract, grant, loan, or cooperative agreement.

- If any funds other than federal appropriated funds have been paid or will be paid to any person influencing or attempting to influence an officer or employee of any agency, a Member of Congress, and officer or employee of Congress, or an employee of a Member of Congress in connection with the federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form – LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

- The undersigned shall require that the language of this certification be included in the award documents for all sub-awards at all tiers (including sub-contracts, sub-grants and contracts under grants, loans, and cooperative agreements) and that all sub-recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. § 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The undersigned certifies or affirms the truthfulness and accuracy of the contents of the statements submitted on or with this certification and understands that the provisions of 31 U.S.C. Section 3801, et seq., are applicable thereto.

Name of Bidder/Company Name _____

Type or print name_____

Signature of authorized representative _____ Date __/__/__

Signature of notary and SEAL _____

Instructions for Certification: By signing and submitting this bid or proposal, the prospective lower tier participant is providing the signed certification set out below.

(1) It will comply and facilitate compliance with U.S. DOT regulations, "Nonprocurement Suspension and Debarment," 2 CFR part 1200, which adopts and supplements the U.S. Office of Management and Budget (U.S. OMB) "Guidelines to Agencies on Governmentwide Debarment and Suspension (Nonprocurement)," 2 CFR part 180,

(2) To the best of its knowledge and belief, that its Principals and Subrecipients at the first tier:

a. Are eligible to participate in covered transactions of any Federal department or agency and are not presently:

(1) Debarred,
(2) Suspended,
(3) Proposed for debarment,
(4) Declared ineligible,
(5) Voluntarily excluded, or
(6) Disqualified,

b. Its management has not within a three-year period preceding its latest application or proposal been convicted of or had a civil judgment rendered against any of them for:

(1) Commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction, or contract under a public transaction,
(2) Violation of any Federal or State antitrust statute, or
(3) Commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making any false statement, or receiving stolen property,

c. It is not presently indicted for, or otherwise criminally or civilly charged by a governmental entity (Federal, State, or local) with commission of any of the offenses listed in the preceding subsection 2.b of this Certification,

d. It has not had one or more public transactions (Federal, State, or local) terminated for cause or default within a three-year period preceding this Certification,

e. If, at a later time, it receives any information that contradicts the statements of subsections 2.a – 2.d above, it will promptly provide that information to FTA,

f. It will treat each lower tier contract or lower tier subcontract under its Project as a covered lower tier contract for purposes of 2 CFR part 1200 and 2 CFR part 180 if it:

   (1) Equals or exceeds $25,000,
   (2) Is for audit services, or
   (3) Requires the consent of a Federal official, and

g. It will require that each covered lower tier contractor and subcontractor:
   (1) Comply and facilitate compliance with the Federal requirements of 2 CFR parts 180 and 1200, and
   (2) Assure that each lower tier participant in its Project is not presently declared by any Federal department or agency to be:

      a. Debarred from participation in its federally funded Project,
      b. Suspended from participation in its federally funded Project,
      c. Proposed for debarment from participation in its federally funded Project,
      d. Declared ineligible to participate in its federally funded Project,
      e. Voluntarily excluded from participation in its federally funded Project, or
      f. Disqualified from participation in its federally funded Project, and

3. It will provide a written explanation as indicated on a page attached in FTA's TEAM-Web or the Signature Page if it or any of its principals, including any of its first tier Subrecipients or its Third Party Participants at a lower tier, is unable to certify compliance with the preceding statements in this Certification Group.

Certification

Contractor _____

Signature of Authorized Official _____ Date ___/___/___

Name and Title of Contractor's Authorized Official _____

BUY AMERICA CERTIFICATION

(STEEL OR MANUFACTURED PRODUCTS)

[61 FR 6302, Feb. 16, 1996, as amended at 74 FR 30239, June 25, 2009]

General Requirement (as stated in 49 CFR 661.5)

(a) Except as provided in 49 CFR 661.7 and 49 CFR 661.11, no funds may be obligated by FTA for a grantee project unless all iron, steel, and manufactured products used in the project are produced in the United States.

(b) All steel and iron manufacturing processes must take place in the United States, except metallurgical processes involving refinement of steel additives.

(c) The steel and iron requirements apply to all construction materials made primarily of steel or iron and used in infrastructure projects such as, transit or maintenance facilities, rail lines, and bridges. These items include, but are not limited to, structural steel or iron, steel or iron beams and columns, running rail and contact rail. These requirements do not apply to steel or iron used as components or subcomponents of other manufactured products or rolling stock, or to bimetallic power rail incorporating steel or iron components.

(d) For a manufactured product to be considered produced in the United States:

(1) All of the manufacturing processes for the product must take place in the United States; and

(2) All of the components of the product must be of U.S. origin. A component is considered of U.S. origin if it is manufactured in the United States, regardless of the origin of its subcomponents.

If steel, iron, or manufactured products (as defined in 49 CFR 661.3 and 661.5) are being procured, the appropriate certificate as set forth below shall be completed and submitted by each bidder or offeror in accordance with the requirement contained in 49 CFR 661.13(b).

Certificate of **Compliance** with Buy America Requirements.
The bidder or offeror hereby certifies that it will comply with the requirements of 49 U.S.C. 5323(j)(1), and the applicable regulations in 49 CFR part 661.

Company_____

Name_____Title_____

Signature_____Date_____

Certificate of **Non-Compliance** with Buy America Steel or Manufactured Products Requirements The bidder or offeror hereby certifies that it cannot comply with the requirements of 49 U.S.C. 5323(j), but it may qualify for an exception to the requirement pursuant to 49 U.S.C. 5323(j)(2), as amended, and the applicable regulations in 49 C.F.R. 661.7.

Company_____

Name_____Title_____

Signature_____Date_____

DIVISION 01
GENERAL REQUIREMENTS

SECTION 01 1000

SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Contractor is responsible for compliance with the “Buy America” clause referenced in these documents and it is the responsibility of each contractor to understand these requirements. Verification that materials meet this clause must be provided with each product and material submittal (Reference Section 0133000 “Submittal Procedures”).

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Access to site.
4. Work restrictions.
5. Specification and drawing conventions.
6. Miscellaneous provisions.

B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Greater Lynchburg Transit Company Operations and Maintenance Facility.

1. Project Location: 419 Bradley Drive, Lynchburg Virginia 24501-4901.

B. Owner: Greater Lynchburg Transit Company, 1301 Kemper Street, Lynchburg Virginia 24501

1. Owner's Representative: GLTC General Manager

C. Architect: Alexandria Architecture, Engineering, Surveying & Landscape Architecture, Inc.

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Wiley Wilson – Civil
2. Hurt & Proffitt – Geotechnical
3. Engineering and Planning Resources – Stormwater Management
4. ASI Signage Innovations – Signage and graphics

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The work to be done under the Contract and in accordance with the Contract Documents consists of performing, installing, furnishing and supplying all materials, equipment, labor and incidentals necessary and/or convenient for the construction of the work outlined below and the carrying out of all duties and obligations imposed upon the Contractor by the Contract Documents.

B. Type of Contract:

1. Project will be constructed under a lump sum single prime contract.

1.5 ACCESS TO SITE

A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.6 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday, unless otherwise indicated.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than 72 in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than 72 in advance of proposed disruptive operations.

2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Nonsmoking Building: Smoking is not permitted on the project site.

F. Controlled Substances: Use of tobacco products and other controlled substances including smokeless tobacco is not permitted.

G. Employee Identification: Provide identification tags for Contractor personnel working on Project site as well as visitors. Require personnel and visitors to use identification tags at all times.

1.7 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 2200

UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Section 012600 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
2. Section 014000 "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

A. Unit price is a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

A. Unit Price No. 1: Removal of unsuitable soil material.

1. Description: Unsuitable soil excavation and disposal off siteas required, according to VDOT Section 303 & 305.
2. Unit of Measurement: Cubic yard of soil excavated, based on survey of volume removed.

B. Unit Price No. 2: Replacement of unsuitable soil with select borrow.

1. Description: Replacement of unsuitable soil with satisfactory soil material, as required, according to VDOT Section 303 & 305, Select Borrow.
2. Unit of Measurement: Cubic yard.

C. Unit Price No. 3: Rock removal and replacement with satisfactory soil material.

1. Description: Rock removal and disposal off site and replacement with satisfactory soil material, as required, according to Section 312000 “Earth Moving”.
2. Unit of Measurement: Cubic yard of rock excavated, based on survey or volume removed.

D. Unit Price No. 4: Broom Finish Concrete Sidewalk

1. Description: Broom finish concrete sidewalk according to Drawings and Division 32 Section "Concrete Paving" including excavation, compaction, and sub base course.
2. Unit of Measurement: Square foot.

E. Unit Price No. 5: Asphalt Paving

1. Description: Asphalt paving according to Division 32 Section “Asphalt Paving” including excavation, compaction, stone sub base and traffic striping.
2. Unit of Measurement: Square foot.

F. Unit Price No. 6: Concrete Paving

1. Description: Concrete paving according to Division 32 Section “Concrete Paving” including excavation, compaction, stone sub base and traffic striping.
2. Unit of Measurement: Square foot.

G. Unit Price No. 7: Concrete Curb

1. Description: Concrete curb according to Drawings and Division 32 Section “Concrete Paving” including excavation, compaction and sub base course.
2. Unit of Measurement: Linear foot.

H. Unit Price No. 8: Pipe Bollard - Exterior

1. Description: Exterior pipe bollard as shown in the Drawings and as specified in Division 5 Section “Metal Fabrications” including excavation, compaction, reinforcement, concrete footing, pipe fill concrete, backfill and painting.
2. Unit of Measurement: Each.

I. Unit Price No. 9: Pipe Bollard - Interior

1. Description: Interior pipe bollard as shown in the Drawings and as specified in Division 5 Section “Metal Fabrications” including excavation, compaction, reinforcement, concrete footing, pipe fill concrete, backfill and painting.
2. Unit of Measurement: Each.

J. Unit Price No. 10: Chain Link Fencing – 4’ ht.

1. Description: Chain link fencing according to details shown on C507 and specified in Division 32 Section “Chain Link fencing and Gates” including excavation, compaction, post, footer, and full height section of fence.
2. Unit of Measurement: Linear foot.

K. Unit Price No. 11: Decorative Metal Fence – 6’ ht.

1. Description: Chain link fencing according to details shown on C507 and specified in Division 32 Section “Chain Link fencing and Gates” including excavation, compaction, post, footer, and full height section of fence.
2. Unit of Measurement: Linear foot.

L. Unit Price No. 12: Chain Link Fencing Gate – 4’ ht.

1. Description: Chain link fencing gate in accordance with chain link fencing shown on C507 and specified in Division 32 Section “Chain Link Fencing and Gates” including excavation, compaction, post, footer, and full height section of fence.
2. Unit of Measurement: Linear foot.

M. Unit Price No. 13: Chain Link Fencing Gate – 6’ ht.

1. Description: Chain link fencing gate in accordance with chain link fencing shown on C507 and specified in Division 32 Section “Chain Link Fencing and Gates” including excavation, compaction, post, footer, and full height section of fence.
2. Unit of Measurement: Linear foot.

N. Unit Price No. 14: Topsoil and Seed

1. Description: Four-inch deep topsoil with seed according to Drawings and Division 32 Section “Turf and Grasses”.
2. Unit of Measurement: Square foot.

END OF SECTION

SECTION 01 2300

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate the work of the alternate into the Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included in Part 3 of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Closed Mesh Fence Alternate.

1. ADD: ¾-inch mesh chain link fencing and gates in all locations shown on drawing C201 and drawing C506, and as specified in Section 323113 CHAIN LINK FENCES AND GATES.

2. DELETE: 2-inch mesh chain link fencing and gates in all locations shown on drawing C201 and drawing C506, and as specified in Section 323113 CHAIN LINK FENCES AND GATES.

B. Alternate No. 2: Bus Operator (Driver) Training Area Asphalt Paving Alternate.

1. ADD: Asphalt paving, in area noted (Site Improvement Note 38) as “Bus Driver Training Area” on drawing C201 and drawing C505, and as follows:

a. Asphalt paving as specified in Section 321216 ASPHALT PAVING.

b. Concrete curb as shown on drawing C502.

c. Verification of final grading and base course(s) for paving.

d. Note that site work including rough and final grading for pad for training area is to be included in the base project scope and is not part of this alternate.

2. DELETE: Topsoil, seeding and mulching as shown on drawing C201 and drawing L101, in area to receive paving alternate.

C. Alternate No. 3: Bus Operator (Driver) Training Area Concrete Paving Alternate.

1. ADD: Concrete paving, in area noted (Site Improvement Note 38) as “Bus Driver Training Area” on drawing C201 and drawing C505, and as follows:

a. Concrete paving as specified in Section 321313 CONCRETE PAVING.

b. Concrete curb as shown on drawing C502.

c. Verification of final grading and base course(s) for paving.

d. Note that site work including rough and final grading for pad for training area is to be included in the base project scope and is not part of this alternate.

2. DELETE: Topsoil, seeding and mulching as shown on drawing C201 and drawing L101, in area to receive paving alternate.

END OF SECTION

SECTION 01 2500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Requirements:

1. Section 012300 "Alternates" for products selected under an alternate.
2. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.4 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Substitution Request Form: Use form provided in at the end of this Section.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed side-by-side comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. The

side-by-side comparison shall be in table format, listing all of the attributes and requirements of the specified product as contained in the Project Specifications, and then next to these list the corresponding information of the proposed substitution. This side-by-side comparison is more detailed and in addition to the information in item #2 on the attached "Substitution Request Form."

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's CPM construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

If the entire body of information and documentation requested in items 2.a through 2.l. above is not completely provided, along with the completed "Substitution Request Form" provided at the end of this Section, the Architect will reject the substitution request as non-compliant. Where the Project Specifications name 2 or more acceptable products and/or manufacturers, the responsibility of proof for equivalency of a non-specified product and/or manufacturer resides with the contractor.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 5 working days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 10 working days of receipt of request, or 5 working days of receipt of additional information or documentation, whichever is later.

   a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform

compatibility tests recommended by manufacturers and deemed appropriate by the Architect or Engineer.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. **Submit requests for substitution during bidding only**. Substitutions must be received no later than 10 working days prior to bid date. Requests received after this time will not be reviewed or considered regardless of cause. Exception is only if the specified product, material, or equipment have been discontinued or are no longer in production.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION *Not Used*

END OF SECTION

Greater Lynchburg Transit Co.
GLTC O&M
Lynchburg, Virginia

SUBSTITUTION REQUEST FORM

PROJECT: _____

OWNER: _____

TO	Architect/Engineer	FROM	Contractor
	Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc. 1420 King Street Suite 510 Alexandria, Virginia 22314		_____

CONTRACTOR'S REQUEST, WITH SUPPORTING DATA

1. Specification Sections to which this request applies: ☐

☐ Product data for proposed substitution is attached (description product, reference standards, performance and test data).

☐ Sample is attached ☐ Sample will be sent if required by Architect

2. Itemized comparison of proposed substitution with product specified.

	SPECIFIED PRODUCT	PROPOSED SUBSTITUTION
Name, brand	_____	_____
Catalog No.	_____	_____
Manufacturer:	_____	_____
Significant Variations	_____	_____
	_____	_____
	_____	_____

_____ _____

_____ _____

3. Proposed change in Contract Time:

☐ Reduce/Increase Contract Time by _____ days. ☐ No change.

4. Proposed Change in Contract Sum:

Credit to Owner $_____ Addition Cost to Owner $_____.

5. Effect of the proposed substitution on other parts of the Work, or on other contracts.

_____

_____

CONTRACTOR'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS

We have investigated the proposed equivalent material and we:

1. believe that it is equal or superior in all respects to the originally specified product, except as stated in 2. above;
2. will provide the same warranty as required in Division 1 Section “Warranties”;
3. will provide the same special warranty or guaranty as specified;
4. will pay redesign and special inspection costs caused by the use of this product;
5. will pay additional costs to other contractors caused by the substitution;
6. will coordinate the incorporation of the proposed substitution in the Work;
7. will modify other parts of the Work as may be needed, to make all parts of the Work complete and functioning;
8. waive future claims for added cost to Contractor caused by the proposed substitution

Contractor Signature (s) _____ Date _____

Greater Lynchburg Transit Co.
GLTC O&M
Lynchburg, Virginia

ARCHITECT'S REVIEW AND ACTION

☐ Provide more information in the following categories. Resubmit.

☐ Sign Contractor's Statement of Conformance. Resubmit.

☐ The proposed substitution is approved, with the following conditions

_____

_____

Addition/Deduction from the Contract Time: _____ days.

Addition/Deduction from the Contract Amount: _____ dollars.

☐ The proposed Substitution is rejected for the following reason (s):

_____

_____

Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc.	Date

SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award if allowable.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
2. Within 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
c. Include costs of labor and supervision directly attributable to the change.
d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified that has become unavailable.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Owner may issue a Construction Change Directive. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 2900

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:

1. Section 012200 "Unit Prices" for administrative requirements governing the use of unit prices.
2. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
3. Section 013200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect 3 days prior to the pre-construction meeting.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

   a. Project name and location.
   b. Name of Architect.
   c. Architect's project number.
   d. Contractor's name and address.
   e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

      1) Labor.
      2) Materials.
      3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

9. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the General Conditions. The period of construction work covered by each Application for Payment is the period indicated in the General Conditions.

C. Payment Application Times: Submit Application for Payment to Architect by the 10th day of the month. The period covered by each Application for Payment is one month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt. Architect will distribute one copy to the Owner. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item indicate if amount paid differs from the amount requested.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms, acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Schedule of unit prices.
6. Submittal schedule (preliminary if not final).
7. List of Contractor's staff assignments.
8. List of Contractor's principal consultants.
9. Copies of building permits.
10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
11. Initial progress report.
12. Report of preconstruction conference.
13. Certificates of insurance and insurance policies.
14. Performance and payment bonds.
15. Data needed to acquire Owner's insurance.

J. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum and release of retainage withheld.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
9. Final liquidated damages settlement statement.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 3100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 013200 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Architect, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.

2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

B. Key Personnel Names: Prior to starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project. Provide to Owner two 24-hour emergency phone contacts where Contractor personnel can be reached at any time.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:

    a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    d. Indicate space requirements for routine maintenance and for anticipated replacement of components.
    e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    f. Indicate required installation sequences.
    g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work: Show the following:

a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System: Show the following:

a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.
10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

1.7 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.
5. Name of Architect.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Form bound in Project Manual.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow five working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 "Contract Modification Procedures."

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 calendar days of receipt of the RFI response.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors that have been awarded at the time of conference; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Phasing.
    c. Critical work sequencing and long-lead items.
    d. Designation of key personnel and their duties.
    e. Lines of communications.
    f. Procedures for processing field decisions and Change Orders.
    g. Procedures for RFIs.
    h. Procedures for testing and inspecting.
    i. Procedures for processing Applications for Payment.
    j. Distribution of the Contract Documents.
    k. Submittal procedures.
    l. Preparation of record documents.
    m. Use of the premises.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. Safety
    y. First aid.
    z. Security.
    aa. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and

installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

    a. Contract Documents.
    b. Options.
    c. Related RFIs.
    d. Related Change Orders.
    e. Purchases.
    f. Deliveries.
    g. Submittals.
    h. Review of mockups.
    i. Possible conflicts.
    j. Compatibility requirements.
    k. Time schedules.
    l. Weather limitations.
    m. Manufacturer's written instructions.
    n. Warranty requirements.
    o. Compatibility of materials.
    p. Acceptability of substrates.
    q. Temporary facilities and controls.
    r. Space and access limitations.
    s. Regulations of authorities having jurisdiction.
    t. Testing and inspecting requirements.
    u. Installation procedures.
    v. Coordination with other work.
    w. Required performance results.
    x. Protection of adjacent work.
    y. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

   a. Preparation of record documents.
   b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
   c. Submittal of written warranties.
   d. Requirements for preparing operations and maintenance data.
   e. Requirements for delivery of material samples, attic stock, and spare parts.
   f. Requirements for demonstration and training.
   g. Preparation of Contractor's punch list by A/E.
   h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
   i. Submittal procedures.
   j. Responsibility for removing temporary facilities and controls.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

E. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner and Architect, the Contractor shall determine which subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

      1) Review schedule for next period.

   b. Review present and future needs of each entity present, including the following:

      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Deliveries.
      5) Access.
      6) Site utilization.
      7) Temporary facilities and controls.
      8) Progress cleaning.
      9) Quality and work standards.

10) Status of correction of deficient items.
11) Field observations.
12) Status of RFIs.
13) Status of proposal requests.
14) Pending changes.
15) Status of Change Orders.
16) Pending claims and disputes.
17) Documentation of information for payment requests.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 3200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Daily construction reports.
4. Site condition reports.
5. Special reports.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting schedules and reports.
2. Section 014000 "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file, where indicated.
2. PDF electronic file.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

C. Daily Construction Reports: Submit at monthly intervals.

D. Site Condition Reports: Submit at time of discovery of differing conditions.

E. Special Reports: Submit at time of unusual event.

F. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Discuss constraints, including phasing, work stages, area separations, and interim milestones.

2. Review submittal requirements and procedures.
3. Review time required for review of submittals and resubmittals.
4. Review requirements for tests and inspections by independent testing and inspecting agencies.
5. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
6. Review and finalize list of construction activities to be included in schedule.
7. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from Notice to Proceed date to date of Final Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
2. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
3. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
4. Substantial Completion: Indicate Substantial Completion date in advance of date established for Final Completion. Include time for Architect's administrative procedures necessary for certification of Substantial Completion, but no fewer than 15 days
5. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Seasonal variations.

3. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

a. Subcontract awards.
b. Submittals.
c. Purchases.
d. Mockups.
e. Fabrication.
f. Sample testing.
g. Deliveries.
h. Installation.
i. Tests and inspections.
j. Adjusting.
k. Curing.
l. Building flush-out.
m. Startup and placement into final use and operation.

4. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:

a. Structural completion.
b. Temporary enclosure and space conditioning.
c. Permanent space enclosure.
d. Completion of mechanical installation.
e. Completion of electrical installation.
f. Substantial Completion.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:

1. Project phasing activities.

2. Construction areas

E. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

A. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.

1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 20 days after date established for the Notice of Award.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
3. Use "one calendar day" as the unit of time for individual activities. Nonworking days and holidays are assumed to be incorporated into the schedule in order to coordinate with the Contract Time.

B. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:

    a. Preparation and processing of submittals.
    b. Mobilization and demobilization.
    c. Purchase of materials.
    d. Delivery.
    e. Fabrication.
    f. Utility interruptions.
    g. Installation.
    h. Testing and commissioning.
    i. Punch list and final completion.
    j. Activities occurring following final completion.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.

C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. List of separate contractors at Project site.
3. Approximate count of personnel at Project site.

4. Equipment at Project site.
5. Material deliveries.
6. High and low temperatures and general weather conditions, including presence of rain or snow.
7. Accidents.
8. Meetings and significant decisions.
9. Unusual events (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating and responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION

SECTION 01 3300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Contractor is responsible for compliance with the “Buy America” clause referenced in these documents and it is the responsibility of each contractor to understand these requirements. Verification that materials meet this clause must be provided with each product and material submittal.

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
3. Section 017419 “Construction Waste Management and Disposal” for submitting documentation on demolition and construction waste disposal.
4. Section 017700 “Closeout Procedures” for submitting product data, schedule and documentation for project closeout.
5. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
6. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
7. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Submittals: Written and graphic information and physical samples that require Architect's responsive action. Submittals may be rejected for not complying with requirements.

B. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections. A summary of the list of submittals is included at the end of the section for Contractor us. This summary does imply the final schedule of submittals and should be verified by the Contractor.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 10 business days for initial review of each submittal.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
4. Transmittal Form for Electronic Submittals: Use electronic form at the end of this section:

    a. Project name.
    b. Date.
    c. Name and address of Architect.
    d. Name of Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Specification Section number and title.
    i. Specification paragraph number or drawing designation and generic name for each of multiple items.
    j. Drawing number and detail references, as appropriate.
    k. Location(s) where product is to be installed, as appropriate.
    l. Related physical samples submitted directly.
    m. Transmittal number, numbered consecutively.
    n. Other necessary identification.
    o. Remarks.

E. Options: Identify options requiring selection by Architect.

F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators and installers, authorities having jurisdiction and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete paper copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

J. Summary Submittals List: See Summary Submittals List following this section, listing categories of information to be submitted.

1. Summary Submittal List is to be reviewed in conjunction with individual specifications sections. Most comprehensive or stringent requirements of either the Summary Submittals List or the specification section shall prevail.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:

a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.
b. Schedules.
c. Compliance with specified standards.
d. Notation of coordination requirements.
e. Notation of dimensions established by field measurement.
f. Relationship and attachment to adjoining construction clearly indicated.
g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).
3. Submit Shop Drawings in the following format:

a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.
   e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

   a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

   a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

E. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."

F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."

G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."

H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."

I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."

K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

R. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

T. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

U. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

V. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance Material Submittals: See requirements in Section 017700 "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action. Architect will forward each submittal to appropriate party.

B. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

C. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION

Submittal No._____

Submittal Transmittal

PROJECT: GLTC Operations and Maintenance Facility

WD PROJECT #: **444505**

OWNER: Greater Lynchburg Transit Company

A/E: Alexandria Architecture, Engineering, Land Surveying & Landscape Architects, Inc.

CONTRACT # & NAME_____

CONTRACTOR: _____
(NAME, ADDRESS, TELEPHONE & FAX NUMBERS)

☐ NEW SUBMITTAL ☐ RESUBMITTAL Date: _____

This submittal is: ☐ AS SPECIFIED REMARKS:_____

NUMBER OF COPIES SUBMITTED: (8 maximum) _____

TYPE OF SUBMITTAL: ***(CHECK ALL THAT APPLY)***

( ) SHOP DRAWINGS
( ) SAMPLE
( ) COLOR SELECTION
( ) SCHEDULE
( ) WARRANTY
( ) TEST REPORT
( ) PRODUCT DATA/CATALOG CUT
( ) RECORD DOCUMENT
( ) PERFORMANCE DATA
( ) OPERATIONS & MAINTENANCE DATA
( ) OTHER _____

SPEC. SECTION: _____

PARAGRAPH(S): _____

DWG. REF. NO.:_____

CONTRACTOR CERTIFICATION

CONTRACTOR CERTIFIES THAT THE INFORMATION SUBMITTED COMPLIES WITH THE CONTRACT DOCUMENT REQUIREMENTS.

By: _____

Date: _____

NOTE: Contractor shall apply an approval stamp to each copy of each submittal.

DESCRIPTION OF SUBMITTAL:_____

PRODUCT NAME:_____

MANUFACTURER:_____

ADDRESS:_____ TEL. NO.:_____

CONTRACTOR or SUBCONTRACTOR:_____ TEL. NO.:_____

SUPPLIER:_____ TEL. NO.:_____

GLTC Operations & Maintenance Facility	Wendel
419 Bradley Drive, Lynchburg VA 24505-4910 Owner: Greater Lynchburg Transit Company 1301 Kemper Street, PO Box 797 Lynchburg VA 24505-0797	Architects & Engineers 1420 King Street, Suite 510 Alexandria VA 22314 p. 703-299-8718 f. 703-299-8719

Summary Submittals List

Specification Section	Title
033000 - Cast-in-Place Concrete	Product Data & Material Certificates
033000 - Cast-in-Place Concrete	Concrete Design Mixes
033000 - Cast-in-Place Concrete	Steel Reinforcement Shop Dwgs
033000 - Cast-in-Place Concrete	Installer Qualification Data
033000 - Cast-in-Place Concrete	Manufacturer Qualification Data
033000 - Cast-in-Place Concrete	Testing & Inspection Reports
033000 - Cast-in-Place Concrete	Pre-installation Meeting Minutes
033543 - Polished Concrete Finishing	Product Data
033543 - Polished Concrete Finishing	Manufacturer Qualification Data
033543 - Polished Concrete Finishing	Installer Qualification Data
033543 - Polished Concrete Finishing	Certifications
033543 - Polished Concrete Finishing	Independent Test Reports
033543 - Polished Concrete Finishing	Maintenance Data
034500 - Precast Architectural Concrete	See 079200 - Joint Sealants for Combined Submittal
034500 - Precast Arch. Concrete	Product Data
034500 - Precast Arch. Concrete	Production Drawings
034500 - Precast Arch. Concrete	Erection Drawings
034500 - Precast Arch. Concrete	Samples for Each Type & Finish
034500 - Precast Arch. Concrete	Design Modifications
034500 - Precast Arch. Concrete	Design Mixes
034500 - Precast Arch. Concrete	Test Reports
034500 - Precast Arch. Concrete	Certificates
034500 - Precast Arch. Concrete	Engineer Qualification Data
034500 - Precast Arch. Concrete	Installer Qualification Data
034500 - Precast Arch. Concrete	Fabricator Qualification Data
034500 - Precast Arch. Concrete	Sill Unit Samples
040514 - Unit Masonry Mortar & Grout	Product Data
040514 - Unit Masonry Mortar & Grout	Certifications
040514 - Unit Masonry Mortar & Grout	Grout & Mortar Design Mixes
040514 - Unit Masonry Mortar & Grout	Samples
040514 - Unit Masonry Mortar & Grout	Testing & Inspection Reports
042000 - Unit Masonry	Product Data

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Summary Submittals List

Specification Section	Title
042000 - Unit Masonry	Full-Range Samples
042000 - Unit Masonry	Certifications
042000 - Unit Masonry	Steel Reinforcement Shop Dwgs
042000 - Unit Masonry	Manufacturer Qualification Data
042000 - Unit Masonry	Installer Qualification Data
042000 - Unit Masonry	Testing & Inspection Reports
050515 - Fluoropolymer Finish	Product & Test Data
050515 - Fluoropolymer Finish	Samples
050515 - Fluoropolymer Finish	Coating Manufacturer Qualification
050515 - Fluoropolymer Finish	Warranty
051200 - Structural Steel	Product Data & Mill Test Reports
051200 - Structural Steel	Shop Drawings
051200 - Structural Steel	Welding Certificates
051200 - Structural Steel	Fabricator Qualification Data
051200 - Structural Steel	Erector Qualification Data
051200 - Structural Steel	Testing & Inspection Reports
055300 - Metal Gratings	Product Data
055300 - Metal Gratings	Shop Drawings
055300 - Metal Gratings	Welding Certificates
055300 - Metal Gratings	Qualification Data
055300 - Metal Gratings	Mill Certificates
055300 - Metal Gratings	Delegated-Design Analysis
055000 - Metal Fabrications	Professional Certifications
055000 - Metal Fabrications	Product Data
055000 - Metal Fabrications	Shop Drawings
055000 - Metal Fabrications	Calculations
055000 - Metal Fabrications	Design Modifications
055000 - Metal Fabrications	Certificates
055000 - Metal Fabrications	Engineer Qualification Data
055000 - Metal Fabrications	Fabricator/Installer Qualification
060573 - Wood Treatment	Product Data

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Summary Submittals List

Specification Section	Title
060573 - Wood Treatment	Certificates
061600 - Sheathing	Product Data
064000 - Architectural Woodwork	Product Data
064000 - Architectural Woodwork	Shop Drawings
064000 - Architectural Woodwork	Samples
064000 - Architectural Woodwork	Certificates
064000 - Architectural Woodwork	Fabricator Qualification Data
064000 - Architectural Woodwork	Warranty
071113 - Bituminous Dampproofing	Product Data
071113 - Bituminous Dampproofing	Installer Qualification Data
071416 - Cold Fl.-App. Waterproofing	Product Data
071416 - Cold Fl.-App. Waterproofing	Installer Qualification Data
071416 - Cold Fl.-App. Waterproofing	Inspection Reports
071416 - Cold Fl.-App. Waterproofing	Warranty
072100 - Thermal Insulation	Product Data
071800 - Traffic Coatings	Product Data
071800 - Traffic Coatings	Samples
071800 - Traffic Coatings	Installer Qualification Data
071800 - Traffic Coatings	Inspection Data
071800 - Traffic Coatings	Maintenance Data
074113.13 - Formed Mtl. Roof Panels	Product Data
074113.13 - Formed Mtl. Roof Panels	Shop Drawings
074113.13 - Formed Mtl. Roof Panels	Samples
074113.13 - Formed Mtl. Roof Panels	Installer Qualification Data
074113.13 - Formed Mtl. Roof Panels	Product Test Reports
074113.13 - Formed Mtl. Roof Panels	Field Quality-Control Reports
074113.13 - Formed Mtl. Roof Panels	Special Warranties
074113.13 - Formed Mtl. Roof Panels	Maintenance Data

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Summary Submittals List

Specification Section	Title
076200 - Sheet Metal Flashing & Trim	See 133419 - Mtl. Bldg. Systems for Combined Submittal
076200 - Sheet Mtl. Flashing & Trim	Product Data
076200 - Sheet Mtl. Flashing & Trim	Shop Drawings
076200 - Sheet Mtl. Flashing & Trim	Samples
076200 - Sheet Mtl. Flashing & Trim	Certification
076200 - Sheet Mtl. Flashing & Trim	Fabricator Qualification Data
076200 - Sheet Mtl. Flashing & Trim	Installer Qualification Data
076200 - Sheet Mtl. Flashing & Trim	Warranty
078100 - Applied Fireproofing	Product Data
078100 - Applied Fireproofing	Schedule
078100 - Applied Fireproofing	Test Reports
078100 - Applied Fireproofing	Certifications
078100 - Applied Fireproofing	Installer Qualification Data
078400 - Firestopping	Product Data
078400 - Firestopping	Schedules
078400 - Firestopping	Test Reports
078400 - Firestopping	Certifications
078400 - Firestopping	Installer Qualification Data
079200 - Joint Sealants	Product Data
079200 - Joint Sealants	Samples
079200 - Joint Sealants	Certifications
079200 - Joint Sealants	Test Reports
079200 - Joint Sealants	Manufacturer Qualification Data
079200 - Joint Sealants	Installer Qualification Data
079200 - Joint Sealants	Installer's Warranty
079200 - Joint Sealants	Manufacturer's Warranty
084113 - Alum. Entr. & Storefronts	Product Data
084113 - Alum. Entr. & Storefronts	Shop Drawings
084113 - Alum. Entr. & Storefronts	Hardware Schedule
084113 - Alum. Entr. & Storefronts	Samples
084113 - Alum. Entr. & Storefronts	Installer Qualification Data

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Summary Submittals List

Specification Section	Title
084113 - Alum. Entr. & Storefronts	Manufacturer Qualification Data
084113 - Alum. Entr. & Storefronts	Calculations
084113 - Alum. Entr. & Storefronts	Design Modifications
084113 - Alum. Entr. & Storefronts	Test Reports
084113 - Alum. Entr. & Storefronts	Maintenance Data
084113 - Alum. Entr. & Storefronts	Warranties
088000 - Glazing	Product Data
088000 - Glazing	Samples
088000 - Glazing	Calculations
088000 - Glazing	Certifications
088000 - Glazing	Manufacturer Qualification Data
088000 - Glazing	Installer Qualification Data
088000 - Glazing	Maintenance Data
088000 - Glazing	Warranties
081113 - Hollow Mtl. Doors & Frames	Product Data
081113 - Hollow Mtl. Doors & Frames	Shop Drawings
081113 - Hollow Mtl. Doors & Frames	Installer Qualification Data
081113 - Hollow Mtl. Doors & Frames	Fabricator Qualification Data
081416 - Flush Wood Doors	Product Data
081416 - Flush Wood Doors	Shop Drawings
081416 - Flush Wood Doors	Samples
081416 - Flush Wood Doors	Warranty
081416 - Flush Wood Doors	Installer Qualification Data
083100 - Access Doors & Panels	Product Data
083100 - Access Doors & Panels	Manufacturer Qualifications
084113 - Alum.-Framed Entrances & Storefronts	See 079200 - Joint Sealants for Combined Submittal
083300 - Coiling Doors	Product Data
083300 - Coiling Doors	Shop Drawings
083300 - Coiling Doors	Samples
083300 - Coiling Doors	Certifications

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Specification Section	Title
083300 - Coiling Doors	Inistaller Qualification Data
083300 - Coiling Doors	Operation & Maintenance Data
083613 - Sectional Doors	Product Data
083613 - Sectional Doors	Shop Drawings
083613 - Sectional Doors	Samples
083613 - Sectional Doors	Certifications
083613 - Sectional Doors	Installer Qualification Data
083613 - Sectional Doors	Operation & Maintenance Data
085113 - Aluminum Windows	Product Data
085113 - Aluminum Windows	Shop Drawings
085113 - Aluminum Windows	Hardware Schedule
085113 - Aluminum Windows	Glass Samples
085113 - Aluminum Windows	Aluminum Samples
085113 - Aluminum Windows	Design Modifications
085113 - Aluminum Windows	Test Reports
085113 - Aluminum Windows	Installer/Manufacturer Qualification
085113 - Aluminum Windows	Maintenance Data
085113 - Aluminum Windows	Warranties
087100 - Door Hardware	Product Data
087100 - Door Hardware	Shop Drawings
087100 - Door Hardware	Initial Selection Samples
087100 - Door Hardware	Verification Samples
087100 - Door Hardware	Door Hardware Schedule
087100 - Door Hardware	Keying Schedule
087100 - Door Hardware	Installer Qualification Data
087100 - Door Hardware	Arch. Hardware Consultant Qualif.
087100 - Door Hardware	Product Certificates
087100 - Door Hardware	Product Test Reports
087100 - Door Hardware	Warranty
087100 - Door Hardware	Maintenance Data
087513 - Assistive Window Actuator	Product Data
087513 - Assistive Window Actuator	Shop Drawings

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Specification Section	Title
087513 - Assistive Window Actuator	Warranty
087513 - Assistive Window Actuator	Manufacturer Qualification Data
087513 - Assistive Window Actuator	Installer Qualification Data
087513 - Assistive Window Actuator	Warranty
088000 - Glazing	See: 084113 - Alum.-Framed Entr. & Storefronts for Combined Submittal
089000 - Louvers & Vents	Product Data
089000 - Louvers & Vents	Shop Drawings
089000 - Louvers & Vents	Color & Finish Samples
091000 - Non-Structural Metal Framing	Product Data
091000 - Non-Structural Metal Framing	Installer Qualification Data
092900 - Gypsum Board	Product Data
092900 - Gypsum Board	Samples
092900 - Gypsum Board	Certification
092900 - Gypsum Board	Installer Qualification Data
093000 - Tiling	Product Data
093000 - Tiling	Samples
093000 - Tiling	Installer Qualification Data
093000 - Tiling	Certification
093000 - Tiling	Maintenance Data
093000 - Tiling	Extra Stock
095100 - Acoustical Ceilings	Product Data
095100 - Acoustical Ceilings	Shop Drawings
095100 - Acoustical Ceilings	Samples
095100 - Acoustical Ceilings	Installer Qualification Data
095100 - Acoustical Ceilings	Extra Stock
096500 - Resilient Flooring	Product Data
096500 - Resilient Flooring	Samples
096500 - Resilient Flooring	Installer Qualification Data

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Specification Section	Title
096500 - Resilient Flooring	Maintenance Data
096500 - Resilient Flooring	Extra Stock
099000 - Painting & Coating	Product Data
099000 - Painting & Coating	Samples
099000 - Painting & Coating	Certification
099000 - Painting & Coating	Installer Qualification Data
099000 - Painting & Coating	Extra Stock
101400 - Interior & Exterior Signs	Product Data
101400 - Interior & Exterior Signs	Shop Drawings
101400 - Interior & Exterior Signs	Samples
101400 - Interior & Exterior Signs	Installation Instructions
101400 - Interior & Exterior Signs	Closeout Submittals
101400 - Interior & Exterior Signs	Warranty
102113 - Toilet Compartments	Product Data
102113 - Toilet Compartments	Shop Drawings
102113 - Toilet Compartments	Samples
102113 - Toilet Compartments	Maintenance Data
102113 - Toilet Compartments	Installer Qualification Data
102113 - Toilet Compartments	Warranty
102213 - Wire Mesh Partitions	Product Data
102213 - Wire Mesh Partitions	Shop Drawings
102213 - Wire Mesh Partitions	Samples
102213 - Wire Mesh Partitions	Installer Qualification Data
102226 - Operable Partitions	Product Data
102226 - Operable Partitions	Shop Drawings
102226 - Operable Partitions	Samples
102226 - Operable Partitions	Test Reports
102226 - Operable Partitions	Installer Qualification Data
102226 - Operable Partitions	Warranty
102600 - Wall and Column Protections	Product Data

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Specification Section	Title
102600 - Wall and Column Protections	Shop Drawings
102600 - Wall and Column Protections	Samples
102813 - Toilet Accessories	Product Data
102813 - Toilet Accessories	Warranty
102813 - Toilet Accessories	Installer Qualification Data
103000 - Automatic Spill Barrier	Product Data
103000 - Automatic Spill Barrier	Shop drawings
103000 - Automatic Spill Barrier	Field Test Reports
103000 - Automatic Spill Barrier	Sample warranty
103000 - Automatic Spill Barrier	Operation and Maintenance Manual
103000 - Automatic Spill Barrier	Coordination Drawings
103000 - Automatic Spill Barrier	Maintenance Materials
105113 - Metal Lockers	Product Data
105113 - Metal Lockers	Shop Drawings
105113 - Metal Lockers	Samples
105113 - Metal Lockers	Installer Qualification Data
105500 - Postal Specialties	Product Data
105500 - Postal Specialties	Shop Drawings
105500 - Postal Specialties	Samples
106700 - Storage Equipment	Product Data
106700 - Storage Equipment	Shop Drawings
106700 - Storage Equipment	Field Test & Start-up Reports
106700 - Storage Equipment	Certification
106700 - Storage Equipment	Warranty
106700 - Storage Equipment	Operation & Maintenance Manual
106700 - Storage Equipment	Extra Materials
107500 - Flagpoles	Product Data
107500 - Flagpoles	Shop Drawings
107500 - Flagpoles	Samples for Verification

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Specification Section	Title
107500 - Flagpoles	Delegated Design submittal
111400 - Fuel & Fluid Mgmt. System	Product Data
111400 - Fuel & Fluid Mgmt. System	Shop Drawings
111400 - Fuel & Fluid Mgmt. System	Test & Inspection Reports
111400 - Fuel & Fluid Mgmt. System	Certification
111400 - Fuel & Fluid Mgmt. System	Operation & Maintenance Manual
111400 - Fuel & Fluid Mgmt. System	Warranty
115100 - Shop Equipment	Product Data
115100 - Shop Equipment	Shop Drawings & Schematics
115100 - Shop Equipment	Field Test & Start-up Reports
115100 - Shop Equipment	Certification
115100 - Shop Equipment	Operation & Maintenance Manual
115100 - Shop Equipment	Extra Materials
115100 - Shop Equipment	Warranty
115110 - CO Exhaust Systems	Product Data
115110 - CO Exhaust Systems	Shop Drawings & Schematics
115110 - CO Exhaust Systems	Delegated-design Analysis
115110 - CO Exhaust Systems	Field Test & Start-up Reports
115110 - CO Exhaust Systems	Certification
115110 - CO Exhaust Systems	Operation & Maintenance Manual
115110 - CO Exhaust Systems	Extra materials
115110 - CO Exhaust Systems	Warranty
115400 - Fare Collection Equipment	Product Data
115400 - Fare Collection Equipment	Shop Drawings & Schematics
115400 - Fare Collection Equipment	Test & Inspection Reports
115400 - Fare Collection Equipment	Field Test & Start-up Reports
115400 - Fare Collection Equipment	Certification
115400 - Fare Collection Equipment	Operation & Maintenance Manual
115400 - Fare Collection Equipment	Warranty
115500 - Vehicle Wash Equipment	Product Data
115500 - Vehicle Wash Equipment	Shop Drawings & Schematics

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Specification Section	Title
115500 - Vehicle Wash Equipment	Delegated-design Analysis
115500 - Vehicle Wash Equipment	Test & Inspection Reports
115500 - Vehicle Wash Equipment	Field Test & Start-up Reports
115500 - Vehicle Wash Equipment	Certification
115500 - Vehicle Wash Equipment	Operation & Maintenance Manual
115500 - Vehicle Wash Equipment	Extra Materials
115500 - Vehicle Wash Equipment	Warranty
115600 - Fueling System Equipment	Product Data
115600 - Fueling System Equipment	Shop Drawings & Schematics
115600 - Fueling System Equipment	Wiring Diagrams
115600 - Fueling System Equipment	Test & Inspection Data
115600 - Fueling System Equipment	Field Test & Start-up Reports
115600 - Fueling System Equipment	Certification
115600 - Fueling System Equipment	Operation & Maintenance Manual
115600 - Fueling System Equipment	Maintenance material
115600 - Fueling System Equipment	Warranty
115800 - Fluid Lubrication Systems	Product Data
115800 - Fluid Lubrication Systems	Shop Drawings & Schematics
115800 - Fluid Lubrication Systems	Wiring Diagrams
115800 - Fluid Lubrication Systems	Test & Inspection Reports
115800 - Fluid Lubrication Systems	Field Test & Start-up Reports
115800 - Fluid Lubrication Systems	Certification
115800 - Fluid Lubrication Systems	Operation & Maintenance Manual
115800 - Fluid Lubrication Systems	Maintenance Material
115800 - Fluid Lubrication Systems	Warranty
115810 - Fluid Lubrication Piping	Product Data
115810 - Fluid Lubrication Piping	Piping Schedule
115810 - Fluid Lubrication Piping	Shop/Coordination Drawings
115810 - Fluid Lubrication Piping	Quality Assurance Certification
115810 - Fluid Lubrication Piping	Welding Certification
115810 - Fluid Lubrication Piping	Field Test Reports
122113 - Horizontal Louver Blinds	Product Data

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Specification Section	Title
122113 - Horizontal Louver Blinds	Shop Drawings
122113 - Horizontal Louver Blinds	Samples
122113 - Horizontal Louver Blinds	Installer Qualification Data
122113 - Horizontal Louver Blinds	Maintenance Data
122113 - Horizontal Louver Blinds	Warranty
122116 - Vertical Louver Blinds	Product Data
122116 - Vertical Louver Blinds	Samples
124813 - Entrance Floor Mats	Product Data
124813 - Entrance Floor Mats	Samples
124813 - Entrance Floor Mats	Maintenance Data
124813 - Entrance Floor Mats	Warranty
124813 - Entrance Floor Mats	Extra Stock
131200 - Fuel Island Canopy	Shop Drawings
131200 - Fuel Island Canopy	Samples for Verification
131200 - Fuel Island Canopy	Delegated-design Analysis
131200 - Fuel Island Canopy	Product Data
131200 - Fuel Island Canopy	Design Calculations for Q.C.
131200 - Fuel Island Canopy	Product Test Reports
131200 - Fuel Island Canopy	Field Quality-control Reports
131200 - Fuel Island Canopy	Warranties
131200 - Fuel Island Canopy	Maintenance Data
131200 - Fuel Island Canopy	Manufacturer Qualification Data
131200 - Fuel Island Canopy	Erector Qualification Data
131200 - Fuel Island Canopy	Welding Certificates
131200 - Fuel Island Canopy	Warranty
133419 - Metal Building Systems	Product Data & Material Certificates
133419 - Metal Building Systems	Shop Drawings
133419 - Metal Building Systems	Samples
133419 - Metal Building Systems	Delegated-Design Analysis
133419 - Metal Building Systems	Erector Qualification Data
133419 - Metal Building Systems	Manfuacturer Qualification Data
133419 - Metal Building Systems	Land Surveyor Qualification Data

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Specification Section	Title
133419 - Metal Building Systems	Engineer Qualification Data
133419 - Metal Building Systems	Manufacturer Accreditation
133419 - Metal Building Systems	Welding Certificates
133419 - Metal Building Systems	Metal Bldg System Certificates
133419 - Metal Building Systems	Product & Material Test Reports
133419 - Metal Building Systems	Testing & Inspection Reports
133419 - Metal Building Systems	Surveys
133419 - Metal Building Systems	Warranties
133419 - Metal Building Systems	Maintenance Data
143000 - Cranes	Product Data
143000 - Cranes	Shop Drawings & Schematics
143000 - Cranes	Delegated-design Analysis
143000 - Cranes	Test & Inspection Reports
143000 - Cranes	Field Test & Start-up Reports
143000 - Cranes	Certification
143000 - Cranes	Operation & Maintenance Manual
143000 - Cranes	Warranty
144500 - Vehicle Lifts	Product Data
144500 - Vehicle Lifts	Delegated-design Analysis
144500 - Vehicle Lifts	Shop Drawings & Schematics
144500 - Vehicle Lifts	Test & Inspection Reports
144500 - Vehicle Lifts	Field Test & Start-up Reports
144500 - Vehicle Lifts	Certification
144500 - Vehicle Lifts	Operation & Maintenance Manual
144500 - Vehicle Lifts	Warranty
Suppression Piping	Product Data
210518 - Escutcheons for Fire-Suppression Piping	Product Data
Fire-Suppression Piping	Product Data
and Equipment	Product Data
and Equipment	Equipment-Label Schedule

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Specification Section	Title
and Equipment	Valve Schedule
and Equipment	Maintenance Data
211119 - Fire Department Connections	Product Data
211313 - Wet-Pipe Sprinkler Systems	Product Data
211313 - Wet-Pipe Sprinkler Systems	Approved Sprinkler Piping Drawings
211313 - Wet-Pipe Sprinkler Systems	Fire-Hydrant Flow Test Report
211313 - Wet-Pipe Sprinkler Systems	Hydraulic Calculations
211313 - Wet-Pipe Sprinkler Systems	Coordination Drawings
211313 - Wet-Pipe Sprinkler Systems	Field Test Reports
211313 - Wet-Pipe Sprinkler Systems	Field Quality Control Reports
211313 - Wet-Pipe Sprinkler Systems	Operation and Maintenance Data
213113 - Electric Drive, Centrifugal Fire Pumps	Product Data
213113 - Electric Drive, Centrifugal Fire Pumps	Shop Drawing: Detail Equipment Assemblies
213113 - Electric Drive, Centrifugal Fire Pumps	Shop Drawing: Wiring Diagrams
213113 - Electric Drive, Centrifugal Fire Pumps	Field Quality Control Reports
213113 - Electric Drive, Centrifugal Fire Pumps	Operation and Maintenance Data
213400 - Pressure Maintenance Pumps	Product Data
213400 - Pressure Maintenance Pumps	Shop Drawing: Detail Equipment Assemblies
213400 - Pressure Maintenance Pumps	Shop Drawing: Wiring Diagrams
213400 - Pressure Maintenance Pumps	Field Quality Control Reports
213400 - Pressure Maintenance Pumps	Operation and Maintenance Data
213900 - Controllers for Fire-Pump Drivers	Product Data
213900 - Controllers for Fire-Pump Drivers	Shop Drawings: Detail Equipment Assemblies
213900 - Controllers for Fire-Pump Drivers	Shop Drawings: Wiring Diagrams
213900 - Controllers for Fire-Pump Drivers	Manufacturers Factory Test Reports
213900 - Controllers for Fire-Pump Drivers	Field Quality Control Reports
213900 - Controllers for Fire-Pump Drivers	Operation and Maintenance Data
221313 - Facilty Sanitary Sewer	Product Data
221313 - Facilty Sanitary Sewer	Qualifications

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Specification Section	Title
221313 - Facilty Sanitary Sewer	Material Certificates
220500 - Common Work Results for Plumbing	Product Data
220500 - Common Work Results for Plumbing	Welding Certificates
220517 - Sleeves and Sleeve Seals for Plumbing Piping	Product Data
220518 - Escutcheons for Plumbing Piping	Product Data
220519- Meters and Gages	Prduct Data
220519- Meters and Gages	Operations and Maintenance Data
220523 - General-Duty Valves for Plumbing Piping	Product Data
220523 - General-Duty Valves for Plumbing Piping	Valve Schedule
220529 - Hangers and Supports for Plumbing Piping and Equipment	Product Data
220529 - Hangers and Supports for Plumbing Piping and Equipment	Shop Drawings
220529 - Hangers and Supports for Plumbing Piping and Equipment	Welding Certifications
220553 - Identification for Plumbing Piping and Equipment	Product Data
220553 - Identification for Plumbing Piping and Equipment	Equipment label schedule
220553 - Identification for Plumbing Piping and Equipment	Valve numbering scheme

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Specification Section	Title
220553 - Identification for Plumbing Piping and Equipment	Valve schedule
220719 - Plumbing Piping Insulation	Product Data
220719 - Plumbing Piping Insulation	Application Schedule
220719 - Plumbing Piping Insulation	Field Quality Report
221116 - Domestic Water Piping	Product data
221116 - Domestic Water Piping	Piping Schedule
221116 - Domestic Water Piping	Shop/Coordination drawings
221116 - Domestic Water Piping	Field Qualitiy test reports
221119 - Domestic Water Piping Specialties	Product Data
221119 - Domestic Water Piping Specialties	Specialties schedule
221119 - Domestic Water Piping Specialties	Shop/Coordination drawings
221119 - Domestic Water Piping Specialties	Operations and Maintenance Data
221119 - Domestic Water Piping Specialties	Maintenance material
221316 - Sanitary Waste and Vent Piping	Product data
221316 - Sanitary Waste and Vent Piping	Piping Schedule
221316 - Sanitary Waste and Vent Piping	Shop/Coordination drawings
221316 - Sanitary Waste and Vent Piping	Field Qualitiy test reports
221319 - Sanitary Waste and Vent Piping Specialties	Product Data
221319 - Sanitary Waste and Vent Piping Specialties	Specialties schedule
221319 - Sanitary Waste and Vent Piping Specialties	Shop/Coordination drawings
221319 - Sanitary Waste and Vent Piping Specialties	Operations and Maintenance Data
221319 - Sanitary Waste and Vent Piping Specialties	Maintenance material
221323 - Sanitary Waste Interceptors	Product Data
221323 - Sanitary Waste Interceptors	Maintenance material

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Specification Section	Title
221513 - General-Service Compressed-Air Piping	Product data
221513 - General-Service Compressed-Air Piping	Piping Schedule
221513 - General-Service Compressed-Air Piping	Shop/Coordination drawings
221513 - General-Service Compressed-Air Piping	Welding Certifications
221513 - General-Service Compressed-Air Piping	Field Qualitiy test reports
221519 - General-Service Packaged Air Compressors and Receivers	Product Data
221519 - General-Service Packaged Air Compressors and Receivers	Coordination Drawings
221519 - General-Service Packaged Air Compressors and Receivers	Certifications
221519 - General-Service Packaged Air Compressors and Receivers	Field Quality Reports
221519 - General-Service Packaged Air Compressors and Receivers	Start-up reports
221519 - General-Service Packaged Air Compressors and Receivers	Warranty
221519 - General-Service Packaged Air Compressors and Receivers	Operations and Maintenance Data
221519 - General-Service Packaged Air Compressors and Receivers	Maintenance Material
221613 - Fuel Gas Piping	Product data
221613 - Fuel Gas Piping	Piping Schedule
221613 - Fuel Gas Piping	Shop/Coordination drawings
221613 - Fuel Gas Piping	Welding Certifications
221613 - Fuel Gas Piping	Field Qualitiy test reports
223400 - Fuel-Fired, Domestic-Water Heaters	Product Data

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Specification Section	Title
223400 - Fuel-Fired, Domestic-Water Heaters	Coordination Drawings
223400 - Fuel-Fired, Domestic-Water Heaters	Certifications
223400 - Fuel-Fired, Domestic-Water Heaters	Field Quality Reports
223400 - Fuel-Fired, Domestic-Water Heaters	Start-up reports
223400 - Fuel-Fired, Domestic-Water Heaters	Warranty
223400 - Fuel-Fired, Domestic-Water Heaters	Operations and Maintenance Data
224000 - Plumbing Fixtures	Product Data
224000 - Plumbing Fixtures	Shop Drawings
224000 - Plumbing Fixtures	Operations and Maintenance Data
224000 - Plumbing Fixtures	Warranty
224716 - Pressure Water Coolers	Product Data
224716 - Pressure Water Coolers	Shop Drawings
224716 - Pressure Water Coolers	Operations and Maintenance Data
224716 - Pressure Water Coolers	Warranty
224716 - Pressure Water Coolers	Maintenance material
230500- Motors and Variable Frequency Drives	Product Data
230517- Sleeves and Sleeve Seals for HVAC Piping	Product Data
230518- Escutcheons for HVAC piping	Product Data
230519- Meters and Gauges	Prduct Data
230519- Meters and Gauges	Operations and Maintenance Data
230523- General-Duty valves for HVAC Piping	Product Data
230523- General-Duty valves for HVAC Piping	Valve Schedule
230529- Hangers and Supports for HVAC Piping and Equipment	Product Data
230529- Hangers and Supports for HVAC Piping and Equipment	Shop Drawings

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Specification Section	Title
230529- Hangers and Supports for HVAC Piping and Equipment	Welding Certifications
230553- Identification for HVAC Piping and Equipment	Product Data
230553- Identification for HVAC Piping and Equipment	Equipment label schedule
230553- Identification for HVAC Piping and Equipment	Valve numbering scheme
230553- Identification for HVAC Piping and Equipment	Valve schedule
230593- Testing adjusting and Balancing	Qualification data
230593- Testing adjusting and Balancing	Certified TAB reports
230593- Testing adjusting and Balancing	Sample report forms
230713- Duct insulation	Product Data
230713- Duct insulation	Application Schedule
230713- Duct insulation	Field Quality reports
230718- Refrigerant Piping Insulation	Product Data
230718- Refrigerant Piping Insulation	Application Schedule
230718- Refrigerant Piping Insulation	Field Quality reports
230719- HVAC Piping Insulation	Product Data
230719- HVAC Piping Insulation	Application Schedule
230719- HVAC Piping Insulation	Field Quality Report
230900- Instrumentation and Controls	Product Data
230900- Instrumentation and Controls	Control Drawings
230900- Instrumentation and Controls	Bill of Materials
230900- Instrumentation and Controls	Equipment schedules
230900- Instrumentation and Controls	Qualificiation Data
230900- Instrumentation and Controls	Operations and Maintenance Data

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Specification Section	Title
230993- Sequence of operations for HVAC controls	Sequence of operations
232113- Hydronic Piping	Product data
232113- Hydronic Piping	Piping Schedule
232113- Hydronic Piping	Shop/Coordination drawings
232113- Hydronic Piping	Welding Certifications
232113- Hydronic Piping	Field Qualitiy test reports
232116- Hydronic Specialties	Prodict Data
232116- Hydronic Specialties	Specialties schedule
232116- Hydronic Specialties	Shop/Coordination drawings
232116- Hydronic Specialties	Operations and Maintenance Data
232116- Hydronic Specialties	Maintenance material
232133- Hydronic Pumps	Product Data
232133- Hydronic Pumps	Field quality reports
232133- Hydronic Pumps	Start-up report
232133- Hydronic Pumps	Warranty info
232133- Hydronic Pumps	Operations and Maintenance Data
232133- Hydronic Pumps	Maintenance material
232300- Refrigerant Piping	Product Data
232300- Refrigerant Piping	Shop drawings
232300- Refrigerant Piping	Deligated design
232300- Refrigerant Piping	Welding Certifications
232300- Refrigerant Piping	Field quality reports
232300- Refrigerant Piping	Operations and Maintenance Data
232500- HVAC water treatment	Product Data
232500- HVAC water treatment	Field Quality reports
232500- HVAC water treatment	Water analysis
233113- Metal ducts	Product data
233113- Metal ducts	Shop drawings
233113- Metal ducts	Coordination drawings

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Specification Section	Title
233113- Metal ducts	Welding certifications
233113- Metal ducts	Field quality reports
233300- Air duct accessories	Product Data
233300- Air duct accessories	Shop drawings
233300- Air duct accessories	Coordination drawings
233300- Air duct accessories	Field Quality Reports
233300- Air duct accessories	Operation and Maintenance Data
233300- Air duct accessories	Maintenance Material
233423- HVAC Power Ventilators	Product Data
233423- HVAC Power Ventilators	Coordination Drawings
233423- HVAC Power Ventilators	Certifications
233423- HVAC Power Ventilators	Field Quality Reports
233423- HVAC Power Ventilators	Start-up reports
233423- HVAC Power Ventilators	Warranty
233423- HVAC Power Ventilators	Operations and Maintenance Data
233423- HVAC Power Ventilators	Maintenance Material
233600- Air terminal units	Product Data
233600- Air terminal units	Coordination drawings
233600- Air terminal units	Operations and Maintenance Data
233713- Diffusers, Registers, and Grilles	Product Data
233713- Diffusers, Registers, and Grilles	Coordination Drawings
234500- Gas detection and alarms	Product Data
234500- Gas detection and alarms	Wiring diagram
234500- Gas detection and alarms	Shop drawings
234500- Gas detection and alarms	Operation description
234500- Gas detection and alarms	Field Quality Reports
234500- Gas detection and alarms	Start-up service reports
234500- Gas detection and alarms	Warranty
234500- Gas detection and alarms	Operations and Maintenance Data
235100- Breeching Chimney and Stacks	Product data

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Summary Submittals List

Specification Section	Title
235100- Breeching Chimney and Stacks	Shop drawings
235100- Breeching Chimney and Stacks	Welding Certifications
235100- Breeching Chimney and Stacks	Warranty
235216- Condensing Boilers	Product data
235216- Condensing Boilers	Efficiency curves
235216- Condensing Boilers	Certifications
235216- Condensing Boilers	Source quality reports
235216- Condensing Boilers	Field quality reports
235216- Condensing Boilers	Start-up reports
235216- Condensing Boilers	Warranty
235216- Condensing Boilers	Operations and Maintenance Data
235216- Condensing Boilers	Warranty
236313- Air cooled Refrigerant Condensers	Product Data
236313- Air cooled Refrigerant Condensers	Certifications
236313- Air cooled Refrigerant Condensers	Field quality reports
236313- Air cooled Refrigerant Condensers	Start-up reports
236313- Air cooled Refrigerant Condensers	Warrant
237313- Indoor central station air handling units	Product Data
237313- Indoor central station air handling units	Shop Drawings
237313- Indoor central station air handling units	Certifications
237313- Indoor central station air handling units	Field Quaility reports
237313- Indoor central station air handling units	Start-up reports
237313- Indoor central station air handling units	Warranty
237313- Indoor central station air handling units	Operations and Maintenance Data
237313- Indoor central station air handling units	Maintenance Material
237314- Outdoor Central Station Heat Recovery Units	Product Data
237314- Outdoor Central Station Heat Recovery Units	Shop Drawings
237314- Outdoor Central Station Heat Recovery Units	Certifications

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Specification Section	Title
237314- Outdoor Central Station Heat Recovery Units	Field Quaility reports
237314- Outdoor Central Station Heat Recovery Units	Start-up reports
237314- Outdoor Central Station Heat Recovery Units	Warranty
237314- Outdoor Central Station Heat Recovery Units	Operations and Maintenance Data
237314- Outdoor Central Station Heat Recovery Units	Maintenance Material
238126- Split system air conditioners	Product Data
238126- Split system air conditioners	Shop Drawings
238126- Split system air conditioners	Certifications
238126- Split system air conditioners	Field Quaility reports
238126- Split system air conditioners	Start-up reports
238126- Split system air conditioners	Warranty
238126- Split system air conditioners	Operations and Maintenance Data
238126- Split system air conditioners	Maintenance Material
238219- Fan coil units	Product Data
238219- Fan coil units	Field quality reports
238219- Fan coil units	Warranty
238219- Fan coil units	Operations and Maintenance Data
238219- Fan coil units	Maintenance Material
238236- Finned tube radiation heaters	Product data
238236- Finned tube radiation heaters	Field quality reports
238236- Finned tube radiation heaters	Operations and Maintenance Data
238239- Unit heaters	Product Data
238239- Unit heaters	Field quality reports
238239- Unit heaters	Operation and Maintenance Data
238239- Unit heaters	Warranty
238239- Unit heaters	Maintenance Material

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Summary Submittals List

Specification Section	Title
238216.11- Hydronic Air Coils	Product Data
238216.11- Hydronic Air Coils	Certifications
238216.11- Hydronic Air Coils	Warranty
238216.11- Hydronic Air Coils	Operations and Maintenance Data
260513 - Medium Voltage Cables	Product Data for Each Product Type
260513 - Medium Voltage Cables	Samples
260513 - Medium Voltage Cables	Qualifications
260513 - Medium Voltage Cables	Material Certificates
260513 - Medium Voltage Cables	Source Quality Test Reports
260513 - Medium Voltage Cables	Field Quality Test Reports
260519 - Low Voltage Electrical Conductors and Cables	Product Data for Each Product Type
260519 - Low Voltage Electrical Conductors and Cables	Field quality-control test reports
260525 - Grounding and Bonding for Electrical Systems	Product Data for Each Product Type
260525 - Grounding and Bonding for Electrical Systems	As-Built Data: Test Wells
260525 - Grounding and Bonding for Electrical Systems	As-Built Data: Ground Rods
260525 - Grounding and Bonding for Electrical Systems	As-Built Data: Ground Rings
260525 - Grounding and Bonding for Electrical Systems	As-Built Data: Grounding Arrangements and Connections for Seperately Derived Stsems
260529 - Hangers and Supports for Electrical Systems	Product Data: Steel Slotted Support Systems
260529 - Hangers and Supports for Electrical Systems	Nonmetallic Slotted Support Systems
260529 - Hangers and Supports for Electrical Systems	Qualifications
260529 - Hangers and Supports for Electrical Systems	Welding Certificates

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Specification Section	Title
260533 - Racways and Boxes for Electrical Systems	Product Data for Each Product Type
260533 - Racways and Boxes for Electrical Systems	Surface Raceways
260533 - Racways and Boxes for Electrical Systems	Wireways and fittings
260533 - Racways and Boxes for Electrical Systems	Floor boxes
260533 - Racways and Boxes for Electrical Systems	Hinged-cover enclosures
260533 - Racways and Boxes for Electrical Systems	Cabinets
260543 - Underground Ducts and Raceways For Electrical Systems	Product Data for Each Product Type
260548 - Vibration and Seismic Controls for Electrical Systems	Product Data for Each Product Type
260548 - Vibration and Seismic Controls for Electrical Systems	Coordination Drawings
260548 - Vibration and Seismic Controls for Electrical Systems	Qualification Data
260548 - Vibration and Seismic Controls for Electrical Systems	Welding certificates
260548 - Vibration and Seismic Controls for Electrical Systems	Field Quality Control Test Reports
260553 - Identification for Electrical Systems	Product Data for Each Product Type
260923 - Lighting Control Devices	Product Data for Each Product Type
260923 - Lighting Control Devices	Shop Drawings
260923 - Lighting Control Devices	Operation and Maintenance Data
262200 - Low Voltage Transformers	Product Data for Each Product Type
262200 - Low Voltage Transformers	Operation and Maintenance Data

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Specification Section	Title
262413 - Switchboards	Product Data for Each Product Type
262413 - Switchboards	Shop Drawings
262413 - Switchboards	Qualification Data
262413 - Switchboards	Operation and Maintenance Data
262413 - Switchboards	Operation and Maintenance Data: Routine Maintenance Requirements
262413 - Switchboards	Manufacturer's Instructions for Test and Adjusting Overcurrent Protective Devices
262413 - Switchboards	Operation and Maintenance Data: Time-Current Coordination Curves
262416 - Panelboards	Product Data for Each Product Type
262416 - Panelboards	Qualifications
262416 - Panelboards	Field Quality-Control Reports
262416 - Panelboards	Operation and Maintenance Data
262416 - Panelboards	Panelboard Schedules
262416 - Panelboards	Manufacturer's Instructions for Test and Adjusting Overcurrent Protective Devices
262416 - Panelboards	Time-Current Coordination Curves
262726 - Wiring Devices	Product Data for Each Product Type
262726 - Wiring Devices	Operation and Maintenance Data
262816 - Enclosed Switches and Circuit Breakers	Product Data for Each Product Type
262816 - Enclosed Switches and Circuit Breakers	Qualifications
262816 - Enclosed Switches and Circuit Breakers	Field Quality-Control Reports
262816 - Enclosed Switches and Circuit Breakers	Operation and Maintenance Data
262816 - Enclosed Switches and Circuit Breakers	Manufacturer's Instructions for Test and Adjusting Enclosed Switches and Circuit Breakers
262816 - Enclosed Switches and Circuit Breakers	Time-Current Coordination Curves

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Specification Section	Title
263213 - Engine Generators	Product Data for Each Product
263213 - Engine Generators	Certification of the emissions performance of the generator set engine by the engine manufacturer
263213 - Engine Generators	Special Warranty
263213 - Engine Generators	Shop Drawings
263213 - Engine Generators	Outline drawings of assembly
263213 - Engine Generators	One line diagrams and wiring diagrams for assembly and components
263213 - Engine Generators	Interconnection wiring diagrams
263213 - Engine Generators	Qualifications
263213 - Engine Generators	Source Quality-Control Test Reports: Certified Summary of Perfomance Tests
263213 - Engine Generators	Source Quality-Control Test Reports: Report of Factory Test on Project Units
263213 - Engine Generators	Qualification Data: Manufacturer
263213 - Engine Generators	Source Quality-Control Test Reports: On-site acceptance test
263213 - Engine Generators	Source Quality-Control Test Reports: On-site acceptance test
263600 - Transfer Switches	Product Data for Each Product
263600 - Transfer Switches	Shop Drawings
263600 - Transfer Switches	Single Line Diagram
263600 - Transfer Switches	Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions
263600 - Transfer Switches	Detailed description of equipment anchorage devices on which the certification is based and their installation requirements
263600 - Transfer Switches	Qualification Data for Manufacturer
263600 - Transfer Switches	Field Quality-Control Test Reports
263600 - Transfer Switches	Operation and Maintenance Data
263600 - Transfer Switches	Features and Operating Sequences, Automatic and Manual
263600 - Transfer Switches	List of all Factory Settings of Relays; Provide Relay-Setting and Calibration Instructions, Including Software, Where Applicable

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Specification Section	Title
264113 - Lightning Protection for Structures	Product Data for Each Product
264113 - Lightning Protection for Structures	Shop Drawings
264113 - Lightning Protection for Structures	Qualification Data
264113 - Lightning Protection for Structures	Field Quality-Control Test Reports
264113 - Lightning Protection for Structures	Qualitiy Assurance
264113 - Lightning Protection for Structures	System Certificate
265100 - Interior Lighting	Product Data: For Each Type of fixture
265100 - Interior Lighting	Shop Drawings
265100 - Interior Lighting	Nonstandard/Custom Lighting Fixtures
265100 - Interior Lighting	Detail Equipment Assemblies
265100 - Interior Lighting	Wiring Diagrams
265100 - Interior Lighting	Installation Instructions
265100 - Interior Lighting	Coordination Dreawings
265100 - Interior Lighting	Qualification Data
265100 - Interior Lighting	For qualified agencies providing photometric data for lighting fixtures
265100 - Interior Lighting	For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer
265100 - Interior Lighting	Field quality-control reports
265100 - Interior Lighting	Warranty
265100 - Interior Lighting	Operation and Maintenance Data
265100 - Interior Lighting	Furnish Extra Lamps and Parts
265600 - Exterior Lighting	Product Data: For Each Type of fixture
265600 - Exterior Lighting	Shop Drawings
265600 - Exterior Lighting	Shop Drawings
265600 - Exterior Lighting	Detail Equipment Assemblies
265600 - Exterior Lighting	Anchor-Bolt Templetes
265600 - Exterior Lighting	Design Calculations
265600 - Exterior Lighting	Wiring Diagrams
265600 - Exterior Lighting	Samples
265600 - Exterior Lighting	Qualification Data
265600 - Exterior Lighting	Operation and Maintenance Data
265610 - Large Area Lighting	Product Data for Each Product Type

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Specification Section	Title
265610 - Large Area Lighting	Coordination Drawings
265610 - Large Area Lighting	Qualification Data
265610 - Large Area Lighting	Field Quality Control Test Reports
274133 - Television Distribution System	Product Data for Each Product Type
274133 - Television Distribution System	Equipment List
274133 - Television Distribution System	Face plates
274133 - Television Distribution System	Source quality-control test: Coax sweep test
274133 - Television Distribution System	Field Quality-Control Reports
274133 - Television Distribution System	Operation and Maintenance Data
275116 - Public Address System	Product Data for Each Product Type
275116 - Public Address System	Rack Layouts
275116 - Public Address System	Input Stations
275116 - Public Address System	Amplifier sizing calculations
275116 - Public Address System	Dimensional Information
275116 - Public Address System	Plans showing equipment locatopns
275116 - Public Address System	Block diagrams showing major components and interfaces
275116 - Public Address System	Wiring diagrams
275116 - Public Address System	Manufacturer's Qualifications
275116 - Public Address System	Supplier's Qualifications
275116 - Public Address System	Installer Qualifications
275116 - Public Address System	Operation and Maintenance Data: For Public Adress System
275123 - Computer/Telephone Network	Product Data for Each Product Type
275123 - Computer/Telephone Network	Manufacturer's Certification of products and installers
275123 - Computer/Telephone Network	Installer Qualifications
275123 - Computer/Telephone Network	Sample
275123 - Computer/Telephone Network	Test Reports
275123 - Computer/Telephone Network	Operation and Maintenance Data
283100 - Access Control	Product Data for Each Product Type
283100 - Access Control	UL Certificate
283100 - Access Control	Shop Drawings
283100 - Access Control	Installer Qualifications
283100 - Access Control	Warranties

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Specification Section	Title
283100 - Access Control	Operation and Maintenance Data
281301 - Intrusion Detection	Product Data for Each Product Type
281301 - Intrusion Detection	UL Certificate
281301 - Intrusion Detection	Shop Drawings
281301 - Intrusion Detection	Installer Qualifications
281301 - Intrusion Detection	Warranties
281301 - Intrusion Detection	Operation and Maintenance Data
282300 - CCTV Systems	Product Data for Each Product Type
282300 - CCTV Systems	UL Certificate
282300 - CCTV Systems	Shop Drawings
282300 - CCTV Systems	Installer Qualifications
282300 - CCTV Systems	Warranties
282300 - CCTV Systems	Operation and Maintenance Data
283111 - Digital,Addressable Fire Alarm System	Product Data for Each Product Type
283111 - Digital,Addressable Fire Alarm System	Battery Charts
283111 - Digital,Addressable Fire Alarm System	Product Certifications
283111 - Digital,Addressable Fire Alarm System	Qualification Data: Installer
283111 - Digital,Addressable Fire Alarm System	Extra Materials
283111 - Digital,Addressable Fire Alarm System	Shop Drawing
283111 - Digital,Addressable Fire Alarm System	Operating Description
283111 - Digital,Addressable Fire Alarm System	FACP Operating Description
283111 - Digital,Addressable Fire Alarm System	Record of field tests
283111 - Digital,Addressable Fire Alarm System	Field Quality-Control Reports
283111 - Digital,Addressable Fire Alarm System	Operation and Maintenance Data
311000 - Site Clearing	Schedule of Operations
311000 - Site Clearing	Permits
311000 - Site Clearing	Material Test Reports
312000 - Earth Moving	Product Data
312000 - Earth Moving	Samples
312000 - Earth Moving	Material Test Reports
312000 - Earth Moving	Pre-excavation Photographs

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Specification Section	Title
312000 - Earth Moving	Qualification Data
312000 - Earth Moving	Testing & Inspection Reports
312319 - Dewatering	Qualification Data
312319 - Dewatering	Shop Drawings
312500 - Erosion & Seimentation Control	Product Data
321216 - Asphalt Paving	Product Data
321216 - Asphalt Paving	Qualification Data
321216 - Asphalt Paving	Material Certifications
321216 - Asphalt Paving	Material Test Reports
321313 - Concrete Paving	Product Data
321313 - Concrete Paving	Qualification Data
321313 - Concrete Paving	Material Certifications
321313 - Concrete Paving	Material Test Reports
321443 - Pourous Unit Paving	Product Data
321443 - Pourous Unit Paving	Qualification Data
321443 - Pourous Unit Paving	Material Certifications
321443 - Pourous Unit Paving	Material Test Reports
323113 - Chain Link Fence and Gates	Product Data
323113 - Chain Link Fence and Gates	Qualification Data
323113 - Chain Link Fence and Gates	Material Certifications
323113 - Chain Link Fence and Gates	Material Test Reports
323119 - Decorative Metal Fences	Product Data
323119 - Decorative Metal Fences	Qualification Data
323119 - Decorative Metal Fences	Material Certifications
323119 - Decorative Metal Fences	Material Test Reports
323223 - Segmental Retaining walls	Product Data
323223 - Segmental Retaining walls	Qualification Data
323223 - Segmental Retaining walls	Material Certifications

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Specification Section	Title
323223 - Segmental Retaining walls	Material Test Reports
329200 - Turf and Grasses	Product Data
329200 - Turf and Grasses	Qualification Data
329200 - Turf and Grasses	Material Certifications
329200 - Turf and Grasses	Material Test Reports
329300 - Plants	Product Data
329300 - Plants	Qualification Data
329300 - Plants	Material Certifications
323223 - Segmental Retaining walls	Product Data
323223 - Segmental Retaining walls	Material Certifications
323223 - Segmental Retaining walls	Shop Drawings
323223 - Segmental Retaining walls	Delegated Design Submittal
331000 - Water Distribution System	Product Data
331000 - Water Distribution System	Field Quality Control Reports
334100 - Storm Utility Drainage Piping	Product Data
334100 - Storm Utility Drainage Piping	Material Certifications
334100 - Storm Utility Drainage Piping	Shop Drawings
334600 - Subdrainage	Product Data
334600 - Subdrainage	Material Certifications
334600 - Subdrainage	Shop Drawings
334600 - Subdrainage	Samples for Initial Verification

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Specification Section	Title

SECTION 01 4000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.
4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified

installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data: For Contractor's quality-control personnel.

C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.

6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and re-inspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.
b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.

c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, and mockup; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Demolish and remove mockups when directed unless otherwise indicated.

L. Integrated Exterior Mockups: Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.

1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
3. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.

    a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents, at the Contractor’s expense.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.

6. Do not perform any duties of Contractor.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in Statement of Special Inspections attached to this Section, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and re-inspecting corrected work.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 01 4100

SPECIAL INSPECTIONS AND STRUCTURAL TESTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 GENERAL REQUIREMENTS

A. Provide Special Inspections and Structural Testing in accordance with Chapter 17 of the 2009 Virginia Uniform Statewide Building Code (2009 VUSBC) and 2009 International Building Code (2009 IBC).

B. Special Inspections and Structural Testing shall be in accordance with *CASE National Practice Guideline for Special Inspections.*

C. The program of Special Inspection and Structural Testing is a Quality Assurance program intended to ensure that the work is performed in accordance with the Contract Documents.

D. This specification section is intended to inform the Contractor of the Owner's quality assurance program and the extent of the Contractor's responsibilities. This specification section is also intended to notify the Special Inspector, Testing Laboratory, and other Agents of the Special Inspector of their requirements and responsibilities.

E. Related Specification Sections include the following:

1. Division 01 Section "Quality Requirements" for testing agency procedures and administrative requirements.
2. Division 03 Sections "Cast-in-Place Concrete" for material testing and other quality requirements.
3. Division 04 Section "Unit Masonry" for material testing and other quality requirements.
4. Division 05 Section "Structural Steel Framing" for material testing and other quality requirements.
5. Division 13 Section "Pre-Engineered Metal Building System" for material testing and other quality requirements.
6. Division 31 Section "Earth Moving" for material testing and other quality requirements.

1.3 SCHEDULE OF INSPECTIONS AND TESTS

A. Required inspections and tests are described in the individual Specification Sections for the items to be inspected or tested and the "Schedule of Special Inspection Services", which is included at the end of this Section.

B. The services and quantities of testing specified are approximate. Actual services and quantities of testing will be determined by the Owner and/or Architect during construction.

C. The Architect will determine the locations for taking sample specimens for testing in accordance with the specifications.

1.4 QUALIFICATIONS

A. The Special Inspector shall be a licensed Professional Engineer or Structural Engineer who is approved by the Structural Engineer of Record (SER) and Building Official.

B. The Testing Laboratory and individual technicians shall be approved by the Structural Engineer of Record (SER) and Building Official.

C. The testing laboratory shall maintain a full-time licensed Professional Engineer or Structural Engineer on staff who shall certify all test reports. The Engineer shall be responsible for the training of the testing technicians and shall be in responsible charge of the field and laboratory testing operations.

D. Special Inspections shall be performed by inspectors who are either licensed Professional Engineers (P.E.), Structural Engineers (S.E.), or Engineers-In-Training (EIT) with an education and background in structural engineering except as indicated below.

1. Special Inspections of soils and foundations may be performed by inspectors with an education and background in geotechnical engineering in lieu of a background in structural engineering.
2. Technicians performing sampling and testing of concrete shall be ACI certified *Concrete Field Testing Technicians – Grade 1*.
3. Inspectors performing inspections of concrete work such as inspections of concrete placement, batching, reinforcing placement, curing and protection, may be ACI certified *Concrete Construction Inspectors* or ICC certified *Reinforced Concrete Special Inspector* in lieu of being a licensed P.E., S.E., or EIT.
4. Technicians performing visual inspection of welding shall be AWS *Certified Welding Inspectors* or ICC certified *Structural Welding Special Inspectors* with one year relevant experience, technicians performing non-destructive testing such as ultrasonic testing, radiographic testing, magnetic particle testing, or dye-penetrant testing shall be certified as an ASNT-TC Level II or Level III technician.
5. Inspectors performing visual inspections of steel framing and high-strength bolting may be ICC certified *Structural Steel and Bolting Special Inspector* with one year relevant experience, in lieu of being a licensed P.E., S.E., or EIT.
6. Inspectors performing inspections of masonry may be ICC certified *Structural Masonry Special Inspector* with one year relevant experience, in lieu of being a licensed P.E., S.E., or EIT.
7. Technicians performing standard tests described by specific ASTM Standards shall have training in the performance of such tests and must be able to demonstrate either by oral or written examination competence for the test to be conducted. They shall be under the supervision of a licensed Professional Engineer and shall not be permitted to independently evaluate test results.

1.5 SUBMITTALS

A. If requested, the Special Inspector and Testing Laboratory shall submit to the SER and Building Official for review, a copy of their qualifications which shall include the names and qualifications of each of the individual inspectors and technicians who will be performing inspections or tests.

B. The Special Inspector and Testing Laboratory shall disclose any past or present business relationship or potential conflict of interest with the Contractor or any of the Subcontractors whose work will be inspected or tested.

1.6 PAYMENT

A. The Owner shall engage and pay for the services of the Special Inspector, Agents of the Special Inspector, and Testing Laboratory.

B. If any materials which require Special Inspections are fabricated in a plant which is not located within 100 miles of the project, the Contractor shall be responsible for the travel expenses of the Special Inspector or Testing Laboratory.

C. The Contractor shall be responsible for the cost of any retesting or reinspection of work which fails to comply with the requirements of the Contract Documents.

1.7 CONTRACTOR RESPONSIBILITIES

A. **Without exception, work which fails to comply with the requirements of the Contract Documents or work which has not been inspected is to be immediately removed and replaced, at the Contractor's cost.**

B. The Contractor shall cooperate with the Special Inspector and his agents so that the Special Inspections and testing may be performed without hindrance.

C. The Contractor shall review the *Statement of Special Inspections* and shall be responsible for coordinating and scheduling inspections and tests. The Contractor shall notify the Special Inspector or Testing Laboratory at least 24 hours in advance of a required inspection or test. Uninspected work that required inspection may be rejected solely on failure of notification.

D. The Contractor shall provide incidental labor and facilities to provide access to the work to be inspected or tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

1. Construct a storage box on site of sufficient size to store concrete cylinders which will afford protection as required by ASTM C 31.
2. Provide the laboratory with representative initial samples, in requested quantities.
3. When source, quality or characteristic of an approved material changes or indicates lack of compliance with Contract requirements, submit additional samples of materials to testing laboratory.
4. Patch area where samples are taken for purposes of testing to the satisfaction of the Architect.

E. The Contractor shall keep at the project site the latest set of construction drawings, field sketches, approved shop drawings, and specifications for use by the inspectors and testing technicians.

F. The Special Inspection program shall in no way relieve the Contractor of his obligation to perform work in accordance with the requirements of the Contract Documents or from implementing an effective Quality Control program. All work that is to be subjected to Special Inspections shall first be reviewed by the Contractor's quality control personnel.

G. The Contractor shall be solely responsible for construction site safety.

1.8 LIMITS ON AUTHORITY

A. The Special Inspector or Testing Laboratory may not release, revoke, alter, or enlarge on the requirements of the Contract Documents.

B. The Special Inspector or Testing Laboratory will not have control over the Contractor's means and methods of construction.

C. The Special Inspector or Testing Laboratory shall not be responsible for construction site safety.

D. The Special Inspector or Testing Laboratory has no authority to stop the work.

1.9 STATEMENT OF SPECIAL INSPECTIONS

A. The *Statement of Special Inspections* will be prepared by the Structural Engineer of Record (SER) and shall be submitted with the application for Building Permit.

1.10 RECORDS AND REPORTS

A. Detailed daily reports shall be prepared for each inspection or test and submitted to the Special Inspector. Reports shall include:

1. Date of test or inspection.
2. Name of inspector or technician.
3. Location of specific areas tested or inspected.
4. Description of test or inspection and results.
5. Applicable ASTM standard.
6. Weather conditions.
7. Signature of Special Inspector or Technician.

B. The Special Inspector shall submit interim reports to the Building Official, as required, which include all inspections and test reports received during that period. Copies shall be sent to the SER, Architect, and Contractor.

C. Any discrepancies from the Contract Documents found during a Special Inspection shall be immediately reported to the Contractor. If the discrepancies are not corrected, the Special Inspector shall notify the SER and Building Official. Reports shall document all discrepancies identified and the corrective action taken.

D. The Testing Laboratory shall immediately notify the Special Inspector and the SER by telephone, fax, or e-mail of any results which fail to comply with the requirements of the Contract Documents.

E. Reports shall be submitted to the Special Inspector within 7 days of the inspection or test. Hand written reports may be submitted if final typed copies are not available.

F. At the completion of the work requiring Special Inspections, each inspection agency and testing laboratory shall provide a statement to the Special Inspector that all work was completed in substantial conformance with the Contract Documents and that all appropriate inspections and tests were performed.

1.11 FINAL REPORT OF SPECIAL INSPECTIONS

A. The *Final Report of Special Inspections* shall be completed by the Special Inspector and submitted to the SER and Building Official prior to the issuance of a Certificate of Use and Occupancy.

B. The *Final Report of Special Inspections* will certify that all required inspections have been performed and will itemize any discrepancies that were not corrected or resolved.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

Statement of Special Inspections

140 John James Audubon Pkwy
Buffalo, New York 14228
P 716.688.0766
F 716.625.6825

Project: Greater Lynchburg Transit Corporation - Operations and Maintenance (GLTC O&M)

Location: Lynchburg, VA

Owner: GLTC

Owner's Address: Lynchburg, VA

Architect/Engineer of Record: Wendel

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection requirements of the 2009 Virginia Uniform Statewide Building Code (2009 VUSBC) and 2009 IBC. It includes a Schedule of Special Inspection Services applicable to this project as well as the name of the Special Inspector and the identity of other approved agencies intended to be retained for conducting these inspections.

The Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Building Official, Structural Engineer and Architect of Record. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official, Structural Engineer and Architect of Record. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Interim reports shall be submitted to the Building Official, Owner, Structural Engineer and Architect of Record.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: **Biweekly** or ☐ per attached schedule.

Prepared by:

(type or print name)

Signature Date

Design Professional Seal

Owner's Authorization:

Signature Date

Building Official's Acceptance:

Signature Date

Project: GLTC O&M Facility

Schedule of Special Inspection Services

The following sheets comprise the required schedule of special inspections for this project. The construction divisions which require special inspections for this project are as follows:

- ☒ Soils and Foundations
- ☒ Concrete Construction
- ☐ Precast Concrete
- ☒ Masonry Construction
- ☒ Structural Steel Construction
- ☐ Cold-Formed Steel Framing
- ☐ Sprayed Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Smoke Control

Inspection Agents	**Firm**	**Address**
1. Special Inspector		
2. Testing Laboratory		
3. Testing Laboratory		
4. Other		

Note: The qualifications of all personnel performing Special Inspection activities are subject to the approval of the Building Official.

The inspectors and testing agencies shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official, prior to commencing work.

The credentials of all Inspectors and testing technicians shall be provided if requested.

It is recommended that the person administering the Special Inspections program be a Professional Engineer experienced in the design of buildings.

Minimum Qualifications

Project: GLTC O&M Facility

When the Structural Engineer of Record deems it appropriate that the individual performing a stipulated test of inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

Key for Minimum Qualifications of Inspection Agents (where indicated on Schedules)	
PE/SE	Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE	Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT	Engineering in Training – a graduate engineer who has passed the FE exam
ACI-CFTT	American Concrete Institute Certified Concrete Field Testing Technician
ACI-CCI	American Concrete Institute Certified Concrete Field Testing Technician
ACI-LTT	American Concrete Institute Certified Concrete Field Testing Technician
ACI-STT	American Concrete Institute Certified Concrete Field Testing Technician
AWS-CWI	American Welding Society Certified Welding Inspector
AWS/AISC-SSI	American Welding Society Certified Structural Steel Inspector
ASNT	American Society of Non-Destructive Testing - Level II or III
ICC-SMSI	International Code Council Certified Structural Masonry Special Inspector
ICC -SWSI	International Code Council Certified Structural Steel and Welding Special Inspector
ICC -SFSI	International Code Council Certified Spray-Applied Fireproofing Special Inspector
ICC -PCSI	International Code Council Certified Prestressed Concrete Special Inspector
ICC -RCSI	International Code Council Certified Reinforced Concrete Special Inspector
NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET -ST	Soils Technician – Levels I, II, III & IV
NICET -GET	Geotechnical Engineering Technician – Levels I, II, III & IV
EDI-EIFS	EIFS Third Party Inspector

Note: The qualifications of inspection agents may be indicated on the Schedule in instances where the Structural Engineer deems such requirements are appropriate.

Soils and Foundations

Project: GLTC O&M Facility

Verification & Inspection	Continuous	Periodic	Referenced Standard	IBC Reference	Agent No. (Qualif.)
SOILS INSPECTIONS			Specification Section 312000	1704.7	
1. Verify materials below footings are adequate to achieve the design bearing capacity.		X			PE/GE
2. Verify excavations are extended to proper depth and have reached proper material.		X			PE/GE
3. Perform classification and testing of controlled fill materials.		X			PE/GE
4. Verify use of proper materials, densities and lift thicknesses during placement and compaction of controlled fill.	X				PE/GE
5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly.		X			PE/GE

Concrete Construction

Verification & Inspection	Continuous	Periodic	Referenced Standard	IBC Reference	Agent No. (Qualif.)
1. Inspection of reinforcing steel and placement.		X	ACI 318: 3.5, 7.1-7.7	1903.5, 1907.1, 1907.7, 1914.4	
2. Inspect bolts to be installed in concrete prior to and during placement of concrete.	X			1912.5	
3. Verifying use of required design mix.		X	ACI 318: Ch. 4, 5.2-5.4	1904, 1905.2-1905.4, 1914.2, 1914.3	
4. Sampling fresh concrete and performing slump, air content and determining the temperature of fresh concrete at the time of making specimens for strength tests.	X		ASTM C 172 ASTM C 31 ACI 318: 5.6, 5.8	1905.6, 1914.10	
5. Inspection of concrete placement for proper application techniques.	X		ACI 318: 5.9, 5.10	1905.9, 1905.10, 1914.6, 1914.7, 1914.8	
6. Inspection for maintenance of specified curing temperature and techniques.		X	ACI 318: 5.11-5.13	1905.11, 1905.13, 1914.9	

Masonry Construction - Level 1

Project: GLTC O&M Facility

Inspection Task	Frequency of Inspection		Reference For Criteria			Agent No. (Qualif.)
	Continuous during task listed	Periodically during task listed	IBC section	ACI 530/ ASCE 5/TMS 402[a]	ACI 530.1/ ASCE 6/TMS 602[a]	
1. As masonry construction begins, the following shall be verified to ensure compliance:						
a. Proportions of site-prepared mortar.		X			Art. 2.6A	
b. Construction of mortar joints.		X			Art. 3.3B	
c. Location of reinforcement and anchorages.		X			Art. 3.4 and 3.6A	
2. The inspection program shall verify:						
a. Size and location of structural elements.		X			3.3G	
b. Type, size and location of anchors, including other details of anchorage of masonry to structural members, frames or other construction.		X		Sec. 1.15.4, 2.1.2		
c. Specified size, grade and type of reinforcement.		X		Sec. 1.12	Art. 2.4, 3.4	
d. Protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F).		X	Sec. 2104.3, 2104.4		Art. 1.8	
3. Prior to grouting, the following shall be verified to ensure compliance:						
a. Grout space is clean.		X			Art. 3.2D	
b. Placement of reinforcement and anchorages.		X		Sec. 1.12	Art. 3.4	
c. Proportions of site-prepared grout.		X			Art. 2.6B	
d. Construction of mortar joints.		X			Art. 3.3B	
4. ~~a.~~ Grout placement shall be verified to ensure compliance with code and Construction Document Provisions.	X				Art. 3.5	
5. Preparation of any required grout and mortar specimens shall be observed.	X		Sec. 2105.3, 2105.4, 2105.5		Art. 1.4	
6. Preparation of any required inspection provisions of the Construction Documents and the approved submittals shall be verified.		X			Art. 1.5	

Structural Steel Construction

Project: GLTC O&M Facility

Verification & Inspection	Continuous	Periodic	Referenced Standard	IBC Reference	Agent No. (Qualif.)
1. Material verification of high-strength bolts, nuts, and washers: a. Identification markings to conform to ASTM standards specified in the approved construction documents. b. Manufacturer's certificate of compliance required.	X	X	Applicable ASTM material specifications; AISC ASD, Section A3.4; AISC LRFD, Section A3.3		
2. Inspection of high-strength bolting: a. Bearing-type connections. b. Slip-critical connections.		X X	AISC LRFD Section M2.5	1704.3.3	
3. Material verification of structural steel: a. Identification markings to conform to ASTM standards specified in the approved construction documents. b. Manufacturers' certified mill test reports.	X	X	ASTM A 6 or ASTM A 568 ASTM A 6 or ASTM A 568	1708.4	
4. Material verification of weld filler materials: a. Identification markings to conform to AWS specification in the approved construction documents. b. Manufacturer's certificate of compliance required.	X	X	AISC, ASD, Section A3.6; AISC LRFD, Section A3.5		
5. Inspection of welding: a. Structural steel: 1) Complete and partial penetration groove welds. 2) Multi-pass fillet welds. 3) Single-pass fillet welds < 5/16″.	X X	X	AWS D1.1	1704.3.1	
6. Inspection of steel frame joint details for compliance with approved construction documents: a. Details such as bracing and stiffening. b. Member locations. c. Application of joint details at each connection.	X X	X		1704.3.2	

Final Report of Special Inspections

Project: Greater Lynchburg Transit Corporation - Operations and Maintenance (GLTC O&M)

Location: Lynchburg, VA

Owner: GLTC

Owner's Address: Lynchburg, VA

Special Inspector: _____

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

_____
(Type or print name)

_____
Signature Date

Design Professional Seal

Copies:
Owner – GLTC
Architect/Engineer of Record – Wendel

SECTION 01 4200

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AABC	Associated Air Balance Council www.aabc.com	(202) 737-0202
AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABMA	American Bearing Manufacturers Association www.americanbearings.org	(202) 367-1155
ACI	American Concrete Institute (Formerly: ACI International) www.concrete.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The)	(205) 257-2530

	www.aeic.org	
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute (The) www.ahrinet.org	(703) 524-8800
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction www.aitc-glulam.org	(303) 792-9559
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(607) 256-3313
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute (See AHRI)	
ARI	American Refrigeration Institute	

	(See AHRI)	
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (American Society of Mechanical Engineers) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Safety Engineers (The) www.asse.org	(847) 699-2929
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International) www.astm.org	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWEA	American Wind Energy Association www.awea.org	(202) 383-2500
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWMAC	Architectural Woodwork Manufacturers Association of Canada www.awmac.com	(403) 453-7387
AWPA	American Wood Protection Association (Formerly: American Wood-Preservers' Association) www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association	(800) 926-7337

	www.awwa.org	(303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.gobrick.com	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
BOCA	BOCA (Building Officials and Code Administrators International Inc.) (See ICC)	
BWF	Badminton World Federation (Formerly: International Badminton Federation) www.bwfbadminton.org	60 3 9283 7155
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.electricity.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CFSEI	Cold-Formed Steel Engineers Institute www.cfsei.org	(866) 465-4732 (202) 263-4488
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919

CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(404) 622-0073
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.org	(706) 278-3176
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(800) 328-6306 (847) 517-1200
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
CWC	Composite Wood Council (See CPA)	
DASMA	Door and Access Systems Manufacturers Association www.dasma.com	(216) 241-7333
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electronic Components Association www.ec-central.org	(703) 907-8024
ECAMA	Electronic Components Assemblies & Materials Association (See ECA)	

EIA	Electronic Industries Alliance (See TIA)	
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (703) 538-1616
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association (Electrostatic Discharge Association) www.esda.org	(315) 339-6937
ESTA	Entertainment Services and Technology Association (See PLASA)	
EVO	Efficiency Valuation Organization www.evo-world.org	(415) 367-3643 44 20 88 167 857
FIBA	Fédération Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Fédération Internationale de Volleyball (The International Volleyball Federation) www.fivb.org	41 21 345 35 45
FM Approvals	FM Approvals LLC www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridaroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council U.S. www.fscus.org	(612) 353-4511
GA	Gypsum Association www.gypsum.org	(301) 277-8686
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GS	Green Seal	(202) 872-6400

	www.greenseal.org	
HI	Hydraulic Institute www.pumps.org	(973) 267-9700
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association (See AHRI)	
HMMA	Hollow Metal Manufacturers Association (See NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(415) 536-0288
IAS	International Approval Services (See CSA)	
ICBO	International Conference of Building Officials (See ICC)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (202) 370-1800
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICPA	International Cast Polymer Alliance www.icpa-hq.org	(703) 525-0511
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IES	Illuminating Engineering Society (Formerly: Illuminating Engineering Society of North America) www.ies.org	(212) 248-5000
IESNA	Illuminating Engineering Society of North America	

	(See IES)	
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 981-0100
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
IGSHPA	International Ground Source Heat Pump Association www.igshpa.okstate.edu	(405) 744-5175
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
Intertek	Intertek Group (Formerly: ETL SEMCO; Intertek Testing Service NA) www.intertek.com	(800) 967-5352
ISA	International Society of Automation (The) (Formerly: Instrumentation, Systems, and Automation Society) www.isa.org	(919) 549-8411
ISAS	Instrumentation, Systems, and Automation Society (The) (See ISA)	
ISFA	International Surface Fabricators Association (Formerly: International Solid Surface Fabricators Association) www.isfanow.org	(877) 464-7732 (801) 341-7360
ISO	International Organization for Standardization www.iso.org	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association (See ISFA)	
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (See CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333

MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(888) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MMPA	Moulding & Millwork Producers Association (Formerly: Wood Moulding & Millwork Producers Association) www.wmmpa.com	(800) 550-7889 (530) 661-9591
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937 (604) 298-7578
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.org	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6223 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NEBB	National Environmental Balancing Bureau	(301) 977-3698

	www.nebb.org	
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFPA	NFPA International (See NFPA)	
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NHLA	National Hardwood Lumber Association www.nhla.com	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	National Oak Flooring Manufacturers Association (See NWFA)	
NOMMA	National Ornamental & Miscellaneous Metals Association www.nomma.org	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSPE	National Society of Professional Engineers www.nspe.org	(703) 684-2800

NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PLASA	PLASA (Formerly: ESTA - Entertainment Services and Technology Association) www.plasa.org	(212) 244-1505
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(706) 882-3833
RIS	Redwood Inspection Service www.redwoodinspection.com	(925) 935-1499
SAE	SAE International (Society of Automotive Engineers) www.sae.org	(877) 606-7323 (724) 776-4841
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	
SCTE	Society of Cable Telecommunications Engineers www.scte.org	(800) 542-5040 (610) 363-6888
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers	

	(See ASCE)	
SIA	Security Industry Association www.siaonline.org	(866) 817-8888 (703) 683-2075
SJI	Steel Joist Institute www.steeljoist.org	(843) 293-1995
SMA	Screen Manufacturers Association www.smainfo.org	(773) 636-0672
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SRCC	Solar Rating and Certification Corporation www.solar-rating.org	(321) 638-1537
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	Tilt-Up Concrete Association www.tilt-up.org	(319) 895-6911
TCNA	Tile Council of North America, Inc. (Formerly: Tile Council of America) www.tileusa.com	(864) 646-8453

TEMA	Tubular Exchanger Manufacturers Association, Inc. www.tema.org	(914) 332-0040
TIA	Telecommunications Industry Association (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance) www.tiaonline.org	(703) 907-7700
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance (See TIA)	
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrasssod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tileroofing.org	(312) 670-4177
UBC	Uniform Building Code (See ICC)	
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association www.wcmanet.org	(212) 297-2122

WDMA	Window & Door Manufacturers Association www.wdma.com	(800) 223-2301 (312) 321-6802
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of California) www.wicnet.org	(916) 372-9943
WMMPA	Wood Moulding & Millwork Producers Association (See MMPA)	
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 938-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	Deutsches Institut für Normung e.V. www.din.de	49 30 2601-0
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, LLC www.icc-es.org	(800) 423-6587 (562) 699-0543

D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	(202) 761-0011
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce National Institute of Standards and Technology www.nist.gov	(301) 975-4040

DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-2664
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FG	Federal Government Publications www.gpo.gov	(202) 512-1800
GSA	General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory Environmental Energy Technologies Division http://eetd.lbl.gov	(510) 486-4000
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742
SD	Department of State www.state.gov	(202) 647-4000
TRB	Transportation Research Board National Cooperative Highway Research Program www.trb.org	(202) 334-2934
USDA	Department of Agriculture Agriculture Research Service U.S. Salinity Laboratory www.ars.usda.gov	(202) 720-3656
USDA	Department of Agriculture Rural Utilities Service www.usda.gov	(202) 720-2791
USDJ	Department of Justice Office of Justice Programs National Institute of Justice www.ojp.usdoj.gov	(202) 307-0703
USP	U.S. Pharmacopeia www.usp.org	(800) 227-8772 (301) 881-0666

USPS	United States Postal Service www.usps.com	(202) 268-2000

E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CFR	Code of Federal Regulations Available from Government Printing Office www.gpo.gov/fdsys	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
	Available from Defense Standardization Program www.dsp.dla.mil	
	Available from General Services Administration www.gsa.gov	(800) 488-3111 (202) 619-8925
	Available from National Institute of Building Sciences/Whole Building Design Guide www.wbdg.org/ccb	(202) 289-7800
MILSPEC	Military Specification and Standards (See DOD)	
USAB	United States Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
USATBCB	U.S. Architectural & Transportation Barriers Compliance Board (See USAB)	

F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California Department of Consumer Affairs Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation www.bearhfti.ca.gov	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations Office of Administrative Law California Title 24 Energy Code www.calregs.com	(916) 323-6225
CDHS	California Department of Health Care Services (Formerly: California Department of Health Services) (See CCR)	
CDPH	California Department of Public Health Indoor Air Quality Program www.cal-iaq.org	
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(800) 848-5580 (415) 703-2782
SCAQMD	South Coast Air Quality Management District www.aqmd.gov	(909) 396-2000
TFS	Texas Forest Service Forest Resource Development and Sustainable Forestry http://txforestservice.tamu.edu	 (979) 458-6606

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 5000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.
2. Section 017419 “Construction Waste Management and Disposal” for submitting documentation on demolition and construction waste disposal.
3. Section 312319 "Dewatering" for disposal of ground water at Project site.
4. Section 321216 "Asphalt Paving" for construction and maintenance of asphalt pavement for temporary roads and paved areas.
5. Section 321313 "Concrete Paving" for construction and maintenance of cement concrete pavement for temporary roads and paved areas.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.

1.4 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

D. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.

1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

E. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Location of proposed air-filtration system discharge.
4. Waste handling procedures.
5. Other dust-control measures.

1.5 QUALITY ASSURANCE

A. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Architect's Field Office: Of sufficient size to accommodate needs of Owner, Architect, with separate office for Architect's Construction Representative with lockable door. Include accommodations for Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no less than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
7. Construction Representative's office to be equipped with high speed internet access and phone/fax line.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

D. General Contractor's Field Office: Contractor to furnish and install office of sufficient size to accommodate needs of construction personnel office. Keep office clean and orderly. Furnish and equip offices as follows:

1. Furniture required for Project-site activities including desks, chairs, file cabinets, plan tables, plan racks, bookcases, copier/scanner/fax machine, and high speed internet access.
2. Conference room of sufficient size to accommodate meetings of 20 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no less than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- (1.2-m-) square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F (20 to 22 deg C).
6. Lighting fixtures capable of maintaining average illumination of 20 fc (215 lx) at desk height.
7. Cleaning service once per week.
8. Secure locks for all doors and windows.
9. Have field office installed and functional at start of mobilization on site and maintain in place through Substantial Completion.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Arrange with utility company and Owner to establish main water service. Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.

   a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
   b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.

2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

A. Electric Power Service: Arrange with utility company and Owner to establish power service and provide temporary electrical power service there from.

B. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service as shown on the Contract Documents.

C. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
2. Install lighting for Project identification sign.

D. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.

1. Provide additional telephone lines for the following:

   a. Provide a dedicated telephone line for each facsimile machine and computer with modem in each field office.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Contractor's emergency after-hours telephone number.
e. Architect's office.
f. Engineers' offices.
g. Owner's office.
h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Locate field offices, storage sheds, sanitary facilities, and other temporary construction and support facilities for easy access.
2. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
3. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove just prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on drawing C-104.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Provide temporary parking areas for construction personnel as discussed and agreed upon with Owner and Architect at Preconstruction Meeting.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

F. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.

1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated, or if not indicated, provide 4 foot by 8 foot sign comprised of ¾ inch exterior grade plywood mounted on 4 x 4 preservative treated wood posts set 4 feet into the ground. Sign content and layout as directed by Architect. Submit shop drawings for approval prior to fabrication and installation.
2. Prepare temporary signs to provide directional information to construction personnel and visitors.
3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood or steel.
4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
5. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

D. Storm Water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

E. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.
3. Maintain security through badging requirements for all onsite personal and temporary badges for visitors.

G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weather tight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:

1. Protect porous materials from water damage.
2. Protect stored and installed material from flowing or standing water.
3. Keep porous and organic materials from coming into prolonged contact with concrete.
4. Remove standing water from decks.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:

1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
2. Keep interior spaces reasonably clean and protected from water damage.
3. Periodically collect and remove waste containing cellulose or other organic matter.
4. Discard or replace water-damaged material.
5. Do not install material that is wet.
6. Discard, replace, or clean stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use permanent HVAC system to control humidity.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
    b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
    c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION

SECTION 01 6000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Contractor is responsible for compliance with the “Buy America” clause referenced in these documents and it is the responsibility of each contractor to understand these requirements. Verification that materials meet this clause must be provided with each product and material submittal (Reference Section 0133000 “Submittal Procedures”).

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Requirements:

1. Section 012300 "Alternates" for products selected under an alternate.
2. Section 012500 "Substitution Procedures" for requests for substitutions.
3. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 SUBMITTALS

A. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products:

a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

4. Manufacturers:

   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION *Not Used*

END OF SECTION

SECTION 01 7300

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017419 “Construction Waste Management and Disposal” for submitting documentation on construction waste disposal.
4. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
5. Section 078400 "Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction, in writing at least 48hrs in advance of the work. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches (2440 mm) in occupied spaces and 90 inches (2300 mm) in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect, and where applicable, as required by authority having jurisdiction codes, standards and regulations.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

F. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

G. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 017419 Construction Waste Management and Disposal.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

SECTION 01 7419

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:

1. Section 311000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials, including the following:

1. Construction Waste:

   a. Masonry and CMU.
   b. Lumber.
   c. Wood sheet materials.
   d. Wood trim.
   e. Metals.
   f. Roofing.
   g. Insulation.
   h. Gypsum board.
   i. Piping.
   j. Electrical conduit.
   k. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:

      1) Paper.
      2) Cardboard.
      3) Boxes.
      4) Plastic sheet and film.
      5) Polystyrene packaging.
      6) Wood crates.
      7) Plastic pails.

1.5 ACTION SUBMITTALS

A. Waste Management Plan: Submit one (1) original, one (1) copy, and one (1) electronic PDF on CD of plan within seven (7) days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report, submit one (1) original, one (1) copy, and one (1) electronic PDF on CD. Use Form CWM-7 for construction waste. Include the following information:

1. Material category.
2. Generation point of waste.
3. Total quantity of waste in tons.
4. Quantity of waste salvaged, both estimated and actual in tons
5. Quantity of waste recycled, both estimated and actual in tons
6. Total quantity of waste recovered (salvaged plus recycled) in tons

7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices. For commingled recycling the average annual recycling rate for a sorting facility is acceptable for recording diversion rtes if the facility's method of recording and calculating the recycling rate is regulated by a local or state government authority. Information shall be submitted with Waste Management Plan.

F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

1.7 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:

1. Review and discuss waste management plan including responsibilities of waste management coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.8 WASTE MANAGEMENT PLAN

A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Use Form CWM-1 for construction. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:

1. Total quantity of waste.
2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
3. Total cost of disposal (with no waste management).
4. Revenue from salvaged materials.
5. Revenue from recycled materials.
6. Savings in hauling and tipping fees by donating materials.
7. Savings in hauling and tipping fees that are avoided.
8. Handling and transportation costs. Include cost of collection containers for each type of waste.
9. Net additional cost or net savings from waste management plan.

PART 2 - PRODUCTS *Not Used*

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

E. Waste Tracking: Input waste tickets into online waste tracking system or approved equivalent file sharing program with 10 working days of a container “pull” and submit a monthly report with waste tickets.

F. Subcontractor Participation: Each contractor will participate and comply in General Contractor’s Construction Waste Management Plan to meet the guidelines herein this specification.

3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.

C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan. A co-mingled method may be allowed if submitted in the Construction Waste Management Plan and approved by the Owner.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

   a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off the ground and protect from the weather.
5. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.

3.4 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.5 ATTACHMENTS

A. Form CWM-1 for construction waste identification.

B. Form CWM-3 for construction waste reduction work plan.

C. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.

D. Form CWM-7 for construction waste

END OF SECTION

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FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION

MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

* Insert units of measure.

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FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

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FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN

MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

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FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT

MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

SECTION 01 7700

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 017300 "Execution" for progress cleaning of Project site.
2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.3 SUBMITTALS

A. Product Data: For cleaning agents.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

D. Certificates of Release: From authorities having jurisdiction.

E. Certificate of Insurance: For continuing coverage.

F. Field Report: For pest control inspection.

G. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and/or corrected (A/E's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
9. Complete final cleaning requirements, including touchup painting.
10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.

c. Name of Architect.
d. Name of Contractor.
e. Page number.

4. Submit list of incomplete items in the following format:

a. MS Excel electronic file. Architect will return annotated file.
b. PDF electronic file. Architect will return annotated file.

1.7 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of the warranties is on the date of Substantial Completion.

B. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Remove and replace all disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers and grills.
o. Clean ducts, blowers, and coils that display contamination with particulate matter on inspection. Units are not to be operated without filters during construction.

1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements in Section 017419 Construction Waste Management and Disposal.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

   a. Do not paint over "UL", other required, and all other labels and identification, including mechanical and electrical nameplates. Remove paint applied to required and all labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out lamps, lamps noticeably dimmed by hours of use, and defective and noisy starters or other components in light fixtures to comply with requirements for new fixtures.

END OF SECTION

SECTION 01 7823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Operation manuals for systems, subsystems, and equipment.
3. Product maintenance manuals.
4. Systems and equipment maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect and Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

    a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Authority will return copy with comments.

1. Correct or revise each manual to comply with Architect's and Commissioning Authority's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Authority.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.

2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.

2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.
3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 01 7839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit PDF electronic files of scanned record prints and one set of file prints.
2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit PDF electronic files of scanned record prints and three sets of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Accurately record information in an acceptable drawing technique.
   c. Record data as soon as possible after obtaining it.
   d. Record and check the markup before enclosing concealed installations.
   e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

   a. Dimensional changes to Drawings.
   b. Revisions to details shown on Drawings.
   c. Depths of foundations below first floor.
   d. Locations and depths of underground utilities.
   e. Revisions to routing of piping and conduits.
   f. Revisions to electrical circuitry.
   g. Actual equipment locations.
   h. Duct size and routing.
   i. Locations of concealed internal utilities.
   j. Changes made by Change Order or Construction Change Directive.
   k. Changes made following Architect's written orders.
   l. Details not on the original Contract Drawings.
   m. Field records for variable and concealed conditions.
   n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, and protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 01 7900

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

1.3 SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Pre-instruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.

2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Operations manuals.
    b. Maintenance manuals.
    c. Project record documents.
    d. Identification systems.

e. Warranties and bonds.
f. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.
c. Shutdown instructions for each type of emergency.
d. Operating instructions for conditions outside of normal operating limits.
e. Sequences for electric or electronic systems.
f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

DIVISION 03
CONCRETE

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls, piers, and grade beams.
3. Interior slabs-on-grade.
4. Miscellaneous exterior concrete.

B. Related Sections include the following:

1. Division 01 Sections "Quality Requirements" and “Special Inspections and Structural Testing” for independent testing agency procedures and administrative requirements.
2. Division 03 Sections for polished concrete slab requirements.
3. Division 32 Sections for exterior concrete pavement and walks.

1.3 SUBMITTALS

A. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

B. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup and tie spacing, bent bar diagrams, bar arrangement, splices and laps, and supports for concrete reinforcement.

C. Qualification Data: For Installer and manufacturer.

D. Material Certificates and Product Data: For each of the following, signed by manufacturers:

1. Cementitious materials, aggregates, and admixtures.
2. Form materials and form-release agents.
3. Steel reinforcement and accessories.

4. Curing compounds.
5. Floor and slab treatments.
6. Bonding agents and adhesives.
7. Vapor retarders.
8. Joint-filler strips and joint sealants.
9. Repair materials.

E. Field quality-control test and inspection reports.

F. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant and obtain aggregate from one source. Obtain admixtures through one source from a single manufacturer, unless supplier certifies compatibility between admixtures from multiple manufacturers.

E. Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specification for Structural Concrete."
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 318, "Building Code Requirements for Reinforced Concrete."
4. ACI 302.1R, "Guide for Concrete Floor and Slab Construction."
5. ACI 305R, "Hot Weather Concreting."
6. ACI 306R, "Cold Weather Concreting."
7. ACI 212.3R, “Chemical Admixtures for Concrete.”
8. ACI 304R, “Guide for Measuring, Mixing, Transporting, and Placing Concrete.”

9. ACI 308R, “Guide to Curing Concrete.”
10. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice."
11. ASTM C494, “Standard Specification for Chemical Admixtures for Concrete.”
12. ASTM C309, “Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.”
13. ASTM E 1643, “Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.”

F. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Sections. The Contractor shall record, type, and distribute minutes of the meeting to all parties concerned within 5 days.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Special Inspector.
c. Independent testing agency responsible for concrete design mixes.
d. Independent testing agency responsible for field quality control.
e. Ready-mix concrete manufacturer.
f. Concrete subcontractor.
g. Concrete pump supplier (if pumps are to be used).

2. Review special inspection and testing and inspecting agency procedures for field quality control; concrete finishes and finishing; cold- and hot-weather concreting procedures; curing procedures; construction, contraction and isolation joints; joint-filler strips and sealant; vapor-retarder installation; anchor rod installation tolerances; steel reinforcement installation; floor flatness requirements; polished concrete requirements; concrete repair procedures; and concrete protection.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

   a. High-density overlay, Class 1 or better.
   b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
   c. Structural 1, B-B or better; mill oiled and edge sealed.
   d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

F. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: Plain-steel bars, cut bars true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I, Type II, or Type I/II. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F or C.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Water: ASTM C 94 and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.
5. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
7. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A; 15 mil thickness. Include manufacturer's recommended adhesive or pressure-sensitive seam tape, pipe boots and detail strip. Provide under all slabs on grade.

1. Products:
a. Fortifiber Building Systems Group; Moistop Ultra.
b. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
c. Insulation Solutions, Inc.; Viper VaporCheck.

d. Meadows, W. R., Inc.; Perminator.
e. Raven Industries Inc.; Vapor Block.
f. Reef Industries, Inc.; Griffolyn.
g. Stego Industries, LLC; Stego Wrap.

