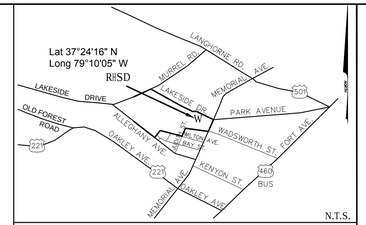
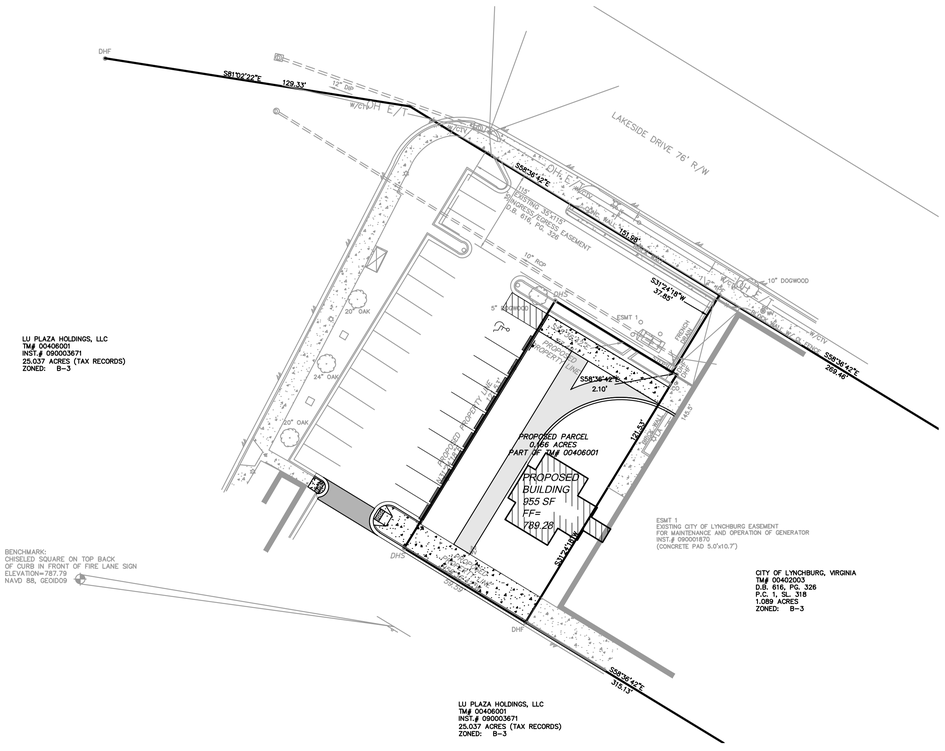
COVER SHEET
FOR
STORYBOOK READING ROOM
LYNCHBURG PUBLIC LIBRARY
CITY OF LYNCHBURG, VIRGINIA



VICINITY MAP



LEGEND

IPF	IRON PIN FOUND
DHF	DRILL HOLE FOUND
	ELECTRIC POLE
	GUY WIRE
	CLEANOUT
	WATER METER
	WATER VALVE
	STORM MANHOLE
	FIRE HYDRANT
	LIGHT POLE
	EDGE OF PAVEMENT
	BENCHMARK
	SIGN
OH E	OVERHEAD ELECTRIC
OH T	OVERHEAD TELEPHONE
OH CTV	OVERHEAD CABLE TV
	CONCRETE
TW	TOP OF WALL
EC	EDGE OF CONCRETE
TBC	TOP BACK OF CURB
LA	LANDCAPED AREA
TFD	TOP OF FRENCH DRAIN

PROPOSED LEGEND:

- LIMITS OF CONSTRUCTION
- 800 — PROPOSED INDEX CONTOUR
- 802 — PROPOSED CONTOUR
- STORM SEWER
- STORM INLET
- CONCRETE
- ADD ALTERNATE CONCRETE
- STANDARD DUTY ASPHALT PAVEMENT

GENERAL NOTES:

1. TAX MAP #00406001
2. ZONED: B-3
   CURRENT USE: VACANT
   PROPOSED USE: LIBRARY
   ADDRESS: 2315 MEMORIAL AVENUE, LYNCHBURG, VIRGINIA 24501
3. OWNER: CITY OF LYNCHBURG - CITY MANAGERS OFFICE
   ADDRESS: 900 CHURCH STREET, LYNCHBURG, VIRGINIA 24504
   CONTACT: SCOTT GLASS
   PHONE: (434) 455-4409
4. THE SCOPE OF THIS PLAN SHALL INCLUDE 955 SF BUILDING ADDITION AND SIDEWALK.
5. TOTAL DISTURBED AREA WILL BE: 0.18 ACRES.
6. NO DEMOLITION, SITE WORK, OR GRADING IS PERMITTED PRIOR TO ISSUANCE OF A LAND DISTURBANCE PERMIT ISSUED BY THE CITY OF LYNCHBURG.
7. ALL EROSION/STORMWATER MANAGEMENT MEASURES MUST BE DE-WATERED PRIOR TO ISSUANCE OF CERTIFICATE OF OCCUPANCY AND ALL TEMPORARY EROSION MUST BE REMOVED WITHIN 30 DAYS OF PERMANENT STABILIZATION OF THE SITE.
8. ALL CONSTRUCTION STAGING, LOADING, TEMPORARY PARKING, AND LAY DOWN AREAS SHALL BE COORDINATED WITH THE OWNER PRIOR TO ANY CONSTRUCTION OR DEMOLITION ACTIVITIES.
9. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATE DUST CONTROL TO PREVENT DAMAGING AND/OR NUISANCE AIRBORNE DUST FROM LEAVING THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR TAKING WHATEVER MEASURES ARE NECESSARY TO CORRECT AND/OR COMPENSATE BORDERING PROPERTY OWNERS AND THE OWNER FOR ALL DAMAGES DUE TO DUST.
10. THIS PROJECT IS TO BE CONSTRUCTED IN ACCORDANCE WITH THE LATEST EDITION OF THE CITY OF LYNCHBURG MANUAL OF DETAILS AND SPECIFICATIONS.
11. CONTRACTOR RESPONSIBLE FOR OBTAINING ALL PERMITS AND BONDS AS DEEMED NECESSARY BY THE CITY OF LYNCHBURG.
12. CONTRACTOR SHALL CONTACT THE CITY OF LYNCHBURG PRIOR TO ANY DEMOLITION OR GRADING ACTIVITIES WITHIN THE RIGHT OF WAY TO OBTAIN THE APPROPRIATE PERMITS.
13. CONTRACTOR SHALL CONTACT THE OWNER IN WRITING NOT LESS THAN 30 DAYS MINIMUM PRIOR TO ANY DEMOLITION AND/OR CONSTRUCTION ACTIVITY TO VERIFY MARKING OF EXISTING UTILITY SERVICES.
14. CONTRACTOR SHALL BE REQUIRED TO PROVIDE PROOF TO THE CITY OF LYNCHBURG THAT A SOIL TEST HAS BEEN CONDUCTED IN ORDER TO DETERMINE FERTILIZER APPLICATION RATES FOR THE ESTABLISHMENT OF GRASS ON THE SITE.
15. THE AREA SHOWN HEREON IS LOCATED IN FLOOD HAZARD ZONE 'X' AND IS NOT LOCATED WITHIN FLOOD HAZARD ZONE 'A' FOR A 100 YEAR FLOOD AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY AS SHOWN ON MAP #5100930043D DATED REVISED JUNE 3, 2008.
16. THE CITY OF LYNCHBURG WILL REQUIRE A PRE-CONSTRUCTION MEETING WITH THE CERTIFIED RESPONSIBLE LAND DISTURBER, THE ENGINEER AND JACOB DORMAN OF THE CITY OF LYNCHBURG PRIOR TO THE ISSUANCE OF THE LAND DISTURBANCE PERMIT. JACOB DORMAN MAY BE CONTACTED AT 434-455-3892 TO SET UP MEETING. CONTRACTOR SHALL BE PREPARED TO PROVIDE THEIR CERTIFICATION NUMBER AT THIS MEETING.
17. CONTACT THE CITY ENVIRONMENTAL REVIEWER, THE CITY CONSTRUCTION COORDINATOR AND MISS UTILITY 48 HOURS IN ADVANCE OF ANY CONSTRUCTION ACTIVITY.
18. THE PROJECT WILL NOT REQUIRE ANY ADDITIONAL WATER OR SANITARY SEWER CONNECTIONS.

CONTRACTOR SHALL PROVIDE AN APPROVED PLAN ADDENDUM PRIOR TO ISSUANCE OF ANY LAND DISTURBANCE PERMIT, IDENTIFYING THE LOCATION, ADEQUATE STABILIZATION MEASURES AND AN APPROVED PERMIT FOR ANY OFFSITE BORROW/FILL/WASTE AREAS THAT WILL BE USED IN CONJUNCTION WITH THIS PROJECT. APPROXIMATELY 150 CY OF MATERIAL WILL BE GRADED ONSITE TO CONSTRUCT THE PROPOSED FINISH ELEVATIONS. EARTH MATERIAL (200 CY) WILL BE IMPORTED TO ACHIEVE THE PROPOSED GRADES. THE ULTIMATE DESTINATION OF ALL DEBRIS FROM DEMOLITION MUST BE IDENTIFIED AT THE PRE-CONSTRUCTION CONFERENCE. THE EARTHWORK VOLUME IS BASED ON A COMPARISON OF THE EXISTING SURFACE AND THE PROPOSED FINISH SURFACE AND DOES NOT INCLUDE OR EXCLUDE VOLUMES FOR ADDITIONAL SUB-BASE FILL OR EXCAVATION. THE CONTRACTOR SHALL PERFORM AN INDEPENDENT EARTHWORK ANALYSIS TO DETERMINE THE VOLUME OF MATERIAL THAT WILL BE MOVED TO CONSTRUCT THE PROPOSED IMPROVEMENTS TO THE DESIGN ELEVATIONS.

SHEETS

IMPERVIOUS AREA STATISTICS:

TOTAL AREA: 8,220 SF

EXISTING IMPERVIOUS AREA: 7,905 SF

TOTAL POST IMPERVIOUS AREA: 3,975 SF

"I hereby certify that, to the best of my ability, this plan has been prepared, where applicable, in accordance with the latest City of Lynchburg Manual of Specifications and Standard Details and City Code."

Signature: _____
Printed Name and Title: PATRICK C. PROFFITT, PE
Date: 02/04/13 *Registration Number:* 034330

"I/ We hereby certify that all site construction, drainage and grading will be done pursuant to this plan and that the applicable Stormwater Management conditions and requirements of the City of Lynchburg, the Commonwealth of Virginia and the Federal Government and its agencies are hereby made part of this plan."

Signature: _____
Printed Name: _____
Title: _____ *Date:* _____

LAND DISTURBANCE ONLY EROSION & SEDIMENT CONTROL APPROVAL

TRC: _____ DATE: _____

E&S: _____ DATE: _____

VIRGINIA CERTIFIED RESPONSIBLE LAND DISTURBER

_____
NAME - PRINTED *SIGNATURE* *DATE*

_____
PHONE # *COMPANY*

_____
ADDRESS

THE ENGINEER AND/OR SURVEYOR TAKES NO RESPONSIBILITY FOR THE LOCATION OR ACCURACY OF THE UTILITIES AS SHOWN HEREON OR ANY UTILITIES WITHIN THE PROJECT THAT MAY NOT BE SHOWN HEREON. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE UTILITY COMPANIES TO SEE IF ANY UTILITIES EXIST WITHIN THE AREA OF THE PROJECT BEFORE ANY CONSTRUCTION BEGINS. ANY COST INCURRED BY DAMAGING ANY UTILITY WITHIN THE PROJECT SHALL BE AT THE EXPENSE OF THE CONTRACTOR.

48 WORKING HOURS PRIOR TO STARTING THE WORK, THE CONTRACTOR SHALL CALL MISS UTILITY AT PHONE NUMBER 811 AND ADVISE THE NATURE AND LOCATION OF THE WORK.

HURT & PROFFITT
INCORPORATED
ENGINEERING >> SURVEYING >> PLANNING
2524 LANGHORNE ROAD
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800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

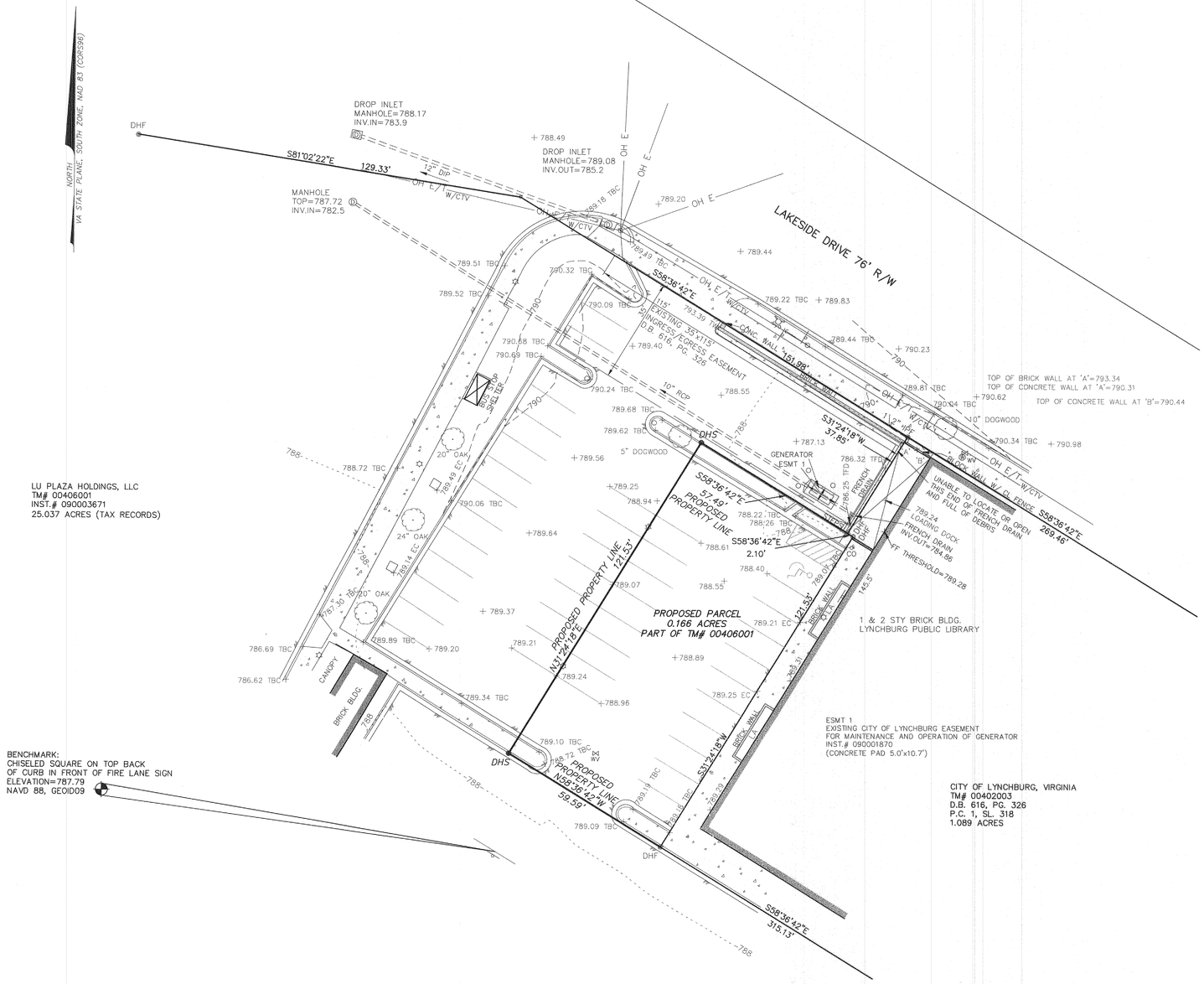
COVER SHEET
FOR
LYNCHBURG PUBLIC LIBRARY
CITY OF LYNCHBURG, VIRGINIA

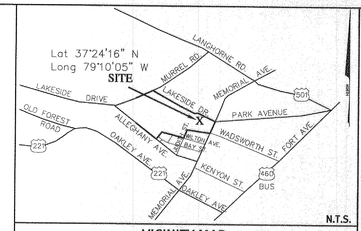
PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
Lic. No. 034330
02/04/2013
PROFESSIONAL ENGINEER

HURT & PROFFITT

SHEET NO.
C1.0





VICINITY MAP

NOTES:

1. THIS PLAT HAS BEEN PREPARED FROM AN ACTUAL FIELD SURVEY DONE AS PER DATE OF THIS PLAT AND THERE ARE NO VISIBLE EASEMENTS OR ENCROACHMENTS EXCEPT AS SHOWN.
2. THIS PLAT HAS BEEN PREPARED WITHOUT THE BENEFIT OF A TITLE REPORT AND DOES NOT, THEREFORE, NECESSARILY INDICATE ALL ENCUMBRANCES ON THE PROPERTY.
3. THE AREA SHOWN HEREON IS LOCATED IN FLOOD HAZARD ZONE 'X' AND IS NOT LOCATED WITHIN FLOOD HAZARD ZONE 'A' FOR A 100 YEAR FLOOD AS DETERMINED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY AS SHOWN ON MAP #51009J0043D DATED REVISED JUNE 3, 2008.
4. THE UTILITIES SHOWN HEREON ARE PLOTTED PER VISIBLE EVIDENCE IN THE FIELD. UNDERGROUND UTILITIES HAVE NOT BEEN MARKED IN THE FIELD AT THIS TIME.

LEGEND

○IPF	IRON PIN FOUND
●DHF	DRILL HOLE FOUND
	ELECTRIC POLE
→	GUY WIRE
	CLEANOUT
	WATER METER
WV	WATER VALVE
	STORM MANHOLE
	FIRE HYDRANT
	LIGHT POLE
	EDGE OF PAVEMENT
	BENCHMARK
	SIGN
— OH E —	OVERHEAD ELECTRIC
— OH T —	OVERHEAD TELEPHONE
— OH CTV —	OVERHEAD CABLE TV
	CONCRETE
TW	TOP OF WALL
EC	EDGE OF CONCRETE
TBC	TOP BACK OF CURB
LA	LANDCAPED AREA
TFD	TOP OF FRENCH DRAIN

THIS TOPOGRAPHIC SURVEY WAS COMPLETED UNDER THE DIRECT RESPONSIBLE CHARGE OF, J.A. MICHAEL NICHOLS FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION; THAT THE IMAGERY AND/OR DATA WAS OBTAINED ON 5-2-2012 AND 5-24-2012; AND THAT THIS PLAT, MAP, OR DIGITAL GEOSPACIAL DATA INCLUDING METADATA MEETS MINIMUM ACCURACY STANDARDS UNLESS OTHERWISE NOTED.

20 10 0 20 40
GRAPHIC SCALE IN FEET

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ENGINEERING >> SURVEYING >> PLANNING

PLAT SHOWING
TOPOGRAPHIC SURVEY FOR THE LYNCHBURG PUBLIC LIBRARY
PROPOSED STORYBOOK ROOM
CITY OF LYNCHBURG, VIRGINIA

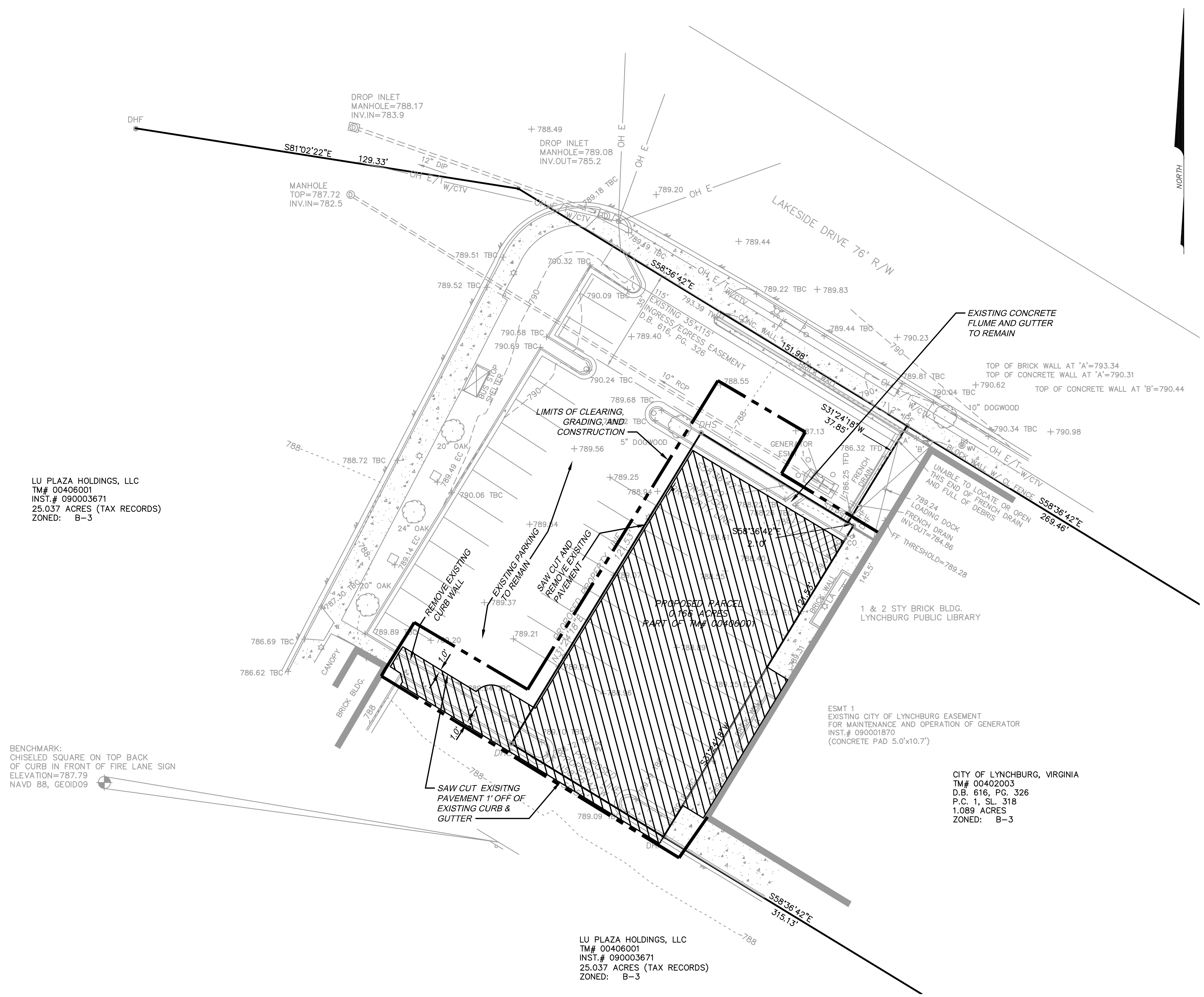
PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	LS-13610
DATE:	5-2-2012
DRAWN BY:	CRL
CHECKED BY:	JAMN

COMMONWEALTH OF VIRGINIA
5/7/13
J. A. MICHAEL NICHOLS
Lic. No. 2172
LAND SURVEYOR

HURT & PROFFITT

SHEET NO.
C2.0

May 07, 2013 - 2:02pm V:\LandProjects\20120224\dwg\TOPO.dwg



DEMOLITION NOTES:

1. NO LAND DISTURBING ACTIVITY SHALL OCCUR PRIOR TO OBTAINING A LAND DISTURBANCE PERMIT FROM THE LOCAL AUTHORITY.
2. ALL EXCESS AND UNSUITABLE MATERIAL TO BE DISPOSED OF BY CONTRACTOR, NO BURNING IS ALLOWED ONSITE.
3. CONTRACTOR RESPONSIBLE FOR COORDINATION WITH ALL APPLICABLE UTILITY COMPANIES & OWNER AS NECESSARY DURING CONSTRUCTION AND DURING RELOCATION OF EXISTING UTILITIES.
4. CONTRACTOR TO NOTIFY ENGINEER AND APPLICABLE UTILITY SERVICE PROVIDER OF ANY CONFLICTS WITH UNDERGROUND UTILITIES.
5. CONTRACTOR TO SUPPLY THE CITY OF LYNCHBURG WITH THE NAME AND CERTIFICATION NUMBER OF THE RESPONSIBLE LAND DISTURBER AND POST THE LAND DISTURBANCE BOND AT THE AMOUNT SET BY THE LOCAL AUTHORITY WHEN OBTAINING THE LAND DISTURBANCE PERMIT.
6. CONTRACTOR RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS, BONDS, AND FEES AT HIS EXPENSE FOR THIS PROJECT THAT HAVE NOT BEEN OBTAINED BY OWNER. CONTRACTOR SHALL COORDINATE WITH OWNER.
7. DEMOLITION CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS IN THE FIELD. ANY DISCREPANCIES FOUND SHALL BE REPORTED TO OWNER AND CIVIL ENGINEER PRIOR TO SUBMISSION OF BIDS.
8. ALL PORTIONS OF WORK SHALL BE DONE IN ACCORDANCE WITH ALL CITY OF LYNCHBURG, STATE OF VIRGINIA, AND NATIONAL CODES (ORDINANCES, AND STANDARDS).
9. CONTRACTOR TO ESTABLISH AND PROPERLY FLAG PROPERTY LINES PRIOR TO DEMOLITION. (IF APPLICABLE)
10. DEMOLITION CONTRACTOR TO ACQUIRE ALL NECESSARY PERMITS TO COMPLETE DEMOLITION. VERIFY WITH THE CITY OF LYNCHBURG BUILDING DEPARTMENT, ZONING, RIGHT OF WAY, AND ALL OTHER GOVERNING AUTHORITIES.
11. ALL PLUMBING, SANITARY, GAS, CABLE T.V., ELECTRICAL, AND TELEPHONE LINES SERVICING THIS SITE TO BE CAPPED IN ACCORDANCE WITH COUNT CODES. (IF APPLICABLE)
12. DEMOLITION CONTRACTOR TO NOTIFY UTILITY NOTIFICATION CENTER NO LESS THAN 48 HOURS OR MORE THAN (5) WORKING DAYS PRIOR TO DEMOLITION OF EXISTING UTILITIES AS REQUIRED.
13. DEMOLITION CONTRACTOR TO PROVIDE ALL BARRICADES, SCAFFOLDING, SHORING AND OTHER MEANS OF PROTECTION REQUIRED TO COMPLY WITH ALL STATE LAWS, AND LOCAL MUNICIPAL ORDINANCES TO SAFE GUARD PERSONS.
14. ANY FILL MATERIAL REQUIRED SHALL BE CLEAN, NO CONCRETE RUBBLE ETC. WILL BE ACCEPTED.
15. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY EXISTING SITE IMPROVEMENTS, NOT SPECIFICALLY PLANNED FOR DEMOLITION, IF DAMAGED DUE TO DEMOLITION ACTIVITY.

LEGEND

TO BE DEMOLISHED

20 10 0 20 40
GRAPHIC SCALE IN FEET

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DEMOLITION PLAN FOR LYNCHBURG PUBLIC LIBRARY

CITY OF LYNCHBURG, VIRGINIA

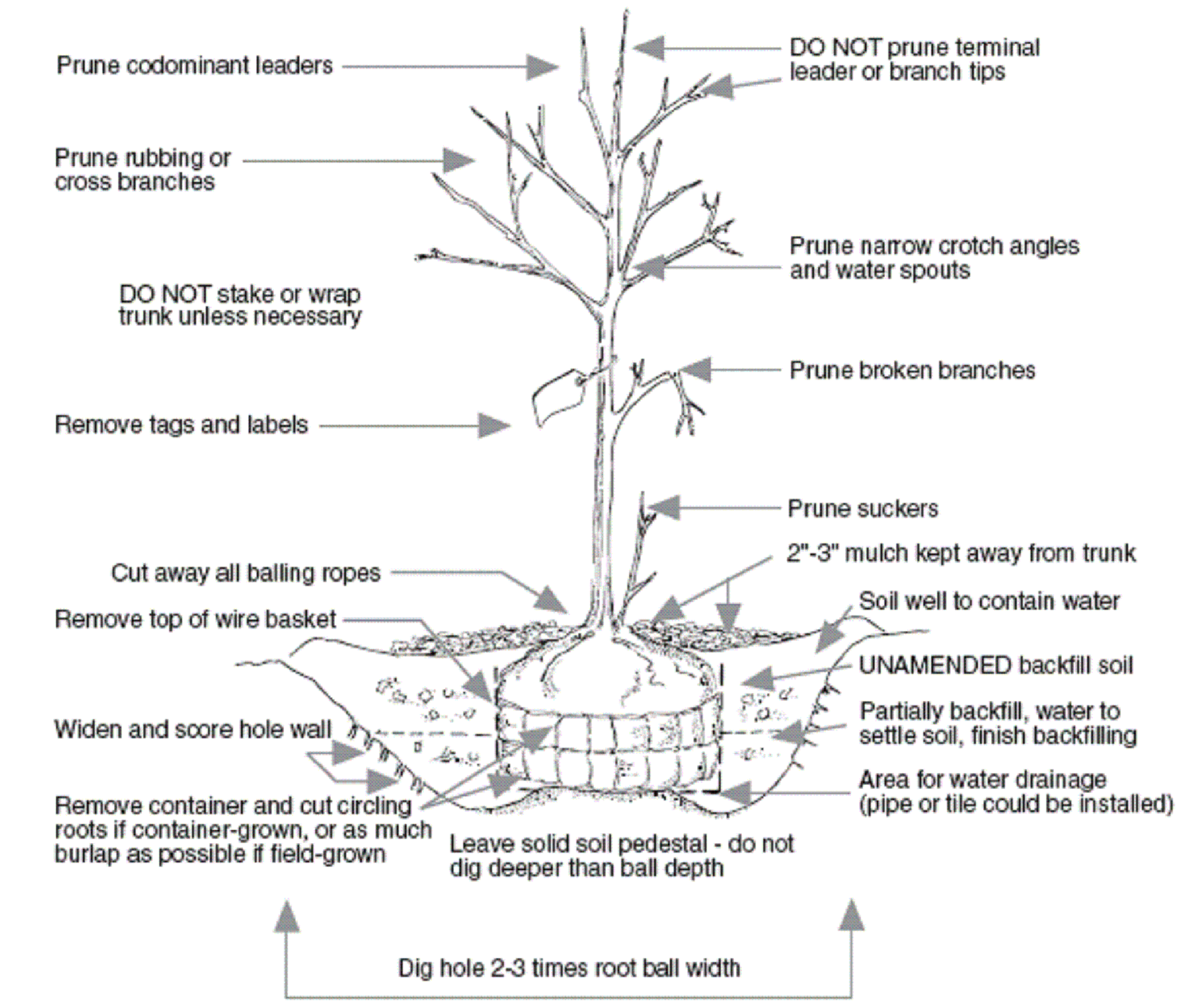
PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
Lic. No. 034330
02/04/2013
PROFESSIONAL ENGINEER

HURT & PROFFITT

SHEET NO.
C3.0

May 07, 2013 — 1:59pm V:\LandProjects\20120224\dwg\SITE.dwg



TREE & SHRUB PLANTING DETAIL

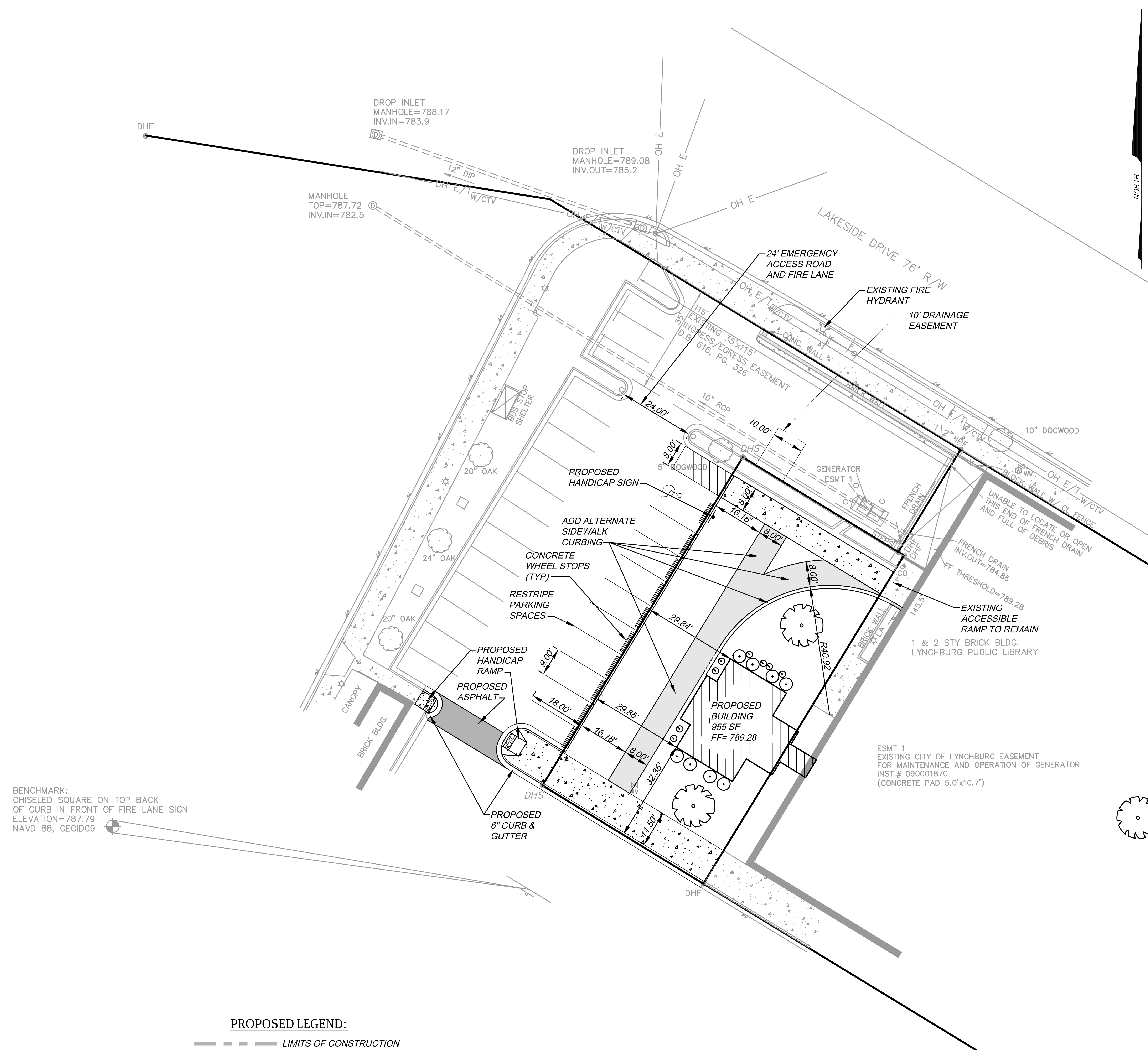
PLANTING, FERTILIZING, AND WATERING SCHEDULE FOR PERIOD OF ONE YEAR AFTER INSTALLATION.

PLANT TREES, SHRUBS AND GROUNDCOVERS AS PER THE PLANTING DETAIL. PLANT EVERGREEN MATERIALS BETWEEN SEPTEMBER 1 AND DECEMBER 1 OR IN SPRING BEFORE NEW GROWTH BEGINS. PLANT DECIDUOUS MATERIALS IN A DORMANT CONDITION. IF OWNER REQUIRES PLANTING AT OTHER TIMES, PLANTS SHALL BE SPRAYED WITH ANTI-DESICCANT PRIOR TO DIGGING.

WATER PLANTINGS HEAVILY ONCE A WEEK DURING PERIODS OF INADEQUATE RAINFALL. WATER SLOWLY AND ALLOW WATER TO REACH TOP OF PLANT SAUCER.
CHECK SOIL MOISTURE WITH AN APPROPRIATE INSTRUMENT PRIOR TO WATERING TO PREVENT OVER WATERING.

INCORPORATE SLOW RELEASE FERTILIZER, PREFERABLY COMPOSED OF 25-50% WATER INSOLUBLE NITROGEN (WIN) INTO THE SOIL BACKFILL AT PLANTING TIME. IF, DURING THE GROWING SEASON, GROWTH SEEMS SLOW OR COLOR IS PALER THAN NORMAL HAVE SOIL TESTED AND FERTILIZE AS PER RESULTING RECOMMENDATIONS.

SOIL AMENDMENTS.
WHEN EXISTING SOIL ON SITE IS NOT ADEQUATE TO SUPPORT VIGOROUS GROWTH, PROVIDE PLANTING MIXTURE CONSISTING OF 5 PARTS EXISTING SOIL TO 1 PART PEAT MOSS AND 1 LB. OF PLANT FERTILIZER FOR EACH CUBIC YARD OF MIXTURE OR EQUIVALENT.



LANDSCAPE CALCULATIONS:

BUILDING FOUNDATION LANDSCAPING (70 L.F. BUILDING):
1 ORNAMENTAL TREE/50 FEET OF BUILDING REQUIRED.
2 ORNAMENTAL TREES ARE REQUIRED. 2 ORNAMENTAL TREES PROVIDED.
1 LARGE SHRUB IN COMBINATION WITH 1 MEDIUM & 1 SMALL SHRUB/10 FEET OF BUILDING REQUIRED.**
4 MEDIUM & 4 SMALL SHRUB/10 FEET OF BUILDING REQUIRED.
8 MEDIUM SHRUBS ARE REQUIRED. 8 MEDIUM SHRUBS ARE PROVIDED.
8 SMALL SHRUBS ARE REQUIRED. 8 SMALL SHRUBS ARE PROVIDED. = 80 FEET OF COVERAGE
= 80 FEET OF COVERAGE

LANDSCAPE SCHEDULE - SEC.35.1-25.1.5

TREES: NAME:	QUANTITY	SIZE/CALIPER	SHRUBS: NAME:	QUANTITY	GAL./HEIGHT
AUTUMN BRILLANCE SERVICEBERRY	(2) FIFTEEN	6' HEIGHT	FIREPOWER NANDINA	(57) FIFTY SEVEN	3' HEIGHT
			CORAL BELLS	(15) FIFTEEN	1 GAL.

SITE NOTES:

1. SETBACKS:
   FRONT: 20'
   SIDE: 10'
   REAR: 0'
2. ALL EXTERIOR LIGHTING SHALL BE NON-DIRECTIONAL AND GLARE SHIELDED TO PREVENT ILLUMINATION OF ADJACENT PROPERTIES.
3. CONTRACTOR TO COORDINATE WITH CITY OF LYNCHBURG PRIOR TO SAW CUTTING AND PATCHING ASPHALT WITHIN RIGHT OF WAY.
4. THE PROJECT WILL NOT REQUIRE ANY ADDITIONAL WATER OR SANITARY SEWER CONNECTIONS.

PROPOSED LEGEND:

- LIMITS OF CONSTRUCTION
- 800 PROPOSED INDEX CONTOUR
- 802 PROPOSED CONTOUR
- STORM SEWER
- STORM INLET
- CONCRETE
- ADD ALTERNATE CONCRETE
- STANDARD DUTY ASPHALT PAVEMENT

20 10 0 20 40
GRAPHIC SCALE IN FEET

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SITE LAYOUT FOR LYNCHBURG PUBLIC LIBRARY

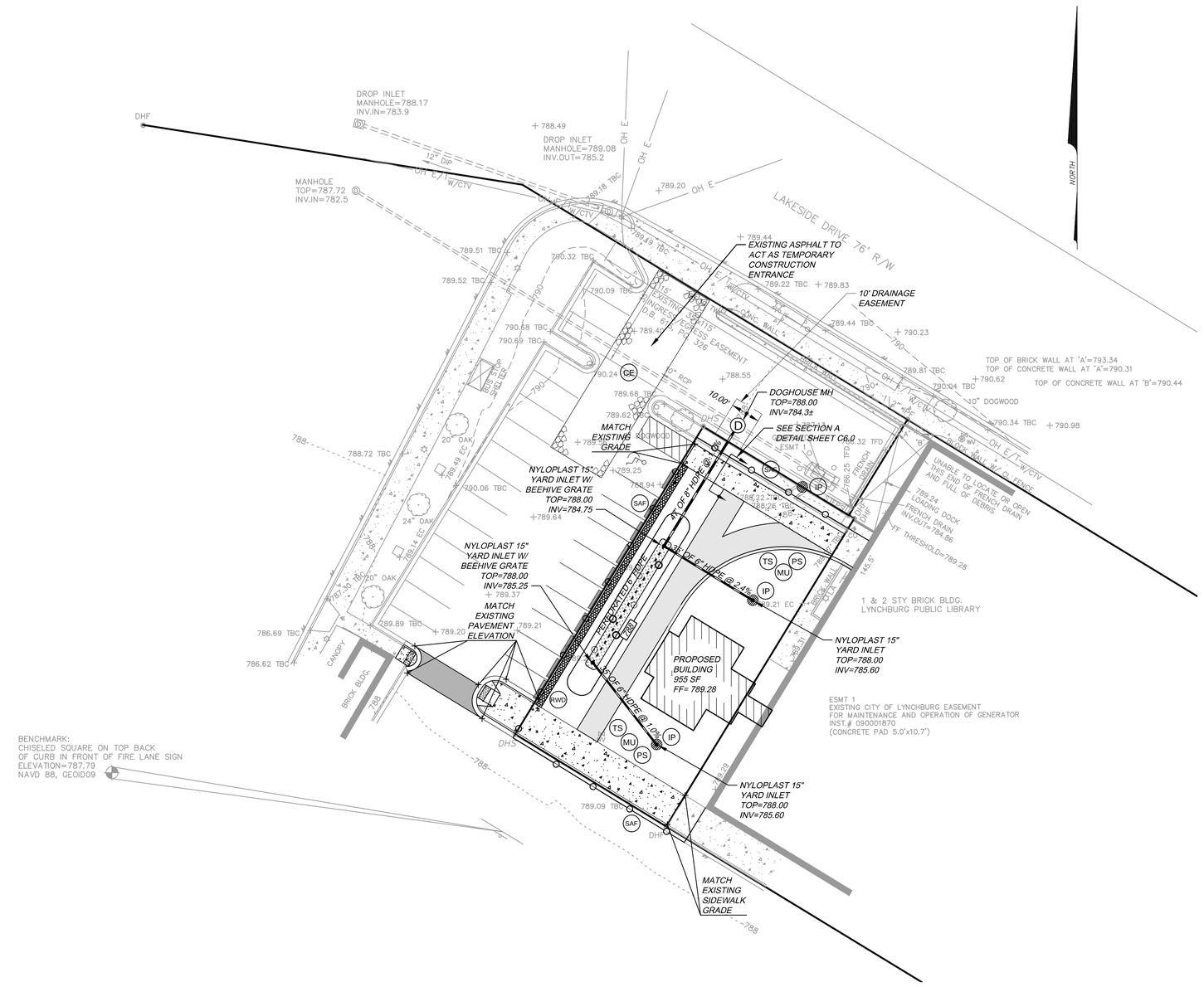
CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
Lic. No. 034330
02/04/2013
PROFESSIONAL ENGINEER

HURT & PROFFITT

SHEET NO.
C4.0



GRADING NOTES :

1. *TOTAL DISTURBED AREA DURING CONSTRUCTION = 0.18 AC.*
2. *ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PER THE STANDARDS AND SPECIFICATIONS OF THE MOST RECENT VERSION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).*
3. *THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL DEVICES FOR THE DURATION OF THE PROJECT. ALL EROSION CONTROL DEVICES SHALL BE CHECKED DAILY TO ENSURE THAT ALL ARE PROPERLY IN PLACE AND FUNCTIONING AS PLANNED. ALL EROSION CONTROL DEVICES WILL BE REPAIRED (CLEANED) AS NECESSARY, AND AFTER EACH RAINFALL PRODUCING RUNOFF AS A MINIMUM.*
4. *ALL DISTURBED AREAS TO RECEIVE TEMPORARY SEEDING, PERMANENT SEEDING AND MULCH. ALL SLOPES OF 2:1 OR GREATER MUST RECEIVE BLANKET AND MATTING IN ADDITION TO SEEDING AND MULCHING PRACTICES AS STATED IN THE MOST RECENT VERSION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.*
5. *ALL FILL SHALL BE COMPACTED TO 95% STANDARD PROCTOR, PLACED IN 8" LOOSE LIFTS.*
6. *CONTRACTOR IS TO FURNISH THE NAME OF THEIR VIRGINIA CERTIFIED RESPONSIBLE LAND DISTURBER TO THE CITY OF LYNCHBURG PRIOR TO ANY LAND DISTURBANCE.*
7. *CONTRACTOR TO TEMPORARY SEED & MULCH DIVERSIONS IMMEDIATELY FOLLOWING CONSTRUCTION.*
8. *CONTRACTOR TO BE RESPONSIBLE FOR REROUTING ALL TEMPORARY DIVERSIONS AND SILT FENCE AS NECESSARY DURING CONSTRUCTION TO MAINTAIN PROPER DRAINAGE OF DISTURBED AREAS.*
9. *CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL ADDITIONAL E&S MEASURES OR MAINTENANCE REQUESTS OR REROUTING, OR RELOCATING, E&S MEASURES AS DEEMED NECESSARY BY THE CITY OF LYNCHBURG OR LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.*
10. *ALL FILL AREAS TO BE STRIPPED OF UNSUITABLE MATERIAL BEFORE PLACING AND COMPACTING FILL MATERIAL.*
11. *CONTRACTOR SHALL BACKFILL TO THE EDGE OF PAVEMENT AND COMPACT. CONTRACTOR SHALL SEED, FERTILIZE AND MULCH IMMEDIATELY UPON COMPLETION OF GRADING OPERATIONS.*
12. *CONTRACTOR SHALL CONTACT ENGINEER IF ADDITIONAL CONSTRUCTION ENTRANCE MEASURES ARE NEEDED TO PREVENT THE TRACKING OF MUD, DIRT, OR DEBRIS ONTO ANY PAVED SURFACES INSIDE OR OUTSIDE OF THE PROPOSED CONSTRUCTION LIMITS.*
13. *UPON COMMENCEMENT OF FINAL GRADING ACTIVITIES THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND SUPPLYING THE NECESSARY SAMPLES AND RESULTS TO DETERMINE FERTILIZER AND NUTRIENT APPLICATION FOR THE ESTABLISHMENT OF GRASS IN THE SITE.*

VIRGINIA UNIFORM CODING SYSTEM FOR EROSION AND SEDIMENT CONTROL PRACTICES

* CHART TAKEN FROM THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (JULY 1992)

- (SAF) *SAFETY FENCE (3.01)*
- (CE) *TEMPORARY CONSTRUCTION ENTRANCE (3.02)*
- (IP) *STORM DRAIN INLET PROTECTION (3.07)*
- (RWD) *TEMPORARY RIGHT OF WAY DIVERSION (3.11)*
- (TS) *TEMPORARY SEEDING (3.31)*
- (PS) *PERMANENT SEEDING (3.32)*
- (MU) *MULCHING (3.35)*

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GRADING AND EROSION AND SEDIMENT CONTROL PLAN FOR LYNCHBURG PUBLIC LIBRARY CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
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SHEET NO.
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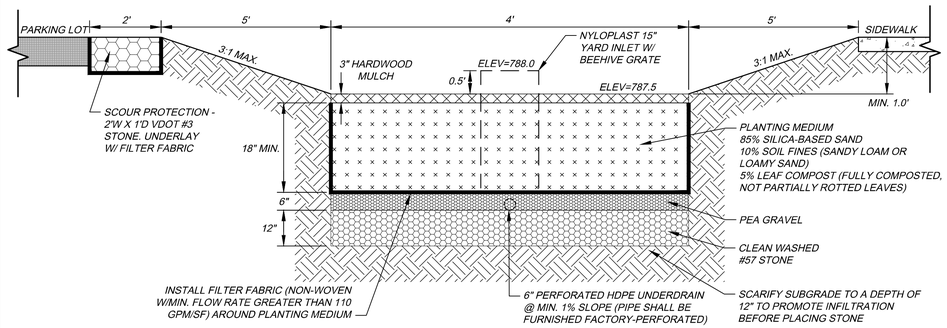


NOTES:
1. BIORETENTION FILTER SHALL BE INSTALLED WITH LANDSCAPING AS THE LAST STAGE OF THE PROJECT.
2. ALL CONTRIBUTING AREAS SHALL BE ADEQUATELY STABILIZED PRIOR TO INSTALLATION.
3. BIORETENTION INSTALLATION, MAINTENANCE, AND INSPECTION SHALL CONFORM TO MINIMUM STANDARD 3.11 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK.

BIORETENTION FILTER DETAIL

N.T.S.

BIORETENTION PLANTING SCHEDULE

	QUAN	TYPE	COMMON NAME	SIZE@ INSTALL
⊙	3	S	RED OSIER DOGWOOD	2' HT. MIN.
⊙	3	S	SWEET PEPPERBUSH	2' HT. MIN.
▨	20	S	TUFTED HAIR GRASS	QUARTS.

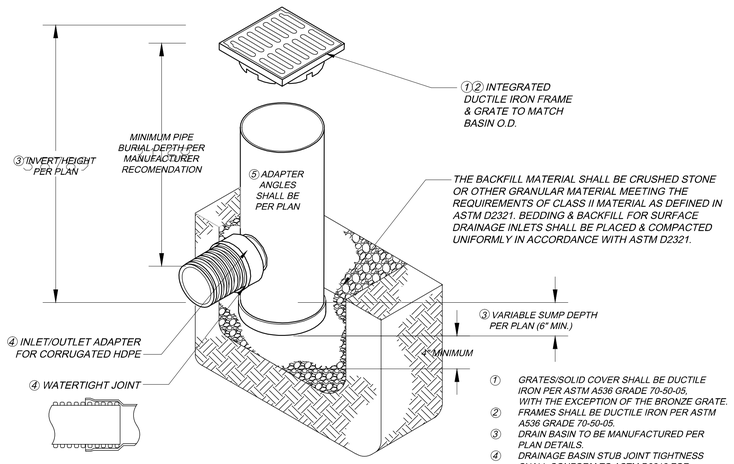
KEY TO PLANTING TYPES:
S=WOODY SHRUB/ GRASSES/GROUNDCOVERS

Description	Method	Frequency	Time of the year
SOIL			
Inspect and Repair Erosion	Visual	Monthly	Monthly
ORGANIC LAYER			
Remulch any void areas	By hand	Whenever needed	Whenever needed
Remove previous mulch layer before applying new layer (optional)	By hand	Once every two to three years	Spring
Any additional mulch added (optional)	By hand	Once a year	Spring
PLANTS			
Removal and replacement of all dead and diseased vegetation considered beyond treatment	See planting specifications	Twice a year	3/15 to 4/30 and 10/1 to 11/30
Treat all diseased trees and shrubs	Mechanical or by hand	N/A	Varies, depends on insect or disease infestation
Watering of plant material shall take place at the end of each day for fourteen consecutive days after planting has been completed	By hand	Immediately after completion of project	N/A
Replace stakes after one year	By hand	Once a year	Only remove stakes In the spring
Replace any deficient stakes or wires	By hand	N/A	Whenever needed
Check for accumulated sediments	Visual	Monthly	Monthly

BIORETENTION MAINTENANCE SCHEDULE

Stormwater Calculations Summary Tables		
Overall Pre & Post Drainage Areas		
Design Frequency Event	2 YR	10 YR
Pre-Developed		
Rainfall Intensity	4.1 in/hr	5.6 in/hr
Time of Concentration	5.0 min	5.0 min
Composite Runoff Factor	0.90	0.90
Drainage Area	0.18 acre	0.18 acre
Calculated Inflow	**0.7 cfs**	**0.9 cfs**
Post-Developed		
Rainfall Intensity	4.1 in/hr	5.6 in/hr
Time of Concentration	5.0 min	5.0 min
Composite Runoff Factor	0.60	0.60
Drainage Area	0.18 acre	0.18 acre
Calculated Inflow	**0.4 cfs**	**0.6 cfs**

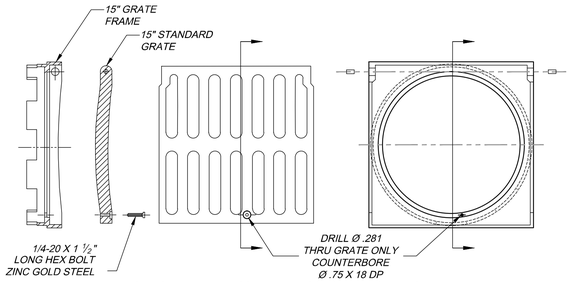
Note: Post-developed outflows do not include bioretention storage



① GRATES/SOLID COVER SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE BRONZE GRATE.
② FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05.
③ DRAIN BASIN TO BE MANUFACTURED PER PLAN DETAILS.
④ DRAINAGE BASIN STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE.
⑤ ADAPTERS TO BE MOUNTED PER PLAN DETAILS.
⑥ NYLOPLAST DRAIN BASIN # 2518AG OR APPROVED EQUAL.

15" INLINE DRAIN INLET

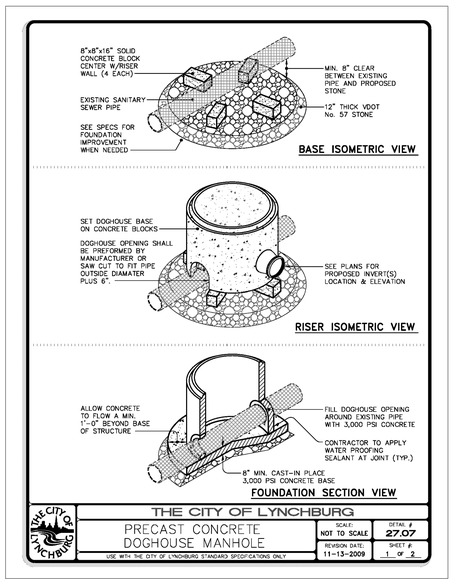
N.T.S.

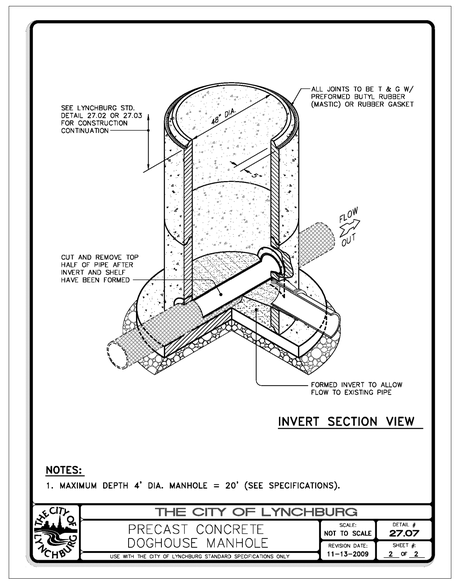


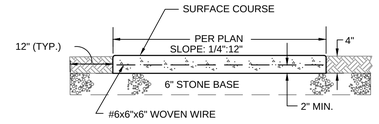
NYLOPLAST FRAME AND COVER # 1599CGP OR APPROVED EQUAL.

15" INLINE DRAIN GRATE DETAIL

N.T.S.



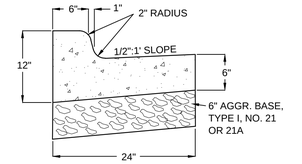




BASE STONE: 6" VDOT #21A
SURFACE COURSE: 4" CLASS 3000 psi CONCRETE
SIDEWALK TO BE POURED MONOLITHICALLY WITH A WOOD FLOAT FINISH. CONSTRUCTION JOINTS @ 6' INTERVALS, EXPANSION JOINTS @ 30' INTERVALS FILLED W/ PRE-MOLDED ⅝" JOINT FILLER.

TYP. CONC. WALK SECTION

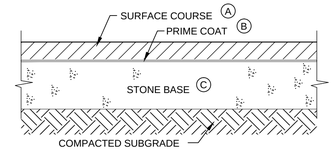
N.T.S.



24" COMBINED CURB AND GUTTER SHALL BE CONSTRUCTED OF ONE COURSE CLASS "A3" CONCRETE (AE) CONFORMING TO THE ABOVE SECTION AND SHALL BE THOROUGHLY SPADED IN FORMS AND FINISHED WITH A WOODEN FLOAT. CONCRETE SHALL BE POURED IN 10' LENGTHS WITH JOINTS CUT ENTIRELY THROUGH THE CURB AND GUTTER BY MEANS OF 1/4" STEEL PLATES. FRONT CURB FORMS WITH 2" RADII SHALL BE REQUIRED.

2' CONC. CURB & GUTTER

N.T.S.

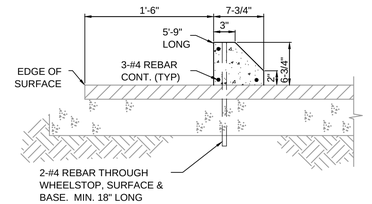


		DEPTH	MATERIAL	COMPACTION/APPLICATION RATE
A	SURFACE COURSE:	2"	VDOT TYPE SM-9.5A	115 LBS/SY/IN
B	PRIME COAT:	N/A	VDOT TYPE CRS-2	0.4 GAL/SY
C	STONE BASE	6"	VDOT TYPE 1, SIZE 21B	150 LBS/CF

NOTE:
1. APPLICATION OF TACK AT JOINTS, ADJACENT TO CURBS, GUTTERS OR OTHER APPURTENANCES SHALL BE APPLIED BY HAND WAND AT THE RATE OF 0.3 GAL./SQ.YD.
2. ACTUAL PAVING SECTIONS TO BE BASED ON CBR RESULTS.

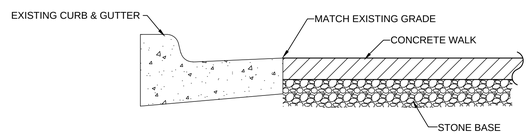
TYPICAL PAVING SECTION

N.T.S.



PRECAST CONCRETE WHEELSTOP

N.T.S.



SECTION A

N.T.S.

HURT & PROFFITT INCORPORATED
ENGINEERING >> SURVEYING >> PLANNING
2524 LANGHORNE ROAD
LYNCHBURG VA 24501
800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

DETAIL SHEET FOR LYNCHBURG PUBLIC LIBRARY

CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
Lic. No. 034330
02/04/2013
PROFESSIONAL ENGINEER

HURT & PROFFITT

SHEET NO.
C6.0

EROSION AND SEDIMENT CONTROL NARRATIVE

PROJECT DESCRIPTION
THIS PROJECT CONSISTS OF THE CONSTRUCTION OF A READING ROOM ADDITION, ASSOCIATED WALKS, DRAINAGE IMPROVEMENTS, AND STORMWATER MANAGEMENT AT THE LYNCHBURG PUBLIC LIBRARY, LOCATED IN LYNCHBURG, VIRGINIA. A TOTAL OF 0.18 ACRES WILL BE DISTURBED AS A RESULT OF CONSTRUCTION ACTIVITIES, WHICH WILL RESULT IN A DECREASE OF 0.09 ACRES OF IMPERVIOUS SURFACE.

EXISTING SITE CONDITIONS
THE SITE AREA IS CURRENTLY A PAVED PARKING LOT. SITE RUNOFF FLOWS TO THE NORTH, WHERE IT DRAINS THROUGH A CURB CUT TO A TRENCH DRAIN NEAR THE LIBRARY LOADING DOCK.

ADJACENT PROPERTY
THE PROJECT IS ADJACENT TO RESIDENTIAL LAKESIDE DRIVE TO THE NORTH, THE LIBRARY BUILDING TO THE EAST, AND PARKING LOTS TO THE SOUTH AND WEST.

CRITICAL AREAS
NO CRITICAL AREAS HAVE BEEN IDENTIFIED FOR THIS SITE.

OFFSITE AREAS
ALL GRADING SHALL OCCUR ON SITE. ANY ADDITIONAL BORROW OR WASTED SOIL FROM THE SITE WILL BE EITHER STOCKPILED ON SITE, OR REMOVED TO A LOCATION CHOSEN BY THE CONTRACTOR AT A LATER DATE. CONTRACTOR SHALL BE RESPONSIBLE FOR ENSURING THAT A SITE PLAN IS SUBMITTED FOR APPROVAL, FOR ANY BORROW OR FILL AREAS OFF SITE, OR AN AMENDED PLAN IS FILED FOR ANY STOCKPILE AREAS ON SITE.

SOILS
THE SOIL SURVEY MAP FOR LYNCHBURG, VIRGINIA, VERSION 10, DATED AUGUST 9, 2010 INDICATES THAT THIS SITE CONSISTS OF URBAN LAND.

STORMWATER
DUE TO THE DECREASE IN IMPERVIOUS AREA, NO STORMWATER MANAGEMENT IS REQUIRED FOR THIS SITE; HOWEVER, STORMWATER QUANTITY AND QUALITY TREATMENT FOR THIS SITE WILL BE PROVIDED BY A PROPOSED BIORETENTION FILTER.

ADEQUATE CHANNEL
ALL ONSITE PROPOSED CHANNELS ARE ADEQUATE.

EROSION AND SEDIMENT CONTROL
3.01 SAFETY FENCE (SAF) - A PROTECTIVE BARRIER INSTALLED TO PREVENT ACCESS TO AN EROSION CONTROL MEASURE.

3.02 CONSTRUCTION ENTRANCE (CE) - ONE CONSTRUCTION ENTRANCE IS PROPOSED AT THE ENTRANCE TO THE SITE, AS SHOWN ON PLANS. WHERE THE ENTRANCE IS PROPOSED IN PAVED AREAS CONTRACTOR SHALL REMOVE ALL MUD, DIRT, AND DEBRIS PRIOR TO ENTERING THE PUBLIC RIGHT OF WAY. CONTRACTOR SHALL INSTALL ADDITIONAL STONE STABILIZATION AS NECESSARY TO PREVENT TRACKING ONTO THE EXISTING ROADWAY WITHIN THE LIMITS OF CONSTRUCTION.

3.05 SILT FENCE (SF) - A TEMPORARY SEDIMENT BARRIER CONSTRUCTED OF POSTS PLACED ACROSS OR AT THE TOE OF A SLOPE OR IN A MINOR DRAINAGE WAY TO INTERCEPT AND DETAIN SEDIMENT AND DECREASE FLOW VELOCITIES FROM DRAINAGE AREAS OF LIMITED SIZE.

3.07 INLET PROTECTION (IP) - STORM DRAIN INLET PROTECTION SHALL BE PLACED AT THE INLET OF ALL CURB AND DROP INLETS TO FILTER SEDIMENT-LADEN RUNOFF.

3.11 TEMPORARY RIGHT-OF-WAY DIVERSION (RWD) - A RIDGE OF COMPACTED GRAVEL CONSTRUCTED ACROSS A DISTURBED RIGHT OF WAY TO DIVERT SEDIMENT LADEN RUNOFF TO A SEDIMENT TRAPPING MEASURE.

3.31 TEMPORARY SEEDING (TS) - THE CONTRACTOR IS TO IMPLEMENT TEMPORARY SEEDING IF DISTURBED LAND IS LEFT EXPOSED FOR OVER 30 DAYS AND CONSTRUCTION IS NOT COMPLETE IN THIS AREA.

3.32 PERMANENT SEEDING (PS) - ESTABLISHMENT OF PERENNIAL VEGETATIVE COVER BY PLANTING SEED ON ROUGH-GRADED AREAS THAT WILL NOT BE BROUGHT TO FINAL GRADE FOR A YEAR OR MORE OR WHERE PERMANENT, LONG-LIVED VEGETATIVE COVER IS NEEDED ON FINE-GRADED AREAS.

3.35 MULCHING (MU) - APPLICATION OF PLANT RESIDUES OR OTHER SUITABLE MATERIALS TO DISTURBED SURFACES TO PREVENT EROSION AND REDUCE OVERLAND FLOW VELOCITIES. FOSTERS PLANT GROWTH BY INCREASING AVAILABLE MOISTURE AND PROVIDING INSULATION AGAINST EXTREME HEAT OR COLD.

VEGETATIVE MEASURES
TEMPORARY SEEDING/PERMANENT STABILIZATION: SEEDING MEASURES SHALL BE TAKEN ON DISTURBED SOIL AT CUT/FILL SLOPES, SIDES OF SEDIMENT BASINS, DITCH LINES, OR AREAS OUTSIDE OF ON-GOING CONSTRUCTION PRACTICES WITHIN SEVEN (7) DAYS OF COMPLETED GRADING. ALL AREAS DISTURBED BY CONSTRUCTION WILL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINAL GRADING. UNLESS OTHERWISE INDICATED, ALL EROSION AND SEDIMENT CONTROL PRACTICES SHALL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

MANAGEMENT STRATEGIES
– EROSION AND SEDIMENT CONTROL SHOULD BE DISCUSSED BETWEEN THE GRADING CONTRACTOR AND THE OWNER PRIOR TO ANY EXCAVATION SO THAT LIMITS OF CONSTRUCTION AND EROSION CONTROL METHODS ARE CLEARLY UNDERSTOOD BY BOTH PARTIES.
– CONSTRUCTION WILL BE SEQUENCED SO THAT GRADING OPERATIONS CAN BEGIN AND END AS QUICKLY AS POSSIBLE.
– THERE IS TO BE NO TRACKING OF MUD OR DIRT BY CONSTRUCTION EQUIPMENT ONTO ANY PAVED DRIVES OR ROADS.
– SEDIMENT TRAPPING MEASURES WILL BE INSTALLED AS A FIRST STEP IN GRADING AND WILL BE SEEDED AND MULCHED IMMEDIATELY FOLLOWING INSTALLATION.
– SEEDING OR OTHER STABILIZATION WILL FOLLOW IMMEDIATELY AFTER GRADING.
– AREAS WHICH ARE NOT TO BE DISTURBED WILL BE CLEARLY MARKED BY FLAGS, SIGNS, ETC.
– AFTER ACHIEVING ADEQUATE STABILIZATION, THE TEMPORARY E&S CONTROLS WILL BE CLEANED UP AND REMOVED.

PERMANENT STABILIZATION
ALL AREAS DISTURBED BY CONSTRUCTION SHALL BE STABILIZED WITH PERMANENT SEEDING IMMEDIATELY FOLLOWING FINISH GRADING. MULCH (STRAW OR FIBER) WILL BE USED ON RELATIVELY FLAT AREAS. IN ALL SEEDING OPERATIONS, SEED, FERTILIZER AND LIME WILL BE APPLIED PRIOR TO MULCHING.