2.7 FLOOR AND SLAB TREATMENTS

A. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Construction Chemicals - Building Systems; Maximent HD.
b. ChemMasters; ConColor.
c. Conspec by Dayton Superior; Conshake 500.
d. Dayton Superior Corporation; Quartz Tuff.
e. Edoco by Dayton Superior; Burke Non Metallic Floor Hardener 250.
f. Euclid Chemical Company (The), an RPM company; Surflex.
g. Kaufman Products, Inc.; Tycron.
h. L&M Construction Chemicals, Inc.; Quartzplate FF.
i. Symons by Dayton Superior; Hard Top.

B. Penetrating Sealer: High penetration silane sealer providing minimum 95 percent screening per NCHRP 244 standards for chloride ion penetration resistance. Apply 2 coats where indicated at the manufacturer's suggested rate according to its written instructions. Do not exceed 125 square feet per gallon coverage. Provide 10 year warranty.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Euclid Chemical Company; Euco-Guard S-40.
b. L&M Construction Chemicals, Inc.; Aquapel Plus.
c. Sonneborn, Division of ChemRex.; Penetrating Sealer 40 VOC.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products:

a. BASF Construction Chemicals - Building Systems; Kure 200.
b. ChemMasters; Safe-Cure Clear.
c. Conspec by Dayton Superior; W.B. Resin Cure.
d. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
e. Edoco by Dayton Superior; Res X Cure WB.
f. Euclid Chemical Company (The); Kurez DR VOX.
g. L&M Construction Chemicals, Inc.; L&M Cure R.
h. Meadows, W. R., Inc.; 1100 Clear.
i. Symons by Dayton Superior; Resi-Chem Clear.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 ADHESIVE ANCHORS

A. Injectable adhesives are to be used for drilling and grouting steel rebar and threaded anchor rods into hardened concrete.

1. The following products are two-component epoxy-adhesive anchoring systems for use in standard applications:

a. Products:

1) Hilti, Inc.; HIT-HY 150
2) ITW Red Head: Epcon C6
3) Simpson Strong-Tie: ET
4) Powers Fasteners: T308+

2.11 REPAIR MATERIALS

A. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

B. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations. This material is to be used for floor and slab areas beneath floor coverings.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C 109.

C. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.12 CONCRETE MIXTURES, GENERAL

A. It is the intent of this Specification to secure, for every part of the work, concrete of homogeneous structure which, when hardened, will have the required strength, appearance and resistance to weathering.

B. For slabs on grade, formulate the concrete mix design to minimize the amount of cement and water necessary to produce the required slump and workability. Utilize properly graded aggregates to minimize water and cement demand.

C. No concrete may be placed in the work until the Architect has approved the appropriate design mix.

D. If, during the progress of the work, any difficulty should occur in securing concrete of the required workability and strength, the Architect may order such changes in the proportions or materials, or both, as may be necessary. Any changes so ordered shall be made at the Contractor's expense.

E. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

F. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.

2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.

G. Admixtures: Use admixtures according to manufacturer's written instructions.

H. Provide concrete with the following properties:

Portion of Structure	**28-day Minimum Strength (psi)**	**Slump (± 1")**	**Maximum Water/Cement Ratio**	**Maximum Coarse Aggregate Size (ASTM C33)**	**Air Content (± 1.5%)**
Footings	3000	3"	0.50	#57	6%
Foundation walls and piers	4000	4"	0.45	#57	6%
Interior 5” slabs on grade at office areas	3500	4"	0.50	#57	2%
Interior 8” slabs on grade at vehicle areas	4500	4"	0.40	#57	2%
Exterior concrete	4500	4"	0.40	#57	6%

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class C, 1/2 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces.

3.4 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.
2. Seal vapor retarder to foundation walls or grade walls with manufacturer's recommended tape.
3. Seal all penetrations (including pipes) with manufacturer's recommended pipe boots and tape.
4. Repair all damaged areas with manufacturer's recommended patches.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate vertical joints in walls beside piers integral with walls, near corners, and in concealed locations where possible.
4. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. Crack control joints in floor slabs are to be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate and within 18 hours after placement. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floor slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 305 and 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

D. Flatwork: Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch.

E. Polished Concrete: See Division 03 sections for polished concrete requirements.

F. Fine-Broom Finish in Vehicle Areas: Apply a first trowel finish to surfaces indicated and where vehicles are stored or maintained. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness tolerances for trowel finished floor surfaces.

G. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

H. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:

1. Uniformly apply dry-shake floor hardener at a rate of 100 lb./100 sq. ft. unless greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
3. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing

operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

   a. Cure concrete surfaces with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with the polishing or bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with the polishing or bonding of floor covering used on Project.

F. Wait a minimum of 48 hours after finishing slab before allowing foot traffic on slab. Do not allow construction traffic or loads to be applied to slabs until the concrete is 7 days old.

3.12 LIQUID FLOOR TREATMENTS

A. Penetrating Sealer: Prepare, apply, and finish penetrating sealer according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Apply to concrete that is at least 21 days old or older if recommended by manufacturer’s written instructions.
3. Apply liquid until surface is saturated using a low-pressure sprayer, roller, brush or broom. Broom or squeegee material for even distribution. Apply a second coat in a similar manner.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Special Inspections: Special Inspections required are enumerated in the Schedule of Special Inspection Services contained in Section 014100.

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain samples from the first three (3) batches at the start of placement for each day's pour of each concrete mixture exceeding 5 cu. yd., plus one (1) set for each additional 50 cu. yd. or fraction thereof.

   a. Should any portion of required testing and/or batch time not meet specified requirements, the concrete batch in question shall be rejected. Testing shall then be performed until three (3) consecutive batches of concrete meets all specified requirements, including batch time. Testing shall return to the specified frequency only when all testing requirements have been satisfied for three (3) consecutive batches of concrete.
      1) All appropriate parties shall be notified immediately of each failed test.
      2) Additional testing required due to concrete not meeting specified requirements shall be performed at contractor's expense.

   b. When frequency of testing will provide fewer than five (5) composite samples of each concrete mixture, testing shall be conducted from at least five (5) randomly selected batches or from each batch if fewer than five (5) are used.

2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39; for each set, test one specimen at 7 days, two specimens at 28 days, and hold one specimen in reserve for later testing if required.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by Architect.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

11. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

3.16 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION

SECTION 03 3543

POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Ground and polished interior concrete slabs.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 03 Section CAST-IN-PLACE CONCRETE for slab curing and finishing requirements, for finishes other than polishing, and for protection of concrete slabs against damage or staining prior to commencement of polished concrete finishing.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each product. Include manufacturer's technical data, application instructions, and recommendations for each polished concrete finishing product and accessory material required
   2. Include manufacturer's printed installation instructions for densifier, including requirements for moisture content of concrete substrate.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit applicator qualifications for polished concrete, verifying experience and certification of densifier manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

B. Certificates: Submit harder/densifier manufacturer's certification that applicator for polished concrete is currently approved by manufacturer.

C. Test Reports: Submit certified test reports, prepared by an independent testing laboratory, confirming compliance of products with specified performance criteria.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit written maintenance instructions for polished concrete slabs. Include the following:
      a. Methods and frequency recommended for maintaining optimum condition under anticipated use.
      b. Precautions against cleaning products and methods which may be detrimental to finishes and performance of polished surfaces.

2. Include copy of submittal in Project information manual.

1.7 SYSTEM REQUIREMENTS

A. Performance Requirements for Polished Slabs:
1. Static coefficient of friction: Provide polished concrete slab finishes with a static coefficient of friction of not less than 0.6, as determined by testing identical products in accordance with ANSI/NFSI B101.1.

1.8 QUALITY CONTROL

A. Source Limitations: Obtain primary polished concrete flooring materials from single source from single manufacturer. Provide secondary materials of type and from source recommended by manufacturer of primary materials

B. Manufacturer Qualifications: A firm experienced in manufacturing products for polished concrete floors similar to those indicated for this Project with a record of successful in-service performance.

C. Installer Qualifications:
1. Company experienced in performing specified work similar in design, products, and extent to scope of this Project; with a record of successful in-service performance; and with sufficient production capability, facilities, and personnel to produce specified work.
2. Certified in writing by manufacturer of densifier as qualified to provide polished concrete floor slab finishing indicated.
3. Installer must maintain full-time supervisor on job site during times that Work is in progress.

D. Walkway Auditor: Certified by the National Floor Safety Institute (NFSI) to test polished floors for static coefficient of friction according to ANSI/NFSI B101.1.

1.9 MOCK-UPS

A. Polished Concrete Slabs:
1. Prior to commencing Work and preceding pre-installation conference, provide mock-up of polished finishing for concrete slab.
2. Size and location: Not less than 35 square feet x full thickness of slab, in location within building acceptable to Architect.
3. Materials and extent: See Division 03 Section CAST-IN-PLACE CONCRETE for concrete slab for mock-up.
a. Use approved concrete mix design, and accepted densifier.
b. Demonstrate ability to achieve finishing tolerances specified in Division 03 Section CAST-IN-PLACE CONCRETE.
c. Demonstrate ability to comply with curing requirements specified in Division 03 Section CAST-IN-PLACE CONCRETE.
d. Show full range of color, finishes and sheens, surface defects and repair, and workmanship expected in final Work.
e. Provide the following finishes to mock-up, for Architect's selection. See Part 3 below for description of each finish.
1) Finish half of mock-up to provide fne aggregate finish ("sand finish").
2) Finish the other half of mock-up to provide medium aggregate finish.
f. Provide the following sheens (gloss level) to mock-up, for Architect's selection. See Part 3 below for description of each sheen.

1) Finish half of mock-up to provide high gloss appearance.
2) Finish the other half of mock-up to provide very high gloss appearance.

4. Simulate finished lighting conditions for Architect's review of mockups.

B. Architect's Review:
1. Architect will select finish and sheen for polished concrete finishing for the Work, based on review of the finishes and sheens displayed in mock-up.
2. Architect will review mock-ups for visual acceptance of color, finish and sheen, and workmanship, including the following:
a. Compliance with approved submittals.
b. Uniformity of concrete paste color.
c. Uniformity of sheen (gloss level).

C. Maintain approved mock-ups during construction as standard for subsequent Work.

D. Remove mock-ups at completion of Project.

1.10 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work, for polished concrete.
1. Attendees: In addition to those specified in Division 01 Section PROJECT MEETINGS, include concrete producer, concrete finisher, concrete polisher, technical representative of densifier (liquid applied product) manufacturers, and walkway auditor.
2. Agenda: In addition to items specified in Division 01 Section PROJECT MEETINGS, discuss details of each step of grinding, honing, and polishing operations; application of liquid applied products; protecting concrete floor surfaces until polishing work begins; and protecting polished concrete floors after polishing work is completed.

1.11 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

B. Store materials to prevent deterioration from moisture, heat, cold, direct sunlight, or other detrimental effects.

1.12 PROJECT CONDITIONS

A. Environmental Limitations:
1. Comply with densifier manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting polished concrete floor slab finishing operations.
2. Maintain ambient temperature of between 50 and 90 degrees F during application and for at least 48 hours after application.

B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during polished concrete floor slab finishing operations.

C. Concrete shall be cured a minimum of 45 days or as otherwise directed by densifier manufacturer before application of densifier can begin.

D. Close spaces to traffic during polished concrete floor slab finishing operations and for not less than 24 hours after application, unless manufacturer recommends a longer period.

E. Damage and Stain Prevention: Take precautions to prevent damage and staining of concrete surfaces to be polished. Coordinate with Division 03 Section CAST-IN-PLACE CONCRETE for protection of concrete slabs prior to commencement of polished concrete finishing

F. Mask or otherwise protect adjacent construction, including glass, windows, and doors, from overspray and damage by polished concrete floor slab finishing equipment and procedures

PART 2 - PRODUCTS

2.1 MATERIALS

A. Liquid Densifier:
1. Odorless, non-hazardous, lithium silicate product formulated to penetrate concrete and react with calcium to produce permanent chemical reaction that hardens and densifies the concrete substrate.
2. Acceptable products and manufacturers: Subject to compliance with requirements, provide one of the following.
a. Certi-Shine Clear by Vexcon Chemicals, Inc.
b. Lion Hard by; L&M Construction Chemicals, Inc.
c. Consolideck LS by PROSOCO, Inc.
d. Formula One Lithium Densifier MP by L. M. Scofield Company.

B. Polish Guard:
1. Non-film forming, stain resistant, food resistant, chemical stain resistant, impregnating sealant designed to be used on concrete surfaces previously densified.
2. Acceptable products and manufacturers: Subject to compliance with requirements, provide one of the following.
a. Certi-Shine Finish Coat Ultra by Vexcon Chemicals, Inc.
b. Permaguard by L&M Construction Chemicals, Inc.
c. Scofield Formula One Guard W by L. M. Scofield Company.
d. LS Guard by PROSOCO, Inc.

2.2 RELATED MATERIALS

A. General: Provide accessory materials produced by or recommended in writing by manufacturer of liquid densifier products and acceptable to installer of polished concrete.

B. Patching Compound: Compound composed of 40% portland cement, 45% limestone, and 15% vinyl acetate copolymer, when mixed with dust salvaged from grinding process forms a paste that hardens when surface imperfections are filled.

C. Grout Material: Clear modified silicate sealant, containing no pore clogging latex, when mixed with dust salvaged from grinding process forms a paste that reacts with calcium hydroxide in concrete that hardens when surface imperfections are filled.

D. Protective Cover:
1. Non-woven, puncture and tear resistant, polypropylene fibers laminated with a multi-ply, textured membrane, not less than 18 mils in thickness.
2. For use after completion of concrete polishing operations.

2.3 POLISHING EQUIPMENT

A. Field Grinding and Polishing Equipment:
   1. Variable speed, multiple head, counter-rotating or planetary, walk-behind machine with not less than 400 pounds of down pressure on grinding or diamond polishing pads.
   2. Only wet grinding will be permitted prior to densification. After densification, dry polishing may be used; use dust extraction equipment with flow rate suitable for dust generated, with squeegee attachments.

B. Edge Grinding and Polishing Equipment: Hand-held or walk-behind machines which produces same results, without noticeable differences, as field grinding and polishing equipment.

C. Grinding and Polishing Pads: Bonded pads with embedded industrial grade diamonds of varying grits for grinding and polishing respectively as appropriate for each operation, fabricated for mounting on equipment of sufficient quality to attain maximum refinement during the processing of the concrete surface

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Verify that slabs to be polished comply with meet finish and surface profile requirements specified in Division 03 Section CAST-IN-PLACE CONCRETE.

C. Verify that slabs to be polished are free of stains, oils, grease , laitance, and other substances detrimental to producing a satisfactory polished concrete surface.

D. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

A. Prepare and clean substrates according to densifier manufacturer's written instructions.

B. Protect other work from water and dust generated by grinding operations.
   1. Control water and dust to comply with environmental protection regulations.
   2. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation. Remove temporary enclosures upon completion of Work.

3.3 POLISHING CONCRETE SLABS

A. General:
   1. Comply with densifier manufacturer’s written instruction except where more stringent requirements are specified herein
   2. Polished concrete will be final exposed floor finish. Maximize consistency of appearance for full extent of polished concrete.
   3. Protect polished surfaces upon completion of polishing operations.

B. Sequence of Polishing: Perform polishing either before partition studs are erected, or after partition studs are erected, but before gypsum board is installed, at Contractor's choice.

C. Initial Grinding:
   1. Grind concrete slabs using grinding equipment with metal-bonded grinding pads to provide uniform light aggregate exposure.
      a. Begin grinding in one direction using sufficient size grit pad. Make sequential grinding passes with each pass perpendicular to the previous pass, using finer grit pad with each pass. Do not cut concrete so as to create a visible checker board or linear pattern.
      b. Achieve maximum refinement with each pass to remove scratches from the previous pass, before proceeding to next finer grit pads.
      c. Do not skip grits.
      d. Vacuum slab using squeegee vacuum attachment or clean with auto scrubber after each pass, using clean water.
   2. Continue grinding until slab finish matches specified Class and approved mock-up.

D. Treating Surface Imperfections:
   1. Mix patching compound and grout material with dust created by grinding operations to match color of adjacent concrete surface.
   2. Fill surface imperfections including, but not limited to, holes, surface damage, small and micro cracks, air holes, pop-outs, and voids.
   3. Work compound and treatment until color differences between concrete surface and filled surface imperfections are not reasonably noticeable when viewed from 10 feet away under lighting conditions that will be present after construction.

E. Water Absorbency Test:
   1. Perform surface absorbency test by applying water to a representative portion of the prepared concrete slab, in accordance with densifier manufacturer's recommendations. A properly prepared surface, when dry, will immediately absorb clean water without surface beading effects.
   2. If slab fails the absorbency test, treat slabs using materials and methods recommended by densifier manufacturer. Repeat procedures as required to obtain proper absorbency.
   3. Do not proceed with finishing operations until unsatisfactory conditions are corrected.

F. Allow concrete surface to dry prior to application of densifier.

G. Application of Densifier:
   1. Apply densifier in accordance with manufacturer's instructions.
   2. Apply densifer at rate recommended by densifier manufacturer, and undiluted or diluted as recommended by densifier manufacturer, considering surface profile, density, and porosity of concrete, using spray equipment of type recommended by densifier manufacturer.
   3. Distribute and spread liquid using push broom, rotary floor machine equipped with brush or pad disk, or as otherwise recommended by densifier manufacturer.
   4. Allow densifier to remain on concrete surface for time period recommended by manufacturer. As material penetrates into concrete, apply additional densifier as required to maintain 1 to 3 mil wet film thickness of densifier and to keep concrete surface from drying during this time period.
   5. When recommended time period is complete, remove excess densifier using squeegee and wet vacuum.

H. Grout Grinding:

1. Use grinding equipment and appropriate grit grinding pads.
2. While applying fresh grout material, grind concrete in direction perpendicular to initial grinding to remove scratches.
3. Vacuum floor using squeegee vacuum attachment after each pass.

I. Honing:
1. Hone concrete slabs using wet grinding with resin-bonded grinding pads.
2. Grind concrete in one direction starting with 30 to 50 grit pad. Make as many sequential passes required to remove scratches, each pass perpendicular to previous pass, up to when the concrete "hones" (begins to shine, typically 200 grit), reaching maximum refinement with each pass.
3. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.

J. Polishing:
1. Use polishing equipment with resin bonded polishing pads.
2. Begin polishing in one direction starting with 200 grit pad.
3. Make sequential passes with each pass perpendicular to previous pass using finer grit pad with each pass, up to grit specified for indicated sheen level.
4. Achieve maximum refinement with each pass to remove scratches from the previous pass, before proceeding to finer grit pads.
5. Auto scrub or vacuum floor using squeegee vacuum attachment after each pass.
6. Continue polishing until gloss appearance, as measured according to ASTM E430, matches approved mock-ups.

K. Polish Guard: Uniformly apply and remove excessive liquid according to manufacturer's instructions.

L. Final Polished Concrete Floor Finish:
1. Finishes: Fine aggregate finish ("sand finish"): Remove not more than 1/16 inch of concrete surface by grinding and polishing resulting in majority of exposure displaying fine aggregate with no exposure of medium aggregate.
2. Sheens (gloss levels): High gloss appearance.
   a. Procedure: Not less than 6 steps with full refinement of each diamond pad up to 1500 grit resin bonded pad with one application of densifier.
   b. Gloss reading: Not less than 60 according to ASTM E430 before polish guard application.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified walkway auditor to perform tests.

B. Testing: Perform static coefficient of friction tests according to ANSI/NFSI B101.1.

C. Polished concrete flooring will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Maintenance Training: Engage a qualified instructor to train Owner's designated personnel in proper procedures for maintaining polished concrete flooring.

3.6 PROTECTION

A. After completion of polished concrete finishing, protect polished concrete floor finishes from damage and wear during remainder of construction period. Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensures that polished concrete is without damage or deterioration at time of Substantial Completion.
   1. Do not apply tape to polished concrete surfaces. Tape alters the natural curing process and transfers chemicals to and from the slab. Tape, plastics and other adhesives can contribute to plasticizer migration and show tape marks in the finished surface.
   2. When covering slabs, tape the first sheet to adjoining wall, then overlap the second sheet to the first and tape it to the paper; continue likewise with subsequent cover sheets. Do not tape to slab surface.

END OF SECTION

SECTION 03 4500

PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Architectural precast concrete sills.
   2. Design of precast units including final engineering design for unit reinforcement, support and anchorage.
   3. Attachments, anchors and accessories including loose erection hardware required to secure units to supporting structure.
   4. Welding required for installation.
   5. Flashing, joint fillers and sealants for precast Work.
   6. Cleaning and patching exposed surfaces of precast Work.

B. Products Furnished But Not Installed Under This Section: Anchors and inserts for connecting architectural precast concrete to building structure.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 01 Section TESTING AND INSPECTION SERVICES for requirements for independent agency for quality control testing and inspection.

B. See Division 04 Section UNIT MASONRY for precast concrete lintels used in conjunction with masonry Work and for masonry installed in conjunction with precast units set in mortar.

C. See Division 07 Section SHEET METAL FLASHING AND TRIM for flashing ***and cants***.

D. See Division 07 Section JOINT SEALANTS for sealants and joint fillers.

1.4 ACTION SUBMITTALS

A. Combined Submittal: Submit items required below as a combined submittal with requirements of Division 07 Section JOINT SEALANTS.

B. Product Data: Submit manufacturer's specifications and installation instructions for each proprietary material used.

C. Shop Drawings:
   1. Production drawings:

a. Indicate unit dimensions, finish, reveals, rustication strips, bevels, drips, joints, special shapes and member identification marks.
b. Indicate reinforcing, locations and details of anchors, lifting and erection inserts and other items cast into units.
c. Identify each material used including materials used for sealing formwork joints and release agents.

2. Erection drawings:
   a. Indicate unit shapes, dimensions, joints, finishes, member identification marks, arrangements of units and relationship to adjacent materials on elevation and section drawings.
   b. Indicate locations and details of anchorage devices embedded in or attached to other construction.
   c. Indicate details of connections, handling and erection procedures, and erection sequence. Indicate welds in accordance with AWS standard symbols.
   d. Indicate applicable design live and dead loads, wind loads, seismic loads, used in design.
   e. Indicate material properties used in Work.
   f. Number each precast unit on erection drawings to correspond to identification number given each unit for fabrication and applied on an unexposed face of unit.

D. Samples:
1. Submit minimum three sample sets for each type and finish of precast showing full range (high, middle and low) of color, texture and finish expected in completed Work.
2. Sample sets shall consist of minimum three samples in each set.
3. Samples shall be minimum 12 inches (300 mm) x 12 inches (300 mm) x 2 inches (50 mm) thick.
4. Final acceptance of samples will be based on review of field mock-up panels and shop production samples.

1.5 INFORMATIONAL SUBMITTALS

A. Design Modifications:
1. Submit for review any proposed variations in details or substitutions in materials required to meet specified performance requirements and to coordinate Work.
2. Note measures taken to modify concrete forms, reinforcing or mix to minimize bowing of stone-faced panels.

B. Design Mixes: Submit copies of mix designs with supporting information.

C. Test Reports: Submit copies of reports specified in quality control testing and inspection as Contractor's responsibility.

D. Certificates:
1. Submit copies of manufacturer's certificates of mill tests of cement, reinforcing steel and structural steel embedments.
2. Submit certification that welders have satisfactorily passed AWS qualifications test within previous 12 months.

E. Qualification Data: Submit fabricator and installer qualifications verifying years of experience; include list of completed projects having similar scope of Work identified by name, location, date, reference names and phone numbers.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Connections indicated are suggested for precast installation. Final connection design is responsibility of Contractor.
   2. Support and anchorage as specified and indicated are minimum requirements.
   3. Dimensions indicated are based on assumed design temperature of 70 deg F (21 deg C). Adjust fabrication and erection procedures to accommodate ambient temperature range at time of operations.
   4. Design modifications:
      a. Make only to meet field conditions and to ensure proper fitting of Work.
      b. Obtain Architect's approval of modifications.
      c. Maintain general design concept without increasing or decreasing component dimensions.
   5. Concrete design mix: Proportion mixes by either laboratory trial batch or field experience method, using materials proposed for Work and complying with ACI 318.
   6. Design Work with proper clearances for intended openings.

B. Interface with Other Systems:
   1. Coordinate with Work of other trades affected by Work of this Section.
   2. Coordinate location of connectors cast into precast assemblies with connectors in cast-in-place concrete or otherwise affixed to structure.
   3. Provide items, such as anchors or supports, in a timely manner so as not to delay job progress.
   4. Coordinate with fixtures or materials mounted within, or adjacent to assemblies; provide cut-outs as required using manufacturer's templates and field measurements to verify actual installed locations and dimensions.
   5. Coordinate with Division 07 Section JOINT SEALANTS to assure compatibility of stone-to-concrete panel edge sealant with panel-to-panel sealant.

1.7 QUALITY ASSURANCE

A. Designer/Engineer Qualifications: Design under direct supervision of a Registered Professional Engineer, licensed in Project jurisdiction.

B. Single Source Requirements:
   1. Provide precast concrete units from one fabricator.
   2. Obtain cement, aggregates, pigments and water from single sources, in sufficient quantity to complete entire Work and to assure regularity of appearance and uniformity of color.

C. Installer Qualifications: Company specializing in erection of architectural precast concrete work with not less than 5 years documented, successful experience with work comparable to Work of this Project.

D. Fabricator Qualifications:
   1. Company specializing in fabrication of architectural precast concrete work with not less than 5 years documented, successful experience with work comparable to Work of this Project.
   2. Sufficient production capacity to produce, transport and deliver Work without causing Project time delays.

E. Welder Qualifications: AWS certified for each type of weld required.

F. Regulatory Requirements:
   1. Conform to applicable requirements of authorities having jurisdiction over Project.
   2. Submit to authorities precast engineering details, data, calculations, Contractor's quality control and inspection reports, and other data as may be required by authorities.

G. Reference Standards: Except as may be modified by governing authorities or these Specifications, comply with the applicable provisions of the following codes, specifications and standards:
   1. ACI 318 "Building Code Requirements for Structural Concrete".
   2. CRSI "Manual of Standard Practice".
   3. PCI MNL-120 "PCI Design Handbook - Precast and Prestressed Concrete".
   4. PCI MNL-117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products".

1.8 SHOP PRODUCTION SAMPLES

A. Prior to going into full production, provide one shop production sample for each sill unit as indicated on Drawings:

B. Do not order production run quantities of cement and aggregate until shop production samples have been accepted.

C. Materials and Extent:
   1. Cast and finish sills at plant, using mix design preliminarily accepted in field mock-up panels.
   2. Show design features, color range, texture and workmanship expected in the final Work, in accordance with final Shop Drawings and complete in every respect incorporating every required material.

D. Architect's Review:
   1. Architect will review shop production samples for visual acceptance of materials and workmanship, including acceptable sizes, frequency, and types of surface imperfections such as airholes and bugholes.
   2. Obtain Architect's approval of shop production samples before proceeding with subsequent Work.

E. Maintain accepted shop production samples at plant during fabrication as standard for subsequent Work.

F. Properly maintained and accepted shop production samples may be incorporated into final Work.

1.9 SAMPLE INSTALLATION

A. Prior to commencing installation Work and preceding pre-installation conference, provide sample installation Work.

B. Size and Location: As indicated on Drawings.

C. Materials: Complete installation with every material in wall system, including flashing, anchors and sealant.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of materials and workmanship.
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain accepted sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

1.10 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.11 DELIVERY, STORAGE AND HANDLING

A. Handle and transport precast members in position consistent with their shape and design. Lift and support only from points indicated on final Shop Drawings.

B. Protect members to prevent staining, cracking, chipping, spalling or bowing and warping of concrete.

C. Use equipment and methods for transportation, site handling and erection under direction of precast fabricator.

D. Storage:
   1. Store units off ground and in manner to prevent cracking, distortion, warping, staining or other physical damage.
   2. Place stored units so that identification marks are discernible prior to installation.
   3. Separate stacked members by non-staining resilient spacers.
   4. Store so that lifting devices are accessible and undamaged.
   5. Do not use upper member of stacked tier as storage area for shorter member or heavy equipment.

1.12 PROJECT CONDITIONS

A. Field verify dimensions of supporting structure and other adjoining elements before fabrication.

B. Provide for erection tolerances corresponding with specified tolerances for other Work where field measurements cannot be obtained.

C. Remedy unsatisfactory tolerances in adjoining Work.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement:
1. ASTM C150, Type I or III.
2. Use only one brand, type and source of cement for entire Project. Stockpile quantity of cement required, to ensure uniformity of color of precast panels.
3. Color: Gray or white or blend of both as required to match Architect's sample.
4. Fly ash, ground granulated blast furnace slag, and other replacement cementitious materials are not acceptable.

B. Aggregate:
1. Normal weight aggregate: Except as modified by PCI MNL 117, ASTM C33, with coarse aggregates complying with Class5S.
2. Provide fine and coarse aggregate for each type finish from one source for entire job.
3. Aggregate color range: As required to match Architect's sample.

C. Pigment:
1. ASTM C979, synthetic mineral oxide or colored water-reducing admixtures,, harmless to concrete set and strength; stable at high temperature, resistant to ultra-violet light and alkali-resistant.
2. Provide if required to match Architect's sample.
3. Color: As required to match Architect's sample.

D. Water: Clean, fresh and potable.

E. Admixtures:
1. Only use admixtures which have been tested and accepted in mix designs.
2. Air entraining: ASTM C260, certified by manufacturer to be compatible with other admixtures.
3. Water-reducing admixture: ASTM C494, Type A.
4. Water-reducing and retarding admixture: ASTM C494, Type D.
5. Calcium chloride or admixtures containing chloride ions or other salts are not permitted.

2.2 REINFORCEMENT AND CONNECTIONS

A. Reinforcement:
1. Reinforcing steel:
a. Deformed bar: ASTM A615, Grade 60.
b. Low-alloy steel reinforcing bar for welding: ASTM A706, Grade 60.
c. Galvanized reinforcing bars: ASTM A767, Class II, 2 ounce per square foot zinc, hot-dip galvanized; chromate wash-treated.
d. Welded wire fabric: ASTM A185.
e. Welded deformed wire fabric: ASTM A497.
f. Epoxy-coated reinforcing bars: Conforming to ASTM A775, Section 1.3A.2.a.

B. Supports for Reinforcement:
1. Bar supports: CRSI Class 1 or 2, Types A or B for areas exposed to view; Class 3 acceptable in other areas.
2. Bar supports for epoxy-coated reinforcing:

a. Wire bar supports coated with dielectric material for minimum distance of 2 inches (50 mm) from point of contact with reinforcing bars. Provide dielectric material compatible with concrete.
b. If reinforcing bars are used as bar supports, use epoxy-coated bars.
c. In walls, use epoxy-coated spreader bars or, if combination bar clips and spreaders are used, coat supports with epoxy.

3. Tie wire: 16 gage (1.6 mm) or heavier, black-annealed.
   a. For epoxy-coated reinforcing use plastic-, epoxy- or nylon-coated tie wire.

C. Steel Connection and Supporting Devices:
1. Carbon-steel shapes and plates: ASTM A36.
2. Carbon-steel headed studs: ASTM A108, AISI 1018 through AISI 1020, cold finished; AWS D1.1, Type A or B, with arc shields.
3. Carbon-steel plate: ASTM A283.
4. Malleable steel castings: ASTM A47.
5. Carbon-steel castings: ASTM A27, Grade 60-30.
6. High-strength, low-alloy structural steel: ASTM A572.
7. Carbon-steel structural tubing: ASTM A500, Grade B.
8. Wrought carbon-steel bars: ASTM A675, Grade 65.
9. Deformed-steel wire or bar anchors: ASTM A496 or ASTM A706.
10. Carbon-steel bolts and studs: ASTM A307, Grade A; carbon-steel, hex-head bolts and studs; carbon-steel nuts; and flat, unhardened steel washers.
11. Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123, after fabrication, and ASTM A153, as applicable.
12. Shop-primed finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in FS TT-P-664 according to SSPC-PA 1.

D. Lifting or Handling Devices: Capable of supporting member in positions anticipated during manufacturer, storage, transportation and erection.

E. Welding electrodes: Comply with provisions of AWS specifications.

F. Paint:
1. Shop primer: SSPC Paint 25, or fabricator's standard.
2. Field touch-up paint: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

2.3 FORMWORK

A. Formwork: Non-staining metal, fiberglass reinforced polyester, concrete, or other acceptable material; non-reactive with concrete and capable of producing required finish surfaces.

2.4 ACCESSORIES

A. Grout:
1. Non-shrink grout: Premixed, nonmetallic, nonstaining, noncorrosive grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and

water-reducing agents, complying with ASTM C1107, of consistency suitable for application and 30 minute working time.

2. Epoxy-resin grout: Two-component mineral-filled epoxy-polysulfide.

B. Bearing Pads: Provide one of the following bearing pads for architectural precast concrete units, as recommended by precast fabricator for the application.

1. Elastomeric pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from molded sheet, 50 to 70 shore A durometer, minimum tensile strength 2250 psi (15.5 MPa) per ASTM D412.
2. Random, fiber reinforced elastomeric pads: Preformed, randomly oriented synthetic fiber set in elastomer. Surface hardness of 80 to 100 shore A durometer.
3. Frictionless pads: Tetrafluoroethylene (TFE), glass fiber reinforced, bonded to mild steel plate, of type required for anticipated stress.
4. High density plastic: Multimonomer, nonleaching, plastic strip.

C. Flashing: See Division 07 Section SHEET METAL FLASHING AND TRIM.

2.5 CONCRETE MIX DESIGN

A. Design Mixes:

1. Prepare design mix for each type of concrete required.
2. Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project.

B. Strength and Durability:

1. Compressive strength: 5000 psi (34.5 MPa) minimum at 28 days when tested per ASTM C39.
2. Maximum water-cement ratio: 0.40.
3. Water absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
4. Admixtures:
   a. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
5. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.
6. Adjust design mixes to obtain required color, texture and gradation of surface aggregate and to fulfill performance requirements and handling stresses.

C. Prepare single mix design for entire unit.

D. Batching and Mixing:

1. Plant shall conform to requirements of ASTM C94 and shall be certified by National Ready Mix Concrete Association.
2. Volumetric batch of concrete is not permitted.
3. Measure concrete components by weight accurately, within tolerance limits of ASTM C94.
4. Temperature of concrete at time of placement: Not to exceed 85 deg F (29 deg C).

2.6 FABRICATION

A. Conform to procedures in PCI MNL-117.

B. Formwork:
1. Fabricate and reinforce forms for close control of dimensions and details.
2. Make forms sufficiently rigid to meet casting tolerances.
3. Do not permit form joints on faces exposed to public view in finished Work.
4. Coat formwork with form release agent.

C. Reinforcement:
1. Support and space reinforcement to maintain reinforcement position in precast units during casting.
2. Keep reinforcement 1-1/2 inch (38 mm) minimum from edges and surfaces of units.
3. Assemble contiguous reinforcement as single assembly (cage) prior to placing in forms.

D. Accessories:
1. Embed and locate steel, anchors, inserts, plates, angles and other cast-in items as indicated on final Shop Drawings.
2. Locate lift loops and erection inserts so they are not visible in completed construction.
3. Secure non-ferrous accessories with stainless steel tie wire or provide with embedments capable of sustaining full loads.

E. Casting:
1. Cast units indoors, maintain controlled ambient temperature.
2. Mix concrete to distribute fine and coarse aggregate evenly.
3. Place to prevent concrete segregation in forms.

F. Details:
1. Conform to details on final Shop Drawings.
2. Joints: Full and square for full thickness.
3. Arrises: Straight, sharp, true and continuous at joints.

G. Mark each panel to correspond to identification mark on Shop Drawings for panel location and mark each panel with date cast.

H. Curing:
1. Cure until concrete has achieved 2000 psi (13.8 MPa) minimum compressive strength before removing units from forms, or longer if required for stripping and handling.
2. Conform to requirements of MNL-117 by moisture retention without heat, or by accelerated heat curing using low pressure live steam or radiant heat and moisture.

I. Welding:
1. Use proper preheat for welding high strength steels.
2. Do not reduce cross-sectional area of reinforcing by welding.

2.7 FABRICATION TOLERANCES

A. Fabrication Tolerances: Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items..

2.8 SHOP FINISHES

A. Precast Concrete:

1. Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance.
2. Smooth finish: As-cast smooth finish from form liners.
3. Allow concrete to attain minimum 7 day strength of 4,000 psi minimum, prior to surface treatment or as required to withstand handling stresses and to produce consistent precast finish.
4. Treat surfaces in continuous operation, to achieve uniform appearance.
5. Do not change equipment, materials, or procedure for surface treatment during Work.
6. Discard and replace or correct finish of precast units which develop undesirable irregularities as a result of surface treatment.

2.9 SHOP QUALITY CONTROL

A. Independent Agency Responsibilities:
1. Review Contractor's shop quality control program.
2. Submit weekly reports.

B. Contractor Responsibilities:
1. Provide quality control testing and inspection in accordance with PCI MNL-117.
2. During precast fabrication, make random tests and inspections at precast plant as follows:
   a. Compression strength tests in accordance with ASTM C39.
   b. Slump tests in accordance with ASTM C143.
   c. Air entrainment tests in accordance with ASTM C231.
   d. Water absorption test in accordance with PCI MNL-117.
   e. Verification of reinforcing size, spacing and depth of cover.
   f. Inspection of laps or welding.
   g. Inspection of forms.
3. Submit weekly reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify that structure and anchorage inserts not within tolerances required to erect units have been corrected prior to precast concrete erection.

3.2 PREPARATION

A. Prepare support equipment for erection procedure, temporary bracing and induced loads during erection.

B. Check and approve cast-in-place supporting members, inserts and anchors in supporting Work.

3.3 ERECTION

A. Precast Units Set in Mortar:
1. Set precast in full bed of mortar, unless otherwise indicated.

2. Do not set units above until mortar in course below is set sufficiently to maintain alignment and prevent extrusion of mortar.
3. Provide weepholes as indicated or detailed on final Shop Drawings.
4. Back parge and build Work firmly against and around other Work where indicated.
5. Butter joints for full width before setting.
6. Tool joints slightly concave.
7. Remove spillage immediately.
8. Rake out joints before mortar is set where sealant installation is indicated.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.

B. If members cannot be adjusted to conform to design or tolerance criteria, notify Architect before proceeding with Work.

3.5 ACCEPTANCE

A. Precast units may be rejected due to any one of the following reasons:
1. Non-conformance with specified tolerances.
2. Damage to surfaces, finish, corners or edges exposed to view after erection.
3. Broken, chipped, spalled, cracked or otherwise damaged units.
4. Other defects as listed in PCI MNL-117.

B. Patching:
1. Patch and repair exposed surfaces prior to final cleaning of precast units and sealing of joints.
2. Patching of stone-faced precast units will not be permitted.
3. Patching will not be permitted for units with structural defects.
4. Acceptance of repaired units by Architect is contingent upon the following:
   a. Repairs being done skillfully so as to be sound, permanent and flush with adjacent surfaces.
   b. Color and texture of repaired areas matching adjoining surfaces and showing no apparent line of demarcation between original and repaired Work.
5. Architect's decision will be final with respect to acceptance or rejection of patched units.

C. Remove and replace units which are rejected, including units with unacceptable patching.

3.6 CLEANING

A. Clean dirt or blemishes from surface of exposed members.

B. Wash and rinse in accordance with precast fabricator's recommendations.

C. Protect other Work from damage due to cleaning operations.

D. Do not use cleaning materials or processes which could alter character of exposed concrete finishes.

3.7 PROTECTION

A. Protect the Work during the remainder of construction so that it will be without any evidence of damage at time of acceptance.

END OF SECTION

DIVISION 04
MASONRY

SECTION 04 0514

UNIT MASONRY MORTARING AND GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Mortar and grout for unit masonry.
   2. Grout for reinforced unit masonry.
   3. Non-shrink grout for setting items such as steel bearing plates and handrails.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 04 Section UNIT MASONRY for mortar and grout installation.

B. See Division 09 Section TILING for mortar and grout for ceramic and quarry tile.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for proprietary materials.
   2. Combined submittal: Submit product data for integral water repellent admixture for mortar as combined submittal with data for integral water repellent for concrete masonry units, as specified in Division 04 Section UNIT MASONRY.

B. Samples:
   1. Submit samples of colored mortars prepared in 6 inch (150 mm) long metal channels.
   2. Submit for review prior to preparation of mock-ups.
   3. Final approval shall be made with final review of mock-ups.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Submit manufacturer's certification that the following comply with specified standards:
      a. Portland cements.
      b. Hydrated lime.
      c. Mortar aggregates.
   2. Submit certification that masonry units, when combined with mortar and grout specified, produce specified compressive strength.

B. Mix Design: Submit certified design mix for reinforced masonry grout, certifying that design mix complies with specified standard and compressive strength.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Refer to Division 04 Section UNIT MASONRY.

B. Regulatory Requirements: Refer to Division 04 Section UNIT MASONRY.

C. Reference Standards: Refer to Division 04 Section UNIT MASONRY.

1.6 MOCK-UPS

A. Following submittal and initial review of mortar samples, provide mortar for unit masonry mock-ups as specified in Division 04 Section UNIT MASONRY.

1.7 SAMPLE INSTALLATIONS

A. Provide mortar for unit masonry sample installations as specified in Division 04 Section UNIT MASONRY.

1.8 DELIVERY, STORAGE AND HANDLING

A. Store packaged materials in unopened containers in a dry place and protected from weather.

1.9 PROJECT CONDITIONS

A. Environmental Requirements: Refer to Paragraph “Mixing”.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement:
   1. Type: ASTM C150, Type I, II or III, from one source only, non-staining and non-air-entraining.
   2. Color: White, gray or blend as required to match Architect's sample**[s]** for colored mortar.

B. Lime: Hydrated lime; ASTM C207, Type S.

C. Mortar Sand:
   1. Type: ASTM C144, clean, washed and free from iron and impurities; conform to grading requirements for natural sand.
   2. Colored aggregates:
      a. Natural sand, ground granite or other sound stone, well graded.
      b. Color**[s]** as required to match Architect's sample**[s]** for colored mortar.
   3. Sand for masonry mortar joints 1/4 inch (6 mm) wide or less: 100% passing No. 8 sieve with 10% being retained on No. 16 sieve.

D. Coarse Aggregate: Pea gravel or smaller, conforming to ASTM C404.

E. Water: Clean, clear, nonalkaline and free of salts and other harmful elements; potable.

F. Additives:
   1. Do not use anti-freeze, air-entraining admixtures or calcium chloride in mortar.
   2. Integral water repellent:

a. Description: Integral liquid polymeric water repellent admixture for mixing with mortar.
b. Performance:
1) Water permeance: Class E rating, when tested in accordance with ASTME514.
2) Bond strength of mortar containing water repellent admixture shall equal or exceed bond strength of same type of mortar without water repellent admixture.
c. Manufacturer: Water repellent admixture for mortar shall be by same manufacturer as integral water repellent for concrete masonry units specified in Division 04 Section UNIT MASONRY.

G. Pre-Packaged Colored Mortar:
1. Provide factory prepared mixture of portland cement, lime, and pigments , and integral water repellant, and containing no other ingredients; requiring addition of sand and water only.
a. Portland cement: ASTM C150, Type I, II, or III.
b. Lime: Hydrated lime; ASTM C207, Type S.
c. Pigments: ASTM C979; mineral oxide pigments. Pigments shall not exceed 10% of portland cement by weight.
2. Color as required to match Architect's sample for colored mortar.
3. Acceptable products and manufacturers:
a. Riverton Portland Cement Lime Custom Color by Capital Materials Corporation.
b. Eaglebond Portland & Lime by LaFarge North America Inc.
c. Rainbow Mortamix Custom Color Cement/Lime by Holcim (US) Inc..
d. Lehigh Custom Color Portland/Lime Cement by Lehigh Cement Co.
4. Non-chloride accelerator admixture:
a. Non-corrosive, non-chloride accelerator admixture complying with ASTM C494, Type C.
b. Product containing not more chloride ions than are present in municipal drinking water.
c. Acceptable products and manufacturers:
1) Accelguard 80 by Euclid Chemical Company.
2) Morset by W.R. Grace.

2.2 MIXES

A. Unit Masonry:
1. General:
a. Comply with requirements of ASTM C270, Proportion Specification, for job-mixed mortar; and ASTM C1142 for ready-mixed mortar.
b. Limit cementitious materials in mortar to portland cement and lime.
c. Masonry cement mortars are not acceptable.
2. Exterior mortar:
a. Type S colored portland cement/lime mortar, containing integral water repellent admixture**.**
b. One color will be required; as selected by Architect from sample panels.
3. Mortar for CMU
a. For CMU in contact with soil: Type M portland cement/lime mortar; natural color.
b. For other CMU: Type S portland cement/lime mortar; natural color.

B. Masonry Grout:
   1. Comply with proportion requirements of ASTM C476.
   2. Provide mix with compressive strength of 3000 psi (20.7 Mpa).
   3. Slump: 8 inches to 11 inches (200 mm to 275 mm), in accordance with ASTM C143.
   4. Use fine grout (grout without coarse aggregate) for filling spaces less than 4 inches (100 mm) in both horizontal directions.
   5. Use coarse grout (grout with coarse aggregate) for filling spaces 4 inches (100 mm) or larger in both horizontal directions.
   6. Do not use mortar in place of masonry grout.

C. Non-Shrink Grout:
   1. Ready-to-use material requiring only the addition of water at the site.
   2. Minimum compressive strength: 5000 psi (34.5 MPa).

2.3 MIXING

A. General:
   1. Use mechanical mixers and clean after each batch.
   2. Avoid over-sanding by accurate measurement of proportions. Batch quantities using batching box or similar type of container of known volume; “shovel measure” will not be acceptable.
   3. Mix cement and pigment for colored mortar prior to mixing in mortar box.

B. Mixing Time: Minimum of 3 minutes and maximum of 5 minutes typically.

C. Mixing:
   1. Mix mortar with maximum of water consistent with good workability on board to provide maximum tensile bond strength within capacity of mortar.
   2. If mortar loses good working consistency, re-temper by adding water and remixing on board. Do not re-temper mortar at mixer.
   3. Do not use mortar that is older than 2-1/2 hours after initial mixing, partially set, frozen or of a lumpy consistency.

D. Cold Weather Requirements:
   1. For temperatures below 40 deg F (4 deg C) heat mortar materials to protect both mortar and completed Work from freezing.
   2. When outside air temperature is:
      a. 40 deg F (4 deg C) and below: Heat mixing water and sand to produce mortar temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C).
      b. 32 deg F (0 deg C) and below: Heat grout materials to produce grout temperature between 40 deg F (4 deg C) and 120 deg F (49 deg C). Maintain temperatures of mortar and grout above freezing until used in masonry.
   3. Ideal mortar temperature is 70 deg F + 10 deg F (21 deg C + -12 deg C). Maintain mixing temperature selected within 10 deg F (-12 deg C).
   4. Do not use anti-freeze compounds or calcium chloride in mortars to lower the freezing point or accelerate setting.

E. Hot Weather Requirements: Do not apply mortar to substrates when air temperatures exceed 100 deg F (38 deg C).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Refer to Division 04 Section UNIT MASONRY for installation of mortar and grout.

3.3 FIELD QUALITY CONTROL

A. Independent Agency Responsibilities:
   1. Field inspections:
      a. Inspect and verify as required in 2009 Virginia Uniform Statewide Building Code (VUSBC)**,** Table 1704.5.
      b. Review and observe mortar and grout batching and mixing procedures and proportions.
   2. Laboratory tests: No tests of mortar or grout are required.
   3. Provide weekly written reports.

END OF SECTION

SECTION 04 2000

UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Concrete masonry units.
   2. Precast, and unit masonry lintels.
   3. Bond beams.
   4. Through-wall flashing.
   5. Metal reinforcing, ties, anchors and accessories.

B. Products Furnished But Not Installed Under This Section:
   1. Advise concrete installer of requirements for placement of inserts and flashing reglets used in masonry Work.
   2. Advise steel fabricator of requirements for locations of welded channel slots used in masonry Work.

C. Products Installed But Not Furnished Under This Section:
   1. Consult other trades in advance and make provisions for installation of their Work in order to avoid cutting and patching.
   2. Build in pipe sleeves furnished by other trades for pipes and conduit through masonry walls.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 03 Section CONCRETE FORMING for dovetail anchor slot installation.

B. See Division 04 Section UNIT MASONRY MORTARING AND GROUTING for mortar and grout materials and mixes.

C. See Division 05 Section STRUCTURAL STEEL FRAMING for channel slot installation.

D. See Division 05 Section METAL FABRICATIONS for miscellaneous metal anchors, bolts, sleeves, and other accessories built into masonry Work.

E. See Division 07 Section BITUMINOUS DAMPPROOFING for dampproofing of exterior walls.

F. See Division 07 Section THERMAL INSULATION for cavity wall thermal insulation.

G. See Division 07 Section SHEET METAL FLASHING AND TRIM for metal reglets and counter, coping and cap flashing.

H. See Division 07 Section JOINT SEALANTS for sealants and joint fillers.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each type of masonry unit and accessory.
   2. Combined submittal: Submit product data for integral water repellent for GFCMU, SFCMU,and ground and polished CMU as combined submittal with data for integral water repellent admixture for mortar, as specified in Division 04 Section UNIT MASONRY MORTARING AND GROUTING.

B. Samples:
   1. Submit minimum three sample sets for each type of GFCMU and SFCMU showing full range (high, middle and low) of color, texture and finish variation expected in completed Work.
   2. Sample sets shall consist of minimum five samples in each set.
   3. Samples size:
      a. GFCMU, SFCMU: Not less than 4 inch x 4 inch x 1 inch (100 mm x 100 mm x 25 mm) thick.
   4. Weep holes/vents: Full size units.

1.4 INFORMATIONAL SUBMITTALS

A. Certifications:
   1. Submit manufacturer's certifications showing that the following comply with specified requirements:
      a. Concrete masonry units.
      b. Reinforcing steel.
   2. Submit water repellent manufacturer's certification that GFCMU and SFCMU manufacturer is currently certified by water repellent manufacturer for production of concrete masonry units containing integral water repellent.

B. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Minimum compressive strength of CMU: f'_m = [**] psi ([**] MPa).
   2. See Division 04 Section UNIT MASONRY MORTARING AND GROUTING for testing requirements.

B. Visual Requirements:
   1. Do not use units with chips, cracks, voids, discolorations or other defects which might be visible or cause staining in finished Work. [Do not use ground face concrete masonry units which have chips, cracks, voids, discoloration or other defects which would be visible when viewed from a distance of 6 feet (1830 mm) under diffused lighting.]
   2. Obtain masonry units from one manufacturer, of uniform color and texture, or uniform blend of color and texture, for each type required for each continuous or visually related area.
   3. Provide GFCMU and SFCMU that does not exceed variations in color and texture of samples approved by Architect.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer of GFCMU and SFCMU shall be certified by water repellent manufacturer for production of concrete masonry units containing integral water repellent.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Regulatory Requirements:
   1. Conform to requirements of local building code requirements, not necessarily fully defined on Drawings, for fire ratings and lateral support conditions for masonry.

D. Reference Standards: Except as otherwise specified, conform to the following standards:
   1. ACI 530.1/ASCE 6/TMS 602, “Specifications for Masonry Structures”.

1.7 SAMPLE PANELS

A. Prior to construction of mock-ups, and after acceptance of block and mortar samples, provide 2 sample panels of masonry Work with mortar color for each panel as selected by Architect.

B. Size: 4 feet high x 4 feet wide (1200 mm high x 1200 mm wide) x 2 wythes thick.

C. Materials and Extent:
   1. Complete installation with specified block, mortar, bond patterns and jointing.
   2. Show full color range, bond patterns, texture, mortar and workmanship expected in the final Work.
   3. Brace panels as required for stability.
   4. Locate on Site as directed by Architect.

D. Architect's Review:
   1. Architect will review sample panels for visual acceptance of materials and workmanship.
   2. Sample panels will be used for final selection of block and mortar color for mock-ups and for subsequent Work.
   3. Obtain Architect's approval of sample panels before proceeding with subsequent Work.

E. Maintain approved sample panels during construction as standard for subsequent Work.

F. Remove sample panels from Project site at completion of Project.

1.8 SAMPLE INSTALLATION

A. Prior to commencing Work and preceding pre-installation conference, provide sample installation of exterior masonry Work.

B. Size: One full column bay horizontally, full height vertically, in location acceptable to Architect.

C. Materials: Complete installation with materials in wall system, including cold-formed metal framing, sheathing, insulation, flashing, weeps, anchors, supports, bedding, jointing, grouts and sealants.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of materials and workmanship.
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain approved sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Delivery: Deliver materials, other than bulk materials, to site in unopened containers; fully identified with name, type grade, color and size.

B. Storage:
   1. Protect against water, dirt and contamination from other materials.
   2. Store on planks in dry locations, protected from weather.

C. Protection:
   1. During freezing weather, protect masonry units with tarpaulins or other suitable material.
   2. Protect facing materials against mortar splashes and staining.
   3. Protect windows, door frames, and other adjacent Work from damage by masonry Work or masonry cleaning.

1.11 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Cold-weather requirements:
      a. Do not use frozen materials or materials mixed or coated with ice or frost.
      b. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
      c. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
   2. Cold weather cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (5 deg C) and above and will remain so until masonry has dried out, but not less than 7 days after completion of cleaning.
   3. Hot weather requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.12 SEQUENCING AND SCHEDULING

A. Load Application: Do not apply loading to masonry columns or load bearing walls until such masonry is fully capable of supporting loads.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Concrete Masonry Units (CMU):
   1. ASTM C90.
      a. Lightweight with dry net concrete weight of not more than 105 pcf (1680 kg/m³).
      b. Medium weight with dry net concrete weight between 105 pcf (1680 kg/m³) and 125 pcf (2000 kg/m³).
      c. Normal weight with dry net concrete weight 125 pcf (2000 kg/m³) or more.
      d. Aggregates: Do not use aggregates made from scoria or tuff. Aggregates made from pumice are acceptable if texture and color of units match Architect's samples.
      e. Provide medium weight or normal weight CMU at exposed exterior locations.
   2. Face dimensions: Manufacturer's standard, nominal 16 inches (400 mm) long x 8 inches (200 mm) high (unless otherwise indicated), thickness as indicated on Drawings.
   3. Finish: Manufacturer's standard color and texture; fine, smooth and tight.
   4. Provide special shapes as indicated or where required for high-lift grouting, or to build lintels, corners, jambs, bond beams, and control joints.
   5. For exposed outside corners, provide CMU with radius corners.
   6. Integral water repellent:
      a. Description: Integral liquid polymeric water repellent admixture for mixing with concrete during production of masonry units.
      b. Performance: Water permeance of Class E rating, when tested in accordance with ASTM E514.
      c. Manufacturer: Water repellent admixture for concrete masonry units shall be by same manufacturer as integral water repellent for mortar specified in Division 04 Section UNIT MASONRY MORTAR AND GROUT.

B. Ground and Polished Face Concrete Masonry Units:
   1. Normal weight hollow load bearing CMU: ASTM C90, with dry net concrete weight of 125 pcf (2000 kg/m³) or more.
   2. Face dimensions: Manufacturer's standard, nominal 16 inches (400 mm) long x 8 inches (200 mm) high (unless otherwise indicated), thickness as indicated on Drawings; 8 x 8 score.
   3. Finish: Provide units of special aggregate, with exposed surfaces (including corners and returns at openings), integrally colored, filled and polished. Match color and texture of Architect's sample.
   4. Provide special shapes as indicated or where required to build lintels, corners, jambs, bond beams, and control joints.
   5. Integral water repellent:
      a. Description: Integral liquid polymeric water repellent admixture for mixing with concrete during production of masonry units.
      b. Performance: Water permeance of Class E rating, when tested in accordance with ASTM E514.
      c. Manufacturer: Water repellent admixture for concrete masonry units shall be by same manufacturer as integral water repellent for mortar specified in Division 04 Section UNIT MASONRY MORTAR AND GROUT.
   6. Acceptable products and manufacturers:
      a. Design is based on Trendstone Plus, filled and polished masonry units, to establish standard of quality.

b. Equivalent products by other manufacturers may be acceptable provided they comply with requirements of Contract Documents.

C. Mortar and Grout: See Division 04 Section UNIT MASONRY MORTARING AND GROUTING.

2.2 COMPONENTS

A. Concrete Masonry Lintels:
1. Provide built-in-place masonry lintels of specially-formed bond beam units, made from concrete matching concrete masonry units in color, texture, and compressive strength. Reinforce units with reinforcing bars placed as indicated and filled with coarse grout. Temporarily support built-in-place lintels until cured.

B. Bond Beams: Fabricated from special shape masonry units, same material as load bearing concrete masonry units, filled with concrete or grout and reinforced as indicated.

2.3 ACCESSORIES

A. Horizontal Joint Reinforcing:
1. Type: Welded wire units of 10 foot (3 m) minimum lengths with prefabricated corner and tee units.
2. Provide units conforming to ASTM A951.
   a. Wire size for side rods: W1.7 (0.148 inch (3.8 mm) diameter).
   b. Wire size for cross rods: W1.7 (0.148 inch (3.8 mm) diameter).
3. Size: Width of between 1-1/2 inches to 2 inches (38 mm to 50 mm) less than nominal wall width.
4. Unit fabrication:
   a. Single wythe walls: Truss type units.
   b. Composite, multi-wythe bonded walls: Truss type units with additional side rods spaced for embedment in inside face of back-up wythe.
   c. Cavity walls:
      1) Truss type units with rectangular box type loops, spaced not more than 16 inches (400 mm) on center, that engage adjustable rectangular pintle ties for embedment in outer wythe.
      2) Size pintle ties for width of cavity and depth of outer wythe.
5. Individual welded wire mesh ties (so-called “rat wire”) are not acceptable.
6. Finish:
   a. For interior walls: Mill galvanized.
   b. For exterior walls: Hot-dip galvanized after fabrication.
7. Acceptable products and manufacturers:
   a. For single wythe walls:
      1) Dur-O-Wal D/A 310 by Dayton Superior.
      2) Series 300, 2 Wire System, by WIRE-BOND.
      3) No. 120 by Hohmann & Barnard, Inc.
   b. For composite, multi-wythe bonded walls:
      1) Dur-O-Wal D/A 310 DSR by Dayton Superior.
      2) Series 300, 4 Wire System, by WIRE-BOND.
      3) No. 140 by Hohmann & Barnard, Inc.
   c. For cavity walls:
      1) Dur-O-Wal D/A370 with pintle ties, by Dayton Superior.

2) Series 900 with pintle ties, by WIRE-BOND.
3) No. 170 with pintle ties, by Hohmann & Barnard, Inc.

B. Anchors and Ties:
1. Anchors:
a. Provide bolts, straps, bars and rods of the type and size indicated, but fabricated from not less than 16 gage (1.6 mm) sheet metal or 3/8 inch (9 mm) diameter rod stock, unless otherwise indicated.
b. Where masonry is indicated to be anchored to structural steel, provide adjustable type anchors which provide lateral restraint.
2. Individual wire ties:
a. Fabricate from 3/16 inch (5 mm) cold-drawn steel wire, ASTM A82, unless otherwise indicated, of the length required for proper embedment in wythes of masonry indicated.
b. For use with hollow masonry units laid with cells aligned vertically, provide rectangular shaped ties.
c. For use with solid masonry units, provide ties with ends bent to 90 deg angles to form hooks not less than 2 inches (50 mm) long.
d. Where spacing and back-up joints do not align, provide either offset or adjustable 2-piece ties.
3. For interior Work, fabricate with mill galvanized finish.
4. For devices which extend into exterior wythe, fabricate from steel with hot-dip galvanized coating, ASTM A153, Class B-2.

C. Concrete Inserts:
1. For installation of concrete inserts, see Division 03 Section CAST-IN PLACE CONCRETE.
2. Unit type: Furnish cast iron or malleable iron, fabricated from not less than 12 gage (2.8 mm) steel, hot-dip galvanized after fabrication with 1.5 oz. (503 g/sq. m/Z450) zinc coating, ASTM A153, Class B-2.
3. Dovetail strap type:
a. Furnish dovetail slots with 7/8 inch (21 mm) wide flat bar anchors, fabricated from 16 gage (1.6 mm) galvanized steel, with 1/4 inch (6 mm) upturned end or 1/2 inch (13 mm) diameter hole located within 1/2 inch (13 mm) of end of bar. Anchor to extend to within 1-1/2 inch (38 mm) of face of masonry units.
b. At Contractor's option, 9 gage (3.8 mm) galvanized wire triangular tie-backs with metal tabs for insertion into dovetail slots may be provided in lieu of flat bar anchors.

D. Reinforcing Bars: Deformed steel reinforcing bars conforming to ASTM A615, Grade 60, sizes as indicated, free from mill scale and excess or loose rust deposits.

E. Movement Joint Fillers:
1. Types: Preformed elastomeric products specifically recommended by manufacturer for use in masonry walls.
2. Filler for control joints at CMU:
a. Material: EPDM/SBS/CR rubber blend complying with ASTM D2000.
b. Provide solid rubber “Key Section” (80 Shore A durometer hardness).
3. Do not use movement joint fillers at building expansion joints.
4. Acceptable products and manufacturer:

a. Filler for control joints at CMU: Equivalent to Block Seal 2018-3 or Slot-Seal Standard 2015-3 by Williams Products, Inc..

F. Weep Hole Wicks: Cotton sash cord.

G. Through-Wall Flashing: Stainless steel, ASTM A666, Type 304, 2D finish, full annealed or deadsoft temper, 0.015 inch (0.4 mm) thick.

H. Termination Bars: 1 inch (25 mm) x 1/8 inch (3 mm) stainless steel. Provide with stainless steel self-drilling fasteners, suitable for substrate.

I. Lap Sealant for Flashing: Non-staining butyl sealant. Provide with primers as recommended by sealant manufacturer for substrates to be sealed.

J. Sealant at Termination Bars and Other Concealed Locations in Contact with Dampproofing: Sealant compatible with dampproofing as recommended by dampproofing manufacturer.

K. Cavity Wall Drainage System:
1. Form:
a. Polyethylene, nylon, or recycled polyester strands woven into 90% open mesh; fabricated in either trapezoidal (dovetail) configuration or in 3-dimensional projecting staggered profiled pattern, to allow moisture in cavity to drain to weeps without being blocked by mortar droppings.
b. Non-trapezoidal or non-profiled forms are not acceptable.
2. Size: 1-1/2 inch to 2 inch (39 mm to 50 mm) thick x approximately 10 inches (250 mm) high.
3. Acceptable products and manufacturers:
a. Mortar Break II by Advanced Building Products, Inc.
b. Mortar Net by Mortar Net USA, Ltd.

L. Sheathing: See Division 06 Section SHEATHING.

M. Loose Fill Insulation:
1. Silicone-treated perlite, ASTM C549 Type II or IV.
2. Maximum thermal conductivity “k” of 0.37 Btu-inch/hr-ft^2- deg F (0.64 W/(m^2 x K); asbestos-free.

N. Cavity Wall Insulation: Refer to Division 07 Section THERMAL INSULATION.

O. Bond Breaker: Asphalt-saturated organic felts, No. 15, complying with ASTM D226, Type I.

P. Transition Membrane:
1. Vapor-permeable, 17 mil-thick, self-adhering “breathable” sheet consisting of adhesive coating over a permeable film laminate.
2. Physical properties:
a. Membrane vapor permeance, when tested in accordance with ASTM E96: Not less than 37 perms.
3. Locations: As indicated on Drawings.
4. Acceptable product and manufacturer: Equivalent to Blueskin VP160 by the Henry Company.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which masonry is to be installed. Do not proceed with masonry Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Concrete Masonry Units:
   1. Do not wet concrete masonry units before laying.
   2. Do not install wet concrete masonry units. When cutting CMU using wet saws, allow units to dry before laying.
   3. Do not install concrete masonry units that are less than 7 days old after fabrication.

B. Remove loose rust, ice and other coating from reinforcement.

C. Lay out walls in advance for accurate spacing of surface bond patterns and joint widths and to properly locate openings, control joints, expansion joints, returns and offsets.

3.3 ERECTION

A. General:
   1. Do not use units with chips, cracks, voids, discolorations or other defects which might be visible or cause staining in finished Work.
   2. Cutting:
      a. Cut units with motor-driven saw equipment to provide clean, sharp, unchipped edges.
      b. In lieu of cutting, use guillotine-type splitter to split SFCMU, when cut surface will be exposed.
      c. Cut or split, as applicable, units to provide pattern indicated and to fit adjoining Work neatly.
      d. Use full units without cutting wherever possible.
   3. Lay cut units with cut surfaces concealed.

B. Installation Tolerances:
   1. Mortar joint thickness:
      a. Bed joints: +/- 3/32 inch (+/-2.4 mm), with maximum 3/32 inch (2.4 mm) variation of bed joint thicknesses in adjoining courses.
      b. Head joints: +/- 1/8 inch (+/-3 mm).
      c. Collar joints: +/- 1/4 inch (+/-6 mm).
   2. Cavity width: +/- 1/4 inch (+/-6 mm).
   3. Variation from level:
      a. Bed joints: +/- 3/16 inch (+/-5 mm) in 10'-0” (3 m), +/- 3/8 inch (+/-9 mm) maximum overall.
      b. Top surface of bearing wall: +/- 1/8 inch (+/-3 mm) in 10'-0” (3 m), no more than 1/16 inch (1.5 mm) within width of single unit.
   4. Variation from plumb: +/- 1/4 inch (+/-6 mm) in 10'-0” (3 m), +/- 1/2 inch (+/-13 mm) maximum overall.
   5. Alignment of head joints in alternating courses: +/- 1/2 inch (+/-13 mm) in 10'-0” (3 m).
   6. True to line: +/- 1/4 inch (+/-6 mm) in 10'-0” (3 m), +/- 1/2 inch (+/-13 mm) maximum.

7. Variation in cross-sectional dimensions: For columns and thickness of walls, do not exceed minus 1/4 inch (-6 mm) nor plus 1/2 inch (+13 mm) from dimensions indicated.
8. Alignment of columns and walls (bottom versus top): +/- 1/2 inch (+/-13 mm).
9. Deviation from theoretical position in plan or elevation, including deviation from plumb, level or dimensioned angle: +/- 3/8 inch (+/-9 mm) total at any location.

C. Laying Masonry:
1. Lay masonry true to dimensions, plumb, in bond, in line, properly anchored and with level courses accurately spaced, to full thickness indicated.
2. Lay solid concrete masonry units with completely filled bed, head and collar joints; butter ends with sufficient mortar to fill head joints and shove into place.
   a. Do not slush head joints.
   b. At composite multi-wythe bonded construction, fill space between wythes (collar joint) solid with mortar or grout.
3. Concrete masonry units:
   a. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells.
   b. Bed webs in mortar in starting course on footings and foundation walls, in every course of, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.
   c. For starting courses on footings where cells are not grouted, spread out full mortar bed including areas under cells.
   d. Fill CMU cores with grout 3 courses (24 inches (600 mm)) under bearing plates, beams, lintels, posts and similar conditions unless otherwise indicated.
   e. Where wall ties align with head joints between adjoining units, apply mortar into head joints from top after units are set, to provide sufficient depth of mortar to solidly embed wall ties in place.
4. Adjust coursing as necessary to align with heads and sills of openings, to maintain same jointing for surfaces of building.
5. Lay exposed block carefully for uniform appearance where used as facing units.
6. Lay masonry units within one minute after spreading mortar.
7. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
8. Build interior partitions to underside of structure above, unless otherwise indicated.
   a. Install pressure-relieving joint filler between top of wall and underside of structure above, unless otherwise indicated.
   b. For walls to receive fire safing insulation between top of wall and underside of structure above, provide solid CMU for top course, or place layer of metal lath in joint below top course and fill top course with mortar or grout.

D. Bond:
1. Lay concrete masonry units in running bond.
2. Lay concealed masonry with units in wythe bonded by lapping not less than 2 inches (50 mm).
3. Bond and interlock each course of each wythe at corners, unless otherwise indicated.

E. Joints:
1. Lay masonry units with approximately 3/8 inch (9 mm) wide joints, both horizontally and vertically.

2. Install compressible filler in joints where sealed joints are indicated.
3. Tooling of mortar joints:
   a. Where masonry is exposed or below grade, tool joints concave.
   b. In surfaces to be plastered, tiled, or covered with other masonry or waterproofing, cut joints flush.
4. Sealed joints:
   a. Install compressible filler in joints where sealant joints are indicated.
   b. See Division 07 Section JOINT SEALANTS for sealant installation.

F. Interface With Other Work:
1. Install sleeves in neat and workmanlike manner; carefully cut and point to match adjacent surfaces in exposed masonry.
2. Install metal anchors for steel door frames in masonry as walls and partitions are erected; fill space between hollow metal frames and masonry solidly with mortar as each course is laid.
3. Where built-in items are embedded in cores of hollow masonry units, place layer of metal lath in joint below and rod mortar or grout into core.
4. Install reglets and nailers for flashing and other related Work where required.
5. Coordinate construction of exterior masonry walls with application of bituminous dampproofing.

G. Stopping and Resuming Work:
1. Rack back one-half masonry unit length in each course; do not tooth.
2. Clean exposed surfaces of set masonry, wet units lightly (if specified to be wetted), and remove loose masonry units and mortar prior to laying fresh masonry.
3. Adjust each unit to its final position in wall while mortar remains plastic; remove and reinstall with fresh mortar units disturbed after mortar has stiffened.
4. Protect partially completed masonry walls against weather when Work is not in progress, by covering top of walls with strong, waterproof, nonstaining membrane. Extend membrane at least 2 feet (600 mm) down both sides of walls and anchor securely in place.

H. Horizontal Joint Reinforcing:
1. Install joint reinforcement according to manufacturer's recommendations and to comply with building code.
2. Locate reinforcement in wall width to provide 5/8 inch (15 mm) minimum side mortar cover for exterior face and 1/2 inch (13 mm) for interior face.
3. Spacing:
   a. Maximum 16 inches (450 mm) on center vertically for walls, 8 inches (200 mm) on center vertically for parapets, unless otherwise indicated.
   b. Reinforce masonry openings greater than 1'-0” (300 mm) wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8 inches (200 mm) apart, both immediately above lintels and below sills. Extend reinforcing minimum of 2'-0” (600 mm) beyond jambs of opening, except as otherwise indicated.
4. Lap side rods 6 inches (150 mm) minimum at splices.
5. At inside and outside corners and tee sections, use prefabricated “L” and “T” units.
6. Cover reinforcement with mortar.
7. Discontinue joint reinforcement at control joints and expansion joints.

I. Reinforced Masonry:

1. Install reinforcing bars as walls are erected, splicing where necessary [with minimum lap of 48 bar diameters.][in accordance with Lap Schedule on Structural Drawings??] Secure reinforcement in proper alignment and position for full height of walls by use of hot-dipped galvanized rebar positioners.
2. Remove mortar protrusions extending into cells or cavities to be reinforced or filled, before pouring grout.
3. Use grout mix specified in Division 04 Section UNIT MASONRY MORTARING AND GROUTING.
4. Limit height of vertical grout pours to not more than 60 inches.
    a. Clean grout spaces to remove droppings and mortar fins.
    b. Provide temporary cleanout and inspection holes at base of one face of walls and around columns, to prevent damming of cleanout water in grout spaces and to verify that grout has filled masonry voids. Fill cleanout holes with coursed CMU upon completion of grouting.
5. Consolidate during placement to insure complete filling of cores and grout spaces.
6. Allow each pour to set sufficiently to carry weight of next pour, before pouring next pour.
7. Do not displace masonry units during grouting operation.

J. Anchors and Ties for Ends of CMU Walls:
1. Install anchors and ties according to manufacturer's recommendations.
2. Space anchors as indicated, but not more than 16 inches (400 mm) on center vertically.
3. Allow for open space not less than 1/2 inch (13 mm) in width between masonry and structural framing [or existing construction], unless otherwise indicated. Keep open space free of mortar or other rigid materials.
4. Embed metal ties in masonry joints at least 1-1/2 inch (38 mm) or [thickness of wythe]/2, whichever is greater.
5. Anchor masonry to structural members [or existing construction]where masonry abuts or faces such items.

K. Lintels and Shelf Angles:
1. Install loose steel lintels and shelf angles where indicated and as required for support of masonry.
2. Provide precast [masonry] lintels wherever openings of more than 1'-0” (300 mm) are indicated without structural steel or other supporting lintels.
3. Temporarily support built-in-place lintels of bond beam units until cured.
4. Setting lintels:
    a. Provide minimum bearing of 8 inches (200 mm) at each end of lintels, unless otherwise indicated.
    b. Clean bottom surface of lintels and set in place.

L. Movement Joints:
1. General:
    a. Install control and expansion joints in unit masonry where indicated.
    b. Build-in related items as masonry progresses.
    c. Do not form continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.
2. Locations:
    a. As indicated or, if not indicated, provide vertical control joints spaced at maximum of 30'-0” (9 m) on center and at points of natural weakness in masonry Work.

b. Above and below major openings in wall.
c. At vertical chases, recesses and other points of reduction in wall thickness.
d. Where end of masonry wall butts against supporting structure.
e. Where masonry partitions are installed across control joints in floor slabs, make nearest vertical wall joint on one side of floor control joint, a wall control joint.

3. Form control joints in concrete masonry units by one of the following methods:
   a. Fit bond-breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
   b. Install preformed control-joint gaskets designed to fit standard sash block.

M. Through-Wall Flashing:
1. Preparation:
   a. Make masonry surfaces smooth and free from projections which could puncture flashing.
   b. Complete masonry Work to elevations required for installation of through-wall flashing.
   c. Clean excess mortar from surfaces receiving flashing.
2. Install through-wall flashing according to flashing manufacturer's instructions.
3. On masonry, place flashing on sloping bed of mortar and cover with mortar
4. Flashing profile:
   a. Extend flashing full length required and minimum of 4 inches (100 mm) into masonry each end.
   b. Extend flashing minimum 1/4 inch (6 mm) beyond exterior face of outer wythe with drip profile..
   c. At veneer walls, extend flashing across cavity and turn up minimum of 8 inches (200 mm)at face of sheathing. [Install termination bar to secure flashing, and apply continuous sealant bead along top edge of termination bar; install screws for termination bars into studs; do not screw to sheathing alone.] Tuck behind felts.
   d. At cavity walls, extend flashing across cavity and turn up minimum of 8 inches (200 mm) [15 inches (375 mm)]at face of inner wythe. [Extend through inner wythe to within (2 inch (13 mm) of interior face of wall. If interior surface of inner wythe is concealed by furring, carry flashing completely through inner wythe and turn up approximately 2 inches (50 mm).][Install termination bar to secure flashing, and apply continuous sealant bead along top edge of termination bar.]
   e. Make flashing flush to bottom of masonry and provide continuous pan for flow of water through weeps to outside face of masonry.
5. Check for proper placement of flashing and backer rod and sealant so that water will not be trapped behind sealant joint.
6. End dams:
   a. Provide end dams at ends of horizontal flashing that are not continuous.
   b. Extend flashings beyond openings at least 4 inches (100 mm) and turn up into head joint at least one brick course high, to form pan to direct moisture to outside surface of wall.
   c. Seal corners of end dams to make watertight.
7. Cavity wall drainage system:
   a. Install woven net on through-wall flashing in cavity walls, with zig-zag side facing up, or profiled side facing exterior.
   b. Butt adjoining sections to provide continuous installation for full thickness and length of cavity.
8. Repair damage to flashing before proceeding with masonry Work.

9. Sealing flashing:
    a. Seal penetrations in flashing before covering with mortar.
    b. Lap splices and intersections of continuous through-wall flashing at least 6 inches (150 mm) and seal laps with sealant.
    c. Interlock splices and intersections of metal flashing by overlapping not less than 6 inches (150 mm) and sealing laps with a minimum of 5 transverse rows of butyl sealant.
    d. Seal laps, joints and penetrations in flashing as follows:
        1) Metal flashing: Seal with butyl sealant. Seal dowel penetrations in flashing by placing specially-formed stainless steel thimble-type caps over dowel ends. Seal flange of caps to flashing with butyl sealant.
10. Locations: Provide concealed flashing in masonry Work where indicated including shelf angles, lintels, ledges, bond beams and other obstructions in masonry to provide positive downward flow of water in wall through to outside surface.

N. Weepholes:
1. Provide weepholes by mortaring sash cord wick into head joints in masonry course above flashing, spaced not more than 16 inches (400 mm) on center. Extend cord at least 4 inches (100 mm) into cavity.
2. Cut wicks flush with exterior face of wall.

O. Cavity Wall Insulation:
1. Verify that mortar joints are cut flush with masonry on inner faces of cavity to provide an even surface on which to apply insulation.
2. Install insulation boards horizontally beginning at bottom of inner wythe.
3. Place small dabs of adhesive, spaced approximately 12 inches (300 mm) o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose.
4. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Install subsequent courses of insulation by applying boards directly above underlying courses with staggered joints.
5. Press units firmly against inside wythe of masonry or other construction as shown.
6. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.
7. Maintain clear space between insulation and outer wythe to dimension indicated.
8. Keep insulation above level of outer wythe during masonry installation to assure adequate room to manipulate or adjust insulation as required.
9. Cut and shape insulation with knife, handsaw or other cutting tool as required to fit around wall penetrations, projections or openings and to accommodate conduit or other services within cavity. Seal cut-outs with adhesive recommended by insulation manufacturer.

P. Transition Membranes:
1. Install transition strips and auxiliary materials according to air barrier manufacturer's written instructions to form a seal with adjacent construction.
2. Repair punctures, voids, and deficient lapped seams in transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 REPAIR, POINTING AND CLEANING

A. Repair:
   1. Remove and replace masonry units where loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units as intended.
   2. Provide new units to match adjoining units and install in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing:
   1. Point mortar joints at corners, openings and adjacent Work to provide neat, uniform appearance.
   2. Prepare joints to receive sealant where indicated.
      a. Mortar joints:
         1) Rake out mortar after initial set, to provide depth as recommended by sealant manufacturer to accommodate sealant and backer rod.
         2) Clean and prime joint surfaces to receive sealant.
      b. Control joints and expansion joints: Clean and prime joint surfaces to receive sealant.
      c. See Division 07 Section JOINT SEALANTS.

C. Cleaning:
   1. Clean mortar spills and smears as they occur.
   2. Remove large mortar particles by hand using wooden paddles and non- metallic scrape hoes or chisels. Remove particles daily.
   3. Protect adjacent materials including metal, glass, and precast concrete.
   4. Mask or otherwise protect adjacent construction, including windows, doors and ornamental trim, from acid solutions.
   5. Follow cleaning agent manufacturer's instructions.

3.5 PROTECTION

A. Protect masonry Work from collapse, deterioration, discoloration or damage during construction and until final acceptance of Work.

END OF SECTION

DIVISION 05
METALS

SECTION 05 0515

FLUOROPOLYMER FINISH

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Shop-applied fluoropolymer paint finish on metal.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS for aluminum doors and framing to receive fluoropolymer finish.

B. See Division 08 Section ALUMINUM WINDOWS for aluminum windows to receive fluoropolymer finish.

C. See Division 08 Section LOUVERS for aluminum louvers to receive fluoropolymer finish.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Submit product data for paint finishes.
   2. Include test data demonstrating compliance of coating with AAMA 2605 for humidity resistance, salt spray resistance, color retention, chalk resistance and resistance to erosion.

B. Samples: Submit samples of metal finish for each color selected, on production line-prepared components.

1.5 QUALITY ASSURANCE

A. Coating Manufacturer Qualifications: Licensed by resin manufacturer to manufacture coatings based on Kynar 500 or Hylar 5000 resin.

B. Applicator Qualifications: Authorized by coating manufacturer.

C. Color Control: During production, maintain approved color range samples for use in comparing against production material.

1.6 WARRANTY

A. Submit component fabricator's written warranty for integrity of film and permanence of coating color for 20 years.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Coating:
   1. Factory spray-applied fluoropolymer finish, conforming to high performance requirements of AAMA2604.
   2. Resin: Polyvinylidene Fluoride PVDF fluoropolymer resin manufactured by one of the following:
      a. Kynar 500 by Arkema Group.
      b. Hylar 5000 by Solvay Plastics.
   3. Formulation:
      a. 2-coat fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
   4. Acceptable products and manufacturer: Equivalent to the following by PPG Industries, Inc.:
      a. Standard colors: Equivalent to Duranar Coating by PPG Industries, Inc.

B. Coating Touch-Up:
   1. Product recommended by coating formulator, matching original finish for color and gloss.
   2. Provide touch-up adhesion to original finish equal to adhesion of the original finish to prepared surface.

2.2 SOURCE QUALITY CONTROL

A. Test coatings in accordance with requirements of AAMA 2605 to verify compliance with the following:
   1. Specular gloss: Gloss values within +/- 5 units of manufacturer's specified values, measured in accordance with ASTM D523.
   2. Dry film hardness: No rupture of paint film using pencil of grade F hardness minimum, when tested in accordance with ASTM D3363.
   3. Film adhesion: No removal of paint film with 1/16 inch (1.5 mm) cross hatch for both dry film and wet film.
   4. Impact resistance: No removal of paint film, 1/10 inch (2.5 mm) deformation.
   5. Abrasion resistance: Coefficient of abrasion of 40 minimum, when tested in accordance with ASTM D968.
   6. Humidity, salt spray, chalk and erosion resistance, and color retention shall comply with requirements of cited reference.

B. Sealant Compatibility: Verify adhesion qualities of coatings and specified sealants through adhesion and peel testing in conjunction with sealant manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Provide multi-stage cleaning and pretreatment systems to remove organic and inorganic surface soils and residual oxides, and to provide a chemical conversion coating which will adhere firmly to organic coatings.

B. Metal Preparation and Pre-Treatment:
   1. Comply with the following, unless otherwise recommended and confirmed by testing.
   2. Processing and cleaning aluminum substrate: ASTM B449, Section 5.
   3. Pre-treatment:
      a. Conversion coating on aluminum: ASTM D1730, Type B, Method 5 (Amorphous Chromium Phosphate Treatment) or Method 7 (Amorphous Chromate Treatment).
      b. Coating weight of chemical conversion coating: 30 mg per square foot (325 mg per square meter) minimum, in compliance with ASTM B449, Section 6, Class I.
      c. Processing: ASTM B449, Section 5.

3.3 APPLICATION

A. Perform application specified by formulator and as follows:
   1. Coil coating of sheet material is permissible provided coating meets high performance requirements of AAMA 1402 and 1403.
   2. Coating films: Uniform and free from flow lines, streaks, blisters, sags or other surface imperfections in dry-film state.
   3. Total dry-film thickness (DFT) of coating exclusive of conversion coatings on exposed surfaces: 1.2 mils (0.03 mm) minimum. Determine coating thickness as follows:
      a. Primer: Inhibitive primer, average 0.2-0.3 mil (0.005-.008 mm) DFT.
      b. Color coat: Fluoropolymer resin color coat, minimum 1.0 mil (0.025 mm) DFT.
   4. Increase specified film thickness if required to achieve selected color.

B. Follow manufacturer's latest printed application instructions.

END OF SECTION

SECTION 05 1200

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Structural steel.
2. Grout.
3. Accessories.

B. Related Sections include the following:

1. Division 01 Sections "Quality Control" and “Special Inspection and Structural Testing” for independent testing agency procedures and administrative requirements.
2. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrications, and other metal items not defined as structural steel.
3. Division 09 Sections for surface preparation, priming, and final painting requirements.

1.3 SUBMITTALS

A. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

B. Welding certificates.

C. Qualification data for firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. Product Data and Mill Test Reports: Signed by manufacturers certifying that the following products comply with requirements:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Shear stud connectors.
4. Shop primers.
5. Nonshrink grout.

E. Source quality-control test reports.

1.4 QUALITY ASSURANCE

A. Installer Qualifications, shall comply with one of the following:
1. Erector shall be a qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE CSE.
2. For non AISC-Certified Erectors, installer shall comply with the following practices and procedure requirements, and submit supporting documentation.

a. Provide a written safety plan, compliant with governmental regulations, which is understood and implemented by supervision and erection crews.
b. All welders are qualified per AWS D1.1, "Structural Welding Code--Steel."
c. Provide a written bolt tightening procedure, compliant with the Research Council on Structural Connections (RCSC) specifications.
d. Provide a written fall protection procedure, periodically monitored and recorded by a qualified fall protection personal.
e. Crane operators shall be CCO certified or equivalently trained.
f. Provide project specific erection plans with all hoisting and erection requirements.
g. Erector shall provide a project history, a minimum of four projects, of similar size jobs with reference contacts.

B. Fabricator Qualifications, shall comply with one of the following. Additional requirements are provided in the “Source Quality Control” Article.

1. Fabricator shall be a qualified fabricator who participates in the AISC Quality Certification Program and is certified to the “Standard for Steel Building Structures (STD).”
2. For non AISC-Certified Plants, comply with independent testing and inspection requirements.

a. Fabricator shall be registered with and approved by authorities having jurisdiction.
b. Erector shall provide a project history, a minimum of four projects, of similar size jobs with reference contacts.

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

1. Present evidence that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Sections.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver structural steel to Project site in such quantities and at such times to ensure continuity of installation.

B. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

C. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.6 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992.

B. Channels, Angles, M, S-Shapes: ASTM A 36.

C. Plate and Bar: ASTM A 36.

D. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.

E. Steel Pipe: ASTM A 53, Type E or S, Grade B.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 or ASTM A 490, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B.

C. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Plate Washers: ASTM A 36 carbon steel.
3. Washers: ASTM F 436 hardened carbon steel.

D. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563 heavy hex carbon steel.
2. Washers: ASTM F 436 hardened or ASTM A 36 carbon steel.

2.3 PRIMER

A. Galvanizing Repair Paint: SSPC-Paint 20.

B. Primer: For steel exposed to view in the bus wash area:
1. Series 66-BJ45 Hi-Build Epoxoline (grey / beige), Tnemec Company. 3.0 to 5.0 mils dry film thickness.
2. Series 50-330 Poly-Ura-Prime for touch-up of above primer, Tnemec Company. 2.5 to 3.0 mils dry film thickness.

C. Primer: For interior steel exposed to view, 2.0 to 3.0 mils dry film thickness:
1. Series 10-1009 Gray Alkyd Primer, Tnemec Company.
2. Ceco No.15 Gray Primox, Cheesmaan-Elliot Company.
3. 681-FD Alkyd Primer, Dupont Company.
4. 5205 Tank and Structural Primer, Glidden Company.

2.4 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.

1. Fabricate beams with rolling camber up.
2. Identify high-strength structural steel according to ASTM A 6 and maintain markings until structural steel has been erected.
3. Mark and match-mark materials for field assembly.
4. Fabricate for a delivery sequence that will expedite erection and minimize field handling of structural steel.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning" or SSPC-SP 2, "Hand Tool Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

G. Holes: Provide holes required for securing other work to structural steel and for passage of other work through steel framing members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Base-Plate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Unless otherwise noted on the plans, install snug-tightened, high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Steel not exposed to view.
2. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
3. Surfaces to be field welded.
4. Surfaces to be high-strength bolted with slip-critical connections.
5. Galvanized surfaces.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning" or SSPC-SP 3, "Power Tool Cleaning" for interior steel exposed to view.
2. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" for exterior steel exposed to view and exposed steel in the bus wash area.

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide the dry film thickness specified, but not less than 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to inaccessible surfaces after assembly or erection. Change color of second coat to distinguish it from first.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123.

1. Fill vent holes and grind smooth after galvanizing.
2. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. For AISC certified facilities, submit a written program for the proposed fabrication quality control. As a minimum, perform at least the following shop tests and inspections and submit test reports. If Fabricator's facility is not AISC certified, Contractor will engage an independent testing and inspecting agency, acceptable to the Owner, to perform shop inspections and tests and to prepare test reports.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

2. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements.

B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1 and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

F. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1 for stud welding and as follows:

1. Bend tests will be performed if visual inspections reveal either a less-than- continuous 360-degree flash or welding repairs to any shear connector.
2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify elevations of concrete bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with steel erector present, for compliance with requirements.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place, unless otherwise indicated.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Base Plates: Clean concrete bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base plates. Clean bottom surface of base plates.

1. Set base plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of base plate.
3. Snug-tighten or pretension anchor rods as directed, after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members forming part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Unless otherwise noted on the plans, install snug-tightened, high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts".

B. Weld Connections: Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

D. Bolted Connections: Field-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. Welded Connections: Field welds will be visually inspected according to AWS D1.1.

1. In addition to visual inspection, field welds will be tested according to AWS D1.1 and the following inspection procedures, at testing agency's option:
   a. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted. Test for a minimum of:
      1) 20% of all connection fillet welds at random, final pass only.
      2) 100% of tension member fillet welds (i.e. hanger connection plates and other similar connections) for root and final passes.
   b. Ultrasonic Inspection: ASTM E 164. Test for a minimum of 100% of all full penetration welds.

F. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

END OF SECTION

SECTION 05 5000

METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Metal fabrications made from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not part of structural steel, ornamental metal or other metal systems specified elsewhere.
   2. Miscellaneous framing and supports for Work of other Sections, including but not limited to the following:
      a. Countertops.
      b. Architectural woodwork.
      c. Overhead coiling doors.
      d. Aluminum entrances and window wall.
      e. Fluid reel hangers.
      f. Exhaust reel hangers.
      g. Fuel shear valve hangers.
      h. Hangers and supports related to HVAC equipment.
      i. Toilet compartments.
      j. Louvers.
      k. Grilles.
      l. Folding partitions.
      m. Other locations indicated on Drawings.
   3. Steel lintels.
   4. Shelf angles.
   5. Steel trim including steel angle corner guards and edge angles.
   6. Pipe bollards.
   7. Slotted channel framing system.

B. Products Furnished but Not Installed:
   1. Provide templates for anchor and bolt installation specified in other Sections.
   2. Furnish inserts and anchoring devices which are set in concrete or built into masonry for installation of metal fabrications.
   3. Furnish steel lintels and shelf angles for installation in masonry.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 04 Section UNIT MASONRY for installation of lintels and shelf angles.

B. See Division 05 Section COLD-FORMED METAL FRAMING for cold-formed metal framing.

C. See Division 09 Section PAINTING AND COATING for field applied painting systems.

D. See Division 10 Section WIRE MESH PARTITIONS.

1.4 ACTION SUBMITTALS

A. Professional Certification: Provide Shop Drawings and engineering calculations prepared and sealed by Registered Professional Engineer, licensed in Project jurisdiction, for fabrications required to comply with structural requirements.

B. Product Data: Submit manufacturer's specifications and installation instructions for products used in miscellaneous metal fabrications, including paint products and grout.

C. Shop Drawings:
1. Submit Shop Drawings for fabrication and erection of miscellaneous metal fabrications.
2. Include plans, elevations and details of sections and connections.
   a. Include details for fabrication and assembly of hangers.
3. Show anchorage and accessory items.

1.5 INFORMATIONAL SUBMITTALS

A. Calculations: Submit, for information only, engineering calculations for fabrications required to comply with structural requirements including fabrications accommodating hanging of fluid reels, exhaust reels, diesel shear valves, and hangers associated with support from walls, columns or structure above.

B. Design Modifications: Submit for review proposed variations in details or substitutions in materials required to meet specified performance requirement or to coordinate Work.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Use materials of size and thickness indicated or, if not indicated, as required to produce strength and durability in finished product for use intended.
2. Design and fabricate components to support loads indicated or required to comply with requirements of authorities having jurisdiction over Project.
3. Design modifications:
   a. May be proposed by manufacturer to satisfy performance requirements.
   b. Must conform to design and specified durability and strength.
   c. Must maintain profiles and alignments indicated.

B. Visual Requirements: For metal fabrications exposed to view, use materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness.

C. Interface With Other Systems:
1. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions and directions for installation of anchors, including concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which will be embedded in concrete or masonry construction.
2. Coordinate delivery of such items to Project site.

1.7 QUALITY ASSURANCE

A. Designer/Engineer Qualifications: Design elements required to meet structural requirements, including, but not limited to, metal fabrications accommodating hanging of reels, valves and HVAC equipment, under direct supervision of a Registered Professional Engineer, licensed in Project jurisdiction.

B. Fabricator and Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Welding Standards:
   1. Comply with applicable provisions of AWS D1.1 “Structural Welding Code--Steel,” AWS D1.2 “Structural Welding Code--Aluminum,” and AWS D1.3 “Structural Welding Code--Sheet Steel.”
   2. Welder qualifications: AWS certified for type of welding required.
   3. Finish joints in accordance with National Ornamental & Miscellaneous Metals Association (NOMMA) Guideline 1:
      a. Finish 1: No evidence of a welded joint.
      b. Finish 2: Completely sanded joint, some undercutting and pinholes acceptable.
      c. Finish 3: Partially dressed weld with splatter removed.
      d. Finish 4: Good quality, uniform undressed weld with minimal spatter.

D. Galvanizing:
   1. Coating applicator: Company specializing in hot dip galvanizing after fabrication approved by manufacturer or fabricator.
   2. Hot-dip galvanizing fabrication practices: Conform to requirements of ASTM A123, A143, A384 and A385 unless otherwise specified.

E. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction over Project.

1.8 PROJECT CONDITIONS

A. Field verify dimensions of supporting structure and other adjoining elements before fabrication where possible.

1.9 COORDINATION

A. Coordinate attachment of metal fabrications to metal building system with metal building system manufacturer.

B. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

C. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Metals:
   1. Steel plates, shapes and bars: ASTM A36.
   2. Steel tubing: Cold-formed, ASTM A500, grade selected by fabricator to suit Project conditions.
   3. Steel pipe: ASTM A53 standard weight (Schedule 40) unless another weight is indicated or required by structural loads; type selected by fabricator to suit Project conditions.
   4. Steel bars: ASTM A29, ASTM A108, ASTM A575 or ASTM A576, type and grade selected by fabricator to suit Project conditions.
   5. Steel sheet:
      a. Uncoated, cold-rolled steel sheet: ASTM A1008 either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
      b. Uncoated, hot-rolled steel sheet: ASTM A1011 either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
      c. Galvanized steel sheet: ASTM A653, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
   6. Steel plate for cold-forming: ASTM A283, grade selected by fabricator to suit Project conditions.
   7. Malleable iron castings: ASTM A47, grade selected by fabricator to suit Project conditions.
   8. Gray iron castings: ASTM A48, class selected by fabricator to suit Project conditions.
   9. Brackets, flanges and anchors: Cut or formed metal of same material and finish as supported units, unless otherwise indicated.
   10. Aluminum: Alloy and temper recommended by fabricator.

B. Primers: Use primers compatible with finish paint specified in Division 09 Section PAINTING AND FINISHING.
   1. Ferrous metal - typical painting systems: Universal shop primer; fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79. Use primer with a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Ferrous metal - polyurethane coating system:
      a. Moisture-cure organic zinc-rich primer complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat. Use primer with VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      b. Acceptable products and manufacturers:
         1) Carbozinc 684 by Carboline Company.
         2) Ganicin 2.8 MCZ by Dupont Company.
         3) 90-97 Tneme-Zinc by Tnemec Company, Inc.

C. Galvanizing Repair Paint: High zinc-dust content paint complying with SSPC Paint 20.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mil thickness per coat.

E. Grout: Non-shrink grout; factory-packaged, non-staining, non-corrosive, non-gaseous grout complying with ASTM C1107; specifically recommended by manufacturer for both interior and exterior applications.

F. Concrete Fill: See Division 03 Section CAST-IN-PLACE CONCRETE.

2.2 ACCESSORIES

A. General:
1. Unless otherwise indicated, provide Type 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633, Class Fe/Zn 5, at exterior walls.
2. Provide stainless-steel fasteners for fastening aluminum.
3. Select fasteners for type, grade, and class required.

B. Fasteners and Anchors:
1. Steel bolts, nuts, and washers: Regular hexagon head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
2. Steel bolts, nuts, and washers: ASTM A325 Type 1, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.
3. Stainless-steel bolts and nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.
4. Anchor Bolts: ASTM F1554, Grade 36; hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
5. Lag bolts: ASME B18.2.1.
6. Machine screws: ASME B18.6.3.
7. Wood screws: Flat head, ASMB B18.6.1.
8. Washers:
   a. Plain washers: Round, ASME B18.22.1.
   b. Lock washers: Helical, spring type, ASME B18.21.1.
   c. Provide beveled washers for structural beams and channels, tapered in thickness and smooth.
9. Cast-in-place anchors in concrete:
   a. Anchors capable of sustaining, without failure, load equal to four times load imposed, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.
   b. Threaded or wedge type; galvanized ferrous castings, either ASTM A47 malleable iron or ASTM A27 cast steel. Provide bolts, washers, and shims as required for complete installation, hot-dip galvanized per ASTM A153.
10. Expansion anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, load equal to six times load imposed when installed in unit masonry and four times load imposed when installed in concrete, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.
    a. Anchors in interior locations: Carbon-steel components zinc-plated to comply with ASTM B633, Class Fe/Zn 5.
    b. Anchors in exterior locations: Alloy Group 1 stainless-steel bolts complying with ASTM F593, and nuts complying with ASTM F594.
11. Powder driven anchors:
    a. Type and size indicated or, if not indicated, comply with manufacturer's standards.

b. Use devices and tools which comply with ANSI A10.3.
c. Do not use powder driven anchors as suspension member anchors.

12. Chemical anchors: Adhesive anchors with screen tube and stainless steel threaded rod, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
13. Post-installed anchors: Torque-controlled expansion anchros or chemical anchors.
    a. Material for interior locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM 1941M), Class Fe/Zn 5, unless otherwise indicated.
    b. Material for exterior locations and where stainless steel is indicated: Alloy [Group I (A1)] stainless steel bolts, ASTM F593 (ASTM F738M) and nuts, ASTM F594 (ASTM F836M).
14. Slotted-channel inserts:
    a. Cold-formed, hot-dip galvanized steel box channels (struts) complying with MFMA-4, 1-5/8 inch x 7/8 inches (41 mm x 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temrporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B633, Class FE/Zn 5, as needed for fastening to inserts.

C. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2.3 FABRICATION

A. Assembly:
1. Pre-assemble items in shop to greatest extent possible.
2. Disassemble units as necessary for shipping and handling limitations.
3. Clearly mark units for re-assembly and coordinated installation.

B. Fabricate Work to dimensions indicated or accepted on Shop Drawings.

C. Forming:
1. Form exposed Work true to line and level with accurate angles and surfaces and straight sharp edges.
2. Ease exposed edges to radius of approximately 1/32 inch (0.75 mm) unless otherwise indicated.
3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing Work.
4. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible.

D. Welding:
1. Weld corners and seams continuously, complying with AWS recommendations.
2. At exposed connections, grind exposed welds smooth and flush, fill with automotive body filler, and sand smooth to match and blend with adjoining surfaces.

E. Anchors and Fasteners:
1. Provide for required anchorage, coordinated with supporting structure.

2. Fabricate and space anchoring devices to provide adequate support for intended use.
3. Cut, reinforce, drill and tap metal fabrications as indicated to receive hardware and similar items.
4. Use exposed fasteners of type indicated or, if not indicated, Phillips flathead (counter-sunk) screws or bolts.

F. Galvanized Steel:
1. Fabricate items in accordance with Class I guidelines as described in AGA's Recommended Details for Galvanized Structures.
2. Use fabrication practices for products in accordance with applicable portions of ASTM A143, A384 and A385, except as specified herein. Avoid fabrication techniques which could cause distortion or embrittlement of steel.
3. Consult Architect regarding potential warpage problems or potential handling problems during the galvanizing process which may require modification of design before fabrication proceeds.
4. Remove welding slag and burrs prior to delivery for galvanizing.
5. Provide vent and drain holes and/or lifting lugs to facilitate handling during the galvanizing process that are suitable to Architect and fabricator.
   a. Locate holes so they will not be visible on exposed surfaces. If this is not possible, plug holes with zinc solder after galvanizing and file smooth. Do not fill holes indicated to remain as weep holes.
   b. Remove lifting lugs after galvanizing.
6. After galvanizing, fill holes that were required for the galvanizing process.
7. Remove, by blast cleaning or other methods, surface contaminants and coatings which would not be removable by normal chemical cleaning process in galvanizing operation.

2.4 SHOP FINISHING

A. Galvanizing:
1. Complete shop fabrication prior to application of coating.
2. Remove mill scale and rust, clean and pickle units as required.
3. Apply galvanized coating in accordance with the following:
   a. ASTM A153 for galvanizing iron and steel hardware.
   b. ASTM A123 for galvanizing rolled, pressed and forged steel shapes, plates, bars and strip 1/8 inch (3 mm) thick and heavier.
   c. ASTM A653 for galvanizing steel sheet, G90 (Z275) coating, except for steel sheet in contact with interior pressure preservative treated wood, provide G185 (Z550) coating.
4. Coating weight: Conform with Table 1 of ASTM A123 and ASTM A153, as appropriate.
5. Provide post-galvanizing treatments as recommended by AGA for conditions applicable to Work. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Shop Priming, General:
1. Clean, treat and paint metal fabrications , except galvanized metal, in shop prior to delivery to site.
2. Prepare all surfaces, inside and out, whether exposed or concealed in Work.

C. Shop Priming Ferrous Metal - Typical Painting Systems:

1. Preparation: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications.
    a. Exteriors (SSPC Zone 1B): SSPC-SP6 “Commercial Blast Cleaning.”
    b. Interiors (SSPC Zone 1A): SSPC-SP3 “Power Tool Cleaning.”
2. Priming:
    a. Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA1, “Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel,” for shop painting.
    b. Stripe paint corners, crevices, bolts, welds, and sharp edges.

D. Shop Priming Ferrous Metal - Polyurethane Coating System:
1. Clean by SSPC-SP6 “Commercial Blast Cleaning”.
2. Apply prime coat as soon as possible after cleaning. Provide smooth, uniform dry film thickness of 2.5 to 3.5 mils (.06 to .09 mm). Stripe paint corners, crevices, bolts, welds, and sharp edges.

E. Shop Preparation for Galvanized Metal - Typical Painting Systems: Clean galvanized metal surfaces designated to be field painted in accordance with SSPC-SP1 “Solvent Cleaning”, followed by SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning”.

F. Shop Preparation for Galvanized Metal - Polyurethane Coating System: Clean by SSPC-SP1 “Solvent Cleaning”, followed by SSPC-SP2 “Hand Tool Cleaning” or SSPC-SP3 “Power Tool Cleaning”.

2.5 COMPONENTS

A. Miscellaneous Framing and Supports:
1. Provide miscellaneous steel framing and supports which are not part of structural steel framework, as required to complete Work.
2. Fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection, unless otherwise indicated.
3. Cut, drill and tap units to receive hardware and similar items.
4. Equip units with integrally welded anchors for casting into concrete or building into masonry, where required. Furnish inserts if units must be installed after concrete is placed.
5. Space anchors at 24 inches (600 mm) on center. Provide minimum anchor units of 1-1/4 inch x 1/4 inch x 8 inch (31 mm x 6 mm x 200 mm) steel straps, unless otherwise indicated.
6. Provide welded steel angle frames for roof openings.
7. Where required by details or conditions, and not otherwise indicated, provide welded or bolted structural steel assemblies above suspended ceilings and connect to structure to provide rigid assembly.
8. Finishes:
    a. Exposed exterior items: Galvanized.
    b. Exposed interior items: Prime painted, unless otherwise indicated.
    c. Items concealed in exterior and interior construction: Galvanized.
    d. Items concealed in interior construction: Prime painted, unless otherwise indicated.

B. Steel Lintels:
   1. Furnish loose structural steel lintels for openings in masonry walls as indicated on Drawings.
   2. Size to provide not less than 8 inches (200 mm) bearing on each side, unless otherwise indicated. Fabricate lintels in single lengths over each opening; do not locate end joints in lintels over openings.
   3. Finishes:
      a. Exterior walls: Galvanized.
      b. Interior walls: Prime painted.

C. Steel Trim Including Steel Angle Corner Guards and Edge Angles.
   1. Fabricate units from steel angles, shapes, plates, and bars of profiles and dimensions indicated. Miter corners and use concealed field splices where possible.
   2. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
   3. Finishes:
      a. Interior: Prime painted.
      b. Exterior: Galvanized.

D. Loose Bearing and Leveling Plates:
   1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
   2. Galvanize plates.
   3. Prime plates with zinc-rich primer.

E. Pipe Bollards:
   1. Fabricate from structural steel shapes and plates indicated.
   2. Provide fully welded construction unless otherwise indicated, with base plate sloped to suit floor slope so that bollard is vertical.
   3. Provide steel closure for top of bollard as indicated, for field welding after filling bollard with concrete.
   4. Finish: Prime painted.

F. Wire Mesh Partitions:
   1. Fabric: Minimum 0.1345 inch (3.5 mm) diameter steel wire, 1-1/2 inch (38 mm) diamond mesh, securely clinched to frame members.
   2. Framework: Cold-rolled steel channels, tubes and pipes. Minimum weights and sizes as recommended by partition manufacturer for conditions indicated.
   3. Hardware:
      a. Hinges: 1-1/2 pair butt hinges, welded to door and frame.
      b. Lock:
         1) Mortise type cylinder lock operated by key outside with recessed knob inside.
         2) Furnish lock less cylinders. Provide cylinders keyed to building system as specified in 087100 DOOR HARDWARE.
   4. Finish:
      a. Provide manufacturer's standard shop-applied enamel finish.
      b. Color: To be selected by Architect from manufacturer's full standard color range.
      c. Acceptable product and manufacturer: Equivalent to No. 130A by Acorn Wire and Iron Works, Inc., Chicago, IL.

G. Slotted Channel Framing System: Cold-formed metal channels with continuous slot complying with MFMA-3.
   1. Cold-formed low carbon steel channels complying with ASTM A1008 or A1011, Grade 33; hot-dipped galvanized after fabrication.
      a. Size: 0.1046 inch (2.7 mm) thick; 1-5/8 inch deep x 1-5/8 inch wide (40 mm deep x 40 mm wide) x longest lengths consistent with field conditions for continuous installation.
      b. Fabricate with manufacturer's standard anchors for casting into concrete.
   2. Provide with manufacturer's standard accessories including galvanized spring-nut fasteners, fittings, spacers and other accessories as required for complete installation.
   3. Acceptable products and manufacturer: Equivalent to P1000 Series by Unistrut Corporation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions and final Shop Drawings.
   1. Place and secure cold-formed metal framing components in accordance with AISI and AISC “Specifications”.

B. Cutting, Fitting and Placement:
   1. Cut, drill and fit metal fabrications as required.
   2. Set Work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels.
   3. Provide temporary bracing or anchors in formwork for items which are built into concrete.
   4. Fit exposed connections accurately together to form tight hairline joints.

C. Fastening:
   1. Secure metal fabrications to in-place construction by using threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
   2. Anchor securely as required for intended use, using concealed anchors wherever possible.
   3. Do not use powder driven anchors if safety hazard exists.

D. Welding:
   1. Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welds.
   2. Grind exposed joints smooth and touch-up shop paint coat.
   3. Touch-up welded areas of galvanized members with galvanizing repair paint in accordance with ASTM A780.

E. For framing and supports located above ceilings (for support of components such as ceiling-hung toilet compartments, operable panel partitions, and projection screens), coordinate framing

and supports with locations of ducts and other above-ceiling devices and equipment. Modify framing and supports, and provide supplemental framing and bracing, so as to not interfere with above-ceiling devices and equipment, while providing required support to components supported by framing.

F. Setting Loose Lintels and Shelf Angles: See Division 04 Section UNIT MASONRY.

G. Setting Loose Plates:
1. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
2. Set loose leveling and bearing plates on wedges, or other adjustable devices.
3. After bearing members are positioned and plumbed, tighten anchor bolts.
4. Do not remove wedges or shims, but if protruding, cut off flush with edge of bearing plate before packing with cement grout.
5. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

H. Pipe Bollards:
1. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions, so that bollard is vertical. Slope grout up approximately 1/8 inch (3 mm) toward bollard.
2. Anchor bollards in place with concrete footings. Center, plumb, and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position so that bollard is vertical, until concrete has cured.
3. Fill bollard with concrete as specified in DIVISION 3.
4. Round and smooth exposed concrete at top of bollard.

I. Slotted Channel Framing System: Furnish for installation in Division 03 Section CAST-IN-PLACE CONCRETE.

J. Installing Bearing and Leveling Plates:
1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUST AND CLEAN

A. Touch-Up Painting:
1. Immediately after erection, clean field welds, bolted connections and abraded areas of shop paint.
2. Paint exposed areas with same material used for shop painting, except provide different color.
3. Provide minimum dry film thickness of 2.0 mils (0.05 mm).

B. For Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and repair in accordance with ASTM A780.

END OF SECTION

SECTION 05 5300

METAL GRATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal bar gratings.
2. Expanded-metal gratings.
3. Formed-metal plank gratings.
4. Extruded-aluminum plank gratings.
5. Glass-fiber-reinforced plastic gratings.
6. Metal frames and supports for gratings.

B. Related Sections:

1. Section 051200 "Structural Steel Framing" for structural-steel framing system components.
2. Section 055000 "Metal Fabrications" for miscellaneous structural steel elements.

1.3 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Floors: Uniform load of 250 lbs./sq. ft. or concentrated load of 3000 lbs., whichever produces the greater stress.
2. Vehicular Maintenance and Parking Areas subject to Bus Loads: Uniform load of 250 lbs./sq. ft. or AASHTO HS20-44 concentrated load, whichever produces the greater stress.
3. Limit deflection to L/240 or 1/4 inch, whichever is less.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, sections, details, and attachments to other work.

C. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

B. Welding certificates.

1.6 QUALITY ASSURANCE

A. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual" and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code - Steel."
2. AWS D1.2, "Structural Welding Code - Aluminum."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

B. Steel Bars for Bar Gratings: ASTM A 36 or steel strip, ASTM A 1011 or ASTM A 1018.

C. Wire Rod for Bar Grating Crossbars: ASTM A 510.

D. Expanded-Metal Carbon Steel: ASTM F 1267, Class 1.

E. Expanded-Metal Galvanized Steel: ASTM F 1267, Class 2, Grade A.

2.2 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Shapes: ASTM B 221, alloys as follows:

1. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
2. 6061-T1, for grating crossbars.

C. Aluminum Sheet: ASTM B 209, Alloy 5052-H32.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless steel fasteners for fastening stainless steel.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Plain Washers: Round, ASME B18.22.1.

F. Lock Washers: Helical, spring type, ASME B18.21.1.

G. Post-Installed Anchors: Chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.

B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5 FABRICATION

A. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.

D. Fit exposed connections accurately together to form hairline joints.

E. Welding: Comply with AWS recommendations and the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.

2.6 METAL BAR GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. All American Grating.
3. BarnettBates Corporation.
4. Borden Metal Products (Canada) Limited.
5. Fisher & Ludlow; Division of Harris Steel Limited.
6. Grating Pacific, Inc.
7. Grupo Metelmex, S.A. de C.V.
8. IKG Industries; a division of Harsco Corporation.

9. Marwas Steel Co.; Laurel Steel Products Division.
10. Ohio Gratings, Inc.
11. Seidelhuber Metal Products; Division of Brodhead Steel Products.

B. Welded Steel Grating:

1. Bearing Bar Spacing, Depth, and Thickness: As noted on drawings or as required to comply with structural performance requirements.
2. Traffic Surface: Serrated.
3. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

C. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

1. Bearing Bar Spacing, Depth, and Thickness: As noted on drawings or as required to comply with structural performance requirements.
2. Traffic Surface: Serrated.
3. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.

D. Pressure-Locked, Rectangular Bar Aluminum Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

1. Bearing Bar Spacing, Depth, and Thickness: As noted on drawings or as required to comply with structural performance requirements.
2. Traffic Surface: Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive.
3. Aluminum Finish: Mill finish.

E. Pressure-Locked, Aluminum I-Bar Grating: Fabricated by swaging crossbars between bearing bars.

1. Bearing Bar Spacing, Depth, and Thickness: As noted on drawings or as required to comply with structural performance requirements.
2. Traffic Surface: Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive.
3. Aluminum Finish: Mill finish.

F. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.

1. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
2. Provide no fewer than four saddle clips for each grating section composed of rectangular bearing bars 3/16 inch or less in thickness and spaced 15/16 inch or more o.c., with each clip designed and fabricated to fit over two bearing bars.
3. Provide no fewer than four weld lugs for each grating section composed of rectangular bearing bars 3/16 inch or less in thickness and spaced less than 15/16 inch o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
4. Provide no fewer than four flange blocks for each section of aluminum I-bar grating, with

block designed to fit over lower flange of I-shaped bearing bars.

5. Furnish threaded bolts with nuts and washers for securing grating to supports.
6. Furnish self-drilling fasteners with washers for securing grating to supports.
7. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.

G. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

1. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.

H. Do not notch bearing bars at supports to maintain elevation.

2.7 EXPANDED-METAL GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. All American Grating.
3. Central Expanded Metal, Inc.
4. Fisher & Ludlow; Division of Harris Steel Limited.
5. Grating Pacific, Inc.

B. Provide expanded-metal gratings in material, finish, style, size, thickness, weight, and type indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads.

1. Material: Steel or Aluminum.
2. Steel Finish: Galvanized.
3. Aluminum Finish: Mill finish, as fabricated.

C. Fabricate cutouts in grating sections for penetrations of sizes and at locations indicated. Cut openings neatly and accurately to size. Edge-band openings with bars having a thickness not less than overall grating thickness at contact points.

D. Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than 1/8 inch thick to the cut ends. Divide panels into sections only to extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.

2.8 FORMED-METAL PLANK GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. Fisher & Ludlow; Division of Harris Steel Limited.
3. Grating Pacific, Inc.

4. GS Metals Corp.
5. IKG Industries; a division of Harsco Corporation.
6. Morton Manufacturing Company.
7. Unistrut.

B. C-shaped channels rolled from heavy sheet metal of thickness indicated, and punched in serrated diamond shape to produce raised slip-resistant surface and drainage holes.

1. Channel Width and Depth: As required to comply with structural performance requirements.

C. Fabricate cutouts in grating sections for penetrations of sizes and at locations indicated. Cut openings neatly and accurately to size. Edge-band openings with metal sheet or bars having a thickness not less than grating material.

D. Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than 1/8 inch thick to the cut ends. Divide panels into sections only to extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.

2.9 EXTRUDED-ALUMINUM PLANK GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alabama Metal Industries Corporation; a Gibraltar Industries company.
2. IKG Industries; a division of Harsco Corporation.
3. Ohio Gratings, Inc.
4. Seidelhuber Metal Products; Division of Brodhead Steel Products.

B. Provide extruded-aluminum plank gratings in type, size, and finish indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads.

1. Type: Extruded-aluminum planks approximately 6 inches wide with multiple flanges approximately 1.2 inches o.c., acting as bearing bars connected by a web that serves as a walking surface. Top surface has raised ribs to increase slip resistance.
2. Depth: As required to comply with structural performance requirements.
3. Perforations: None.
4. Finish: Mill finish, as fabricated.

C. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

2.10 GLASS-FIBER-REINFORCED PLASTIC GRATINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Grating, LLC.
2. Creative Pultrusions, Inc.

3. Enduro Systems Inc.; Composite Products Division.
4. Fibergrate Composite Structures Inc.
5. Fisher & Ludlow; Division of Harris Steel Limited.
6. Grating Pacific, Inc.
7. Seasafe, Inc.; a Gibraltar Industries company.
8. Strongwell Corporation.

B. Molded or Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings made by placing glass-fiber strands that have been saturated with thermosetting plastic resin in molds in alternating directions to form interlocking bars without voids and with a high resin content.

1. Configuration: As required to comply with structural performance requirements.
2. Resin: Polyester or Vinylester.

a. Flame-Spread Index: 25 or less when tested according to ASTM E 84.
b. U.S.D.A. Acceptance: Accepted for food-processing applications.

3. Color: Manufacturer's standard.
4. Traffic Surface: Applied abrasive finish.

C. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

2.11 GRATING FRAMES AND SUPPORTS

A. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, fabricate from same basic metal as gratings.
2. Equip units indicated to be cast into concrete with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches wide by 1/4 inch thick by 8 inches long.

B. Frames and Supports for Glass-Fiber-Reinforced Plastic Gratings: Fabricate from glass-fiber-reinforced plastic shapes of sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.

1. Unless otherwise indicated, use shapes made from same resin as gratings.
2. Equip units indicated to be cast into concrete or built into masonry with integral anchors.

2.12 ALUMINUM FINISHES

A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

2.13 STEEL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish gratings, frames, and supports after assembly.

C. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete.

D. Fit exposed connections accurately together to form hairline joints.

1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

E. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING METAL BAR GRATINGS

A. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.

B. Attach removable units to supporting members with type and size of fasteners indicated or as recommended by grating manufacturer for type of installation conditions shown.

C. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

3.3 INSTALLING EXPANDED-METAL GRATINGS

A. General: Comply with manufacturer's written instructions for installing gratings.

B. Place units with straight edge of bond up and with long direction of diamond-shaped openings parallel to direction of span.

C. Attach removable units to supporting members by bolting at 6-inch intervals.

D. Attach nonremovable units to supporting members by welding unless otherwise indicated. Space welds at 6-inch intervals.

E. Attach aluminum units to steel supporting members by bolting at 6-inch intervals.

F. Butt edges parallel to long direction of diamond-shaped openings and weld at every second bond point. Place individual grating sections so diamonds of one piece are aligned with those of adjacent sections.

3.4 INSTALLING METAL PLANK GRATINGS

A. General: Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard anchor clips and hold-down devices for bolted connections.

B. Attach removable units to supporting members by bolting at every point of contact.

C. Attach nonremovable units to supporting members by welding unless otherwise indicated. Comply with manufacturer's written instructions for size and spacing of welds.

D. Attach aluminum units to steel supporting members by bolting at side channels at every point of contact and by bolting intermediate planks at each end on alternate sides. Bolt adjacent planks together at midspan.

3.5 INSTALLING GLASS-FIBER-REINFORCED PLASTIC GRATINGS

A. Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard stainless-steel anchor clips and hold-down devices for bolted connections.

3.6 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

DIVISION 06
WOOD AND PLASTIC

SECTION 06 0573

WOOD TREATMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Pressure preservative wood treatment.
   2. Fire retardant wood treatment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 06 Section ROUGH CARPENTRY for blocking and grounds.

B. See Division 06 Section ARCHITECTURAL WOODWORK for cabinetry and millwork.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Pressure preservative treatment: Submit data for wood-preservative treatment from chemical treatment manufacturer. Indicate type of preservative used, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
   2. Fire retardant treatment: Submit data for fire-retardant treatment from chemical treatment manufacturer. Include physical properties of treated materials, both before and after exposure to elevated temperatures when tested according to ASTM D5516 and ASTM D5664.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Pressure preservative treatment: Provide certification by treating plant that treated materials comply with specified requirements. For water based preservative treated materials, certify that moisture content at time of shipment from treating plant was reduced to levels specified.
   2. Fire retardant treatment: Provide certification by treating plant that treated materials comply with specified requirements.

1.5 SYSTEM REQUIREMENTS

A. Pressure Preservative Treated Wood: Provide pressure preservative treated wood as follows.
   1. Wood in conjunction with roofing, for blocking and nailers at roof curbs, parapet coping, cants, and support for metal flashing.
   2. Wood sleepers and sills in contact with concrete or masonry slabs that are in direct contact with earth.
   3. Other locations indicated on Drawings.

B. Fire Resistance Requirements:
   1. Fire retardant treat interior wood framing, blocking, nailers, furring, and grounds, and those items indicated or specified as “Fire Retardant Treated Wood”.
   2. Treated material shall not exceed the following values in accordance with ASTM E84:
      a. Flame spread: 25.
      b. Smoke developed: 200.

PART 2 - PRODUCTS

2.1 SHOP TREATMENT

A. Pressure Preservative Treatment:
   1. General:
      a. Comply with applicable requirements of AWPA Standard U1.
      b. Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
   2. Preservative chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
   3. Use categories:
      a. AWPA U1-UC1: Interior, dry applications, such as blocking in interior partitions and in millwork.
      b. AWPA U1-UC2: Interior, potentially damp applications, such as sill plates
   4. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
   5. After treatment, kiln-dry lumber to maximum moisture content of 19 percent for lumber and 15 percent for plywood, and stamp “dry”. Do not use material that is warped or does not comply with requirements for untreated material.
   6. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber after drying and discard damaged or defective pieces.

B. Fire Retardant Treatment:
   1. General:
      a. Comply with applicable requirements of AWPA C20 for lumber and AWPA C27 for plywood, and meeting Underwriter's Laboratories FR-S rating.
      b. Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.
         1) Finish carpentry and architectural woodwork: Identify treated items with separable paper classification marking. Stamped-on or inked markings are not acceptable.
   2. Products:
      a. Provide low-hygroscopic treatment chemicals, free of halogens, sulfates, ammonium phosphate and formaldehyde.
      b. Use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
         1) Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under

elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.

2) No form of degradation occurs due to acid hydrolysis or other causes related to treatment.

3) Contact with treated wood does not promote corrosion of metal fasteners.

3. Treatment and fabrication requirements:

a. Fabricate wood before treatment wherever possible, to minimize cutting and jointing required after treatment.

1) Cutting to length, joining cuts and light sanding are permitted after treatment. Do not rip wood after treatment.

2) Species meeting requirements of UL may be milled after treatment, within limits set for wood removal. Species not meeting UL requirements shall be milled before treatment.

b. Implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

c. After fire retardant treatment, kiln dry to moisture content required for non-fire retardant treated woodwork materials.

d. Discard treated material that does not comply with requirements of referenced standards. Do not use twisted, warped, bowed, discolored, or otherwise damaged or defective material.

4. Acceptable products and manufacturers:

a. D-Blaze by Chemical Specialties, Inc.

b. Dricon by Arch [Chemicals] Wood Protection, Inc.

c. Pyro-Guard by Hoover Treated Wood Products, Inc.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See other sections for installation of wood.

B. Before installation, apply field treatment complying with AWPA M4 to cut surfaces of treated lumber and plywood.

END OF SECTION

SECTION 06 1000

ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Lumber.
   2. Softwood plywood.
   3. Rough hardware.
   4. Blocking, nailers, furring and grounds.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 06 Section WOOD TREATMENT for pressure preservative and fire retardant treatment methods.

B. See Division 06 Section SHEATHING for plywood sheathing.

C. See Division 06 Section ARCHITECTURAL WOODWORK for cabinetry and millwork.

D. See Division 09 Section GYPSUM BOARD for coordination of blocking installation with partition construction.

1.3 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Grading:
      a. Furnish each piece of lumber factory-marked with official grade stamp of inspection agency, identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
      b. For lumber which will be exposed to view in completed Work, furnish grade stamps applied to back or ends of each piece, or omit grade stamps entirely and submit certificates of grade compliance issued by inspection agency.
   2. Sizes: Provide finish sizes in accordance with U.S. Product Standard PS 20, “American Softwood Lumber Standard”; dressed lumber, S4S.

B. Fire Resistance Requirements: See Division 06 Section WOOD TREATMENT.

C. Interface with Other Systems:
   1. Coordinate with Work of other trades affected by Work of this Section.
   2. Provide items, such as anchors or supports, in a timely manner so as not to delay job progress.
   3. Correlate location of furring, nailers, blocking, grounds and similar supports to allow attachment of other Work.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable requirements of authorities having jurisdiction over Work.

B. Reference Standards: Except as modified by governing code, comply with requirements of specified lumber inspection bureau or association.

1.5 DELIVERY, STORAGE AND HANDLING

A. Storage:
1. Keep rough carpentry materials dry until finish is applied and building is enclosed.
2. Provide air circulation in stacks of lumber and plywood. For pressure preservative treated wood, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Lumber, General:
1. Type: Sound, thoroughly seasoned, well manufactured and free from warp that cannot be corrected in process of bridging or nailing.
2. Use same species for members in any one assembly.
3. Seasoning: Season lumber two inches (50 mm) and less in thickness to moisture content of 19 percent or less, with indication of “S-Dry” on grade stamp.
4. Grades for framing materials: Conform to grading rules of manufacturer's association for specie of wood being used.

B. Softwood Lumber for Concealed Locations:
1. Light framing (nominal sizes 2 inches to 4 inches thick and 2 inches to 4 inches wide) (nominal sizes 50 mm to 100 mm thick and 50 mm to 100 mm wide):
   a. Douglas FirLarch or HemFir; WWPA Construction or Standard.
2. Furring, cant strips, blocking, nailers, plates, grounds: Same material as light framing except utility grade is acceptable.

C. Plywood:
1. Provide panels bearing APA grade-trademark.
2. Panels for general interior utility use not otherwise specified: APA EXT B-B where both sides are exposed; APA EXT B-C where one side is exposed.
3. Equipment mounting panels: APA C-D Plugged, Exposure 1; fire- retardant treated; 3/4 inch (19 mm) thick, unless otherwise indicated.
4. Marine grade plywood: Provide APA Marine grade plywood at locations indicated.
5. For fire-retardant treated APA Rated plywood, apply allowable stress reduction factors as recommended by APA, and manufacturer and applicator of fire-retardant treatment.

2.2 ACCESSORIES

A. Rough Hardware:
1. General:

a. Provide fasteners of type, material, finish and quantity required for proper installation of carpentry, millwork and other specified items; and where necessary to coordinate, secure and complete Work.
b. Provide in sizes to rigidly secure and support members in place.
c. Where Work to be fastened is exposed to weather, high moisture conditions, in ground contact, or in contact with concrete or masonry, provide fasteners galvanized in accordance with ASTM A153, or of Type 304 stainless steel.
1) For fasteners in contact with interior pressure preservative treated wood, provide (G185) (Z550) galvanized coating, or Type 304 stainless steel.
2) For fasteners in contact with exterior pressure preservative treated wood, provide Type 304 stainless steel.

2. Nails, wire, brads, and staples: FS FF-N-105.
3. Power-driven fasteners: CABO NER-272.
4. Wood screws: ASME B18.6.1.
5. Lag bolts: ASME B18.2.1.
6. Bolts, nuts and washers:
a. Steel bolts: ASTM A307, Grade A.
b. Nuts: ASTM A563 hex nuts and flat washers.

B. Framing Anchors:
1. Provide framing anchors of types and sizes as indicated.
2. Material and finish:
a. For framing anchors in contact with wood that is not pressure preservative treated, fabricate from steel sheet, hot-dip galvanized per ASTM A653, G90 (Z275) coating.
b. For framing anchors in contact with interior pressure preservative treated wood, except, fabricate from steel sheet, hot-dip galvanized per ASTM A653, G185 (Z550) coating.

2.3 SHOP TREATMENT

A. See Division 06 Section WOOD TREATMENT.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Installing Rough Carpentry:
1. Lay out Work carefully.
2. Cut material to fit; level, plumb and brace to hold wood in proper position; drive nails and spikes home; and pull bolt nuts tight with heads and washers in close contact with Work.
3. Avoid shims and wedges. Do not shim framing components.
4. Fasten Work securely in place.
5. Frame openings and provide blocking for Work of other trades.

6. Erection tolerances: If framing members receive finish surface, align finish subsurface to vary not more than 1/8 inch (3 mm) from plane of surfaces of adjacent furring and framing members.
7. Blocking:
    a. Install wood blocking, nailers and furring in partitions, located as required for handrails, shower seats, urinal screens, grab bars, wall-hung cabinetry and other wall-hung items, whether or not such blocking, nailers and furring are indicated on Drawings.
    b. Coordinate with Division 09 Section GYPSUM BOARD.

B. Sorting:
1. Sort framing material to suit placement so that permitted defects will have least detrimental effect on stability of Work.
2. Avoid large or unsound knots at connections.
3. Use straight material at corners.
4. Set horizontal and sloped members with crown up.

C. Installing Plywood:
1. Conform to recommendations of APA.
2. Equipment mounting panels:
    a. Install panels so that label for fire-retardant-treatment is visible
    b. Provide marine-grade plywood equipment mounting panels on all walls in telephone rooms, data rooms, and electrical rooms, from 6 inches above finished floor to above finished floor.

END OF SECTION

SECTION 06 1600

SHEATHING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Gypsum wall and roof sheathing.
   2. Plywood wall sheathing.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section COLD-FORMED METAL FRAMING for stud framing for sheathing.

B. See Division 06 Section ROUGH CARPENTRY for plywood backing panels and substrates.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for sheathing, weather-resistant barrier, and fasteners.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, or other causes.

B. Stack sheathing flat on leveled supports off the ground, under cover, and fully protected from weather, with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings

1.5 PROJECT CONDITIONS

A. Do not leave gypsum sheathing exposed to weather for more than 180 days.

PART 2 - PRODUCTS

2.1 GYPSUM SHEATHING

A. Gypsum Wall and Roof Sheathing: Provide one of the following.
   1. Glass-mat gypsum sheathing:
      a. Silicone-treated gypsum core surfaced with inorganic glass fiber mats and moisture- resistant surface coating, conforming to ASTM C1177; Type X fire-resistant type.
      b. Thickness: 5/8 inch (16 mm).
      c. Acceptable product and manufacturers; wall sheathing:

1) GlasRoc by CertainTeed.
2) DensGlass by G-P Gypsum Products.
3) Gold Bond e^2XP Sheathing by National Gypsum Co.
4) Securock by United States Gypsum Co.

d. Acceptable products and manufacturers; roof sheathing:
1) GlasRoc by CertainTeed.
2) DensDeck by G-P Gypsum Products.
3) Gold Bond e^2XP Sheathing by National Gypsum Co.
4) Securock by United States Gypsum Co.

2.2 PLYWOOD SHEATHING

A. Plywood Wall Sheathing:
1. Either DOC PS 1 or DOC PS 2. Factory mark panels to indicate compliance with applicable standard.
2. Exterior or Exposure 1 sheathing; fire-retardant treated.
3. Span rating: Not less than 16/0.
4. Nominal thickness: 1 inch (25 mm).

2.3 ACCESSORIES

A. Fasteners for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, ASTM C954, in length recommended by sheathing manufacturer for thickness of sheathing, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

B. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.

C. Miscellaneous Accessories: Provide as required for complete installations.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sheathing Joint and Penetration Treatment Materials for Glass-Mat Gypsum Sheathing Board:
1. Sealant: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing, and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
2. Sheathing tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:
   1. NES NER-272 for power-driven fasteners.
   2. Table 2304.9.1, “Fastening Schedule,” in ICC's “International Building Code.”

D. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections.

E. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

F. See Division 05 Section COLD-FORMED METAL FRAMING for metal framing and support installation.

3.3 SHEATHING INSTALLATION

A. Gypsum Sheathing:
   1. Install sheathing in accordance with GA-253 and manufacturer's recommendations.
      a. Fasten gypsum sheathing to cold-formed metal framing with screws.
      b. Install boards with a 3/8 inch (10 mm) gap where non-load-bearing construction abuts structural elements.
      c. Install boards with a 1/4 inch (6 mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
   2. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
   3. Vertical installation:
      a. Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
      b. Space fasteners approximately 8 inches (200 mm) o.c. and set back a minimum of 3/8 inch (10 mm) from edges and ends of boards.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

A. Gypsum Sheathing;
   1. Seal sheathing joints according to sheathing manufacturer's written instructions.
   2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION

SECTION 06 4000

ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
1. Standing and running trim with for field-painted finish, including bases, rails, crowns, casings and sills.
2. Flush wood paneling and wainscot
3. Cabinets with plastic laminate finish and related hardware.
4. Counter and vanity tops of plastic laminate material.
5. Counter and vanity tops of solid surfacing material.
6. Closet and utility shelving.
7. Framing, Blocking and furring in conjunction with above.
8. Finishing and installation in conjunction with above.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 06 Section ROUGH CARPENTRY for blocking, nailers and furring in partitions.

B. See Division 07 Section JOINT SEALANTS for sealants used at countertops.

C. See Division 08 Section FLUSH WOOD DOORS for flush wood doors .

D. See Division 09 Section PAINTING AND COATING for field applied painting systems.

E. See DIVISION 26 for electrical connection requirements.

1.3 ACTION SUBMITTALS

A. Product Data:
1. Submit manufacturer's specifications and installation instructions for proprietary items.
2. Include catalog cuts for cabinet hardware.

B. Shop Drawings:
1. Submit Shop Drawings of woodwork showing location of each item, dimensioned plans and elevations, large scale details, joints, sections and connections to adjacent Work.
2. Include details of framing, blocking and furring and coordination for interface Work at substrates.
3. Include hardware schedule for cabinet hardware.
4. Include door schedule showing locations, configuration, details, elevations, conditions at openings**,** hardware locations, mounting details and anchorage.
5. Shop Drawings will not be reviewed until specified certificates have been received.

C. Samples:

1. Flitches: Prior to submittal of finished samples, submit full size, full length flitches for each required veneer, showing full range of graining pattern and color for each veneer from each log.
    a. For burl veneers, submit sample of typical patching and plugging expected in final Work. Plug cuts shall follow approximate silhouette or shape of each knot or imperfection removed; “football” or round plug cuts will not be allowed. No natural knots will be allowed to remain in any finished Work.
2. Lumber and panel products for transparent finish: For each species and cut; finished one face and one edge.
3. Plastic laminate: Prior to submittal of finished samples, submit manufacturer's full range of standard color and texture samples for selection by Architect.
4. Solid surfacing material: Submit minimum manufacturer's full range of standard color and texture samples for selection by Architect.
5. Plastic laminate finished samples:
6. Cabinet hardware: Samples for each required finish.
7. Samples will not be reviewed until specified certificates have been received.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
1. Prior to submittal of Shop drawings and Samples, submit woodwork firm certification that Work complies with specified requirements including AWI quality grades.
2. Prior to submittal of Shop drawings and Samples, submit evidence that woodwork firm is licensed under AWI Quality Certification Program.

B. Qualification Data: Submit woodwork manufacturer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Warranty: Submit signed and dated warranty.

1.6 DEFINITIONS

A. Exposed Surfaces: Surfaces visible when doors and drawers are closed; cabinets and shelving are open-type or behind clear glass doors; bottoms of casework more than 42 inches (1050 mm) above finished floor; tops of casework less than 78 inches (1950 mm) above finished floor, or are visible from upper floor or staircase; front edges of cabinet body members are visible or seen through a gap of greater than 1/8 inch (3 mm) with doors and drawers closed.

B. Semi-Exposed Surfaces: Surfaces that become visible when drawers and doors are opened; bottoms of cabinets between 30 inches (750 mm) and up to 42 inches (1050 mm) above finished floor; front edges of shelving behind doors.

C. Concealed Surfaces: Surfaces not visible after installation; bottoms of cabinets less than 30 inches (750 mm) above finished floor; tops of cabinets 78 inches (1950 mm) or more above finished floor and not visible from an upper level.

1.7 SYSTEM REQUIREMENTS

A. Fire Resistance Requirements:
   1. Woodwork: Treat those items required to be treated by authorities having jurisdiction over Work, and those items indicated as “Fire Retardant Treated Wood”.

B. Interface with Other Systems:
   1. Coordinate Work with that of other trades affected by this installation. Give particular attention to timely providing of wood blocking and furring so as not to delay job progress.
   2. Coordinate with electrical, plumbing and other fixtures mounted within, or adjacent to woodwork and requiring access. Provide openings as required using manufacturer's templates and field measurements to verify actual installed locations and dimensions.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications:
   1. Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
   2. Shop is a certified participant in AWI's Quality Certification Program.

B. Reference Standards: Unless otherwise indicated, comply with “Architectural Woodwork Standards”, a joint publication of AWI, Woodwork Institute (WI) and Architectural Woodwork Manufacturers Association of Canada (AWMAC), for grades of architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver woodwork to building after concrete, masonry and other Work involving wet materials have been completed for at least 10 days, when areas are ready to receive Work, and only after temperature has been stabilized in installation areas at approximate level which will prevail in building when occupied.

B. Protect woodwork against damage during handling, transit and storage.
   1. Provide extra protection for vulnerable corners and edges.
   2. Ship panels face-to-face with protection between items.

C. Store in dry, clean, well ventilated place, protected from dampness, moisture and weather.

D. Stack in accordance with manufacturer's instructions.

E. Do not drag units across each other or across other surfaces.

1.11 PROJECT CONDITIONS

A. Verify dimensions before proceeding and obtain measurements at job site for Work required to be accurately fitted to other construction.
   1. Measurements shall be accurate so that finished Work is precisely assembled and fitted.
   2. Verify locations of concealed blocking, nailers and furring that support woodwork, before partitions are enclosed.
   3. Record measurements on final Shop Drawings.

B. Remedy unsatisfactory tolerances in adjoining Work.

C. Proceed with woodwork only after substrate construction and penetrating Work have been completed.

D. Environmental Requirements:
   1. Obtain temperature and humidity requirements for woodwork installation and storage areas from woodwork manufacturer.
   2. Do not install woodwork until required temperature and relative humidity have been stabilized and will be maintained in installation areas.
   3. Maintain temperature and humidity in installation area as required to maintain moisture content of installed woodwork within 1.0 percent tolerance of optimum moisture content, from date of installation through remainder of construction period.

1.12 WARRANTY

A. Woodwork: Provide two year warranty agreeing to repair or replace Work which is not in conformance with requirements of Contract Documents or Work that becomes inoperable or objectionable in appearance.

PART 2 - PRODUCTS

2.1 SOLID LUMBER MATERIALS

A. Blocking and Furring: No. 1 Common; Douglas fir or Southern pine.

2.2 PANEL MATERIALS

A. General:
   1. Grade: Premium.
   2. Provide thicknesses as indicated; if not indicated, provide minimum thicknesses required by AWI for Premium Grade Work.

B. Panel Core Material:
   1. Core material for use under plastic laminate: Comply with ANSI A208.1.
      a. Provide non-urea formaldehyde-bonded particleboard, 45 pcf (720 kg/cu. m) density. Provide phenol formaldehyde-bonded particleboard, Type M-2, 45 pcf (720 kg/cu. m) density, for tops in which sinks occur.
      b. Provide particleboard core for cabinet doors and for adjustable shelves.
   2. Core material for use under wood veneer:

a. Exterior grade, medium density fiberboard (MDF), manufactured with formaldehyde-free resins; minimum 45 pcf (720 kg/cu. m) density; manufactured from 100% recovered and recycled wood fiber content, and containing no added formaldehyde.
b. Acceptable products and manufacturers:
1) Vesta FR MDF by Flakeboard.
2) Purekor Platinum MDF by Panel Source, division of McKillican, Inc.

C. Engineered Reclaimed Wood Paneling:
1. Fire Resistance Classification: Class C.
2. Panel Thickness: 3/4 inch
3. Edges: Squared
4. Color: Leather
5. Basis-of-Design Product: Kirei Windfall, by Kirei USA

D. anel Facing Material - Plastic Laminate Overlay:
1. Description: High pressure laminates, complying with NEMA LD3. Provide the following grades:
a. Exposed horizontal surfaces: HGS, nominal 0.048 inch (1.2 mm) thick.
b. Exposed vertical surfaces: VGS, nominal 0.028 inch (.7 mm) thick.
c. Semi-exposed surfaces - one of the following:
1) CLS, nominal 0.020 inch (.5 mm) thick.
2) Melamine-faced particleboard: Thermoset decorative overlay (melamine) complying with ALA 1992, over medium density particleboard complying with ANSI A208.1, Grade M-2.
d. Concealed surfaces: BKL, nominal 0.020 inch (.5 mm) thick.
e. Radiused surfaces: HGP, nominal 0.039 inch (1 mm) thick.
f. Balancing sheet: BKL, nominal 0.020 inch (.5 mm) thick.
2. Finish: Matte.
3. Color: 5342-58 Earth.
4. Adhesive: Clear drying type recommended by laminate manufacturer.
5. Basis of Design: Formica Corp.
a. Equivalent acceptable manufacturers:
1) Abet Laminiti.
2) Nevamar Corp.
3) Wilsonart International.

E. Solid Surfacing Material:
1. Description: Homogenous, mineral-filled acrylic and polymer resin, complying with NEMA LD3 and with the following physical properties:
a. Tensile strength: Minimum 3900 psi (26.9 MPa), when tested in accordance with ASTM D638.
b. Hardness: Minimum 56 Barcol, when tested in accordance with ASTM D2583.
c. Water absorption: Maximum 0.04% for 3/4 inch (19 mm) thickness, when tested in accordance with ASTM D570.
2. Colors and finishes:
a. SS-1: Sorrel
b. SS-2: Pompeii Red
c. SS-3: Tumbleweed
3. Provide units with integral sinks where indicated.

4. Thickness: 3/4 inch (19 mm), unless otherwise indicated.
5. Adhesive: Type as recommended by solid surfacing material manufacturer.
6. Basis of Design: Corian by DuPont Co.
   a. Equivalent acceptable products and manufacturers:
      1) Surell by Formica Corp.
      2) Fountainhead by Nevamar Corp.

F. Extruded Aluminum Trim:
   1. Extruded aluminum alloy 6063-T5.
      a. Provide profiles as indicated, for installation with wood panels.
      b. Punch fins with staggered holes for screw attachment.
   2. Finish: Factory-applied finish consisting of chemical conversion coating followed by manufacturer's standard baked-on corrosion-resistant primer; compatible with specified joint compound and finishes.
   3. Profiles and dimensions:
      a. Panel perimeter trim:
         1) Dimensions: 3/4 inch wide x 3/4 inch deep.
         2) Acceptable product and manufacturer: Equivalent to “F” Reveal Molding by Fry Reglet Corp.
      b. Panel corner trim:
         1) Dimensions: 3/4 inch wide x 7/8 inch deep.
         2) Acceptable product and manufacturer: Equivalent to “X” Corner Molding by Fry Reglet Corp.

2.3 CABINET HARDWARE

A. General: Hardware shall comply with ANSI/BHMA A156.9.

A. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.

B. Wire Pulls (Plastic Laminate Cabinets): Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

C. Catches: Magnetic catches, BHMA A156.9, B03141.

D. Adjustable Shelf Standards and Supports:
   1. Cabinets: BHMA 156.9, B04071, with shelf rests B04081.
   2. Closet and Utility Shelving: BHMA A156.9, B04102, with shelf brackets B04112.

E. Drawer Slides: BHMA A156.9, B05091.
   1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel or epoxy-coated steel with polymer rollers.
   2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
   3. Box Drawer Slides: Grade 1; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
   4. File Drawer Slides: Grade 1HD-100; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

5. Pencil Drawer Slides: Grade 2; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

F. Door Locks: BHMA A156.11, E07121.

G. Drawer Locks: BHMA A156.11, E07041.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Chromium Plated (Plastic Laminate Cabinets): BHMA 626 for brass or bronze base; BHMA 652 for steel base.

I. Miscellaneous Hardware: Provide other required hardware as indicated and as required for complete and proper operation and installation of units.

2.4 FABRICATION

A. General:
   1. Comply with referenced AWI standards.
   2. Provide details and profiles indicated.
   3. Fabricate units rigid, neat, free from defects, warp or buckle in accordance with final Shop Drawings.
   4. Provide factory cutouts for openings in units as required to receive associated Work.
   5. Where possible, factory glaze units indicated to receive glass; glazing system shall be as recommended by manufacturer, suitable for condition and location of installation.
   6. Premachine units at factory to receive hardware using hardware manufacturer's templates.
   7. Assemble units at the factory and disassemble only as required for shipping to the site. Accurately mark units for assembly at site.

B. Standing and Running Trim:
   1. Premium Grade.
   2. Fabricate from solid stock material for field-painted finish as indicated.
   3. Groove or kerf backs of flat trim. Do not let grooves and kerfs show on exposed ends of finished Work.

C. Cabinets:
   1. Premium Grade.
   2. Fabricate from solid stock material with opaque finish and panel material with veneer with plastic laminate finish as indicated. Apply edge sheets prior to applying face sheets to doors.
   3. Provide dust panels of 1/4 inch (6 mm) thick plywood or tempered hardboard above compartments and drawers, except where located directly under tops.
   4. Fabricate semi-exposed surfaces to match exposed surfaces.
   5. Miterfold corners for drawer fabrication are not acceptable.
   6. Prepare units for hardware, and install at factory where practical.

D. Countertops and Vanity Tops:
   1. Premium Grade.
   2. Fabricate from panel material with plastic laminate finish, complete with side and back splashes as indicated, except where solid surfacing material units are indicated.
   3. Solid surfacing tops:

a. Form joints between components using manufacturer's standard joint adhesive; without conspicuous joints. Reinforce with 2 inch wide strip of solid surfacing material.
b. Provide factory cutouts for fixtures and fittings as indicated on Drawings.
c. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges.

E. Paneling:
1. Premium Grade.
2. Fabricate from solid stock material for transparent finish and fire-retardant-treated panel material with veneer for transparent finish.

F. Closet and Utility Shelving:
1. Grade: Custom.
2. Shelf Material: ¾ inch (19mm) medium density fiberboard or particleboard with Grade VGS plastic laminate cladding and 3mm PVC edge banding in matching color.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates and adjoining construction, and conditions under which Work will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Blocking and Furring:
1. Provide surface-mounted wood blocking, nailers, furring and grounds on partitions, located as required for wall-hung cabinetry and other wall-hung items, whether or not such blocking and similar items are indicated on Drawings.
2. See Division 06 Section ROUGH CARPENTRY for installation of blocking and furring within partitions, ie. below gypsum board.
3. Coordinate with Division 09 Section GYPSUM BOARD.

3.3 INSTALLATION

A. General:
1. Premium Grade.
2. Install in accordance with final Shop Drawings and manufacturer's instructions.
3. Install Work plumb, level, true, and straight with no distortions.
a. Shim using concealed shims.
b. Install to tolerance of 1/8 inch in 10 feet (3 mm in 3 m) for plumb and level.
4. Assemble and install Work without machine and tool marks.
5. Neatly fit and scribe Work to adjacent surfaces.

B. Standing and Running Trim:
1. Prime cut edges and ends of exterior standing and running trim, prior to installation.
2. Provide concealed blocking anchored securely to substrates.
3. Install in single lengths without splicing wherever possible, level, plumb and square.
4. Scarf running joints. Stagger joints in adjacent and related members.

5. Cope at returns and internal angles and miter at external angles.
6. Blind nail with fine finishing nails. Set nails for putty stopping.
7. Draw trim tight against finished surface.
8. Coordinate with mechanical, plumbing and electrical requirements to provide openings for diffusers, sprinkler heads, receptacles, switches and fixtures.
9. Coordinate installation of wood handrails with installation of metal railings.

C. Paneling:
1. Anchor paneling to supporting substrate with concealed panel-hanger clips. Direct attachment to substrates is not acceptable. Do not use face fastening.
2. Install flush paneling with no more than 1/16 inch in 96 inch (1.5 mm in 2400 mm) vertical cup or bow and 1/8 inch in 96 inch (3 mm in 2400 mm) horizontal variation from a true plane.

D. Cabinets and Miscellaneous Ornamental Items:
1. Install with concealed fasteners, plumb and level.
2. Securely attach to supporting substrates and blocking and furring.
3. Coordinate with electrical requirements to provide openings at receptacles and switches.
4. Adjust doors and drawers to center in openings, and to equalize width of gaps between adjoining doors and drawers.
5. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish. For fastening into wood blocking, use wood screws at least 3 inches long.

E. Countertops:
1. Install countertops straight, level and plumb.
2. Provide concealed blocking and anchor securely to walls.
3. Coordinate with electrical and plumbing requirements to provide openings at receptacles, switches and plumbing fixtures.
4. Solid surfacing material countertops:
   a. Comply with manufacturer's instructions and recommendations.
   b. Where required, bond solid surfacing material units together using manufacturer's recommend sealant or adhesive.
   c. Anchor units securely to supporting framing.
   d. Ease exposed edges and sand smooth.

3.4 ADJUSTING AND REPAIR

A. Before completion of Work, adjust hardware until components operate properly.

B. Replace defective, damaged, missing or stolen hardware.

C. Touch-up marred finishes, including shop primers to match adjacent surfaces.

D. Remove and replace units which are warped, bowed, not properly fitted or finished or otherwise damaged.

3.5 CLEANING AND PROTECTION

A. Clean Work upon completion.

B. Protect units during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

DIVISION 07
THERMAL AND MOISTURE PROTECTION

SECTION 07 1113

BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Bituminous dampproofing for the following locations:
      a. CMU backup.
      b. Other locations indicated on Drawings.
   2. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 07 Section COLD FLUID-APPLIED WATERPROOFING for exterior wall waterproofing system.

B. See Division 07 Section CRYSTALLINE WATERPROOFING for waterproofing at elevator pits.

C. See Division 07 Section THERMAL INSULATION for foundation insulation.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for materials.

1.4 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate dampproofing Work with Work of other trades.
   2. Provide materials and accessories in timely manner so as not to delay Work.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

1.6 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver materials in manufacturer's unopened containers or bundles, fully identified with brand, type, grade, class and all other qualifying information.

C. Take necessary precautions to keep products clean, dry and free of damage.

D. Protect materials from exposure to fire, high temperatures or excessive sunlight.

1.8 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not apply dampproofing materials when temperature is below 40 deg F (4 deg C).
   2. Do not apply primer to moist surfaces.

1.9 SEQUENCING AND SCHEDULING

A. Coordinate and schedule Work to ensure that protection materials are installed the same day the membrane is applied.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Karnak Corporation.
   2. Equivalent products by the following manufacturers may be acceptable provided they comply with requirements of Contract Documents:
      a. Henry Company.
      b. Koppers Inc.
      c. W.R. Meadows, Inc.
      d. Euclid Chemical.

2.2 MATERIALS

A. Dampproofing:
   1. Type: Emulsified asphalt compound, non-fibrated for brush or spray application, complying with ASTM D1227, Type III, Class 1. Material shall not re-emulsify after setting.
   2. Odor elimination: For interior and concealed-in-wall applications, provide dampproofing warranted by manufacturer to be substantially odor-free after drying for 24 hours under normal conditions.
   3. Acceptable product and manufacturer: Equivalent to No. 100 Non-Fibered Emulsion Dampproofing by Karnak Corporation.

B. Primer: Asphalt primer complying with ASTM D41 or ASTM D1227 Type III, Class 1, as recommended by dampproofing manufacturer for conditions of installation.

2.3 ACCESSORIES

A. Cement Mortar: Epoxy or latex modified cementitious composition as recommended by dampproofing manufacturer.

B. Patching Compound: Fast setting, non-shrinking patching compound recommended by dampproofing manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify the following substrate conditions before application of primer and dampproofing:
   1. That substrate condition is satisfactory and in accordance with manufacturer's instructions.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Substrate Preparation:
   1. Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.
   2. Patch voids and holes using patching compound or cement mortar.
   3. Remove fins and projections, loose materials, dirt, mortar lumps and other foreign matter, and brush surfaces clean.
   4. Remove grease, oil and other contaminants.
   5. Install or apply cant strips and similar accessories as recommended by dampproofing manufacturer, whether or not shown on Drawings.

3.3 APPLICATION

A. Apply in accordance with dampproofing manufacturer's instructions.

B. Priming: Prime substrate as recommended by manufacturer's instructions, at rate recommended by manufacturer with coverage suitable for substrate conditions.

C. Dampproofing:
   1. Apply two coats by brush or spray, at a total rate of between 2 and 3 gallons per 100 square feet (9 and 12 liters per 10 square meters), to obtain total uniform dry film thickness of not less than 15 mils (0.4 mm).
   2. Do not apply second coat until first coat is completely dry.
   3. Apply evenly, free from runs and sags. Completely cover surfaces.
   4. Apply before installation of any penetrations which would prevent application of a continuous coating.

3.4 CLEANING

A. Remove overspray and spilled materials from surfaces not intended to receive dampproofing.
   1. Clean to original condition, or replace areas or items damaged by dampproofing.
   2. Exposed surfaces shall be completely free of dampproofing at completion of Work.

END OF SECTION

SECTION 07 1416

COLD FLUID-APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Fluid-applied waterproofing for the following locations:
      a. Foundation walls.
      b. Other locations indicated on Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 07 Section BITUMINOUS DAMPPROOFING.

B. See Division 07 Section CRYSTALLINE WATERPROOFING for waterproofing of pits.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for materials.
   2. Include manufacturer's details for special waterproofing conditions including edge, joint and corner details.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit installer qualifications verifying years of experience and current approval of waterproofing manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

B. Inspection Reports: Submit copy of manufacturer's technical representative's field inspection reports.

1.5 CLOSEOUT SUBMITTALS

A. Warranty; Submit signed and dated warranty.

1.6 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate waterproofing Work with Work of other trades.
   2. Provide materials and accessories in timely manner so as not to delay Work.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. Not less than 5 years documented, successful experience with work comparable to Work of this Project, approved by waterproofing manufacturer. Such approval shall be current as of the date of bid of this Project.
2. Installer must maintain full-time supervisor on job site during times that Work is in progress. Supervisor must have minimum of five years experience in work similar in nature and scope to Work of this Project.

B. Manufacturer's Inspections:
1. Provide inspections by manufacturer's technical representative prior to, during and at completion of installation.
2. Contractor shall be responsible for carrying out recommendations of manufacturer's representative.
3. Provide written reports of inspection.

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver materials in manufacturer's unopened containers or bundles, fully identified with brand, type, grade, class and all other qualifying information.

C. Take necessary precautions to keep products clean, dry and free of damage.

D. Protect materials from exposure to fire, high temperatures or excessive sunlight.

1.10 PROJECT CONDITIONS

A. Environmental Requirements:
1. General: Proceed with waterproofing Work only when existing and forecasted weather conditions will permit Work to be performed in accordance with manufacturer's specifications.
2. Apply materials when ambient temperature is 45 deg F (7 deg C) and rising, and surface temperature is 65 deg F to 85 deg F (18 deg C to 29 deg C).
3. Do not apply materials if ambient temperature is lower than 45 deg F (7 deg C), nor if surface temperature is within 5 deg F (-15 deg C) of wet bulb temperature.
4. Warm coating materials before application if ambient temperature is lower than 60 deg F (16 deg C).

1.11 SEQUENCING AND SCHEDULING

A. Do not install waterproofing until items that will penetrate waterproofing have been installed.

1.12 WARRANTY

A. Furnish written warranty signed by waterproofing manufacturer and Installer agreeing to repair or replace waterproofing that does not comply with requirements or that does not remain watertight within specified warranty period.
   1. Warranty period: Five years after date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Design is based on Procor by Grace Construction Products, to establish standard of quality.
   2. Equivalent products by the following manufacturers are acceptable provided they comply with requirements of Contract Documents:
      a. Carlisle.
      b. Neogard.

2.2 WATERPROOFING MATERIALS

A. General: Provide waterproofing materials recommended by manufacturer to be compatible with one another and able to develop bond to substrate under conditions of service and application, as demonstrated by waterproofing manufacturer based on testing and field experience.
   1. Produce waterproofing materials suitable for application to vertical, horizontal, and sloped substrates, as applicable.

B. Cold Fluid-Applied Waterproofing:
   1. Two-component fluid-applied waterproofing membranes with self-curing rubber-based materials; comply with the requirements of ASTM C836.
   2. Comply with physical performance requirements as follows:
      a. Elongation, per ASTM D412: 500 percent.
      b. Adhesion, per ASTM D903: 5 lb/in (800 N/m).
      c. Dry film thickness, per ASTM D3767 (Method A): 0.060 inch (1.5 mm) nominal thickness.

2.3 AUXILIARY MATERIALS

A. Provide all auxiliary materials recommended by the manufacturer, including, but not limited to, liquid membrane, tape, reinforcing, sealant, and drainage materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify the following substrate conditions before application of primer and waterproofing:

1. That substrate condition is satisfactory and in accordance with manufacturer's instructions.
2. That concrete surfaces are smooth, free of voids, spalled areas, loose aggregate, and sharp protrusions, and with no form match lines or coarse aggregate visible.
3. That concrete is fully cured (minimum 28 days) and dry.
4. That detrimental membrane-curing compound containing oil, wax or pigment has not been used on concrete.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Verify that substrate is visibly dry and free of moisture.
   1. Test for moisture vapor transmission by plastic sheet method according to ASTM D 4263, by calcium chloride test, or by another method recommended in writing by waterproofing manufacturer.
   2. Do not apply waterproofing until moisture content of concrete does not exceed that recommended by waterproofing manufacturer.

C. Substrate Preparation:
   1. Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.
   2. Remove remaining concrete fins and projections, and grind flush.
   3. Acid-etch, or shot-blast clean concrete surfaces uniformly according to ASTM D4259 with a self-contained, recirculating, blast-cleaning apparatus, to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D4258.
   4. Verify that elements penetrating through deck are secured against movement.

D. Terminations and Penetrations:
   1. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C898 and manufacturer's written instructions.
   2. In drain applications, apply a 0.060 inch (1.5 mm) coating of waterproofing membrane over the drain flange and extend it 6 inch (152 mm) beyond the flange. Penetration openings must be sealed and stabilized prior to the application of waterproofing membrane.
   3. Once sealed and stabilized, install a 1 inch (25.4 mm) fillet of waterproofing or liquid membrane around the protrusion. Extend the membrane 6 inches (152 mm) onto the structural substrate and at least 2 inches (51 mm) onto the penetration. For plastic pipes and other low adhesion substrates, a tie-in using manufacturer’s recommended tape will be needed

E. Joint and Crack Treatment: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C898 and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D4258 before coating surfaces.
   1. Apply a 0.060 inch (1.5 mm) coating of waterproofing membrane over non-moving joints or hairline cracks and extend the material 6 inches (152 mm) from each side of the opening.

3.3 INSTALLATION

A. Install systems in accordance with waterproofing manufacturer's instructions.

B. Apply waterproofing according to ASTM C898 and manufacturer's written instructions.
   1. After detailing is complete, apply a uniform coating of waterproofing membrane at a minimum thickness of 0.060 inch (1.5 mm) over the entire area to be waterproofed.
   2. On horizontal applications, use the pour-and-spread method. Pour the mixed material directly from the container and spread using a rounded-edge steel trowel, float or screed. Use only metal squeegees with thickness guides at the ends.
   3. On vertical applications, apply waterproofing using the pour-and-trowel method. Pour the mixed material directly from the container onto the vertical surface and follow directly behind it with a straight-edge steel trowel.
      a. Spread the material uniformly across the surface with only 1 or 2 passes, starting at the bottom of the wall and pulling the material up the wall. Additional passes with the trowel over the material will cause material to become stringy and difficult to trowel.

3.4 FIELD QUALITY CONTROL

A. Flood Testing: Flood test full extent of horizontal and vertical waterproofed area for leaks, according to recommendations in ASTM D5957, after waterproofing has cured for time period recommended by manufacturer. Install temporary containment assemblies, plug or dam drains, and fill with potable water.
   1. Flood to a depth of 2 inches.
   2. Flood each area for 48 hours.
   3. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.

B. Engage an independent testing agency to observe flood testing and examine for evidence of leaks during flood testing.

3.5 CURING, PROTECTING, AND CLEANING

A. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
   1. Do not permit foot or vehicular traffic on membrane until cured. Minimize traffic on membrane thereafter.

B. Protect waterproofing from damage and wear during remainder of construction period.

C. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction

3.6 FINAL INSPECTION

A. Inspect completed installation with waterproofing manufacturer's technical representative to evaluate application.

B. Provide written report and correct deficiencies.

END OF SECTION

SECTION 07 1800

TRAFFIC COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Traffic-bearing waterproofing:
      a. Resistant to vehicular traffic.
         1) Walls, floors and curbs of Fuel Storage Room and Pump Room (required for this location for its fuel- and oil-resistance).
         2) Other locations as indicated on Drawings.
      b. Resistant to pedestrian traffic for the following locations:
         1) Mechanical and electrical rooms.
         2) Other locations indicated on Drawings.
   2. Accessories.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 03 Section CAST-IN-PLACE CONCRETE for concrete curing methods and concrete finish treatment required at areas receiving waterproofing.

B. See Division 07 Section COLD FLUID-APPLIED WATERPROOFING.

C. See DIVISION 33 for floor drain requirements.

1.4 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for materials.
   2. Include manufacturer's details for special waterproofing conditions including edge, joint and corner details.

B. Samples: Submit three sets of cured samples in each selected color on rigid base, showing full range of color and texture expected in Work.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit installer qualifications verifying years of experience and current approval of waterproofing manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

B. Inspection Reports: Submit copy of manufacturer's technical representative's field inspection reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data:
1. Submit cleaning and maintenance data for materials provided.
2. Include copy of submittal in Project information manual.

1.7 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
1. Coordinate waterproofing Work with Work of other trades.
2. Provide materials and accessories in timely manner so as not to delay Work.

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
1. Not less than 5 years documented, successful experience with work comparable to Work of this Project; approved by waterproofing manufacturer for application of manufacturer’s products.
2. Installer must maintain full-time supervisor on job site during times that Work is in progress. Supervisor must have minimum of 5 years experience in work similar in nature and scope to Work of this Project.

B. Manufacturer's Inspections:
1. Provide inspections by manufacturer's technical representative prior to, during and at completion of installation.
2. Contractor shall be responsible for carrying out recommendations of manufacturer's representative.
3. Provide written reports of inspection.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver materials in manufacturer's unopened containers or bundles, fully identified with brand, type, grade, class and all other qualifying information.

C. Take necessary precautions to keep products clean, dry and free of damage.

D. Protect materials from exposure to fire, high temperatures or excessive sunlight.

1.11 PROJECT CONDITIONS

A. Environmental Requirements:

1. Apply materials when ambient temperature is 40 deg F (4 deg C) and rising.
2. Do not apply materials if ambient temperature if air and surface temperatures are lower than 40 deg F (4 deg C) or higher than 110 deg F (43 deg C).
3. Do not apply waterproofing during rainy or inclement weather, nor if rain is expected within 8 hours of application.
4. Extend cure times when ambient temperature is 60 deg F (16 deg C) or below.

1.12 SEQUENCING AND SCHEDULING

A. Do not install traffic coatings until items that will penetrate traffic coatings have been installed.

B. Apply traffic coatings prior to installation of equipment to be installed on surfaces to receive traffic coatings, so as to provide complete traffic coating coverage for all floor, equipment pads, and curbs.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
1. Design is based on the following systems as manufactured by Neogard, to establish standard of quality:
   a. Resistant to vehicular traffic: Autogard FC, with FC7540 topcoat.
   b. Resistant to pedestrian traffic: Pedagard M with FC7510 topcoat.
2. Equivalent products by the following may be acceptable, provided they comply with requirements of Contract Documents:
   a. Carlisle Coatings & Waterproofing.
   b. Degussa Construction Chemicals, BASF.
   c. Tremco.

2.2 MATERIALS

A. Traffic Coatings: Complying with ASTM C957.

B. Material Compatibility: Provide primers; base, intermediate, and topcoats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 WATERPROOFING RESISTANT TO VEHICULAR TRAFFIC

A. Primer: Waterproofing manufacturer's solventless primer, for concrete.

B. Elastomeric Coating:
1. Solvent-free, 100% solids, polyurethane for liquid application.
2. Color: To be selected by Architect from manufacturer’s full color range.
3. Physical properties - top coat:
   a. Tensile strength: Minimum 5000 psi, when tested in accordance with ASTM D412.
   b. Elongation at break: Minimum 350%, when tested in accordance with ASTM D412.

c. Tear resistance: Minimum 400 pli, when tested in accordance with ASTM D1004.
d. Hardness, Shore A: 88 - 94, when tested in accordance with ASTM D2240.
e. Vapor transmission: Maximum 1.5 perm at 20 mils dry film thickness, when tested in accordance with ASTM E96, Procedure B.
f. Adhesion: Minimum 400 psi, when tested in accordance with ASTM D4541.

C. Aggregate: Uniformly graded, washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer

2.4 WATERPROOFING RESISTANT TO PEDESTRIAN TRAFFIC

A. Primer: Waterproofing manufacturer's solventless primer, for concrete.

B. Elastomeric Coating:
1. Solvent-free, 100% solids, polyurethane for liquid application.
2. Color: To be selected by Architect from manufacturer’s full color range.
3. Physical properties - top coat:
a. Tensile strength: Minimum 2200 psi, when tested in accordance with ASTM D412.
b. Elongation at break: Minimum 80%, when tested in accordance with ASTM D412.
c. Tear resistance: Minimum 165 pli, when tested in accordance with ASTM D1004.
d. Hardness, Shore A: 84 - 90, when tested in accordance with ASTM D2240.
e. Vapor transmission: Maximum 0.4 perm @ 20 mil dry film thickness, when tested in accordance with ASTM E96.
f. Adhesion: Minimum 400 psi, when tested in accordance with ASTM D4541.

C. Aggregate: Uniformly graded, washed silica sand of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer

2.5 MISCELLANEOUS MATERIALS

A. Sealant: One-part moisture cured urethane sealant, as recommended by waterproofing manufacturer.

B. Flashing Reinforcement: Non-woven, uncoated fiberglass mesh, for use at slab/wall intersections if recommended by traffic coating manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify the following substrate conditions before application of primer and waterproofing:
1. That substrate condition is satisfactory and in accordance with manufacturer's instructions.
2. That concrete surfaces are smooth, free of voids, spalled areas, loose aggregate, and sharp protrusions, and with no form match lines or coarse aggregate visible.
3. That concrete is fully cured (minimum 28 days) and dry.

4. That detrimental membrane-curing compound containing oil, wax or pigment has not been used on concrete.
5. That concrete surfaces are visibly dry and pass the following test prior to application of coating system:
   a. Tape 24 inch square x 60 mil (.015 meters square x 1.5 mm) thick sheet of rubber or vinyl mat to slab, in direct sunlight or with lit sun lamp placed directly above mat and not more than 48 inches (1200 mm) above mat. Seal all edges of mat to slab with plastic moisture-resistant tape.
   b. If, after 4 hours, there is condensation or drops of moisture on underside of mat, there is too much moisture in concrete substrate; do not install coating system. Wait until concrete dries naturally, or accelerate drying with heat and ventilation. Repeat test until moisture in concrete substrate is at acceptable level.

3.2 PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Substrate Preparation:
   1. Follow manufacturer's instructions to clean and prepare surfaces and seal cracks and joints.
   2. Vacuum blast or shotblast surfaces to remove laitance and contaminants.
   3. Hairline cracks and cold joints: Coat with three coats of elastomeric coating material.
   4. Cracks 1/16 inch (1.5 mm) and wider: Rout, and seal with sealant.
   5. Control joints: Seal with sealant.
   6. Verify that elements penetrating through deck are secured against movement.

3.3 INSTALLATION

A. General:
   1. Traffic coating resistant to vehicular traffic: Provide three coat system, consisting of base coat, intermediate coat, and top coat.
   2. Traffic coating resistant to pedestrian traffic: Provide two-coat system, consisting of base coat (waterproofing course) and top coat.

B. Install systems in accordance with waterproofing manufacturer's instructions.
   1. Apply each coat of elastomeric coating material at rate recommended by manufacturer, to yield specified average dry thicknesses.
   2. Apply each coat within time limits recommended by manufacturer.
   3. Finish shall be smooth (except for broadcast aggregate) and seamless, without entrapped air.

C. Primer:
   1. Apply primer to substrate surfaces at rate recommended by manufacturer.
   2. Reprime surfaces if base coat is not applied within time limits recommended by manufacturer.

D. Detail Work:
   1. Coat cracks, cold and control joints, with of elastomeric coating base coat material, to a total dry film thickness of at least 30 mils.
   2. Extend coating material 2 inches minimum on each side of cracks, joints and cants.

E. Slab/Wall Intersections: Provide one of the following treatments, as recommended by traffic coating manufacturer.
   1. Prior to application of base coat and subsequent coats, apply continuous bead of sealant at rigid slab/wall intersections.
   2. Prior to application of base coat and subsequent coats, embed 12 inch wide flashing reinforcement in detail coat 2 inches wider than flashing, at rigid slab/wall intersections.

F. Traffic Coating Resistant to Vehicular Traffic:
   1. Base coat:
      a. Apply base coat elastomeric coating material over primed substrates at rate of 60 sf/gallon, or as otherwise recommended by traffic coating manufacturer. Extend base coat over surfaces which received detail work.
      b. Back roll and allow to cure.
   2. Intermediate coat:
      a. Apply intermediate coat elastomeric coating material over base coat at rate of 100 sf/ gallon, or as otherwise recommended by traffic coating manufacturer.
      b. Immediately broadcast aggregate in an even distribution over surface, at rate of 10 to 15 pounds per 100 square feet, or as otherwise recommended by traffic coating manufacturer.
      c. Back roll and allow to cure.
   3. Top coat:
      a. When intermediate coat is dry, apply top coat elastomeric coating material at rate of 60 sf/gallon, or as otherwise recommended by traffic coating manufacturer.
         1) Immediately broadcast aggregate in an even distribution over surface, at rate of 15 to 18 pounds per 100 square feet, or as otherwise recommended by traffic coating manufacturer.
         2) Backroll to encapsulate aggregate.
      b. Average dry thickness of system, exclusive of aggregate: 52 mils.

G. Traffic Coating Resistant to Pedestrian Traffic:
   1. Base coat:
      a. Apply base coat elastomeric coating material over primed substrates at rate of 75 sf/ gallon, or as otherwise recommended by traffic coating manufacturer. Extend base coat over surfaces which received detail work.
      b. Back roll and allow to cure.
   2. Top coat:
      a. Apply top coat elastomeric coating material over base coat at rate of 125 sf/gallon, or as otherwise recommended by traffic coating manufacturer.
         1) Immediately broadcast aggregate in an even distribution over surface, at rate of 10 to 15 pounds per 100 square feet, or as otherwise recommended by traffic coating manufacturer.
         2) Back roll after broadcasting aggregate.
      b. Average dry thickness of system, exclusive of aggregate: 32 mils.

3.4 PROTECTION

A. Protection:
   1. After completion of application, do not allow traffic on coated surfaces until completely cured.
   2. After top course has cured, allow additional 24 hours before allowing traffic on coated surfaces.

3.5 REPAIR

A. As installation of other construction, and of equipment installed on traffic coatings, proceeds, inspect traffic coatings and maintain protection of structure afforded by traffic coatings by patching and repairing areas of traffic coatings which have been damaged by other construction or by installation of equipment installed on traffic coatings.

3.6 FINAL INSPECTION

A. Inspect completed installation with waterproofing manufacturer's technical representative to evaluate application.

B. Provide written report and correct deficiencies.

END OF SECTION

SECTION 07 2100

THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Thermal batt insulation.
   2. Thermal rigid insulation.
   3. Safing insulation.
   4. Fire-rated duct wrap insulation.
   5. Cavity wall insulation.
   6. Self-Adhering Air Barrier Flashing.
   7. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 04 Section UNIT MASONRY for cavity wall insulation installation.

B. See Division 07 Section FIRESTOPPING for firestopping sealants, foams, putties, and devices.

C. See Division 09 Section GYPSUM BOARD for sound attenuation blankets.

D. See DIVISION 22 and 23 for pipe and duct insulation other than fire-rated duct wrap.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each type of insulation and accessory.

1.4 PERFORMANCE REQUIREMENTS

A. Interface with Other Work:
   1. Coordinate delivery and placement of insulation when installed in conjunction with other Work so as not to delay Work.
   2. Where piping occurs at interior faces of exterior walls, whether concealed or exposed in completed construction, verify that insulation has been installed continuously between piping and face of wall.

1.5 DELIVERY, STORAGE AND HANDLING

A. Protect insulation from damage and moisture, soil and freezing. Store in dry location.

PART 2 - PRODUCTS

2.1 INSULATION

A. General:
1. Locations specified below are solely for Contractor's general information and shall not limit locations of each insulation type. Provide insulation at locations specified below, and at additional locations indicated on Drawings whether or not such additional locations are specified below.

B. Glass Fiber Batt Insulation -Foil Faced:
1. Glass fiber batts, aluminum foil kraft facing, complying with ASTM C665, Type III, Class B, Category 1.
2. Thickness: As indicated.
3. Fire resistance: Insulation shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
   a. Flame spread: 75 or less.
   b. Smoke development: 150 or less.
4. Acceptable products and manufacturers:
   a. CertaPro Foil Faced Insulation by Certainteed.
   b. Foil Faced Insulation by Johns Manville.
   c. Foil Faced Thermal Batt Insulation by Owens Corning.
5. Locations: As indicated on Drawings.

C. Extruded Polystyrene Rigid Insulation:
1. Extruded polystyrene board, complying with ASTM C578, Type X.
2. Thickness: As indicated.
3. Fire resistance: Insulation shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
   a. Flame spread: 75 or less.
   b. Smoke development: 450 or less.
4. Acceptable products and manufacturers:
   a. STYROFOAM brand Square Edge, by Dow Chemical Company.
   b. Foamular 150 by Owens Corning.
   c. Amofoam-CM by PACTIV Building Products.
5. Locations: As indicated on Drawings.

D. Safing Insulation:
1. Semi-rigid mineral fiber felt, unfaced; complying with ASTM C612, Types I-IV, or ASTM C665, Type I.
2. Density: 4.0 pcf (64 kg/m^3).
3. Fire resistance: Insulation shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
   a. Flame spread: 15 or less.
   b. Smoke development: 0.
4. Acceptable products and manufacturers:
   a. RoxulSafe by Roxul.
   b. Thermafiber Safing Insulation, Unfaced, by Thermafiber.
5. General locations:
   a. Penetrations through fire-rated construction.

b. In gaps between pre-engineered metal building (PEMB) roofing and tops of fire-rated partitions.

E. Self-Adhering Sheet Air Barrier Flashing:
1. Modified Bituminous Sheet: 35-mil- (0.9-mm-) thick, self-adhering sheet consisting of SBS rubberized asphalt laminated to polypropylene film with release liner on adhesive side.
a. Physical and Performance Properties:
1) Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference when tested in accordance with ASTM E 2178.
2) Tensile Strength: Minimum 493 psi (3.4 MPa) when tested in accordance with ASTM D 412, Die C.
3) Ultimate Elongation: Minimum 200 percent when tested in accordance with ASTM D 412, Die C.
4) Puncture Resistance: Minimum 40 lbf (178 N) when tested in accordance with ASTM E 154.
5) Water Absorption: Maximum 0.15 percent weight gain after 48-hour immersion at 70 deg F (21 deg C) when tested in accordance with ASTM D 570.
6) Vapor Permeance: Maximum 0.05 perm (2.8 ng/Pa x s x sq. m) when tested in accordance with ASTM E 96/E 96M, Water Method.
b. Acceptable product and manufacturer: Equivalent to Blueskin WB Window and Door Flashing by Henry Company.

F. Fire-Rated Duct Wrap:
1. Mineral fiber consisting of UL-classified filler material, both unfaced and with aluminum foil facing on one side; melting point of 3000 deg F (1650 deg C), continuous use limit of 2300 deg F (1260 deg C); suitable for up to 2-hour fire rating; asbestos free.
2. Thickness: 1-1/2 inch (38 mm).
3. Fire resistance:
a. Insulation shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
1) Flame spread: 5 or less.
2) Smoke development: 5 or less.
b. Provide materials and construction which are identical to those tested by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.
c. Fire resistance ratings: Provide fire- resistance-rated assemblies as shown or required, in which duct wrap serves as direct-applied protection for fire-rated air duct systems, tested in accordance with ASTM E119 by testing laboratory acceptable to authorities having jurisdiction.
4. Acceptable products and manufacturers:
a. 3M Fire Barrier Duct Wrap 15A by 3M Fire Protection Products, St. Paul, MN.
b. FyreWrap Duct Insulation by Unifrax Corp., Niagra Falls, NY.
c. Pyroscat FP Duct Wrap by Geo V. Hamilton.

2.2 ACCESSORIES

A. Provide installation accessories recommended by insulation manufacturer.

B. Masonry and Concrete Fasteners:
   1. Hardened nails, pneumatically-driven fasteners or other anchors as recommended by insulation manufacturer, sufficient to penetrate substrate and permanently retain insulation.
   2. At exposed insulation applications, provide fasteners with caps.

C. Adhesive for Bonding Insulation: Type recommended by insulation board manufacturer for application indicated; product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

D. Clips and Clip Adhesive:
   1. As recommended by insulation manufacturer, suitable for conditions of application.

E. Safing Insulation Accessories:
   1. Provide impaling clips and other accessories recommended by safing insulation manufacturer for conditions of installation.
   2. See Division 07 Section FIRESTOPPING for firestopping sealants, foams, putties, and devices.

F. Tape:
   1. Adhesive tape of type recommended by insulation manufacturer, to tape joints and tears in faced insulation.
   2. For exposed facings, provide tape matching color and finish of exposed facing.

G. Duct Wrap Accessories:
   1. Filament tape:
      a. 1 inch (25 mm) wide.
      b. Acceptable product and manufacturer: Equivalent to No. 898 by 3M Company, St. Paul, MN.
   2. Banding: Stainless steel banding, 3/4 inch wide x minimum 0.015 inch thick.
   3. Insulation pins: Copper-coated steel pins, 10 gauge x 4-5 inches long.
   4. Clips: Galvanized steel clips, 1-1/2 inch x 1-1/2 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Clean substrates of substances harmful to insulation including projections that might puncture or tear insulation.

3.3 INSTALLATION

A. General:
   1. Comply with manufacturer's instructions for particular conditions of installation in each case.

2. If printed conditions of installation are not available or do not apply to Project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with Work.
3. Extend insulation full thickness indicated over entire surface to be insulated.
4. Apply single layer of insulation of required thickness, unless otherwise indicated or required to make up total thickness.
5. Coordinate Work with installation of other materials.
6. Cut and fit tightly around penetrating elements and abutting construction.
7. Do not obstruct ventilation spaces.
8. Fill gaps and voids with insulation and mastic.
9. Do not install insulation above or within 3 inches (75 mm) of recessed lighting fixtures, wiring compartments or ballasts, unless fixtures are protected.

B. Batt Insulation:
1. Fit insulation between framing members.
2. In vertical applications, where framing members are set out from substrate wall structure, provide insulation support strips attached to backs of studs to hold insulation in place. Install in accordance with manufacturer's recommendations, horizontally at 2 feet (600 mm) on center, unless otherwise recommended by strip or insulation manufacturer.
3. Provide adhesives or mechanical fastening at locations where accessory materials are necessary to hold insulation in place.
4. Set vapor barrier faced units with vapor barrier face to inside of building, unless otherwise indicated.
5. Tape joints and ruptures in vapor barriers, and seal each continuous area of insulation to surrounding construction to provide vapor-tight installation.
6. Perimeter wall and curtain wall applications:
   a. Coordinate clip or fastener devices with perimeter wall and curtain wall substrate construction.
   b. Sequence and install insulation with safing insulation in strict accordance with manufacturer's instructions to provide complete thermal barrier and fire separation.
7. Z-furring applications: Coordinate and sequence with installation of Z-furring as specified in Division 09 Section METAL SUPPORT ASSEMBLIES.

C. Rigid Insulation:
1. Install using manufacturer's recommended clips or adhesive.
2. Complete installation and concealment of plastic materials as rapidly as possible in each area.
3. Cavity wall applications: Coordinate and sequence installation as specified in Division 04 Section UNIT MASONRY.

D. Safing Insulation:
1. Install to comply with manufacturer's instructions and in conjunction with sealing of penetrations with firestopping sealants and foams as specified in Division 07 Section FIRESTOPPING**]**.
2. Install safing insulation of proper size on safing clips spaced as required, maximum 24 inches (600 mm) o.c., in "safe-off" areas between exterior walls and floor slabs, in gaps between steel deck flutes and tops of fire-rated partitions**,** and at every "poke-through" floor slab penetration, including cables, conduits, ducts, pipes and other utilities, and penetrations of structural framing.
3. Install safing insulation at penetrations of structural framing through fire-rated partitions.

4. Provide wire hangers in lieu of safing clips, at floor slab penetrations where recommended by manufacturer and compress safing insulation into voids to provide complete seal.
5. Leave no voids at floor slabs or fire-rated wall construction whether exposed or concealed in completed construction.

E. Self-Adhering Sheet Air Barrier Flashing:

F. Apply and firmly adhere modified bituminous sheets horizontally over area to receive air barrier. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure airtight installation.
1. Apply sheets in a shingled manner to shed water without interception by any exposed sheet edges.
2. Apply sheets to form a seal with adjacent construction and maintain continuous air barrier.
3. Roll sheets firmly to enhance adhesion to substrate.

G. Duct Wrap Insulation:
1. General:
a. Coordinate with DIVISION 23 for duct installation.
b. Comply with Fire Resistance Requirements specified above.
c. Cut insulation for each layer in lengths to wrap completely around duct perimeter plus provide overlap joint of at least 3 inches (75 mm).
d. Space attachment banding (typical for both filament tape and metal banding) not more than 4 inches (100 mm) from each butt joint between adjacent wraps of blanket, and not more than 14 inches (350 mm) apart from each other.
e. Wrap attachment banding (typical for both filament tape and steel banding) completely around insulation, to secure insulation firmly in place.
2. Preparation: For duct spans more than 24 inches (600 mm) wide, weld insulation pins along bottom of horizontal ducts and on sides of vertical duct runs, to prevent insulation sag. Space pins in accordance with insulation manufacturer's requirements.
3. Interior insulation wrap:
a. Provide unfaced insulation for interior wrap.
b. Butt adjacent widths of insulation tightly together. Gaps between adjacent blankets are not permitted.
c. Install using filament tape.
4. Exterior insulation wrap:
a. Provide foil-faced insulation for exterior wrap. Install with foil facing out.
b. Butt adjacent widths of insulation tightly together. Gaps between adjacent blankets are not permitted.
c. Locate butt joints on exterior layer at least 12 inches (300 mm) from butt joints on interior layer.
d. Install using metal banding. Tension banding sufficiently to hold blankets snugly in place, but not to cause cutting or damage to insulation material.
5. Wrap support members using similar methods as for ductwork, except use one layer of foil-faced insulation.

END OF SECTION

SECTION 07 4113.13

FORMED METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Exposed-fastener, lap-seam, metal roof panels.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 06 Section SHEATHING for gypsum roof sheathing at formed metal panel roof systems.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:
   1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
   2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1:10 (1-1/2 inches per 12 inches).

C. Samples: For each type of exposed finish required, prepared on Samples of size indicated below:
   1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

C. Field quality-control reports.

D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
   1. Wind Loads: As indicated on Drawings.
   2. Other Design Loads: As indicated on Drawings.
   3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 or ASTM E 331 at the following test-pressure difference:
   1. Test-Pressure Difference: 2.86 lbf/sq. ft. (137 Pa).

C. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.

D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
   1. Uplift Rating: UL 90.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.11 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.12 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including rupturing, cracking, or puncturing.
      b. Deterioration of metals and other materials beyond normal weathering.
   2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
   1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
      a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
      b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
      c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
   2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Design is based on Mighti-Rib panels by Fabral to establish a standard of quality.
   2. Equivalent products by other manufacturers may be acceptable provided they comply with requirements of Contract Documents.

2.2 STANDING-SEAM, VERTICAL-RIB, METAL ROOF PANELS

A. General: Provide factory-formed metal roof panels designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to roof deck. Include accessories required for weathertight installation.

B. Standing-Seam, Vertical-Rib, Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs, symmetrically spaced between ribs; designed for sequential

installation by mechanically attaching panels to roof deck using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness.
   a. Exterior Finish: Fluoropolymer. See Division 05 Section FLUOROPOLYMER FINISH.
   b. Color: To be selected by Architect from manufacturer's full range of standard colors.
2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from zinc-coated (galvanized) steel, aluminum-zinc alloy-coated steel, or stainless-steel sheet.
3. Joint Type: Mechanically seamed, double folded.
4. Panel Coverage: 16 inches (406 mm).
5. Panel Height: 2 inches (51 mm).
6. Uplift Rating: UL 90.

2.3 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 60 mils (1.52 mm) thick, specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer when recommended by underlayment manufacturer.
   1. Tensile strength: 35/35 lb/inch when tested in accordance with ASTM D5147, MX/XD.
   2. Elongation at break: Not less than 10% for modified bitumen portion of membrane, when tested in accordance with ASTM D5147, MX/XD.
   3. Tear strength: 35/35 lbf when tested in accordance with ASTM D5147, MX/XD.
   4. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
   5. Acceptable product and manufacturer: Equivalent to MetaLayment Waterproofing Underlayment by CertainTeed, Saint-Gobain.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
   2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
   3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure

strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panelsas required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

D. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.

F. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

G. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials and underlayment, are nonstaining, and do not damage panel finish.
   1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
   3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.5 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
   1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
   2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories: See Division 05 Section FLUORPOLYMER FINISH for requirements for shop-applied fluoropolymer finish.
1. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
1. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
    a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
   1. Apply over the entire roof surface.

B. Flashings: Install flashings to cover underlayment to comply with requirements specified in Division 07 Section SHEET METAL FLASHING AND TRIM.

3.4 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels in orientation indicated on Drawings. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Shim or otherwise plumb substrates receiving metal panels.
   2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air or water-resistive barriers and flashings that are concealed by metal panels are installed.
   3. Install screw fasteners in predrilled holes.
   4. Locate and space fastenings in uniform vertical and horizontal alignment.
   5. Install flashing and trim as metal panel work proceeds.
   6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
   7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
   8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Standing-seam, Vertical-Rib, Metal Roof Panels: Fasten metal panels to supports with fasteners at each standing seam joint, at location and spacing recommended by manufacturer.
   1. Install clips to supports with self-drilling or self-tapping fasteners.
   2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
   3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.

4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
5. Provide metal closures at rake edges and rake walls.

E. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended in writing by metal panel manufacturer.

F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (610 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

G. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

H. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal panel installation, including accessories. Report results in writing.

B. Remove and replace applications where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 6200

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Counter flashing.
   2. Cap flashing.
   3. Downspouts.
   4. Flashing trim and accessories.

B. Single Subcontract Responsibility: Provide flashing in conjunction with roofing system under single subcontract provisions as specified in Division 13 Section METAL BUILDING SYSTEMS.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 04 Section UNIT MASONRY for through-wall flashing and installation requirements for through-wall flashing.

B. See Division 13 Section METAL BUILDING SYSTEMS for flashing requirements in conjunction with roofing system.

C. See Division 07 Section JOINT SEALANTS for sealants and joint fillers.

1.3 ACTION SUBMITTALS

A. Combined Submittals: Submit following as combined submittal with Work specified in Division 13 Section METAL BUILDING SYSTEMS.

B. Product Data: Submit manufacturer's specifications and installation instructions and recommendations for each type of flashing and sheet metal.

C. Shop Drawings:
   1. Submit Shop Drawings showing fabrication, layout, joining, joint details, profiles and anchorage of metal to form flashings and trim.
   2. Show waterproof details at penetrations and obstructions and connections to adjoining Work.
   3. Clearly detail shaping, jointing, length of sections, fastening and installation.
   4. Shop Drawings shall be based on manufacturers' recommendations and shall fully comply with manufacturers' details and specifications as required to provide fully warranted roofing systems.

D. Samples:
   1. Submit manufacturer's full range of standard color samples of painted aluminum for Architect's selection.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Submit roof membrane manufacturer's certification that proposed flashing materials, details and systems as indicated and specified fully comply with manufacturer's details and specifications.
   2. If any portion of Contract Documents does not conform to manufacturer's standard recommendations, submit notification of portions of roof design that are at variance with manufacturer's specifications and which would interfere with issuance of warranty.

B. Qualification Data: Submit fabricator and installer qualifications verifying years of experience and roofing membrane manufacturer's approval; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Warranty: Submit combined warranty as specified in Division 13 Section METAL BUILDING SYSTEMS.

1.6 SYSTEM REQUIREMENTS

A. Performance Requirements: Provide permanently watertight flashing and sheet metal installations which will not deteriorate in excess of manufacturer's published limitations.

B. Thermal Movements:
   1. Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
   2. Temperature change (range): 120 deg F ambient; 180 deg F material surfaces.

C. Interface with Other Systems:
   1. Do not proceed with installation of flashing and sheet metal until completion of curb and substrate construction, cants, blocking, and other construction required to receive flashing.
   2. Coordinate flashing with other Work for correct sequencing of items comprising entire membrane or system of roofing or waterproofing and rain drainage.

1.7 QUALITY ASSURANCE

A. Installer/Fabricator Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project, approved or acceptable to roofing membrane manufacturer.

B. Reference Standards: Comply with applicable details and installation recommendations of SMACNA.

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver materials in manufacturer's unopened containers or bundles, fully identified with brand, type, grade, class and all other qualifying information.

C. Take necessary precautions to keep products clean, dry and free of damage.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Provide products by manufacturers acceptable to roofing system manufacturer.

2.2 MATERIALS

A. Aluminum:
   1. Type: ASTM B209, alloy 3003-H14.
   2. Finish:
      a. Two-coat fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
      b. Color: To be selected by Architect from coating manufacturer's standard colors.
   3. Thickness: .032 inch (20 gage) (.8 mm) typically.

2.3 PRODUCTS

A. Extruded Aluminum Trim and Flashing:
   1. ASTM B209, alloy 6063-T52, 0.08 inch (2 mm) minimum thickness, of profile and dimensions indicated.
   2. Fabricate with formed aluminum joint covers and flashing assembly, and with prefabricated corner units.
   3. Finish:
      a. Manufacturer's standard Kynar resin based fluoropolymer coating.
      b. Color: To be selected by Architect from manufacturer's full standard color range.

B. Downspouts:
   1. Fabricate from 0.6 mm thick aluminum**,** dimensions and profile as indicated on Drawings, in 8'-0” to 10'-0” (2.4 to 3 m) sections with 1-1/2 inch (38 mm) telescoping end joints.
   2. Lock longitudinal joints.

C. Copings:
   1. Fabricate from 1.2 mm thick aluminum, dimensions and configurations as indicated on Drawings.

D. Counterflashing:

1. Fabricate from 0.8 mm thick aluminum, dimensions and configurations as indicated on Drawings.

2.4 ACCESSORIES

A. General: Provide solder, fasteners and accessories recommended by metal sheet manufacturer for fabrication and installation.

B. Termination Bars: 1 inch x 1/8 inch stainless steel; pre-drill with countersunk holes for fasteners, not more than 12 inches on center.

C. Welding Rods: Type recommended by stainless steel sheet manufacturer for type of metal sheets furnished.

D. Nails, Screws and Rivets:
1. Same metal as flashing/sheet metal, or other non-corrosive metal as recommended by sheet metal fabricator.
2. Provide in sizes and lengths to suit application.
3. Match finish of exposed fastener heads with material being fastened.

E. Cleats:
1. Same metal and gage as flashing/sheet metal being anchored.
2. Size: 2 inches (50 mm) wide, punched for 2 anchors.

F. Draw Band: Stainless steel, 1/2 inch (13 mm) wide.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

H. Sealants: Provide material recommended by roofing membrane manufacturer and as specified in Division 07 Section JOINT SEALANTS.

I. Mastic: Polyisobutylene, nonhardening, nonskinning, nonmigrating sealant.

J. Epoxy Seam Sealer: 2-part non corrosive, aluminum seam cementing compound, recommended by aluminum manufacturer for exterior and interior static joints.

2.5 FABRICATION

A. Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.

B. Form sections in longest practical lengths, minimum 8 feet (2.4 m). Make allowances for expansion at joints.

C. Provide flat lock seams, except corners. Fabricate corners minimum 18 inches x 18 inches (450 mm x 450 mm) mitered and sealed as one piece.

D. Hem exposed edges of flashings on underside 1/2 inch (13 mm).

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates and conditions under which metal flashing and trim will be installed. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Unless otherwise indicated, install sheet metal flashing and trim to comply with manufacturer's installation instructions and SMACNA's “Architectural Sheet Metal Manual”.
   1. Anchor Work securely, providing for thermal expansion of metal units.
   2. Conceal fasteners where possible and set units true to line and level as indicated.
   3. Provide laps, joints and seams that are watertight and weatherproof.

B. Flashing:
   1. Separate dissimilar metals by painting each metal surface in area of contact with heavy application of bituminous coating, or by other permanent separation as recommended by manufacturers of dissimilar metals.
   2. Install Work with provisions for thermal expansion of running trim, flashing, and other items exposed for more than 15'-0” (4.5 m) continuous length.
   3. Locate expansion seams as indicated or, if not indicated, at maximum 10'-0” (3 m) intervals and 2'-0” (600 mm) each side of corners.
   4. Soldered joints: Neutralize and remove flux residues after soldering. Do not solder aluminum.
   5. Sealant-filled joints:
      a. Where sealant joints are required within flashing or at interfaces with other Work, form flashing to provide proper shapes and sizes of sealant beads with adequate joint bond surfaces.
      b. Install sealants in accordance with manufacturer's instructions.
   6. Epoxy cemented seams: Where fixed seams or joints require sealing or cementing to ensure waterproofness or adequate strength, form flashing properly and install epoxy seam sealer in accordance with manufacturer's instructions.
   7. On vertical surfaces, lap 2-piece flashings minimum 3 inches (75 mm).
   8. At splices and intersections, lap-seam and solder continuous through-wall flashing or counterflashing. At penetrations and interruptions, turn-up flashing at least 4 inches (100 mm) to form pan to direct moisture to outside surface of wall.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
   1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24 inch (600 mm) centers.
   2. Anchor interior leg of coping with screw fasteners and washers at 24 inch (600 mm) centers.
   3. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24 inch (600 mm) centers.

D. Counterflashing: Coordinate installation of counterflashings with roof membrane system installation, lapping joints minimum of 2 inches (50 mm).

E. Downspouts:

1. Install plumb and true and to angles shown.
2. Provide hangers spaced as required for proper anchorage and support of downspouts but not more than 10'-0" (3 m) on center.
3. Provide elbows at bottom where leaders empty onto splash blocks.
4. Where drain pipes are shown, fit leaders into drain boots and calk joint.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protect flashings and sheet metal Work during construction, to ensure that Work will be without damage or deterioration, other than natural weathering, at time of acceptance.

END OF SECTION

SECTION 07 8100

APPLIED FIREPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Spray-applied fire resistive material.
   2. Accessories.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 01 Section TESTING AND INSPECTION SERVICES for requirements for independent agency for quality control testing and inspection.

B. See Division 05 Section STRUCTURAL STEEL FRAMING for steel requirements.

C. See Division 05 Section STEEL DECKING for deck requirements.

D. See Division 07 Section THERMAL INSULATION for fire safing insulation.

E. See Division 07 Section FIRESTOPPING for fire-stopping sealants.

F. See Division 09 Section GYPSUM BOARD for fire-rated gypsum board enclosures.

1.4 DEFINITIONS.

A. SFRM: Spray-applied fire-resistive material.

B. Batch-Mixed SFRMs:
   1. Materials are combined with water in a batch mixer to form a wet slurry. The slurry is then conveyed through a hose to a nozzle, where compressed air is used to disperse the material into a spray pattern for application to the construction to be protected.
   2. Since the proportion of water to other ingredients is established in the batch mix, the installer cannot alter the consistency of the SFRM at point of application.

1.5 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each material.

1.6 INFORMATIONAL SUBMITTALS

A. Schedule:
   1. Submit schedule of each member or assembly which requires application of fire resistive material.
   2. Arrange schedule on a floor by floor basis with each member or assembly fully identified as to location.
   3. List UL assembly designation, hourly rating, type, density and required thickness of each fire resistive material for each member or assembly.
   4. Include calculations showing compliance with UL spray applied fire resistive material adjustment equation for each beam assembly as may be required.
   5. For steel joist assemblies, include applicable fire-resistance design designations, with each steel joist tested with the same maximum tensile stress as each steel joist indicated on Drawings. Design designations with steel joists tested at lower maximum tensile stress than those indicated are not permitted.

B. Test Reports: Submit certified test reports performed by recognized testing laboratory showing that materials and systems have been previously tested and meet or exceed performance requirements.

C. Certificates:
   1. Submit certification from fire resistive material manufacturer that each product complies with specified requirements, is 100 percent asbestos-free, is suitable for indicated use and conforms to designated UL assemblies.
   2. Submit joint certification, signed by fire resistive material manufacturer and steel fabricator, stating that steel substrates and any coatings (including paints) have been reviewed, have been tested in accordance with ASTM E119 (with required fire resistive material) to fire resistive material and will not impair proper adhesion or performance of fire resistive material.
   3. Submit joint certification, signed by fire resistive material manufacturer and steel deck manufacturer, stating that steel deck substrates and any coatings (including rolling compounds or lubricants) have been reviewed, have been tested in accordance with ASTM E119 (with required fire resistive material) to provide required fire-resistance rating and are compatible with fire resistive material and will not impair proper adhesion or performance of fire resistive material.

D. Qualification Data: Submit installer qualifications verifying years of experience and approval of manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.7 SYSTEM REQUIREMENTS

A. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction over Project.

B. Fire Performance Requirements:
   1. General: Provide materials and construction which are identical to those tested for the following fire performance characteristics, in accordance with test method indicated, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.
   2. Fire resistance ratings: Provide as indicated on Drawings by reference to design designation in UL “Fire Resistance Directory” for fire-resistance-rated assemblies in

which spray-applied fire resistive material serves as direct-applied protection, tested in accordance with ASTM E119.

3. Surface burning characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
   a. Flame spread: 10.
   b. Smoke developed: 5.
4. Base fire-resistance design thicknesses for open web steel joists on testing at maximum tensile stress for each steel joist as indicated on Drawings. Design thicknesses based on steel joists tested at lower maximum tensile stress than those indicated are not permitted.

C. Physical Performance Requirements - Batch-mixed SFRM:
1. Dry density: Except as modified by authorities having jurisdiction, provide material complying with minimum individual and average density values listed in each required UL design assembly measured in accordance with ASTM E605, but not less than 15 pcf(240 kg/m³)
2. Deflection: No cracking, spalling, delamination or other similar deterioration or separation from substrate when tested in accordance with ASTM E759.
3. Bond impact: No cracking, spalling, delamination or other similar deterioration or separation from substrate when tested in accordance with ASTM E760.
4. Corrosion resistance: No evidence of corrosion on steel when tested in accordance with ASTM E937.
5. Air erosion: 0.025 gm/f² (0.27 gm/m²) allowable weight loss when tested in accordance with ASTM E859.
6. Cohesion/adhesion (bond strength), when tested in accordance with ASTM E736: Minimum 150 psf(7.2 kPa)
7. Compressive strength, when tested in accordance with ASTM E761: Minimum 5.21 psi(35.9 kPa)

1.8 QUALITY ASSURANCE

A. Installer Qualifications:
1. A firm specializing in installation of fire resistive materials similar to those required for this Project with a minimum of 5 years successful documented experience; licensed by fire resistive material manufacturer.
2. Installer must maintain full-time supervisor on job site during times that fire-resistive material Work is in progress. Supervisor must have minimum of five years experience in fire-resistive material work similar in nature and scope to Work of this Project.

B. Manufacturer's Inspections:
1. Provide inspections by manufacturer's technical representative prior to, during and at completion of installation.
2. Contractor shall be responsible for carrying out recommendations of manufacturer's representative.
3. Provide written reports of inspection.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver to site in original, unopened packages, fully identified as to manufacturer, brand or other identifying data, and bearing the proper UL labels for fire hazard and fire-resistance classification.

C. Store in protected and dry area.

D. Support as required to prevent any damage to materials.

E. Use materials prior to expiration date.

F. Remove from Project site and discard any material whose shelf life has expired and any material that has been exposed to moisture or otherwise deteriorated.

1.11 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Comply with manufacturer's requirements.
   2. Maintain minimum air and substrate temperature of 40 deg F (4 deg C) for 24 hours before, during and for 24 hours after application; provide temporary enclosures and heat as required to maintain this minimum temperature.
   3. Ventilate areas of Work as required for proper curing and thorough drying of fire resistive materials during and subsequent to its application; provide forced air circulation where natural ventilation is inadequate.

B. Protection:
   1. Provide temporary enclosures to prevent deterioration of fire resistive materials from adverse environmental conditions.
   2. Protect fire resistive materials from abrasion and other damage during construction.
   3. Protect adjacent construction not scheduled to receive fire-resistive material from damage from fire-resistive material application.

1.12 SEQUENCING AND SCHEDULING

A. Sequence and coordinate application of fire resistive materials with Work of other trades affected by Work of this Section.

B. Coordinate installation of fire resistive materials with other Work in order to minimize the need for removal or cutting of fire resistive materials to accommodate such Work.

C. Complete installation of clips, hangers, support sleeves and other attachments required to penetrate fire resistive materials prior to commencement of fire resistive materials application.

D. Do not install ducts, piping, equipment or other components (either suspended or attached to areas scheduled for fire resistive materials) which would interfere with application of fire resistive materials until fire resistive material Work is complete, inspected, tested and found to be in compliance with requirements of Contract Documents.

E. Do not install fire resistive materials to underside of roof decks until roofing Work is complete; prohibit roof traffic upon commencement of fire resistive materials application and until fire resistive material is cured and fully dried.

F. Do not install fire resistive materials to underside of steel decking until concrete Work is complete.

G. Do not install enclosing or concealing construction around fire resistive material Work until:
   1. Fire resistive material Work is complete, inspected, tested and found to be in compliance with requirements of Contract Documents.
   2. Fire-resistive material is substantially dry as indicated by a moisture content of three percent or less. Submit report indicating results of field inspection.

PART 2 - PRODUCTS

2.1 BATCH-MIXED FIRE-RESISTIVE MATERIAL

A. Batch-Mixed Fire Resistive Material:
   1. Description: Batch-mixed SFRM; asbestos-free.
      a. Type FRM-1: Gypsum based.
   2. Acceptable products and manufacturers:
      a. Type FRM-1:
         1) Pyrolite 15 by Carboline Co., Fireproofing Products Division.
         2) Cafco 300 by Isolatek International Corp.
         3) Monokote Type MK-6 by W.R. Grace & Company.
         4) Type 5GP by Southwest Vermiculite Co., Inc., division of Carboline Co.

B. Accessories:
   1. General: Provide auxiliary fire-resistive materials that are compatible with sprayed fire-resistive materials and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistive designs indicated.
   2. Primer/adhesive for bonding fire-resistive material: Product approved by manufacturer of sprayed fire-resistive material.

C. Lath, Clips and Lath Hangers:
   1. Provide for locations and assemblies as indicated on Drawings and as required for listed UL assemblies.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify that penetrations through fire resistive materials are completely installed and securely attached to substrates.

C. Verify that substrates are not obstructed by any construction or equipment which could interfere with proper application of fire resistive materials.

D. Do not install fire resistive materials until written certification has been received from installer stating that surfaces to receive fire resistive materials have been inspected by installer, are in accordance with manufacturer's requirements and are acceptable to receive fire resistive materials.

3.2 PREPARATION

A. Prepare surfaces in accordance with manufacturer's instructions.

B. Substrates shall be clean and free of oil, grease, loose mill scale, dirt, paints/primers (other than those certified and accepted) or other foreign substances which would impair proper bond and adhesion of fire resistive materials to substrates.
   1. Remove loose or scaling rust.

C. Provide masking, drop cloths or other suitable covering as required to prevent overspray of fire resistive materials.

3.3 INSTALLATION

A. Apply fire resistive materials in accordance with final Schedules and manufacturer's instructions.

B. Comply with manufacturer's mixing and application procedures and equipment requirements.

C. Coat substrates with primer/adhesive prior to application of fire resistive materials, where required to achieve fire-resistance rating or where recommended by fire resistive materials manufacturer for material and application indicated.

D. Extend fire resistive materials full thickness over entire area of each substrate scheduled for protection.

E. Batch-Mixed Fire Resistive Material:
   1. Unless otherwise recommended by fire resistive materials manufacturer, install in a monolithic blanket of uniform texture.
   2. Apply fire resistive materials in thicknesses and densities indicated but not less than required to achieve fire resistance ratings designated for each condition.
      a. Where structural steel members having different thicknesses of fire resistive materials intersect or connect, provide fire resistive materials equal to the greater thickness on all members for 2 feet (600 mm) from junction of members.
      b. Attachments such as miscellaneous steel angles and brackets, light-gage steel framing, and hangers shall be covered in areas of attachment with same thickness of fire resistive material as adjoining structural member.
   3. Apply fire-resistive material to produce the following finishes:
      a. Concealed applications: Spray-textured finish with no further treatment.
      b. Exposed applications: “Knock-down” or “skip-trowel” finish to smooth out texture and produce neat edges.

F. Cure and thoroughly dry fire resistive materials in accordance with manufacturer's instructions.

G. Schedule application in sequence with field quality control. Do not commence application in a new area until applications in previous areas have been completed, inspected, tested and found to be in compliance with requirements of Contract Documents.

3.4 FIELD QUALITY CONTROL

A. Independent Agency Responsibilities:
1. General:
   a. Inspect and test completed applications of sprayed fire-resistive material in successive stages, in areas of extent and using methods as follows.
   b. Do not proceed with application of fire-resistive material for the next area until test results for previously completed applications of fire-resistive material show compliance with requirements.
2. Inspection:
   a. Visually inspect prepared surface of members to receive fire-resistive material, prior to application of fire-resistive material.
   b. Verify that substrates to receive fire-resistive material have been cleaned and are free from substances which would impair proper bond and adhesion of fire resistive materials.
   c. Verify that temperature and humidity conditions are as recommended by fireproofing manufacturer for application of fireproofing to proceed. Report ambient temperature and humidity conditions.
   d. Visually inspect fire resistive materials during application and immediately prior to installation of subsequent enclosing or concealing construction.
3. Testing: Tested values must equal or exceed values indicated and values required for approved fire-resistance design.
   a. Thickness:
      1) Thickness for floors, roofs, and wall assemblies: For each 1000 sq. ft. (93 sq. m) area, or partial area, on each floor, from the average of 4 measurements from a 144 sq. in. (0.093 sq. m.) sample area, with sample width of not less than 6 inches (150 mm) in accordance with ASTM E605.
      2) Thickness for structural frame members: From a sample of not less than 25% of structural members per floor, in accordance with ASTM E605.
   b. Density for floors, roofs, walls, and structural frame members: At frequency and from sample size indicated for determining bond strength of each type of construction and structural framing member, in accordance with ASTM E605.
   c. Bond strength for floors, roofs, walls, and structural framing members: For each 10,000 sq. ft. (930 sq. m) area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, in accordance with ASTM E736.
4. If inspections or tests discover applications of fire-resistive material not in compliance with requirements, perform additional random testing to determine extent of noncompliance.
5. Attend pre-installation conference.
6. Submit weekly written reports. Interpret inspections and tests, and state in each report whether inspected and tested Work complies with or deviates from requirements.

B. Contractor Responsibilities:
1. Coordinate and schedule inspection and testing of completed fire resistive materials in successive stages of application.

2. Repair or replace fire resistive materials which are not in conformance with requirements of Contract Documents.
3. Apply additional fire-resistive material in accordance with manufacturer's written instructions where test results indicate that thickness does not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.5 CLEANING, REPAIR AND PROTECTION

A. Immediately upon completion of applications in each area, remove overspray and fall out of materials from surfaces of other Work; clean surfaces and remove evidence of soiling; remove and replace materials which cannot be cleaned to satisfaction of Architect.

B. Repair:
1. Coordinate application of sprayed fire-resistive material with other construction to minimize need to cut or remove fire protection.
2. As installation of other construction proceeds, inspect fire-resistive material and maintain protection of structure afforded by fire resistive materials by patching and repairing areas which have been removed or damaged prior to concealment of fire resistive materials by other Work.

C. Protect and maintain fire resistive materials and topcoats according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection systems will be without damage or deterioration at time of Substantial Completion. Repair or replace work that has not been successfully protected.

3.6 SCHEDULE OF FIRE RESISTIVE MATERIALS ASSEMBLIES
1. UL Assemblies:
a. UL assembly designations required include, but are not necessarily limited to, those indicated on Drawings.
b. Other UL assemblies may be proposed for use, consistent with required hourly rating, configuration of member or assembly to be fireproofed, and other requirements of Contract Documents.

END OF SECTION

SECTION 07 8400

FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Firestopping of penetrations and voids through fire-rated roof, wall, floor and partition assemblies including empty openings and openings containing cables, pipes, ducts, conduit and other elements.
   2. Joints in or between fire-resistance-rated constructions.

B. Single Subcontract Responsibility: Engage a single Subcontractor to coordinate, furnish and install firestopping Work.
   1. Provide firestopping of plumbing penetrations through fire-rated assemblies, as indicated in Division 22 and Drawings.
   2. Provide firestopping of mechanical and plumbing penetrations through fire-rated assemblies, as indicated in Division 23 and Drawings.
   3. Provide firestopping of electrical penetrations through fire-rated assemblies, as indicated in Division 26 and Drawings.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 07 Section THERMAL INSULATION for fire safing insulation.

B. See Division 07 Section JOINT SEALANTS for non-fire-resistive joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each firestop material, including joint preparation and curing requirements. Include the following:
   1. Detailed specification of construction and fabrication.
   2. Manufacturer's installation instructions.
   3. Catalog cut listing system components.

1.4 INFORMATIONAL SUBMITTALS

A. Schedules:
   1. Submit schedule of each type of penetration and void which requires installation of firestopping. Include penetrating elements.
   2. List UL assembly designation, L-rating, if applicable, hourly rating, type and required thickness of each firestopping material for each penetration type.
   3. Provide qualified engineering judgments and drawings for non-standard applications, if required, and designate these clearly.

B. Test Reports:

1. Submit certified test reports performed by recognized testing laboratory showing that materials and systems have been previously tested and meet or exceed performance requirements.
2. Submit certified compatibility and adhesion test reports for firestopping products indicating that materials forming each joint substrate and joint backing have been tested for compatibility and adhesion with proposed firestopping materials.
3. Include firestopping manufacturer's interpretation of test results relative to firestopping performance and recommendations for primers and substrate preparation needed to obtain adhesion.

C. Certificates: Submit certification from firestopping manufacturer that each firestopping product complies with specified requirements, is 100 percent asbestos-free, is suitable for indicated use, conforms to designated UL assemblies and will provide fire rating at least equal to that of surrounding construction.

D. Qualification Data: Submit installer qualifications verifying years of experience and acceptance of manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 DEFINITIONS

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit the spread of heat, fire gases, and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated material is not obtained.

E. Construction Gap: Gaps between adjacent sections of walls, exterior walls, at wall tops between the top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.

F. System: Specific products and applications, classified and numbered by Underwriter's Laboratories, Inc. to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through the thickness of the barrier and used to permanently guard the penetration. Sleeves are described as part of penetrating systems in other section and may or may not be required.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Be responsible for evaluating each opening condition and selecting appropriate firestopping materials to maintain fire resistance ratings and designate appropriate UL assembly.

2. Include resistance to cold smoke at penetrations, connections to adjacent materials and other construction gaps.
3. Consider exposure of opening to water, movement, vibration and temperature variation in determining appropriate material selection for opening.
4. All firestopping materials, systems, and devices must be listed by Underwriter's Laboratories, Inc. (UL).

B. Structural Requirements: Where more than four inches (100 mm) of floor is open and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

C. Fire Resistance Ratings:
1. General:
   a. Provide firestop systems produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which firestop systems are installed.
   b. Provide materials and construction which are tested for the following fire performance characteristics, in accordance with test method indicated, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction.
2. Fire resistance ratings: Provide firestopped openings with rating equivalent to surrounding construction with design designation in UL "Fire Resistance Directory" for fire-resistance-rated assemblies, tested in accordance with the following:
   a. ASTM E814 (UL1479): Time rating and temperature rise rating.
   b. ASTM E84 (UL723): Flame spread rating.
3. Provide F-rating of firestopping of not less than fire-resistance rating of assembly or material being firestopped.
4. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
   a. Penetrations located outside wall cavities.
   b. Penetrations located outside fire-resistance-rated shaft enclosures.
5. Joints in or between fire-resistance-rated construction: Provide fire-resistive joint systems with ratings determined in accordance with ASTM E1966 or UL 2079
   a. Joints include those installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
   b. Fire-resistance rating: Equal to or exceeding the fire-resistance rating of construction they will join.

D. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction over Project.

E. Codes and Standards: Provide firestopping listed in the U.L. "Fire Resistance Directory as follows:
1. Through-penetration firestop devices (XHCR).
2. Fire resistance ratings (BXUV).
3. Through-penetration firestop systems (XHEZ).
4. Fill, void, or cavity material (XHHW).

1.7 QUALITY ASSURANCE

A. Installer Qualifications:

1. A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements.
2. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.

B. Source Limitations: Obtain firestop systems, for each kind of penetration, joint and construction condition indicated, through one source from a single manufacturer.

C. Manufacturer's Representative: Manufacturers of firestopping materials shall provide qualified technical representative at Project site when requested, for purpose of rendering advice concerning proper installation of materials with minimum of 2 year experience in installation of similar materials.

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

B. Meeting shall include representatives of Contractor, mechanical, plumbing, and electrical trades, and other trades having responsibility for penetrations through fire-rated assemblies.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Use materials prior to expiration date.

1.10 PROJECT CONDITIONS

A. Environmental Conditions: Do not install materials unless ambient and substrate temperatures are within requirements and manufacturer's instructions can be complied with, and unless Work can proceed in accordance with agreements of pre-installation conference.

1.11 SEQUENCING AND SCHEDULING

A. Sequence and coordinate installation of firestopping with Work of other trades affected by the Work of this Section.

B. Do not install firestopping systems until installation of penetrating items and supporting material has been completed.

C. Do not install enclosing or concealing construction until firestopping Work is complete and determined to be in compliance with requirements of Contract Documents and of authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers: Provide firestop systems complying with specified requirements and with those systems indicated in the Firestop System Schedules at the end of Part 3.

2.2 FIRESTOPPING, GENERAL

A. Compatibility: Provide firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating firestop systems, under conditions of service and application, as demonstrated by firestop system manufacturer based on testing and field experience.

B. Accessories:
1. Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with "System Requirements" above.
2. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated.
3. Provide accessories including, but not limited to, the following items, as applicable to the firestop system and to conditions of installation:
   a. Permanent forming/damming/backing materials, including the following:
      1) Slag-/rock-wool-fiber insulation.
      2) Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
      3) Fire-rated form board.
      4) Fillers for sealants.
   b. Temporary forming materials.
   c. Substrate primers.
   d. Collars.
   e. Steel sleeves.

2.3 FIRE-RESISTIVE JOINT SYSTEMS

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with "System Requirements" above. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

2.4 FILL MATERIALS

A. General: Provide firestop systems containing the types of fill materials indicated in the Firestop System Schedules at the end of Part 3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.

B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

C. Latex Sealants: Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.

D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.

F. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.

G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

H. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

I. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.

J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

K. Silicone Sealants:
   1. Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
   2. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.

2.5 MIXING

A. For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Verify that penetrations are properly sized and in suitable conditions for application of materials.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing firestop systems to comply with firestopping manufacturer's written instructions and the following requirements:
   1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
   2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Do not apply paint or other coatings or substances to surfaces adjoining firestopping surfaces until firestopping materials have been installed and are nominally cured, so that adhesion will not be impaired by migration of such substances onto joint surfaces.

C. Prime or seal bonding joint surfaces in accordance with sealant manufacturer's recommendations. Avoid migration of primer or sealer onto adjoining surfaces and remove spillage immediately.

D. Mask areas as required to protect adjacent surfaces. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates or damaging adjoining surfaces.

3.3 INSTALLATION

A. Install firestopping in accordance with manufacturer's instructions and in compliance with UL System designs.

B. Ensure that anchoring devices, backup materials, clips, sleeves, dams, supports and other materials used in actual fire test are installed.

C. Install firestopping materials in required thickness to obtain indicated fire rating, with sufficient pressure to ensure an effective smoke seal.

D. Tool or trowel exposed surfaces. Remove excess material promptly as work progresses.

E. Seal holes of voids to create smoke barrier.

F. Finish surfaces which are exposed to provide uniform, smooth and level appearance.

G. Where floor openings without penetrating items are more than 4 inches (100 mm) in width and subject to traffic and loading, install firestopping materials capable of supporting same loading as adjoining floor.

H. Protect materials from damage on surfaces subject to traffic.

I. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.

J. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable trays, bus ducts or other items, close unused portions of the opening with firestopping material tested for the application.

K. Install smoke stopping as specified for firestopping.

L. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12 inch (300 mm) wide fiber dams for full thickness and height of air cavity at maximum 15 foot (4.5 m) intervals.

3.4 IDENTIFICATION

A. Identify through-penetration firestop systems with preprinted metal or plastic labels on both sides of penetration.

B. Attach labels permanently to surfaces adjacent to and within 6 inches of edge of firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems.
   1. Use mechanical fasteners for metal labels.
   2. For plastic labels, use self-adhering type with adhesives capable of permanently bonding labels to surfaces on which labels are placed and, in combination with label material, will result in partial destruction of label if removal is attempted.

C. Include the following information on labels:
   1. The words “Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage.”
   2. Contractor's name, address, and phone number.
   3. Through-penetration firestop system designation of applicable testing and inspecting agency.
   4. Date of installation.
   5. Through-penetration firestop system manufacturer's name.
   6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Owner will engage a qualified testing agency to perform tests and inspections, in accordance with ASTM E2174.

B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.

C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated firestop systems immediately and install new materials to produce firestop systems complying with specified requirements.

3.7 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE

A. The listed UL-classified systems below refer to the alpha-alpha-numeric designations listed in UL's “Fire Resistance Directory” under product Category XHEZ. Comply with requirements of listed systems.

B. Firestop Systems with No Penetrating Items:
   1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-0001-0999 or F-A-0001-0999.
   2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-0001-0999.
   3. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-0001-0999 or C-BJ-0001-0999 or W-J-0001-0999.
   4. Framed walls: W-L-0001-0999.
   5. Type of fill materials: One or more of the following.
      a. Latex sealant.
      b. Silicone sealant.
      c. Intumescent putty.
      d. Mortar.

C. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
   1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-1001-1999 or F-A-1001-1999.
   2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-1001-1999 or C-BK-1001-1999 or F-B-1001-1999.
   3. Framed floors: F-C-1001-1999.
   4. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-1001-1999 or C-BJ-1001-1999 or W-J-1001-1999.
   5. Concrete or masonry walls with minimum thickness greater than 8 inches: C-BK-1001-1999 or W-K-1001-1999.
   6. Framed walls: W-L-1001-1999.
   7. Type of fill materials: One or more of the following.
      a. Latex sealant.
      b. Silicone sealant.
      c. Intumescent putty.
      d. Mortar.

D. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:
   1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-2001-2999 or F-A-2001-2999.

2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-2001-2999 or F-B-2001-2999.
3. Framed floors: F-C-2001-2999.
4. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-2001-2999 or C-BJ-2001-2999 or W-J-2001-2999.
5. Concrete or masonry walls with minimum thickness greater than 8 inches: C-BK-2001-2999.
6. Framed walls: W-L-2001-2999.
7. Type of fill materials: One or more of the following.
   a. Latex sealant.
   b. Silicone sealant.
   c. Intumescent putty.
   d. Intumescent wrap strips.
   e. Firestop device.

E. Firestop Systems for Electrical Cables:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-3001-3999 or F-A-3001-3999.
2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-3001-3999 or F-B-3001-3999.
3. Framed floors: F-C-3001-3999.
4. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-3001-3999 or C-BJ-3001-3999 or W-J-3001-3999.
5. Concrete or masonry walls with minimum thickness greater than 8 inches: C-BK-3001-3999.
6. Framed walls: W-L-3001-3999.
7. Type of fill materials: One or more of the following.
   a. Latex sealant.
   b. Silicone sealant.
   c. Intumescent putty.
   d. Silicone foam.
   e. Pillows/bags.

F. Firestop Systems for Cable Trays:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-4001-4999 or F-A-4001-4999.
2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-4001-4999.
3. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-4001-4999 or C-BJ-4001-4999 or W-J-4001-4999.
4. Concrete or masonry walls with minimum thickness greater than 8 inches: W-K-4001-4999.
5. Framed walls: W-L-4001-4999.
6. Type of fill materials: One or more of the following.
   a. Latex sealant.
   b. Intumescent putty.
   c. Silicone foam.
   d. Pillows/bags.
   e. Mortar.

G. Firestop Systems for Insulated Pipes:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-5001-5999 or F-A-5001-5999.

2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-5001-5999.
3. Framed floors: F-C-5001-5999.
4. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-5001-5999 or W-J-5001-5999.
5. Concrete or masonry walls with minimum thickness greater than 8 inches: C-BK-5001-5999.
6. Framed walls: W-L-5001-5999.
7. Type of Fill Materials: One or more of the following:
    a. Latex sealant.
    b. Intumescent putty.
    c. Silicone foam.
    d. Intumescent wrap strips.

H. Firestop Systems for Miscellaneous Electrical Penetrants:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-6001-6999 or F-A-6001-6999.
2. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-6001-6999.
3. Framed walls: W-L-6001-6999.
4. Type of fill materials: One or more of the following.
    a. Latex sealant.
    b. Intumescent putty.
    c. Mortar.

I. Firestop Systems for Miscellaneous Mechanical Penetrations:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-7001-7999.
2. Framed floors: F-C-7001-7999.
3. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-7001-7999 or W-J-7001-7999.
4. Framed walls: W-L-7001-7999.
5. Type of fill materials: One or both of the following.
    a. Latex sealant.
    b. Mortar.

J. Firestop Systems for Groupings of Penetrations:
1. Concrete floors with minimum thickness less than or equal to 5 inches: C-AJ-8001-8999 or F-A-8001-8999.
2. Concrete floors with minimum thickness greater than 5 inches: C-BJ-8001-8999.
3. Framed floors: F-C-8001-8999.
4. Concrete or masonry walls with minimum thickness less than or equal to 8 inches: C-AJ-8001-8999 or C-BJ-8001-8999 or W-J-8001-8999.
5. Framed walls: W-L-8001-8999.
6. Type of fill materials: One or more of the following.
    a. Latex sealant.
    b. Mortar.
    c. Intumescent wrap strips.
    d. Firestop device.
    e. Intumescent composite sheet.

END OF SECTION

SECTION 07 9200

JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, sealants and joint fillers for the following:
   1. Exterior joint systems:
      a. Paving expansion and control joints.
      b. Concrete and masonry expansion, control and false joints.
      c. Flashing, reglet and retainer joints.
      d. Roof penetration perimeter joints.
      e. Wall opening perimeter joints, including openings at doors, windows and louvers.
   2. Interior joint systems:
      a. Control joints, including concrete and tile.
      b. Interior face of exterior wall masonry control and expansion joints.
      c. Interior face of exterior wall opening perimeter joints, including openings at doors, windows and louvers.
      d. Partition perimeter and control joints.
      e. Partition opening perimeter joints, including openings at doors, louvers and grilles.
      f. Perimeter joints between cabinetry, countertops, splashes, built-in equipment, and adjoining construction.
      g. Sanitary joint systems for plumbing fixtures and ceramic tile wall joints.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section GLAZING for sealants for glass and glazing systems.

B. See Division 09 Section GYPSUM BOARD for acoustical sealant.

1.3 ACTION SUBMITTALS

A. Combined Submittal: Submit items required below as a combined submittal with requirements of other technical Sections as specified in those Sections.

B. Product Data:
   1. Submit joint sealant manufacturer's product descriptions with instructions, including limitations, for storage, joint opening preparation, and installation of sealants and joint components. Indicate where primers will be used, or submit printed statement from sealant manufacturer that no primers are required for adequate adhesion.
   2. Submit backer rod and bond breaker tape manufacturer's product description with instructions, including limitations, for storage, handling and installation.

C. Samples:
   1. Submit manufacturer's full range of standard color samples for color selection by Architect.

2. Submit samples of backer rod materials, minimum 12 inches (300 mm) long.
3. Submit samples of sealant bond breaker materials.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit statement written on joint sealant manufacturer's official letterhead, dated no earlier than one year prior to submittal, and signed by the responsible representative, indicating that sealants proposed for use have been tested and conform to requirements of Contract Documents and the following:
   1. Sealant meets applicable referenced specification requirements.
   2. Sealant is compatible with specified backer rod materials as determined by ASTM C1087.
   3. Sealant is compatible with and does not adhere to specified bond breaker as determined by ASTM C1087.
   4. Sealant is compatible with and has been tested for adequate adhesion to each respective substrate. Include identification of primer(s) required to obtain adequate adhesion.

B. Test Reports:
   1. Submit test reports, as partial fulfillment of these requirements, from joint sealant manufacturers or an independent laboratory.
      a. Testing of sealants shall comply with ASTM C1021 and be dated within one year of submittal. Include a listing of tests made and their results. Test data more than one year old may be submitted provided manufacturer indicates in statement of compliance that tested sealants have not changed in formula or manufacture sufficient to produce different results.

C. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Warranties: Submit signed and dated warranties.

1.6 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Use ASTM C1087 or sealant manufacturer's standard test method to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
   3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
   5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.7 SYSTEM REQUIREMENTS

A. General Material Requirements:
   1. Where more than one of manufacturer's products comply with specified requirements, provide specific product recommended by manufacturer for particular application or condition of use in each case.
   2. Where joint fillers, sealants or other required joint materials are not specifically shown or specified, provide materials as recommended by manufacturer for proper conditions of application and use as required to fulfill system requirements.
   3. Elastomeric sealants:
      a. Hardness or consistency: Determine proper hardness or consistency in consultation with manufacturer, considering joint movement and exposure for joint size indicated.
      b. Modulus of elasticity:
         1) In general, provide sealants having lowest modulus of elasticity which is consistent with degree of exposure to wear, abrasion and vandalism.
         2) Sealant exposed to traffic shall have strength and modulus sufficiently high to resist damage by traffic, including indentation by stiletto heels.
   4. Joint fillers: Determine proper size, shape, hardness and compressibility of joint fillers in consultation with manufacturer considering joint conditions, movement and proposed sealants.

B. Performance Requirements:
   1. General: Design, manufacture and install joint materials to establish and maintain watertight and airtight continuous joint systems without causing staining or deterioration of joint substrates.
   2. Stain test response characteristics: Provide elastomeric sealants which are non-staining to porous substrates when tested in accordance with ASTM C1248.
   3. Compatibility and adhesion: Provide only sealants, joint fillers, primers and other compounds which are compatible with each other and with joint surfaces and which will adhere to joint surfaces.
   4. Ranges of hardness: In general, provide sealants within the following ranges (fully cured sealant at 75 deg F (24 deg C)):
      a. For joints subject to maximum movement and nominal exposure to weather and abrasion (such as vertical wall joints not subject to vandalism): 15 to 25 Shore A durometer hardness.
      b. For joints subject to moderate movements and severe weather exposure or moderate abrasion (such as horizontal joints exposed to light traffic or vertical joints exposed to vandalism): 25 to 40 Shore A durometer hardness.
      c. For joints subject to minimum movement and severe abrasion (such as sidewalk joints): 35 to 60 Shore A durometer hardness.

C. Color Requirements:
   1. Fully concealed joints: Provide manufacturer's standard color which has best overall performance characteristics for required application.
   2. Exposed joints:
      a. Masonry and perimeter window joints: Two colors will be required; provide custom colors to match Architect's samples.
      b. Other joints: Color to be selected from manufacturer's standard full color range by Architect.

1.8 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain materials from a single manufacturer for each different product required.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project, acceptable to manufacturer.

C. Manufacturer Qualifications: Manufacturers of elastomeric sealants shall provide qualified technical representative at Project site when requested, for purpose of rendering advice concerning proper installation of his materials.

1.9 SAMPLE INSTALLATIONS AND MOCK-UPS

A. Prior to pre-installation conference and commencing Work, provide sealants, joint fillers and other joint materials in conjunction with sample installations and mock-ups specified in other technical Sections.

B. Installations shall represent primary types of materials, substrate surfaces, joint size, exposure and other conditions to be encountered in Work.

C. Preparation, priming, application and curing shall comply with manufacturer's recommendations and actual proposed methods.

D. Schedule installations, with allowance for sufficient curing time, so that samples may be examined and necessary adjustments made at least one (1) week prior to date scheduled for commencing installation of Work.

E. Architect will visually examine samples for staining, dirt pickup, shrinkage, color, general workmanship and appearance.

F. Cut and pull sealant from each sample joint and examine for internal bubbles or voids, adhesion and general compatibility with substrate.

1.10 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

B. Furnish for review at conference, samples of sealants on production runs of substrate material, prepared as described below, as proof of adhesion of each sealant to each respective substrate.
   1. Furnish substrate samples prepared, cleaned, primed (if required) and sealant installed the same as for the sealant work.
   2. After sealant manufacturer's recommended curing period, immerse samples in tap water for at least 24 hours and present for review while immersed.

1.11 DELIVERY, STORAGE AND HANDLING

A. Deliver products to Project site in their original unopened containers bearing the name of manufacturer and brand.

B. Store, handle and protect products as recommended by manufacturer to prevent damage and deterioration. .

C. Store sealants within sealant manufacturer's recommended optimum temperature range for at least 16 hours before use. Store backer rod and bond breaker tape in clean dry areas at 70 deg F so they will not become damp, wet or frost covered.

1.12 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with installation of joint sealants under the following conditions:
   1. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer, or are below 40 deg F (4 deg C), unless approved in writing, with appropriate application procedures, by sealant manufacturer, and unless Installer provides and uses operational heat boxes for sealant installation. If heat boxes are not used, sealant installation cannot proceed.
   2. In damp or rainy weather, for exterior sealants.
   3. When joint substrates are wet. Do not install interior or exterior sealants until after substrate surfaces have thoroughly dried.

B. Joint-Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

C. Joint-Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.13 WARRANTIES

A. Provide the following written warranties:
   1. Installer's warranty: Signed by Installer agreeing to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within two years from date of Substantial Completion.
   2. Manufacturer's warranty: Signed by elastomeric sealant manufacturer agreeing to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within the following periods from date of Substantial Completion.
      a. Silicone sealants: 20 years.
      b. Polyurethane sealants: 5 years.

B. Warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
   1. Movement of structure resulting in stresses on sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
   2. Disintegration of joint substrates from natural causes exceeding design specifications.
   3. Mechanical damage caused by individuals, tools, or other outside agents.
   4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 SEALANTS

A. Sealant Type 1:
   1. Multi-component, non-sag, modified polyurethane-based elastomeric sealant; capable of ±50% movement as measured in compliance with ASTM C719, and ASTM C920, Type M, Grade NS, Class 50.
   2. Acceptable products and manufacturers:
      a. Dynatrol II by Pecora Corp.
      b. Dymeric 240/240FC by Tremco, Inc.
   3. Locations: Typical exterior joints in vertical surfaces and in horizontal non-traffic surfaces.

B. Sealant Type 2:
   1. One-part, non-sag, neutral cure, silicone sealant; capable of ±50% movement as measured in compliance with ASTM C719; ASTM C920, Type S, Grade NS, Class 50.
   2. Acceptable products and manufacturers:
      a. 791 Silicone Building Sealant by Dow Corning Corp.
      b. Silpruf SCS2000 by Momentive Performance Materials, Inc.
      c. 864 by Pecora Corp.
      d. Spectrem 3 by Tremco, Inc.
   3. Locations: Typical exterior joints in vertical surfaces and in horizontal non-traffic surfaces.

C. Sealant Type 3:
   1. Multi-component, polyurethane-based elastomeric sealant, self-leveling and with compatible non-sag sealant for use on slopes, capable of ±25% movement as measured in compliance with ASTM C719; ASTM C920, Type M, Grade P, Class 25, Use T.
   2. Acceptable products and manufacturers:
      a. Urexpan NR-200 by Pecora Corp.
      b. Sonolastic SL 2 Sealant by Sonneborn Building Products Div., BASF.
      c. THC 900/901 by Tremco, Inc.
   3. Locations: Typical exterior and interior horizontal traffic joints.

D. Sealant Type 4:
   1. Latex acrylic emulsion compound, permanently flexible, non-staining and non-bleeding, paintable, conforming to ASTM C834.
   2. Acceptable products and manufacturers:
      a. AC20 Acrylic Latex by Pecora Corp.
      b. Sonolac by Sonneborn Building Products Div., BASF.
      c. Tremflex 834 by Tremco, Inc.
   3. Locations: Typical interior joints in vertical surfaces and in horizontal non-traffic surfaces, except as otherwise indicated.

E. Sanitary Sealant:
   1. One part, non-sag, elastomeric silicone sealant containing fungicide for mildew resistance; ASTM C920, Type S, Grade NS, Class 25.
   2. Acceptable product and manufacturers:
      a. 786 Mildew Resistant Silicone Sealant by Dow Corning Corp.
      b. Sanitary SCS 1700 by Momentive Performance Materials, Inc.

c. 898 by Pecora Corp.
d. Tremsil 200 by Tremco, Inc.

3. Locations: Plumbing fixture and ceramic tile joints.

2.2 JOINT FILLERS

A. Backer Rod: Comply with ASTM C1330, of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance of the following types.

1. Type C (closed-cell material with a surface skin):
   a. Expanded closed cell polyethylene shape, compressed not more than 25 to 33 percent of its dimension at time of installation in joint opening.
   b. Acceptable products and manufacturers:
      1) ITP Standard Backer Rod by Industrial Thermo Polymers Limited.
      2) Sealtight Backer Rod by W.R. Meadows, Inc.
      3) Green Rod by Nomaco, Inc.
2. Locations: Provide for bond breaker and support for elastomeric sealants and elsewhere as indicated and required by sealant manufacturer for proper application of sealant.

B. Expansion and Isolation Joint-Filler Strips:

1. ASTM D1751, asphalt-impregnated cellulosic fiber; or ASTM D1752, cork or self-expanding cork.
2. Locations:
   a. Exterior horizontal joints where sealant is not indicated.
   b. Horizontal joints as filler below sealant and backer rod where indicated.