CONSTRUCTION SEQUENCE
1. *INSTALL CONSTRUCTION ENTRANCE. (EXISTING PAVEMENT)*
2. *INSTALL PERIMETER CONTROLS AS SHOWN ON PLANS.*
3. *COMPLETE SITE DEMOLITION.*
4. *GRADE BUILDING PAD.*
5. *INSTALL INLET PROTECTION AS EACH STORMWATER STRUCTURE IS PLACED.*
6. *CONSTRUCT BUILDING.*
7. *COMPLETE FINISH GRADING.*
8. *SPREAD TOPSOIL; TEMPORARY AND PERMANENT SEEDING AND MULCHING TO BE PLACED ON ALL DISTURBED AREAS.*
9. *INSTALL LANDSCAPING.*
10. *BIORETENTION FILTER TO BE INSTALLED UPON STABILIZATION OF ALL UPSTREAM DRAINAGE AREAS.*
11. *CONTRACTOR TO RESTORE ALL AREAS BACK TO EITHER PROPOSED GRADES OR EXISTING CONDITIONS AFTER COMPLETION OF THE PROJECT. ALL DISTURBED AREAS, HAUL ROADS, CONSTRUCTION ROADS, LAY DOWN AREAS, ETC. SHALL BE RESTORED.*

SEEDING SPECIFICATIONS:

(TS) TEMPORARY SEEDING-

WINTER - 40 LBS. ANNUAL RYE/40 LBS. CEREALE RYE (PER ACRE)
SUMMER - 40 LBS. ANNUAL RYE/40 LBS. FOXTAIL MILLET (PER ACRE)

FERTILIZER - 1500 LBS. 10-18-10/ACRE
LIME - 2 TONS/ACRE

(PS) PERMANENT SEEDING-

SEASONAL SPECIFICATION - PER ACRE

2/1 TO 5/15 100 LBS. TALL FESCUE
15 LBS. ANNUAL RYE
2 LBS. RED CLOVER

5/16 TO 7/31 120 LBS. TALL FESCUE
10 LBS. FOXTAIL MILLET
2 LBS. RED CLOVER

8/1 TO 9/15 100 LBS. TALL FESCUE
15 LBS. ANNUAL RYE
2 LBS. RED CLOVER

9/16 TO 1/31 120 LBS. TALL FESCUE
10 LBS. CEREALE RYE
2 LBS. RED CLOVER

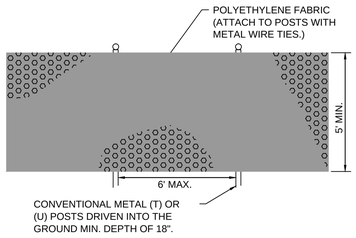
FERTILIZER - ALL SEASONS - 1500 LBS. 10-18-10/ACRE
LIME - ALL SEASONS - 2 TONS/ACRE

(MU) * A MULCH COVER IS REQUIRED ON EVERY SEEDING

* STRAW AT 80 BALES PER ACRE OR AN APPROVED MANUFACTURED MULCH/STABILIZATION MATERIAL

VIRGINIA EROSION AND SEDIMENT CONTROL REGULATIONS MINIMUM STANDARD #1

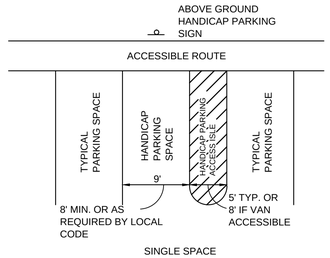
PERMANENT OR TEMPORARY SOIL STABILIZATION SHALL BE APPLIED TO DENUDED AREAS WITHIN 7 DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE SITE. TEMPORARY SOIL STABILIZATION SHALL BE APPLIED WITHIN SEVEN DAYS TO DENUDED AREAS THAT MAY NOT BE AT FINAL GRADE BUT WILL REMAIN DORMANT (UNDISTURBED) FOR LONGER THAN 30 DAYS. PERMANENT STABILIZATION SHALL BE APPLIED TO AREAS THAT ARE TO BE LEFT DORMANT FOR MORE THAN ONE YEAR.



PHYSICAL PROPERTIES OF PLASTIC SAFETY FENCE:

PHYSICAL PROPERTY	TEST	REQUIREMENTS
RECOMMENDED COLOR	N/A	INTERNATIONAL ORANGE
TENSILE YIELD	ASTM D638	AVG. 2000 LBS. PER 4 FT. WIDTH
ULTIMATE TENSILE STRENGTH	ASTM D638	AVG. 2900 LBS. PER 4 FT. WIDTH
ELONGATION AT BREAK (%)	ASTM D638	GREATER THAN 1000%
CHEMICAL RESISTANCE	N/A	INERT TO MOST CHEMICALS & ACIDS

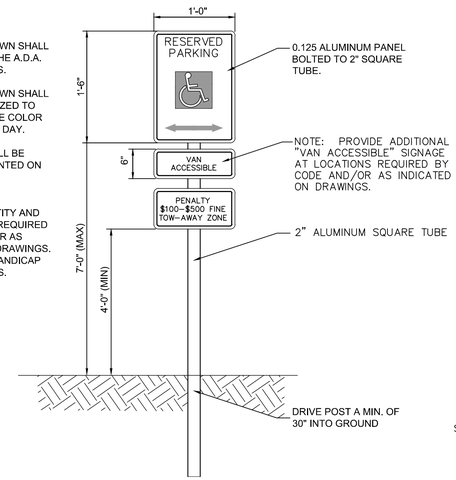
PLASTIC SAFETY FENCE (SAF)
VESHC STD. 3.01
N.T.S.



SINGLE SPACE

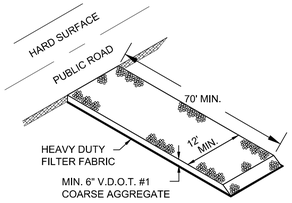
HANDICAP PARKING DETAIL
N.T.S.

NOTES:
1. TWO ADJACENT HANDICAP SPACES MAY SHARE THE SAME PARKING ACCESS ISLE.
2. HANDICAP PARKING SPACES AND ACCESS ISLES SHALL BE LEVEL WITH SURFACE SLOPES NOT EXCEEDING 2% IN ANY DIRECTION.
3. 1 OUT OF EVERY 8 HANDICAP SPACES, BUT NOT LESS THAN 1, SHALL BE VAN ACCESSIBLE AND SHALL HAVE PROPER SIGNAGE NOTING "VAN ACCESSIBLE".
4. HANDICAP AND VAN ACCESSIBLE PARKING SPACES SHALL HAVE PROPER SIGNAGE AS PER LOCAL CODE AND A.D.A. REQUIREMENTS.
5. HANDICAP SPACES SHALL COMPLY WITH LOCAL CODES AND A.D.A. REQUIREMENTS.



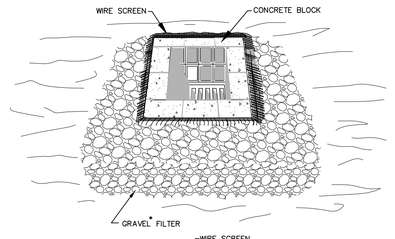
1. ALL SIGNS SHOWN SHALL CONFORM TO THE A.D.A. SPECIFICATIONS.
2. ALL SIGNS SHOWN SHALL BE REFLECTORIZED TO SHOW THE SAME COLOR BY NIGHT AS BY DAY.
3. ALL SIGNS SHALL BE SECURELY MOUNTED ON POST.
4. INSTALL QUANTITY AND AT LOCATIONS REQUIRED BY CODE AND/OR AS INDICATED ON DRAWINGS. CONFIRM ALL HANDICAP SIGNAGE CODES.

HANDICAP PARKING SIGN
N.T.S.



SILT FENCE (SF)
(WITHOUT WIRE SUPPORT)
VESHC STD. 3.05
N.T.S.

TEMPORARY CONSTRUCTION ENTRANCE (CE)
VESHC STD. 3.02
N.T.S.



SPECIFIC APPLICATION

THIS METHOD OF INLET PROTECTION IS APPLICABLE WHERE HEAVY FLOWS ARE EXPECTED AND WHERE AN OVERFLOW CAPACITY IS NECESSARY TO PREVENT EXCESSIVE PONDING AROUND THE STRUCTURE.

PLATE. 3.07-3
SOURCE: VA. DSWC

* GRAVEL SHALL BE VDOT #3, #357 OR #5 COARSE AGGREGATE.

BLOCK AND GRAVEL DROP INLET SEDIMENT FILTER (IP)
VESHC STD. 3.07
N.T.S.

EROSION AND SEDIMENT CONTROL DEVICES:

PERIMETER EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITY. AS CONSTRUCTION PROCEEDS, ALL ADDITIONAL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE INSTALLED AS SOON AS POSSIBLE. EROSION AND SEDIMENT CONTROL DEVICES AS SHOWN ON THE PLAN ARE A MINIMUM AND THE PROJECT CONDITION MAY DICTATE ADDITIONAL CONTROL. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PER THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK.

EROSION AND SEDIMENT CONTROL MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING ALL EROSION CONTROL DEVICES FOR THE DURATION OF THE PROJECT. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE CHECKED WEEKLY AND AFTER EACH SIGNIFICANT RAINFALL TO INSURE THAT ALL DEVICES ARE IN PLACE AND FUNCTIONING AS REQUIRED. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE MAINTAINED PER THE LATEST EDITION OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK. IN GENERAL, IF THE SILT BUILT UP BEHIND A BARRIER BECOMES AS DEEP AS 9 INCHES, THE SILT IS TO BE REMOVED AND THE BARRIER REPAIRED OR REPLACED. AFTER COMPLETION OF THE PROJECT, AND PERMANENT SEEDING HAS BEEN ESTABLISHED, EROSION CONTROL DEVICES AND ANY SILT BUILT UP SHALL BE REMOVED. DISTURBED AREAS DUE TO THIS CLEANUP OPERATION SHALL BE REPAIRED, RESEEDED AND REMULCHED.

GENERAL EROSION AND SEDIMENT CONTROL NOTES
TABLE 6-1

ES-1: UNLESS OTHERWISE INDICATED, ALL VEGETATIVE AND STRUCTURAL EROSION AND SEDIMENT CONTROL PRACTICES WILL BE CONSTRUCTED AND MAINTAINED ACCORDING TO MINIMUM STANDARDS AND SPECIFICATIONS OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK AND VIRGINIA REGULATIONS VR 625-02-00 EROSION AND SEDIMENT CONTROL REGULATIONS.

ES-2: THE PLAN APPROVING AUTHORITY MUST BE NOTIFIED ONE WEEK PRIOR TO THE PRE-CONSTRUCTION CONFERENCE, ONE WEEK PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITY, AND ONE WEEK PRIOR TO THE FINAL INSPECTION.

ES-3: ALL EROSION AND SEDIMENT CONTROL MEASURES ARE TO BE PLACED PRIOR TO OR AS THE FIRST STEP IN CLEARING.

ES-4: A COPY OF THE APPROVED EROSION AND SEDIMENT CONTROL PLAN SHALL BE MAINTAINED ON THE SITE AT ALL TIMES.

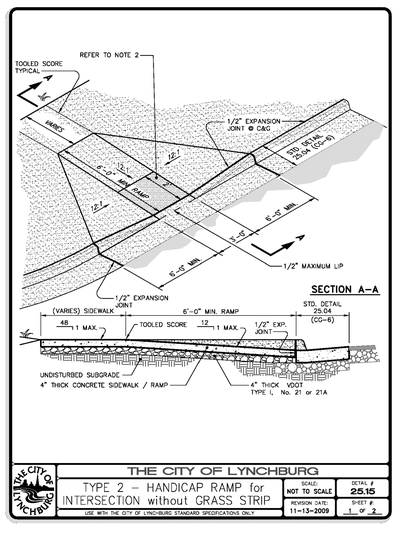
ES-5: PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES IN AREAS OTHER THAN INDICATED ON THESE PLANS (INCLUDING, BUT NOT LIMITED TO, OFF SITE BORROW OR WASTE AREAS), THE CONTRACTOR SHALL SUBMIT A SUPPLEMENTARY EROSION CONTROL PLAN TO THE OWNER FOR REVIEW AND APPROVAL BY THE PLAN APPROVING AUTHORITY.

ES-6: THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE PLAN APPROVING AUTHORITY.

ES-7: ALL DISTURBED AREAS ARE TO DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES AND DURING SITE DEVELOPMENT UNTIL FINAL STABILIZATION IS ACHIEVED.

ES-8: DURING DEWATERING OPERATIONS, WATER WILL BE PUMPED INTO AN APPROVED FILTERING DEVICE.

ES-9: THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.



NOTES:
1. CROSS AND SIDE RAMPS SHALL NOT EXCEED A SLOPE OF 12:1.
2. CROSS RAMP SHALL HAVE A TRUNCATED DOME PATTERN MEETING THE CURRENT AMERICANS WITH DISABILITIES ACT ACCESSIBILITY GUIDELINES (ADAAG). THE TRUNCATED DOME PATTERN SHALL EXTEND THE FULL WIDTH OF THE CROSS RAMP BY 2 FEET IN LENGTH IN THE DIRECTION OF PEDESTRIAN TRAVEL. THE TRUNCATED DOME SURFACE SHALL BE RED IN COLOR TO PRODUCE A 70% CONTRAST WITH SURROUNDING CONCRETE SURFACES. RECOMMENDED MANUFACTURERS INCLUDE 2004 ADA COMPLIANT DETECTABLE WARNING PAVER BY PAVESTONE COMPANY, STEP-SAFE BY TRANSPO INDUSTRIES, INC. AND ALERTMAT BY DETECTABLE WARNING SYSTEMS. DETECTABLE WARNING SURFACE SHALL BE INSTALLED WITH THE ELONGATED SIDE PARALLEL TO THE RAMP OPENING. MATS INSTALLED FOR NEW CONSTRUCTION SHALL BE RECESSED TO MOUNT FLUSH WITH THE SURROUNDING CONCRETE RAMP/SURFACE.
3. CURB RAMPS ARE TO BE LOCATED WHEREVER AN ACCESSIBLE ROUTE WITHIN THE RIGHT-OF-WAY OF A ROADWAY CROSSES AS SHOWN ON PLANS OR AS DIRECTED BY CITY ENGINEER AND SHOULD NOT BE LOCATED BEHIND VEHICLE STOP LINES, EXISTING LIGHT POLES, FIRE HYDRANTS, DROP INLETS, ETC.

THE CITY OF LYNCHBURG
TYPE 2 – HANDICAP RAMP for INTERSECTION without GRASS STRIP
USE WITH THE CITY OF LYNCHBURG STANDARD SPECIFICATIONS ONLY
SCALE: NOT TO SCALE
DETAIL # 25.15
REVISION DATE: 11-13-2009
SHEET # 2 OF 2

HURT & PROFFITT
INCORPORATED
* ENGINEERING >> SURVEYING >> PLANNING
2524 LANGHORNE ROAD
LYNCHBURG VA 24501
800.242.4906 TOLL FREE
434.847.7796 MAIN
434.847.0047 FAX

DETAIL SHEET
FOR
LYNCHBURG PUBLIC LIBRARY
CITY OF LYNCHBURG, VIRGINIA

PROJECT NO.	20120224
G.L. NO.	229-14-B3.9
FILE NO.	G-13819
DATE:	01/18/2013
DRAWN BY:	NRO
CHECKED BY:	PCP

COMMONWEALTH OF VIRGINIA
PATRICK C. PROFFITT
Lic. No. 034330
02/04/2013
PROFESSIONAL ENGINEER

HURT & PROFFITT

SHEET NO.
C7.0

DRAWING INDEX

BUILDING CODE SUMMARY

A. APPLICABLE CODES AND REFERENCES

1. THE VIRGINIA CONSTRUCTION CODE (VCC), 2009, EFFECTIVE MARCH 1, 2011; INTERNATIONAL CODE COUNCIL (ICC) INTERNATIONAL BUILDING CODE, 2009 ADOPTED BY REFERENCE.
   a. VIRGINIA REHABILITATION CODE (VRC); INTERNATIONAL CODE COUNCIL (ICC) INTERNATIONAL EXISTING BUILDING CODE, 2009 ADOPTED BY REFERENCE.
   b. PORTIONS OF THE VIRGINIA CONSTRUCTION CODE (VCC), AS REFERENCED BY THE VRC; INTERNATIONAL CODE COUNCIL (ICC) INTERNATIONAL BUILDING CODE, 2009 ADOPTED BY REFERENCE.
2. THE DEPARTMENT OF JUSTICE 2010 ADA STANDARDS FOR ACCESSIBLE DESIGN; 2010 STANDARDS FOR PUBLIC ACCOMMODATIONS AND COMMERCIAL FACILITIES; TITLE III

B. PROJECT DESCRIPTION

1. ADDITION TO EXISTING LIBRARY BUILDING. WORK INCLUDES ADDITION OF A STORYBOOK ROOM, AND SUPPORT SPACES.
2. FIRE PROTECTION: FULLY SPRINKLERED
3. EXISTING OCCUPANCY: A3
4. PROPOSED OCCUPANCY: A3, UNCHANGED

OCCUPANCY:

EXST: ASSEMBLY USE, A3. UNCHANGED BY ADDITION. OCCUPANT LOAD UNKNOWN.
NEW: ASSEMBLY USE, A3. OCCUPANT LOAD 49 (POSTED).

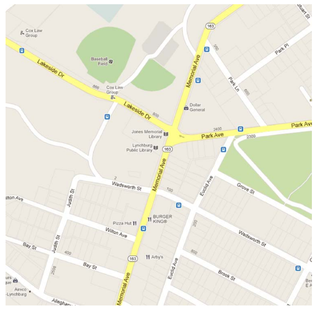
CONSTRUCTION CLASSIFICATION:

1. EXISTING COLUMNS ARE PROTECTED WITH METAL LATH AND GYPSUM PLASTER; ASSUMED EQUIVALENT TO 2 HR PROTECTION.
2. EXISTING ROOF IS PROTECTED WITH GYPSUM DECK; ASSUMED EQUIVALENT TO 1 HR PROTECTION.
3. EXISTING CONSTRUCTION IS EQUIVALENT TO NO "WORSE" THAN VCC 2009 CONSTRUCTION CLASSIFICATION IB. FOR THE PURPOSE OF THIS PROJECT, THE DESIGNER IS ASSUMING THE EXISTING IS IB CONSTRUCTION. ADDITION SHALL BE IB CONSTRUCTION.
4. NEW COLUMNS ARE PROTECTED WITH INTUMESCENT PAINT FOR 2 HR PROTECTION.
5. NEW ROOF IS PROTECTED WITH INTUMESCENT PAINT FOR 1 HR PROTECTION.

CJMW ARCHITECTURE
1030 Main Street
Lynchburg, VA 24504
p. 434.847.6564
www.cjmw.com

DATE: **April 30, 2013** COMMISSION NO. **12-1010**

LOCATION MAP



MAIN LIBRARY STORYBOOK ROOM

ROOM & CORRIDOR ADDITION

2311 MEMORIAL AVENUE, LYNCHBURG, VIRGINA 24501

ARCHITECT
CJMW ARCHITECTURE
1030 MAIN STREET
LYNCHBURG, VA 24504
434-847-6564

INTERIOR DESIGN
CJMW ARCHITECTURE
1030 MAIN STREET
LYNCHBURG, VA 24504
434-847-6564

PLUMBING, MECHANICAL AND ELECTRICAL ENGINEER
KINCAID & ASSOCIATES, PC
828 MAIN STREET, SUITE 1402
LYNCHBURG, VIRGINIA 24504
434-455-1560

STRUCTURAL ENGINEER
NOLEN FRISA
103 HOMESTEAD DRIVE
FOREST, VA 24551
434-385-4390

CONSTRUCTION DOCUMENTS
APRIL 30, 2013

DATE: APRIL 30, 2013
REVISION: -

DOCUMENT PHASE: CONSTRUCTION DOCUMENTS

COMMISSION NO: 12-1010
PROJECT NAME: MAIN LIBRARY STORYBOOK ROOM

SYMBOLS

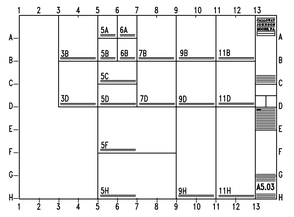
REFERENCES: DETAIL NUMBER 1H / A9.02 SHEET NUMBER

- A6.01 — SECTION REFERENCE
- A5.01 — EXTERIOR ELEVATION REFERENCE
- 2F / A9.01 — DETAIL REFERENCE / LARGE SCALE PLAN REFERENCE
- -???? — INTERIOR ELEVATION REFERENCE
- 100 — DOOR NUMBER
- ROOMNAME 100 — ROOM NAME & NUMBER
- A — COLUMN GRID DESIGNATION
- B — WINDOW\LOUVER\OTHER OPENING
- +8'-0" — NEW SPOT ELEVATION
- +8'-0" — EXISTING SPOT ELEVATION
- C2 — SPECIAL WALL TYPE
- 1 — REVISION
- 4 — REFERENCE TO TYPICAL NOTE
- TRUE NORTH / PLAN NORTH — NORTH ARROWS

MATERIAL DESIGNATIONS

- EARTH
- GRAVEL
- CONCRETE
- TERRAZZO
- PLASTER,SAND,GROUT
- BRICK
- CMU
- 75% SOLID CMU
- STEEL
- FINISHED WOOD
- PLYWOOD
- ROUGH WOOD FRAMING
- BLOCKING
- BATT INSULATION
- RIGID INSULATION
- ACOUSTICAL TILE
- CERAMIC TILE
- CARPET

DETAIL REFERENCES



DETAILS ARE REFERENCED ACCORDING TO THEIR POSITION ON THE DRAWING SHEET. THE SYSTEM IS SIMILAR TO THAT OF A MAP. THE DRAWING SHEET IS DIVIDED INTO A GRID WITH LETTERS ON THE SIDES AND NUMBERS GOING ACROSS AS SHOWN ABOVE. FOR EXAMPLE DETAIL 9D.A5.03 WOULD BE FOUND AT THE INTERSECTION OF LINES 9 AND D ON SHEET A5.03

ABBREVIATIONS

@	and	C.H.	ceiling height
∠	angle	CI.	cast iron
@	at	C.J.	control joint or construction joint
℄	centerline	C.M.T.	ceramic mosaic tile
[	channel	C.M.U.	concrete masonry unit
ø	diameter or round	C.T.	ceramic tile
⊥	perpendicular	C. to C.	center to center
#	pound or number	CAB.	cabinet
		CARP.	carpet
		CEM.	cement
		CER.	ceramic
		CLG.	ceiling
		CLO.	closet
		CLR.	clear
A.B.	anchor bolt	CNTR.	counter
A.F.F.	above finish floor	COL.	column
A.P.	access panel	COMP.	composition
A.T.C.	acoustical tile ceiling	CONC.	concrete
A/C.	air conditioning	CONF.	conference
ABV.	above	CONN.	connection
ACOUS.	acoustical	CONSTR.	construction
ADD.	addendum	CONT.	continuous
ADJ.	adjacent or adjustable	CONTR.	contractor
AGG.	aggregate	CORR.	corridor
AL.	aluminum	CSMT.	casement
ALT.	alternate	CTR.	center
ANOD.	anodize	CTSK.	countersink (sunk)
APPROX.	approximate		
APT.	apartment	D.	diameter
ARCHT.	architect (ural)	D.F.	drinking fountain
AUTO.	automatic	D.H.	double hung
AVG.	average	D.L.	dead load
		DBL.	double
B.U.R.	built-up roofing	DEM.	demolish, demolition
BD.	board	DEPT.	department
BEV.	beveled	DIAG.	diagonal, diagram
BITUM.	bituminous	DIFF.	diffuser
BLDG.	building	DIM.	dimension
BLK.	block	DMT.	demountable
BLKG.	blocking	DN.	down
BM.	beam or bench mark	DO.	door opening
BR.	bedroom	DR.	door
BRCG.	bracing	DS.	downspout
BRG.	bearing	DTL.	detail
BSMT.	basement	DWG.	drawing
BTW.	between	DWR.	drawer
C.B.	catch basin	E.	east
E.C.	electric contractor		
E.J.	expansion joint		
E.W.C.	electric water cooler		
EA.	each		
ELAS.	elastomeric		
ELEC.	electric (al)		
ELEC. CAB.	electric cabinet		
ELEV.	elevator, elevation		
EMER.	emergency		
ENCL.	enclose (ure)		
ENTR.	entrance		
EQ.	equal		
EQUIP.	equipment		
ESTB.	establish		
EXP.	expansion		
EXSTG.	existing		
EXT.	exterior		
F.B.O.	furnished by others		
F.D.	floor drain		
F.E.	fire extinguisher		
F.E.C.	fire extinguisher cab.		
F.H.C.	fire hose cabinet		
F.O.C.	face of concrete		
F.O.F.	face of finish		
F.O.S.	face of studs		
F.S.	full size		
F.T.F.	face to face		
FDN.	foundation		
FIN.	finish (ed)		
FL.	floor (ing)		
FLASH'G.	flashing		
FLUOR.	fluorescent		
FRPT.	fireproof (ing)		
F.P.W.H.	freeze proof wall hydrant		
FT.	foot or feet		
FTG.	footing		
FURN.	furnish		
FURR.	furring		
FUT.	future		
F.V.	field verify		
G.B.	grab bar		
G.C.	general contractor		
GA.	gage, gauge		
GALV.	galvanized		
GL.	glass, glazing		
GR.	grade		
GYP.	gypsum		
H.B.	hose bibb		
H.C.	hollow core		
H.M.	hollow metal		
H.P.	horsepower		
HDW.	hardware		
HDWD.	hardwood		
HORIZ.	horizontal		
HT.	height		
HVAC.	heating/ventilating /air conditioning		
HWY.	highway		
I.P.S.	iron pipe size		
ID.	inside diameter		
IN.	inches		
INCL.	include (ed) (sion)		
INSUL.	insulation (ed)		
INT'R.	interior		
INV.	invert		
INV. EL.	invert elevation		
JAN.	janitor		
JT.	joint		
K.D.	kiln dried or knock down		
KIT.	kitchen		
KO.	knockout		
L.	left, length		
L.H.	left hand		
L.L.	live load		
L.P.	low point		
L.R.	living room		
LW.	lightweight		
LAB.	laboratory		
LAM.	laminate (d)		
LAV.	lavatory		
LT.	light		
LTG.	lighting		
LVR.	louver		
M.C.	medicine cabinet or mechanical contractor		
M.H.	manhole		
M.O.	masonry opening		
MACH.	machine		
MAINT.	maintenance		
MAS.	masonry		
MATL.	material (s)		
MAX.	maximum		
MBR.	member		
MECH.	mechanic (al)		
MED.	medium		
MEMB.	membrane		
MET.	metal		
MEZZ.	mezzanine		
MFGR.	manufacture (er)		
MIN.	minimum		
MISC.	miscellaneous		
MOD.	modified		
MTD.	mounted		
MUL.	mullion		
N.	north		
N.I.C.	not in contract		
N.T.S.	not to scale		
NO. or #	number		
NOM.	nominal		
O. to O.	out to out		
O.C.	on center (s)		
O.D.	outside diameter		
OFF.	office		
OPP.	opposite hand		
OPN'G.	opening		
OPP.	opposite		
OUT.	outlet		
OZ.	ounce		
P.C.	plumbing contractor		
P.C.F.	pounds per cubic foot		
P.L.F.	pounds per lineal foot		
P.LAM.	plastic laminate		
P.S.F.	pounds per square foot		
P.S.I.	pounds per square inch		
P.T.D.	paper towel dispenser		
P.T.R.	paper towel receptacle		
P.T.	pressure treat (ed)		
PLAS.	plaster		
PLYWD.	plywood		
PNL.	panel		
PNT(d).	paint (ed)		
PR.	pair		
PT.	point		
PTD/R.	combination paper towel dispenser & receptacle		
PTN.	partition		
PVC.	polyvinyl chloride		
PVMT.	pavement		
Q.T.	quarry tile		
R.	riser, radius		
R.A.	return air		
R.C.P.	reinforced concrete pipe		
R.D.	roof drain		
R.H.	right hand		
R.O.	rough opening		
R.O.W.	right of way		
REMAR.	riemforcing bar		
REC.	recessed		
RECT.	rectangular		
REF.	reference		
REFR'G.	refrigerator		
REG.	register		
REINF.	reinforced		
REQ.	required		
RESIL.	resilient		
RET.	return		
REV.	revisions(s), revised		
RFG.	roofing		
RM.	room		
S-P.	single-ply		
S.	south		
S.C.	solid core		
S.C.J.	structural control joint		
S.D.	soap dispenser or storm drain		
S.N.D.	sanitary napkin dispenser		
S.N.R.	sanitary napkin receptacle		
S.S.	stainless steel		
S.T.C.	sound transmission classification		
S4S.	surfaced 4 sides		
SAN.	sanitary		
SCHED.	schedule		
SECT.	section		
SFTWD.	softwood		
SHT.	sheet		
SIM.	similar		
SPEC.	specification		
SQ.	square		
SQ. FT.	square foot		
STD.	standard		
STL.	steel		
STOR.	storage		
STRUC.	structure (al)		
SURF.	surface		
SUSP.	suspended		
SW.	switch		
SYM.	symmetry (ical)		
T&B.	top and bottom		
T&G.	tongue and groove		
T.	tread		
T.C.	top of curb		
T.P.	top of pavement		
T.P.D.	toilet paper dispenser		
T.W.	top of wall		
TEL.	telephone		
TEMP.	tempered or temperature		
TERZ.	terrazzo		
THK.	thick (ness)		
THRES.	threshold		
TLT.	toilet		
TV.	television		
TYP.	typical		
U.O.N.	unless otherwise noted		
UNFIN.	unfinished		
UTIL.	utility		
V.B.	vinyl base		
V.C.T.	vinyl composition tile		
V.I.F.	verify in field		
V.F.	vinyl fabric		
V.T.	vinyl tile		
V.W.F.	vinyl wall fabric		
VENT.	ventilating		
VERT.	vertical		
VEST.	vestibule		
VOL.	volume		
W.	west, women		
W.C.	water closet		
W.F.	wide flange		
W.I.	wrought iron		
W.W.F.	welded wire fabric		
W/	with		
W/O	without		
WD.	wood		
WDW.	window		
WP.	waterproofing		
WSCT.	wainscot		
WT.	weight		
YD.	yard		

DRAWING INDEX

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1. ADDITION TO EXISTING LIBRARY BUILDING. WORK INCLUDES ADDITION OF A STORYBOOK ROOM, AND SUPPORT SPACES.
2. FIRE PROTECTION: FULLY SPRINKLERED
3. EXISTING OCCUPANCY: A3
4. PROPOSED OCCUPANCY: A3, UNCHANGED

OCCUPANCY:

EXST: ASSEMBLY USE, A3. UNCHANGED BY ADDITION. OCCUPANT LOAD UNKNOWN.
NEW: ASSEMBLY USE, A3. OCCUPANT LOAD 49 (POSTED).

CONSTRUCTION CLASSIFICATION:

1. EXISTING COLUMNS ARE PROTECTED WITH METAL LATH AND GYPSUM PLASTER; ASSUMED EQUIVALENT TO 2 HR PROTECTION.
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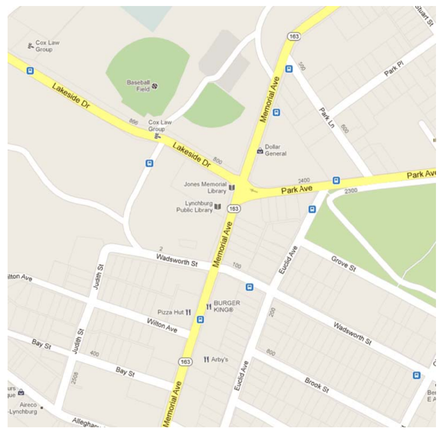
CJMW ARCHITECTURE
1030 Main Street
Lynchburg, VA 24504
p. 434.847.6564
www.cjmw.com

DATE: April 30, 2013 COMMISSION NO. 12-1010

LOCATION MAP



SYMBOLS

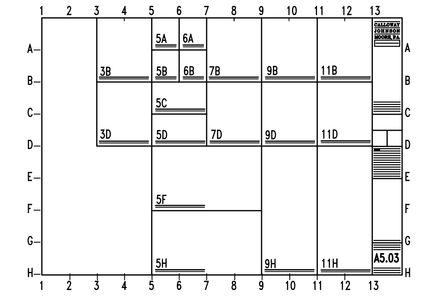
REFERENCES: DETAIL NUMBER 1H / A9.02 SHEET NUMBER

- SECTION REFERENCE (A6.01)
- EXTERIOR ELEVATION REFERENCE (A5.01)
- DETAIL REFERENCE / LARGE SCALE PLAN REFERENCE (2F / A9.01)
- INTERIOR ELEVATION REFERENCE (????)
- DOOR NUMBER (100)
- ROOMNAME 100 ROOM NAME & NUMBER
- COLUMN GRID DESIGNATION (A)
- WINDOW\LOUVER\OTHER OPENING (B)
- +8'-0" NEW SPOT ELEVATION
- +8'-0" EXISTING SPOT ELEVATION
- SPECIAL WALL TYPE (CT)
- REVISION (1)
- REFERENCE TO TYPICAL NOTE [4]
- NORTH ARROWS (TRUE NORTH, PLAN NORTH)

MATERIAL DESIGNATIONS

- EARTH
- GRAVEL
- CONCRETE
- TERRAZZO
- PLASTER,SAND,GROUT
- BRICK
- CMU
- 75% SOLID CMU
- STEEL
- FINISHED WOOD
- PLYWOOD
- ROUGH WOOD FRAMING
- BLOCKING
- BATT INSULATION
- RIGID INSULATION
- ACOUSTICAL TILE
- CERAMIC TILE
- CARPET

DETAIL REFERENCES



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ABBREVIATIONS

&	and	C.H.	ceiling height	E.C.	electric contractor	H.B.	hose bibb	MAX.	maximum	Q.T.	quarry tile	SUSP.	suspended
∠	angle	C.I.	cast iron	E.J.	expansion joint	H.C.	hollow core	MBR.	member			SW.	switch
@	at	C.J.	control joint or construction joint	E.W.C.	electric water cooler	H.M.	hollow metal	MECH.	mechanic (al)	R.	riser, radius	SYM.	symmetry (ical)
℄	centerline	C.M.T.	ceramic mosaic tile	EA.	each	H.P.	horsepower	MED.	medium	R.A.	return air		
[	channel	C.M.U.	concrete masonry unit	ELAS.	elastomeric	HDW.	hardware	MEMB.	membrane	R.C.P.	reinforced concrete pipe	T&B.	top and bottom
ø	diameter or round	C.T.	ceramic tile	ELEC.	electric (al)	HDWD.	hardwood	MET.	metal	R.D.	roof drain	T&G.	tongue and groove
⊥	perpendicular	C. to C.	center to center	ELEC. CAB.	electric cabinet	HORIZ.	horizontal	MEZZ.	mezzanine	R.H.	right hand	T.	tread
℄	plate	CAB.	cabinet	ELEV.	elevator, elevation	HT.	height	MFGR.	manufacture (er)	R.O.	rough opening	T.C.	top of curb
#	pound or number	CARP.	carpet	EMER.	emergency	HVAC.	heating/ventilating /air conditioning	MIN.	minimum	R.O.W.	right of way	T.P.	top of pavement
		CEM.	cement	ENCL.	enclose (ure)			MISC.	miscellaneous	REBAR.	rienforcing bar	T.P.D.	toilet paper dispenser
		CER.	ceramic	ENTR.	entrance	HWY.	highway	MOD.	modified	REC.	recessed	T.W.	top of wall
		CLG.	ceiling	EQ.	equal			MTD.	mounted	RECT.	rectangular	TEL.	telephone
		CLO.	closet	EQUIP.	equipment	I.P.S.	iron pipe size	MUL.	mullion	REF.	reference	TEMP.	tempered or temperature
		CLR.	clear	ESTB.	establish	ID.	inside diameter			REFR'G.	refrigerator	TERR.	terrazzo
		CLO.	closet	EXP.	expansion	IN.	inches	N.	north	REG.	register	THK.	thick (ness)
		CLR.	clear	EXSTG.	existing	INCL.	include (ed) (sion)	N.I.C.	not in contract	REINF.	reinforced	THRES.	threshold
		CNTR.	counter	EXT.	exterior	INSUL.	insulation (ed)	N.T.S.	not to scale	REQ.	required	TLT.	toilet
		COL.	column			INT'R.	interior	NO. or #	number	RESIL.	resilient	TV.	television
		COMP.	composition	F.B.O.	furnished by others	INV.	invert	NOM.	nominal	RET.	return	TYP.	typical
		CONC.	concrete	F.D.	floor drain	INV. EL.	invert elevation	O. to O.	out to out	REV.	revisions(s), revised		
		CONF.	conference	F.E.	fire extinguisher			O.C.	on center (s)	RFG.	roofing	U.O.N.	unless otherwise noted
		CONN.	connection	F.E.C.	fire extinguisher cab.	JAN.	janitor	O.D.	outside diameter	RM.	room	UNFN.	unfinished
		CONSTR.	construction	F.H.C.	fire hose cabinet	JT.	joint	OFF.	office			UTIL.	utility
		CONT.	continuous	F.O.C.	face of concrete			O.H.	opposite hand	S-P.	single-ply		
		CONTR.	contractor	F.O.F.	face of finish	K.D.	kiln dried or knock down	OPN'G.	opening	S.	south	V.B.	vinyl base
		COORD.	corridor	F.O.S.	face of studs	KIT.	kitchen	OPP.	opposite	S.C.	solid core	V.C.T.	vinyl composition tile
		CSMT.	casement	F.S.	full size	KO.	knockout	OUT.	outwart	S.C.J.	structural control joint	V.I.F.	verify in field
		CTR.	center	F.T.F.	face to face			OZ.	ounce	S.D.	soap dispenser or storm drain	V.F.	vinyl fabric
		CTSK.	countersink (sunk)	FDN.	foundation	L.	left, length					V.T.	vinyl tile
				FIN.	finish (ed)	L.H.	left hand	P.C.	plumbing contractor	S.N.D.	sanitary napkin dispenser	V.,W.F.	vinyl wall fabric
		D.	diameter	FL.	floor (ing)	LL.	live load	P.C.F.	pounds per cubic foot	S.N.R.	sanitary napkin receptacle	VENT.	ventilating
		D.F.	drinking fountain	FLASH'G.	flashing	L.P.	low point	P.L.F.	pounds per lineal foot	S.S.	stainless steel	VERT.	vertical
		D.H.	double hung	FLUOR.	fluorescent	L.R.	living room	P.LAM.	plastic laminate	S.T.C.	sound transmission	VEST.	vestibule
		D.L.	dead load	FRPF.	fireproof (ing)	LW.	lightweight	P.S.F.	pounds per square foot		classification	VOL.	volume
		DBL.	double	F.P.W.H.	freeze proof wall hydrant	LAB.	laboratory	P.S.I.	pounds per square inch	S4S.	surfaced 4 sides		
		DEM.	demolish, demolition	FT.	foot or feet	LAM.	laminate (d)	P.T.D.	paper towel dispenser	SAN.	sanitary	W.	west, women
		DEPT.	department	FTG.	footing	LAV.	lavatory	P.T.R.	paper towel receptacle	SCHED.	schedule	W.C.	water closet
		DIAG.	diagonal, diagram	FURN.	furnish	LT.	light	P.T.	pressure treat (ed)	SECT.	section	W.F.	wide flange
		DIFF.	diffuser	FURR.	furring	LTG.	lighting	PLAS.	plaster	SFTWD.	softwood	W.I.	wrought iron
		DIM.	dimension	FUT.	future	LVR.	louver	PLYWD.	plywood	SHT.	sheet	W.W.F.	welded wire fabric
		DMT.	demountable	F.V.	field verify			PNL.	panel	SIM.	similar	W/	with
		DN.	down			M.C.	medicine cabinet or mechanical contractor	PNT(d).	paint (ed)	SPEC.	specification	W/O	without
		DO.	door opening	G.B.	grab bar			PR.	pair	SQ.	square	WD.	wood
		DR.	door	G.C.	general contractor	M.H.	manhole	PT.	point	SQ. FT.	square foot	WDW.	window
		DS.	downspout	GA.	gage, gauge	M.O.	masonry opening	PTD/R.	combination paper towel dispenser & receptacle	STD.	standard	WP.	waterproofing
		DTL.	detail	GALV.	galvanized	MACH.	machine			STL.	steel	WSCT.	wainscot
		DWG.	drawing	GL.	glass, glazing	MAINT.	maintenance	PTN.	partition	STOR.	storage	WT.	weight
		DWR.	drawer	GR.	grade	MAS.	masonry	PVC.	polyvinyl chloride	STRUC.	structure (al)		
		E.	east	GYP.	gypsum	MATL.	material (s)	PVMT.	pavement	SURF.	surface	YD.	yard
		C.B.	catch basin										

MAIN LIBRARY STORYBOOK ROOM

ROOM & CORRIDOR ADDITION

2311 MEMORIAL AVENUE, LYNCHBURG, VIRGINA 24501

COMMONWEALTH OF VIRGINIA
4/30/13
EMMETT W LIPSEY
Lic. No. 005965
ARCHITECT

ARCHITECT
CJMW ARCHITECTURE
1030 MAIN STREET
LYNCHBURG, VA 24504
434-847-6564

INTERIOR DESIGN
CJMW ARCHITECTURE
1030 MAIN STREET
LYNCHBURG, VA 24504
434-847-6564

PLUMBING, MECHANICAL AND ELECTRICAL ENGINEER
KINCAID & ASSOCIATES, PC
828 MAIN STREET, SUITE 1402
LYNCHBURG, VIRGINIA 24504
434-455-1560

STRUCTURAL ENGINEER
NOLEN FRISA
103 HOMESTEAD DRIVE
FOREST, VA 24551
434-385-4390

CONSTRUCTION DOCUMENTS
APRIL 30, 2013

DATE: APRIL 30, 2013
REVISION: -

DOCUMENT PHASE: CONSTRUCTION DOCUMENTS

COMMISSION NO: 12-1010
PROJECT NAME: MAIN LIBRARY STORYBOOK ROOM

OUTLINE SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

1-1. ALL WORK SHALL COMPLY WITH VIRGINIA STATEWIDE BUILDING CODE (IBC 2009), AND LOCAL CODES.

1-2. CONTRACTOR SHALL PROVIDE UTILITIES. ONE AS-BUILT SET OF DRAWINGS SHALL BE MAINTAINED IN GOOD CONDITION ON SITE.

1-3. CONTRACTOR SHALL COORDINATE ALL WORK BETWEEN SUBCONTRACTORS, MATERIAL SUPPLIERS, LOCAL AGENCIES AND ADJACENT TENANTS/PROPERTY OWNERS.

1-4. OWNER SHALL PROVIDE ALL TESTING OF CONCRETE, STRUCTURAL ITEMS, MASONRY, AND SOIL COMPACTION, IN ACCORD WITH THIRD PARTY SPECIAL INSPECTIONS REQUIRED BY AHJ (AUTHORITY HAVING JURISDICTION).

1-5. CONTRACTOR SHALL PROTECT EXISTING MATERIALS TO REMAIN OR TO BE SALVAGED AND REUSED. CLEAN AND REPAIR EXISTING MATERIALS TO FUNCTIONAL CONDITION SATISFACTORY TO OWNER.

1-6. PERFORM ALL EXTERIOR WET WORK DURING DAYLIGHT HOURS AND WITH FAVORABLE WEATHER CONDITIONS FORECASTED. DO NOT ATTEMPT REPAIRS OR APPLICATION OF PRIMER, PAINT, PUTTY, EPOXY, OR MORTAR WHEN RELATIVE HUMIDITY EXCEEDS 80 PERCENT, OR WHEN AIR TEMPERATURE IS BELOW 40 DEGREES F, OR WHEN FREEZING IS EXPECTED

1-7. CONTRACTOR SHALL MAINTAIN ALL EXISTING FIRE PROTECTION SYSTEMS AND FOLLOW SOUND FIRE PREVENTION PRACTICES DURING DEMOLITION AND NEW WORK. PROJECT SITE SHALL BE A SMOKE-FREE WORK ZONE. 24-HOUR FIRE WATCH SHALL BE PROVIDED FOLLOWING ANY TORCH/OPEN-FLAME/HIGH HEAT PROCEDURES.

1-8. CONTRACTOR SHALL CLEARLY DEFINE AND MAINTAIN TRAFFIC FLOW TO ALL AREAS OF THE SITE AND SURROUNDINGS. PROVIDE TRAFFIC CONES, SIGNS AND FLAGMEN AS NEEDED TO COMPLY WITH ALL LOCAL REGULATIONS.

1-9. CONTRACT CLOSEOUT: TURN OVER TO OWNER ALL AS-BUILT DOCUMENTS CLEARLY SHOWING RECORD OF ALL CHANGES TO CONSTRUCTION DOCUMENTS. PROVIDE OWNER WITH O & M MANUALS AND INSTRUCTION FOR ALL BUILDING SYSTEMS. PROVIDE GUARANTEES, BONDS AND CERTIFICATE OF OCCUPANCY.

1-10. CLEANING: REMOVE TRASH AND DEBRIS WEEKLY. COMPLY WITH ALL CODES, ORDINANCES AND ANTI-POLLUTION LAWS. PERFORM FINAL CLEANING SATISFACTORY TO OWNER.

1-11. BEFORE DEMOLITION/CONSTRUCTION BEGINS, CONTRACTOR SHALL MAKE A THOROUGH SURVEY OF THE FACILITY AND NOTIFY OWNER/ARCHITECT IN WRITING OF ANY CONFLICTS AND/OR DISCREPANCIES BETWEEN EXISTING CONDITIONS AND PROPOSED WORK. FAILURE TO DO SO SHALL NOT RELIEVE CONTRACTOR OF RESPONSIBILITIES FOR PERFORMANCE OF WORK IN ACCORD WITH CONSTRUCTION DOCUMENTS.

1-12. SEE COVER SHEET FOR BUILDING CODE SUMMARY.

DIVISION 3 - CONCRETE

3-1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DETAILS. BRING ANY CONFLICTS AND/OR DISCREPANCIES TO ATTENTION OF ARCHITECT.

CONTRACTOR SHALL PROVIDE ALL TEMPORARY BRACING, SHORING AND SUPPORT AS NEEDED DURING CONSTRUCTION.

3-2. COORDINATE FOUNDATION REQUIREMENTS WITH CIVIL DRAWINGS. FOOTINGS SHALL REST ON UNDISTURBED SOIL OR ENGINEERED FILL. CONTRACTOR SHALL FIELD VERIFY ACTUAL SOIL BEARING CAPACITY, AND ADJUST DESIGN ACCORDINGLY.

3-3. PROVIDE 15 MIL MIN. POLY VAPOR BARRIER UNDER ALL INTERIOR SLABS-ON-GRADE. ALL FLOOR SLABS ON GRADE SHALL BE 4 INCH MINIMUM THICKNESS AND SHALL BE REINFORCED WITH 6x6 WWF. PROVIDE MIN 4" GRANULAR FILL UNDER SLABS. COORDINATE ADDITIONAL REQUIREMENTS WITH STRUCTURAL DRAWINGS.

DIVISION 4 - MASONRY

4-1. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL DETAILS. BRING ANY CONFLICTS AND/OR DISCREPANCIES TO ATTENTION OF OWNER/ARCHITECT.

4-2. BRICK FOR REPAIRS/INFILL AND NEW WORK SHALL MEET ASTM C216. BRICK SHALL MATCH EXISTING IN COLOR AND COURSING AT REPAIRS, AND SHALL BE AS ARCHITECT-DIRECTED FOR NEW WORK. PROVIDE SAMPLES FOR BRICK SELECTION. PROVIDE MOCK-UP PANELS (3 FOOT X 3 FOOT MINIMUM, MAXIMUM QUANTITY OF 4).

4-3. BRICK UNITS; FACING BRICK SHALL MEET ASTM C216, TYPE FBS, GRADE SW.

4-4. MORTAR MATERIALS:
- a. MASONRY CEMENT SHALL MEET ASTM C91 TYPE S AS INDICATED ON THE STRUCTURAL DRAWINGS.
- b. PORTLAND CEMENT SHALL MEET ASTM C150, TYPE I.
- c. HYDRATED LIME SHALL MEET ASTM C207, TYPE S.
- d. MORTAR AGGREGATE SHALL MEET ASTM C144.
- e. WATER SHALL BE CLEAN AND POTABLE.

4-5. REINFORCEMENT AND ANCHORAGE: MASONRY VENEER ANCHORS: 2-PIECE ANCHORS THAT PERMIT DIFFERENTIAL MOVEMENT BETWEEN MASONRY VENEER AND STRUCTURAL BACKUP, HOT DIP GALVANIZED TO ASTM A153/A153M, CLASS B. REINFORCEMENT: TRUSS OR LADDER TYPE.

4-6. FLASHINGS: RUBBERIZED ASPHALT FLASHING: SELF-ADHERING COMPOSITE MATERIAL COMPRISING RUBBERIZED ASPHALT ADHESIVE COMPOUND BONDED TO CROSS-LAMINATED POLYETHYLENE FILM, MINIMUM 0.030 INCH TOTAL THICKNESS. PROVIDE PRODUCT EQUAL TO PERM-A-BARRIER MANUFACTURED BY W R GRACE & CO.

4-7. MORTAR MIXES: MORTAR FOR UNIT MASONRY SHALL MEET ASTM C270, PROPORTION SPECIFICATION.

4-8. PROTECTION AND CONDITIONS: STACK MASONRY UNITS ON PLATFORMS OR ANY OTHER APPROVED LOCATION THAT WILL PROTECT THEM FROM CONTACT WITH SOIL AND EXPOSURE TO WATER. EXERCISE CARE IN HANDLING UNITS TO AVOID CHIPPING AND BREAKAGE. DURING RAINY WEATHER COVER ALL EXPOSED UNITS WITH A LAYER OF 6-MIL POLYETHYLENE. DURING NON-RAINY WEATHER REMOVE THE COVER FROM THE MASONRY UNITS. WET OR VERY DAMP MASONRY UNITS SHALL BE THOROUGHLY DRIED BEFORE BEING LAID. NO MASONRY SHALL BE LAID WHEN THE TEMPERATURE HAS DROPPED BELOW 45 DEGREES F. UNLESS IT IS RISING. AT NO TIME WHEN THE TEMPERATURE HAS DROPPED BELOW 40 DEGREES F. MAY MASONRY WORK PROCEED UNLESS PERMISSION IS OBTAINED FROM THE ARCHITECT BEFORE PROCEEDING WITH THE WORK. WHEN MASONRY WORK IS AUTHORIZED DURING TEMPERATURES BELOW 40 DEGREES F., THE SUBCONTRACTOR SHALL MAKE PROVISIONS TO HEAT AND MAINTAIN THE TEMPERATURE OF THE MASONRY MATERIALS AND PROTECT THE COMPLETED WORK FROM FREEZING.

4-9. COURSING: MAINTAIN MASONRY COURSES TO UNIFORM DIMENSION. FORM VERTICAL AND HORIZONTAL JOINTS OF UNIFORM THICKNESS.
BRICK UNITS: BOND - RUNNING (TYPICAL), UNLESS OTHERWISE NOTED ON THE DRAWINGS.

4-10. CMU SHALL MEET ASTM C90, GRADE N. SEE STRUCTURAL DRAWINGS FOR ADDITIONAL REQUIREMENTS.

4-11. MORTAR SHALL COMPLY WITH ASTM C270. USE TYPE S FOR MASONRY BELOW GRADE OR IN CONTACT WITH EARTH. USE TYPE N FOR REINFORCED MASONRY AND FOR ALL OTHER APPLICATIONS, UNLESS NOTED OTHERWISE.

4-12. MORTAR FOR REPOINTING AREAS OF EXISTING BRICK, WITHIN PROJECT LIMITS IF REQUIRED, SHALL MATCH EXISTING MORTAR IN MATERIAL COMPOSITION, PROFILE AND COLOR. JOINT DETAILS SHALL MATCH EXISTING IN EVERY RESPECT FOR CORRECT APPEARANCE. PROVIDE MOCKUP FOR ARCHITECT'S APPROVAL TO DEMONSTRATE METHOD AND QUALITY OF WORKMANSHIP IN REMOVAL OF OLD MORTAR AND COLOR, QUALITY AND JOINT DETAIL FOR REPOINTING WORK.

4-13. INSTALL "MORTAR NET" AND WEEPS ABOVE ALL FLASHING TURNOUT, TYPICAL. WEEPS SHALL OCCUR 6" MIN ABOVE FINISHED GRADE. INSTALL CONT. FLASHING WITH END DAMS AND MESH FOR WEEP HOLES.

1H OUTLINE SPECIFICATIONS
A0.01 NTS

DIVISION 5 - METALS
5-1. SEE STRUCTURAL DRAWINGS.

PERFORATED METAL SCREEN
5-2. PROVIDE ALL PARTS AND ASSEMBLE METAL SCREEN AS DETAILED.
SCREEN TO BE PERFORATED ALUMINUM PANELS CONNECTED TO BACK-UP STRUCTURE OF PRE-FINISHED STEEL TUBE FRAMING.
PERFORATED PANELS TO BE 1/16" MIN THICKNESS WITH 1/4" ROUND PERFORATIONS ON 3/8" CENTERS, STAGGERED PATTERN FOR A 42% OPEN AREA PER PANEL. DESIGN SHALL HAVE SIDE AND END MARGINS AS INDICATED, AND BE OF A STRAIGHT PATTERN. PANELS SHALL BE RADIUSED TO FOLLOW THE CURVATURE OF THE ROOF STRUCTURE.

DIVISION 6 - WOOD
ROUGH CARPENTRY

6-1. WOOD CONSTRUCTION SHALL CONFORM TO THE REQUIREMENTS OF THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION AND THE AMERICAN FOREST & PAPER ASSOCIATION (NATIONAL DESIGN SPEC).

6-2. DIMENSION LUMBER: SIZES - NOMINAL SIZES AS INDICATED ON DRAWINGS, S4S.
MOISTURE CONTENT: S-DRY OR MC19.

6-3. STUD FRAMING (2 BY 2 THROUGH 2 BY 6): GRADE: NO. 2. FB-SINGLE (MINIMUM EXTREME FIBER STRESS IN BENDING): 875 PSI. E (MINIMUM MODULUS OF ELASTICITY): 1,400,000 PSI.

6-4. MISCELLANEOUS FRAMING, BLOCKING, NAILERS, GROUNDS, FURRING AND ROOFING NAILERS:
LUMBER: S4S, NO. 2 OR STANDARD GRADE.
BOARDS: STANDARD OR NO. 3.

FINISH CARPENTRY

6-5. QUALITY GRADE: UNLESS OTHERWISE INDICATED PROVIDE PRODUCTS OF QUALITY SPECIFIED BY AWI ARCHITECTURAL WOODWORK STANDARDS FOR PREMIUM GRADE.

6-6. FABRICATION: SHOP ASSEMBLE WORK, TO THE GREATEST EXTENT POSSIBLE, FOR DELIVERY TO SITE, PERMITTING PASSAGE THROUGH BUILDING OPENINGS.

CASEWORK

6-7 COMPONENTS
GENERAL: SUBJECT TO COMPLIANCE WITH THE FOLLOWING REQUIREMENTS, PROVIDE AWI PREMIUM CASEWORK AS INDICATED ON THE DRAWINGS.
SPECIES: MAPLE
FINISH: TRANSLUCENT STAIN TO BE SELECTED BY ARCHITECT
CABINET CONSTRUCTION:
FACE FRAMES
3/4" PLYWOOD WITH WOOD VENEER AS SELECTED BY ARCHITECT
JOINTS SHALL BE MORTISED AND 3/8" TENON CONSTRUCTION, GLUED AND SECURED WITH STEEL FASTENERS.
TOE KICK: 2x4 WITH VENEER TO MATCH CASEWORK.
SIDES EXPOSED TO VIEW: VENEER END TO MATCH FRAME SPECIES AND FINISH.
DRAWERS:
SOLID WOOD DRAWER FACES
DRAWER BOXES
SOLID WOOD OR PLYWOOD WITH 1/2" MINIMUM THICKNESS.
SIDES SHALL BE DADOED, RABBETED, OR DOVETAILED TO RECEIVE THE FRONT AND BACK MEMBERS OF THE DRAWER BOX. BUTT JOINTS ARE NOT ACCEPTABLE.
COLOR, TEXTURES, AND PATTERNS: AS SELECTED BY ARCHITECT. INTERIOR SURFACES, NOT EXPOSED TO VIEW SHALL BE MELEMINE (WHITE).
DRAWERS SHALL HAVE RAILS AND GUIDES WITH FULL EXTENSION.

FABRICATION
6-8 SHOP ASSEMBLE CASEWORK FOR DELIVERY TO SITE IN UNITS EASILY HANDLED AND TO PERMIT PASSAGE THROUGH BUILDING OPENINGS.
FORM SMOOTH EDGES.

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

SHEET WATERPROOFING

7-1. MEMBRANE
TOTAL THICKNESS: 55 MILS, ASTM D412 (TPO THICKNESS OF 30 MILS, BUTYL ALLOY THICKNESS OF 25 MILS)
TENSILE STRENGTH: 1,999 PSI, ASTM D412
PUNCTURE STRENGTH- FAILURE LOAD: 108 LBF, ASTM E154
PUNCTURE STRENGTH- ELONGATION AT FAILURE: 492%, ASTM E154
TEAR STRENGTH-MD: 289 PSI, ASTM D624 DIE C
LAP SEAM PEEL STRENGTH (TEST @ 75°F SEPARATION TYPE): 5.6 PLI, ASTM D903
PEEL STRENGTH TO CONCRETE (TEST @ 75°F SEPARATION TYPE): 5.9 PLI, ASTM D903 (MODIFIED)
WATER ABSORPTION: 0.7 %, ASTM D570
WATER VAPRO PERMEANCE: 0.02 PERMS, ASTM E96, METHOD B
LOW TEMPERATURE FLEX: <-10DEGREES F, ASTM D1970

7-2. ACCESSORIES
SEAM TAPE: 3" WIDE
PRIMERS: LOW VOC
REINFORCING FABRIC: 12" WIDE
TERMINATION BAR: ALUMINUM, COMPATIBLE WITH MEMBRANE AND ADHESIVES

7-3. DRAINAGE PANEL AND PROTECTION BOARD
PLACE DRAINAGE PANEL DIRECTLY AGAINST MEMBRANE, BUTT JOINTS, PLACE TO ENCOURAGE DRAINAGE DOWNWARD. SCRIBE AND CUT BOARDS AROUND PROJECTIONS, PENETRATIONS, AND INTERRUPTIONS.
PLACE PROTECTION BOARD DIRECTLY AGAINST DRAINAGE PANEL; BUTT JOINTS. SCRIBE AND CUT BOARDS AROUND PROJECTIONS, PENETRATIONS, AND INTERRUPTIONS.
ADHERE PROTECTION BOARD TO SUBSTRATE WITH COMPATIBLE ADHESIVE.

WATER REPELLENTS

7-4. WATER REPELLENTS APPLIED TO EXTERIOR MASONRY SURFACES
WATER REPELLENT: NON-GLOSSY, COLORLESS, PENETRATING, WATER-VAPOR-PERMEABLE, NON-YELLOWING SEALER, THAT DRIES INVISIBLY LEAVING APPEARANCE OF SUBSTRATE UNCHANGED.
APPLICATIONS: VERTICAL SURFACES AND NON-TRAFFIC HORIZONTAL SURFACES.
NUMBER OF COATS: TWO.
VOC CONTENT: AS SPECIFIED IN SECTION 01 6116.
MOISTURE ABSORPTION WHEN APPLIED TO MASONRY: 5 PERCENT, MAXIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM C 140 USING MASONRY SAMPLE COMPLETELY COATED WITH WATER REPELLENT.
MAINTAINS DRY APPEARANCE WHEN WETTED.
PRODUCTS: WATER-BASED, 100 PERCENT ACRYLIC.
APPLY WATER REPELLENT IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, USING PROCEDURES AND APPLICATION METHODS RECOMMENDED AS PRODUCING THE BEST RESULTS.
APPLY AT RATE RECOMMENDED BY MANUFACTURER, CONTINUOUSLY OVER ENTIRE SURFACE.
APPLY TWO COATS, MINIMUM.
REMOVE WATER REPELLENT FROM UNINTENDED SURFACES IMMEDIATELY BY A METHOD INSTRUCTED BY WATER REPELLENT MANUFACTURER.

THERMAL INSULATION

7-5. FOAM BOARD INSULATION
EXTRUDED POLYSTYRENE BOARD INSULATION: ASTM C 578, TYPE X; EXTRUDED POLYSTYRENE BOARD WITH EITHER NATURAL SKIN OR CUT CELL SURFACES; WITH THE FOLLOWING CHARACTERISTICS:
1. FLAME SPREAD INDEX: 75 OR LESS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
2. SMOKE DEVELOPED INDEX: 450 OR LESS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
3. BOARD SIZE: 48 X 96 INCH.
4. BOARD THICKNESS: 2 INCHES, OR AS INDICATED ON DRAWINGS.
5. BOARD EDGES: SQUARE.
6. THERMAL CONDUCTIVITY (K FACTOR) AT 25 DEGREES F: 0.18.
7. COMPRESSIVE RESISTANCE: 15 PSI.

DIVISION 7 (CONTINUED)

7-6. BATT INSULATION
WHERE BATT INSULATION IS INDICATED, EITHER GLASS FIBER OR MINERAL FIBER BATT INSULATION MAY BE USED, AT CONTRACTOR'S OPTION.
GLASS FIBER BATT INSULATION: FLEXIBLE PREFORMED BATT OR BLANKET, COMPLYING WITH ASTM C 665; FRICTION FIT.
1. FLAME SPREAD INDEX: 25 OR LESS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
2. SMOKE DEVELOPED INDEX: 450 OR LESS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
3. COMBUSTIBILITY: NON-COMBUSTIBLE, WHEN TESTED IN ACCORDANCE WITH ASTM E 136, EXCEPT FOR FACING, IF ANY.
4. FORMALDEHYDE CONTENT: ZERO.
5. THERMAL RESISTANCE: R-VALUE AS INDICATED ON DRAWINGS.
6. FACING: UNFACED.
MINERAL FIBER BATT INSULATION: FLEXIBLE PREFORMED BATT OR BLANKET, COMPLYING WITH ASTM C 665; FRICTION FIT; UNFACED FLAME SPREAD INDEX OF 0 (ZERO) WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
1. SMOKE DEVELOPED INDEX: 0 (ZERO), WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
2. THERMAL RESISTANCE: R-VALUE AS INDICATED ON DRAWINGS.

WEATHER BARRIERS

7-7 AIR BARRIER SHEET, MECHANICALLY FASTENED:
AIR PERMEANCE: 0.004 CUBIC FEET PER SQUARE FOOT, MAXIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM E 2178.
WATER VAPOR PERMEANCE: 5 PERMS, MINIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM E96/E 96M PROCEDURE A (DESICCANT METHOD).
WATER PENETRATION RESISTANCE: WITHSTAND A WATER HEAD OF 21 INCHES, MINIMUM, FOR MINIMUM OF 5 HOURS, WHEN TESTED IN ACCORDANCE WITH AATCC 127.
ULTRAVIOLET AND WEATHERING RESISTANCE: APPROVED IN WRITING BY MANUFACTURER FOR MINIMUM OF 9 MONTHS WEATHER EXPOSURE.
SURFACE BURNING CHARACTERISTICS: FLAME SPREAD INDEX OF 25 OR LESS, SMOKE DEVELOPED INDEX OF 50 OR LESS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84.
INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.

7-8 ACCESSORIES
SELF-ADHESIVE SHEET FLASHING: ASTM D 1970.
FASTENERS: AS RECOMMENDED BY MANUFACTURER, SUITABLE FOR PROJECT REQUIREMENTS.

THERMOPLASTIC MEMBRANE ROOFING

7-9 MEMBRANE: ONE PLY, FULLY ADHERED, OVER INSULATION
MATERIAL: ETHYLENE PROPYLENE DIENE MONOMER (EPDM) COMPLYING WITH ASTM D 4637.
REINFORCING: INTERNAL FABRIC.
GRADE AND CLASS: GRADE 1 CLASS U, UNREINFORCED.
THICKNESS: 45 MILS (1.1 MM) NOMINAL
SHEET WIDTH: FACTORY FABRICATED INTO LARGEST SHEETS POSSIBLE.
COLOR: WHITE.
SEAMING MATERIALS: AS RECOMMENDED BY MEMBRANE MANUFACTURER.

7-10 AUXILIARY MATERIALS:
SHEET FLASHING MATERIAL: 60 MIL (1.5 MM) THICK REINFORCED EPDM, UNCURED OR CURED, ACCORDING TO APPLICATION.
BONDING ADHESIVE: MANUFACTURER'S STANDARD BONDING ADHESIVE.
SPLICE ADHESIVE AND CLEANER: SINGLE-COMPONENT BUTYL SPLICING ADHESIVE AND SOLVENT BASED SPLICE CLEANER; OR SPLICE PRIMER AND TAPE: MANUFACTURER'S STANDARD SYNTHETIC RUBBER POLYMER PRIMER AND 3-INCH (75 MM) WIDE MINIMUM, BUTYL SPLICE TAPE WITH RELEASE FILM.
LAP SEALANT: MANUFACTURER'S STANDARD SINGLE-COMPONENT SEALANT.
WATER CUTOFF MASTIC: MANUFACTURER'S STANDARD BUTYL MASTIC SEALANT.
METAL TERMINATION BARS: MANUFACTURER'S STANDARD ALUMINUM BARS, APPROXIMATELY 1 INCH (25 MM) WIDE, ROLL FORMED AND PREPUNCHED.
FASTENERS: FACTORY-COATED STEEL FASTENERS AND METAL OR PLASTIC PLATES MEETING CORROSION-RESISTANCE PROVISIONS OF FM 4470, DESIGNED FOR FASTENING SHEET TO SUBSTRATE, AND ACCEPTABLE TO ROOFING SYSTEM MANUFACTURER.
MISCELLANEOUS ACCESSORIES: PROVIDE POURABLE SEALERS, PREFORMED INSIDE AND OUTSIDE CORNER SHEET FLASHINGS, T-JOINT COVERS, IN-SEAM SEALANTS, TERMINATION REGLETS, AND OTHER ACCESSORIES RECOMMENDED BY ROOFING SYSTEM MANUFACTURER FOR INTENDED USE.

7-11 ROOF INSULATION MATERIALS:
EXTRUDED POLYSTYRENE BOARD INSULATION: ASTM C 578, TYPE X; EXTRUDED EXPANDED POLYSTYRENE BOARD WITH NATURAL SKIN SURFACES; WITH THE FOLLOWING CHARACTERISTICS:
BOARD SIZE: 48" X 96"
BOARD THICKNESS: 1-1/2"
TAPERED BOARD: SLOPE AS INDICATED; MINIMUM THICKNESS 1/2"; FABRICATE OF FEWEST LAYERS POSSIBLE.
COMPRESSIVE RESISTANCE: 25 PSI
INSTALL RIGID INSULATION IN LAYERS WITH OFFSET JOINTS. INSTALL AND SECURE EACH LAYER TO ROOF DECK WITH MECHANICAL FASTENERS AS SPECIFICALLY DESIGNED/SIZED FOR CONDITIONS.

7-12 ACCESSORIES:
STACK BOOTS: PREFABRICATED FLEXIBLE BOOT AND COLLAR FOR PIPE STACKS THROUGH MEMBRANE; SAME MATERIAL AS MEMBRANE.
INSULATION JOINT TAPE: GLASS FIBER REINFORCED TYPE AS RECOMMENDED BY INSULATION MANUFACTURER, COMPATIBLE WITH ROOFING MATERIALS; 6 INCHES WIDE; SELF ADHERING.
INSULATION FASTENERS: APPROPRIATE FOR PURPOSE INTENDED AND APPROVED BY ROOFING MANUFACTURER.
MEMBRANE ADHESIVE: AS RECOMMENDED BY MEMBRANE MANUFACTURER.
INSULATION ADHESIVE: AS RECOMMENDED BY INSULATION MANUFACTURER.
WALKWAY PADS: TYPE AS RECOMMENDED BY MEMBRANE MANUFACTURER; SIZE AS INDICATED.
PROTECTION BOARD: AS RECOMMENDED BY MEMBRANE MANUFACTURER

SHEET METAL FLASHING AND TRIM

7-13 SHEET MATERIAL:
STAINLESS STEEL: ASTM A 666 TYPE 304, SOFT TEMPER, 0.018 INCH THICK; SMOOTH NO. 2B TO 2D FINISH.

7-14 ACCESSORIES:
FASTENERS: GALVANIZED STEEL, WITH SOFT NEOPRENE WASHERS.
PRIMER: ZINC CHROMATE TYPE.
PROTECTIVE BACKING PAINT: ZINC MOLYBDATE ALKYD.
PLASTIC CEMENT: ASTM D 4586, TYPE I.

ROOF SPECIALTIES

7-15 COPINGS AND FASCIAS:
EXTRUDED ALUMINUM, 0.05 INCH THICK, SHAPED AS INDICATED, INCLUDE COVER PLATES TO CONCEAL AND WEATHER SEAL JOINTS AND ATTACHMENT FLANGES.
1. FINISH: FLUOROPOLYMER COATING (HIGH PERFORMANCE).
COLOR: TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD RANGE.
LOCATION: COPING AT TOP OF TRANSLUCENT WALL PANELS. FASCIA AT MASONRY ROOF EDGES.
2. FINISH: FLUOROPOLYMER COATING (HIGH PERFORMANCE).
A. COLOR: TO BE SELECTED BY ARCHITECT FROM MANUFACTURER'S STANDARD RANGE.
B. LOCATION: FASCIA AT EDGES OF RADIUSED ROOF OVER VESTIBULE 101.

INTUMESCENT MASTIC FIREPROOFING

7-16 THIN-FILM INTUMESCENT FIRE-RESISTIVE COATING FOR EXPOSED INTERIOR STRUCTURAL STEEL WITH DECORATIVE TOPCOAT.
WATER-BASED, ASBESTOS-FREE, FACTORY-MIXED THIN FILM
INTUMESCENT COATING SYSTEM WITH SMOOTH AND UNIFORM FINISH TEXTURE.
SURFACE BURNING CHARACTERISTICS, WHEN TESTED IN ACCORDANCE WITH ASTM E 84:
FLAME SPREAD INDEX: 25, MAXIMUM.
SMOKE DEVELOPED INDEX: 50, MAXIMUM.
HARDNESS: 80, MINIMUM, WHEN TESTED IN ACCORDANCE WITH ASTM D 2240, TYPE D DUROMETER.
DENSITY: 11.4 LB/GALLON, MINIMUM.
PROTECTIVE AND DECORATIVE TOP COATING: AS RECOMMENDED BY FIREPROOFING MANUFACTURER FOR EXPOSURE

DIVISION 7 (CONTINUED)

COORDINATE WITH PAINT SPECIFIED IN SECTION 09 9000 FOR COLOR AND SHEEN MATCH BETWEEN STEEL COATED WITH INTUMESCENT COATING AND ADJACENT PAINTED SURFACES.
PRIMER: AS REQUIRED BY TESTED AND LISTED ASSEMBLIES, AND AS RECOMMENDED BY FIREPROOFING MANUFACTURER TO SUIT SPECIFIC SUBSTRATE CONDITIONS.
REINFORCEMENT: GLASS FIBER FABRIC MATCHING TYPE USED IN TESTED AND LISTED ASSEMBLIES.

TRANSLUCENT WALL PANELS

7-17. 4" THICK INSULATED TRANSLUCENT FIBERGLASS SANDWICH PANEL UNIT
TRANSLUCENT FACES MANUFACTURED FROM GLASS FIBER REINFORCED THERMOSET RESINS, FORMULATED SPECIFICALLY FOR ARCHITECTURAL USE. THERMOPLASTIC (E.G. POLYCARBONATE, ACRYLIC) FACES ARE NOT ACCEPTABLE.
FACE SHEETS SHALL NOT DEFORM, DEFLECT OR DRIP WHEN SUBJECTED TO FIRE OR FLAME.
FLAMESPREAD SHALL BE NO GREATER THAN 50 & SMOKE DEVELOPED NO GREATER THAN 250 IN ACCORDANCE WITH UL 723
COLOR STABILITY - FULL THICKNESS OF EXTERIOR FACE SHEET SHALL NOT CHANGE COLOR MORE THAN 3 CIE UNITS DELTA E BY ASTM D 2244 AFTER 5 YEARS OUTDOOR SOUTH FLORIDA WEATHERING AT 5 DEGREES FACING SOUTH, DETERMINED BY THE AVERAGE OF AT LEAST THREE WHITE SAMPLES WITH AND WITHOUT A PROTECTIVE FILM OR COATING TO ENSURE LONG TERM COLOR STABILITY. COLOR STABILITY SHALL BE UNAFFECTED BY ABRASION OR SCRATCHING.
EXTERIOR FACE SHEET .070" CRYSTAL SUPER WEATHERING
INTERIOR FACE SHEET .045" WHITE S-171
LIGHT TRANSMISSION 14%
PANEL U FACTOR .15
SHGC .09
GRID CORE AS INDIACTED ON DRAWINGS
MANUFACTURERS FACTORY APPLIED FINISH, WHICH MEETS THE PERFORMANCE REQUIREMENTS OF AAMA 2604
COLOR SELECTED FROM MANUFACTURES STANDARDS
WINDOWS SHALL BE DESIGNED SPECIFICALLY FOR INCLUSION IN THE TRANSLUCENT PANEL UNIT WALL SYSTEM AND FACTORY UNITIZED TO PANELS.
HC2000 FIXED WINDOWS: F-AW80, SHALL PASS REQUIREMENTS AT 120 PSF UNIFORM STRUCTURAL LOAD WITH AIR INFILTRATION <.01 CFM/FT2 AT 6.24 PSF AND NO WATER PENETRATION AT 12PSF.
GLAZED WITH 1" LOW E LAMINATED GLASS.

JOINT SEALERS

7-18 EXTERIOR SEALANTS SHALL BE SILICONE & ELASTOMERIC. INTERIOR SEALANTS SHALL BE ACRYLIC LATEX & PAINTABLE.

DIVISION 8 - DOORS AND WINDOWS

8-1. HOLLOW METAL FRAMES: COMPLY WITH FRAME REQUIREMENTS SPECIFIED IN ANSI A250.8 FOR LEVEL 1, 16 GAGE.
PROVIDE MORTAR GUARD BOXES FOR HARDWARE CUT-OUTS IN FRAMES TO BE INSTALLED IN MASONRY OR TO BE GROUTED.
FRAMES IN MASONRY WALLS: SIZE TO SUIT MASONRY COURSING WITH HEAD MEMBER 4 INCHES HIGH TO FILL OPENING WITHOUT CUTTING MASONRY UNITS.
FINISH: FACTORY PRIMED FOR FIELD FINISHING.
GROUT FOR FRAMES: PORTLAND CEMENT GROUT OF MAXIMUM 4-INCH SLUMP FOR HAND TROWELING; THINNER PUMPABLE GROUT IS PROHIBITED.

8-2. FLUSH WOOD DOORS:
QUALITY LEVEL: PREMIUM GRADE, IN ACCORDANCE WITH AWI/AWMAC ARCHITECTURAL WOODWORK QUALITY STANDARDS ILLUSTRATED, SECTION 1300.
WOOD VENEER FACED DOORS SHALL BE 5-PLY.
INTERIOR DOORS: 1-3/4" THICK UNLESS OTHERWISE INDICATED; FLUSH CONSTRUCTION.
PROVIDE SOLID CORE DOORS AT ALL LOCATIONS.
PARTICLEBOARD CORE WITH PLIES AND FACES AS INDICATED ABOVE.
WOOD VENEER FACING FOR TRANSPARENT FINISH: MAPLE, VENEER GRADE AS SPECIFIED BY QUALITY STANDARD, PLAIN SLICED, SLIP VENEER MATCH, RUNNING ASSEMBLY MATCH.
VERTICAL EDGES: COMPATIBLE HARDWOOD
CORES CONSTRUCTED WITH STILES AND RAILS. PROVIDE SOLID BLOCKS AT LOCK EDGE FOR HARDWARE REINFORCEMENT. PROVIDE SOLID BLOCKING FOR OTHER THROUGHBOLTED HARDWARE.
FACTORY MACHINE DOORS FOR HARDWARE OTHER THAN SURFACE-MOUNTED HARDWARE, IN ACCORDANCE WITH HARDWARE REQUIREMENTS AND DIMENSIONS.
FACTORY FIT DOORS FOR FRAME OPENING DIMENSIONS IDENTIFIED ON SHOP DRAWINGS, WITH EDGE CLEARANCES IN ACCORDANCE WITH SPECIFIED QUALITY STANDARD.
FACTORY FINISH DOORS IN ACCORDANCE WITH APPROVED SAMPLE.
DO NOT FIELD CUT OR TRIM; IF FIT OR CLEARANCE IS NOT CORRECT, REPLACE DOOR.
ADJUST DOORS FOR SMOOTH AND BALANCED MOVEMENT.
ADJUST CLOSERS FOR FULL CLOSURE; COMPLY WITH ACCESSIBILITY CODE.

ACCESS DOORS AND PANELS

8-3. ACCESS PANELS FOR MECHANICAL UNITS
FACTORY FABRICATED, FULLY ASSEMBLED LOUVERED UNITS WITH CORNER JOINTS WELDED, FILLED, AND GROUND FLUSH; SQUARE AND WITHOUT RACK OR WARP; COORDINATE REQUIREMENTS WITH ASSEMBLIES UNITS ARE TO BE INSTALLED IN.
SIZE: AS INDICATED ON DRAWINGS

STOREFRONT

8-4 ALUMINUM-FRAMED STOREFRONT: FACTORY FABRICATED, FACTORY FINISHED ALUMINUM FRAMING MEMBERS WITH INFILL, AND RELATED FLASHINGS, ANCHORAGE AND ATTACHMENT DEVICES.
GLAZING POSITION: CENTERED (FRONT TO BACK).
VERTICAL MULLION DIMENSIONS: 1-3/4 X 4-1/2 INCHES.
WATER LEAKAGE TEST PRESSURE DIFFERENTIAL: 12 LBF/SQ FT.
AIR INFILTRATION TEST PRESSURE DIFFERENTIAL: 6.24 PSF.
CONDENSATION RESISTANCE FACTOR: 56 MINIMUM
FINISH: CLASS I COLOR TO MATCH EXISTING LIBRARY STOREFRONT.
DOORS: GLAZED ALUMINUM.
THICKNESS: 1-3/4 INCHES.
FABRICATE COMPONENTS WITH MINIMUM CLEARANCES AND SHIM SPACING AROUND PERIMETER OF ASSEMBLY, YET ENABLING INSTALLATION AND DYNAMIC MOVEMENT OF PERIMETER SEAL.
FINISHING: APPLY FACTORY FINISH TO ALL SURFACES THAT WILL BE EXPOSED IN COMPLETED ASSEMBLIES.

FINISH HARDWARE

8-5 GENERAL
PROVIDE ALL HARDWARE SPECIFIED OR REQUIRED TO MAKE DOORS FULLY FUNCTIONAL, COMPLIANT WITH APPLICABLE CODES, AND SECURE TO THE EXTENT INDICATED. PROVIDE PRODUCTS THAT COMPLY WITH THE FOLLOWING: APPLICABLE PROVISIONS OF FEDERAL, STATE, AND LOCAL CODES.

8-6. PROVIDE HEAVY DUTY, COMMERCIAL GRADE, ACCESSIBLE HARDWARE. PROVIDE CHART/SAMPLE TO OWNER/ARCHITECT FOR COLOR/FINISH SELECTION.

8-7. PROVIDE CLOSERS AS INDICATED IN HARDWARE SETS. CLOSERS SHALL BE 5 POUNDS MAX LOAD TO OPERATE. PROVIDE WEATHERSTRIPPING AND APPROVED H/C (& ZERO-STEP) THRESHOLDS AT EXTERIOR DOORS. WHERE OTHER THRESHOLDS OCCUR, TRANSITIONS SHALL BE ACCESSIBLE.

8-8. SLIDING DOORS: PROVIDE ALL DOORS, TRACKS, HANGERS, ROLLERS, GUIDES, STOPS AND ACCESSORIES REQUIRED FOR COMPLETE, FUNCTIONAL SYSTEM AS SHOWN ON THE DRAWINGS. ALL COMPONENTS SHALL BE OF COMMERCIAL GRADE AND DESIGNED FOR FREQUENT USE.

8-9. HARDWARE BASIS OF DESIGN:
CLOSERS: SARGENT 421 SERIES CAM ACTION DOOR CLOSER
HINGES: MCKINNEY TA2714
HOLD OPENS: ROCKWOOD 494 - AUTOMATIC DOOR HOLDER AND STOP FH WS/PLASTIC ANCHORS

8-10. HARDWARE SETS

SET 01-VESTIBULE/EXTERIOR
DOOR 101
PROVIDE HARDWARE REQUIRED TO MEET ANSI F82/F21 ENTRANCE STOREROOM FUNCTION
PULLS SHALL BE INSTALLED ON BOTH SIDES; CLOSER AND DEADBOLT ON VESTIBULE SIDE.

SET 02- CORRIDOR/CLOSET
DOORS 103 AND 104
PROVIDE HARDWARE REQUIRED TO MEET ANSI F84/F05 CLASSROOM FUNCTION
LEVERS SHALL BE INSTALLED ON BOTH SIDES. CLOSERS NOT REQUIRED.

SET 03- CORRIDOR/STORYBOOK ROOM
DOOR 105
PROVIDE HARDWARE REQUIRED TO MEET ANSI F75/F01 PASSAGE FUNCTION
PULLS SHALL BE INSTALLED ON BOTH SIDES. CLOSERS AND HOLD OPENS SHALL BE INSTALLED ON CORRIDOR SIDE.

GLAZING

8-8 GLASS MATERIALS
FLOAT GLASS: ALL GLAZING IS TO BE TEMPERED FLOAT GLASS UNLESS OTHERWISE INDICATED, OR REQUIRED.
ANNEALED TYPE: ASTM C1036, TYPE I, TRANSPARENT FLAT, CLASS 1 CLEAR, QUALITY Q3 (GLAZING SELECT).
HEAT-STRENGTHENED AND FULLY TEMPERED TYPES: ASTM C1048.
THICKNESSES: AS INDICATED; FOR EXTERIOR GLAZING COMPLY WITH SPECIFIED REQUIREMENTS FOR WIND LOAD DESIGN REGARDLESS OF SPECIFIED THICKNESS.

SEALED INSULATED GLASS UNITS
VISION GLAZING, LOW-E.
APPLICATION: ALL EXTERIOR VISION GLAZING EXCEPT GLAZING UNIT IN TRANSLUCENT WALL PANEL FRAMING.
THERMAL RESISTANCE (U-VALUE): 0.29 WINTER, 0.27 SUMMER, MAXIMUM.
TOTAL SOLAR HEAT GAIN COEFFICIENT: 0.38, NOMINAL.
TOTAL VISIBLE LIGHT TRANSMITTANCE: 70 PERCENT, NOMINAL.
SHADING COEFFICIENT: 0.44, NOMINAL.
BASIS OF DESIGN: PPG INDUSTRIES, INC: WWW.PPGIDEASCAPES.COM.
OUTBOARD LITE: ANNEALED FLOAT GLASS, 1/4 INCH THICK, MINIMUM.
COATING: PPG SOLARBAN 60 ON # 2 SURFACE, NO COATING ON #3 SURFACE.TINT: NONE (CLEAR).
INBOARD LITE: ANNEALED FLOAT GLASS, 1/4 INCH THICK. TINT: NONE (CLEAR).
TOTAL THICKNESS: 1 INCH.
DURABILITY: CERTIFIED BY AN INDEPENDENT TESTING AGENCY TO COMPLY WITH ASTM E2190.
EDGE SPACERS: ALUMINUM, BENT AND SOLDERED CORNERS.
EDGE SEAL: GLASS TO ELASTOMER WITH SUPPLEMENTARY SILICONE SEALANT.

DIVISION 9 - FINISHES

9-1. REPAIR/REPLACE FINISHES TO MATCH EXISTING IN AREAS WHERE DEMOLITION IS REQUIRED,

GYPSUM BOARD ASSEMBLIES

9-2 BOARD MATERIALS
GYPSUM WALLBOARD: PAPER-FACED GYPSUM PANELS AS DEFINED IN ASTM C1396/C1396M; SIZES TO MINIMIZE JOINTS IN PLACE; ENDS SQUARE CUT.
APPLICATION: USE FOR VERTICAL SURFACES AND CEILINGS, UNLESS OTHERWISE INDICATED.
AT ASSEMBLIES INDICATED WITH FIRE-RATING: USE TYPE REQUIRED BY INDICATED TESTED ASSEMBLY; IF NO TESTED ASSEMBLY IS INDICATED, USE TYPE X BOARD, UL OR WH LISTED.
GYPSUM WALLBOARD SHALL BE 5/8 INCH, UNLESS NOTED OTHERWISE. CEILINGS SHALL BE FINISHED SMOOTH.

9-3. METAL FRAMING
NON-LOADBEARING FRAMING SYSTEM COMPONENTS: ASTM C 645; GALVANIZED SHEET STEEL, OF SIZE AND PROPERTIES NECESSARY TO COMPLY WITH ASTM C 754 FOR THE SPACING INDICATED, WITH MAXIMUM DEFLECTION OF WALL FRAMING OF L/240 AT 5 PSF.
EXCEPTION: THE MINIMUM METAL THICKNESS AND SECTION PROPERTIES REQUIREMENTS OF ASTM C 645 ARE WAIVED PROVIDED STEEL OF 40 KSI MINIMUM YIELD STRENGTH IS USED, THE METAL IS CONTINUOUSLY DIMPLED, THE EFFECTIVE THICKNESS IS AT LEAST TWICE THE BASE METAL THICKNESS, AND MAXIMUM STUD HEIGHTS ARE DETERMINED BY TESTING IN ACCORDANCE WITH ASTM E 72 USING ASSEMBLIES SPECIFIED BY ASTM C 754.
STUDS: "C" SHAPED WITH FLAT OR FORMED WEBS WITH KNURLED FACES, SIZE AS NOTED ON DRAWINGS.
RUNNERS: U SHAPED, SIZED TO MATCH STUDS.
CEILING CHANNELS: C SHAPED, OR HAT-SHAPED AS INDICATED ON THE DRAWINGS.
FURRING: HAT-SHAPED SECTIONS, MINIMUM DEPTH OF 7/8 INCH.
LOADBEARING STUDS FOR APPLICATION OF GYPSUM BOARD
CEILING HANGERS: TYPE AND SIZE AS SPECIFIED IN ASTM C 754 FOR SPACING REQUIRED.
PARTITION HEAD TO STRUCTURE CONNECTIONS: PROVIDE MECHANICAL ANCHORAGE DEVICES THAT ACCOMMODATE
DEFLECTION USING SLOTTED HOLES, SCREWS AND ANTI-FRICTION BUSHINGS, PREVENTING ROTATION OF STUDS WHILE
MAINTAINING STRUCTURAL PERFORMANCE OF PARTITION.

CARPET

9-4. MOHAWK GROUP/BIGELOW/CONNECT/BROADLOOM WITH ACTIONBAC. COLORSTRAND SD NYLON, 24 OZ. INSTALL WITH DOUBLE STICK COMMERCIAL PAD ADHERED TO CONCRETE SUBSTRATE. WARMLY YOURS ENVIRON II RADIANT HEATING SYSTEM SHALL BE INSTALLED BETWEEN DOUBLE STICK PAD AND CARPET LAYERS PER MANUFACTURER'S RECOMMENDATIONS. RADIANT HEAT SOURCE SHALL BE TURNED OFF FOR 24 HOURS PRIOR TO, DURING AND FOLLOWING CARPET INSTALLATION. TEMPERATURE OF RADIANT HEAT SHALL BE RESTRICTED TO A MAXIMUM OF 85°F.

ACOUSTICAL CEILINGS

9-5 ACOUSTICAL UNITS - GENERAL: ASTM E1264, CLASS A.
ACOUSTICAL TILE: PAINTED MINERAL FIBER, ASTM E1264 TYPE III, WITH TO THE FOLLOWING CHARACTERISTICS:
MODEL: ULTIMA SQUARE LAY-IN/1910 BY ARMSTRONG
SIZE: 24 X 24 INCHES.
THICKNESS: 3/4 INCHES.
SURFACE COLOR: WHITE.

SUSPENSION SYSTEM

9-6 SUSPENSION SYSTEM - GENERAL: ASTM C635; DIE CUT AND INTERLOCKING COMPONENTS.
MODEL: PRELUDE EXPOSED TEE GRID BY ARMSTRONG, WITH 4" HIGH AXIOM INTERLUDE STRAIGHT TRIM WHERE INDICATED. PROVIDE STABILIZER BARS, CLIPS, SPLICES, PERIMETER MOLDINGS, AND HOLD DOWN CLIPS AS REQUIRED.

9-7. CARPET PILE AND OTHER CHARACTERISTICS SHALL COMPLY WITH ANSI A117 FOR ACCESSIBLE TRAVEL. PROVIDE SAMPLES/CHARTS TO OWNER/ARCHITECT FOR COLOR SELECTION. COORDINATE CARPET & PAD SELECTION WITH ANSI A117.

9-8. INSTALL CARPET FOR MINIMUM NUMBER OF SEAMS. DO NOT LOCATE SEAMS IN HIGH TRAFFIC AREAS. T-SEAMS ARE NOT ACCEPTABLE, EXCEPT IN SHALLOW CLOSETS. ROLL ALL SEAMS AND EDGES.

DIVISION 9 (CONTINUED)

PAINT
9-9. GENERAL: CLEAN AND PREP ALL SURFACES TO RECEIVE PAINT. COLORS: TO BE SELECTED FROM MANUFACTURER'S FULL RANGE OF AVAILABLE COLORS.

9-10. PAINT ALL HOLLOW METAL FRAMES. COLOR TO BE SELECTED BY ARCHITECT.

9-11. STRUCTURAL STEEL SHALL RECEIVE INTUMESCENT PAINT. TINT TO MATCH COLOR AS SELECTED BY ARCHITECT.

9-12. SCHEDULE:
PNT-01 SHERWIN WILLIAMS OR EQUAL / SEMI-GLOSS FINISH FOR METAL TUBE COLUMNS / COLOR TO BE SELECTED BY ARCHITECT.
PNT-02 SHERWIN WILIAMS OR EQUAL / SEMI-GLOSS FINISH FOR HOLLOW METAL DOOR FRAMES / COLOR TO BE SELECTED BY ARCHITECT.
PNT-03 SHERWIN WILLIAMS OR EQUAL / FLAT FINISH FOR GWB CEILINGS AND SOFFITS / COLOR TO BE SELECTED BY ARCHITECT.
PNT-04 SHERWIN WILLIAMS OR EQUAL / SEMI-GLOSS FINISH FOR CMU / COLOR TO BE SELECTED BY ARCHITECT
WD-01 SHERWIN WILLIAMS OR EQUAL / SATIN FINISH / COLOR TO BE SELECTED BY ARCHITECT / TRANSPARENT WOOD STAIN

DIVISION 10 - SPECIALITIES
NOT USED

DIVISION 11- EQUIPMENT
NOT USED

DIVISION 12 - FURNISHINGS

TACKABLE PANELS
12-1 HOMASOTE PANELS WRAPPED WITH PANEL FABRIC
PANEL FABRIC: MAHARAM / GLIMMER OR EQUAL / COLOR TO BE SELECTED BY ARCHITECT.

UPHOLSTERED CUSHIONS
12-2 DENSE, FIRE RETARDANT FOAM UPHOLSTERED BENCH CUSHIONS FOR BUILT-IN BENCH SEATS. ALL MATERIALS MUST BE FIRE RETARDANT. INSTALL AND ATTACH CUSHIONS TO BUILT IN BENCH SEATING WITH A HIDDEN SECURE FASTENER SYSTEM. PROVIDE REMOVABLE CUSHION COVERS WITH HEAVY DUTY ZIPPER ON BACK SIDE OF CUSHION. CUSHION SHALL BE BOX TYPE WITH SELF CORDING ON TOP AND BOTTOM EDGES.
UPHOLSTERY FABRIC: MOMENTUM / REVOLVE OR EQUAL / COLOR TO BE SELECTED BY ARCHITECT.

DIVISION 13 - SPECIAL CONSTRUCTION
NOT USED

DIVISION 14 - CONVEYING SYSTEMS
NOT USED

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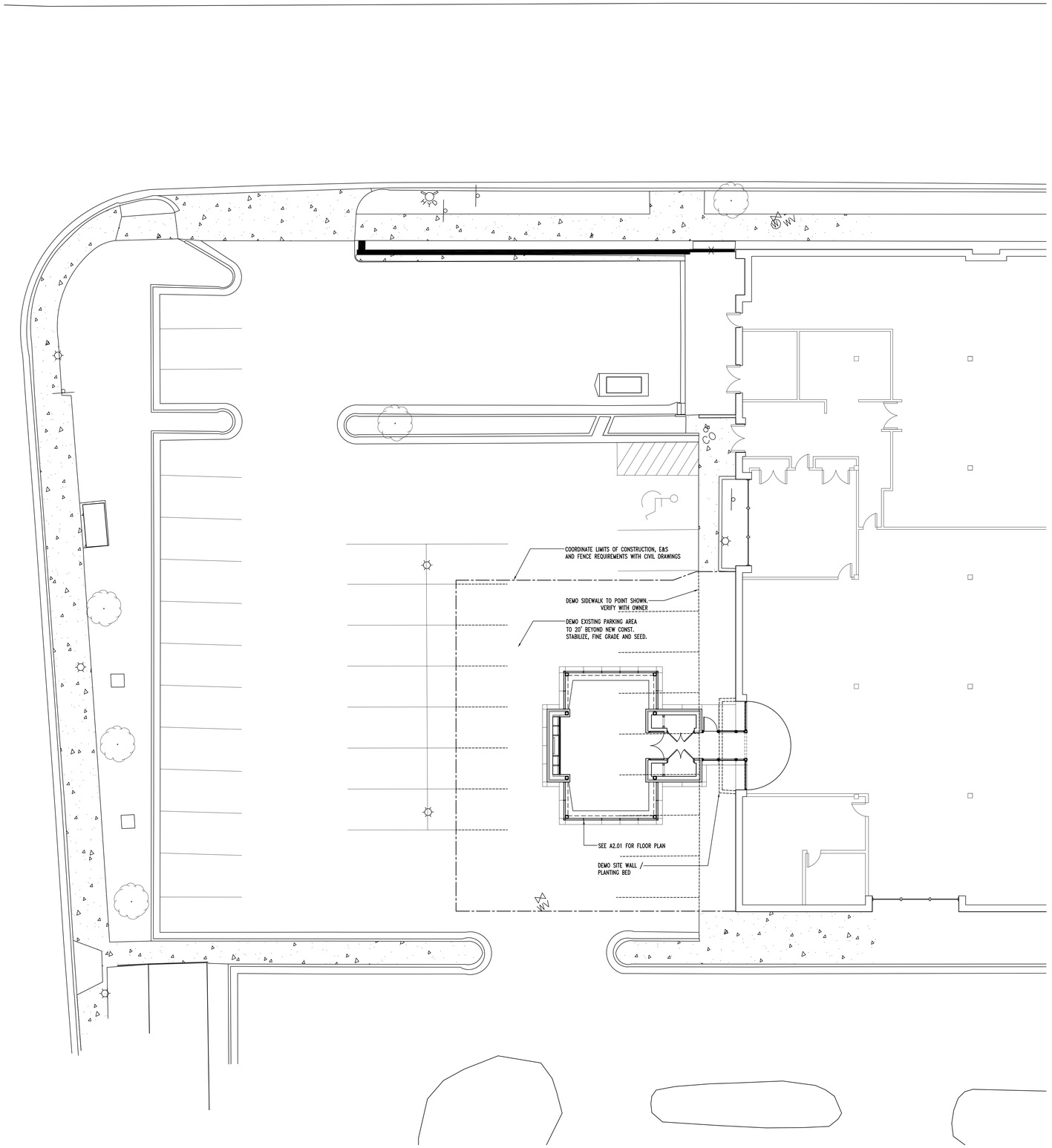
OUTLINE SPECIFICATIONS
sheet
A0.01

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: MW



5H SITE PLAN
A1.01 1"=10'

PLAN NORTH

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SITE PLAN
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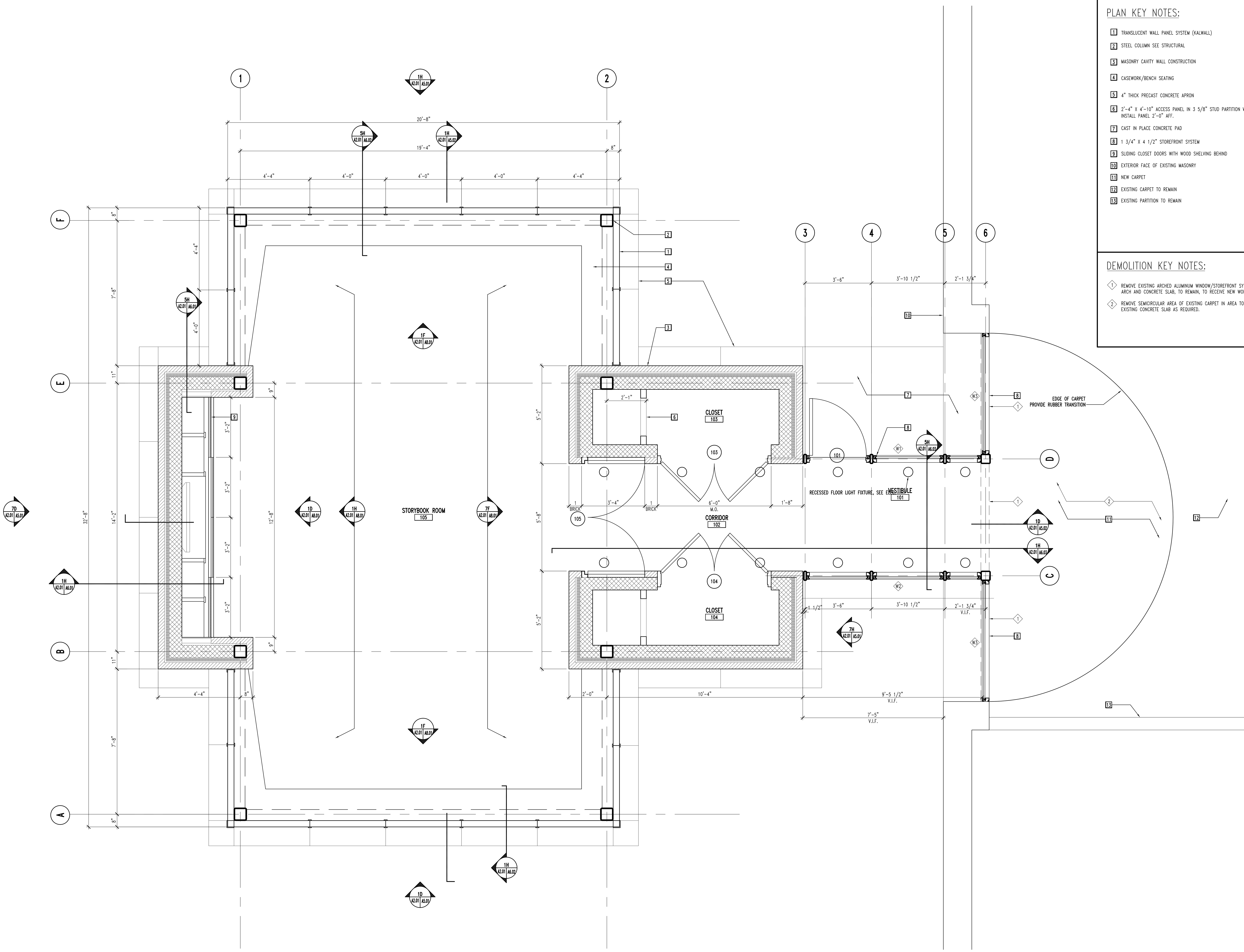

1H FIRST FLOOR PLAN

A2.01 1/2"=1'-0"

PLAN NORTH

PLAN KEY NOTES:

1. TRANSLUCENT WALL PANEL SYSTEM (KALWALL)
2. STEEL COLUMN SEE STRUCTURAL
3. MASONRY CAVITY WALL CONSTRUCTION
4. CASEWORK/BENCH SEATING
5. 4" THICK PRECAST CONCRETE APRON
6. 2'-4" X 4'-10" ACCESS PANEL IN 3 5/8" STUD PARTITION WITH 5/8" GWB ONE SIDE. INSTALL PANEL 2'-0" AFF.
7. CAST IN PLACE CONCRETE PAD
8. 1 3/4" X 4 1/2" STOREFRONT SYSTEM
9. SLIDING CLOSET DOORS WITH WOOD SHELVING BEHIND
10. EXTERIOR FACE OF EXISTING MASONRY
11. NEW CARPET
12. EXISTING CARPET TO REMAIN
13. EXISTING PARTITION TO REMAIN

DEMOLITION KEY NOTES:

1. REMOVE EXISTING ARCHED ALUMINUM WINDOW/STOREFRONT SYSTEM. PREPARE EXISTING BRICK ARCH AND CONCRETE SLAB, TO REMAIN, TO RECEIVE NEW WORK.
2. REMOVE SEMICIRCULAR AREA OF EXISTING CARPET IN AREA TO RECEIVE NEW CARPET. PREPARE EXISTING CONCRETE SLAB AS REQUIRED.

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FIRST FLOOR PLAN

sheet

A2.01

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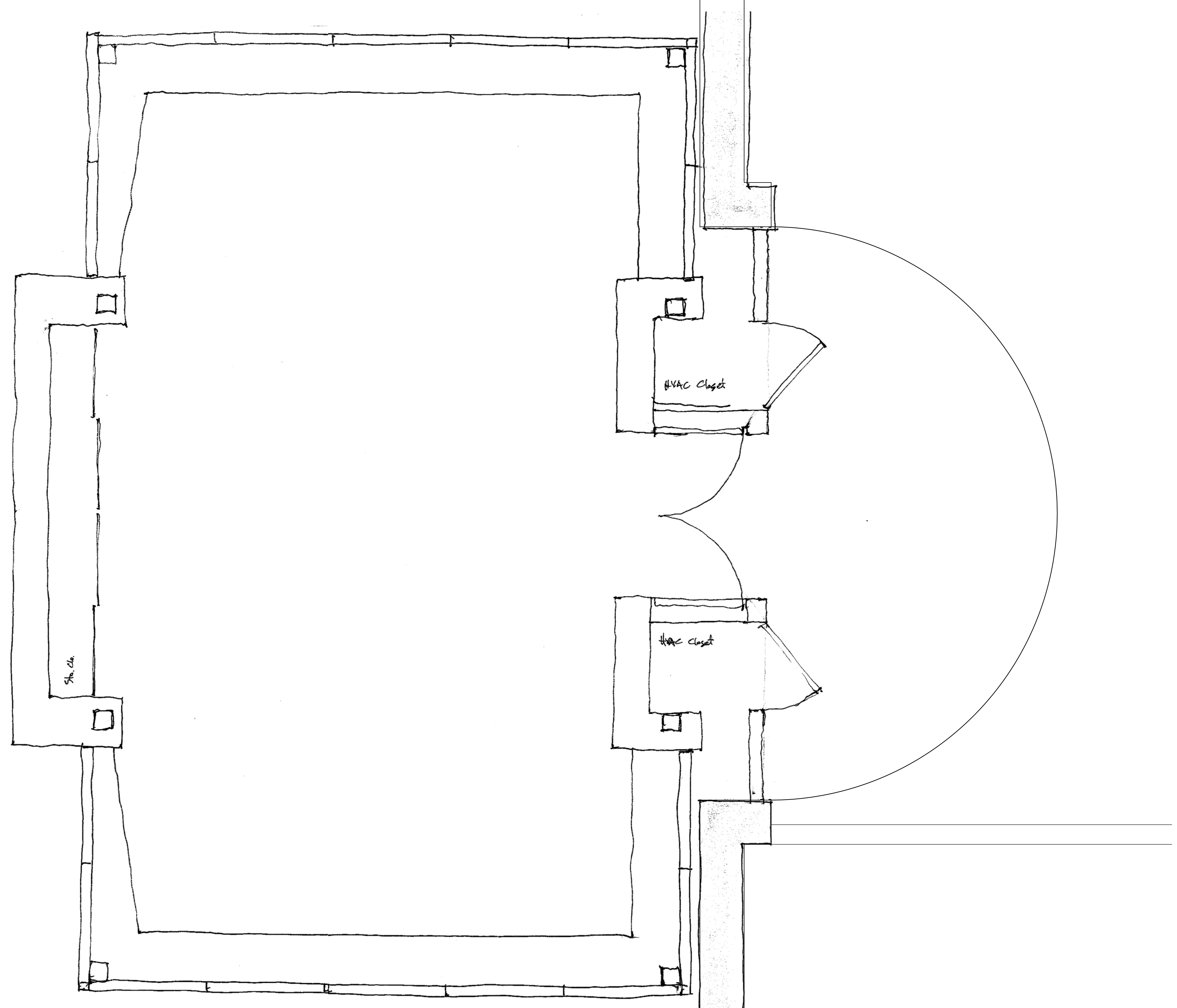
DEDUCTIVE BID ALTERNATE:

DEDUCTIVE BID ITEM No. 1–DEDUCT COST TO DELETE VESTIBULE 101 AND CORRIDOR 102, INCLUDING ALL ARCHITECTURAL, STRUCTURAL AND MEP COMPONENTS SHOWN IN THESE SPACES. ALSO DEDUCT COST TO REDUCE SQUARE FOOTAGE OF CLOSETS 103 AND 104 TO SIZE REQUIRED TO HOUSE MECHANICAL HVAC UNITS, TO REMAIN. REFER TO THE SKETCH ON THIS SHEET FOR REVISED PLAN OF THE ADDITION.

1. BASE BID ITEM: CONSTRUCTION OF FULL ADDITION AS INDICATED ON SHEET A2.01.
2. DEDUCTIVE BID ITEM: CONSTRUCTION OF REDUCED ADDITION AS INDICATED ON SHEET A2.01A.



1H DEDUCTIVE BID ALTERNATE FIRST FLOOR PLAN
A2.01A 1/2"=1'-0"

PLAN NORTH

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BID ALTERNATE
FIRST FLOOR PLAN AND NARRATIVE

sheet

A2.01A

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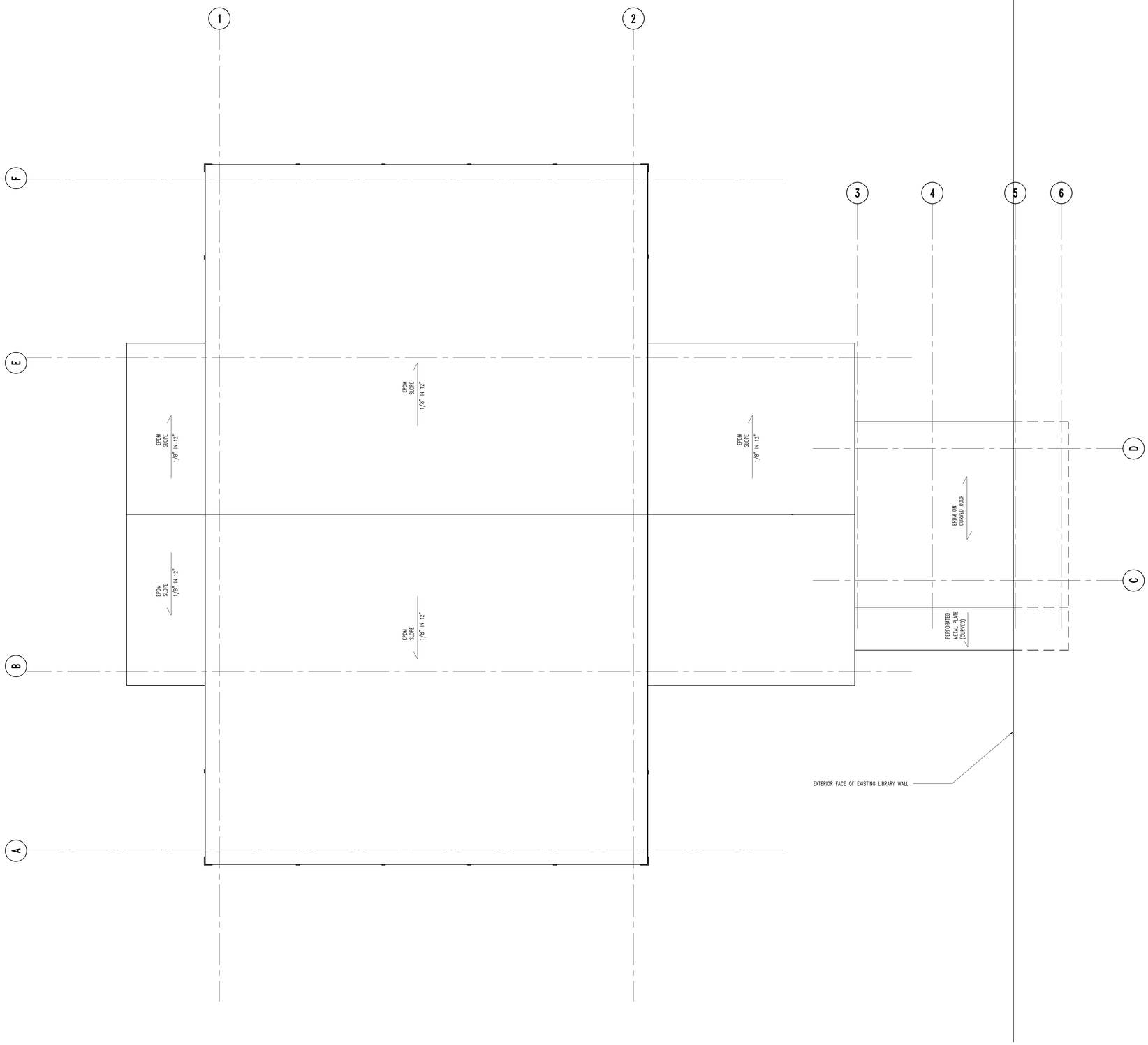

1H ROOF PLAN
A2.01 1/2"=1'-0"

N
PLAN NORTH

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ROOF PLAN
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A2.02

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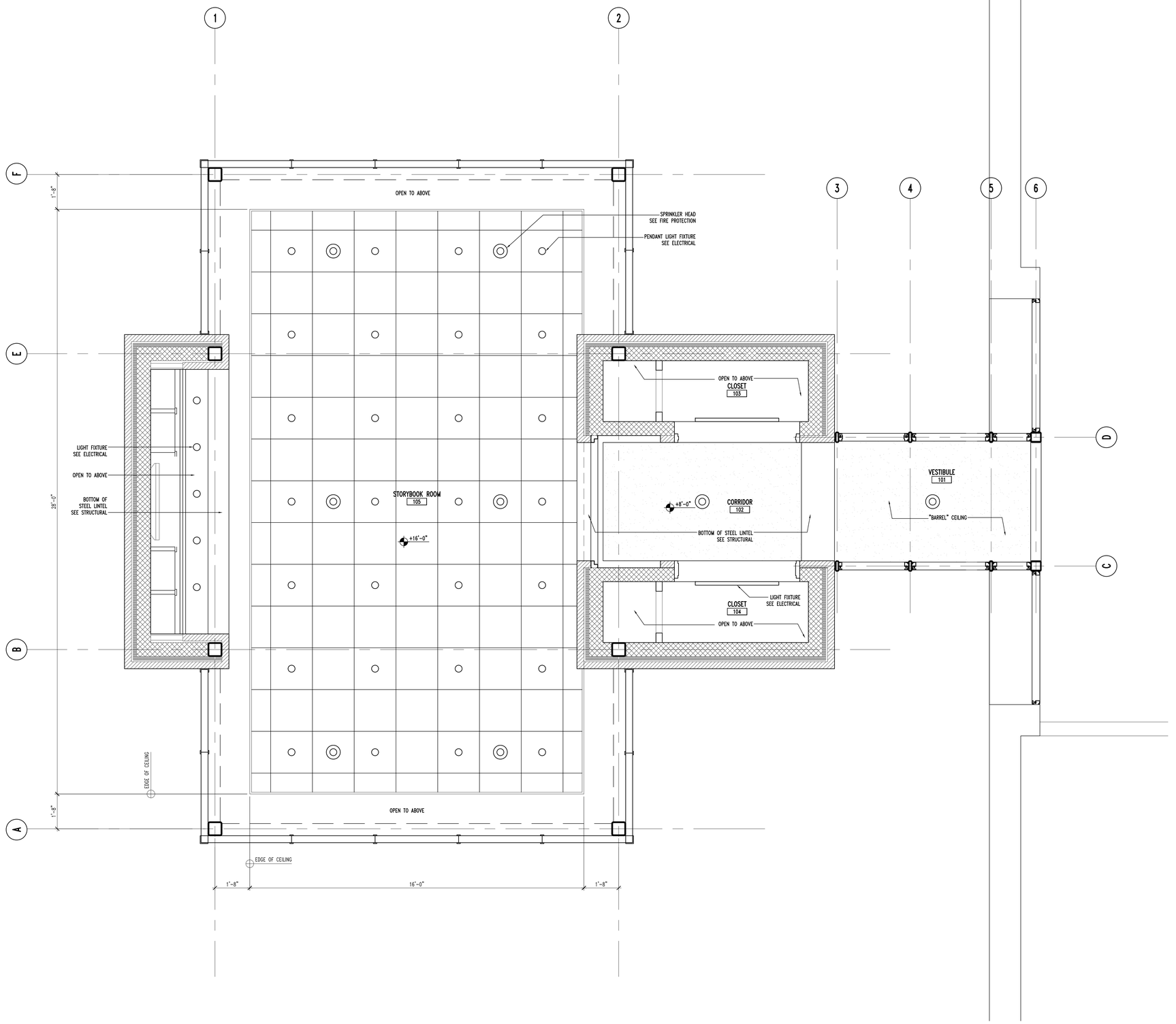

1H REFLECTED CEILING PLAN

A2.01 1/2"=1'-0"

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FIRST FLOOR
REFLECTED CEILING PLAN

sheet

A2.03

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: MW

ROOM FINISH SCHEDULE

Room Number	Room Name	Floor	Base	Walls				Trim	Millwork		Ceiling		Remarks
				North Wall	South Wall	East Wall	West Wall		Horizontal	Vertical	Material	Height	
101	VESTIBULE	CPT-01	NOTE 1	NOTE 1	NOTE 1	--	--	--	--	--	GWB	--	2, 3
102	CORRIDOR	CPT-01	NOTE 4	NOTE 4	--	--	--	PNT-02	--	--	GWB	--	--
103	CLOSET	CPT-01	NOTE 5	NOTE 5	NOTE 5	NOTE 5	NOTE 5	PNT-02	--	--	--	--	--
104	CLOSET	CPT-01	NOTE 5	NOTE 5	NOTE 5	NOTE 5	NOTE 5	PNT-02	--	--	--	--	--
105	STORYBOOK ROOM	CPT-01	--	NOTE 6	NOTE 6	NOTE 6	NOTE 6	PNT-02	WD-01	WD-01	ACT-01	--	3, 7, 8

ROOM FINISH NOTES

NOTE 1. STOREFRONT.
NOTE 2. REFER TO FLOOR PLAN FOR CARPET PATTERN EXTENDING INTO EXISTING LIBRARY AREA.
NOTE 3. PAINT HOLLOW METAL TUBE COLUMNS PNT-01.
NOTE 4. BRICK VENEER.
NOTE 5. SEALED CMU, PAINTED. PNT-04
NOTE 6. KALWALL SYSTEM.
NOTE 7. BUILT-IN BENCHES TO BE WD-01 W/ UPHOLSTERED LOOSE BOX CUSHION AFFIXED TO TOP OF BENCH.
NOTE 8. SLIDING DOORS TO RECEIVE TACKABLE PANELS ON FACE OF DOORS.
NOTE 9. WOOD BUILT-IN CASEWORK

GENERAL NOTES

1. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR DETAILED INFORMATION ON ALL MATERIALS.

2. ALL CMU WALLS TO BE SEMI-GLOSS; ALL TRIM & MILLWORK TO BE SEMI-GLOSS; ALL CEILINGS TO BE FLAT FINISH, UON.

3. FLUSH WOOD DOORS SHALL RECEIVE FACTORY FINISH TRANSPARENT STAIN TO BE SELECTED BY ARCHITECT.

4. ALL FLOORING TRANSITIONS SHALL MEET ADAAG.

LEGEND

ACT ACOUSTICAL CEILING TILE
CPT CARPET
GWB GYPSUM WALL BOARD
PNT PAINT

FINISH LEGEND

CPT-01	CARPET	MOHAWK OR EQ	BIGELOW/CONNECT/BROADLOOM WITH ACTIONBAC	TO BE SELECTED	COLORSTRAND SD NYLON, 24 OZ INSTALLED WITH DOUBLE STICK COMMERCIAL PAD ADHERED TO CONCRETE. WASHING MAT SYSTEM INSTALLED BETWEEN PAD AND CARPET PER MANUFACTURER RECOMMENDATIONS.
ACT-01	ACOUSTICAL CEILING TILE	ARMSTRONG	ULTIMA SQUARE LAY-IN / 1910	WHITE	24"x24"x⅝" W/ 15/16" PRELUDE EXPOSED TEE GRID; 4" H AXIOM INTERLUDE STRAIGHT TRIM WHERE INDICATED
PNT-01	PAINT	SHERWIN WILLIAMS	SEMI-GLOSS FINISH	COLOR TO BE SELECTED	--
PNT-02	PAINT	SHERWIN WILLIAMS	SEMI-GLOSS FINISH	COLOR TO BE SELECTED	--
PNT-03	PAINT	SHERWIN WILLIAMS	FLAT FINISH	COLOR TO BE SELECTED	--
PNT-04	PAINT	SHERWIN WILLIAMS	SEMI-GLOSS FINISH	COLOR TO BE SELECTED	--
WD-01	WOOD STAIN	SHERWIN WILLIAMS	SATIN FINISH	COLOR TO BE SELECTED	TRANSPARENT WOOD STAIN

TACKABLE PANELS: HOMASOTE PANELS WRAPPED WITH PANEL FABRIC
PANEL FABRIC: MAHARAM / GUMMER OR EQ / COLOR TO BE SELECTED BY ARCHITECT

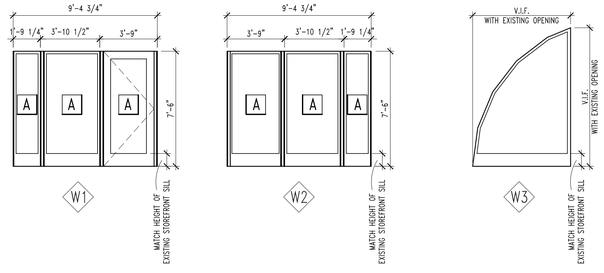
UPHOLSTERED CUSHIONS: DENSE, FIRE RETARDANT FOAM BENCH CUSHIONS WITH REMOVEABLE UPHOLSTERY COVERS FOR BUILT-IN BENCH SEATS. ALL MATERIALS SHALL BE FIRE RETARDANT. INSTALL AND ATTACH CUSHIONS TO TOP OF BUILT-IN BENCH SEATING WITH A HIDDEN SECURE FASTENER SYSTEM. ALL HARDWARE SHALL BE NON-CORROSIVE. PROVIDE REMOVEABLE CUSHION COVERS WITH HEAVY DUTY ZIPPER ON BACK SIDE OF CUSHION. CUSHION SHALL BE BOX TYPE WITH SELF CORDING ON TOP & BOTTOM EDGES.
UPHOLSTERY FABRIC: MOMENTUM / REVOLVE OR EQ / COLOR TO BE SELECTED BY ARCHITECT

STOREFRONT NOTES:
1. FIELD VERIFY FRAME, OPENING, AND CLEAR DIMENSIONS PRIOR TO FABRICATION.
2. (MAX) 1-3/4" FACE WIDTH X 4-1/2" TOTAL DEPTH, ALLOWING FOR 1" INSULATED GLASS.
3. UNLESS OTHERWISE NOTED, ALL ELEVATIONS ARE ALUMINUM STOREFRONT.
4. 1/2" CAULK JOINT DRAWN AT EDGE OF ALUMINUM STOREFRONT.
5. SEE SPECIFICATIONS FOR COMPLETE LIST OF GLAZING TYPES AND REQUIREMENTS.

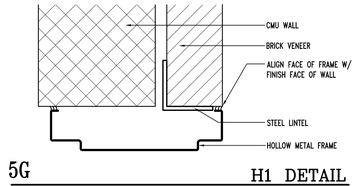
GLAZING LEGEND:
A VISION GLASS (SAFETY)

DOOR & FRAME SCHEDULE

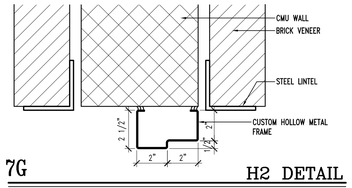
Door				Frame						
No.	Door Size	Material	Type	Material	Type	Head	Jamb	Sill	Rating	Hardware	Remarks
101	3'-0"x7'-0"x1-3/4"	ALUM	A	ALUM	--	--	--	--	--	01	STOREFRONT SYSTEM
103	(2) 2'-10"x7'-0"x1-3/4"	WD	B	HM	--	H1	J1	--	--	02	--
104	(2) 2'-10"x7'-0"x1-3/4"	WD	B	HM	--	H1	J1	--	--	02	--
105	(2) 3'-0"x7'-0"x1-3/4"	WD	B	HM	--	H2	J2	--	--	03	--



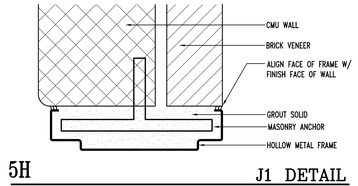
1H CURTAINWALL ELEVATIONS
A3.01 1/4"=1'-0"



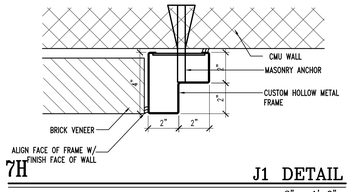
5G H1 DETAIL
3" = 1'-0"



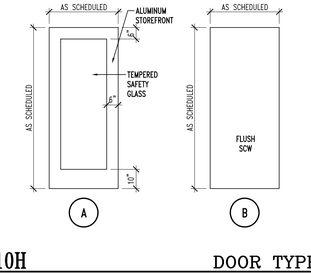
7G H2 DETAIL
3" = 1'-0"



5H J1 DETAIL
3" = 1'-0"



7H J1 DETAIL
3" = 1'-0"



10H DOOR TYPES
A3.01 3/8"=1'-0"

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SCHEDULES, DOOR TYPES, DOOR DETAILS & PARTITION TYPES

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A3.01

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commission: 12-1010
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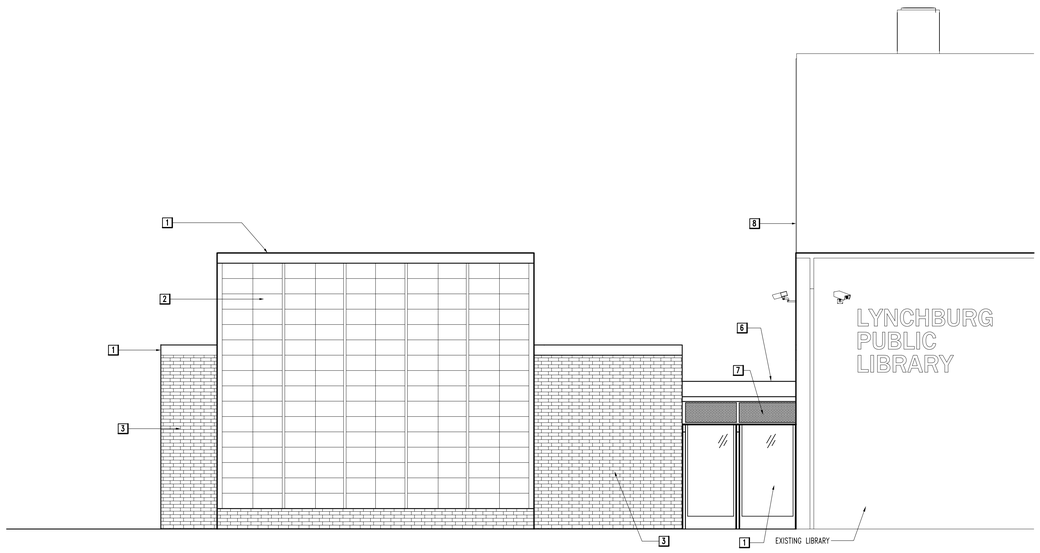
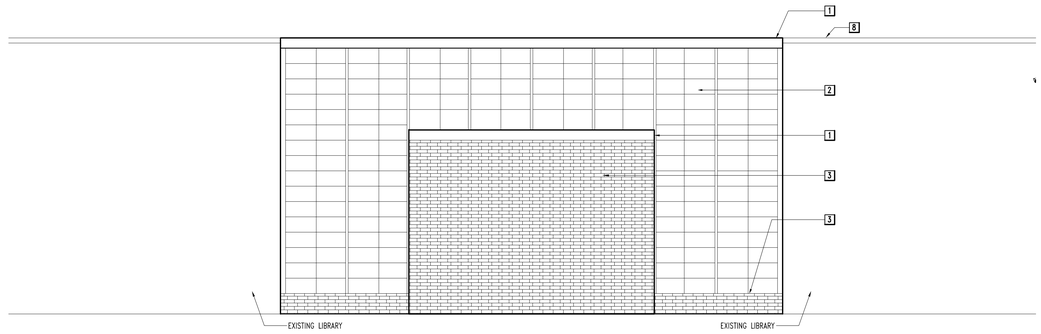


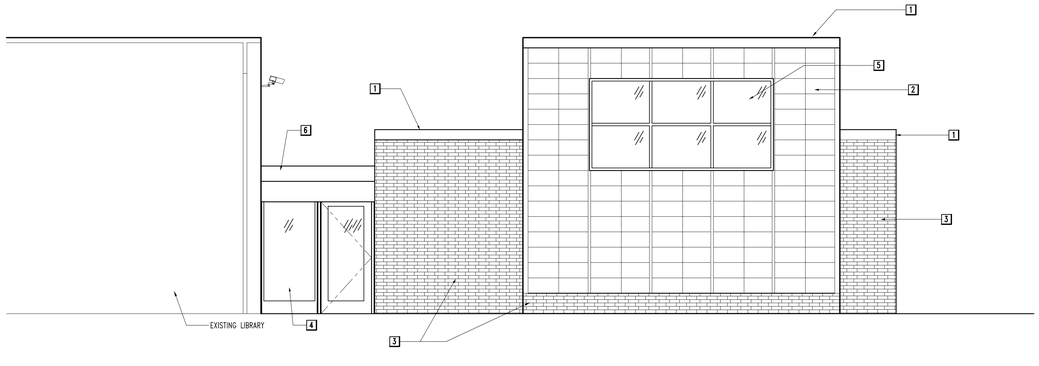
1D SOUTH ELEVATION

A5.01 1/4"=1'-0"



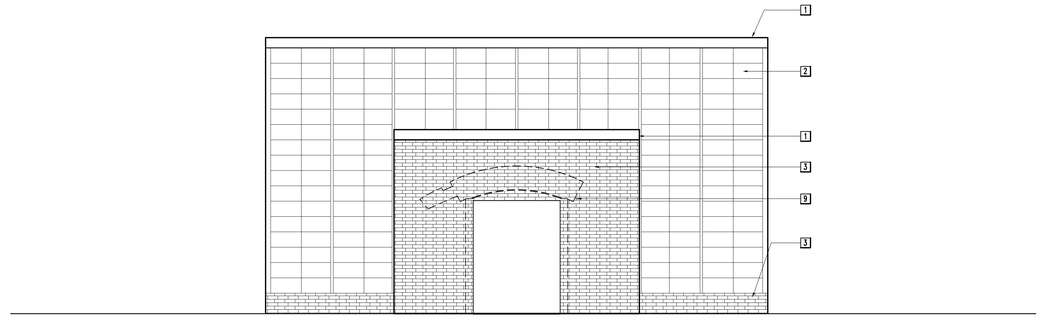
7D WEST ELEVATION

A5.01 1/4"=1'-0"



1H NORTH ELEVATION

A5.01 1/4"=1'-0"



7H EAST ELEVATION

A5.01 1/4"=1'-0"

KEY TO MATERIALS

1	METAL ROOF EDGE TRIM/DRIP
2	TRANSLUCENT WALL PANEL SYSTEM
3	BRICK VENEER – RUNNING BOND
4	STOREFRONT GLAZING SYSTEM
5	WALL PANEL SYSTEM WINDOW
6	EPDM ROOFING
7	PERFORATED METAL PLATE ON STEEL TUBE FRAMING ATTACHED TO BEAM. ALIGN PANEL TRIM WITH VERTICAL STOREFRONT FRAMING MEMBERS
8	EXISTING LIBRARY
9	CONNECTOR SHOWN DASHED, SEE A6.04

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ELEVATIONS

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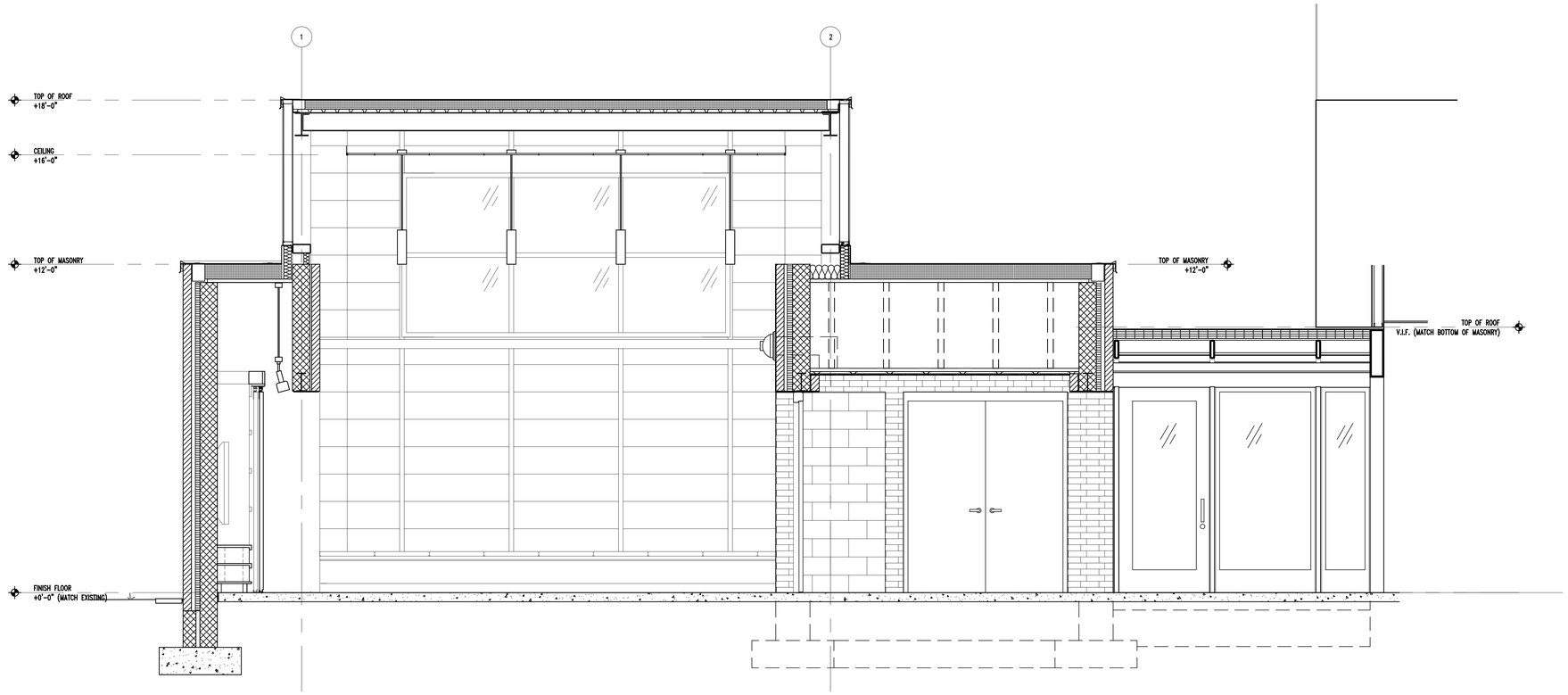
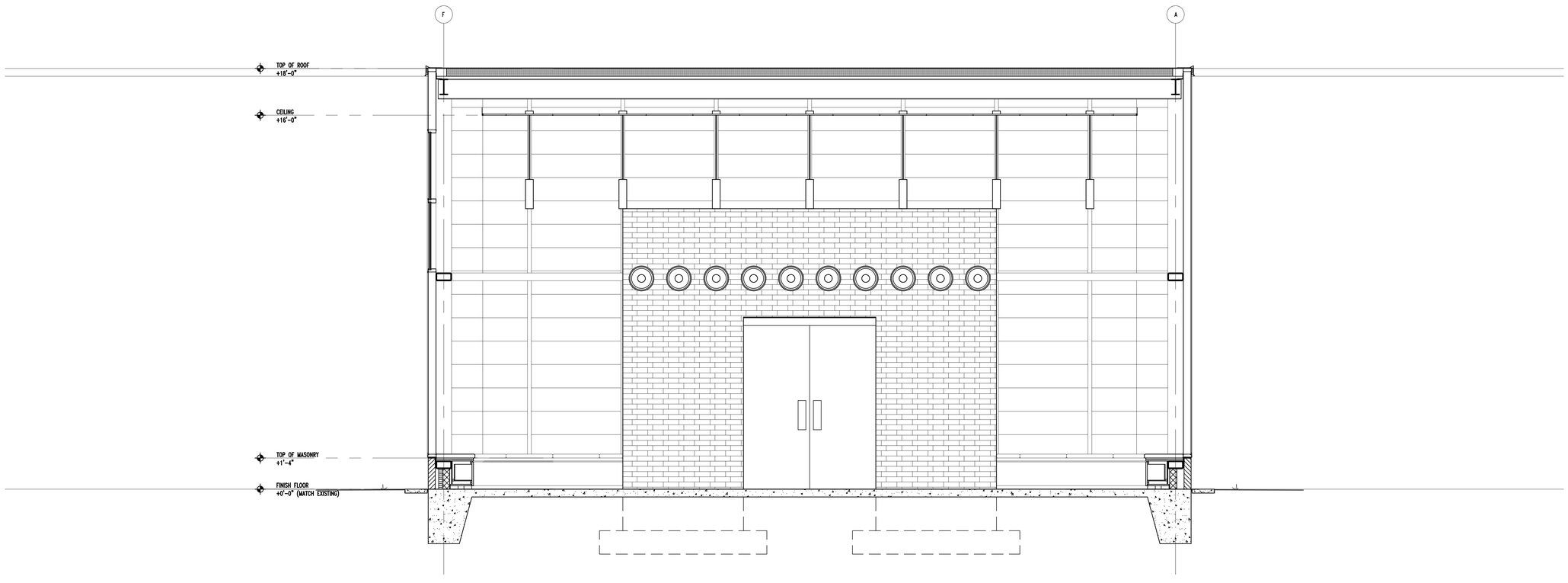


1D BUILDING SECTION

A5.02 1/2"=1'-0"



1H BUILDING SECTION

A5.02 1/2"=1'-0"