2.3 ACCESSORIES

A. Solvents: Oil-free cleaning solvent as recommended by sealant manufacturer.

B. Primers: Non-staining product as recommended by sealant manufacturer for each specific joint surface and condition.

C. Bond Breaker Tape:

1. Self-adhesive bond breaker tape of type recommended by sealant manufacturer and suitable for conditions of usage.
2. Liquid bond breaker and duct tape are not permitted.

D. Drain Tube:

1. Silicone rubber tubing complying with ASTM C1115, Classification TH3S2.
   a. Tube shall have maximum outside diameter of 3/8 inch (10 mm and minimum inside diameter of 1/4 inch (6 mm).
   b. Provide in color to match adjoining sealant.
2. Other drain tube materials will only be considered upon submission of suitable ultraviolet resistance test data and proof of adequate adhesion of sealant to surface of drain tube.
3. Acceptable manufacturers:
   a. Trelleborg, Inc.
   b. Spectrum Manufacturing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 JOINT PREPARATION

A. General:
   1. Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
   2. Comply with recommendations in ASTM C1193, for use of joint sealants as applicable to materials, applications, and conditions indicated.

B. Clean and prepare joint surfaces in accordance with sealant manufacturer's instructions.

C. Verify the following substrate conditions before application of primer and sealant:
   1. Remove detrimental curing or form-release compounds from joint surfaces.
   2. That joint substrates are dry, sound and thoroughly clean.
   3. Protect surfaces that have been cleaned from contamination by deleterious materials such as oil, dust and rain, until primer (where required) and sealant are applied.
   4. Use cleaning solvents as recommended by the sealant manufacturer. Furnish containers for cleaning solvent storage that are clean, oil-free and suitable for use with the solvent.

D. Substrate Preparation:
   1. Concrete, masonry, and other porous substrates:
      a. Allow concrete, masonry or other porous substrates wetted by rain or other sources of moisture to dry for at least 24 hours under good drying conditions before application of primer or sealant.
      b. Remove loose particles, dirt, paint, foreign matter, and concrete curing compound by sandblasting, nylon bristle brush or other sealant manufacturer-approved method not injurious to substrate material and that will not change appearance of exposed surfaces adjacent to sealant joint opening.
      c. Expose fine aggregate of concrete substrates to be sealed. Remove dust created by cleaning by repeated brushing with a soft bristle brush or by blowing dust from the substrate with oil-free compressed air.
      d. Clean sealant joint opening of mortar droppings and other materials that affect finished sealant joint performance prior to installation of backer rod.
   2. Mortar joints:
      a. Where indicated or specified, rake out mortar joints to width and depth indicated to receive sealant.
      b. Bring joints having excessive depth to proper depth with backer rod specified.
      c. Rake out to proper depth joints that are too shallow.
   3. Metal substrates:
      a. Remove oils, residues from forming processes, corrosion and oxide build-up by nylon bristle brush, chemical cleaners or other sealant manufacturer-approved method.
      b. Following removal, clean substrate surface using two-cloth system with a clean, lint free, white cloth soaked in solvent which is poured, not dipped, onto the cloth, followed by wiping substrate surface dry with the second clean, lint free, dry,

white cloth before solvent evaporates. Change to clean rags frequently. Brush application of solvents is not permitted.

4. Coated metal and other non-porous substrates:
   a. Clean substrate surface using two-cloth system with a clean, lint free, white cloth soaked in solvent which is poured, not dipped, onto the cloth, followed by wiping substrate surface dry with the second clean, lint free, dry, white cloth before solvent evaporates. Change to clean rags frequently. Brush application of solvents is not permitted.
   b. Clean PVDF-coated panels with solvent that is compatible with coating system, and is approved by both sealant manufacture and by coating manufacturer.

E. Prime or seal bonding joint surfaces in accordance with sealant manufacturer's recommendations.
   1. Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience.
   2. Apply primer, as recommended by sealant manufacturer, only to previously cleaned substrate surfaces to which sealants will be applied. Preferred method for application is with a clean, lint-free cloth for non-porous substrates, and a clean natural bristle brush for porous substrates.
   3. Apply primer to cloth or brush by pouring; dipping is not permitted.
   4. Take adequate measures, such as masking joint opening edges, to prevent primer from being applied to face of adjacent surfaces.
   5. Allow primer to cure as recommended by sealant manufacturer before installation of sealant.
   6. Prime only those substrate surfaces that can be sealed immediately after recommended primer curing period to preclude dust, oil, rain, condensation or other deleterious conditions to contaminate primer.
   7. Avoid migration of primer or sealer onto adjoining surfaces and remove spillage immediately.

F. Do not apply paint or other coatings or substances to surfaces adjoining joint surfaces until sealants have been installed and are nominally cured, so that adhesion will not be impaired by migration of such substances onto joint surfaces.

3.3 INSTALLATION

A. Backer Rod:
   1. Install backer rod, of proper type and size, at proper depth in joint to provide specified joint dimensions.
   2. Place backer rod into joint to avoid lengthwise stretching, twisting, braiding or lapping. Provide continuity with tight butt joints.
   3. Install dry backer rod immediately prior to installing sealant. Apply sealant with backer rod in place unless otherwise indicated.
   4. Install closed cell backer rod to avoid compression in excess of that specified and to avoid puncturing of backer rod.
   5. If backer rod is to function as a temporary joint seal for weather protection or other reasons, for a period of time before sealant installation, remove backing and replace it immediately prior to sealant installation with new backer rod.
   6. Installation of backer rod using tooling devices or putty knives is not permitted.

B. Bond Breaker Tape:

1. Install properly sized bond breaker tape so that entire surface is covered. One tape may be lapped over another to achieve total coverage.
2. Do not extend bond breaker tape onto substrate surfaces to interrupt or prevent adhesion of sealant to substrate.

C. Drain Tube:
1. Install drain tube at spacing indicated on Drawings, or no greater than 32 inches (810 mm) on center.
2. Tube shall project from face of sealant 1/4 inch (6 mm) minimum to 3/8 inch (10 mm) maximum, and inward a sufficient dimension to extend beyond interior face of sealant backing, which has been interrupted to permit drain tube installation.

D. Joint Dimensions:
1. Create joint opening depth (as measured at sealant and substrate interface) for sealant contacting and bonded to substrate surfaces of no less than 1/4 inch (6 mm) in depth, with minimum 1/8 inch (3 mm) sealant depth at mid-point of joint width.
2. Unless indicated otherwise on Drawings:
   a. For joint opening widths from 1/4 inch (6 mm) up to 1/2 inch (13 mm) wide, provide joint opening depth of 1/4 inch (6 mm).
   b. For joint opening widths over 1/2 inch (13 mm) and to 3/4 inch (19 mm) wide, provide joint opening depth of one half joint width,
   c. For joint opening widths over 3/4 inch (19 mm) and to 2 inches (50 mm) wide, provide joint opening depth no greater than 3/8 inch (10 mm).
   d. Joint openings not to exceed 1 inch (25 mm).
3. See Drawings for joint opening requirements.

E. Sealant:
1. General:
   a. Comply with sealant manufacturer's instructions, and ASTM C1193.
   b. Inspect joint opening prior to sealant installation for proper installation of backer rod or bond breaker tape, proper opening depth and proper substrate preparation, cleaning and (where required) priming.
   c. Do not apply sealant to damp, wet or frost covered substrates, backer rod or bond breaker tape.
   d. Dry-tool exposed sealant surface immediately using no lubricant such as soap and water. A lubricant is allowed, if permitted by sealant manufacturer and is a solvent or similar type product as recommended in writing by sealant manufacturer.
   e. Confine sealants to joint areas indicated by use of masking tapes or other suitable means to prevent spillage or migration onto adjoining surfaces, and to avoid smearing sealant on surfaces adjacent to joint opening.
      1) Apply tape only to those joints to be sealed the same day.
      2) Remove tape after tooling sealant surface and before sealant begins to cure.
   f. Remove excess sealant from adjacent surfaces promptly as Work progresses.
   g. Protect horizontal or other surfaces likely to receive sealant droppings during installation.
2. Non-sag or gunnable sealant:
   a. Apply non-sag sealant into joint opening with sealant gun so as to fill void completely. Use gun nozzle of proper size to fit joint opening.
   b. Take care not to smear adjoining surfaces with sealant.

c. Force sealant, by tooling, fully into joint opening and intimate contact with substrate surface.
d. Tool exposed joint surface so that slight concave surface is formed. Do not use sealant gun for tooling.

3. Pourable or self-leveling sealant:
   a. Apply self-leveling sealant to finish close to joint opening surface without overflowing and to form slightly concave joint surface.
   b. Where required due to slope or other conditions, install non-sag formulation of the same sealant in accordance with procedures specified for that sealant type.
4. At stairs, apply continuous bead of sealant to junction of walls and stair stringers, landings, treads, and risers.

3.4 CLEANING

A. Clean off excess sealant or smears with cleaning compound recommended by sealant manufacturer promptly as Work progresses.

3.5 FIELD QUALITY CONTROL

A. Sealant Compatibility Requirements:
   1. Verify adhesion qualities of intended finishes and coatings with sealants through field adhesion and peel testing.
   2. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   3. Perform tests under normal environmental conditions that will exist indicating actual installation.

3.6 CURING AND PROTECTION

A. Cure sealants in accordance with manufacturer's instructions to obtain maximum bond to surfaces, cohesive strength and durability at earliest possible date.

B. Provide proper procedures for protection of sealants during construction so that they will be without indication of deterioration or damage at time of acceptance.

END OF SECTION

DIVISION 08
DOORS AND WINDOWS

SECTION 08 1113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Exterior and interior steel doors.
   2. Exterior and interior steel frames.
   3. Insulated exterior steel doors.
   4. Steel frames for interior glazing.
   5. Glazed door (vision) panels.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 06 Section ARCHITECTURAL WOODWORK for applied wood trim.

B. See Division 08 Section FLUSH WOOD DOORS.

C. See Division 08 Section DOOR HARDWARE for hardware requirements.

D. See Division 08 Section GLAZING for glass requirements.

E. See Division 09 Section PAINTING AND FINISHING for field applied finish.

F. See Division 28 Section ACCESS CONTROL for special security hardware requirements.

G. See Division 28 Section INTRUSION DETECTION for requirements related to intrusion detection and warning systems.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Shop Drawings - Door Schedule:
   1. Submit Shop Drawings for fabrication and installation of steel doors and frames.
   2. Include locations, configuration, details, elevations, conditions at openings, and fire rating.
   3. Include hardware locations (including security hardware), mounting details and anchorage.

1.4 DEFINITIONS

A. Reference in Contract Documents to “hollow metal” doors and frames refers to Work of this Section.

1.5 SYSTEM REQUIREMENTS

A. Fire Resistance Requirements:
   1. Comply with label requirements of NFPA and applicable local codes.
   2. Fabricate door and frame assemblies that comply with NFPA 80, are identical to door and frame assemblies tested per NFPA 252 and are labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
   3. Fabricate borrowed-light frame assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.
   4. Provide UL labels permanently fastened at factory on each door and frame within size limitations established by NFPA and UL for labeling.
   5. Provide anchors for UL labeled frames required by authority having jurisdiction.

B. Interface With Other Systems:
   1. Coordinate with Work of other trades affected by Work of this Section.
   2. Provide items, such as anchors or supports, in a timely manner so as not to delay job progress.
   3. Place items, such as anchors or supports, accurately in relation to final locations.
   4. Use Contractor's bench marks.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

B. Manufacturer Qualifications:
   1. Company specializing in steel doors and frames for fire rated openings, having minimum of 5 years successful, documented experience with work comparable to that required for this Project.
   2. Company whose units are inspected, tested and listed by UL for single point hardware and astragal conditions for sizes and profiles indicated.

C. Reference Standards: Comply with applicable provisions of Steel Door Institute.

1.7 DELIVERY, STORAGE AND HANDLING

A. Protect units from damage during transit, storage and installation.

B. Tool marks, rust, blemishes and any other damage on exposed surfaces will not be acceptable.

C. Store units in dry location, off ground and in such manner as to prevent deterioration.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Hot-Rolled Sheet Steel: ASTM A1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Sheet Steel: ASTM A1008, Commercial Steel (CS).

C. Metallic-Coated Steel Sheets: ASTM A653, Commercial Steel (CS), Type B, with A40 zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

D. Prime Paint:
   1. Rust-inhibitive enamel or paint, compatible with finish paints as specified in Division 09 Section PAINTING AND COATING.
   2. For metallic-coated steel: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

2.2 ACCESSORIES

A. Supports and Anchors: Fabricate from metallic-coated sheet steel, of thicknesses as follows.
   1. Frames for interior doors: 0.052 inch thick.
   2. Frames for exterior doors: 0.064 inch thick.

B. Inserts, Bolts and Fasteners: Manufacturer's standard units, except hot-dip galvanize items built into exterior walls.

C. Jamb Anchors:
   1. Masonry and concrete substrates:
      a. Tee shaped corrugated or perforated metal anchors built into adjoining construction.
      b. Fabricate anchors from steel, same thickness as frame; 2-1/2 inches wide x 10 inches long (63 mm wide x 250 mm long).
      c. Use adjustable anchors with friction fit for frames set in masonry; weld to frames set in concrete.
      d. Provide 3 per jamb up to 7'-0” (2100 mm) high and 4 per jamb over 7'-0” (2100 mm) high.
      e. Where concrete has been placed prior to setting of frames, anchor with 3/8 inch (9 mm) countersunk flat head bolts with expansion shields or inserts; minimum 4 per jamb. Dimple and reinforce frame face to set bolt heads slightly below face.
   2. Steel stud substrates:
      a. Fabricate anchor clips from 0.0598 inch (1.5 mm) thick steel; width to match stud width.
      b. Jamb anchors: Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows:
         1) Three anchors per jamb up to 60 inches in height.
         2) Four anchors per jamb from 60 up to 90 inches in height.
         3) Five anchors per jamb from 90 up to 96 inches in height.
         4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches or fraction thereof more than 96 inches in height.
      c. Head anchors:
         1) No anchors required for frame less than 42 inches wide.
         2) Two anchors for frames more than 42 inches wide but less than 48 inches wide.
         3) Reinforced frames for frames wider than 48 inches.
   3. At fire rated frames, comply with fire resistance requirements and provide UL rated anchors.

D. Floor Anchors: Where floor fill or setting beds occur, provide 0.1046 inch (2.657 mm) thick adjustable clip angles, with pre-drilled holes, welded to frame for attachment to structural substrate.

E. Vertical Bracing:
1. For frames supported on steel studs, if studs at jamb do not extend to structure above, provide vertical steel struts, 3/8 inch x 2 inches (9 mm x 50 mm), extended from top of frame at each jamb to supporting construction above.
2. Bend top of struts at right angle and attach to supporting construction by bolting, welding or other suitable anchorage.

2.3 FABRICATION

A. General Fabrication Requirements:
1. Fabricate units rigid, neat, free from defects, warp or buckle. Shop fabricate units in largest units practicable.
2. Reinforce units as required to prevent twisting or sagging.
3. Form exposed surfaces with corners square, unless otherwise indicated. Form molded members straight and true, with joints coped or mitered. Dress welded joints smooth so they are invisible after finishing.
4. Conceal fastenings, unless otherwise indicated. Countersink exposed screws using flat, Phillips head screws.

B. Steel Doors:
1. Provide metal doors of types and styles indicated. Comply with ANSI A250.8 for materials and construction requirements.
2. Fabricate exposed faced of doors and panels from cold-rolled steel sheets.
3. Interior doors: Provide Level 2, Model 2 doors with 0.042 inch (1.0 mm) thick face sheets.
4. Exterior doors:
   a. Provide Level 4, Model 2 doors with 0.067 inch (1.7 mm) thick face sheets, metallic-coated.
   b. Weld 0.053 inch (1.3 mm) thick metallic-coated steel channels to both face sheets or form integrally with edge construction of door, to provide flush filler channel at top of doors and flush steel closure channel at bottom of doors.
   c. Seal joints in top edges of doors against water penetration. Provide weep-hole openings in bottom of doors to permit escape of entrapped moisture.
5. Pairs of doors - astragals:
   a. Labeled doors with fire rating of 1-1/2 hours or less: Do not provide astragals. Provide doors which have been tested for required fire rating without use of astragals.
   b. Exterior doors: Provide integral astragals, flush with door faces, formed from door face sheets.

C. Steel Frames:
1. Provide metal frames of types and styles indicated. Comply with ANSI A250.8 for materials and construction requirements, except brake-form custom shapes as required to provide profiles and configurations indicated.
2. Frames for interior doors: Fabricate from minimum 0.053 inch (1.3 mm) thick sheet steel.

3. Frames for exterior doors: Fabricate from minimum 0.067 inch (1.7 mm) thick sheet steel, metallic-coated.
4. For openings over 4'-0" (1200 mm) wide, increase thickness by at least 0.014 inch (0.4 mm).
5. Provide heavier thicknesses as required for configuration indicated or as required to comply with regulatory or fire rating requirements.
6. Welded frames:
   a. Fully welded construction, including jamb and head stops, with welded, mitered and reinforced corner joints.
   b. Welds on exposed faces shall be ground smooth and flush to provide smooth, seamless faces and edges.
   c. Provide 0.0598 inch (1.5 mm) thick steel channel spreaders at bottom of frames to prevent distortion during shipment and installation.
7. Mullions: Closed or tubular construction to match indicated profiles.

D. Hardware:
1. Prepare doors and frames to receive hardware. Coordinate with Hardware Schedule. Comply with SDI 107 and ANSI A115 "Specifications for Door and Frame Preparation".
2. Mortise, reinforce, drill and tap units at factory to receive mortise type hardware.
3. Reinforce, drill and tap units to receive surface-applied hardware.
4. Use minimum thickness reinforcement for hardware recommended by SDI.
5. Locate hardware as indicated on final Shop Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
6. Provide metal plaster guards for mortise cut-outs.
7. Security hardware:
   a. Door Schedule indicates doors to receive security devices. Coordinate with Work of Division 28 Section ACCESS CONTROL AND SECURITY SYSTEMS and Division 28 Section INTRUSION DETECTION.
   b. Premachine and reinforce doors and frames to receive concealed contacts (position switches) and concealed associated wiring, as indicated on hardware schedule; one contact per leaf.

E. Thermal-Rated (Insulating) Assemblies - Exterior Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C1363.

F. Glazed Frames:
1. Form glazed light frames profiles shown. Provide anchors at jambs same as for door frames. Provide closed mullion sections fabricated from minimum 0.0598 inch (1.5 mm) thick steel.
2. Miter, fit and weld corners of frames. Provide non-removable panel moldings on the exterior. Secure removable moldings with not less than No.6 x 32 Phillips oval-head countersunk machine screws at 12 inches (300 mm) on center.
3. Provide continuous felt strips cemented in place, on bed and stop surfaces, so that glass does not touch metal.

G. Glazed Door (Vision) Panels:
1. Provide glazed panels; sizes as indicated.
2. Provide glazing frame assembly with fixed and removable moldings flush with face sheets.

3. Glaze with manufacturer's standard glazing materials, consistent with fire ratings.

H. Glazing Stops:
1. Minimum 0.0359 inch (0.9 mm) thick steel.
2. Provide non-removable stops on outside of exterior doors and on secure side of interior doors.

2.4 SHOP FINISH

A. Prime Finish:
1. Clean, pretreat, and apply manufacturer's standard primer
2. Shop primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
3. Provide minimum 2 coats of primer to reinforcement and attachment steel in contact with concrete or masonry.
4. Apply primer with even consistency with a uniformly finished surface.

B. Metallic-Coated Steel Sheet Finishes:
1. Clean surfaces to remove contaminants and apply conversion coating of type suited to organic coating applied.
2. Clean welds, mechanical connections and abraded areas and apply galvanizing repair paint to comply with ASTM A780.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install in accordance with final Shop Drawings and manufacturer's instructions.

B. Frame Installation:
1. Comply with provisions of ANSI A250.11.
2. Set frames accurately in position, plumbed, aligned and braced securely.
3. Coordinate installation of built-in anchors for wall partition construction.
4. Terminate frames at indicated finished floor level. Where floor fill or setting beds occur, support frames with adjustable clip angles, anchored to structural substrate.
5. Anchor frames to concrete with bolts, spacers and masonry anchorage devices; fill depressions in frames with body putty and grind smooth.
6. After wall construction is complete, remove temporary braces and spreaders.
7. Leave surfaces smooth and undamaged.

C. Door Installation: Fit doors accurately in frames within clearances specified in ANSI A250.8, unless otherwise shown.

D. Install labeled fire doors and frames to meet requirements of cited references and NFPA Standard No. 80.

E. Install hardware in accordance with hardware manufacturer's instructions and as specified in Division 08 Section DOOR HARDWARE. Adjust installation to provide uniform clearance at head and jambs and to contact stops uniformly.

3.3 ADJUSTING, REPAIR AND CLEANING

A. Adjusting:
1. Before completion of Work, adjust hardware until doors operate properly.
2. Adjust doors to provide uniform clearance at head and jambs and to contact stops uniformly.
3. Test security devices with operation of security system in Owner's presence.

B. Repair:
1. Remove and replace doors which are warped, bowed, not properly fitted to frames or otherwise damaged; and doors which do not swing or operate freely.
2. Sand smooth rusted or damaged areas of prime coat and touch-up with compatible air-drying primer.
3. Replace defective, damaged, missing or stolen hardware.
4. Repair damaged metallic coating in accordance with ASTM A780.

C. Cleaning: Clean doors and frames.

3.4 PROTECTION

A. Protect units during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 08 1416

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Interior flush wood doors.
   2. Glazed door (vision) panels.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section HOLLOW METAL DOORS AND FRAMES for steel frames.

B. See Division 08 Section DOOR HARDWARE for hardware requirements.

C. See Division 08 Section GLAZING for glass requirements.

D. See Division 09 Section PAINTING AND COATING for field applied finish.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each type of door. Include details of core and edge construction, and trim for openings.
   2. Include shop-finishing specifications.
   3. Submit manufacturer’s instructions for installation of positive pressure seals.

B. Shop Drawings - Door Schedule:
   1. Submit Shop Drawings for fabrication and installation of wood doors.
   2. Include locations, configuration, details, elevations, dimensions and locations of openings.
   3. Include location and extent of hardware blocking, and dimensions and locations of mortises and holes for hardware conditions**.**
   4. Indicate requirements for veneer matching. Indicate doors to be shop-finished and finish requirements.

C. Samples:
   1. Submit three sample sets for each type of transparent finished veneer showing full range (high, middle and low) of color, texture and finish expected in completed Work.
   2. Sample sets shall consist of minimum three samples in each set.
   3. Samples shall be minimum 12 inches x 12 inches (300 mm x 300 mm).

1.4 CLOSEOUT SUBMITTALS

A. Warranty: Submit signed and dated warranty.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain flush wood doors from single manufacturer.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Certificate of Fire Retardant Treatment:
   1. Certify that fire-retardant salts used comply with local building code requirements, with AWPA Standard C20 for lumber and C27 for plywood, and will not bleed through finished surfaces.
   2. State name of salts used.

D. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Standards."
   1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.

1.6 DELIVERY, STORAGE AND HANDLING

A. Package doors in vented opaque polybags at factory prior to shipment.

B. Protect doors against damage during handling, transit and storage.

C. Store doors in clean, dry, well-ventilated place, protected from dampness, moisture and weather, in accordance with manufacturer's directions.
   1. Locate stored doors out of direct sunlight, at temperature of not less than 40 deg F (4 deg C).
   2. Store doors by stacking flat so air will circulate under stack and doors do not bend or sag.
   3. Do not walk on nor place other materials on top of stacked doors.

D. Do not drag doors across one another or across other surfaces.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Do not install doors until concrete, masonry, plaster and tile Work are completed and dried in areas receiving doors.
   2. Condition doors to average prevailing humidity in installation areas prior to hanging.
   3. Do not subject doors to abnormal heat, dryness or humidity.
   4. Avoid sudden changes such as forced heat (used to dry out building).

1.8 WARRANTY

A. Provide written warranty signed by Contractor, door manufacturer and installer, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced standards.

B. Warranty Period:
   1. Solid core and mineral core: "Life of Original Installation".

2. Hollow core: 5 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers - Typical Flush Doors:
1. Algoma Hardwoods, Inc.
2. Eggers Industries, Architectural Door Division.
3. Lambton Doors.
4. VT Industries, Architectural Door Division.
5. Marshfield Door Systems, Inc.

2.2 DOOR CONSTRUCTION, GENERAL

A. General:
1. Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.

B. Doors for Transparent Finish:
1. Grade: Premium, with Grade AA faces.
2. Species and cut: White oak, rift cut.
3. Matching:
a. Matching of adjacent veneer leaves: Bookmatch.
b. Matching within door face: Center balanced match.
c. Pair and set match: Provide for doors hung in same opening or separated only by mullions.
d. Where indicated, provide doors with faces produced from same flitches as wood panels; match veneer lay-up and sequencing of adjoining wall panels. Comply with requirements in Division 06 Section ARCHITECTURAL WOODWORK.
4. Stiles: Applied wood-veneer edges of same species as faces and covering edges of faces.
5. Veneer manufacturer:
a. Provide veneer flitches equivalent to those from Bacon Veneer Company, Burr Ridge, IL.
b. Provide veneers for architectural woodwork and wood doors from same flitches. See Division 06 Section ARCHITECTURAL WOODWORK.
c. Inform Architect of date by which flitches must be selected, so as not to delay Project.

C. Doors for Painted (Opaque) Finish:
1. Grade: Custom.
2. Faces: Medium-density overlay.
3. Stiles: Manufacturer's standard construction.

2.3 SOLID CORE DOORS

A. Particleboard Cores:
1. Particleboard: Mat-formed particle board complying with ANSI A208.1, Grade LD-1 or LD-2 as standard with door manufacturer.
2. Blocking: Provide wood blocking as needed to eliminate through-bolting hardware.

B. Interior Veneer-Faced Doors:
   1. Core: Particleboard.
   2. Construction:
      a. Hot press 5-ply, complying with AWI PC-5. Use of 2-ply faces is not acceptable.
      b. Bond stiles and rails to core, then abrasive plane entire unit before veneering.
   3. Crossband: Manufacturer's standard hardwood veneer or engineered composite.

2.4 FABRICATION

A. General:
   1. Fabricate units rigid, neat, free from defects, warp or buckle.
   2. Doors to be field-painted: Fabricate doors in sizes indicated for Project-site fitting.
   3. Transparent-finish doors:
      a. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels, unless otherwise indicated:
         1) Comply with clearance requirements of referenced quality standard for fitting.
      b. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
         1) Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
   4. Provide factory cutouts for openings in doors where indicated.
   5. Factory glaze doors to receive glass, where practical.

B. Pre-Hung Wood Door Frames:
   1. Provide one piece frame with adjustable stop.
   2. Form profile to match manufacturer's standard selected by Architect.

C. Glazed Openings in Doors:
   1. Refer to Division 08 Section GLAZING for glass requirements.
   2. Use door manufacturer's standard glazing system, suitable for condition and location of installation.
   3. Trim openings with moldings of material and profile indicated. Miter corners of frames and trim.

2.5 SHOP FINISHES

A. Transparent Finish Interior Doors:
   1. Provide complete factory finishing. Comply with AWI recommendations.
   2. Finish faces and tops, bottoms and edges of doors.
   3. Finish: Clear, satin gloss, UV-cured polyurethane topcoat; manufacturer's standard finish with performance requirements comparable to AWI System catalyzed polyurethane transparent..

B. Paint (Opaque) Finish Doors:
   1. Prime doors with primer which is compatible with field applied finish paint coats. Prime faces and tops, bottoms, and edges of doors. Comply with AWI recommendations.
   2. Finish: Refer to Division 09 Section PAINTING AND COATING.

C. Factory prime or finish cutouts after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install in accordance with final Shop Drawings and manufacturer's instructions.

B. Paint Finish Doors:
   1. Align and fit doors in frames with uniform clearances and bevels as indicated below.
   2. Machine doors for hardware. Seal cut surfaces after fitting and machining.
   3. Touch-up prime coat of paint, including edges of cutouts.
   4. Fitting clearances for unrated doors:
      a. Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors; and 1/8 inch (3.2 mm) from bottom of door to top of floor finish or covering.
      b. Where threshold is indicated, provide 1/4 inch (6.4 mm) clearance from bottom of door to top of threshold.
      c. Bevel door 1/8 inch in 2 inches (3-1/2 deg) at lock and hinge edges.

C. Veneer-faced Doors:
   1. Align doors in frames for uniform clearance at each edge.
   2. Do not field cut, trim, fit or machine transparent finish veneer doors unless necessary. Restore finish before installation if fitting or machining is required at Project site.

D. Install hardware in accordance with hardware manufacturer's instructions and as specified in Division 08 Section DOOR HARDWARE. Adjust installation to provide uniform clearance at head and jambs and to contact stops uniformly.

3.3 ADJUSTING, REPAIR AND CLEANING

A. Adjusting:
   1. Before completion of Work, adjust hardware until doors operate properly.
   2. Adjust doors to provide uniform clearance at head and jambs and to contact stops uniformly.

B. Repair:
   1. Remove and replace doors which are warped, bowed, not properly finished, fitted to frames or otherwise damaged; and doors which do not swing or operate freely. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
   2. Touch-up marred finishes to match adjacent unmarred surfaces.
   3. Replace defective, damaged, missing or stolen hardware.

C. Cleaning: Clean doors.

3.4 PROTECTION

A. Protect units during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 08 3100

ACCESS DOORS AND PANELS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Access panels as indicated on Drawings.
   2. Access panels for items of mechanical, plumbing and electrical Work located behind or above finished walls or ceilings which require access, whether or not such panels are indicated on Drawings.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in access door or panel equipment having minimum of 5 years successful, documented experience with work comparable to that required for this Project.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers - Access Panels:
   1. Listed products establish standard of quality and are manufactured by Milcor Inc., except as indicated.
   2. Equivalent products by following are acceptable:
      a. Cierra Products (Babcock-Davis).
      b. Activar, Inc.
      c. Karp Associates, Inc.

2.2 ACCESS PANELS

A. Flush Panel - Gypsum Board:
   1. Frame: 16 gage (1.5 mm) steel with integral galvanized steel drywall bead.
   2. Panel: 14 gage (1.9 mm) steel fitted flush with drywall bead.
   3. Hardware:
      a. Concealed spring hinges or concealed continuous piano hinge.
      b. Flush key operated cylinder lock.
   4. Finish: Factory prime coat.
   5. Acceptable product and manufacturer: Equivalent to Style DW by Milcor.

B. Flush Panel - Masonry, Concrete, and Tile:
   1. Frame: 16 gage (1.5 mm) steel with a nominal 1 inch (25 mm) exposed frame flange.
   2. Panel: 14 gage (1.9 mm) steel, fitted flush with frame flange.
   3. Hardware:
      a. Concealed spring hinges or concealed continuous piano hinge.
      b. Galvanized steel masonry anchors.
      c. Flush key operated cylinder lock.
   4. Finish: Factory prime coat.
   5. Acceptable product and manufacturer: Equivalent to Style M by Milcor.

C. Flush Stainless Steel Panel - Tile:
   1. Frame: 16 gage (1.6 mm) stainless steel with nominal 1 inch (25 mm) exposed frame flange.
   2. Panel: 16 gage (1.6 mm) stainless steel, fitted flush with frame flange.
   3. Hardware:
      a. Concealed spring hinges or concealed continuous piano hinge.
      b. Galvanized steel masonry anchors.
      c. Flush key operated cylinder lock.
   4. Finish: No. 4 satin finish.
   5. Locations: Toilet Rooms and Locker/Shower Rooms with ceramic tile wall finish.
   6. Acceptable product and manufacturer: Equivalent to Style MS by Milcor.

D. Flush Panel - Gypsum Board Ceilings:
   1. Frame: 16 gage (1.5 mm) steel, recessed to coordinate with gypsum board ceiling suspension framing members.
   2. Panel: 18 gage (1.2 mm) steel, recessed to accept 2 layers of gypsum board.
   3. Hardware:
      a. Continuous steel piano type hinge with stainless steel pin.
      b. Sleeved and grommeted screwdriver operated cam lock.
   4. Finish: Factory prime coat.
   5. Acceptable product and manufacturer: Equivalent to Style ATR by Milcor.

E. Fire Rated Panels:
   1. Frame: 16 gage (1.5 mm) steel with a nominal 1 inch (25 mm) frame flange and integral masonry anchors for masonry installations.
   2. Panel: 20 gage (.9 mm) steel, sandwich construction, with non-combustible insulation core.
   3. Temperature rise rating: 250 deg F at the end of 30 minutes.
   4. Hardware:
      a. Continuous steel piano type hinge for length of panel.
      b. Latching device with flush cylinder lock and interior latch release.
      c. Automatic panel closer.
   5. Finish: Factory prime coat.
   6. Install UL label on each panel.
   7. Locations: Access panels in fire-rated partitions.
   8. Acceptable product and manufacturer: Equivalent to Style UFR by Milcor.

F. Exterior Access Panels:
   1. Frame: Extruded aluminum, 0.08 inch (2 mm) thick, with nominal 1-1/4 inch (32 mm) exposed frame flange.

2. Panel: 0.06 inch (1.5 mm) thick aluminum, fitted flush with frame flange; with 2 inch (50 mm) thick glass fiber insulation.
3. Hardware:
   a. Concealed, gasketed weatherseals.
   b. Continuous stainless steel piano hinge.
   c. Key-operated lockable handle on exterior.
4. Finish: Primed for field painting.
5. Size: 36 inch x 36 inch (914 mm x 914 mm).
6. Acceptable product and manufacturer: Equivalent to Cierra B-XT Series by Babcock-Davis.

G. Exterior Access Panels - Vertical Installation:
1. Frame: 16 gage (1.5 mm) steel with a nominal 1 inch (25 mm) exposed frame flange.
2. Panel: 14 gage (1.9 mm) steel, fitted flush with frame flange.
3. Hardware:
   a. Concealed, gasketed weatherseals.
   b. Concealed continuous piano hinges.
   c. Galvanized steel masonry anchors.
   d. Flush key operated cylinder locks in sufficient number for size of panel.
4. Finish: Hot-dip galvanize all components after fabrication.
5. Product and manufacturer and manufacturer: DSC-214M, galvanized and gasketed by Karp Associates.

H. Latching and Locking Devices:
1. Provide number of latches for each access panel in sufficient quantity to hold door in flush, smooth plane when closed; but at least one latch per door.
2. For panels so specified, provide key operated cylinder lock in lieu of screwdriver-operated latch. If more than 1 latch is required for a panel, provide lock in lieu of 1 latch.
   a. Key all locks alike, for all access panels.
   b. Provide 2 keys for each panel with lock.
3. For panels with recessed doors, provide access sleeves for each latch and each lock. Furnish plastic grommets, for installation in hole cut through applied finish material.

2.3 ACCESSORIES

A. Fasteners: Provide fasteners recommended by access panel manufacturer, as appropriate for attachment to each type of substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Adjust for proper operation.

C. Install face of door flush with adjacent finished surface.

3.3 CLEANING AND PROTECTION

A. Clean exposed metal surfaces in accordance with manufacturer's instructions. Touch up damaged metal coatings.

B. Protect units from damage during construction.

END OF SECTION

SECTION 08 3300

COILING DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Coiling doors.
   2. Coiling fabric doors.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 09 Section PAINTING AND COATING for field applied painting systems.

B. See Division 13 Section METAL BUILDING SYSTEMS for steel framing.

C. See DIVISION 26 for electrical connection requirements.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component.

B. Shop Drawings:
   1. Submit Shop Drawings for fabrication and installation of overhead coiling doors.
   2. Include locations, configuration, details, elevations, conditions at openings and anchoring and supporting systems.
   3. Include provisions for operation requirements.

C. Samples: Submit 12 inch square (300 mm square) samples of finished grilles.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit manufacturer's certification that doors have been designed, fabricated and installed to meet or exceed specified performance requirements.

B. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Submit operation, cleaning and maintenance data for materials and systems provided.
   2. Include list of replacement parts and sources.
   3. Include copy of submittal in Project information manual.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Design Drawings: Drawings indicate design concept with regard to size, shape and location of various components and together with Specifications impose performance requirements, outline material selections, fabrication methods and installation procedures for completed systems.
   2. Design and engineering:
      a. Contractor is responsible for design and engineering as required to fulfill performance criteria.
      b. Provide door systems complete with required components including frames, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, motors and installation accessories, as required to suit openings, allowable head room and operating requirements.

B. Structural Requirements:
   1. Exterior doors: Design, fabricate, reinforce and install doors to withstand gravity loads and 22 psf (110 kg/m^2) wind load, acting inward and outward, with maximum deflection of l/120 of clear opening width, without permanent deformation of door components.
   2. Interior doors: Design, fabricate, reinforce and install doors to withstand operating loads with maximum deflection of l/120 of clear opening width, without permanent deformation of door components.

C. Cycles of Operation Requirements:
   1. Design, fabricate and install door operator and components for 100,000 cycles of operation, without limitation of frequency of cycling.
   2. "Cycle": Starting from door in fully closed position, door moves to fully open position and then back to fully closed position.

D. Electrical Wiring Requirements:
   1. Provide complete installation of wiring to connect parts of equipment.
   2. Wiring shall be in accordance with applicable local codes and National Electric Code Standard.
   3. Materials shall be U.L. listed.
   4. Conceal wiring unless otherwise shown.
   5. Test entire wiring system for insulation to ground.
   6. Connect parts of equipment with insulated wiring as required for operation.

E. Interface With Other Systems:
   1. Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of units.
   2. Coordinate templates and anchorage devices with adjoining Work.

1.7 QUALITY ASSURANCE

A. Single Source Responsibility: Provide doors manufactured by one manufacturer for entire Project.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project, acceptable to manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Products and Manufacturers – Coiling Doors:
   1. Listed products establish standard of quality and are as indicated below.
   2. Equivalent products by following are acceptable:
      a. The Cookson Co.
      b. McKeon Rolling Steel Door Company.
      c. Raynor Garage Doors.

2.2 COILING DOORS

A. Steel Curtain – Interior Doors:
   1. Interlocking flat slats fabricated from structural quality, cold-rolled galvanized steel sheets complying with ASTM A653, structural quality, Grade 33, with G90 (Z275) zinc coating; minimum 20 gage (1 mm).
   2. Slat profile: Flat slat, equivalent to F-265 by Overhead.
   3. Provide continuous endlocks and windlocks as required to comply with structural requirements.
   4. Provide bottom bar for curtain reinforcement.

B. Insulated Steel Curtain – Exterior Doors:
   1. Double faced, insulated, interlocking flat slats fabricated from structural quality, cold-rolled galvanized steel sheets complying with ASTM A653, structural quality, Grade 33, with G90 (Z275) zinc coating; minimum 22 gage (.85 mm).
      a. Slat profile: Flat slat, equivalent to No. F-2651 Insulated Slats by Overhead.
      b. Insulation: Foamed-in-place polyurethane.
   2. Provide continuous endlocks and windlocks as required to comply with structural requirements.
   3. Provide bottom bar for curtain reinforcement, fitted with bottom weatherseal.

C. Guides:
   1. Steel shapes or angles, not less than 3/16 inch (5 mm) thick.
      a. Extend wall angles above door opening head to support coil brackets, unless otherwise indicated.
      b. Provide removable stops on guides to prevent over-travel of curtain and a continuous bar for holding windlocks.
   2. Provide required fasteners to attach at jambs.
   3. Provide with windlock bars as required to fulfill performance requirements.
   4. Weatherstripping:
      a. Provide with continuous weatherstripping at insulated doors.
      b. Provide weatherstripping at interior door at Chassis Wash M1-1.

D. Brackets: Manufacturer's standard design, either cast iron or cold-rolled steel plate with bell mouth guide groove for curtain.

E. Barrel and Counterbalance Mechanisms:
   1. Barrel: Fabricate from hot-formed structural-quality carbon steel, welded or seamless pipe, of sufficient diameter and wall thickness to support roll-up of curtain without

distortion of slats and to limit barrel deflection to not more than 0.03 inch per foot (.75 mm per 300 mm) of span under full load.

2. Provide spring balance of adjustable steel helical torsion springs.
   a. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Provide high cycle springs as required to comply with cycles of operation requirements.
   b. Provide cast steel barrel plugs to secure ends of springs to barrel and shaft.
3. Fabricate torsion rod for counterbalance shaft of cold-rolled steel in size required to hold fixed spring ends and carry torsional load.
4. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

F. Hood:
1. Fabricate from same material and finish as curtain, minimum 24 gage, reinforced as required for length of run.
2. Provide with weather baffle.

G. Finishes:
1. Hood and curtain slats:
   a. Shop finish with manufacturer's standard baked enamel finish or powder-coat-applied finish, consisting of primer and topcoat(s) according to coating manufacturer's written instructions for cleaning, pretreatment, application, thermosetting, and minimum dry film thickness.
   b. Color and gloss: As selected by Architect from manufacturer's full range of colors and glosses.
2. Shop prime other non-galvanized, exposed ferrous metal components with manufacturer's standard rust-inhibitive primer.

H. Motor Operation:
1. Provide power operation complete in enclosed assembly, with high-starting torque motor that will raise or lower door at approximately 12 inches (300 mm) per second, with thermal overload protection.
2. Provide motor and components as required to comply with cycles of operation requirements.
3. Provide electrically operated safety bottom bar attached to bottom angles of curtain which will instantly stop downward movement and reverse to fully open position upon contact with any obstruction.
4. Provide electric eye sensing devices which will prevent downward movement of curtain when beam is broken by any obstruction.
5. Control stations:
   a. Interior:
      1) Heavy duty full guarded, surface mount NEMA ICS 6 Type enclosure.
      2) Constant contact; 2 buttons: “open” and “close”.
      3) Locations: Provide one-2-button station at each jamb. Priority goes to whichever station is accessed first.
   b. Exterior:
      1) Key operated.
      2) Location: Right jamb.
   c. Provide separate control station for each door.
6. Emergency operation:

a. Provide mechanism for automatically engaging sprocket and chain operator and releasing brake for emergency use, operable from floor.
b. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
c. Arrange emergency operator to not affect timing of limit switch for power operations.

7. Safety interlock switch: Equip doors with safety interlock switch to disengage power supply when doors are locked

I. Acceptable Products and Manufacturer:
1. Interior Doors – Type 1: Series 610 by Overhead.
2. Exterior Doors – Type 4: Insulated Series 625 by Overhead.

2.3 FABRIC ROLL-UP DOORS:

A. Fabric Roll-Up Doors:
1. Description: High speed electric powered fabric roll-up doors.
2. Material: Polyester multifilament PVC-coated fabric.
3. Color: As selected by Architect from manufacturer's full range.

B. Operation:
1. Electric operator to allow for opening speeds of up to 100 inches per second.
2. Motor: 1 or 2 hp, 230/460 volts, 3 phase unit.
3. Self-diagnostic custom microprocessor with variable frequency motor drive.
4. Electric control panel: NEMA-4 rated enclosure, assembled and ready for connection by others. Control panel must have push button emergency stop.
5. Edges:
a. Curtain bottom edge to be free of any rigid structural pieces.
b. Bottom edge equipped with a flexible wireless reversing edge.
c. Reversing edge to be sealed within the full width of the bottom curtain loop and is activated only when pressure is applied.
d. Reversing signal sent wirelessly via transmitter and receiver eliminating coil cords.
e. Wires on the bottom edge or sides of curtain will not be allowed; coil cords are also not allowed.
6. Send and receive photo eye to be provided.
7. Absolute encoder to provide infinite adjustment. Adjustments to be made without the aid of special tools. Doors requiring manual assistance, recalibration, or operator interface with door controls after power loss are not allowed.
8. Door actuation: [Single control with Open / Close and Emergency Stop push buttons.] [Ceiling mounted, low voltage pull switch.] [Radio control actuator. [Motion detector system.]
9. Curtain displacement and recapture system:
a. Door curtain shall be able to release at any point of the full height on both edges of door.
b. Door curtains that partially release are not acceptable.
c. Impacted or displaced curtain will automatically recapture itself on the next upward cycle. Doors requiring manual assistance, recalibration, or operator interface with door controls for curtain alignment are not allowed.
d. Doors requiring breakable tabs, tape connections, or wind knobs or wheels on the curtain will not be allowed.

10. Springs in barrels and/or side columns will not be allowed. Tension straps will not be allowed.
11. Curtain and track retention system
    a. Door curtain to be free of any rigid profiles, structural stiffeners and bottom bars.
    b. Door curtain top seal integrated to door curtain. Top seal rolls up with door to prevent scraping of vision window and curtain discoloration. Seal to automatically deploy against wall when door is fully closed. Door curtains with top seal penetrating wall or constant contact while door rolls up are not allowed.
    c. Top to bottom continuous side seals. Curtain edges to have continuous lateral reinforced strips from floor to top of opening eliminating potential of gaps for air infiltration. Doors using brush seals or gasket seals which touch fabric as the door rolls are not acceptable.
    d. Continuous track system to fully retain curtain the entire length of the side guides and require no more than ½ inch gap for door curtain edges to travel inside of. Track Systems requiring additional brushes or gasket attached to side frames are not acceptable.
    e. Low profile side column requires 5-1/2 inch wall space on each side of door opening.
12. Provide a minimum 16 gauge galvanized steel side guide/frame system.
13. Acceptable product and manufacturer: Equivalent to Model 615 High Speed Fabric Roll-Up Door System by Marathon.

2.4 ACCESSORIES

A. Provide anchors, inserts and other miscellaneous accessories as required for complete installation.

B. Provide vision lights where shown, consisting of individual slat cut-outs with weathertight inserts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Erect coiling doors as complete units in accordance with final Shop Drawings and manufacturer's instructions.

B. Install plumb, level and true to established building lines.

3.3 ADJUSTING AND CLEANING

A. Upon completion of each installation, test operation to demonstrate satisfactory operation acceptable to Architect.

B. Repair damaged galvanized coating in accordance with ASTM A780.

C. Adjust as required for proper operation.

D. Clean surfaces and lubricate joints and bearings in accordance with manufacturer's instructions.

3.4 PROTECTION

A. Protect doors from weathering, deterioration or damage until acceptance.

END OF SECTION

SECTION 08 3613

SECTIONAL DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Extruded aluminum framed doors with glass and aluminum panel infill.
   2. Glass and glazing.
   3. Coordination and provisions for Owner furnished and installed security access devices.
   4. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section METAL FABRICATIONS for support framing and bracing.

B. See Division 08 Section COILING DOORS AND GRILLES.

C. See Division 08 Section GLAZING for glass requirements.

D. See Division 09 Section PAINTING AND COATING for field applied painting systems.

E. See DIVISION 26 for electrical connection requirements.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component.

B. Shop Drawings: Submit Shop Drawings showing components for proper installation including anchoring and supporting systems and provisions for operation requirements.

C. Samples: Submit 12 inch (300 mm) long samples of finished frame members for each required profile, material and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates: Submit manufacturer's certification that doors have been designed, fabricated and installed to meet or exceed specified performance requirements.

B. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit operation, cleaning and maintenance data for materials and systems provided.
2. Include list of replacement parts and sources.
3. Include copy of submittal in Project information manual.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
1. Design Drawings: Drawings indicate design concept with regard to size, shape and location of various components and together with Specifications impose performance requirements, outline material selections, fabrication methods and installation procedures for completed systems.
2. Design and engineering:
   a. Contractor is responsible for design and engineering as required to fulfill performance criteria.
   b. Provide door systems complete with required components including frames, sections, brackets, guides, tracks, counterbalance mechanisms, hardware, motors and installation accessories, as required to suit openings and allowable head room.

B. Structural Requirements:
1. Exterior doors: Design, fabricate, reinforce and install doors to withstand 22 psf (107 kg/m²) wind load, acting inward and outward, plus operating loads times safety factor of 1.5 with maximum deflection of l/120 of clear opening width.

C. Cycles of Operation Requirements: Design, fabricate and install doors for 100,000 cycles of operation.

D. Electrical Wiring Requirements:
1. Provide complete installation of wiring to connect parts of equipment.
2. Wiring shall be in accordance with applicable local codes and National Electric Code Standard.
3. Materials shall be UL listed.
4. Conceal wiring unless otherwise shown.
5. Test entire wiring system for insulation to ground.
6. Connect parts of equipment with insulated wiring as required for operation.

E. Interface With Other Systems:
1. Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of units.
2. Coordinate templates and anchorage devices with adjoining Work.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project, acceptable to manufacturer.

B. Single Source Responsibility: Provide doors manufactured by one manufacturer for entire Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Clopay Corp.
   2. Equivalent products by following are acceptable:
      a. Ceco/Windsor Door, Little Rock, AR.
      b. Overhead Door Corp., Dallas, TX
      c. Raynor Garage Doors, Dixon, IL.

2.2 SECTIONAL DOORS

A. Configuration: High lift, follow roof track, as indicated.

B. Stiles and Rails:
   1. Heavy duty, extruded aluminum components.
   2. Thickness: Nominal 2-1/8 inches (54 mm).
   3. Face dimensions:
      a. Top and bottom rails: As required for door dimension.
      b. Combined meeting rail pairs: Nominal 3-1/2 inches (89 mm) wide.
      c. Center stiles: Nominal 2-13/16 inches (71.4 mm) wide.
      d. End stiles: Nominal 3-1/2 inches (89 mm) wide.
   4. Provide meeting rails designed for rabbetted weather joints.
   5. Provide throughrods to secure stiles and rails and reinforcing fins on intermediate rails as required to fulfill performance requirements.

C. Panels:
   1. Aluminum panels and glass panels, located as indicated on Drawings.
      a. Aluminum: Flat aluminum panels, minimum 1/2 inch (13 mm), insulated.
      b. Vision panels: Manufacturer's 1/2 inch (13 mm) thick clear insulating glass.
   2. Provide manufacturer's standard glazing system.

D. Tracks:
   1. Galvanized steel, continuous angle mounted, reinforced as required to fulfill performance requirements.
   2. Size: As required for conditions of installation.
   3. Provide required fasteners for attachment to substrates indicated.

E. Hardware:
   1. Fabricate hinges and brackets from galvanized steel.
   2. Provide rollers with hardened steel ball bearings.
   3. Counterbalance:
      a. Heavy-duty springs on continuous ball-bearing cross header shaft.
      b. Provide galvanized lifting cables with minimum 5:1 safety factor.

F. Locking: Inside spring loaded slide bolt lock on end stile that engages slot in track.
   1. Provide one inside slide lock.

G. Provide continuous weatherstripping as follows:
   1. Door bottom: Single contact aluminum and vinyl compression seal.

2. Jambs and head: EPDM rubber fastened to jamb frames, and to header or top of door as required to suit seal configuration.

H. Finishes:
1. Aluminum components: Clear anodized finish.
2. Non-galvanized, exposed ferrous metal components: Shop prime for field painting with primer which is compatible with finish paint systems specified in Division 09 Section FIELD PAINTING.

I. Spring Counterbalance: Torsion spring counterbalance mechanism sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable with minimum 7 to 1 safety factor.
1. High Cycle Spring: 100,000 cycles.

J. Motor Operation:
1. Provide power operation complete in enclosed assembly, with high-starting torque motor that will raise or lower door at approximately 12 inches per second (300 mm per second), with thermal overload protection.
2. Provide safety bottom bar attached to bottom angles of curtain which will instantly stop downward movement and reverse to fully open position upon contact with any obstruction.
3. Control stations:
a. Interior:
1) Heavy duty full guarded, surface mount NEMA ICS 6 Type enclosure.
2) Constant contact; 2 buttons: “open” and “close”.
3) Locations: Provide one-2-button station at each jamb. Priority goes to whichever station is accessed first.
b. Exterior:
1) Key operated.
2) Location: Right jamb.
c. Provide separate control station for each door.
4. Emergency operation:
a. Provide mechanism for automatically engaging sprocket and chain operator and releasing brake for emergency use, operable from floor.
b. Include interlocking devices to automatically prevent motor from operating until emergency sprocket and/or manual locking provision are disengaged.
c. Arrange emergency operator to not affect timing of limit switch for power operations.

K. Acceptable Product and Manufacturer: Equivalent to Series 903 by Clopay.

2.3 ACCESSORIES

A. Safety/Conspicuity Stripe Appliqué:
1. Apply polyester or polyester/vinyl hazard identification tape to vision panels in patterns and locations as shown on Drawings.
2. Requirements:
a. Colors: Alternating, yellow and clear.
b. Flexible prismatic reflective surface.
c. Pre-sealed edges.
d. Pressure sensitive adhesive application.

e. 10-year warranty.

3. Installation: In accordance with manufacturer’s instructions and recommendations.

4. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Daybrite Reflective V92 by Reflexite Corporation.

b. Premium Engineering Grade reflective tape by Nikkalite (Nippon Carbide Industries [USA], Inc.).

c. Diamond Grade Series 983 conspicuity markings by 3M.

B. Provide hinges, hardware, anchors, inserts and other miscellaneous accessories as required for complete installation.

C. Galvanizing Repair Paint: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Erect doors as complete units in accordance with final Shop Drawings and manufacturer's instructions.

B. Install plumb, level and true to established building lines.

C. Anchor and support as required for rigid installation.

3.3 ADJUSTING AND CLEANING

A. Upon completion of each installation, test operation to demonstrate satisfactory operation , including security operation, acceptable to Architect.

B. Adjust as required for proper operation.

C. Clean surfaces and lubricate joints and bearings in accordance with manufacturer's instructions.

3.4 DEMONSTRATION

A. Startup Services: Engage a factory-authorized service representative to perform startup services and to train Owner's maintenance personnel as specified below:

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

a. Test door closing when activated by detector or alarm connected fire-release system. Reset door-closing mechanism after successful test.

2. Train Owner's maintenance personnel on procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance, and procedures for testing and resetting release devices.
3. Review data in the maintenance manuals.

3.5 PROTECTION

A. Protect doors from any weathering, deterioration or damage until acceptance.

END OF SECTION

SECTION 08 4113

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
1. Aluminum framing for glass, panels, doors and other components.
2. Aluminum-framed entrance doors and hardware.
3. Curtainwall construction.
4. Operable window construction.
5. Aluminum sheet metal Work including aluminum trim and miscellaneous closures.
6. Glass and glazing.
7. Sealants, joint fillers and gaskets.
8. Flashing, weeps and vents.
9. Perimeter and integral anchors, reinforcing, inserts, bearings, expansion devices and fasteners.
10. Finishing.
11. System design and engineering.

B. Single Subcontract Responsibility: Retain a single firm or company to design, fabricate and install Work of this Section and related Sections so as to establish undivided responsibility for entire window wall system.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section FLUOROPOLYMER FINISH for resinous coating requirements.

B. See Division 07 Section SHEET METAL FLASHING AND TRIM for perimeter flashing.

C. See Division 07 Section FIRESTOPPING for firestopping.

D. See Division 07 Section JOINT SEALANTS for perimeter joint fillers and sealants.

E. See Division 08 Section ALUMINUM WINDOWS.

F. See Division 08 Section DOOR HARDWARE for entrance door hardware.

G. See Division 08 Section GLAZING.

H. See Division 13 Section METAL BUILDING SYSTEMS for additional requirements related to Work of this Section.

I. See DIVISION 26 for wiring requirements for electrically operated hardware devices and electrical provisions for security system.

1.3 ACTION SUBMITTALS

A. Combined Submittal:
   a. Submit items required in this Section as a combined submittal with requirements of Division 07 Section JOINT SEALANTS and Division 08 Section DOOR HARDWARE and Division 08 Section GLAZING.
   2. Assemble submittals, including Product Data, Shop Drawings and Samples, of principal component parts into this submittal and prepare coordination details and erection diagrams for complete system.
   3. Show in this submittal that window wall system has received prior approval of Contractor, installer, and manufacturer or fabricator of each principal component including metal, glass, sealants and gasketing components.

B. Professional Certification: Provide Shop Drawings and engineering calculations signed and sealed by a Registered Professional Engineer, licensed in Project jurisdiction.

C. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

D. Shop Drawings:
   1. Submit Shop Drawings for complete window wall system.
      a. Show plans, elevations and typical details of each condition for every member, joint, anchorage and glazing system.
      b. Show isometric joining and sealant details of all member intersection and corner conditions.
      c. Include hardware details, locations and mounting heights.
      d. Include locations of Fire Department Labels as specified in Division 08 Section GLAZING.

E. Hardware Schedule:
   1. Submit hardware schedule for each door and operable window opening.
   2. Include catalog cuts and templates.
   3. Include listing of Owner furnished and installed security devices with each applicable set.
   4. Obtain templates from Owner for security devices scheduled for mortised application; assemble and submit with hardware schedule for coordination for factory premachining and reinforcing of doors and frames.

F. Samples:
   1. Window wall components:
      a. Submit three sample sets for each type of finish showing full range (high, middle and low) of color, texture and finish expected in completed Work.
      b. Prepare samples on specified alloy, temper and thickness of metal required for Work.
      c. Sample sets: Minimum three samples in each set.
      d. Samples size: Minimum 12 inch (300 mm) long for extrusions and 12 inch square (300 mm square) for sheet or plate.
   2. Samples for sealant adhesion and compatibility testing:
      a. Submit to sealant manufacturer for pre-construction testing.
      b. Size and quantity: As required by sealant manufacturer.

1.4 INFORMATIONAL SUBMITTALS

A. Initial Submittal Requirements:
   1. Qualification data: Submit installer and manufacturer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.
   2. List of suppliers: Submit complete listing of products, fabricators and sub-sub-contractors involved in window wall Work.

B. Calculations:
   1. Submit, for information only, engineering calculations verifying that maximum deflections and stresses do not exceed specified performance requirements under full design loading.

C. Design Modifications: Submit for review any proposed variations in details or substitutions in materials required to meet specified performance requirements and to coordinate Work.

D. Test Reports:
   1. Submit certified test reports performed by recognized testing laboratory verifying that systems submitted for use on this Project have been previously tested and meet or exceed specified performance requirements.
   2. Submit certified data verifying adhesion qualities of proposed aluminum finishes and sealants through adhesion and peel testing.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit instructions which describe materials, devices and procedures to be followed in cleaning and maintaining systems.
   2. Include manufacturer's brochures describing the actual materials used in Work, including metal alloys, finishes, glass, sealants, gaskets and other major components.
   3. Include copy of submittal in Project information manual.

B. Warranties: Submit signed and dated warranties.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Drawings indicate design concept, size, shape and location of various components. Conform to design, specified performance requirements and material selections.
   2. Design modifications:
      a. May be proposed by manufacturer to satisfy performance requirements.
      b. Conform to design and specified durability and strength.
      c. Maintain profiles and alignments shown.
   3. Size glazing channels to provide adequate bite on glass, minimum edge clearances and adequate width for sealants, as recommended by manufacturers of window wall systems, glass, and sealants.

B. Structural Performance Requirements:
   1. General: Comply with specified criteria, unless more stringent criteria is required by local authorities having jurisdiction.

2. Design loads:
    a. Design, fabricate and install component parts so that completed systems, including glass, will withstand uniform positive and negative design wind pressuresin accordance with ASTM E330, times design factor of safety.
    b. Design wind loads: As indicated on Drawings.
    c. Other design loads: As indicated on Drawings.
3. Glass Statistical Factor (Safety Factor): Refer to Division 08 Section GLASS AND GLAZING.
4. Thermal movement:
    a. Design, fabricate and install components to withstand thermal expansion and contraction forces resulting from an ambient temperature range of minus 5 deg F (minus 21 deg C) to plus 110 deg F (43 deg C) and surface temperature range of 5 deg F (minus 15 deg C) to 185 deg F (85 deg C) without causing buckling, undue stress on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance or other detrimental effects.
    b. Design operable doors and windows to function normally over this temperature range.
5. Deflection at full loading:
    a. Limit deflection of each component part (other than glass) perpendicular to glass plane to the following values, of clear span (L) of component part, except for more stringent requirements specified herein. Measure deflection from gages located on framing members.
        1) For spans up to 13'-6" (4.1 m): L/175, with maximum of 3/4 inch (19 mm) for members supporting individual lites, whichever is less.
        2) For spans more than 13'-6" (4.1 m): L/240 + 1/4 inch (6 mm).
    b. Limit deflections of members parallel to glass plane, when carrying full dead load, to 1/8 inch (3 mm) or 25% of glass bite design dimension, whichever is less, between member and top of fixed component immediately below.
    c. Limit deflection of glass-supporting members to l/300 of glass length for distance glass is supported.
    d. Base deflection calculations upon combination of maximum direct loadings, building deflections, internal stresses and erection tolerances.
    e. Provide minimum 1/16 inch (1.5 mm) clearance between members and operable components below.
    f. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
6. Design factor of safety:
    a. Design and fabricate structural components including members, glazing stops or gaskets, weldments, connection adhesives and sealants used as adhesives with factor of safety not less than 1.5 (i.e., failure of any structural component shall not occur at less than 1.5 times maximum "Design Wind Pressure" in accordance with ASTM E330).
    b. Failure is defined as breakage, disengagement or permanent distortion.
7. Building movement:
    a. Design systems to withstand building movements, including thermal movements, loading deflections, shrinkage and similar movements.
    b. Architect will furnish specific data on anticipated building movements as may be requested by Contractor.

C. See Division 13 Section METAL BUILDING SYSTEMS for required deflection limits applicable to aluminum-framed entrances and storefronts.

D. Air Leakage and Water Penetration Performance Requirements:
   1. Design, fabricate and install systems, including joints between systems and other Work, to effectively prevent leakage of either water or air into building, both under specified test conditions and under any combination of specified performance requirements.
   2. Water penetration:
      a. Definition: Appearance of uncontrolled water, other than condensation, on indoor face of any part of wall, including in concealed spaces adjacent to or below the window wall system.
      b. Design system of gutters and weeps to drain water to exterior face of wall.
      c. Design system so no uncontrolled water penetration occurs when wall is tested in accordance with ASTM E331 with air pressure differential of 20 percent of inward design wind pressure, but not less than 6.24 psf (300 Pa).
      d. Design operable aluminum windows to meet water penetration requirements of ANSI/AAMA 101 for window types specified.
   3. Air leakage:
      a. Design system so that air infiltration does not exceed the following allowable infiltration rates when tested in accordance with ASTM E283 at static air pressure differential of 6.24 psf. (300 Pa).
      b. Fixed units: 0.06 cfm per square foot (0.03 L/s per sq. m) for curtain wall, storefront, and closed and locked windows, on complete module or bay.

E. Thermal Performance:
   1. Condensation resistance: Design system to resist condensation when subjected to a condensation resistance laboratory evaluation test with the following winter conditions:
      a. Exterior 99% dry bulb temperature of 10 deg F, and
      b. Interior 99% dry bulb temperature of 72 deg F, with interior relative humidity of 30%.
   2. Thermal transmittance: U values not to exceed the following, as determined according to NFRC 100.
      a. Fixed lights, including glass and metal framing: U value not to exceed 0.33 Btu/ft^2/ deg F (1.87 W/m^2 x K)

F. Thermal-Break or Thermally-Improved System Requirements:
   1. Provide system tested to demonstrate resistance to thermal conductance and condensation, and tested to show adequate strength and security of glass retention.
   2. Provide aluminum components with integrally concealed low conductance thermal barrier, located between exterior materials and window members exposed on interior, eliminating direct metal-to-metal contact.
   3. If poured polyurethane thermal break systems are used, fabricate with mechanical interlock to prevent shrink back.

G. Entrance Door Performance Requirements:
   1. Design and fabricate doors to withstand operating loads which result from heavy traffic conditions using selected hardware, without permanent measurable deflections.
   2. Limit elastic deflections to provide normal degree of rigidity required to avoid glass breakage, air leaks and other objectionable results of excessive flexibility.
   3. Provide tight joints to minimize air leaks and to provide for no uncontrolled water on interior of building.

H. Sealant Compatibility Requirements: Verify adhesion qualities of intended finishes and coatings with sealants through adhesion and peel testing in conjunction with sealant manufacturer.

I. Visual Requirements:
   1. Metal surfaces: Fabricate surfaces exposed to view from materials which are smooth and free of surface blemishes. Do not use materials which have stains and discolorations, including welds, exposed in completed Work.
   2. Surface flatness and edges: Provide flat surfaces with machine cut edges and corners sharp and true to angle or curvature required.

1.7 QUALITY ASSURANCE

A. Installer/Manufacturer Qualifications:
   1. Firm or company which has specialized for a period of not less than 5 consecutive years in successful design, fabrication and installation of work similar to major components of Work indicated and required for this Project.
   2. Employ only experienced tradesmen with minimum 5 years successful experience in fabrication and installation of work.
   3. System design and engineering: Performed under direct supervision of a Registered Professional Engineer, licensed in Project jurisdiction.

B. Regulatory Requirements:
   1. Conform to applicable requirements of authorities having jurisdiction over Project.
   2. Electrically operated locking devices at egress openings: Connect devices to building fire and smoke/heat alarm system, so that when fire or smoke/heat devices are activated, the electric locking mechanisms will be disengaged and rendered inoperable allowing free, unrestricted egress through opening.

C. Reference Standards: Except as may be modified by governing authorities or these Specifications, comply with applicable provisions and recommendations of the following:
   1. AAMA “Aluminum Curtain Wall Design Guide Manual”.
   2. AAMA/NWWDA “North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors”.
   3. NAAMM “Metal Finishes Manual”.
   4. The Aluminum Association, Inc. “Specifications For Aluminum Structures”.

1.8 SAMPLE INSTALLATION

A. Prior to commencing Work and preceding pre-installation conference, provide sample installation of Work.

B. Size and Location: As indicated on Drawings.

C. Materials: Incorporate complete materials as required for finished Work.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of workmanship.
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain accepted sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

G. Dismantle unacceptable sample installation and remove from site.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver fabricated units and component parts to site identified in accordance with erection diagrams prepared by manufacturer.

B. Store in accordance with manufacturer's instructions, above grade on dunnage, properly protected from weather and construction activities.

1.11 PROJECT CONDITIONS

A. Verify dimensions of supporting structure at site by accurate field measurements so that Work will be accurately designed, fabricated and fitted to structure. Tolerances for supporting structure are specified in other Sections.

B. Fabrication and erection procedures shall take into account ambient temperature range at time of respective operations.

1.12 SEQUENCING AND SCHEDULING

A. Coordinate window wall Work with contiguous Work and provide components at proper time and sequence to avoid delays in overall Work.

1.13 WARRANTY

A. Provide 5 year written warranty signed by Contractor, installer and manufacturers agreeing to repair or replace defective materials or workmanship, including any evidence of early deterioration, weathering or aging of Work, uncontrolled water penetration or air infiltration, glass breakage, deterioration of finishes, failure of operating parts to properly function and any other deterioration or failure of Work to conform to Contract Documents.

B. Include the following separate warranties:
   1. Anodized coating: Provide 3 year written warranty guaranteeing that coating will not develop excessive fading or non-uniformity of color or shade, and will not crack, peel, pit or corrode.
   2. Glass: Provide written warranties for glass units as specified in Division 08 Section GLAZING.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Design is based on the following systems as manufactured by Kawneer to establish a standard of quality:
      a. Storefront: Trifab 451T.
      b. Storfront windows: Series Storefront GLASSvent Windows.
      c. Curtain wall: 1600UT System 1.
      d. Entrance doors: 360 Insulclad Thermal Entrances.
   2. Equivalent systems by following manufacturers may be acceptable provided they can meet performance and finish requirements and design profile limitations, including certified test reports showing compliance with referenced United States standards at time of submittal.
      a. VistaWall Architectural Products.
      b. Wausau Window and Wall Systems.
      c. YKK AP America, Inc.

2.2 MATERIALS

A. Aluminum Extrusions:
   1. Shapes and thicknesses as indicated and as required to fulfill performance requirements, but not less than 1/8 inch (3 mm) thick, unless otherwise indicated.
   2. Alloy and temper recommended by manufacturer for type of use and finish indicated.
      a. Sheet and plate: ASTM B209.
      b. Extruded bars, rods, profiles, and tubes: ASTM B221.
      c. Extruded structural pipe and tubes: ASTM B429.
      d. Structural profiles: ASTM B308.
      e. Welding rods and bare electrodes: AWS A5.10.

B. Aluminum Sheets and Plates:
   1. Sizes and minimum gages as indicated and as required to fulfill performance requirements.
   2. Suitable alloy for forming and fabrication requirements with adequate temper and structural characteristics and suitable for finishing as specified.

C. Carbon Steel: High strength, low alloy products or structural steel as required to fulfill performance requirements.

D. Glass and Glazing:
   1. Spacers, setting blocks, gaskets, and bond breakers: Manufacturer's standard permanent, nonmigrating types compatible with sealants and suitable for joint movement and system performance requirements.
   2. Glazing sealants and glass: See Division 08 Section GLAZING.

2.3 COMPONENTS

A. Aluminum Framing System:
   1. Glazing channel: Minimum clearance for thickness and type of glass indicated in accordance with GANA requirements or manufacturer's recommendations.

2. Provide inside outside glazing.
3. Design to accommodate components indicated including operable doors and windows.
4. Design framing so panels can be removed from inside outside of building.
5. Provide the following components:
    a. Thermally-broken aluminum adapters as required to accommodate components indicated including operable doors and windows.
    b. Provide aluminum clips and bracing as required for support of spandrel insulation.
6. Framing members:
    a. Provide end caps for glazing members and receptor frames which are open-ended extrusions, to allow for continuous uninterrupted bond surface for perimeter sealants.
    b. Mechanically-fasten end caps, and fully seal on back side of each end cap to adjacent framing member profile using silicone sealant; fill voids, screw bosses, and similar irregularities with sealant.
7. Framing anchors:
    a. Provide anchors that permit three way adjustment to accommodate fabrication and construction tolerances.
    b. Use materials and protective coating recommended by manufacturer.
8. Flashing: Corrosion resistant, non-staining, non-bleeding and compatible with adjoining materials.
9. Finish: To be selected by Architect from manufacturer’s full range of anodic finishes.

B. Entrance Doors:
1. Type:
    a. Medium stile of profiles and configurations indicated, fabricated from minimum 1/8 inch (3 mm) thick extruded aluminum tubular stiles and rails with glass panel infill.
    b. Fabricate doors with 10 inch (255 mm) high bottom rail.
2. Door glazing system: Manufacturer's standard system as required to fulfill performance requirements.
3. Finish: To be selected by Architect from manufacturer’s full range of anodic finishes.
4. Finish hardware:
    a. Provide doors complete with operable hardware, and with door manufacturer's standard head, jamb, astragal, and sill weatherstripping.
    b. See Division 08 Section DOOR HARDWARE for operable hardware.

C. Operable Window Units:
1. Types:
    a. Casement: Project out.
    b. Awning: Project out.
2. Hardware:
    a. To be selected by Architect from manufacturer's standard full range.
    b. Provide unit with manufacturer's standard maintenance tool to prohibit operation of unit without tool.
3. Screens: Provide manufacturer's standard removable insect screen units.
4. Glazing system: Manufacturer's standard system as required to fulfill performance requirements.
5. Provide units complete, including head, sill and jamb weatherstripping.
6. Finish: To be selected by Architect from manufacturer’s full range of anodic finishes.

D. Miscellaneous Trim and Closures:
   1. Form from brake formed or extruded aluminum, minimum 0.06 inch (1.5 mm) thick, to profiles and dimensions shown.
   2. Form bends smooth and true.
   3. Provide flush meeting edges without metal-to-metal laps at joints.
   4. Finish: To be selected by Architect from manufacturer's full range of anodic finishes.

2.4 ACCESSORIES

A. Spandrel Panel Thermal and Safing Insulation: See Division 07 Section BUILDING INSULATION.

B. Perimeter Flashing: See Division 07 Section SHEET METAL FLASHING AND TRIM.

C. Firestopping: See Division 07 Section FIRESTOPPING.

D. Perimeter Sealants and Joint Fillers: See Division 07 Section JOINT SEALANTS.

E. Fasteners:
   1. Provide fasteners for attachment of components to structural supports and for connecting components as recommended by component manufacturers and selected to prevent galvanic action with components fastened.
   2. For embedment in masonry or concrete, provide zinc plated fasteners, conforming to requirements of ASTM B633 for Class FE/ZN 8, service condition SC2 (moderate) with Type II finish meeting corrosion resistance requirements after 96 hour salt spray test, unless otherwise selected by manufacturer.
   3. For attachment of aluminum components, provide AISI 300 series stainless steel.
   4. Provide concealed fasteners, except where indicated or where shown and accepted on final Shop Drawings. Where exposed in finished surfaces, use oval-head countersunk Phillips heads with color to match adjacent surfaces.

F. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30 mil thickness per coat.

G. Reinforcing and Joining Materials:
   1. Steel angles, plates, bars, rods and other steel accessories: Hot-dipped galvanized, or if galvanizing is not compatible with alloy of component parts, shop painted with manufacturer's standard standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
      a. Structural shapes, plates, and bars: ASTM A36.
      b. Cold-rolled sheet and strip: ASTM A1008.
      c. Hot-rolled sheet and strip: ASTM A1011.
   2. Aluminum angles, plates, bars and other aluminum accessories: Alloys as recommended by manufacturer or fabricator to develop required strength of assembly.

H. Inserts: Galvanized steel or cast iron inserts of suitable design and adequate strength for condition of use.

I. Concealed Flashing: Dead soft stainless steel 26 gage minimum (0.5 mm minimum), or extruded aluminum (0.062 inch minimum thickness) (1.6 mm minimum thickness) of alloy and type selected by manufacturer.

J. Slip and Separator Gaskets: Types and materials as recommended by manufacturer for joint condition.

K. Galvanizing Repair Paint: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

2.5 FABRICATION

A. Fabricate in accordance with final Shop Drawings and component manufacturer's instructions.

B. Fit and assemble Work in shop insofar as practicable. Mark and disassemble units which are too large for shipment to Project site, retaining units in sizes as large as possible for shipment and erection.

C. Complete welding, cutting, drilling and fitting of joints prior to chemical treatment and application of finishes.

D. Welding:
1. Weld with electrodes and by methods recommended by aluminum manufacturer and in accordance with applicable recommendations of AWS.
2. Use only methods which will avoid distortion or discoloration of exposed faces.
3. Grind weld areas smooth and restore finish before proceeding with other treatment.

E. Reinforce members and joints with steel plates, bars, rods or angles as required for rigidity and strength and as needed to fulfill performance requirements. Use concealed stainless steel fasteners for jointing which cannot be welded.

F. Separate dissimilar metals or alloys with heavy coating of bituminous coating or other suitable permanent separation as required to prevent galvanic action.

G. Conceal fasteners unless otherwise indicated or otherwise shown and accepted on final Shop Drawings.

H. Carefully fit and match Work with continuity of line and design, using rigidly secured joints with hairline contact unless otherwise shown.

I. Entrance Doors:
1. Check door frame dimensions before proceeding with fabrication of doors.
2. Fabricate stile and rail doors with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or J-bolts. In addition, weld corners at concealed points of contact of stiles and rail webs.
3. Provide rabbets and removable stops required for glazing. Miter or kerf stops to provide hairline joints at corners of glass and panels.

J. Finish Hardware:

1. Premachine and reinforce members to receive finish hardware in accordance with final Hardware Schedule and hardware manufacturer's instructions using templates furnished by each manufacturer.
2. Premachine and reinforce doors and frames to receive concealed contacts (position switches) and concealed associated wiring, as indicated on hardware schedule; one contact per leaf. See DIVISION 28 for contacts and wiring.

K. Fabrication Tolerances for Flat Panels:
1. Fabricate panels with flatness tolerance of 1/16 inch in 2'-0" (1.5 mm in 600 mm) measured in any direction and any location inside a 2 inch (50 mm) wide border area.
2. Tolerance shall be non-cumulative.

2.6 SHOP FINISHES

A. Clear Anodized Coating Finish:
1. Conform to NAAMM AA-M32C22A41 (Class 1, coat thickness 0.7 mils minimum) (Class 1, coat thickness .018 mm minimum).
2. Color and texture: Clear satin finish.
3. Preparation: Remove scratches, abrasions, dents, die markings and similar defects prior to finishing operations in addition to finish treatment specified.
4. Fully seal finish according to procedures recommended by finisher.
5. Coatings requirements:
   a. ASTM B137 - Anodic Coating Weight.
   b. ASTM B244 - Anodic Coating Thickness.
   c. ASTM B136 - Stain Test.
6. Color control: During production, maintain approved color range samples for use in comparing against production material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with final Shop Drawings and manufacturer's instructions and recommendations for installation of Work.
1. Do not install damaged components.
2. Fit joints to produce hairline joints free of burrs and distortion.
3. Rigidly secure nonmovement joints.
4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
5. Seal joints watertight unless otherwise indicated.

B. Erection Tolerances:
1. Variations from plumb or any dimensioned angle shown: +/- 1/8 inch (+/- 3 mm) maximum in any story height or 10 foot (3 m) run, non-cumulative.

2. Variations from level: +/- 1/8 inch (+/- 3 mm) maximum in any column-to-column space or 20 foot (6 m) run, non-cumulative.
3. Variations from theoretical calculated position as located in plan or elevation in relation to established floor lines, column line and other fixed elements of the structure, including variations from plumb, level, straight and member size: 1/4 inch (6 mm) maximum variation in any column-to-column space or floor-to-floor height, or 20 feet (6 m).
4. Offsets in end-to-end or edge-to-edge alignment of consecutive members: 1/16 inch (1.5 mm).

C. Metal Protection:
1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

E. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section JOINT SEALANTS to produce weathertight installation.

F. Install components plumb and true in alignment with established lines and grades, and without warp or rack.

G. Install glazing as specified in Division 08 Section GLAZING.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
1. Exterior doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-installed entrance door hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

I. Repair damaged galvanized coating in accordance with ASTM A780.

J. Apply sealants in accordance with requirements of Division 07 Section JOINT SEALANTS.

3.3 FIELD QUALITY CONTROL

A. Perform tests in presence of Owner's independent testing agency.

B. Water Penetration Tests:
1. Contractor is responsible for costs of initial testing, and additional testing if required, including costs of architect and Owner's independent testing agency associated with witnessing additional testing.
2. Static air pressure difference test: Conduct in accordance with ASTM E1105 at uniform static air pressure difference of 6.24 psf (300 Pa) on areas indicated on Drawings.
3. Water spray test without air pressure difference:
a. Upon completion of installation of wall framing on lower two typical floors of building and with at least 75 lineal feet (23 meters) of area fully glazed (including

nominal curing of sealant and glazing compounds), but before installation of interior finishes, check wall for water penetration in accordance with "Specifications for Field Check of Metal Curtain Wall for Water Leakage" AAMA Standard 501.2.

b. Architect will designate areas to be tested.

c. Test area: Two bays wide (but not less than 30 feet (9 m)) by two stories high.

C. Depending upon prevalence or absence of leakage in initial water penetration test, and upon measures adopted by Contractor to eliminate sources of leakage, Architect will determine necessity for (and scope of) additional tests.

D. Correct units not meeting specified requirements, and re-test until units comply with specified requirements.

3.4 PROTECTION AND CLEANING

A. In addition to specific protection and cleaning methods required for each component part and recommended by respective manufacturers, maintain window wall throughout construction period in clean and properly protected condition so that it will be without any indication of use or damage at time of acceptance.

B. Carefully select and apply cleaning and maintenance methods so that finishes will not become uneven or otherwise impaired as result of unequal exposure to light and weathering conditions.

END OF SECTION

SECTION 08 5113

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Aluminum-framed windows.
   2. Sliding transaction window.
   3. Aluminum sheet metal work including trim and miscellaneous closures.
   4. Glass and glazing.
   5. Sealants, calking, joint fillers and gaskets.
   6. Flashing and weeps.
   7. Anchors, reinforcing, and fasteners.
   8. Finishing.
   9. System design and engineering.

B. Single Subcontract Responsibility: Retain a single firm or company, to design, fabricate and install Work of this Section and related Sections so as to establish undivided responsibility for windows.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 01 Section TESTING AND INSPECTION SERVICES for requirements for independent agency for quality control testing and inspection.

B. See Division 05 Section FLUOROPOLYMER FINISH for resinous coating requirements.

C. See Division 07 Section JOINT SEALANTS for perimeter joint fillers and sealants.

D. See Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

E. See Division 08 Section ASSISTIVE WINDOW ACTUATOR for window actuators.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Shop Drawings: Submit Shop Drawings for windows.
   1. Show plans, elevations and typical details of each condition for every member, joint, anchorage and glazing system.
   2. Include hardware details, locations and mounting heights.

C. Hardware Schedule:
   1. Submit hardware schedule for each operable window type
   2. Include catalog cuts and templates.

D. Samples:
   1. Glass:
      a. Submit 12 inch square (7740 mm square) samples of each type of glass.
      b. Samples shall be typical production run quality and shall be complete with low emissivity coatings and primary and secondary edge seals.
   2. Aluminum:
      a. Submit samples for each type of finish showing color, texture and finish expected in completed Work.
      b. Prepare samples on specified alloy, temper and thickness of metal required for Work.
      c. Samples size: Minimum 12 inch (300 mm) long for extrusions.

1.4 INFORMATIONAL SUBMITTALS

A. Design Modifications: Submit for review proposed variations in details or substitutions in materials required to meet specified performance requirements and to coordinate Work.

B. Test Reports:
   1. Submit certified test reports performed by recognized testing laboratory verifying that systems indicated and specified have been previously tested and meet or exceed specified performance requirements.
   2. Submit certified data verifying adhesion qualities of proposed aluminum finishes and sealants through adhesion and peel testing.

C. Qualification Data: Submit installer qualifications verifying years of experience and acceptance of manufacturer; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit instructions which describe materials, devices and procedures to be followed in cleaning and maintaining systems.
   2. Include manufacturer's brochures describing the actual materials used in Work, including metal alloys, finishes, glass, sealants, gaskets and other major components.
   3. Include copy of submittal in Project information manual.

B. Warranties: Submit signed and dated warranties.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Drawings indicate design concept, size, shape and location of various components. Conform to design, specified performance requirements and material selections.
   2. Design modifications:
      a. May be proposed by manufacturer to satisfy performance requirements.
      b. Conform to design and specified durability and strength.
      c. Maintain profiles and alignments shown.
   3. Size glazing channels to provide adequate bite on glass, minimum edge clearances and adequate width for sealants.

B. Performance Requirements - General: Design, fabricate and install aluminum windows to comply with requirements of AAMA/WDMA 101/I.S.2/NAFS for specified window performance classes and grades, and with the following performance requirements where they exceed requirements of the referenced standard.

C. Structural Performance Requirements:
   1. General: Comply with specified criteria, unless more stringent criteria is required by local authorities having jurisdiction.
   2. Uniform load deflection test:
      a. Test unit at design pressure, both positive and negative, acting normal to plane of wall, in accordance with ASTM E330.
      b. There shall be no glass breakage or permanent damage to any member, and no deflection of any unsupported span more than 1/175 of its span or 3/4 inch (19 mm), whichever is less.
   3. Uniform load structural test:
      a. Test unit at 1.5 x design pressure, both positive and negative, acting normal to plane of wall, in accordance with ASTM E330.
      b. There shall be no glass breakage, permanent damage to fasteners and hardware, or permanent deformation of main frame or sash sections on excess of 0.2 percent of its span.
   4. Components shall withstand thermal expansion and contraction forces resulting from a surface temperature range of minus 30 deg F (-34 deg C) to plus 180 deg F (82 deg C), without causing buckling, undue stress on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance or other detrimental effects.

D. Air Leakage and Water Penetration Performance Requirements:
   1. Window assemblies, including joints between windows and other Work, shall effectively prevent leakage of water and air into building, both under specified test conditions and under any combination of performance requirements.
   2. Water penetration:
      a. Definition: Appearance of uncontrolled water, other than condensation, on indoor face of any part of wall.
      b. Design system of gutters and weeps to drain water to exterior face of wall.
      c. Design system so no uncontrolled water penetration occurs when wall is tested in accordance with ASTM E331 and ASTM E547, with air pressure differential of not less than 12 psf (574 Pa) and water rate of 5 gal/hr/sf (19 liters/hr/.093 m^2).
      d. Sliding Window: Design system so no uncontrolled water penetration occurs when wall is tested in accordance with ASTM E331 and ASTM E547, with air pressure differential of not less than 15 psf (720 Pa) and water rate of 5 gal/hr/sf (19 liters/hr/.093 m^2).
   3. Air infiltration:
      a. Fixed Window: Design system so that air infiltration does not exceed 0.10 cfm per square foot at static air pressure differential of 6.24 psf (300 Pa) when tested in accordance with ASTM E283.
      b. Sliding Window: Design system so that air infiltration does not exceed 0.03 cfm per square foot (0.05 L/s per sq. m) at static air pressure differential of 6.24 psf (300 Pa) when tested in accordance with ASTM E283.

E. Thermal-Break System Requirements:

1. Provide condensation resistance factor (CRF) of not less than the following:
   a. Fixed window: 57 for glass and 59 for frame, when tested in accordance with AAMA 1503.
   b. Sliding window: 66 for glass and 66 for frame, when tested in accordance with AAMA 1503.
2. Provide window systems tested to demonstrate resistance to thermal conductance and condensation, and tested to show adequate strength and security of glass retention.
3. Provide aluminum components with integrally concealed low conductance thermal barrier, located between exterior materials and window members exposed on interior, eliminating direct metal-to-metal contact.

F. Thermal Transmittance Performance Requirements:
1. Fixed Window: Provide U-value not to exceed 0.58 Btu/ft^2/hr/deg F at 15 mph exterior wind velocity, when tested in accordance with AAMA 1503.1.
2. Sliding Window: Provide U-value not to exceed 0.43 Btu/ft^2/hr/deg F at 15 mph exterior wind velocity, when tested in accordance with AAMA 1503.1.

G. Sealant Compatibility Requirements: Verify adhesion qualities of intended finishes and coatings with sealants through adhesion and peel testing in conjunction with sealant manufacturer.

H. Visual Requirements:
1. Metal surfaces: Fabricate surfaces exposed to view from materials which are smooth and free of surface blemishes. Do not use materials which have stains and discolorations, including welds, exposed in completed Work.
2. Surface flatness and edges: Provide flat surfaces and cut edges by machine provide corners sharp and true to angle or curvature required.

1.7 QUALITY ASSURANCE

A. Installer/Manufacturer Qualifications:
1. Firm or company which has specialized for a period of not less than 5 consecutive years in successful design, fabrication and installation of work similar to major components of Work indicated and required for this Project.
2. Employ only experienced tradesmen with minimum 5 years successful experience in fabrication and installation of Work.

B. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction over Project.

C. Reference Standards: Except as may be modified by governing authorities or these Specifications, comply with applicable provisions and recommendations of the following:
1. AAMA/WDMA 101/I.S.2/NAFS, “North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors”.
2. NAAMM “Metal Finishes Manual”.
3. Insulating Glass Certification Council.

1.8 SAMPLE INSTALLATION

A. Prior to commencing Work and preceding pre-installation conference, provide sample installation of Work.

B. Extent and Location: One complete window unit, in location acceptable to Architect.

C. Materials: Incorporate complete materials and components as required for finished Work.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of workmanship.
   2. Obtain Architect's approval of sample installation before proceeding with subsequent Work.

E. Maintain accepted sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver fabricated units and component parts to site identified in accordance with erection diagrams prepared by manufacturer.

B. Store in accordance with manufacturer's instructions, above grade on dunnage, properly protected from weather and construction activities.

1.11 PROJECT CONDITIONS

A. Verify dimensions of supporting structure at site by accurate field measurements so that Work will be accurately designed, fabricated and fitted to structure. Tolerances for supporting structure are specified in other Sections.

1.12 SEQUENCING AND SCHEDULING

A. Coordinate windowWork with contiguous Work and provide components at proper time and sequence to avoid delays in overall Work.

1.13 WARRANTY

A. Provide the following warranties signed by Contractor, installer and manufacturers:
   1. Fluoropolymer coating: Provide as specified in Division 05 Section FLUOROPOLYMER FINISH.
   2. Glass: Provide 5 year written warranty for insulating glass units which have failed hermetic seal, fogging or visual obstruction resulting from film formation or moisture collection between internal glass surfaces.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Design is based on systems as manufactured by Kawneer to establish a standard of quality.
      a. Projected, outswing casement and fixed windows: 8225TL Thermal Windows.
      b. Sliding Windows: AA3350 IsoPort Thermal Window.
   2. Equivalent systems by other manufacturers are acceptable provided they can meet performance and finish requirements and design profile limitations.

2.2 MATERIALS

A. Aluminum Extrusions:
   1. Shapes and thicknesses as indicated and as required to fulfill performance requirements, but not less than 1/8 inch (3 mm) thick for main members unless otherwise indicated.
   2. Suitable alloy for extruding with adequate structural characteristics and suitable for finishing as specified.

B. Aluminum Sheets and Plates:
   1. Sizes and minimum gages as indicated and as required to fulfill performance requirements.
   2. Suitable alloy for forming and fabrication requirements with adequate temper and structural characteristics and suitable for finishing as specified.

C. Carbon Steel: High strength, low alloy products or structural steel as required to fulfill performance requirements.

D. Glass: Manufacturer's 1 inch (25 mm) thick clear insulating glass, certified CBA level by IGCC.

2.3 COMPONENTS

A. Window Units:
   1. Types:
      a. Projected.
      b. Casement.
      c. Fixed. Provide units with same frame depth as operable units.
      d. Horizontal sliding.
   2. Performance classes and grades: Provide units complying with following requirements as defined in AAMA/WDMA 101/I.S.2/NAFS, in addition to system requirements specified above.
      a. Projected: P-HC90
      b. Outswing casement: C-HC90
      c. Fixed: F-HC90
      d. Horizontal sliding: CW-PG50-HS
   3. Features:
      a. Full insect screens for operable units; 18 x 16 fiberglass mesh in extruded tubular aluminum frame, except at horizontal sliding units.

4. Hardware: Provide manufacturer's commercial grade hardware for operable units, including the following:
    a. Projected:
        1) Cam locks.
        2) Access control locks.
        3) Hinges.
        4) Limit stop.
    b. Casement:
        1) Cam locks.
        2) Access control locks.
        3) Hinges.
        4) Butt hinges.
        5) Limit stop.
    c. Fixed: None required.
    d. Horizontal sliding:
        1) Handle with continuous, integral pulls.
        2) Sash lock.
        3) Stainless roller track.
        4) Limit stop.
5. Glazing system: Manufacturer's standard system as required to fulfill performance requirements; factory-glaze units.
6. Provide units complete, including full head, sill, jamb and meeting rail weatherstripping.

B. Sliding Transaction Windows – 2 Panel Type:
1. Description: 2-panel pass through aluminum-framed window, with 1 fixed lite and 1 sliding lite.
2. Track: Overhead.
3. Finish: Satin anodized.
4. Acceptable product and manufacturer: Equivalent to Model D1039A CRL Arlene Pass Thru with D1670 by C.R. Laurence.

C. Miscellaneous Trim and Closures:
1. Provide miscellaneous trim and closures as indicated and as required for complete installation.
2. Form from brake formed or extruded aluminum, minimum 0.04 inch (1.02 mm) thick, to profiles and dimensions shown.
3. Form bends smooth and true.
4. Provide flush meeting edges without metal-to-metal laps at joints.

2.4 ACCESSORIES

A. Perimeter Sealants and Joint Fillers: See Division 07 Section JOINT SEALANTS.

B. Fasteners:
1. Provide fasteners for attachment of components to structural supports and for connecting components as recommended by component manufacturers and selected to prevent galvanic action with components fastened.
2. For embedment in masonry or concrete, provide zinc plated fasteners, conforming to requirements of ASTM B633 for Class FE/ZN 8, service condition SC2 (moderate) with Type II finish meeting corrosion resistance requirements after 96 hour salt spray test, unless otherwise selected by manufacturer.

3. For attachment of aluminum components, provide AISI 300 series stainless steel.
4. Provide concealed fasteners, except where indicated or where shown and accepted on final Shop Drawings. Where exposed in finished surfaces, use oval-head countersunk Phillips heads with color to match adjacent surfaces.

C. Bituminous Coatings: Cold-applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil (.75 mm) thickness per coat, or other suitable separation materials and systems as recommended by component manufacturer.

D. Reinforcing and Joining Materials:
1. Steel angles, plates, bars, rods and other steel accessories: ASTM A36, galvanized or if galvanizing is not compatible with alloy of component parts, shop painted with zinc chromate primer after cutting to size.
2. Aluminum angles, plates, bars and other aluminum accessories: Alloys as recommended by manufacturer or fabricator to develop required strength of assembly.

E. Inserts: Galvanized steel or cast iron inserts of suitable design and adequate strength for condition of use.

F. Slip and Separator Gaskets: Types and materials as recommended by manufacturer for joint condition.

G. Galvanizing Repair Paint: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

2.5 FABRICATION

A. Fabricate in accordance with final Shop Drawings and component manufacturers' instructions. Field check masonry opening dimensions before proceeding with fabrication of windows.

B. Fit and assemble Work in shop insofar as practicable. Mark and disassemble units which are too large for shipment to Project site, retaining units in sizes as large as possible for shipment and erection.

C. Complete welding, cutting, drilling and fitting of joints prior to chemical treatment and application of finishes.

D. Welding:
1. Weld with electrodes and by methods recommended by aluminum manufacturer and in accordance with applicable recommendations of AWS.
2. Use only methods which will avoid distortion or discoloration of exposed faces.
3. Grind weld areas smooth and restore finish before proceeding with other treatment.

E. Reinforce members and joints with steel plates, bars, rods or angles as required for rigidity and strength and as needed to fulfill performance requirements.
1. Use concealed stainless steel fasteners for jointing which cannot be welded.
2. Where fasteners screw anchor into aluminum less than 1/8 inch (3 mm) thick, reinforce interior of section with aluminum or non-magnetic stainless steel to receive screw threads.
3. Do not bridge thermal break, or impair independent frame movement, with fasteners.

F. Separate dissimilar metals or alloys with heavy coating of bituminous paint or other suitable permanent separation as required to prevent galvanic action.

G. Conceal fasteners unless otherwise indicated or otherwise shown and accepted on final Shop Drawings.

H. Carefully fit and match Work with continuity of line and design, using rigidly secured joints with hairline contact that will not discolor finish.
   1. Miter or cope corners of sash and frames, and mechanically stake and fasten.
   2. Set and seal in epoxy, and seal weathertight.

I. Windows:
   1. Field check opening dimensions before proceeding with fabrication of windows.
   2. Provide rabbets and removable stops required for glazing, and which are reglazable without dismantling of sash framing. Miter or kerf stops to provide hairline joints at corners of glass and panels.
   3. Adjust operating sash and hardware to provide a tight fit at contact points and at weatherstripping for smooth operation and weathertight closure.
   4. Shop glaze windowsto greatest extent possible.

2.6 SHOP FINISH

A. Fluoropolymer Resinous Coating: See Division 05 Section FLUOROPOLYMER FINISH.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with final Shop Drawings and manufacturer's instructions and recommendations for installation of Work.

B. Erection Tolerances:
   1. Variations from plumb: ± 1/8 inch (± 3 mm).
   2. Variations from level: ± 1/8 inch (± 3 mm).
   3. Offsets in end-to-end or edge-to-edge alignment of consecutive members: 1/16 inch (1.5 mm).

C. Do not erect warped, bowed, deformed or otherwise damaged or defaced members.

D. Remove and replace members which are damaged in erection process, as directed.

E. Cutting and Trimming:
   1. Cut and trim component parts during erection only with approval of manufacturer or fabricator, and in accordance with his recommendation.
   2. Do not cut through reinforcing members.

3. Restore finish completely to satisfaction of Architect.
4. Remove and replace members where cutting and trimming has impaired strength or appearance as directed.

F. Setting:
1. Set units level, plumb and true to line, with uniform joints.
2. Support units on shims and secure in place by bolting to clip angles and similar supports anchored to supporting structure.
3. Use only types of equipment, wedges, spacers, shims and other items during erection which will not stain or mark finish of units.

G. Paint concealed contact surfaces of dissimilar materials with heavy coating of bituminous paint or provide other separation as per manufacturer's recommendation.

H. Solder and braze only to fill or seal joints (not to form structural joints) in accordance with component part manufacturer's recommendations. Grind smooth and restore finish.

I. Repair damaged galvanized coating of anchors and reinforcing in accordance with ASTM A780. Paint clip angles and other ferrous metal parts which will be concealed with galvanizing repair paint.

J. Windows:
1. Securely anchor in place to straight, plumb and level conditions, without distortion.
2. Check operating sash hardware movement and weatherstripping contact, making final adjustments as necessary.

K. Sliding Transaction Window Installation:
1. Comply manufacturer's instructions and recommendations for installation of Work.
2. Do not erect warped, bowed, deformed or otherwise damaged or defaced members.
3. Securely anchor in place to straight, plumb and level conditions, without distortion.
4. Support units on shims and secure in place by bolting to clip angles and similar supports anchored to supporting structure.
5. Check operating sash hardware movement, making final adjustments as necessary.

L. Apply sealants in accordance with requirements of Division 07 Section JOINT SEALANTS.

3.3 FIELD QUALITY CONTROL

A. Perform tests in presence of Owner's independent testing agency.

B. Field Tests:
1. Contractor is responsible for costs of initial testing, and additional testing if required, including costs of architect and Owner's independent testing agency associated with witnessing additional testing.
2. After completion of installation and nominal curing of sealant and glazing compounds, but before installation of interior finishes, test for water leaks and air infiltration in accordance with AAMA 502, “Voluntary Specification for Field Testing of Windows and Sliding Glass Doors”.
3. Perform tests on 3 windows to be selected by Architect.
4. Perform test using Test Method B.

C. Depending upon prevalence or absence of leakage in initial water penetration test, and upon measures adopted by Contractor to eliminate sources of leakage, Architect will determine necessity for (and scope of) additional tests.

D. Correct units not meeting specified requirements, and re-test until units comply with specified requirements.

3.4 PROTECTION AND CLEANING

A. In addition to specific protection and cleaning methods recommended by manufacturer, maintain windowsthroughout construction period in clean and properly protected condition so that they will be without any indication of use or damage at time of acceptance.

B. Carefully select and apply cleaning and maintenance methods so that finishes will not become uneven or otherwise impaired as result of unequal exposure to light and weathering conditions.

END OF SECTION

SECTION 087100

DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Mechanical door hardware for the following:

   a. Swinging doors.
   b. Overhead doors.

2. Cylinders for door hardware specified in other Sections.
3. Electrified door hardware.

B. Related Sections:

1. Division 06 ARCHITECTURAL WOODWORK for cabinet door hardware provided as part of architectural woodwork.
2. Division 08 Section HOLLOW METAL DOORS AND FRAMES for astragals provided as part of labeled fire-rated assemblies.
3. Division 08 Section FLUSH WOOD DOORS for astragals and integral intumescent sealsprovided as part of labeled fire-rated assemblies.
4. Division 08 Section ACCESS DOORS AND PANELS for access door hardware, except including cylinders.
5. Division 08 Section COILING DOORS AND GRILLES for door hardware provided as part of overhead door assemblies.
6. Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS for installation of entrance door hardware, except including cylinders.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: Details of electrified door hardware, indicating the following:

1. Wiring Diagrams: For power, signal, and control wiring and including the following:

a. Details of interface of electrified door hardware and building safety and security systems.
b. Schematic diagram of systems that interface with electrified door hardware.
c. Point-to-point wiring.
d. Risers.
e. Elevations doors controlled by electrified door hardware.

2. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.

C. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.

D. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.

1. Sample Size: Full-size units or minimum 2-by-4-inch (51-by-102-mm) Samples for sheet and 4-inch (102-mm) long Samples for other products.

a. Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.

E. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

a. Submittal Sequence: Submit door hardware schedule concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
b. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
c. Content: Include the following information:

1) Identification number, location, hand, fire rating, size, and material of each door and frame.
2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
5) Fastenings and other pertinent information.

6) Explanation of abbreviations, symbols, and codes contained in schedule.
7) Mounting locations for door hardware.
8) List of related door devices specified in other Sections for each door and frame.

2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and Architectural Hardware Consultant.

B. Product Certificates: For electrified door hardware, from the manufacturer.

1. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.

C. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

D. Warranty: Special warranty specified in this Section.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC) Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC) Architectural Openings Consultant (AOC).

C. Source Limitations: Obtain each type of door hardware from a single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

E. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.

1. Air Leakage Rate: Maximum air leakage of0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.

F. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

G. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

H. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines ICC/ANSI A117.1 HUD's "Fair Housing Accessibility Guidelines".

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
   c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than **1/2 inch (13 mm)** high and **3/4 inch (19 mm)** high for exterior sliding doors.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." In addition to Owner**,** Construction Manager, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Requirements for access control.

J. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys and permanent cores to Owner by registered mail or overnight package service.

1.8 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.
b. Faulty operation of doors and door hardware.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three 3 years from date of Substantial Completion, unless otherwise indicated.

a. Electromagnetic and Delayed-Egress Locks: Five 5 years from date of Substantial Completion.
b. Exit Devices: Two 2 years from date of Substantial Completion.
c. Manual Closers: Ten 10 years from date of Substantial Completion.
d. Concealed Floor Closers: Five 5 years from date of Substantial Completion.

1.10 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled in Part 3 "Door Hardware Schedule" to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:

1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Schedule" Article.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. IVES Hardware; an Ingersoll-Rand company.
b. Hager companies.

B. Self-Closing Hinges and Pivots: BHMA A156.17.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Ives.
b. Hager.

2.3 CONTINUOUS HINGES

A. Continuous Hinges: BHMA A156.26; minimum 0.120-inch- (3.0-mm-) thick, hinge leaves with minimum overall width of 4 inches (102 mm); fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

B. Aluminum geared-Type Hinges:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. IVES Hardware; an Ingersoll-Rand company.
b. Hager companies.

2.4 MECHANICAL LOCKS AND LATCHES

A. Lock Functions: As indicated in door hardware schedule.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
2. Deadbolts: Minimum **1-inch (25-mm)** bolt throw.

C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.

D. Lock Trim:

1. Description: As specified Schlage 06A levers. No Substitution.

E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

F. Mortise Locks: BHMA A156.13; Grade **1**; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Schlage Commercial Lock Division; an Ingersoll-Rand company. No Substitution.

2.5 ELECTRIC LOCKS

1. Electromechanical Locks and Latches: No Substitution

a. Schlage Lock Company; an Ingersoll-Rand Company (SCH).

B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Schlage Commercial Lock Division; an Ingersoll-Rand company. No Substitution.

2.6 SURFACE BOLTS

2.7 MANUAL FLUSH BOLTS

A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. IVES Hardware; an Ingersoll-Rand company.
b. Trimco.

2.8 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

   a. IVES Hardware; an Ingersoll-Rand company.
   b. Trimco.

2.9 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

   a. Von Duprin; an Ingersoll-Rand company No Substitution on exterior doors.
   b. Falcon Lock; an Ingersoll-Rand company.

2.10 LOCK CYLINDERS

A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Manufacturer: Cylinders to be keyed to owners existing Schlage Primus Everest system..
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
3. New Schlage system with patent to 2029.

B. High-Security Lock Cylinders: BHMA A156.30; Grade 1; Type M, mechanical E, electrical; permanent cores that are removable; face finished to match lockset.

C. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

2.11 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.

1. Master Key System: Change keys and a master key operate cylinders.
2. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
3. Existing System: Schlage Primus 29 new system.

a. Master key or grand master key locks to Owner's New Schlage system.

4. Keyed Alike: Key all cylinders to same change key.

B. Keys: Nickel silver, Brass.

1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

a. Notation: "DO NOT DUPLICATE."

2. Quantity: In addition to one extra key blank for each lock, provide the following:

a. Cylinder Change Keys: Three.
b. Master Keys: Five.
c. Grand Master Keys: Five.
d. Great-Grand Master Keys: Five.
e. Control keys: Five.
f. Contruction keys: Twelve.

2.12 KEY CONTROL SYSTEM

A. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Lund Equipment Co., Inc.
b. MMF Industries.

2. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.

B. Cross-Index System: Multiple-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by [**key control manufacturer**] [**Installer**].

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Lund Equipment Co., Inc.
b. MMF Industries.

2.13 OPERATING TRIM

A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

    a. IVES Hardware; an Ingersoll-Rand company.
    b. Hager companies.

2.14 ACCESSORIES FOR PAIRS OF DOORS

A. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release and with internal override.

B. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.

C. Astragals: BHMA A156.22.

2.15 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.
    2.
        a. LCN Closers; an Ingersoll-Rand company.
        b. Falcon Lock; an Ingersoll-Rand company.

2.16 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze.

    1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

        a. IVES Hardware; an Ingersoll-Rand company.
        b. Trimco.

2.17 ELECTROMAGNETIC STOPS AND HOLDERS

A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single, floor-mounted electromagnet single, floor-mounted electromagnet double unit with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. LCN Closers; an Ingersoll-Rand company.
b. Rixson.

2.18 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Glynn-Johnson; an Ingersoll-Rand company.
b. Rockwood Manufacturing Company.
c. ABH.

2.19 DOOR GASKETING

A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Zero International.
b. National Guard Products.
c. Pemko Manufacturing Co.; an ASSA ABLOY Group company.

2.20 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. Zero International.
b. National Guard Products.

c. Pemko Manufacturing Co.; an ASSA ABLOY Group company.

2.21 METAL PROTECTIVE TRIM UNITS

A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. IVES Hardware; an Ingersoll-Rand company.
b. Trimco.

2.22 AUXILIARY DOOR HARDWARE

A. Auxiliary Hardware: BHMA A156.16.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following.

a. IVES Hardware; an Ingersoll-Rand company
b. Hager Companies.
c. Trimco.

2.23 FABRICATION

A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.

1. Manufacturer's identification is permitted on rim of lock cylinders only.

B. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.

C. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Fire-Rated Applications:

a. Wood or Machine Screws: For the following:

1) Hinges mortised to doors or frames**;** use threaded-to-the-head wood screws for wood doors and frames.
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:

1) Surface hinges to doors.
2) Closers to doors and frames.
3) Surface-mounted exit devices.

3. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.24 FINISHES

A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings to comply with the following unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

D. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches (750 mm) of door height greater than 90 inches (2286 mm).

E. Lock Cylinders: Install construction cores to secure building and areas during construction period.

1. Replace construction cores with permanent cores as indicated in keying schedule and as directed by Owner.
2. Furnish permanent cores to Owner for installation.

F. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

G. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room. Verify location with Architect.

1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.

H. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 079200 "Joint Sealants."

I. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

J. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

K. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

L. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 FIELD QUALITY CONTROL

A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.

1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
3. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

3.8 DOOR HARDWARE SCHEDULE

SPEXTRA: 123928

HARDWARE GROUP NO. 01

A100-1

EACH TO HAVE:

2	EA	PIVOT SET	7226 SET	626	IVE
2	EA	INTERMEDIATE PIVOT	7226 INT	626	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
2	EA	ELEC PANIC HARDWARE	RX-EL-HD-3349A-EO	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURF. AUTO OPERATOR	9553 REG/STD MS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-853	630	LCN
1	EA	BOLLARD POST	8310-866	AL	LCN
1	SET	SEALS	5050CL	CLR	NGP
2	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 02

A100-2

EACH TO HAVE:

2	EA	PIVOT SET	7226 SET	626	IVE
2	EA	INTERMEDIATE PIVOT	7226 INT	626	IVE
2	SET	PUSH/PULL BAR	9103EZHD-12"-STD	630	IVE
1	EA	SURF. AUTO OPERATOR	9553 REG/STD MS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 03

A103-2	A106-1	A107-1	A108-1	A109-1	A110-1
A111-1	A113-1	A114-1	A115-1	A121-1	A122-1
A126-1	A127-1	A137-2	M108-1	M109-1	M123A-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 04

M10-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	EL STOREROOM LOCK	L9080TEL 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP
1	EA	ASTRAGAL	139A	600	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 05

M119-1 M124-1 M126-1 M128-1 M129-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A 806A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 06

A132A-1 A133-1 A133A-1 M104-1 M105-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 07

A132-2 A133-2

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 08

A116-1 A117-1 M131-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06A	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 09

M107-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 10

M106-1 M127-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 11

M1-2 S1-2 S1A-2 S2-2 S2A-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	XP-99-EO	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP
1	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

HARDWARE GROUP NO. 12

M1-1	M11-2	M122-2	M123-5	M124-3	M124-4
M2-1	M3-1	M4-1	M5-1	M6-1	M7-1
M8-1	S1-1	S2-1	SS1		

EACH TO HAVE:

1			HARDWARE BY DOOR MANUFACTURER		

HARDWARE GROUP NO. 13

M116-2	M118-2	M120-1	M135-2

EACH TO HAVE:

2	EA	CONT. HINGE	112HD	628	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP1	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	SC81 SSHO	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP
1	EA	ASTRAGAL	139A	600	NGP
2	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

HARDWARE GROUP NO. 14

M117-2

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	9949-EO	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	DOOR PULL	VR910 DT	630	IVE
1	EA	DOOR PULL	VR910 NL	630	IVE
2	EA	SURFACE CLOSER	SC81 SSHO	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP
2	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
2	EA	DOOR CONTACT	679-05HM	BLK	SCE

HARDWARE GROUP NO. 15

M117-1 M117-3

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A 806A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 16

M116-1 M124-2

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 17

M13-1 M132-2

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	EL STOREROOM LOCK	L9080TEL 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
2	EA	SURFACE CLOSER	SC81 SS	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE
2	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 18

A135-1 M125-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	EL STOREROOM LOCK	L9080TEL 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 19

A102-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE

1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 20

A103-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 21

A104-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 22

A105-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	L9010 06A	626	SCH
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 23

A118-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
2	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	WALL STOP/HOLDER	WS45	626	IVE
1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 24

A119-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
2	EA	SURFACE CLOSER	SC81 SSHO	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 25

A120-1 A120-2

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PUSH PLATE	8200 4" X 16"	630	IVE
1	EA	PULL PLATE	8302 6" 4" X 16"	630	IVE
1	EA	SURF. AUTO OPERATOR	9542 HL/D MS	ANCLR	LCN
2	EA	ACTUATOR, WALL MOUNT	8310-852	630	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 26

A123-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 27

A125-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	99-L-996-06	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 28

A134-1 M130-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	EA	MOP PLATE	8400 4" X 1" LDW	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 29

A131-1 A141-2 M11-1 M122-1 M14-1 M9A-1
M9B-1

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL+-XP-99-EO	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	4111 SCUSH	689	LCN
1	SET	SEALS	5050CL	CLR	NGP
1	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 30

A141-1

EACH TO HAVE:

1	EA	PIVOT SET	7226 SET	626	IVE
1	EA	INTERMEDIATE PIVOT	7226 INT	626	IVE
1	SET	PUSH/PULL BAR	9103EZHD-12"-STD	630	IVE
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 31

A131-2

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	99-L-BE-996-06	626	VON
1	EA	CONCEALED CLOSER	6034 BUMP	689	LCN
1	EA	FLOOR STOP	FS18S	BLK	IVE
1	SET	SEALS	5050CL	CLR	NGP

HARDWARE GROUP NO. 32

A139-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	99-L-996-06	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 33

A137-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 34

A130-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 35

A-2 A-3 A142-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC HARDWARE	RX-LC-QEL+-XP-99-EO	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE
1	EA	DOOR CONTACT	679-05HM	BLK	SCE
1	EA	POWER SUPPLY	PS914 900-2RS	LGR	VON
1			CARD READER BY OTHERS		

HARDWARE GROUP NO. 36

M110-1 M112-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	OFFICE/ENTRY LOCK	L9050T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 HW/PA	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 37

M111-1

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 38

M1-3 M118-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
2	EA	SURFACE CLOSER	SC81 SSHO	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 39

M123-4

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	SURFACE CLOSER	SC81 SS	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 40

M123-3

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	FIRE EXIT HARDWARE	99-L-F-996-06	626	VON
1	EA	RIM CYLINDER	20-057	626	SCH
1	EA	FSIC CONST. CORE	23-030-ICX		SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 41

M123-2

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	OH STOP	100S	630	GLY
1	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 42

M132-1 M134-1 M135-1

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	SET	CONST LATCHING BOLT	FB51P	630	IVE
1	EA	DUST PROOF STRIKE	DP2	626	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	SC81 REG OR PA AS REQ	689	FAL
2	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
2	EA	SILENCER	SR64	GRY	IVE

HARDWARE GROUP NO. 43

M135A-1 SS-2

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	STOREROOM LOCK	L9080T 06A	626	SCH
1	EA	PRIMUS CORE	20-740-XP	626	SCH
1	EA	SURFACE CLOSER	SC81 SS	689	FAL
1	EA	KICK PLATE	8400 10" X 1 1/2" LDW	630	IVE
1	SET	SEALS	5050CL	CLR	NGP
1	EA	DOOR SWEEP	101VA	CL	NGP
1	EA	THRESHOLD	896V	AL	NGP
1	EA	DOOR CONTACT	679-05HM	BLK	SCE

END OF SECTION 087100

SECTION 08 7513

ASSISTIVE WINDOW ACTUATOR

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Electric dual chain window actuators.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section ALUMINUM WINDOWS for requirements for aluminum windows.

B. See DIVISION 26 for electrical requirements related to assistive window actuators.

1.3 REFERENCES:

A. ANSI A117.1-1998 sections 506 and 1002.13; ANSI A117.1-1992 sect's 4.12 and 4.25.

B. Life Safety Code NFPA 10, Emergency Escape and Rescue Openings.

C. Building Codes- Current state building code and IBC: all applicable sections.

D. ADAAG, Section 4.27 Controls and Operating Mechanisms.

E. UFAS Section 4.34.2(9) and 4.27 and Retrofit Manual, Section 4.12, pg. 98-101.

F. AAMA/ANSI 101-93, Voluntary Specifications for Windows and Sliding Doors.

1.4 ACTION SUBMITTALS

A. Combined Submittal: Submit items required in this Section as a combined submittal with requirements of Division 08 Section ALUMINUM WINDOWS.

B. Product Data: Submit manufacturer's specifications and installation instructions for materials.

C. Shop Drawings:
   1. Show existing field conditions of installed windows and defining the following:
      a. Jamb depth.
      b. Window, jamb, head, mullions dimensions and configurations.
      c. Verification of movable sash attachment area.
      d. Distance between jambs.
      e. Distance between head and finished sill.
      f. Distance from finished floor to finished sill.
   2. Floor plan indicating window locations by number or letter indicating control location and height of sill above finished floor.
   3. Scaled and dimensioned window drawings, including sections, from window manufacturer.
   4. Indicate non-standard layout and placement of actuator.

1.5 CLOSEOUT SUBMITTALS

A. Warranty: Submit signed and dated warranty.

1.6 PERFORMANCE REQUIREMENTS

A. Window actuating system to be compatible with type and model of window to be modified.

B. Window actuating system to open, close and latch windows in accordance with requirements of referenced standards.

1.7 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate window actuator Work with Work of other trades.
   2. Provide materials and accessories in timely manner so as not to delay Work.

1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain window actuator system from manufacturer with not less than 5 years documented, successful experience in supplying specified Work.

B. Installer Qualifications: Not less than 3 years documented, successful experience with work comparable to Work of this Project.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Deliver materials in manufacturer's unopened containers, fully identified with brand, type, grade, class and all other qualifying information.

1.10 SEQUENCING

A. Sequence installation of window actuator after completion of finishes surrounding window, and after final cleaning and adjustments have been made to window.

1.11 SAMPLE INSTALLATIONS

A. Prior to commencing Work provide sample installations of assistive window actuator Work.

B. Extent: Install actuator on one window unit capable of being inspected from both sides of window unit.

C. Architect's Review:
   1. Architect will review sample installation for compatibility and functional operation..
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

D. Maintain approved sample installations during construction as standard for subsequent Work.

E. Properly finished and maintained sample installations may be incorporated into completed Work.

1.12 WARRANTY

A. Manufacturer's written warranty guaranteeing window actuator system materials and components to be free of defects for a period of not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Design is based on products as manufactured by Northern Star Technologies to establish a standard of quality:
      a. Dual Chain Actuator: ET-DCA3.
      b. Locking actuator: ET-MPLA.
   2. Equivalent products by the following manufacturers are acceptable, provided they comply with the requirements of the Contract Documents.
      a. A-Solution, Inc. Albuquerque, NM.
      b. Functional Fenestration, Inc. Hawthorne, CA.

2.2 WINDOW ACTUATOR:

A. Technical Features:
   1. Actuator maintains inherent operating range of window.
   2. Dual synchronous chain; 2 motors, 2 gear assemblies and 2 chains.
   3. Clutching or power disengagement capability shall prevent damage to window or window actuator due to occasional excessive operational force.
   4. Pivoting universal mounting bracket system.
   5. Maximum current absorption: 2.8 Amps.

B. Operation:
   1. Two motors and two chain design in a single housing.
      a. Low noise dual isolation enclosure.
   2. Electronic overload cutoff limit stop, low noise operation; safety synchronization.
   3. Lifting/closing force: 1000 N.
   4. Static lock force: 8000 N.
   5. Voltage supply: 24VDC.
   6. Maximum push and pull force: 500 N.
   7. Endurance tests: 10,000 cycles.