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BUILDING SECTIONS

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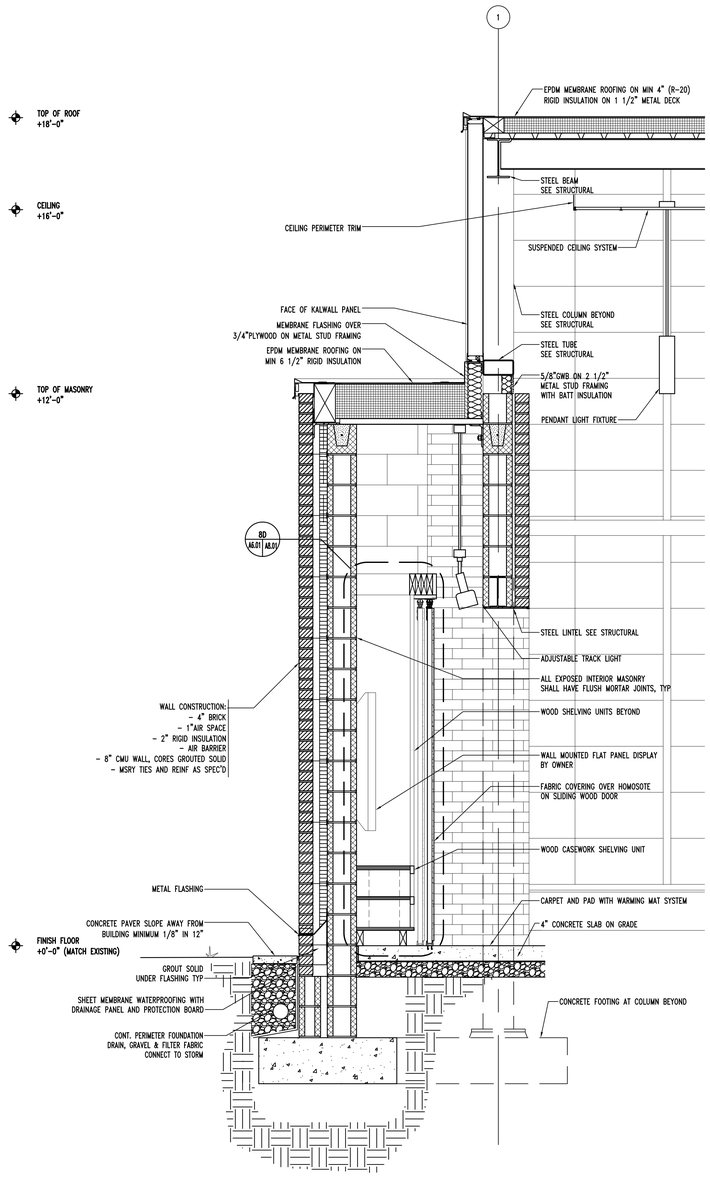
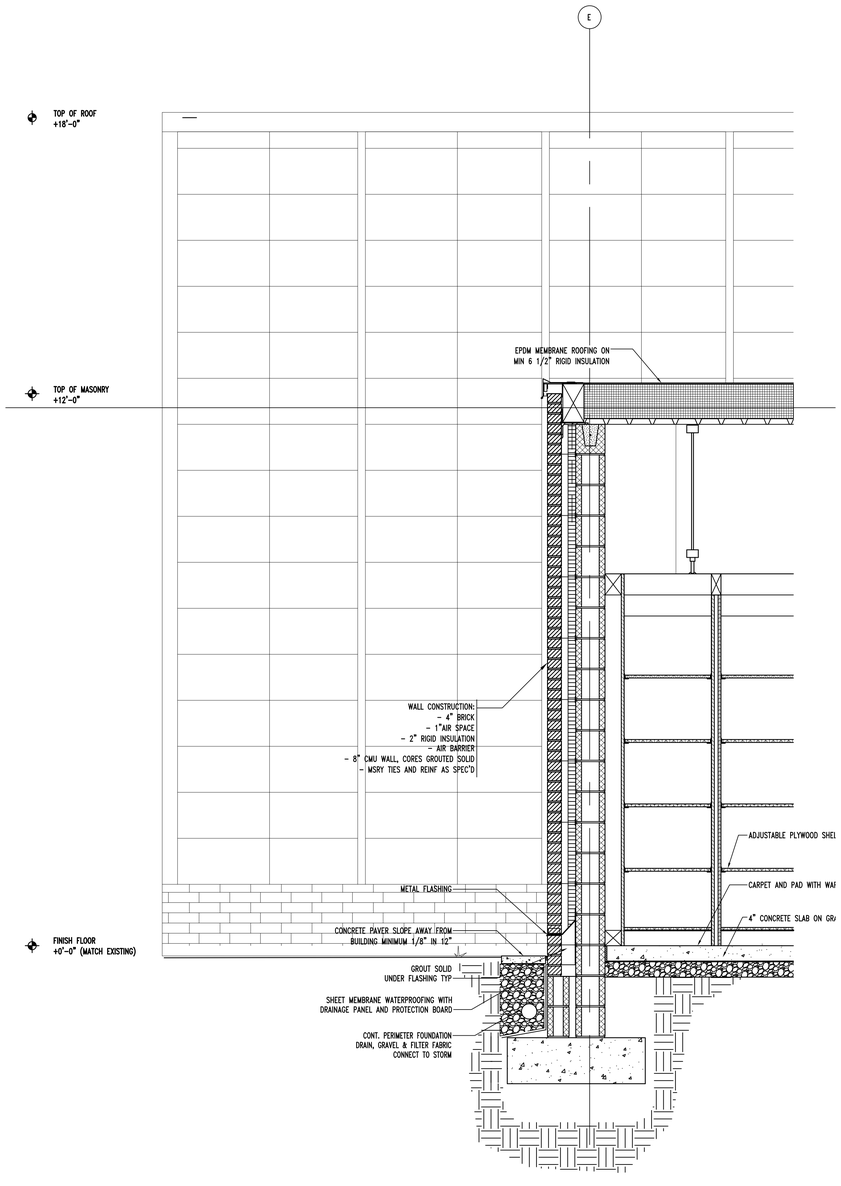


1H WALL SECTION

A6.01 3/4"=1'-0"



5H WALL SECTION

A6.01 3/4"=1'-0"

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WALL SECTIONS

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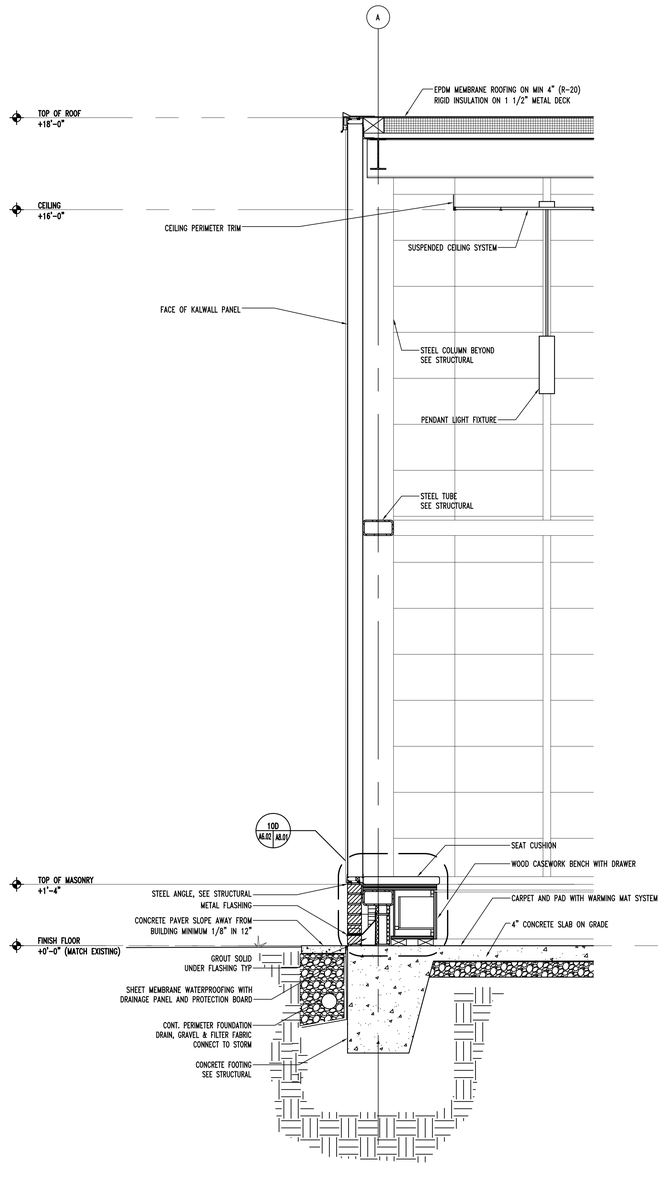
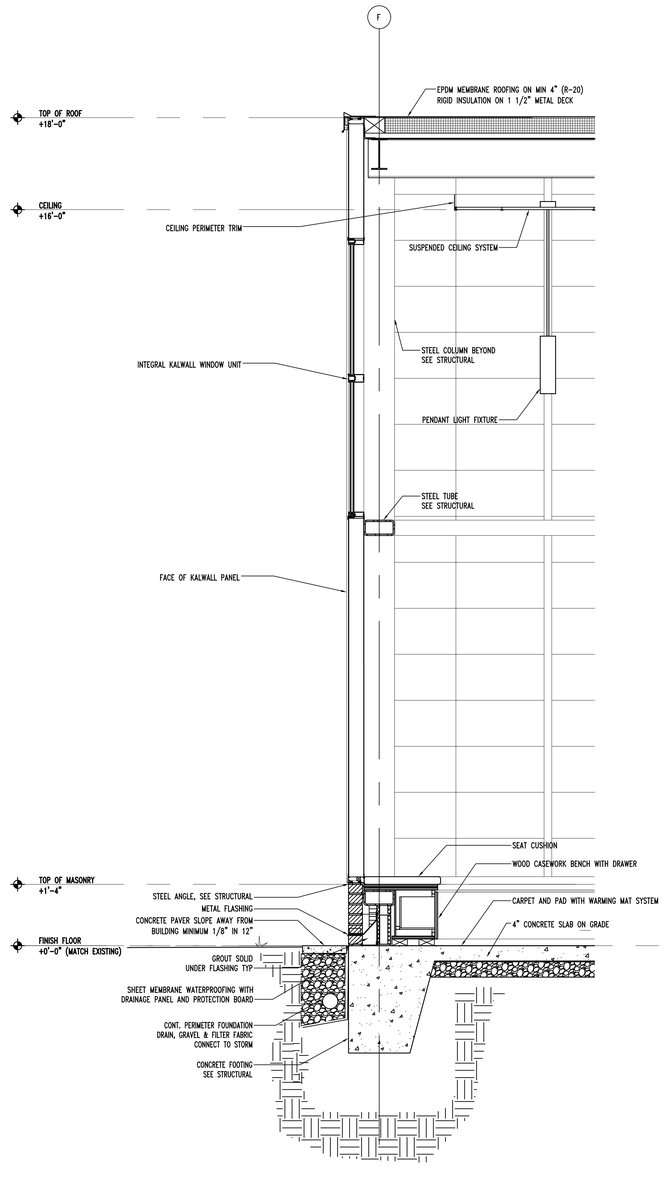


1H WALL SECTION

A6.01 3/4"=1'-0"



5H WALL SECTION

A6.01 3/4"=1'-0"

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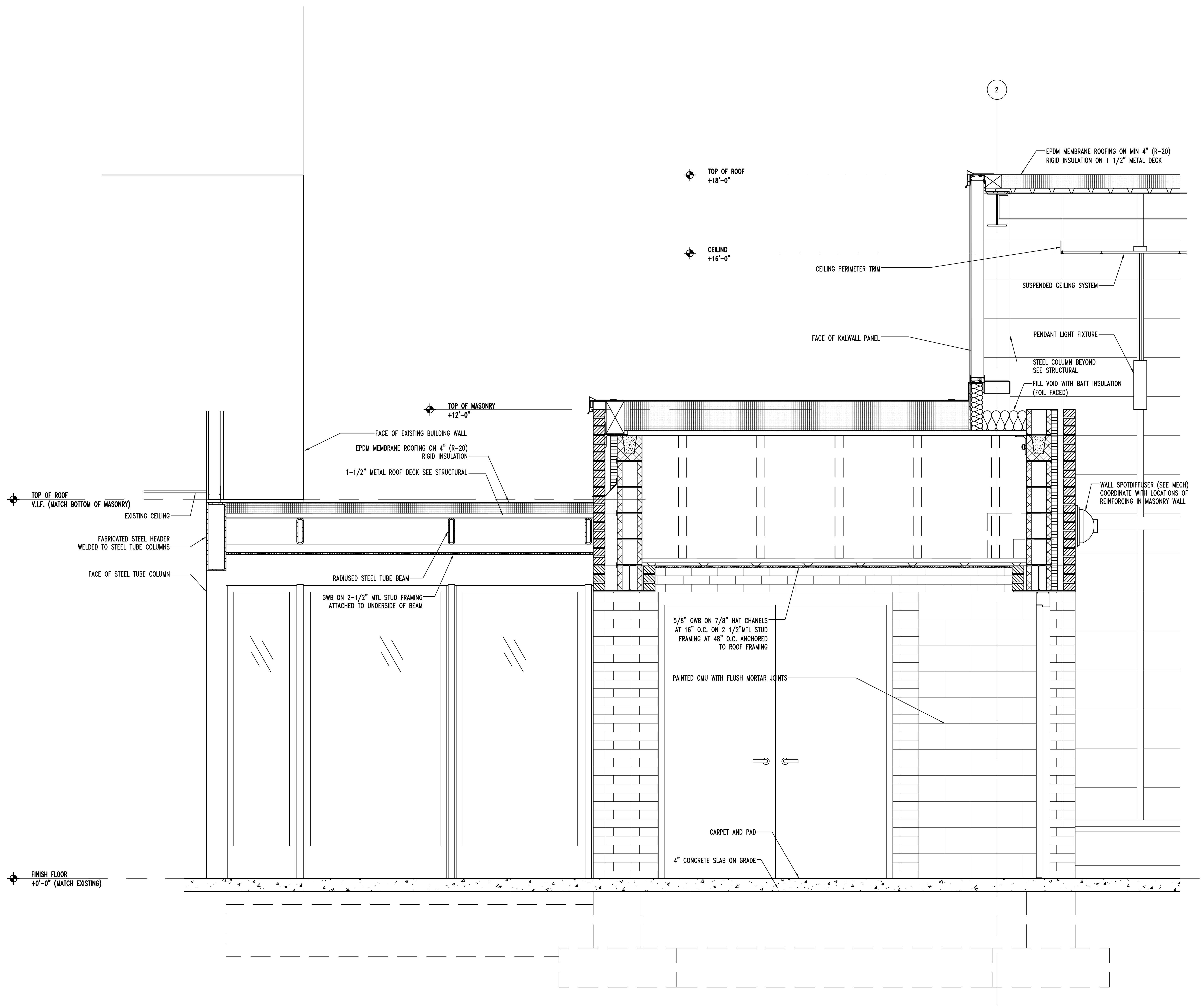

1H WALL SECTION
A6.01 3/4"=1'-0"

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WALL SECTIONS
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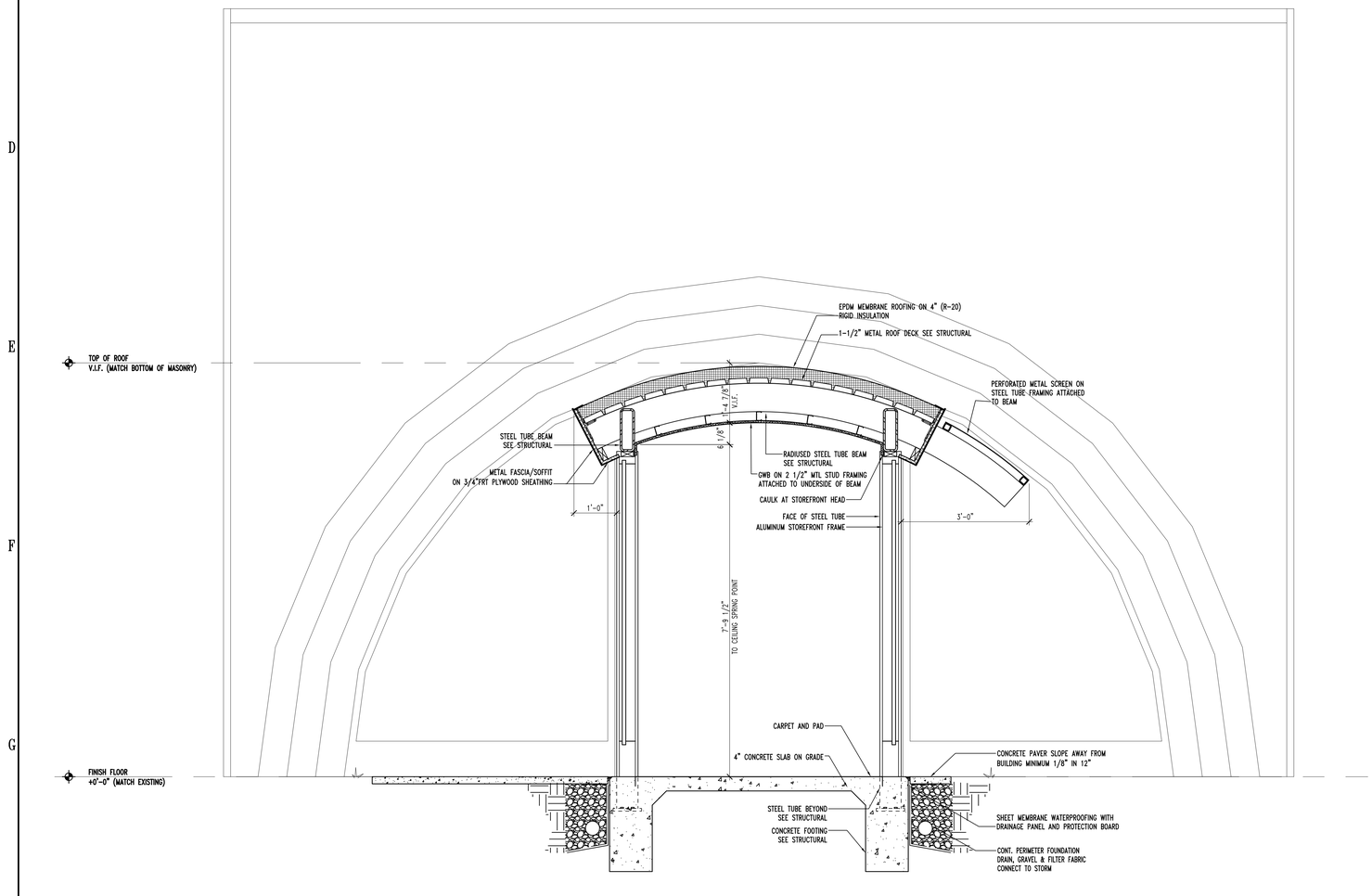

1H WALL SECTION

A6.01 3/4"=1'-0"

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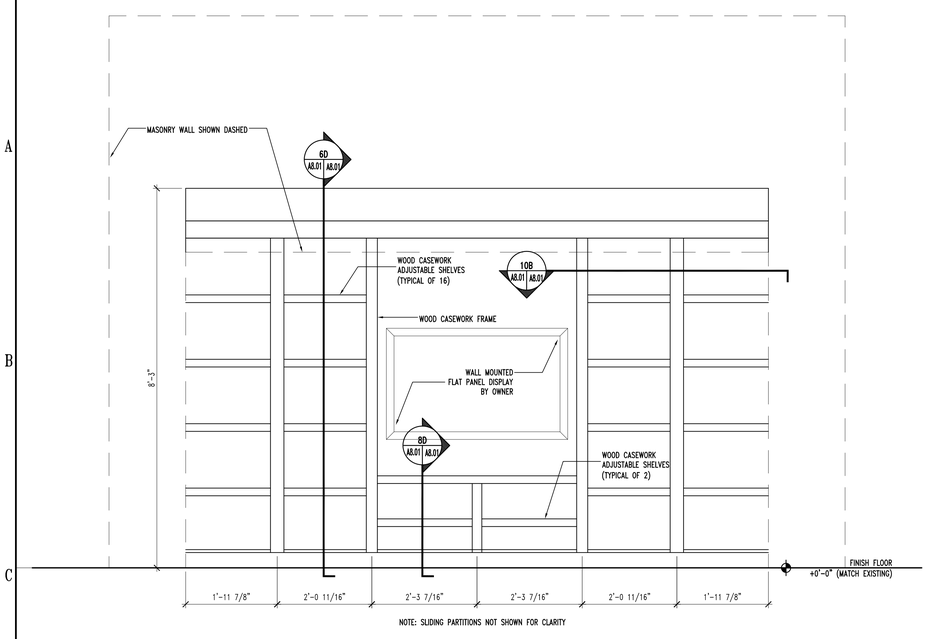
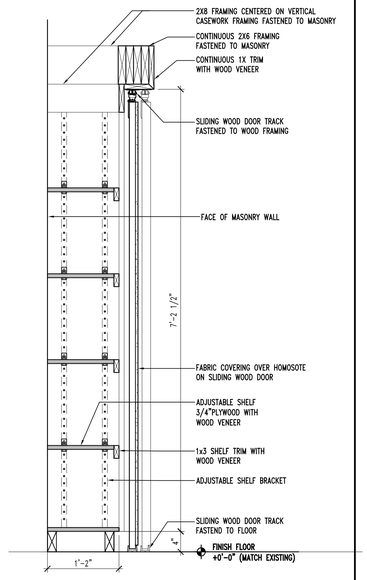


NOTE: SLIDING PARTITIONS NOT SHOWN FOR CLARITY

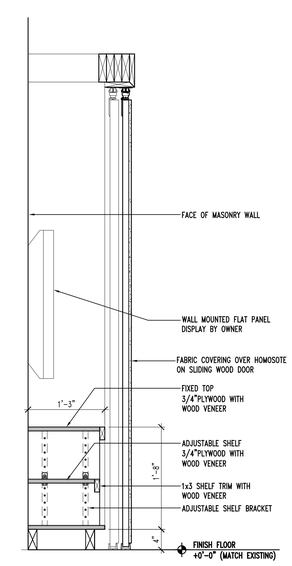
1D CASEWORK ELEVATION WEST WALL SHELVING

A8.01 3/4"=1'-0"



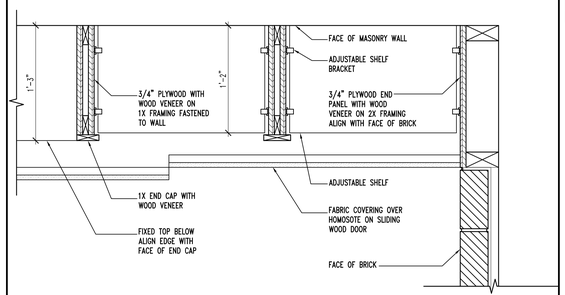
6D CASEWORK SECTION

A8.01 3/4"=1'-0"



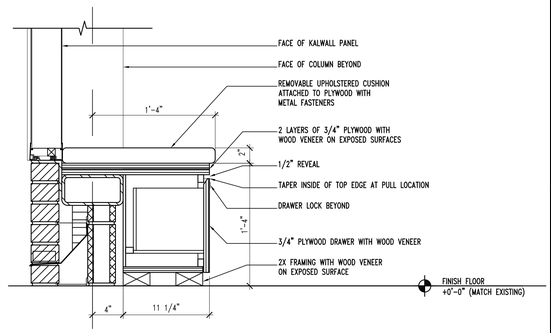
8D CASEWORK SECTION

A8.01 3/4"=1'-0"



10B CASEWORK PLAN DETAIL

A6.01 1-1/2"=1'-0"



10D CASEWORK SECTION

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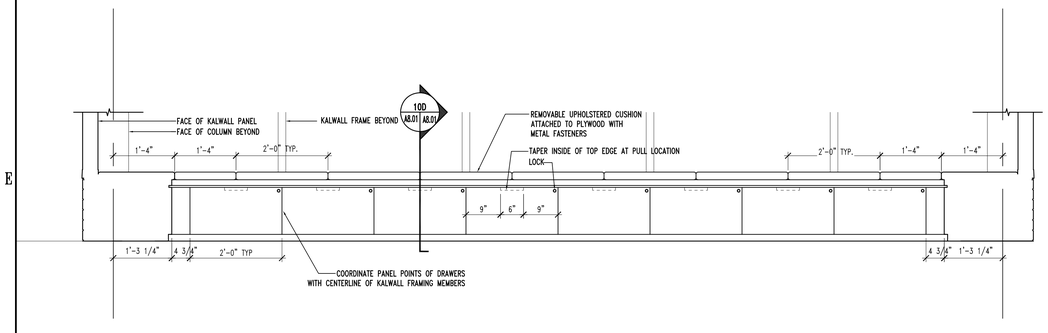
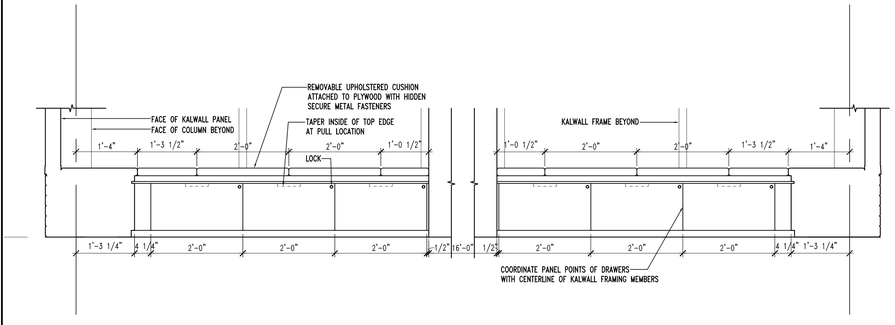


1F CASEWORK ELEVATION NORTH/SOUTH WALL

A8.01 3/4"=1'-0"



7F CASEWORK ELEVATION EAST WALL

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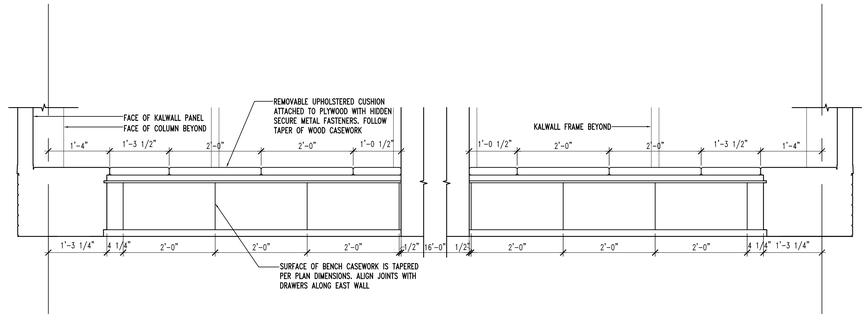

1H CASEWORK ELEVATION WEST WALL

A8.01 3/4"=1'-0"

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CASEWORK ELEVATIONS AND SECTIONS

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A8.01

date: DATE APRIL 30, 2013
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STRUCTURAL GENERAL NOTES:

1. REFERENCE ABBREVIATIONS FOR STANDARDS AND SPECIFICATIONS ARE AS FOLLOWS:
   - ACI – AMERICAN CONCRETE INSTITUTE
   - AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION
   - AISI – AMERICAN IRON AND STEEL INSTITUTE
   - ASCE – AMERICAN SOCIETY OF CIVIL ENGINEERS
   - ASTM – AMERICAN SOCIETY FOR TESTING AND MATERIALS
   - AWPA – AMERICAN WOOD PRESERVERS' ASSOCIATION
   - AWS – AMERICAN WELDING SOCIETY
   - CRSI – CONCRETE REINFORCING STEEL INSTITUTE
   - IBC – INTERNATIONAL BUILDING CODE
   - NCMA – NATIONAL CONCRETE MASONRY ASSOCIATION
   - NDS – NATIONAL DESIGN SPECIFICATION
   - SDI – STEEL DECK INSTITUTE

2. MATERIAL DESIGN STRENGTHS:
   - CAST–IN–PLACE CONCRETE
     - FOOTINGS & FOUNDATIONS . . . . . f'c = 3,500 PSI
     - FLOOR SLABS . . . . . f'c = 3,500 PSI
   - REINFORCING STEEL BARS . . . . . fy = 60,000 PSI
   - STRUCTURAL STEEL
     - ROLLED W–SHAPES . . . . . Fy = 50,000 PSI
     - OTHER ROLLED SHAPES & PLATES . . . Fy = 36,000 PSI
     - TUBE STEEL (HSS) . . . . . Fy = 46,000 PSI
   - CONCRETE MASONRY UNITS (NET AREA) . . f'c = 1,900 PSI
   - CONCRETE MASONRY ASSEMBLIES . . . . f'm = 1,500 PSI
   - SOIL BEARING CAPACITY . . q = 2,000 PSF (PRESUMPTIVE)

3. STRUCTURAL ELEMENTS FOR THIS BUILDING ARE DESIGNED UNDER PROVISIONS OF THE FOLLOWING CODES AND SPECIFICATIONS:
   - VIRGINIA CONSTRUCTION CODE 2009 (IBC 2009 W/VA AMENDMENTS)
   - ACI 318–08 AND ACI 301–08
   - ACI 530–08/ASCE 5–08 & ACI 530.1–08/ASCE 6–08
   - AISC 360–05
   - SJI SPECIFICATIONS, K–1.1–05, JG–1.1–05, LH/DLH–1.1–05
   - ASCE 7–05
   - NATIONAL DESIGN SPECIFICATION (NDS) 2005

4. BUILDING DESIGN LOADS:

   FLOOR LIVE LOAD:
   - SLAB–ON–GRADE (TYP) . . . . . 200 PSF
   - MECHANICAL . . . . . 150 PSF

   ROOF LIVE LOAD: . . . . . 30 PSF

   OCCUPANCY CATEGORY (TABLE 1604.5) II

   ROOF SNOW LOAD:
   - GROUND SNOW LOAD . . . . . P_g = 25 PSF
   - FLAT ROOF SNOW LOAD . . . . . P_f = 20 PSF
   - SNOW EXPOSURE FACTOR . . . . . C_e = 1.00
   - SNOW THERMAL FACTOR . . . . . C_t = 1.00
   - SNOW LOAD IMPORTANCE FACTOR . . . . . I_s = 1.00
   - DRIFTING SNOW . . . . . 0–88 PSF (WHERE APPLICABLE)

   WIND LOAD:
   - BASIC WIND SPEED . . . . . V = 90 MPH
   - WIND IMPORTANCE FACTOR . . . . . I_w = 1.00
   - WIND EXPOSURE . . . . . B
   - INTERNAL PRESSURE COEFFICENT . . . . . 0.18(±)
   - COMPONENTS AND CLADDING DESIGN PRESSURE (ASCE EQ. 6–22): $p = 12.35[(GC_p)–(±0.18)]$ PSF

   SEISMIC DATA:
   - A. SEISMIC IMPORTANCE FACTOR: 1.00
   - B. MAPPED SPECTRAL RESPONSE ACCELERATIONS: Ss = 0.220g; S1 = 0.069g
   - C. SITE CLASS: D
   - D. SPECTRAL RESPONSE COEFFICIENTS: S_{DS} = 0.235; S_{D1} = 0.111
   - E. SEISMIC DESIGN CATEGORY: B
   - F. BASIC SEISMIC FORCE RESISTING SYSTEM: ORDINARY REINFORCED MASONRY SHEAR WALLS
   - G. DESIGN BASE SHEAR: V = 0.117W
   - H. SEISMIC RESPONSE COEFFICIENT: Cs = 0.117
   - I. RESPONSE MODIFICATION FACTOR: R = 2.0
   - J. ANALYSIS PROCEDURE USED: EQUIVALENT LATERAL FORCE

5. COORDINATE STRUCTURAL WORK WITH ARCHITECTURAL, ELECTRICAL, MECHANICAL, PLUMBING AND RELATED WORK OF OTHER TRADES. NOTIFY ARCHITECT FOR CLARIFICATION OF DISCREPANCIES/CONFLICTS AND/OR MODIFICATIONS REQUIRED BY CHANGES IN WORK OF OTHER TRADES.

6. COORDINATE CHANGES IN FOOTING ELEVATIONS, IF ANY, REQUIRED BY UNKNOWN EXISTING FOUNDATION CONDITIONS OR INADEQUATE BEARING CAPACITY WITH ARCHITECT/STRUCTURAL ENGINEER.

7. DESIGN SOIL BEARING CAPACITY IS BASED ON A PRESUMPTIVE SOIL BEARING CAPACITY OF 2,000 PSF. SOIL BEARING CAPACITY SHALL BE VERIFIED BY A GEOTECHNICAL ENGINEER PRIOR TO PLACEMENT OF FOUNDATIONS.

8. ELEVATIONS SHOWN ON STRUCTURAL DRAWINGS ARE REFERENCED FROM A NOMINAL FINISH FLOOR ELEVATION OF 0'–0". ELEVATIONS PRECEDED WITH (+) SIGN ARE ABOVE 0'–0". ELEVATIONS PRECEDED WITH (–) SIGN ARE BELOW 0'–0".

9. SEE MATERIAL SPECIFICATION NOTES, THIS DRAWING, FOR DETAILED REQUIREMENTS FOR THE FOLLOWING STRUCTURAL MATERIALS:
   - A. CAST–IN–PLACE CONCRETE . . . . . SECTION 033000
   - B. UNIT MASONRY . . . . . SECTION 042000
   - C. STRUCTURAL STEEL . . . . . SECTION 051200
   - D. METAL ROOF DECK . . . . . SECTION 053200

10. ROOF DECK SHALL BE 1 1/2", 22 GAGE WIDE RIB (TYPE 'B') METAL ROOF DECK, PAINTED.

11. ALL LOOSE STEEL LINTELS FOR MASONRY WALLS EXPOSED TO EXTERIOR CONDITIONS SHALL BE HOT–DIP GALVANIZED AFTER FABRICATION.

12. VERTICALLY REINFORCED CONCRETE MASONRY UNITS, PILASTERS, BOND BEAMS, AND CMU INFILL AT JOIST AND BEAM BEARINGS SHALL BE INFILLED WITH MASONRY GROUT OR WITH PEA AGGREGATE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI.

13. COORDINATE LOCATIONS OF SLAB ON GRADE CONSTRUCTION AND CONTROL JOINTS WITH FLOOR FINISHES AND PARTITION WALL/OPENING LOCATIONS. JOINT SPACING FOR 4" THICK SLABS SHALL NOT EXCEED 12 FEET, SEE DETAIL 'A', DWG S1.01.

14. ALL WOOD CONSTRUCTION IN DIRECT CONTACT WITH MASONRY OR CONCRETE SHALL BE PRESERVATIVE TREATED (PT).

15. SEE FOUNDATION NOTES, THIS DWG, FOR ADDITIONAL REQUIREMENTS FOR FOUNDATION CONSTRUCTION.

16. SEE FRAMING NOTES, THIS DRAWING, FOR ADDITIONAL REQUIREMENTS FOR STEEL CONSTRUCTION.

FOUNDATION NOTES:

1. ALL FOUNDATIONS SHALL BEAR ON ORIGINAL SOIL OR COMPACTED FILL MATERIAL WITH A MINIMUM BEARING CAPACITY OF 2,000 PSF.

2. ALL FOOTINGS EXPOSED TO EXTERIOR CONDITIONS SHALL HAVE A BOTTOM OF FOOTING ELEVATION A MINIMUM OF 2'–0" BELOW ADJACENT EXTERIOR GRADE. LOWER BOTTOM OF FOOTING ELEVATIONS IF REQUIRED BY SOIL CONDITIONS OR CHANGES IN EXTERIOR GRADE TO MAINTAIN A MINIMUM DEPTH OF 2'–0" BELOW EXTERIOR GRADE. COORDINATE CHANGES IN FOOTING ELEVATIONS WITH OTHER TRADES AS REQUIRED. MAINTAIN COURSING ELEVATION TO TOP OF FOOTING WHERE MASONRY IS SUPPORTED ON FOOTING.

3. MAINTAIN A MINIMUM OF 3 INCHES CLEAR COVER FOR ALL REINFORCING BARS CAST AGAINST EARTH.

4. COORDINATE UNDERFLOOR PIPING, DRAINS, CONDUITS, INSERTS, BLOCK–OUTS AND OTHER WORK OF OTHER TRADES AS RELATED TO FOUNDATION AND FLOOR SLAB CONSTRUCTION TO INSURE PROPER PLACEMENT AND LOCATION PRIOR TO POURING CONCRETE.

5. FOOTINGS IN VICINITY OF PLUMBING OR BURIED ELECTRICAL WORK MAY BE DEPRESSED AS REQUIRED TO PERMIT PIPING/CONDUIT TO PASS ABOVE TOP OF FOOTING. COORDINATE ANY CHANGES IN TOP OF COLUMN FOOTINGS WITH STEEL FABRICATOR AS REQUIRED TO ADJUST BASE PLATE ELEVATIONS. ANY FOOTING STEPS REQUIRED SHALL BE AS SHOWN IN DETAIL 'B', DRAWING S1.01.

6. WHERE WALL FOOTINGS INTERSECT COLUMN FOOTINGS, CONTINUE TYPICAL WALL FOOTING REINFORCEMENT THROUGH COLUMN FOOTING.

7. PROVIDE VERTICAL DOWELS IN WALL FOOTINGS TO MATCH MASONRY WALL REINFORCING. DOWELS SHALL EXTEND A MINIMUM OF 24 INCHES ABOVE TOP OF FOOTING INTO WALL, AND SHALL HAVE A 12 INCH HORIZONTAL LEG IN THE FOOTING, UNLESS NOTED. SEE WALL SECTIONS FOR ADDITIONAL DETAILS.

8. PROVIDE PERIMETER INSULATION AROUND EXTERIOR WALL AS SHOWN ON THE ARCHITECTURAL DRAWINGS.

9. ALL CONCRETE FOR FOUNDATIONS SHALL HAVE A MINIMUM 28–DAY DESIGN COMPRESSIVE STRENGTH OF 3,500 PSI. ALL REINFORCING REINFORCING STEEL BARS SHALL BE ASTM A615, GRADE 60. SEE PROJECT SPECIFICATION SECTION 033000 FOR FURTHER DETAILS AND REQUIREMENTS.

10. WHERE STEEL COLUMNS EXTEND BELOW FINISHED FLOOR LEVEL, PROVIDE A MINIMUM OF 3 INCHES OF CONCRETE ENCASEMENT AROUND STEEL DOWN TO TOP OF FOOTING WHEN GROUND FLOOR SLAB IS PLACED.

11. ALL COLUMN BASE PLATES ARE TO BE SET DIRECTLY ON TOP OF FOOTINGS WITH NOMINAL 1 1/2–INCH GROUT/LEVELING ALLOWANCE, SEE NOTE "3" ABOVE. SEE DETAIL '1H', DRAWING S1.01, FOR TYPICAL BASE PLATE DETAIL.

12. UNLESS NOTED OTHERWISE ON THE PLANS, TYPICAL MASONRY WALL VERTICAL REINFORCING FOR CMU WALLS IS #5 BARS @ 32" C/C. VERTICAL REINFORCING SHALL BE EXTENDED THRU ALL BOND BEAMS. GROUT ALL REINFORCED CORES SOLID. VERTICAL CORES AT WALL INTERSECTIONS, CORNERS AND LINTEL BEARINGS SHALL BE REINFORCED WITH (1)#5 BAR AND GROUTED SOLID.

STRUCTURAL FRAMING NOTES:

1. ALL NEW STRUCTURAL STEEL FRAMING SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS, ALLOWABLE STRESS DESIGN (ASD). SEE PROJECT SPECIFICATION SECTION 051200, STRUCTURAL STEEL, FOR ADDITIONAL DETAILS AND REQUIREMENTS.

2. ALL BOLTED CONNECTIONS SHALL BE MADE USING ASTM A325 BOLTS, 3/4–INCH DIAMETER, UNLESS NOTED OTHERWISE ON THE DRAWINGS. CONNECTIONS ARE DESIGNED BASED ON BEARING CONDITIONS RATHER THAN FRICTION CONDITIONS UNLESS NOTED, EXCEPT AT MOMENT CONNECTIONS.

3. UNLESS SPECIFIC VALUES ARE SHOWN ON THE STRUCTURAL DRAWINGS, ALL FRAMING CONNECTIONS SHALL BE SIZED BASED ON ONE–HALF THE TOTAL ALLOWABLE UNIFORM LOAD FOR THE BEAM AND SPAN SHOWN IN THE LOAD TABLES OF THE AISC 13th EDITION MANUAL OF STEEL CONSTRUCTION (FOR SHEAR LOAD ONLY).

4. ALL STRUCTURAL WELDING SHALL COMPLY WITH AMERICAN WELDING SOCIETY (AWS) SPECIFICATION D1.1, CURRENT EDITION. WHERE FILLET WELDS ARE REQUIRED FOR SHOP OR FIELD CONNECTIONS, MINIMUM SIZE SHALL BE 3/16–INCH UNLESS NOTED OTHERWISE ON THE DRAWINGS.

5. STRUCTURAL STEEL FABRICATOR SHALL SUBMIT FABRICATION SHOP DRAWINGS TO THE ARCHITECT/ENGINEER FOR REVIEW PRIOR TO FABRICATING ANY STEEL. SHOP DRAWINGS SHALL BE SUBMITTED THROUGH THE GENERAL CONTRACTOR AND SHALL BE REVIEWED BY THE GENERAL CONTRACTOR PRIOR TO SUBMISSION TO THE ARCHITECT/ ENGINEER.

6. STRUCTURAL STEEL FABRICATOR SHALL COORDINATE COLUMN ANCHOR BOLT LOCATIONS AND SIZES WITH THE GENERAL CONTRACTOR TO INSURE PROPER PLACEMENT OF SUCH ITEMS IN CONCRETE WORK. ANY OTHER EMBEDMENTS PROVIDED BY THE STRUCTURAL STEEL FABRICATOR SHALL ALSO BE COORDINATED PRIOR TO PLACING CONCRETE.

7. METAL ROOF DECK SHOP DRAWINGS SHALL BE COORDINATED WITH THE STRUCTURAL STEEL AND JOIST SHOP DRAWING AND SHALL BE SUBMITTED TO THE ARCHITECT/ENGINEER FOR REVIEW. DRAWINGS SHALL INDICATE SHEET LAYOUT, PANEL LENGTHS, END CONDITIONS, SUPPORT CONDITIONS AROUND MAJOR OPENINGS, AND DECK WELDING/ FASTENING PATTERN REQUIRED TO MEET THE SPECIFIED SHEAR DIAPHRAGM AND WIND LOAD REQUIREMENTS OF THE SPECIFICATIONS AND DESIGN PLANS. DECK SHALL CONFORM TO REQUIREMENTS OF PROJECT SPECIFICATION SECTION 053200.

8. GENERAL CONTRACTOR SHALL COORDINATE THE FABRICATION AND ERECTION OF STRUCTURAL STEEL AND METAL ROOF DECK TO INSURE THAT REQUIREMENTS OF THE WORK OF OTHER TRADES ARE CONSIDERED AND INCLUDED ON AN ACCURATE AND TIMELY BASIS. IN PARTICULAR, COLD–FORMED METAL FRAMING AND MASONRY CONSTRUCTION MUST BE CLOSELY COORDINATED WITH ALL STEEL WORK. SEE SPECIFICATION SECTION 05400 FOR COLD–FORMED METAL FRAMING REQUIREMENTS.

9. PROVIDE L5x3x1/4 (LLV) ANGLE SUB–FRAMES (ALL 4 SIDES) AT ALL ROOF DECK PENETRATIONS/OPENINGS GREATER THAN ONE FOOT BY ONE FOOT. FRAMING SHALL EXTEND TO ADJACENT JOISTS OR TO ADJACENT FRAMING.

MATERIAL SPECIFICATION NOTES

CAST–IN–PLACE CONCRETE (SECTION 033000):

1. CONCRETE SHALL CONFORM TO ASTM C94. MINIMUM STRENGTH AT 28 DAYS SHALL BE 3,500 PSI. MAXIMUM SLUMP 4 INCHES. ALL AGGREGATES SHALL CONFORM TO ASTM C33. CONCRETE FOR EXTERIOR EXPOSURE SHALL BE AIR–ENTRAINED 5–7%. CONCRETE FOR INTERIOR EXPOSURE SHALL BE NON–AIR–ENTRAINED.

2. ALL DETAILING, FABRICATION AND PLACEMENT OF REINFORCING STEEL, FORMWORK, MIXING, HANDLING, PLACING, FINISHING AND CURING OF CONCRETE SHALL BE IN ACCORDANCE WITH ACI "MANUAL OF STAND–ARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" (ACI–315) AND ACI "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI–318), AND CONCRETE REINFORCING STEEL INSTITUTE (CRSI) "PLACING REINFORCING BARS".

3. ALL REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM A615, NEW BILLET STEEL DEFORMED BARS, GRADE 60. ALL REINFORCING BAR SPLICES SHALL BE ACI CLASS B TENSION LAP SPLICES, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.

4. WELDED WIRE FABRIC (WWF) SHALL MEET REQUIREMENTS OF ASTM A185, MINIMUM WWF LAP AT SPLICES TO BE 12 INCHES.

5. THE FOLLOWING CONCRETE COVER SHALL BE PROVIDED FOR REINFORCEMENT NEAREST THE DESCRIBED SURFACE, UNLESS SHOWN OTHERWISE ON THE DRAWINGS:
   - #6 OR LARGER BARS ..... 2 INCHES
   - #5 OR SMALLER BARS ..... 1–1/2 INCHES
   - FOOTING REINFORCEMENT ..... 3 INCHES

6. CONCRETE SLABS ON GRADE SHALL BE FINISHED TO THE FOLLOWING TOLERANCES: FF 30, FL 25. ELEVATED CONCRETE SLABS SHALL BE FINISHED TO THE FOLLOWING TOLERANCES: FF 25.

7. PREFORMED STEEL KEYED CONSTRUCTION JOINTS MAY BE USED IN SLABS ON GRADE ONLY IF THE TOP OF THE METAL KEY DOES NOT PROJECT ABOVE THE FINISHED SLAB SURFACE. WWF DOES NOT EXTEND THRU CONSTRUCTION JOINTS IN SLABS ON GRADE.

8. CONSTRUCTION JOINTS IN ELEVATED SLABS ON METAL DECK SHALL BE FORMED WITH WWF EXTENDING THROUGH AT SLAB MID–DEPTH.

9. UNLESS OTHERWISE SHOWN, ALL SLABS ON GRADE SHALL BE 4" CONCRETE WITH 6x6 W1.4XW1.4 WELDED WIRE FABRIC (1–1/2" CLEAR FROM TOP). SEE ARCHITECTURAL DRAWINGS FOR LOCATION OF ANY FLOOR SLAB DEPRESSIONS. UNLESS NOTED OTHERWISE, SLABS ON GRADE SHALL HAVE EITHER CONSTRUCTION JOINTS OR SAWCUT JOINTS SPACED SO THAT THE JOINTS FORM PANELS IN THE SLAB, WITH NO SLAB PANEL GREATER THAN 144 SQUARE FEET OR MORE THAN 12.0 FEET IN ANY ONE DIRECTION. INSTALL SAWCUT CONTROL JOINTS AS SOON AS THE SLAB IS CAPABLE OF BEING SAWN WITHOUT RAVELING.

10. INTERIOR SLAB CONCRETE SHALL RECEIVE A STEEL TROWEL FINISH. IMMEDIATELY FOLLOWING FINISHING, CONCRETE SHALL BE PROTECTED FROM PREMATURE OR EXCESSIVE DRYING, TEMPERATURE EXTREMES AND INJURY. COORDINATE CURING PROCEDURES WITH FLOOR FINISH REQUIREMENTS.

11. CONCRETE TESTING SHALL BE AS REQUIRED BY ACI, MODIFIED AS FOLLOWS: TAKE 4 6–INCH CYLINDERS OF EACH CONCRETE POUR. TEST (1) AT 7 DAYS AND (2) AT 28 DAYS. HOLD ONE CYLINDER FOR POSSIBLE TEST UNTIL 60 DAYS, THEN DISPOSE OF IF TEST NOT REQUESTED. SEND REPORTS TO ARCHITECT, CONTRACTOR AND STRUCTURAL ENGINEER.

CONCRETE UNIT MASONRY (SECTION 042000):

1. MASONRY CONSTRUCTION AND MATERIALS SHALL CONFORM TO ALL REQUIREMENTS OF "SPECIFICATIONS FOR MASONRY STRUCTURES" (ACI 530.1/ASCE 6–05) PUBLISHED BY THE AMERICAN CONCRETE INSTITUTE, EXCEPT AS MODIFIED BY THE CONTRACT DOCUMENTS.

2. CONCRETE MASONRY UNITS (CMU) SHALL COMPLY WITH ASTM C90, GRADE N, WITH A MINIMUM COMPRESSIVE STRENGTH OF 2,150 PSI ON THE NET AREA.

3. UNLESS NOTED OTHERWISE, MORTAR FOR EXTERIOR AND FOUNDATION WALL MASONRY SHALL BE TYPE 'S', PORTLAND CEMENT/LIME MORTAR. MORTAR FOR INTERIOR MASONRY SHALL BE TYPE 'S'.

4. UNLESS NOTED OTHERWISE, ALL CONCRETE MASONRY ASSEMBLIES SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH f'm OF 1,500 PSI. COMPRESSIVE STRENGTH SHALL BE DETERMINED BY THE UNIT OF STRENGTH METHOD.

5. HORIZONTAL MASONRY WALL REINFORCEMENT SHALL BE "DUR–O–WAL" OR EQUAL CONFORMING TO ASTM A82, COLD DRAWN STEEL WIRE, No. 9 SIZE RODS AND CROSS TIES, CONTINUOUS LADDER DESIGN, GALVANIZED. REINFORCE ALL CMU WALLS AT 16" C/C VERTICALLY.

6. ALL GROUT FOR GROUTING MASONRY BLOCK CORES SHALL BE SAND AGGREGATE CEMENT GROUT MEETING ASTM C476 OR PEA–AGGREGATE CONCRETE AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 2,500 PSI. SLUMP FOR THIS GROUT SHALL BE 8". MAXIMUM GROUT LIFT TO BE 5 FEET. ALLOW A MINIMUM OF 15 MINUTES BETWEEN SUCCESSIVE LIFTS. ROD OR VIBRATE GROUT DURING PLACEMENT TO INSURE SOLID GROUTING. ALLOW A MINIMUM OF 24 HOURS FOR MASONRY TO SET PRIOR TO GROUTING.

7. ALL ANCHOR BOLTS AND REINFORCING IN MASONRY SHALL BE COMPLETELY GROUTED. GROUT FOR VERTICAL REINFORCING BARS, BOND BEAMS, AND ANCHORS SHALL BE SAND AGGREGATE CEMENT GROUT OR PEA–AGGREGATE CONCRETE. MASONRY CELLS TO BE GROUTED SHALL BE CLEAR OF MORTAR FINS, DEBRIS OR OTHER OBSTRUCTIONS THAT WOULD INHIBIT THE FLOW OF GROUT.

8. CONTINUE VERTICAL WALL REINFORCING THRU INTERMEDIATE LEVEL BOND BEAMS AND 6" INTO UPPERMOST BOND BEAM WHERE PRESENT. WHERE WALL CONTINUES ABOVE BOND BEAM, EXTEND REINFORCING FULL HEIGHT INTO TOP COURSE OF CMU.

9. GROUT ALL EXTERIOR CMU CORES SOLID.

STRUCTURAL STEEL (SECTION 051200):

1. DESIGN OF ALL STRUCTURAL STEEL ELEMENTS FOR THIS PROJECT IS IN ACCORDANCE WITH THE AISC 360–05 "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS", ALLOWABLE STRESS DESIGN (ASD) BUILDINGS", ALLOWABLE STRESS DESIGN (ASD) METHOD.

2. STRUCTURAL STEEL MATERIAL DESIGN STRENGTHS ARE AS FOLLOWS:
   - ROLLED W SHAPES, ASTM A992 OR A572 . . . . . Fy = 50,000 PSI
   - ANGLES AND PLATES, ASTM A36 . . . . . Fy = 36,000 PSI
   - HOLLOW STRUCTURAL SHAPES (HSS), ASTM A500 . . Fy = 46,000 PSI

3. UNLESS OTHERWISE NOTED ON THE STRUCTURAL DRAWINGS, ALL BOLTED CONNECTIONS FOR STRUCTURAL STEEL MEMBERS SHALL BE MADE USING 3/4" DIAMETER A325 BOLTS, TYPE X (BEARING–TYPE CONNECTIONS WITH THREADS EXCLUDED IN A SHEAR PLANE). ALL CONNECTIONS SHALL BE CONSIDERED AS FOR TYPE 2 FRAMING (SIMPLY SUPPORTED BEAMS AND GIRDERS) UNLESS SPECIFICALLY NOTED OTHERWISE ON THE DRAWINGS. NUTS SHALL CONFORM TO ASTM A563 DH. WASHERS SHALL CONFORM TO ASTM F436.

4. UNLESS SPECIFIC VALUES ARE SHOWN ON THE STRUCTURAL DRAWINGS, ALL FRAMING CONNECTIONS SHALL BE SIZED BASED ON ONE–HALF THE TOTAL ALLOWABLE UNIFORM LOAD FOR THE BEAM AND SPAN SHOWN IN THE LOAD TABLES OF THE AISC 13th EDITION MANUAL OF STEEL CONSTRUCTION (FOR SHEAR LOAD ONLY).

5. ALL WELDING SHALL CONFORM TO REQUIREMENTS OF AWS WELDING SPECIFICATION D1.1, USING E70XX ELECTRODES. WELDS SHALL BE AS SHOWN ON THE DRAWINGS OR AS DETERMINED BY SHOP FABRICATOR FOR WELDED CONNECTIONS. MINIMUM WELD SIZE FOR ALL WELDED CONNECTIONS SHALL BE 3/16" FILLET WELD.

6. PROVIDE L5x3 1/2x1/4(LLV) ANGLE SUB–FRAMES (ALL 4 SIDES) AT ALL ELEVATED ROOF DECK PENETRATIONS/OPENINGS GREATER THAN ONE FOOT BY ONE FOOT. FRAMING SHALL EXTEND TO ADJACENT BEAMS, JOISTS OR TO ADJACENT ANGLES.

7. VERIFY OPENING SIZES AND LOCATIONS WITH MECHANICAL/ELECTRICAL AND PLUMBING REQUIREMENTS. DO NOT CUT ANY STRUCTURAL FRAMING OR BRACING TO INSTALL SUCH OPENINGS.

METAL ROOF DECK (SECTION 053200):

1. METAL ROOF DECK PRODUCTS AND INSTALLATION SHALL COMPLY WITH AISI "SPECIFICATIONS FOR THE DESIGN OF COLD–FORMED STEEL MEMBERS" AND STEEL DECK INSTITUTE (SDI) "SPECIFICATIONS AND COMMENTARY FOR STEEL ROOF DECK".

2. METAL ROOF DECK SHALL BE 1–1/2 INCHES DEEP, 22 GAGE, WIDE RIB (TYPE B) ROOF DECK. DECK FINISH SHALL BE PRIME–PAINTED SHEET STEEL PER ASTM 611, GRADE C, AND SHOP PRIMED AS FOLLOWS: SHOP PRIMER, GRAY OR WHITE BAKED–ON LEAD AND CHROMATE FREE RUST INHIBITIVE PRIMER CONFORMING TO THE PERFORMANCE REQUIREMENTS OF FED SPEC TT–P–664. DECK UNCOATED STEEL THICKNESS = 0.0295 INCHES. DECK SHALL HAVE A MINIMUM SECTION MODULUS OF Sp = 0.186 INCHES CUBED AND Sn = 0.192 INCHES CUBED PER FOOT OF WIDTH.

3. ROOF DECK SHALL BE ATTACHED TO STRUCTURAL STEEL/ANGLE SUPPORT FRAMING BY MEANS OF PUDDLE WELDS. DECK WELDS AT PERIMETER OF BUILDING AND ALONG ATTACHMENTS TO EXTERIOR STEEL SHALL HAVE A MINIMUM DIAPHRAM SHEAR CAPACITY OF 300 POUNDS PER LINEAR FOOT. DECK WELDS AT PERIMETER SHALL ALSO MEET REQUIREMENTS FOR UL 90 UPLIFT.

4. PROVIDE SUPPLEMENTARY FRAMING ANGLES AND/OR STRUCTURAL STEEL SUPPORTS FOR ALL PENETRATIONS IN ROOF DECK PER STRUCTURAL STEEL SECTION 051200.

SPECIAL INSPECTIONS:

SPECIAL INSPECTIONS FOR STRUCTURAL ELEMENTS OF THIS PROJECT ARE REQUIRED AS LISTED IN SECTION 1704 OF THE 2009 VIRGINIA CONSTRUCTION CODE (IBC 2009 WITH VIRGINIA AMENDMENTS). SUCH INSPECTIONS ARE TO BE PERFORMED BY A QUALIFIED INDEPENDENT TESTING AGENCY RETAINED BY THE OWNER. TESTING PROCEDURES SHALL BE REVIEWED BY THE ARCHITECT, STRUCTURAL ENGINEER OF RECORD, GENERAL CONTRACTOR AND THE OWNER PRIOR TO CONDUCTING INSPECTIONS AND TESTS. THE TESTING AGENCY SHALL PROVIDE WRITTEN REPORTS/RECORDS OF ALL INSPECTIONS TO THE OWNER, ARCHITECT, STRUCTURAL ENGINEER OF RECORD, AND THE BUILDING OFFICIAL, NOTING COMPLIANCE OR NON–COMPLIANCE WITH THE REQUIREMENTS OF THE CONSTRUCTION DOCUMENTS AND WITH APPLICABLE CODE DOCUMENTS.

SPECIAL INSPECTIONS OF NON–STRUCTURAL COMPONENTS, SUCH AS EIFS, FIRE PROOFING, ETC., MAY ALSO BE REQUIRED, DEPENDING ON THE APPLICATION PRESENT. SEE ARCHITECTURAL DRAWINGS FOR NON–STRUCTURAL SPECIAL INSPECTION REQUIREMENTS.

STRUCTURAL INSPECTIONS SHALL AT A MINIMUM INCLUDE THE FOLLOWING, WITH ADDITIONAL INSPECTIONS AS MAY BE REQUIRED BY THE BUILDING OFFICIAL:

A. STRUCTURAL FILL, TO ENSURE PROPER COMPACTION AND COMPLIANCE WITH PROJECT SPECIFICATIONS (REF SECTION 1704.7).

B. CAST–IN–PLACE CONCRETE, TO INCLUDE INSPECTION OF REINFORCING STEEL PLACEMENT IN FOOTINGS AND WALLS FOR COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS, VERIFICATION OF USE OF REQUIRED APPROVED DESIGN MIX, MAINTENANCE AND APPLICATION OF SPECIFIED CURING TECHNIQUES, AND STRENGTH TESTING OF CONCRETE (REF SECTION 1704.4).

C. STRUCTURAL STEEL, TO INCLUDE COMPLIANCE WITH MATERIAL SPECIFICATIONS AND ERECTION TOLERANCES, AND CONNECTIONS, TO INCLUDE BOTH WELDED AND BOLTED CONNECTIONS (REF SECTION 1704.3).

1. MATERIAL VERIFICATION OF HIGH STRENGTH BOLTS, NUTS AND WASHERS TO INCLUDE VERIFICATION OF IDENTIFICATION MARKINGS CONFORMING TO ASTM SPECIFICATION REQUIRED BY THE CONSTRUCTION DOCUMENTS.

2. WELDED CONNECTION INSPECTION SHALL INCLUDE VISUAL INSPECTION OF WELDS PER AWS SPECIFICATION D1.1. PERIODIC INSPECTION IS REQUIRED FOR SINGLE–PASS FILLET WELDS LESS THAN OR EQUAL TO 5/16".

3. BOLTED CONNECTION INSPECTION SHALL COMPLY WITH REQUIREMENTS OF AISC/RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR ASTM A490 BOLTS". (NOTE: NO SLIP–CRITICAL CONNECTIONS ARE USED ON THIS PROJECT).

D. CONCRETE MASONRY, TO INCLUDE COMPLIANCE WITH MATERIAL SPECIFICATIONS, INSPECTION OF REINFORCING PLACEMENT, GROUTING AND STRENGTH TESTS OF MATERIALS AND PROTECTION DURING HOT OR COLD WEATHER OPERATIONS, PER TABLE 1704.5.1 LEVEL 1 FOR NONESSENTIAL FACILITIES (REF SECTION 1704.5).

PER TABLE 1704.5.3 LEVEL 2 FOR ESSENTIAL FACILITIES

E. METAL ROOF DECK ATTACHMENT TO STRUCTURAL MEMBERS, TO INCLUDE PERIODIC CHECKING OF PUDDLE WELDS BETWEEN DECK AND STRUCTURAL MEMBERS AND SCREW FASTENING OF DECK SIDELAPS.

042613
12402–S0.01

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CONSTRUCTION DOCUMENTS

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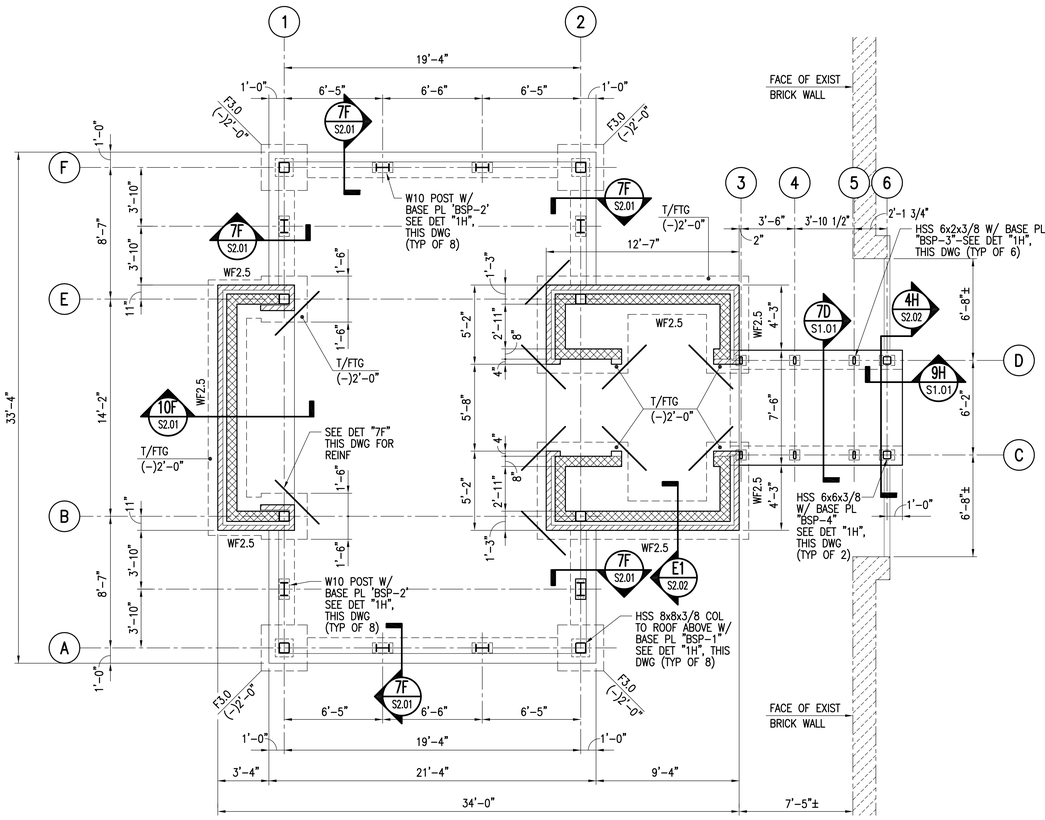
CONSTRUCTION DOCUMENTS
STRUCTURAL GENERAL NOTES & MATERIAL SPECIFICATIONS
sheet

S0.01

date: APRIL 30, 2013
commission: 12–1010
drawn by: REC/NFA



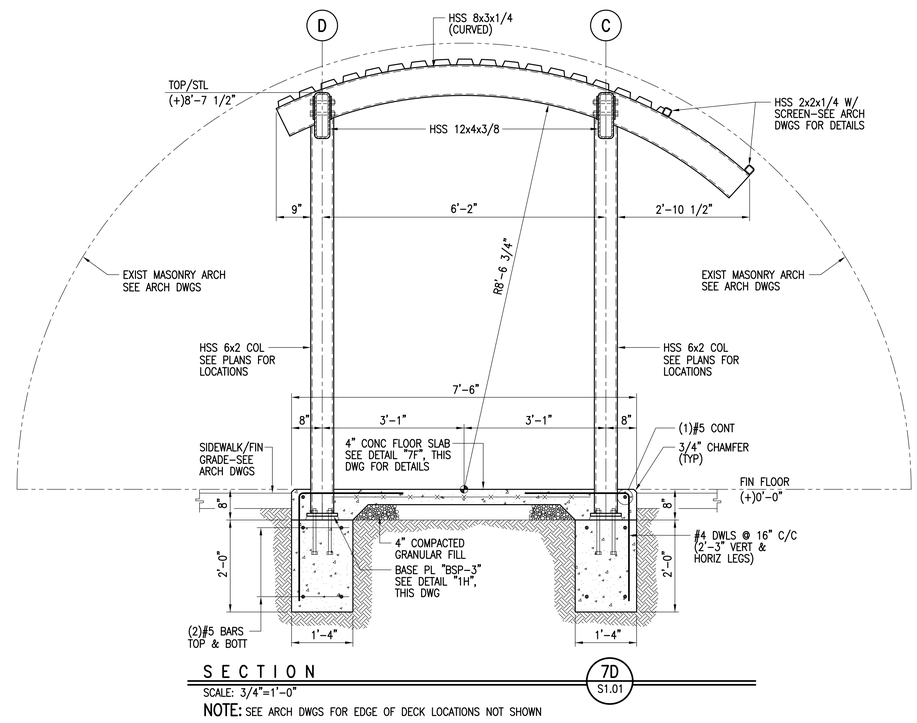
N

FOUNDATION & FLOOR SLAB PLAN

SCALE: 1/4"=1'-0"

WALL FOOTING SCHEDULE		
FTG MARK	FOOTING SIZE LENGTH x WIDTH x THICKNESS	REINFORCING
WF2.5	2'-6" x 1'-0"	(3)#5 LONGITUDINAL BARS #5 @ 48" TRANSVERSE BARS

COLUMN FOOTING SCHEDULE		
FTG MARK	FOOTING SIZE LENGTH x WIDTH x THICKNESS	REINFORCING
F3.0	3'-0" x 3'-0"x 1'-0"	(3)#5 EW-BOTTOM

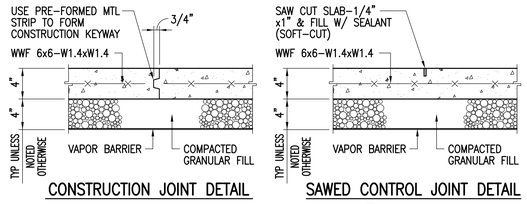


SECTION

SCALE: 3/4"=1'-0"

7D S1.01

NOTE: SEE ARCH DWGS FOR EDGE OF DECK LOCATIONS NOT SHOWN



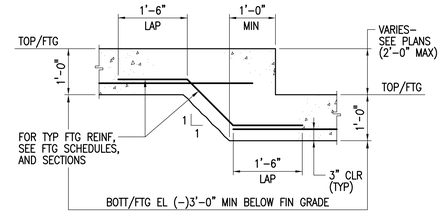
DETAIL

CONCRETE FLOOR SLAB CONSTRUCTION & CONTROL JOINT DETAILS

SCALE: 1 1/2"=1'-0"

7F S1.01

NOTE: REINFORCE INSIDE CORNERS W/ #5 x 4'-0"LG (TYP)

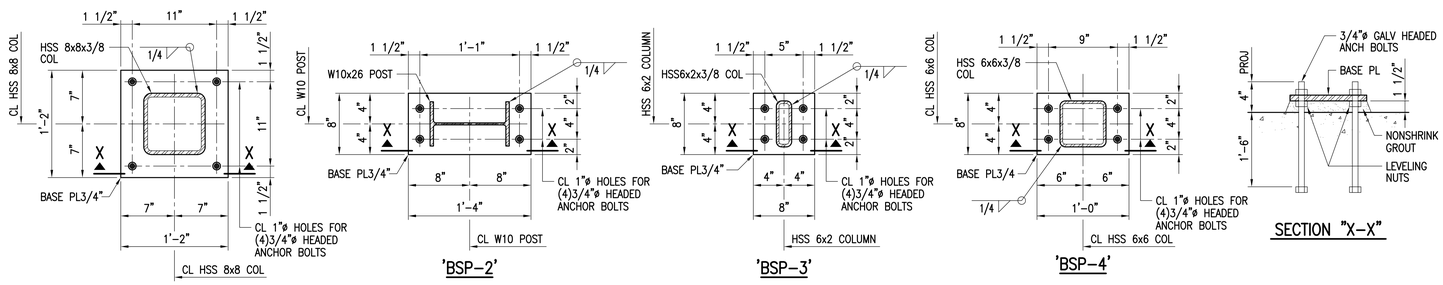


DETAIL

TYPICAL FOOTING STEP

SCALE: 3/4"=1'-0"

10F S1.01

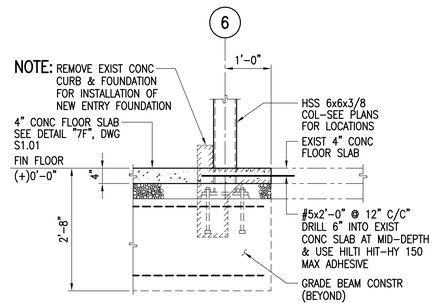


DETAIL

BASE PLATE DETAILS

SCALE: 1 1/2"=1'-0"

1H S1.01



SECTION

SCALE: 3/4"=1'-0"

9H S1.01

FOR STRUCTURAL GENERAL NOTES, SEE DWG S0.01

042613
12402-S1.01

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FOUNDATION PLAN

sheet

S1.01

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commission: 12-1010
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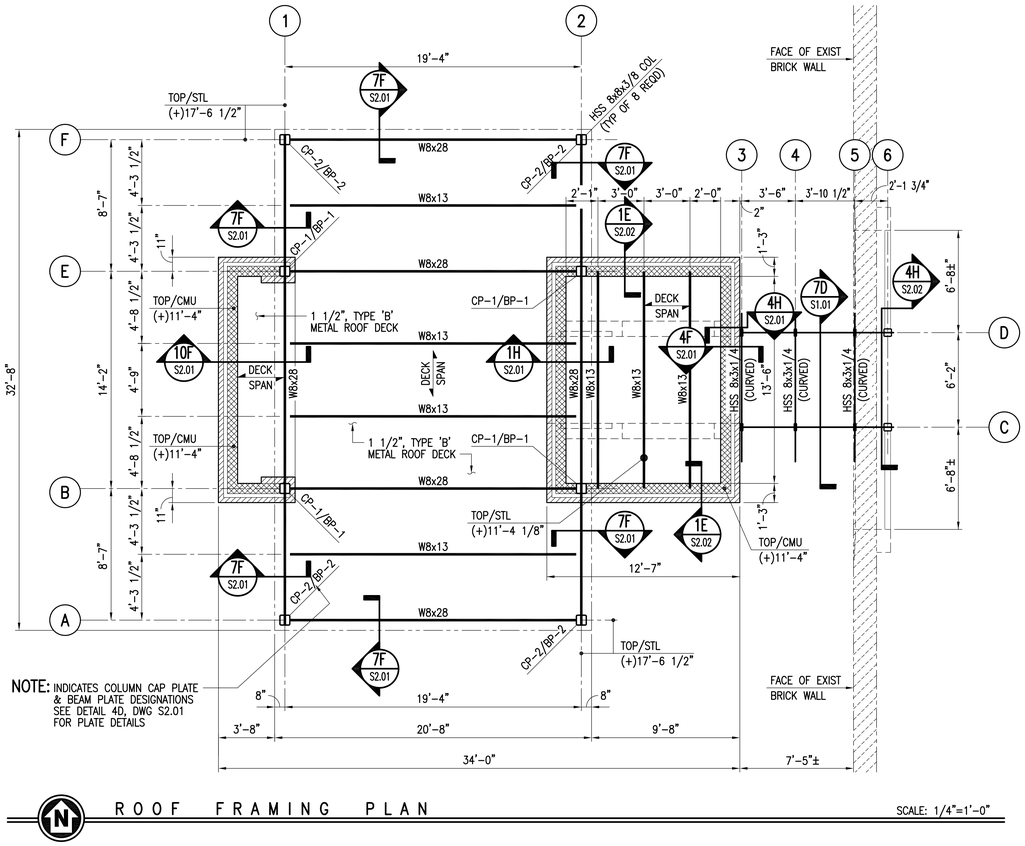
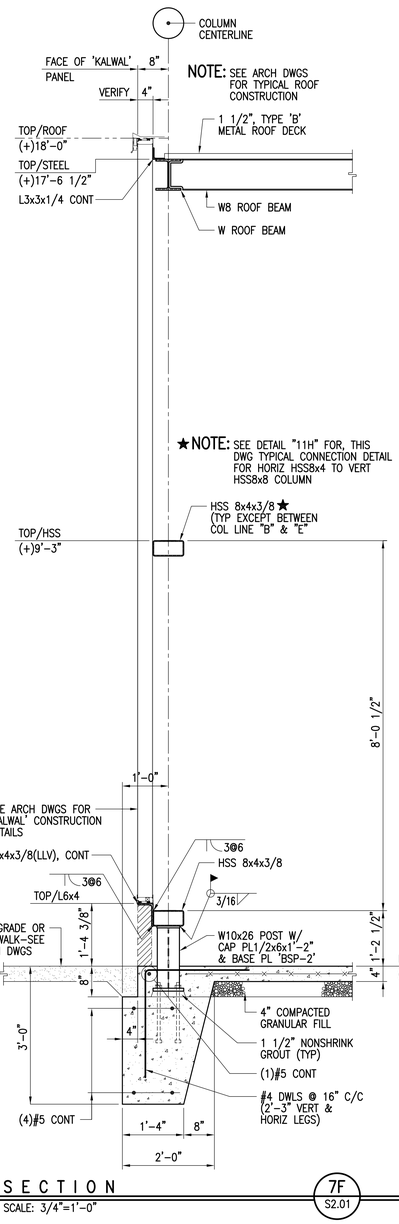


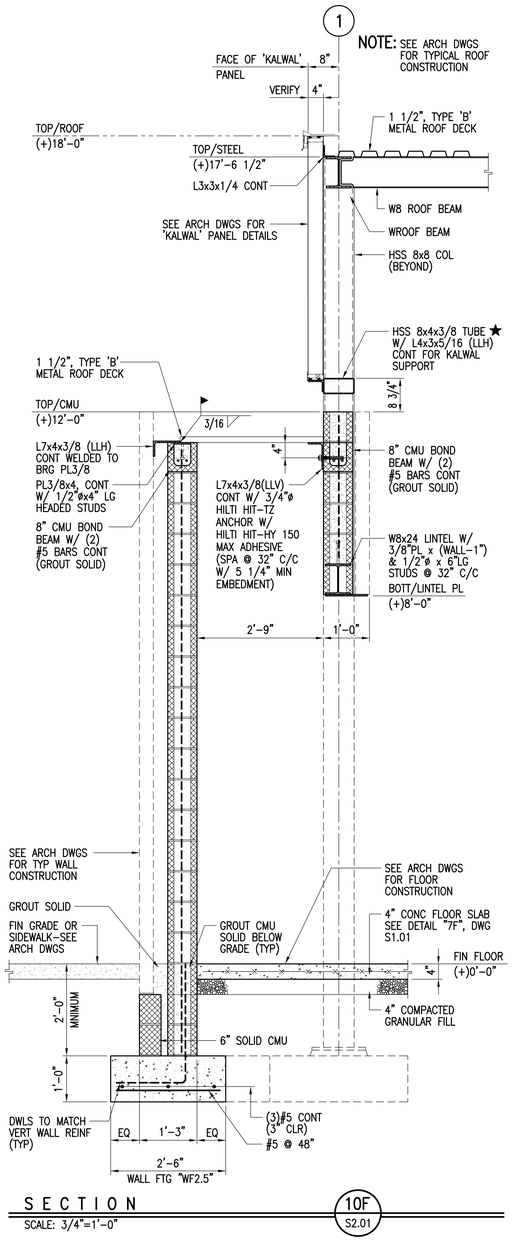
ROOF FRAMING PLAN

SCALE: 1/4"=1'-0"



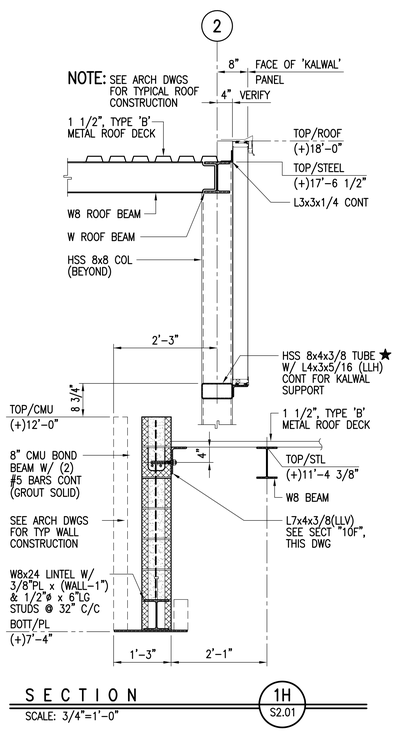
SECTION 7F S2.01

SCALE: 3/4"=1'-0"



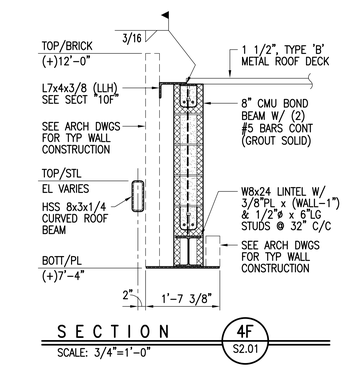
SECTION 10F S2.01

SCALE: 3/4"=1'-0"



SECTION 1H S2.01

SCALE: 3/4"=1'-0"



SECTION 4F S2.01

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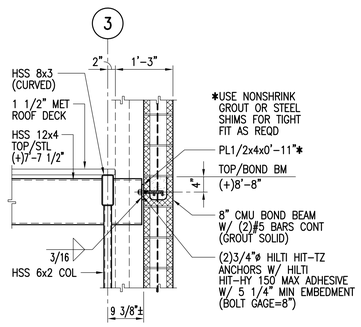
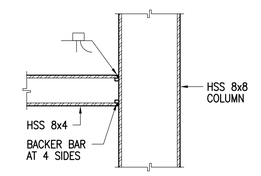


SECTION 4H S2.01

SCALE: 3/4"=1'-0"



DETAIL 11H S2.01

SCALE: 1 1/2"=1'-0"

FOR STRUCTURAL GENERAL NOTES, SEE DWG S0.01

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ROOF FRAMING PLAN

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S2.01

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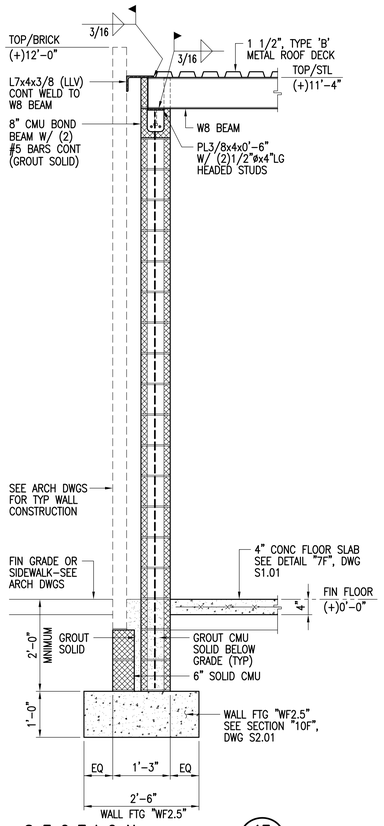
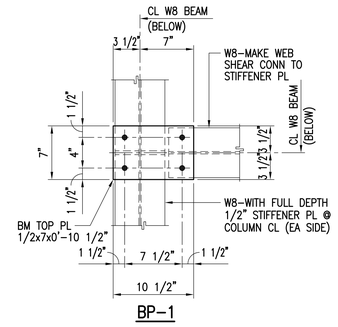
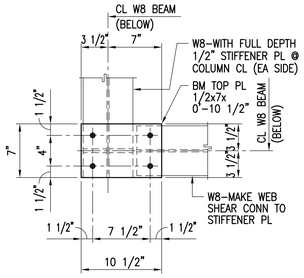


SECTION 1E S2.02

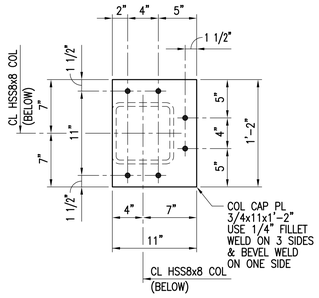
SCALE: 3/4"=1'-0"



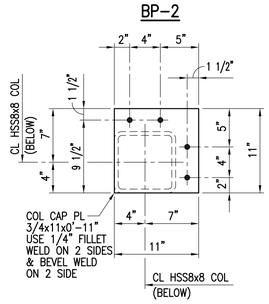
BP-1



BP-2



CP-1



CP-2

CAP PLATE & BEAM PLATE DETAILS AT COLUMNS "B-1", "B-2" & "E-1", "E-2"

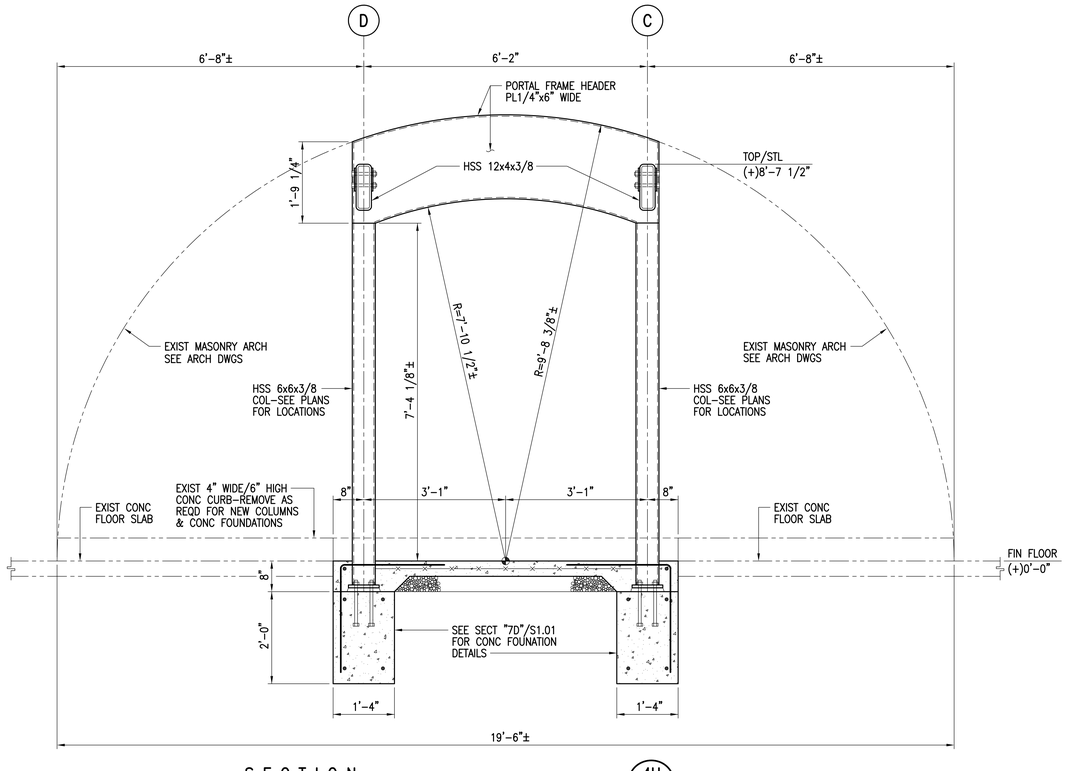
CAP PLATE & BEAM PLATE DETAILS AT COLUMNS "A-1", "A-2" & "F-1", "F-2"

DETAIL 4D S2.02

SCALE: 1 1/2"=1'-0"

SECTION 1H S2.02

SCALE: 3/4"=1'-0"



SECTION 4H S2.02

SCALE: 3/4"=1'-0"

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LEGEND:

DUCTWORK:

DOUBLE–LINE / SINGLE–LINE

- EXHAUST, RETURN OR FAN SUCTION
- SUPPLY OR FAN DISCHARGE
- 24x12 — DUCT SIZE–INCHES FIRST SIZE IS SIDE SHOWN
- SIZE TRANSITION
- SHAPE TRANSITION
- UP — RADIUS OFFSET UP IN DIRECTION OF AIR FLOW
- DN — RADIUS OFFSET DOWN IN DIRECTION OF AIR FLOW
- ELBOW WITH TURNING VANES
- RADIUS ELBOW
- FLEXIBLE DUCTWORK 6'–0" MAXIMUM LENGTH
- FLEXIBLE EQUIPMENT CONNECTION
- RADIUS DIVIDED FLOW BRANCHES
- VANED ELBOW DIVIDED FLOW BRANCHES
- 45 DEGREE DIVIDED FLOW BRANCHES
- 45 DEGREE BRANCH CONNECTION
- 45 DEGREE BRANCH TO ROUND TAKEOFF FITTING
- FIRE DAMPER AND ACCESS DOOR
- MANUAL VOLUME DAMPER
- M — MOTORIZED DAMPER AND ACCESS DOOR
- SD — SMOKE DAMPER AND ACCESS DOOR
- 90 DEGREE ELBOW DOWN
- 90 DEGREE ELBOW UP
- 90 DEGREE ELBOW DOWN
- 90 DEGREE ELBOW UP
- LINEAR DIFFUSER

PIPING:

- GATE VALVE
- BUTTERFLY VALVE
- CALIBRATED BALANCING VALVE
- AUTOMATIC BALANCING VALVE
- MANUAL BALANCING COCK
- VENTURI FLOWMETER
- GLOBE VALVE
- BALL VALVE
- CHECK VALVE
- PRESSURE REDUCING VALVE
- TRIPLE DUTY VALVE
- AUTOMATIC FLOW CONTROL VALVE
- 2–WAY ELECTRONIC CONTROL VALVE
- 3–WAY ELECTRONIC CONTROL VALVE
- 2–WAY PNEUMATIC CONTROL VALVE
- 3–WAY PNEUMATIC CONTROL VALVE
- PRESSURE RELIEF VALVE
- STEAM TRAP
- TEST PLUG
- DPT — DIFFERENTIAL PRESSURE TRANSMITTER
- CO — CLEAN–OUT
- FLANGE
- PLUG VALVE
- PIPE CAP
- FUNNEL DRAIN
- MANUAL AIR VENT
- DRAIN VALVE WITH HOSE CONNECTION
- STRAINER
- STRAINER WITH BLOWOFF
- AUTOMATIC AIR VENT
- ECCENTRIC PIPE REDUCER
- CONCENTRIC REDUCER
- UNION
- DIRECTION OF FLOW IN PIPE
- PITCH PIPE DOWN IN DIRECTION OF ARROW
- PIPE TURNED DOWN
- PIPE TURNED UP
- BOTTOM PIPE TAKE–OFF
- TOP PIPE TAKE–OFF
- PRESSURE GAGE
- THERMOMETER
- FLEXIBLE PIPE CONNECTOR

LINETYPES:

- DCW — DOMESTIC COLD WATER
- DHW — DOMESTIC HOT WATER
- CWR — CONDENSER WATER RETURN
- CWS — CONDENSER WATER SUPPLY
- CHWR — CHILLED WATER RETURN
- CHWS — CHILLED WATER SUPPLY
- D — DRAIN
- HWS — HOT WATER SUPPLY
- HWR — HOT WATER RETURN
- PIPE, EXISTING (LIGHT LINE WEIGHT)
- PIPE, REMOVED
- REMOVE PIPING AND DUCTWORK
- PIPE, NEW

GENERAL:

- (E) — EXISTING
- 1 — DEMOLITION NOTE
- 1 — CONSTRUCTION NOTE
- ø — ROUND DUCT
- S1 / 200 — AIR DEVICE DESIGNATION AND CFM
- LIMIT OF REMOVAL
- CONNECTION POINT NEW TO EXISTING
- A / M1 M1 — LETTER INDICATES DETAIL OR ENLARGED PLAN; SHEET NUMBER WHERE DETAIL OR ENLARGED PLAN IS DRAWN; SHEET NUMBER WHERE DETAIL OR ENLARGED PLAN IS TAKEN FROM
- A / M1 M1 — LETTER INDICATES ELEVATION; SHEET NUMBER WHERE ELEVATION IS DRAWN; SHEET NUMBER WHERE ELEVATION IS TAKEN FROM
- 1 / M1 M1 — NUMBER INDICATES SECTION; SHEET NUMBER WHERE SECTION IS DRAWN; SHEET NUMBER WHERE SECTION IS TAKEN FROM

ABBREVIATIONS:

AFF	ABOVE FINISHED FLOOR
ALT	ALTITUDE, ALTERNATE
AHU	AIR HANDLING UNIT
AMP	AMPERE
ADP	APPARATUS DEW POINT
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL, ARCHITECT
ATM	ATMOSPHERE
AVG	AVERAGE
BOD	BOTTOM OF DUCT
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNIT
BTUH	BRITISH THERMAL UNIT PER HOUR
CDWR	CONDENSER–WATER RETURN
CDWS	CONDENSER–WATER SUPPLY
CFM	CUBIC FEET PER MINUTE
CHWR	CHILLED–WATER RETURN
CHWS	CHILLED–WATER SUPPLY
℄	CENTER–LINE (PIPE, DUCT, EQUIPMENT, ETC.)
CLG	COOLING
COND	CONDENS(–ER,–ING,–ATION) OR CONDENSATE
CV	COEFFICIENT, VALVE FLOW
dB	DECIBEL
DEG	DEGREE
DIA	DIAMETER
DIFF	DIFFERENCE OR DELTA
DX	DIRECT EXPANSION
DR	DRAIN
DWG	DRAWING
DB	DRY BULB TEMPERATURE
(E) OR EX	EXISTING
EFF	EFFICIENCY
ELEV OR EL	ELEVATION
ENT	ENTERING
EAT	ENTERING AIR TEMPERATURE
EWT	ENTERING WATER TEMPERATURE
ETR	EXISTING TO REMAIN
EVAP	EVAPORAT (–E,–ING,–ED,–OR)
EXP	EXPANSION
F	FAHRENHEIT
FA	FACE AREA
FD	FIRE DAMPER OR FLOOR DRAIN
FT	FOOT, FEET
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL TANK VENT
FPM	FEET PER MINUTE
FPS	FEET PER SECOND
GA	GAUGE
GAL	GALLONS
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	GRAINS (MOISTURE)
HD	HEAD
HGT	HEIGHT
HP	HORSEPOWER
HR	HOUR(S)
HZ	HERTZ
ID	DIAMETER, INSIDE
IN	INCH
IPS	IRON PIPE SIZE
KW	KILOWATT
KWH	KILOWATT HOUR
L	LENGTH
LB OR LBS	POUND OR POUNDS
LBS/HR	POUNDS PER HOUR
LF	LINEAR FEET
LVG	LEAVING
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MIN	MINIMUM
MTG	MOUNTING
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED, OR NOISE CRITERIA
NG	NATURAL GAS
NO	NORMALLY OPEN, OR NUMBER
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OD	DIAMETER, OUTSIDE
OZ	OUNCE
%	PERCENT
PD	PRESSURE DROP OR DIFFERENCE
PH	PHASE (ELECTRICAL)
PRESS	PRESSURE
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	PSI ABSOLUTE
PSIG	PSI GAUGE
R–XXX	REFRIGERANT (134A, 410, ETC.)
RA	RETURN AIR
RECIRC	RECIRCULATE
RL	REFRIGERANT LIQUID
RH	RELATIVE HUMIDITY
RHG	REFRIGERANT HOT GAS
RPM	REVOLUTIONS PER MINUTE
RS	REFRIGERANT SUCTION
SA	SUPPLY AIR
SAT	SATURATION
SEC	SECOND
SF	SQUARE FOOT
SG	SPECIFIC GRAVITY
SH	SENSIBLE HEAT
SP	STATIC PRESSURE (INCHES OF WATER)
SPEC	SPECIFICATION
SQ	SQUARE
STD	STANDARD
TD	TEMPERATURE DIFFERENCE
TEMP	TEMPERATURE
T' STAT	THERMOSTAT
TONS	TONS OF REFRIGERATION
TSP	TOTAL STATIC PRESSURE (INCHES OF WATER)
TYP	TYPICAL
V	VOLT
VOL	VOLUME
VTR	VENT THROUGH ROOF
WB	WET BULT TEMP., OF
WG	WATER GAUGE
WPD	WATER PRESSURE DROP
W	WATT
UH	UNIT HEATER

GENERAL NOTES:

1. THESE DRAWINGS ARE SCHEMATIC IN NATURE AND INDICATE THE GENERAL AND APPROXIMATE LOCATION OF EQUIPMENT, PIPING AND DUCTWORK. THE CONTRACTOR SHALL FIELD VERIFY ALL LOCATIONS AND DIMENSIONS PRIOR TO FABRICATION AND INSTALLATION. DO NOT SCALE DRAWINGS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE SITE PRIOR TO BIDDING IN ORDER TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS. ANY DISCREPANCIES OR QUESTIONS REGARDING THE BID DOCUMENTS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT / ENGINEER 10 DAYS PRIOR TO THE BID DATE.
3. ALL MATERIAL AND EQUIPMENT INDICATED, SHALL BE NEW – UNLESS NOTED AS (E), EXIST., "EXISTING", OR "EXISTING TO REMAIN (ETR)".
4. ALL WORK ON THIS PROJECT SHALL BE INSTALLED/PERFORMED IN ACCORDANCE WITH THE CURRENT EDITION OF THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE (VUSBC); AND IN ACCORDANCE WITH ALL OTHER APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS AND REQUIREMENTS.
5. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL REQUIRED PERMITS – OTHER THAN THE BUILDING PERMIT, AND SHALL ARRANGE FOR INSPECTIONS BY THE LOCAL AUTHORITY(IES) HAVING JURISDICTION (AHJ).
6. THE CONTRACTOR SHALL THOROUGHLY CLEAN HIS WORK AREA DAILY, AND REMOVE ALL TRASH AND DEBRIS FROM THE JOB SITE AFTER THE COMPLETION OF EACH DAY'S WORK, AND AT THE COMPLETION OF THE PROJECT.
7. PROVIDE OPENINGS IN THE BUILDING CONSTRUCTION FOR THE PASSAGE OF PIPING AND DUCTWORK. DO NOT PENETRATE STRUCTURAL MEMBERS WITHOUT PRIOR APPROVAL OF THE ENGINEER.
8. THE CONTRACTOR SHALL COORDINATE THE INSTALLATION OF WORK WITH EXISTING CONDITIONS AND THE WORK OF OTHER TRADES. MINOR DEVIATIONS FROM THE PLANS MAY BE MADE TO AVOID MINOR CONFLICTS. WHEN MAJOR CONFLICTS ARE APPARENT, THE ARCHITECT/ENGINEER SHALL BE ADVISED/NOTIFIED IMMEDIATELY, AND THE AFFECTED WORK SHALL NOT BE INSTALLED UNTIL THE CONFLICT HAS BEEN RESOLVED.
9. ALL NECESSARY ALLOWANCES AND PROVISIONS SHALL BE MADE BY THE CONTRACTOR FOR BEAMS, COLUMNS, OR OTHER OBSTRUCTIONS OF THE BUILDING, AND/OR THE WORK OF OTHERS; WHETHER OR NOT SAME IS SHOWN. WHERE NECESSARY TO AVOID OBSTRUCTIONS, THE DUCTS SHALL BE TRANSFORMED, SPLIT, DIVIDED, OFF–SET, RAISED OR LOWERED WITH THE REQUIRED FREE AREA BEING MAINTAINED.
10. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS.
11. ALL PIPING, DUCTWORK, GAS VENTS, ETC. SHALL BE SLEEVED THROUGH ROOF WALL, AND FLOOR PENETRATIONS.
12. ALL MECHANICAL EQUIPMENT SHALL BE INSTALLED IN A MANNER SUCH THAT ALL FILTERS, VALVES, MOTORS, ETC., ARE COMPLETELY ACCESSIBLE AND SERVICEABLE, INCLUDING ACCESS DOORS IF REQUIRED.
13. THE CONTRACTOR SHALL BE AWARE THAT THE DRAWINGS DO NOT INDICATE ALL PIPE SUPPORT LOCATIONS AND HANGER DETAILS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING AND PROPERLY INSTALLING ALL NECESSARY AND REQUIRED SUPPORTS AND HANGERS.
14. RUN ALL PIPING AND DUCTWORK CONCEALED ABOVE CEILINGS AND/OR AS HIGH AS POSSIBLE, GIVING WAY TO GRAVITY DRAIN PIPING – UNLESS OTHERWISE NOTED OR INDICATED.
15. SLOPE CONDENSATE DRAINS AT A MINIMUM OF 1/8 INCH FALL PER FOOT IN THE DIRECTION OF FLOW. PROVIDE DRAINAGE TYPE FITTINGS.
16. SEE SPECIFICATIONS FOR DUCTWORK REQUIREMENTS.
17. ALL DUCTWORK SIZES SHOWN/INDICATED ARE CLEAR INSIDE DIMENSIONS.
18. PROVIDE FLEXIBLE CONNECTIONS BETWEEN HVAC UNITS AND SHEET METAL DUCTWORK.
19. PROVIDE AIR TURNING DEVICES WITHIN DUCTWORK AT ALL CHANGES IN DIRECTION OF 30 DEGREES OR GREATER.
20. SQUARE THROAT ELBOWS WITHOUT TURNING VANES, MITERED ELBOWS, STRAIGHT, RECTANGULAR AND ROUND DUCT TAPS, AND AIR SCOOPS ARE NOT PERMITTED.
21. SEAL ALL SUPPLY, RETURN AND EXHAUST AIR DUCTS TO ENSURE THAT THE SUM OF THE AIR DEVICES IS AT LEAST 95% OF THE TOTAL UNIT AIR FLOW.
22. A CERTIFIED BALANCING CONTRACTOR SHALL PERFORM AN ASSOCIATED FUEL, AIR, AND WATER FLOW BALANCE AND SUBMIT THE BALANCE REPORTS TO THE ENGINEER FOR APPROVAL.
23. THERMOSTATS, FAN SPEED CONTROLLERS, EMERGENCY PUSH–BUTTONS AND TIME SWITCHES SHALL BE MOUNTED APPROXIMATELY 56" ABOVE FLOOR.
24. COMPLETE AND PROPER INSTALLATION OF THERMOSTATS AND ALL OTHER NECESSARY AND REQUIRED FIELD MOUNTED CONTROLS AND CONTROL COMPONENTS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THE MANUFACTURER(S) OF HVAC UNITS (AIR HANDLERS, CHILLERS, FAN COIL UNITS, ETC.) SHALL FURNISH COMPLETE WIRING DIAGRAMS TO THE CONTRACTOR FOR HIS USE IN WIRING CONTROLS. ALL CONTROL WIRING SHALL BE IN CONDUIT AND PROVIDED PER DIVISION 16 OF THE PROJECT SPECIFICATIONS.
25. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY DAMAGE THAT OCCURS TO EQUIPMENT AND SYSTEM(S) DURING INSTALLATION.
26. IT SHALL BE UNDERSTOOD THAT THE DRAWINGS AND SPECIFICATIONS ARE COMPLEMENTARY AND ARE TO BE TAKEN TOGETHER FOR A COMPLETE INTERPRETATION OF THE WORK. WHERE THERE ARE CONFLICTS BETWEEN THE DRAWINGS AND SPECIFICATIONS, OR WITHIN THE DRAWINGS AND SPECIFICATIONS THEMSELVES, THE ITEMS OF HIGHER STANDARD SHALL GOVERN.
27. NO EXCLUSION FROM, OR LIMITATION IN THE SYMBOLISM USED ON THE DRAWINGS FOR THE WORK OR, THE LANGUAGE USED IN THE SPECIFICATIONS FOR THE WORK SHALL BE INTERPRETED AS A REASON FOR OMITTING THE APPURTENANCES OR ACCESSORIES NECESSARY TO COMPLETE ANY REQUIRED WORK, SYSTEM, OR ITEM OF EQUIPMENT.

DESIGN DATA SCHEDULE

SPACE	SUMMER OUTDOOR	SUMMER INDOOR	WINTER OUTDOOR	WINTER INDOOR
ALL MAIN FLOOR INTERIOR SPACES	100 deg F DB / 77 deg F WB	75 deg F DB / 50 % RH	10 deg F DB	70 deg F DB / 50 % RH

NOTES:
1. Outdoor design conditions based on 2009 ASHRAE Fundamentals - "Mean of Annual Daily Extremes"
2. Heat-pump outdoor "Ambient Condition" for unit selection based on 105 deg F.

SPLIT-SYSTEM, HEAT PUMP UNIT - SCHEDULE

MARK	LOCATION	INDOOR AIR HANDLING UNIT: DRAW-THRU, SUPPLY FAN DATA: MIN. SUPPLY (CFM)	MIN. VENT. AIR (CFM)	MIN. ESP (IN. WG.)	MOTOR DATA: HP	RPM	V	PH	HZ	DX COOLING COIL DATA: MIN. TOTAL (MBH)	MIN. SENS. (MBH)	EAT: DB (deg F)	EAT: WB (deg F)	LAT: DB (deg F)	LAT: WB (deg F)	ROWS / FPI (MAX.)	MAX. APD (IN. WC.)	MIN. FACE VEL. (FPM)	SUPPLEMENTAL ELECTRIC HEATER DATA: MIN. CAP. REQ'D (MBH)	NOM. EAT (deg F)	MIN. LAT (deg F)	MIN. REQ'D kW	V	PH	HZ	MODEL NO.: (SEE NOTE 2)	OUTDOOR CONDENSING UNIT: MARK	NOM. CAP. (TONS)	COMPRESSOR DATA: NO. / SIZE	RLA (EA.)	AHRI INPUT (kW)	V	PH	HZ	STEP(S)	CONDENSER FAN DATA: MIN. REQ'D SEER	NO.	CFM (EA.)	MOTOR DATA: HP (EA.)	V	PH	HZ	REMARKS (SEE ASSOCIATED NOTES)
AHU-1	SOUTH CLOSET	1,200	120	0.50	1/2	1,050	208	1	60	36.2	31.2	80.00	67.00	59.5	57.5	4 / 14	0.30	250	35.2	68.0	95.0	10.3	208	3	60	BAYEABC15LG3AA	ACCU-1	3	1 / 3	13.2	2.39	208	1	60	1	14	1	4,710	1/6	208	1	60	TRANE MODEL 4TWB3036B & GAM9A0836, OR APPROVED EQUALS
AHU-2	NORTH CLOSET	1,200	120	0.50	1/2	1,050	208	1	60	36.2	31.2	80.00	67.00	59.5	57.5	4 / 14	0.30	250	35.2	68.0	95.0	10.3	208	3	60	BAYEABC15LG3AA	ACCU-2	3	1 / 3	13.2	2.39	208	1	60	1	14	1	4,760	1/6	208	1	60	TRANE MODEL 4TWB3036B & GAM9A0836, OR APPROVED EQUALS

NOTES:
1. PROVIDE AIR-COOLED CONDENSING UNITS WITH "LOW AMBIENT" COOLING CAPABILITY DOWN TO 35 DEG F.
2. SET AIR HANDLING UNIT MOTOR SPEED TAPS FOR MAXIMUM AIRFLOW THROUGH UNIT.
3. PROVIDE AIR-COOLED CONDENSING UNITS WITH SOUND ATTENUATION BLANKETING ON THE REFRIGERANT CIRCUIT COMPRESSOR(S).
4. PROVIDE INDOOR AIR HANDLERS WITH SINGLE-POINT POWER CONNECTION, AND SOUND BAFFLE KITS.
5. PROVIDE INDOOR AIR HANDLERS WITH PLENUM STAND INCLUDING INTEGRATED SOUND BAFFLE.

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CONSTRUCTION DOCUMENTS

COMMONWEALTH OF VIRGINIA — MARK A. PHILLIPS — Lic. No. 362.30 — 4/30/2013 — PROFESSIONAL ENGINEER

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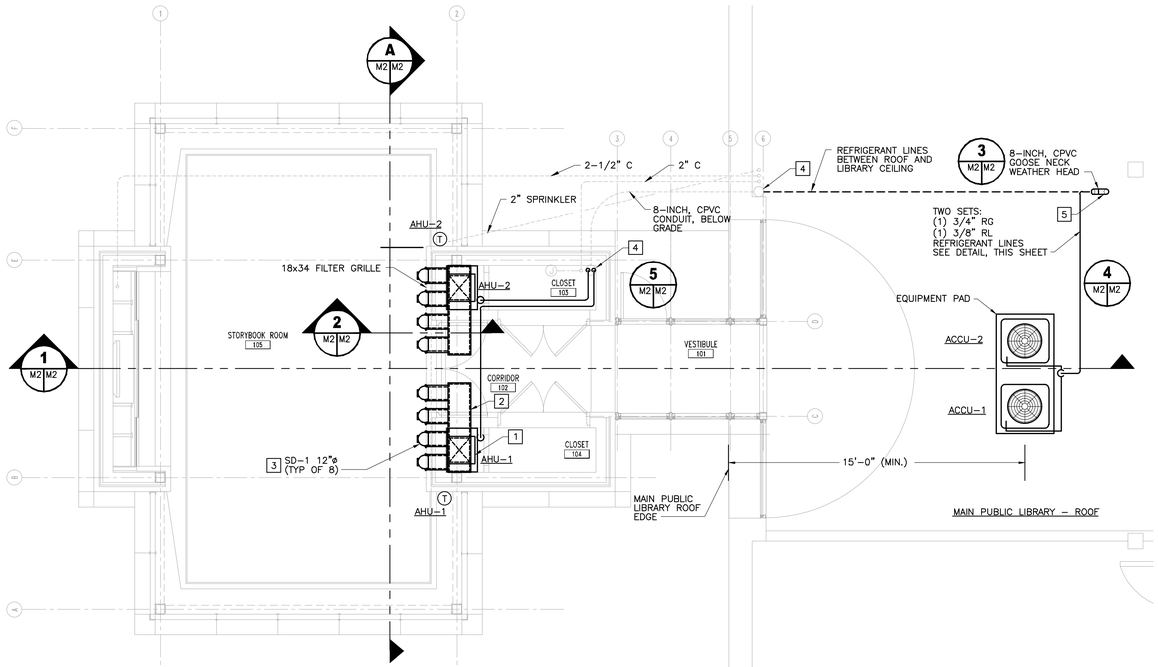
MECHANICAL – LEGEND, ABBREVIATIONS, GENERAL NOTES, AND SCHEDULES

sheet

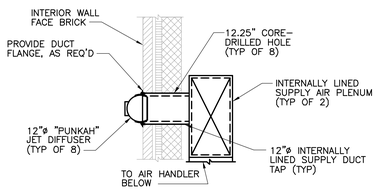
M1

date: APRIL 30, 2013
commission: 12-1010
drawn by: DFC



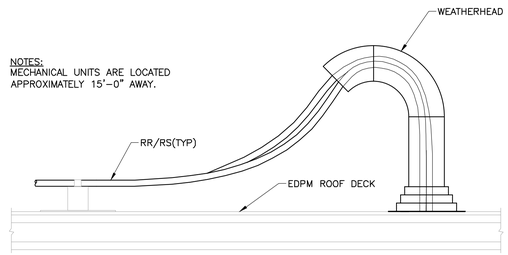
N HVAC MAIN FLOOR AND PARTIAL ROOF - PLAN

SCALE: 1/4" = 1'-0"



2 M2 M2 DETAIL - SPOT DIFFUSERS

SCALE NTS



3 M2 M2 DETAIL - ROOF WEATHER HEAD

SCALE NTS

1 PROVIDE SPLIT-SYSTEM HEAT PUMP UNIT PER EQUIPMENT SCHEDULE ON SHEET M1 AND MECHANICAL SPECIFICATIONS ON SHEETS M4 AND M5.

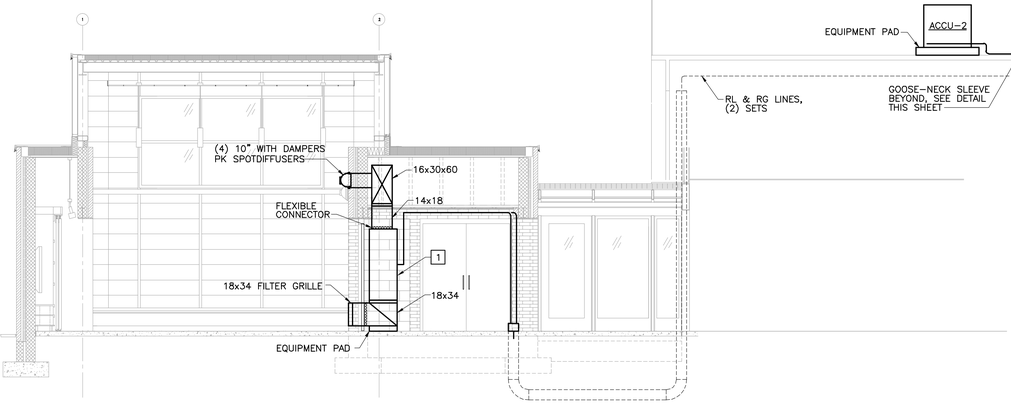
2 ALL SUPPLY AND RETURN AIR DUCTWORK AND PLENUMS SHALL BE INTERNALLY LINED TO ATTENUATE NOISE. REFER TO DUCT LINER SPECIFICATION ON SHEET M3, AND DUCT FABRICATION REQUIREMENTS AND SPECIFICATIONS ON SHEETS M3 AND M4.

3 PROVIDE "PUNKAH-STYLE" JET DIFFUSERS PER PLAN AND SCHEDULE, THIS SHEET. COORDINATE THE INSTALLATION OF JET DIFFUSERS WITH INDICATED LINED DUCT TAPS. PROVIDE "LEAST" OBTRUSIVE DUCT "END-FLANGE" FOR CONNECTION OF DIFFUSER, IF REQUIRED.

4 PROVIDE 8-INCH DIA. CPVC CARRIER PIPE UP THROUGH FLOOR, AND DOWN BELOW GRADE AS SHOWN, AND ROUTE REFRIGERANT PIPING TO AND FROM CONDENSING UNITS. BELOW GRADE PIPING SHALL HAVE (MIN.) 5 DIA. RADIUS BENDS AS NECESSARY AND REQUIRED TO ALLOW PROPER INSTALLATION OF REFRIGERANT LINES. COORDINATE CARRIER PIPE PROVISION WITH SITE/CIVIL WORK.

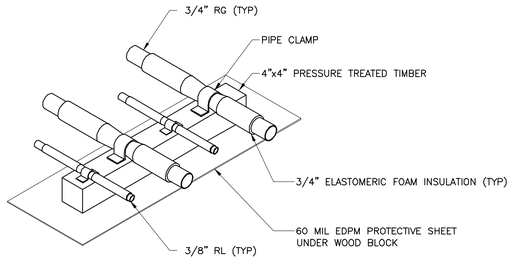
5 COORDINATE ROOF PENETRATION REQUIREMENTS AND INSTALLATION WITH HOLDER OF EXISTING EPDM ROOFING WARRANTY, SO AS NOT TO VOID EXISTING WARRANTY.

6 PROVIDE 34x18 FILTER GRILLE RETURN PER SCHEDULE THIS SHEET, AND SPECIFICATIONS ON SHEET M4. INSTALL BASE OF RETURN GRILLE A MIN. OF 4-INCHES ABOVE FINISHED FLOOR.



1 M2 M2 HVAC SECTION

SCALE 1/4"=1'-0"



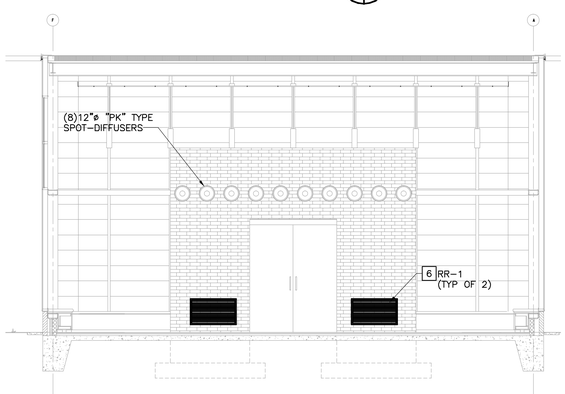
4 M2 M2 DETAIL - PIPING ROOF SUPPORT(S)

SCALE NTS

AIR DEVICE SCHEDULE

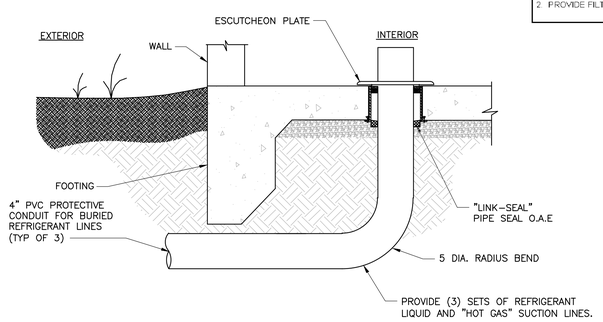
MARK	SERVICE	TYPE	MATERIAL	CFM RANGE	NECK SIZE	FACE SIZE	THROW	NOISE (NC)	ACCESSORIES	REMARKS
SD-1	SUPPLY AIR	DUCT - MTD. "PUNKAH" TYPE JET DIFFUSER	ALUMINUM	240 TO 300	12"	6-1/2" (MIN.)	1-WAY	25 OR LESS	VOLUME DAMPER; (MIN.) 70 DEG. ROTATION	SEIHO INTERNATIONAL, INC. MODEL: PK-12, OR APPROVED EQUAL; SEE NOTES
RR-1	RETURN AIR	SURF.-MTD. LOUVER-FACE FILTER REG.	ALUMINUM	500 TO 1250	34 X 18	36 x 20	–	25 OR LESS	w/ INTEGRAL OBD	ANEMOSTAT MODEL: XF35-1L-H-L-40-34x18-OBD-81 OR APPROVED EQUAL; SEE NOTES

NOTES:
1. DIFFUSER MOUNTING ADAPTER SHALL PROTRUDE NO MORE THAN 1/2-INCH BEYOND FACE OF BRICK.
2. PROVIDE FILTER REGISTER WITH "BOTTOM HINGE" AND 1-INCH "MERV 8" FILTER.



A M2 M2 INTERIOR ELEVATION (FACING LIBRARY)

SCALE 1/4"=1'-0"



5 M2 M2 DETAIL - BELOW GRADE PIPING

SCALE NTS

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HVAC – MAIN FLOOR, AND PARTIAL ROOF PLAN, SECTIONS, DETAILS AND NOTES

sheet

M2

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: DPC

MECHANICAL SPECIFICATIONS:

PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. THE DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING THE GENERAL AND SUPPLEMENTARY CONDITIONS, AND THE DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS AND ALL FOLLOWING SECTIONS.
B. ALL PROJECT AND OTHER DIVISION 23 SECTIONS.
1.2 SUBMITTALS
A. PRODUCT DATA: UNLESS OTHERWISE INDICATED, FOR EACH ITEM (OR PRODUCT) INDICATED IN ALL FOLLOWING SPECIFICATION SECTIONS AND/OR SHOWN ON THE DRAWINGS; PROVIDE THE MANUFACTURER'S STANDARD ENGINEERING DATA CUT-SHEETS – CLEARLY MARKED TO INDICATE THE PROPOSED ITEM(S) TO BE INCORPORATED INTO THE WORK – AND INDICATING, AT A MINIMUM, THE FOLLOWING: MODEL NO. AND TYPE; OVERALL EQUIPMENT AND SUB-ASSEMBLY DIMENSIONS, PROFILES AND CONSTRUCTION DETAILS; PERFORMANCE AND OPERATING DATA AND CHARACTERISTICS; ELECTRICAL DATA AND OPERATING CHARACTERISTICS (IF APPLICABLE); AND ALL FURNISHED OPTIONS, SPECIALTIES AND ACCESSORIES FOR EACH PRODUCT/ITEM/COMPONENT. ADDITIONALLY, PROVIDE ENGINEERING DATA ON THE EQUIPMENT AND/OR COMPONENT MATERIALS OF CONSTRUCTION; ANY AND ALL INDUSTRY STANDARDS, SUCH AS ANSI, ASTM, ASME, NFPA, AND UL, ETC. TO WHICH THE EQUIPMENT ITEMS ARE FABRICATED AND/OR MANUFACTURED; AND, PROVIDE THE MANUFACTURER'S QUALITY ASSURANCE CERTIFICATIONS AND WARRANTY DOCUMENTS.
1.3 QUALITY ASSURANCE
A. MECHANICAL/HVAC EQUIPMENT SELECTIONS: EQUIPMENT OF HIGHER ELECTRICAL CHARACTERISTICS, PHYSICAL DIMENSIONS, CAPACITIES, AND/OR RATINGS MAY BE FURNISHED; PROVIDED THAT THE PROPOSED ALTERNATE EQUIPMENT IS APPROVED IN WRITING BY THE ARCHITECT AND ENGINEER; AND, THE CONNECTING MECHANICAL AND ELECTRICAL SERVICES, DUCT/PIPE SIZES, CONTROL VALVES, BASES, MOTORS, CIRCUIT BREAKERS, CONDUCTORS, CONDUIT SIZES, AND EQUIPMENT SPACES, ETC. ARE APPROPRIATELY MODIFIED (UP-SIZED). IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE THESE ADDITIONAL REQUIREMENTS; AND, NO ADDITIONAL COSTS SHALL BE INCURRED BY THE OWNER, UNLESS APPROVED IN ADVANCE BY APPROPRIATE CONTRACT MODIFICATION FOR THESE INCREASES. IF MINIMUM ENERGY RATINGS AND/OR EFFICIENCIES ARE SPECIFIED, THE ALTERNATE EQUIPMENT SHALL COMPLY WITH THE STATED REQUIREMENTS.

SECTION 23 05 00 – BASIC MECHANICAL MATERIALS AND METHODS FOR HVAC
PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES:
1. PIPING MATERIALS AND INSTALLATION INSTRUCTIONS COMMON TO MOST PIPING SYSTEMS.
2. MECHANICAL SLEEVE SEALS
3. SLEEVES.
4. ESCUTCHEONS.
5. GROUT.
B. RELATED SECTIONS INCLUDE:
1. ARCHITECTURAL SECTIONS RELATED TO BUILDING ENVELOPE AND INTERIOR INSTALLATIONS.
2. ALL DIVISION 23 SECTIONS.
1.3 DEFINITIONS
A. FINISHED SPACES: SPACES OTHER THAN MECHANICAL AND ELECTRICAL EQUIPMENT ROOMS, FURRED SPACES, PIPE AND DUCT SHAFTS, UNHEATED SPACES IMMEDIATELY BELOW ROOF, SPACES ABOVE CEILINGS, UNEXCAVATED SPACES, CRAWL SPACES, AND TUNNELS.
B. EXPOSED, INTERIOR INSTALLATIONS: EXPOSED TO VIEW INDOORS. EXAMPLES INCLUDE FINISHED OCCUPIED SPACES AND MECHANICAL EQUIPMENT ROOMS.
C. EXPOSED, EXTERIOR INSTALLATIONS: EXPOSED TO VIEW OUTDOORS OR SUBJECT TO OUTDOOR AMBIENT TEMPERATURES AND WEATHER CONDITIONS. EXAMPLES INCLUDE ROOFTOP LOCATIONS.
D. CONCEALED, INTERIOR INSTALLATIONS: CONCEALED FROM VIEW AND PROTECTED FROM PHYSICAL CONTACT BY BUILDING OCCUPANTS. EXAMPLES INCLUDE ABOVE CEILINGS AND IN DUCT SHAFTS.
E. THE FOLLOWING ARE INDUSTRY ABBREVIATIONS FOR PLASTIC MATERIALS:
1. CPVC: CHLORINATED POLYVINYL CHLORIDE PLASTIC.
2. HDPE: HIGH-DENSITY POLYETHYLENE PLASTIC.
3. PE: POLYETHYLENE PLASTIC.
4. PEX: "CROSS-LINKED" POLYETHYLENE PLASTIC.
5. PVC: POLYVINYL CHLORIDE PLASTIC.
6. RTFE: REINFORCED POLYTETRAFLUOROETHYLENE PLASTIC.
F. THE FOLLOWING ARE INDUSTRY ABBREVIATIONS FOR RUBBER MATERIALS:
1. EPDM: ETHYLENE-PROPYLENE-DIENE TERPOLYMER RUBBER.
2. NBR: ACRYLONITRILE-BUTADIENE RUBBER. (BUNA-N)
G. WELDING CERTIFICATES.
1.4 QUALITY ASSURANCE
A. SOURCE LIMITATIONS FOR PRODUCTS: OBTAIN EACH TYPE OF ITEM (PRODUCT) FROM A SINGLE SOURCE, FROM A SINGLE MANUFACTURER.
B. STEEL SUPPORT WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO AWS D1.1, "STRUCTURAL WELDING CODE--STEEL."
C. STEEL PIPE WELDING: QUALIFY PROCESSES AND OPERATORS ACCORDING TO ASME BOILER AND PRESSURE VESSEL CODE: SECTION IX, "WELDING AND BRAZING QUALIFICATIONS."
1. COMPLY WITH THE PROVISIONS OF THE ASME B31 SERIES "CODE FOR PRESSURE PIPING" – ALL SECTIONS.
2. CERTIFY THAT EACH WELDER HAS PASSED AWS QUALIFICATION TESTS FOR WELDING PROCESSES INVOLVED AND THAT CERTIFICATION IS CURRENT.
D. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: SHALL BE "LISTED AND LABELED" AS DEFINED IN NFPA 70, ARTICLE 100, BY A "NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL)" ACCEPTABLE TO THE "AUTHORITIES HAVING JURISDICTION (AHJ)", AND MARKED FOR INTENDED USE.
E. PROVIDE PRODUCT CERTIFICATES INDICATING COMPLIANCE WITH ASTM STANDARDS.
1.5 DELIVERY, STORAGE, AND HANDLING
A. DELIVER PIPES AND TUBES WITH FACTORY-APPLIED END CAPS. MAINTAIN END CAPS THROUGH SHIPPING, STORAGE, AND HANDLING TO PREVENT PIPE END DAMAGE AND TO PREVENT ENTRANCE OF DIRT, DEBRIS, AND MOISTURE.
B. STORE ALL MATERIAL(S)/EQUIPMENT OUT OF THE WEATHER. COVER WITH PLASTIC SHEETS OR WOVEN TARPAULIN THOSE MATERIAL(S) AND/OR EQUIPMENT ITEMS THAT CANNOT BE REASONABLY STORED IN TEMPORARY STORAGE FACILITIES. SECURE COVERS IN A MANNER THAT WILL MAINTAIN PROTECTION THROUGHOUT STORAGE PERIOD, AND SO AS NOT BE BLOWN OFF SITE.
C. STORE PLASTIC PIPES PROTECTED FROM DIRECT SUNLIGHT. SUPPORT METAL AND PLASTIC PIPES TO PREVENT SAGGING AND BENDING.
1.6 COORDINATION
A. ARRANGE FOR PIPE SPACES, CHASES, SLOTS, AND OPENINGS IN BUILDING STRUCTURE DURING PROGRESS OF CONSTRUCTION, TO ALLOW FOR MECHANICAL INSTALLATIONS.
B. COORDINATE INSTALLATION OF REQUIRED SUPPORTING DEVICES AND SET SLEEVES IN POURED-IN-PLACE CONCRETE AND OTHER STRUCTURAL COMPONENTS AS THEY ARE CONSTRUCTED.
PART 2 – PRODUCTS
2.1 MANUFACTURERS
A. IN OTHER PART 2 ARTICLES WHERE SUB-PARAGRAPH TITLES BELOW INTRODUCE LISTS, THE FOLLOWING REQUIREMENTS APPLY FOR PRODUCT SELECTION:
1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THE SECTION, MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO THE MANUFACTURERS SPECIFIED / LISTED.
2.2 PIPE, TUBE, AND FITTINGS
A. REFER TO INDIVIDUAL DIVISION 23 PIPING SECTIONS – FOR PIPE, TUBE, AND FITTINGS (MATERIAL AND OTHER REQUIREMENTS) NOT SPECIFICALLY INDICATED IN THIS SECTION.
B. STEEL PIPE: NPS 2 (DN 50) AND SMALLER: ASTM A 53, TYPE S (SEAMLESS), GRADE B; SCHEDULES 40 AND 80, BLACK STEEL PIPE WITH PLAIN ENDS. STEEL PIPE: NPS 2-1/2 THROUGH NPS 12 (DN 65 THROUGH DN 300): ASTM A 53, TYPE E OR S (SEAMLESS OR ERW – ELECTRIC RESISTANCE WELDED), GRADE B; SCHEDULES 40 AND 80, BLACK STEEL WITH BUTT-WELDING ENDS.
C. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURER'S THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. ACIPCO – AMERICAN CAST IRON PIPE COMPANY
2. IPSCO
3. LEBARGE PIPE & STEEL COMPANY
4. U.S. STEEL – TUBULAR PRODUCTS DIVISION
5. WHEATLAND TUBE COMPANY – A DIVISION OF THE JOHN MANEELY CO.
D. MALLEABLE-IRON UNIONS: ASME B16.39; CLASS 150 WROUGHT-STEEL FITTINGS: ASTM A 234/A 234M, WALL THICKNESS AND ENDS TO MATCH ADJOINING PIPE. WROUGHT-STEEL FLANGES AND FLANGED FITTINGS: ASME B16.5, INCLUDING BOLTS, NUTS, AND GASKETS OF THE FOLLOWING MATERIAL GROUP, END CONNECTIONS, AND FACINGS:
1. MATERIAL GROUP: 1.1.
2. END CONNECTIONS: BUTT WELDING.
3. FACINGS: RAISED FACE.
E. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURER'S THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
a. ACIPCO – AMERICAN CAST IRON PIPE COMPANY
b. ANVIL INTERNATIONAL
c. FEDERAL FLANGE
d. LEBARGE PIPE & STEEL COMPANY
e. THE VIKING CORPORATION
f. WARD MANUFACTURING, INC.
g. WELDBEND CORPORATION
F. WELDING MATERIALS: COMPLY WITH SECTION II, PART C, OF THE ASME BOILER AND PRESSURE VESSEL CODE FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND FOR CHEMICAL ANALYSIS OF PIPE BEING WELDED.
G. GASKET MATERIAL: THICKNESS, MATERIAL, AND TYPE SUITABLE FOR FLUID TO BE HANDLED; AND DESIGN TEMPERATURES AND PRESSURES.
H. PIPE THREADS: ASME B1.20.1 FOR FACTORY-THREADED PIPE AND PIPE FITTINGS.
I. SOFT COPPER TUBE: ASTM B 88, TYPES K AND L (ASTM B 88M, TYPES A AND B), WATER TUBE, ANNEALED TEMPER. HARD COPPER TUBE: ASTM B 88, TYPES L AND M (ASTM B 88M, TYPES B AND C), WATER TUBE, DRAWN TEMPER.
1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURER'S THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
a. ALASKAN COPPER & BRASS COMPANY
b. ANSONIA COPPER & BRASS COMPANY
c. CERRO FLOW PRODUCTS, INC.
d. DRAWN METAL TUBE, INC.
e. ELKHART PRODUCTS CORP.
f. HUSSEY COPPER, LTD
g. MUELLER INDUSTRIES, INC.
h. WOLVERINE TUBE, INC.
2. COPPER PRESSURE FITTINGS: ASME B16.18, CAST-COPPER-ALLOY OR ASME B16.22, WROUGHT-COPPER, SOLDER-JOINT FITTINGS. FURNISH WROUGHT-COPPER FITTINGS, WHERE AVAILABLE.
3. COPPER AND COPPER ALLOY "PRESS-FIT" FITTINGS": ANSI BS-8537.
4. BRONZE FLANGES: ASME B16.24, CLASS 150, WITH SOLDER-JOINT ENDS. FURNISH CLASS 300 FLANGES, IF REQUIRED TO MATCH PIPING.
5. COPPER UNIONS: MSS SP-123, CAST-COPPER-ALLOY, HEXAGONAL-STOCK BODY, WITH BALL-AND-SOCKET, METAL-TO-METAL SEATING SURFACES, AND SOLDER-JOINT OR THREADED ENDS.
2.3 JOINING MATERIALS
A. REFER TO INDIVIDUAL DIVISION 23 PIPING SECTIONS FOR SPECIAL JOINING MATERIALS NOT LISTED BELOW.
B. PIPE-FLANGE GASKET MATERIALS: SUITABLE FOR CHEMICAL, THERMAL AND PRESSURE CONDITIONS OF SYSTEM FLUID AND PIPING.
1. ASME B16.21, NONMETALLIC, FLAT, ASBESTOS-FREE, 1/8-INCH (3.2-MM) MAXIMUM THICKNESS UNLESS THICKNESS OR SPECIFIC MATERIAL IS INDICATED.
a. FULL-FACE TYPE: FOR FLAT-FACE, CLASS 125, CAST-IRON AND CAST-BRONZE FLANGES.
b. NARROW-FACE TYPE: FOR RAISED-FACE, CLASS 250, CAST-IRON AND STEEL FLANGES.
2. AWWA C110, RUBBER, FLAT FACE, 1/8 INCH (3.2 MM) THICK, UNLESS OTHERWISE INDICATED; AND FULL-FACE OR RING TYPE, UNLESS OTHERWISE INDICATED.
C. FLANGE BOLTS AND NUTS: ASME B18.2.1, CARBON STEEL, UNLESS OTHERWISE INDICATED.
D. SOLDER FILLER METALS: ASTM B 32, LEAD-FREE ALLOYS. INCLUDE WATER-FLUSHABLE FLUX ACCORDING TO ASTM B 813.
E. BRAZING FILLER METALS: AWS A5.8, BCUP SERIES, COPPER-PHOSPHORUS ALLOYS FOR GENERAL-DUTY BRAZING, UNLESS OTHERWISE INDICATED; AND AWS A5.8, BAG1, SILVER ALLOY FOR REFRIGERANT PIPING, UNLESS OTHERWISE INDICATED.
F. WELDING FILLER METALS: COMPLY WITH AWS D10.12 FOR WELDING MATERIALS APPROPRIATE FOR WALL THICKNESS AND CHEMICAL ANALYSIS OF STEEL PIPE BEING WELDED.