C. Materials:
   1. All parts to be corrosion resistant.
   2. Bearings: Self-lubricating ball bearings.
   3. Chain type: Stainless steel double link chain.

D. Finishes:
   1. Dual chain actuator: Manufacturer's standard.
      a. Basis-of-design: Anodized aluminum.
   2. Sash or chassis brackets and adapters: Manufacturer's standard.

E. Accessories:
   1. Heavy-duty drive for windows over 35 lbs and up to 55 lbs operating force.

2.3 LOCKING ACTUATOR:

A. Features:
1. Hi-torque quiet belt drive mechanism.
2. Flat mount 4-hole tabs.
3. Electronic overload cutoff and limit stop.
4. Maximum current absorption: 1.5 Amps.

B. Operation:
1. Turning angle: 180 degrees.
2. Lifting/closing force: 10 Nm.
3. Voltage supply: 24VDC.
4. Endurance tests: 10,000 cycles.

C. Materials:
1. All parts to be corrosion resistant.

D. Finishes:
1. Locking actuator: Manufacturer’s standard.
2. Basis-of-design: White.

E. Warranty: 5 years.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Examine installed windows and determine that installation is complete and that windows are operating smoothly and compatible with all actuator system requirements.

3.2 PREPARATION:

A. Protect adjacent surfaces not designated to receive actuators.

3.3 INSTALLATION:

A. Installer shall have experience installing devices of the type specified.

B. Install actuators according to manufacturer's recommended instructions and approved shop drawings.

3.4 FIELD QUALITY CONTROL:

A. After installation, test all windows and operators. Cycle open and closed a minimum of ten times. Verify the following:
1. Proper sash alignment in window frame.
2. Full opening and closing.
3. "Excessive force" electronic overload protection system.
4. Complete and tight gasket closure for weather tight window unit seal.

B. Correct deficiencies and make required actuator adjustments.

3.5 DEMONSTRATION:

A. Demonstrate operation of window operators to Owner's designated representativs.

END OF SECTION

SECTION 08 8000

GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
      a. Windows.
      b. Doors.
      c. Glazed curtainwalls.
      d. Storefront framing.
      e. Glazed entrances.
      f. Interior borrowed lites.
   2. Security sliding transaction windows
   3. Glazing materials and accessories.

B. Single Subcontract Responsibility: Provide glass and glazing under single subcontract provisions as specified in the following Sections:
   1. Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section HOLLOW METAL DOORS AND FRAMES for hollow metal doors and hollow metal framing systems.

B. See Division 08 Section FLUSH WOOD DOORS for wood door framing systems.

C. See Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS for aluminum framing systems in conjunction with window wall and glazing system requirements for entrance doors.

D. See Division 08 Section ALUMINUM WINDOWS for glass and glazing for aluminum windows.

E. See Division 10 Section TOILET ACCESSORIES for glass and glazing in conjunction with framed mirrors and shower doors.

1.4 ACTION SUBMITTALS

A. Combined Submittal: Submit the following as a combined submittal with Work specified in Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.

B. Product Data: Submit manufacturer's specifications and installation instructions for each type of glass required.

C. Samples:
   1. Glass:
      a. Submit 12 inch (300 mm) square samples of each type of glass (except clear single lite glass).
      b. Samples shall be typical production run quality and, as applicable, shall be complete with required tint, reflective and low emissivity coatings, fritted coatings, laminating films, opacifiers and primary and secondary edge seals.

D. Calculations: Provide glass manufacturer's thermal stress analysis, for the most critical exterior application.

E. Certificates:
   1. Submit certificate from glass manufacturer stating that manufacturer has reviewed glazing details including use of sealants and gaskets and each product provided is recommended for application indicated, and that materials are compatible and will adhere to specified finish.
   2. Submit certificate from glass manufacturer stating that manufacturer has reviewed application of heat absorbing or reflective glass for effects of partial or full shading (including locations and types of indicated interior window treatment) under expected service temperature ranges and that resulting thermal stresses will not reduce “Glass Statistical Factor” below 2.5.
   3. Submit certificate for glass materials at “Hazardous Locations” showing compliance with requirements of CPSC 16CFR, Part 1201.
   4. Submit certificate stating that glass units can withstand design loads.
   5. Submit glass manufacturer’s review of Shop Drawings for window wall system, with recommendations and suggestions.

F. Qualification Data: Submit manufacturer and installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit cleaning and maintenance data for materials provided.
   2. Include copy of submittal in Project information manual.

B. Warranties: Submit signed and dated warranties.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:

1. Glass thicknesses when indicated (except for ornamental applications) are for convenience of detailing only and are to be determined by Contractor or glass manufacturer as required to fulfill performance requirements.
2. Glazing channel dimensions indicated are intended to provide necessary minimum bite on glass, minimum edge clearances and adequate sealant and/or gasket thickness within required tolerances.
3. Coordinate glazing systems with glazing channels to assure proper installation of systems.

B. Performance Requirements:
1. Refer to the following Sections for performance criteria pertaining to design of glass, glazing systems and framing members for glazing applications.
   a. Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
2. Glass Statistical Factor (Safety Factor):
   a. Provide glass of sufficient thicknesses that probability of breakage at “Design Wind Pressure” will not exceed 8 lites per 1000 lites (2.5 SF) at 60 second wind load.
   b. For glass inclined more than 15 deg from vertical, including glass for skylights, provide glass of sufficient thicknesses that probability of breakage at “Design Loads” will not exceed 1 lite per 1000 lites (5.0 SF) unless glass manufacturer specifically recommends, in writing, a lower SF.
   c. Provide glass manufacturer's data, on request, substantiating glass breakage data if such data is not otherwise available as manufacturer's published data.
3. Compatibility and adhesion: Provide glazing sealants, gaskets, and glazing accessories which are compatible with each other and with glass and glass framing members, and which will adhere to joint surfaces.
4. Provide watertight and airtight installation of glass.
5. Each installation must withstand specified performance requirements including normal temperature changes, wind loading and impact loading, without failure.

C. Fire-Protection-Rated Glazing Labeling:
1. Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F (250 deg C), and the fire-resistance rating in minutes.
2. For fire-protection-rated glazing, provide products identical to those tested in accordance with the following, and labeled and listed by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
   a. Fire-resistant glazing products for door assemblies: NFPA 252.
   b. Fire-resistant glazing products for window assemblies: NFPA 257.

D. Interface with Other Systems: Provide primary and secondary seals on insulating units that are compatible with sealant used for structural sealant glazing.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented successful experience in installation of work similar to Work of this Project, licensed or approved by glass manufacturer.

B. Single Source Responsibility:
   1. Provide glass and glazing materials from one source for each type of glass.
   2. Use same glazing material in each joint system unless material manufacturer recommends otherwise.

C. Manufacturer Qualifications:
   1. Not less than 5 years documented successful experience in production of work similar to Work of this Project, with sufficient capacity to supply glass in a timely fashion.
   2. Manufacturer of insulating glass units shall be a member of IGMA (Insulating Glass Manufacturers Alliance).

D. Regulatory Requirements:
   1. Comply with applicable requirements of authorities having jurisdiction over Project.
   2. Safety glazing requirements:
      a. Provide glass and glazing at “Hazardous Locations” complying with requirements of CPSC 16CFR, Part 1201, Consumer Product Safety Commission Standard on Architectural Glazing Materials, including required tests and labeling.
      b. Permanently mark each lite of safety glazing material with certification label acceptable to authorities having jurisdiction.

E. Reference Standards: Unless otherwise required to comply with regulatory requirements or otherwise recommended by fabricator to fulfill performance requirements, comply with the following:
   1. AAMA “TIR-A Glazing Guidelines”.
   2. GANA “Glazing Manual”.
   3. IGMA TM-3000 “Glazing Guidelines for Sealed Insulating Glass Units”.

1.8 SAMPLE INSTALLATION

A. Prior to commencing Work, glaze one bay of each type of glazing system in area as acceptable to Architect.

B. Install sample installations to match final Work in every respect.

C. Install sample installations in presence of glazing materials manufacturer and glass manufacturer representatives, not less than one week in advance of scheduled glazing Work.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of workmanship.
   2. Obtain Architect's approval of sample installation before proceeding with subsequent Work.

E. Accepted sample installations may remain in completed Work.

F. Dismantle unacceptable sample installations and remove from site.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

B. Attendees: Glass manufacturer's representative, glazier and fabricator of framing or other supporting structure receiving glass.

C. Agenda:
1. Review glazing procedure, application of glazing materials and installation of removable stops.
2. Evaluate suitability of specified compounds and sealants for anticipated weather conditions.
3. Review coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver glazing materials in manufacturer's unopened packaging.

B. Glass shall bear manufacturer's labels indicating type and quality. Labels shall be left on glass until final cleaning, unless otherwise directed by Architect.

C. Store in accordance with manufacturer's recommendations.

D. Provide cushions at glass edges to prevent damage during handling or storage.

1.11 PROJECT CONDITIONS

A. Environmental Conditions:
1. Ensure that conditions of temperature, humidity and precipitation are as recommended by glass manufacturer.
2. Do not proceed with glazing when ambient or substrate temperature conditions are below 40 deg F.
3. Install glazing sealants only when temperatures are in middle third of manufacturer's recommended installation temperature range.
4. Do not perform any glazing Work when framing members are wet or frosted.

1.12 WARRANTY

A. Provide written 10 year warranties, made out to Owner and signed by glass manufacturer agreeing to furnish replacements for the following:
1. In manufacturer's warranties, “initial purchaser” shall refer to Owner.
2. Insulating glass units which have failed hermetic seal, fogging, reflective or low emissivity coating defects, breakage due to edge flaws (such as chips or gouges) or migration of edge spacers.
3. Laminated glass units which show evidence of delamination, deterioration of laminating films, loss of transparency or other forms of deterioration including edge separation due to defective materials or lamination, or breakage due to edge flaws (such as chips or gouges).
4. Coated or spandrel glass which show evidence of peeling, cracking or deterioration of coating or opacifier/scrim, or breakage due to edge flaws (such as chips or gouges).
5. Glass units with latent visual defects.

PART 2 - PRODUCTS

2.1 GLASS MATERIALS

A. Clear Float Glass:
   1. ASTM C1036, Type I, Class 1, Quality q^3.
   2. Minimum thickness: 6 mm.

B. Heat-Treated Glass:
   1. General:
      a. Fabrication process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
      b. For uncoated glass, comply with requirements for Condition A.
      c. For coated vision glass, comply with requirements for Condition C (other coated glass).
      d. Adjust temperature settings of heat-treating ovens to suit specific glass coatings, so as to minimize distortion and discoloration of coatings.
   2. Fully tempered glass:
      a. ASTM C1048, Kind FT, of color and type indicated.
      b. Provide fully tempered glass certified by SGCC or other recognized certification agency, acceptable to authorities having jurisdiction, as complying with requirements of CPSC 16CFR, Part 1201 for Category II materials.
      c. Roller wave distortion: Limit roller wave distortion to 0.003 inches peak to valley.
      d. Wherever possible, locate tong marks along edge which will be concealed in glazing system.
      e. Permanently mark each unit of tempered glass with certification label acceptable to authorities having jurisdiction. Permanent marking is not required for tempered spandrel glass.
      f. Locations: Provide as indicated and as required to comply with referenced standards.
   3. Heat-strengthened glass:
      a. ASTM C1048, Kind HS, of color and type indicated.
      b. Locations: Provide as indicated, as required to comply with referenced standards and as required for conditions of glass application and intended use.

C. Tinted Float Glass:
   1. Color: Gray.
      a. Properties, at 6 mm thickness:
         1) Visible transmittance: 47%.
         2) Shading coefficient: 0.70.
      b. Thickness: 6 mm.
      c. Acceptable product and manufacturer: Equivalent to 3, Monolithic Gray by Viracon.

D. Low-Emissivity Coated Glass:
   1. ASTM C1376, coated by pyrolytic process or vacuum deposition (sputter-coating) process, and complying with other requirements specified.
   2. Do not apply coatings until after glass has been heat-treated.
   3. Properties: See “Insulating Glass” below.
   4. Acceptable product and manufacturer: See “Insulating Glass” below.

E. Ceramic-Coated Vision (Fritted) Glass:
   1. ASTM C1048, Kind FT, Condition C, Type 1, Class 1, Quality q^3; with ceramic enamel applied by silk-screened process; complying with Specification No. 95-1-31 in GANA's Tempering Division's "Engineering Standards Manual" and with other requirements specified.
   2. Ceramic frit color: Match color of specified product.
   3. Pattern: See Drawings for pattern types.
   4. Acceptable product and manufacturer: Equivalent to Silkscreen Pattern, Screen 3058, Fog Gray V1087, by Viracon.

F. Insulating Glass Units (IGU):
   1. Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190, and complying with other requirements specified.
   2. Fabricate units at factory with hermetic seals at edges with both primary and secondary elastomeric seals.
   3. Make primary seals of polyisobutylene and secondary seals of neutral cure, 2-part silicone manufactured specifically for use in insulating glass units, unless otherwise recommended by manufacturer to fulfill performance criteria.
   4. Spacer:
      a. Rolled laser welded aluminum tube with soldered, brazed, welded or uncut bent corners.
      b. Size: Not less than 3/4 inch smaller or more than 1 inch smaller than glass lights, centered to show equal margins top, bottom and both sides.
      c. Fill void between spacer and glass edges completely with silicone secondary seal, devoid of trapped air bubbles.
   5. IGU schedule:
      a. IGU-1:
         1) 6 mm clear heat-strengthened float glass with low-emissivity coating (#2 surface) outdoor lite; 1/2 inch air space; 6 mm clear heat-strengthened float glass indoor lite; 1 inch assembled unit thickness.
         2) Physical properties:
            a) Visible transmittance: 76%.
            b) Solar transmittance: 47%.
            c) Solar reflectance: 21%.
            d) Winter U-value: 0.31.
            e) Summer U-value: 0.29.
            f) Shading coefficient: 0.63.
            g) Solar heat gain coefficient: 0.54.
            h) R (Solar Reflectance): 12%.
            i) LSG (Light to Solar Gain) Ratio: 1.41.
         3) Acceptable product and manufacturer: Equivalent to Solarscreen 2000 Insulating Glass VE 1-85 by Viracon.
      b. IGU-2:
         1) Same as IGU-1 but with ceramic-colored frit pattern (#3 surface).
         2) Acceptable product and manufacturer: Equivalent to Insulating HS/HS Silkscreen Glass VE 1-85 by Viracon.
      c. IGU-3:
         1) Same as IGU-1 but with tinted heat-strengthened float glass outdoor lite and ceramic-colored frit pattern (#4 surface).

2) Acceptable product and manufacturer: Equivalent to Insulating HS/HS Silkscreen Glass VE 3-85 by Viracon.

2.2 GLAZING MATERIALS

A. General:
1. Comply with manufacturer's recommendation for selection of hardness, depending on location of application, conditions at time of installation and performance requirements indicated.
2. Provide materials, and variations or modifications that are compatible with surfaces contacted in installation.
3. Color: Provide colors selected by Architect from manufacturer's standard colors.

B. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Silicone Glazing (Weatherseal) Sealant:
1. Medium-modulus, neutral-curing silicone sealant; complying with ASTM C920, Type M or S, Grade NS, Class 50.
2. Color: Black.
3. Acceptable products and manufacturers:
   a. 795 by Dow Corning Corp.
   b. SilPruf SCS2000 by Momentive Performance Materials, Inc.
   c. 864 by Pecora.
   d. Spectrem 3 by Tremco.

D. Acrylic-Emulsion Glazing Sealant: Emulsion of acrylic, with or without latex rubber modification; compounded specifically for glazing; nonhardening, nonstaining and nonbleeding.

E. Butyl Rubber Glazing Tape:
1. Partly-vulcanized, self-adhesive, non-staining, elastomeric tape, 100% solids; complying with AAMA 800.
2. Provide with or without spacer rod, as recommended by tape and glass manufacturers to suit applications indicated.

F. Polyurethane Foam Glazing Tape:
1. High-density, closed-cell, flexible, non-extruding tape, adhesive backed one side only; recommended by manufacturer for exterior applications with nominal pressure in glazing channel.
2. Acceptable manufacturer: Norton Company.
3. Acceptable products: As recommended by manufacturer suitable for conditions of application and use.

G. Molded Resilient Neoprene Gaskets: Continuous extruded neoprene gaskets complying with applicable ASTM standards for physical properties including durometer hardness and tensile strength recommended by framing manufacturer and tested to demonstrate conformance with Contract Documents.

H. Glazing Felt: Treated wool felt, adhesive backed, non-wicking and non-staining.

I. Glazing Accessories:

1. Provide materials with proven record of compatibility with surfaces and other materials contacted in installation.
2. Setting blocks: Neoprene or silicone, 70-90 Shore A durometer hardness.
3. Spacers: Neoprene or silicone, 40-50 Shore A durometer hardness, adhesive backed one face only.
4. Corner blocks: Closed cell neoprene wedge blocks designed to prevent lateral displacement of glass, as recommended by manufacturer and GANA Glazing Manual.
5. Cleaners, primers, and sealers: As recommended by sealant or gasket manufacturer.

2.3 FABRICATION

A. Cutting:
1. Obtain sizes from Shop Drawings or by field measurement.
2. Cut glass to fit openings with minimum edge clearances and bite on glass recommended by glass manufacturer. Do not nip glass edges.
3. Factory cut heavy heat absorbing glass (over 10 mm) and heavy float glass (over 13 mm).
4. Edges:
   a. Concealed: Wheel cut or sawed and seamed.
   b. Exposed: Square edge; ground smooth and polished.
5. If glass will be cut in field, fabricate glass 2 inches larger than required.
6. Provide required openings in tempered or heat-strengthened glass before heat-treating. Do not cut, seam, nip or abrade such glass after heat-treating.
7. When glass is pre-cut to sizes obtained from Shop Drawings, take field measurements of openings before glazing to verify adequate bite of glass and minimum edge clearance.
8. If openings do not comply with tolerances for which pre-cut glass was sized, use new glass specially cut to fit such openings.

B. Fire Department Labels:
1. Provide permanent labels as indicated on Drawings and as required to comply with requirements of authorities having jurisdiction over Work.
2. Prior to tempering, etch or sandblast label on #2 surface of insulating unit, unless otherwise required to fulfill performance criteria.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, including framing and glazing channels, and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Ensure that frame openings are plumb, level, true to line and otherwise properly installed.

C. Inspect each piece of glass immediately before installation, and discard pieces which evidence damage or deterioration including edge damage or face imperfections.

3.2 PREPARATION

A. Clean glazing channel and other framing members to receive glass immediately before glazing.

B. Remove coatings not firmly bonded to substrate. Remove lacquer from metal surfaces abutting elastomeric sealants.

C. Apply primer or sealer to joint surfaces where recommended by sealant manufacturer.

3.3 INSTALLATION

A. Comply with combined recommendations of referenced standards, glass manufacturer and manufacturer of sealants and other materials used in glazing, except where more stringent requirements are indicated or specified, and except where manufacturer's technical representatives direct otherwise.

B. Layout:
1. Unify appearance of each series of lites by setting each piece to match others as nearly as possible.
2. Inspect each piece and set with pattern, draw and bow oriented in same direction as other pieces.

C. Setting Blocks:
1. Install setting blocks at sill one-quarter in from each end of the glass, unless otherwise recommended by manufacturer.
2. Use blocks of proper size to support glass.

D. Spacers:
1. Provide spacers for glass sizes larger than 50 united inches to separate glass from stops except where continuous glazing gaskets or felts are provided.
2. Locate spacers no farther than 24 inches apart and no closer than 12 inches to corners.
3. Place spacers opposite one another. Make bite of spacer on glass a nominal 1/4 inch or greater.

E. End Blocks: Provide end blocks to comply with requirements of referenced glazing standards except where otherwise required by glass manufacturer.

F. Backer Rods: Install compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers.

G. Sealant Glazing:
1. Force sealants into channel to eliminate voids and to ensure complete “wetting” or bond of sealant to glass and channel surfaces.
2. Use masking tape to limit coverage of glazing materials to surfaces intended for sealants.
3. Cure sealants for high early strength and durability.
4. Tool exposed surfaces of glazing materials to provide slight wash away from glass.

H. Gasket Glazing:
1. Vulcanize joints of glazing gaskets in accordance with manufacturer's instructions to provide continuous watertight and airtight seal at corners and other locations where joints are required.
2. Butt or lap ends of tape.
3. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not “walk” out when subjected to movement.

4. Anchor gasket to stop with matching ribs, or by proven adhesives, including embedment of gasket tail in cured heel bead. Set gaskets in silicone sealant at corners.
5. Install exposed tapes or gaskets with slight protrusion above stops in final compressed condition.

I. Insulating Glass:
1. Set insulating units with void between edge of units and glazing channel except in cases where a heel bead is required to prevent water leakage.
2. Conceal edge spacer and seal binding of units with glazing material.

J. Sliding Transaction Window Installation:
1. Comply manufacturer's instructions and recommendations for installation of Work.
2. Do not erect warped, bowed, deformed or otherwise damaged or defaced members.
3. Securely anchor in place to straight, plumb and level conditions, without distortion.
4. Support units on shims and secure in place by bolting to clip angles and similar supports anchored to supporting structure.
5. Check operating sash hardware movement, making final adjustments as necessary.

3.4 CLEANING

A. Clean excess sealant or compound from glass and framing members immediately after application.

B. After installation and until final acceptance, clean glass as frequently as required, but not less than once per month, to remove build-up of dirt, scum, and other substances. Comply with glass manufacturer's recommendations for cleaning.

C. Wash and polish glass on both faces not more than 4 days prior to final acceptance.

D. Comply with glass manufacturer's recommendations for final cleaning.

3.5 PROTECTION

A. Protect glass from breakage after installation. Do not apply markers to surfaces of glass.

B. Remove non-permanent labels.

C. Remove and replace glass which is broken, chipped, cracked, abraded or damaged.

3.6 GLASS TYPE SCHEDULE

A. Insulating Glass: ASTM E774, Class CBA; factory preassembled, sealed insulating glass units with 1/2-inch (13.2 mm) air space; aluminum spacer tube with desiccant held captive within, and dual seal construction.
1. IGU-2 - Spandrel:
   a. Outer lite: 1/4-inch (6 mm) clear plate glass or tempered safety glass as shown or specified, with low-emissivity (low-E) coating equal to Viracon’s VE-85 on the number two (inside) surface.
   b. Inner lite: 1/4-inch (6 mm) clear plate glass or tempered safety glass as shown or specified.
   c. Screen: #3058#3, V1087 – fog gray (Viraspan #3).

d. Airspace: 1/2 inch (13 mm).
e. Spacer: Rolled laser welded aluminum tube with soldered, brazed, welded or uncut bent corners
   1) Mill finish.
   2) Fill void between spacer and glass edges completely with silicone secondary seal, devoid of trapped air bubbles.
f. Physical properties:
   1) Visible transmittance: NA.
   2) Solar transmittance: NA.
   3) Solar reflectance: NA.
   4) Winter U-value: 0.31.
   5) Summer U-value: 0.29.
   6) Shading coefficient: NA.
   7) Solar heat gain coefficient: NA.
   8) R (Solar Reflectance): NA.
   9) LSG (Light to Solar Gain) Ratio: NA.
g. Acceptable product and manufacturer: Equivalent to Insulating HS/HS Silkscreen Glass VE 1-85 by Viracon.

2. IGU-3:
   a. Outer lite: 1/4-inch (6 mm) gray plate glass or tempered safety glass as shown or specified, with low-emissivity (low-E) coating equal to Viracon's Solarscreen 85 on the number-two (inside) surface
   b. Inner lite: 1/4-inch (6 mm) clear plate glass or tempered safety glass as shown or specified.
   c. Airspace: 1/2 inch (13 mm).
   d. Spacer: Rolled laser welded aluminum tube with soldered, brazed, welded or uncut bent corners
      1) Mill finish.
      2) Fill void between spacer and glass edges completely with silicone secondary seal, devoid of trapped air bubbles.
   e. Physical properties:
      1) Visible transmittance: 38%.
      2) Winter U-value: 0.31.
      3) Summer U-value: 0.29.
      4) Shading coefficient: 0.38.
      5) Solar heat gain coefficient: 0.33.
      6) R (Solar Reflectance): 7%.
      7) LSG (Light to Solar Gain) Ratio: 1.15.
   f. Acceptable product and manufacturer: Equivalent to Insulating HS/HS VE 3-85 by Viracon.

B. General:
   1. Glass Type numbers specified below correspond to Type numbers indicated on Drawings.
   2. Temper units where indicated on Drawings, specified or required to fulfill performance criteria.

C. Schedule:

Type	Description
G1	IGU-1

G2	IGU-2
G4	IGU-3

END OF SECTION

SECTION 08 9000

LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Horizontal Blade Louver.

1.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Louvers shall withstand the effects of gravity and wind loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.

B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.

C. Color and finish samples: For each type of metal finish required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.

B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

C. Fasteners: Use types and sizes to suit unit installation conditions.

1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
2. For color-finished louvers, use fasteners with heads that match color of louvers.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.2 FABRICATION, GENERAL

A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.

B. Join frame members to each other and to fixed louver blades with fillet welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.3 STATIONARY, EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable Blade Louver:

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Greenheck
    b. Titus
    c. Ruskin

2. Louver Depth: 4 inches.
3. Frame: Heavy gauge extruded 6063-T5 aluminum, not less than .081 in nominal wall thickness
4. Blades: Drainable design, heavy gauge extruded 6063-T5 aluminum, not less than 0.081 inch nominal wall thickness, positioned at 37 deg and 45 deg angles on approximately 4 in centers.
5. Mechanically fastened construction
6. Finish: 70% Kynar
7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
8. Provide with mounting flange on all four sides
9. Wind Loads: Determine loads based on a uniform pressure of 25PSF (100 MPH equivalent), acting inward or outward. Louver frames, mullions, and section joints shall be adequately supported from the building structure to withstand this same wind loading.
10. Color to be selected by Architect
11. Warranty: 10 years

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.

C. Louver Screening:

1. Bird Screening: Aluminum, 1/2-inch (13-mm) square mesh, 0.063-inch (1.60-mm) wire.

2.5 ALUMINUM FINISHES

A. High-Performance Organic Finish: 2-coat 70% Kynar finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: Selected by Architect.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.

B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather tight connection.

C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.

D. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.

E. Protect nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

F. Caulk all sides.

END OF SECTION

DIVISION 09
FINISHES

SECTION 09 1000

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Metal studs and furring.
   2. Metal suspension systems.
   3. Accessories.

B. Products Furnished but Not Installed Under This Section: Furnish inserts and anchors for suspended ceilings to other trades well in advance of time needed for coordination with other Work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See DIVISION 06 Sections for wood blocking, furring and similar items.

B. See Division 09 Section GYPSUM BOARD for partition finish materials.

C. See Division 09 Section ACOUSTICAL CEILINGS for acoustical panel suspension systems.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

1.4 SYSTEM REQUIREMENTS

A. Performance Requirements: Provide metal framing as indicated but not lesser bare metal thickness than that required to comply with ASTM C754 under the following conditions:
   1. Gypsum board partitions:
      a. Standard systems: Maximum deflection of l/240 of partition height.
      b. Systems to receive moisture- and mold-resistant gypsum board or cementitious backer board: Maximum deflection of l/360 of partition height.
   2. Interior suspended ceilings and soffits: Maximum deflection of l/360 of distance between supports.
   3. Seismic loads: See Structural Drawings for seismic requirements.

B. Fire-Test-Response Characteristics
   1. For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency acceptable to authorities having jurisdiction.
   2. If the Contract Documents indicate a fire resistance rated gypsum board assembly which includes products which are not commercially available, then another fire resistance rated

gypsum board assembly having the same hourly rating, but constructed of commercially available products meeting requirements of the Contract Documents, shall be provided as part of the Work.

1.5 QUALITY ASSURANCE

A. Single Source Responsibilities: Obtain steel framing members for gypsum board assemblies from a single manufacturer.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Reference Standards: Except where required by local code or these specifications, comply with applicable requirements of ASTM C754 for installation of steel framing.

1.6 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Steel Framing and Furring:
   1. ClarkDietrich Metal Framing.
   2. Marino\Ware Industries Corp.
   3. Telling Industries.

B. Grid Suspension Assemblies:
   1. Armstrong World Industries.
   2. Chicago Metallic Corp.
   3. USG Interiors, Inc.

2.2 METAL FRAMING AND FURRING MATERIALS

A. Metal Studs and Runners:
   1. ASTM C645, "C" shaped, minimum bare metal thickness as follows, except as otherwise required to fulfill performance requirements:
      a. Provide 0.018 inch (0.45 mm) minimum bare metal thickness studs, except as otherwise indicated.
         1) Provide greater thickness as required to comply with performance requirements.
         2) Provide 0.033 inch (0.79 mm) minimum bare metal thickness studs at walls to receive cementitious backer board , and moisture- and mold-resistant gypsum board with ceramic tile facing.
      b. Provide runner bare metal thickness as recommended by stud manufacturer for thickness of corresponding studs.
   2. Depth of sections: 3-5/8 inches (92 mm) unless otherwise indicated.
   3. Corrosion protection: G40 (Z120) hot-dip galvanized coating per ASTM A653.

B. Metal Furring Channels:
   1. Hat-shaped:
      a. ASTM C645, 7/8 inch (22 mm) high, 0.018 inch (0.45 mm) minimum bare metal thickness, with G40 (Z120) hot-dip galvanized coating per ASTM A653.
      b. Provide 0.033 inch (0.79 mm) minimum bare metal thickness at furring to receive cementitious backer board.
   2. Z-shaped: ASTM C645, depths as indicated, 0.021 inch (0.50 mm) minimum bare metal thickness minimum, with G40 (Z120) hot-dip galvanized coating per ASTM A653.
   3. Resilient: Manufacturer's standard type designed to reduce sound transmission; 1/2 inch (13 mm) deep, 0.018 inch (0.45 mm) minimum bare metal thickness steel with G40 (Z120) hot-dip galvanized coating per ASTM A653.

2.3 CEILING AND SOFFIT SUPPORT MATERIALS

A. Hanger Attachments to Concrete:
   1. Anchors:
      a. Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488 by an independent testing agency.
      b. Type: Postinstalled, expansion anchor...
   2. Powder-actuated fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E1190 by an independent testing agency.

B. Hangers:
   1. Steel wire or rods, sizes to comply with requirements of ASTM C754 for ceiling or soffit area and loads to be supported.
   2. Wire:
      a. ASTM A641, Class 1 zinc coating, soft temper, 0.162 inch (4.12 mm) diameter.
      b. Locations: Interior ceilings and soffits.
   3. Rod hangers:
      a. ASTM A510, mild carbon steel; 7/32 inch (5.56 mm) diameter.
      b. Protective coating: ASTM A153, hot-dip galvanized.
      c. Locations: Exterior ceilings and soffits.

C. Framing System:
   1. Main runners:
      a. Carrying channels: Cold-rolled, commercial-steel sheet with 0.055 inch (1.37 mm) bare metal thickness and minimum 1/2 inch (12.7 mm) wide flanges.
      b. Depth: As indicated on Drawings..
      c. Finish: Galvanized with G40 (Z120) hot-dip galvanized coating per ASTM A653; galvanized or painted with rust-inhibitive paint for interior Work.
      d. Form to required radius at curved ceilings.
   2. Cross furring:
      a. Hat-shaped steel furring channels, ASTM C645, 7/8 inch (22 mm) high, 0.018 inch (0.45 mm) minimum bare metal thickness, galvanized.
      b. Resilient furring channels: 1/2 inch (12.7 mm) deep members designed to reduce sound transmission.

3. Tie wire: ASTM A641, Class 1 zinc coating, soft temper, 0.0625 inch (1.59 mm) diameter wire, or double strand of 0.0475 inch (1.21 mm) diameter wire.

D. Framing System for Interior Gypsum Board Ceilings:
1. At Contractor's option, in lieu of cold rolled runner and cross furring framing system for gypsum board ceilings, provide interlocking cold-rolled sheet steel grid complying with ASTM C635, "Heavy Duty" structural classification.
2. Finish: Manufacturer's standard factory finish.
3. Acceptable product and manufacturer: Equivalent to 660 Furring System by Chicago Metallic Corp.

2.4 ACCESSORIES

A. Typical Trim: See Division 09 Section GYPSUM BOARD.

B. Backer Plates:
1. Steel, galvanized; 6 inches (150 mm) wide x 0.055 inch (1.37 mm) minimum bare metal thickness x lengths to suit size of items to be attached; fastened to studs for attachment of surface mounted fittings and accessories.
2. Elimination of backer plates or direct attachment of accessories or equipment to studs will not be allowed.

C. Ceiling Isolation Hangers:
1. Combination neoprene element and spring hangers, consisting of steel frame containing neoprene isolation element at the top and coil steel spring seated in neoprene cup on the bottom.
   a. Rated for 1 inch static deflection at load range as required for specific ceiling support.
   b. Neoprene, for 40±5 durometer:
      1) Initial tensile strength, when tested in accordance with ASTM D676: 2000 psi minimum.
      2) Initial elongation at break, when tested in accordance with ASTM D412: 450% minimum.
      3) Compression set after 22 hours at 158 deg F, when tested in accordance with ASTM D395, Method B: 30% maximum.
2. Provide with upper and lower threaded steel rods, and anchors, as required for support of ceiling and for complete installation.
3. Acceptable products and manufacturers:
   a. Design is based on Type 30N, rated for specified static deflection, by Mason Industries, to establish standard of quality.
   b. Equivalent Isolation Hangers by Kinetics Noise Control Inc., are acceptable.
4. Locations: Where indicated on Drawings.

D. Miscellaneous Accessories: Provide as required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install in accordance with reference standards and manufacturer's instructions.

B. Tolerances:
   1. Do not exceed 1/8 inch in 8'-0" (3 mm in 2400 mm) variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.
   2. Shim as required to comply with specified tolerances.

C. Install framing to comply with ASTM C754 and with ASTM C840 requirements that apply to framing installation.

D. Install supplementary framing, blocking and bracing at terminations in gypsum board assemblies to support handrails, fixtures, equipment, heavy trim, grab bars, toilet accessories, furnishings or similar construction.

3.3 METAL SUPPORT INSTALLATION

A. Metal Runners:
   1. Align and secure runner tracks accurately to partition layout at both floor and ceiling.
   2. Provide fasteners appropriate to substrate construction as recommended by manufacturer.
   3. Partitions extending to bottom of surfaces to receive sprayed-on fireproofing:
      a. Before application of fireproofing, provide ceiling runners or continuous offset anchor plates (Z-clips) to surfaces indicated to receive sprayed-on fireproofing. Fasten to framing not more than 24 inches (600 mm) on center.
      b. After application of fireproofing, remove only as much fireproofing as needed to complete installation of framing and gypsum board without reducing thickness of fireproofing below that required to obtain fire-resistance rating indicated. Protect remaining fireproofing from damage.
      c. Where anchor plates are used, fasten runners to anchor plates.

B. Metal Studs:
   1. Position metal studs vertically in the runners, spaced at 16 inches (400 mm) on center, unless otherwise indicated.
      a. At walls indicated to receive stone cladding, provide studs spaced at 12 inches (300 mm) on center.
      b. At walls indicated to receive cementitious backer board, moisture- and mold-resistant gypsum board with ceramic tile, or veneer plaster base, provide studs spaced at 16 inches (300 mm) on center.
   2. At door and borrowed light frames in partitions not framed to slab above, provide 2 studs at each jamb, full height to structure above.
      a. Additionally, provide 2 diagonal stud braces, 1 each at hinge side and strike side of opening, extending from just above ceiling to supporting construction above.
      b. For pairs of doors, provide third diagonal brace at center of opening.

3. Place studs so that flanges face in same direction.
4. Cut studs 1/2 inch (13 mm) short of full height to provide perimeter relief.
5. Align and plumb partition framing accurately.
6. Locate studs no more than 2 inches (50 mm) from abutting partitions, partition corners and other construction.
7. Bracing of partitions above ceilings:
   a. Where partitions extend above ceilings, but not to structure, brace top of partitions with diagonal stud braces approximately 36 inches (900 mm) on center.
   b. Attach stud braces to steel angles securely fastened to structure.
8. Slip-type head joints: Where partitions abut ceiling or deck construction or vertical structural elements, provide slip or cushion type joint between partition and structure using the following methods, to prevent transfer of structural loads or movements to partitions, and to provide lateral support.
   a. Double-runner system: ASTM C645 top runners, inside runner with 2 inch deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
9. Provide horizontal bracing where necessary for lateral support.
10. Exterior walls: Where studs are installed directly against exterior walls, install asphalt felt strips or glass fiber strips between studs and wall.
11. Chase walls:
    a. Position steel studs vertically in runners, with flanges in same direction and with studs on opposite sides of chase directly across from each other.
    b. Cut cross-bracing from gypsum board 12 inches (300 mm) high by chase wall width.
    c. Space cross-bracing 48 inches (1200 mm) on center vertically and attach to stud web with six screws per brace.
    d. In lieu of gypsum board cross-bracing, 2-1/2 inch (64 mm) steel studs may be used.
12. Backer plates and blocking:
    a. Where handrails, grab bars, cabinets, wall-mounted door stops, or other wall-hung items are attached to partitions, install backer plates or wood blocking accurately positioned and firmly secured to metal studs, whether or not such backer plates or blocking are indicated on Drawings.
    b. Do not use wood blocking in fire-rated construction.
    c. Coordinate with Division 06 Sections for blocking installation.

C. Hat Channel Furring:
1. Install metal furring where indicated and where gypsum board finish is installed over masonry or concrete, unless another type of framing is indicated.
2. Attach hat-shaped furring channels either vertically or horizontally with fasteners through alternate wing flanges (staggered).
3. Space furring channels at 24 inches (600 mm) on center, unless otherwise indicated. Where furring is indicated to receive cementitious backer board, moisture- and mold-resistant gypsum board with ceramic tile, or veneer plaster, space at 16 inches (400 mm) on center.
4. Install furring channels within 4 inches (100 mm) of floor line and ceiling line.
5. Attach corner furring channels where furring conditions permit in similar manner.

D. Z-Furring:

1. Securely attach narrow flanges of members to wall with concrete stub nails or power-driven fasteners, except as otherwise indicated.
2. At exterior corners, attach wide flange of furring member to wall with short flange extending beyond corner; screw attach short flange of furring channel on adjacent wall surface to web of extended member.
3. At interior corners, space members no more than 12 inches (300 mm) from corner member.
4. Sequence furring installation with installation of insulation.

E. Ceiling and Soffit Support Systems:
1. Secure hangers or rods to structural support by connecting directly to structure where possible; otherwise connect to inserts, clips or other anchorage devices or fasteners indicated.
   a. Locate hangers so they are plumb.
   b. Do not allow hangers to contact ducts, light fixtures, or similar equipment.
2. Space main runners, hangers and furring according to requirements of ASTM C754, except as otherwise indicated.
   a. For moisture- and mold-resistant gypsum board ceilings, space cross-furring channels not more than 12 inches on center.
3. Where spacing of structural members, or width of ducts or other equipment, prevents regular spacing of hangers, provide supplemental hangers and suspension members and reinforce nearest affected hangers to span extra distance.
4. Attach directly to structural elements only; do not attach to metal deck without concrete fill. Loop hangers and wire-tie directly or provide anchors or inserts.
5. Extend runners to within 6 inches (150 mm) of walls.
6. Wire-tie or clip furring members to main runners and to other structural supports indicated. In fire resistance rated assemblies, wire-tie furring members; do not clip.
7. Do not permit furring or runners to contact masonry or concrete walls.
8. Provide 1 inch (25 mm) clearance between furring or runners and abutting walls and partitions.
9. Ceiling isolation hangers:
   a. Install isolation hangers, making certain that hangers are vertical and that they do not rub against pipe, duct, ceiling beams or other interferences.
   b. Connect wires to lower end of hangers and proceed with steel ceiling grid construction in the normal manner.

END OF SECTION

SECTION 09 2900

GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Gypsum board and accessories.
   2. Sound-rated construction and accessories.
   3. Gypsum board finishing.
   4. Trim and accessories.

B. Products Furnished but Not Installed under This Section: Furnish inserts and anchors for suspended ceilings to other trades well in advance of time needed for coordination with other Work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 6 Sections for wood blocking, furring and similar items.

B. See Division 06 Section SHEATHING for gypsum sheathing.

C. See Division 09 Section METAL SUPPORT ASSEMBLIES for metal framing and ceiling suspension grid.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions with Project conditions and materials clearly identified or detailed for each required system.

B. Samples:
   1. Submit 12 inch (300 mm) long samples of each type of trim required.
   2. Submit 24 inch (600 mm) square samples of impact-resistant gypsum board.

1.4 INFORMATIONAL SUBMITTALS

A. Certification: Submit manufacturers' certifications that gypsum board assembly components comply with specified requirements, including requirements for use of synthetic gypsum and recycled content**.**

1.5 SYSTEM REQUIREMENTS

A. Fire-Test-Response Characteristics
   1. For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency acceptable to authorities having jurisdiction.

2. If the Contract Documents indicate a fire resistance rated gypsum board assembly which includes products which are not commercially available, then another fire resistance rated gypsum board assembly having the same hourly rating, but constructed of commercially available products meeting requirements of the Contract Documents, shall be provided as part of the Work.

B. Acoustical Ratings: Where sound ratings are indicated, provide materials and application procedures identical to those tested by manufacturer to achieve Sound Transmission Class (STC) scheduled or indicated in accordance with ASTM E90.

1.6 QUALITY ASSURANCE

A. Single Source Responsibilities: Obtain each type of gypsum board and other panel products from one manufacturer. Provide accessories including adhesive, clips, attachment devices that are standard for panel manufacturer.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Reference Standards: Except where required by local code or these specifications, install gypsum board in accordance with applicable requirements and recommendations of ASTM C840, except for more stringent requirements of manufacturer.
1. Apply acoustical sealant in accordance with applicable requirements of ASTM C919.

1.7 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Delivery:
1. Deliver material to site promptly without undue exposure to weather.
2. Deliver in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade.

B. Storage:
1. Store above ground in dry, ventilated space.
2. Protect materials from soiling, rusting and damage.
3. Store board to be directly applied to masonry walls at 70 deg F (21 deg C) for 24 hours prior to installation.

1.9 PROJECT CONDITIONS

A. Environmental Requirements:
1. Do not install gypsum board (for non-adhesive attachment) when ambient temperature is below 40 deg F (4 deg C).
2. For adhesive attachment of gypsum board, and for finishing of gypsum board, maintain ambient temperature above 50 deg F (10 deg C) from one week prior to attachment or joint treatment until joint treatment is complete and dry.

3. Provide ventilation, either natural or mechanical, to remove excess moisture during joint treatment.
4. Temperature requirements may be waived only on recommendation of board materials manufacturers.

B. Do not install interior products until installation areas are enclosed and conditioned.

1.10 SEQUENCING AND SCHEDULING

A. Prior to installation of gypsum board ceiling grid, tag items, that will require access panels for access. Review locations with Architect.

B. In locations where access panels in ceilings are not permitted, coordinate installation of gypsum board ceilings with balancing of HVAC devices above such ceilings, to allow devices to be balanced before gypsum board is installed below such devices.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Gypsum Board and Accessories:
1. Listed products establish standard of quality and are manufactured by United States Gypsum Company (USG).
2. Equivalent products by following are acceptable:
a. CertainTeed, Inc.
b. G-P Gypsum.
c. Lafarge North America Inc.
d. National Gypsum Company.
e. Temple-Inland.

2.2 BOARD MATERIALS

A. Environmental Considerations:
1. Facing paper: Provide products using gypsum board facing paper made of 100% recycled content.
2. Synthetic gypsum:
a. Provide products manufactured from at least 80% synthetic gypsum, from waste byproducts of titanium dioxide manufacturing or flue gas desulfurization processes.
b. To extent feasible, furnish products from manufacturing plants closest to Project site.
c. Manufacturing plants of acceptable manufacturers where 90% synthetic gypsum board is known to be produced include the following:
1) USG: East Chicago and Aliquippa, PA.
2) G-P Gypsum Corp.: Wheatfield, IN.
3) National Gypsum Company: Pittsburgh, PA.
4) Temple-Inland Forest Products Corp.: Cumberland, TN. and West Memphis, AR.

B. Gypsum Board:

1. ASTM C1396, Type X fire-resistant type except where Type C fire-resistant type is indicated or required to meet UL assembly types.
2. Edges: Tapered.
3. Thickness: As indicated.
4. Acceptable products and manufacturers: Equivalent to Sheetrock Brand Regular, Firecode or Firecode C Gypsum Panels by USG.

C. Impact-Resistant Gypsum Board: Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.
1. Description: Impact-resistant, ASTM C1396, Type X fire-resistant type gypsum-based panels; with unexposed face of glass fiber-mesh scrim embedded in gypsum and cellulose fibers, or embedded below inner paper face.
2. Edges: Tapered.
3. Thickness: 5/8 inch (16 mm).
4. Performance properties:
   a. Surface indentation: Average depth of 0.11 inch (2.8 mm), when tested in accordance with ASTM D5420.
   b. Soft body impact (surface failure): Minimum 480 ft-lb (650 N-m), when tested in accordance with ASTM E695 using 60 pound (27 kg) leather bag.
5. Acceptable products and manufacturers:
   a. Gold Bond Hi-Impact Type XP Wallboard by National Gypsum Company.
   b. Fiberock VHI (Very-high Impact) Abuse-resistant Gypsum Fiber Panels by USG.

D. Ceiling Board:
1. ASTM C1396, non-sag type except where Type C fire-resistant type is indicated or required to meet UL assembly types.
2. Thickness: 1/2 inch (13 mm).
3. Acceptable product and manufacturer: Equivalent to Interior Gypsum Ceiling Board by USG.

E. Moisture- and Mold-Resistant Gypsum Board:
1. ASTM C1396, Type X fire-resistant type except where Type C fire-resistant type is indicated or required to meet UL assembly types.
2. Edges: Tapered.
3. Thickness: As indicated.
4. Locations:
   a. Partitions in Toilet Rooms, but not shower walls, Janitor Closets, other partitions to receive ceramic tile, and as indicated on Drawings.
   b. Do not use for ceilings.
5. Acceptable products and manufacturers: Equivalent to Sheetrock Brand Mold Tough, Mold Tough Firecode C, or Mold Tough Type X Gypsum Panels by USG.

2.3 ACCESSORIES

A. Typical Trim:
1. Material for interior Work: Galvanized steel. Vinyl or plastic products are not acceptable.
2. Corner beads:
   a. Type: Knurled flanges with spaced holes for screw application; crimp-on type is not acceptable.

b. Size: Flanges at least 1-1/4 inches (32 mm) wide.
c. Acceptable product and manufacturer: Equivalent to Dur-A-Bead No. 103 by USG.

3. Casing beads (edge beads):
a. Type: Knurled flange with spaced holes, requiring finishing with joint compound; "U-bead" not requiring finishing is not acceptable.
b. Size: Minimum 7/8 inch (22 mm) wide flange, with depth to suit gypsum board thickness.
c. Acceptable product and manufacturer: Equivalent to No. 200A ("LC-bead" channel-type edge) or No. 200B ("L-bead" angle edge) by USG.

4. Control joints:
a. Roll-formed zinc with perforated flanges.
b. Size: 1-3/4 inch (44 mm) wide, with 1/4 inch (6 mm) wide center channel.
c. Provide with removable tape strip over channel.
d. Acceptable product and manufacturer: Equivalent to No. 093 by USG.

B. Extruded Aluminum Trim:
1. Extruded aluminum alloy 6063-T5.
a. Provide profiles as indicated, with integral tapered grooved fins for installation to adjoining gypsum board, requiring finishing with joint compound.
b. Punch fins with staggered holes for screw attachment.

2. Finish: Factory-applied finish consisting of chemical conversion coating followed by manufacturer's standard baked-on corrosion-resistant primer; compatible with specified joint compound and finishes.

3. Profiles and dimensions: As indicated on Drawings.

4. Acceptable manufacturers:
a. Fry Reglet Corp.
b. Gordon, Inc.
c. Pittcon Industries.

C. Extruded Aluminum Partition Closures:
1. Description: Pre-assembled, spring-loaded aluminum partition closure providing tight fitting closure at vertical juncture of partitions and storefront or window walls.

2. Extruded aluminum alloy 6063-T5.

3. Finish: Clear anodized.

4. Acceptable product and manufacturer: Equivalent to Mullion Mate Extruded Aluminum Partition Closure by Gordon, Inc.

D. Adhesives and Joint Treatment Materials:
1. Conform to requirements of ASTM C475 and panel manufacturers' recommendations.

2. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Joint compounds:
a. Provide asbestos-free products.
b. Drying-type (ready-mixed):
1) ASTM C475; ready-mixed taping and topping compounds, regular.
2) Acceptable products and manufacturer: Equivalent to SHEETROCK Taping Joint Compound and Topping Joint Compound, or SHEETROCK All Purpose Joint Compound, all by USG.

c. Setting (chemically-hardening) type: Acceptable products and manufacturer: Equivalent to SHEETROCK Setting-Type Joint Compound by USG.

4. Laminating adhesive for multiple layers: Special adhesive or joint compound specifically recommended for laminating gypsum boards.
5. Laminating adhesive for direct application: Special adhesive or joint compound specifically recommended for laminating gypsum boards and for adhering gypsum boards to solid substrates.
6. Reinforcing joint tape:
   a. ASTM C475, 2 inch (50 mm) nominal width.

E. Gypsum Board Screws: Self-drilling, self-tapping steel screws.
1. For steel framing less than 0.03 inch (0.76 mm) thick: Comply with ASTM C1002.
2. For steel framing from 0.033 inch (0.84 mm) thick to 0.112 inch (2.85 mm) thick: Comply with ASTM C954.

F. Asphalt Felts: Asphalt-saturated organic felts, No. 15, complying with ASTM D226, Type I.

G. Acoustical Sealant:
1. Non-drying, non-hardening, non-skinning compound, specifically recommended as an acoustical sealant.
2. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Acceptable products and manufacturers:
   a. AC-20 FTR by Pecora Corp.
   b. SHEETROCK Acoustical Sealant by USG.

H. Acoustical Sealant: See Division 07 Section JOINT SEALANTS.

I. Sound Attenuation Blankets:
1. Sound attenuation blankets for use in fire-rated construction:
   a. Mineral fiber, conforming to ASTM C665, Type I.
   b. Surface burning characteristics per ASTM E84:
      1) Flame spread: 15 or less.
      2) Smoke developed: 0.
   c. Thicknesses: As indicated.
   d. Acceptable product and manufacturer: Equivalent to Thermafiber Sound Attenuation Fire Blankets (SAFB) by Thermafiber.
   e. At Contractor's option, provide sound attenuation blankets for use in fire-rated construction in non-fire-rated construction, in lieu of the following.
2. Sound attenuation blankets for use in non-fire-rated construction:
   a. Glass fiber, unfaced, conforming to ASTM C665, Type I.
   b. Surface burning characteristics per ASTM E84:
      1) Flame spread: 25 or less.
      2) Smoke developed: 50 or less.
   c. Thicknesses: As indicated.
   d. Acceptable products and manufacturers:
      1) Sound-SHIELD Sound Control Batts by Johns Manville.
      2) Unfaced Thermal Batt Insulation/Sound Attenuation Batts by Owens/Corning Fiberglas Corp.

J. Z-Furring Insulation: See Division 07 Section THERMAL INSULATION.

K. Miscellaneous Accessories: Provide as required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which Work is to be installed.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 GENERAL INSTALLATION REQUIREMENTS

A. Install in accordance with reference standards and manufacturer's instructions.

B. Tolerances:
1. Do not exceed 1/8 inch in 8'-0" (3 mm in 2400 mm) variation from plumb or level in exposed lines of surface, except at joints between gypsum board units.
2. Do not exceed 1/16 inch (1.6 mm) variation between planes of abutting edges or ends.
3. Shim as required to comply with specified tolerances.

C. See Division 09 Section METAL SUPPORT ASSEMBLIES for metal framing and support installation.

3.3 BOARD INSTALLATION

A. Single Layer Gypsum Board on Metal Studs:
1. Loosely butt gypsum board joints together and neatly fit.
2. Do not place butt ends against tapered edges.
3. Maximum allowable gap at end joints: 1/8 inch (3 mm).
4. Stagger joints on opposite sides of partitions.
5. Apply boards on walls vertically or horizontally with face out.
6. Do not locate vertical joints within 8 inches (200 mm) of external corners of windows, doors or other openings, except at control joints.
7. Apply ceiling boards first where gypsum board ceilings and wall occur.
8. Cut openings in gypsum board to fit electrical outlets, plumbing, light fixtures and piping snugly and small enough to be covered by plates and escutcheons. Cut both face and back paper.
9. Screw board in place securely with screws spaced according to manufacturer's recommendations.

B. Single Layer Gypsum Board on Furring:
1. Apply gypsum board with long dimension at right angles to furring channel.
2. Center end joints over channel web; stagger end joints from those in adjacent rows of board.
3. Fasten boards to furring channels with screws spaced according to manufacturer's recommendations.

C. Double Layer Gypsum Board:
   1. Fasten base layer to studs or furring with screws, and attach face layer using laminating adhesive and screws, applied according to manufacturer's instructions.
   2. Offset face-layer joints at least 10 inches (250 mm) from parallel base-layer joints.
   3. Screw both layers to metal supports at double layer ceiling applications and where required for fire-rated construction.

D. Direct Gypsum Board Adhesive Application:
   1. Apply adhesive with manufacturer's recommended spreader to backs of gypsum boards in band of four beads each to center of each board and along edges.
   2. Position boards vertically and press firmly in place to insure good bond.
   3. Fasten top and bottom of board if required.

E. Moisture- and Mold-Resistant Gypsum Board:
   1. Complete plumbing rough-in before gypsum board panels are erected.
      a. Where tubs or shower receptors are required, install fixtures before application of board, lap edges of fixtures as indicated.
   2. Separate gypsum panels from rough-in and fixtures by 1/4 inch (6 mm) space.
   3. Make necessary cut-outs and seal cut or exposed panel edges with thinned-down ceramic tile adhesive or with waterproof flexible sealant, as recommended by gypsum board manufacturer.
   4. Install moisture- and mold-resistant board horizontally.
   5. Prior to tile application, fill openings around pipes, fittings, fixtures, interior angles and other penetrations with waterproof flexible sealant, as recommended by gypsum board manufacturer. Do not fill 1/4 inch (6 mm) gap at bottom of panels.

3.4 SOUND-RATED CONSTRUCTION

A. Insulation:
   1. Install sound attenuation blankets in sound-rated partitions and ceilings where indicated.
   2. Completely fill space between studs and framing to full height of partition wall or full area of ceiling.
   3. Fit carefully behind electrical outlets and other Work penetrating sound-rated construction.
   4. Install sound attenuation blankets in gaps between steel deck flutes and tops of sound-rated partitions which are not fire-rated. For fire-rated partitions, see Division 07 Section THERMAL INSULATION.
   5. Attach blankets in accordance with manufacturer's instructions.

B. Gypsum Board:
   1. Install gypsum board same as for interior partitions and ceilings.
   2. Coordinate with installation of perimeter sealants.

C. Acoustical Sealant:
   1. Comply with recommendations in ASTM C919 for sealants, for use of joint sealants as applicable to materials, applications, and conditions indicated.
   2. At partition walls, provide continuous beads of acoustic sealant at juncture of both faces of runners or plates with floor and ceiling construction, and wherever gypsum board abuts dissimilar materials, prior to installation of gypsum board.
   3. At ceilings, provide continuous beads of sealant wherever gypsum board abuts dissimilar materials.

4. Provide continuous bead of sealant behind faces of control joints prior to installation of surface-applied control joint accessories. Locate sealant at proper depth in joint to allow for insertion of expansion portion of control joint accessory.
5. After installation of gypsum board base layers, cut face layer sheets 1/2 inch (13 mm) less than floor-to-ceiling height and position with 1/4 inch (6 mm) open space between gypsum board and floor, ceiling and dissimilar vertical construction. Fill 1/4 inch (6 mm) open space with continuous sealant beads after installation of face layer.
6. At openings and cutouts, fill open spaces between gypsum board and fixtures, cabinets, ducts and other flush or penetrating items, with continuous bead of sealant.
7. Seal sides and backs of electrical boxes to completely close off openings and joints.

D. Sound Flanking Paths:
1. Where sound-rated partition walls intersect non-rated gypsum board partition walls, extend sound-rated construction to completely close sound flanking paths through non-rated construction.
2. Seal joints between face layers at vertical interior angles of intersecting partitions.

3.5 ACCESSORY INSTALLATION

A. Trim:
1. Use same fasteners to anchor trim accessory flanges as required to fasten gypsum board to supports, unless otherwise recommended by trim manufacturer.
2. Install metal corner beads at external corners.
3. Install metal casing bead trim whenever edge of gypsum board would otherwise be exposed or semi-exposed.

B. Control Joints:
1. Install control joints at following locations:
   a. At junction of gypsum board partitions with walls or partitions of other finish material.
   b. Within long runs of partitions, ceilings or soffits at approximately 30'-0" (9 m) on center. Where doors in long runs are suitably located, extend control joints from both corners of frame to ceiling.
   c. Other locations as indicated on Drawings.
2. Where gypsum board is vertically continuous, as at stairwells, provide horizontal control joints at each floor level.

C. Extruded Aluminum Trim: Install as indicated on Drawings and in accordance with manufacturer's instructions.

3.6 FINISHING

A. General:
1. Provide levels of gypsum board finish for locations as follows, in accordance with ASTM C840.
   a. Level 1: Ceiling plenum areas and concealed areas, except provide higher level of finish as required to comply with fire resistance ratings and acoustical ratings.
   b. Level 2: Gypsum board below tile, except remove tool marks and ridges.
   c. Level 4: Gypsum board surfaces, except where another finish level is indicated.
2. Sand using 150 grit or finer sandpaper.

B. Interior Gypsum Board:
   1. Taping:
      a. Use setting-type compound, or taping or all-purpose drying-type compound.
      b. General:
         1) Impact-resistant gypsum board: Use setting-type joint compound. Mix joint compound according to manufacturer's directions.
         2) Other gypsum board types: Use setting-type compound, or taping or all-purpose drying-type compound.
      c. Butter compound into inside corners and joints.
      d. Center tape over joints and press down into fresh compound.
      e. Remove excess compound.
      f. Tape joints of gypsum board above suspended ceilings.
   2. First coat:
      a. Immediately after bedding tape, apply skim coat of compound and allow to dry completely in accordance with manufacturer's instructions.
      b. Apply first coat of compound over flanges of trim and accessories.
      c. Apply first coat of compound over exposed fastener heads and finish level with board surface.
   3. Second coat:
      a. After first coat treatment is dried, apply second coat of compound over tape and trim, feathering compound 2 inches (50 mm) beyond edge of first coat.
      b. Spot fasteners with second coat of compound.
   4. Third coat:
      a. After second coat has dried, sand surface lightly and apply thin finish coat to joints, fasteners and trim, feathering compound 2 inches (50 mm) beyond edge of second coat.
      b. Allow third coat to dry. Apply additional compound, and touch-up and sand, to provide surface free of visual defects, tool marks, and ridges, and ready for application of finish.

C. Moisture- and Mold-Resistant Gypsum Board:
   1. Treat fastener heads and joints with setting-type joint compound.
   2. For joints to be covered with tile, apply tape and joint compound bedding coat and skim coat only; do not apply finish coats.
      a. Do not crown joints or leave excess compound on panels.
      b. Remove tool marks and ridges.
      c. For fastener heads to be covered with tile, apply one coat of joint compound.
   3. For fastener heads, joints and edges not to be covered with tile, tape and finish as specified for interior gypsum board, with setting-type joint compound.

3.7 PROTECTION

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
   1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
   2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.8 ADJUSTING

A. Correct damage and defects which may telegraph through finish Work.

B. Leave Work smooth and uniform.

END OF SECTION

SECTION 09 3000

TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Ceramic wall tile.
   2. Quarry tile.
   3. Setting materials and grouts.
   4. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 07 Section JOINT SEALANTS for sealants and joint fillers.

B. See Division 09 Section GYPSUM BOARD for moisture- and mold-resistant gypsum board substrates.

C. See DIVISION 22 for prefabricated shower receptors.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for materials specified.

B. Samples:
   1. Tile and trim:
      a. Submit set of manufacturer's full range of standard color samples for each type for selection by Architect.
      b. Following selection, submit full size samples for each size, type and color.
   2. Grout:
      a. Submit set of manufacturer's full range of standard color samples for each type for selection by Architect.
      b. Following selection, submit 4 inch (100 mm) long samples for each type and color mounted in suitable metal channel retainer.
   3. Threshold: Submit 6 inch (150 mm) long full profile samples.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

B. Certificates: Submit certification, signed by Contractor, waterproofing membrane manufacturer and concrete curing agent manufacturer, stating:
   1. Concrete substrates and curing agents have been reviewed;

2. Substrates comply with waterproofing membrane manufacturer's requirements; and
3. Curing agents are compatible with waterproofing membrane and will not interfere with waterproofing adhesion.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data:
1. Submit manufacturer's written maintenance instructions for tile materials.
2. Include copy of submittal in Project information manual.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented successful experience with work comparable to Work of this Project.

B. Reference Standards: Comply with applicable recommendations of Tile Council of North America (TCNA) and ANSI.

1.7 SAMPLE INSTALLATIONS

A. Prior to commencing Work and preceding pre-installation conference, provide sample installations of ceramic tile Work.

B. Sizes and Locations: Full height ceramic wall tile x minimum 4 feet (1200 mm) wide, and adjoining 4 feet x 4 feet (1200 mm x 1200 mm) of ceramic floor tile, in location acceptable to Architect.

C. Materials: Complete installations with materials including tile, setting materials, grout, sealants and joint fillers.

D. Architect's Review:
1. Architect will review sample installations for visual acceptance of materials and workmanship.
2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain approved sample installations during construction as standard for subsequent Work.

F. Properly finished and maintained sample installations may be incorporated into completed Work.

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color and design.

B. Store materials in accordance with manufacturer's instructions.

1.10 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Maintain minimum temperature of 65 deg F (18 deg C) in spaces to receive materials for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation.
   2. After installation, maintain minimum temperature of 55 deg F (13 deg C) in areas where Work is completed.

1.11 SEQUENCING AND SCHEDULING

A. Install materials after rough-in operations have been completed.

B. Do not install materials over concrete slabs until they are cured and are sufficiently dry to achieve bond with setting materials in accordance with TCNA and materials manufacturers' recommendations.

1.12 EXTRA STOCK

A. Deliver one unopened carton of tile materials for each 10 cartons (or fraction thereof) installed of each type, pattern and color.

B. Store at job site where directed. Ensure cartons are identified by manufacturer, pattern and color.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers - Ceramic Tile:
   1. Products specified establish standard of quality and are manufactured as noted.
   2. Equivalent products by other manufacturers may be acceptable provided they comply with requirements of Contract Documents.

2.2 TILE

A. General:
   1. Provide tile of domestic manufacturer, standard grade, conforming to ANSI A137.1.
   2. Provide base, caps, returns and other trim accessories as follows, unless otherwise indicated on Drawings; same characteristics as tile, and to suit setting method for each application.
      a. Base for Thin-Set Mortar Installations: Straight.
      b. External Corners for Thin-Set Mortar Installations: Surface bullnose.
      c. Internal Corners: Field-butted square corners, except with coved base and cap angle pieces designed to member with stretcher shapes.
   3. Provide batched production of tile at plant to insure optimum consistency of color and texture of both field tiles and trim shapes.

B. Glazed Wall Tile (Type 1): Provide flat tile complying with the following requirements:
   1. Module Size: 8 by 8 inches.
   2. Thickness: 5/16 inch, minimum.
   3. Face: Plain with cushion edges.
   4. Manufacturer and Product: Crossville; Limestone.
   5. Colors: Locations as shown:
      a. AV232 Lipika.

C. Glazed Wall Tile (Type 2): Provide flat tile complying with the following requirements:
   1. Module Size: 8 by 16 inches
   2. Thickness: 5/16 inch, minimum.
   3. Face: Plain with cushion edges.
   4. Manufacturer and Product: Crossville; Limestone
   5. Colors: Locations as shown
      a. AV235 Midnight

D. Glazed Wall Tile with Single Bullnose (Type 3): Provide flat tile complying with the following requirements:
   1. Module Size: 4 by 24 inches
   2. Thickness: 5/16 inch, minimum.
   3. Face: Plain with cushion edges.
   4. Manufacturer and Product: Crossville; Limestone
   5. Colors: Locations as shown
      a. AV235 Midnight

E. Ceramic Quarry Floor Tile:
   1. Module Size: 8 by 8 inches.
   2. Thickness: 5/16 inch minimum.
   3. Face: Plain with cushion edges.
   4. Manufacturer and Product: Metropolitan Ceramics: Quarrybasics.
   5. Color: MT-505 Plaza Gray.

F. Ceramic Quarry Tile - Base:
   1. Module Size: 4 by 8 inches.
   2. Thickness: 5/16 inch minimum.
   3. Top Edge: Bullnose.
   4. Bottom Edge: Straight.
   5. Face: Plain with cushion edges.
   6. Manufacturer and Product: Metropolitan Ceramics: Quarrybasics.
   7. Color: MT-505 Plaza Gray.

2.3 SETTING MATERIALS

A. Factory-Blended Mortar Mixes:
   1. Description:
      a. Factory blended mortar mixes consisting of portland cement, sand and additives, complying with ANSI 118.4.
      b. Provide with latex additive in lieu of water.
   2. Acceptable products and manufacturers:
      a. Hydroment Tile-Mate by Bostik.
      b. Laticrete 272 by Laticrete International, Inc.

c. Kerabond by Mapei.

B. Sand: ASTM C144.

C. Liquid Latex Additives:
1. General:
a. Acrylic or SBR latex additives to be mixed with mortar or grout in lieu of all or part of water.
b. Grout and latex additive shall be products of same manufacturer.
2. Acceptable products and manufacturers:
a. For thin-set mortar mixes:
1) Hydroment 425 by Bostik.
2) Laticrete 3701 or 333 by Laticrete International, Inc.
3) Keralastic by Mapei.
b. For thick-set mortar mixes:
1) Hydroment 425 by Bostik.
2) Laticrete 3701 by Laticrete International, Inc.
3) Keracrete by Mapei.
c. For grout:
1) Hydroment 425 by Bostik.
2) Laticrete 1776 by Laticrete International, Inc.

D. Epoxy Mortar:
1. Description: Two-component epoxy mortar complying with ANSI A118.3, non-flammable and solvent-free; resistant to acids, alkalis, oils and food wastes.
2. Acceptable products and manufacturers:
a. Epox-E-Set AARII-HT by Bostik.
b. Latapoxy 300 by Laticrete International, Inc.
c. Kerapoxy by Mapei Corporation.
d. 100 Percent Solids Epoxy Mortar by TEC Specialty Products Inc.

E. Water: Clean and potable, free from injurious impurities.

F. Reinforcing: Welded wire fabric, galvanized; ASTM A185, 2 inch x 2 inch x 0.062 inch wire diameter (51 mm x 51 mm x 1.6 mm wire diameter).

G. Cleavage Membrane: Polyethylene film, 4 mil (0.1 mm) thick.

2.4 GROUTS

A. Sanded Grout for Unglazed Tile:
1. Description:
a. Factory blended, sanded grout consisting of portland cement, graded quartz and additives; complying with ANSI A118.7.
b. Provide with either latex additive in lieu of water, or with water only when grout mix contains dry polymer additive.
2. Grout and latex additive shall be products of same manufacturer.
3. Colors: To be selected by Architect from manufacturer's standard full color range.
4. Acceptable products and manufacturers:
a. Hydroment Ceramic Tile Grout (Sanded) by Bostik.
b. Laticrete Sanded Grout (500 Series) by Laticrete International, Inc.

c. Keracolor S by Mapei Corporation.

B. Non-Sanded Grout for Glazed Tile:
1. Description:
a. Factory blended, mildew resistant, non-sanded grout consisting of portland cement and additives; complying with ANSI A118.7.
b. Provide with either latex additive in lieu of water, or with water only when grout mix contains dry polymer additive.
2. Grout and latex additive shall be products of same manufacturer.
3. Colors: To be selected by Architect from manufacturer's standard full color range.
4. Acceptable products and manufacturers:
a. Hydroment Dry Tile Grout (Unsanded) by Bostik.
b. Laticrete Unsanded Grout (600 Series) by Laticrete International, Inc.
c. Keracolor U by Mapei Corporation.

C. Epoxy Grout:
1. Description: Factory blended epoxy grout complying with ANSI A118.3; resistant to acids, alkalis, oils and food wastes.
2. Colors: To be selected by Architect from manufacturer's standard full color range.
3. Acceptable products and manufacturers:
a. U-Poxy/AAR II by Bostik.
b. Latapoxy SP-100 by Laticrete International, Inc.
c. Kerapoxy by Mapei Corporation.

2.5 ACCESSORIES

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Tile Cleaner: Neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

C. Metal Trim:
1. Roll-formed stainless steel corner trim; ASTM A167, Type 304.
a. Profile: "L"-shape with bullnose exposed profile, 12.5 mm height. Anchoring leg is perforated to bond with mortar.
b. Finish: Brushed finish.
c. Acceptable product and manufacturer: Equivalent to Rondec RO 125 EB by Schlüter Systems LP.
2. Bullnose-rounded profile; provide for use at vertical outside corners of tile.
a. Roll-formed stainless steel, ASTM A167, Type 304; with anchoring leg perforated to bond with mortar. Provide with cap profiles.
b. Height: 5/16 inch, or as required to accommodate thickness of tile.
c. Finish: Polished.
d. Acceptable product and manufacturer: Equivalent to Rondec EV/RO 80E by Schlüter Systems LP.
3. Extruded aluminum edge strips.
a. Profile: "L"-shape, height equal to thickness of floor tile plus setting bed.
b. Finish: Clear satin anodized.

c. Acceptable product and manufacturer: Equivalent to Schiene AE 100 by Schlüter Systems LP.

4. Cove inside corner wall trim: Roll-formed stainless steel cove wall trim.
   a. Material:
      1) Stainless steel, Type 304.
      2) Finish: Brushed.
   b. Profile:
      1) Radiused cove, 23/32 inch radius, with offset on each side of height equal to thickness of tile plus bond coat.
      2) Anchoring legs are perforated to bond with mortar.
   c. Provide with inside corners, connectors, and end caps as required to provide complete installation.
   d. Basis-of-Design product: DILEX-EBHK U11/O11 by Schluter Systems LP.

D. Marble Thresholds:
   1. Description:
      a. Natural marble, complying with ASTM C503; polished finish.
      b. Uniform, fine- to medium-grained white stone with gray veining.
   2. Fabrication:
      a. Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes; 3/4 inch (19 mm) thick.
      b. Bevel edges at 1:2 slope, aligning lower edge of bevel with adjacent floor finish. Limit height of bevel to 1/2 inch (13 mm) or less, and finish bevel to match face of threshold.

E. Crack Isolation (Suppression) Membranes:
   1. Combination crack isolation/waterproofing membranes, for adhering to latex-portland cement mortar; complying with ANSI A118.12.
   2. Provide accessories, including pre-formed reinforcing units for inside and outside corners, seaming materials and special attachment adhesives and materials as required to make waterproof and for complete installation.
   3. Descriptions, and corresponding acceptable products and manufacturers:
      a. Two layers of polyvinyl chloride (PVC) sheet fused together and faced on both sides with high-strength, nonwoven polyester fabric; 60 inches (1524 mm) wide by 0.040 inches (1 mm) thick; Composeal Gold by Compotite Corp.
      b. Chlorinated polyethylene (CPE) sheet faced on both sides with high-strength, nonwoven polyester fabric; 60 inches (1524 mm) wide by 0.030 inches (0.76 mm) thick.
         1) Dal-Seal TS by Dal-Tile Corp.
         2) Nobleseal TS by The Noble Company.

F. Waterproofing Membrane for Typical Floors:
   1. Description: Self-curing liquid rubber polymer applied in multiple layers with continuous glass fiber reinforcement, complying with ANSI A118.10.
   2. Acceptable products and manufacturers:
      a. Ultra-Set by Bostik.
      b. Laticrete 9235 by Laticrete International.
      c. Mapelastic 400 by Mapei.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

B. Substrate Tolerances:
   1. Verify that substrates are suitable to receive tile and within TCNA recommended tolerances.
   2. Verify that walls are square in both horizontal and vertical directions to provide for proper tile alignment.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. For tile floors installed with thin-set mortar, provide concrete substrates that comply with flatness tolerances specified in referenced ANSI A108 Series of tile installation standards.
   1. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer’s written instructions. Use product specifically recommended by tile-setting material manufacturer.
   2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Do not seal substrate unless recommended by manufacturer.

3.3 INSTALLATION, GENERAL

A. Blending:
   1. For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples.
   2. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

B. Installation Standards:
   1. Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to installation methods specified below.
   2. Comply with TCNA "Handbook for Ceramic Tile Installation" that apply to installation methods specified below.
   3. Comply with manufacturer’s instructions for installation of each material required, including curing times and temperatures.

C. Layout:
   1. Lay out tile in patterns indicated on Drawings, to minimize cutting and to avoid tile less than half size.
   2. Center tile fields in both directions in each space or on each wall area, unless different layout is indicated on Drawings.

3. Lay out tile wainscots to next full tile beyond dimensions indicated.

D. Jointing:
1. Align joints horizontally and vertically with uniform width.
2. Pattern: Lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size.
3. Joint widths: Install tile with the following joint widths.
   a. Glazed tile: 1/16 inch (1.6 mm).
   b. Quarry tile: 1/4 inch(6 mm).

E. Interface with Other Work:
1. Coordinate setting ceramic tile with installation of adjacent or integral construction and accessories to provide neat installation with minimum cutting and symmetrical conditions wherever possible.
2. Extend tile Work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated.
3. Terminate Work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
4. Accurately form intersections and returns.
5. Fit tile closely to outlets, piping and other penetrations so that plates, collars or covers overlap tile.
6. Install ceramic tile in recessed covers, such as access doors and cleanouts.

F. Cutting and Grinding Tile:
1. Perform cutting and drilling without marring visible surfaces.
2. Carefully grind edges of tile abutting trim, finish or built-in items.

G. Movement Joints:
1. Comply with TCNA EJ171 requirements for expansion joints and other sealant-filled joints, including control, contraction, and isolation joints.
   a. Locate such joints during installation of setting materials, mortar beds, and tile.
   b. Extend joints full thickness of tile and setting bed, down to the substrate. Do not saw-cut joints after installing tiles.
   c. For tile edges adjoining movement joints, remove “spacers” or “dots” so as not to interfere with functioning of movement joints.
2. Spacing: 20 feet to 25 feet (6.1 m to 7.6 m) on center each direction.
3. Provide additional joints:
   a. Where tile Work abuts restraining surfaces, such as perimeter walls, dissimilar floors, curbs, columns, pipes and ceilings.
   b. Where changes occur in backing materials.
   c. Where expansion, control, **[seismic,]** construction or cold joints occur in structure or backing materials.
4. Widths:
   a. Interior quarry tile and paver tile: Width of grout joint, but not less than 1/4 inch (6 mm).
   b. Interior ceramic tile: Minimum 1/4 inch (6 mm).
   c. Tile joints at expansion, control, seismic or construction joints: Same width as joints in substrate, except minimum widths specified above.
5. Prepare joints and install sealant and joint filler in accordance with TCNA EJ171 and TCNA recommendations and as specified in 07 Section JOINT SEALANTS.

H. Metal Trim: Install where indicated, in longest lengths possible, according to manufacturer's instructions.

3.4 FLOOR TILE AND THRESHOLD INSTALLATION

A. Thin-Set Ceramic Tile with Crack Isolation Membrane on Concrete Substrates:
   1. Install isolation membrane bonded securely to substrate, in accordance with membrane manufacturer's instructions and ANSI A108.17. Do not install tile over membrane until membrane has cured and been tested to determine that it is watertight.
   2. Install tiles in accordance with manufacturer's instructions and TCNA Full Coverage Method F125A (ANSI A108.5).
   3. Press and twist, or mechanically vibrate, paver tiles in place to provide 100% mortar contact on tile backs, and to provide full support of tiles including edges and corners. Bring tile surfaces to proper alignment.

B. Thresholds:
   1. Install in one piece.
   2. Fit and cope neatly to door jambs.
   3. Install in accordance with TCNA Method TH611 using latex-portland cement thin-set mortar.

3.5 WALL TILE INSTALLATION

A. Thin-Set Ceramic Tile on Moisture- and Mold-Resistant Gypsum Board Substrates: Install tiles in accordance with manufacturer's instructions and TCNA Latex-Portland Cement Mortar Method W243 (ANSI A108.5).

B. Adhesive-Set Ceramic Tile on Moisture- and Mold-Resistant Gypsum Board Substrates:
   1. Prime surface before applying adhesive as recommended by adhesive manufacturer.
   2. Apply adhesive and set tile in accordance with manufacturer's instructions and TCNA Method W242 (ANSI A108.4).
   3. Allow minimum of 24 hours after tile is set for solvent evaporation before grouting.

3.6 SHOWER STALL INSTALLATION

A. Prefabricated Shower Receptor With Ceramic Tile on a Mortar Bed:
   1. Install prefabricated receptor and wall tiles in accordance with manufacturer's instructions and TCNA Cement Mortar Method B411 (ANSI A108.1).

3.7 FINISHING

A. Grouting and Pointing:
   1. Mix and install grout in accordance with manufacturer's directions, including requirements for preparation. Use amount of latex additive as recommended by grout manufacturer.
   2. After tile has set sufficiently, fill joints with grout until flush with surrounding tile.
   3. Point joints full and remove excess grout immediately. Do not allow grout film to dry on surface of tile.

3.8 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean ceramic tile surfaces so they are free of foreign matter.
   1. Remove grout residue from tile as soon as possible.
   2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned.
   3. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Protection:
   1. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
   2. Where temporary use of new floors is unavoidable, provide large, flat boards or plywood panels for walkways over fire-resistive Kraft paper.

D. Remove cracked, damaged, or defective material and install new material, before final cleaning.

E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09 5100

ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Acoustical panels for lay-in application.
   2. Metal framing and suspension systems.
   3. Trim and accessories.

B. Products Furnished but Not Installed Under This Section: Furnish inserts and anchors to other trades well in advance of time needed for coordination with other Work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See DIVISION 21 for sprinkler heads.

B. See DIVISION 23 for mechanical grilles and diffusers.

C. See DIVISION 26 for light fixtures, fire and smoke detectors and speakers.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component.

B. Shop Drawings:
   1. Submit Shop Drawings showing details and reflected ceiling plans.
   2. Show location of items of Work requiring coordination with acoustical ceilings or supported by acoustical ceiling systems.

C. Samples:
   1. Panels: Submit 12 inch x 12 inch (30 mm x 300 mm) samples of each type.
   2. Exposed framing members and moldings: Submit 12 inch (300 mm) lengths of each type, color and finish.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit installer qualifications verifying years of experience; include list of projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 SYSTEM REQUIREMENTS

A. Seismic Requirements: See structural Drawings.

B. Interface With Other Systems: Coordinate layout and installation of acoustical ceiling units, suspension system components and accessories with other Work supported by, or penetrating through, ceilings, including but not limited to light fixtures, fire and smoke detection system components, HVAC equipment, fire-suppression system components and partition system.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

1.7 SAMPLE INSTALLATIONS

A. Prior to commencing Work and preceding pre-installation conference, provide sample installations for suspended acoustical ceiling Work.

B. Size: Minimum 10 feet square (3000 mm) in areas acceptable to Architect.

C. Materials: Complete installations with materials in systems, including panels, suspension system, wall moldings, light fixtures and mechanical grilles and diffusers.

D. Architect's Review:
1. Architect will review sample installations for visual acceptance of materials and workmanship.
2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain approved sample installations during construction as standard for subsequent Work.

F. Properly finished and maintained sample installations may be incorporated into completed Work.

1.8 SEQUENCING AND SCHEDULING

A. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wetwork in space is completed and nominally dry, and Work above ceilings is complete.

1.9 PROJECT CONDITIONS

A. Verify measurements and dimensions at site.

B. Survey space to determine variation of floor slabs from level. Identify high and low points, and coordinate with Architect in field to establish datum for laying out each ceiling area.

C. Environmental Requirements:
1. Permit panelsto reach room temperature and stabilized moisture content before installation.
2. Do not install panelsuntil ambient conditions of temperature and humidity in space will be continuously maintained at values near those indicated for final occupancy.
3. Do not install if ambient temperature is less than 60 deg F (15 deg C).

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to site in manufacturer's unopened containers, clearly indicating manufacturer's name, brand, type, style, size, color, texture and other identifying information.

B. Store materials in dry location, off ground and in manner to prevent damage or deterioration.

C. Replace materials which have been damaged or are otherwise unfit for use, as directed.

1.11 EXTRA STOCK

A. Deliver one unopened carton of panelsfor each 100 cartons (or fraction thereof) installed for each type, pattern and color.

B. Store at Project site where directed. Ensure cartons are identified by manufacturer, product, pattern and color.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers - Acoustical Panels:
   1. Listed products establish standard of quality and are manufactured by USG Interiors, Inc.
   2. Equivalent products by the following manufacturers may be acceptable provided they comply with requirements of Contract Documents:
      a. CertainTeed, Inc.
      b. Armstrong World Industries.

2.2 ACOUSTICAL PANELS

A. Acoustical Panels ACT-1:
   1. Description: Mineral fiber with fine texture.
   2. Classification, per ASTM E 1264: Type IV, Form 1 and 2, Pattern E, G.
   3. Size: 24 inch x 24 inch x 3/4 inch thick.
   4. Edge profile: Shadowline tapered.
   5. Finish: Factory applied latex paint.
   6. Color: White.
   7. Light reflectance: ASTM E1477, LR .89.
   8. Flame spread: ASTM E1264, 0-25.
   9. Ceiling attenuation class (CAC Range): ASTM E1264, 35 minimum.
   10. Noise-reduction coefficient (NRC): ASTM E1264, 0.70.
   11. Acceptable product and manufacturer: Equivalent to Mars ClimaPlus 86785 by USG Interiors.

2.3 SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C635.

B. Attachment Devices: Size for five times the design load indicated in ASTM C635, Table 1, "Direct Hung," unless otherwise indicated.
   1. Power-actuated fasteners in concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E1190, conducted by a qualified testing and inspecting agency.
   2. Anchors in concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E488 or ASTM E1512 as applicable, conducted by a qualified testing and inspecting agency.
      a. Type: Postinstalled expansion anchors.
      b. Corrosion protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
   1. Zinc-coated, carbon-steel wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
   2. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106 inch (2.69 mm) diameter wire.

2.4 SUSPENSION SYSTEMS

A. Exposed Suspension System:
   1. Description:
      a. ASTM C635, intermediate duty, exposed T with 15/16 inch (24 mm) wide face; interlocking components.
      b. End condition of cross runners: Butt-edge.
   2. Materials: Cold-rolled steel with hot-dipped galvanized coating.
   3. Finish and color: Manufacturer's standard factory finish; white.
   4. Acceptable products and manufacturers:
      a. Prelude XL by Armstrong.
      b. 200 Snap-Grid System by Chicago Metallic Corp.
      c. DONN Brand DX/DXL by USG Interiors.

2.5 ACCESSORIES

A. Trim:
   1. Manufacturer's standard trim and edge moldings to suit suspension system requirements; same finish as suspension system.
   2. Provide edge moldings to fit penetrations exactly, including circular penetrations.
   3. Expansion joints: Provide framing and closure trim.
   4. Transition trim:
      a. Extruded aluminum perimeter trim 2-7/16 inches high, with exposed bottom fin approximately 3/16 inch wide.
      b. Provide 90° factory-welded corners.
      c. Provide with manufacturer's recommended splice plates, hanging clips, and other accessories as required for complete installation.
      d. Finish and color: Manufacturer's standard baked polyester paint finish; color to be selected by Architect from manufacturer's full color range.

5. Acceptable Products and Manufacturers:
   a. Transition Molding: Equivalent to Transition Molding #7902 by Armstrong.
   b. Shadow Molding: Equivalent to Shadow Molding #7873 by Armstrong.
   c. Perimeter Moldings:
      1) Equivalent to Axiom Vector Trim No. AX2VESTR by Armstrong.
      2) Equivalent to Axiom Classic Trim AX6STR by Armstrong.
   d. Edge Trim (for use with tegular panel): Equivalent to Axiom - Knife Edge (standard finish, SL) by Armstrong.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction and conditions under which Work is to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install materials and systems in accordance with final Shop Drawings, manufacturer's instructions and requirements of ASTM C636,

B. Install system to support imposed loads with maximum deflection of l/360 of span.

C. Tolerances:
   1. Level completed assembly to tolerance of 1/8 inch in 10 feet (3 mm in 3000 mm).
   2. Variation from plumb of grid members caused by eccentric loads: 2 degrees maximum.

D. Hangers:
   1. Coordinate location of hangers with other Work.
   2. Space not more than 6 inches (150 mm) from each end and not more than 4 feet (1200 mm) on center between ends of members to be supported.
   3. Provide additional hangers for support of fixtures, equipment, and other items supported by ceiling suspension system, in quantity as required to prevent eccentric deflection or rotating of supporting runners.
      a. At each corner of ceiling suspension system around fixtures, equipment, and other items, provide at least 1 hanger for support of ceiling suspension system.
      b. Hangers for fixtures, equipment, and other items shall be provided by trade that provides the fixture, equipment, or item.
   4. Hang system independent of walls, columns, ducts, pipes and conduit.
   5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
   6. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
   7. Where spacing of structural members, width of ducts, or other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental

suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

8. Where ceilings are below steel deck without concrete fill, attach hangers directly to structural elements only; do not attach to steel deck. Loop hangers and wire-tie directly or provide anchors or inserts.

E. Center suspension system on room axis leaving equal border units, unless otherwise indicated on Drawings. Adjust so that perimeter units are not less than one-half of panel width.

F. Edge Molding Installation:
   1. Install edge moldings where ceilings abut walls, partitions or other penetration elements.
   2. Miter cut inside and outside corners to provide flush, tight, hairline joints.
   3. Secure moldings to building construction at 16 inches (400 mm) on center, and maximum 3 inches (75 mm) from each end of each molding.
   4. Do not use exposed fasteners, including pop rivets, on moldings and trim.

G. Panel Installation:
   1. Install panels in place, level, in uniform plane and free from twist, warp and dents.
   2. Rest panel edges resting on flanges of tees.
   3. Support perimeters on wall moldings.
   4. Neatly scribe and cut panels for accurate fit at borders, interruptions, and penetrations by other Work.
      a. Where tegular edge panels are cut, custom cut tegular profile on cut sides of panels to match factory tegular edge. Touch-up cut surfaces with paint to match color and finish of exposed panel surfaces.
   5. Lay directional patterned units one way with pattern parallel to longest room axis, unless otherwise indicated.

3.3 CLEANING AND PROTECTION

A. Clean and repair exposed surfaces that have been stained, marred, or otherwise damaged.

B. Remove and replace Work which cannot be successfully cleaned or repaired.

C. Protect Work so that it will be without damage at time of acceptance.

END OF SECTION

SECTION 09 6500

RESILIENT FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Static dissipative tile.
   2. Resilient base.
   3. Setting materials and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each material.

B. Samples:
   1. Tile materials: Submit 12 inch (300 mm) square samples for each type, pattern, color and size.
   2. Base and strip materials: Submit 12 inch (300 mm) lengths for each type, color and size.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data:
   1. Submit installer qualifications verifying years of experience and manufacturer's acceptance; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit manufacturer's written maintenance instructions for resilient materials.
   2. Include copy of submittal in Project information manual.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Not less than 5 years documented, successful experience with work comparable to Work of this Project, approved by manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to job site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color and design.

B. Store materials in accordance with manufacturer's instructions.

1.7 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Maintain minimum temperature of 65 deg F (18 deg C) in spaces to receive materials for at least 48 hours prior to installation, during installation and for not less than 48 hours after installation.
   2. Store materials in spaces where they will be installed for at least 48 hours before beginning installation.
   3. After installation, maintain minimum temperature of 55 deg F (13 deg C) in areas where Work is completed.

1.8 SEQUENCING AND SCHEDULING

A. Install resilient materials after other finishing operations, including painting, have been completed.

B. Do not install resilient materials over concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by resilient material manufacturer's recommended bond and moisture tests.

1.9 EXTRA STOCK

A. Deliver one unopened carton of resilient materials for each 100 boxes (or fraction thereof) installed of each type, pattern and color.

B. Store at job site where directed.

C. Ensure boxes are identified by manufacturer, pattern and color.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers - Static Dissipative Tile:
   1. Listed products establish standard of quality and are manufactured by Armstrong.
   2. Equivalent products by other manufacturers are also acceptable provided they meet the requirements of Contract Documents.

B. Acceptable Manufacturers - Resilient Base:
   1. BurkeMercer Flooring Products.
   2. Flexco.
   3. Johnsonite.
   4. Roppe Corp.

2.2 PRODUCTS

A. Static Dissipative Tile:
   1. Comply with ASTM F1066, Class 2.
   2. Size: 12 inch x 12 inch x 1/8 inch thick.
   3. Colors: To be selected by Architect from manufacturer’s full range.

4. Physical properties:
   a. Static load limit: Less than 0.005 inches when tested in accordance with ASTM F970.
   b. Resistance: Point to point and point to ground of 10^5 to 10^9 when tested in accordance with ANSI/ESD S7.1, ASTM F150.
   c. Static dissipation: At 12% R.H. with dissipative footware: 1000 to 100 volts in 0.2 seconds average.
   d. Static generation: At 12% R.H. with dissipative footware: Less than 10 volts when tested in accordance with ANSI/ESD STM 97.2.
5. Acceptable product and manufacturer: Equivalent to Static Dissipative Tile SDT by Armstrong.

B. Resilient Base:
1. Description: ASTM F1861.
   a. Type: TS (rubber, vulcanized thermoset).
   b. Group: 1 (solid, homogeneous).
   c. Style: Style B (cove).
2. Height: 4 inches (102 mm).
3. Thickness: 0.125 inch (3 mm).
4. Furnish base in continuous coils. Individual lengths are not acceptable.
5. Colors: To be selected by Architect from manufacturer's full range of standard colors.

2.3 ACCESSORIES

A. Leveling and Patching Compounds: Latex-modified, portland cement-based or blended hydraulic-cement-based formulation provided or approved by resilient flooring manufacturer for applications indicated.

B. Primers and Adhesives:
1. Water-resistant products as recommended by manufacturer to suit resilient flooring and substrate conditions indicated.
2. VOC limits: Provide cements with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
3. Adhesive for static dissipative tile: Provide manufacturer’s recommended adhesive.

C. Detergents and Polish: Types recommended by flooring manufacturer.

D. Copper strips: Provide manufacturer’s copper grounding strips for static dissipative tile.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Prepare substrates according to resilient flooring manufacturer's written instructions to ensure adhesion of resilient flooring.

B. Concrete Substrates: Prepare according to ASTM F710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
   3. Alkalinity and adhesion testing: Perform tests recommended by resilient flooring manufacturer. Proceed with installation only after substrates pass testing.
   4. Moisture testing: Perform tests recommended by resilient flooring manufacturer and as follows. Proceed with installation only after substrates pass testing.
      a. Perform anhydrous calcium chloride test according to ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
      b. Perform relative humidity test using in situ probes according to ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate, within tolerance of 1/4 inch in 10'-0" (6 mm in 3000 mm).

D. Do not install resilient flooring until materials are same temperature as space where they are to be installed.
   1. Move resilient flooring products and installation materials into spaces where they will be installed at least 72 hours in advance of installation.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient flooring products.

3.3 INSTALLATION

A. General:
   1. Install resilient materials in accordance with manufacturer's instructions.
   2. Apply adhesive to provide continuous bond between resilient material and substrate. Do not allow adhesive to bleed through joints.
   3. Cut units to length; provide straight and tight butt joints.
   4. Fit materials tightly so each unit is in contact with surrounding units and joints in proper alignment.
   5. Scribe, cut, and fit exposed edges of units which adjoin other Work and neatly abut with tight joint.

B. Static Dissipative Tile:
   1. Apply adhesive over the area to set until dry-to touch, approximately one hour.
   2. Cut copper strips into 2 inch strips. Provide minimum one grounding strip for every 1000 square feet.
   3. Install tile as indicated, laying the field area first.
   4. At copper grounding strip locations, place 18 inches of the copper grounding strip over the adhesive. The remaining 6 inches should continue up the wall. Apply additional adhesive over the strip, and allow to dry.
   5. Lay out tile and roll in both directions within the adhesives 6-hour working time. Clean adhesive residue from the surface.
   6. Allow 72 hours to dry and set.

7. Grounding: Install grounding according to manufacturer’s written instructions.

C. Resilient Base Installation:
1. Install in accordance with manufacturer's instructions.
   a. Do not stretch base during installation.
   b. Roll base firmly in place immediately after applying adhesive.
2. At cove base corners, use corner grooving tool with sharp blades to cut groove in back of resilient base. Bending of cove base around corners without grooving back is not acceptable.
3. Align tops of adjacent sections.
4. Do not allow adhesive to ooze onto wall above base.

3.4 CLEANING

A. Immediately remove excess adhesive from surfaces.

B. Sweep or vacuum thoroughly.

C. Do not wash or scrub flooring for at least five days after installation, to prevent excess moisture from interfering with adhesive bond and/or seam treatments.

D. After adhesive and/or seams have set up, clean flooring by damp-mopping with very dilute neutral detergent solution in accordance with flooring manufacturer's instructions.

E. Near completion of Project and just prior to final acceptance, clean flooring once again.
1. Apply 2 coats of flooring manufacturer's recommended floor polish. Buff thoroughly with mechanical buffers.
2. Follow flooring and polish manufacturers' instructions.

3.5 PROTECTION

A. Prohibit traffic on floor finish for minimum of 48 hours after installation.

B. Protect Work from damage during construction period so that it will be without any indication of use or damage at time of acceptance.

END OF SECTION

SECTION 09 9000

PAINTING AND COATING

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work Included: Work of this Section includes, but is not limited to, the following:
   1. Field painting and finishing of exposed surfaces of items of architectural, structural, mechanical and electrical Work, interior and exterior, which require paint finish for protection or appearance as shown on Drawings or as specified.
   2. Surface preparation and priming of materials required to be painted, but not furnished under Work of other Sections as primed or prepared surfaces.
   3. Touch-up painting of prime coats which have become damaged or otherwise abraded or removed during construction.

B. Description of Work Not Included: Certain items of Work shall not be included in Work of this Section unless specific reference is made to painting such items on Drawings or in Specifications. These items include:
   1. Shop finished items and materials with factory-applied or integral finish.
   2. Concealed surfaces in inaccessible areas such as foundation spaces, furred areas, utility tunnels, pipe spaces and shafts.
   3. Finished metal surfaces such as anodized aluminum, stainless steel, chromium plated metal, copper, bronze and other nonferrous metals, unless otherwise indicated.
   4. Operating parts of mechanical and electrical equipment including UL and rating labels, and equipment identification, name or nomenclature plates.
   5. UL and rating labels on doors, frames, and hardware.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section FLUOROPOLYMER FINISH for fluoropolymer coatings.

B. See DIVISIONS 23 and 26 for additional requirements for painting mechanical and electrical equipment.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each paint system and material.
   2. Include complete listing for each material by product name.

B. Samples:
   1. Submit samples for each color, texture and sheen prepared on 12 inch (300 mm) square hardboard as required to match Architect's Color Schedule.
   2. Samples shall be stepped, to show progressively primers and top coats.

1.4 INFORMATIONAL SUBMITTALS

A. Certificates:
   1. Submit manufacturer's certification that materials to be used are manufacturer's “best quality grade”.
   2. Where shop prime materials are by different manufacturer than finish coat materials, submit certificate signed by both prime and finish coat manufacturers verifying compatibility.

1.5 DEFINITIONS

A. Paint: Coating systems materials, including paints, enamels, stains, varnishes, lacquers, sealers, fillers and other types of applied coating materials whether used as primers, intermediate or finish coats. Standard coating terms defined in ASTM D16 apply to this section.

B. Exposed Surfaces: Surfaces or areas visible in finished Work.

C. Paint Schedule: A guide to finishing various surfaces throughout the Project; not intended as definitive listing of Work.

1.6 SYSTEM REQUIREMENTS

A. Color Requirements:
   1. Specified Paint Schedule lists basic painting systems.
   2. Prior to beginning painting Work, Architect will prepare and furnish a Color Schedule accompanied by color chips.
   3. Color Schedule shall list areas and surfaces to be painted together with colors, textures and sheens required for various surfaces.
   4. As many as ten different colors may be required.
   5. Colors may be special colors, not manufacturer's standard colors.
      a. Provide two or more colors on walls in certain rooms or areas, if indicated in Color Schedule. Such rooms or areas may vary from those scheduled, at no additional expense to Owner.
      b. Include cutting in of different colors in the Work.
   6. Match color chips and submit samples as specified before proceeding.
   7. Submit samples as specified before proceeding.

B. Regulatory Requirements:
   1. Comply with local, state and federal codes, laws and regulations for VOC content.
   2. Such codes, laws and regulations take precedence over paints specified in this Section.

C. Interface with Other Work:
   1. Shop primed items: Certain items of Work are specified under other Sections to be shop primed for field painting specified in this Section. Such items include, but are not limited to, the following:
      a. Structural steel, including steel joists and metal deck.
      b. Metal fabrications.
      c. Steel doors and frames.
      d. Wood doors (paint finish).
      e. Access panels.
      f. Coiling doors.

g. Fire extinguisher and valve cabinets.
h. Mechanical and electrical equipment and accessories.

2. Shop finished items: Certain items of Work are specified under other Sections to be shop finished and do not require finish painting in field. Such items include, but are not limited to, the following:
   a. Site fencing and furnishings.
   b. Structural steel.
   c. Metal fabrications.
   d. Architectural woodwork (transparent finish).
   e. Roof accessories.
   f. Coiling doors.
   g. Aluminum entrances and window wall components.
   h. Metal toilet compartments.
   i. Louvers and vents.
   j. Prefabricated specialties and accessories.
   k. Equipment including mechanical and electrical equipment.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

1.8 SAMPLE INSTALLATIONS

A. Prior to commencing Work and after Architect’s approval of paint samples, provide sample installations of painting Work.

B. Quantities, Extent, and Locations:
   1. Provide sample installations in up to 5 different areas of building. Locations of areas will be determined by Architect.
   2. Extent: Provide sample installations of up to 3 different colors in each sample installation area, with each color full room height x 4 feet (1200 mm) wide.
   3. Prior to applying sample installation paint systems, provide temporary lighting in each sample installation area, to simulate final lighting type, source locations, and brightness, as acceptable to Architect.

C. Materials: Provide complete installation with scheduled system materials and number of coats.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of materials and workmanship, and for final approval of paint colors.
   2. Obtain Architect's approval of sample installation before proceeding with subsequent Work.

E. Maintain approved sample installation during construction as standard for subsequent Work.

F. After Architect’s approval of final color, re-paint each entire sample installation area with approved color and sheen so that no evidence of other sample installation colors remains.

1.9 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver paint to site factory-mixed, ready for application, in original, unopened containers, bearing manufacturer's labels, indicating the following information:
   1. Name of material.
   2. Manufacturer's stock number and date of manufacture.
   3. Contents by volume including major pigment and vehicle constituent.
   4. Thinning instructions.
   5. Recommended application instrument.
   6. VOC content and emissions.
   7. Color name and number.

B. Storage:
   1. Store materials and equipment in dry storage area.
   2. Keep area neat and orderly.
   3. Protect storage area surfaces from paint spillage.
   4. Maintain paint containers in clean condition, free of foreign materials and residue, protected from freezing.

C. Place paint or solvent soaked rags, waste or other materials which might constitute fire hazard in metal containers and remove from premises at close of each day's Work.

1.11 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Apply paint to surfaces which are free of moisture.
   2. Do not apply paint in rain, snow, fog or mist or when relative humidity exceeds 85%.
   3. During periods of inclement weather, painting may be continued if areas and surfaces to be painted are enclosed and artificial heat is supplied, provided temperature and humidity conditions prescribed are maintained.
   4. Do not start interior painting until exterior building openings are closed.
   5. Temperature:
      a. Exterior paint: Do not apply exterior paint when ambient temperature is below 50 deg F for water-thinned coatings and below 45 deg F (7 deg C) for other coatings, or when temperature is expected to drop to 32 deg F (0 deg C) within 24 hours of application.
      b. Interior paint: Once interior painting is started, maintain constant temperature of 65 deg F (18 deg C) or above in area of Work.
      c. Prevent variations in temperature which might result in condensation on freshly painted surfaces.
   6. Where paint manufacturer's specifications or instructions differ from above, the more stringent requirements apply to this Work.
   7. Paint fumes:
      a. Take every precaution against potential hazards of paint fumes as necessary and as required by regulations, codes and laws.
      b. Provide additional ventilation and protective equipment if necessary.

1.12 EXTRA STOCK

A. Deliver one unopened 5 gallon (19 L) container of paint for each top coat installed for each paint material, sheen and color.

B. Store at Project site where directed. Ensure containers are identified by manufacturer, product, sheen and color.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS – GENERAL FIELD PAINTING SYSTEMS

A. Acceptable Products and Manufacturers - Typical Interior Painting Systems:
   1. Listed products establish standard of quality and are manufactured by Benjamin Moore & Co.
   2. Equivalent products in the following low-VOC product lines are acceptable:
      a. Genesis by Duron Inc.
      b. Lifemaster No VOC by Glidden Professional.
      c. Harmony by Sherwin-Williams Co.

B. Acceptable Products and Manufacturers - Interior Concrete Slabs and Exterior Painting Systems:
   1. Listed products establish standard of quality and are manufactured by Benjamin Moore & Co.
   2. Equivalent products by following are acceptable:
      a. Duron Inc.
      b. Glidden Professional.
      c. Sherwin-Williams Co.

C. Acceptable Products and Manufacturers - Exterior Masonry Coatings:
   1. Listed products establish standard of quality and are manufactured by MAB Paints and Coatings.
   2. Equivalent products by following are acceptable:
      a. Benjamin Moore & Co.
      b. PPG Industries, Pittsburgh Paints.
      c. Sonneborn Building Products.
      d. Thoro Systems Products, Inc.

2.2 PRODUCTS AND MANUFACTURERS – HIGH PERFORMANCE COATING SYSTEMS

A. Acceptable Products and Manufacturers – High Performance Coatings:
   1. Listed products establish standard of quality and are manufactured by Tnemec Company, Inc.
   2. Equivalent products by following are acceptable:
      a. Carboline Company.
      b. Dupont Company.

2.3 MATERIALS

A. Chemical Components of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and the following chemical restrictions:
   1. Flat paints, coatings, and primers: VOC content of not more than 50 g/L.
   2. Nonflat paints, coatings, and primers: VOC content of not more than 150 g/L.
   3. Anti-corrosive and anti-rust paints applied to ferrous metals: VOC not more than 250 g/L.
   4. Floor Coatings: VOC not more than 100 g/L.
   5. Shellacs, Clear: VOC not more than 730 g/L.
   6. Shellacs, Pigmented: VOC not more than 550 g/L.

B. Coatings:
   1. Provide “best quality grade” of various types of coatings as produced by acceptable paint manufacturers.
   2. Materials not displaying manufacturer's identification as standard “best-grade” product will not be acceptable.

C. Thinners:
   1. Water-thinned systems: Clean, potable water.
   2. Solvent-thinned systems: Pure linseed oil, turpentine, shellac and other materials of highest quality with identifying labels intact and seals unbroken, as recommended by paint manufacturer as suitable for each type of paint.

D. Primers and Undercoats: As recommended by paint manufacturer, suitable for substrate and compatible with finish coat requirements.

E. Galvanizing Repair Paint: High zinc-dust content paint with dry film containing not less than 94 percent zinc dust by weight, complying with SSPC Paint 20.

F. Exterior Paint: Non-chalking and mildew resistant.

G. Interior Paint: Withstand washing with mild detergent solution, without loss of color, sheen or pigments.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for maximum moisture content and other conditions affecting performance of work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (CMU): 12 percent.
   3. Gypsum board: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
   1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

A. Prepare surfaces in accordance with paint manufacturer's instructions.

B. Make substrates clean, dry, smooth, free from dust and other foreign matter which would adversely affect adhesion or appearance.

C. Remove or protect hardware, plates, trim, lighting fixtures and similar items placed prior to painting. Disconnect equipment and temporarily move, where necessary, to permit painting of wall surfaces. Replace removed items upon completion of painting.

D. Touch-up of Prime Coats:
   1. Before applying succeeding coats, touch-up primers and undercoats and remove foreign matter from surface.
   2. Feather spot-priming or spot-coating into adjacent coating to produce smooth and level surface.

E. Repair damaged galvanized coating in accordance with ASTM A780.

F. Do not apply final coats until other trades, whose operations would be detrimental to finish painting, have completed their Work in areas to be painted.

3.3 PREPARATION OF SURFACES

A. Ferrous Metal - Typical Painting Systems:
   1. Clean and prime surfaces, which have not been shop primed, before surface is damaged by weather or other exposure.
   2. Shop-primed items: After installation is completed, touch-up heads of bolts, welded surfaces which are unpainted, and surfaces or areas where primer has been abraded or otherwise damaged.
   3. Prior to application of field coats, remove oil, grease, welding flux residues and other contaminants harmful to painting in accordance with SSPC-SP1 “Solvent Cleaning”.
   4. After solvent cleaning, prepare bare metal surfaces by removing rust scale, loose mill scale or other detrimental deposits in accordance with SSPC-SP3 “Power Tool Cleaning”.

B. Ferrous Metal - Polyurethane Systems:
   1. Prepare surfaces in strict accordance with coating manufacturer's instructions.
   2. After completion of steel erection, power wash steel using tri-sodium phosphate detergent solution, with minimum pressure of 3000 psi (21 MPa). Rinse throughly with clean water and allow to dry completely.
   3. After cleaning, prepare rusted areas and abraded areas in accordance with SSPC-SP11 “Power Tool Cleaning to Bare Metal”.
   4. After completion of power tool cleaning, spot prime areas that were power tool cleaned, using specified primer. Spot prime the same day that areas were power tool cleaned.

C. Galvanized Steel:

1. General: Prepare surfaces of galvanized steel for painting in accordance with ASTM D6386.
2. Remove passivation film and grease and oil residue from galvanized steel by chemical cleaning and etching, and mechanical methods, to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
    a. Chemically clean and etch using diluted solution of water-reducible phosphoric acid and detergent blend, and water. Dilute, apply, rinse with hot water, and force dry, in accordance with manufacturer's written instructions.
        1) Acceptable product and manufacturer: Equivalent to Clean >n Etch by Great lakes Laboratories.
    b. Mechanically abrade surface in accordance with SSPC-SP3 "Power Tool Cleaning".
3. Test surfaces using one of the following methods:
    a. Copper sulfate test: Apply one drop of a 10% copper sulfate solution to the treated/rinsed/dried surface. If a black spot develops within 5 seconds of contact, the surface is ready for painting. If a black spot does not develop within 5 seconds of contact, provide additional cleaning and etching, and re-test until a black spot does so develop.
    b. Water break test: Spray water on the treated/rinsed/dried surface. If the water beads or breaks, the surface is not ready for paint; provide additional cleaning and etching, and re-test until water sheets over the surface. If the water sheets over the surface, it is a good signal that the passivation film and other oily soil has been removed, and the surface is ready for painting.

D. Aluminum - Typical Painting Systems:
1. Clean surfaces of oil, grease and other contaminants in accordance with SSPC-SP1 "Solvent Cleaning".
2. Pretreat in accordance with SSPC-Paint 27 "Base Zinc Chromate-Vinyl Butyral Washcoat".

E. Aluminum - Polyurethane Systems:
1. Prepare surfaces in strict accordance with coating manufacturer's instructions.
2. Chemical etch to clean surfaces of oil, grease and other contaminants, using Clean >N Etch by Great Lakes Laboratories or as recommended by paint manufacturer.

F. Concrete:
1. Remove release agents, curing compounds, efflorescence, and chalk.
2. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

G. Concrete Masonry:
1. Remove efflorescence and chalk.
2. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

H. Gypsum Board:
1. Repair surface defects including cracks, depressions or holes with gypsum board joint finishing compound as specified in Division 09 Section GYPSUM BOARD.
2. Fill out flush and sand smooth.
3. Clean surfaces of dust dirt and other contaminants.

4. Do not begin paint application until finishing compound is dry.

3.4 APPLICATION

A. Manufacturer's Instructions:
   1. Follow paint manufacturer's instructions; do not exceed manufacturer's recommended application rate.
   2. Use application materials and equipment recommended by paint manufacturer.
   3. Stir materials before application to produce mixture of uniform density. Re-stir as required during application.
   4. Use thinners only if recommended by paint manufacturer.
   5. Provide total dry film thickness recommended by paint manufacturer for conditions of use.

B. Painting, General:
   1. Number of coats specified are minimum number acceptable.
   2. Allow each coat of paint, varnish and enamel to dry thoroughly before applying succeeding coats.
   3. Use products of same manufacturer for succeeding coats.
      a. Where shop primed materials are field painted, or prime coat materials are by different manufacturer than finish coat materials, confirm compatibility of materials and submit required certification.
      b. If shop primer is not compatible with finish coats, apply barrier coat, as recommended by finish coat manufacturer, over incompatible shop primer.
   4. Make edges of paint adjoining other materials or colors sharp and clean, without overlapping.
   5. Make each coat of paint slightly different shade from preceding coat.
   6. Final colors shall match approved samples.

C. Painting Mechanical and Electrical Items:
   1. When covered and uncovered pipes, conduits, hangers and rods pass through finished room or space, paint with type of undercoat materials consistent with material to be painted and with same type and color of finish coat as used on immediately adjacent walls or ceiling surfaces, whichever surface is most appropriate to be matched, or color code as specified in DIVISION 23.
   2. Give pumps, fans, heating and cooling units two coats of paint unless factory finished (or unless painting is specified under other Sections).
   3. Paint interior of ducts black behind grilles or registers exposed to view or which reflect light.
   4. Do not paint name plates or polished surfaces of equipment. Leave clean and free of paint.

D. Painting Traffic Marking:
   1. Clean and sweep surfaces to eliminate loose material, oil, grease dirt, dust and moisture.
   2. Paint traffic, lane and other markings as indicated on Drawings.
      a. Width of individual lines: 4 inches (100 mm), ±1/8 inch per linear foot (3 mm per 300 mm), non-cumulative.
      b. Paint coverage: Between 100 sf and 110 sf of surface per gallon of paint (2.48 sq. m and 2.7 sq. m of surface per liter of paint), to yield wet film thickness of not less than 15 mils (0.38 mm).
      c. Paint markings with straight, sharply defined parallel edges.

E. Painting Miscellaneous Items and Areas:
   1. Paint shop-primed door hinges same color as door frames to which attached, unless a different color is selected. Do not paint door hardware which have plated finishes.
   2. Finish tops, bottoms and edges of doors same as faces of doors.
   3. Finish closets same as adjoining rooms, unless otherwise specified.
   4. Finish other surfaces not specifically mentioned same as adjoining surfaces.
   5. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.

F. Touch-up:
   1. Touch-up and restore finish where damaged.
   2. If touch up is visible, recoat entire surface.
   3. If stain, dirt or undercoats show through final coat of paint, correct defects and cover with additional coats until coating or paint film is of uniform finish, color, appearance and coverage.
   4. Give special attention to edges, corners, crevices, welds, exposed fasteners and similar items to be sure these areas receive dry film thickness equivalent to flat surfaces.

3.5 CLEANING

A. At completion of each day's Work, remove from premises rubbish and accumulated materials caused by this Work.

B. Clean off paint spots, oil and other soiling from pre-finished surfaces and surfaces with integral finish. Use solvents which will not damage finished surface.

3.6 EXTERIOR PAINT SCHEDULE – GENERAL FIELD PAINTING

A. Exterior - Exterior Ferrous Metal - Alkyd Finish:
   1. Primer: Rust inhibiting alkyd primer; touch up shop primed items.
      a. Acceptable product and manufacturer: Equivalent to Moorcraft SuperSpec DTM Alkyd Satin Z163 by Benjamin Moore.
   2. Second coat: Alkyd enamel, gloss.
      a. Acceptable product and manufacturer: Equivalent to Moorcraft SuperSpec Urethane Gloss Enamel Z22 by Benjamin Moore.
   3. Third coat: Same as second coat.

B. Exterior Galvanized Metal - Alkyd Finish:
   1. Primer: Acrylic primer ; touch up shop primed items.
      a. Acceptable product and manufacturer: Equivalent to DTM Acrylic Semi-Gloss M29 by Benjamin Moore.
   2. Second coat: Alkyd enamel, semi-gloss.
      a. Acceptable product and manufacturer: Equivalent to Moorcraft SuperSpec Urethane Gloss Enamel Z22 by Benjamin Moore.
   3. Third coat: Same as second coat.

C. Exterior Concrete Masonry Units - Vinyl Acrylic Finish - New Surfaces:
   1. Primer: Vinyl acrylic latex block filler.
      a. Acceptable product and manufacturer: Equivalent to Moorcraft Super Craft Latex Block Filler No. 285 by Benjamin Moore.
   2. Second coat: Vinyl acrylic latex, low lustre.

a. Acceptable product and manufacturer: Equivalent to MoorGard Latex House Paint 103 by Benjamin Moore.

3. Third coat: Same as second coat.

3.7 EXTERIOR PAINT SCHEDULE – HIGH-PERFORMANCE COATINGS

A. Exterior Steel – Fluoropolymer Finish:

1. Primer: Zinc-rich, organic.
   a. Acceptable product and manufacturer: Equivalent to Series H90-97 Tneme Zinc by Tnemec.
2. Second coat: Inorganic hybrid water-based epoxy.
   a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.
3. Third coat: Thermoset fluoropolymer.
   a. Acceptable product and manufacturer: Series 1071 Fluoronar by Tnemec.
4. Locations: Columns, support steel, metal fabrications and ornamental metal.

B. Exterior Concrete, Dense Masonry, Stucco – Acrylate Finish:

1. First coat: Modified waterborne acrylate.
   a. Acceptable product and manufacturer: Series 156 Enviro-Crete by Tnemec.
2. Second coat: Same as first coat.

C. Exterior CMU – Acylate Finish:

1. Sealer: Waterborne cementitious acrylic.
   a. Acceptable product and manufacturer: Series 130 Envirofill by Tnemec.
2. Second coat: Modified waterborne acrylate.
   a. Acceptable product and manufacturer: Series 156 Enviro-Crete by Tnemec.
3. Third coat: Same as second coat.

D. Exterior Galvanized Metal:

1. Primer: Inorganic hybrid water-based epoxy.
   a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.
2. Second coat: Thermoset fluoropolymer.
   a. Acceptable product and manufacturer: Series 1071 Fluoronar by Tnemec.

3.8 INTERIOR PAINT SCHEDULE – GENERAL FIELD PAINTING

A. Interior Gypsum Board - Acrylic-Latex Finish - Semi-Gloss:

1. First coat: Low-VOC interior primer.
   a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Primer Sealer 231 by Benjamin Moore.
2. Second coat: Low-VOC acrylic-latex interior paint; semi-gloss.
   a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Semi-Gloss Enamel 224 by Benjamin Moore.
3. Third coat: Same as second coat.
4. Locations: Walls in wet areas, including but not limited to restrooms, janitor closets, and trash rooms.

B. Interior Gypsum Board - Acrylic-Latex Finish - Eggshell:

1. First coat: Low-VOC interior primer.
   a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Primer Sealer 231 by Benjamin Moore.

2. Second coat: Low-VOC acrylic-latex interior paint; eggshell.
    a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Eggshell 223 by Benjamin Moore.
3. Third coat: Same as second coat.
4. Locations: Walls other than to receive semi-gloss.

C. Interior Gypsum Board - Acrylic-Latex Finish - Flat:
1. First coat: Low-VOC interior primer.
    a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Primer Sealer 231 by Benjamin Moore.
2. Second coat: Low-VOC acrylic-latex interior paint; flat.
    a. Acceptable product and manufacturer: Equivalent to Eco Spec Interior Latex Flat 219 by Benjamin Moore.
3. Third coat: Same as second coat.
4. Locations: Ceilings and soffits.

D. Exterior and Interior Traffic Marking Paint - Latex Finish:
1. First coat: Latex coating specifically manufactured for vehicular traffic markings.
    a. Product and manufacturer: P58 Safety & Zone marking Latex.
2. Provide paint that is compatible with traffic coating; coordinate with Division 07 Section TRAFFIC COATINGS.
3. Colors:
    a. Accessibility markings: Blue.
    b. Other markings: Yellow.