2.4 MECHANICAL SLEEVE SEALS
A. DESCRIPTION: MODULAR SEALING ELEMENT UNIT, DESIGNED FOR FIELD ASSEMBLY, TO FILL ANNULAR SPACE BETWEEN PIPE AND SLEEVE.
1. AVAILABLE MANUFACTURERS:
a. ADVANCE PRODUCTS & SYSTEMS, INC.
b. CALPICO, INC.
c. METRAFLEX CO.
d. PIPELINE SEAL AND INSULATOR, INC. (PSI – LINKSEAL)
2. SEALING ELEMENTS: EPDM INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE. INCLUDE TYPE AND NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE.
3. PRESSURE PLATES: CARBON STEEL. INCLUDE TWO FOR EACH SEALING ELEMENT.
4. CONNECTING NUTS AND BOLTS: ASTM A194-12A (TYPE 304) NUTS AND ASTM F593-02 (2008) – (TYPE 304) STAINLESS STEEL BOLTS WITH CORROSION-RESISTANT COATING OF LENGTH REQUIRED TO SECURE PRESSURE PLATES TO SEALING ELEMENTS. INCLUDE ONE SET (NUMBER AS REQUIRED) FOR EACH SEALING ELEMENT.
2.5 SLEEVES
A. GALVANIZED-STEEL SHEET: 20GA. (0.0359-INCH) MINIMUM THICKNESS; ROUND TUBE CLOSED WITH WELDED LONGITUDINAL JOINT.
B. STEEL PIPE: ASTM A 53, TYPE E OR S, GRADE B, SCHEDULE 40, GALVANIZED, PLAIN ENDS.
C. STACK SLEEVE FITTINGS: MANUFACTURED, CAST-IRON SLEEVE WITH INTEGRAL CLAMPING FLANGE. INCLUDE CLAMPING RING AND BOLTS AND NUTS FOR MEMBRANE FLASHING.
1. UNDERDECK CLAMP: CLAMPING RING WITH SET SCREWS.
2.6 ESCUTCHEONS
A. DESCRIPTION: MANUFACTURED WALL AND CEILING ESCUTCHEONS AND FLOOR PLATES, WITH AN ID TO CLOSELY FIT AROUND PIPE, TUBE, AND INSULATION OF INSULATED PIPING AND AN OD THAT COMPLETELY COVERS OPENING.
B. ONE-PIECE, DEEP-PATTERN TYPE: DEEP-DRAWN, BOX-SHAPED BRASS WITH POLISHED CHROME-PLATED FINISH.
C. ONE-PIECE, CAST-BRASS TYPE: WITH SET SCREW.
1. FINISH: ROUGH BRASS OR POLISHED CHROME-PLATED.
D. SPLIT-CASTING, CAST-BRASS TYPE: WITH CONCEALED HINGE AND SET SCREW OR SPRING CLIPS.
1. FINISH: ROUGH BRASS.
E. SPLIT-PLATE, STAMPED-STEEL TYPE: WITH CONCEALED HINGE, SET SCREW OR SPRING CLIPS, AND CHROME-PLATED FINISH.
F. SPLIT-CASTING, FLOOR-PLATE TYPE: CAST BRASS WITH CONCEALED HINGE AND SET SCREW.
2.7 GROUT
A. DESCRIPTION: ASTM C 1107, GRADE B, NON-SHRINK / NON-METALLIC, DRY HYDRAULIC-CEMENT GROUT.
1. CHARACTERISTICS: POST-HARDENING, VOLUME-ADJUSTING, NON-STAINING, NON-CORROSIVE, NONGASEOUS, AND RECOMMENDED FOR INTERIOR AND EXTERIOR APPLICATIONS.
2. DESIGN MIX: 5000-PSI (34.5-MPA), 28-DAY COMPRESSIVE STRENGTH.
3. PACKAGING: PRE-MIXED AND FACTORY PACKAGED.
PART 3 – EXECUTION
3.1 PIPING SYSTEMS – COMMON REQUIREMENTS
A. INSTALL PIPING ACCORDING TO THE REQUIREMENTS BELOW, AND OTHER DIVISION 23 SECTIONS SPECIFYING INDIVIDUAL PIPING SYSTEM REQUIREMENTS.
B. DRAWING PLANS, ELEVATIONS, SECTIONS, SCHEMATICS, AND DIAGRAMS INDICATE THE GENERAL LOCATION AND ARRANGEMENT OF THE PIPING SYSTEMS. INDICATED LOCATIONS AND ARRANGEMENTS WERE USED TO SIZE PIPE AND CALCULATE FRICTION LOSS, EXPANSION, AND OTHER DESIGN CONSIDERATIONS. INSTALL PIPING AS INDICATED, UNLESS DEVIATIONS TO THE LAYOUT ARE APPROVED IN WRITING BY THE ENGINEER, OR SHOWN ON APPROVED COORDINATION DRAWINGS.
C. INSTALL PIPING IN CONCEALED LOCATIONS, UNLESS OTHERWISE INDICATED AND EXCEPT IN EQUIPMENT ROOMS AND SERVICE AREAS.
D. 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 APPROVED BY THE ENGINEER.
E. INSTALL PIPING TO PERMIT VALVE(S) AND EQUIPMENT SERVICING.
F. INSTALL PIPING AT INDICATED AND/OR REQUIRED SLOPES.
G. INSTALL PIPING FREE OF SAGS AND BENDS.
H. INSTALL FITTINGS FOR ALL CHANGES IN DIRECTION AND BRANCH CONNECTIONS.
I. INSTALL PIPING TO ALLOW APPLICATION OF INSULATION.
J. SELECT SYSTEM COMPONENTS (PIPE, FITTINGS, AND ALL OTHER REQUIRED APPURTENANCES) WITH PRESSURE RATINGS EQUAL TO OR GREATER THAN THE REQUIRED SYSTEM OPERATING PRESSURE.
K. PIPE WALL SLEEVES ARE NOT REQUIRED FOR PROPERLY CORE-DRILLED HOLES.
L. INSTALL PIPE WALL SLEEVES AROUND CARRIER PIPES PASSING THROUGH CONCRETE AND MASONRY WALLS, AND CONCRETE FLOOR AND ROOF SLABS.
1. CUT PIPE SLEEVES TO LENGTH FOR MOUNTING FLUSH WITH BOTH WALL SURFACES.
2. INSTALL SLEEVES THAT ARE LARGE ENOUGH TO PROVIDE 1/4-INCH (6.4-MM) ANNULAR CLEAR SPACE BETWEEN PIPE SLEEVE AND PIPE, OR PIPE SLEEVE AND CARRIER PIPE INSULATION. USE THE FOLLOWING SLEEVE MATERIALS:
a. STEEL PIPE SLEEVES: FOR PIPES SMALLER THAN NPS 6 (DN 150).
3. EXCEPT FOR UNDERGROUND WALL PENETRATIONS, SEAL ANNULAR SPACE BETWEEN SLEEVE AND PIPE OR PIPE INSULATION, USING JOINT SEALANTS APPROPRIATE FOR SIZE, DEPTH, AND LOCATION OF JOINT. REFER TO DIVISION 7 SECTION "JOINT SEALANTS" FOR MATERIALS AND INSTALLATION.
M. ABOVEGROUND, EXTERIOR-WALL PIPE PENETRATIONS: SEAL PENETRATIONS USING SLEEVES AND MECHANICAL SLEEVE SEALS. SELECT SLEEVE SIZE TO ALLOW FOR 1-INCH (25-MM) ANNULAR CLEAR SPACE BETWEEN PIPE AND SLEEVE FOR INSTALLING MECHANICAL SLEEVE SEALS.
1. INSTALL STEEL PIPE FOR SLEEVES SMALLER THAN 6 INCHES (150 MM) IN DIAMETER.
2. INSTALL SHEET METAL PIPE SLEEVES FOR ALL PENETRATIONS THROUGH INTERIOR, NON-MASONRY WALLS.
N. FIRE-BARRIER PENETRATIONS: MAINTAIN INDICATED FIRE RATING OF WALLS, PARTITIONS, CEILINGS, AND FLOORS AT PIPE PENETRATIONS. SEAL PIPE PENETRATIONS WITH FIRE-STOP MATERIALS. REFER TO DIVISION 7 SECTION "THROUGH-PENETRATION FIRE-STOP SYSTEMS" FOR MATERIALS.
O. VERIFY FINAL EQUIPMENT LOCATIONS FOR ROUGHING-IN.
P. REFER TO OTHER SECTIONS OF THESE SPECIFICATIONS FOR SPECIFIC EQUIPMENT ROUGHING-IN REQUIREMENTS.
3.2 PIPING JOINT CONSTRUCTION
A. JOIN PIPE AND FITTINGS ACCORDING TO THE REQUIREMENTS INDICATED BELOW AND DIVISION 23 SECTIONS SPECIFYING INDIVIDUAL PIPING SYSTEMS.
B. REAM ENDS OF PIPE(S) AND TUBE(S) TO REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.
C. REMOVE ALL DIRT, OIL, SCALE, SLAG AND DEBRIS FROM THE INSIDE AND OUTSIDE OF PIPE(S), TUBE(S) AND ASSOCIATED FITTINGS PRIOR TO ASSEMBLY.
D. 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.
E. BRAZED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS'S "BRAZING HANDBOOK," "PIPE AND TUBE" CHAPTER, USING COPPER-PHOSPHORUS BRAZING FILLER METAL COMPLYING WITH AWS A5.8.
F. THREADED JOINTS: THREAD PIPE WITH TAPERED PIPE THREADS ACCORDING TO ASME B1.20.1. CUT THREADS FULL AND CLEAN USING SHARP DIES. REAM THREADED PIPE ENDS TO REMOVE BURRS AND RESTORE FULL ID. JOIN PIPE, FITTINGS AND VALVES AS FOLLOWS:
1. APPLY APPROPRIATE TAPE OR THREAD COMPOUND TO EXTERNAL PIPE THREADS, UNLESS DRY SEAL THREADING IS SPECIFICALLY INDICATED.
2. ENSURE THAT THREAD TAPE AND/OR COMPOUND IS COMPATIBLE WITH CONVEYED SYSTEM FLUID.
3. DAMAGED THREADS: DO NOT USE PIPE OR PIPE FITTINGS WITH THREADS THAT ARE CORRODED OR DAMAGED. DO NOT USE PIPE SECTIONS THAT HAVE CRACKED OR OPEN WELDS.
4. UPON COMPLETION OF EACH THREADED PIPE JOINT, REMOVE ALL EXCESS PIPE THREAD COMPOUND FROM PIPE AND FITTING.
G. WELDED JOINTS: CONSTRUCT JOINTS ACCORDING TO AWS D10.12, USING QUALIFIED PROCESSES AND WELDING OPERATORS ACCORDING TO PART 1 "QUALITY ASSURANCE" ARTICLE.
3.3 PIPING CONNECTIONS
A. MAKE CONNECTIONS ACCORDING TO THE FOLLOWING, UNLESS OTHERWISE INDICATED:
1. INSTALL UNIONS, IN PIPING NPS 2 (DN 50) AND SMALLER, ADJACENT TO EACH VALVE AND AT FINAL CONNECTION TO EACH PIECE OF EQUIPMENT.
2. WET PIPING SYSTEMS: INSTALL DIELECTRIC COUPLING AND NIPPLE FITTINGS TO CONNECT PIPING MATERIALS OF DISSIMILAR METALS.
3.4 EQUIPMENT INSTALLATION – COMMON REQUIREMENTS
A. INSTALL MECHANICAL/HVAC EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURERS' WRITTEN INSTRUCTIONS AND RECOMMENDATIONS.
B. INSTALL EQUIPMENT LEVEL AND PLUMB, PARALLEL AND PERPENDICULAR TO BUILDING LINES (SURFACES), AND OTHER SYSTEMS/COMPONENTS IN CONCEALED AND EXPOSED SPACES, UNLESS OTHERWISE INDICATED.
C. INSTALL MECHANICAL/HVAC EQUIPMENT TO FACILITATE EASE OF SERVICE, MAINTENANCE, AND/OR REPAIR – REPLACEMENT OF EQUIPMENT COMPONENTS. CONNECT EQUIPMENT FOR EASE OF DISCONNECTION, WITH MINIMUM INTERFERENCE TO OTHER INSTALLATIONS. EXTEND GREASE FITTINGS TO ACCESSIBLE LOCATIONS.
D. INSTALL PIPING AND EQUIPMENT TO ALLOW RIGHT-OF-WAY FOR PIPING SYSTEMS REQUIRED TO BE INSTALLED AT SPECIFIC SLOPE(S).
E. INSTALL EQUIPMENT TO ALLOW FOR MAXIMUM POSSIBLE HEADROOM, IF SPECIFIC MOUNTING HEIGHTS ARE NOT INDICATED.
3.5 PAINTING
A. PAINTING OF MECHANICAL SYSTEMS, EQUIPMENT, AND COMPONENTS IS SPECIFIED IN DIVISION 9 SECTION "PAINTING (PROFESSIONAL LINE PRODUCTS)."
B. DAMAGE AND TOUCHUP: REPAIR MARRED AND DAMAGED FACTORY-PAINTED FINISHES WITH MATERIALS AND PROCEDURES TO MATCH ORIGINAL FACTORY FINISH.
3.6 ERECTION OF METAL SUPPORTS AND ANCHORAGES
A. REFER TO DIVISION 5 SECTION "METAL FABRICATIONS" FOR STRUCTURAL STEEL.
B. CUT, FIT, AND PLACE MISCELLANEOUS METAL SUPPORTS ACCURATELY IN LOCATION, ALIGNMENT, AND ELEVATION TO SUPPORT AND ANCHOR MECHANICAL MATERIALS AND EQUIPMENT.
C. FIELD WELDING: COMPLY WITH AWS D1.1.
3.7 ERECTION OF WOOD SUPPORTS AND ANCHORAGES
A. CUT, FIT, AND PLACE WOOD GROUNDS, NAILERS, BLOCKING, AND ANCHORAGES TO SUPPORT, AND ANCHOR MECHANICAL MATERIALS AND EQUIPMENT.
B. SELECT FASTENER SIZES THAT WILL NOT PENETRATE MEMBERS IF OPPOSITE SIDE WILL BE EXPOSED TO VIEW OR WILL RECEIVE FINISH MATERIALS. TIGHTEN CONNECTIONS BETWEEN MEMBERS. INSTALL FASTENERS WITHOUT SPLITTING WOOD MEMBERS.
C. ATTACH TO SUBSTRATES AS REQUIRED TO SUPPORT APPLIED LOADS.
3.8 GROUTING
A. MIX AND INSTALL GROUT FOR MECHANICAL EQUIPMENT BASE BEARING SURFACES, PUMPS AND OTHER EQUIPMENT BASE PLATES, AND ANCHORS.
B. CLEAN SURFACES THAT WILL COME INTO CONTACT WITH GROUT.
C. PROVIDE FORMS AS REQUIRED FOR THE PLACEMENT OF GROUT.
D. AVOID AIR ENTRAPMENT DURING PLACEMENT OF GROUT.
E. PLACE GROUT, COMPLETELY FILLING EQUIPMENT BASES.
F. PLACE GROUT ON CONCRETE BASES AND PROVIDE SMOOTH BEARING SURFACE FOR EQUIPMENT.
G. PLACE GROUT AROUND ANCHORS.
H. CURE PLACED GROUT.
END OF SECTION – 23 05 00

SECTION 23 07 13 – HVAC DUCT INSULATION
PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES REQUIREMENTS FOR INSULATING THE FOLLOWING HVAC DUCT SERVICES:
1. INDOOR, CONCEALED SUPPLY AND OUTDOOR AIR.
2. INDOOR, EXPOSED SUPPLY AND OUTDOOR AIR.
3. AND, SOUND ATTENUATING DUCT LINERS.
B. RELATED SECTIONS INCLUDE:
1. OTHER DIVISION 23 SECTIONS.
1.3 SUBMITTALS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3; AND INCLUDE THERMAL CONDUCTIVITY, WATER-VAPOR PERMEANCE THICKNESS, AND JACKETS (BOTH FACTORY- AND FIELD-APPLIED IF ANY).
B. LEED SUBMITTALS:
1. PRODUCT DATA FOR PREREQUISITE EA 2: DOCUMENTATION INDICATING THAT DUCT INSULATION R-VALUES COMPLY WITH TABLES IN ASHRAE/IESNA 90.1-2010, SECTION 6 – "HEATING, VENTILATING, AND AIR CONDITIONING."
2. PRODUCT DATA FOR CREDIT EQ 4.1: FOR ADHESIVES AND SEALANTS, DOCUMENTATION INCLUDING PRINTED STATEMENT OF VOC CONTENT AND CHEMICAL COMPONENTS.
C. QUALIFICATION DATA: FOR QUALIFIED INSTALLER.
D. MATERIAL TEST REPORTS: FROM A QUALIFIED TESTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION INDICATING, INTERPRETING, AND CERTIFYING TEST RESULTS FOR COMPLIANCE OF INSULATION MATERIALS, SEALERS, ATTACHMENTS, CEMENTS, AND JACKETS, WITH REQUIREMENTS INDICATED. INCLUDE DATES OF TESTS AND TEST METHODS EMPLOYED.
E. FIELD QUALITY-CONTROL REPORTS.

b. PROJECT SHEET-METAL MATERIALS INCLUDE: GALVANIZED STEEL, ALUMINUM, AND STAINLESS. PROVIDED CDWP'S SHALL NOT DAMAGE, DEGRADE, OR CORRODE THE DUCT MATERIALS TO WHICH THEY ARE INSTALLED. CONTRACTOR SHALL COORDINATE INSTALLATION OF PROPER WELD PINS WITH DUCT MATERIAL SUBSTRATE.
2. INSULATION-RETAINING WASHERS: SELF-LOCKING WASHERS FORMED FROM 0.016-INCH- (0.41-MM-) THICK, GALVANIZED-STEEL, ALUMINUM, OR STAINLESS-STEEL SHEET, WITH BEVELED EDGE SIZED AS REQUIRED TO HOLD INSULATION SECURELY IN PLACE BUT NOT LESS THAN 1-1/2 INCHES (38 MM) IN DIAMETER.
a. PRODUCTS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1) AGM INDUSTRIES, INC.; RC-150.
2) GEMCO; R-150.
3) MIDWEST FASTENERS, INC.; WA-150.
4) NELSON STUD WELDING; SPEED CLIPS.
b. PROTECT ENDS WITH CAPPED SELF-LOCKING WASHERS INCORPORATING A SPRING STEEL INSERT TO ENSURE PERMANENT RETENTION OF CAP IN EXPOSED LOCATIONS.
A. STAPLES: OUTWARD-CLINCHING INSULATION STAPLES, NOMINAL 3/4-INCH- (19-MM-) WIDE, STAINLESS STEEL OR MONEL.
B. WIRE: 0.080-INCH (2.0-MM) NICKEL-COPPER ALLOY OR 0.062-INCH (1.6-MM) SOFT-ANNEALED, GALVANIZED STEEL – AS REQUIRED, FOR THE EXPOSED CONDITIONS.
1. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
a. C & F WIRE.
b. OR, ENGINEER APPROVED EQUAL.
2.9 CORNER ANGLES
A. ALUMINUM CORNER ANGLES: 0.080 INCH (2.0 MM) THICK, MINIMUM 1 BY 1 INCH (25 BY 25 MM), ALUMINUM ACCORDING TO ASTM B 209 (ASTM B 209M), ALLOY 3003, 3005, 3105, OR 5005; TEMPER H-14.
PART 3 – EXECUTION
3.1 EXAMINATION
A. EXAMINE SUBSTRATES AND CONDITIONS FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF INSULATION APPLICATION.
1. VERIFY THAT SYSTEMS TO BE INSULATED HAVE BEEN TESTED AND ARE FREE OF DEFECTS.
2. VERIFY THAT SURFACES TO BE INSULATED ARE CLEAN AND DRY.
B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
3.2 PREPARATION
A. SURFACE PREPARATION: CLEAN AND DRY SURFACES TO RECEIVE INSULATION. REMOVE MATERIALS THAT WILL ADVERSELY AFFECT INSULATION APPLICATION.
3.3 GENERAL INSTALLATION REQUIREMENTS
A. INSTALL INSULATION MATERIALS, ACCESSORIES, AND FINISHES WITH SMOOTH, STRAIGHT, AND EVEN SURFACES; FREE OF VOIDS THROUGHOUT THE LENGTH OF DUCTS AND FITTINGS.
B. INSTALL INSULATION MATERIALS, VAPOR BARRIERS OR RETARDERS, JACKETS, AND THICKNESSES REQUIRED FOR EACH ITEM OF DUCT SYSTEM AS SPECIFIED IN INSULATION SYSTEM SCHEDULES.
C. INSTALL ACCESSORIES COMPATIBLE WITH INSULATION MATERIALS AND SUITABLE FOR THE SERVICE. INSTALL ACCESSORIES THAT DO NOT CORRODE, SOFTEN, OR OTHERWISE ATTACK INSULATION OR JACKET IN EITHER WET OR DRY STATE.
D. INSTALL INSULATION WITH LONGITUDINAL SEAMS AT TOP AND BOTTOM OF HORIZONTAL RUNS.
E. INSTALL MULTIPLE LAYERS OF INSULATION WITH LONGITUDINAL AND END SEAMS STAGGERED.
F. KEEP INSULATION MATERIALS DRY DURING APPLICATION AND FINISHING.
G. INSTALL INSULATION WITH TIGHT LONGITUDINAL SEAMS AND END JOINTS. BOND SEAMS AND JOINTS WITH ADHESIVE RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
H. INSTALL INSULATION WITH LEAST NUMBER OF JOINTS PRACTICAL.
I. WHERE VAPOR BARRIER IS INDICATED, SEAL JOINTS, SEAMS, AND PENETRATIONS IN INSULATION AT HANGERS, SUPPORTS, ANCHORS, AND OTHER PROJECTIONS WITH VAPOR-BARRIER MASTIC.
1. INSTALL INSULATION CONTINUOUSLY THROUGH HANGERS AND AROUND ANCHOR ATTACHMENTS.
2. FOR INSULATION APPLICATION WHERE VAPOR BARRIERS ARE INDICATED, EXTEND INSULATION ON ANCHOR LEGS FROM POINT OF ATTACHMENT TO SUPPORTED ITEM TO POINT OF ATTACHMENT TO STRUCTURE. TAPER AND SEAL ENDS AT ATTACHMENT TO STRUCTURE WITH VAPOR-BARRIER MASTIC.
3. INSTALL INSERT MATERIALS AND INSTALL INSULATION TO TIGHTLY JOIN THE INSERT. SEAL INSULATION TO INSULATION INSERTS WITH ADHESIVE OR SEALING COMPOUND RECOMMENDED BY INSULATION MATERIAL MANUFACTURER.
J. APPLY ADHESIVES, MASTICS, AND SEALANTS AT MANUFACTURER'S RECOMMENDED COVERAGE RATE AND WET AND DRY FILM THICKNESSES.
K. INSTALL INSULATION WITH FACTORY-APPLIED JACKETS AS FOLLOWS:
1. DRAW JACKET TIGHT AND SMOOTH.
2. COVER CIRCUMFERENTIAL JOINTS WITH 3-INCH- (75-MM-) WIDE STRIPS, OF SAME MATERIAL AS INSULATION JACKET. SECURE STRIPS WITH ADHESIVE AND OUTWARD CLINCHING STAPLES ALONG BOTH EDGES OF STRIP, SPACED 4 INCHES (100 MM) O.C.
3. OVERLAP JACKET LONGITUDINAL SEAMS AT LEAST 1-1/2 INCHES (38 MM). CLEAN AND DRY SURFACE TO RECEIVE SELF-SEALING LAP. STAPLE LAPS WITH OUTWARD CLINCHING STAPLES ALONG EDGE AT 3 INCHES (75 MM) O.C.
a. FOR BELOW AMBIENT SERVICES, APPLY VAPOR-BARRIER MASTIC OVER STAPLES.
4. COVER JOINTS AND SEAMS WITH TAPE, ACCORDING TO INSULATION MATERIAL MANUFACTURER'S WRITTEN INSTRUCTIONS, TO MAINTAIN VAPOR SEAL.
5. WHERE VAPOR BARRIERS ARE INDICATED, APPLY VAPOR-BARRIER MASTIC ON SEAMS AND JOINTS AND AT ENDS ADJACENT TO DUCT FLANGES AND FITTINGS.
L. CUT INSULATION IN A MANNER TO AVOID COMPRESSING INSULATION MORE THAN 75 PERCENT OF ITS NOMINAL THICKNESS.
M. FINISH INSTALLATION WITH SYSTEMS AT OPERATING CONDITIONS. REPAIR JOINT SEPARATIONS AND CRACKING DUE TO THERMAL MOVEMENT.
N. REPAIR DAMAGED INSULATION FACINGS BY APPLYING SAME FACING MATERIAL OVER DAMAGED AREAS. EXTEND PATCHES AT LEAST 4 INCHES (100 MM) BEYOND DAMAGED AREAS. ADHERE, STAPLE, AND SEAL PATCHES SIMILAR TO BUTT JOINTS.
3.4 PENETRATIONS
A. INSULATION INSTALLATION AT ROOF PENETRATIONS: INSTALL INSULATION CONTINUOUSLY THROUGH ROOF PENETRATIONS.
1. SEAL PENETRATIONS WITH FLASHING SEALANT.
2. FOR APPLICATIONS REQUIRING ONLY INDOOR INSULATION, TERMINATE INSULATION ABOVE ROOF SURFACE AND SEAL WITH JOINT SEALANT. FOR APPLICATIONS REQUIRING INDOOR AND OUTDOOR INSULATION, INSTALL INSULATION FOR OUTDOOR APPLICATIONS TIGHTLY JOINED TO INDOOR INSULATION ENDS. SEAL JOINT WITH JOINT SEALANT.
3. EXTEND JACKET OF OUTDOOR INSULATION OUTSIDE ROOF FLASHING AT LEAST 2 INCHES (50 MM) BELOW TOP OF ROOF FLASHING.
4. SEAL JACKET TO ROOF FLASHING WITH FLASHING SEALANT.
B. INSULATION INSTALLATION AT INTERIOR WALL AND PARTITION PENETRATIONS (THAT ARE NOT FIRE RATED): INSTALL INSULATION CONTINUOUSLY THROUGH WALLS AND PARTITIONS.
C. INSULATION INSTALLATION AT FIRE-RATED WALL AND PARTITION PENETRATIONS: TERMINATE INSULATION AT FIRE DAMPER SLEEVES FOR FIRE-RATED WALL AND PARTITION PENETRATIONS. EXTERNALLY INSULATE DAMPER SLEEVES TO MATCH ADJACENT INSULATION AND OVERLAP DUCT INSULATION AT LEAST 2 INCHES (50 MM).
1. COMPLY WITH REQUIREMENTS IN DIVISION 07 SECTION "PENETRATION FIRE-STOPPING" FOR FIRE-STOPPING AND FIRE-RESISTIVE JOINT SEALERS.
D. INSULATION INSTALLATION AT FLOOR PENETRATIONS:
1. DUCT: FOR PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES, TERMINATE INSULATION AT FIRE DAMPER SLEEVES AND EXTERNALLY INSULATE DAMPER SLEEVE BEYOND FLOOR TO MATCH ADJACENT DUCT INSULATION. OVERLAP DAMPER SLEEVE AND DUCT INSULATION AT LEAST 2 INCHES (50 MM).
2. SEAL PENETRATIONS THROUGH FIRE-RATED ASSEMBLIES. COMPLY WITH REQUIREMENTS IN DIVISION 07 SECTION "PENETRATION FIRE-STOPPING."
3.5 INSTALLATION OF MINERAL-FIBER INSULATION
A. BLANKET INSULATION INSTALLATION ON DUCTS AND PLENUMS: SECURE WITH ADHESIVE AND INSULATION PINS.
1. APPLY ADHESIVES ACCORDING TO MANUFACTURER'S RECOMMENDED COVERAGE RATES PER UNIT AREA, FOR 100 PERCENT COVERAGE OF DUCT AND PLENUM SURFACES.
2. APPLY ADHESIVE TO ENTIRE CIRCUMFERENCE OF DUCT(S), AND TO ALL SURFACES OF FITTINGS AND TRANSITIONS.
3. INSTALL EITHER CAPACITOR-DISCHARGE-WELD PINS AND SPEED WASHERS OR CUPPED-HEAD, CAPACITOR-DISCHARGE-WELD PINS ON SIDES AND BOTTOM OF HORIZONTAL DUCTS AND SIDES OF VERTICAL DUCTS AS FOLLOWS:
a. ON DUCT SIDES WITH DIMENSIONS 18 INCHES (450 MM) AND SMALLER, PLACE PINS ALONG LONGITUDINAL CENTERLINE OF DUCT. SPACE 3 INCHES (75 MM) MAXIMUM FROM INSULATION END JOINTS, AND 16 INCHES (400 MM) O.C.
b. ON DUCT SIDES WITH DIMENSIONS LARGER THAN 18 INCHES (450 MM), PLACE PINS 16 INCHES (400 MM) O.C. EACH WAY, AND 3 INCHES (75 MM) MAXIMUM FROM INSULATION JOINTS. INSTALL ADDITIONAL PINS TO HOLD INSULATION TIGHTLY AGAINST SURFACE AT CROSS BRACING.
c. PINS MAY BE OMITTED FROM TOP SURFACE OF HORIZONTAL, RECTANGULAR DUCTS AND PLENUMS.
d. DO NOT OVER-COMPRESS INSULATION DURING INSTALLATION.
e. IMPALE INSULATION OVER PINS AND ATTACH SPEED WASHERS.
f. CUT EXCESS PORTION OF PINS EXTENDING BEYOND SPEED WASHERS OR BEND PARALLEL WITH INSULATION SURFACE. COVER EXPOSED PINS AND WASHERS WITH TAPE MATCHING INSULATION FACING.
4. FOR DUCTS AND PLENUMS WITH SURFACE TEMPERATURES BELOW AMBIENT, INSTALL A CONTINUOUS UNBROKEN VAPOR BARRIER. CREATE A FACING LAP FOR LONGITUDINAL SEAMS AND END JOINTS WITH INSULATION BY REMOVING 2 INCHES (50 MM) FROM ONE EDGE AND ONE END OF INSULATION SEGMENT. SECURE LAPS TO ADJACENT INSULATION SECTION WITH 1/2-INCH (13-MM) OUTWARD-CLINCHING STAPLES, 1 INCH (25 MM) O.C. INSTALL VAPOR BARRIER CONSISTING OF FACTORY- OR FIELD-APPLIED JACKET, ADHESIVE, VAPOR-BARRIER MASTIC, AND SEALANT AT JOINTS, SEAMS, AND PROTRUSIONS.
a. REPAIR PUNCTURES, TEARS, AND PENETRATIONS WITH TAPE OR MASTIC TO MAINTAIN VAPOR-BARRIER SEAL.
b. INSTALL VAPOR STOPS FOR DUCTWORK AND PLENUMS OPERATING BELOW 50 DEG F (10 DEG C) AT 18-FOOT (5.5-M) INTERVALS. VAPOR STOPS SHALL CONSIST OF VAPOR-BARRIER MASTIC APPLIED IN A Z-SHAPED PATTERN OVER INSULATION FACE, ALONG BUTT END OF INSULATION, AND OVER THE SURFACE. COVER INSULATION FACE AND SURFACE TO BE INSULATED A WIDTH EQUAL TO TWO TIMES THE INSULATION THICKNESS, BUT NOT LESS THAN 3 INCHES (75 MM).
5. OVERLAP FACED AND UN-FACED BLANKETS A MINIMUM OF 2 INCHES (50 MM) ON LONGITUDINAL SEAMS AND END JOINTS. AT END JOINTS, SECURE WITH STEEL BANDS SPACED A MAXIMUM OF 18 INCHES (450 MM) O.C.
6. INSTALL INSULATION ON RECTANGULAR DUCT ELBOWS AND TRANSITIONS WITH A FULL INSULATION SECTION FOR EACH SURFACE. INSTALL INSULATION ON ROUND AND FLAT-OVAL DUCT ELBOWS WITH INDIVIDUALLY MITERED GORES CUT TO FIT THE ELBOW.
7. INSULATE DUCT STIFFENERS, HANGERS, AND FLANGES THAT PROTRUDE BEYOND INSULATION SURFACE WITH 6-INCH- (150-MM-) WIDE STRIPS OF SAME MATERIAL USED TO INSULATE DUCT. SECURE ON ALTERNATING SIDES OF STIFFENER, HANGER, AND FLANGE WITH PINS SPACED 6 INCHES (150 MM) O.C.
3.6 FINISHES
A. INSULATION WITH PAINTABLE JACKET MATERIAL: PAINT JACKET WITH PAINT SYSTEM IDENTIFIED BELOW AND AS SPECIFIED IN DIVISION 09 PAINTING SECTIONS.
1. FLAT ACRYLIC FINISH: TWO (2) FINISH COATS OVER A PRIMER THAT IS COMPATIBLE WITH JACKET MATERIAL AND FINISH COAT PAINT. ADD FUNGICIDAL AGENT TO RENDER FABRIC MILDEW PROOF.
a. FINISH COAT MATERIAL: INTERIOR, FLAT, LATEX-EMULSION SIZE.
b. NO PAINTING REQUIRED FOR DUCTWORK WITH FSK JACKETED INSULATION.
B. FLEXIBLE ELASTOMERIC THERMAL INSULATION: AFTER ADHESIVE HAS FULLY CURED, APPLY TWO COATS OF INSULATION MANUFACTURER'S RECOMMENDED PROTECTIVE COATING.
C. COLOR: FINAL COLOR AS SELECTED BY ARCHITECT. VARY FIRST AND SECOND COATS TO ALLOW VISUAL INSPECTION OF THE COMPLETED WORK.
D. DO NOT FIELD PAINT ALUMINUM OR STAINLESS-STEEL JACKETS.
3.7 FIELD QUALITY CONTROL
A. TESTING AGENCY: OWNER WILL ENGAGE A QUALIFIED TESTING AGENCY TO PERFORM INDEPENDENT TESTS AND INSPECTIONS.
B. PERFORM TESTS AND INSPECTIONS.
C. TESTS AND INSPECTIONS:
1. INSPECT DUCTWORK, RANDOMLY SELECTED BY ARCHITECT / ENGINEER, BY REMOVING FIELD-APPLIED JACKET AND INSULATION IN LAYERS IN REVERSE ORDER OF THEIR INSTALLATION. EXTENT OF INSPECTION SHALL BE LIMITED TO TWO (2) LOCATION(S) FOR EACH DUCT SYSTEM DEFINED IN THE "DUCT INSULATION SCHEDULE, GENERAL" ARTICLE.
D. ALL INSULATION APPLICATIONS WILL BE CONSIDERED DEFECTIVE WORK IF SAMPLE INSPECTION REVEALS NON-COMPLIANCE WITH REQUIREMENTS.
3.8 DUCT INSULATION SCHEDULE, GENERAL
A. PLENUMS AND DUCTS REQUIRING INSULATION AND LINERS:
1. INDOOR, CONCEALED SUPPLY, RETURN, AND OUTDOOR AIR.
2. INDOOR, EXPOSED SUPPLY, RETURN, AND OUTDOOR AIR.
B. ITEMS NOT INSULATED:
1. FACTORY-INSULATED FLEXIBLE DUCTS.
2. FACTORY-INSULATED PLENUMS AND CASINGS.
3. FLEXIBLE CONNECTORS.
4. VIBRATION-CONTROL DEVICES.
5. FACTORY-INSULATED ACCESS PANELS AND DOORS.

3.9 INDOOR DUCT AND PLENUM INSULATION, AND LINER SCHEDULE
A. CONCEALED, ROUND, SUPPLY-AIR DUCT INSULATION AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
B. CONCEALED, ROUND, OUTDOOR-AIR DUCT INSULATION SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 2-1/2 INCHES (65 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
C. CONCEALED, RECTANGULAR, SUPPLY-AIR DUCT AND PLENUM INSULATION, AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
D. CONCEALED, RECTANGULAR, RETURN-AIR DUCT INSULATION AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
E. CONCEALED, RECTANGULAR, OUTDOOR-AIR DUCT INSULATION SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 2-1/2 INCHES (65 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
F. EXPOSED, ROUND, SUPPLY-AIR DUCT INSULATION AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
G. EXPOSED, ROUND, OUTDOOR-AIR DUCT INSULATION SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 2-1/2 INCHES (65 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
H. EXPOSED, RECTANGULAR, SUPPLY-AIR DUCT AND PLENUM INSULATION, AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
I. EXPOSED, RECTANGULAR, RETURN-AIR DUCT INSULATION AND LINER SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 1-1/2 INCHES (40 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
2. FIBROUS-GLASS LINER: 3/4-INCH.
J. EXPOSED, RECTANGULAR, OUTDOOR-AIR DUCT INSULATION SHALL BE THE FOLLOWING:
1. MINERAL-FIBER BLANKET: 2-1/2 INCHES (65 MM) THICK AND 1.5-LB/CU. FT. (24-KG/CU. M) NOMINAL DENSITY.
END OF SECTION – 23 07 13

SECTION 23 31 13 – METAL HVAC DUCTS
PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES: METAL DUCTS FOR SUPPLY, RETURN, OUTSIDE, AND EXHAUST AIR-DISTRIBUTION SYSTEMS IN PRESSURE CLASSES FROM -2 TO +10-INCH W.G.; INCLUDED ARE:
1. SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS.
2. SINGLE-WALL ROUND DUCTS AND FITTINGS.
3. SHEET METAL MATERIALS.
4. SEALANTS AND GASKETS.
5. HANGERS AND SUPPORTS.
B. RELATED SECTIONS INCLUDE:
1. ALL DIVISION 23 SECTIONS.
1.3 SYSTEM DESCRIPTION
A. DUCT SYSTEM DESIGN, AS INDICATED, HAS BEEN USED TO SELECT SIZE AND TYPE OF AIR-MOVING AND -DISTRIBUTION EQUIPMENT AND OTHER AIR SYSTEM COMPONENTS. CHANGES TO LAYOUT OR CONFIGURATION OF DUCT SYSTEM SHALL BE APPROVED IN WRITING BY THE ENGINEER. ACCOMPANY REQUESTS FOR LAYOUT MODIFICATIONS WITH CALCULATIONS SHOWING THAT PROPOSED LAYOUT WILL PROVIDE ORIGINAL DESIGN RESULTS WITHOUT INCREASING SYSTEM TOTAL PRESSURE.
1.4 PERFORMANCE REQUIREMENTS
A. DUCT CONSTRUCTION, INCLUDING SHEET METAL THICKNESSES, SEAM AND JOINT CONSTRUCTION, REINFORCEMENTS, AND HANGERS AND SUPPORTS, SHALL COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" AND PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED IN "DUCT SCHEDULE" ARTICLE.
B. STRUCTURAL PERFORMANCE: DUCT HANGERS AND SUPPORTS SHALL WITHSTAND THE EFFECTS OF GRAVITY LOADS AND STRESSES WITHIN LIMITS AND UNDER CONDITIONS DESCRIBED IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE".
C. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1 – 2010.
1.5 SUBMITTALS
A. REFER TO GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3; AND INCLUDE:
1. DUCT MATERIALS AND THICKNESSES.
2. LINERS AND ADHESIVES.
3. SEALANTS AND GASKETS.
B. SHOP DRAWINGS:
1. FACTORY- AND SHOP-FABRICATED DUCTS AND FITTINGS.
2. FITTINGS.
3. SEAM AND JOINT CONSTRUCTION.
4. PENETRATIONS THROUGH FIRE-RATED AND OTHER PARTITIONS.
5. EQUIPMENT INSTALLATION BASED ON EQUIPMENT BEING USED ON PROJECT.
6. LOCATIONS FOR DUCT ACCESSORIES, INCLUDING DAMPERS, TURNING VANES, AND ACCESS PANELS.
7. JOINT AND SEAM CONSTRUCTION AND SEALING.
8. REINFORCEMENT DETAILS AND SPACING.
C. WELDING CERTIFICATES.
D. FIELD QUALITY-CONTROL REPORTS.
1.6 QUALITY ASSURANCE
A. WELDING QUALIFICATIONS: QUALIFY PROCEDURES AND PERSONNEL ACCORDING TO THE FOLLOWING:
1. AWS D1.1/D1.1M, "STRUCTURAL WELDING CODE- STEEL," FOR HANGERS AND SUPPORTS.
2. AWS D9.1M/D9.1, "SHEET METAL WELDING CODE," FOR DUCT JOINT AND SEAM WELDING.
B. ASHRAE COMPLIANCE: COMPLY WITH THE APPLICABLE REQUIREMENTS IN ASHRAE 62.1-2010, SECTION 5 – "SYSTEMS AND EQUIPMENT" AND SECTION 7 – "CONSTRUCTION AND SYSTEM START-UP."
C. ASHRAE/IESNA COMPLIANCE: COMPLY WITH THE APPLICABLE REQUIREMENTS IN ASHRAE/IESNA 90.1-2010, SECTION 6.4.4 – "HVAC SYSTEM CONSTRUCTION AND INSULATION."
D. NFPA COMPLIANCE: COMPLY WITH THE APPLICABLE REQUIREMENTS IN NFPA 90A "INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS", AND NFPA 90B, "INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS."
PART 2 – PRODUCTS
2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS
A. GENERAL FABRICATION REQUIREMENTS: UNLESS OTHERWISE INDICATED, COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" BASED ON INDICATED STATIC-PRESSURE CLASS.
B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-1, "RECTANGULAR DUCT/TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 2-2, "RECTANGULAR DUCT/LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
D. ELBOWS, TRANSITIONS, OFFSETS, BRANCH CONNECTIONS, AND OTHER DUCT CONSTRUCTION: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 4, "FITTINGS AND OTHER CONSTRUCTION," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
2.2 SINGLE-WALL ROUND DUCTS AND FITTINGS
A. GENERAL FABRICATION REQUIREMENTS: UNLESS OTHERWISE INDICATED, COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 3, "ROUND, OVAL, AND FLEXIBLE DUCT," BASED ON INDICATED STATIC-PRESSURE CLASS.
1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
a. LINDAB INC.
b. MCGILL AIRFLOW LLC.
c. SEMCO INCORPORATED.
d. SHEET METAL CONNECTORS, INC.
e. SPIRAL MANUFACTURING CO., INC.
B. TRANSVERSE JOINTS: SELECT JOINT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-1, "ROUND DUCT TRANSVERSE JOINTS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
C. LONGITUDINAL SEAMS: SELECT SEAM TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-2, "ROUND DUCT LONGITUDINAL SEAMS," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
D. TEES AND LATERALS: SELECT TYPES AND FABRICATE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES," FOR STATIC-PRESSURE CLASS, APPLICABLE SEALING REQUIREMENTS, MATERIALS INVOLVED, DUCT-SUPPORT INTERVALS, AND OTHER PROVISIONS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE."
2.3 SHEET METAL MATERIALS
A. GENERAL MATERIAL REQUIREMENTS: UNLESS OTHERWISE INDICATED, COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS.
B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.
1. GALVANIZED COATING DESIGNATION: G90 (Z275).
2. FINISHES FOR SURFACES EXPOSED TO VIEW: MILL PHOSPHATIZED.
C. FACTORY- OR SHOP-APPLIED ANTI-MICROBIAL COATING:
1. APPLY TO THE SURFACE OF SHEET METAL AND INTERIOR PORTIONS OF DUCT LINERS THAT WILL FORM THE INTERIOR SURFACE OF THE DUCT. AN UNTREATED CLEAR COATING SHALL BE APPLIED TO THE EXTERIOR SURFACE.
2. ANTI-MICROBIAL COMPOUND SHALL BE TESTED FOR EFFICACY BY AN NRTL AND REGISTERED BY THE EPA FOR USE IN HVAC SYSTEMS.
3. COATING CONTAINING THE ANTI-MICROBIAL COMPOUND SHALL HAVE A HARDNESS OF 2H, MINIMUM, WHEN TESTED ACCORDING TO ASTM D 3363.
4. SURFACE-BURNING CHARACTERISTICS: MAXIMUM FLAME-SPREAD INDEX OF 25 AND MAXIMUM SMOKE-DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO UL 723; CERTIFIED BY AN NRTL.
5. SHOP-APPLIED COATING COLOR: BLACK OR WHITE.
D. REINFORCEMENT SHAPES AND PLATES: ASTM A 36/A 36M, STEEL PLATES, SHAPES, AND BARS; BLACK AND GALVANIZED.
1. WHERE BLACK- AND GALVANIZED-STEEL SHAPES AND PLATES ARE USED TO REINFORCE ALUMINUM DUCTS, ISOLATE THE DIFFERENT METALS WITH BUTYL RUBBER, NEOPRENE, OR EPDM GASKET MATERIALS.
E. TIE RODS: GALVANIZED STEEL, 1/4-INCH (6-MM) MINIMUM DIAMETER FOR LENGTHS 36 INCHES (900 MM) OR LESS; 3/8-INCH (10-MM) MINIMUM DIAMETER FOR LENGTHS LONGER THAN 36 INCHES (900 MM).
2.4 SEALANT AND GASKETS
A. GENERAL SEALANT AND GASKET REQUIREMENTS: SURFACE-BURNING CHARACTERISTICS FOR SEALANTS AND GASKETS SHALL BE A MAXIMUM FLAME-SPREAD INDEX OF 25 AND A MAXIMUM SMOKE-DEVELOPED INDEX OF 50 WHEN TESTED ACCORDING TO UL 723; CERTIFIED BY AN NRTL.

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CONSTRUCTION DOCUMENTS

COMMONWEALTH OF VIRGINIA
MARK A. PHILLIPS
Lic. No. 36230
4/30/2013
PROFESSIONAL ENGINEER

revisions

Main Library
Storybook Room
2311 Memorial Avenue
Lynchburg Virginia 24501

MECHANICAL / HVAC SPECIFICATIONS

sheet
M3

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: MAP

MECHANICAL SPECIFICATIONS (CONTINUED):

B. TWO-PART TAPE SEALING SYSTEM:
1. TAPE: WOVEN COTTON FIBER IMPREGNATED WITH MINERAL GYPSUM AND MODIFIED ACRYLIC/SILICONE ACTIVATOR TO REACT EXOTHERMICALLY WITH TAPE TO FORM HARD, DURABLE, AIRTIGHT SEAL.
2. TAPE WIDTH: 4 INCHES (102 MM).
3. SEALANT: MODIFIED STYRENE ACRYLIC.
4. WATER RESISTANT.
5. MOLD AND MILDEW RESISTANT.
6. MAXIMUM STATIC-PRESSURE CLASS: 10-INCH W.G. (2500 PA), POSITIVE AND NEGATIVE.
7. SERVICE: INDOOR AND OUTDOOR.
8. SERVICE TEMPERATURE: -40 TO +200 DEG F (-40 TO +93 DEG C).
9. SUBSTRATE: COMPATIBLE WITH GALVANIZED SHEET STEEL, OR ALUMINUM.
10. FOR INDOOR APPLICATIONS, USE SEALANT THAT HAS A VOC CONTENT OF 250 G/L OR LESS WHEN CALCULATED ACCORDING TO 40 CFR 59, SUBPART D (EPA METHOD 24).

C. WATER-BASED JOINT AND SEAM SEALANT:
1. APPLICATION METHOD: BRUSH ON.
2. SOLIDS CONTENT: MINIMUM 65 PERCENT.
3. SHORE A HARDNESS: MINIMUM 20.
4. WATER RESISTANT.
5. MOLD AND MILDEW RESISTANT.
6. VOC: MAXIMUM 75 G/L (LESS WATER).
7. MAXIMUM STATIC-PRESSURE CLASS: 10-INCH W.G. (2500 PA), POSITIVE AND NEGATIVE.
8. SERVICE: INDOOR OR OUTDOOR.
9. SUBSTRATE: COMPATIBLE WITH GALVANIZED SHEET STEEL, OR ALUMINUM SHEETS.

D. FLANGE GASKETS: BUTYL RUBBER, NEOPRENE, OR EPDM POLYMER WITH POLYISOBUTYLENE PLASTICIZER.

2.5 HANGERS AND SUPPORTS
A. HANGER RODS FOR NON-CORROSIVE ENVIRONMENTS: CADMIUM-PLATED STEEL RODS AND NUTS.
B. STRAP AND ROD SIZES: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 5-1 (TABLE 5-1M), "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 5-2, "MINIMUM HANGER SIZES FOR ROUND DUCT."
C. DUCT ATTACHMENTS: SHEET METAL SCREWS, BLIND RIVETS, OR SELF-TAPPING METAL SCREWS; COMPATIBLE WITH DUCT MATERIALS.
D. HANGER ROD, WIRE, TRAPEZE, AND RISER SUPPORTS:
1. SUPPORTS FOR GALVANIZED-STEEL DUCTS: GALVANIZED-STEEL SHAPES AND PLATES.

PART 3 – EXECUTION
3.1 DUCT INSTALLATION
A. DRAWING PLANS, SCHEMATICS, AND DIAGRAMS INDICATE GENERAL LOCATION AND ARRANGEMENT OF DUCT SYSTEM. INDICATED DUCT LOCATIONS, CONFIGURATIONS, AND ARRANGEMENTS WERE USED TO SIZE DUCTS AND CALCULATE FRICTION LOSS FOR AIR-HANDLING EQUIPMENT SIZING AND FOR OTHER DESIGN CONSIDERATIONS. INSTALL DUCT SYSTEMS, AS INDICATED, UNLESS DEVIATIONS TO LAYOUT ARE APPROVED IN WRITING BY ENGINEER, OR ON SHOP DRAWINGS.
B. UNLESS OTHERWISE INDICATED, INSTALL DUCTS ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE".
C. PROVIDE DUCTWORK WITH THE CORROSION PROTECTION CHARACTERISTICS NECESSARY AND REQUIRED FOR THE AMBIENT CONDITIONS WHERE THEY WILL INSTALLED AND COORDINATED WITH THE ASSOCIATED HANGER AND SUPPORT MATERIALS.
D. INSTALL ROUND DUCTS IN MAXIMUM PRACTICAL LENGTHS.
E. INSTALL DUCTS WITH FEWEST POSSIBLE JOINTS.
F. INSTALL FACTORY- OR SHOP-FABRICATED FITTINGS FOR CHANGES IN DIRECTION, SIZE, AND SHAPE AND FOR BRANCH CONNECTIONS.
G. UNLESS OTHERWISE INDICATED, INSTALL DUCTS VERTICALLY AND HORIZONTALLY, AND PARALLEL AND PERPENDICULAR TO BUILDING LINES.
H. INSTALL DUCTS CLOSE TO WALLS, OVERHEAD CONSTRUCTION, COLUMNS, AND OTHER STRUCTURAL AND PERMANENT ENCLOSURE ELEMENTS OF BUILDING.
I. INSTALL DUCTS WITH A MINIMUM CLEARANCE OF 1 INCH (25 MM), PLUS ALLOWANCE FOR INSULATION THICKNESS.
J. ROUTE DUCTS TO AVOID PASSING THROUGH TRANSFORMER VAULTS, ELECTRICAL EQUIPMENT ROOMS, AND ENCLOSURES.
K. WHERE DUCTS PASS THROUGH NON-FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS AND ARE EXPOSED TO VIEW, COVER THE OPENING BETWEEN THE PARTITION AND DUCT OR DUCT INSULATION WITH SHEET METAL FLANGES OF SAME METAL THICKNESS AS THE DUCT. OVERLAP OPENINGS ON FOUR SIDES BY AT LEAST 1-1/2 INCHES (38 MM).
L. WHERE DUCTS PASS THROUGH FIRE-RATED INTERIOR PARTITIONS AND EXTERIOR WALLS, INSTALL FIRE DAMPERS. COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION "AIR DUCT ACCESSORIES" FOR FIRE AND SMOKE DAMPERS.
M. PROTECT DUCT INTERIORS FROM MOISTURE, CONSTRUCTION DEBRIS AND DUST, AND OTHER FOREIGN MATERIALS. COMPLY WITH SMACNA'S "IAQ GUIDELINES FOR OCCUPIED BUILDINGS UNDER CONSTRUCTION," APPENDIX G, "DUCT CLEANLINESS FOR NEW CONSTRUCTION GUIDELINES."

3.2 INSTALLATION OF EXPOSED DUCTWORK
A. PROTECT DUCTS EXPOSED IN FINISHED SPACES FROM BEING DENTED, SCRATCHED, OR DAMAGED.
B. TRIM DUCT SEALANTS FLUSH WITH METAL. CREATE A SMOOTH AND UNIFORM EXPOSED BEAD. DO NOT USE TWO-PART TAPE SEALING SYSTEM.
C. MAINTAIN CONSISTENCY, SYMMETRY, AND UNIFORMITY IN THE ARRANGEMENT AND FABRICATION OF FITTINGS, HANGERS AND SUPPORTS, DUCT ACCESSORIES, AND AIR OUTLETS.
D. REPAIR OR REPLACE DAMAGED SECTIONS AND FINISHED WORK THAT DOES NOT COMPLY WITH THESE REQUIREMENTS.

3.3 DUCT SEALING
A. SEAL DUCTS FOR DUCT STATIC-PRESSURE, SEAL CLASSES, AND LEAKAGE CLASSES SPECIFIED IN "DUCT SCHEDULE" ARTICLE ACCORDING TO SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE", AND AS INDICATED BELOW:
1. CONDITIONED SPACE, SUPPLY-AIR DUCTS IN PRESSURE CLASSES 2-INCH W.G. (500 PA) AND LOWER: SEAL CLASS B.
2. CONDITIONED SPACE, EXHAUST DUCTS: SEAL CLASS B.
3. CONDITIONED SPACE, RETURN-AIR DUCTS: SEAL CLASS B.

3.4 HANGER AND SUPPORT INSTALLATION
A. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," CHAPTER 5, "HANGERS AND SUPPORTS", AND AS INDICATED BELOW.
B. BUILDING ATTACHMENTS: CONCRETE INSERTS, POWDER-ACTUATED FASTENERS, OR STRUCTURAL-STEEL FASTENERS APPROPRIATE FOR CONSTRUCTION MATERIALS TO WHICH HANGERS ARE BEING ATTACHED.
1. PROVIDE BUILDING ATTACHMENTS WITH THE CORROSION PROTECTION CHARACTERISTICS NECESSARY AND REQUIRED FOR THE AMBIENT CONDITIONS WHERE THEY WILL INSTALLED AND COORDINATED WITH THE ASSOCIATED DUCT MATERIALS.
2. WHERE PRACTICAL, INSTALL CONCRETE INSERTS BEFORE PLACING CONCRETE.
3. INSTALL POWDER-ACTUATED CONCRETE FASTENERS AFTER CONCRETE IS PLACED AND COMPLETELY CURED.
4. USE POWDER-ACTUATED CONCRETE FASTENERS FOR STANDARD-WEIGHT AGGREGATE CONCRETES OR FOR SLABS MORE THAN 4 INCHES (100 MM) THICK.
5. DO NOT USE POWDER-ACTUATED CONCRETE FASTENERS FOR LIGHTWEIGHT-AGGREGATE CONCRETES OR FOR SLABS LESS THAN 4 INCHES (100 MM) THICK.
C. HANGER SPACING: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 5-1 (TABLE 5-1M), "RECTANGULAR DUCT HANGERS MINIMUM SIZE," AND TABLE 5-2, "MINIMUM HANGER SIZES FOR ROUND DUCT," FOR MAXIMUM HANGER SPACING; INSTALL HANGERS AND SUPPORTS WITHIN 24 INCHES (610 MM) OF EACH ELBOW AND WITHIN 48 INCHES (1200 MM) OF EACH BRANCH INTERSECTION.
D. HANGERS EXPOSED TO VIEW: THREADED ROD AND ANGLE OR CHANNEL SUPPORTS, OR HEAVY WIRE, AS INDICATED.
E. SUPPORT VERTICAL DUCTS WITH STEEL ANGLES OR CHANNEL SECURED TO THE SIDES OF THE DUCT WITH WELDS, BOLTS, SHEET METAL SCREWS, OR BLIND RIVETS; SUPPORT AT EACH FLOOR AND AT A MAXIMUM INTERVALS OF 16 FEET (5 M).
F. INSTALL UPPER ATTACHMENTS TO STRUCTURES. SELECT AND SIZE UPPER ATTACHMENTS WITH PULL-OUT, TENSION, AND SHEAR CAPACITIES APPROPRIATE FOR SUPPORTED LOADS AND BUILDING MATERIALS WHERE USED.

3.5 CONNECTIONS
A. MAKE CONNECTIONS TO EQUIPMENT WITH FLEXIBLE CONNECTORS COMPLYING WITH DIVISION 23 SECTION "23 33 00 – HVAC METAL DUCT ACCESSORIES."
B. COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR BRANCH, OUTLET AND INLET, AND TERMINAL UNIT CONNECTIONS.

3.6 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS.
B. LEAKAGE TESTS:
1. COMPLY WITH SMACNA'S "HVAC AIR DUCT LEAKAGE TEST MANUAL." SUBMIT A TEST REPORT FOR EACH TEST.
2. TEST THE FOLLOWING SYSTEMS:
a. SUPPLY DUCTS WITH A PRESSURE CLASS OF 2-INCH W.G. (500 PA) OR HIGHER: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 100 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
b. RETURN DUCTS WITH A PRESSURE CLASS OF 2-INCH W.G. (500 PA) OR HIGHER: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 100 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
c. OUTDOOR AIR DUCTS WITH A PRESSURE CLASS OF 2-INCH W.G. (500 PA) OR HIGHER: TEST REPRESENTATIVE DUCT SECTIONS TOTALING NO LESS THAN 100 PERCENT OF TOTAL INSTALLED DUCT AREA FOR EACH DESIGNATED PRESSURE CLASS.
3. DISASSEMBLE, REASSEMBLE, AND SEAL SEGMENTS OF SYSTEMS TO ACCOMMODATE LEAKAGE TESTING AND FOR COMPLIANCE WITH TEST REQUIREMENTS.
4. TEST FOR LEAKS BEFORE APPLYING EXTERNAL INSULATION.
5. CONDUCT TESTS AT STATIC PRESSURES EQUAL TO MAXIMUM DESIGN PRESSURE OF SYSTEM OR SECTION BEING TESTED. IF STATIC-PRESSURE CLASSES ARE NOT INDICATED, TEST SYSTEM AT MAXIMUM SYSTEM DESIGN PRESSURE. DO NOT PRESSURIZE SYSTEMS ABOVE MAXIMUM DESIGN OPERATING PRESSURE.
6. PROVIDE TEN (10) CALENDAR DAYS' ADVANCE NOTICE OF TESTING.
C. DUCT SYSTEM CLEANLINESS TESTS:
1. VISUALLY INSPECT DUCT SYSTEM TO ENSURE THAT NO VISIBLE CONTAMINANTS ARE PRESENT.
2. TEST SECTIONS OF METAL DUCT SYSTEM, CHOSEN RANDOMLY BY OWNER, FOR CLEANLINESS ACCORDING TO "VACUUM TEST" IN NADCA ACR, "ASSESSMENT, CLEANING AND RESTORATION OF HVAC SYSTEMS."
a. ACCEPTABLE CLEANLINESS LEVEL: NET WEIGHT OF DEBRIS COLLECTED ON THE FILTER MEDIA SHALL NOT EXCEED 0.75 MG/100 SQ. CM.
D. DUCT SYSTEM WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS TESTS AND INSPECTIONS.
E. PREPARE TEST AND INSPECTION REPORTS.

3.7 START UP
A. AIR BALANCE: COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION "23 90 20 – HVAC TESTING, ADJUSTING, AND BALANCING."

3.8 DUCT SCHEDULE
A. UNLESS OTHERWISE INDICATED, FABRICATE HVAC DUCTS WITH GALVANIZED SHEET STEEL.
B. SUPPLY DUCTS:
1. DUCTS CONNECTED TO HEAT PUMPS, TERMINAL UNITS, AND RE-HEAT COILS:
a. PRESSURE CLASS: POSITIVE 2-INCH W.G. (500 PA).
b. MINIMUM SMACNA SEAL CLASS: B.
c. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 12.
d. SMACNA LEAKAGE CLASS FOR ROUND: 6.
C. RETURN DUCTS:
1. DUCTS CONNECTED TO HEAT PUMPS, TERMINAL UNITS, AND RE-HEAT COILS:
a. PRESSURE CLASS: POSITIVE OR NEGATIVE 2-INCH W.G. (500 PA).
b. MINIMUM SMACNA SEAL CLASS: C.
c. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 24.
d. SMACNA LEAKAGE CLASS FOR ROUND: 12.
D. EXHAUST DUCTS:
1. DUCTS CONNECTED TO FANS EXHAUSTING (ASHRAE 62.1, CLASS 1 AND 2) AIR:
a. PRESSURE CLASS: NEGATIVE 2-INCH W.G. (500 PA).
b. MINIMUM SMACNA SEAL CLASS: C IF NEGATIVE PRESSURE, AND B IF POSITIVE PRESSURE.
c. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 24.
d. SMACNA LEAKAGE CLASS FOR ROUND: 12.
E. OUTDOOR-AIR (NOT FILTERED, HEATED, OR COOLED) DUCTS:
1. DUCTS CONNECTED TO HEAT PUMPS, TERMINAL UNITS, AND RE-HEAT COILS:
a. PRESSURE CLASS: POSITIVE OR NEGATIVE 2-INCH W.G. (500 PA).
b. MINIMUM SMACNA SEAL CLASS: B.
c. SMACNA LEAKAGE CLASS FOR RECTANGULAR: 12.
d. SMACNA LEAKAGE CLASS FOR ROUND: 6.
F. INTERMEDIATE REINFORCEMENT:
1. GALVANIZED-STEEL DUCTS: GALVANIZED STEEL.

G. ELBOW FITTING(S) CONFIGURATION:
1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 4-2, "RECTANGULAR ELBOWS."
a. VELOCITY 1000 FPM (5 M/S) OR LOWER:
1) RADIUS TYPE RE 1 WITH MINIMUM 0.5 RADIUS-TO-DIAMETER RATIO, OR MITERED TYPE RE 4 WITHOUT VANES.
b. VELOCITY 1000 TO 1500 FPM (5 TO 7.6 M/S):
1) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 4-3, "VANES AND VANE RUNNERS," AND FIGURE 4-4, "VANE SUPPORT IN ELBOWS."
c. VELOCITY 1500 FPM (7.6 M/S) OR HIGHER:
1) MITERED TYPE RE 2 WITH VANES COMPLYING WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 4-3, "VANES AND VANE RUNNERS," AND FIGURE 4-4, "VANE SUPPORT IN ELBOWS."
2. ROUND DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-4, "ROUND DUCT ELBOWS."
a. MINIMUM RADIUS-TO-DIAMETER RATIO AND ELBOW SEGMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," TABLE 3-1, "MITERED ELBOWS." ELBOWS WITH LESS THAN 90-DEGREE CHANGE OF DIRECTION HAVE PROPORTIONATELY FEWER SEGMENTS.
1) VELOCITY 1000 FPM (5 M/S) OR LOWER: 0.5 RADIUS-TO-DIAMETER RATIO, AND THREE SEGMENTS FOR 90-DEGREE ELBOW.
2) VELOCITY 1000 TO 1500 FPM (5 TO 7.6 M/S): 1.0 RADIUS-TO-DIAMETER RATIO, AND FOUR SEGMENTS FOR 90-DEGREE ELBOW.
3) VELOCITY 1500 FPM (7.6 M/S) OR HIGHER: 1.5 RADIUS-TO-DIAMETER RATIO, AND FIVE SEGMENTS FOR 90-DEGREE ELBOW.
b. ROUND ELBOWS, 12 INCHES (305 MM) AND SMALLER IN DIAMETER: STAMPED OR PLEATED.
c. ROUND ELBOWS, 14 INCHES (356 MM) AND LARGER IN DIAMETER: STANDING SEAM, OR WELDED.
H. BRANCH CONFIGURATION:
1. RECTANGULAR DUCT: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 4-6, "BRANCH CONNECTION."
a. RECTANGULAR MAIN TO RECTANGULAR BRANCH: 45-DEGREE ENTRY.
b. RECTANGULAR MAIN TO ROUND BRANCH: 45-DEGREE ENTRY WITH TRANSITION PIECE FROM RECTANGULAR TO ROUND. SPIN-INS ARE PROHIBITED / NOT ALLOWED.
2. ROUND: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE," FIGURE 3-5, "90 DEGREE TEES AND LATERALS," AND FIGURE 3-6, "CONICAL TEES." SADDLE TAPS ARE PERMITTED IN EXISTING DUCT.
a. VELOCITY 1000 FPM (5 M/S) OR LOWER: 90-DEGREE TAP.
b. VELOCITY 1000 TO 1500 FPM (5 TO 7.6 M/S): CONICAL TAP.
c. VELOCITY 1500 FPM (7.6 M/S) OR HIGHER: 45-DEGREE LATERAL.

END OF SECTION – 23 31 13

SECTION 23 33 00 – HVAC METAL DUCT ACCESSORIES

PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES:
1. BACK-DRAFT DAMPERS.
2. MANUAL VOLUME DAMPERS.
3. FLANGE CONNECTORS.
4. TURNING VANES.
5. FLEXIBLE CONNECTORS.
6. DUCT ACCESSORY HARDWARE.
B. RELATED SECTIONS INCLUDE, BUT ARE NOT LIMITED TO:
1. ALL DIVISION 23 SECTIONS.
1.3 SUBMITTALS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
B. SHOP DRAWINGS: FOR DUCT ACCESSORIES. INCLUDE PLANS, ELEVATIONS, SECTIONS, DETAILS AND ATTACHMENTS TO OTHER WORK.
1. DETAIL DUCT ACCESSORIES FABRICATION AND INSTALLATION IN DUCTS AND OTHER CONSTRUCTION. INCLUDE DIMENSIONS, WEIGHTS, LOADS, AND REQUIRED CLEARANCES; AND METHOD OF FIELD ASSEMBLY INTO DUCT SYSTEMS AND OTHER CONSTRUCTION. INCLUDE THE FOLLOWING:
a. SPECIAL FITTINGS.
b. MANUAL VOLUME DAMPER INSTALLATIONS.
c. CONTROL DAMPER INSTALLATIONS.
d. FIRE-DAMPER INSTALLATIONS, INCLUDING SLEEVES; AND DUCT-MOUNTED ACCESS DOORS AND REMOTE DAMPER OPERATORS.
e. WIRING DIAGRAMS: FOR POWER, SIGNAL, AND CONTROL WIRING.
C. SOURCE LIMITATIONS FOR ACCESSORIES: OBTAIN EACH TYPE OF DEVICE FROM A SINGLE SOURCE, FROM A SINGLE MANUFACTURER.
D. SOURCE QUALITY-CONTROL REPORTS.
E. OPERATION AND MAINTENANCE DATA: FOR AIR DUCT ACCESSORIES TO INCLUDE IN OPERATION AND MAINTENANCE MANUALS.
1.4 QUALITY ASSURANCE
A. COMPLY WITH NFPA 90A, "INSTALLATION OF AIR CONDITIONING AND VENTILATING SYSTEMS," AND WITH NFPA 90B, "INSTALLATION OF WARM AIR HEATING AND AIR CONDITIONING SYSTEMS."
B. COMPLY WITH AMCA 500-D TESTING FOR DAMPER RATING.

PART 2 – PRODUCTS
2.1 MATERIALS
A. UNLESS OTHERWISE INDICATED, COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR ACCEPTABLE MATERIALS, MATERIAL THICKNESSES, AND DUCT CONSTRUCTION METHODS. SHEET METAL MATERIALS SHALL BE FREE OF PITTING, SEAM MARKS, ROLLER MARKS, STAINS, DISCOLORATIONS, AND OTHER IMPERFECTIONS; AND AS FOLLOWS:
B. GALVANIZED SHEET STEEL: COMPLY WITH ASTM A 653/A 653M.
1. GALVANIZED COATING DESIGNATION: G90 (Z275).
2. EXPOSED-SURFACE FINISH: MILL PHOSPHATIZED.
C. REINFORCEMENT SHAPES AND PLATES: GALVANIZED-STEEL REINFORCEMENT WHERE INSTALLED ON GALVANIZED SHEET METAL DUCTS; COMPATIBLE MATERIALS FOR ALUMINUM AND STAINLESS-STEEL DUCTS.
D. TIE RODS: GALVANIZED STEEL, 1/4-INCH (6-MM) MINIMUM DIAMETER FOR LENGTHS 36 INCHES (900 MM) OR LESS; 3/8-INCH (10-MM) MINIMUM DIAMETER FOR LENGTHS LONGER THAN 36 INCHES (900 MM).
2.2 BACK-DRAFT DAMPERS
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. CESCO PRODUCTS; A DIVISION OF MESTEK, INC.
2. RUSKIN COMPANY.
3. SEMCO INCORPORATED.
B. DESCRIPTION: GRAVITY BALANCED.
C. MAXIMUM AIR VELOCITY: 2,500 FPM (13 M/S).
D. MAXIMUM SYSTEM PRESSURE: 2-INCH W.G. (0.5 KPA).
E. FRAME: 0.052-INCH- (1.3-MM-) THICK, GALVANIZED SHEET STEEL; 0.063-INCH- (1.6-MM-) THICK EXTRUDED ALUMINUM; OR, 0.052-INCH- (1.3-MM-) THICK STAINLESS STEEL; AS NECESSARY AND REQUIRED FOR ASSOCIATED ADJACENT DUCTWORK, AND WITH WELDED CORNERS AND MOUNTING FLANGE.
F. BLADES: MULTIPLE, SINGLE-PIECE BLADES; MAXIMUM 6-INCH (150-MM) WIDTH, OF 0.025-INCH- (0.6-MM-) THICK, ROLL-FORMED ALUMINUM OR NON-COMBUSTIBLE, TEAR-RESISTANT, NEOPRENE-COATED FIBERGLASS, AND SEALED EDGES.
G. BLADE ACTION: PARALLEL.
H. BLADE SEALS: VINYL FOAM OR NEOPRENE, MECHANICALLY LOCKED.
I. BLADE AXLES:
1. MATERIAL: GALVANIZED STEEL, ALUMINUM, OR STAINLESS STEEL TO MATCH FRAMES.
2. DIAMETER: 0.20 INCH (5 MM).
J. TIE BARS AND BRACKETS: GALVANIZED STEEL, ALUMINUM, OR STAINLESS STEEL TO MATCH FRAMES.
K. RETURN SPRING: ADJUSTABLE TENSION.
L. BEARINGS: STEEL BALL OR SYNTHETIC PIVOT BUSHINGS.
M. ACCESSORIES:
1. ADJUSTMENT DEVICE TO PERMIT SETTING FOR VARYING DIFFERENTIAL STATIC PRESSURE.
2. COUNTERWEIGHTS AND SPRING-ASSIST KITS FOR VERTICAL AIRFLOW INSTALLATIONS.
3. SCREEN MOUNTING: FRONT MOUNTED IN SLEEVE.
a. SLEEVE THICKNESS: 20-GAGE (1.0-MM) MINIMUM.
b. SLEEVE LENGTH: 6 INCHES (152 MM) MINIMUM.
4. SCREEN MATERIAL: GALVANIZED STEEL.
5. SCREEN TYPE: BIRD.
6. 90-DEGREE STOPS.
2.3 MANUAL VOLUME DAMPERS
A. LOW-LEAKAGE, STEEL, MANUAL VOLUME DAMPERS:
1. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
a. AIR BALANCE INC.; A DIVISION OF MESTEK, INC.
b. METALAIRE, INC.
c. RUSKIN COMPANY.
2. LOW-LEAKAGE RATING, WITH LINKAGE OUTSIDE AIRSTREAM, AND BEARING AMCA'S CERTIFIED RATINGS SEAL FOR BOTH AIR PERFORMANCE AND AIR LEAKAGE.
3. SUITABLE FOR HORIZONTAL OR VERTICAL APPLICATIONS.
4. FRAMES:
a. HAT OR ANGLE SHAPED.
b. GALVANIZED- OR STAINLESS-STEEL CHANNELS TO MATCH ADJACENT DUCTWORK, AND 0.064 INCH (1.62 MM) THICK.
c. MITERED AND WELDED CORNERS.
d. FLANGES FOR ATTACHING TO WALLS AND FLANGE-LESS FRAMES FOR INSTALLING IN DUCTS.
5. BLADES:
a. MULTIPLE OR SINGLE BLADE.
b. PARALLEL- OR OPPOSED-BLADE DESIGN.
c. STIFFEN DAMPER BLADES FOR STABILITY.
d. GALVANIZED OR STAINLESS, ROLL-FORMED STEEL TO MATCH ADJACENT DUCTWORK, AND 0.064 INCH (1.62 MM) THICK.
6. BLADE AXLES: GALVANIZED- OR STAINLESS-STEEL TO MATCH ADJACENT MATERIALS.
7. BEARINGS:
a. OIL-IMPREGNATED BRONZE OR MOLDED SYNTHETIC.
b. DAMPERS IN DUCTS WITH PRESSURE CLASSES OF 3-INCH W.G. (750 PA) OR LESS SHALL HAVE AXLES FULL LENGTH OF DAMPER BLADES, AND BEARINGS AT BOTH ENDS OF OPERATING SHAFT.
8. BLADE SEALS: NEOPRENE.
9. JAMB SEALS: CAMBERED STAINLESS STEEL OR ALUMINUM.
10. TIE BARS AND BRACKETS: GALVANIZED STEEL OR ALUMINUM.
11. ACCESSORIES:
a. INCLUDE LOCKING DEVICE TO HOLD SINGLE-BLADE DAMPERS IN A FIXED POSITION WITHOUT VIBRATION.
B. JACKSHAFT:
1. SIZE: 1-INCH (25-MM) DIAMETER.
2. MATERIAL: GALVANIZED-STEEL PIPE ROTATING WITHIN PIPE-BEARING ASSEMBLY MOUNTED ON SUPPORTS AT EACH MULLION, AND AT EACH END OF MULTIPLE-DAMPER ASSEMBLIES.
3. LENGTH AND NUMBER OF MOUNTINGS: AS REQUIRED TO CONNECT LINKAGE OF EACH DAMPER IN MULTIPLE-DAMPER ASSEMBLY.
C. DAMPER HARDWARE:
1. ZINC-PLATED, DIE-CAST CORE WITH DIAL AND HANDLE MADE OF 3/32-INCH- (2.4-MM-) THICK ZINC-PLATED STEEL, AND A 3/4-INCH (19-MM) HEXAGON LOCKING NUT.
2. INCLUDE CENTER HOLE TO SUIT DAMPER OPERATING-ROD SIZE.
3. INCLUDE ELEVATED PLATFORM FOR INSULATED DUCT MOUNTING.
2.4 FLANGE CONNECTORS
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. DUCTMATE INDUSTRIES, INC.
2. NEXUS PDQ; DIVISION OF SHILCO HOLDINGS INC.
3. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
B. DESCRIPTION: ADD-ON OR ROLL-FORMED, FACTORY-FABRICATED, SLIDE-ON TRANSVERSE FLANGE CONNECTORS, GASKETS, AND COMPONENTS.
C. MATERIAL: GALVANIZED STEEL.
D. GAUGE AND SHAPE: MATCH CONNECTING DUCTWORK.
2.5 TURNING VANES
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. DUCTMATE INDUSTRIES, INC.
2. METALAIRE, INC.
3. SEMCO INCORPORATED.
4. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
B. MANUFACTURED TURNING VANES FOR METAL DUCTS: CURVED BLADES OF GALVANIZED SHEET STEEL; SUPPORT WITH BARS PERPENDICULAR TO BLADES SET; SET INTO VANE RUNNERS SUITABLE FOR DUCT MOUNTING.
1. ACOUSTIC TURNING VANES: FABRICATE AIRFOIL-SHAPED ALUMINUM EXTRUSIONS WITH PERFORATED FACES AND FIBROUS-GLASS FILL.
C. GENERAL REQUIREMENTS: COMPLY WITH SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE"; FIGURES 4-3, "VANES AND VANE RUNNERS," AND 4-4, "VANE SUPPORT IN ELBOWS."
D. VANE CONSTRUCTION: SINGLE WALL FOR DUCTS UP TO 36 INCHES (915 MM) WIDE AND DOUBLE WALL FOR LARGER DIMENSIONS.
2.6 FLEXIBLE CONNECTORS
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. DUCTMATE INDUSTRIES, INC.
2. VENTFABRICS, INC.
3. WARD INDUSTRIES, INC.; A DIVISION OF HART & COOLEY, INC.
B. MATERIALS: FLAME-RETARDANT OR NON-COMBUSTIBLE FABRICS.
C. COATINGS AND ADHESIVES: COMPLY WITH UL 181, CLASS 1.
D. METAL-EDGED CONNECTORS: FACTORY FABRICATED WITH A FABRIC STRIP 3-1/2 INCHES (89 MM) WIDE ATTACHED TO 2 STRIPS OF 2-3/4-INCH- (70-MM-) WIDE, 0.028-INCH- (0.7-MM-) THICK, GALVANIZED SHEET STEEL OR 0.032-INCH- (0.8-MM-) THICK ALUMINUM SHEETS. PROVIDE METAL COMPATIBLE WITH CONNECTED DUCTS.
E. INDOOR SYSTEM, FLEXIBLE CONNECTOR FABRIC: GLASS FABRIC DOUBLE COATED WITH NEOPRENE.
1. MINIMUM WEIGHT: 26 OZ./SQ. YD. (880 G/SQ. M).
2. TENSILE STRENGTH: 530 LBF./INCH (93 N/MM) IN THE WARP, AND 440 LBF./INCH (77 N/MM) IN THE FILLING.
3. SERVICE TEMPERATURE: -40 TO +200 DEG F (-40 TO +93 DEG C).
2.7 DUCT ACCESSORY HARDWARE
A. INSTRUMENT TEST HOLES: CAST IRON OR CAST ALUMINUM TO SUIT DUCT MATERIAL, INCLUDING SCREW CAP AND GASKET. SIZE TO ALLOW INSERTION OF PITOT TUBE AND OTHER TESTING INSTRUMENTS AND OF LENGTH TO SUIT DUCT-INSULATION THICKNESS.
B. ADHESIVES: HIGH STRENGTH, QUICK SETTING, NEOPRENE BASED, WATERPROOF, AND RESISTANT TO GASOLINE AND GREASE.