3.9 INTERIOR PAINT SCHEDULE – HIGH-PERFORMANCE COATINGS

A. Interior Metals – Polyurethane Finish:
1. Primer: Inorganic hybrid water-based epoxy.
    a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.
2. Second coat: Ceramic-modified waterborne aliphatic polyurethane.
    a. Acceptable product and manufacturer: Series 297 Eviro-Glaze by Tnemec
3. Locations: Doors and frames.

B. Interior Metals – Acrylic Finish:
1. Primer: Self-cross-linking hydrophobic acrylic.
    a. Acceptable product and manufacturer: Series 115 Uni-Bond DF by Tnemec.
2. Second coat: Self-cross-linking hydrophobic acrylic.
    a. Acceptable product and manufacturer: Series 115 Uni-Bond DF by Tnemec.
3. Locations: Overhead galvanized metal deck, steel joists, stringers, sprinkler pipe, conduit.

C. Interior Concrete – Acrylic Finish:
1. Primer: Self-cross-linking hydrophobic acrylic.
    a. Acceptable product and manufacturer: Series 115 Uni-Bond DF by Tnemec.
2. Second coat: Self-cross-linking hydrophobic acrylic.
    a. Acceptable product and manufacturer: Series 115 Uni-Bond DF by Tnemec.
3. Locations: Concrete ceilings; bus garage.

D. Interior Concrete – Polyurethane Finish:
1. Primer: Inorganic hybrid water-based epoxy.
    a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.

2. Second coat: Ceramic-modified waterborne aliphatic polyurethane.
    a. Acceptable product and manufacturer: Series 297 Eviro-Glaze by Tnemec.
3. Locations: Concrete walls and ceilings in bus garage and stairwells.

E. Interior CMU – Polyurethane Finish:
1. Sealer: Waterborne cementitious acrylic.
    a. Acceptable product and manufacturer: Series 130 Envirofill by Tnemec.
2. Second coat: Inorganic hybrid water-based epoxy.
    a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.
3. Third coat: Ceramic-modified waterborne aliphatic polyurethane.
    a. Acceptable product and manufacturer: Series 297 Eviro-Glaze by Tnemec.
4. Locations: Bus garage and stairwells.

F. Interior Galvanized Metal – Polyurethane Finish:
1. Primer: Inorganic hybrid water-based epoxy.
    a. Acceptable product and manufacturer: Series 27 WB Typoxy by Tnemec.
2. Second coat: Ceramic-modified waterborne aliphatic polyurethane.
    a. Acceptable product and manufacturer: Series 297 Eviro-Glaze by Tnemec.

END OF SECTION

DIVISION 10
SPECIALTIES

SECTION 10 2113

TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not necessarily limited to, the following:
   1. Floor-anchored, overhead braced solid polymer toilet compartments.
   2. Urinal screens.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section METAL FABRICATIONS for steel framing and support for ceiling hung compartments.

B. See Division 10 Section TOILET ACCESSORIES for partition mounted accessories.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for components and finish.
   2. Include photographic catalog cuts for manufacturer's standard components, including hardware, anchors and fasteners.

B. Shop Drawings: Submit plans, elevations and details of compartments, showing layout, dimensions and anchoring details to adjacent construction.

C. Samples: Submit 4 inch (100 mm) square samples of solid polymer in selected colors.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit cleaning and maintenance data for materials provided.
   2. Include copy of submittal in Project information manual.

B. Warranty: Submit signed and dated warranty.

1.5 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate compartment Work with Work of other trades and provide items to be placed during installation of other Work at proper time so as to avoid delays in overall Work.
   2. Place such items, including inserts and anchors, accurately in relation to final locations of compartment components.

3. Use Contractor's bench marks.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

B. Regulatory Requirements:
1. Conform to applicable requirements of authorities having jurisdiction over Project.
2. Except as may be modified by governing authorities, comply with applicable requirements and provisions of the following:
a. ANSI A117.1 "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People".
b. Americans with Disabilities Act.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent damage to materials.

1.8 PROJECT CONDITIONS

A. Field Dimensions:
1. Field verify dimensions of supporting structure and other adjoining elements before fabrication.
2. Provide for erection tolerances corresponding with specified tolerances for other Work where field measurements cannot be obtained.
3. Remedy unsatisfactory tolerances in adjoining Work.

1.9 WARRANTY

A. Furnish signed warranty guaranteeing toilet compartments and urinal screens against rust, breakage and delamination, and guaranteeing hinges against breakage, for not less than 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
1. Listed products establish standard of quality and are manufactured by Scranton Products.
2. Equivalent products by the following are acceptable provided they comply with requirements of Contract Documents:
a. Bradley Corp.
b. Hadrian Manufacturing Inc.

2.2 MATERIALS

A. Panels:
   1. Solid, polypropylene formed under pressure and heat into solid homogeneous sheets; non-laminated, non-absorbent.
   2. Color: As selected by Architect from manufacturer's full standard color range.
   3. Acceptable products and manufacturers: Equivalent to Floor-Mounted Overhead Braced Compartments by Scranton Products.

2.3 ACCESSORIES

A. Hardware:
   1. Provide manufacturer's standard heavy-duty fastenings and fittings.
   2. Door hardware:
      a. Continuous self-closing stainless steel hinges. For out-swing doors, provide hinges with integral stop to limit door swing, so that bumper on outside of door is not necessary.
      b. Latch and keeper:
         1) Recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide strike with mortise into pilaster of a depth able to accommodate full throw of latch bolt.
         2) Provide units that comply with accessibility requirements of authorities having jurisdiction.
      c. Combination coat hook/bumper.
      d. Door pulls. Provide pull on both faces of door for wheelchair-accessible compartments.
   3. Material and finish: Bright chrome-plated, nonferrous, cast zinc alloy (zamac)..

B. Brackets and Fittings:
   1. General: Provide as required for complete and rigid installations compatible with substrate conditions.
   2. Brackets:
      a. Full-height (continuous) type: Manufacturer's standard design; stainless steel.
      b. Continuous plastic brackets are not acceptable.
   3. Shoes:
      a. Stainless steel, ASTM A666, Type 304, not less than 0.0312 inch (0.8 mm) thick and 3 inches (75 mm high), finished to match hardware., mechanically fastened to pilasters.
      b. Plastic shoes are not acceptable.
   4. Headrails: Continuous extruded aluminum, with anti-grip profile.
   5. Provide continuous extruded aluminum channel on bottom of panels.
   6. Support posts for urinal screens: Manufacturer's standard aluminum post with floor shoe for anchoring to floor construction.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match hardware, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use hot-dip galvanized or other rust-resistant, protective-coated steel.

2.4 FABRICATION

A. Shop fabricate units in accordance with field dimensions indicated on final Shop Drawings.

B. Provide sizes indicated, adjusted to actual field measurements.

C. Fabricate with flat, smooth surfaces, free of waves, warping, buckles, rough areas and voids.

D. Provide concealed internal metal reinforcement for attachment of brackets, hardware, grab bars, accessories and anchoring devices. Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

E. Provide cut-outs for Work indicated or required.

F. Minimum Thickness: 1 inch (25 mm), for panels, doors and pilasters.

G. Floor-Anchored Overhead-Braced Units:
   1. Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, fasteners, and anchors at pilasters to suit floor conditions.
   2. Make provisions for setting and securing continuous head rail at top of each pilaster.
   3. Provide shoes at pilasters to conceal supports and leveling mechanism.

H. Door Widths: As indicated.

I. Urinal-Screen Construction:
   1. Matching panels.

J. Complete fabrication at factory, including drilling, tapping and assembly, to extent possible within delivery limitations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 ERECTION

A. Installation:
   1. Install in accordance with final Shop Drawings and manufacturer's instructions.
   2. Avoid scratching or damage to finishes.
   3. Do not install units which are warped, bowed, deformed or otherwise damaged.
   4. Install compartments rigid, straight, plumb and level.
   5. Set units with not more than 1/2 inch (13 mm) between pilasters and panels, and not more than 1 inch (25 mm) clearances between panels and walls.
   6. Floor-anchored overhead-braced units:
      a. Secure pilasters to floor and level, plumb, and tighten.
      b. Secure continuous head rail to each pilaster with not less than two fasteners.

c. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

7. Install wall-hung urinal screens on continuous wall brackets attached to panel with through-bolts. Provide devices for wall anchorage appropriate for supporting substrate construction.

B. Hardware Adjustment:

1. Adjust and lubricate hardware for proper operation after installation.
2. Set hinges on in-swing doors to hold doors open approximately 30° from closed position when unlatched.
3. Set hinges on out-swing doors to return to fully closed position.

3.3 CLEANING AND ADJUSTMENTS

A. Perform final adjustments to leveling devices, door hardware and other operating parts.

B. Clean exposed surfaces and touch up minor finish imperfections using materials and methods recommended by compartment manufacturer.

C. Replace damaged units which cannot be satisfactorily field repaired, as directed by Architect.

3.4 PROTECTION

A. Protect compartments during construction so that they will be without evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 10 2213

WIRE MESH PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Woven diamond mesh partitions.
   2. Gates and hardware.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section DOOR HARDWARE for cylinders for locks for gates.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Shop Drawings:
   1. Submit Shop Drawings for fabrication and erection of mesh partitions.
   2. Include plans, elevations and large scale details.
   3. Indicate anchorage and accessory items.
   4. Provide location template drawings for items supported by, or anchored to, permanent construction.

C. Samples: Submit manufacturer's full standard color range samples for selection by Architect.

1.4 SYSTEM REQUIREMENTS

A. Interface with Other Systems:
   1. Coordinate with Work of other trades affected by Work of this Section.
   2. Provide items, such as anchors or supports, in a timely manner so as not to delay job progress.
   3. Coordinate with electrical, plumbing and other fixtures or materials mounted within or adjacent to assemblies, or requiring access.
   4. Provide cut-outs as required using manufacturer's templates and field measurements to verify actual installed locations and dimensions.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

1.6 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent any damage to materials.

1.8 PROJECT CONDITIONS

A. Field verify dimensions of supporting structure and other adjoining elements before fabrication.

B. Provide for erection tolerances corresponding with specified tolerances for other Work where field measurements cannot be obtained.

C. Remedy unsatisfactory tolerances in adjoining Work.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Acorn Wire and Iron Works, Inc.
   2. Equivalent products by following are acceptable:
      a. Miller Wire Works, Inc.
      b. Standard Wire & Steel Works.

2.2 COMPONENTS

A. General: Provide materials as specified, unless otherwise indicated on Drawings or required for proper installation of indicated configurations.

B. Fabric: Minimum 0.135 inch (3.5 mm) diameter steel wire, 1-1/2 inch (38 mm) diamond mesh, securely clinched to frame members.

C. Frames:
   1. Joints: Mortised and tenoned joints.
   2. Vertical members: 1-1/4 inch (32 mm) x 5/8 inch (16 mm) cold rolled steel C-section channels.
   3. Horizontal members: 1 inch (25 mm) x 1/2 inch (13 mm) cold rolled steel C-section channels.
   4. Center reinforcing bar: 1 inch (25 mm) x 1/2 inch (13 mm) cold rolled steel channel.
   5. Top capping bar: 2-1/4 inch (58 mm) x 1 inch (25 mm) cold rolled steel channel with 1/4 inch (6 mm) "U" bolts at 2'-4" (710 mm) on center.

6. Corner posts:
   a. 1-1/4 inch (32 mm) x 1-1/4 inch (32 mm) angles with 1/4 inch (6 mm) bolt holes to align with bolt holes in vertical frame members, with floor plate.
   b. At corners other than 90° provide manufacturer's tubular posts.
7. Floor sockets: 2-1/2 inches (64 mm) high with set screw adjustment.

D. Sliding Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3.2-mm) steel channels, banded with 1-1/2-by-1/8-inch (38-by-3.2-mm) flat steel bar cover plates on four sides.
   1. Hardware: Two, four-wheel roller-bearing carriers, box track, and bottom guide channel for each door.
   2. Cylinder Lock: Mortise type with manufacturer's standard cylinder; operated by key outside and recessed turn knob inside.

E. Finish:
   1. Provide manufacturer's standard shop applied enamel finish.
   2. Color: To be selected by Architect from manufacturer's full standard color range.

F. Acceptable Product and Manufacturer: Equivalent to No. 130A by Acorn.

2.3 ACCESSORIES

A. Provide bolts, hardware and accessories for complete installation.

B. Provide field bracing as necessary to install partitions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install in accordance with final Shop Drawings and manufacturer's instructions.

B. Install plumb, rigid, properly aligned and securely fastened to supporting substrates.

3.3 ADJUSTING AND REPAIR

A. Adjust moving components for smooth operation without binding.

B. Touch-up damaged finish after installation using field-applied paint to match color of shop-applied finish.

END OF SECTION

SECTION 10 2226

OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Manually-operated, acoustical panel partition system.
   2. Accordion folding partition system.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section 05 METAL FABRICATIONS for overhead support framing.

B. See Division 09 Section GYPSUM BOARD for sound barrier construction above ceilings at track.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit material descriptions, construction details, finishes, installation details, and operating instructions for each type of folding panel partition, component, and accessory specified.
   2. Include data on acoustical performance, surface-burning characteristics, and durability.

B. Shop Drawings:
   1. Submit plans, elevations and details of units, showing layout, dimensions and anchoring details to adjacent construction.
   2. Indicate dimensions; weights; conditions at openings and for storage; and required installation, storage, and operating clearances.
   3. Include reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
      a. Suspended ceiling components.
      b. Structural members to which suspension systems will be attached.
      c. Items penetrating finished ceiling, including the following:
         1) Lighting fixtures.
         2) HVAC ductwork, outlets, and inlets.
         3) Speakers.
         4) Sprinklers.
         5) Smoke detectors.
         6) Access panels.
      d. Plenum acoustical barriers.
   4. Include setting drawings for embedded items and cutouts required in other work, including support-beam, mounting-hole templates.
   5. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

C. Samples:
   1. Submit set of manufacturer's full range of vinyl fabric color and pattern samples for selection by Architect.
   2. Following selections, submit 24 inch (600 mm) square samples for each type of vinyl fabric selected.

1.4 INFORMATIONAL SUBMITTALS

A. Test Reports:
   1. Submit certified test reports performed by recognized independent testing laboratory showing that assembly has been previously tested and meets or exceeds specified STC rating.
   2. Submit certified test reports performed by a recognized independent testing laboratory showing that panel components have been previously tested and meet or exceed specified flammability performance requirements.

B. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:
   1. Submit manufacturer's written operation and maintenance data, including cleaning instructions for panel face finishes and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
   2. Seals, hardware, track, carriers, and other operating components.

B. Warranty: Submit signed and dated warranty.

1.6 SYSTEM REQUIREMENTS

A. Design Requirements:
   1. Drawings indicate design concept, size, shape and location of various components. Conform to design, specified performance requirements and material selections.
   2. Contractor shall be responsible for design and engineering for system for proper support and operation for conditions of installation and intended use.

B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
   1. Sound transmission requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than the STC indicated.

C. Surface-Burning Characteristics: Provide panel components, including skins and finishes, with flame spread rating of not more than 25 and smoke developed of 50 or less, as determined by independent testing laboratory acceptable to authorities having jurisdiction, in accordance with ASTM E84.

D. Interface With Other Systems:

1. Coordinate partition Work with Work of other trades and provide items to be placed during installation of other Work at proper time so as to avoid delays in overall Work.
2. Place such items, including inserts and anchors, accurately in relation to final locations of operable partition components.
3. Use Contractor's bench marks.

1.7 QUALITY ASSURANCE

A. Installer Qualifications:
1. Minimum 5 years documented, successful experience with work comparable to Work of this Project.
2. An employer of workers trained and approved by manufacturer

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver units in manufacturer's unopened protective wrappings, fully identified with manufacturer's name, model numbers and colors.

B. Store in dry, protected area.

1.10 PROJECT CONDITIONS

A. Field verify dimensions of supporting structure and other adjoining elements before fabrication.

1.11 WARRANTY

A. Submit written warranty signed by operable partition manufacturer, agreeing to repair or replace track and panel components of folding panel assemblies that fail, or have their performance materially reduced, due to defects in materials or workmanship within warranty period.
1. Failures include, but are not limited to, the following:
a. Failure of operating components to function normally.
b. Failure of systems to meet performance requirements.
2. Warranty period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Products and Manufacturers:
1. Design is based on products listed below manufactured by Panelfold Inc., to establish standard of quality.
2. Equivalent products by following manufacturers may be acceptable provided they comply with requirements of Contract Documents.
a. Advanced Equipment Corp.
b. Hufcor.

c. Industrial Acoustics Co.
d. Modernfold.

2.2 MATERIALS

A. Steel Frame: Steel sheet, not less than 0.0598 inch (1.5 mm) nominal specified thickness for uncoated steel.

B. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B221 for extrusions; manufacturer's standard strengths and thicknesses for type of use.

C. Steel Face/Liner Sheets: Tension-leveled steel sheet, not less than 0.0359 inch nominal specified thickness for uncoated steel. Provide greater thickness as required to comply with specified acoustical performance.

2.3 OPERABLE PARTITIONS

A. General: Operable acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, storage pocket doors, and accessories.
1. Panel operation: Manually operated, paired panels.
2. Configurations: As indicated on Drawings.
3. Acoustic rating: 52 STC.
4. Dimensions:
   a. Panel thickness: 4-1/4 inches (108 mm).
   b. Panel width: Standard widths.
   c. Hanging weight: 12 lbs/sq ft.
   d. 9’ tall x 35’ long.
5. Acceptable product and manufacturer: Equivalent to Moduflex Series 620 by Panelfold, Inc.

B. Panel Construction:
1. Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment.
2. Panels: Panel faces laminated to metal frames, with internal insulation to achieve STC.
3. Panel trim: No vertical trim on panel edges; minimal groove appearance at panel joints
4. Fabricate panels with tight hairline joints and concealed fasteners.
5. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

C. Panel Closure: Manufacturer's standard.
1. Initial Closure: Fixed jamb.
2. Final closure: Fixed jamb.

D. Panel Finish:
1. Woven Fabric: Manufacturer's standard 100 percent polyolefin woven fabric, from same dye lot, treated to resist stains.
   a. Color: as selected by Architect from manufacturer’s full range.
   b. Class A fire hazard classification when tested in accordance with ASTM E-84.
   c. Acceptable product and manufacturer: Equivalent to Woventex wall covering.

E. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
   1. Hinges: Full leaf butt hinges, attached directly to panel frame, and projecting not more than 1/4 inch (6 mm) from panel face; not less than 4 hinges per panel.

F. Seals:
   1. General:
      a. Provide types of seals indicated that produce operable panel partitions complying with acoustical performance requirements and the following:
      b. Manufacturer's standard seals.
      c. Seals made from materials and in profiles that minimize sound leakage.
      d. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
   2. Vertical seals: Deep-nesting, interlocking astragals mounted on each edge of panel, with continuous PVC acoustical seal.
   3. Horizontal top seals: Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track.
   4. Horizontal bottom seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
      a. Seals shall not contact floor during movement of panels.
      b. Automatically actuated.

G. Suspension System:
   1. Suspension tracks: Aluminum, with adjustable steel hanger rods for overhead support, designed for type of operation, size, and weight of operable panel partition indicated.
      a. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction.
      b. Limit track deflection to no more than 0.10 inch (2.5 mm) between bracket supports.
      c. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
   2. Track soffit: Continuous aluminum.
   3. Trolleys (carriers):
      a. Provide trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
      b. Multidirectional carriers: Capable of negotiating 90 deg L, T, and X intersections without track switches.
   4. Track intersections and accessories:
      a. As required for type of operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified.
      b. Fabricate track intersections from steel or aluminum.
   5. Aluminum finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
   6. Steel finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.4 ACCORDION FOLDING PARTITION

A. General:

1. Accordion folding frame with pantograph sections designed for horizontal extension and retraction, covered with decorative facing material, reinforced for hardware attachment, supported by overhead suspension system, and equipped with manufacturer's standard air-release method to prevent billowing.
2. STC Rating: 44.
3. Dimensions:
    a. Stack Width (Stored): Maximum 18-1/2 inches (470 mm).
    b. Width When Extended: Class A fire hazard classification when tested in accordance with ASTM E-84.
    c. Maximum 7 inches (178 mm).
    d. 8’6” tall x 10’ long.
    e. Hanging weight: 7.3 lbs/sq ft.
4. Acceptable product and manufacturer: Equivalent to Sonicwall 88 by Panelfold, Inc.

B. Panel Finishes:
1. Woven Fabric: Manufacturer's standard 100 percent polyolefin woven fabric, from same dye lot, treated to resist stains.
    a. Color: as selected by Architect from manufacturer’s full range.
    b. Class A fire hazard classification when tested in accordance with ASTM E-84.
    c. Acceptable product and manufacturer: Equivalent to Woventex wall covering.
2. Paint: Manufacturer's standard baked enamel.

C. Partition Type: Single fixed jamb partition with the following hardware:
1. Lead Post Latching Hardware: Latch on both sides secured to surface jamb striker.
2. Storage-End Hardware: Sliding jamb within storage pocket.
3. Pendant Pull: Near top of lead post in addition to standard pull handle/latch for units more than 10 feet (3 m) high or 20 feet (6 m) wide, or both.
4. Foot Bolt: On lead post(s) where indicated; secured to post without interference with seals.

D. Components:
1. Posts and Seals: Provide types of posts and seals that produce accordion folding partitions complying with performance requirements.
2. Posts: Steel or aluminum; formed with deep-nesting and interlocking interfaces and fabricated to ensure rigidity of accordion folding partition.
3. Hardware: Manufacturer's standard manually operated pulls, latches, locks, and bolts as required to operate accordion folding partitions; with decorative, protective finish.
4. Trim: Manufacturer's standard with decorative, protective finish.
5. Tiebacks: As required to maintain accordion folding partitions in stacked position; with manufacturer's standard finish.

E. Suspension System:
1. Suspension Tracks:
    a. Steel or aluminum mounted directly to overhead structural support, designed for type of operation, size, and weight of accordion folding partition indicated.
    b. Size track to support partition operation and storage without damage to suspension system, accordion folding partitions, or adjacent construction.
    c. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports.
    d. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

2. Track: Surface mounted.
3. Head Closure Trim: Integral with track for protecting overhead surfaces; with factory-applied, decorative, protective finish.
4. Carriers:
   a. Trolley system as required for size and weight of partition and for easy, quiet operation; with manufacturer's standard ball-bearing carriers at lead post and manufacturer's standard ball-bearing carriers at intermediate panel supports.
   b. Wheels: Manufacturer's standard.
5. Track Switches and Accessories: Manufacturer's standard switches as required for type of operation, storage, track configuration, and layout indicated.
6. Finishes:
   a. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
   b. Steel Finish: Factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.5 FACING MATERIALS:

A. General: Provide facing materials with appropriate backing that comply with indicated fire-test-response characteristics, and that are factory attached to accordion folding partitions with concealed fasteners.
   1. Factory-apply facing material free of air bubbles, wrinkles, blisters, and other defects; and with no gaps or overlaps. Tightly secure and conceal raw and selvage edges of facing material for finished appearance. Horizontal butted edges or seams are not permitted.
   2. Where facing material with directional or repeating pattern, directional weave, or matching grain is indicated, mark facing-material top and attach facing material in same direction.

2.6 ACCESSORIES

A. Accessories: Provide fasteners, anchors and other accessories as required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed.

C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 ADJUSTING

A. Adjust operable panel partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 FIELD QUALITY CONTROL

A. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids; adjust partitions for acceptable fit.

B. Testing:
   1. Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E336, determined by ASTM E413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
   2. Extent: All operable panel partition installations.

C. Repair or replace operable panel partitions that do not comply with requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of repaired, replaced, or additional work with specified requirements.

E. Prepare test and inspection reports.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.
   1. Test and adjust seals, hardware, carriers, tracks, pass doors, and other operable components. Replace damaged or malfunctioning operable components.
   2. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
   3. Review data in maintenance manuals.

3.6 CLEANING AND PROTECTION

A. Clean soiled surfaces and paint finishes on completing installation of folding panel partitions, to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure folding panel partitions are without damage or deterioration at time of Substantial Completion.

C. Replace panels that cannot be cleaned and repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION

SECTION 10 2600

WALL AND COLUMN PROTECTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Column shields.
   2. Corner guards.
   3. Accessories.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 05 Section METAL FABRICATIONS for carbon steel corner and pipe guards.

1.3 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component.

B. Shop Drawings: Submit detailed Shop Drawings showing mounting locations and anchoring systems and conditions at adjacent construction.

C. Samples: Submit 12 inch (300 mm) long samples for each type and finish.

1.4 SYSTEM REQUIREMENTS

A. Interface with Other Systems:
   1. Coordinate with Work of other trades affected by Work of this Section.
   2. Provide items, such as anchors or supports, in a timely manner so as not to delay job progress.
   3. Coordinate with materials mounted within, or adjacent to, assemblies requiring access.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping crates or packaging.

C. Support as required to prevent any damage to materials.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Omega Industrial Products.
   2. Equivalent products by other manufacturers may be acceptable provided they comply with requirements of Contract Documents.

2.2 PRODUCTS

A. Column Shields (Type CS):
   1. Description: Column shield composed of 2 steel wings anchored to base plate.
   2. Material: Hot rolled steel meeting the requirements of STM A36.
   3. Dimensions:
      a. Wings: 42 inches high, 3/16 inch thick (7 gage).
      b. Base plate: ½ inch thick.
   4. Finish: Manufacturer’s standard.
   5. Hardware: Provide manufacturer’s standard hardware.
   6. Acceptable product and manufacturer: Equivalent to 12”-14” or 8”-10” Column Guard by Omega Industrial Products.

B. Corner Guards (Type CG):
   1. Description: Corner shield anchored to base plate.
   2. Material: Hot rolled steel meeting the requirements of STM A36.
   3. Dimensions:
      a. Shield: 42 [30] inches high, 3/16 inch thick (7 gage).
      b. Base plate: ½ inch thick.
   4. Finish: Manufacturer’s standard.
   5. Hardware: Provide manufacturer’s standard hardware.
   6. Acceptable product and manufacturer: Equivalent to Corner Shield by Omega Industrial Products.

2.3 ACCESSORIES

A. Provide anchors, inserts and other miscellaneous accessories as required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting structure and conditions under which Work will be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install in accordance with final Shop Drawings and manufacturer's instructions.

B. Install plumb, level and true to line; rigidly attached to substrates.

3.3 PROTECTION

A. Protect guards during construction so that they will be without any evidence of damage at time of acceptance.

END OF SECTION

SECTION 10 2813

TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Toilet accessories.
   2. Framed mirrors.
   3. Accessories.

B. Products Furnished But Not Installed: Furnish inserts and anchors which must be set in concrete or built into masonry; coordinate delivery with other Work to avoid delay.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 08 Section GLAZING for unframed mirrors.

B. See Division 10 Section TOILET COMPARTMENTS for compartment construction.

C. See DIVISION 26 for electrical connection requirements for hand dryers.

1.3 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each component and finish.
   2. Include photographic catalog cuts for manufacturer's standard components, including hardware, anchors and fasteners.

1.4 CLOSEOUT SUBMITTALS

A. Warranty: Submit signed and dated warranty.

1.5 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate toilet accessory Work with Work of other trades and provide items to be placed during installation of other Work at proper time so as to avoid delays in overall Work.
   2. Place such items, including inserts and anchors, accurately in relation to final locations of cabinet components.
   3. Use Contractor's bench marks.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility: Obtain accessory items from one manufacturer except where otherwise indicated.

B. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

C. Regulatory Requirements:
   1. Conform to applicable requirements of authorities having jurisdiction over Project.
   2. Except as may be modified by governing authorities, comply with applicable requirements and provisions of the following:
      a. ANSI A117.1 "Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People".
      b. Americans with Disabilities Act.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping crates or packaging.

C. Protect factory applied protective face coverings from damage.

D. Support as required to prevent any damage to materials.

1.8 WARRANTY

A. Provide written 15 year warranty for replacement of mirror units which develop visible silver spoilage defects within warranty period.

B. Provide manufacturer's written warranty for hand dryers, warranting to repair or replace defective parts or workmanship as follows:
   1. Motor brushes: 3 years from Substantial Completion.
   2. All other parts: 10 years from Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Bobrick Washroom Equipment, Inc.
   2. Equivalent products by following are acceptable:
      a. Bradley Corp.

2.2 MATERIALS

A. Stainless Steel:
   1. Type 304, manufacturer's standard thickness, unless otherwise indicated.
   2. Finish: No. 4 bright directional polish, unless otherwise noted.

B. Mirror Glass:
   1. ASTM C1503, Mirror Select Quality; with silvering, electro-plated copper coating, and protective organic coating.
   2. Minimum thickness: 1/4 inch (6 mm).

2.3 TOILET AND BATH ACCESSORY SCHEDULE

A. General: Accessory types scheduled below correspond to types indicated on Drawings.

B. Framed Mirror without Shelf (MR1): Provide framed mirror without shelf complying with the following:
   1. Products: Bobrick B-165-1836, or equal.
   2. Glass: 1/4-inch float/plate glass, No. 1 quality.
   3. Stainless-Steel, Channel-Framed Mirror: Fabricate frame from stainless-steel channels in manufacturer's standard satin finish with square corners mitered to hairline joints and mechanically interlocked. Provide concealed wall mounting bracket for theft-proof installation.

C. Liquid Soap Dispenser (SD): Provide liquid soap dispenser complying with the following:
   1. Products: Impact ClearVu Encore Soap Dispenser 9347.
   2. Surface-mounted type, minimum 46-oz. capacity see-through tank. Push bar dispensing operation. Removable backplate and hidden security key lock to discourage vandalism.
      a. Soap Valve: Designed for dispensing soap in liquid form.

D. Toilet Tissue Dispenser (TTD): Provide toilet tissue dispenser complying with the following:
   1. Products: Bobrick B-2888, or equal.
   2. Type: Multi-roll dispenser.
   3. Mounting: Surface mounted with concealed anchorage.
   4. Material: Satin-finish aluminum bracket with plastic spindle.
   5. Operation: Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty.
   6. Capacity: Designed for tissue rolls up to 6-inch-diameter.

E. Clothes Hooks (CH): Provide clothes hooks and bumper complying with the following:
   1. Products: Bobrick B-677 Towel Pin, or equal.
   2. Material: Type 304 stainless steel.

F. Paper Towel Dispenser (PTD): Provide stainless-steel paper towel dispenser complying with the following:
   1. Products: Bobrick B-2620, or equal.
   2. Surface-Mounted Type: Sized for minimum of 400 C-fold or 525 multifold paper towels without using special adapters; with hinged front equipped with tumbler lockset; and with refill indicators that are pierced slots at sides or front.

G. Waste Receptacle (WR): Provide stainless-steel waste receptacle complying with the following:
   1. Products: Rubbermaid 9079, or equal.
   2. Floor-standing Type: Round with open removable top; fire-safe construction; UL certified; 35-gal. capacity.
      a. Accessory: Round container; injection molded linear low-density polyethelyene (LLDPE).
         1) Product: Rubbermaid 3546.
         2) Capacity: 22 gallons.
         3) Color: Gray.

H. Grab Bar (GB): Provide stainless-steel grab bars complying with the following:
   1. Products: Bobrick B-6806, or equal. Comply with ADA.
   2. Material: Bar 18-gauge wall Type 304 stainless steel.
   3. Mounting: Exposed with manufacturer's standard flanges and anchors.
   4. Gripping Surfaces: Smooth, satin finish, except peened finish at accessible showers.
   5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
   6. At water closets for the handicapped, provide the following unless otherwise shown:
      a. Back wall: 36-inch minimum length grab bar behind the water closet.
      b. Side wall: 42-inch minimum length grab bar to the side of the water closet.
   7. At accessible showers provide 24-inch long horizontal grab bar and 48-inch long horizontal grab bars as shown.

I. Vertical Grab Bar (VGB): Provide stainless-steel grab bars complying with the following:
   1. Products: Bobrick B-6806.
   2. Material: Bar 18-gauge wall Type 304 stainless steel.
   3. Mounting: Exposed with manufacturer's standard flanges and anchors.
   4. Gripping Surfaces: Smooth, satin finish, unless otherwise noted.
   5. Outside Diameter: 1-1/2 inches for heavy-duty applications.
   6. At water closets for the handicapped, provide the following unless otherwise shown:
      a. Side wall: 18-inch minimum length grab bar to the side of the water closet.

J. Towel Bar (TB): Provide stainless steel towel bar complying with the following:
   1. Products: Bobrick B-674.
   2. Bright polished stainless steel, 3/4 inch round bar, 24 inch length, concealed mounting.

K. Soap Holder (SH): Provide stainless steel soap holder complying with the following:
   1. Products: Bobrick B-680 or equal.
   2. Bright polished stainless steel, surface mounted with concealed mounting, dish has two ridges and two drain holes.

L. Shower Curtain Rod (SC): Provide stainless steel curtain rod complying with the following:
   1. Products: Bobrick B-6047 or equal.
   2. Extra heavy duty stainless steel rod, 1-1/4 inch diameter with concealed mounting.

M. Mop and Broom Holder (MBH): Provide stainless steel mop and broom holder complying with the following:
   1. Products: Bobrick B-224X36 or equal.
   2. 18 gauge stainless steel shelf, 8 inches deep.
   3. 4 spring loaded rubber cam mop holders.
   4. 3 rag hooks.

5. Stainless steel rod for wet rags.

N. Shower Receptor (SR-1): Provide shower receptors complying with the following:
1. Products: Aquasurf Solid Surface Shower Receptors by Willoughby Industries.
2. 36-inch by 36-inch.
3. Solid surface shower floor pan with integrally molded support bracing, positive sloped non-slip textured floor, and integral perimeter flange.
4. 3-1/2 inch standard drain opening.
5. Plain curbs.
6. Color: As selected by Architect from manufacturer's full range.

O. Shower Receptor (SR-2): Provide shower receptors complying with the following:
1. Products: Aquasurf ADA Accessible Solid Surface Shower Receptors by Willoughby Industries.
2. 36-inch by 60-inch.
3. Solid surface shower floor pan with front-forward drain with integrally sloped trench and integral front transition strip.
4. 3-1/2 inch standard drain opening.
5. Color: As selected by Architect from manufacturer's full range.

P. Hand Dryer: Provide hand dryers complying with the following:
1. Products:
   a. Xlerator Model XL-W; 277, by Excel Dryer.
   b. Xlerator Recess Kit #40502.
2. Recess mounted where shown and as required for ADA compliance.
3. Automatic operation.
4. Stainless steel type 304, #4 satin finish.

Q. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies, that prevent direct contact with and burns from piping, and allow service access without removing coverings.
2. Material and finish: Antimicrobial, molded-plastic, white.
3. Products: Handy-Shield by Plumberex Specialty Products, Inc.

2.4 ACCESSORIES

A. Inserts, Anchors and Fasteners:
1. Provide concealed fastenings wherever possible. Where exposed fastenings are required, match finish of fastenings to finish of accessories fastened thereby.
2. Provide fasteners recommended by accessory manufacturer, appropriate for proper attachment to supporting substrates.
3. Provide theft-resistant fasteners for exposed mountings.

B. Keys: Furnish minimum of 6 universal keys to Owner, for access to toilet accessory units requiring internal access for servicing or resupply.

2.5 FABRICATION

A. Fabricate units with tight seams and joints, and exposed edges rolled.

B. Exposed welds will not be accepted. Exposed weld spots will not be accepted.

C. Hang doors and access panels with full-length, continuous hinges.

D. Equip units for concealed anchorage and with corrosion-resistant backing plates.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install only after completion of contiguous Work.

C. Set Work accurately, measured from established building lines and levels, plumb and in true alignment with previously completed Work.

D. Anchor securely to supporting construction, using concealed fasteners wherever possible.

3.3 CLEANING, ADJUSTMENT AND REPAIR

A. Adjust components to operate properly and verify that mechanisms function properly and smoothly.

B. Remove protective coverings only when danger of damage from other Work is passed.

C. Clean and polish exposed surfaces prior to final acceptance.

D. Repair and/or replace damaged units.

3.4 PROTECTION

A. Protect Work during construction so that it will be without any evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 10 3000

AUTOMATIC SPILL BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Automatically closing doorway spill barriers.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.3 QUALITY ASSURANCE

A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years' experience supplying specified equipment.

B. Each product shall be provided by a single manufacturer.

C. All components shall be factory tested and documented to operate as a complete system

D. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

1.4 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location.
2. Indicate locations, dimensions, and profiles of wall and floor reinforcements.
3. Indicate locations and installation details of built-in anchors.

C. Field test reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

D. Sample Warranty- warranty information for each piece of equipment and contractors general warranty.

E. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.
b. Provide approved submittal as part of operations and maintenance clearly identifying manufacturer and provided model number.
c. Manufacturer's printed operating instructions.
d. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
e. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stock quantity and local parts and service source.
f. Include vendor contact information for service and warranty
g. Include all testing reports

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Drawn to scale, and coordinated with door openings.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Seals: One set for each size unit.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data:

1. Submit operation, cleaning and maintenance data for materials and systems provided.

2. Include list of replacement parts and sources.

3. Include copy of submittal in Project information manual.

B. Warranty.

1.8 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

PART 2 – PRODUCTS

2.1 AUTOMATIC CLOSING DOORWAY SPILL BARRIERS

A. Doors M118-1 and M118-2:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Model R11-1212; Denios Inc.

a. Sealed width: 76 inches.
b. Overall plan dimensions: 104 inches wide by 22 inches wide.
c. Barrier height; 12 inches of liquid retention behind the closed barrier.
d. Construction: AISI 304 stainless steel.
e. Finish: natural, mat finish stainless steel, glass beaded blasted to provide uniform scratch free surface.
f. Seals: PTFE encapsulated seals, temperature resistant and inert to most chemicals.
g. Sump Depth: 6 inches.
h. Load capacity: 3.25 tons per wheel, for a total 6.5 tons.

i. Safety procedures:

1) Cover Plate provided with anti-skid diamond plate.
2) Vertical piers on either side of opening provided with yellow and black diagonal visual warning stripes.

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment securely per manufacturers written instructions, to prevent damage resulting from inadequate fastening.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

3.4 CLEANUP

A. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

B. Clean area around equipment installation and remove packing or installation debris from job site.

3.5 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment.

END OF SECTION

SECTION 104210

INTERIOR AND EXTERIOR SIGNS

PART 1 - GENERAL

1.1. SUMMARY

A. Related Documents: Provisions established within the General and Supplementary Conditions of the Contract, Division 1 General Requirements, and the Drawings are collectively applicable to this Section.

1. See Drawings for sign plans, elevations and schedules

B. Section Includes:

1. Illuminated reverse channel letters.
2. Non-illuminated monolith
3. Bus slip overheads
4. No smoking panel
5. Bay ID
6. DOT parking signs
7. Room ID, Restroom, Stair, Fire Evacuations, Informational signs, Level ID
8. Vinyl letters
9. Dimensional letters and reception sign
10. Fire Extinguisher

1.2. QUALITY ASSURANCE

A. Supplier: Obtain all products in this section from a single supplier.

B. Installer: Installation shall be performed by installer specialized and experienced in work similar to that required for this project.

C. UL Listed: All electrical work on the sign to be UL Listed.

D. All signs to be ADA compliant and meet all local and municipal codes.

1.3. SUBMITTALS

A. Submit in accordance with requirements of Division 1.

B. Product Data: Submit product data for specified products. Include material details for each sign specified.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.

D. Samples: Submit supplier's standard color chart for selection purposes and selected colors for verification purposes.

E. Installation: Submit supplier's installation instructions.

F. Closeout Submittals:

1. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.
2. Submit warranty documents specified herein.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 1.

1. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.
2. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
3. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.
4. Handle products in accordance with manufacturer's instructions.

A. WARRANTY

A. Project Warranty: Comply with requirements of Division 1.

B. Manufacturer's Warranty: Submit manufacturer's standard warranty document executed by authorized company official.

1. Warranty Period: One year from product ship date. Warranty specifically excludes letter-mounting substrate.
2. Limited Warranty on White LEDs, 4 years (must be exercised through manufacturer)
3. Limited Warranty on Power Supplies, 5 years (must be exercised through manufacturer)

PART 2 - PRODUCTS

2.1. SIGNAGE SYSTEMS

A. Acceptable Manufacturers:

1. ASI, 2957 Alt Boulevard, Grand Island, NY 14072; (716) 775-0104 telephone; (716)775-3329 facsimile; bethany.bernatovicz@asisignage.com
2. Substitutions: Submit in accordance with Section 01600.

Sign Type 1 – Not Used

Sign Type 2 – Building ID Reverse Illuminated letters and logo

A. Acceptable Product: Illuminated Reverse Channel Fabricated Metal Dimensional Letters

B. Letter Materials:

1. Aluminum with acrylic polyurethane paint finish (or brushed satin aluminum with clear coat): Faces: .090” Returns: .063” Insides of letters painted white for increased reflectivity. ¼” clear polycarbonate backs and standoffs per manufacturers’ standards.

C. Fabricated Letters:

1. Height: 14-1/2” logo & 9” letters
2. Depth: 3”
3. Letter style: See drawing

D. LEDs and Electric:

1. Bright White with wide viewing angles, constant current, UL, cUL recognized, CE, CSA Certified, RoHs and WEEE compliant.
2. 12 Volt DC power supply with Class 2 outputs. Operating temperatures between -40˚ and + 60˚ C. UL, cUL and CSA certified. Number of power supplies to be determined by manufacturer.
3. LED modules to attach to inside letter cabinets (facing out/wall) and wiring per manufacturer’s standards.

E. Mounting Method:

1. Mounted to a raceway painted a similar color to the buildings background. Studs and spacers to raceway as recommended by sign fabricator
2. Individual letter wiring to be pulled through to interior and all wiring between letters and transformers to be made by sign installer(s).
3. Final electrical connections to be done by others.

Sign Type 3 – Building Grounds ID

A. Acceptable Product: ASI 2739D Series, non-illuminated.

B. Aluminum Panel 60" (h) x 36" (w) x 7” deep

C. Panel Construction: .090" aluminum face, bonded to a rigid, extruded aluminum framework, to form a panel thickness of 7-1/8 inches. Panel shall be attached flush to frame with no visible screws, fasteners or retainer lip.

D. Panel Finish: Satin matte polyurethane finish color, with maximum gloss of 15 degrees, in panel color indicated in schedule. Panels shall be smooth, and free of scratches, blemishes or other. See drawing for colors.

E. Graphics:

1. Fabrication: Provide graphics of premium grade ScotchCal vinyl lettering by 3M or as recommended by sign manufacturer
2. Lettering: Provide size, colors, and typestyles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

F. Mounting:

1. Direct embed into concrete with double post inside the sign and 48” below grade.

Sign Type 4 – No smoking sign

A. Acceptable Product: ASI APF Series, 1 sided, non-illuminated, wall mounted aluminum panel construction.

B. Aluminum Panel Size: 16” height x 12” length.

C. Panel Construction: .090" aluminum panel with square corners. Panel Finish: Satin matte polyurethane coating, with maximum gloss of 15 degrees, in panel color indicated in schedule. Panels shall be smooth, and free of scratches, blemishes or other imperfections.

D. Graphics:

1. Fabrication: Provide graphics of premium grade vinyl
2. Lettering: Provide size, colors, and type styles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

E. Mounting:

1. Wall mounted with VHB tape and silicone adhesive.

Sign Type 5 – Door/Bay ID sign

A. Acceptable Product: ASI APF Series, 1 sided, non-illuminated, wall mounted aluminum panel construction.

B. Aluminum Panel Size: 5” height x 5” length.

C. Panel Construction: .090" aluminum panel with square corners. Panel Finish: Satin matte polyurethane coating, with maximum gloss of 15 degrees, in panel color indicated in schedule. Panels shall be smooth, and free of scratches, blemishes or other imperfections.

D. Graphics:

1. Fabrication: Provide graphics of premium grade vinyl
2. Lettering: Provide size, colors, and type styles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

E. Mounting:

1. Wall mounted with VHB tape and silicone adhesive.

Sign Type 7 – DOT sign

A. Acceptable Product: DOT panel and post, 1 sided, non-illuminated, wall mounted aluminum panel construction.

B. Aluminum Panel Size: 18” height x 12” length.

C. Panel Construction: .080" aluminum panel with radius corners. Panel Finish: Standard DOT engineer grade reflective background. Panels shall be smooth, and free of scratches, blemishes or other imperfections.

D. Graphics:

1. Fabrication: Provide graphics of premium grade vinyl or screened images.
2. Lettering: Provide size, colors, and type styles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

E. Mounting:

1. Single u-channel galvanized post 2#. 12’ long post. Direct embedded into concrete 36” below grade. Panel mounted to post with stainless steel hardware.

Sign Type A, B, C – ADA Room ID, Restroom/Stair, Level ID signs

A. Acceptable Product: ASI EBJ Series

B. Panel Size: See Drawing

C. Panel Construction: .125” matte acrylic with subsurface paint.

D. Applied letters: Individual acrylic dimensional letters raised 1/32” from the surface with a matte finish with Rowmark adhesive.

E. Grade 2 Braille: Clear raster balls.

F. Mounting:

1. Wall mounting with VHB tape and silicone.

Sign Type A1 – ADA Room ID with changeable message signs

A. Acceptable Product: ASI EBJ/WS-1 Series

B. Panel Size: 7-5/16” x 8”

C. Panel Construction: .125” matte acrylic faceplate with opening for window with subsurface paint. .125” clear acrylic backer subsurface painted attached to faceplate with filler to create space for paper insert.

D. Applied letters: Individual acrylic dimensional letters raised 1/32” from the surface with a matte finish with Rowmark adhesive.

E. Grade 2 Braille: Clear raster balls.

F. Insert: Paper insert provided by Sign Company.

G. Mounting:

1. Wall mounting with VHB tape and silicone.

Sign Type D – Fire Evacuation with changeable message signs

A. Acceptable Product: ASI WS-1 Series

B. Panel Size: 12” x 11”

C. Panel Construction: .125” matte acrylic faceplate with opening for window with subsurface paint. .125” clear acrylic backer subsurface painted attached to faceplate with filler to create space for paper insert.

D. Applied letters: Subsurface applied letters for the header.

E. Insert: Paper insert provided by Sign Company. Architect to provide file for floor layout and evacuation routes.

F. Mounting:

1. Wall mounting with VHB tape and silicone.

Sign Type E – Not Used

Sign Type F – Informational sign

A. Acceptable Product: ASI SPJ Series

B. Panel Size: See drawing

C. Panel Construction: .125” matte acrylic faceplate with subsurface graphics and subsurface background color.

D. Mounting:

1. Wall mounting with VHB tape and silicone.

Sign Type G & 6 – Vinyl signs

A. Acceptable Product: ASI LTV Series

B. Vinyl Size: See drawings for sizing

1. Provide graphics of premium grade ScotchCal vinyl lettering by 3M or as recommended by sign manufacturer
2. Lettering: Provide size, colors, and typestyles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

C. Mounting:

1. To surface of the glass.

Sign Type H – Dimensional letters

A. Acceptable Product: ASI LPS Series

B. Panel Size: 25” diam. circle logo

C. Letter Construction: ¼” cut aluminum logo and letters

D. Copy: See drawing

E. Color: Horizontal brushed finish

F. Mounting:

1. Flush stud and silicone.

Sign Type K – Fire Extinguisher signs

A. Acceptable Product: ASI 252B-W Series

B. Panel Size: 6” x 6-1/2”

C. Panel Construction: .125” matte acrylic panels for each side with subsurface graphics and subsurface background color. Glued into t-bar extrusion.

D. Mounting:

1. Projected from wall with 252 aluminum t-bar painted same color as background of panel. Mounted to wall with mechanical fasteners (1/8” toggle bolts flathead).

Sign Type L – Directional sign

A. Acceptable Product: ASI PMA Series, changeable insert sign.

B. Aluminum Panel Size: 34-7/8” height x 20” length.

C. Panel Construction: .125” matte acrylic faceplate with subsurface graphics, subsurface background color and square corners. Panels shall be smooth, and free of scratches, blemishes or other imperfections.

D. Graphics:

1. Fabrication: Provide graphics of premium grade vinyl
2. Lettering: Provide size, colors, and type styles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

E. Mounting:

1. .125” acrylic backer mounted to the wall with VHB and silicone adhesive. Insert panels mounted to the backer with VHB tape with 1/16” reveals.

Sign Type R – Reception Desk sign

A. Acceptable Product: ASI acrylic panel and vinyl

B. Aluminum Panel Size: 30” height x 90” length.

C. Panel Construction: .25” thick 30/30 clear acrylic panel with polished edges, subsurface etch look vinyl logo. Panels shall be smooth, and free of scratches, blemishes or other imperfections.

D. Graphics:

1. Fabrication: Provide graphics of premium grade vinyl
2. Lettering: Provide size, colors, and type styles indicated on drawings and sign schedules. Provide computer generated, accurately reproducing letterform, and be executed in a clean, precise manner.

E. Mounting:

1. 5/8” diameter satin aluminum caps and hardware to mount flush to the reception desk.

2.2. FABRICATION - GENERAL

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

B. Allow for thermal movement resulting from a maximum ambient temperature change (range) of 100 deg F (38 deg C). Design, fabricate, and install sign assemblies to prevent buckling, opening up of joints, and over-stressing of welds and fasteners.

C. Mill joints to a tight, hairline fit. Form joints exposed to the weather to exclude water penetration.

D. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.

E. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.

F. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

G. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

H. Increase material thickness or reinforce with concealed stiffeners or backing materials as required to produce surfaces without distortion, buckles, warp, or other surface deformations

I. Create signage to required sizes and layout. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

PART 3 - EXECUTION

3.1. EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.

B. Scheduling of installation by Owner or its representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer’s acceptance of substrate and conditions.

3.2. INSTALLATION

A. Install product in accordance with supplier’s instructions.

B. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.

C. Install product level, plumb, and at heights indicated.

D. UL Approved Installation required.

E. Install signs within the following tolerances and in accordance with manufacturer's recommendations:

1. Interior Signs: Within 1/4 inch vertically and horizontally of intended location.
2. Exterior Signs: Within 1 inch vertically and horizontally of intended location.

3.3. CLEANING, PROTECTION, AND REPAIR

A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 10 feet.

B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1.

3.4. SIGN SCHEDULE

A. Schedule: Refer to signage schedule and Drawings for sizes, locations, and layout of signage types, sign text copy, and graphics.

END OF SECTION

SECTION 10 4400

FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Fire extinguishers.
   2. Accessories.

1.2 QUALITY ASSURANCE

A. Regulatory Requirements: Conform to applicable requirements of authorities having jurisdiction over Project.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent any damage to materials.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Larsen's Manufacturing Co.
   2. J.L. Industries, by Activar.
   3. Potter-Roemer, Inc.

2.2 EXTINGUISHERS

A. Fire Extinguishers:
   1. Typical locations - Type FE1:
      a. Description: Multi-purpose dry chemical, red enameled steel shell with chrome valve, pressure indicating gage and hose.
      b. Mounting: Bracket mounting.
      c. Capacity: 10 pounds (4.54 kg).
      d. UL rating: 3-A:40-B:C.
   2. Pantries - Type FE2:
      a. Description: Wet chemical type; in stainless-steel container; with pressure-indicating gage.
      b. Mounting: Bracket mounting.
      c. Capacity: 6 liter.

d. UL rating: 2-A:1-B:C:K.

3. Electrical rooms - Type FE3:
   a. Description: Carbon dioxide, red enameled aluminum shell with brass valve, O-ring seal and hose.
   b. Mounting: Bracket mounting.
   c. Capacity: 10 pounds (4.54 kg).
   d. UL rating: 10-B:C.

B. Locations:
   1. For bracket mounting, in each of the following locations; provide one extinguisher for each location, except provide two extinguishers where so noted by (2). In addition to locations shown on Drawings, locate in field as directed by Architect.
      a. Switchgear Room.
      b. Each maintenance bay (2).
      c. Each mechanical room.
      d. Each electrical room.

2.3 ACCESSORIES

A. Fire Extinguisher Mounting Brackets:
   1. Provide manufacturer's standard brackets for mounting where extinguishers are indicated without cabinets.
   2. Provide size as required to accommodate extinguisher.

B. Miscellaneous Accessories: Provide anchors and other accessories as required for complete installation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install items in accordance with manufacturer's recommendations and in locations and at mounting heights indicated. If not indicated, locate and mount at heights required to comply with applicable regulations of local governing authorities.

B. Set Work accurately as measured from established building lines and levels, plumb and in true alignment with previously completed Work.

C. Anchor securely in place to supporting construction, using concealed anchorage wherever possible.

D. Cabinet:
   1. Prepare recesses in adjacent construction as required for cabinet trim configuration, type and size.

E. Extinguishers:
   1. Install extinguisher inside each extinguisher cabinet.
   2. Where extinguishers are indicated without cabinets, install extinguisher on brackets.
      a. Identify bracket mounted extinguishers with red letter decals spelling "FIRE EXTINGUISHER" applied to wall surface; letter size, style and location as acceptable to Architect.
   3. Properly charge and tag each extinguisher, showing date of installation.

3.3 CLEANING AND REPAIR

A. Remove protective coverings when there is no longer danger of damage to Work from other Work.

B. Restore protective coverings which have been removed or damaged during shipment or installation of Work, if other Work is still required to be performed in same location.

C. Clean exposed to view surfaces prior to final acceptance.

D. Replace damaged units as directed.

END OF SECTION

SECTION 10 5113

METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Single tier lockers.
   2. Double tier lockers.
   3. Benches and pedestals.
   4. Accessories.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each item, component part and finish.
   2. Include photographic catalog cuts for manufacturer's standard components, including hardware, anchors and fasteners.

B. Shop Drawings:
   1. Submit plans, elevations and details of units, showing layout, dimensions and anchoring details to adjacent construction.
   2. Include schedule for number plates for layout for review by Owner and Architect.

C. Samples:
   1. Manufacturer's samples: Submit full range of manufacturer's standard color samples for selection by Architect.
   2. Following selection, Submit 4 inch (100 mm) square finished metal samples for each color.

1.3 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate locker Work with Work of other trades and provide items to be placed during installation of other Work at proper time so as to avoid delays in overall Work.
   2. Place such items, including inserts and anchors, accurately in relation to final locations of locker components.
   3. Use Contractor's bench marks.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 5 years documented, successful experience with work comparable to Work of this Project.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver units in manufacturer's unopened protective wrappings, fully identified with manufacturer's name, model numbers and colors.

B. Store in dry, protected area.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by ASI Storage Solutions
   2. Equivalent products by following are acceptable:
      a. Republic Storage Systems Company.
      b. Penco Products, Inc.

2.2 MATERIALS:

A. Steel: Prime grade mild cold-rolled sheet steel free from surface imperfection, capable of taking a high-grade enamel finish.

B. Hooks: Zinc plated forged steel, ball ends.

C. Bolts and Nuts: Zinc plated truss fin head bolts and hex nuts.

2.3 LOCKER TYPES

A. Single Tier Units:
   1. Size: 12 inches (305 mm) wide x 18 inches (457 mm) deep x 72 inches (1829 mm) high above base.
   2. Handle: Recessed with built-in key controlled combination lock.

B. Double Tier Units:
   1. Size: 12 inches (305 mm) wide x 18 inches (457 mm) deep x 36 inches (915 mm) high; 72 inches (1829 mm) overall height above base.
   2. Handle: Recessed with provision for padlocks only; padlocks to be provided by others.

2.4 HEAVY DUTY LOCKERS:

A. Traditional Plus Collection.

B. Locker Configuration: Single Tier, 12-inch wide by 18-inch deep by 72-inch high.

C. Material: Mild cold rolled commercial quality steel, ASTM A1008.

D. Finish: Steel surfaces power washed, phosphate treated, and finished with an electrostatically applied 2-mil thick hybrid epoxy/polyester powder coating and baked.

E. Construction: Unitized with common intermediate uprights separating units.
   1. Individual sloped top 18-gage sheet steel constructed and finished to match lockers:
      a. Slope Rise: 1/3 of the locker depth.
      b. At continuous hoods add a 1 inch vertical rise to the front.
   2. Continuous metal base 14-gage sheet steel constructed and finished to match lockers.
   3. Filler panels 20-gage sheet steel constructed and finished to match lockers.
   4. End panels 20-gage sheet steel minimum, constructed and finished to match lockers; provide one-piece panels for double row (back-to-back) locker ends.
   5. Trim 18-gage sheet steel at recessed lockers constructed and finished to match lockers.
   6. Assemble locker components with rivets.

F. Door Frames:
   1. 16-gage channel.
   2. Vertical members shall have additional flange to provide a continuous door strike.
   3. Cross frame members; 16-gage channel shaped.

G. Doors: 14-gage channel shaped on both the lock and hinge side, with angle formations across the top and bottom.

H. Body:
   1. Bottoms: 16-gage.
   2. Tops, Sides, Backs and Shelves: 24-gage.
   3. Bolt spacing shall not exceed 9 inches on-center.

I. Hardware:
   1. Hinges: 16-gage continuous piano type, riveted to both door and frame.
   2. Handles: One-piece 20-gage deep drawn stainless steel (recessed) cup designed to accommodate locks.
   3. Bolt spacing shall not exceed 9 inches on-center.
   4. Latching:
      a. 11-gage frame hook secured to the frame.
      b. Padlock hasp protruding through recessed handle.
      c. Rubber silencer secured to frame at each latch hook.

J. Locker Interior Equipment:
   1. Shelf at single tier lockers.
   2. 3 wall hooks and one ceiling hook at single and double tier lockers.

K. Number Plates: Polished aluminum number plate riveted to door face with black numerals 1/2 inch high.

L. Color: ASI Blue Frost 36.

2.5 BENCHES

A. Description: 1-1/4 inch (32 mm) thick northern hard maple seats with manufacturer's standard steel pedestals, anchors and fasteners.

B. Sizes:
   1. Typical: 9-1/2 inches (242 mm) wide x 18 inches (458 mm) high x lengths as indicated on Drawings.

2. Provide benches 24 inches (610 mm) wide x 48 inches (1220 mm) long where indicated on Drawings.

C. Finishes: Manufacturer's standard materials as follow:
1. Seats: Clear varnish or sealer system.
2. Pedestals: Baked enamel finish; manufacturer’s standard silver color.

D. Acceptable Product: Equivalent to Benches and Pedestals by ASI.

2.6 FABRICATION:

A. Handicapped Accessible Lockers: Fabricate handicapped accessible lockers complying with the following:
1. Provide not less than 1 shelf located no higher than 48 inches (1219 mm) above the floor for forward reach.
2. Provide 1 shelf located at bottom of locker no lower than 15 inches (381 mm) above the floor for forward reach.
3. Provide hardware that does not require tight grasping, pinching, or twisting of the wrist, and that operates with a force not more than 5 lbf (22.2 N).
4. Locations: As indicated on Drawings.

2.7 FINISHES, GENERAL:

A. Finish all steel surfaces and accessories, except prefinished stainless-steel and chrome-plated surfaces.

B. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

D. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.8 STEEL SHEET FINISHES:

A. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods, including power wash and phosphate treatment.

B. Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish.
1. 2 mm epoxy/polyester powder coat, electrostatically applied.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Comply with final Shop Drawings and manufacturer's instructions. Install number plates in numerical sequence, unless otherwise indicated in final Shop Drawings.

B. Install lockers and benches in locations indicated; plumb, level and securely fastened to substrates.

C. Install trim, including metal base and top, flush and with hairline joints against adjacent surfaces; rigidly secure.
   1. Attach recess trim to recessed lockers with concealed clips.
   2. Attach sloping top units to lockers, with closures at exposed ends.
   3. End panels: Attach finished end panels with fasteners only at perimeter to conceal exposed ends of nonrecessed lockers.

3.3 ADJUSTING AND CLEANING

A. Adjust doors and operable hardware for proper operation.

B. Clean units in accordance with manufacturer's instructions.

C. Replace or repair units with damaged components or finishes to satisfaction of Architect.

3.4 PROTECTION

A. Protect units so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 10 5500

POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Postal sorter.
   2.
   3. Lockable mailboxes.Accessories.

1.2 ACTION SUBMITTALS

A. Product Data:
   1. Submit manufacturer's specifications and installation instructions for each component and finish.
   2. Include manufacturer's certification that units required for this Project comply with US Postal Service (USPS) requirements.

B. Shop Drawings:
   1. Submit complete Shop Drawings showing installation details, materials, finishes, anchorage and relationship of components to adjacent materials.
   2. Include identification sequence for compartments.
   3. Include layout of engraved identification text.

C. Samples: Submit 4 inch (100 mm) square samples of each exposed material.

1.3 SYSTEM REQUIREMENTS

A. Interface With Other Systems:
   1. Coordinate Work with other trades affected by Work of this Section.
   2. Provide items, including inserts and anchors, accurately in relation to final locations of components, in a timely manner so as not to delay job progress.
   3. Coordinate with other materials or fixtures mounted within or adjacent to assemblies, or requiring access.
   4. Use Contractor's bench marks.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in equipment listed on USPS approved list; having minimum of 5 years successful, documented experience with work comparable to Work of this Project.

B. Regulatory Requirements:
   1. Mail equipment shall meet requirements of USPS, including dimensions, construction and installation of units.

2. Make submittals required by USPS to review installation, and obtain necessary approvals to initiate mail pick-up and/or delivery service.
3. Final acceptance of the installations will be contingent upon approval of installation by USPS.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent damage to materials.

1.6 PROJECT CONDITIONS

A. Coordinate layout and installation of postal specialties with wall construction.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
1. Products listed below establish standard of quality.
2. Equivalent products by following are acceptable:
a. Bommer Industries, Inc.
b. Salsbury Industries.
c. Florence Manufacturing Co.
d. Safco Products Co

2.2 PRODUCTS

A. Postal Sorter:
1. Postal sorter with the following components:
a. Postal module.
b. 11 inch extra-wide postal trays.
c. 20 compartment trays.
d. Adjustable shelves.
2. Configurations and dimensions: As indicated on Drawings.
3. Acceptable product and manufacturer: Equivalent to E-Z Sort Sorter Module #7751GR by Safco Products.

B. USPS Approved Front-Loading Mailboxes:
1. Description:
a. Horizontal style mailboxes consisting of multiple compartments enclosed within recessed wall box.
b. Provide access to compartments for distributing incoming mail from front of unit with accessibility to entire group of compartments.
c. Provide access to each compartment for removing mail by swinging compartment door.
2. Total number of units: As indicated on Drawings.

3. Dimensions and configurations: As indicated on Drawings.
4. Mounting: Recessed mounted.
5. Locks: 5-pin cylinder cam lock on each unit, 2 keys each lock, 1,000 key changes.
6. Box Identification: As selected by Architect from manufacturer's full range.
7. Mail Distribution: USPS.
8. Material and Finish: As selected by Architect from manufacturer's full range.
9. Rear of unit: Solid non-removable back.
10. Acceptable product and manufacturer: Equivalent to USPS-STD-4B+, 3600FL Series, as manufactured by Salsbury Industries

2.3 ACCESSORIES

A. Provide mounting brackets, anchors and other accessories as required for complete installation.

2.4 FABRICATION

A. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs, and safe to touch.

B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.

C. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.

D. Comply with AWS for recommended practices in shop welding. Provide welds behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed and contact surfaces.

E. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

F. Protect exposed, factory finished surfaces by covering with adhesive paper or other suitable covering prior to shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. General: Install postal specialties level and plumb, according to manufacturer's written instructions and roughing-in drawings.
   1. Metal Protection: Where aluminum and copper alloys will contact grout, concrete, masonry, wood, or dissimilar metals, protect against galvanic action by painting contact

surfaces with bituminous coating or by other permanent separation as recommended by manufacturers of dissimilar metals.

2. **Final acceptance depends on compliance with USPS requirements**.

B. Install units in accordance with final Shop Drawings and manufacturer's instructions in locations indicated. Install number tabs in numerical sequence, unless otherwise indicated in final Shop Drawings.

1. Mount units at height complying with USPS regulations.
2. Set Work accurately as measured from established building lines and levels, plumb and in true alignment with previously completed Work.
3. Anchor securely in place to supporting construction, using concealed anchorage wherever possible.

C. Letterboxes:

1. Install mailboxes with center of tenant-door lock cylinder not more than 67 inches (1702 mm) above finished floor and bottom of lowest compartment not less than 28 inches (711 mm) above finished floor.
2. Arrange compartments in groups indicated on Drawings.

3.3 FIELD QUALITY CONTROL

A. Arrange for USPS personnel to examine and test postal specialties served by USPS after they have been installed according to USPS regulations.

B. Obtain written final approval of postal specialties to be served by USPS. Obtain this approval from USPS postmaster that authorizes mail collection for the served installation

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as postal specialties are installed, unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of postal specialty installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace postal specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by postal specialty manufacturer.

E. Replace postal specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.5 DEMONSTRATION

A. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain postal specialties.

END OF SECTION

SECTION 10 6700

STORAGE EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. The General Provisions of the Contract, including General and Special Conditions, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. BIN UNIT, 66 OPENING
   Equipment Mark Number: 1040
   Submittal requirements: PD

2. CABINET, 6 DRAWER, 33 INCH
   Equipment Mark Number: 1105
   Submittal requirements: PD

3. CABINET, 9 DRAWER, 59 INCH
   Equipment Mark Number: 1113
   Submittal requirements: PD

4. CABINET, FLAMMABLE MATERIALS, LARGE
   Equipment Mark Number: 1140
   Submittal requirements: PD

5. CABINET, STORAGE, SHOP, 18 INCH
   Equipment Mark Number: 1185
   Submittal requirements: PD

6. DESK, STAND-UP
   Equipment Mark Number: 1220
   Submittal requirements: PD

7. LADDER, SAFETY, ROLLING
   Equipment Mark Number: 1305 & 1310
   Submittal requirements: PD

8. RACK, GLASS
   Equipment Mark Number: 1500
   Submittal requirements: PD

9. RACK, PALLET
   Equipment Mark Number: 1530
   Submittal requirements: PD

10. SHELVING UNIT, 18 INCH
Equipment Mark Number: 1680
Submittal requirements: PD

11. TABLE, LAYOUT, STEEL TOP
Equipment Mark Number: 1765
Submittal requirements: PD

12. TABLE, LAYOUT, WOOD TOP
Equipment Mark Number: 1776
Submittal requirements: PD

13. WORKBENCH, SEVERE USE
Equipment Mark Number: 1860
Submittal requirements: PD

14. BENCH, BATTERY
Equipment Mark Number: 2030
Submittal requirements: PD

15. CART, PARTS
Equipment Mark Number: 5030
Submittal requirements: PD

16. DOLLY, DRUM
Equipment Mark Number: 5290
Submittal requirements: PD

17. HOPPER, SELF DUMPING, 3/4 YARD
Equipment Mark Number: 5460
Submittal requirements: PD, OM, T

18. BUS TIRE CAROUSEL
Equipment Mark Number: 5121
Submittal requirements: PD, OM, SD, T

B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1. Coordinate and verify all electrical and utility connections with all trades prior to equipment ordering and purchase.

C. Piping, wiring, and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. All components shall be factory tested and documented to operate as a complete system

B. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items.

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Submit Product Data in accordance with Division 1 - General Requirements of these specifications.

2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

1.5 INFORMATION SUBMITTALS

A. Factory tests and inspection reports prior to shipping.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

C. Certificates: For certification required in "Quality Assurance" Article

D. Warranty- warranty information for each piece of equipment and contractors general warranty

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit

B. Filters: one set for each unit containing a filter

1.8 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions. Equipment shall be stored per manufacturer's recommendation.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.10 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. Lifting capacity shall be painted with letters and numbers 3 inches high Minimum on both sides of lifting mast assembly.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 SHELVING UNIT
Equipment Mark Number: 1040

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Equipto or approved equal

B. Capacities and Dimensions:

1. Minimum number of openings: 66.

2. Minimum opening sizes:

a. 6 wide by 7-1/2 inches high: 60 each.

b. 6 wide by 9 inches high: 6 each.

3. Maximum overall dimensions:

a. Width: 36 inches.

b. Depth: 12 inches.

c. Height: 84 inches.

C. Features and Construction:

1. Unit uprights: Constructed of minimum 16 gauge steel with tapered slots on 1-1/2 inch centers for acceptance of shelf support brackets.

2. Shelves: Pan type with smooth edges, securely fastened at 10 points, constructed of minimum 18 gauge steel, adjustable on 1-1/2 inch centers.

3. Enclosure: Provided with side and back panels and base front strip.

4. Dividers: Laterally adjustable on 1 inch centers with quick-fastening clips.

5. Label holders: Full width 3/4 inch tab holder across each shelf.

6. End unit: Provide end unit(s) as required to close off row end.

a. Include (Add-On) units for long, continuous rows as needed. Each row to have end units for close-off

D. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.2 CABINET, 6 DRAWER
Equipment Mark Number: 1105

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Stanley Vidmar or approved equal

B. General Description:

1. Metal shelf storage unit of workstation/bench height with multiple pull out shelves of various depths.

C. Capacities and Dimensions:

1. Maximum overall dimensions, nominal:

a. Width: 30 inches.

b. Depth: 27-3/4 inches.

c. Height: 33 inches.

2. Minimum quantity of drawers: 6.

3. Minimum drawer capacity: 400 pounds each.

4. Minimum drawer dimensions:

   a. Drawer usable height (Drawers numbered top to bottom):

      1) Drawers 1, and 2: 2-1/4 inches.

      2) Drawer 3: 3 inches.

      3) Drawers 4 and 5: 3-7/8 inches.

      4) Drawer 6: 7 inches.

5. Partition configurations:

   a. Drawer 1: 24 compartments.

   b. Drawer 2: 20 compartments.

   c. Drawer 3: 16 compartments.

   d. Drawer 4: 20 compartments.

   e. Drawer 5: 16 compartments.

   f. Drawer 6: 12 compartments.

D. Features and Construction:

1. Cabinet: Heavy gauge sheet steel cabinet shall be channel formed with mountings permitting installation of various height drawers, front columns with drilled and tapped bolt holes. Cabinet shall come complete with a keyed lock capable of securing all drawers within unit.

2. Base: Design of base shall include front and rear forklift openings of ample strength to permit moving of fully loaded cabinet. Front base plate shall be provided to prevent dirt buildup. Base shall be drilled for bolting to floor.

3. Drawer suspension: Cabinet shall be designed for total interchangeability for all drawer heights. Sealed steel roller bearing system shall permit full drawer extension at rated capacity without sagging.

4. Drawer walls: Slotted walls on 3/4 inch centers shall be provided for mounting dividers and partitions.

5. Drawer pulls: Drawer faces shall be fitted with nominal 3/4 drawer width drawer pulls with 1 inch high label holder provided with paper labels and protective vinyl shields and end caps.

6. Drawer dividers: All drawer dividers shall be factory installed.

7. Drawer heights: For adaptability to changing inventory needs drawers shall be available in usable heights of 2-1/4 to 13-1/4 inches in not over 1 inch increments.

E. Accessories:

1. Recessed base: Stanley Vidmar No. RB-1, one each.

2. Floor attachment kit: Stanley Vidmar No. CAK-1, one each.

F. Finish: Phosphate primer covered by durable enamel in Owner's choice of manufacturer's standard colors

2.3 CABINET, 9 DRAWER
Equipment Mark Number: 1113

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Stanley Vidmar or approved equal

B. General Description:

1. Metal shelf storage unit of eye level height with multiple pull out shelves of various depths.

C. Capacities and Dimensions:

1. Maximum overall dimensions, nominal:

a. Width: 30 inches.

b. Depth: 27-3/4 inches.

c. Height: 59 inches.

2. Minimum quantity of drawers: 9.

3. Minimum drawer capacity: 400 pounds each.

4. Minimum drawer dimensions:

a. Drawer usable height (Drawers numbered top to bottom):

1) Drawers 1, 2, 3 and 4: 3-7/8 inches.

2) Drawers 5, 6, 7 and 8: 5-3/8 inches.

3) Drawer 9: 8-1/2 inches.

5. Partition configurations:

a. Drawer 1: 24 compartments.

b. Drawer 2: 20 compartments.

c. Drawer 3: 16 compartments.

d. Drawer 4: 12 compartments.

e. Drawer 5: 20 compartments.

f. Drawer 6: 16 compartments.

g. Drawer 7: 12 compartments.

h. Drawer 8: 8 compartments.

i. Drawer 9: 12 compartments.

D. Features and Construction:

1. Cabinet: Heavy gauge sheet steel cabinet shall be channel formed with mountings permitting installation of various height drawers, front columns with drilled and tapped bolt holes. Cabinet shall come complete with a keyed lock capable of securing all drawers within unit.

2. Base: Design of base shall include front and rear forklift openings of ample strength to permit moving of fully loaded cabinet. Front base plate shall be provided to prevent dirt buildup. Base shall be drilled for bolting to floor.

3. Drawer suspension: Cabinet shall be designed for total interchangeability for all drawer heights. Sealed steel roller bearing system shall permit full drawer extension at rated capacity without sagging.

4. Drawer walls: Slotted walls on 3/4 inch centers shall be provided for mounting dividers and partitions.

5. Drawer pulls: Drawer faces shall be fitted with nominal 3/4 drawer width drawer pulls with 1 inch high label holder provided with paper labels and protective vinyl shields and end caps.

6. Drawer dividers: All drawer dividers shall be factory installed.

7. Drawer heights: For adaptability to changing inventory needs drawers shall be available in usable heights of 2-1/4 to 13-1/4 inches in not over 1 inch increments.

E. Accessories:

1. Overhead cabinet: Stanley Vidmar No. OS-135, one each.

2. Adjustable shelf: Stanley Vidmar No. CS-40, one each.

3. Floor attachment kit: Stanley Vidmar No. CAK-1, one each.

F. Finish: Phosphate primer covered by durable enamel in Owner's choice of manufacturer's standard colors.

2.4 CABINET, PAINT AND INK
Equipment Mark Number: 1140

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Stanley Vidmar or approved equal

B. Capacities and Dimensions:

1. Minimum storage capacity: 40 gallons.

2. Maximum overall dimensions, nominal:

a. Width: 43 inches.

b. Depth: 18 inches.

c. Height: 44 inches.

C. Features and Construction:

1. Standards: The cabinet shall comply with the latest requirements of NFPA combustible liquids Code No. 30 and OSHA safety requirements for the storage of paint and ink. Cabinet shall be FM approved.

2. Walls, top, bottom, and doors: Construction shall consist of double wall 18 gauge sheet steel with 1-1/2 inch air space between inner and outer walls.

3. Containment: Cabinet shall have a 2 inch pan-type bottom.

4. Fire baffle and cap

5. Screened flame arrester vent: Two vents per cabinet, one each at left side bottom and right side top, shall be threaded for and provided with 2 inch NPT steel plugs.

6. Closure: Double doors with full-length piano hinges and 3-point latch mechanism with key lock.

7. Shelf: Three each adjustable shelves shall be provided 14-3/4” apart.

D. Finish: High-gloss yellow epoxy powder finish inside and out with "FLAMMABLE - KEEP FIRE AWAY" in minimum 4 inch bright red letters across doors.

2.5 CABINET SHOP
Equipment Mark Number: 1185

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Equipto or approved equal

B. Capacities and Dimensions:

1. Shelving: Full width shelves, five each.

2. Minimum shelf capacity: 200 pounds, minimum.

3. Maximum overall dimensions:

a. Width: 36 inches.

b. Depth: 18 inches.

c. Height: 78 inches.

C. Features and Construction:

1. Shelves: Four box edge full-length shelves shall be adjustable on maximum 2 inch centers without removing fasteners.

2. Doors: Three point box edge latching doors shall have common locks and two keys for each cabinet. Doors shall open a full 180 degrees and be flush mounted when closed with latching actuated by grip-type satin chrome plated steel handle.

3. Base: Cabinet shall be pedestal mounted for protection from moisture.

4. Assembly: Back, front, and sides shall be flush with no bolt heads on front or sides.

5. Locks: All cabinets covered by this specification shall be keyed alike.

D. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.6 DESK, STAND-UP
Equipment Mark Number: 1220

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Pucel or approved equal.

B. Capacities and Dimensions:

1. Overall desk dimensions:

a. Width: 36 inches.

b. Depth: 30 inches.

c. Height: 43 inches.

2. Drawer dimensions:

a. Width: 18 inches.

b. Depth: 27.5 inches.

c. Height: 5 inches.

C. Features and Construction:

1. Steel construction, with edges properly finished to prevent injury.

2. Cabinet area beneath drawer to have bottom, and intermediate shelf.

3. Writing surface to be sloped slightly.

4. Drawer to have telescoping ball bearing steel slides and have rolled handle and built-in key lock.

5. Provide with locking casters and pigeon hole units and risers.

D. Finish: Durable enamel in manufacturer's standard color.

2.7 LADDER, SAFETY
Equipment Mark Number: 1305

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Ladder Man or approved equal.

B. Capacities and Dimensions:

1. Steps: 4.

2. Step width: 24 inches

3. Overall dimensions (with handrails):

a. Width: 30 inches.

b. Depth: 45 inches.

c. Height: 73 inches.

4. Platform height: 40 inches

5. Casters:

a. Diameter: 2 inches.

b. Quantity: 4.

6. Handrail: 30 inch

C. Features and Construction:

1. Construction: Unit shall be welded steel tubing.

2. Casters: Unit shall have swivel castors in front and rigid castors in back. Casters shall be locking spring loaded ball bearing type.

3. Safety steps: Safety grating self-cleaning steps shall be constructed of expanded steel.

4. Feet: Rubber tipped feet with automatic positive step locking system shall be provided.

5. Handrails: Handrails shall be provided on both sides of steps and around top platform.

6. Compliance: Design shall comply with applicable OSHA safety standards.

D. Finish: Baked-on powder coat in manufacturer's standard color.

2.8 LADDER, SAFETY
Equipment Mark Number: 1310

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Ladder Man or approved equal.

B. Capacities and Dimensions:

1. Steps: 14.

2. Step width: 24 inches

3. Minimum Capacity: 350 pounds.

4. Overall dimensions (with handrails):

a. Width: 40 inches.

b. Depth: 108 inches.

c. Height: 183 inches.

5. Platform height: 140 inches

6. Casters:

a. Front: 2-4" swivel

b. Center: 2-6” rigid

c. Back- 2-4” rigid.

7. Handrails: 42 inch

C. Features and Construction:

1. Construction: Unit shall be welded steel tubing.

2. Casters: Unit shall have swivel castors in front and rigid castors in back and center. Casters shall be locking spring loaded ball bearing type. Ladder to lock into place when and individual steps on the first step triggering the release bar. The caster carriage retracts allowing the metal reinforced rubber-tipped feet to grip the floor. Ladder releases when the individual steps on a U-tube bar

3. Safety steps: Safety grating self-cleaning steps shall be constructed of expanded steel.

4. Feet: Rubber tipped feet with automatic positive step locking system shall be provided.

5. Handrails: Handrails shall be provided on both sides of steps and around top platform.

6. Compliance: Design shall comply with applicable OSHA safety standards.

7. Provide custom unit with side access from platform to the bus. Intent is for personal to access the roof of the bus from the side and not at the end

D. Finish: Baked-on powder coat in manufacturer’s standard color.

2.9 RACK, GLASS
Equipment Mark Number: 1500

A. Manufacturers

1. Basis-of-Design Product: Custom fabricated item as shown

B. Capacities and Dimensions:

1. Minimum Capacity:

a. Lower compartments: 400 pounds each.

b. Upper compartments: 100 pounds each.

2. Minimum overall dimensions:

a. Width: 118-3/4 inches.

b. Depth: 61-1/2 inches.

c. Height: 94 inches.

C. Features and Construction:

1. Construction: Rack shall be fabricated per specification and as shown.

2. Materials:

a. All wood, including plywood, lumber, and all other wood products, to be fire-retardant treated wood per ICC IBC section 2303.2

b. Frame and base: Rack frame and base shall be constructed of No. 2 or better Douglas Fir.

c. Dividers and panels: Rack dividers and panels shall be constructed of 3/4 inch, five ply, BB or better plywood with smoothest surfaces facing up or out.

d. Exposed edges: All front facing exposed plywood edges shall be covered with hardwood nosing.

e. Wood framing in contact with floor shall be pressure treated.

f. All wood, including plywood, lumber and all other wood products to be fire-retardant-treated wood per ICC IBC/VUSBC section 2303.2

3. Fastening: All joints shall be securely glued and fastened with countersunk wood screws.

4. Rack base: Base shall be slotted to permit entry of lift truck forks.

D. Finish: Paint exposed wood surfaces with two coats of semi-gloss enamel in Owner's choice of color.

2.10 RACK, PALLET
Equipment Mark Number: 1530

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Lyon Workspace Products or approved equal.

B. Capacities and Dimensions:

1. Uprights:

a. Minimum Capacity: 22,000 pounds.

b. Dimensions:

1) Thickness: 3 inches.

2) Depth: 42 inches.

3) Height: 120 inches.

2. Beams:

a. Minimum capacity: 6000 pounds per pair of beams.

b. Dimensions:

1) Length: 108 inches.

2) Depth: 4-1/2 inches.

3) Thickness: 2-3/4 inches.

c. Installed top of beam height from finished floor (Verify beam heights with Owner prior to installation):

1) First beams: 48 inches.

2) Second beams: 84 inches.

3) Top beams: 120 inches.

3. Minimum overall dimensions:

a. Width: 114 inches.

b. Depth: 42 inches.

c. Height: 120 inches.

C. Features and Construction:

1. Uprights:

a. Construction: Upright frames shall be continuously arc welded, heavy gauge steel box section uprights with deep channel cross and diagonal members.

b. Adjustment: Tapered keyhole slots shall be punched on 2 inch centers on both sides for vertical beam adjustments.

c. Base plate: Heavy gauge steel plates with holes for anchoring to floor shall be arc welded to uprights.

2. Beams:

a. Construction: Beams shall be welded, step-type heavy gauge steel box channel.

b. Attachment: Three high tensile studs shall be provided on each end to engage tapered keyhole slots in uprights, locking flush by means of spring loaded lock snaps.

D. Accessories: 52 inches wide by 42 inches deep wire decking with required support channels, Lyon No. WD5242H, two per shelf.

E. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.11 SHELVING UNIT, 18 INCH
Equipment Mark Number: 1680

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Equipto or approved equal.

B. Capacities and Dimensions:

1. Number of shelves: Seven total.

2. Minimum shelf capacity: 1000 pounds per shelf.

3. Maximum overall dimensions, nominal:

a. Width: 36 inches.

b. Depth: 18 inches.

c. Height: 84 inches.

4. Installed shelf height from finished floor, nominal:

a. Top shelf: 84 inches.

b. Bottom shelf: 1 inch.

c. Remaining shelves: Evenly spaced, approximately 12 inches center to center.

C. Features and Construction:

1. Shelf construction: Shelves shall be constructed of 18 gauge steel with double flanged, box-formed edges on all four sides and front and rear shelf edge reinforcing channels.

2. Uprights: Uprights shall be double flanged with tapered bracket slots punched on 1-1/2 inch centers for vertical shelf adjustment.

3. Shelf securement: Slip-in shelf brackets shall reinforce and securely lock shelf into place on all four corners.

4. Commonality: Units shall have the capability of sharing common end and back panels with adjoining units.

5. Assembly: Unit shall be designed for complete, rigid assembly and adjustment without tools.

D. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.12 TABLE, LAYOUT, STAINLESS STEEL TOP
Equipment Mark Number: 1765

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Bench Depot or approved equal.

B. Capacities and Dimensions:

1. Minimum capacity: 5000 pounds.

2. Overall dimensions:

a. Width: 117 inches.

b. Depth: 36 inches.

c. Height: 30 to 36 inches.

C. Features and Construction: Bench to be constructed of 16-gauge 3-inch square tube legs, 16-gauge 2-inch by 3-inch rectangular tube frame, and 18 gauge, grade 304 stainless steel top over 1-1/8” particle board core. The steel top shall be constructed of grade 304 steel with a brushed #4 finish and shall have a sealed bottom.

D. Accessories:

1. Adjustable legs: Set of four, zinc-plated, 6-inch adjustable legs with nickel-plated glides, model LZ, one each.

2. Footrest for added stability

E. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.13 TABLE, LAYOUT, WOOD TOP
Equipment Mark Number: 1776

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Bench Depot or approved equal.

B. Capacities and Dimensions:

1. Minimum capacity: 5000 pounds.

2. Overall dimensions:

a. Width: 120 inches.

b. Depth: 36 inches.

c. Height: 30 to 36 inches.

C. Features and Construction: Bench to be constructed of 16-gauge 3-inch square tube legs, 16-gauge 2-inch by 3-inch rectangular tube frame, and 1-1/2-inch thick solid maple butcherblock made from oil treated solid maple hardwood with round edges. Wood to be dried in a low atmosphere for one year.

D. Accessories:

1. Adjustable legs: Set of four, zinc-plated, 6-inch adjustable legs with nickel-plated glides, model LZ, one each.

2. Locking casters: Set of four, 1200 pound capacity, 5-inch diameter, urethane casters, model DL5-U, one each.

3. Footrest for added stability.

E. Finish: Durable enamel in Owner's choice of manufacturer's standard colors.

2.14 WORKBENCH, SEVERE USE
Equipment Mark Number: 1860

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Service Scaffold or approved equal.

B. Capacities and Dimensions:

1. Minimum capacity: 2,500 pounds.

2. Work surface thickness: 3/8 inch.

3. Overall dimensions:

a. Width: 72 inches.

b. Depth: 32 inches.

c. Height: 34 inches.

C. Features and Construction:

4. Construction:

a. Legs: Workbench legs shall be fabricated of 3 by 3 by 1/4 inch steel angle.

b. Leg braces: Leg braces shall be 3 by 3 by 1/4 inch angle steel with continuous electrical welds to tubing as shown.

c. Top braces: Top braces shall be 3 by 3 by 1/4 inch angle steel with continuous electrical welds to tubing as shown.

d. Top: Top shall be 3/8 inch plate steel with 50 percent minimum electrical welds to top braces. Corners of top shall have 2 inch radius for protection of personnel. All edges shall be ground smooth.

e. Welds: All welds shall conform to American Welding Society standards.

f. Two steel shelves

D. Accessories:

1. Locking casters: Set of four, 5-inch diameter, urethane casters one each

E. Finish: Cover all exposed steel surfaces including both sides of top, braces, and legs with one coat zinc chromate primer and two coats epoxy paint in Owner's choice of colors.

2.15 BENCH, BATTERY
Equipment Mark Number: 2030

A. Manufacturers

1. Basis-of-Design Product: Custom fabricated item as shown

B. Capacities and Dimensions:

2. Minimum capacity: 200 pounds per linear foot of bench.

3. Overall dimensions, nominal:

a. Length: As shown.

b. Depth: 24 inches.

c. Height: 20 inches.

4. Dry paint thickness, minimum: 6 mils.

C. Features and Construction:

5. Construction: Bench shall be fabricated per specification and as shown.

6. Materials: Unit materials shall be 2 by 4 inch Grade 1 or better hardwood, smooth, straight, kiln dried oak, marine grade wood glue, and zinc plated, No. 12 by 2-3/4 inch flat head wood screws.

7. Wood framing in contact with floor shall be pressure treated.

8. All wood, including plywood, lumber and all other wood products to be fire-retardant-treated wood per ICC IBC/VUSBC section 2303.2.

9. Assembly: All joints shall be glued and fastened with countersunk wood screws.

D. Finish: All exposed wood surfaces shall be sealed and finished with 1 to 1 mix of International Paint Integard-740 epoxy paint product number and curing agent number 4346-B applied per manufacturer's recommendations in Owner's choice of color.

2.16 CART, PARTS
Equipment Mark Number: 5030

A. Manufacturers

10. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Pucel Enterprise or approved equal.

B. Capacities and Dimensions:

11. Minimum capacity: 3000 pounds.

12. Length: 48 inches.

13. Width: 24 inches.

14. Height: 32 ½ inches

15. Quantity of shelves: 3

C. Features and Construction:

16. Construction: Rigid unit shall be all welded 12 gauge steel construction. Supporting posts shall be 1-3/4 by 1-3/4 by 3/16 inch angle steel with shelves and tubular push handle welded to post frame.

17. Casters: Cart shall be equipped with two swivel and two fixed phenolic locking castors.

18. Shelves: Top shelf shall be flat. Middle and bottom shelves shall be tray shelves, 2 inches deep.

D. Finish: Durable enamel in manufacturer's standard color.

2.17 DOLLY, DRUM, 600 POUND
Equipment Mark Number: 5290

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Hamilton Caster and Manufacturing Company or approved equal.

B. Capacities and Dimensions:

1. Inside diameter: 23-1/2 inches.

2. Height: 3-1/2 inches.

3. Minimum capacity: 600 pounds.

4. Wheels:

a. Quantity: Four each.

5. Frame:

a. Thickness: 3/16 inch.

b. Width: 3 inches.

C. Features and Construction:

1. Frame: Criss-cross frame shall be constructed of welded steel members.

2. Drum lips: Ends of frame shall be turned up to retain loads.

3. Capacity: Dolly shall be designed to accommodate 55-gallon drums.

4. Wheels: Ball bearing swivel casters shall be of oil resistant synthetic plastic.

D. Finish: Durable enamel in manufacturer's standard color.

2.18 HOPPER, SELF DUMPING, 3/4 YARD
Equipment Mark Number: 5460

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Roura Iron Works, Inc or approved equal.

B. Capacities and Dimensions:

1. Minimum hopper capacity: 3/4 cubic yard, 8000 pounds.

2. Caster wheel diameter: 8 inch.

3. Caster wheel width: 2 inch.

4. Minimum overall dimensions:

a. Length: 60-1/2 inches.

b. Width: 39-1/2 inches.

c. Height: 36 inches (44” with casters)

C. Features and Construction:

1. Construction: Hopper shall be fabricated of 3/16 inch arc welded plate steel, braced and double braced at stress points with steel angle.

2. Base: Hopper base shall accommodate forklift handling. Opening: 2-1/2” x 29-1/2”

3. 1/4” rocker plate with riveted rocker angle

4. Angle reinforced top and front

5. Casters: Four each polyolefin casters shall be mounted securely to base, two fixed, two swivel, Roura No. 8-PO.

6. Operation: Mechanical hopper release catch pulley system shall release and then automatically lock without operator having to touch hopper.

D. Finish: Durable enamel. Color selected by owner.

2.19 BUS TIRE CAROUSEL
Equipment Mark Number: 8121

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Vidir or approved equal.

B. Capacities and Dimensions

1. Maximum tire diameter: 44 inches

2. Minimum tire quantity: 78 tires based on 11” width tires

3. Carrier quantity: 6

4. Motor: (x2) 2 Hp

5. Minimum per carrier weight capacity: 2,000 pounds

6. Minimum machine capacity: 13,000 pounds

7. Minimum off balance load capacity: 2,500 pounds

8. Maximum overall dimensions:

a. Height: 211 inches

b. Width: 178 ½ inches

c. Depth: 111 ½ inches

C. Features and Construction

1. Description: Vertical tire carousel, motor driven, operated by a single user.

2. Full enclosure with solid paneling on the front and rear in addition to an enclosed ceiling.

3. cCSAus certified

4. All steel construction engineered to withstand the specified loading requirements.

5. Assembly to be factory fabricated and tested.

6. Designed to be bolted to the floor.

D. Controls

1. Forward/reverse push button controls with security keypad- front right location

E. Accessories

1. Variable frequency drive: Provides the operator variable speed operation during carousel operation.

2. Tire ramp: Assist the operator in loading and unloading the carousel. Ramps designed to eliminate the requirement to manually lift tires on and off the carousel by creating an incline for tires to roll in/out of position.

F. Utilities Available

1. Electrical: 208 V 3 phase, 15 Amp

G. Finish

1. Durable enamel in manufacturer's standard color.

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match and/or non-interference with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

Install equipment in accordance with plans, shop drawings, and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment securely to floor, per manufacturer's instructions and as directed by Architect, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

C. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment.

B. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. CABINET, MATERIALS STORAGE, AUTOMATED
   Equipment Mark Number: 1725
   Hours Required: 2

2. BUS TIRE CAROUSEL
   Equipment Mark Number: 8121
   Hours Required: 2

3. PARATRANSIT TIRE CAROUSEL
   Equipment Mark Number: 8122
   Hours Required: 2

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION

SECTION 10 7500

FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes ground-mounted flagpoles made from aluminum, fiberglass, stainless steel and steel.

B. Owner-Furnished Material: Flag[s].

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:

1. Seismic Loads: according to SEI/ASCE 7.
2. Wind Loads: according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles".
3. Base flagpole design on polyester, nylon or cotton flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.

B. Shop Drawings: For flagpoles. Include plans, elevations, details, and attachments to other work. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.

1. Include section, and details of foundation system for ground-mounted flagpoles.

C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

D. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified professional engineer.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Flagpole; a Kearney-National Inc. company.
2. Atlantic Fiberglass Products, Inc.
3. Lingo Inc.; Acme Flagpole Company Division.
4. Pole-Tech Company Inc.
5. U.S. Flag & Flagpole Supply, LP.
6. USS Manufacturing Inc.

2.2 FLAGPOLES

A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
3. Provide self-aligning, snug-fitting joints.

B. Exposed Height: 25 feet (7.5 m).

C. Aluminum Flagpoles: Provide **cone**-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch (4.8 mm).

D. Fiberglass Flagpoles: Provide cone-tapered flagpoles fabricated from polyester resin reinforced with woven glass-fiber roving with 75 percent of glass fibers parallel to length of flagpole.

E. Stainless-Steel Flagpoles: Provide cone-tapered flagpoles fabricated from pipe, tube, or plate complying with ASTM A 312/A 312M, ASTM A 269, or ASTM A 666, Alloy UNS S30400.

F. Steel Flagpoles: Provide cone-tapered flagpoles fabricated from standard-weight, seamless steel pipe complying with ASTM A 53/A 53M, Type S, Grade B or steel tube complying with ASTM A 513.

G. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than 0.064-inch- (1.6-mm-) nominal wall thickness. Provide with 3/16-inch (4.8-mm) steel bottom plate and support plate; 3/4-inch- (19-mm-) diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.

1. Provide flashing collar of same material and finish as flagpole.
2. Provide steel ground protectors extending 12 inches (300 mm) aboveground and 6 inches (150 mm) belowground for steel flagpoles where flashing collars are not provided.

H. Sleeve for Fiberglass or Aluminum Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.

1. Provide flashing collar of same material and finish as flagpole.

I. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.

1. Provide units made from aluminum, steel with same finish and color as flagpoles.
2. Provide ground spike at grade-mounted flagpoles.
3. Provide connector to building's lightning protection system conductor at roof-mounted flagpoles.

2.3 FITTINGS

A. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.

1. 0.063-inch (1.6-mm) spun aluminum, finished to match flagpole.
2. 20-oz. (0.70-mm) copper with 23-karat gold leaf finish.
3. Spun stainless steel, finished to match flagpole.

4. Spun copper alloy, finished to match flagpole.

B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16-inch- (8-mm-) diameter, braided polypropylene halyard and 9-inch (228-mm) cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.

1. Provide one halyard and one cleat at each flagpole.
2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
3. Provide halyard covers consisting of a 2-inch (50-mm) channel, 60 inches (1500 mm) long, finished to match flagpole.
4. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.

   a. Provide with neoprene or vinyl covers.

5. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.

   a. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Lingo.

2.4 MISCELLANEOUS MATERIALS

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.

C. Sand: ASTM C 33, fine aggregate.

D. Elastomeric Joint Sealant: Multicomponent nonsag urethane joint sealant complying with requirements in Section 079200 "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.

E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

A. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.

B. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

C. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
   1. Color: As selected by Architect from full range of industry colors and color densities.

D. Gold Anodic Finish: AAMA 611, AA-M32C22A43 Class I, 0.018 mm or thicker; gold color.

E. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

   1. Color and Gloss: As selected by Architect from manufacturer's full range] <Insert color and gloss.

F. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with [AAMA 2604] [AAMA 2605] and containing not less than [50] [70] percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

   1. Color and Gloss: As selected by Architect from manufacturer's full range] <Insert color and gloss.

2.7 STEEL FINISHES

A. Flagpole Interior Finish: Apply one coat of bituminous paint on interior of flagpole or otherwise treat to prevent corrosion.

B. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123/A 123M.

C. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.]

D. Polyurethane Enamel Finish: Immediately after cleaning, apply manufacturer's standard primer and two-coat, high-gloss, high-build polyurethane-enamel finish.

   1. Color: As selected by Architect from manufacturer's full range.

E. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

   1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.8 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.

B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.

D. Place concrete, as specified in Section 033000 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

A. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.

B. Ground Set: Place foundation tube/sleeve, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube/sleeve and allow concrete to cure. Install flagpole, plumb, in foundation tube/sleeve.

1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch (50-mm) layer of elastomeric joint sealant and cover with flashing collar.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11 1400

FUEL AND FLUID MANAGEMENT SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Special Conditions, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. FUEL/FLUID MANAGEMENT SYSTEM, TRANSIT
Equipment Mark Number: 8210
Submittal requirements: PD, SD, OM, T

B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1. Coordinate and verify all electrical and utility connections with all trades prior to equipment ordering and purchase.

C. Piping, wiring, and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.

B. Fluid Management System Manufacturer shall provide the engineering, installation, calibration, software programming and check-out necessary to for a complete and fully operational fluid management system.

C. Each product shall be provided by a single manufacturer.

D. All components shall be fully tested and documented to operate as a complete system.

E. Manufacturer's Representative:

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up. The Fluid Management System installer is required to be a manufacturer certified installer for the system being installed. .

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

H. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Submit Product Data in accordance with General Requirements of these specifications.

2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalogue when pertinent information is contained on a single page.

1.5 INFORMATION SUBMITTALS

A. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

B. Factory tests and inspection reports prior to shipping.

C. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

D. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.7 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.9 LABELING

A. Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.

B. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 FUEL/FLUID MANAGEMENT SYSTEM, TRANSIT
Equipment Mark Number: 8210

A. Manufacturers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Fleetwatch or approved equal

B. General Description:

1. System parameters: In the basic configuration, the system shall record vehicle number, mileage and amounts of diesel fuel, engine oil (two types) , diesel exhaust fluid (DEF), transmission fluid and engine coolant dispensed to buses and unleaded gasoline dispensed to support vehicles at each service (fueling) position. Additionally, system shall record vehicle number and amounts of engine oil (two types), transmission fluid and engine coolant dispensed to vehicles in the Maintenance shop area. Additional system equipment shall provide electronic recording of vehicle number and mileage through manual input at the remote island heads. This system shall provide a fully functional interface to a tank-monitoring controller for monitoring of fluids stored in tanks, and fluid deliveries. The system shall provide software for fluid use and inventory reports. The system shall permit add-on expansion of additional liquid products, if desired by owner at a future date. The system shall automatically collect, record, transmit, compile and print data as specified herein.

2. System equipment: Equipment shall include but not be limited to the following:

a. Remote Island Head (RIH) Units and remote island head junction box: Located at each bus and support vehicle service positions (one RIH unit for each service position) and as required for control and monitoring of all oil, coolant and ATF reels in the Maintenance Shop area. Also include one spare RIH unit capable of operating in any service position. Refer to process drawings for RIH locations. Provide all required remote island head junction boxes and support stands.

b. SYSTEMController: Controller Server, with internal storage and communication capabilities to provide an interface with existing

Information System/Vehicle Maintenance Software by means of direct connection or network interface

c. Control valves and pulse generators not included in other specification sections or contract drawings that are required by Fluid Management System (FMS) shall be provided and installed by FMS. Locate as required per each service position and in the maintenance shop area

d. Vehicle Detectors, installed in each diesel fueling position, connected to RIH to automatically terminate transaction.

e. SYSTEM Monitor 3.5 and DataTools 3.0 Software and programs as necessary for functioning of RIH and SYSTEMController Unit.

Software shall verify accurate data transmission using reasonableness checks, parity checks, and other checks required to ensure accurate data transmission. Data in SYSTEMController Unit shall not be erased until accurate data transmission and storage verification is received from the host computer during a transmission session

f. Data Logger Vehicle-mounted equipment shall be furnished by the fluid management system manufacturer for automatic capture of vehicle number, mileage, engine hours and electronic engine data, for all of the owners busses. Data logger to be installed by owner. Manufacturer to provide training and instructions to assist in the installation.

C. System Operation:

1. FMS shall provide mileage, engine hours, diesel fuel, gasoline, engine oil (two types), transmission fluid, DEF and engine coolant record management by automatically recording, storing and compiling formatted transaction data continuously on a 24-hour per day basis

2. FMS shall be automatic except for operator functions specified herein. System shall operate unattended except for normal service operator inputs, operator file updates, periodic status monitoring, and printer paper and ribbon replacement. Operator transactions and printer messages shall be in conversational language. Input and output codes shall not be used, unless format and storage capacities absolutely dictate their use. All operator transactions and printer messages shall be defined in plain language and be bound in a system manual.

3. FMS shall verify all bus or vehicle identification inputs against bus and vehicle authorization file.

4. FMS shall verify all employee identification inputs against employee authorization file.

5. FMS shall utilize an HTML-based graphical user interface to provide SYSTEMController Server operator with ability to:

a. Set current date and time.

b. Delete vehicle authorization from file.

c. Enter vehicle authorization and vehicle definition parameters in file.

d. Enter employee authorization information in file.

e. Delete employee from file.

f. Place RIH units off and on line.

g. Set fluid quantity limits for exception reports.

h. Set engine oil type by vehicle for selective oil control.

i. Set request and schedule print option for each report.

j. Request Status of Fluid Storage tanks.

k. Request Record of Fluid Receipts.

l. Request Tank Alarm History.

m. Define Storage Tank Parameters.

n. Produce all reports defined in the System Reporting Requirements section of these specifications.

o. Define Maintenance Bay reel sets for Select Bay feature.

p. FMS shall provide the capability for all of the above data to be downloaded from a host CPU to the System Controller on demand from the host CPU

6. Sequence of Operations – Diesel and Unleaded Service Position. RIH display shall prompt fueling operator, in conversational language, for each data item to be entered by fueling operator:

a. FMS shall be activated by entry (or verification) of the fueling operator ID number after the bus or vehicle has stopped in the fuel lane.

b. After entry of a valid employee ID number, the RIH unit shall prompt the user to input the vehicle number, milage, and engine hours.

c. At this point solenoid valves in the diesel or gasoline, engine oil (two types), engine coolant, and ATF lines shall be energized and opened by the RIH unit.

d. As fuel, engine oil, ATF, or coolant are dispensed into bus or vehicle, quantities of products dispensed shall be sensed and recorded initially by the RIH unit. Electronic pulser/transducers shall sense fuel in tenths of a gallon, and other liquids in tenths of a quart

e. Diesel fuel dispensed shall be displayed on the RIH display as follows:

FUEL D<XXX> YYYYY

where **D** is diesel, **XXX** is the calculated expected fuel required quantity, if available, and *** if not available. **YYYYY** is the actual quantity in tenths of fuel dispensed

f. Gasoline fuel dispensed shall be displayed on the RIH display as follows:

FUEL G<XXX> YYYYY

where **G** is gasoline, **XXX** is the calculated expected fuel required quantity, if available, and *** if not available. **YYYYY** is the actual quantity in tenths of fuel dispensed

g. Successive pushing of the SEND button shall cycle the display to show quantities of each of the other fluids dispensed

h. Products and quantities of each dispensed item shall be transmitted by the RIH unit to the System Controller Unit, which shall have capability to retain a minimum of 500,000 fueling transactions.

i. Upon completion of servicing, vehicle traffic sensor installed in each service position shall sense departure of bus or vehicle and cause RIH to terminate transaction.

j. Transaction shall be automatically terminated at end of any 5-minute interval following cessation of servicing operation.

k. Dispensers and solenoid valves to automatically be closed upon exiting of the bus or after 5-minute time out.

7. Sequence of Operations – Diesel Service Position Back-up Mode of Operation. The sequence of operations for servicing vehicles which are not equipped with a FLEETWATCH electronic module or for which there is a malfunction in the on-board electronic module, shall be as follows

a. The sequence shall begin as described above with the entry of the employee ID.

b. After a short time-out period, during which a vehicle number and mileage are not received by any receiver unit, the RIH unit will automatically proceed with a prompt **ENTER VEH NUMBER** and require entry through the keypad of a valid vehicle number for the vehicle to be serviced.

c. For the next step the system shall provide the user the capability to **ENTER MILEAGE** or the system shall automatically calculate mileage based upon fuel dispensed to the vehicle if a mileage is not entered.

d. At this point solenoid valves in the diesel or gasoline, engine oils, coolant, and ATF lines shall be energized and opened by the RIH unit and succeeding steps would be identical to those described in the preceding paragraph.

8. Sequence of Operations – Support Vehicle Fueling Position

a. The sequence of operations for the support vehicle fueling position shall be the same as the Diesel service position with the exception that transaction termination shall be by time out or pushing RESET button only

9. Sequence of Operations – Maintenance Shop Area. RIH display shall prompt operator, in conversational language, for each data item to be entered by mechanic operator.

a. FMS shall be activated by selection of a maintenance bay. RIH shall prompt operator to select a maintenance bay, where the operator shall enter the corresponding bay number:

Prompts: SELECT BAY

b. Next, FMS shall prompt the operator for entry of the mechanic operator ID

Prompts: ENTER VEH NUM

RE-ENTER VEH NUM (if invalid)

c. At this point solenoid valves in the engine oil (both types), engine coolant , and ATF lines in the selected maintenance bay shall be energized and opened by the RIH unit. Only the engine oil specified for the vehicle to be serviced should be energized.

d. As engine oil (both types), ATF , or engine coolant are dispensed into the vehicle, quantities of products dispensed shall be sensed and recorded initially by the RIH unit. Electronic pulser/transducers shall sense all products dispensed in tenths of a quart.

e. Successive pushing of the SEND button shall cycle the display to show quantities of each of the fluids dispensed.

f. Products and quantities of each dispensed item shall be transmitted by the RIH unit to the System Controller Unit

g. Transaction shall be automatically terminated at end of any 5-minute interval following cessation of servicing operation or by pushing the RESET button

D. Features and Construction

1. Remote Island Heads:

a. General: RIH shall:

1) Be located at each diesel and gasoline service position for diesel, gasoline, ATF, coolant and oil operation and as required for control and monitoring of ATF, coolant and oil dispensed in the maintenance shop area. Refer to process drawings for location of RIH units.

2) Be the interface between fueling operator, dispenser, traffic sensors, and FMS.

3) Have the capability to enter into a stand-alone mode of operation should the communication to the SYSTEMController be lost or disrupted. RIH shall continue to authorize and record fueling transactions, store the data and transfer data to the SYSTEMController upon reestablished communication.

4) Be weatherproof, vandal resistant, and tamper proof.

5) RIH components shall be plug-in, remove and replace, maintainable.

6) Consist of push-button console with display, mounted on upright stand.

7) Operate in temperature range from 0 degrees F to 120 degrees F, and relative humidity range of 5 to 95 per cent, non-condensing.

8) Provide remote island head junction box and stand.

b. Keypad: Keypad shall:

1) Be a sealed, flat, pressure sensitive unit providing 16 push-button permanently labeled as follows:

2) 0-9 digits

3) SEND (terminates data entry)

4) CLEAR (clears display)

5) RESET (restarts entry sequence)

6) YES (for entry validation)

7) NO (for entry validation)

c. Display: Display to be alphanumeric, backlit LCD unit with a shatterproof glass face, allowing up to 16 characters to be displayed.

d. Two-Position Key Switch: Provide key-operated switch on face of RIH panel to allow selection of either manual mode or automatic mode. One

key shall operate all RIH units. Provide two keys to each RIH unit, but all units shall be keyed alike.

2. SYSTEMController Server:

a. SYSTEMController Server shall be, at a minimum, a rack-mounted IBM PC Compatible running FLEETWATCH SYSTEMController 3.5 software on a Microsoft Windows Server 2008 platform. Controller shall be capable of controlling, receiving, and recording data produced by all RIH units as specified in a Microsoft SQL Server 2008 database. System Controller shall operate independently of agency CPU and communicate with all RIH units through Local Area Network connection only.

b. System Controller Server shall include web-browser (HTML) based software for viewing vehicle, employee, facility and service data without compromising the integrity of the System database. Such software shall include varying levels of security to limit user access.

c. System Controller Server shall accept fueling data, verify vehicle and employee authorization, and store data. System Controller and its RIH units shall be capable of allowing simultaneous transactions of all products without possibility of any confusion of data.

d. System Controller memory shall be nondestructive in the event of power outage, and similar malfunctions.

e. System Controller shall be capable of being connected to, and automatically transmit data to a host computer system. Connection options shall be dial-up, direct connection, or network connection.

f. System Controller shall provide an Ethernet connection for interface to the Tank Monitoring Controller for inventory and fluid receipt data. System Controller software shall also include the capability for Tank Monitor Interface through an Ethernet network connection. Provide software for this System Controller to provide complete fluid use and receipt reports and detailed tank status reports.

g. System Controller Server shall have capability to store 500,000 separate fueling transactions and 15,000 vehicle authorization numbers.

h. System Controller Server shall have capability to store 15,000 employee ID authorization numbers.

i. System Controller Server shall have capability to store the mileage input at the last servicing, the calculated miles per gallon for each authorized vehicle, an upper and lower limit of acceptable miles per gallon for each vehicle, and shall be capable of performing the data verification checks and calculations described in the "SEQUENCE OF OPERATIONS" section of this specification.

3. System Reporting Requirements-The following reports shall be the minimum provided by the System Controller Server software:

a. Detailed Transaction Report - all data associated with a fueling transaction. Format shall be aligned for ease of reading, and shall include the transaction number for monitoring of real-time activities by management. Asterisks shall denote excess consumption of consumables. Reports shall consist of:

1) Date and time of transaction.

2) Transaction number.

3) Totals by servicing lane.

4) Vehicle number (authorized or not).

5) Employee ID.

6) Manual or electronic entry of vehicle number.

7) Fuel type (diesel or gasoline).

8) Fuel quantity.

9) Engine oil quantity.

10) ATF quantity.

11) Coolant fluid quantity

b. Daily Transaction Report - Printed upon request and consisting of the entire previous day's transactions by fleet, shift, service lane, facility, vehicle number and employee number

c. Buses not fueled - Printed daily. This report consists of all in-service buses which have not been fueled at a given time and date

d. Transaction Year-to-Date and Month-to-Date - by commodity, on request

e. Commodity Exception Report - by day, week or month, by commodity

f. Unauthorized Vehicle Service Report - Transactions of those vehicles serviced that are not in the vehicle authorization file. An authorized code number shall replace vehicle number. This report is to be printed each day

g. Vehicle Authorization Status Report - A Master list, printed on request, of valid vehicle numbers consisting of:

1) Vehicle number

2) Facility assigned

3) Fuel type

h. Fueling Operator Authorization Status Report - The complete fueling worker authorization file by name, identification number, and facility assigned. This report is to be printed on request

i. Tank Inventory Report - Shows total gallons of fluid, inches of fluid, inches of water, and temperature in degrees for each tank in the FMS

j. Fluid Use, Receipt, and Inventory Report

4. Traffic Sensors

a. Provide traffic sensor in each service position to sense departure of bus or vehicle. Traffic sensor shall consist of overhead sonar-type proximity detector

E. Controls: All system components shall be protected from overload and meet applicable National Electrical Code requirements.

F. Utilities Available: Two 120 VAC, 20 A dedicated circuits at each RIH.

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment securely to floor, as directed by Architect, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

C. Provide all required conduit and wiring to make a complete and operable system. Refer to process and electrical drawings for further information.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

1. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

C. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

D. Fuel/Fluid Management System Demonstration Acceptance Test:

Once installed, proper operation of the system shall be demonstrated as follows:

-- Electronic transfer of correct vehicle number and mileage from the bus-mounted data recorder module to the RIH unit.

-- Unlocking of fluid solenoid valves after input of valid vehicle and employee ID.

-- Correct measurement of quantity of fuel, oil, ATF, DEF and coolant dispensed.

-- Relocking of fluid valves upon automatic detection of vehicle exit from service position.

-- Default time-out and relock of valves after five minutes of no flow with vehicle remaining in service position.

-- All of the above five (5) tests with the RIH unit in standalone mode.

-- Correct data transmission from RIH unit to System Controller Server with subsequent logging of the service transaction.

-- Storage of service transactions and subsequent transfer from System Controller Server to MAXIMO Vehicle Maintenance Software.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Direct the technical representative to provide specified hours of training to designated

B. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment

C. Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. FUEL/FLUID MANAGEMENT SYSTEM, TRANSIT
Equipment Mark Number: 8210
Hours Required: minimum of 4 hours total

a. The vendor shall provide training for computer, servicing, and maintenance personnel in use and maintenance of the Fluid Management System hardware and software supplied. Such training shall consist of one one-hour on-site training session for service personnel at the service positions during actual servicing. Training shall also be provided at the location of the System Controller to provide computer personnel with an overview of the total system operation and detailed instructions on running of reports and file maintenance. Such training is to consist of a two-hour training session. A one-hour training session shall also be provided to train designated personnel in the maintenance and troubleshooting of Fluid Management System Equipment.

b. Provide training and oversee the installation of bus mounted transmitters installed by the owner.

D. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

E. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

F. Over the course of a one year period from substantial completion provide a minimum of 2 additional visits to verify the system is operating properly and correct unusual conditions.

END OF SECTION

SECTION 11 5100

SHOP EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Special Conditions and the requirements of Division 1, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. BUFFER/GRINDER, 8 INCH, WITH DUST COLLECTOR
   Equipment Mark Number: 2080
   Submittal requirements: PD, OM

2. CAGE, INFLATION, TIRE
   Equipment Mark Number: 2110
   Submittal requirements: PD

3. CHARGER, BATTERY, FIXED
   Equipment Mark Number: 2130
   Submittal requirements: PD, OM

4. DRILL PRESS, VARIABLE SPEED
   Equipment Mark Number: 2210
   Submittal requirements: PD , OM

5. ABRASIVE BLASTING CABINET
   Equipment Mark Number: 2270
   Submittal requirements: PD, OM

6. PRESS, ELECTRIC/HYDRAULIC, 80 TON
   Equipment Mark Number: 2535
   Submittal requirements: PD, OM

7. REFRIGERANT RECLAMATION SYSTEM, PORTABLE, R-12/22/134
   Equipment Mark Number: 2640
   Submittal requirements: PD, OM

8. SAW, BAND
   Equipment Mark Number: 2690
   Submittal requirements: PD, OM

9. ABRASIVE METAL MITRE SAW
   Equipment Mark Number: 2714
   Submittal requirements: PD, OM

10. VISE
    Equipment Mark Number: 2832

Submittal requirements: PD

11. WELDER, MIG
Equipment Mark Number: 2900
Submittal requirements: PD, OM

12. PORTABLE WELDING CURTAIN
Equipment Mark Number: 2915
Submittal requirements: PD, OM

13. OXYACETYLENE TORCH
Equipment Mark Number: 2920
Submittal requirements: PD, OM

14. PLASMA CUTTER
Equipment Mark Number: 2925
Submittal requirements: PD, OM

15. FLOOR SCRUBBER
Equipment Mark Number: 3357
Submittal requirements: PD, OM

16. TANK, PARTS CLEANING
Equipment Mark Number: 3560
Submittal requirements: PD, OM

17. PORTABLE DIESEL PARTICULATE FILTER CLEANER
Equipment Mark Number: 3570
Submittal requirements: PD, OM

18. PORTABLE VACUUM SYSTEM
Equipment Mark Number: 3624
Submittal requirements: PD, OM

19. WASHER, PARTS, SMALL
Equipment Mark Number: 3785
Submittal requirements: PD, OM

20. WHEEL BALANCER, ELECTRONIC, PARATRANSIT
Equipment Mark Number: 4913
Submittal requirements: PD, OM

21. CART, BATTERY LIFT
Equipment Mark Number: 5015
Submittal requirements: PD

22. WHEEL DOLLY
Equipment Mark Number: 5312
Submittal requirements: PD, OM

23. JACK STAND-TALL
Equipment Mark Number: 5313
Submittal requirements: PD

24. JACK STAND- SHORT
Equipment Mark Number: 5314
Submittal requirements: PD

25. PERSONNEL FALL PROTECTION
Equipment Mark Number 6235
Submittal requirements: PD, OM, SD, T

26. DRAIN PAN, PORTABLE, USED OIL
Equipment Mark Number: 8165
Submittal requirements: PD, OM

27. DRAIN PAN, PORTABLE, USED COOLANT
Equipment Mark Number: 8166
Submittal requirements: PD, OM

28. FILTER, ELCTROSTATIC, PORTABLE
Equipment Mark Number: 9350
Submittal requirements: PD, OM

29. SPILL KIT
Equipment Mark Number: 9985
Submittal requirements: PD

B. Provide roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1. Coordinate and verify all electrical and utility connections with all trades prior to equipment ordering and purchase.