PART 3 – EXECUTION
3.1 INSTALLATION
A. INSTALL DUCT ACCESSORIES ACCORDING TO APPLICABLE DETAILS IN SMACNA'S "HVAC DUCT CONSTRUCTION STANDARDS – METAL AND FLEXIBLE" FOR METAL DUCTS.
B. INSTALL DUCT ACCESSORIES OF MATERIALS SUITED TO DUCT MATERIALS; USE GALVANIZED-STEEL ACCESSORIES IN GALVANIZED-STEEL DUCTS.
C. UNLESS OTHERWISE INDICATED, INSTALL BACK-DRAFT DAMPERS AT OUTLETS OF EXHAUST DUCTS, AND AS CLOSE AS POSSIBLE TO EXHAUST FAN.
D. INSTALL MANUAL VOLUME DAMPERS AT POINTS ON SUPPLY, RETURN, AND EXHAUST SYSTEMS WHERE BRANCHES EXTEND FROM LARGER DUCTS.
1. INSTALL STEEL VOLUME DAMPERS IN STEEL DUCTS.
E. SET DAMPERS TO FULLY OPEN POSITION BEFORE TESTING, ADJUSTING, AND BALANCING.
F. INSTALL TEST HOLES AT FAN INLETS AND OUTLETS, AND ELSEWHERE AS INDICATED.
G. INSTALL FLEXIBLE CONNECTORS TO CONNECT DUCTS TO EQUIPMENT.
H. DO NOT USE FLEXIBLE DUCTS TO CHANGE DIRECTIONS.
I. INSTALL DUCT TEST HOLES WHERE REQUIRED FOR TESTING AND BALANCING PURPOSES.
3.2 FIELD QUALITY CONTROL
A. TESTS AND INSPECTIONS:
1. OPERATE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT.
2. INSPECT LOCATIONS OF ACCESS DOORS AND VERIFY THAT PURPOSE OF ACCESS DOOR CAN BE PERFORMED.
3. OPERATE FIRE, SMOKE, AND COMBINATION FIRE AND SMOKE DAMPERS TO VERIFY FULL RANGE OF MOVEMENT AND VERIFY THAT PROPER HEAT-RESPONSE DEVICE IS INSTALLED.
4. INSPECT TURNING VANES FOR PROPER AND SECURE INSTALLATION.
5. OPERATE REMOTE DAMPER OPERATORS TO VERIFY FULL RANGE OF MOVEMENT OF OPERATOR AND DAMPER.

END OF SECTION – 23 33 00

SECTION 23 37 13 – DIFFUSERS, REGISTERS, AND GRILLES

PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES:
1. "PUNKAH"-STYLE, WALL- OR DUCT-MOUNTED, ROUND, SUPPLY-AIR DIFFUSERS.
2. HORIZONTAL, LOUVERED-FACE, FILTER RETURN REGISTERS.
B. RELATED SECTIONS INCLUDE, BUT ARE NOT LIMITED TO:
1. ALL DIVISION 23 SECTIONS.
1.3 SUBMITTALS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3 FOR ADDITIONAL REQUIREMENTS.
1. DATA SHEETS: INDICATE MATERIALS OF CONSTRUCTION, FINISH, AND MOUNTING DETAILS; AND PERFORMANCE DATA INCLUDING THROW AND DROP, STATIC-PRESSURE DROP, AND NOISE RATINGS.
2. DIFFUSER, REGISTER, AND GRILLE SCHEDULE: INDICATE DRAWING DESIGNATION, ROOM LOCATION, QUANTITY, MODEL NUMBER, SIZE, AND ACCESSORIES FURNISHED.
B. SAMPLES FOR INITIAL SELECTION: FOR DIFFUSERS, REGISTERS, AND GRILLES WITH FACTORY-APPLIED COLOR FINISHES.
C. SOURCE QUALITY-CONTROL REPORTS.
1.4 SOURCE QUALITY CONTROL
A. SOURCE LIMITATIONS FOR DIFFUSERS, REGISTERS, AND GRILLES: OBTAIN EACH TYPE OF AIR DEVICE FROM A SINGLE SOURCE FROM A SINGLE MANUFACTURER.
B. VERIFICATION OF PERFORMANCE: RATE DIFFUSERS, REGISTERS, AND GRILLES ACCORDING TO ASHRAE 70, "METHOD OF TESTING FOR RATING THE PERFORMANCE OF AIR OUTLETS AND INLETS."

PART 2 – PRODUCTS
2.1 CEILING DIFFUSERS
A. "PUNKAH"-STYLE, DUCT-MOUNTED, ROUND, SUPPLY-AIR DIFFUSERS (SD-1):
1. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, PROVIDE THE PRODUCT SCHEDULED ON THE DRAWINGS, OR A COMPARABLE PRODUCT BY ONE OF THE FOLLOWING:
a. SEIHO INTERNATIONAL, INC.
b. AIR CONCEPTS, INC.
c. KRUEGER.
d. METALAIRE, INC.
e. NAILOR INDUSTRIES, INC.
f. PRICE INDUSTRIES.
2. MATERIAL: ALUMINUM.
3. FINISH: CLEAR-ANODIZED, OR, COLOR SELECTED BY ARCHITECT.
4. FACE SIZE: 10-INCH DIAMETER DUCT.
5. FACE STYLE: MIN. 3.5-INCH, SINGLE-NOZZLE TYPE, WITH MIN. 75 DEG ADJUSTMENT ALL AROUND.
6. MOUNTING: DUCT-MOUNTING.
7. PATTERN: ONE-WAY; ADJUSTABLE.
8. INTEGRAL DAMPER: MANUFACTURER'S STANDARD.
2.2 REGISTERS AND GRILLES
A. HORIZONTALLY LOUVERED / BARRED, FILTER-GRILLE RETURN REGISTER (RR-1):
1. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, PROVIDE THE PRODUCT SCHEDULED ON THE DRAWINGS, OR A COMPARABLE PRODUCT BY ONE OF THE FOLLOWING:
a. AIR CONCEPTS, INC.
b. HART & COOLEY INC.
c. KRUEGER.
d. METALAIRE, INC.
e. NAILOR INDUSTRIES INC.
f. PRICE INDUSTRIES.
g. TITUS.
2. MATERIAL: ALUMINUM.
3. FINISH: CLEAR ANODIZED; OR, COLOR SELECTED BY ARCHITECT
4. FACE BLADE ARRANGEMENT: HORIZONTAL; SPACED A MIN. OF 1/4 INCH (6 MM) APART.
5. CORE CONSTRUCTION: REMOVABLE.
6. FRAME: 1 INCH (25 MM) WIDE.
7. MOUNTING: COUNTERSUNK SCREW.
8. DAMPER TYPE: ADJUSTABLE OPPOSED BLADE.
9. ACCESSORIES:

PART 3 – EXECUTION
3.1 EXAMINATION
A. EXAMINE AREAS WHERE DIFFUSERS, REGISTERS, AND GRILLES ARE TO BE INSTALLED FOR COMPLIANCE WITH REQUIREMENTS FOR INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF EQUIPMENT.
B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.
3.2 INSTALLATION
A. INSTALL DIFFUSERS, REGISTERS, AND GRILLES LEVEL AND PLUMB.
B. WALL-MOUNTED OUTLETS AND INLETS: DRAWINGS INDICATE GENERAL ARRANGEMENT OF DUCTS, FITTINGS, AND ACCESSORIES. AIR OUTLET AND INLET LOCATIONS HAVE BEEN INDICATED TO ACHIEVE DESIGN REQUIREMENTS FOR AIR VOLUME, NOISE CRITERIA, AIRFLOW PATTERN, THROW, AND PRESSURE DROP. MAKE FINAL LOCATIONS WHERE INDICATED, AS MUCH AS PRACTICAL.
C. INSTALL DIFFUSERS, REGISTERS, AND GRILLES WITH AIR-TIGHT CONNECTIONS TO DUCTS, AND TO ALLOW SERVICE AND MAINTENANCE OF DAMPERS, AIR EXTRACTORS, AND FIRE DAMPERS.
3.3 ADJUSTING
A. AFTER INSTALLATION, ADJUST DIFFUSERS, REGISTERS, AND GRILLES TO AIR PATTERNS INDICATED, OR AS DIRECTED, BEFORE STARTING AIR BALANCING.

END OF SECTION – 23 37 13

SECTION 23 81 26 – SPLIT-SYSTEM HEAT PUMPS

PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. THIS SECTION INCLUDES SPLIT-SYSTEM HEAT-PUMP UNITS CONSISTING OF SEPARATE EVAPORATOR-FAN AND COMPRESSOR-CONDENSER COMPONENTS.
1.3 SUBMITTALS
A. SEE GENERAL SPECIFICATION REQUIREMENTS ON SHEET M3 FOR ADDITIONAL SUBMITTAL REQUIREMENTS.
B. LEED SUBMITTALS:
1. PRODUCT DATA FOR CREDIT EA 4: FOR REFRIGERANTS, DOCUMENTATION INCLUDING PRINTED STATEMENT THAT REFRIGERANTS ARE FREE OF HCFCS.
C. 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 AND SIZE OF EACH FIELD CONNECTION.
2. WIRING DIAGRAMS: FOR POWER, SIGNAL, AND CONTROL WIRING.
D. SAMPLES FOR INITIAL SELECTION: FOR UNITS WITH FACTORY-APPLIED COLOR FINISHES.
E. FIELD QUALITY-CONTROL REPORTS.
F. OPERATION AND MAINTENANCE DATA: FOR SPLIT-SYSTEM HEAT PUMPS UNITS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS.
G. WARRANTY: SAMPLE OF SPECIAL WARRANTY.
1.4 QUALITY ASSURANCE
A. ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: SHALL BE "LISTED AND LABELED" AS DEFINED IN NFPA 70, ARTICLE 100, BY A "NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL)" ACCEPTABLE TO THE "AUTHORITIES HAVING JURISDICTION (AHJ)", AND MARKED FOR INTENDED LOCATION AND APPLICATION.
B. ASHRAE COMPLIANCE:
1. FABRICATE AND LABEL REFRIGERATION SYSTEM TO COMPLY WITH ASHRAE 15/34 – 2010, "SAFETY STANDARD FOR REFRIGERATION SYSTEMS."
2. ASHRAE COMPLIANCE: APPLICABLE REQUIREMENTS IN ASHRAE 62.1-2010, SECTION 4 – "OUTDOOR AIR QUALITY," SECTION 5 – "SYSTEMS AND EQUIPMENT," SECTION 6 – " PROCEDURES," AND SECTION 7 – "CONSTRUCTION AND SYSTEM START-UP."
C. ASHRAE/IESNA COMPLIANCE: APPLICABLE REQUIREMENTS IN ASHRAE/IESNA 90.1-2010.
1.5 COORDINATION
A. COORDINATE SIZES AND LOCATIONS OF VIBRATION ISOLATOR BASES WITH ACTUAL EQUIPMENT PROVIDED. CAST ANCHOR-BOLT INSERTS INTO BASES. CONCRETE, REINFORCEMENT, AND FORMWORK ARE SPECIFIED IN DIVISION 03 SECTION "CAST-IN-PLACE CONCRETE."
B. COORDINATE SIZES AND LOCATIONS OF ROOF CURBS, EQUIPMENT SUPPORTS, AND ROOF PENETRATIONS WITH ACTUAL EQUIPMENT PROVIDED.
1.6 WARRANTY
A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF SPLIT-SYSTEM AIR-CONDITIONING UNITS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.
1. WARRANTY PERIOD:
a. FOR COMPRESSOR: SEVEN (7) YEARS FROM THE DATE OF SUBSTANTIAL COMPLETION.
b. FOR PARTS: THREE (3) YEARS FROM THE DATE OF SUBSTANTIAL COMPLETION.
c. FOR LABOR: ONE (1) YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.
1.7 EXTRA MATERIALS
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: ONE, (1) SET FOR EACH AIR-HANDLING UNIT.
2. GASKETS: TWO, (2) SETS FOR EACH ACCESS DOOR.
3. FAN BELTS: TWO, (2) SETS FOR EACH AIR-HANDLING UNIT FAN.

PART 2 – PRODUCTS
2.1 MANUFACTURERS
A. BASIS-OF-DESIGN PRODUCT: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, PROVIDE THE PRODUCT(S) INDICATED ON THE DRAWINGS, OR A COMPARABLE PRODUCT BY ONE OF THE FOLLOWING:
1. CARRIER CORPORATION; HOME COMFORT AND HVAC BUILDING & INDUSTRIAL SYSTEMS.
2. YORK; A JOHNSON CONTROLS COMPANY.
2.2 INDOOR UNITS – 5 TONS (18 KW), OR LESS
A. FLOOR-MOUNTED, EVAPORATOR-FAN COMPONENTS:
1. CABINET: MINIMUM 18-GAGE 0.048-INCH (1.22-MM) THICK ASTM A 653 / A 653M, G90 GALVANIZED STEEL WITH BAKED-ENAMEL FINISH, AND REMOVABLE FRONT AND END PANELS IN COLOR SELECTED BY ARCHITECT.
2. INSULATION: FOIL-FACED, GLASS-FIBER DUCT LINER, WITH ANTI-MICROBIAL COATING.
3. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS AND THERMAL-EXPANSION VALVE. COMPLY WITH ARI 210/240.
4. ELECTRIC COIL: HELICAL, NICKEL-CHROME, RESISTANCE-WIRE HEATING ELEMENTS; WITH REFRACTORY CERAMIC SUPPORT BUSHINGS, AUTOMATIC-RESET THERMAL CUT-OUT, BUILT-IN MAGNETIC CONTACTORS, MANUAL-RESET THERMAL CUT-OUT, AIRFLOW PROVING DEVICE, AND ONE-TIME FUSES IN TERMINAL BOX FOR OVER-CURRENT PROTECTION.
5. FAN: CENTRIFUGAL, FORWARD-CURVED, DOUBLE-WIDTH WHEEL OF GALVANIZED STEEL; DIRECTLY CONNECTED TO MOTOR, AND WITH POWER-INDUCED OUTSIDE AIR.
6. FAN MOTOR(S):
a. COMPLY WITH NEMA DESIGNATION, TEMPERATURE RATING, SERVICE FACTOR, ENCLOSURE TYPE, AND EFFICIENCY REQUIREMENTS SPECIFIED IN DIVISION 23 SECTION "COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT."
b. MULTI-TAPPED, MULTI-SPEED WITH INTERNAL THERMAL PROTECTION AND PERMANENT LUBRICATION.
c. WIRING TERMINATIONS: CONNECT MOTOR TO CHASSIS WIRING WITH PLUG CONNECTION.
7. AIRSTREAM SURFACES: SURFACES IN CONTACT WITH THE AIRSTREAM SHALL COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2010.
8. CONDENSATE DRAIN PANS:
a. DOUBLE-WALLED, STAINLESS-STEEL SHEETS WITH SPACE BETWEEN WALLS FILLED WITH FOAM INSULATION AND MOISTURE-TIGHT SEAL.
b. FABRICATED WITH TWO PERCENT (2%) SLOPE IN AT LEAST TWO PLANES TO COLLECT CONDENSATE FROM COOLING COILS (INCLUDING COIL PIPING CONNECTIONS, COIL HEADERS, AND RETURN BENDS), AND TO DIRECT WATER TOWARD DRAIN CONNECTION.
1) LENGTH: EXTEND DRAIN PAN DOWNSTREAM FROM LEAVING FACE TO COMPLY WITH ASHRAE 62.1-2010.
2) DEPTH: A MINIMUM OF 1-1/2 INCHES (38 MM) DEEP.
c. DRAIN CONNECTION: LOCATED AT LOWEST POINT OF PAN AND SIZED TO PREVENT OVERFLOW. TERMINATE WITH THREADED NIPPLE ON ONE END OF PAN.
1) MINIMUM CONNECTION SIZE: NPS 3/4 (DN 19).
d. PAN-TOP SURFACE COATING: ANTI-MICROBIAL, WATERPROOFING COMPOUND.
9. AIR FILTRATION SECTION:
a. GENERAL REQUIREMENTS FOR AIR FILTRATION SECTION:
1) COMPLY WITH NFPA 90A.
2) MINIMUM ARRESTANCE: ACCORDING TO ASHRAE 52.1 AND MERV ACCORDING TO ASHRAE 52.2.
3) FILTER-HOLDING FRAMES: ARRANGED FOR FLAT OR ANGULAR ORIENTATION, WITH ACCESS DOORS ON BOTH SIDES OF UNIT. FILTERS SHALL BE REMOVABLE FROM ONE SIDE OR LIFTED OUT FROM ACCESS PLENUM.
b. DISPOSABLE PANEL FILTERS:
1) FACTORY-FABRICATED, VISCOUS-COATED, FLAT-PANEL TYPE.
2) THICKNESS: 1 INCH (25 MM).
3) INITIAL RESISTANCE: 0.075" W.G.
4) RECOMMENDED FINAL RESISTANCE: 0.15" W.G.
5) ARRESTANCE ACCORDING TO ASHRAE 52.1: 80.
6) MERV ACCORDING TO ASHRAE 52.2: 8.
7) MEDIA: INTERLACED GLASS FIBERS SPRAYED WITH NON-FLAMMABLE ADHESIVE AND ANTI-MICROBIAL AGENT.
8) FRAME: GALVANIZED STEEL, WITH METAL GRID ON OUTLET SIDE, STEEL ROD GRID ON INLET SIDE, AND HINGED; WITH PULL AND RETAINING HANDLES.
2.3 OUTDOOR UNITS – 5 TONS (18 KW), OR LESS
A. AIR-COOLED, COMPRESSOR-CONDENSER COMPONENTS:
1. CASING: STEEL, FINISHED WITH BAKED ENAMEL IN COLOR SELECTED BY ARCHITECT, WITH REMOVABLE PANELS FOR ACCESS TO CONTROLS, WEEP HOLES FOR WATER DRAINAGE, AND MOUNTING HOLES IN BASE. PROVIDE BRASS SERVICE VALVES, FITTINGS, AND GAGE PORTS ON EXTERIOR OF CASING.
2. COMPRESSOR: HERMETICALLY SEALED WITH CRANKCASE HEATER AND MOUNTED ON VIBRATION ISOLATION DEVICE(S). COMPRESSOR MOTOR SHALL HAVE THERMAL- AND CURRENT-SENSITIVE OVERLOAD DEVICES, START CAPACITOR, RELAY, AND CONTACTOR.
a. COMPRESSOR TYPE: SCROLL.
b. TWO-SPEED COMPRESSOR MOTOR WITH MANUAL-RESET, HIGH-PRESSURE SWITCH AND AUTOMATIC-RESET LOW-PRESSURE SWITCH.
c. REFRIGERANT CHARGE: R-410A.
d. REFRIGERANT COIL: COPPER TUBE, WITH MECHANICALLY BONDED ALUMINUM FINS AND LIQUID SUB-COOLER. COMPLY WITH ARI 210/240.
3. HEAT-PUMP COMPONENTS: REVERSING VALVE AND LOW-TEMPERATURE-AIR CUT-OFF THERMOSTAT.
4. AUTOMATIC DE-FROST CYCLE.
5. FAN: ALUMINUM-PROPELLER TYPE, DIRECTLY CONNECTED TO MOTOR.
6. MOTOR: PERMANENTLY LUBRICATED, WITH INTEGRAL THERMAL-OVERLOAD PROTECTION.
7. LOW AMBIENT KIT: PERMITS OPERATION DOWN TO 20 DEG F (-7 DEG C).
8. MOUNTING BASE: POLYETHYLENE.
2.4 ACCESSORIES
A. THERMOSTAT: LOW VOLTAGE, TOUCH-SCREEN PROGRAMMABLE TYPE, WITH SUB-BASE TO CONTROL COMPRESSOR AND EVAPORATOR FAN, AND (AT A MINIMUM) INCLUDING THE FOLLOWING FEATURES:
1. COMPRESSOR TIME DELAY.
2. 24-HOUR TIME CONTROL OF SYSTEM STOP AND START.
3. LIQUID-CRYSTAL DISPLAY INDICATING TEMPERATURE, SET-POINT TEMPERATURE, TIME SETTING, OPERATING MODE, AND FAN SPEED.
4. FAN-SPEED SELECTION INCLUDING AUTO SETTING.
B. AUTOMATIC-RESET TIMER TO PREVENT RAPID CYCLING OF COMPRESSOR.
C. REFRIGERANT LINE KITS: SOFT-ANNEALED COPPER SUCTION AND LIQUID LINES FACTORY CLEANED, DRIED, PRESSURIZED, AND SEALED; FACTORY-INSULATED SUCTION LINE WITH FLARED FITTINGS AT BOTH ENDS.
D. DRAIN HOSE: FOR CONDENSATE.
E. ADDITIONAL MONITORING:
1. MONITOR CONSTANT AND VARIABLE MOTOR LOADS.
2. MONITOR VARIABLE-FREQUENCY-DRIVE OPERATION.
3. MONITOR ECONOMIZER CYCLE.
4. MONITOR COOLING LOAD.
5. MONITOR AIR DISTRIBUTION STATIC PRESSURE AND VENTILATION AIR VOLUMES.
2.5 CAPACITIES AND CHARACTERISTICS
A. AS SCHEDULED ON DRAWINGS:

PART 3 – EXECUTION
3.1 INSTALLATION
A. INSTALL UNITS LEVEL AND PLUMB.
B. INSTALL EVAPORATOR-FAN COMPONENTS USING MANUFACTURER'S STANDARD MOUNTING DEVICES SECURELY FASTENED TO BUILDING STRUCTURE.
C. INSTALL ROOF-MOUNTED, COMPRESSOR-CONDENSER COMPONENTS WITH POLYETHYLENE MOUNTING BASE.
D. INSTALL AND CONNECT PRE-CHARGED REFRIGERANT PIPING (TUBING) TO COMPONENT'S QUICK-CONNECT FITTINGS. INSTALL TUBING TO ALLOW ACCESS TO UNIT.
3.2 CONNECTIONS
A. DUCT CONNECTIONS: DUCT INSTALLATION REQUIREMENTS ARE SPECIFIED IN DIVISION 23 SECTION "HVAC METAL DUCTS". DRAWINGS INDICATE THE GENERAL ARRANGEMENT OF DUCTS. CONNECT SUPPLY AND RETURN DUCTS TO SPLIT-SYSTEM HEAT PUMP UNITS WITH FLEXIBLE DUCT CONNECTORS. FLEXIBLE DUCT CONNECTORS ARE SPECIFIED IN DIVISION 23 SECTION "HVAC METAL DUCT ACCESSORIES."

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CONSTRUCTION DOCUMENTS

COMMONWEALTH OF VIRGINIA
MARK A. PHILLIPS
Lic. No. 36230
4/30/2013
PROFESSIONAL ENGINEER

revisions

Main Library
Storybook Room
2311 Memorial Avenue
Lynchburg Virginia 24501

MECHANICAL / HVAC SPECIFICATIONS

sheet

M4

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: MAP

MECHANICAL SPECIFICATIONS (CONTINUED):

3.3 FIELD QUALITY CONTROL
A. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT, TEST, AND ADJUST COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS.
B. PERFORM TESTS AND INSPECTIONS.
1. MANUFACTURER'S FIELD SERVICE: ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO INSPECT COMPONENTS, ASSEMBLIES, AND EQUIPMENT INSTALLATIONS, INCLUDING CONNECTIONS, AND TO ASSIST IN TESTING.
C. TESTS AND INSPECTIONS:
1. LEAK TEST: AFTER INSTALLATION, CHARGE SYSTEM AND TEST FOR LEAKS. REPAIR LEAKS AND RETEST UNTIL NO LEAKS EXIST.
2. OPERATIONAL TEST: AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, START UNITS TO CONFIRM PROPER MOTOR ROTATION AND UNIT OPERATION.
3. TEST AND ADJUST CONTROLS AND SAFETIES. REPLACE DAMAGED AND MALFUNCTIONING CONTROLS AND EQUIPMENT.
D. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.
E. PREPARE TEST AND INSPECTION REPORTS.
3.4 STARTUP SERVICE
A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICE.
1. COMPLETE INSTALLATION AND STARTUP CHECKS ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS.
2. REFER TO SPECIFICATION SECTION 23 05 93 – TESTING, ADJUSTING, AND BALANCING FOR HVAC FOR ADDITIONAL REQUIREMENTS.
3.5 DEMONSTRATION
A. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO TRAIN THE OWNER'S MAINTENANCE PERSONNEL TO ADJUST, OPERATE, AND MAINTAIN UNITS.
END OF SECTION – 23 81 26

SECTION 23 83 13.16 – ELECTRIC, RADIANT-FLOOR, HEATING MATS
PART 1 – GENERAL
1.1 RELATED SECTIONS
A. REFER TO GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
B. ALL DIVISION 23 SECTIONS.
C. PROJECT ARCHITECTURAL SPECIFICATION SECTIONS.
1.2 SECTION INCLUDES
A. ELECTRIC RADIANT FLOOR HEATING MATS, INSTALLED BENEATH CARPET OR FLOATING WOOD FLOOR COVERING(S).
B. DIGITAL THERMOSTAT WITH PROBE TYPE THERMISTOR SENSOR.
C. ELECTRIC RADIANT FLOOR HEATING SYSTEM COMPONENTS, ACCESSORIES, AND ASSOCIATED INSTALLATION MATERIALS.
1.3 REFERENCES
A. NATIONAL ELECTRICAL CODE (NEC)
B. UNDERWRITER'S LABORATORY (UL)
C. RADIANT PANEL ASSOCIATION (RPA)
D. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1.4 PERFORMANCE REQUIREMENTS
A. ELECTRIC, RADIANT-FLOOR, HEATING MATS AND INTERCONNECTING ELECTRICAL SYSTEM SHALL BE UL "LISTED AND LABELED" AS DEFINED IN NFPA 70, ARTICLE 100, AND ACCEPTABLE TO THE "AUTHORITIES HAVING JURISDICTION (AHJ)", AND MARKED FOR INTENDED LOCATION AND USE.
B. ELECTRIC, RADIANT-FLOOR, HEATING MAT SYSTEM SHALL GENERATE 12 WATTS PER SQUARE FOOT. MAT HEATERS LESS THAN 12 WATTS PER SQUARE FOOT, WILL NOT BE ACCEPTABLE FOR THIS APPLICATION.
C. ELECTRIC, RADIANT-FLOOR, HEATING MAT SUBSTRATE SHALL BE TWO LAYERS OF ALUMINUM FOIL LAMINATE WITH THE HEATING ELEMENT WIRE "SANDWICHED" IN-BETWEEN. MAT THICKNESS SHALL BE 1/16" WAFER-THIN. FREE-FORM HEATING CABLES VOID OF MAT SUBSTRATE WILL NOT BE ACCEPTABLE FOR THIS APPLICATION. HEATING CABLES OR MATS THAT MUST BE BURIED IN MORTAR, WILL NOT BE ACCEPTABLE FOR THIS APPLICATION.
C. ALL HEATING MATS MUST BE STANDARD SIZES, AND READILY AVAILABLE. EACH HEATING MAT MUST INCLUDE 30 FEET OF COLD LEAD EXTENSION WIRE. CUSTOM MAT SIZES WILL NOT BE ACCEPTABLE FOR THIS APPLICATION.
1.5 SUBMITTALS
A. REFER TO GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3 FOR ADDITIONAL SUBMITTAL REQUIREMENTS.
B. PROVIDE TO THE OWNER, ARCHITECT, AND M.E.P. ENGINEER, A COPY OF ALL THE MANUFACTURER'S PRODUCT DATA SHEETS, WARRANTY, AND INSTALLATION INSTRUCTIONS.
C. PROVIDE TO THE OWNER, ARCHITECT, AND M.E.P. ENGINEER, A COPY OF ALL RELEVANT SHOP DRAWINGS, SAMPLES, MOCK-UPS, AND ELECTRICAL SCHEMATICS.
1.6 QUALITY ASSURANCE
A. MANUFACTURER QUALIFICATIONS & SERVICES:
1. MINIMUM 10 YEARS OF EXPERIENCE WITH ELECTRIC RADIANT FLOOR HEATING SYSTEMS.
2. FLOOR HEATING MATS, MAT THERMOSTATS, SENSORS, RELAYS, AND RELATED ITEMS SHALL ALL BE PROVIDED BY THE SAME MANUFACTURER.
3. MUST PROVIDE 24/7 TECHNICAL INSTALLATION SUPPORT, AND FREE DESIGN ASSISTANCE.
B. INSTALLER QUALIFICATIONS:
1. MUST HAVE VERIFIABLE EXPERIENCE SUCCESSFULLY COMPLETING PROJECTS OF SIMILAR SIZE, AND /OR HAS BEEN TRAINED OR CERTIFIED BY A MANUFACTURER'S REPRESENTATIVE.
2. A LICENSED ELECTRICIAN SHALL COMPLETE ALL ELECTRICAL ROUGH-IN, AND ELECTRICAL CONNECTIONS REQUIRED TO COMPLETE THE SYSTEM INSTALLATION.
C. REGULATORY REQUIREMENTS AND APPROVALS – ELECTRIC, RADIANT-FLOOR, HEATING SYSTEM.
1. PROVIDE A RADIANT FLOOR HEATING SYSTEM THAT COMPLIES WITH THE FOLLOWING REQUIREMENTS:
A. HEATING MATS FOR INSTALLATION IN CEMENT-BASED MORTAR, OR OVER WOOD SUBFLOORS SHALL BE LISTED TO UL 1673 AND CSA- C22.2 NO. 130-03.
D. PRE-INSTALLATION MEETINGS:
1. COORDINATE WORK WITH OTHER TRADE REPRESENTATIVES (GENERAL, ELECTRICAL, FLOORING, AND OTHER TRADE CONTRACTORS) TO VERIFY AREAS OF RESPONSIBILITY (SCOPE OF WORK).
2. REVIEW PROJECT TIMELINE AND CONSTRUCTION DEADLINES TO ENSURE PROJECT WILL COMPLY WITH ALL MANUFACTURER'S INSTALLATION INSTRUCTIONS AND WARRANTY REQUIREMENTS.
1.7 DELIVERY, STORAGE AND HANDLING
A. DELIVER MATERIALS IN MANUFACTURER'S ORIGINAL, UN-OPENED, UN-DAMAGED CONTAINERS WITH IDENTIFICATION LABELS INTACT.
B. STORE MATERIALS PROTECTED FROM EXPOSURE TO HARMFUL SITE CONDITIONS, AND IN AN AREA PROTECTED FROM VANDALISM AND THEFT.
PART 2 – PRODUCTS
2.1 MANUFACTURER
A. AVAILABLE MANUFACTURERS: SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE MANUFACTURERS OFFERING PRODUCTS THAT MAY BE INCORPORATED INTO THE WORK INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. WARMLYYOURS PH: 800-875-5285 FX: 800-408-1100
2 CORPORATE DRIVE, SUITE 100
LONG GROVE, IL 60047
WEB: WWW.WARMLYYOURS.COM EMAIL: GJAZWINSKI@WARMLYYOURS.COM
2. OR, ENGINEER "APPROVED" EQUAL.
2.2 ELECTRIC, RADIANT-FLOOR, HEATING MATS
A. THE HEATING ELEMENT SHALL CONSIST OF A MULTI-STRANDED COPPER CONDUCTOR ALLOY RESISTANCE WIRE COVERED BY PVC INSULATION. THE ELEMENT SHALL BE SANDWICHED BETWEEN LAYERS OF FOIL. THE FOIL PROVIDES EACH MAT HEATER WITH GROUND. WIRE SPACING IS CONFIGURED AT 2" TO 3" ON CENTER, PROVIDING 12 WATTS PER SQUARE FOOT EVENLY FOR THE LENGTH OF THE HEATING ROLL. THE 3-CONDUCTOR COLD LEAD RETURN WIRE (30 FT LENGTH) IS FACTORY INSTALLED (SPLICED) AT THE END OF THE HEATING ROLL, AND MUST RUN BACK TO THE POWER SUPPLY (THERMOSTAT OR POWER MODULE) ALONG THE PERIMETER OF THE HEATED SPACE.
B. THE HEATING MAT SHALL BE 120 VAC OR 240 VAC, BE UL "LISTED" AND "LABELED", AND BE BACKED BY A 5 YEAR MANUFACTURER'S WARRANTY. MULTIPLE MAT SYSTEMS MUST BE WIRED IN PARALLEL BY THE INSTALLER.
2.3 THERMOSTAT & ACCESSORIES
A. THERMOSTAT (TH115 SERIES, SMARTSTAT) SHALL BE A 7-DAY PROGRAMMABLE TYPE, WITH A BACK-LIT DIGITAL DISPLAY; AND INCLUDING THE FOLLOWING:
1. "SMARTSTAT(S)" SHALL INCLUDE AN IN-FLOOR TEMPERATURE SENSOR, WITH 15 FT OF EXTENSION WIRE.
2. THERMOSTAT HAS INTEGRAL GFCI PROTECTION, AND HAS A 15 AMP MAXIMUM CAPACITY.
3. TWO ADJUSTABLE TEMPERATURE SET-POINTS, ALLOW FLEXIBILITY WHILE PROGRAMMING THE UNIT.
4. THE SMARTSTAT SHALL INCLUDE A MANUAL OVERRIDE FEATURE.
5. THERMOSTAT SHALL BE DUAL-VOLTAGE (120 VAC / 240 VAC), EXCEPT WHEN LARGER FLOOR HEATING SYSTEMS NEED POWER MODULES TO SWITCH THE AMP LOAD (AMPS EXCEED 15 AMPS). SYSTEMS WITH POWER MODULES, REQUIRE A MASTER THERMOSTAT THAT IS LOW VOLTAGE (12 V). WARRANTY IS 3 YEARS.
B. CORK OR CERAZORB INSULATION MAY BE PROVIDED TO PREVENT HEAT LOSSES UNDER THE ZONE FROM: CONCRETE SLAB SUB-FLOORS, UN-HEATED CRAWL SPACES, UN-HEATED GARAGES, ETC. CORK SHALL BE AT LEAST ¼" THICK (6MM), AND MUST BE TESTED FOR THERMAL RESISTANCE IN ACCORDANCE WITH ASTM C 177-85 AND HAVE A MINIMUM R VALUE OF 0.72 (AT ¼" THICKNESS). CERAZORB SHALL BE AT LEAST 3/16" THICK (5MM), AND HAVE A MINIMUM R-VALUE OF 1.5 (AT 3/16" THICKNESS). MAY NOT BE APPROPRIATE FOR COMMERCIAL OR INDUSTRIAL APPLICATIONS.
PART 3 – EXECUTION
3.1 MANUFACTURER'S INSTRUCTIONS
A. PROVIDE THE RADIANT-FLOOR, HEATING SYSTEM IN ACCORDANCE WITH THE MANUFACTURER'S PRODUCT DATA, INCLUDING PRODUCT TECHNICAL BULLETINS, INSTALLATION INSTRUCTIONS, AND DESIGN DRAWINGS.
3.2 EXAMINATION & PREPARATION
A. INSTALLER SHALL VERIFY FIELD MEASUREMENTS ARE AS SHOWN ON SHOP DRAWINGS(S).
B. ANY REVISIONS NEEDED TO SHOP DRAWINGS, OR PRODUCT PROVIDED, MUST BE CORRECTED PRIOR TO PROCEEDING WITH THE INSTALLATION.
C. PREPARE THE SUB-FLOOR, AS PER THE STANDARD GUIDELINES SET FORTH BY THE CARPET AND RUG INSTITUTE. REMOVE ANY NAILS, STAPLES, OR OTHER SHARP OBJECTS, THAT MAY DAMAGE THE HEATING MAT.
D. INSTALLER SHALL VERIFY THAT THE REQUIRED POWER, IS AVAILABLE, IN PROPER LOCATION, AND READY FOR USE.
3.3 INSTALLATION
A. PROVISION OF THE COMPLETE RADIANT-FLOOR, HEATING SYSTEM SHALL CONFORM TO THE MANUFACTURER'S INSTALLATION INSTRUCTIONS, THE NATIONAL ELECTRICAL CODE, AND APPROPRIATE LOCAL CODES.
3.4 FIELD QUALITY CONTROL
A. TEST EACH MAT HEATER FOR OHMS, WITH A DIGITAL OHMS METER BEFORE AND AFTER THE INSTALLATION OF THE CARPET OR WOOD. RECORD THESE VALUES ON THE WARRANTY FORM PROVIDED AT THE END OF THE MANUFACTURER'S INSTALLATION MANUAL.
B. START-UP (FIRST-TIME ACTIVATION) SHALL PROCEED IMMEDIATELY AFTER TESTING.
C. DURING "START-UP", VOLTAGE AND AMPS SHALL BE TESTED BY A LICENSED ELECTRICIAN.
D. ALL TESTING RECORDS SHALL BE COPIED, AND PROVIDED TO THE ARCHITECT/ENGINEER, WHO WILL FORWARD TO THE OWNER.
END OF SECTION – 23 83 13.16

SECTION 23 90 20 – HVAC TESTING, ADJUSTING, AND BALANCING
PART 1 – GENERAL
1.1 RELATED DOCUMENTS
A. SEE GENERAL SPECIFICATION REQUIREMENTS AT THE TOP OF SHEET M3.
1.2 SUMMARY
A. SECTION INCLUDES:
1. BALANCING AIR SYSTEMS:
a. CONSTANT-VOLUME AIR SYSTEMS.
1.3 DEFINITIONS
A. AABC: ASSOCIATED AIR BALANCE COUNCIL.
B. NEBB: NATIONAL ENVIRONMENTAL BALANCING BUREAU.
C. TAB: TESTING, ADJUSTING, AND BALANCING.
D. TABB: TESTING, ADJUSTING, AND BALANCING BUREAU.
E. TAB SPECIALIST: AN ENTITY ENGAGED TO PERFORM TAB WORK.
1.4 SUBMITTALS
A. LEED SUBMITTAL:
1. AIR-BALANCE REPORT FOR LEED PREREQUISITE EQ 1: DOCUMENTATION OF WORK PERFORMED FOR ASHRAE 62.1-2010, SECTION 7.2.2, "AIR BALANCING."
B. QUALIFICATION DATA: WITHIN 15 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT DOCUMENTATION THAT THE TAB CONTRACTOR AND THIS PROJECT'S TAB TEAM MEMBERS MEET THE QUALIFICATIONS SPECIFIED IN "QUALITY ASSURANCE" ARTICLE.
C. CONTRACT DOCUMENTS EXAMINATION REPORT: WITHIN 30 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT THE CONTRACT DOCUMENTS REVIEW REPORT AS SPECIFIED IN PART 3.
D. STRATEGIES AND PROCEDURES PLAN: WITHIN 30 DAYS OF CONTRACTOR'S NOTICE TO PROCEED, SUBMIT TAB STRATEGIES AND STEP-BY-STEP PROCEDURES AS SPECIFIED IN "PREPARATION" ARTICLE.
E. CERTIFIED TAB REPORTS.
F. SAMPLE REPORT FORMS.
G. INSTRUMENT CALIBRATION REPORTS, TO INCLUDE THE FOLLOWING:
1. INSTRUMENT TYPE AND MAKE.
2. SERIAL NUMBER.
3. APPLICATION.
4. DATES OF USE.
5. DATES OF CALIBRATION.
1.5 QUALITY ASSURANCE
A. TAB CONTRACTOR QUALIFICATIONS: ENGAGE A TAB ENTITY CERTIFIED BY EITHER AABC OR NEBB.
1. TAB FIELD SUPERVISOR: EMPLOYEE OF THE TAB CONTRACTOR AND CERTIFIED BY EITHER AABC OR NEBB.
2. TAB TECHNICIAN: EMPLOYEE OF THE TAB CONTRACTOR AND WHO IS CERTIFIED BY EITHER AABC OR NEBB AS A TAB TECHNICIAN.
B. TAB CONFERENCE: MEET WITH OWNER, ARCHITECT, AND ENGINEER ON APPROVAL OF THE TAB STRATEGIES AND PROCEDURES PLAN TO DEVELOP A MUTUAL UNDERSTANDING OF THE DETAILS. REQUIRE THE PARTICIPATION OF THE TAB FIELD SUPERVISOR AND TECHNICIANS. PROVIDE TEN (10) CALENDAR DAYS' ADVANCE NOTICE OF SCHEDULED MEETING TIME AND LOCATION.
1. AGENDA ITEMS:
a. THE CONTRACT DOCUMENTS EXAMINATION REPORT.
b. THE TAB PLAN.
c. COORDINATION AND COOPERATION OF TRADES AND SUBCONTRACTORS.
d. COORDINATION OF DOCUMENTATION AND COMMUNICATION FLOW.
C. CERTIFY TAB FIELD DATA REPORTS AND PERFORM THE FOLLOWING:
1. REVIEW FIELD DATA REPORTS TO VALIDATE ACCURACY OF DATA AND TO PREPARE CERTIFIED TAB REPORTS.
2. CERTIFY THAT THE TAB TEAM COMPLIED WITH THE APPROVED TAB PLAN AND THE PROCEDURES SPECIFIED AND REFERENCED IN THIS SPECIFICATION.
D. TAB REPORT FORMS: USE STANDARD TAB CONTRACTOR'S FORMS APPROVED BY OWNER, ARCHITECT, AND ENGINEER.
E. INSTRUMENTATION TYPE, QUANTITY, ACCURACY, AND CALIBRATION: AS DESCRIBED IN ASHRAE 111, SECTION 5, "INSTRUMENTATION."
1.6 PROJECT CONDITIONS
A. PARTIAL OWNER OCCUPANCY: THE OWNER MAY OCCUPY COMPLETED AREAS OF BUILDING BEFORE SUBSTANTIAL COMPLETION. COOPERATE WITH OWNER DURING TAB OPERATIONS TO MINIMIZE CONFLICTS WITH OWNER'S OPERATIONS.
1.7 COORDINATION
A. NOTICE: PROVIDE TEN (10) CALENDAR DAYS' ADVANCE NOTICE FOR EACH TEST. INCLUDE SCHEDULED TEST DATES AND TIMES.
B. PERFORM TAB AFTER LEAKAGE AND PRESSURE TESTS ON AIR AND WATER DISTRIBUTION SYSTEMS HAVE BEEN SATISFACTORILY COMPLETED.
PART 2 – PRODUCTS (NOT APPLICABLE)
PART 3 – EXECUTION
3.1 TAB SPECIALISTS
A. SUBJECT TO COMPLIANCE WITH THE REQUIREMENTS OF THIS SECTION, AVAILABLE TAB CONTRACTORS THAT MAY BE ENGAGED INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING:
1. ANNANDALE BALANCING COMPANY, INC.
2. C & W – TESCO, INC.
3. EAST COAST TEST & BALANCE, INC.
4. MECHANICAL BALANCING, INC.
5. MID-ATLANTIC TEST & BALANCE, INC.
3.2 EXAMINATION
A. EXAMINE THE CONTRACT DOCUMENTS TO BECOME FAMILIAR WITH PROJECT REQUIREMENTS AND TO DISCOVER CONDITIONS IN SYSTEMS' DESIGNS THAT MAY PRECLUDE PROPER TAB OF SYSTEMS AND EQUIPMENT.
B. EXAMINE THE APPROVED SUBMITTALS FOR HVAC SYSTEMS AND EQUIPMENT.
C. EXAMINE DESIGN DATA INCLUDING HVAC SYSTEM DESCRIPTIONS, STATEMENTS OF DESIGN ASSUMPTIONS FOR ENVIRONMENTAL CONDITIONS AND SYSTEMS' OUTPUT, AND STATEMENTS OF PHILOSOPHIES AND ASSUMPTIONS ABOUT HVAC SYSTEM AND EQUIPMENT CONTROLS.
D. EXAMINE EQUIPMENT PERFORMANCE DATA INCLUDING FAN CURVES.
1. RELATE PERFORMANCE DATA TO PROJECT CONDITIONS AND REQUIREMENTS, INCLUDING SYSTEM EFFECTS THAT CAN CREATE UNDESIRED OR UNPREDICTED CONDITIONS THAT CAUSE REDUCED CAPACITIES IN ALL OR PART OF A SYSTEM.
2. CALCULATE SYSTEM-EFFECT FACTORS TO REDUCE PERFORMANCE RATINGS OF HVAC EQUIPMENT WHEN INSTALLED UNDER CONDITIONS DIFFERENT FROM THE CONDITIONS USED TO RATE EQUIPMENT PERFORMANCE. TO CALCULATE SYSTEM EFFECTS FOR AIR SYSTEMS, USE TABLES AND CHARTS FOUND IN AMCA 201, "FANS AND SYSTEMS," OR IN SMACNA'S "HVAC SYSTEMS – DUCT DESIGN." COMPARE RESULTS WITH THE DESIGN DATA AND INSTALLED CONDITIONS.
E. EXAMINE SYSTEM AND EQUIPMENT INSTALLATIONS AND VERIFY THAT FIELD QUALITY-CONTROL TESTING, CLEANING, AND ADJUSTING SPECIFIED IN INDIVIDUAL SECTIONS HAVE BEEN PERFORMED.
F. EXAMINE TEST REPORTS SPECIFIED IN INDIVIDUAL SYSTEM AND EQUIPMENT SECTIONS.
G. EXAMINE HVAC EQUIPMENT AND FILTERS AND VERIFY THAT BEARINGS ARE GREASED, BELTS ARE ALIGNED AND TIGHT, AND EQUIPMENT WITH FUNCTIONING CONTROLS IS READY FOR OPERATION.
H. EXAMINE STRAINERS. VERIFY THAT START-UP SCREENS ARE REPLACED BY PERMANENT SCREENS WITH INDICATED PERFORATIONS.
I. EXAMINE HEAT-TRANSFER COILS FOR CORRECT PIPING CONNECTIONS AND FOR CLEAN AND STRAIGHT FINS.
J. EXAMINE OPERATING SAFETY INTERLOCKS AND CONTROLS ON HVAC EQUIPMENT.
K. REPORT DEFICIENCIES DISCOVERED BEFORE AND DURING PERFORMANCE OF TAB PROCEDURES. OBSERVE AND RECORD SYSTEM REACTIONS TO CHANGES IN CONDITIONS. RECORD DEFAULT SET POINTS IF DIFFERENT FROM INDICATED VALUES.
3.3 PREPARATION
A. PREPARE A TAB PLAN THAT INCLUDES STRATEGIES AND STEP-BY-STEP PROCEDURES.
B. COMPLETE SYSTEM-READINESS CHECKS AND PREPARE REPORTS. VERIFY THE FOLLOWING:
1. PERMANENT ELECTRICAL-POWER WIRING IS COMPLETE.
2. AUTOMATIC TEMPERATURE-CONTROL SYSTEMS ARE OPERATIONAL.
3. EQUIPMENT AND DUCT ACCESS DOORS ARE SECURELY CLOSED.
4. BALANCE, SMOKE, AND FIRE DAMPERS ARE OPEN.
5. CEILINGS ARE INSTALLED IN CRITICAL AREAS WHERE AIR-PATTERN ADJUSTMENTS ARE REQUIRED AND ACCESS TO BALANCING DEVICES IS PROVIDED.
6. WINDOWS AND DOORS CAN BE CLOSED SO INDICATED CONDITIONS FOR SYSTEM OPERATIONS CAN BE MET.
3.4 GENERAL PROCEDURES FOR TESTING AND BALANCING
A. PERFORM TESTING AND BALANCING PROCEDURES ON EACH SYSTEM ACCORDING TO THE PROCEDURES CONTAINED IN EITHER AABC'S "NATIONAL STANDARDS FOR TOTAL SYSTEM BALANCE" OR NEBB'S "PROCEDURAL STANDARDS FOR TESTING, ADJUSTING, AND BALANCING OF ENVIRONMENTAL SYSTEMS"; AND, ACCORDING TO ASHRAE 111 AND THIS SECTION.
1. COMPLY WITH REQUIREMENTS IN ASHRAE 62.1-2010, SECTION 7.2.2, "AIR BALANCING."
B. CUT INSULATION, DUCTS, PIPES, AND EQUIPMENT CABINETS FOR INSTALLATION OF TEST PROBES TO THE MINIMUM EXTENT NECESSARY FOR TAB PROCEDURES.
1. AFTER TESTING AND BALANCING, PATCH PROBE HOLES IN DUCTS WITH SAME MATERIAL AND THICKNESS AS USED TO CONSTRUCT DUCTS.
2. INSTALL AND JOIN NEW INSULATION THAT MATCHES REMOVED MATERIALS. RESTORE INSULATION, COVERINGS, VAPOR BARRIER, AND FINISH ACCORDING TO DIVISION 23 SECTION "HVAC INSULATION."
C. MARK EQUIPMENT AND BALANCING DEVICES, INCLUDING DAMPER-CONTROL POSITIONS, VALVE POSITION INDICATORS, FAN-SPEED-CONTROL LEVERS, AND SIMILAR CONTROLS AND DEVICES, WITH PAINT OR OTHER SUITABLE, PERMANENT IDENTIFICATION MATERIAL TO SHOW FINAL SETTINGS.
D. TAKE AND REPORT TESTING AND BALANCING MEASUREMENTS IN INCH-POUND (IP) UNITS.
3.5 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS
A. PREPARE TEST REPORTS FOR BOTH FANS AND OUTLETS. OBTAIN MANUFACTURER'S OUTLET FACTORS AND RECOMMENDED TESTING PROCEDURES. CROSSCHECK THE SUMMATION OF REQUIRED OUTLET VOLUMES WITH REQUIRED FAN VOLUMES.
B. PREPARE SCHEMATIC DIAGRAMS OF SYSTEMS' "AS-BUILT" DUCT LAYOUTS.
C. DETERMINE THE BEST LOCATIONS IN MAIN AND BRANCH DUCTS FOR ACCURATE DUCT-AIRFLOW MEASUREMENTS.
D. CHECK AIRFLOW PATTERNS FROM THE OUTDOOR-AIR LOUVERS AND DAMPERS AND THE RETURN- AND EXHAUST-AIR DAMPERS THROUGH THE SUPPLY-FAN DISCHARGE AND MIXING DAMPERS.
E. LOCATE START-STOP AND DISCONNECT SWITCHES, ELECTRICAL INTERLOCKS, AND MOTOR STARTERS.
F. VERIFY THAT MOTOR STARTERS ARE EQUIPPED WITH PROPERLY SIZED THERMAL PROTECTION.
G. CHECK DAMPERS FOR PROPER POSITION TO ACHIEVE DESIRED AIRFLOW PATH.
H. CHECK FOR AIRFLOW BLOCKAGES.
I. CHECK CONDENSATE DRAINS FOR PROPER CONNECTIONS AND FUNCTIONING.
J. CHECK FOR PROPER SEALING OF AIR-HANDLING-UNIT COMPONENTS.
K. VERIFY THAT AIR DUCT SYSTEM IS SEALED AS SPECIFIED IN DIVISION 23 SECTION "23 31 13 – HVAC METAL DUCTS."
3.6 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS
A. ADJUST FANS TO DELIVER TOTAL INDICATED AIRFLOWS WITHIN THE MAXIMUM ALLOWABLE FAN SPEED LISTED BY FAN MANUFACTURER.
1. MEASURE TOTAL AIRFLOW.
a. WHERE SUFFICIENT SPACE IN DUCTS IS NOT AVAILABLE FOR PITOT-TUBE TRAVERSE MEASUREMENTS, MEASURE THE AIRFLOW AT TERMINAL OUTLETS AND INLETS, AND CALCULATE THE TOTAL AIRFLOW.
2. MEASURE FAN STATIC PRESSURES AS FOLLOWS TO DETERMINE ACTUAL STATIC PRESSURE:
a. MEASURE OUTLET STATIC PRESSURE AS FAR DOWNSTREAM FROM THE FAN AS PRACTICAL AND UPSTREAM FROM RESTRICTIONS IN DUCTS SUCH AS ELBOWS AND TRANSITIONS.
b. MEASURE STATIC PRESSURE DIRECTLY AT THE FAN OUTLET OR THROUGH THE FLEXIBLE CONNECTION.
c. MEASURE INLET STATIC PRESSURE OF SINGLE-INLET FANS IN THE INLET DUCT AS NEAR THE FAN AS POSSIBLE, UPSTREAM FROM THE FLEXIBLE CONNECTION, AND DOWNSTREAM FROM DUCT RESTRICTIONS.
d. MEASURE INLET STATIC PRESSURE OF DOUBLE-INLET FANS THROUGH THE WALL OF THE PLENUM THAT HOUSES THE FAN.
3. REVIEW RECORD DOCUMENTS TO DETERMINE VARIATIONS IN DESIGN STATIC PRESSURES VERSUS ACTUAL STATIC PRESSURES. CALCULATE ACTUAL SYSTEM-EFFECT FACTORS. RECOMMEND ADJUSTMENTS TO ACCOMMODATE ACTUAL CONDITIONS.
4. OBTAIN APPROVAL FROM THE ARCHITECT/ENGINEER AND OWNER FOR ADJUSTMENT OF FAN SPEED HIGHER OR LOWER THAN INDICATED SPEED. COMPLY WITH REQUIREMENTS IN DIVISION 23 SECTION(S) FOR HEAT-PUMP UNITS FOR ADJUSTMENT OF FANS, BELTS, AND PULLEY SIZES TO ACHIEVE INDICATED AIR-HANDLING-UNIT PERFORMANCE.
5. DO NOT MAKE FAN-SPEED ADJUSTMENTS THAT RESULT IN MOTOR OVER-LOAD. CONSULT EQUIPMENT MANUFACTURERS ABOUT FAN-SPEED SAFETY FACTORS. MODULATE DAMPERS AND MEASURE FAN-MOTOR AMPERAGE TO ENSURE THAT NO OVER-LOAD WILL OCCUR. MEASURE AMPERAGE IN FULL-COOLING, FULL-HEATING, ECONOMIZER, AND ANY OTHER OPERATING MODE TO DETERMINE THE MAXIMUM REQUIRED BRAKE HORSEPOWER.
B. ADJUST VOLUME DAMPERS FOR MAIN DUCT(S), SUB-MAIN DUCTS, AND MAJOR BRANCH DUCTS TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES.
1. MEASURE AIRFLOW OF SUB-MAIN AND BRANCH DUCTS.
a. WHERE SUFFICIENT SPACE IN SUB-MAIN AND BRANCH DUCTS IS UNAVAILABLE FOR PITOT-TUBE TRAVERSE MEASUREMENTS, MEASURE AIRFLOW AT TERMINAL OUTLETS AND INLETS AND CALCULATE THE TOTAL AIRFLOW FOR THAT ZONE.
2. MEASURE STATIC PRESSURE AT A POINT DOWNSTREAM FROM THE BALANCING DAMPER, AND ADJUST VOLUME DAMPERS UNTIL THE PROPER STATIC PRESSURE IS ACHIEVED.
3. RE-MEASURE EACH SUB-MAIN AND BRANCH DUCT AFTER ALL HAVE BEEN ADJUSTED. CONTINUE TO ADJUST SUB-MAIN AND BRANCH DUCTS TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES.
C. MEASURE AIR OUTLETS AND INLETS WITHOUT MAKING ADJUSTMENTS.
1. MEASURE TERMINAL OUTLETS USING A DIRECT-READING HOOD OR OUTLET MANUFACTURER'S WRITTEN INSTRUCTIONS AND CALCULATING FACTORS.
D. ADJUST AIR OUTLETS AND INLETS FOR EACH SPACE TO INDICATED AIRFLOWS WITHIN SPECIFIED TOLERANCES OF INDICATED VALUES. MAKE ADJUSTMENTS USING BRANCH VOLUME DAMPERS RATHER THAN EXTRACTORS AND THE DAMPERS AT AIR TERMINALS.
1. ADJUST EACH OUTLET IN SAME ROOM OR SPACE TO WITHIN SPECIFIED TOLERANCES OF INDICATED QUANTITIES WITHOUT GENERATING NOISE LEVELS ABOVE THE LIMITATIONS PRESCRIBED BY THE CONTRACT DOCUMENTS.
2. ADJUST PATTERNS OF ADJUSTABLE OUTLETS FOR PROPER DISTRIBUTION WITHOUT DRAFTS.
3.7 PROCEDURES FOR MOTORS
A. MOTORS, 1/2 HP AND LARGER: TEST AT FINAL BALANCED CONDITIONS AND RECORD THE FOLLOWING DATA:
1. MANUFACTURER'S NAME, MODEL NUMBER, AND SERIAL NUMBER.
2. MOTOR HORSEPOWER RATING.
3. MOTOR RPM.
4. EFFICIENCY RATING.
5. NAMEPLATE AND MEASURED VOLTAGE, EACH PHASE.
6. NAMEPLATE AND MEASURED AMPERAGE, EACH PHASE.
7. STARTER THERMAL-PROTECTION-ELEMENT RATING.
B. MOTORS DRIVEN BY VARIABLE-FREQUENCY CONTROLLERS: TEST FOR PROPER OPERATION AT SPEEDS VARYING FROM MINIMUM TO MAXIMUM. TEST THE MANUAL BYPASS OF THE CONTROLLER TO PROVE PROPER OPERATION. RECORD OBSERVATIONS INCLUDING NAME OF CONTROLLER MANUFACTURER, MODEL NUMBER, SERIAL NUMBER, AND NAMEPLATE DATA.
3.8 PROCEDURES FOR CONDENSING UNITS
A. VERIFY PROPER ROTATION OF FANS.
B. MEASURE ENTERING- AND LEAVING-AIR TEMPERATURES.
C. RECORD COMPRESSOR DATA.
3.9 PROCEDURES FOR HEAT-TRANSFER COILS
A. MEASURE, ADJUST, AND RECORD THE FOLLOWING DATA FOR EACH WATER COIL:
1. ENTERING- AND LEAVING-WATER TEMPERATURE.
2. WATER FLOW RATE.
3. WATER PRESSURE DROP.
4. DRY-BULB TEMPERATURE OF ENTERING AND LEAVING AIR.
5. WET-BULB TEMPERATURE OF ENTERING AND LEAVING AIR FOR COOLING COILS.
6. AIRFLOW.
7. AIR PRESSURE DROP.
B. MEASURE, ADJUST, AND RECORD THE FOLLOWING DATA FOR EACH ELECTRIC HEATING COIL:
1. NAMEPLATE DATA.
2. AIRFLOW.
3. ENTERING- AND LEAVING-AIR TEMPERATURE AT FULL LOAD.
4. VOLTAGE AND AMPERAGE INPUT OF EACH PHASE AT FULL LOAD AND AT EACH INCREMENTAL STAGE.
5. CALCULATED KILOWATT AT FULL LOAD.
6. FUSE OR CIRCUIT-BREAKER RATING FOR OVERLOAD PROTECTION.
C. MEASURE, ADJUST, AND RECORD THE FOLLOWING DATA FOR EACH REFRIGERANT COIL:
1. DRY-BULB TEMPERATURE OF ENTERING AND LEAVING AIR.
2. WET-BULB TEMPERATURE OF ENTERING AND LEAVING AIR.
3. AIRFLOW.
4. AIR PRESSURE DROP.
5. REFRIGERANT SUCTION PRESSURE AND TEMPERATURE.
3.10 TOLERANCES
A. SET HVAC SYSTEM'S AIR FLOW RATES WITHIN THE FOLLOWING TOLERANCES:
1. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: +/- 5.0 PERCENT.
2. AIR OUTLETS AND INLETS: +/- 5.0 PERCENT.
3.11 REPORTING
A. INITIAL CONSTRUCTION-PHASE REPORT: BASED ON EXAMINATION OF THE CONTRACT DOCUMENTS AS SPECIFIED IN "EXAMINATION" ARTICLE, PREPARE A REPORT ON THE ADEQUACY OF DESIGN FOR SYSTEMS' BALANCING DEVICES.
3.12 FINAL REPORT
A. GENERAL: PREPARE A CERTIFIED WRITTEN REPORT; TABULATE AND DIVIDE THE REPORT INTO SEPARATE SECTIONS FOR TESTED SYSTEMS AND BALANCED SYSTEMS.
1. INCLUDE A CERTIFICATION SHEET AT THE FRONT OF THE REPORT'S BINDER, SIGNED AND SEALED BY THE CERTIFIED TESTING AND BALANCING ENGINEER.
2. INCLUDE A LIST OF INSTRUMENTS USED FOR PROCEDURES, ALONG WITH PROOF OF CALIBRATION.
B. FINAL REPORT CONTENTS: IN ADDITION TO CERTIFIED FIELD-REPORT DATA, INCLUDE THE FOLLOWING:
1. FAN CURVES.
2. MANUFACTURERS' TEST DATA.
3. FIELD TEST REPORTS PREPARED BY SYSTEM AND EQUIPMENT INSTALLERS.
4. OTHER INFORMATION RELATIVE TO EQUIPMENT PERFORMANCE; DO NOT INCLUDE SHOP DRAWINGS AND PRODUCT DATA.
C. GENERAL REPORT DATA: IN ADDITION TO FORM TITLES AND ENTRIES, INCLUDE THE FOLLOWING DATA:
1. TITLE PAGE.
2. NAME AND ADDRESS OF THE TAB CONTRACTOR.
3. PROJECT NAME.
4. PROJECT LOCATION.
5. ARCHITECT'S NAME AND ADDRESS.
6. ENGINEER'S NAME AND ADDRESS.
7. CONTRACTOR'S NAME AND ADDRESS.
8. REPORT DATE.
9. SIGNATURE OF TAB SUPERVISOR WHO CERTIFIES THE REPORT.
10. TABLE OF CONTENTS WITH THE TOTAL NUMBER OF PAGES DEFINED FOR EACH SECTION OF THE REPORT. NUMBER EACH PAGE IN THE REPORT.
11. SUMMARY OF CONTENTS INCLUDING THE FOLLOWING:
a. INDICATED VERSUS FINAL PERFORMANCE.
b. NOTABLE CHARACTERISTICS OF SYSTEMS.
c. DESCRIPTION OF SYSTEM OPERATION SEQUENCE IF IT VARIES FROM THE CONTRACT DOCUMENTS.
12. NOMENCLATURE SHEETS FOR EACH ITEM OF EQUIPMENT.
13. DATA FOR TERMINAL UNITS, INCLUDING MANUFACTURER'S NAME, TYPE, SIZE, AND FITTINGS.
14. NOTES TO EXPLAIN WHY CERTAIN FINAL DATA IN THE BODY OF REPORTS VARY FROM INDICATED VALUES.
15. TEST CONDITIONS FOR FANS PERFORMANCE FORMS INCLUDING THE FOLLOWING:
a. SETTINGS FOR OUTDOOR-, RETURN-, AND EXHAUST-AIR DAMPERS.
b. CONDITIONS OF FILTERS.
c. COOLING COIL, WET- AND DRY-BULB CONDITIONS.
d. FAN DRIVE SETTINGS INCLUDING SETTINGS AND PERCENTAGE OF MAXIMUM PITCH DIAMETER.
e. SETTINGS FOR SUPPLY-AIR, STATIC-PRESSURE CONTROLLER.
f. OTHER SYSTEM OPERATING CONDITIONS THAT AFFECT PERFORMANCE.
D. HEAT-PUMP, AIR-HANDLING-UNIT TEST REPORTS: FOR AIR-HANDLING PORTIONS OF UNITS WITH COILS, INCLUDE THE FOLLOWING:
1. UNIT DATA:
a. UNIT IDENTIFICATION.
b. LOCATION.
c. MAKE AND TYPE.
d. MODEL NUMBER AND UNIT SIZE.
e. MANUFACTURER'S SERIAL NUMBER.
f. UNIT ARRANGEMENT AND CLASS.
g. DISCHARGE ARRANGEMENT.
h. SHEAVE MAKE, SIZE IN INCHES (MM), AND BORE.
i. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES (MM).
j. NUMBER, MAKE, AND SIZE OF BELTS.
k. NUMBER, TYPE, AND SIZE OF FILTERS.
2. MOTOR DATA:
a. MOTOR MAKE, AND FRAME TYPE AND SIZE.
b. HORSEPOWER AND RPM.
c. VOLTS, PHASE, AND HERTZ.
d. FULL-LOAD AMPERAGE AND SERVICE FACTOR.
e. SHEAVE MAKE, SIZE IN INCHES (MM), AND BORE.
f. CENTER-TO-CENTER DIMENSIONS OF SHEAVE, AND AMOUNT OF ADJUSTMENTS IN INCHES (MM).
3. TEST DATA (INDICATED AND ACTUAL VALUES):
a. TOTAL AIR FLOW RATE IN CFM (L/S).
b. TOTAL SYSTEM STATIC PRESSURE IN INCHES W.G. (PA).
c. FAN(S) RPM.
d. DISCHARGE STATIC PRESSURE IN INCHES W.G. (PA).
e. FILTER STATIC-PRESSURE DIFFERENTIAL IN INCHES W.G. (PA).
f. COOLING / HEATING-COIL STATIC-PRESSURE DIFFERENTIAL IN INCHES W.G. (PA).
g. OUTDOOR AIRFLOW IN CFM (L/S).
h. RETURN AIRFLOW IN CFM (L/S).
i. OUTDOOR-AIR DAMPER POSITION.
j. RETURN-AIR DAMPER POSITION.
E. APPARATUS-COIL TEST REPORTS FOR BOTH EVAPORATOR (INDOOR), AND CONDENSER (OUTDOOR) COILS:
1. COIL DATA:
a. SYSTEM IDENTIFICATION.
b. LOCATION.
c. COIL TYPE.
d. NUMBER OF ROWS.
e. FIN SPACING IN FINS PER INCH (MM) O.C.
f. MAKE AND MODEL NUMBER.
g. FACE AREA IN SQ. FT. (SQ. M).
h. TUBE SIZE IN NPS (DN).
i. TUBE AND FIN MATERIALS.
j. CIRCUITING ARRANGEMENT.
2. TEST DATA (INDICATED AND ACTUAL VALUES):
a. AIR FLOW RATE IN CFM (L/S).
b. AVERAGE FACE VELOCITY IN FPM (M/S).
c. AIR PRESSURE DROP IN INCHES W.G. (PA).
d. OUTDOOR-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F (DEG C).
e. RETURN-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F (DEG C).
f. ENTERING-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F (DEG C).
g. LEAVING-AIR, WET- AND DRY-BULB TEMPERATURES IN DEG F (DEG C).
h. REFRIGERANT EXPANSION VALVE AND REFRIGERANT TYPES.
i. REFRIGERANT SUCTION PRESSURE IN PSIG (KPA).
j. REFRIGERANT SUCTION TEMPERATURE IN DEG F (DEG C).
F. INSTRUMENT CALIBRATION REPORTS:
1. REPORT DATA:
a. INSTRUMENT TYPE AND MAKE.
b. SERIAL NUMBER.
c. APPLICATION.
d. DATES OF USE.
e. DATES OF CALIBRATION.
3.13 INSPECTIONS
A. INITIAL INSPECTION:
1. AFTER TESTING AND BALANCING ARE COMPLETE, OPERATE EACH SYSTEM AND RANDOMLY CHECK MEASUREMENTS TO VERIFY THAT THE SYSTEM IS OPERATING ACCORDING TO THE FINAL TEST AND BALANCE READINGS DOCUMENTED IN THE FINAL REPORT.
2. CHECK THE FOLLOWING FOR EACH SYSTEM:
a. MEASURE AIRFLOW OF AT LEAST 15 PERCENT OF AIR OUTLETS.
b. MEASURE ROOM TEMPERATURE AT EACH THERMOSTAT / TEMPERATURE SENSOR. COMPARE THE READING TO THE SET POINT.
c. NOTE DEVIATIONS FROM THE CONTRACT DOCUMENTS IN THE FINAL REPORT.
B. FINAL INSPECTION:
1. AFTER INITIAL INSPECTION IS COMPLETE AND DOCUMENTATION BY RANDOM CHECKS VERIFIES THAT TESTING AND BALANCING ARE COMPLETE AND ACCURATELY DOCUMENTED IN THE FINAL REPORT, REQUEST THAT A FINAL INSPECTION BE MADE BY OWNER, ARCHITECT, AND ENGINEER.
2. THE TAB CONTRACTOR'S TEST AND BALANCE ENGINEER SHALL CONDUCT THE INSPECTION IN THE PRESENCE OF OWNER, ARCHITECT, AND ENGINEER.
3. OWNER, ARCHITECT, AND ENGINEER SHALL RANDOMLY SELECT MEASUREMENTS, DOCUMENTED IN THE FINAL REPORT, TO BE RE-CHECKED. RE-CHECKING SHALL BE LIMITED TO 10 PERCENT OF THE TOTAL MEASUREMENTS RECORDED.
4. IF RE-CHECKS YIELD MEASUREMENTS THAT DIFFER FROM THE MEASUREMENTS DOCUMENTED IN THE FINAL REPORT BY MORE THAN THE TOLERANCES ALLOWED, THE MEASUREMENTS SHALL BE NOTED AS "FAILED.
C. TAB WORK WILL BE CONSIDERED DEFECTIVE IF IT DOES NOT PASS FINAL INSPECTIONS. IF TAB WORK FAILS, PROCEED AS FOLLOWS:
1. RE-CHECK ALL MEASUREMENTS AND MAKE ADJUSTMENTS. REVISE AND RE-SUBMIT THE FINAL REPORT. REQUEST RE-INSPECTION. IF THE SECOND FINAL INSPECTION ALSO FAILS, THE OWNER MAY CONTRACT THE SERVICES OF ANOTHER TAB CONTRACTOR TO COMPLETE TAB WORK ACCORDING TO THE CONTRACT DOCUMENTS, AND DEDUCT THE COST OF THE SERVICES FROM THE ORIGINAL TAB CONTRACTOR'S FINAL PAYMENT.
D. PREPARE TEST AND INSPECTION REPORTS.
3.14 ADDITIONAL TESTS
A. WITHIN 90 DAYS OF COMPLETING TAB, PERFORM ADDITIONAL TAB TO VERIFY THAT BALANCED CONDITIONS ARE BEING MAINTAINED THROUGHOUT, AND TO CORRECT UNUSUAL CONDITIONS.
B. SEASONAL PERIODS: IF INITIAL TAB PROCEDURES WERE NOT PERFORMED DURING NEAR-PEAK SUMMER AND WINTER CONDITIONS, PERFORM ADDITIONAL TAB DURING NEAR-PEAK SUMMER AND WINTER CONDITIONS.
END OF SECTION – 23 90 20

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CONSTRUCTION DOCUMENTS

COMMONWEALTH OF VIRGINIA
MARK A. PHILLIPS
Lic. No. 36230
4/30/2013
PROFESSIONAL ENGINEER

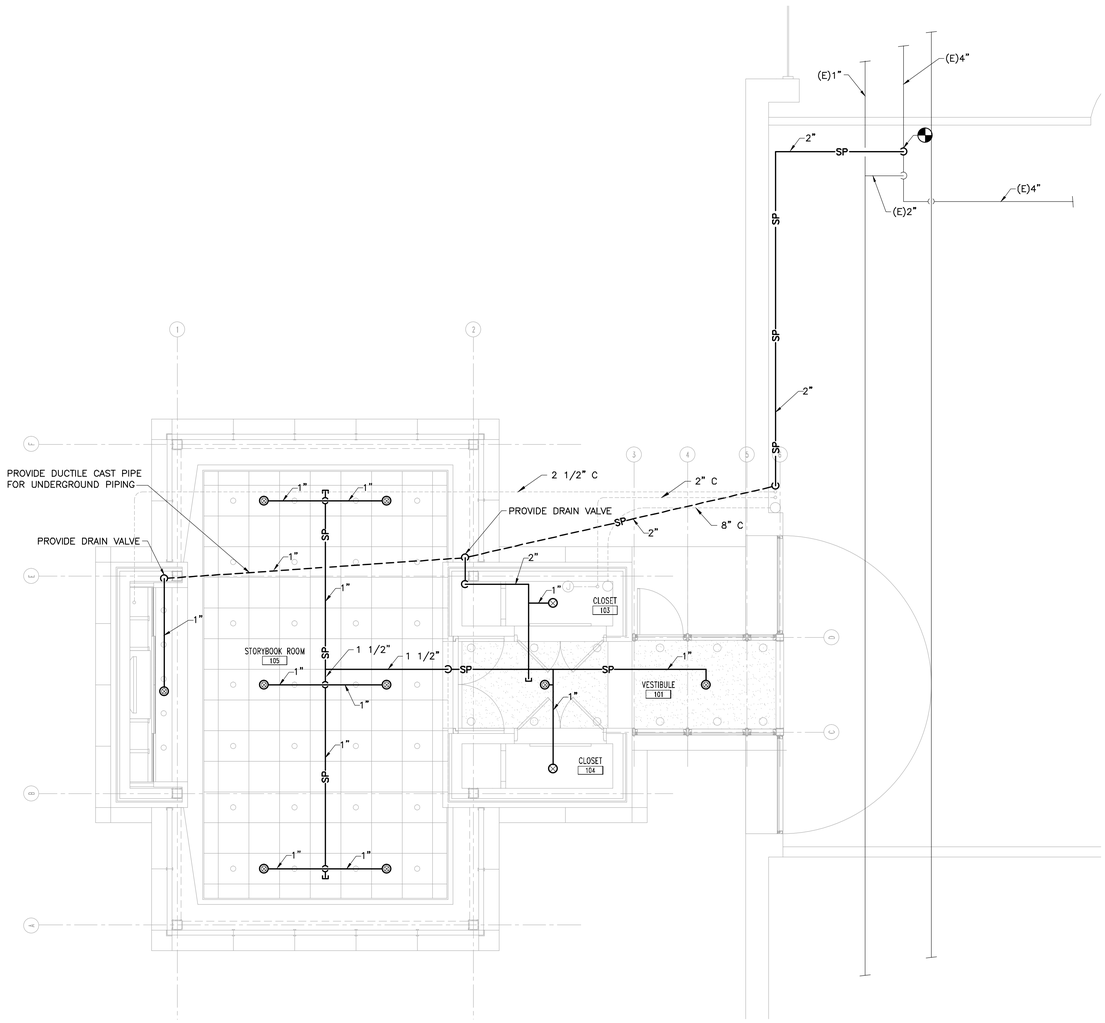
revisions

Main Library
Storybook Room
2311 Memorial Avenue
Lynchburg Virginia 24501

MECHANICAL / HVAC SPECIFICATIONS

sheet
M5

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: MAP



SPRINKLER FLOOR PLAN

SCALE: 1/4"=1'-0"

SPRINKLER SYSTEM NOTES:

1. THE SPRINKLER CONTRACTOR SHALL PROVIDE SPRINKLER HEADS AND PIPING AS REQUIRED TO PROVIDE FULL COVERAGE OF THIS SPACE IN STRICT ACCORDANCE WITH NFPA–13, AND ALL CITY, STATE, AND NATIONAL CODES AND STANDARDS.
2. SUBMIT SPRINKLER HEAD LAYOUT TO ARCHITECT/ENGINEER FOR APPROVAL IN ACCORDANCE WITH SPECIFICATION SECTION 130915.
3. RUN ALL PIPING CONCEALED ABOVE CEILING UNLESS OTHERWISE NOTED.
4. FOR SPRINKLER OCCUPANCY HAZARD CLASSIFICATIONS AND MINIMUM DENSITY FOR SPRINKLER DESIGN, SEE SPECIFICATION SECTION 13915.
5. ALL AREAS OCCUPANCY HAZARD SHALL BE LIGHT HAZARD UNLESS OTHERWISE INDICATED.
6. ALL SPRINKLER HEADS WILL BE QUICK RESPONSE.