C. Piping, wiring, and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. All components shall be factory tested and documented to operate as a complete system

B. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

E. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items.

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

1.5 INFORMATION SUBMITTALS

A. Factory tests and inspection reports prior to shipping.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

C. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit

2. Filters: one set for each unit containing a filter

1.8 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.10 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. Lifting capacity shall be painted with letters and numbers 3 inches high Minimum on both sides of lifting mast assembly.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant

PART 2 – PRODUCTS

2.1 BUFFER/GRINDER, 8 INCH, WITH DUST COLLECTOR
Equipment Mark Number: 2080

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Cincinnati Electrical Tool, Inc. or approved equal.

B. Capacities and Dimensions:

1. Buffer/grinder:

a. Motor: 3/4 HP, 3600 RPM.

b. Minimum Wheel dimensions:

1) Diameter: 8 inches.

2) Thickness: 1 inch.

3) Bore: 3/4 inch.

2. Dust collector:

a. Motor: 1/2 HP, 3,600 RPM.

C. Features and Construction:

1. Motors: Motors shall be totally enclosed, direct drive, and rated for continuous service, with permanently lubricated ball bearings.

2. Wheels: Unit shall be provided standard, with two grinding wheels; one coarse and one medium grit.

3. Wheel guards: Telescoping guards shall be adjustable for wheel wear, and provided with exhaust outlets, adjustable work rests, and spark breakers.

4. Dust collector with reusable filters: The collector shall be an integral part of the cabinet base, provided with front-opening doors for access to motor and filters, and removable dust drawer. Entire unit shall meet OSHA ventilation standards.

5. Conduits: Flexible dust collection conduits shall permit guard adjustment without disturbing connections.

6. Tool tray and water pot: Pot shall be mounted on grinder base between wheels.

7. Power cord: Unit shall be provided with connections for hookup to fused disconnect.

D. Controls: Pushbutton safety starter shall have ON/OFF pushbutton switch; motor thermal overload and under voltage protection. Switching and other electrical controls shall meet applicable National Electrical Code requirements.

E. Accessories:

1. Illuminated eyeshields installed with transformer, Cincinnati No. 000-131, one set of two each per grinder.

2. Magnetic starter, Cincinnati No. 000-532.

F. Utilities Available: 480 VAC, 3 phase, 1-1/4 HP.

G. Finish: Durable enamel in manufacturer's standard color.

2.2 CAGE, INFLATION, TIRE
Equipment Mark Number: 2110

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Branick Industries, Incorporated or approved equal

B. Capacities and Dimensions:

1. Tire capacity: 12.00-24 inches (maximum 50 inch outside diameter).

C. Features and Construction: 5 bar all welded steel construction with high tensile 2-1/4" diameter steel tubing, base plate, and side plates.

D. Finish: Durable enamel in manufacturer's standard color.

2.3 CHARGER, BATTERY, FIXED
Equipment Mark Number: 2130

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Associated Equipment Corporation or approved equal

B. Capacities and Dimensions:

1. DC output rating: 70 amps

2. Charging capacity: 1 to 15, 12 VDC batteries.

3. Clamp rating: 400 amps.

C. Features and Construction:

1. Battery Types: 12 Volt Flooded, AGM, and Gel Cell batteries- including Spiral Cell, Orbital, or Optima batteries.

2. Cabinet: Unit shall be enclosed in bonderized steel cabinet with reinforced frame and gasketed access panel.

3. Display: Analog meter and 3 LED display indicating charge status.

4. AC cord: 6’ 16 gauge-3

5. DC leads: 6.5’, 4 AWG

6. Electrical stability system technology

7. Program for deep discharge recovery of flooded batteries.

8. Diagnostic capability to indicate weak or defective batteries.

D. Accessories: Bus bar set with fiberglass backboard assembly shall be complete with connecting cables, insulated clamp storage bar, and 10 pair of 10 gauge, 300 amp rated charging leads, 36 inches long premounted at bus bar end with vinyl insulated safety clamps on other end Provide with three foot 4 AWG cables to connect to charger or additional bus bars. Associated No. 6075, quantity two of four each.

E. Utilities Available: 120 VAC, 1 phase,.

F. Finish: Durable enamel in manufacturer's standard color.

2.4 DRILL PRESS, VARIABLE SPEED
Equipment Mark Number: 2210

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Clausing Industrial or approved equal

B. Capacities and Dimensions:

1. Motor: 1-1/2 HP, 1,725 RPM.

2. Working dimensions:

a. Drill to center of circle: 20 inch diameter.

b. Table travel: 20 inches.

c. Spindle to table, maximum: 33.125 inches

d. Spindle to base, maximum: 43.375 inches

3. Minimum table working surface, ground:

a. Width: 22 inches.

b. Depth: 19.5 inches

4. Table travel- 20 inches

5. Column dimensions

a. Ground steel, 4” diameter, 3/8 inch thick wall

6. Quill, ground steel:

   a. Minimum Stroke: 0 to 6.5 inches.

   b. Minimum Diameter: 2-1/2 inches.

7. Spindle: No. 3Mt

8. Speeds: 300 to 2,000 RPM.

9. Chuck capacity: 5/8”

C. Features and Construction:

1. Speed control: Speed control shall be operable while machine is running and shall hold speed setting constant under all rated load conditions.

2. Bearings: Spindle assembly shall be supported by not fewer than eight permanently lubricated ball bearings.

3. Work table: Parallel T-slots for clamping and a removable center insert for through table drilling.

   a. Capacity- Two 15.5” long, for .5 inch T-bolt.

4. Table lock: Expanding bushing table lock shall be provided for rigid positioning of table at any angle.

5. Floor base: Two full-length T-slots shall permit insertion of T-bolts from front and rear.

   a. Capacity- Two 13” long, for .5 inch T-bolt

6. Micro- Adjustable Depth Stops and independent Depth Scale allows the user to zero scale the set up for repetitive drilling, quickly and easily.

7. Flexible light to illuminate the work surface.

8. Safety features:

   a. Chuck key: Unit shall include self-ejecting chuck key.

   b. Guard: Steel clip on guard shall completely enclose drive.

9. Spindle: No. 3 Morse Taper shall accept accessory Jacobs type chuck for use with standard bits.

10. Motor: Unit shall be totally enclosed, fan cooled.

11. Depth control: Self-locking adjustment depth stop shall be provided for feed.

12. Table adjustment: Hand gear crank shall permit table elevation.

13. Power cord: Provided a minimum 6-foot power cord and plug compatible with facility's receptacles.

D. Controls: 24 volt pushbutton control station with shrouded START button and protruding STOP button, magnetic starter with transformer and no voltage/low voltage and three leg overload protection. Switches and other electrical controls shall meet applicable National Electrical Code requirements.

E. Accessories: Drill Chuck

F. Utilities Available: 208 VAC, 3 phase.

G. Finish: Durable enamel in manufacturer's standard color.

2.5 ABRASIVE BLASTING CABINET
Equipment Mark Number: 2270

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by TP Tools and Equipment or approved equal

B. Capacities and Dimensions:

1. Motor: 7 Amp vacuum motor

2. Minimum working Dimensions:

a. Width: 46 inches

b. Depth: 28 inches

c. Height: 28 inches

C. Features and Construction:

1. Cabinet: 20 gauge steel

2. Door: Right-hand side-loading 11 gauge steel with angle iron frame work.

3. Lens: 12”x33” side tempered glass lens and frame with inner lens protector.

4. Lights: two 120 watt, 115 V adjustable flood lamps

5. Vacuum: 7 amp Vac-40 vacuum to remove dust

6. Nozzles: 1 steel and 2 ceramic nozzles.

7. Gloves: 28”L double-strength cabinet gloves

8. 50 pounds fast-cutting Skat Magic Abrasive

9. Automatic abrasive recycling system.

10. Expanded metal screen to hold objects up to 200 pounds

11. Quick change trap door for fast abrasive changes.

12. Power cord: Unit shall be provided with a minimum 6-foot power cord and plug compatible with facility's receptacles.

D. Controls:

1. C-25 foot-pedal-operated power gun and foot pedal with 7 ft of air hose.

E. Accessories:

1. Provide 1 additional steel nozzles and 2 additional ceramic nozzles.

2. Provide 50 pounds additional fast-cutting Skat Magic Abrasive.

3. Provide 5 ft of vacuum hose.

F. Utilities Available:

1. Electrical: 120VAC, 1 phase

2. Air: 10-15 cfm @ 80 psi

G. Finish: Epoxy coated red

2.6 PRESS, ELECTRIC/HYDRAULIC, 80 TON
Equipment Mark Number: 2535

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Nugier Press Company, Inc. or approved equal

B. Capacities and Dimensions:

1. Minimum capacity: 80 tons.

2. Minimum inside width: 48 inches.

3. Minimum width between table rails: 8 inches.

4. Table travel: 32 inches.

5. Maximum vertical clearance: 41 inches

6. Ram travel: 14 inches.

7. Approximate ram speed:

a. Advance: 100 IPM.

b. Return: 182 IPM.

8. Minimum ram diameter: 3-1/4 inches.

9. Minimum cylinder bore: 3-1/2 inches.

10. Minimum table spacing increments: 4 inches.

11. Minimum left to right cylinder movement: 34 inches.

12. Pump motor size: 7.5 HP.

C. Features and Construction:

1. Hydraulic pump and motor: The hydraulic pump, motor, and reservoir shall be contained in module located outside the press frame.

   a. Pump: The hydraulic pump shall be a high quality, constant flow, radial piston type without packing and shall be direct coupled to the drive motor.

   b. Motor: The pump drive motor shall be a 7.5 HP pump flange mounted motor with a 1.15 service duty rating, single acting.

2. Movable cylinder: The press head and cylinder (ram) shall be movable from side to side of the head rails. Quick acting 90 degree locking cams shall lock the head at desired location.

3. Table: The press table shall be vertically adjustable with a self-locking table winch and cable that is mounted outside of frame.

4. Construction: Press shall have all channel ends and corners cut and ground for safety.

   a. Frame uprights: The press frame uprights shall be fabricated of steel channels.

   b. Head and table rails: Head and table rails shall be fabricated of steel.

   c. Base members: Both press and pump module base members shall be fabricated of steel angle.

   d. Table locking pins: Press shall have a minimum of four locking pins.

5. Equipment protection: The press shall have a ram travel limit valve to prevent overextension of ram and a maximum capacity relief valve to prevent loading more than 110 percent of press capacity. An adjustable pressure relief valve shall also be provided to allow press operator to set maximum pressure at any point between zero and maximum capacity.

6. Power supply: Connections for hookup to junction box

7. Controls: Press controls shall be mounted on the pump module located outside the press frame so that the front of the press is clear.

   a. Hydraulic controls: There shall be two hand operated hydraulic valves.

   b. ON-OFF control: Pump motor shall be controlled by a pushbutton magnetic starter with overload protection.

   c. Gauge: A large, dial type pressure gauge shall be mounted on the outside of the press frame to isolate gauge from mechanical shock.

8. Standard accessories: Press shall include two flat parallels with "V" grooves, two "V" ram noses, and two flat ram noses as standard accessories.

D. Accessories: Round ram nose, Hypress No. FRN-80, one each.

E. Utilities Available: 480 VAC, 3 phase, 7.5 HP.

F. Finish: Durable enamel in manufacturer's standard color.

2.7 REFRIGERANT RECLAMATION SYSTEM, PORTABLE, R-12/22/134
Equipment Mark No. 2640

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Robinair

B. General Description: Combination portable recovery, recycling, evacuation, and recharging for R-12, R-134a, R-22, R-502, MP, and HP type refrigerant fluids.

C. Capacities and Dimensions:

1. Tanks: minimum 50 pound refillable, qty 2

2. Operating range: 50 to 105 F.

3. Recovery rate:

a. Vapor: slightly less than 1/2 pound per minute.

b. Liquid: 1 pound per minute.

4. Recycling rate- 4 lbs/min

5. Recycling filter-drier- 1150 g x H-9

6. Pump free air displacement- 6 cfm

D. Features and Construction:

1. Can accommodate multiple refrigerants

2. Microprocessor controlled. Prompts lead through programming and also signal when its time to charge the filter-drier, vacuum pump oil, and compressor oil.

3. Float chamber: Unit shall posses a float chamber that automatically adjusts from liquid to vapor.

4. Electronic Scale: Simple recharge to factory specifications. Weighs recovered refrigerant and provides tank overfill protection.

5. Provide with a vacuum pump to thoroughly evacuate the system.

6. Lockout panel to prevent mixing of refrigerants.

7. Heavy-duty filter drier: Unit shall include a filter-drier to remove moisture and acid from the refrigerant. Capacity to handle up to 200 pounds between change-overs. Provide with three sets of charging hpses- one for R012, one for R-134a, and one for refrigerants using ¼” SAE fittings.

8. Recycling: Unit shall be capable of recycling, making an initial pass through the filter-drier. Additional recycling shall be programmable in case of compressor burnout or other conditions.

9. Power cord: Unit shall be provided with a minimum 6-foot power cord and plug compatible with facility's receptacles.

E. Accessories

1. Provide one additional set of replacement hoses for the garage.

2. Provide with heavy-duty vinyl dust cover.

3. Provide two replacement filters for each reclaim system provided.

F. Utilities Available: 120 VAC, 1 phase

2.8 SAW, BAND
Equipment Mark Number: 2690

A. Manufacturers
1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Wellsaw or approved equal

B. Capacities and Dimensions:

1. Motor: 1/2 HP OPD.

2. Minimum horizontal cutting capacity:

a. Rectangular cut: 9-1/2 by 11 inches wide.

b. Round cut: 9-1/2 inches diameter.

c. 45 degree cut: 5-1/2 by 5-1/2 inches.

3. Minimum vertical cutting capacity:

a. Work table: 8 by 10 inches.

b. Throat: 9-1/2 inches high by 6-1/4 inches deep.

4. Blade speeds: 76, 141, and 268 feet per minute.

5. Minimum blade size: 1/2 by 93 inches.

6. Band Wheels: minimum 11” cast iron.

7. Minimum height to top of bed: 26 inches.

C. Features and Construction:

1. Conversion: Saw shall be capable of operation in either vertical or horizontal mode. Conversion from one mode to the other shall be accomplished by self-locking frame release latch and installing or removing vertical work table.

2. Blade support: Ball bearing blade guides shall be provided for full three-way blade support.

3. Drives: There shall be a three speed V-belt drive system from motor with gear and pinion drive to blade.

4. Blade speed change: A stepped pulley shall provide for blade speed change.

5. Frame feed: Frame feed downward motion shall be adjustable.

6. Coolant system: A submersible coolant pump and four gallon capacity reservoir shall be provided.

7. Vise: Manual screw/quick action- A dog and ratchet mechanism type vise with locating pins for modification to 45 degree cuts shall be provided.

8. Fabrication: Saw frame shall be constructed of welded angle steel with sheet steel panels.

9. Mobility:

   a. Retractable wheel assembly: Two rubber wheels shall be mounted on front legs of saw frame with foot actuated jacking lever.

   b. Pull Handle

10. Handle: A pull-out type handle shall automatically lock saw head in down position.

11. Adjustable stock stop

12. Replaceable pivot bar and bushing

13. OSHA blade guards

14. Power cord: A 6 foot, three wire power cord shall include a grounded plug.

15. Provide stock stand

D. Controls: ON/OFF switch shall be mounted in a control box, equipped with overload and low voltage protection.

E. Utilities Available: 120 VAC, 1/2 HP.

F. Finish: Durable enamel in manufacturer's standard color.

2.9 ABRASIVE METAL MITRE SAW
Equipment Mark Number: 2714

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Kalamazoo Industries, Incorporated. or approved equal

B. Capacities and Dimensions:

1. Motor Hp: 5 Hp

2. Minimum cutting capacities:

a. 2 ½” Solids

b. 3” pipe

c. 3.5” at 45 degrees

3. Blade diameter: 14 inches.

4. Arbor shaft: 1 inch. Sealed ball bearings.

5. Spindle RPM: 4400.

C. Features and Construction:

1. Miters either direction 45 degrees

2. Positive index holes and up/down stops

3. Heavy duty stand

a. 12 gauge plain steel top

4. Front table lock

5. Dual cam vises

D. Controls: Manual starter with integral ON/OFF switching, overload protection.

E. Accessories:

1. Abrasive wheel 14 inch diameter, 3/32 inch thickness, medium grit fiberglass reinforced

F. Utilities Available:

1. Electrical: 208 VAC, 3 phase, 5 hp.

2. Provide motor starter disconnect switch mounted to unit for single point connection.

G. Finish: Durable enamel in manufacturer's standard color.

2.10 VISE

Equipment Mark Number: 2832

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Reed Manufacturing Company or approved equal.

B. Capacities and Dimensions:

1. Minimum jaw width: 5 inches.

2. Minimum jaw opening: 6 inches.

3. Minimum throat depth: 6-1/4 inches.

4. Minimum pipe capacity: 1/8 to 4-1/2 inches.

C. Features and Construction:

1. Slide bar: Machined steel slide bar with oil port shall operate in machined channel.

2. Base: 360 degree swivel base shall include locking device.

3. Construction: Semi-steel cast body shall include hardened tool steel nut and screw.

4. Jaws: Main and pipe jaw facings shall be replaceable.

5. Wear compensation: Adjustable collar shall eliminate handle slack.

D. Finish: Durable enamel in manufacturer's standard color.

2.11 WELDER, MIG
Equipment Mark Number: 2900

A. Manufacturers
1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Miller Electric Manufacturing Company or approved equal

B. Capacities and Dimensions:

1. Rated output:

a. 250 amps at 28 VDC, 40 percent duty cycle.

b. 200 amps at 28 VDC, 60 percent duty cycle.

2. Open circuit voltage, maximum: 38.

3. Amps input at rated output, single phase, 60 hertz:

a. 208 volts: 48.

b. KVA: 9.8.

c. KW: 7.5.

4. Amperage range: 30 to 300.

5. Wire feed speed: 50 to 700 IPM.

6. Wire type and diameter:

   a. Solid steel: .023 to .045 inches.

   b. Stainless: .023 to .045 inches.

   c. Flux cored: .030 to .045 inches.

C. Features and Construction:

1. Operation: Welder shall be DC output device capable of performing MIG and Flux-Cored welding operations from 22-gauge to 1/2 inch thick in a single pass.

2. Wire feeder: Welder shall include a built-in wire feeder mounted in a compartment with hinged door to protect components. The drive system shall be aluminum dual gear and quick-change reversible drive rolls with a scaled tension knob.

3. MIG gun: Welder shall include a 15-foot, 250 amp, MIG gun with durable one-piece handle, one million cycle rated trigger and steel spring coils protecting cable ends.

4. Auto gun detect- Automatically detects and recall voltage, wire feed speed and timer of the active gun.

5. Dual front handles- split handle with rubber grips designed to move machine easily and allow work lead and MIG gun to be stored independently

6. Angled wire drive- industrial aluminum dual-gear drive system.

7. Extra drive rolls stored next to drive motor.

8. Flip-down compartment hold parameter chart and storage for consumables.

9. Fan-on demand cooling system only operates when needed.

10. Run-in control: Run-in control shall be adjustable and individually settable for both MIG and spool guns and located on the front panel, allowing the user to optimize starts to their application.

11. Voltage/speed meters: Meters shall be digital self-calibrating digital capable of presetting voltage and wire feed speed. Wire feed speed meter shall be capable of displaying feed speed rate of spool reels.

12. Work cable: Welder shall include a 10-foot work cable with clamp.

13. Housing: Welder components shall be enclosed in a heavy formed sheet metal housing with two 8 inch fixed polyolefin wheels, two four inch swivel front wheel, handle assembly, capable of mounting and securing two shielding gas cylinders at rear of unit. Cooling fan motor shall be a totally enclosed, permanently lubricated, sleeve bearing type. All controls shall be front-mounted for easy access and visibility.

14. Power cord: Welder shall be provided with a 10 foot power cord and NEMA 6-50R plug compatible with the facility's welding receptacles.

15. Spool gun for aluminum welding with 30 foot cable assembly, built-in gas valve, adjustable barrel assembly, 180 degree spool canister, gun handle wire speed adjustment and reversible drive roll. Model Spoolmatic 30A, No. 130 831, one each.

16. Dual cylinder rack for welder mounting of two shielding gas cylinders, Model No. 300 337, one each.

17. Regulator/flow gauge with hose for additional shielding gas cylinder, Model No. 195 050, one each.

18. One pack of ten contact tips, 0.035 inch, Model No. 000 068.

19. One pack of ten contact tips, 0.045 inch, Model No. 000 069.

20. One pack of two nozzle adapters, Model No. 169 729.

21. One pack of two contact tip adapter, Model No. 169 728.

22. One 5/8 inch diameter orifice nozzle, Model No. 169 726.

D. Controls: Controls shall be located on the front panel of welder and include built-in digital timers menu to preset voltage and Wire Speed Control. Standard run-in, pre/postflow, burnback, spot/delay (stitch) timer menu. Front panel to include Power Switch, Voltmeter and Wire Feed Speed Meter.

E. Utilities Available: 208 VAC, 1 phase, 48A.

F. Finish: Durable enamel in manufacturer's standard color.

2.12 PORTABLE WELDING CURTAIN
Equipment Mark Number: 2915

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Steiner Industries or approved equal

B. Capacities and Dimensions

1. Maximum length: 4 feet

2. Maximum height: 5 feet

3. Three sections

C. Features and Construction:

1. Curtain material: 13 oz flame retardant vinyl laminated polyester. Coordinate color with owner prior to ordering.

2. Framing: Heavy duty 18 gauge steel 1 inch square tube frame, 1-1/8 inch tube corners and legs with quick snap connections.

3. 2 inch high locking caster wheels attached to platform leg to accommodate mobility.

4. Slip-fit construction

5. Any screen to be used horizontally or vertically

6. Provide with 24 inch study platform legs. Legs to be adjustable 90 degrees to prevent worker interference.

2.13 OXYACETYLENE TORCH
Equipment Mark Number: 2920

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by WCTA / Lincoln Electric Company or approved equal.

B. Capacities and Dimensions:

1. Acetylene working pressure: 0 to 15 PSI.

2. Acetylene tank pressure: 0 to 200 PSI.

3. Oxygen working pressure: 0 to 80 PSI.

4. Oxygen tank pressure: 0 to 3,000 PSI.

5. Cuts up to 1” thick and welds up to 1/8”

6. Torch hose: Twin oxy acetylene 3/16-inch diameter by 240 inches long.

C. Features and Construction:

1. Materials: Regulator bodies, torch handles, and flow and pressure valves shall be brass and stainless steel construction.

2. Seals: Double "O" ring seals shall be used on all attachments to permit hand tighten of connections.

3. Welding specification: Ready to weld up to 1/4-inch material.

4. Cutting specification: Ready to cut up to 1/2-inch material.

5. Standard equipment:

a. Safety check valves:

1) Acetylene.

2) Oxygen.

b. Goggles.

c. Torch handle.

d. Cutting attachment.

e. Gas mixer.

f. 20 feet of double lined hose.

g. Flint torch lighter.

h. Regulators with gauges:

1) Acetylene.

2) Oxygen.

i. Spark lighter.

D. Accessories:

1. Welding tips: No.0 Part:1600840; No.2 Part:1600860; No.4 Part: 1600880.

2. Cutting tips: No.0 Part:1500830.

3. Heating tips: No.6 Part:1800710.

4. Soapstone holder: KH541, one each.

5. Soapstone: KH542, one set of ten each.

6. Lighter flints: KH571, one box of five single flints.

7. Tip cleaners: KH575, one case of 10 each.

8. Gas dual cylinder cart: Model No. K1702-1, one each.

2.14 PLASMA CUTTER
Equipment Mark Number: 2925

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Miller Electric Manufacturing Company or approved equal

B. Capacities and Dimensions:

1. Rated output: 60 amps at 140 VDC, 50 percent duty cycle (230V).

2. Open circuit voltage, maximum: 230 VDC.

3. Amps input at rated output, single phase, 60 hertz:

a. 208 volts: 47 amps

b. KVA: 9.9.

c. KW: 9.8.

4. Plasma Gas Flow/Pressure: 6.75 CFM at 90 PSI.

C. Features and Construction:

1. Operation: Welder shall be an air plasma device with a rated cutting capable of 7/8 inch mild/stainless steel and a maximum severe cutting capable of 1-1/4 inch mild/stainless steel.

2. Cutting torch: Welder shall include ICE-60T hand-held plasma-cutting torch with 50 foot cable, epoxy shield cup, cup mounted drag shield and quick-disconnect.

3. Line votage compensation- provides peak performance power under variable input voltage conditions (+-15%) for steady and cleaner ending cuts.

4. Fan on-demand cooling circuit: cooling system operates only when needed. Welder shall include a post flow circuit that calculates the length of postflow time to provide shielding gas after the torch trigger is released to extend the life ofconsumables and welding torch.

5. Pilot arc switch: Welder shall allow the operator to cut grates, chain link fence and other perforated metals automatically without re-triggering the gun.

6. Gas/air supply: Welder shall include a built-in automatic gas/air filter and regulator and a quick connect gas/air fitting.

7. Work cable: Welder shall include a 50-foot work cable with clamp.

8. Housing: Welder components shall be enclosed in a heavy formed sheet metal housing. Cooling fan motor shall be a totally enclosed, permanently lubricated, sleeve bearing type. All controls shall be front-mounted for easy access and visibility.

9. Power cord: Welder shall be provided with a minimum 10 foot power cord and NEMA 6-50R plug compatible with the facility's welding receptacles.

D. Controls: Controls shall be located on the front panel of welder and include Pilot Arc Switch, Gas/Air Pressure Gauge, Output Control, Trouble Lights (Pressure Light, Cup Light and Temperature Light), Ready Light, Power Light and Power Switch.

E. Accessories:

1. Plasma circle-cutting guides: Guide set for cutting straight lines or circles up to 12 inches in diameter, Model No. 195-981, one each.

2. Roller guide to assist operator in obtaining recommended standoff distances, to maximize cutting performance and improve tip life, Model No. 194-883, one each.

3. Running gear and cord warp, Model No. 300-511, one each.

4. Cart, model 300-511, one each.

F. Utilities Available: 208 VAC, 1 phase, 47A.

G. Finish: Durable enamel in manufacturer's standard color.

2.15 FLOOR SCRUBBER
Equipment Mark Number: 3357

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Tennant Company or approved equal

B. Capacities and Dimensions:

1. Scrubbing paths: 36 inches

2. Forward speed: 0 to 3.1 MPH

3. Brushes:

a. Type: 36 inch cylindrical, two each

b. Motors: 3/4 hp, two each

c. Down pressure: 0 to 90 pounds

4. Solution tank: Minimum 30 gallons

5. Recovery tank: Minimum 40 gallons

6. Batteries: 6 volt, 335 AHC, six each

7. Minimum aisle turn: 67-1/2 inches, maximum

8. Maximum overall dimensions, nominal:

a. Length: 63 inches

b. Width (body): 28.25 inches

c. Width (scrub head): 38.25 inches

d. Height: 43 inches

9. Gradeability (full/empty): 6 degrees/8 degrees

10. Features and Construction:

a. Construction: Frame shall be glass fiber reinforced and high impact resistant. Brush housing shall be 3/16 inch aluminum with the scrub head being impact resistant. Tanks shall be rotationally molded polyethylene.

b. Operating system: The operators console shall be height adjustable and water resistant with an hour meter gauge and battery discharge indictor. Unit shall have power forward and reverse and brushes and water shall automatically shut off when the machine is stopped.

c. Scrubbing system: Brushes shall be designed for use on rough textured floors and attached with a spring clip system requiring no tools for changes. Brushes shall pick up small debris commonly found on floors during scrub operation without operator adjustment. For easy serviceability, the scrub head shall be modular and removed with four pins and three disconnects, requiring no tools.

d. Recycling system: Unit shall be equipped with a system that recycles the solution, which enables up to three hours of continuous runtime. Recovery and pick up systems that do not leave the floor virtually dry will not be accepted.

e. Vacuum fan: The vacuum fan shall be a 14,000 rpm, dual 0.8 hp, two-stage, 73-inch water lift with stainless steel permanent lint filter and tangential discharge. Fan shall be at least 4 inches above the waterline with the recovery tank having a 10-gallon demisting system that causes air to change direction at least four times.

f. Squeegee: The squeegee shall be of parabolic breakaway design. The squeegee assembly shall be a free floating swing type constructed of non-rusting stainless steel and aluminum with the squeegee capable of swinging to wrap around front wheels to allow all water to be picked up on 180 degree turns. No tools shall be required on either the front or rear squeegee for change outs.

g. Propelling system: The transaxle shall be completely sealed, maintenance free gear-type with two pneumatic, foam filled, non-marking, 4.1 x 3.5 x 6 inch tires and two 5 inch neoprene, non-marking casters.

h. Battery charger: 30 amp with automatic shut off.

i. Power cord: provide with a minimum 6 foot power cord and plug compatible with the facility's welding receptacles

11. Utilities Available: 120 VAC, 30 A

12. Finish: Durable enamel in manufacturer’s standard color

2.16 TANK, PARTS CLEANING
Equipment Mark Number: 3560

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Better Engineering or approved equal

B. Capacities and Dimensions:

1. Pump motor: 5 HP.

2. Minimum pump output: 100 GPM/50 PSI

3. Turntable diameter: Minimum 37 inches

4. Work height: Minimum 48 inches

5. Load height capacity: Minimum 28 inches

6. Fluid capacity: Minimum 110 gallons.

7. Weight capacity: Minimum 1500 lbs

8. Heat: 18kW

C. Features and Construction:

1. Non solvent based.

2. Roll in door- center supported Flush hose: Flexible metal hose shall include nozzle and valve.

3. Vertical (seal-less) pump- No bearings or seal below the solution level. .

4. TEFC pump motor with extended shafts that connect directly to the pump impellers (no couplings).

5. Automatic water level controls: Unit shall have electronic solution control that monitors and maintains solution levels. Monitor shall terminate power to unit when fluid level is not at correct operational height .

6. Jam-free turntable drive system.

7. Oil skimmer.

8. Slide-out filter basket

9. Low water warning and shut-down

10. 12 hr heat timer and 30 min wash timer

11. Sealed cleaning chamber

12. Mid-swing cleaning manifold

13. Construction: Unit shall be constructed of 14 gauge and 16 gauge stainless steel.

14. Clean out: 2-inch NPT bottom drain plug and removable sludge trays shall be included.

15. Power supply: Hardwire with electrical disconnect .

D. Controls: Recessed switch with amber POWER ON light. Switching and other electrical controls shall meet applicable National Electrical Code requirements.

E. Accessories:

1. Automatic 7-day/24 hour timer

2. Casters

3. Steam exhaust

4. In-line strainer

5. Insulation

6. Brush and pump for hand cleaning

7. Automatic low water shut down and automatic water fill

8. Bag Filter installed between the pump and the spray manifolds

9. Hydro-air rinse gun for manual rinsing

10. Small parts basket with lid (12x6x6)

11. Small parts basket (15x9x6)

12. Removable center rod to stabilize part

13. Removable parts “tree” to hang small parts

F. Utilities:

1. Electric: 480 VAC,60 hz, 3 phase, 31 FLA

2. Water: 1/2 inch.

3. Drain: 2 inch NPT

G. Finish: Durable enamel in manufacturer's standard color.

H. Construction: Provide all stainless steel construction.

2.17 PORTABLE DIESEL PARTICULATE FILTER CLEANER
Equipment Mark Number: 3570

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by OTC or approved equal

B. Capacities and Dimensions

1. Three neoprene rings to fit filters from 6 inches to 15.5 inches in diameter

C. Features and Construction

1. Portable

2. Fully automated operation- once started the cleaning process shall be completed with minimal operator oversight.

3. Focused air jet- Concentrates a precise high pressure stream of air directly into every cell. Utilizes a floating puck to prevent splash back

a. Provide three nozzles: two straight (short and long) for standard “open face” DPF’s and one curved for angled-flange DPF’s.

4. No internal filters that would require user maintenance.

5. Kit to include

a. Cleaning unit

b. Neoprene rings

c. Wet/Dry HEPA vacuum

d. Filter nozzles

e. Adjustable feet for standard and flanged dilters

f. Ash disposal kits

g. AC and DC adaptor cables

D. Accessories

1. Horizontal DPF handlers

a. Height range from 6-1/2” to 29-1/2”

b. Safety strap to hold load securely while moving the DPF around the shop.

c. Provide universal mounting assembly with front to back and side to side adjustment.

E. Utilities

1. Electrical: 120 VAC, 1 phase,

2. Compressed air- 100 psi 20 CFM

2.18 PORTABLE VACUUM SYSTEM
Equipment Mark Number: 3624

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Dynabrade or approved equal

B. Capacities and Dimensions:

1. Storage capacity: Minimum 9.9 gallons

2. Water pressure static lift: Minimum 90 inches

3. Sound level: Maximum 76 Decibels

C. Features and Construction

1. Number of vacuum outlets: 2

2. Number of pneumatic outlets: 2

3. Construction: stainless steel drum with plastic and metal components

4. Variable speed vacuum control

5. HEPA filtration (0.3 micron) with felt insert and paper bag.

6. Power cord: Provide with a minimum 26 foot power cord and plug compatible with the facility's welding receptacles

D. Controls: Variable speed vacuum control. Electronic thermal protection device prevents heat overload of motor.

E. Accessories:

1. x2- 1 1/4 inch I.D. x 20’ long light weight coaxial hose with built in 3/8 inch I.D air supply tubing.

2. Wall mount bracket

3. One disposable paper bag

F. Utilities:

1. Electric: 120 VAC,60 hz, 1 phase, 27 foot plug connection

2.19 WASHER, PARTS SMALL
Equipment Mark Number: 3785

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Zep equipment or approved equal

B. Capacities and Dimensions:

1. Pump:

a. Pump output: Maximum 168 gph.

2. Minimum tank size

a. Width: 36”

b. Depth: 24”

c. Height: 28”

3. Reservoir capacity: 35 gallons.

4. Agitating capacity: 400 pounds

a. 10 cfm @ 100 psi to agitate

C. Features and Construction:

1. Cabinet: 10 gauge steel

2. Adjustable agitation speed up to 160 strokes per minute

3. Spring-loaded lid for easy opening and closing

4. Flow through brush with on-off control

5. Two particulate filtration systems, 100 micron and 50 micron

6. Visible filter bowls and change indicator signal when filters need to be changed

7. 165 degree F UL approved fire link. In the event of a fire the platform will lower and the lid closes automatically.

8. Connection for filter bag

9. Power supply: Provide 115 volt 10' grounded power cord.

D. Accessories:

1. Provide Dyna 170 solvent based cleaner to fill unit.

2. Provide Dyna-trap filter bag

E. Utilities Available:

1. Electrical: 120 VAC, 1 phase, 1 amp

F. Finish: Baked-on epoxy powder coated.

2.20 WHEEL BALANCER, ELECTRONIC, PARATRANSIT
Equipment Mark Number: 4913

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Hennessy Industries or approved equal

B. Capacities and Dimensions:

1. Motor:

a. 1.5 HP direct drive, forced air cooling, large housing for heat dissipation, and heavy duty class F insulation for high temperatures applications.

b. Rated for 900 RPM.

2. Rim width: 2 to 19 inches.

3. Maximum tire diameter: 40 inches

4. Wheel weight: 45 pounds minimum to 150 pounds maximum.

C. Features and Construction:

1. Cycle time: 5 seconds average

2. Accuracy: Calibration accuracy shall be .01 ounces

3. Resolution shall be .01 ounces and 1.4 degrees

4. Provide up to 8 balance modes- static and dynamic modes, RV and four different alloy modes, plus match mount.

5. 16 bit microprocessor

6. Automatic distance parameter entry

7. Operator “A” and “B” features to accommodate two technicians using it at one time.

8. Ounce/gram selectable readings with roundoff

9. Automatic self calibration

10. Weight and adaptor storage.

11. Displays: LED display shall indicate weight and position for both planes of the wheel.

12. Guard hood: Hood shall be included as standard equipment with micro-switch interlock to prevent tire spinning unless guard hood is in position over wheel.

13. Start button: Unit shall be equipped with push ON to start spin balance and automatic stop.

14. Emergency stop: Emergency STOP button shall be mounted on front of base cabinet.

15. Power cord: Unit shall be provided with a minimum 6-foot power cord and plug compatible with facility's receptacles.

16. Controls: LED digital display with keypad data entry and computerized control panel.

17. Standard Accessories

a. Graduated Cone Assortment (hardened, 3 piece)

b. Large adapter (truck cone)

c. Cone spring

d. Hub nut

e. No-mar ring

f. Rim width calipers

g. Wheel weight pliers

D. Utilities Available: 208 VAC, 3 phase.

E. Accessories:

1. Extra large truck cone kit

2. 3,4, and 5 lug universal adapters

3. Combi-adapter for bolt hole mounting

F. Finish: Durable enamel in manufacturer's standard color.

2.21 CART, BATTERY LIFT
Equipment Mark Number: 5015

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Global Industrial Equipment or approved equal

B. Capacities and Dimensions:

1. Load capacity: 750 pounds.

2. Lowered height: 5 3/4 inches.

3. Lift: 54 inches.

4. Minimum platform dimensions:

a. Width: 30 inches.

b. Depth: 22 inches.

C. Features and Construction:

1. Construction: Steel frame and braces shall be welded construction.

2. Table adjustments: Foot operated hydraulic pump shall raise and lower table 1-1/4 vertical inches with each stroke of the fold away foot pedal. Hydraulic pump shall have valve for selection of RAISE or LOWER mode.

3. Wheels: Rubber tread 8”x2” rear tires shall be mounted on metal wheels with roller ball bearing hubs. Front lower truck frame shall be equipped with two 3-1/2” casters for positioning of vehicle.

D. Finish: Durable enamel in manufacturer's standard color.

2.22 WHEEL DOLLY
Equipment Mark Number: 5312

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by SEFAC or approved equal

B. Capacities and Dimensions:

1. Lifting capacity: Minimum 1500 pounds.

2. Extended height: Minimum 36 inches.

3. Safety chain length: Minimum 72 inches.

4. Fork Adjustment: 16 inches to 26 inches

C. Features and Construction:

1. Construction: Heavy steel welded construction.

2. Lifting crank: Hand pumped hydraulic cylinder enables lifting and lowering of roller supports.

3. Safety chain: Chain with hook to hold wheel set in place during removal and transport.

4. Roller support arms: Pull out extension for tandem wheels.

5. Rear mounted swivel casters for tight turning radius

D. Finish: Durable enamel in manufacturer's standard color.

2.23 JACK STAND- TALL
Equipment Mark Number: 5313

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by SEFAC or approved equal

B. Capacities and Dimensions:

1. Height adjustment: 53 inches to 80 inches

2. Capacity: Minimum 36,000 pounds.

3. 8 positions- 21 inch

4. Fine adjustments- 6 inches

C. Features and Construction:

1. Construction: Heavy steel welded construction.

2. Tri pod stand with 2 fixed wheels for portability.

3. Spring assisted support adjustment

4. 6 inches of threaded adjustment for flexible height adjustment

5. 7-1/2 inch diameter head for safe and secure engagement with the vehicle

6. 2-1/2 inch incremental pin adjustment

D. Finish: Durable enamel in manufacturer's standard color.

2.24 JACK STAND- SMALL
Equipment Mark Number: 5314|

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by SEFAC or approved equal

B. Capacities and Dimensions:

1. Height adjustment: 26-1/2 inches to 44 inches

2. Capacity: Minimum 36,000 pounds.

3. 7 positions at 2-1/2 inch centers

4. Fine adjustments- 4 inches

C. Features and Construction:

1. Construction: Heavy steel welded construction.

2. Tri pod stand with 2 fixed wheels for portability.

3. 4 inches of threaded adjustment for flexible height adjustment

4. 7-1/2 inch diameter head for safe and secure engagement with the vehicle

5. 2-1/2 inch incremental pin adjustment

D. Finish: Durable enamel in manufacturer's standard color.

2.25 PERSONNEL FALL PROTECTION UNIT
Equipment Mark Number 6235

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Rigid Lifelines or approved equal.

B. Capacities and Dimensions:

1. Pre-engineered track system:

a. Minimum capacity: 2200 pounds, nominal, certified for two user.

b. Minimum length: 45’

c. Three support hangers located in the middle and maximum of 6’ from each end

d. Fall protection track to have a minimum yield strength of 50,000 psi

e. Minimum yield strength of truss structure supporting the fall protection track shall be 42,000 psi

2. Self-retracting lifeline:

a. Capacity: 310 pounds, maximum.

b. Maximum arresting force: 900 pounds

c. Working length: 11 feet.

d. Webbing width: 1 inch.

e. Weight: 2.8 pounds, nominal.

3. Full body harness:

a. Capacity: 310 pounds, maximum.

b. D-ring capacity: 5000 pounds, nominal.

c. Weight: 1.71 pounds, nominal.

C. Features and Construction:

1. Operation: Personnel fall protection shall come complete with self-retracting lifeline, pre-engineered track system, and full body harness.

2. The fall protection system shall be manufactured in an ISO 9001 facility. All welders shall be AWS certified welders. Manufacturing facility must also be an AWS certified welding facility with an AWS certified Quality Management System

3. The manufacturer shall be an experienced manufacturer of fall protection equipment with at least five years of experience manufacturing full fall protection systems

4. All components used in the fall protection system shall be fully tested and documented to be in compliance with both OSHA 1910.66 App C and ANSI Z359 V2.0.

5. The manufacturer of the fall protection system shall be a member in good standing with the International Society of Fall Protection [ISFP] and American Society of Safety Engineers [ASSE].

6. Pre-engineered truss track system:

a. Pre-engineered system to be certified for two users.

b. Construction: A500B tube steel

c. Hangers to be provided and engineered by the track system manufacturer. Hangers to be designed to accommodate suspended installation including installation of kickers to prevent swaying.

d. All trusses to be fully welded to the track and top cord. Hangers and stops to be bolted to/through the track such that no welding is required for installation.

e. Utilizes rotating eye trolley with friction brakes that engage during fall to prevent worker from drifting

f. Track profile design to ensure wheel protection, accurate alignment with minimum friction, and minimum maintenance "self" cleaning profile. All fall protection tracks shall have full contact flange loading surfaces [flat] to decrease flange and wheel loads during a fall event.

g. End stop bumpers through bolted to the track

h. All components to be painted with yellow paint

7. Self-retracting lifeline: Self-retracting lifeline shall be constructed of 1 inch nylon webbing with a sewn in load indicator and transparent plastic casing for visual inspection of internal components. Lifeline shall allow user freedom of movement in all directions through the utilization of a 360 degree swivel. Life shall arrest falls immediately through the use of a cable locking speed sensing brake system and comply with OSHA 1926 and ANSI Z359.1 standards.

a. Construction: lightweight aluminum housing with stainless steel working components.

b. Provide with steel snap hook

c. 3,600 pound rated gate

8. Full body harness: Full body harness shall be designed with three points of adjustment and include a sliding back drop forged proof tested D-ring to provide shock absorption during falls, a sub-pelvic strap to provide greater support while arresting a fall, and parachute buckles to ensure 100 percent closure. Harness shall be multicolored for ease of donning and constructed of 1-3/4 inch nylon straps and include sewn-in load indicators to provide immediate visual inspection points. Harness shall comply with OSHA 1926 and meet ANSI Z359.1-1998 Standard.

D. Delegated design: Contractor is responsible for coordinating all fall restraint capacities and dimensions with owner safety personnel prior to ordering. Provide written approval and verification that system complies with owner safety standards , OSHA, and ANSI regulations.

2.26 DRAIN PAN, PORTABLE, USED OIL
Equipment Mark Number: 8165

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Graco inc. or approved equal

B. Capacities and Dimensions:

1. Minimum tank capacity: 25 gallons.

2. Drain bowl height adjustment, nominal: 45 inches to 69 inches.

3. Operating temperature: 30 degrees to 105 degrees

C. Features and Construction:

1. Construction: Polyethylene tank with used filter tray, tool holders, and sight gauge..

2. Two large wheels shall be fixed and the other two shall be swivel casters.

3. Drain bowl assembly: A vertically adjustable drain bowl assembly with lock screw and removable filter screen..

4. Hose site gauge: Permanent clear hose site gauge shows you when to stop filling.

D. Finish: Durable enamel in manufacturer's standard color.

2.27 DRAIN PAN, PORTABLE, USED COOLANT
Equipment Mark Number: 8166

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Graco inc or approved equal

B. Capacities and Dimensions:

1. Minimum tank capacity: 25 gallons.

2. Drain bowl height adjustment, nominal: 45 inches to 69 inches.

3. Operating temperature: 30 degrees to 105 degrees

C. Features and Construction:

1. Construction: Polyethylene tank with used filter tray, tool holders, and sight gauge.

2. Two large wheels shall be fixed and the other two shall be swivel casters.

3. Drain bowl assembly: A vertically adjustable drain bowl assembly with lock screw and removable filter screen..

4. Hose site gauge: Permanent clear hose site gauge shows you when to stop filling.

D. Finish: Durable enamel in manufacturer's standard color.

2.28 FILTER, ELECTROSTATIC
Equipment Mark Number: 9350

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Plymovent Corporation or approved equal

B. Capacities and Dimensions:

1. Airflow: 883 CFM, nominal.

2. Motor: 1 HP.

3. Maximum noise level: 70 dBa, maximum.

4. Coverage: Arc of 360 degrees with 10-foot radius.

C. Features and Construction:

1. Filter unit: Unit shall be constructed of steel and house filters, impeller, and a TEFC model 110 volt single phase fan motor with spark resistant fan. Unit shall be equipped with a top hinged access door for service and filter replacement with a filter protection shield below the air inlet to eliminate damage to the filter elements. Unit shall be equipped with four 4 inch swivel type lockable casters and a three-prong plug 16-foot power cord.

2. Filtration: Unit shall utilize a multi stage filtration system with the first stage being a washable 3/4 inch deep aluminum mesh pre filter, the second being an electrostatic ionizer with spring loaded stainless steel wires charged to 12,000 volts, and the third being a 176 square foot collection cell charged to 6000 volts with a filtering efficiency of 98 to 99 percent for particulates down to .000005 mm. The unit shall have the capability to house an active carbon filter to absorb unpleasant odors.

3. Extraction arm assembly: Extraction arm, Model# KUA-3-S shall be 6-1/4 inches in diameter, ball bearing collar mounted, and capable of tilting 110 degrees and rotating 360 degrees with a vertical reach of 10 feet and a horizontal circular reach of approximately 19 feet 6 inches in diameter. The arm shall have manual ratcheting and locking airflow damper included in the ring handle, five adjustable friction joints, three friction links, and constructed of black polyemide flex hose covering internal plated steel supports.

4. Filter monitoring system: Unit shall have a monitoring system to alert operator of inadequate filtration system performance. When this occurs, a yellow warning light and an audible alarm shall activate for 20 seconds. After this period, a red light shall activate and the filter fan shall be automatically disabled. The operator must then clean the collection and ionization cells before restarting the filter system.

D. Controls: ON/OFF power switch shall be located on the side panel below steering handle.

E. Accessories:

1. Hood mounted, 24 volt, 20 watt halogen lamp: Model No. HL-20/24-160 with cord and 115/24 volt transformer, one each.

2. Activated Carbon Filter: Model No. CF-002.

3. Replacement pre-filter: Model No. FF-3000, one each

4. Replacement Collection Cell: Model No. EC-3000

5. Replacement Ionizing Cell: Model No. IM-3000

F. Utilities Available: 120 VAC, 1 HP.

G. Finish: Powder coated in manufacturers standard color.

2.29 SPILL KIT
Equipment Mark Number: 9985

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by New Pig or approved equal

B. General Description

1. Spill kit contains an assortment of products for absorbing only oil

C. Capacity and Dimensions

1. Absorbency: up to 39 gallons

D. Features and Construction:

1. Chemical and water resistant polyethylene 65-gallon overpack- treated with UV inhibitors

2. Easy-open, threaded lid

3. Absorbents are packed in protective baskets with a lid for long-term protection against UV degradation; lift out baskets provide easy, organized access to contents for quick spill response

4. Empty overpack can be used as a low-cost shipping container for used-absorbents

5. Booms/socks and pads to meet NFPA 99standards for static decay

6. Provide UV-resistant overpack spill kit cover to accommodate outdoor use

7. UN certified

8. Construction

a. Overpack: Polyethylene

b. Booms: Co-Poly outer skin and Polypropylene inner skin and filler

c. Polypropylene inner skin and filler

d. Mats: Polypropylene

9. Contents included:

a. x2- 5” x 10’ oil only booms

b. x9- 3” x 10’ oil only booms

c. x40 mat absorbents

d. x10- temporary disposal bags and ties

e. x6- tamperproof labels

f. x1- instruction manual

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment securely to floor, as directed by Architect, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

C. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment

B. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. BUFFER/GRINDER, 8 INCH, WITH DUST COLLECTOR
Equipment Mark Number: 2080
Hours Required: 1

2. ABRASIVE BLASTING CABINET
Equipment Mark Number: 2270
Hours Required: 1

3. PRESS ELECTRIC/HYDRAULIC
Equipment Mark Number: 2535
Hours Required: 1

4. SCRUBBER, FLOOR BATTERY, WALK BEHIND
Equipment Mark Number: 3357
Hours Required: 1

5. TANK, PARTS CLEANER
   Equipment Mark Number: 3560
   Hours Required: 1

6. WASHER, PARTS, SMALL
   Equipment Mark Number: 3785
   Hours Required: 1

7. WHEEL BALANCER, ELECTRONIC, PARATRANSIT
   Equipment Mark Number: 4913
   Hours Required: 1

8. PERSONNEL FALL PROTECTION UNIT
   Equipment Mark Number 6235
   Hours Required: 2

9. FILTER, ELCTROSTATIC, PORTABLE
   Equipment Mark Number: 9350
   Hours required: 1

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION

SECTION 11 5110

CARBON MONOXIDE EXHAUST SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMNTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes centrifugal fans, hose reels, exhaust adaptors flexible tubing/hose, and other components necessary for a vehicle carbon monoxide exhaust system.

B. Related section include the following:

1. Division 23 Section "Metal Ducts" for metal duct work not specified in this section.
2. Division 23 Section "Testing, Adjusting and Balancing" for testing, adjusting and balancing requirements not specified in this section.
3. Division 26 Section for power supply routing, field installed disconnects, electrical devices motor controllers.

C. Equipment items as listed below by Equipment Mark Number:

1. REEL, VEHICLE EXHAUST
   Equipment Mark Number: 3304
   Submittal requirements: PD, OM, SD, T

D. Provide roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.
1. Coordinate and verify all electrical and utility connections with all trades prior to equipment ordering and purchase.

E. Piping, wiring, and switching between equipment and utilities

1.3 QUALITY ASSURANCE

A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.

B. Each product shall be provided by a single manufacturer.

C. All components shall be factory tested and documented to operate as a complete system

D. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.
2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

G. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards

1.4 PERFORMANCE REQUIREMENTS

A. Project Altitude: Base air ratings on sea-level conditions.

B. Operating Limits: Classify according to AMCA 99.

C. System Load: The system must operate satisfactorily with one (1) 425 HP CNG operated vehicles attached and running at idle.

1.5 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:
1. PD- Product Data
2. SD- Shop drawings
3. OM- Operation and Maintenance manual
4. T- Training of owners personnel on specific equipment items

B. Produce Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, and provided accessories:

1. Certified fan performance curves with system operating conditions indicated.
2. Certified fan sound-power ratings.
3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
4. Material gages.
5. Flexible tube/hose data, pressure class, heat range, material, and performance.
6. Hose reel data, construction, and operation
7. Controls
8. Adaptors, and other miscellaneous equipment.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate

dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection

1.6 INFORMATION SUBMITTALS

A. Delegated-Design Submittal: For unit hanger support frame for equipment to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified Connecticut professional engineer responsible for their preparation.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

C. Certificates: For certification required in "Quality Assurance" Article

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:
   1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:
      a. Description of system and components.
      b. Schematic diagrams of electrical, plumbing and compressed air systems.
      c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.
      d. Manufacturer's printed operating instructions.
      e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
      f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
      g. Include vendor contact information for service and warranty
      h. Include all start-up and testing reports

   2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents
   1. Nozzles: Provide two (2) extra nozzles
   2. Telescopic lifting pole: Provide two (2) extra lifting poles
   3. Contractor: Provide two (2) extra contactors associated with automatic fan start/stop controls.
   4. Hose: Provide one (1) extra high temp and low temp hose assembly

1.9 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.11 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. Lifting capacity shall be painted with letters and numbers 3 inches high Minimum on both sides of lifting mast assembly.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant

1.12 COORDINATION

A. Coordinate size and location of structural-steel support members.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Nederman or approved equal

2.2 MANUFACTURED UNITS

A. Description:

   1. Centrifugal Fan: Factory-fabricated, -assembled, -tested, and -finished, direct-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor drive assembly, mounting bracket for direct mount to hose reel assembly.
   2. Hose Reel: Factory-fabricated, -assembled, - tested, and –finished, hose reel consisting of welded frame, end plate, rotating cylinder, high temperature flexible hose/tubing, motorized operated, pendant switch, nozzles, and fan switch.

2.3 CENTRIFUGAL FANS

A. Capacity:
   1. Motor: 2 Hp
   2. Air volume: 800 cfm at 7.3” s.p.

B. Housing:

   1. Materials and Fabrication: Formed and reinforced steel housing.

      a. Outlet flange.
      b. Provide direct mount flange that will allow it to be mounted to the motorized hose reel.

   2. Finish: Epoxipolyester powder paint
      a. Color: Manufacturer’s standard

C. Wheels:

   1. Impeller: Radial tip blades

   2. Construction: Cast aluminum

   3. Fan wheel shall be statically and dynamically balanced before fan assembly. Wheels shall be balanced by means of material removal.

   4. Finish: Epoxipolyester powder paint

   5. Color: Manufacturer’s standard

D. Shafts:

1. Statically and dynamically balanced and selected for continuous operation and maximum rated fan speed and motor horsepower, with final alignment and drive adjustment made after installation.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with a rust inhibitive asphatic protective coating.
3. Designed to operate at no more than 70% of first critical speed at top of fan's speed range.

E. Bearings:

1. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball high temperature, bearings.
   a. Ball-Bearing Rating Life: ABMA 9, L_{10} of 50,000 hours.

F. Accessories:

1. Companion Flange: Galvanized steel, for duct connections.
   a. Fan outlet shall be ducted to the outside of the building as shown on drawings with minimum of 22 gauge galvanized ductwork and sealed per SMACNA guidelines.

G. Motors:

1. Refer to Division 23 Section "Motors and Variable Frequency Drives" for general requirements for factory-installed motors.
2. Class F insulation.
3. High Efficiency TEFC type suitable for indoor and outdoor installations.
4. Enclosure Type: Open dripproof.
5. Direct Drive

H. Source Quality Control:

1. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 211, "Laboratory Methods of Testing Fans for Rating." Label fan(s) with the AMCA – Certified Rating Seal.
2. Factory Test: Factory run test each fan before shipping. Provide test report to architect prior to fan installation.

2.4 HOSE REEL(S)

A. General: The hose reel(s) are motorized and intended for the removal of carbon monoxide exhaust fume from all types of vehicles. The hose will be unwound by an electric drive motor from the reel and will lock into place at the desired location. The hose will withdraw after use by the electric drive motor. Contactor switch located on the reel will automatically start the exhaust fan when reel is extended.

B. Frame:

1. Zinc coated steel tube with 12 gauge and plates.
2. The reel shall be provided with two adjustable mounting brackets that will allow for ceiling or wall mount

C. Drum:

1. The drum shall consist of aluminum zinc plated steel, bolted to two composite ends. Inside the drum provide a flexible 6.25 inch aluminum tube connecting the swivel to the drum adapter. The drum adapter is to be cast aluminum and will connect to 6 inch diameter hose
2. The drum shall be capable of accommodating 24′ of 6” tube/hose.
3. Lifting capacity: 65 lbs
4. The drum shall have a hose guide to guide the tube/hose during the first revolution of the drum.
5. A flexible 6.25 inch aluminum tube 12 inches long shall be provided to connect the reel to the fan.
6. Motor to turn via a planetary gear and drum end sprocket gear

D. Controls

1. The motorized reel will include a drive unit and control box containing a circuit board with integrated upper and lower limit switches that will not require a hose stop or mechanical switch.
2. Provide 24V two button pendant station switch to control hose up and down. Station switch to be wired to the motorized hose reel.
3. Circuit board to include relay for fan operation and micro switch operation. Control box to contain contactor and 24V transformer connected to the hose reel..
4. Provide arm with indicator LEDs showing reel status
5. Provide 3-way remote mounted over ride switch with on/off/ auto selection. Switch to be remote mounted to column. Provide required conduit and wiring from remote mount switch to control box. When switch is in on position fan to run continuously. When switch is off position fan to be disabled. When over ride switch is in auto fan to automatically start when hose is lowered and shut off when hose is raised.

2.5 TUBE/HOSE:

A. The hose shall be constructed of high temperature fabric with an external steel helix. The lower 8 feet will handle up to 1380º F and continuous temperatures of 1200º F. The upper 16 feet of hose will handle up to 660º F and continuous temperatures of 575º F. The two hoses will be joined with a steel 6” to 6” hose connector.

B. Features and constructions:

1. Size range: 3” ID through 36” ID
2. Two layers of special high temperature asbestos free material with heat stabilizers and woven stainless steel wire with galvanized steel external helix.
3. Color: Red
4. Extreme temperature resistance
5. Flame resistance
6. Silicone free
7. Excellent flexibility
8. Tight bend radius

C. Band clamps

1. Stainless steel
2. Size range: 1.5” through 36”
3. Designed to bridge helical support

4. Color- silver
5. Positive attachment and 360 degree seal
6. High strength reinforced stainless bridge section

D. Tube/Hose shall be 6″ diameter on all hose reels.

E. Provide sufficient tube/hose such that when the draw is fully retracted the tube/hose will extend from the hose reel to 6′0″ (adj.) above finished floor.

2.6 SYSTEM ACCESSORIES

A. Exhaust Connections:

1. Provide required nozzles to accommodate bus tailpipe configuration. Coordinate with owner prior to ordering.
   a. The 22 gauge stainless steel nozzle shall have a locking clamp and lifting sleeve. The nozzle will connect to 6” diameter hose and have an 8” opening

B. A telescopic lifting pole shall be provided with the nozzle. The lifting pole shall be capable of extending to 10 feet

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install centrifugal fans and hose reels level and plumb.

B. Support fans using spring isolators support furnished with fan.

1. Install as per manufacturers instructions.

C. Support suspended hose reels from structure using galvanized steel Uni-strut. Refer to details on drawings.

D. Install units with clearances for service and maintenance.

E. Label units according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment.”

3.2 CONNECTIONS

A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories.

B. Install ducts adjacent to fans and hose reels to allow service and maintenance.

C. Ground equipment.

D. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.3 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:
   1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.
   2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.
   3. Anchorage: Attach equipment securely to column with field supplied structural steel. Secure unit to support per manufacturers written instructions.
   4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains

3.4 TESTING

A. Perform tests and inspections.
   1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner

B. Equipment Startup Checks:

   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
   3. Verify that cleaning and adjusting are complete.
   4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
   5. Verify lubrication for bearings and other moving parts.
   6. Verify that fan operates when hose reel is extended.
   7. Verify all connections are made per manufacturers requirements.

C. Starting Procedures:

   1. Energize motor and adjust fan to indicated rpm.
   2. Measure and record motor voltage and amperage.

D. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.

E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

F. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.

G. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer

H. Prepare test and inspection reports

3.5 ADJUSTING

A. Lubricate bearings.

3.6 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.7 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment

B. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained
   1. REEL, VEHICLE EXHAUST
      Equipment Mark Number: 3304
      Hours Required: 1

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video

END OF SECTION

SECTION 11 5400

FARE COLLECTION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED SECTIONS

A. The General Provisions of the Contract, including General and Special Conditions, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. VAULT/RECEIVER, FAREBOX, MOBILE BIN
Equipment Mark Number: 7800
PD, OM, T

2. DATA COLLECTION AND REPORTING SYSTEM, FAREBOX
Equipment Mark Number: 7820
PD, SD, OM, T

B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

C. Piping, wiring, and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. Farebox Data collection Manufacturer shall provide the engineering, installation, calibration, wiring, conduit, hardware, software programming, and check-out necessary to for a complete and fully operational system..

B. All components shall be factory tested and documented to operate as a complete system

C. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

F. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection

1.5 INFORMATION SUBMITTALS

A. Factory tests and inspection reports prior to shipping.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information

C. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.7 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.8 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.9 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. Lifting capacity shall be painted with letters and numbers 3 inches high Minimum on both sides of lifting mast assembly.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 VAULT/RECEIVER, FAREBOX, MOBILE BIN
Equipment Mark Number: 7800

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by GFI Genfare or approved equal.

B. General Description: The mobile vault shall be designed to be placed in the bus service area and consist of a cashbox receiver on top of a mobile bin housing and a separate mobile bin on wheels that fits inside the housing. Coins and bills will be transferred from cashboxes in a rapid, secure manner to a mobile vault where bills and coins are kept segregated. The vault shall feature an interlock system that protects collected revenues from theft by requiring a secure sequence of events and conditions. In this sequence, the receiver accepts the locked cashbox and, if secure conditions are met, opens the cashbox while inside the receiver, empties the contents into a separate coin and bill compartments in the vault below and then closes and locks the cashbox.

C. Capacities and Dimensions:

1. Maximum overall dimensions:

a. Width: 38 inches.

b. Depth: 41 inches.

c. Height: 66 inches.

2. Maximum mobile bin dimensions:

a. Width: 30 inches.

b. Depth: 37 inches.

c. Height: 31 inches.

3. Storage capacity:

a. Coins: $ 12500.

b. Bills: $12500.

D. Features and Construction:

1. Environmental:

a. Ambient temperature: 0 degrees F to 120 degrees F

b. Surface heated by direct sunlight: +150 degrees F

c. Humidity range 5% to 90% RH

d. Precipitation: driving rain, exterior condensate and icing effects, wind gusts up to 50 mph.

e. Weather, oil, and diesel fuel resistant

2. Stand-alone structure, no additional supports or overhead enclosure required.

3. Vault: Vault shall be constructed of welded and ground 1/8 inch non-corroding plate steel. The front surface shall have been cleaned, prepared, and painted with weather resistant enamel, door and interior shall be made of stainless steel to deter corrosion and wear. Doors on vault shall be rigid with heavy-duty hinges and security locks.

4. Cashbox receiver: Cashbox receiver shall be located at the top of the vault for gravity assisted revenue transfer. Unit shall be of stainless steel and mechanically operated for positive control. The internal mechanism shall be operated by a crank and allow the contents to transfer securely into dual compartments in the vault below. Elements of receiver shall be integral and all engagements an/or alignments shall be positive and automatic. Receiver shall be equipped with a locking device to restrain movement of operating crank when the receiver is not in use.5-digit mechanical counter in receiver shows number of revenue transfer cycle.

5. Mobile bin: Mobile bin shall be configured with two separate compartments, one for coins and one for bills. The mobile unit must have two large revenue discharge doors with security locks, one for coins and one for bills. Coins shall be discharged from the bin by gravity using sloped stainless steel bottoms surfaces. Discharge door and openings shall be securely designed to prevent unwanted exposure of revenue. Bin shall be equipped with heavy-duty two fixed and two swivel casters. The bottom of the bin must be reinforced to inhabit deformation while being moved with forklift. Mobile bin unit must not exceed 32 inches in width to allow unit to pass through 36 inch doors. Mechanical interlocks sense

6. Receiver indicators: Indicators shall be provided adjacent to the receiver door to signify a ready condition and a process condition. Indicators shall be patches of color that appear in a small window and shall not require electricity.

7. Discharge: Unit shall have built-in time delay assist to allow for gravity discharge of bills and coins and must have secure interlocks to allow for sequence and event controlled operation.

8. Coin access door: Unit access door shall be in captive track and secured by security lock.

9. Bill access door: Bill access door shall have a continuous hinge and be secured with security lock.

E. Accessories: Vault/Cashbox Electronic Monitoring System.

F. Utilities: Vaults do not require AC power.

G. Finish: Polyurethane high visibility orange.

2.2 DATA COLLECTION AND REPORTING SYSTEM, FAREBOX
Equipment Mark Number: 7820

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by GFI Genfare or approved eaul.

B. General Description:

1. Data collection and reporting system (DCRS) shall communicate with the fareboxes to extract transaction and event data and download operating parameters and related information. The DCRS shall communicate with the vault to extract cashbox identification from cashboxes inserted in the receiver. The DCRS shall provide **three** data probes linked to an IBM PC-compatible computer capable of extracting and storing data from the bus fareboxes during routine servicing. The data system shall be capable of generating comprehensive management reports for use by the Owner.

2. System equipment: Equipment shall include but not be limited to the following:

a. Two data probes, each with junction box, probe holder, lock boxes to secure the probe when not in use, interconnecting cabling, and an isolation box for transient voltage protection.

b. Computer system consisting of an IBM PC-compatible computer with display and keyboard, laser printer, and other hardware and software. **Computer equipment to be provided by Owner. **

c. Uninterruptible power supply (UPS) for computer system, isolation box, and cashbox I.D. computer. **UPS to be provided by Owner.**

d. Data collection software and single site use license.

e. Cashbox ID computer.

f. Miscellaneous hardware as required for a complete and operable installation.

C. Features and Construction:

1. Data probe: A data probe shall be provided to permit bi-directional communications between the farebox and the data system by means of infrared technology. The probe shall be a handheld device positioned and touched to a mating data port on the farebox, requiring no plugs or physical electrical contact. The case of the data probe shall be a hardened aluminum extrusion or casting,

containing the necessary hardware for communication between the probe and the farebox. The probe shall be configured with a window of infrared-transparent plastic behind which is a communications link composed of an LED and photosensor. A slot shall be provided within the extrusion to support the probe printed circuit board. A strain relief shall be provided to support the data cable.

The data probe and cabling shall be capable of withstanding extended operations under extreme temperature and humidity variations and shall be impervious to degradation due to diesel fuel, gasoline, oil, transmission fluid, road salts, and sunlight. The data probe shall be capable of withstanding being dropped from a height of three (3) feet onto a concrete surface with no resulting loss of operation. An LED lamp shall be provided in an easy-to-see location on the probe to aid in proper orientation and operation of the data probe. The LED shall pulse at a rate of once per second to indicate that the data computer is operational and the data probe is ready for use. Once the probe is interfaced with the farebox data port, the LED shall flicker while data is being exchanged and then glow steadily for five seconds to indicate that transmission has been completed.

2. Data probe cable: The data cable shall be custom made with three (3) twisted wire pairs, a shield, and a heavy polyurethane jacket flexible at low temperatures and resistant to salt, moisture, abrasion and fuel. Cable length shall be twenty-five (25) feet. The cable shall be supported in the center by a retractor mechanism designed to hold the cable out of the way when not in use. The retractor may be attached to a supporting pole or wall. A probe holder shall be provided to hold the data probe between uses and a lockable box shall be provided to hold the data probe when not in use.

3. Junction box: Each data probe cable shall terminate in a junction box containing one or more connectors for the data probe cable(s) and a terminal strip for a cable connecting the junction box to the central isolation box. Junction boxes may be mounted on the supporting pole or to an existing structure, as appropriate.

4. Supporting poles: Data probe supporting poles and all other equipment shall be properly grounded for lightning protection through existing electrical outlets. The data probe printed circuit board and isolation boxes shall have transient protection circuits.

5. Interconnection cable: Each data probe junction box shall be connected to a central isolation box. Both ends of the cable shall attach to screw terminals. Maximum cable length is not to exceed 1,500 feet.

6. Central isolation box: The data probe subsystem shall include an isolation box designed to protect the data computer and its operator from a near-hit by lightning. The isolation box shall contain a separate opto-isolating printed circuit board for each data probe powered from a common power supply. Terminal strips shall be provided for connection to each of the data probes. The isolation box shall typically be mounted on a wall within 10 feet of the data computer, where its case can be properly grounded. Cables shall connect the isolation box to the data computer. The isolation box shall have its own 110 VAC grounded power cord.

7. Computer equipment: Computer equipment to be provided by Owner. Coordinate CPU specifications with owner and provide final software installation, programming, and connection to CPU for a complete and operable system.

D. Utilities: 110 VAC, 20 A.

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment securely to floor, as directed by Architect, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

C. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment.

B. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. VAULT/RECEIVER, FAREBOX, MOBILE BIN
   Equipment Mark Number: 7800
   Hours Required: 1

2. DATA COLLECTION AND REPORTING SYSTEM, FAREBOX
   Equipment Mark Number: 7820
   Hours Required: 1

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION

SECTION 11 5500

VEHICLE WASH EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Special Conditions, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. WASHER, HI-PRESSURE/HOT WATER, NG
Equipment Mark Number: 3720
Submittal requirements: PD, OM, T

2. HOSE REEL FOR 3720
Equipment Mark Number: 3721
Submittal requirements: PD, OM, T

3. PRESSURE WASHER
Equipment Mark Number: 3722
Submittal requirements: PD, OM, T

4. WASHER, VEHICLE, DRIVE-THRU, HYBRID
Equipment Mark Number: 3901
Submittal requirements: PD, OM, SD, T

5. WATER RECLAMATION SYSTEM, HYBRID
Equipment Mark Number: 3936
Submittal requirements: PD, OM, SD, T

B. Roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1. Coordinate and verify all electrical and utility connections with all trades prior to equipment ordering and purchase.

C. Piping, wiring, and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. All components shall be fully tested and documented to operate as a complete system

B. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for

the project from their local office

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.

E. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to indentify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Provide installation drawings showing all interconnecting utilities such as piping and electrical requirements between controller and lift.

2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, foundations, final dimensions, required clearances, method of field assembly, components, and location and size of each field connection.

1.5 INFORMATION SUBMITTALS

A. Delegated-design submittal: Final design and coordination of the bus wash foundation, pit depth by the wash manufacturer. For equipment supports and foundations to comply with performance requirements and design criteria, including analysis data.

B. Factory tests and inspection reports prior to shipping.

C. Field test and start-up reports, indicating and interpreting test results relative to compliance

with specified requirements, for information.

D. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Belts: One set(s) for each belt-driven unit

2. Filters: one set for each unit containing a filter

B. Provide one year supply of detergent and water treatment chemicals

1.8 WARRANTY

A. Washer, Vehicle, Drive-thru, Hybrid:

1. Warranty work specified herein, for a period of five (5) years beginning upon substantial completion of the project, against defects in materials, workmanship,

and performance.

2. Warranty shall include materials and labor necessary to correct defects, which shall include, but not be limited to the following:

   a. Operation: Noisy, rough or substandard operation.

   b. Parts: Loose, damaged, and missing parts.

   c. Finish: Abnormal deterioration

3. The Water Reclamation System, Mark No. 3937 shall be guaranteed by the Manufacturer or Supplier to control odors for a period of three years after final acceptance and shall take whatever action is necessary to correct any odor causes during the guarantee period without the use of chemicals. Corrective action shall be at no additional cost to Owner

4. Steel framework including galvanizing, welds, and overall integrity shall be warranted for ten (10) years.

B. Warrant all other work specified herein for one year from substantial completion against defects in materials, function and workmanship.

C. Warranty shall include materials and labor necessary to correct defects.

D. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

F. All parts shall be readily available locally in the United States.

1.9 COORDINATION

A. Coordinate size and location of all foundations, pit depth, pit size, bus wash location, supports, piping, electrical, and controls

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.11 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's

name, address, model number, serial number and pertinent utility or operating data.

B. Label all piping in vehicle wash and water reclaim systems as to its function and flow direction.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 WASHER, HI-PRESSURE/HOT WATER, NG
Equipment Mark Number: 3720

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Hotsy Corporation or approved equal.

B. General Description:

1. Hi-pressure/hot water natural gas fired washer shall be designed for effective cleaning of vehicle exteriors through the use of handheld wash wands. Washer shall be complete and operable with all equipment items necessary for a complete wash system, including required piping to all hose reels and wash wands shown on the Drawings.

2. OSHA requirements: The system shall meet or exceed all applicable OSHA standards.

3. Electrical wiring: Electrical wiring shall be in accordance with the latest edition of the National Electric Code and the appropriate sections of Division 26.

4. Certification: Unit must be ETL, UL, CGA or CSA certified and must conform with UL Standard 1776 for pressure washers.

C. Capacities and Dimensions:

1. Pump motor: 20 HP, 1,725 RPM.

2. Maximum discharge capacity: 7.8 GPM.

3. Operating pressure: 3,000 PSI.

4. Float tank capacity: 10 gallons.

5. Heat rise capability: 140 degrees F at 8 GPM.

6. Hose:

a. Inside diameter: 1/2 inch.

b. Length: 50 feet.

c. Burst pressure: 12,000 PSI, minimum.

d. Quantity: One each.

D. Features and Construction:

1. Fabrication: Unit shall be welded frame with enclosed motor cabinet, and enclosed coil cabinet.

2. Water pump: High-pressure pump shall have positive displacement with ceramic plungers, forged brass head, oil bath crankcase, and Buna-N and cloth "V" seals. Both sides of pump shall be fed from the float tank. Pump shall have an oil drain for ease of oil changes.

3. Burner: 720,450 BTU/hour ring type natural draft gas burner shall have aspirating spuds and AGA-listed controls. Manually operated pilot shut-off valve shall be provided to independently shut-off gas supply to pilot. Unit shall be equipped with 24 volt electronic spark ignition. Sealed pressure switch shall control opening and closing of gas valve.

4. Heating coil: Vertically fired water heating coil shall be fabricated with 300 feet of 1 inch, hydrostatic pressure tested tubing, 14,900 PSI burst pressure rated. Coil skin shall be aluminized steel for corrosion resistance. Heating coil to be insulated with fiberfrax ceramic blanket.

5. Wand assembly: Trigger gun control with 48-inch chrome plated wand and polymer insulated grip and side handle.

6. Nozzles: Three hardened stainless steel nozzles with 1/4 inch male quick coupler shall be provided, one each 0 degree, 15 degree, and 40 degree patterns.

7. Pump drive motor: Belt drive system with triple groove cast iron pulleys, grip notch V-section banded belt and auto tensioning arm for belt alignment and tension shall be provided. Motor shall be mounted to side out rails for removal. Belts and pulleys shall be covered for operator safety.

8. Float tank: Float tank shall be composed of polyethylene plastic with automatic nonplugging float valve.

9. Unloader valve: Pressure maintenance during multiple gun operation shall be provided by unloader valve.

10. Pressure switch: Automatic burner shut-off protection shall be provided by pressure switch.

11. Relief valve: Pressure relief valve shall be located at the discharge port of the coil for over pressurization protection.

12. Thermostat: Adjustable thermostat shall control water temperature to a maximum of 248 degrees F.

E. Controls: Control panel shall include magnetic motor control with overload protection and ON/OFF water heater switch, individual burner and motor rocker style monetary switches, adjustable temperature controller, hour meter and detergent metering valve, safety and pressure relief value, pressure switch.

F. Accessories:

1. Draft diverter, 12 inch, natural gas, Hotsy No. 87177300, one each.

2. Remote control (Smart Box): Remote water tight three button control system to activate unit and HEAT/SOAP and rinse function with timer and automatic shut-off, Hotsy No. 89169890, one each.

3. Security keyswitch: Remote water resistant key switch to secure operation of Hotsy equipment to authorized personnel, Hotsy (San Antonio – Smart Control Systems, LLC, DBA Hotsy Equipment Co., 3452 IH35 North, Suite 120, San Antonio, Texas 78219, 800-468-7999) No. 75.0401.

4. Structural machine stand-four feet tall. Stand to be fabricated from stainless steel angle with welded connections.

5. Provide with commercial auto off mechanical timer with 2 hour duration and without a hold option.

G. Utilities Available:

1. Electrical: 460 VAC, 3 phase, 20 HP.

2. Water: 3/4 inch, 8 GPM.

3. Natural gas: 720 CFH.

4. Exhaust: 10 inch with draft diverter.

H. Finish: Epoxy powder coating in manufacturer's standard color.

2.2 HOSE REEL FOR 3720
Equipment Mark Number: 3721

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Hotsy Corporation or approved equal.

B. General Description:

1. Hose Reel for mark Number 3720

2. OSHA requirements: The system shall meet or exceed all applicable OSHA standards.

3. Electrical wiring: Electrical wiring shall be in accordance with the latest edition of the National Electric Code and the appropriate sections of Division 26.

C. Capacities and Dimensions:

1. Hose:

a. Inside diameter: 1/2 inch.

b. Length: 50 feet.

c. Burst pressure: 12,000 PSI, minimum.

d. Quantity: One each.

D. Features and Construction:

1. Wand assembly: Trigger gun control with 48-inch chrome plated wand and insulated grip and side handle.

2. Nozzles: Three hardened stainless steel nozzles with 1/4 inch male quick coupler shall be provided, one each 0 degree, 15 degree, and 40 degree patterns.

E. Components:

1. Wand and hose assembly: One each in addition to standard wand and hose assembly. Hose (50 foot), Hotsy No. 87393930, one each. Gun, Hotsy No. 8749170, one each. Lance, Hotsy No. 87253880, one each. Quick Disconnect, Hotsy No. 98021640, two each. . Nozzle (0 degree), Hotsy No. 87087010, one each. Nozzle (15 degree), Hotsy No. 87087020, one each. Nozzle (40 degree), Hotsy No. 87087040, one each.

2. Hose Reel: Manually retractable reel capable of housing 1/2 inch 50 foot hose, Hotsy No. 89045180, one each with wall mounting kit, Hotsy No. 98022680.

F. Finish: Manufacturer's standard finish in manufacturer’s standard color.

2.3 WASHER, VEHICLE, DRIVE-THRU, HYBRID
Equipment Mark Number: 3902
WATER RECLAMATION SYSTEM, HYBRID
Equipment Mark Number: 3937

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Westmatic or approved equal

B. General Description:

1. Heavy-duty two-brush stationary hybrid drive through vehicle wash capable of washing a high volume of various sizes and styles of vehicles. The machine shall control the wash process to provide a consistent wash result without relying on the judgment of individual drivers. The need for speed sensors, and warning buzzers are not required

2. The unit is to be manufactured according to quality assurance standards of ISO

9001 and environmental standards of ISO 14001

3. This system is capable of washing the front and rear of the vehicles several times during a single pass and includes a special mirror protection program. The front of the vehicle shall be washed with robotic high pressure booms or brushes. The machine fully controls the degree of brush pressure delivered to the vehicle and automatically adjusts as required. For optimal wash result, the vehicle MUST stop to wash the front and rear.

4. The wash functions of this system are operated automatically and controlled by infra-red technology. The wash system shall regulate the washings actions and speed of the drivers to maximize cleaning results while minimizing incidents of damage to vehicles or machine.

5. The system is complete with all control systems, metering devices, drive motors, pump stations and brush assemblies

C. Performance:

1. The Manufacturer or Supplier of the Vehicle Washer, Mark Number 3902 shall be responsible for the design of a washer that satisfactorily washes the Owner's vehicle fleet.

a. The washer shall remove all visible, heavy dirt accumulation and most of the road film from all surfaces including the rear of the Owner's vehicles.

D. The Manufacturer or Supplier of the Vehicle Washer shall be solely responsible for the performance of the washer, as specified, and shall modify, add to, or alter the equipment, as necessary, without any additional cost to the Owner, to provide a satisfactory performance.

E. The brush unit, pumping stations and all electrical controls shall be designed, assembled and supplied by one manufacturer.

F. Minimum of 5 past successive years regularly engaged in the manufacture of bus washers

G. Submit the following information:

1. Provide name of contact person at each installation location who is familiar with the operation and maintenance of the wash system equipment.

2. Provide a sample copy of a typical Operations Manual of similar equipment package as is specified herein. The manual to be prepared according to these specifications requirements.

3. Provide other pertinent information, which details the equipment ratings, performance and applicability of the supplier’s proposed vehicle wash system

H. Equipment Assembly and Testing

1. Assemble and test all equipment at the factory prior to shipment.

2. Ship equipment disassembled only to the extent deemed necessary for reasons of

shipping limitations, handling facilities and avoiding damage.

3. Hydrostatically test all pressurized equipment at two (2) times working pressure.

4. Balance all pump impellers statically, dynamically, and hydraulically and test for design flow and head.

5. Test all factory wired control panels for proper operation.

6. Each motor shall have its insulation resistance to ground measured with 1000 volt "Megger" prior to connections. Make record of these values. Values of resistance of less than ten meg ohms will not be acceptable

I. Installation:

1. Install all components according to manufacturer's installation and specifications.

2. Coordinate installation of equipment with other related work as scheduled or indicated on contract drawings.

3. Vehicle Wash Equipment manufacturer is to provide all final interconnections to and between wash equipment in order to provide a complete and operable system. This includes all water piping, compressed air piping, electrical power and conduit, and control wiring and conduit. Bus wash manufacturer is responsible for all coordination with other trades including final location of bus wash equipment, foundation requirements, and utility requirements. Bus wash manufacturer to provide all motor starters, disconnect switches, and transformers required. Bus wash manufacturer is responsible for all final connections to water, electric, and compressed air utility mains terminated within the water reclaim room. Refer to drawings for further information.

J. Bus wash operation:

1. Vehicles entering the wash area will first pass under the stationary pre-rinse/detergent arch. This detergent arch is designed in 3 parts, to provide chemical coverage to the front, sides, and rear of the vehicle.

2. Just before reaching the machine, the driver is signaled to stop by a red light (traffic light). When stationary, the high pressure booms or brushes (depending on program selected) move into the center of the vehicle and the front wash begins. The front windshield area is cleaned by a side-to-side and overlapping motion. The number of passes during this segment shall be able to be programmed to the desired activity by the transit agency.

3. Once the front cleaning function is complete, the brushes/high pressure booms will withdraw and move automatically around the mirrors "Mirror Protection Program". The driver will receive a green light indicating to proceed as the side brushes move into the sides. The booms also move to an optimal washing distance. The sides of the vehicle are cleaned with brushes and high pressure water (depending on wash program selected). The high pressure pipes shall oscillate at an optimal speed during the side wash.

4. When the rear of the vehicle enters the main wash unit, the driver is signaled to stop by a red light (traffic light). The brushes or high pressure booms shall then move into the back of the vehicle, cleaning with a side-to-side and overlapping motion. The number of passes is programmed to the owner's desires. Alternate program choices are available to accommodate differing styles of vehicles within the fleet.

5. Once the rear has been cleaned, driver is indicated to proceed by the traffic light. The vehicle then proceeds through the final rinse arch as it exits the wash.

6. Total wash time will be approximately 90 seconds.

7. The driver shall under no circumstances drive into the brushes or booms with the vehicle

K. Capacity and Dimensions:

1. Vehicle dimensions, nominal:

a. Length

1) Maximum- 40 feet.

2) Minimum- 25 feet

b. Width: 8 feet, 6 inches (plus mirrors).

c. Height: 11 feet, 4 inches.

L. Features/Performance/Construction

1. Brush Machine Housing:

a. All frame structures shall be hot dip galvanized with the main structural legs not less than 6 by 6 inches square tubing. All frame structures shall be hot dip galvanized.

2. Brushes:

a. The system shall be equipped with 2 vertical brushes. They shall be suspended and full length, capable of washing the vehicle's front if desired, as well as, the rear of the vehicle multiple times with an overlapping movement. This set of brushes will also wash the vehicle's sides and shall be equipped with an automated mirror avoidance program. This function shall be capable of multiple programs to accommodate various styles of vehicles that exist in the fleet presently, and any future styles that may be procured during the lifetime of the wash system

b. Brush pressure is to be electrically driven, with the inclusion of an amperage meter for brushes 1 to 2 which is to constantly monitor pressure on the vehicle's surface. The movements of these brushes are electrically controlled via worm gear boxes and maintenance free belts. Should pressure become too high due to malfunction or driver error, the system

shall automatically shut down to prevent damage. The cause of the shut down shall be indicated on an LED screen within the main control panel. Reactivation of the system shall be achieved by resetting the breaker switch.

c. Start and stopping of the brushes shall be achieved through via infra-red photo cells.

d. Brushes shall have a provision of water and detergent delivery. The mixture of detergent to brushes shall be adjustable from the floor level allowing for adaptation to wash conditions. Piping shall be galvanized with brass spray tips. Brushes are to be driven by energy efficient and durable 3 phase TEFC motors. Infra-red sensors shall be controlled in such a manner as to not start the machine by pedestrian traffic.

e. Bristles shall be polyethylene material that is "X" grooved to facilitate water and detergent delivery. The tips shall be flagged to provide soft touch to prevent scratching to glass and paint. Each brush section shall consist of a pliable plastic backing which is mounted to a 4-3/4” hot dip galvanized steel tubing with a wall thickness of 0.16 inch. All sections of each brush unit shall be full density with a minimum of 84 tips per square inch on all brush sections.

3. Self-adjusting robotic high pressure booms

a. The system shall be equipped with 2 vertical self-adjusting robotic high pressure booms. Booms shall be suspended and full length, capable of washing the vehicle’s front if desired, sides and rear of the vehicle multiple times. Booms must be capable of adapting and contouring to various sizes and shapes of different vehicles.

b. The movements of these high pressure booms (in/out) are electrically controlled via worm gear boxes and maintenance free belts.

c. Pivoting and oscillation of the vertical spray pipes shall be achieved via electric gear/motors. The pipes shall be capable of 180 degrees of rotation. The rotation mechanism shall be capable of stopping rotation at 0, 45, 90, 135, and 180 degrees when needed in order provide the best possible spray angle for the current wash process. Start and stopping of the high pressure booms shall be achieved via infra-red photo cells.

4. Pre soak/ detergent arch

a. The pre-soak arch shall deliver approximately 4 gallons per minute at 45 PSI, to provide efficient and economical vehicle coverage. The spray pipes are manufactured of Stainless Steel. Spray tips shall be brass and equipped with quick disconnects. The pre-soak arch shall be designed in 3 parts, to provide complete coverage of the sides, front and rear. Each part is equipped with a brass solenoid valve to maximize effectiveness. To maximize efficiency and reduce chemical costs, spray to the front and rear of the vehicles shall only be applied when those portions of the vehicle are under the spray arch. The functions of start, stop, sprays for front, and

back, shall be controlled infra-red sensors.

5. Detergent Mixing System

   a. 10G (40-liter) buffer tank for mixing detergent (pre-soak) with automatic mixing of concentrated detergent and water

   b. Pre-determined mix of water and detergent automatically refilled through valve operated by a float Mixture can be changed for winter or summer conditions by changing the nozzle in suction hose of the detergent. Equipment is delivered with a large number of color-coded nozzles, where each color represents a specific mixture

   c. To prevent separation of detergent from water when equipment is inactive, the equipment is delivered with a bypass-type mixture device from pump to tank

   d. Detergent pump is placed on a galvanized floor stand under the buffer tank

6. Buffer Tank, for high pressure pump (qty 2)

   a. Buffer tank with volume of 400G for high pressure pumps for feeding to high pressure booms and optional chassis wash. Tank made of plastic material with automatic refill via solenoid valve and level control delivered complete with suction and bypass connections and shut-off valves. Includes protection for connected pumps “running dry”

7. Traffic Lights/Speed Control System

   a. The drivers will be directed throughout the entire wash process with a minimum of two LED-traffic lights (Red/Yellow/Green). 8” diameter light modules. Lights will interact and be a function of the control system. Traffic lights will be contained in a watertight enclosure.

8. Final Rinse Arch

   a. The final rinse spray arch shall consist of a 3/4 inch galvanized pipe equipped with no less than 20 brass spray tips, mounted on a galvanized frame.

   b. The system shall provide a complete final rinse utilizing no more than 30 GPM @ 45 PSI

   c. All start/stop functions are to be activated by infrared sensors.

9. Water Recycling System with Ozone Generator

   a. System Performance: A wash water reclamation system shall be provided to support 1 vehicle washers by reclaiming all wash and rinse water for reuse in wash cycles. Pumps, separators, controls and valves shall all be located above grade, easily serviceable, and provision shall be made to continuously polish the wash water, storing in advance of use in a wash

water-receiving tank outfitted with an overflow port.

b. To achieve highest economical level of water recycling without the use of any chemical additives.

c. Recycling of approximately 85% of used water.

d. Stainless Steel hydro-cyclones as mechanical purifying unit.

e. Purification level down to particle size 10 microns density 2 with dirt load of 1 g/liter.

f. Fresh water cross-over shall be included (in case of disrupted operation).

g. Hot dipped galvanized framework

h. System includes an Ozone generator for removal of bacteria and odors in recycled water. Completely automatic function producing approximately 5 gr ozone/hour.

10. Water Softener (final rinse)

a. Installation is to include a commercial services water softener capable of supplying soft water with excellent abilities of hardness removal.

b. The softener is to have a corrosion resistant multi-port hydraulic valve with a bypass valve. Flow regulators shall be self-adjusting providing uniform flow rates regardless of pressure. The unit is to be modular in design will all service parts contained within removable cartridges.

c. All softener regeneration cycle times are to be fully adjustable. Error diagnostics are also to be displayed for troubleshooting assistance. The unit is to have a battery backup for memory retention, negating the need to reprogram in the event of power interruption.

d. Tanks will be designed for a working pressure of 100 PSI. The pressure vessel is to be constructed of non-corrosive reinforced fiberglass, containing high efficiency softening resin with no color throw, and long life physical stability. A 40 gallon brine tank equipped with a float operated shut-off to prevent brine tank overflow is to be included.

e. The system is to contain one shutoff valve on the main water feed into the water softener, and one shutoff on each of the fresh water lines leading to the wash unit and the chemical mixing systems.

f. A by-pass valve shall be included in case of trouble or service for the water softener

11. Tire Guide Rails

a. The tire guide rails shall be flared at the entrance to facilitate entrance into the wash. The guide rails shall be constructed of 4” tubular steel pipe. Rail height is not to exceed 6”. All sections shall be smoothly finished to avoid

damage to tires. Rails are to be anchored to the floor with ½" galvanized or non-corrosive concrete lag bolts.

b. All components of the tire guide rails shall be stainless steel.

12. PVC Splash Guards

a. Machine delivered with brushes completely covered with side splash guard made of PVC protected polyester

b. Hot dipped galvanized frame work

13. Dryer/blower

a. Hot Dip Galvanized 4" X 4" square steel tubing framework.

b. Standard Clearance: 14' High x 9' Wide

c. Producers (plastic) Width 28", Height 32-1/2", Depth 29", Nozzle Opening 5" x 10",

d. 5400CFM, Air Velocity 165MPH

e. Motors: Each 15HP, TEFC, 3510RPM, 215 FRAME, 15HP

f. Five (5) Fan/Motor Assemblies (2 on each side, 1 on top). 75HP Total

14. Controls

a. The system shall be equipped with self-diagnostic software that indicates any errors, malfunctions, or other stoppages via the LCD display screen. The nature of the shutdown shall be displayed on the XBT-control panel (LCD screen). The terminal has three different color backgrounds depending on the status of the machine; Green for OPERATIONAL MODE, Orange for EMERGENCY STOP and Red for ALARM. The XBT terminal in the machine's main electric control box adjusts the load sensitive power relays.

b. The system shall include a counter that displays the number of washes performed, both collectively and in various programs chosen. The system is to contain the capability to perform numerous unique wash programs for differing wash choices. Alternate wash selections can be activated by the driver on a control panel prior to commencing the wash. The M340 PLC-steering shall control and monitor the entire cleaning process.

c. All wash components are to be activated by infra-red eyes.

d. All electrical components shall be UL/ULC listed. All control panels shall be UL/ULC listed as a complete enclosed industrial control panel. The main control panel is to include an Ethernet module for use with customer supplied network connection that will allow for functions such as off-site adjustment to wash programs when desired.

e. Front and rear wash process can be programmed for multiple passes of the brushes. The Ethernet module will also permit off-site technical support, and diagnosis.

f. There shall be five emergency stop buttons, one located on each corner of the machine and one on the main control box.

g. The main control box shall include an XBT-control panel with a LCD-screen to provide the following standard functions:

1) There shall be touch-less only, brush only or combination versions of the following:

a) Buses with Bike Racks (Front, Sides and Rear Wash, complete wash)

b) Buses w/o Bike Racks (Front, Sides and Rear Wash, complete wash)

c) Sides and Rear Wash

d) Sides only

e) Touch-less only

f) Small Vehicle (Car, SUV, Pickup)-Touch-less Only

g) Drive Through Without Wash

h) Brushes 1 & 2 Off/On

i) High Pressure Booms Off/On

j) Detergent Arch Off/On

k) Emergency Stop

l) Emergency Stop Reset

15. Provide with an Ethernet module to enable contact between the machine's PLC and the factory for remote diagnostics and off-site program adjustments (network/ internet access required)

16. Skid Plates

a. Provide oversized, flat, polished 3/16 inch thick stainless steel skid plates mounted flush to slab. Angled entry section of tire guide shall minimize tire sidewall damage caused by resistance to lateral movement resulting from misaligned entry to vehicle washer. Plates shall be nominally 4 feet 6 inches wide tapering with tire guide angle to 3 feet 6 inches wide at entrance to straight section of tire guides. Plates shall be 11 feet long.

17. Solenoid Valves: Fresh water solenoid valve shall be slow-closing type to prevent

hammering and stress on water lines. All water solenoid valves shall be union isolated

18. Chassis wash

    a. There shall be one (1) chassis wash stations in each bus washer lane, activated by individual photo cells and shall function as follows:

    b. As bus approaches first chassis wash station the underbody is washed with high pressure recycled water.

    c. All chassis wash pipes, pipe fittings, nozzles, etc. shall be recessed in concrete floor so as not to create a tripping safety hazard. Spray nozzles shall be made of stainless steel. Spray piping shall be galvanized

    d. Chassis wash spray system shall be furnished complete with all hose kits, foot valves, relief valves, shut off valves, suction and bypass connections, low water pump protection, actuation controls, and all other required hardware and incidental components necessary for a complete installation working separately or integrated with overall wash cycle controls.

    e. Provide stainless steel cover to cover trench associated with the chassis wash.

19. High Pressure Wheel Wash

    a. Designed with optimized high-pressure spray pattern to clean the vehicle wheels, rims and rocker panels

    b. Galvanized steel high-pressure pipe (one each side). Minimum 12 stainless steel spray nozzles.

    c. Wheel wash pipes shall suspended by floor mounted brackets on either side of the wash bay

20. Pumps

    a. Pre soak detergent arch:

        1) Stainless steel corrosion-resistant horizontal multi-stage centrifugal pump

        2) Capacity 6.6GPM (25 liters/min) at 60 psi (4.0 bar)

        3) Direct drive single-phase electric motor.

        4) Carbon-type shaft seal

        5) Relief valve of washer-type and bypass function included

        6) Inlet filter

    b. High Pressure Pump

1) Capacity Minimum 50HP Total, 60GPM @ 1200psi

2) Direct drive electric motor for the pump

3) For attaching to floor

4) Direct start

5) Connector hoses included - All vital parts in polished 304 stainless steel

c. High pressure chassis wash pump:

1) Used to supply the tire, chassis wash, and the overhead high pressure arch.

2) This chassis wash shall have its own, dedicated high-pressure pump

3) The High-Pressure Pump shall be a multi-stage vertical stainless steel centrifugal type with a 25hp direct-drive, direct-start motor. Capacity 92GPM at 285psi. All vital parts are polished stainless steel SIS 2333. Pump is delivered with all connector hoses

d. Detergent Pump:

1) A diaphragm metering pump shall inject concentrated detergent into the wash water. The pump shall operate on 120 VAC power. Pump shall include double ball inlet and outlet cartridge type ceramic check valves. Chemical resistant PVDF valve body and fittings, ceramic balls, Viton seals and TFP/P ball seat o-rings. No metal springs are used. Pump shall be capable of a maximum output of 5.9 OZ/Min @ 125 PSI. Output shall be adjustable from 5-100% via stroke length adjustment

e. Water recycling system and ozone generator

1) All pumps are designed for dirty water with oil resistant gaskets and ceramic seals.

2) Submersible pump, 3/4HP, for recycled water, is mounted in ground tank / pit

3) Multi-stage vertical stainless steel centrifugal type filter pump with a 5hp direct drive motor. Capacity 72GPM (275 liters/min) at 71psi (5.0 bar). All vital parts are polished stainless steel SIS 2333. Pump is delivered with all connectors

4) Brush Recycled Water Feed Pump: Multi-stage vertical stainless steel centrifugal type with a 3hp direct drive motor. Capacity 44GPM (165 liters/min) at 71psi (5.0 bar). All vital parts are polished stainless steel SIS 2333. Pump is delivered with all

connectors

M. Finish: Metallic surfaces not suitable for galvanizing shall be coated with 95% zinc primer and covered with durable machine enamel. All erection bolts shall be plated Grade 5.

N. Utilities Required:

1. Electrical:

a. 460V/3 phase, 20 amp- main control panel for the brush wash

b. 460V/3 phase, 125 amp- pump control panel

c. 460V/3 phase, 125 amp- blower control panel

d. 120 V/1 phase, 5 amp- Ozone generator

2. Air: 1/2 inch supply line at 60 PSIG, 15 cfm

3. Water: 1 ½ inch supply line at 60 PSIG, minimum, 40 GPM

4. Drain: 4 inch, minimum overflow to sewer from reclaim pit

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

C. Report in writing to the Architect any damaged, missing or incomplete scheduled equipment and improper rough-in work or utility stub-outs.

3.2 INSTALLATION

A. Vehicle Wash Equipment manufacturer responsible for final interconnections to wash equipment in order to provide a complete and operable system.

B. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

C. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level (or slight slope as required by instructions), plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Use fastenings as specified herein. Attach equipment securely to prevent damage resulting from inadequate fastenings. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches, blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

B. Prepare test and inspection reports

C. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

D. Performance Testing: Each washer shall consecutively wash five vehicles of Owner's choosing within 45 minutes.

E. Equipment shall not damage vehicles, including mirrors, windshield wipers and windows, or equipment itself.

F. Malfunctions during testing shall be corrected within five days and re-tested. Malfunctions during second testing shall be corrected within five days and retested.

G. Inadequate Performance: If equipment fails third test, Owner may elect to have all specified Vehicle Wash Equipment removed from site at no cost or obligation to Owner.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. WASHER, HI-PRESSURE/HOT WATER, NG
   Equipment Mark Number: 3720
   Hours Required: 2

2. PRESSURE WASHER
   Equipment Mark Number: 3722
   Hours Required: 2

3. WASHER, VEHICLE, DRIVE-THRU, HYBRID
   Equipment Mark Number: 3902
   Hours Required: 4

4. WATER RECLAMATION SYSTEM, HYBRID
   Equipment Mark Number: 3937
   Hours Required: 4

B. Washer, Vehicle, Drive-thru, hybrid training:

1. At least 30 days prior to schedule delivery of equipment, submit to the Engineer a detailed outline of the Contractor’s training program for the Customer’s personnel. Include such information as the duration of the program, material and literature to be utilized, topics to be covered, and any material and equipment required to be provided by the Customer.

2. The training program shall include familiarization with equipment operation and performance and detailed instruction in operation, maintenance and test procedures and shall be provided for:

   a. Engineer and Management

   b. Operating Personnel

   c. Maintenance Personnel.

3. The training program shall include the equipment operation and maintenance manual as a basic text for instruction. The program shall be organized to permit the Customer to develop, within its own organization, the capability to continue the education of its personnel in the proper operation, maintenance, and repair of the equipment. The Contractor shall assume no prior knowledge, on the part of the Owner’s personnel, of the equipment

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION

SECTION 11 5600

FUELING SYSTEM EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aboveground fuel storage tanks, piping, pumps, dispensers, chipkey reader hardware, accessories, and any other component parts reasonably incidental to providing a complete fuel dispensing system.
2. Excavation, trenching, backfilling and compaction for fuel piping.

1.3 QUALITY ASSURANCE

A. American Society for Testing and Materials (ASTM)

1. A53-81a Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
2. A120-81 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

B. Underwriters Laboratories, Inc. (UL)

1. Requirements applicable to product listing and labeling.

C. All work shall be installed in compliance with NFPA Standards 17, 30, 30A, and 31.

D. Comply with Connecticut Department of Transportation and local state codes.

E. Comply with EPA Regulations 40 CFR Part 280.

F. This contractor, including the installation foreman shall have not less than five years continuous experience in the installation of fuel storage systems. They shall be fully qualified for fuel tank installations by the tank manufacturer and shall have attended the manufacturer's training seminar within the past two years.

G. Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.

H. All components shall be factory tested and documented to operate as a complete system.

I. The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

J. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.4 ACTION SUBMITTALS

A. Product data including rated capacities of selected model, weights (shipping, installed, and operating), furnished specialties, electrical requirements, equipment interconnections, and accessories; and installation and startup instructions.

B. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection.

C. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring.

1.5 INFORMATION SUBMITTALS

A. Factory tests and inspection reports prior to shipping.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

C. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:
   1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:
      a. Description of system and components.
      b. Schematic diagrams of electrical, plumbing and compressed air systems.
      c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.
      d. Manufacturer's printed operating instructions.
      e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
      f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
      g. Include vendor contact information for service and warranty.

h. Include all start-up and testing reports.

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: Provide one additional diesel fuel filter for each pump.

1.8 WARRANTY

A. Aboveground fuel storage tank

1. Shall be warranted for 30 years against failure due to internal or external corrosion and structural failure

B. Warrant work specified herein for two years from substantial completion against defects in materials, function and workmanship.

C. Warranty shall include materials and labor necessary to correct defects.

D. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

E. All parts shall be readily available locally in the United States.

F. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.9 COORDINATION

A. Coordinate size and location of all foundations, supports, piping, electrical connections, and controls.

1.10 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid or dusty conditions.

B. Label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.11 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

C. Provide FM Global approval labeling for all items that have been tested and labeled as such.

PART 2 - PRODUCTS

2.1 ABOVEGROUND FUEL STORAGE TANKS

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Modern Welding or approved equal

B. Comply with the following standards:
1. UL 142- Underwriters Laboratories, Inc., Steel Aboveground Tanks for Flammable and Combustible Liquids.
2. U.L. 2085, Underwriters Laboratories 2 Hour Fire Rating's Standard for Insulated.
3. NFPA 30, National Fire Protection Association Flammable and Combustible Code.
4. NFPA 30A, National Fire Protection Association Automotive and Marine Service Station
5. Uniform Fire Code International Fire Code Institute
6. B.O.C.A. National Fire Prevention Code

C. Double wall steel UL 142 and 2085 insulated fuel tank with 110% secondary containment, manholes, support saddles, required tank openings, lifting lugs and accessories.

D. Minimum annular space insulation thickness material to be 3". Only UL-2085 listed insulation material shall be used.

E. Internal Load: Tank shall be able to withstand an air pressure test of 3 to 5 psi.

F. Tank shall be designed to support accessory equipment such as ladders, pumps, floating suction, etc. when installed according to manufacturer's instructions and limitations.

G. Tank shall be provided with suitably designed and located lifting lugs which have a 2:1 safety factor

H. Tank shall be capable of storing liquids with a specific gravity up to 1.0

I. Tank is designed for operation at atmospheric pressure only. Both inner and outer tanks shall have openings of sufficient size to meet normal and emergency venting requirements stated in U.L. 142, UFC and NFPA

J. Tank shall be capable of storing gasoline, gasohol, jet fuel, avgas, diesel fuel, methanol or fuel oil at ambient temperatures.

K. Certification Plate: Underwriters Laboratories label "Insulated Secondary Containment Aboveground Tank for Flammable Liquids." shall be affixed to each tank.

L. All threaded fittings shall be of a material of construction consistent with the requirements of the Underwriters Laboratories. All fittings shall be protected using threaded plugs or suitable closure caps

M. Manways shall conform to Underwriters Laboratories 142 standard with regard to construction, bolting and gaskets.

N. Provide required support saddles: design of the steel supports shall be per approved UL listing and be able to support the weight of the tank filled to capacity.

O. Provide access ladder and platform.

P. Cylindrical construction, the primary and secondary tanks shall successfully complete an air pressure test prior to installation. While maintaining pressure of 3-5 psig on the primary tank, the annular space bounded by the primary and secondary containment tank shall be pressurized to 1 1/2 to 3 psig. The secondary tank shall then be checked for tightness.

Q. The interstitial space between the primary tank and the secondary tank shall be suitable for monitoring leaks.

R. Tank to be retested at the jobsite by the installer prior to installation.

S. Provide required coupling kits for pipe penetrations through enclosure.

T. Provide electrical fitting kits for 3/4 in. and 1 in. electrical conduit penetrations through enclosures.

2.2 PIPING

A. Below ground fuel piping: Flexible double wall PVDF construction with primary inner barrier, structural body, primary pipe outer barrier, and secondary pipe.
   1. The outer containment pipe shall include stand-off ribs to create a small interstitial space which allows for optimum fluid migration, continuous monitoring, and easy testing.
   2. Comply with UL971. Primary and secondary piping to be UL listed.
   3. No unions, fittings, or joints, are to be used in underground piping. Piping to be continuous. If a joint is required, joint to made within a fiberglass piping sump. Transition from schedule 40 pipe to fiberglass within fiberglass piping sumps.
   4. Kynar lined

B. Above ground piping: Seamless steel schedule 40 pipe and fittings rated at 150 psi with factory applied corrosion resistive coating.
   1. Provide butt welded joints with welded fittings except at valves and specialties requiring threaded joints.

C. All piping shall be compatible with the product being distributed.

D. Piping trenches will not exceed 2.5 feet in width and will be deep to provide a minimum cover of 18 inches over pipe to finished grade.

E. Provide underground detectable warning tape above piping within trench.

F. Bottom of trenches must be thoroughly compacted with 6 inches of clean, washed pea gravel (1/8 inch to 3/4 inch particles) or crushed rock (1/8 inch to 1/2 inch particles) must be provided under, on top and on sides of pipe. Backfill to subgrade may be same material or thoroughly select fill.

G. Sand, gravel or rock under pipe must be compacted and graded to provide a minimum slope of 1/16 inch per foot to a fiberglass sump that is connected to a tank monitoring system. Slope of pipe is to be verified with the use of a spirit level to the satisfaction of the Project Engineer.

2.3 ISLAND MOUNTED FUEL DISPENSER

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Dresser Wayne or approved equal

B. UL listed and labeled.

C. Compatibility: For dispensing low viscosity petroleum fuels- diesel; biodiesel blends up to 20 % gasoline; gasoline including oxygenated blends, and kerosene.

D. LCD Displays: Backlit 1” six-digit volume display and ½” four character status display per hose. Displays on each corresponding nozzle boot side. Configurable 0-4 digits to right decimal. Programmable gallons. In event of power loss, displays remain visible for approximately 15 minutes.

E. Totalizer: 7-digit electromechanical non-resettable totalizer per hose.

F. Meter: Reliable, micro-accurate 2-possition positive displacement with integral intelligent pulsar. Compact design with two meters in one housing. Electronic calibrations.

G. Dispenser Flow: 10 GPM each hose.

H. Electrical: 120 V

I. Flow control: Proportional 7/8” valve.

J. Cabinet Finish: Powder-coated metallic silver sides, top, and base. Doors painted as selected by owner. Black register face with black decal with white lettering.

K. Cabinet Construction: Stainless steel lower cabinet with stainless steel doors. Hinged door for convenient service access.

L. Lighted Product ID Panels: Light for displays also illuminates product ID panel.

M. Nozzle Boot: Fits UL interchangeable nozzles. Lift nozzle hook for activation.

N. Pulse output interface: Emulated mechanical dispenser interface for connection to fuel management and tank monitoring system.

2.4 PEDESTAL DIESEL DISPENSERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by PMC or approved equal.

B. UL listed and labeled

C. Compatibility: For dispensing low viscosity petroleum fuels- diesel; biodiesel blends up to 20 % gasoline; gasoline including oxygenated blends, and kerosene

D. Pedestal with 8-1/2” steel column made from 12 gauge steel and 14” square base made from 7 gauge steel.
   1. Finish: Powder coated OSHA safety green

E. Meter: Rotary, positive displacement, high accuracy with normal operating range of 5 to 60 GPM.

F. Register: 5 digit resettable counter and a 7 digit non-resettable totalizer reading in 10th gaollons.

G. Provide the following manufacturer optional accessories:
   1. Veeder-Root 100:1 pulser on register
   2. Veeder-Root interlock switch kit for register
   3. Fuel block on the discharge side of the meter to supply a satellite hose stand
   4. Large numeral counter
   5. Strainer: spin-on filter
   6. Air eliminator
   7. Elbows
   8. Normally closed solenoid valve
   9. Provide internal 20 amp DPDT on/off switch to automatically control the solenoid valve open when the nozzle boot lever is lifted. The signal is to be used to control an external solenoid valve and activate the tank pump. System to be deactivated when nozzle boot lever is lowered.

H. Electrical
   1. 120 VAC, 1 phase, 60 Hz

I. Maximum working pressure : 50 psi

J. Satellite hose stand to be provided with the same components specified above with the exception of the register and meter, provided by the same manufacturer.

2.5 FUELING COMPONENTS

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by OPW, Bravo, or approved equal.

B. All components are to be compatible with gasoline and diesel and are to be UL listed.

C. Transition Sump: Provides watertight transition from belowground piping to above ground piping.

1. UL certified
2. Red fiberglass, injection-molded FRP containment chambers.
3. Removable top to allow access during installation of fittings and equipment.
4. Provide flush mounted H-20 rated steel diamond plate cover with interior gasket to provide a water tight seal. Cover to be split into two separate covers. One to be removable to allow access to sump and the other includes penetrations to accommodate above ground pipe installation.
5. Provide with concrete anchoring flanges.
6. Interior water drainage channel and drain lines.
7. Provide factory installed pre greased compression gaskets and fittings to seal water tight around steel above ground pipe

D. Submersible Pumps: Fixed-speed, 3450 rpm, two-stage centrifugal type pump motor with integral, automatic, thermal overload protection, compatible with pumped liquid. Pumps to incorporate a starting and running capacitor, with internal bleed resistor. Manufactured by ISO 9001 certified manufacturer.

1. Check valve: 2-3/4” diameter fluorocarbon viton seal constructed on cast aluminum body and steel backing washer.
2. Pressure relief valve: integral to check valve.
3. Syphon: Venturi-type siphon primer.
4. Air eliminator: Tank return path with one-way check valve to provide active air elimination.
5. Electrical disconnect: electrical yoke for positive contractor disconnect during service.
6. Control box:
   a. Double hook isolation box:
      1) Optically isolates inputs from up to eight dispensers to prevent damage to dispenser relay boards.
      2) Designed to prevent electrical feedback between dispenser hook circuits as required by NEC 514-6,1999.
      3) Fuse-protected output to submersible pump controller
      4) Electrical- 120/1 V input
      5) 300 volt surge protection
      6) Maximum ambient temperature rating: 120 deg F
      7) LED’s to indicate when source power is applied and dispenser hook signals are present.
      8) Control box to latch line power to the submersible pump when the relay is energized by the dispenser signal. Control box to have switch and lockout with pilot light.
   b. Smart Controller:
      1) Relay amperage rating: 30 Amps
      2) Relay/hook signal voltage: 120/208 V
      3) Compatible with all single phase submersible
      4) Fault readout- When on, it will display the last 5 faults the controller encountered. When the switch is off only the current fault is displayed.
      5) Provide with bypass
      6) Provide with auto reset mode
      7) Accept 120 V signal from double hook isolation box.
7. Electrical
   a. 208V, 1 pH, 60 Hz

E. Full-port two-way ball valves: Brass body with stainless steel ball, Teflon seal, and manual open-close arm and a quick quarter turn handle. Compatible with gasoline and diesel fuel.

F. Emergency shut-off valves: Designed to shut-off product flow in the event of a fire. A fusible link attached to a spring-operated lever holds the poppet normally open. In the event of a fire, the fusible link melts at 165 deg F, allowing the spring-actuated poppet to shut off the flow of product.
   1. Body and cap: 178S ductile iron
   2. Packing nut and stem: Stainless steel
   3. Disc: Viton
   4. Stem seat: Viton
   5. Seat ring: brass
   6. Cap and packing nut seals: Viton
   7. Full bore inside diameter
   8. Rated at a normal pressure limit of 125 psi
   9. Non-shock pressure limit of 200psi
   10. Temperature limit of 200 psi

G. Dispenser sumps: Provides watertight transition from belowground piping to above ground piping.
   1. UL certified
   2. Solid fiberglass, Injected-molded FRP, factory sealed joint.
   3. Provide factory installed concrete anchors
   4. Provide with full perimeter liquid collection channel to facilitate quick leak detection and allow flexibility in locating leak sensors
   5. Provide stabilizer bar kit to accommodate shear valve installation.

H. Drop tube, overfill prevention valves: Constructed of extruded aluminum, connect to the stop valve by a clevis and cotter pin assembly, allowing for submerged filling.

I. Drop tubes: .062 thick extruded aluminum, provide tube length to accommodate the desired application.

J. Bolted flexible entry boots: Install for safe seals of pipe and conduit entries in underground containment sumps. Tested to withstand a minimum of 6’ of liquid head pressure. Studded flange connection to create a positive and secure seal where the rubber contacts the sump wall and also around the pipe or conduit. Boot to provide a high compression mechanical seal and permit angled entries up to a 15-degree angle off the perpendicular center line in any direction without leaking or putting undue stress on the pipe or conduit seal.

K. Swivel bolt on couplings: double wall design, with 1/8”NPT interstitial access ports for pressure testing, eliminating the need for rubber test boots. Male NPT threaded connection.
   1. Air line termination kit: 36” long tubing to provide a means of air pressure integrity testing of the pipe interstitial space after installation.

L. Swing check valves:
   1. Body: cast iron
   2. Seat ring: brass
   3. Disc: Viton
   4. Cap: Bronze
   5. Full-bore inside diameter
   6. Rated normal pressure limit: 125 psi

7. Temperature limit: 225 degree F
8. Cold non-shock pressure limit: 200 psi

M. Overfill prevention valves:
1. Valve body, adaptor and collar: cast aluminum
2. Poppet: cast aluminum, hard-coated
3. Cam: stainless steel
4. Follower: brass
5. Shaft: CRS zinc-plated
6. Bearing: Sintered bronze
7. Float: closed-cell nitrile
8. Nipple: 2”-3” schedule 40 steel pipe
9. Lower nipple: 2”-3” schedule 40 steal with Duragaurd coating
10. Completely automatic operation
11. Provide with tank inlet adaptor
12. Integral anti-siphon valve- introducing air/vapor into the fill line after the valve actuates, to help isolate the tank from potential siphon due to a broken or leaking remote-fill pipe.
13. Pressure rating : 150 psi

N. Emergency vents:
1. Lid: cast iron, with powder-coated finish
2. Body: aluminum
3. Shaft: zinc-plated steel
4. O-ring: buna-N
5. Weighted cast iron cover reseats once the pressure in the tank is relieved
6. Octagon shaped base

O. Nozzles:
1. Gasoline, DEF, and Diesel (standard nozzle): Pressure activated such that the nozzle will not open until pumping system is pressurized, and closes automatically when the pressure is removed.
   a. Body: aluminum
   b. Lever and lever guard: Duratuff
   c. Packing: Graphite with Teflon
   d. Disc: Viton
   e. Spout: aluminum
   f. Inlet size: 3/4”
   g. Nozzle to shut-off when falling out of vehicle and is tipped up.
   h. Provide blocker on lever guard
   i. Color as selected by owner
   j. Compatible with gasoline, DEF, and diesel
   k. UL listed
   l. Stainless steel spout
   m. Provide with hold-open clip
   n. Maximum pressure: 50 psi

2. Diesel Posi Lock:
   a. Flowrate: 20-50 GPM
   b. Material: Cast aluminum with brass and stainless steel trim
   c. Provide bumper ring and wear lugs to protect the nozzle
   d. Provide cap:

1) Impact resistant polypropylene
2) Flexible, thermoplastic-elastomer dust seal, resistant to diesel fuel
3) Stainless steel retaining spring
4) Triple stainless steel restraint assembly

e. Level control valve that allow for a consistent 95% fill
f. Provide a factory tested pressure relief valve to meet the requirements of the US DOT standards for fuel tank protection in a fire situation
g. Nozzle to include a built in audible whistle that stops when tank is full
h. Nozzle to automatically shut off when it senses the back pressure in the fuel tank.
i. Nozzle to be automatic shut-off twist lock.

P. Hose swivels:
1. Body: Aluminum
2. Inlet and outlet adaptor: zinc
3. Seals: Buna-N, Viton
4. Bearing: nylon
5. Two planes of rotation

Q. Reconnectable breakaways:
1. Body: aluminum
2. Sleeve: HDPE
3. Seals: Viton
4. Spring: stainless steel
5. Poppet: aluminum
6. Pull force: no more than 350 pounds
7. Reconnectable after relieving line pressure
8. Breakaway poppets and sealing surfaces are protected from impact during separation by a durable plastic sleeve
9. Maximum working pressure: 50 psi

R. Hoses:
1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Parker or approved equal
2. Tube: black nitrile
3. Cover: black hypalon, resistant to cuts, abrasion, sun, weather, and will not scratch or mark vehicle finish
4. Reinforcement: one wire braid
5. Temp range: -40 deg F to 180 deg F
6. Ink brand white letter color
7. Provide require couplings

S. Hose retractors:
1. Housing: cast aluminum
2. Cable: black polyester, stretch resistant
3. Post: aluminum
4. Adjustable tension and field adjustable
5. Removable side plate for full access to the mechanism and tension adjustment
6. Kit to include box, post, bracketing, retractor, and mounting hardware

T. Emergency shut-off shear valves: If the dispenser is pulled over or dislodged by collision, the top of the valve is to break off at the integral shear groove, activating poppets and shutting off the flow of fuel.
   1. Double-poppet design to shut-off supply as well as prevent release of fuel from the dispensers internal piping.
   2. Top: cast iron
   3. Body: cast iron
   4. Disc: M-19
   5. Carrier: zinc-plated steel
   6. Stem: copper-nickel-chrome-plated brass
   7. Poppet spring: stainless steel
   8. Seal: M-19 O-ring
   9. Packing nuts: brass, Teflon coated
   10. Threaded inlet and outlet
   11. Fusible link: a fusible link will trip the valve closed at 165 deg F to shut off fuel supply to the dispenser
   12. Provide U-bolt kit for mounting to dispenser stabilizer bar
   13. Integral test ports- a 3/8" test port to allow the piping system to be air-tested without breaking any piping connections
   14. Thermal relief valve to relieve excessive pressure over 25 psi caused by thermal expansion of fuel in the dispenser piping system in the event of fire
   15. Provide offset adaptor as required

U. Thermal pressure relief valves: stainless steel construction with a viton seal, set at the factory to 25 psi and field adjustable.

V. Atmospheric vents:
   1. Body: aluminum
   2. Screen: 40-mesh brass
   3. Set scres: brass
   4. Vent cap drain spouts extend outward to deter rainwater entry
   5. 7000 scfh at 2 psi

W. Solenoid valves: Prevent accidental siphoning. Valve to power open when wither dispenser is being used and spring close when pumps are off.
   1. Body: Aluminum
   2. Diaphragm: Viton
   3. Seals and disc: Viton
   4. Springs: stainless steel
   5. Rider rings: Teflon
   6. Disc holder: nylon
   7. Core guide: Acetal, delrin
   8. Core and plugnut: stainless steel
   9. Strainer: 100-mesh screen
   10. Explosion proof shell and water tight
   11. 120 V AC
   12. Female NPT threaded ends

X. Mechanical tank gauges: designed to read liquid levels in above ground tank without the need for any on-site manual gauging.
   1. Enclosure: powder-coated aluminum

2. Swivel base- hard-coated aluminum
3. Float: 304 stainless steel
4. Lenses: tempered borosilicate
5. Gears: Acetal
6. Gaskets and o-ring: Nitrile
7. All hardware: stainless steel
8. Angled face
9. Float buoyancy to be approved for gasoline and diesel
10. Numbering: black letters on white backgrounds, 1” tall
11. English units
12. Temperature rating: -40 deg F to 120 deg F.

Y. Remote fill spill containers: designed to prevent spilled product from entering soil during filling operations
1. Horizontal fill and vapor return connections
   a. Fill adaptor: Internal spring loaded valve to automatically close to help prevent fuel spillage, Viton seal, aluminum, and stainless steel spring.
   b. Vapor recovery adaptor: Clear anodized aluminum, Nitrile gasket, stainless steel spring, and acetal resin guide.
2. 30 gallon capacity
3. Lip of the cover to extend over the body to prevent water or snow entry
4. Construction: 12-gauge epoxy-powder coated steel
5. Welded hinge and lockable hatch
6. Lockable ball valve to provide product drainage
7. Adjustable height: each leg to be independently adjustable

2.6 LEVEL MONITORING AND LEAK DETECTION SYSTEM

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Veeder Root or approved eqaul

B. Sump sensors: positive alarm indication of any liquid in underground fuel storage tank piping sumps.
1. Type: hermetically sealed magnetic reed
2. Contact rating: 15 watts
3. Housing material: PVC schedule 40 tubing
4. Temperature rating: - 0 degrees C to 60 degrees C
5. Provide with sump sensor assembly, mounting strips, watertight cord grip, and mounting hardware.

C. Tank level probes: Magnetostrictive Inventory only probe
1. Stainless steel guide tube
2. Temperature rating: -40 deg F to 140 deg F
3. Adjustable spacers
4. Length to be verified prior to ordering
5. Provide installation kit.
6. Provide float kit, to be verified prior to ordering.
7. Provide with water detection.

D. Interstitial sensors for steel tanks: detects the presence of liquid in the interstitial space of a double walled steel tank. When liquid is detected the sensor sends an alarm signal to the monitor.
   1. Cable length: to be verified prior to ordering
   2. Temperature rating: -20 deg C to 70 deg C
   3. Provide with watertight cord grips
   4. Two wires are required to connect to the monitor

E. Overfill alarms and acknowledgement: Wired to an alarm relay in the monitor, the alarm relay activates the overfill alarm horn and light when a potential overfill is detected. Limits can be set at each tank location.
   1. Alarm horn: adjustable noise level from 78 to 103 dB (at 10 feet)
   2. Alarm light: 25 watt, red polycarbonate lens, 75 per minute flashing rate
   3. Alarm acknowledgement switch: when the acknowledgement button is pressed the overfill alarm shuts off and the alarm acknowledgement light illuminated. 120 volt amber lens.
   4. Enclosure: Painted steel, NEMA 4. ½” conduit connector at the bottom
   5. Supply voltage: 120VAC

F. Monitor: Web based internet browser with Ethernet connection
   1. Up to three years of data history
   2. Inventory and delivery monitoring and reporting
   3. Support up to 32 probes
   4. Interstitial/sump monitoring
   5. Dispenser sump monitoring
   6. Groundwater monitoring
   7. Email notification and reporting
   8. Vapor well monitoring
   9. Continuous statistical leak detection software built programmed into controller.
   10. 3.0 gph, .1 gph, and .2 gph in tank leak detection
   11. 3.0 gph, .1 gph, and .2 gph in line leak detection
   12. Sensor status report
   13. Sensor status history report
   14. 7.4” full VGA LCD tough screen display
   15. High resolution, high speed printer
   16. Universal compartments support universal sensor and probe module and output interface module
   17. Built-in relay for overfill alarm
   18. Supports multiple languages
   19. Intuitive and user friendly interface
   20. Single tough screen access to most functions
   21. Customizable on-board help
   22. Custom dashboard
   23. Remote web access
   24. XML web-enabled interface
   25. Up to nine communication ports
   26. Internal auto-dial fax modem communication
   27. RS-232 and RS-485 data communication
   28. USB ports for software upgrades and data backup
   29. Electrical: 120VAC

2.7 MANHOLES

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by OPW or approved equal.
B. Skirt: galvanized steel
C. Cover: steel diamond plate
D. Ring: cast iron or fabricated steel
E. Gasket: nitrile
F. Sized to accommodate sump access
G. Easy cover removal: recessed handle
H. Highway 20 rated (H20)

2.8 GANTRY, FUEL, WITH HOSE AND NOZZLE

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Fleet Fueling Systems or approved equal.

B. General Description: The fuel gantry shall be foundation mounted and designed to suspend the fueling nozzle(s) above the fuel island and allow all fleet vehicles to be refueled with one nozzle within the specified fueling envelope.
C. Minimum Capacities and Dimensions:
   1. Fueling envelope: 20 feet, minimum.
   2. Overall dimensions:
      a. Width: 23 feet 4-1/2 inches.
      b. Depth: 40-1/2 inches.
      c. Height: 144 inches.

D. Features and Construction:

E. Construction: All vertical and horizontal structural components shall be continuously welded ASTM A500 Grade B steel tubing with all butt components filet welded and shall be designed to support all fueling components. Fuel gantry to include all supports, tracks, trolleys, piping, valves, swivels, hoses, and nozzles necessary for complete operation terminating from the diesel dispenser solenoid valve. Each fueling gantry shall be supplied with one additional complete hose and nozzle assembly capable of being connected directly to the pull-away valve.

F. Pull-away: Fuel gantry shall be designed to allow for quick and spill proof separation in the event the nozzle is left connected to the vehicle and moved. A total of 2 ounce maximum spill during separation is acceptable. Upon separation, nozzle and associated hardware must be capable of being reconnected quickly and without any special tools.

G. Nozzle: The nozzle(s) shall be connected to a fuel leader hose cut to length so that the tip of the nozzle is approximately 6 inches above the floor surface when hanging freely from the fuel gantry.

H. Utilities: 1-1/2 inch diesel fuel supply union.

I. Finish: Primed with a two part epoxy primer and painted with superior grade acrylic urethane international yellow color paint

2.9 FIRE SUPPRESSION

A. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Pyro-Chem or approved equal.

B. Provide delegated design submittal. Provide calculations and drawings identifying the fire suppression layout and coverage signed and sealed by a professional engineer registered in Virginia responsible for their preparation.

C. The fire extinguishing system shall be the stored pressure dry chemical pre-engineered fixed nozzle type.

D. The system shall be capable of automatic and manual activation.

E. To be tested in accordance with UL 1254.

F. Installed and maintained in accordance with NFPA 17 and 30.

G. Designed for operation in a minimum 10 mile per hour wind

H. Temperature rating: -40 deg F to 120 deg F

I. Cylinder and agent
   1. Agent to be monoammonium phosphate-based dry chemical agent
   2. Cylinders- steel, tested and marked in accordance with DOT 4BW350 and used to store extinguishing agent. Charged with dry nitrogen to 350 psig at 70 deg F.
   3. Cylinder valve- pressure sealed poppet-type valve having a brass body, stainless steel stem with rubber seat washer, fusible safety relief assembly, and pressure gauge used on all agent cylinders
   4. Cylinder bracketing- cylinders shall be mounted vertically, secured by use of a steel mounting bracket affixed to a rigid bracket capable of supporting the weight of the filled cylinder and the concussion of cylinder discharge.

J. Actuation controls
   1. Control head- The control head shall be mounted directly on the valve of a pneumatic actuating cylinder. A carbon dioxide pilot cartridge that complies with MIL-C0601G shall be used as an integral component of the control head. Control head status shall be visually indicated be a set/fired indicator.
   2. Detection- The ambient temperature of the hazard area shall be monitored by fixed temperature electrical thermal detectors. When temperature of the hazard area exceeds the rating at any detector, the detector shall close a normally open switch element within the detector, sending a signal to the control head. The signal shall energize a solenoid in the control head which exercises the control head and actuates the system.
   3. Pneumatic actuation: The system shall have a PAC-series pneumatic actuating cylinder whose valve opens upon activation of the control head. The valve shall release nitrogen from the PAC cylinder into the pneumatic pipe and tubing network. This nitrogen shall depress a piston above the valve stem in each agent cylinder, opening each agent cylinder valve and releasing the pressurized agent.

4. Manual actuation: The system shall have a mechanical manual actuation capability requiring no electrical power. This is accomplished remotely by means of a remote mechanical pull station.
5. Auxiliary output: The system shall shut off power to all fuel dispensing units, sound an audible alarm, and send an alarm signal to the building fire alarm system in the event of system actuation. This is accomplished by means of dry contacts micro switch installed on the control head.
6. Supervision: A solenoid monitor shall be used to supervise the integrity of all electrical actuation circuits.

K. Distribution Nozzles
1. Nozzles: The system shall utilize discharge nozzles to distribute agent throughout the hazard area. The quantity, location, and orientation of nozzles shall be determined by manufacturer engineer and manufacturer written installation manual.
2. Nozzle covers: All nozzles shall be installed with nozzle covers to prevent foreign matter from clogging the discharge nozzle.

L. Piping and fittings
1. Pipe: All pipe shall be stainless steel pipe in accordance with NFPA 17. All pipe ends shall be thoroughly reamed after cutting, and all oil, ships, and debris shall be removed prior to nozzle installation.
2. Fittings: Standard weight malleable, stainless steel fittings shall be used.
3. Size: All system pipe and fittings will be sized by manufacturer engineer and in accordance with manufacturer written installation manual.
4. Joints: No joint sealant shall be used in the discharge piping.
5. Straps: All system discharge pipe shall be securely fastened by means of pipe hangers and/or pipe straps. UL listed pipe hangers shall be used.
6. Union: A union shall be installed in the discharge piping conveniently close to the cylinder valve to permit the disconnection for inspection and service.

M. System to be installed and tested by a certified contractor.

N. System design to be by manufacturer engineer. Provide engineering services and calculations report to engineer for approval prior to ordering

2.10 ELECTRICAL

A. Provide sealoffs in conduit as required

B. Provide emergency shutoff valve (shear valve) at each dispenser and emergency push-button shutoff greater than 20 feet and within 100 feet of dispenser. Provide sign at location of emergency push-button shutoff.

1. Emergency shut off shall disconnect power to all dispensing devices, to all remote pumps serving the dispensing devices, to all associated power, control, and signal circuits, and to all other electrical equipment in the locations surrounding the fuel dispensing devices. Resetting from an emergency shut off shall require manual intervention.

C. Make all connections to electrical equipment as required for proper operation of storage tank system, including but not limited to motor starters, pumps, dispensers, and pulser units.

D. For each tank monitoring system, furnish and install shielded cable, without splices, within control conduit from each new probe and sensor to the V-R console

PART 3 - EXECUTION

3.1 FUEL TANK INSTALLATION

A. Installation shall be in accordance with manufacturer's written instructions and as noted.

B. Contractor is responsible for initial filling of all tanks.

C. Shutoff and check valves are to be equipped with a pressure-reliving device that will relieve the pressure generated by thermal expansion back to the tank.

3.2 FUEL PIPING AND ACCESSORIES

A. Installation shall be in accordance with manufacturer's written instructions and as noted.

B. Terminate piping in tanks and access manholes as called for. Make connections to equipment with flexible pipe connectors.

C. Grade piping up from tank, 1/8 in. per ft. minimum. Arrange piping to avoid any unnecessary lifts.

D. Install vent piping a minimum of 12 ft above grade and 5 ft. above the highest projection of the canopy.

3.3 TANK CONTAINMENT SUMP

A. Install in accordance with tank manufacturer's instructions. Seal all penetrations watertight with flexible boot connectors.

B. Provide manhole in concrete slab centered over the containment sump.

3.4 TANK MONITORING SYSTEM

A. Install equipment in accordance with manufacturer's written instructions. Provide testing, system start-up, adjustment and calibration by the manufacturer's authorized representative.

B. The system shall be furnished through a single supplier.

C. Provide written confirmation from the manufacturer's authorized representative that the system has been tested and is operational.

D. Overfill alarm and acknowledgement switch shall operate in conjunction with the tank monitoring system.

3.5 PRODUCT IDENTIFICATION

A. Permanently mark all tank openings. The color shall conform to the requirements of the API.

B. Provide a permanent label at the tank fill port. The label shall contain information required by the DEC.

3.6 IDENTIFICATION

A. Install continuous plastic underground warning tape identification during backfilling of excavations for fuel storage tanks and trenches for fuel piping and electrical conduits. Locate tape 6 inches to 8 inches below finished grade, directly over piping, conduit and edges of each storage tank.

3.7 INSTALLATION CHECKLISTS AND WARRANTY CARDS

A. Provide Owner’s Representative with the tank and piping manufacturer’s installation checklist and warranty cards.

B. Fill out and sign upon completion of tank installation.

3.8 FIELD QUALITY CONTROL AND TESTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. General:

1. Installer must test in demonstrate the integrity of tanks, piping, and secondary containment as well as the satisfactory operation of gauging an monitoring systems, before the storage tank system is placed into service. Additionally, the installer is responsible for inspecting and testing the overfill-prevention equipment, line leak detectors and all valves installed to control product flow to verify the safety of the system.

2. Test all system components, piping, tanks, dispensers, etc for complete and correct system operation and demonstrate to owner prior to the system being placed in operation.

3. All testing shall be in compliance with NFPA 30 and 30a requirements.

C. Tank:

1. Tanks are to be factory tested prior to shipment and field tested prior to system start-up.

2. Air pressure test both the primary and secondary tank in accordance with the tank manufacturer's recommendations. In addition to the pressure test, cover the entire tank surface, manways and all fittings with soap solution and inspect for leaks.
3. There shall be no drop in pressure.
4. Fill containment sump/turbine enclosure with water. There shall be no drop in the alter level after four hours.
5. Tank to be tested with air pressure not less than a gauge pressure of 3 psi and not more than a gauge pressure of 5 psi for two hours.
6. The interstitial space shall be air tested at a gauge pressure of 3 psi to 5 psi, by vacuum, or in accordance with the tank's listing of the manufacturer's instructions.

D. Piping:

1. Test aboveground piping at 150% of operating pressure but no less than 50 psig air pressure for two hours. Soap all joints.
2. Before backfilling and after assembly, but before connection to equipment , air test all underground primary piping at 150% of operating pressure but no less than 50 psig for two hours. Soap all joints.
3. Test secondary containment piping per pipe manufacturer's requirements but no less than 5 psig. Soap all joints.
4. There shall be no drop in pressure.

E. Monitoring and Leak Detection Systems:

1. Test and adjust tank monitor and leak detection systems and devices per manufacturer's directions.

F. Final Test:

1. Conduct precision test of all piping, tanks, and equipment in compliance with EPA and Connecticut Department of energy and environmental protection requirements. Test after piping has been completed but before paving and the system is placed in operation.
2. The test shall be conducted using leak detection methods approved by Connecticut Department of energy and environmental protection .

G. Test Results:

1. Provide written certification of all test results to the Owner and Engineer.

H. Final acceptance
1. All tanks to be completely filled with product for acceptance by the state.

3.9 RECORD PHOTOGRAPHS

A. After installation, but before backfilling, take photographs of the following:

1. Each tank assembly
2. Underground piping.
3. Two (2) general views of entire length of run of each piping assembly, including tanks.

B. Submit two (2) copies of each, 8-1/2 in. x 11 in. color prints of above, properly identified.

3.10 RECORD DRAWINGS

A. Provide two sets of as-built AutoCAD drawings 2008 or newer plans that show the size and locations of the tank, equipment, and piping system. These plans must include a statement by the installer that the system has been installed in compliance with all Connecticut State codes, National codes, Department of Health codes, DOT codes, and NFPA requirements.

3.11 TRAINING

A. Instruct Owner's personnel in complete and proper use, operation, and daily maintenance of all system equipment components, including dispenser/tank components, leak detection system, and chipkey reader hardware. Review emergency provisions, including procedures to be followed at time of operational failure. Provide contact names and telephone numbers on labels on each type of equipment. Train Owner's personnel in procedures to follow in identifying sources of operational failures or malfunctions. Confer with Owner on requirements for a complete fueling equipment maintenance program. Training shall be for not less than 8 hours with a factory authorized representative.

B. Provide a minimum of four hours of training related to the leak detection tank monitoring system. The training shall be provided by a certified level technician who install and programmed the equipment.

END OF SECTION

SECTION 11 5800

FLUID LUBRICATION SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes fluid lubrication system equipment.

B. Related Sections include the following:

1. Division 11 Section "Fluid Lubrication Piping" for distribution piping.

1.3 REFERENCE

A. The publications listed below form a part of this specification to the extent referenced.

B. The publications are referenced in the text by basic designation only.

1. Underwriters Laboratories
2. NFPA 30/30A
3. Connecticut Fire Code

1.4 QUALITY ASSURANCE

A. American Society for Testing and Materials (ASTM)

1. A53-81a Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
2. A120-81 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

B. Underwriters Laboratories, Inc. (UL)

1. Requirements applicable to product listing and labeling.

C. All work shall be installed in compliance with NFPA Standards 17, 30, 30A, and 31.

D. Comply with Connecticut Department of Transportation and local state codes.

E. Comply with EPA Regulations 40 CFR Part 280.

F. Installing contractor shall be fully qualified for fluid tank installations by the tank manufacturer and shall have attended the manufacturer’s training seminar within the past two years.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

H. All components shall be fully tested and documented to operate as a complete system

I. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office
   1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.
   2. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment

1.5 ACTION SUBMITTALS

A. Product Data: For pipe, tube, fittings, pumps, tanks, monitoring systems, specialties, and couplings.

B. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection

C. Wiring diagrams detailing power and control wiring and differentiating clearly between manufacturer-installed wiring and field-installed wiring

1.6 INFORMATION SUBMITTALS

A. Factory tests and inspection reports prior to shipping.

B. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

C. Certificates: For certification required in "Quality Assurance" Article

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:
   1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:
      a. Description of system and components.
      b. Schematic diagrams of electrical, plumbing and compressed air systems.
      c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.
      d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.
f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.
g. Include vendor contact information for service and warranty
h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Provide five extra pump mufflers.

2. Provide five extra inlet compressed air hose kits.

1.9 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.10 COORDINATION

A. Coordinate size and location of all foundations, supports, piping, electrical connections, and controls.

1.11 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid or dusty conditions.

B. Label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.12 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate with stamped figures showing manufacturer's name, address, model number, serial number and pertinent utility or operating data.

B. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 - PRODUCTS

2.1 GENERAL

A. Work Included: Provide materials and equipment necessary to install, test and make ready for operation a fluid dispensing system that is comprised of fluid reel banks, dispense consoles fluid dispensing pumps, and various components as specified here in,

B. Above Tanks and Drums, except waste storage, shall each be fully filled with designated fluid. Obtain owner approval for fluid manufacturer prior to installation.

C. Provide 10” x 14” signs (wall mounted) over each pump.

D. Provide labels at each hose reel designating fluid.

2.2 ABOVEGROUND FLUID STORAGE TANKS

A. Manufacturer
   1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Containment Solutions or approved equal.

B. Comply with the following standards:
   1. UL 142- Underwriters Laboratories, Inc., Steel Aboveground Tanks for Flammable and Combustible Liquids.
   2. U.L. 2085, Underwriters Laboratories 2 Hour Fire Rating's Standard for Insulated.
   3. NFPA 30, National Fire Protection Association Flammable and Combustible Code.
   4. NFPA 30A, National Fire Protection Association Automotive and Marine Service Station
   5. Uniform Fire Code International Fire Code Institute
   6. B.O.C.A. National Fire Prevention Code

C. General Tank Description:
   1. Tanks are designed and UL listed as atmospheric tanks with a maximum working pressure of 1 PSI.
   2. The primary tank and the secondary containment tank shall have passed a proof of design hydrostatic pressure test of 25 PSI.

3. Tanks shall be equipped with (9) total openings- four (4) NPT openings, plus one for primary tank working vent, one for primary tank emergency vent, one for monitoring the interstitial space, one for secondary tank emergency vent, and one for secondary tank emergency vent. The emergency vents shall be sized per NFPA & UL 142 requirements. Coordinate tank opening quantity and
4. The tank shall be equipped with a minimum two (2) lifting lugs.
5. Tanks include a 1 year warranty.
6. Tank shall be provided with threaded PVC plugs in fittings (water tight).
7. The primary and secondary containment tank shall be pressure tested in the factory to UL 142 specification (3 PSI).
8. Tank is to be air tested at the factory but MUST be retested at the jobsite by the installer prior to installation and meet UL142 specifications

D. Primary Tank
1. The standard primary storage tank shall be rectangular in design. The tank will be constructed of UL 142 specified thickness, with continuous welds.
2. The primary storage tank shall be constructed of ASTM A-569 or A-36 carbon steel or 304 stainless steel, as required for compatibility of products being stored.

E. Secondary Containment Tank:
1. The secondary containment tank shall be rectangular in design and constructed of UL 142 specified steel thickness, with continuous welds.
2. The secondary containment tank shall be listed by Underwriters Laboratories as secondary containment under UL 142 standard.

F. Finish
1. The exterior surface of the secondary tank shall be cleansed of foreign material and coated with a corrosion resistant industrial paint (3 to 5 mils dry film thickness)
2. The standard color shall be desert sand.

2.3 ABOVEGROUND STEEL CLOSED HEAD STORAGE DRUM

A. Materials

1. Only new material shall be used in the manufacturing process and the manufacturer shall ensure that the material used meets all appropriate specifications and quality assurance requirements.
2. Material Requirements
   a. Nominal capacity of the tank(s) shall be: See drawings
   b. Minimal material thickness of the tank(s) shall be 18 gauge steel.
   c. Provide polyethylene tanks for storing windshield washer fluid and engine coolant.
3. Loading Conditions: Tank shall meet the following design criteria.
   a. Internal Load: Tank(s) shall withstand an air pressure test of 1.5-2.5 psi.
4. Product Storage Requirements
   a. Tank(s) shall be capable of storing liquids with a specific gravity up to 1.1.
   b. Tank(s) is designed for operation at atmospheric pressure only. Tank(s) shall have openings of sufficient size to meet normal venting requirements as stated in U.L. 142, UFC, and NFPA 30.

c. Tank(s) shall be capable of storing motor oil, gear oil, windshield washer fluid, grease, engine coolant, and automatic transmission fluid at ambient temperature.

B. Accessories

1. Certification Plate: Underwriters Laboratories label shall be affixed to each tank.
2. Fittings: Threaded/NPT
   a. All threaded fittings shall be of a material of construction consistent with the requirements of the Underwriters Laboratories label. All fittings shall be protected using threaded plugs or suitable closure caps.
   b. Location: Refer to drawings.
   c. Primary vent to be 3/4” vent with Sch 40 galvanized nipple
   d. 2” bung hole for connection to pump suction kit

C. Installation

1. Tank shall be installed in strict accordance with the most recent installation instructions provided by the tank manufacturer, PEI/RP200, UFC, NFPA 30, local ordinance, recognized engineering procedure, and other applicable codes.

D. Factory Painting

1. Prepare tank surface with SSPC-SP-3 sandblast. Finish tank suface with factory applied epoxy finish.

2.4 USED OIL AND COLLANT EVACUATION SYSTEMS

A. Manufacturer
1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Graco Inc or approved equal.

B. The system to be a wall mount 1” double diaphragm pump. The diaphragm pump to be of aluminum construction and have TPE diaphragms, balls & seats. Pump to include the following components:
1. Air and fluid connecting hose kit
2. Air filter/regulator/lubricator kit with gauge and automatic tank drain valve on the air filter
3. Air guard runaway valve for pump protection
4. Wall bracket
5. Adapters
6. 2000 PSI Stainless steel ball type fluid shut-off valve for pump outlet
7. 10 FT evacuation hose kit
8. Air solenoid valve
   a. Power open, spring closed
   b. 24 V DC
   c. Leads: 18 AWG x 12 in

C. Supply the following portable used oil receivers:

1. 25 gallon, portable used oil receiver with top connect coupler. Refer to specification 115100 “Shop Equipment” for further requirements.

D. Provide high level alarm/ pump shut-off system for used oil and used coolant. Refer to overfill alarm and acknowledgement specifications below. Locate alarm on wall near fluid evacuation systems and install above floor per the local electrical code. Overfill alarm to be controlled by web based inventory and leak detection control panel.

2.5 DOUBLE DIAPHRAGM PUMP

A. The system to be a wall mount 1” double diaphragm pump. The diaphragm pump to be of aluminum construction and have TPE diaphragms, balls & seats. The unit to be complete with all necessary components to draw from a 55 gallon drum or bulk tank, refer to drawings. The pump to have a 1½” NPT (F) aluminum drop tube. Pump to include the following components:
   1. Pressure relief kit
   2. Air and fluid connecting hose kit
   3. Air filter/regulator/lubricator kit with gauge and automatic tank drain valve on the air filter
   4. Air guard runaway valve for pump protection
   5. Wall bracket
   6. Adapters
   7. Suction hose kit with low level cut off
   8. 2000 PSI Stainless steel ball type fluid shut-off valve for pump outlet.

2.6 PISTON PUMP

A. Provide positive displacement piston pump shall have a pneumatically operated pumping stroke length and cycle on demand only. The air motor is to have an internal muffler that operates below OSHA noise standards, and be equipped with a grounding lug. The design of the air motor shall incorporate a valve in piston design which increases the pump's durability, longevity and gives uniform delivery on both the up and down strokes. The air motor cylinder material is to be hard coated aluminum and corrosive resistant steel. The air motor to feature a non-metallic poppet valve. The air motor and lower pump section shall be of the divorced design.

B. Provide stainless steel lower unit components for the following fluid types:
   1. Engine coolant

C. Pump to include the following components:
   1. 1½” Stainless steel drop tube
      a. Provide aluminum for ATF and GO
   2. Pressure relief kit
   3. Air and fluid connecting hose kit
   4. Air filter/regulator/lubricator kit with gauge and automatic tank drain valve on the air filter
   5. Air guard runaway valve for pump protection
   6. 2,000 psi ball type shut-off valve for pump outlet
   7. For wall mount pumps provide the following:
      a. Wall bracket
      b. Adapters
      c. Suction hose kit with low level cut off

2.7 CHASSIS GREASE (CG) 400 LB DRUM PUMP SYSTEM:

A. The positive displacement oil pump shall have a pneumatically operated pumping stroke length and cycle on demand only. The air motor is to have an integral muffler that operates below OSHA noise standards, and be equipped with a grounding lug. The design of the air motor shall incorporate a valve in piston design which increases the pump's durability, longevity and gives uniform delivery on both the up and down strokes. The air motor cylinder material is to be hard coated aluminum and corrosive resistant steel. The pump system to include pump elevator, inductor plate, carriage, and connecting hoses.

1. Air and fluid connecting hose kit
2. Air filter/regulator/lubricator kit with gauge and automatic tank drain valve on the air filter
3. Air guard runaway valve for pump protection
4. Provide stationary supply stand
5. 5,000 psi needle shut-off valve for pump outlet

2.8 DIESEL EXHAUST FLUID (DEF) PUMP

A. The system to be a wall mount, double diaphragm pump. The diaphragm pump to be of polypropylene construction and have PTFE ball, flouroelastomer seat and stainless steel diaphragm materials. The unit to be complete with all necessary components to draw DEF from storage tank. The pump to have a 1½" NPT (F) stainless steel drop tube. Pump to include the following components:

1. Pressure relief kit
2. Air and fluid connecting hose kit
3. Air filter/regulator/lubricator kit with gauge and automatic tank drain valve on the air filter
4. Air guard runaway valve for pump protection
5. Wall bracket
6. Adapters
7. Suction hose kit with low level cut off
8. 2000 PSI ball type stainless steel fluid shut-off valve for pump outlet

2.9 FLUID DISPENSING REELS

A. General:

1. Provide steel reel mounting channels to mount the number of reels as per each overhead reel station. The channel to accept specified reels. Channel to be painted black.

B. Reel Specification (EO, GO, ATF, EC, CG, CA, WWF):

1. The hose reel shall have a minimum capacity of 50 feet of 1/2" ID hose for, EO, GO, ATF, EC, CG, and CA. The hose reel shall have a minimum capacity of 65 feet of 3/8" ID hose for WWF. The hose reel base will be a 10 gauge, heavy-duty double pedestal frame with welded joints and formed ribs for strength and durability.
2. The ratchet assembly will be constructed of ZA-12 non-sparking alloy for use in fueling and other type environments. The ratchet will be designed to prevent damage in the event

of being spun backwards and fits to an over-sized, two-point, mounted pivot support, that is removable as an assembly for service.

3. The spring is a sealed unit and must be adjustable from the reel exterior with or without pressure and without removing the hose. The rewind motor spring will provide uniform tension through the usable range. It has high demand steel spring and external tension adjustment. The latch spring engineered to eliminate reel lock out condition.
4. The reel spool to be all metal and have sealed roller bearings
5. The fluid swivel will be full-ported, 1/2” NPT, with Viton seals and Teflon back up washers. The swivel will be completely accessible and serviceable without disassembly of other reel components. The swivel will be rated for a minimum of 1500-psi (103 bar) working pressure, and vacuum up to 24” Hg. (610mm Hg).
6. The hose guide roller assembly will be the full width of the spool, with 1-1/8” (29mm) diameter steel rollers, a one-piece roller support and Delrin bearings and seals.
7. The reel to be designed to mount on ceilings, wall or floors.
8. The bar stop assemblies will be constructed of high impact, molded Hytrel.
9. Accessories
    a. EO, ATF, GO- 2,000 psi ball type shut-off valve for reel inlet
    b. WWF & EC- 2,000 psi ball type stainless steel fluid shut-off valve for reel inlet
    c. CG- 5,000 psi needle shut-off valve for reel inlet

C. Reel Specification (DEF):

1. The hose reel shall have a minimum capacity of 50 feet of 3/4” ID, DEF compatible hose. The hose reel base will be a 10 gauge, heavy-duty double pedestal frame with welded joints and formed ribs for strength and durability.
2. The ratchet assembly will be constructed of ZA-12 non-sparking alloy for use in fueling and other type environments. The ratchet will be designed to prevent damage in the event of being spun backwards and fits to an over-sized, two-point, mounted pivot support that is removable as an assembly for service.
3. The two, (one on each side) sealed, self-aligning ball bearings, support the hose spool on the reel base. The spool will be a welded assembly with formed flange support ribs and rolled edges for strength and durability. The rewind motor spring will provide uniform tension through the usable range. It has high demand steel spring and external tension adjustment. The latch spring engineered to eliminate reel lock out condition.
4. Provide with double-riveted connections and contained in its own lubricated, sealed safety canister. The canister assembly will be mounted externally to the reel base and have an external spring tension adjustment
5. The fluid swivel will be full-ported, 3/4” BSPP thread, with stainless steel seals and back up washers. The swivel will be completely accessible and serviceable without disassembly of other reel components. The swivel will be rated for a maximum of 50 psi working pressure.
6. The hose guide roller assembly will be the full width of the spool, with 1-1/8” (29mm) diameter steel rollers, a one-piece roller support and Delrin bearings and seals.
7. The reel to be designed to mount on ceilings, wall or floors.
8. The bar stop assemblies will be constructed of high impact, molded Hytrel.
9. Accessories:
    a. 3/4” 2,000 psi stainless steel ball type shut-off valve

D. Reel Specifications (Elec)

1. The hose reel shall have a minimum capacity of 95 feet of 12 gauge insulated electrical cord. The hose reel base will be a 10 gauge, heavy-duty single pedestal frame with welded joints and formed ribs for strength and durability.
2. The ratchet assembly will be constructed of ZA-12 non-sparking alloy for use in fueling and other type environments. The ratchet will be designed to prevent damage in the event of being spun backwards and fits to an over-sized, two-point, mounted pivot support, that is removable as an assembly for service
3. Provide with single industrial receptacle.
4. Reel to be provided with an adjustable arm
5. The spring is a sealed unit and must be adjustable from the reel exterior with or without pressure and without removing the hose. The rewind motor spring will provide uniform tension through the usable range. It has high demand steel spring and external tension adjustment. The latch spring engineered to eliminate reel lock out condition
6. The reel to be designed to mount on ceilings, wall or floors.
7. Electrical:
    a. 120V/1
    b. 18 amp

2.10 DISPENSING HANDLES

A. General
1. The dispensing handles to be designed and manufactured by same manufacturer of the fluid pumps and reels.
2. The compressed air reel to be provided with air coupler to match the ones to be utilized by owner.
3. Provide for each reel hose an identification label that has the product ID and snaps around the hose at the bottom near dispense valve connection.
4. Label to be plastic, available in 9 standard colors and have clearly visible lettering.
5. Reference: Seton, custom Setmark snap around pipe markers.

B. Dispensing handles specifications (EO, EC, ATF, GO)
1. The handle is to be heavy duty cast construction with trigger guard, trigger lock and inlet swivel.
2. The meter to have large LCD display with set up menu to program display resolution/lighting, calibration and units of measurement. There are to be simple control buttons on the meter head for ease of operation.
3. The meter head to have protective high density housing and the inlet swivel to have protection boot.
4. The meter has the ability to be pre-set for desired units and has an automatic shut-off.
5. The max flow to be 5 GPM.
6. The meter head to have protective housing and inlet swivel protection boot.
7. The unit to operate on replaceable AA alkaline battery.
8. Nozzle end:
    a. EO- rigid extension with standard automatic non-drip quick-close nozzle for oil.
    b. EC- rigid extension with standard quick close nozzle for engine coolant
    c. ATF- flexible extension with standard automatic non-drip quick-close nozzle for oil.
    d. GO- extension with standard quick-close nozzle for gear oil.

C. Dispensing handles specifications (WWF)

1. The dispense valve to be a bib type valve with rubber tip.
2. Valve to have bottom trigger and ¼” NPT inlet with screen.
3. Full volume dispense nozzle.

D. Dispensing handles specifications (CG)
1. The dispense valve to be of machined steel construction.
2. The valve to have rugged heavy duty handle with trigger guard.
3. The trigger to have a top adjustment nut, lockable.
4. The valve to be able to dispense grease up to NLGI #2.
5. The valve to include Z-swivel and 30” whip hose with coupler

E. Dispensing handles specifications (DEF)
1. The handle is to be heavy duty cast construction with trigger guard, trigger lock and stainless steel inlet swivel.
2. Provide stainless steel nozzle.
3. The meter head to have protective high density housing and the inlet swivel to have protection boot.

2.11 MANAGEMENT/MONITORING SYSTEM

A. Manufacturer
1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Veeder Root or approved equal.

B. Tank level probes: Magnetostrictive Inventory only probe
1. Stainless steel guide tube
2. Temperature rating: -40 deg F to 140 deg F
3. Adjustable spacers
4. Length to be verified prior to ordering
5. Provide installation kit
6. Provide float kit, to be verified prior to ordering.
7. Provide with water detection for all fluids except waste oil and waste coolant inventory probes. Waste oil and waste coolant inventory probes to be provided without water detection.

C. Interstitial sensors for steel tanks: detects the presence of liquid in the interstitial space of a double walled steel tank. When liquid is detected the sensor sends an alarm signal to the monitor.
1. Cable length: to be verified prior to ordering
2. Temperature rating: -20 deg C to 70 deg C
3. Provide with watertight cord grips
4. Two wires are required to connect to the monitor

D. Overfill alarms and acknowledgement: Wired to an alarm relay in the monitor, the alarm relay activates the overfill alarm horn and light when a potential overfill is detected. Limits can be set at each tank location.
1. Alarm horn: adjustable noise level from 78 to 103 dB (at 10 feet)
2. Alarm light: 25 watt, red polycarbonate lens, 75 per minute flashing rate

3. Alarm acknowledgement switch: when the acknowledgement button is pressed the over-fill alarm shuts off and the alarm acknowledgement light illuminated. 120 volt amber lens.
4. Enclosure: Painted steel, NEMA 4. ½" conduit connector at the bottom
5. Supply voltage: 120VAC

E. Inventory and leak detection monitor panel: Web based internet browser with Ethernet connection
1. Up to three years of data history
2. Inventory and delivery monitoring and reporting
3. Support up to 32 probes
4. Interstitial/sump monitoring
5. Dispenser sump monitoring
6. Groundwater monitoring
7. Email notification and reporting
8. Vapor well monitoring
9. Continuous statistical leak detection software built programmed into controller.
10. 3.0 gph, .1 gph, and .2 gph in tank leak detection
11. 3.0 gph, .1 gph, and .2 gph in line leak detection
12. Sensor status report
13. Sensor status history report
14. 7.4" full VGA LCD tough screen display
15. High resolution, high speed printer
16. Universal compartments support universal sensor and probe module and output interface module
17. Built-in relay for overfill alarm
18. Supports multiple languages
19. Intuitive and user friendly interface
20. Single tough screen access to most functions
21. Customizable on-board help
22. Custom dashboard
23. Remote web access
24. XML web-enabled interface
25. Up to nine communication ports
26. Internal auto-dial fax modem communication
27. RS-232 and RS-485 data communication
28. USB ports for software upgrades and data backup.
29. Electrical: 120 VAC
30. Provide panel with relay to de-energize used oil and used coolant solenoid valve upon high level detection.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Installation of all equipment and systems and components shall be by experienced installers capable of installing each item in accordance with drawings and specifications and manufacturers requirements.

B. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.

C. Install equipment with clearances for service and maintenance.

D. Support suspended hose reels from structure or columns.

1. Install as per manufacturer's instructions.

3.2 CLEANING AND ADJUSTING

A. After installation all items shall be cleaned as recommended by the manufacturer and protected from damage until completion of the project. All movable parts shall be cleaned and adjusted to operate as designed without binding or deformation of the members and where applicable, to have all contact surfaces fit tight and even without forcing or warping the components.

3.3 FIELD QUALITY CONTROL AND TESTING

A. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

B. General:

1. Installer must test in demonstrate the integrity of tanks, piping, and secondary containment as well as the satisfactory operation of gauging an monitoring systems, before the storage tank system is placed into service. Additionally, the installer is responsible for inspecting and testing the overfill-prevention equipment, line leak detectors and all valves installed to control product flow to verify the safety of the system.

2. Test all system components, piping, tanks, dispensers, etc for complete and correct system operation and demonstrate to owner prior to the system being placed in operation.
3. All testing shall be in compliance with NFPA 30 and 30a requirements

C. Tank:

1. Tanks are to be factory tested prior to shipment and field tested prior to system start-up.
2. Air pressure test both the primary and secondary tank in accordance with the tank manufacturer's recommendations. In addition to the pressure test, cover the entire tank surface, manways and all fittings with soap solution and inspect for leaks.
3. There shall be no drop in pressure.
4. Fill containment sump/turbine enclosure with water. There shall be no drop in the alter level after four hours.
5. Tank to be tested with air pressure not less than a gauge pressure of 3 psi and not more than a gauge pressure of 5 psi for two hours.
6. The interstitial space shall be air tested at a gauge pressure of 3 psi to 5 psi, by vacuum, or in accordance with the tank's listing of the manufacturer's instructions

D. Upon completion of the installation the Installer shall conduct operating test for approval of the Owner. These tests shall include but not be limited to the following:

1. All tests per manufacturer instructions.
2. Demonstration & training of all equipment to owner's personnel.

E. Tests shall be performed as outlined in the reference cited herein.

F. All test equipment and facilities shall be furnished at no additional expense to the Owner.

G. Final acceptance
1. All tanks to be completely filled with product for acceptance by the state

3.4 DEMONSTRATION

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fluid lubrication system equipment.
2. Review data in maintenance manuals.
3. Schedule training with Owner and Architect with at least 14 days advance notice. Owner's personnel training shall be for not less than 4 hours.
4. Provide training for up to ten (10) people.

END OF SECTION

SECTION 11 5810

FLUID LUBRICATION PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, apply to this Section.

1.2 SUMMARY

A. This Section includes fluid lubrication piping, specialties, and accessories within the building.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working-Pressure Rating: Unless otherwise indicated, minimum pressure requirement for piping is 150 psig.

1.4 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label.

D. All components shall be fully tested and documented to operate as a complete system

E. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

F. Training: Provide technical representative to train Owner's maintenance personnel in operation and maintenance of specified equipment

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Comply with NFPA 30, "Flammable and Combustible Liquids Code," and NFPA 30a

1.5 ACTION SUBMITTALS

A. Product Data: For each type of the following:
   1. Piping
   2. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.

B. Provide piping schedule indicating type of intended installation and installation location. Refer to piping schedule below.

C. Shop/Coordination Drawings: Produced in electronic format (compatible with Autocad 2008) Detailed at ¼" =1'-0" scale, double lined. Drawings shall indicate duct and pipe layout and elevation, and all equipment with manufacturers' recommended maintenance access. The following items shall be shown and coordinated with each other, using input from installers of the items and trades involved: (Submit 3 hard copies of all documents to Architect for Review and Approval):

   1. Duct and piping installation in all spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct and piping layout.
   2. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
   3. Fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides.
   4. Detail location of anchors, alignment guides, and expansion joints and loops.

   5. Piping layout indicating sizes, configuration, and service.
   6. Elevation of top of ducts and pipes.
   7. Dimensions of main duct runs from building grid lines.
   8. Duct and pipe fittings.
   9. Reinforcement and spacing.
   10. Suspended ceiling components.
   11. Structural members to which duct and piping will be attached.
   12. Room walk paths and equipment access
   13. Items penetrating finished ceiling including the following:

      a. Lighting fixtures.
      b. Air outlets and inlets.

1.6 INFORMATION SUBMITTALS

A. Certificates: For certification required in "Quality Assurance" Article.

B. Welding certificates.

C. Field quality-control test reports.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Refer to Part 3 "Piping Applications" Article for applications of pipe, tube, and fitting materials.

2.2 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type L.

B. Wrought-Copper Fittings: ASME B16.22.

2.3 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; type, grade, and wall thickness as indicated in Part 3 "Piping Applications" Article.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article

C. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 "Piping Applications" Article.

D. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.

E. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed

2.4 STAINLESS STEEL PIPING

A. Stainless-Steel Pipe: ASTM A 312/A 312M, Schedule 40.

B. Stainless-Steel Pipe Fittings: ASTM A 182

2.5 JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.6 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Nipples:

1. Performance: Subject to compliance with requirements and related documents, provide products meeting a minimum performance of the following:

2. Description:

a. Standard: IAPMO PS 66
b. Electroplated steel nipple. complying with ASTM F 1545.
c. Pressure Rating: 2000 psig at 225 deg F.
d. End Connections: Male threaded or grooved.
e. Lining: Inert and noncorrosive, propylene

2.7 VALVES

A. Refer to fluid lubrication system specifications and drawings for valve type and location.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. General: Unions, transition, and special fittings with pressure ratings same as or higher than system pressure rating may be used in applications below, unless otherwise indicated.

B. Fluid Piping System

1. The contractor to provide the following required steel pipe and/or copper tubing to make up fluid lubrication system and connection to dispense reels. The contractor to furnish and install all required hangers, brackets, fittings, hardware to attach piping. The fluid lubrication system to be tested per manufacturer's standards.

Fluid/Service	Type
Engine Oil (EO)	Sch 40 Steel Pipe, Grade B, ERW
Windshield Washer Fluid (WWF)	Copper Pipe
Automatic Transmission Fluid (ATF)	Sch 40 Steel Pipe, Grade B, ERW
Engine Coolant (EC)	Copper Pipe
Gear Oil (GO)	Sch 40 Steel Pipe, Grade B, ERW
Chassis Grease (CG)	Sch 160 Steel Pipe, Grade B, seamless
Diesel Exhaust Fluid (DEF)	Sch 40 Stainless Steel Pipe, type 304
Used Oil	Sch 40 Steel Pipe
Used Coolant	Copper Pipe

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping to permit valve servicing.

D. Install piping at indicated slopes.

E. Install piping free of sags and bends.

F. Install fittings for changes in direction and branch connections.

G. Select system components with pressure rating equal to or greater than system operating pressure.

H. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

I. Install drains, consisting of a tee fitting, NPS 3/4 ball valve, and short NPS 3/4 threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

J. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

K. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

L. Install branch connections to mains using tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.

M. Install unions in piping**,** NPS 2 and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

N. Install shutoff valve immediately upstream of each dielectric fitting.

3.3 JOINT CONSTRUCTION

A. Copper- Wrought copper fittings and soldered joints

B. Steel Pipe-
   1. EO, ATF, and used oil- threaded malleable iron 300 psi fittings and threaded joints
   2. Grease- Forged steel 9000 psi socket weld fittings and welded joints
   3. GO- Forged steel 3000 psi socket weld fittings and welded joints

C. Stainless Steel Pipe-
   1. DEF- Class 150 Stainless wrought socket weld fittings

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric nipples.

3.5 VALVE INSTALLATION

A. Install valves in accessible locations, protected from possible damage.

B. Install valves at pump outlet and at inlet to hose reel.

3.6 HANGER AND SUPPORT INSTALLATION

A. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:

1. NPS 1/2 and Smaller: Maximum span, 60 inches; minimum rod size, 3/8 inch.
2. NPS 3/4 to NPS 1-1/4: Maximum span, 84 inches; minimum rod size, 3/8 inch.
3. NPS 1-1/2: Maximum span, 108 inches; minimum rod size, 3/8 inch.
4. NPS 2: Maximum span, 10 feet; minimum rod size, 3/8 inch.

B. Support vertical steel pipe at each floor and at spacing not greater than 10 feet.

C. Install the following pipe attachments:
1. Adjustable steel clevis hangers for individual horizontal piping less than 20 feet long.
2. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe

3.7 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

3.8 PAINTING

A. Paint metal piping, valves and piping specialties, except components, with paint or protective coating.

1. Latex Over Alkyd Primer System: MPI INT 5.1Q.

    a. Prime Coat: Quick-drying alkyd metal primer.
    b. Intermediate Coat: Interior latex matching topcoat.
    c. Topcoat: Interior latex (semigloss).

2. Color:
    a. Engine oil- Blue
    b. Automatic Transmission Fluid- Orange
    c. Gear oil- Lt Blue
    d. Common grease- Green
    e. Windshield washer fluid- White
    f. Engine coolant- Green

B. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish

3.9 LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches high

D. Pipe label color schedule
1. All labels
    a. Background color: Black
    b. Letter color: White

3.10 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. General:

1. Installer must test in demonstrate the integrity of tanks, piping, and secondary containment as well as the satisfactory operation of gauging an monitoring systems, before the storage tank system is placed into service.

2. Test all system components and piping for complete and correct system operation and demonstrate to owner prior to the system being placed in operation.
3. All testing shall be in compliance with NFPA 30 and 30a requirements

C. Piping:

1. Test aboveground piping at 150% of operating pressure but no less than 100 psig air pressure for two hours. Soap all joints.
2. There shall be no drop in pressure

D. Repair leaks and defects with new materials and retest system until satisfactory results are obtained.

E. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

F. Report test results promptly and in writing to Architect.

END OF SECTION

DIVISION 12
FURNISHINGS

SECTION 12 2113

HORIZONTAL LOUVER BLINDS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Horizontal louver blinds.
   2. Accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Shop Drawings:
   1. Submit Shop Drawings showing layout and installation details.
   2. Include details of conditions at adjacent construction.

C. Samples:
   1. Manufacturer's samples: Submit manufacturer's full range of standard color samples for slats for selection by Architect.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: Submit installer qualifications verifying years of experience; include list of completed projects having similar scope of work identified by name, location, date, reference names and phone numbers.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit cleaning and maintenance data for materials provided.
   2. Include copy of submittal in Project information manual.

B. Warranty: Submit signed and dated warranty.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Not less than 5 years documented, successful experience with work comparable to Work of this Project.

1.6 SAMPLE INSTALLATION

A. Prior to commencing Work and preceding pre-installation conference, provide sample installation of typical blind Work.

B. Size and Location: One window, in location acceptable to Architect.

C. Materials: Complete installation with every required component.

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of workmanship.
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain accepted sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

1.7 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent any damage to materials.

1.9 PROJECT CONDITIONS

A. Field verify dimensions of supporting structure and other adjoining elements before fabrication.

B. Environmental Requirements: Maintain minimum ambient temperature of 60 deg F (16 deg C).

1.10 SEQUENCING AND SCHEDULING

A. Do not install blinds until building is completely enclosed and wetwork and finishing operations, including painting, are completed.

1.11 WARRANTY

A. Provide lifetime written warranty covering labor and material, signed by manufacturer and installer, agreeing to repair or replace Work which exhibits defects or is not in conformance with Contract Documents.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Hunter Douglas Contract.

2. Equivalent products by following are acceptable:
   a. Bali Division of Springs Window Fashions (SWF Contract).
   b. Levolor Contract.

2.2 HORIZONTAL LOUVER BLINDS

A. Description: Horizontal blind system consisting of head channel, tilting mechanism, tilt rod, cord lock, drum and cradles, end braces, installation brackets, intermediate brackets, slat support braided ladders, slats, bottom rail, lift cord and other accessories as required for complete installation.

B. Components:
   1. Headrail:
      a. U-shaped channel of phosphatized steel, minimum 0.025 inch (0.635 mm) thick.
      b. Enclose all hardware in headrail.
   2. Slats:
      a. Aluminum; nominal 1 inch (25 mm) wide x nominal 0.008 (0.20 mm) inch thick after coating.
      b. Type: Unperforated.
      c. Fabricate blinds with at least 13.8 slats per foot (per 305 mm).
   3. Bottom rail:
      a. Phosphatized steel, minimum 0.031 inch thick (0.787 mm).
      b. Provide with color-coordinated snap-on plastic end caps.
   4. Lift cord:
      a. Braided polyester cord of sufficient length to properly control raising and lowering with pull ring.
      b. Locate cord 1-1/2 inches (38 mm) from jamb edge.
      c. Provide cord capable of removal and reattachment.
   5. Ladders:
      a. Braided polyester cord.
      b. Do not exceed 24 inches (600 mm) spacing between ladders, nor 7 inches (175 mm) between end ladder and end of slat.
   6. Tilting mechanism: Worm gear type.
   7. Tilt rod: Transparent with round fluted cross section.

C. Features:
   1. Disengaging clutch: Tilting mechanism automatically disengages when blind reaches fully closed position.

D. Finishes and Colors:
   1. Slats: Manufacturer's standard coating system using paint process to reduce static attraction of dust to slats; color to be selected by Architect from manufacturer's full standard color range.
   2. Ladders, cords and exposed steel components: Manufacturer's standard coating systems; color to match slats.

E. Acceptable Product: Equivalent to 1" Mini Horizontal Aluminum Blinds (product number CL82 1) by Hunter Douglas..

2.3 ACCESSORIES

A. Provide mounting brackets, anchors and other accessories as required for complete installation.
   1. Sealant: Resilient sealer material for sealing screw holes and penetration through window wall framing.

2.4 FABRICATION

A. Fabricate blinds free of sharp edges, burrs or other defects which compromise operation or are harmful to persons or materials in contact with them.

B. Accurately fit joints, corners and miters with sharp hairline joints.

C. Number each blind on an unexposed face of blind unit corresponding to identification numbers on Shop Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install according to final Shop Drawings and manufacturer's instructions to provide configurations and layout indicated on Drawings.

B. Position blinds level and true. Maintain 1/4 inch (6 mm) clear from each side of window jamb, unless otherwise indicated.

C. Anchor as required to provide rigid, secure installation.

D. Test blinds for smooth operation.

3.3 CLEANING AND REPAIR

A. Clean finished installation of dirt and finger marks.

B. Exposed surfaces shall be free from dents, tool marks, warpage, buckle, adhesive and open joints.
   1. Repair damaged blinds.
   2. Replace units which cannot be repaired to satisfaction of Architect.

3.4 PROTECTION

A. Protect units during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

SECTION 12 2116

VERTICAL LOUVER BLINDS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide vertical blinds for all aluminum windows which are complete assemblies including hardware, fastenings and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's product data and standard color chart for vinyl louvers.

B. Samples: Submit sample of vinyl louver in color selected.

1.3 JOB CONDITIONS

A. Do not install blinds until building is completely enclosed, masonry and concrete are fully cured and drywall is taped, spackled and sanded.

B. Maintain minimum ambient temperature of 60 deg F (16 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Graber.
   2. Equivalent products by the following manufacturers may be acceptable provided they comply with requirements of Contract Documents:
      a. Bali.
      b. Hunter Douglas Contract.
      c. Levolor.

2.2 VERTICAL BLINDS

A. System shall include direct surface mount, extruded aluminum head channel finished to match window finish, carrier tracks and spacer links, traversing cord and rotation chain.
   1. Traversing and pivot mechanism: Manufacturer's standard mechanism providing full synchronous 180 deg rotation for each louver blade.
   2. Louver blades: 3 inch (75 mm) wide, extruded solid vinyl with bead chain connecting louvers at bottom. Color to be selected from manufacturer's standards.
   3. Acceptable product and manufacturer: Equivalent to G-71 SuperVue Smooth PVC Vertical Blinds by Graber.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install according to manufacturer's written instructions.

B. Position blinds level, plumb and true.

C. Test blinds for smooth operation. Repair defective blinds.

3.2 CLEANING

A. Clean finished installation of dirt and finger marks.

END OF SECTION

SECTION 12 4813

ENTRANCE FLOOR MATS

PART 1 - GENERAL

1.1 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
   1. Surface-mounted entrance mats.
   2. Accessories.

1.2 ACTION SUBMITTALS

A. Product Data: Submit manufacturer's specifications and installation instructions for each component and finish.

B. Samples: Submit 12 inch square samples of mats.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data:
   1. Submit cleaning and maintenance data for materials provided.
   2. Include copy of submittal in Project information manual.

B. Warranty: Submit signed and dated warranty.

1.4 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, meet at site and review installation procedures and coordination with other Work.

1.5 PROJECT CONDITIONS

A. Environmental Requirements:
   1. Maintain minimum temperature of 70 deg F (21 deg C) in spaces to receive mat for at least 24 hours prior to installation, during installation and for not less than 48 hours after installation.
   2. Unroll mats and store facedown in spaces where they will be installed, at least 24 hours before beginning installation.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, handle and protect products in accordance with manufacturer's instructions.

B. Store in protected and dry area in manufacturer's unopened protective shipping packaging.

C. Support as required to prevent any damage to materials.

1.7 WARRANTY

A. Provide two year warranty agreeing to replace components with material defects or improper installation.

1.8 EXTRA STOCK

A. Deliver in unopened packages, identified by manufacturer, product, pattern and color.

B. Store at Project site where directed.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers:
   1. Listed products establish standard of quality and are manufactured by Consolidated Plastics.
   2. Equivalent products by the following are acceptable:
      a. American Floor Mats.
      b. MatsEtc, (a division of Optima Inc.).

2.2 ENTRANCE MATS:

A. Entrance Mats:
   1. Description: Heavy duty entrance mats, suitable for indoor and outdoor use; ultraviolet light-fade, salt, chemical and abrasion resistant.
   2. Dimensions and configurations:
      a. One-piece mats for each location, in dimensions and configurations indicated on Drawings. Tiles are not acceptable.
      b. Thickness: 3/8 inch (10 mm) thick.
   3. Construction:
      a. Face: Solution-dyed UV-stabilized reinforced polypropylene fibers; linear ribbed pattern.
         1) Composition: 100% recycled 30 oz. Polyethylene Terephthalate (PET) plastics.
      b. Backing: Natural rubber, dimensionally stable and water-permeable.
         1) Composition: 15% recycled rubber.
         2) Cleated.
   4. Color: Dark Gray.
   5. Acceptable product and manufacturer: Equivalent to Aquasorb Eco Mats by Consolidated Plastics.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

A. Install mats in accordance with manufacturer's instructions.

3.3 CLEANING, REPAIR AND PROTECTION

A. Clean components in accordance with manufacturer's instructions.

B. Repair or replace damaged components.

C. Protect entrance mats during construction so that they will be without any evidence of damage or use at time of acceptance.

END OF SECTION

DIVISION 13
SPECIAL CONSTRUCTION

SECTION 13 1200

FUEL ISLAND CANOPY

PART 1 - GENERAL

1.1 DESCRIPTION

A. Freestanding, pre-engineered metal canopies including concrete foundations, steel framing, metal roof, roof drains and leaders, fascia components, and metal ceiling and accessories.

1.2 RELATED SECTIONS

A. Division 11 – Equipment: Fuel and Fluid Management System.

B. Division 11 – Equipment: Fueling System Equipment.

C. Division 26 – Electrical.

1.3 REFERENCES

A. American Institute of Steel Construction, Inc. (AISC): AISC 360 - Specification for Structural Steel Buildings (copyrighted by AISC, ANSI approved).

B. American Society of Civil Engineers (ASCE): ASCE 7-05 - Minimum Design Loads for Buildings and Other Structures (copyrighted by ASCE, ANSI approved).

C. American Welding Society (AWS): AWS D1.1 - Structural Welding Code - Steel (copyrighted by AWS, ANSI approved).

D. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code (copyrighted by NFPA, ANSI approved) - hereinafter referred to as NEC.

E. ASTM International (ASTM):
   1. ASTM A 36/A 36M - Standard Specification for Structural Steel.
   2. ASTM F 1554 (GR36) - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
   3. ASTM A 325/A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
   4. ASTM A 500/A 500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
   5. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
   6. ASTM A 653/A 653 M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
   7. ASTM C 1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

F. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM MFM - Metal Finishes Manual.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide pre-engineered canopies capable of withstanding the effects of gravity loads and the following loads and stresses per IBC 2009 with Virginia Amendments:
   1. Minimum design wind load per ASCE 7, CH. 6.
   2. Minimum design snow load per ASCE 7, CH. 7.
   3. Minimum design seismic criteria per ASCE 7, CH. 11 – 13.
   4. Load combinations per ASCE 7, CH 2.
   5. Live load deflections shall be limited to H/240.

B. Thermal Movements: Provide pre-engineered canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.5 SUBMITTALS

A. Shop Drawings: For the following metal canopy system components, including all design documents. Include plans, elevations, sections, details, and attachments to other work:
   1. Drawings shall show specific application to this Project. Submit all required drawings in one submission, except as noted.
      a. Erection Drawings: Manufacturer's complete erection drawings. Indicate manufacturer's identification marking for the components.
      b. Manufacturer's drawings showing base plate dimensions and foundation loads for all columns and /or rigid frames.
         1) Manufacturer's standard sheets showing loads or details for a multiple range of building spans, heights, and loadings will not be accepted.
      c. Foundation drawings showing dimensions and elevations of all piers, walls, and footings required.
      d. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach all columns and/or rigid frames to foundation. Indicate column reactions at each location.
      e. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
      f. Metal Canopy Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
      g. Anchor bolt and tie rod details.
      h. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8).
         1) Flashing and trim.

2) Gutters.
3) Downspouts.

B. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.

C. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for all components.

E. Quality Control Submittals:
1. Design Calculations: Manufacturer's design calculations signed and sealed by a professional engineer who is legally qualified to practice in jurisdiction where Project is located, for the entire canopy structure and foundation.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.

G. Field quality-control reports.

H. Warranties: Sample of special warranties.

I. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.6 CANOPY DESIGN REQUIREMENTS

A. The fuel island canopy and associated foundations shall be designed by the engineering staff of the company producing the canopy

B. The design shall be done by a professional engineer who is legally qualified to practice in jurisdiction where Project is located. All drawings and product data shall bear the seal of the professional engineer.

C. Comply with the applicable provisions of the Virginia Uniform Statewide Building Code, the ICC International Fire Code, the Virginia Statewide Fire Prevention Code, referenced codes and regulations, and amendments.

D. Foundations shall be designed per provided geotechnical report.

E. Anchor bolts shall be designed per ACI 318, Appendix D.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in engineering and manufacturing pre-engineered canopies with a minimum documented experience of twenty years and with a quality assurance program utilizing a quality inspection for each system.
   1. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.

B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

C. Welding certificates.

D. Welding: Qualify procedures and personnel according to the following:
   1. Welding shall be in accordance with AWS D1.1 (with E70XX electrodes).
   2. Structural shop welding shall be done by certified welders.
   3. Steel shop connections shall be welded and field connections shall be bolted unless otherwise noted on the Drawings. Shop welds may be changed to field welds with the approval of the project engineer.
   4. Slag shall be cleaned from welds and inspected. Steel shall be painted with red oxide rust-inhibitive primer.

E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

H. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.

I. Product Options:
   1. Information on the Drawings and in the Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.
   2. The Drawings indicate size, profiles, and dimensional requirements of pre-engineered metal canopies and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval.

If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

J. Coordination
   1. The Contractor shall conduct site meetings to verify project requirements, substrate conditions, utility connections, manufacturer's drawings and installation instructions. Comply with provisions of the General Conditions Article 4.11.7: Project Schedule on project meetings.
   2. The contractor shall prepare for and pour the concrete footers for the pre-engineered metal canopies. Manufacturer shall furnish recommended footing drawings and prints and rebar details for concrete footings, as well as provide anchor bolts to be embedded in concrete footer. Such items shall be delivered to project site in time for installation.

K. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Store products in manufacturer's unopened packaging until ready for installation.

D. Protect components and accessories from corrosion, deformation, damage, and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.9 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Section 03300 "Cast-in-Place Concrete."

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Manufacturer shall warrantee the products it manufacturers to be free of defects in materials, leaks, and workmanship for 1 year from date of shipment.

PART 2 - PRODUCTS

2.1 FUEL ISLAND CANOPY

A. Acceptable Manufacturer: Subject to compliance with requirements, provide fuel island canopy by one of the following:
   1. Austin Mohawk and Company, Inc., Utica, NY.
   2. Shelters Direct, Laurel, MD.
   3. TFC Canopy, Garrett, IN.
   4. Or approved equal.

B. Substitutions: Requests for substitutions will be considered in accordance with provisions of the General Conditions.

2.2 MATERIALS

A. Structural Steel:
   1. Material and work shall conform to the latest AISC 360.
   2. Wide flange I-beam shall conform to ASTM A 572/A 572M GR.50, Fy ‘ 50 ksi. Other rolled sections shall conform to ASTM A 36/A 36M, Fy ‘ 36 ksi.
   3. Square and rectangular tubing shall conform to ASTM A 500/A 500M, Grade B, Fy ‘ 46 ksi.
   4. Plate steel shall conform to ASTM A 36/A 36M, Fy ‘ 36 ksi.
   5. Structural steel shall be painted with a rust inhibitive (red oxide) primer (std).

B. Sheet Metal:
   1. Decking: 3 inch (76 mm) by 16 inch (406 mm) by 20 gage smooth white, ASTM A 653/A 653M GR40, Fy ‘ 40 ksi, galvanized steel with baked enamel finish.

2.3 PRE-ENGINEERED METAL CANOPY

A. General: Provide a complete, integrated set of manufacturer’s canopy components, to form a pre-engineered canopy, ready for construction on project site. Design to be four-columns as shown on Drawings. Pre-engineered metal canopy will be designed to meet all applicable site structural wind, snow and seismic requirements. Calculations shall show adequate capacity of stacked members to resist overturning about their flanges.

B. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

D. Design Load: 30 psf.

E. Maximum Deflection: 1/140 of the span.

F. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

G. Canopy Fascia

1. Aluminum Composite Panel (ACM): Available with a fluorocarbon paint finish, masked on one side. Shall be warranted for 20 years.

H. Canopy Finishes: Comply with NAAMM MFM for recommendations for applying and designating finishes.
   1. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

I. Fabrication: Fabricate pre-engineered canopies completely in factory.

J. Canopy Lights: Canopy lights shall be LSI Industries Inc., Encore Series Model # EC S 320 PSMV F MT BRZ or approved equal. Lights shall be provided by canopy manufacturer.

K. Colors as selected by Architect from manufacturer's standard colors.

2.4 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

B. Downspout: Connect to roof drains within columns and run exposed along column side as shown. 3 inch (76 mm) by 4 inch (102 mm) by 24 gage hot-dip galvanized steel with baked enamel finish. Color as selected by Architect from manufacturer's standard colors
   1. Mounting Straps: Fabricated from same material, finish and color as downspouts.

2.5 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
   1. Make shop connections by welding or by using high-strength bolts.
   2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
   1. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
   2. Weld clips to frames for attaching secondary framing.
   3. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
   1. Make shop connections by welding or by using non-high-strength bolts.
   2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

2.6 FIRE PROTECTION

A. Provide Fire Marshal approved dry chemical fire extinguishing system, Pyro-Chem Attendant II. System to include required control head, pneumatic actuating cylinder, chemical agent storage cylinders, discharge nozzles, audible alarm, and remote mechanical pull station.
   1. Provide required control wiring and conduit, pneumatic actuation line, and agent distribution piping.
   2. Control head, pneumatic actuating cylinder, and mechanical pull station to be located adjacent to emergency shut-off.
   3. Storage cylinder capacity, quantity and location of discharge nozzles, and pipe sizing to be determined by manufacturer engineer.
   4. Provide delegated design engineering services.
   5. Provide calculations report to engineer for approval prior to ordering.
   4. Provide interconnection with dispenser. In the event of an alarm the dispenser pumps are to be disabled. Provide supervision of the detection/initiation circuit, tie into building fire alarm. Alarm to be generated upon system activation.
   5. Refer to Section 115600 FUELING SYSTEM EQUIPMENT, paragraph 2.9 for further information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
   1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
   2. Check installed anchor bolts for accuracy. Verify that bearing surfaces are ready to receive the work.
   3. Verify the rough-in of required mechanical and electrical services prior to placement of the structure.
   4. If preparation is the responsibility of another installer, notify the Architect of unsatisfactory preparation before proceeding.
   5. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 INSTALLATION

A. A work area shall be required extending 10 feet (3 m) beyond buildings and canopies in all directions to the extent practical. The work area shall be flat, comprised of hard-packed soil or gravel, asphalt, or concrete, and free of open excavation, debris, construction equipment and construction workers. An additional flat work space a minimum of 25 feet (7.6 m) by 25 feet (7.6 m) or as practical shall be provided adjacent to the canopy and/or building for unloading and storing materials. Site to meet OSHA guidelines to allow lift equipment and scaffolding to maneuver the work area.

B. Set pre-engineered metal canopy plumb and aligned. Level base plates true to plane with full bearing on concrete bases.

C. Fasten pre-engineered metal canopy columns to anchor bolts and/or foundation bolts.

D. Provide anchor bolts as follows:
   1. Anchor bolts or foundation bolts will be set by the Owner in accordance with approved site specific drawings. They must not vary from the size and dimensions shown on the erection drawings. Use of a plywood template is recommended. Remove template prior to column erection.
   2. Anchor bolts shall conform to ASTM F 1554 (GR36), and shall have a minimum of 7 inches (178 mm) of exposed thread and 23 inch (584 mm) minimum embedment with 1-1/4 inch (32 mm) nut and washer as embedment end.
   3. Shrinkage-resistant grout shall be ASTM C 1107, factory-packaged, aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30 minute working time installed by the Contractor.

E. Provide bolted connections as follows:
   1. Structural erection bolts shall conform to ASTM A 325/A 325M.
   2. A minimum diameter of 3/4 inch (19 mm) erection bolts shall be used for cross beam-to-column connections and a minimum of 5/8 inch (16 mm) diameter bolts for all other connections.
   3. Drilled holes in structural steel shall be deburred.
   4. Flat structural washers (minimum of one) shall be used on bolted connections.
   5. Bolts shall be tightened to snug tight per latest RCSC specifications (unless otherwise specified).

F. Provide screws as follows:
   1. Fastening shall be performed per installation prints provided by the manufacturer.
   2. Installation screws shall be furnished with electrode deposited cadmium coating unless otherwise noted.

3. Self-drilling and self-tapping screws shall have a sufficient cut point and a 1/2 inch (13 mm) outside diameter dished metal-backed neoprene washer to be used in water sealing applications .

G. Provide pedestrian protection and warnings during construction which comply with local, Federal, and OSHA codes.

H. Prior to steel erection of any kind, the Contractor shall grade, backfill and otherwise prepare the job site to allow for rolling scaffold and ensure safe working conditions including the removal or relocation of overhead power lines.

I. Any grade or elevation situations which deviate from the approved manufacturer's plans shall be conveyed to the manufacturer prior to fabrication.

J. All anchor bolts and/or leveling plates shall be set within 1/4 inch (6 mm) tolerance on layout and grade level.

K. Temporary electrical power shall be provided.

L. Connect electrical power service to power distribution system according to requirements specified in Division 26 - Electrical.

M. Dumpster for trash and debris shall be provided by the Contractor.

3.4 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to canopy assembly and weather tight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete canopy assembly, including trim, copings, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   2. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) on-center using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and no more than 60 inches (1524 mm) on-center between top and bottom fasteners.

3.5 ADJUSTING AND CLEANING

A. After completing installation, inspect exposed finishes and repair damaged finishes.

1. Repair damaged galvanized coatings on galvanized items with galvanized repair paint in accordance with ASTM A780 and manufacturer's written instructions.
2. Touchup Painting: After erection, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.

B. Erect and install the canopy and appurtenances in accordance with the manufacturer's printed instructions except as otherwise specified. Install the work of this Section so the structure is secure and weather tight, and exposed materials are free of visible dents, scratches, tool marks, cuts and other imperfections. Install system free of rattles, wind whistles, and noise due to thermal movement.

3.6 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 13 3419

METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Description of Work: Work of this Section includes, but is not limited to, the following:
1. Structural-steel framing.
2. Metal roof panels.
3. Composite metal roof panels.
4. Metal wall panels.
5. Foam-insulation-core metal wall panels.
6. Metal soffit panels.
7. Thermal insulation.
8. Snow guards.
9. Accessories.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. See Division 01 Sections QUALITY CONTROL and SPECIAL INSPECTION AND STRUCTURAL TESTING for independent testing agency procedures and administrative requirements.

B. See Division 03 Section CAST-IN-PLACE CONCRETE for concrete foundations, slabs, and anchor-bolt installation.

C. See Division 07 Section THERMAL INSULATION for insulation not provided as part of the metal building system.

D. See Division 07 Section JOINT SEALANTS for joint sealants not provided as part of the metal building system.

E. See Division 08 Section HOLLOW METAL DOORS AND FRAMES for hollow metal doors and frames not provided as part of the metal building system.

F. See Division 08 Section COILING DOORS.

G. See Division 08 Section SECTIONAL DOORS.

H. See Division 08 Section ALUMINUM-FRAMED ENTRANCES AND STOREFRONT for aluminum-framed entrances and storefront not provided as part of the metal building system.

I. See Division 08 Section ALUMINUM WINDOWS for windows not provided as part of the metal building system.

J. See DIVISION 11 for equipment in conjunction with metal building systems.

K. See Division 31 Section EARTH MOVING - BUILDING for foundations and building pad preparation.

1.4 DEFINITIONS

A. Terminology Standard: See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in referenced standards.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of metal building system component. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
   1. Structural-steel-framing system.
   2. Metal roof panels.
   3. Metal wall panels.
   4. Metal liner panels.
   5. Insulation and vapor retarder facings.
   6. Flashing and trim.
   7. Snow guards.
   8. Accessories.

B. Shop Drawings: For the following metal building system components. Include plans, elevations, sections, details, and attachments to other work.
   1. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach metal building to foundation. Indicate “pinned base” column reactions at each location for foundation design verification.
   2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
      a. Show provisions for attaching interior equipment and other items attached to metal building systems.
   3. Metal Roof and Wall Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
      a. Show wall-mounted items including doors, windows, louvers, and lighting fixtures.
   4. Snow Guard Drawings:
      a. Include details of rail-type snow guards.
      b. Include calculation of number and location of snow guards based on snow load, roof slope, roof type, components, spacings, and finish.
   5. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8):
      a. Flashing and trim.
      b. Gutters.
      c. Downspouts.

d. Louvers.
e. Snow guards.

C. Samples: For each type of exposed finish required, prepared on Samples of sizes indicated below:
1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
3. Vapor-Retarder Facings: Nominal 6-inch- (150-mm-) square Samples.
4. Snow guards: Base, bracket, and 12-inch- (300-mm-) long rail.
5. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.

D. Delegated-Design Submittal: For metal building systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified erector, manufacturer and professional engineer.

B. Manufacturer Accreditation: Statement that metal building system and components were designed and produced by a manufacturer accredited according to the International Accreditation Service's AC472.

C. Welding certificates.

D. Metal Building System Certificates: For each type of metal building system, from manufacturer.
1. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
a. Name and location of Project.
b. Order number.
c. Name of manufacturer.
d. Name of Contractor.
e. Building dimensions including width, length, height, and roof slope.
f. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
g. Governing building code and year of edition.
h. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
i. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
j. Building-Use Category: Indicate category of building use and its effect on load importance factors.

E. Erector Certificates: For each product, from manufacturer.

F. Manufacturer Certificates: For each product, from manufacturer.

G. Material Test Reports: For each of the following products:

1. Structural steel including chemical and physical properties.
2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shop primers.
5. Nonshrink grout.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption. Include tests for snow guards, performed by manufacturer and witnessed by qualifying testing agency.

I. Source quality-control reports.

J. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.

K. Warranties: Sample of special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panel finishes to include in maintenance manuals.

1.8 METAL BUILDING SYSTEM PERFORMANCE

A. Delegated Design: Design metal building system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Structural Performance: Metal building systems shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."

1. Design Loads: Comply with load requirements of the Virginia Statewide Uniform Building Code (VUSBC) and applicable national standards, as indicated below:
   a. General:
      1) Building Occupancy Category: II
      2) Building column and rigid portal frame bases are to be designed as “pinned” without bending moments.
      3) Minimum live load: 20 psf
      4) Collateral Dead Load: 10 psf
      5) Additional Roof Load for Photovoltaic Panels (Future: Not in Contract) : 5 psf
      6) Coordinate with mechanical equipment supplier for hung mechanical equipment loads and locations.
   b. Snow Loads:
      1) Ground Snow Load: 25 psf
      2) Importance Factor: 1.00
      3) Exposure Factor: 1.00 (partially exposed)
      4) Thermal Factor: 1.00 (partially heated)

5) Design for sloped roof snow loads, unbalanced loadings, and applicable drifting per Code.

c. Wind Loads:
   1) Basic Wind Speed: 90 mph
   2) Exposure Category: C
   3) Importance Factor: 1.00
   4) Topography Factor: 1.00
   5) Directionality Factor: 0.85
   6) Design main building frame and components for wind loads per Code.

d. Seismic Loads:
   1) Site Soil Classification: D
   2) Importance Factor: 1.00
   3) Short Period Design Acceleration (S_{DS}): 0.234
   4) One Second Period Design Acceleration (S_{D1}): 0.111
   5) Seismic Design Category: B
   6) Design main building frame for seismic loads and deflections per Code.

2. Deflection Limits: Design metal building system assemblies to withstand design loads with deflections no greater than the following:
   a. Overall drift for Wind Loads: 1/300 of the building height.
   b. Overall building drift for Seismic Loads: Deflection limits per Code.
   c. Purlins and Rafters: Vertical deflection of 1/240 of the span.
   d. Girts: Horizontal deflection of 1/240 of the span.
   e. Metal Roof Panels: Vertical deflection of 1/240 of the span.
   f. Metal Wall Panels: Horizontal deflection of 1/240 of the span.
3. Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
4. Metal panel assemblies shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to ASTM E 1592.

C. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Air Infiltration for Metal Panels:
   1. Metal roof panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of roof area when tested according to ASTM E 1680 at negative test-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
   2. Metal Wall Panels: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E 283 at static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

E. Water Penetration for Metal Panels:
   1. Metal roof panels: No water penetration when tested according to ASTM E 1646 at test-pressure difference of 2.86 lbf/sq. ft. (137 Pa).
   2. Metal wall panels: No water penetration when tested according to ASTM E 331 at a wind-load design pressure of not less than 2.86 lbf/sq. ft. (137 Pa).

F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.

G. Thermal Performance: Provide insulated metal panel assemblies with the following maximum U-factors and minimum R-values for opaque elements when tested according to ASTM C 1363 or ASTM C 518:
   1. Metal Roof Panel Assemblies:
      a. U-Factor: 0.035.
      b. R-Value: R-26, typical.
   2. Metal Wall Panel Assemblies:
      a. U-Factor: 0.052.
      b. R-Value: R-19, typical.

1.9 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer and member of MBMA.
   1. Accreditation: According to the International Accreditation Service's AC472.
   2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer licensed in the State of Virginia.

B. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.

C. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.

D. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.3, "Structural Welding Code - Sheet Steel."

F. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.

G. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.

1.10 MOCK-UPS

A. Prior to commencing Work and after acceptance of samples, build mockup of metal roof panel system to demonstrate aesthetic effects and set quality standards for materials and execution.

B. Materials and Extent:
   1. Use same materials, finishes, details, methods and anchorage systems proposed for Work.
   2. Build mockup of typical roof area as shown on Drawings.
   3. Provide mock-up system complete with panels, closures, clips, backing plates and other accessories as required for complete system.
   4. Make details identical to proposed details for Project.

C. Architect's Review:
   1. Architect will review mock-ups for visual acceptance of materials and workmanship.
   2. Obtain Architect's approval of mock-ups before proceeding with subsequent Work.

D. Maintain approved mock-ups during construction as standard for subsequent Work.
   1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.11 SAMPLE INSTALLATION

A. Prior to commencing Work and preceding pre-installation conference, provide sample installation of typical wall area.

B. Size and Location: As indicated on Drawings.

C. Materials: Incorporate complete materials as required for finished Work

D. Architect's Review:
   1. Architect will review sample installation for visual acceptance of workmanship.
   2. Obtain Architect's approval of sample installations before proceeding with subsequent Work.

E. Maintain accepted sample installation during construction as standard for subsequent Work.

F. Properly finished and maintained sample installation may be incorporated into completed Work.

G. Dismantle unacceptable sample installation and remove from site.

1.12 PRE-INSTALLATION CONFERENCE

A. Prior to commencing Work, at Contractor's direction, meet at site and review installation procedures and coordination with other Work.
   1. Review methods and procedures related to metal building systems including, but not limited to, the following:
      a. Condition of foundations and other preparatory work performed by other trades.
      b. Structural load limitations.
      c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
      d. Required tests, inspections, and certifications.
      e. Unfavorable weather and forecasted weather conditions.
   2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
      a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
      b. Structural limitations of purlins and rafters during and after roofing.
      c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
      d. Temporary protection requirements for metal roof panel assembly during and after installation.
      e. Roof observation and repair after metal roof panel installation.

3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
   a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
   b. Structural limitations of girts and columns during and after wall panel installation.
   c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
   d. Temporary protection requirements for metal wall panel assembly during and after installation.
   e. Wall observation and repair after metal wall panel installation.

1.13 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Protect foam-plastic insulation as follows:
   1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
   3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

1.14 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

B. Field Measurements:
   1. Established Dimensions for Foundations: Comply with established dimensions on approved anchor-bolt plans, establishing foundation dimensions and proceeding with fabricating structural framing without field measurements. Coordinate anchor-bolt installation to ensure that actual anchorage dimensions correspond to established dimensions.
   2. Established Dimensions for Metal Panels: Where field measurements cannot be made without delaying the Work, either establish framing and opening dimensions and proceed with fabricating metal panels without field measurements, or allow for field trimming metal panels. Coordinate construction to ensure that actual building dimensions, locations of structural members, and openings correspond to established dimensions.

1.15 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section CAST-IN-PLACE CONRETE.

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.16 WARRANTY

A. Structural Design - Lifetime: Manufacturer shall warrant that the building will not experience an occurrence of structural failure or an occurrence of structural damage due to improper structural design (excepting ventilation systems) on account of weather conditions, such as wind, ice, and snow. The foregoing warranty is limited to 50 years with respect to any Owner which is not an individual.

B. Fluoropolymer Coating: Provide written warranty as specified in Division 05 Section FLUOROPOLYMER FINISH.

C. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
   1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS AND MANUFACTURERS

A. Acceptable Products and Manufacturers: Design is based on the following systems as manufactured by Ceco Building Systems to establish a standard of quality:
   1. Roof systems:
      a. Roof Type 1 and Roof Type 3: BattonLok HS.
      b. Roof Type 2; Composite Roof: BattonLok HS with Interior Metal Roof Liner.
   2. Soffit system: Artisan L12.
   3. Wall system:
      a. Type EXT-1:
         1) Type 1A: FWP Insulated Wall Panels.
            a) Width: 24 inches.
            b) Orientation: Horizontal.
         2) Type 1B: FWP Insulated Wall Panels.
            a) Width: 24 inches.
            b) Orientation: Vertical.
         3) Type 1C: IPP II Insulated Wall Panels.
            a) Width: 36 inches.
            b) Orientation: Vertical.
         4) Type 1D: EWF Insulated Wall Panels.
            a) Orientation: Vertical.
      b. Type EXT-2:
         1) Type 2A: AVP Wall Panels.
            a) Orientation: Horizontal.

2) Type 2B: AVP Wall Panels.
a) Orientation: Vertical.

c. Type EXT-3:
1) Type 3A: ShadowRib Wall Panels.
a) Orientation: Vertical.
2) Type 3B: PBU Wall Panels.
a) Orientation: Vertical.

4. Locations: As indicated on Drawings.
5. Equivalent systems by following manufacturers may be acceptable provided they can meet performance and finish requirements and design profile limitations, including certified test reports showing compliance with referenced United States standards.
a. Butler Manufacturing.
b. Nucor Building Systems.
c. Varco Pruden Buildings.

2.2 PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted-flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, SS, Grade 50 or 80; with Class AZ50 coating.
2. Surface: Smooth, flat finish.

2.3 STRUCTURAL-STEEL FRAMING

A. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafter, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.
1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
2. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
3. Exterior Column Type: Uniform depth and tapered at locations as indicated on Drawings.
4. Rafter Type: Uniform depth.

B. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.

C. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
1. Purlins: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum 2-1/2-inch- (64-mm-) wide flanges.
a. Depth: As needed to comply with system performance requirements.

2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum 2-1/2-inch- (64-mm-) wide flanges.
    a. Provide girts for installation between columns and out-board of columns as required and at locations as indicated on Drawings.
    b. Depth: As required to comply with system performance requirements.
3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
4. Flange Bracing: Minimum 2-by-2-by-1/8-inch (51-by-51-by-3-mm) structural-steel angles or 1-inch- (25-mm-) diameter, cold-formed structural tubing to stiffen primary-frame flanges.
5. Sag Bracing: Minimum 1-by-1-by-1/8-inch (25-by-25-by-3-mm) structural-steel angles.
6. Base or Sill Angles: Minimum 3-by-2-inch (76-by-51-mm) zinc-coated (galvanized) steel sheet.
7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
8. Secondary End-Wall Framing: Manufacturer's standard sections fabricated from structural-steel sheet.
9. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
10. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.

D. Bracing: Provide adjustable wind bracing as follows, and as indicated on Drawings:
1. Pinned-Base Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
2. Pinned-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
3. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.

E. Bolts: Provide plain-finish bolts for structural-framing components that are primed or finish painted. Provide zinc-plated or hot-dip galvanized bolts for structural-framing components that are galvanized.

F. Materials:
1. W-Shapes: ASTM A 992/A 992M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
3. Plate and Bar: ASTM A 36/A 36M; ASTM A 572/A 572M, Grade 50 or 55 (345 or 380); or ASTM A 529/A 529M, Grade 50 or 55 (345 or 380).
4. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
5. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B or C, structural tubing.
6. Structural-Steel Sheet: Hot-rolled, ASTM A 1011/A 1011M, Structural Steel (SS), Grades 30 through 55 (205 through 380), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480); or cold-rolled, ASTM A 1008/A 1008M,

Structural Steel (SS), Grades 25 through 80 (170 through 550), or High-Strength Low-Alloy Steel (HSLAS), Grades 45 through 70 (310 through 480).

7. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grades 33 through 80 (230 through 550,) or High-Strength Low-Alloy Steel (HSLAS), Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
    a. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 50 or 80 (340 or 550); with Class AZ50 (AZM150) coating.
9. Non-High-Strength Bolts, Nuts, and Washers: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), carbon-steel, hex-head bolts; ASTM A 563 (ASTM A 563M) carbon-steel hex nuts; and ASTM F 844 plain (flat) steel washers.
    a. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
10. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563 (ASTM A 563M) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers.
    a. Finish: Hot-dip zinc coating, ASTM A 153/A 153M, Class C.
11. High-Strength Bolts, Nuts, and Washers: At Contractor's option, provide ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with spline ends; ASTM A 563 (ASTM A 563M) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M) hardened carbon-steel washers, plain.
12. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex-head steel structural bolts with spline ends.
    a. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
13. Unheaded Anchor Rods: ASTM F 1554, Grade 36.
    a. Configuration: Straight.
    b. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
    e. Finish: Plain.
14. Headed Anchor Rods: ASTM F 1554, Grade 36.
    a. Configuration: Straight.
    b. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
    c. Plate Washers: ASTM A 36/A 36M carbon steel.
    d. Washers: ASTM F 436 (ASTM F 436M) hardened carbon steel.
    e. Finish: Plain.

G. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
1. Apply primer to primary and secondary framing to a minimum dry film thickness of 1 mil (0.025 mm).
    a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of 0.5 mil (0.013 mm) on each side.
2. Prime galvanized members with specified primer after phosphoric acid pretreatment.
3. Primer: SSPC-Paint 15, Type I, red oxide.

H. Other Supports and Bracing: See DIVISION 11, EQUIPMENT.

2.4 METAL ROOF PANELS

A. Standing-Seam, Vertical-Rib, Metal Roof Panels, Panel Roof Type 1, Panel Roof Type 2 and Panel Roof Type 3: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
   1. Material: Aluminum-zinc alloy-coated steel sheet, 0.024-inch nominal uncoated steel thickness.
      a. Exterior Finish: Fluoropolymer. See Division 05 Section FLUOROPOLYMER FINISH.
      b. Color: To be selected by Architect from manufacturer’s full range of standard colors.
   2. Clips: Manufacturer's standard, floating type to accommodate thermal movement; fabricated from zinc-coated (galvanized) steel, aluminum-zinc alloy-coated steel, or stainless-steel sheet.
   3. Joint Type: Mechanically seamed, double folded.
   4. Panel Coverage: 16 inches (406 mm).
   5. Panel Height: 2 inches (51 mm).
   6. Uplift Rating: UL 90.

B. Flush-Profile, Metal Liner Panels, Panel Roof Type 2: Solid panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels; designed for interior side of metal roof panel assemblies and installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.
   1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) nominal thickness.
      a. Exterior Finish: Siliconized polyester.
      b. Color: As selected by Architect from manufacturer's full range.
   2. Panel Coverage: 16 inches (406 mm).
   3. Panel Height: 1.5 inches (38 mm), nominal.

2.5 METAL WALL PANELS

A. Semi-Concealed-Fastener Metal Wall Panels, Type EXT-2A and Type EXT-2B: Formed with raised, trapezoidal major ribs, single intermediate valley fold and smaller, equally-spaced, pencil ribs between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels using semi-concealed fasteners.
   1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal thickness.
      a. Exterior Finish: Fluoropolymer. See Division 05 Section FLUOROPOLYMER FINISH.
      b. Color: As selected by Architect from manufacturer's full range.
   2. Panel Coverage: 36 inches (915 mm).
   3. Panel Height: 1.25 inches (31.75 mm), nominal.

B. Concealed-Fastener, Flush-Profile, Metal Wall Panels, Type EXT-3A: Formed with vertical panel edges and a single trapezoidal rib, centered between panel edges; with lapped joint between panels; designed to be installed by lapping and interconnecting side edges of adjacent

panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
   a. Exterior Finish: Fluoropolymer. See Division 05 Section FLUOROPOLYMER FINISH.
   b. Color: As selected by Architect from manufacturer's full range.
2. Panel Coverage: 16 inches (406 mm).
3. Panel Height: 3 inches (76 mm).

C. Exposed-Fastener, Reverse-Rib, Metal Wall Panels Type EXT-3B: Formed with recessed, trapezoidal valleys and flat pan between valleys; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
   1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, 0.024-inch (0.61-mm) nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      a. Exterior Finish: Fluoropolymer. See Division 05 Section FLUOROPOLYMER FINISH.
      b. Color: As selected by Architect from manufacturer's full range.
   2. Major-Rib Spacing: 6 inches (152 mm) o.c.
   3. Panel Coverage: 36 inches (914 mm).
   4. Panel Height: 3/4 inches (19 mm).

2.6 FOAMED-INSULATION-CORE METAL WALL PANELS

A. Foamed-Insulation-Core Metal Wall Panels, General:
   1. Factory-formed and -assembled, metal wall panels fabricated from two metal facing sheets and an insulation core foamed in place during fabrication, with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

B. Concealed-Fastener, Foam-Insulation-Core Metal Wall Panels Type EXT-1A, Type EXT-1B, Type EXT-1C, and Type EXT-1D: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
   1. Panel Thermal-Resistance Value (R-Value): 19.
   2. Facing Material: Fabricate panel with exterior and interior facings of same material, surface profile, finish and thickness. Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
      a. Steel sheet thickness:
         1) Type 1A: 0.030-inch (0.76-mm) nominal uncoated steel thickness.
         2) Type 1B: 0.030-inch (0.76-mm) nominal uncoated steel thickness.
         3) Type 1C: 0.024-inch ((0.61-mm) nominal uncoated steel thickness.
         4) Type 1D: 0.024-inch ((0.61-mm) nominal uncoated steel thickness.
      b. Exterior Surface:
         1) Type 1A: Stucco-embossed, flat.
         2) Type 1B: Stucco-embossed, flat.

3) Type 1C: Stucco-embossed, 1/8 inch (3 mm) deep trapezoidal profile.
4) Type 1D: Stucco-embossed, 1 inch (25 mm) wide x 3/8 inch (9.5 mm) deep flutes.

c. Exterior Finish: Two-coat fluoropolymer; see Division 05 Section FLUOROPOLYMER FINISH.

d. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage:
1) Type 1A: 24 inches (610 mm).
2) Type 1B: 24 inches (610 mm).
3) Type 1C: 36 inches (914 mm).
4) Type 1D: 42 inches (1067 mm).

4. Insulation Core: Modified polyisocyanurate or polyurethane foam using a non-CFC blowing agent, foamed-in-place or board type, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
a. Closed-Cell Content: 90 percent when tested according to ASTM D 6226.
b. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D 1622.
c. Compressive Strength: Minimum 20 psi (140 kPa) when tested according to ASTM D 1621.
d. Shear Strength: 26 psi (179 kPa) when tested according to ASTM C 273/C 273M.

5. Fire-Test-Response Characteristics: Class A according to ASTM E 108.

6. Surface-Burning Characteristics: Flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E 84.

2.7 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal roof panels.
1. Finish: As indicated on Drawings.

2.8 SHOP FINISHES

A. Exposed Coil-Coated Finish: See Division 05 Section FLUOROPOLYMER FINISH.

B. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.9 THERMAL INSULATION

A. Faced Metal Building Insulation: ASTM C 991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

B. Unfaced Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.

C. Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I (foil facing), Class 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core. Provide units tested for interior exposure without an approved thermal barrier.

D. Retainer Strips: 0.025-inch (0.64-mm) nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.

E. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than 0.02 perm (1.15 ng/Pa x s x sq. m) when tested according to ASTM E 96/E 96M, Desiccant Method.
   1. Composition: White polypropylene film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.

F. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.10 DOORS AND FRAMES

A. Doors and Frames: As specified in Division 08 Section HOLLOW METAL DOORS AND FRAMES.

2.11 WINDOWS

A. Aluminum Windows: See Division 08 Section ALUMINUM WINDOWS.

2.12 SNOW GUARDS

1. Description: Snow guard rails fabricated from metal pipes, bars, or extrusions, anchored to brackets and equipped with two rails.
2. Material and Finish: Aluminum; mill.
3. Acceptable product and manufacturer: Equivalent to ASG4025 Snow Guard by Alpine SnowGuards.

2.13 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
   1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
   1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.

2. Clips: Manufacturer's standard, formed from steel sheet with stainless steel clips, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from steel, stainless-steel sheet or nylon-coated aluminum sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide 1-inch (25-mm) standoff; fabricated from extruded polystyrene.

C. Flashing and Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
2. Opening Trim: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.

D. Gutters: Formed from 0.022-inch (0.56-mm) nominal-thickness, metallic-coated steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2438-mm-) long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters.
2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.

E. Downspouts: Formed from 0.022-inch (0.56-mm) nominal-thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum 10-foot- (3-m-) long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.

F. Louvers: See DIVISION 22 and DIVISION 23 for requirements related to exterior louvers.

G. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.

H. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
a. Fasteners for Metal Roof Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.

b. Fasteners for Metal Wall Panels: Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless-steel or zinc-alloy-steel hex washer head.
c. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
d. Blind Fasteners: High-strength aluminum or stainless-steel rivets.

2. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
4. Metal Panel Sealants:
   a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
   b. Joint Sealant: ASTM C 920; one-part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.14 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to evaluate product.

B. Special Inspector: Owner will engage a qualified special inspector to perform the following tests and inspections and to submit reports. Special inspector will verify that manufacturer maintains detailed fabrication and quality-control procedures and will review the completeness and adequacy of those procedures to perform the Work.
   1. Special inspections will not be required if fabrication is performed by manufacturer registered and approved by authorities having jurisdiction to perform such Work without special inspection.
      a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

C. Testing: Test and inspect shop connections for metal buildings according to the following:
   1. Bolted Connections: Shop-bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
   2. Welded Connections: In addition to visual inspection, shop-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.

D. Product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

2.15 FABRICATION

A. General: Design components and field connections required for erection to permit easy assembly.
   1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
   2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members shall be free of cracks, tears, and ruptures.

B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
   1. Make shop connections by welding or by using high-strength bolts.
   2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
   3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
   4. Weld clips to frames for attaching secondary framing.
   5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll-forming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
   1. Make shop connections by welding or by using non-high-strength bolts.
   2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
   1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Before erection proceeds, survey elevations and locations of concrete-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.
   1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written erection instructions and erection drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base Plates: Clean concrete--bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
   1. Level and plumb individual members of structure.
   2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.
   1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for bolt type and joint type specified.
      a. Joint Type: Snug tightened or pretensioned.

G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.

1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
2. Locate and space wall girts to suit openings such as doors and windows.
3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.

H. Bracing: Install bracing in roof where indicated on erection drawings.

I. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.

J. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL PANEL INSTALLATION, GENERAL

A. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.
1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.

B. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
2. Install metal panels perpendicular to structural supports unless otherwise indicated.
3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Locate metal panel splices over, but not attached to, structural supports with end laps in alignment.
6. Lap metal flashing over metal panels to allow moisture to run over and off the material.

C. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.

D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.

E. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and

sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.

1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section JOINT SEALANTS.

3.5 METAL ROOF PANEL INSTALLATION

A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
   1. Install ridge caps as metal roof panel work proceeds.
   2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.

B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
   1. Install clips to supports with self-drilling or self-tapping fasteners.
   2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
   3. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
   4. Rigidly fasten eave end of metal roof panels and allow ridge end free movement due to thermal expansion and contraction. Predrill panels for fasteners.
   5. Provide metal closures at peaks, rake edges, rake walls and each side of ridge caps.

C. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

3.6 METAL WALL PANEL INSTALLATION

A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
   1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
   2. Shim or otherwise plumb substrates receiving metal wall panels.
   3. When two rows of metal panels are required, lap panels 4 inches (102 mm) minimum.
   4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
   5. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Predrill panels.
   6. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws.
   7. Install screw fasteners in predrilled holes.
   8. Install flashing and trim as metal wall panel work proceeds.
   9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated; or, if not indicated, as necessary for waterproofing.

10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.

C. Insulated Metal Wall Panels: Install insulated metal wall panels on exterior side of girts. Attach panels to supports at each panel joint using concealed clip and fasteners at maximum 42 inches (1067 mm) o.c., spaced not more than manufacturer's recommendation. Fully engage tongue and groove of adjacent insulated metal wall panels.
1. Install clips to supports with self-tapping fasteners.
2. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels as weather seal.

3.7 METAL SOFFIT PANEL INSTALLATION

A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.

B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.8 THERMAL INSULATION INSTALLATION

A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
3. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.

B. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.

3.9 FALL PROTECTION ANCHORS INSTALLATION

A. Install fall arrest system in accordance with final Shop Drawings and manufacturer's instructions.

B. Where contact between dissimilar metal occurs, provide isolation materials to prevent corrosion.

3.10 SNOW GUARD INSTALLATION

A. Install snow guards according to manufacturer's written instructions.

B. Do not use fasteners that will penetrate metal roofing, or fastening methods that void metal roofing finish warranty.

C. Seam-Mounted, Rail-Type Snow Guards: Clamps attached to vertical ribs of standing-seam metal roof panels.

3.11 ACCESSORY INSTALLATION

A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
   1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
   3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.

B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
   1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
   2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
   1. Provide elbows at base of downspouts to direct water away from building.

E. Circular Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Mount ventilators on flat level base. Install preformed filler strips at base to seal ventilator to metal roof panels.

F. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.

G. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.

3.12 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Inspection of fabricators.
   2. Steel construction.
   3. Connections.
   4. Anchor bolt installation.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Tests and Inspections:
   1. High-Strength, Field-Bolted Connections: Connections shall be tested and inspected during installation according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
   2. Welded Connections: In addition to visual inspection, field-welded connections shall be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at inspector's option:
      a. Liquid Penetrant Inspection: ASTM E 165.
      b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
      c. Ultrasonic Inspection: ASTM E 164.

D. Product will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.13 ADJUSTING

A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.

3.14 DEMONSTRATION

A. Demonstrate fall protection anchor operation, safety and maintenance in fall arrest system use to Owner's designated personnel.

B. Each anchor shall be load tested to appropriately demonstrate the ability of the installation to meet the design loads.

3.15 CLEANING AND PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

C. Touchup Painting: After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
   1. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
   2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
   1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

DIVISION 14
CONVEYING SYSTEMS

SECTION 14 3000

CRANES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Special Conditions, apply to the Work in this Section.

1.2 WORK INCLUDED

A. Equipment items as listed below by Equipment Mark Number:

1. CRANE, BRIDGE, FREE STANDING, 1 TON
Equipment Mark Number: 5074
Submittal requirements: PD, OM, SD, T

2. CRANE, PORTABLE, 2 TON
Equipment Mark Number: 5280
Submittal requirements: PD, OM

3. HOIST, CHAIN, ELECT., 1 TON
Equipment Mark Number: 5362
Submittal requirements: PD, OM

B. Provide roughing-in, installation of equipment, and final connection of utilities, with labor, services, and incidentals necessary for complete and operational equipment installation.

1. Coordinate and verify all electrical, foundation, and utility connections with all trades prior to equipment ordering and purchase.

C. Wiring and switching between equipment and utilities.

1.3 QUALITY ASSURANCE

A. Experience: Equipment shall be produced by a manufacturer of established reputation with a minimum of five years experience supplying specified equipment.

B. Each product shall be provided by a single manufacturer.

C. All components shall be fully tested and documented to operate as a complete system

D. Manufacturer's Representative: The manufacturer authorized representative shall be factory trained and certified personnel providing service, startup, and quality control field labor for the project from their local office.

1. Installation: Provide a qualified manufacturer's representative at site to supervise work related to equipment installation, check out and start up.

2. Training: Provide technical representative to train Owner's maintenance personnel

in operation and maintenance of specified equipment

1.4 ACTION SUBMITTALS

A. Refer to above submittal requirements. The following abbreviations are used to identify submittals required:

1. PD- Product Data

2. SD- Shop drawings

3. OM- Operation and Maintenance manual

4. T- Training of owners personnel on specific equipment items

B. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical requirements, wiring diagrams, and provided accessories.

1. Submit Product Data in accordance with Division 1 - General Requirements of these specifications.

2. Restrict submitted material to pertinent data. For instance, do not include manufacturer's complete catalog when pertinent information is contained on a single page.

C. Shop drawings and schematics detailing fabrication, installation, piping layout, materials and finishes, system interconnections, and utility connections of equipment assemblies. Indicate dimensions, weights, loadings, required clearances, method of field assembly, components, and location and size of each field connection

1.5 INFORMATION SUBMITTALS

A. Delegated-design submittal: For equipment supports, foundations, structure, and capacities to comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer responsible for their preparation

B. Factory tests and inspection reports prior to shipping.

C. Field test and start-up reports, indicating and interpreting test results relative to compliance with specified requirements, for information.

D. Certificates: For certification required in "Quality Assurance" Article

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Manual:

1. Provide a Complete parts list, operating instructions, and maintenance manual covering equipment at time of installation including, but not limited to:

a. Description of system and components.

b. Schematic diagrams of electrical, plumbing and compressed air systems.

c. Provide approved submittal as part of O&M clearly identifying manufacturer and provided model number.

d. Manufacturer's printed operating instructions.

e. Printed listing of periodic preventive maintenance items and recommended frequency required to validate warranties. Failure to provide maintenance information will indicate that preventive maintenance is not a condition for validation of warranties.

f. List of original manufacturer's parts, including suppliers' part numbers and cuts, recommended spare parts stockage quantity and local parts and service source.

g. Include vendor contact information for service and warranty

h. Include all start-up and testing reports

2. Assemble and provide copies of manual in 8-1/2 by 11 inch format. Foldout diagrams and illustrations are acceptable. Provide copies per provisions of Division 1 - General Requirements.

1.7 WARRANTY

A. Warrant work specified herein for one year from substantial completion against defects in materials, function and workmanship unless otherwise noted below.

B. Warranty shall include materials and labor necessary to correct defects.

C. Defects shall include, but not be limited to noisy, rough, or substandard operation; loose, damaged, and missing parts; and abnormal deterioration of finish.

D. All parts shall be readily available locally in the United States.

E. Any units or parts which prove defective during the warranty period will be replaced with OEM parts and transportation prepaid.

1.8 COORDINATION

A. Coordinate size and location of all foundations, supports, piping, electrical, and controls

1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in manufacturer's containers, appropriately packaged and/or crated for protection during domestic shipment and storage in humid, dusty conditions.

B. Indelibly label all containers, including those contained in others, on outside with item description(s) per title and Mark Number of this specification.

C. Provide equipment and materials specified complete in one shipment for each equipment item. Split or partial shipments are not permissible.

1.10 LABELING

A. Nameplate: Manufacturer shall securely attach in a prominent location on each major item of equipment a non-corrosive nameplate showing manufacturer's name, address, model number, serial number, and pertinent utility or operating data.

B. Crane capacity shall be painted with letters and numbers 3 inches high minimum on both sides of the boom web.

C. All electrical equipment and materials shall be new and shall be listed by Underwriter's Laboratories, Inc. (U.L.), or other National Recognized Testing Laboratory (NRTL), in categories for which standards have been set by that agency and labeled as such in the manufacturer's plant.

PART 2 – PRODUCTS

2.1 CRANE, BRIDGE, FREESTANDING, 1 TON
Equipment Mark Number: 5074

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Columbus McKinnon Lode Rail or approved equal

B. Warranty: The crane must have a 10 year parts and 1 year labor warranty

C. Capacities and Dimensions:

1. Bridge:

a. Minimum bridge capacity: 1 ton.

b. Bridge length: 17 feet 8 inches.

c. Bridge depth: 14 7/8”

d. Bridge overhang: 1 foot 0 inches on each end of the runway

e. Minimum bridge trolley travel: 14feet 11 3/16 inches.

2. Runway

a. Capacity: 1 ton

b. Length: 53 feet 0 inches

c. Cantilever: 4 feet on each end

d. Overall length: 54 feet 7 inches

e. Runway depth: 15 3/8inches

f. Runway centers width: 15 feet 8 inches

g. Runway sections 28 feet & 25 feet

3. Supports

a. Number of supports: 6 (two assemblies per support center)

b. Support centers length: 25 feet-25 feet

c. Minimum overall height: 18 feet 8 1/2 inches

d. Support centers width: 18 feet 8 inches

e. Minimum overall width: 20 feet 3 1/2 inches

f. Anchor bolt load: 4191 pounds, 6 inch reinforced concrete minimum. Concrete compressive strength 3000 psi required.

4. Festooning

a. Runway carrier: 8 Gliders

b. Festoon clamps: Runway: 1, Bridge: 1

c. Conductor type: Flat cable (4-conductor #14 AWG) 1 pcs @ 80 ft each

d. Bridge carrier

1) Bridge: 1

2) 5-Trolleys

5. Trolley Pin height: 16 feet 0 inches to trolley pin

6. Speeds:

a. Bridge: Manual motion.

b. Trolley: Manual motion.

7. System capacity: 2,000 pounds, maximum.

D. Features and Construction:

1. Bridge: A single girder bridge shall be provided with the system.

a. Materials: The bridge shall consist of cold-rolled steel members welded together with two inch by two inch square tubing welded on top for reinforcement and strength as required. A stack section at one end of a runway shal serve as an extension that allows festoon carriers to be stored on the end of the runway without reducing crane coverage.

2. Runways:

a. Materials: Track sections shall consist of cold-rolled steel members

welded together.

3. Provide 14”x14” base plate welded to each support with 1 inch diameter bolt holes in each corner 11 inches on center.

4. Hoist trolley: Wheel to match the taper of the track to reduce rolling resistance. Wheels to contain ball bearings that are sealed and lubricated for life. Trolleys to be designed to operate in temperatures from +5 degrees F to + 200 degrees F.

5. End trucks: Provide connection between the bridge and runways. Wheels to match the taper of the track to reduce roiling resistance. Two horizontal wheels will center the truck within the runway to prevent binding of the bridge. Any slight runway misalignment is taken up by having the bridge float in one end truck and firmly clamped in the other.

6. Festoon trolleys: Trolleys to have four wheels and a pivoting festoon saddle support.

7. Festoon system: Provide flat cable and festoon system with enough cable for 3 foot loops on the runway and 1 foot 6 inch loops on the bridge.

   a. Trolleys: used to support the flat cable along the runway and bridge

   b. Clamps: used to anchor the festooning at the start of the runway and bridge. Also provided to prevent the festooning trolleys from exiting the track, and provide a redundant stop for the end trucks and trolleys.

8. End stops and Universal bumpers: Provide high impact molded end stop bumpers on the bridge and runways to prevent the end truck and trolley from exiting the track. The bumpers are to be bolted to the track to physically limit the travel of the end truck and trolley.

9. Hoist: Refer to item 5362. Provide one for each bridge crane.

10. Power supply: Power supply shall be provided by power feed end cap consisting of a rubber end pad and an aluminum terminal box with a twist type cable entry gland. Power feed cap shall be pre-assembled with attached plug connectors and jumper wires.

11. Capacity plate: Adhesive PVC foil plates indicating capacity of system shall be attached to both sides of bridge and equally spaced along runway length. Capacity stated on hoist shall be same as capacity indicated on plates.

E. Controls: All protective circuits and components shall meet National Electrical Code requirements.

1. Provide required contactors, relays, and switches to disable power to associated vehicle lift when crane is not in “home” position. Provide a roller type limit switch in the runway to enable/disable the lift. Lift to be enabled when crane is positioned approximately 2 feet from end of runway at the entrance into the maintenance bay. Similarly crane to be disabled when lift is enabled.

F. Finish: Durable, corrosion inhibiting enamel paint with color coded components and zinc-

galvanized components where required.

2.2 CRANE, JIB
Equipment Mark Number: 5080

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Abell-Howe Company or approved equal.

B. Capacities and Dimensions:

1. Capacity: 2000 pounds.

2. Dimensions:

a. Span : 12 feet.

b. Height under beam: 10 feet

c. Footing: 6 feet x 6 feet x 4 feet

3. Swing: 180 degrees, maximum.

C. Features and Construction:

1. Mast: Fabricated from heavy wall structural steel pipe with wall thickness sized to minimize deflection.

2. Base plate: Large diameter base plate reinforced with heavy steel gussets for continuous alignment.

3. Head section: Rigid steel plate box type with welded construction for minimum deflection between boom and mast

4. Boom: rolled steel I-beam section with long wearing tapered flange for smooth trolley travel.

5. 360 degree rotation on a tapered roller bearing providing full capacity vertical and radial thrust loading

6. Lower section of the head to revolve around the pillar on a pair of steel rollers equipped with self-aligning roller bearings

7. Stops: Crane shall be equipped with stops to prevent any portion of the boom, hoist, or tagline system from coming in contact with building walls or structure. Verify placement of stops in the field.

D. Finish: Durable enamel in manufacturer's standard color.

2.3 CRANE, PORTABLE
Equipment Mark Number: 5280

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Star Machine and Tool Company or approved equal.

B. Capacities and Dimensions:

1. Boom capacity:

a. Retracted: 4000 pounds.

b. Extended: 3000 pounds.

2. Maximum boom height:

a. Retracted: 109 inches.

b. Extended: 117 inches.

3. Effective boom reach:

a. Retracted: 45 inches.

b. Extended: 60 inches.

4. Minimum overall dimensions:

a. Width: 46 inches.

b. Depth: 77 inches.

c. Height: 80 inches.

5. Leg throat: 40 inches.

6. Wheel diameters:

a. Fixed: 8 inches.

b. Leg, swivel: 8 inches.

7. Lift chain: 48 inches.

C. Features and Construction:

1. Construction: Frame and boom shall be continuously welded seam box construction of heavy steel. Legs shall be flanged, I-beam construction.

2. Adjustment: Crane boom height and length shall be adjustable without use of tools.

3. Portability: Crane assembly shall be mobile frame mounted for portability. A steerable caster shall be at mast end with handle for towing and positioning. Heavy non-steel support wheels shall be for load bearing and quiet operation.

4. Hydraulics: Manual, double acting pump shall be included for rapid boom positioning and high force multiplication lifting.

5. Lift chain: Length shall be adjustable at boom attachment. Chain shall be provided with slip hook and grab hook.

6. Operating controls: Control valve for precise lowering control with automatic valving shall limit descent speed under load.

D. Finish: Durable enamel in manufacturer's standard color.

2.4 HOIST, CHAIN, ELECTRIC
Equipment Mark Number: 5362

A. Manufacturers

1. Basis-of-Design Product: Subject to compliance with requirements, provide equipment by Coffing Hoists or approved equal.

B. Capacities and Dimensions:

1. Hoist:

a. Capacity: 2000 pounds.

b. Lifting range: 20 feet.

c. Number of Chains: 2

d. Lifting speed: 8 FPM.

e. Motor: 1/2 HP.

C. Features and Construction:

1. Frame and wheels: Cast aluminum alloy with cast iron wheels and sealed, lifetime lubricated ball bearings. Motorized trolley wheels to be heat treated for added durability.

2. Five-pocket load sheave.

3. Multiple disk motor brake- heavy duty, direct acting designed for positive load spotting and holding

4. Mechanical load brake- Weston type, controls load lowering and prevents load drift. Holds independent of multiple disc motor brake

5. Load hook and chain: Forged steel hook with safety clip attached to heat treated chain by bearing type swivels.

6. Limit switches- adjustable to regulate upper and lower load travel. Provide stainless steel limit switch shaft.

7. Provide solid state starting switch

8. Gearing and transmission- helical gearing precision machined of alloy steel in oil bath.

9. Provide with overload clutch to protect hoist, clutch, and supporting structures from damaging overloads, chain jamming, and reverse phasing.

10. Wrap-around side plates to act as safety lugs and bumpers to protect wheels.

11. Hoist mounting: Lug mounted to trolley for minimum headroom.

12. Pendant: Designed to accommodate thumb or two handed operation constructed of glass- filled nylon, NEMA 3R. Control pendant shall be mounted 36 inches above finished floor.

13. Built in compliance with ASME/ANSI B30.16 and CSSA standards.

D. Controls: Pushbutton pendant, 24 volt, with cord strain relief bushings for hoist UP/DOWN.

E. Utilities Available: 480 VAC, 3 phase, 1/2 HP.

PART 3 - EXECUTION

3.1 INSPECTION

A. Coordinate location of rough-in work and utility stub-outs to assure match with equipment to be installed.

B. Inspect delivered equipment for damage from shipping and exposure to weather.

C. Compare delivered equipment with packing lists and specifications to assure receipt of all items.

3.2 INSTALLATION

A. Perform work under direct supervision of Foreman or Construction Superintendent with authority to coordinate installation of scheduled equipment with Architect.

B. Install equipment in accordance with plans, shop drawings and manufacturer's instructions:

1. Positioning: Place equipment in accordance with any noted special positioning requirements generally level, plumb and at right angles to adjacent work.

2. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging equipment or adjacent work.

3. Anchorage: Attach equipment, as directed by Architect, to prevent damage resulting from inadequate fastening. Installation fasteners shall be installed to avoid scratching or damaging adjacent surfaces.

4. Upon completion of work, finish surfaces shall be free of tool marks, scratches,

blemishes, and stains.

3.3 TESTING

A. Perform tests and inspections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to start-up inspect, test, and adjust components, assemblies, and equipment installations, including connections, check operation of the equipment and components for operation and performance as specified and examine the finish for damage. Provide report in writing that the installation meets the requirements and shall include information concerning minor adjustments and minor repairs, which may be required before final acceptance by the Owner.

2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment

C. Prepare test and inspection reports

D. After final connections are made and prior to authorizing payment, specified equipment shall be tested for compliance with all specified features in the presence of the Architect using acceptance procedures provided by the manufacturer.

3.4 CLEANUP

A. Touch-up damage to painted finishes.

B. Wipe and clean equipment of any oil, grease, and solvents, and make ready for use.

C. Clean area around equipment installation and remove packing or installation debris from job site.

D. Notify Architect for acceptance inspection.

3.5 TRAINING

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment

B. Direct the technical representative to provide specified hours of training to designated Owner's maintenance personnel in operation and maintenance of the following equipment. Coordinate, with Owner, training schedule and list of personnel to be trained.

1. CRANE, BRIDGE, FREE STANDING, 1 TON
Equipment Mark Number: 5074
Hours Required: 2

2. CRANE, PORTABLE, 2 TON
Equipment Mark Number: 5280
Hours Required: 1

3. HOIST, CHAIN, ELECT., 1 TON

Equipment Mark Number: 5362
Hours Required: 1

C. Obtain, from technical representative, a list of Owner's personnel trained in equipment operations and maintenance.

D. Provide a Windows compatible movie file format recording on DVD disk of the training session. The DVD training movie can be of a live session or a produced training video.

END OF SECTION