SPRINKLER HEAD SCHEDULE

(A) SEMI–RECESSED – WET PIPE

LEGEND

(E)	EXISTING
(1)	DEMOLITION NOTE
1	CONSTRUCTION NOTE
	LIMIT OF REMOVAL
	CONNECTION POINT NEW TO EXISTING
	PIPE, EQUIPMENT AND FIXTURES REMOVED
—SP—	WET PIPE SPRINKLER SYSTEM
(A)	SPRINKLER HEAD TYPE
101	ROOM NUMBER DESIGNATION
	SEMI–RECESSED SPRINKLER HEAD
	UPRIGHT SPRINKLER HEAD
	PIPE CAP
	PIPE TURNED DOWN
	PIPE TURNED UP
	BOTTOM PIPE TAKE–OFF
	TOP PIPE TAKE–OFF
	SPRINKLER AREA

FIRE PROTECTION SPECIFICATIONS:

SECTION 211313 – WET–PIPE SPRINKLER SYSTEMS

1.1 QUALITY ASSURANCE
A. QUALITY STANDARDS: NFPA 13 AND NFPA 70.

1.2 PIPING MATERIALS
A. STANDARD–PRESSURE, WET–PIPE SPRINKLER SYSTEM, NPS 2 AND SMALLER:

RETAIN ONE OR MORE OF 14 SUBPARAGRAPHS BELOW.
1. SCHEDULE 30, BLACK–STEEL PIPE WITH ROLL–GROOVED ENDS AND UNCOATED FITTINGS.
2. SCHEDULE 30, BLACK–STEEL PIPE AND WELDING FITTINGS.

1.3 SPRINKLER MATERIALS
A. SPRINKLER TYPES:
1. ROOMS WITHOUT CEILINGS: UPRIGHT SPRINKLERS.
2. ROOMS WITH SUSPENDED CEILINGS: RECESSED SPRINKLERS.
3. SPECIAL APPLICATIONS: EXTENDED–COVERAGE, FLOW–CONTROL, AND QUICK–RESPONSE SPRINKLERS WHERE INDICATED.
B. SPRINKLER FINISHES:
1. RECESSED SPRINKLERS: BRIGHT CHROME, WITH BRIGHT CHROME ESCUTCHEON.
2. UPRIGHT SPRINKLERS: CHROME PLATED IN FINISHED SPACES EXPOSED TO VIEW; ROUGH BRONZE IN UNFINISHED SPACES NOT EXPOSED TO VIEW; WAX COATED WHERE EXPOSED TO ACIDS, CHEMICALS, OR OTHER CORROSIVE FUMES.

1.4 SPRINKLER SPECIALTY PIPE FITTINGS
A. BRANCH OUTLET FITTINGS.
B. FLOW DETECTION AND TEST ASSEMBLIES.
C. BRANCH LINE TESTERS.
D. SPRINKLER INSPECTOR'S TEST FITTINGS.
E. ADJUSTABLE DROP NIPPLES.
F. FLEXIBLE, SPRINKLER HOSE FITTINGS.
G. SPRINKLER ESCUTCHEONS:
1. CEILING MOUNTING: CHROME–PLATED STEEL, ONE PIECE, FLAT.

SECTION 211313

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CONSTRUCTION DOCUMENTS

COMMONWEALTH OF VIRGINIA
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LEGEND, GENERAL NOTES, SPECIFICATIONS AND SPRINKLER FLOOR PLAN

sheet

FP1

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: DFC

LEGEND

LINETYPES:

- EXISTING (LIGHT LINE WEIGHT)
- REMOVED, DEMOLISHED
- EXISTING TO REMAIN
- NEW WORK

GENERAL:

- (E) EXISTING
- 1 DEMOLITION NOTE
- 1 CONSTRUCTION NOTE
- LIMIT OF REMOVAL
- CONNECTION POINT NEW TO EXISTING
- A / E1|E1 — LETTER INDICATES DETAIL OR ENLARGED PLAN; SHEET NUMBER WHERE DETAIL OR ENLARGED PLAN IS DRAWN; SHEET NUMBER WHERE DETAIL OR ENLARGED PLAN IS TAKEN FROM
- A / E1|E1 — LETTER INDICATES ELEVATION; SHEET NUMBER WHERE ELEVATION IS DRAWN; SHEET NUMBER WHERE ELEVATION IS TAKEN FROM
- 1 / E1|E1 — NUMBER INDICATES SECTION; SHEET NUMBER WHERE SECTION IS DRAWN; SHEET NUMBER WHERE SECTION IS TAKEN FROM

LIGHTING

- E / 1a — SUSPENDED FIXTURE. UPPERCASE LETTER INDICATES TYPE. LOWERCASE LETTER INDICATES SWITCHING.
- O / 1 a — 4' STRIP FLUORESCENT. UPPERCASE LETTER INDICATES TYPE. LOWERCASE LETTER INDICATES SWITCHING.
- A / 1a — RECESSED ROUND DOWNLIGHT. UPPERCASE LETTER INDICATES TYPE. LOWERCASE LETTER INDICATES SWITCHING.
- EX — EXIT SIGN, UNIVERSAL MOUNTED ARROWS AS INDICATED. TWO ARROWS INDICATE DOUBLE FACED SIGN. WALL MOUNTED EXIT SIGN
- M N — SIMPLE TRACK LIGHTING
- H / 1 c — INCANDESCENT, HID OR FLUORESCENT FIXTURE, WALL MOUNTED. LETTER INDICATES TYPE.
- A / 1a — FLUORESCENT OR HID FIXTURE WITH BATTERY PACK BALLAST LETTER INDICATES TYPE.
- S — SWITCH, SINGLE POLE, MOUNT 48" AFF, UON.
- S_3 — SWITCH, THREE WAY, MOUNT 48" AFF, UON.
- S_4 — SWITCH, FOUR POLE, MOUNT 48" AFF, UON.
- S_{ab} — LOWER CASE LETTERS (USED ON ANY LIGHTING SWITCH) INDICATES WHICH FIXTURES ARE CONTROLLED BY A GIVEN SWITCH. MULTIPLE LOWER CASE LETTERS INDICATES MULTIPLE SWITCHES.
- OS — OCCUPANCY SENSOR
- OS — CEILING MOUNTED OCCUPANCY SENSOR
- D / 4 R-3 — WALL MOUNTED INCANDESCENT OR FLUORESCENT WITH BATTERY PACK BALLAST. LETTER INDICATES TYPE.

COMMUNICATION

- +84 TV — TELEVISION OUTLET RECEPTACLE, DUPLEX, NEMA 5-20R, WALL MOUNTED. PROVIDE A 4X4 JUNCTION AND APPROPRIATE COVER TO ACCOMODATE RECEPTACLE AND RG-6 CABLE CONNECTION. COORDINATE WITH OWNER. PROVIDE CABLE TV CONNECTION.
- DATA/COMMUNICATION OUTLET, WALL MOUNTED SINGLE GANG BOX 18" AFF, UON. ROUTE 3/4"C. WITH PULL WIRE FROM OUTLET BOX TO ACCESSIBLE AREA IN CEILING.

POWER

- 1 — RECEPTACLE, DUPLEX, NEMA 5-20R, WALL MOUNTED 18" AFF, UON.
  AC= MOUNT 6" ABOVE COUNTER,
  CM= CEILING MOUNTED
  WP=WEATHERPROOF,
  IG=ISOLATED GROUND,
  CTR=COUNTER LEVEL
  xx"AFF=MOUNTING HEIGHT,
  EWC=ELECTRIC WATER COOLER
  T=TAMPER RESISTANT
- 1 — QUAD RECEPTACLE, NEMA 5-20R, UON. 18" AFF UON.
- 1 — GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLE, NEMA 5-20R, UON. PROVIDE A DEVICE WITH INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER.
- E 1 / UH-1 — EQUIPMENT CONNECTION
- J — JUNCTION BOX
- J 1 — FLOOR MOUNT JUNCTION BOX
- 60/3 / 45F — DISCONNECT (AMP RATING/POLES; FUSE SIZE; "NF" = NON FUSED)
- 208Y/120 — RECESSED PANELBOARDS

FIRE ALARM SYSTEM

- F — FIRE ALARM MANUAL PULL STATION. MOUNT 48" AFF, UON.
- F 15 — FIRE ALARM HORN/STROBE. NUMBER INDICATES CANDELAS.
- 15 — CEILING MOUNTED FIRE ALARM HORN/STROBE. NUMBER INDICATES CANDELAS.

CONDUIT & WIRING

- CONDUIT RUN EXPOSED
- CONDUIT RUN CONCEALED ABOVE CEILING BELOW FLOOR OR IN WALL
- CONDUIT RUN CONCEALED IN OR BELOW FLOOR SLAB OR BELOW GRADE, AS APPLICABLE
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- HOMERUN
- ARROWHEADS: INDICATE NUMBER OF CIRCUITS IN CONDUIT i.e. TWO ARROWHEADS INDICATE TWO CIRCUITS
- PARTIAL HOMERUN, INDICATES MORE THAN 1 CIRCUIT OFF BRANCH BREAKER

GENERAL NOTES

1. THE DRAWINGS AND SPECIFICATIONS MAY EXCEED THE MINIMUM REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE AND OTHER APPLICABLE CODES. IN ALL CASES THE MOST STRINGENT REQUIREMENT SHALL BE FOLLOWED.
2. EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS. IF THOSE INSTRUCTIONS CONFLICT WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS THE ENGINEER SHALL BE NOTIFIED IMMEDIATELY FOR RESOLUTION BEFORE INSTALLATION CONTINUES.
3. ALL WORK ON THIS PROJECT SHALL BE INSTALLED IN ACCORDANCE WITH APPLICABLE CODE AND REGULATIONS.
4. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INTENDED TO INDICATE THE GENERAL AND APPROXIMATE LOCATION OF AND THE EXTENT OF THE WORK. THE CONTRACTOR SHALL COORDINATE ALL WORK. DO NOT SCALE DRAWINGS. FIELD VERIFY ALL DIMENSIONS.
5. ALL HEIGHTS INDICATED OR NOTED TO THE CENTER OF THE DEVICE, FIXTURE OR PIECE OF EQUIPMENT UNLESS OTHERWISE NOTED.
6. WHERE ELECTRICAL DEVICES ARE SHOWN ON ARCHITECTURAL ELEVATIONS, THOSE LOCATIONS SHALL SUPERSEDE APPROXIMATE LOCATIONS SHOWN ON ELECTRICAL DRAWINGS.
7. ALL NECESSARY ALLOWANCES AND PROVISIONS SHALL BE MADE BY THIS CONTRACTOR FOR BEAMS, COLUMNS OR OTHER OBSTRUCTIONS OF THE BUILDING OR THE WORK, WHETHER OR NOT SAME IS INDICATED, WHERE NECESSARY TO AVOID OBSTRUCTIONS.
8. REFER TO SPECIFICATIONS FOR MATERIALS AND METHODS FOR ELECTRICAL CONSTRUCTION.
9. IN GENERAL, RACEWAY ROUTING AND HOME RUNS ARE NOT SHOWN. CIRCUIT NUMBERS ARE SHOWN ADJACENT TO DEVICES AND EQUIPMENT. THE CONTRACTOR SHALL PROVIDE ALL NECESSARY RACEWAYS, BOXES AND WIRES FOR A COMPLETE SYSTEM. CONDUIT AND HOME RUNS ARE SHOWN IN ORDER TO CLARIFY CIRCUITING.
10. HOMERUNS ARE SHOWN TO INDICATE CIRCUITING AND NOT TO INDICATE INDIVIDUAL CONDUIT RUNS TO THE PANEL, UON. CONTRACTOR MAY GROUP CIRCUIT INTO MULTIWIRE BRANCH (SHARED NEUTRALS) W./ UP TO THREE SINGLE PHASE (SINGLE POLE) BRANCH CIRCUITS, ON SEPARATED PHASES TO THE SAME PANEL IN ONE CONDUIT, UON.
11. LOWER CASE LETTER SHOWN NEXT TO LIGHTING FIXTURES INDICATES SWITCH THAT CONTROLS FIXTURE. MULTIPLE LOWER CASE LETTERS INDICATE SEPARATE SWITCHING OF INBOARD AND OUTBOARD LAMPS. WHERE INBOARD AND OUTBOARD SWITCHING OF FIXTURES IS INDICATED, PROVIDE TWO BALLASTS PER FIXTURE. IN LIEU OF THIS, TANDEM WIRING IS ACCEPTABLE. IN ALL CASES, ALL INBOARD LAMPS OF FIXTURE ON THE SAME CIRCUIT, IN THE SAME SPACE SHALL BE ON THE SAME CIRCUIT AND IN THE SAME SPACES SHALL BE ON THE SAME SWITCH, UON.
13. THE CONTRACTOR SHALL THOROUGHLY CLEAN HIS WORK AREA DAILY AND REMOVE ALL TRASH AND DEBRIS AFTER THE COMPLETION OF THE WORK.
14. SEAL ALL EXTERIOR WALL PENETRATIONS WATER-TIGHT. PROVIDE JUNCTION BOX ON THE INSIDE WALL WHERE CONDUITS PENETRATE. SEAL INSIDE CONDUITS WITH MANUFACTURED SEALS.
15. RECEPTACLES AND SWITCHES SHALL BE INSTALLED TIGHT TO THE MOUNTING SURFACE OF THE OUTLET BOX, USING NO MORE THAN TWO WASHERS, IF REQUIRED, TO SHIM THEM OUT. ANY OUTLET BOX INSTALLED TOO FAR RECESSED INTO THE WALL TO MEET THIS REQUIREMENT SHALL BE REMOVED AND REINSTALLED TO MEET THIS REQUIREMENT, AND THE WALL FINISH REPAIRED.

PANEL R SCHEDULE

VOLTS: 208Y/120
PHASES: 3
WIRES: 4
SOLID NEUTRAL, GROUND BAR

PHASE TO PHASE VOLTS: 208
PHASE TO NEUT. VOLTS: 120
MAIN BREAKER 225 AMP
LOCATION:
MINIMUM SHORT CIRCUIT RATING: 65K RMS SYM AMPS SERIES RATED
FLUSH MOUNTED

WIRE SIZE Ø	WIRE SIZE NEUT.	WIRE SIZE GND	COND. SIZE	CKT. NO.	DESCRIPTION	CONN. KVA	TRIP AMPS	Ø	TRIP AMPS	CONN KVA	DESCRIPTION	CKT. NO.	WIRE SIZE Ø	WIRE SIZE NEUT.	WIRE SIZE GND	COND. SIZE
#1/2	#1/2	#12	1/2"	1	READING ROOM LIGHTING		20	A	30	1.76	ACCU-1	2	#10		#10	3/4"
#1/2	#1/2	#12	1/2"	3	CORRIDOR AND VESTIBULE LIGHTING		20	B		1.76			#10			
#1/2	#1/2	#12	1/2"	5	RECEPTACLES	1.26	20	C		4.14			#8			
#1/2	#1/2	#12	1/2"	7	TELEVISION	0.60	20	A	45	4.14	AHU-1	8	#8		#10	3/4"
#1/2	#1/2	#12	1/2"	9	ROOFTOP RECEPTACLE	0.18	20	B		4.14			#8			
#1/2	#1/2	#12	1/2"	11	TRACK LIGHTING		20	C	30	1.76	ACCU-2	12	#10			
#1/2	#1/2	#12	1/2"	13	FLOOR HEATING		20	A		1.76			#10		#10	3/4"
#1/2	#1/2	#12	1/2"	15	FLOOR HEATING		20	B		4.14			#8			
#1/2	#1/2	#12	1/2"	17	FLOOR HEATING		20	C	45	4.14	AHU-2	18	#8		#10	3/4"
				19				A		4.14			#8			
				21				B				22				
				23				C				24				
				25				A				26				
				27				B				28				
				29				C				30				
				31				A				32				
				33				B				34				
				35				C				36				
				37				A				38				
				39				B				40				
				41				C				42				
													A	B	C	
					TOTAL CONNECTED KVA	33.94					TOTAL AMPS PER PHASE		103.4	85.2	94.2	

CONTRACTOR SHALL NOT CHANGE CIRCUIT NUMBERS WITHOUT WRITTEN PERMISSION

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOG NUMBER	VOLTS	VOLT-AMPS	LAMPS QTY	LAMPS TYPE	DESCRIPTION	REMARKS
A	WINONA	5470-05 F 120V OG BAL STD	120	28	1	CFQ26W/G24Q-3	OPAL GLASS PENDANT	
B	LSI	4 LUMELEX 2065 SERIES FOR WALLWASHING AND 2 2060 SERIES FOR READING.	120			LED	2-CKT SUSPENDED TRACK, 12' BLACK TRACK LIGHTING	SUSPENDED VIA SINGLE STAINLESS STEEL CABLE SUPPORT AT HEIGHT DIRECTED
C	WINONA	HEBRLED 9006 L3 NAT SH0 TF PC STD	12	15	1	5000K, 25° LED	IN-GRADE BRASS LED FIXTURE, SOFTENING LENS BRASS FINISH, FLAT TOP, ADJUSTABLE LAMP	PROVIDE 12 VOLT TRANSFORMER PROVIDE CONCRETE POUR COLLAR
D	LITHONIA	WSQ LED 1 10A700/40K SR4 ELCW	120			LED	ARCHITECTURAL WALL SCONCE EMERGENCY BATTERY PACK	
F	LITHONIA	Z232 MVOLT	120	64	2	L825HT8	TWO LAMP FLUORESCENT STRIP	PROVIDE WIRE GARD
EX	LITHONIA	LRP # RMR (NOTE A) 120/277 EL N	277	5		LED	EDGE-LIT THERMOPLASTIC BATTERY BACKUP	NOTE A: ARROWS AS REQUIRED NUMBER OF FACES AS REQUIRED SELF DIAGNOSTIC

NOTES
1 FIXTURES ARE SPECIFIED WITH GE LAMPS TO IDENTIFY THE TYPE, TEMPERATURE, COLOR RENDERING, LAMP LIFE AND INITIAL LUMENS REQUIRED. NO SUBSTITUTIONS WILL BE ALLOWED WITHOUT PRIOR APPROVAL.
2 VERIFY LAMP COMPATIBILITY WITH FIXTURE FURNISHED PRIOR TO ORDERING LAMPS.

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revisions

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ELECTRICAL LEGEND, NOTE AND SCHEDULES

sheet

E1

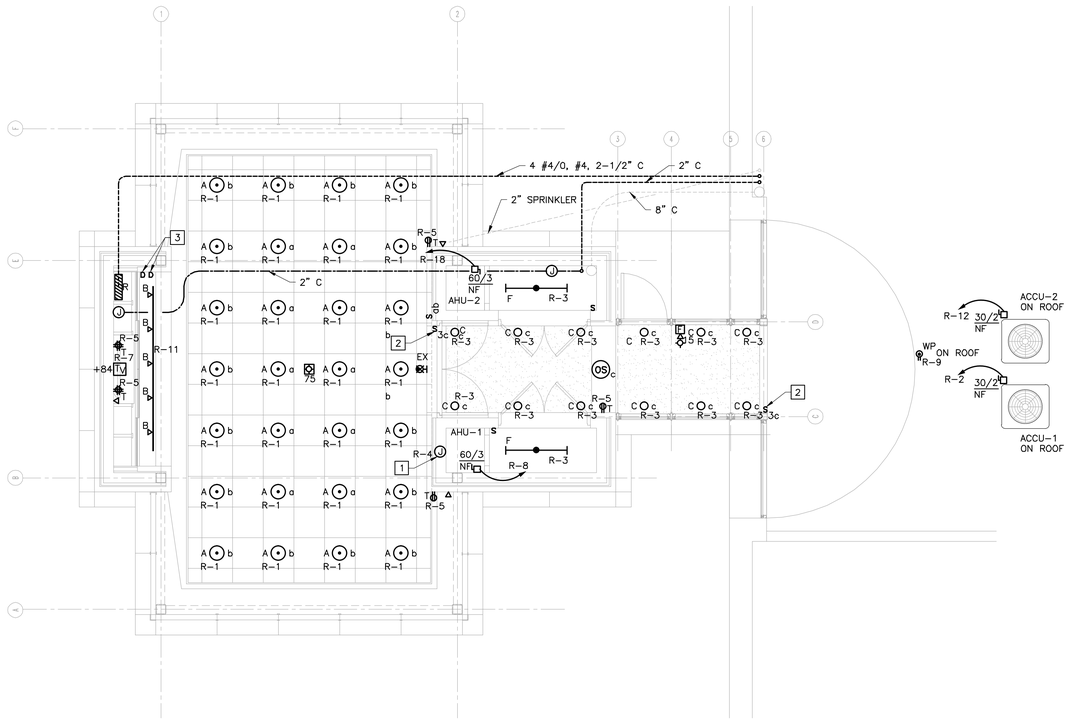
date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: BJW

CONSTRUCTION NOTES:

1. CONNECTION TO FLOOR HEATING MAT.
2. CONNECT SWITCH TO OVERRIDE OCCUPANCY SENSOR AND KEEP LIGHTS ON WHEN DESIRED.
3. CONNECT EACH DIMMER TO ONE CIRCUIT OF TRACK.

GENERAL CONSTRUCTION NOTES:

1. PROVIDE FIRE ALARM DEVICES UL LISTED FOR USE WITH EXISTING SIMPLEX 4100 SYSTEM. CONNECT TO EXISTING SYSTEM AT CLOSEST LOCATION.
2. PROVIDE CABLE FROM TELEVISION BACK TO BUILDING SERVICE POINT.
3. PROVIDE CAT 5 CABLE FROM EACH DATA OUTLET BACK TO BUILDING SERVER ROOM.
4. CONNECT EXIT SIGNS TO LOCAL LIGHTING CIRCUIT AHEAD OF SWITCH.



ENLARGED PLAN

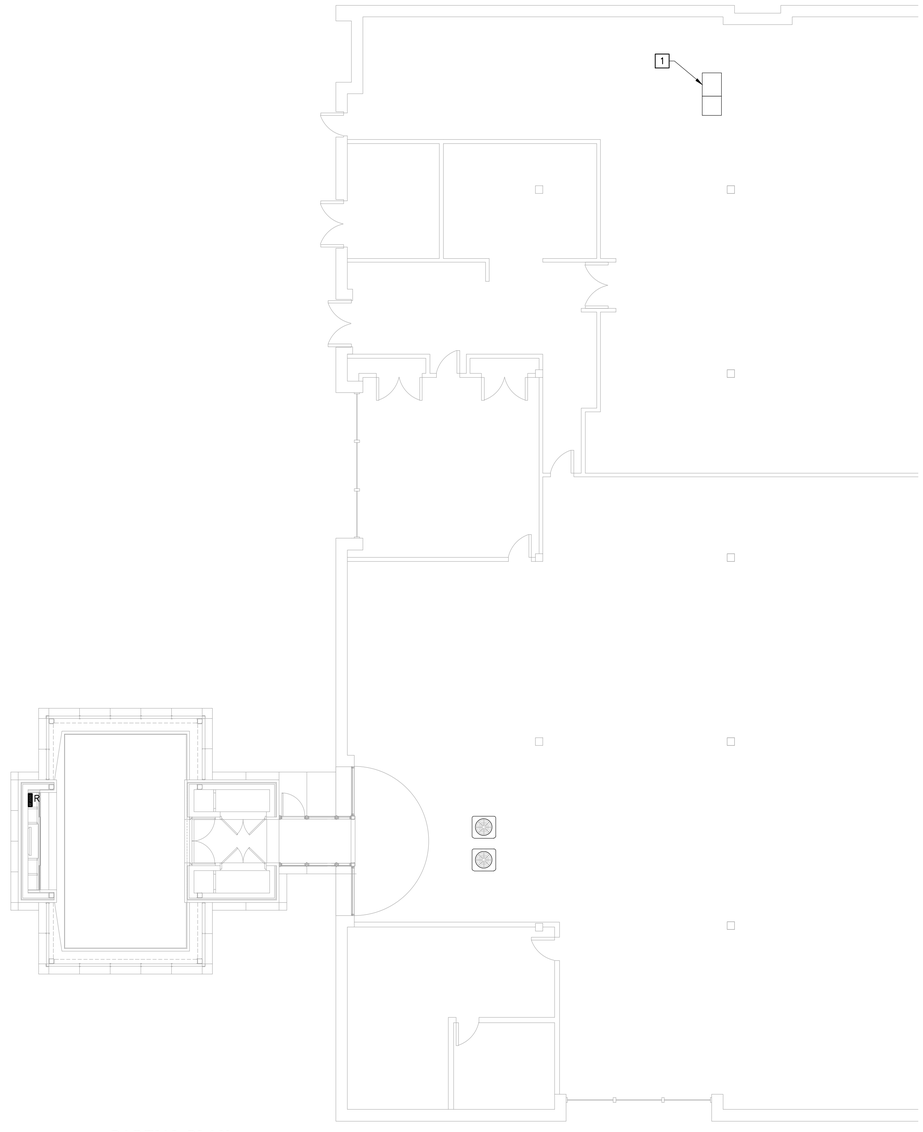
SCALE 1/4"=1'-0"

CONSTRUCTION NOTES:

1. EXISTING EATON POW-R-LINE SWITCHBOARD ON SECOND FLOOR. PROVIDE 3 POLE 200 AMP 65KAIC BREAKER TO FEED PANELBOARD R.

GENERAL CONSTRUCTION NOTES:

1. COORDINATE ROUTING OF FEEDER ON SITE WITH THE OWNER AND ARCHITECT.



PARTIAL PLAN

SCALE 1/8"=1'-0"

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ELECTRICAL FLOOR PLANS

sheet

E2

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: DMK

ELECTRICAL SPECIFICATIONS:

SECTION 260519 – CONDUCTORS AND CABLES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES THE FOLLOWING:
1. BUILDING WIRES AND CABLES RATED 600 V AND LESS.
2. CONNECTORS, SPLICES, AND TERMINATIONS RATED 600 V AND LESS.

1.3 INFORMATIONAL SUBMITTALS
A. FIELD QUALITY-CONTROL TEST REPORTS.

1.4 QUALITY ASSURANCE
A. 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.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 CONDUCTORS AND CABLES
A. COPPER CONDUCTORS: COMPLY WITH NEMA WC 70.
B. CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR TYPES THHN-THWN AND XHHW.
C. MULTICONDUCTOR CABLE: COMPLY WITH NEMA WC 70 FOR ARMORED CABLE, TYPE MC WITH GROUND WIRE.

2.2 CONNECTORS AND SPLICES
A. DESCRIPTION: FACTORY-FABRICATED CONNECTORS AND SPLICES OF SIZE, AMPACITY RATING, MATERIAL, TYPE, AND CLASS FOR APPLICATION AND SERVICE INDICATED.

PART 3 – EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS
A. FEEDERS: COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.
B. BRANCH CIRCUITS: COPPER. SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
A. EXPOSED FEEDERS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
B. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
C. FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE XHHW, SINGLE CONDUCTORS IN RACEWAY.
D. EXPOSED BRANCH CIRCUITS, INCLUDING IN CRAWLSPACES: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
E. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY OR ARMORED CABLE, TYPE AC.
F. BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN-THWN, SINGLE CONDUCTORS IN RACEWAY.
G. CLASS 1 CONTROL CIRCUITS: TYPE THHN-THWN, IN RACEWAY.
H. CLASS 2 CONTROL CIRCUITS: POWER-LIMITED CABLE, CONCEALED IN BUILDING FINISHES.

3.3 INSTALLATION OF CONDUCTORS AND CABLES
A. CONCEAL CABLES IN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
B. USE MANUFACTURER-APPROVED PULLING COMPOUND OR LUBRICANT WHERE NECESSARY; COMPOUND USED MUST NOT DETERIORATE CONDUCTOR OR INSULATION. DO NOT EXCEED MANUFACTURER'S RECOMMENDED MAXIMUM PULLING TENSIONS AND SIDEWALL PRESSURE VALUES.
C. USE PULLING MEANS, INCLUDING FISH TAPE, CABLE, ROPE, AND BASKET-WEAVE WIRE/CABLE GRIPS, THAT WILL NOT DAMAGE CABLES OR RACEWAY.
D. INSTALL EXPOSED CABLES PARALLEL AND PERPENDICULAR TO SURFACES OF EXPOSED STRUCTURAL MEMBERS, AND FOLLOW SURFACE CONTOURS WHERE POSSIBLE.

3.4 CONNECTIONS
A. 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.
B. MAKE SPLICES AND TAPS THAT ARE COMPATIBLE WITH CONDUCTOR MATERIAL AND THAT POSSESS EQUIVALENT OR BETTER MECHANICAL STRENGTH AND INSULATION RATINGS THAN UNSPLICED CONDUCTORS.
C. WIRING AT OUTLETS: INSTALL CONDUCTOR AT EACH OUTLET, WITH AT LEAST 6 INCHES OF SLACK.

3.5 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS
A. INSTALL SLEEVES AND SLEEVE SEALS AT PENETRATIONS OF EXTERIOR FLOOR AND WALL ASSEMBLIES.

3.6 FIRESTOPPING
A. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY .

3.7 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.
B. TESTS AND INSPECTIONS:
1. AFTER INSTALLING CONDUCTORS AND CABLES AND BEFORE ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, TEST FEEDER CONDUCTORS.
2. PERFORM EACH VISUAL AND MECHANICAL INSPECTION AND ELECTRICAL TEST STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
C. TEST REPORTS: PREPARE A WRITTEN REPORT TO RECORD THE FOLLOWING:
1. TEST PROCEDURES USED.
2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
3. TEST RESULTS THAT DO NOT COMPLY WITH REQUIREMENTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE COMPLIANCE WITH REQUIREMENTS.
D. REMOVE AND REPLACE MALFUNCTIONING UNITS AND RETEST AS SPECIFIED ABOVE.

END OF SECTION

SECTION 260526 – GROUNDING AND BONDING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. SECTION INCLUDES: GROUNDING SYSTEMS AND EQUIPMENT.

1.3 QUALITY ASSURANCE
A. 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.
B. COMPLY WITH UL 467 FOR GROUNDING AND BONDING MATERIALS AND EQUIPMENT.

PART 2 – PRODUCTS

2.1 CONDUCTORS
A. INSULATED CONDUCTORS: COPPER OR TINNED-COPPER WIRE OR CABLE INSULATED FOR 600 V UNLESS OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.

PART 3 – EXECUTION

3.1 APPLICATIONS
A. CONDUCTORS: INSTALL SOLID CONDUCTOR FOR NO. 8 AWG AND SMALLER, AND STRANDED CONDUCTORS FOR NO. 6 AWG AND LARGER UNLESS OTHERWISE INDICATED.

3.2 EQUIPMENT GROUNDING
A. INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS WITH ALL FEEDERS AND BRANCH CIRCUITS.
B. AIR-DUCT EQUIPMENT CIRCUITS: INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTOR TO DUCT-MOUNTED ELECTRICAL DEVICES OPERATING AT 120 V AND MORE, INCLUDING AIR CLEANERS, HEATERS, DAMPERS, HUMIDIFIERS, AND OTHER DUCT ELECTRICAL EQUIPMENT. BOND CONDUCTOR TO EACH UNIT AND TO AIR DUCT AND CONNECTED METALLIC PIPING.

3.3 INSTALLATION
A. GROUNDING CONDUCTORS: ROUTE ALONG SHORTEST AND STRAIGHTEST PATHS POSSIBLE UNLESS OTHERWISE INDICATED OR REQUIRED BY CODE. AVOID OBSTRUCTING ACCESS OR PLACING CONDUCTORS WHERE THEY MAY BE SUBJECTED TO STRAIN, IMPACT, OR DAMAGE.
B. BONDING STRAPS AND JUMPERS: INSTALL IN LOCATIONS ACCESSIBLE FOR INSPECTION AND MAINTENANCE EXCEPT WHERE ROUTED THROUGH SHORT LENGTHS OF CONDUIT.
1. BONDING TO EQUIPMENT MOUNTED ON VIBRATION ISOLATION HANGERS AND SUPPORTS: INSTALL BONDING SO VIBRATION IS NOT TRANSMITTED TO RIGIDLY MOUNTED EQUIPMENT.
C. BONDING INTERIOR METAL DUCTS: BOND METAL AIR DUCTS TO EQUIPMENT GROUNDING CONDUCTORS OF ASSOCIATED FANS, BLOWERS, ELECTRIC HEATERS, AND AIR CLEANERS. INSTALL BONDING JUMPER TO BOND ACROSS FLEXIBLE DUCT CONNECTIONS TO ACHIEVE CONTINUITY.

END OF SECTION

SECTION 260533 – RACEWAYS AND BOXES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES RACEWAYS, FITTINGS, BOXES, ENCLOSURES, AND CABINETS FOR ELECTRICAL WIRING.

1.3 QUALITY ASSURANCE
A. 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.
B. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 METAL CONDUIT AND TUBING
A. RIGID STEEL CONDUIT: ANSI C80.1.
B. IMC: ANSI C80.6.
C. EMT: ANSI C80.3.
D. FMC: ZINC-COATED STEEL.
E. LFMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.
F. FITTINGS FOR CONDUIT (INCLUDING ALL TYPES AND FLEXIBLE AND LIQUIDTIGHT), EMT, AND CABLE: NEMA FB 1; LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.
1. FITTINGS FOR EMT: STEEL, SET-SCREW OR COMPRESSION TYPE.
G. JOINT COMPOUND FOR RIGID STEEL CONDUIT OR IMC: LISTED FOR USE IN CABLE CONNECTOR ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED RACEWAY JOINTS FROM CORROSION AND ENHANCE THEIR CONDUCTIVITY.

2.2 NONMETALLIC CONDUIT AND TUBING
A. RNC: NEMA TC 2, TYPE EPC-40-PVC, UNLESS OTHERWISE INDICATED.
B. FITTINGS FOR RNC: NEMA TC 3; MATCH TO CONDUIT OR TUBING TYPE AND MATERIAL.

PART 3 – EXECUTION

3.1 RACEWAY APPLICATION
A. OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED:
1. EXPOSED CONDUIT: RIGID STEEL CONDUIT.
2. CONCEALED CONDUIT, ABOVEGROUND: EMT.
3. UNDERGROUND CONDUIT: RNC, TYPE EPC-40-PVC, CONCRETE ENCASED.
4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFMC.
5. BOXES AND ENCLOSURES, ABOVEGROUND: NEMA 250, TYPE 3R.
B. COMPLY WITH THE FOLLOWING INDOOR APPLICATIONS, UNLESS OTHERWISE INDICATED:
1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
2. EXPOSED, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: EMT.
3. EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID STEEL CONDUIT.
4. CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
5. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
6. DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
7. BOXES AND ENCLOSURES: NEMA 250, TYPE 1.
C. MINIMUM RACEWAY SIZE: 1/2-INCH TRADE SIZE.
D. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
1. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED.

3.2 INSTALLATION
A. COMPLY WITH NECA 1 FOR INSTALLATION REQUIREMENTS APPLICABLE TO PRODUCTS SPECIFIED IN PART 2 EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER.
B. KEEP RACEWAYS AT LEAST 6 INCHES AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
C. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUCTOR INSTALLATION.
D. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE THE FINISHED SLAB.
E. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEWER BENDS ARE ALLOWED.
F. CONCEAL CONDUIT AND EMT WITHIN FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
G. RACEWAYS EMBEDDED IN SLABS:
1. RUN CONDUIT LARGER THAN 1-INCH TRADE SIZE, PARALLEL OR AT RIGHT ANGLES TO MAIN REINFORCEMENT. WHERE AT RIGHT ANGLES TO REINFORCEMENT, PLACE CONDUIT CLOSE TO SLAB SUPPORT.
2. ARRANGE RACEWAYS TO CROSS BUILDING EXPANSION JOINTS AT RIGHT ANGLES WITH EXPANSION FITTINGS.
3. CHANGE FROM RNC, TYPE EPC-40-PVC, TO RIGID STEEL CONDUIT BEFORE RISING ABOVE THE FLOOR.
H. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIVE, OR OUTDOOR CONDITIONS: APPLY LISTED COMPOUND TO THREADS OF RACEWAY AND FITTINGS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.
I. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE INSULATING BUSHINGS TO PROTECT CONDUCTORS, INCLUDING CONDUCTORS SMALLER THAN NO. 4 AWG.
J. FLEXIBLE CONDUIT CONNECTIONS: USE MAXIMUM OF 72 INCHES OF FLEXIBLE CONDUIT FOR RECESSED AND SEMIRECESSED LIGHTING FIXTURES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS.
1. USE LFMC.
K. RECESSED BOXES IN MASONRY WALLS: SAW-CUT OPENING FOR BOX IN CENTER OF CELL OF MASONRY BLOCK, AND INSTALL BOX FLUSH WITH SURFACE OF WALL.

3.3 FIRESTOPPING
A. APPLY FIRESTOPPING TO ELECTRICAL PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.

3.4 PROTECTION
A. PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS THAT ENSURE COATINGS, FINISHES, AND CABINETS ARE WITHOUT DAMAGE OR DETERIORATION AT TIME OF SUBSTANTIAL COMPLETION.
1. REPAIR DAMAGE TO GALVANIZED FINISHES WITH ZINC-RICH PAINT RECOMMENDED BY MANUFACTURER.
2. REPAIR DAMAGE TO PVC OR PAINT FINISHES WITH MATCHING TOUCHUP COATING RECOMMENDED BY MANUFACTURER.

END OF SECTION

SECTION 262416 PANELBOARDS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. SECTION INCLUDES:
1. LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS.

1.3 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PANELBOARD, SWITCHING AND OVERCURRENT PROTECTIVE DEVICE, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONS AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES.
B. SHOP DRAWINGS: FOR EACH PANELBOARD AND RELATED EQUIPMENT.
1. INCLUDE DIMENSIONED PLANS, ELEVATIONS, SECTIONS, AND DETAILS. SHOW TABULATIONS OF INSTALLED DEVICES, EQUIPMENT FEATURES, AND RATINGS.
2. DETAIL ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.
3. DETAIL BUS CONFIGURATION, CURRENT, AND VOLTAGE RATINGS.
4. SHORT-CIRCUIT CURRENT RATING OF PANELBOARDS AND OVERCURRENT PROTECTIVE DEVICES.
5. INCLUDE EVIDENCE OF NRTL LISTING FOR SERIES RATING OF INSTALLED DEVICES.
6. DETAIL FEATURES, CHARACTERISTICS, RATINGS, AND FACTORY SETTINGS OF INDIVIDUAL OVERCURRENT PROTECTIVE DEVICES AND AUXILIARY COMPONENTS.
C. FIELD QUALITY-CONTROL REPORTS:
1. TEST PROCEDURES USED.
2. TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
3. RESULTS OF FAILED TESTS AND CORRECTIVE ACTION TAKEN TO ACHIEVE TEST RESULTS THAT COMPLY WITH REQUIREMENTS.
D. PANELBOARD SCHEDULES: FOR INSTALLATION IN PANELBOARDS.
E. OPERATION AND MAINTENANCE DATA: FOR PANELBOARDS AND COMPONENTS TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 1 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:
1. MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING OVERCURRENT PROTECTIVE DEVICES.

1.4 QUALITY ASSURANCE
A. SOURCE LIMITATIONS: OBTAIN PANELBOARDS, OVERCURRENT PROTECTIVE DEVICES, COMPONENTS, AND ACCESSORIES FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.
B. 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.
C. COMPLY WITH NEMA PB 1.
D. COMPLY WITH NFPA 70.

1.5 PROJECT CONDITIONS
A. ENVIRONMENTAL LIMITATIONS:
1. DO NOT DELIVER OR INSTALL PANELBOARDS UNTIL SPACES ARE ENCLOSED AND WEATHERTIGHT, WET WORK IN SPACES IS COMPLETE AND DRY, WORK ABOVE PANELBOARDS IS COMPLETE, AND TEMPORARY HVAC SYSTEM IS OPERATING AND MAINTAINING AMBIENT TEMPERATURE AND HUMIDITY CONDITIONS AT OCCUPANCY LEVELS DURING THE REMAINDER OF THE CONSTRUCTION PERIOD.
2. RATE EQUIPMENT FOR CONTINUOUS OPERATION UNDER THE FOLLOWING CONDITIONS UNLESS OTHERWISE INDICATED:
a. AMBIENT TEMPERATURE: NOT EXCEEDING 23 DEG F TO PLUS 104 DEG F.
b. ALTITUDE: NOT EXCEEDING 6600 FEET.
B. SERVICE CONDITIONS: NEMA PB 1, USUAL SERVICE CONDITIONS, AS FOLLOWS:
1. AMBIENT TEMPERATURES WITHIN LIMITS SPECIFIED.
2. ALTITUDE NOT EXCEEDING 6600 FEET.

1.6 COORDINATION
A. COORDINATE LAYOUT AND INSTALLATION OF PANELBOARDS AND COMPONENTS WITH OTHER CONSTRUCTION THAT PENETRATES WALLS OR IS SUPPORTED BY THEM, INCLUDING ELECTRICAL AND OTHER TYPES OF EQUIPMENT, RACEWAYS, PIPING, ENCUMBRANCES TO WORKSPACE CLEARANCE REQUIREMENTS, AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.

1.7 WARRANTY
A. SPECIAL WARRANTY: MANUFACTURER'S STANDARD FORM IN WHICH MANUFACTURER AGREES TO REPAIR OR REPLACE TRANSIENT VOLTAGE SUPPRESSION DEVICES THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1.8 EXTRA MATERIALS
A. FURNISH EXTRA MATERIALS THAT MATCH PRODUCTS INSTALLED AND THAT ARE PACKAGED WITH PROTECTIVE COVERING FOR STORAGE AND IDENTIFIED WITH LABELS DESCRIBING CONTENTS.
1. KEYS: TWO SPARES FOR EACH TYPE OF PANELBOARD CABINET LOCK.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS FOR PANELBOARDS
A. ENCLOSURES: FLUSH- AND SURFACE-MOUNTED CABINETS.
1. RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.
a. INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1.
2. FRONT: SECURED TO BOX WITH CONCEALED TRIM CLAMPS. FOR SURFACE-MOUNTED FRONTS, MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
3. FINISHES:
a. PANELS AND TRIM: STEEL, FACTORY FINISHED IMMEDIATELY AFTER CLEANING AND PRETREATING WITH MANUFACTURER'S STANDARD TWO-COAT, BAKED-ON FINISH CONSISTING OF PRIME COAT AND THERMOSETTING TOPCOAT.
b. BACK BOXES: SAME FINISH AS PANELS AND TRIM.
4. DIRECTORY CARD: INSIDE PANELBOARD DOOR, MOUNTED IN METAL FRAME WITH TRANSPARENT PROTECTIVE COVER.
B. INCOMING MAINS LOCATION: BOTTOM.
C. PHASE, NEUTRAL, AND GROUND BUSES:
1. MATERIAL: HARD-DRAWN COPPER, 98 PERCENT CONDUCTIVITY.
2. EQUIPMENT GROUND BUS: ADEQUATE FOR FEEDER AND BRANCH-CIRCUIT EQUIPMENT GROUNDING CONDUCTORS; BONDED TO BOX.
3. ISOLATED GROUND BUS: ADEQUATE FOR BRANCH-CIRCUIT ISOLATED GROUND CONDUCTORS; INSULATED FROM BOX.
D. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL AND SIZES.
1. MATERIAL: TIN-PLATED ALUMINUM.
2. MAIN AND NEUTRAL LUGS: MECHANICAL TYPE.
3. GROUND LUGS AND BUS-CONFIGURED TERMINATORS: MECHANICAL TYPE.
4. FEED-THROUGH LUGS: MECHANICAL TYPE, SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT OPPOSITE END OF BUS FROM INCOMING LUGS OR MAIN DEVICE.
E. FUTURE DEVICES: MOUNTING BRACKETS, BUS CONNECTIONS, FILLER PLATES, AND NECESSARY APPURTENANCES REQUIRED FOR FUTURE INSTALLATION OF DEVICES.
F. PANELBOARD SHORT-CIRCUIT CURRENT RATING: RATED FOR SERIES-CONNECTED SYSTEM WITH INTEGRAL OR REMOTE UPSTREAM OVERCURRENT PROTECTIVE DEVICES AND LABELED BY AN NRTL. INCLUDE SIZE AND TYPE OF ALLOWABLE UPSTREAM AND BRANCH DEVICES, LISTED AND LABELED FOR SERIES-CONNECTED SHORT-CIRCUIT RATING BY AN NRTL.

2.2 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. EATON ELECTRICAL INC.; CUTLER-HAMMER BUSINESS UNIT.
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL – ELECTRICAL DISTRIBUTION.
3. SIEMENS ENERGY & AUTOMATION, INC.
4. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.
B. PANELBOARDS: NEMA PB 1, LIGHTING AND APPLIANCE BRANCH-CIRCUIT TYPE.
C. BRANCH OVERCURRENT PROTECTIVE DEVICES: BOLT-ON CIRCUIT BREAKERS, REPLACEABLE WITHOUT DISTURBING ADJACENT UNITS.
D. DOORS: CONCEALED HINGES; SECURED WITH FLUSH LATCH WITH TUMBLER LOCK; KEYED ALIKE.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES
A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
1. EATON ELECTRICAL INC.; CUTLER-HAMMER BUSINESS UNIT.
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL – ELECTRICAL DISTRIBUTION.
3. SIEMENS ENERGY & AUTOMATION, INC.
4. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.
B. MOLDED-CASE CIRCUIT BREAKER (MCCB): COMPLY WITH UL 489, WITH SERIES-CONNECTED RATING TO MEET AVAILABLE FAULT CURRENTS.
1. THERMAL-MAGNETIC CIRCUIT BREAKERS: INVERSE TIME-CURRENT ELEMENT FOR LOW-LEVEL OVERLOADS, AND INSTANTANEOUS MAGNETIC TRIP ELEMENT FOR SHORT CIRCUITS. ADJUSTABLE MAGNETIC TRIP SETTING FOR CIRCUIT-BREAKER FRAME SIZES 250 A AND LARGER.
2. MOLDED-CASE CIRCUIT-BREAKER (MCCB) FEATURES AND ACCESSORIES:
a. STANDARD FRAME SIZES, TRIP RATINGS, AND NUMBER OF POLES.
b. LUGS: MECHANICAL STYLE, SUITABLE FOR NUMBER, SIZE, TRIP RATINGS, AND CONDUCTOR MATERIALS.
c. APPLICATION LISTING: APPROPRIATE FOR APPLICATION; TYPE SWD FOR SWITCHING FLUORESCENT LIGHTING LOADS; TYPE HID FOR FEEDING FLUORESCENT AND HIGH-INTENSITY DISCHARGE (HID) LIGHTING CIRCUITS.
d. MULTIPOLE UNITS ENCLOSED IN A SINGLE HOUSING OR FACTORY ASSEMBLED TO OPERATE AS A SINGLE UNIT.

PART 3 – EXECUTION

3.1 EXAMINATION
A. EXAMINE PANELBOARDS BEFORE INSTALLATION. REJECT PANELBOARDS THAT ARE DAMAGED OR RUSTED OR HAVE BEEN SUBJECTED TO WATER SATURATION.
B. EXAMINE ELEMENTS AND SURFACES TO RECEIVE PANELBOARDS FOR COMPLIANCE WITH INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.
C. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION
A. INSTALL PANELBOARDS AND ACCESSORIES ACCORDING TO NEMA PB 1.1.
B. MOUNT TOP OF TRIM 76 INCHES ABOVE FINISHED FLOOR UNLESS OTHERWISE INDICATED.
C. MOUNT PANELBOARD CABINET PLUMB AND RIGID WITHOUT DISTORTION OF BOX. MOUNT RECESSED PANELBOARDS WITH FRONTS UNIFORMLY FLUSH WITH WALL FINISH AND MATING WITH BACK BOX.
D. INSTALL FILLER PLATES IN UNUSED SPACES.
E. ARRANGE CONDUCTORS IN GUTTERS INTO GROUPS AND BUNDLE AND WRAP WITH WIRE TIES.
F. COMPLY WITH NECA 1.

3.3 IDENTIFICATION
A. CREATE A DIRECTORY TO INDICATE INSTALLED CIRCUIT LOADS; INCORPORATE OWNER'S FINAL ROOM DESIGNATIONS. OBTAIN APPROVAL BEFORE INSTALLING. USE A COMPUTER OR TYPEWRITER TO CREATE DIRECTORY; HANDWRITTEN DIRECTORIES ARE NOT ACCEPTABLE.

3.4 FIELD QUALITY CONTROL
A. PERFORM TESTS AND INSPECTIONS.
B. ACCEPTANCE TESTING PREPARATION:
1. TEST INSULATION RESISTANCE FOR EACH PANELBOARD BUS, COMPONENT, CONNECTING SUPPLY, FEEDER, AND CONTROL CIRCUIT.
2. TEST CONTINUITY OF EACH CIRCUIT.
C. TESTS AND INSPECTIONS:
1. PERFORM EACH VISUAL AND MECHANICAL INSPECTION AND ELECTRICAL TEST STATED IN NETA ACCEPTANCE TESTING SPECIFICATION. CERTIFY COMPLIANCE WITH TEST PARAMETERS.
2. CORRECT MALFUNCTIONING UNITS ON-SITE, WHERE POSSIBLE, AND RETEST TO DEMONSTRATE COMPLIANCE; OTHERWISE, REPLACE WITH NEW UNITS AND RETEST.
D. PANELBOARDS WILL BE CONSIDERED DEFECTIVE IF THEY DO NOT PASS TESTS AND INSPECTIONS.
E. PREPARE TEST AND INSPECTION REPORTS, INCLUDING A CERTIFIED REPORT THAT IDENTIFIES PANELBOARDS INCLUDED AND THAT DESCRIBES SCANNING RESULTS. INCLUDE NOTATION OF DEFICIENCIES DETECTED, REMEDIAL ACTION TAKEN, AND OBSERVATIONS AFTER REMEDIAL ACTION.

3.5 ADJUSTING
A. ADJUST MOVING PARTS AND OPERABLE COMPONENT TO FUNCTION SMOOTHLY, AND LUBRICATE AS RECOMMENDED BY MANUFACTURER.

END OF SECTION

SECTION 262726 – WIRING DEVICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS
A. DRAWINGS AND GENERAL PROVISIONS OF THE CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION 1 SPECIFICATION SECTIONS, APPLY TO THIS SECTION.

1.2 SUMMARY
A. THIS SECTION INCLUDES THE FOLLOWING:
1. RECEPTACLES AND ASSOCIATED DEVICE PLATES.
2. WALL-BOX MOTION SENSORS.
3. SNAP SWITCHES AND WALL-BOX DIMMERS.
4. WALL-SWITCH AND EXTERIOR OCCUPANCY SENSORS.
5. COMMUNICATIONS OUTLETS.

1.3 SUBMITTALS
A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT INDICATED.
B. OPERATION AND MAINTENANCE DATA: FOR WIRING DEVICES TO INCLUDE IN ALL MANUFACTURERS' PACKING LABEL WARNINGS AND INSTRUCTION MANUALS THAT INCLUDE LABELING CONDITIONS.

1.4 QUALITY ASSURANCE
A. SOURCE LIMITATIONS: OBTAIN EACH TYPE OF WIRING DEVICE AND ASSOCIATED WALL PLATE THROUGH ONE SOURCE FROM A SINGLE MANUFACTURER. INSOFAR AS THEY ARE AVAILABLE, OBTAIN ALL WIRING DEVICES AND ASSOCIATED WALL PLATES FROM A SINGLE MANUFACTURER AND ONE SOURCE.
B. 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.
C. COMPLY WITH NFPA 70.

PART 2 – PRODUCTS

2.1 MANUFACTURERS
A. MANUFACTURERS' NAMES: SHORTENED VERSIONS (SHOWN IN PARENTHESES) OF THE FOLLOWING MANUFACTURERS' NAMES ARE USED IN OTHER PART 2 ARTICLES:
1. COOPER WIRING DEVICES; A DIVISION OF COOPER INDUSTRIES, INC. (COOPER).
2. HUBBELL INCORPORATED; WIRING DEVICE-KELLEMS (HUBBELL).
3. LEVITON MFG. COMPANY INC. (LEVITON).
4. PASS & SEYMOUR/LEGRAND; WIRING DEVICES & ACCESSORIES (PASS & SEYMOUR).

2.2 STRAIGHT BLADE RECEPTACLES
A. CONVENIENCE RECEPTACLES, 125 V, 20 A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, AND UL 498.
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 5351 (SINGLE), 5352 (DUPLEX).
b. HUBBELL; HBL5351 (SINGLE), CR5352 (DUPLEX).
c. LEVITON; 5891 (SINGLE), 5352 (DUPLEX).
d. PASS & SEYMOUR; 5381 (SINGLE), 5352 (DUPLEX).

2.3 GFCI RECEPTACLES
A. GENERAL DESCRIPTION: STRAIGHT BLADE, NON-FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED.
B. DUPLEX GFCI CONVENIENCE RECEPTACLES, 125 V, 20 A:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; GF20.
b. PASS & SEYMOUR; 2084.

2.4 SNAP SWITCHES
A. COMPLY WITH NEMA WD 1 AND UL 20.
B. SWITCHES, 120/277 V, 20 A:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 2221 (SINGLE POLE), 2222 (TWO POLE), 2223 (THREE WAY), 2224 (FOUR WAY).
b. HUBBELL; CS1221 (SINGLE POLE), CS1222 (TWO POLE), CS1223 (THREE WAY), CS1224 (FOUR WAY).
c. LEVITON; 1221-2 (SINGLE POLE), 1222-2 (TWO POLE), 1223-2 (THREE WAY), 1224-2 (FOUR WAY).
d. PASS & SEYMOUR; 20AC1 (SINGLE POLE), 20AC2 (TWO POLE), 20AC3 (THREE WAY), 20AC4 (FOUR WAY).

2.5 OCCUPANCY SENSORS
A. WALL-SWITCH SENSORS:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 6111 FOR 120 V, 6117 FOR 277 V.
b. HUBBELL; WS1277.
c. LEVITON; ODS 10-ID.
d. PASS & SEYMOUR; WS3000.
e. WATT STOPPER (THE); WS-200.
2. DESCRIPTION: PASSIVE-INFRARED TYPE, 120/277 V, ADJUSTABLE TIME DELAY UP TO 30 MINUTES, 180-DEGREE FIELD OF VIEW, WITH A MINIMUM COVERAGE AREA OF 900 SQ. FT..

2.6 COMMUNICATIONS OUTLETS
A. TELEPHONE OUTLET:
1. PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
a. COOPER; 3560-6.
b. LEVITON; 40649.
2. DESCRIPTION: SINGLE RJ-45 JACK FOR TERMINATING 100-OHM, BALANCED, FOUR-PAIR UTP; TIA/EIA-568-B.1; COMPLYING WITH CATEGORY 5E. COMPLY WITH UL 1863.

2.7 WALL PLATES
A. SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES.
1. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
2. MATERIAL FOR FINISHED SPACES: 0.035-INCH- THICK, SATIN-FINISHED STAINLESS STEEL.
3. MATERIAL FOR UNFINISHED SPACES: GALVANIZED STEEL.
4. MATERIAL FOR DAMP LOCATIONS: CAST ALUMINUM WITH SPRING-LOADED LIFT COVER, AND LISTED AND LABELED FOR USE IN "WET LOCATIONS."
B. WET-LOCATION, WEATHERPROOF COVER PLATES: NEMA 250, COMPLYING WITH TYPE 3R WEATHER-RESISTANT , DIE-CAST ALUMINUM WITH LOCKABLE COVER.

2.8 FINISHES
A. COLOR: WIRING DEVICE CATALOG NUMBERS IN SECTION TEXT DO NOT DESIGNATE DEVICE COLOR.
1. WIRING DEVICES CONNECTED TO NORMAL POWER SYSTEM: ALMOND, UNLESS OTHERWISE INDICATED OR REQUIRED BY NFPA 70 OR DEVICE LISTING.
2. ISOLATED-GROUND RECEPTACLES: AS SPECIFIED ABOVE, WITH ORANGE TRIANGLE ON FACE.

PART 3 – EXECUTION

3.1 INSTALLATION
A. COMPLY WITH NECA 1, INCLUDING THE MOUNTING HEIGHTS LISTED IN THAT STANDARD, UNLESS OTHERWISE NOTED.
B. COORDINATION WITH OTHER TRADES:
1. TAKE STEPS TO INSURE THAT DEVICES AND THEIR BOXES ARE PROTECTED. DO NOT PLACE WALL FINISH MATERIALS OVER DEVICE BOXES AND DO NOT CUT HOLES FOR BOXES WITH ROUTERS THAT ARE GUIDED BY RIDING AGAINST OUTSIDE OF THE BOXES.
2. KEEP OUTLET BOXES FREE OF PLASTER, DRYWALL JOINT COMPOUND, MORTAR, CEMENT, CONCRETE, DUST, PAINT, AND OTHER MATERIAL THAT MAY CONTAMINATE THE RACEWAY SYSTEM, CONDUCTORS, AND CABLES.
3. INSTALL DEVICE BOXES IN BRICK OR BLOCK WALLS SO THAT THE COVER PLATE DOES NOT CROSS A JOINT UNLESS THE JOINT IS TROWELED FLUSH WITH THE FACE OF THE WALL.
4. INSTALL WIRING DEVICES AFTER ALL WALL PREPARATION, INCLUDING PAINTING, IS COMPLETE.
C. CONDUCTORS:
1. DO NOT STRIP INSULATION FROM CONDUCTORS UNTIL JUST BEFORE THEY ARE SPLICED OR TERMINATED ON DEVICES.
2. STRIP INSULATION EVENLY AROUND THE CONDUCTOR USING TOOLS DESIGNED FOR THE PURPOSE. AVOID SCORING OR NICKING OF SOLID WIRE OR CUTTING STRANDS FROM STRANDED WIRE.
3. THE LENGTH OF FREE CONDUCTORS AT OUTLETS FOR DEVICES SHALL MEET PROVISIONS OF NFPA 70, ARTICLE 300, WITHOUT PIGTAILS.
4. EXISTING CONDUCTORS:
a. CUT BACK AND PIGTAIL, OR REPLACE ALL DAMAGED CONDUCTORS.
b. STRAIGHTEN CONDUCTORS THAT REMAIN AND REMOVE CORROSION AND FOREIGN MATTER.
c. PIGTAILING EXISTING CONDUCTORS IS PERMITTED PROVIDED THE OUTLET BOX IS LARGE ENOUGH.
D. DEVICE INSTALLATION:
1. REPLACE ALL DEVICES THAT HAVE BEEN IN TEMPORARY USE DURING CONSTRUCTION OR THAT SHOW SIGNS THAT THEY WERE INSTALLED BEFORE BUILDING FINISHING OPERATIONS WERE COMPLETE.
2. KEEP EACH WIRING DEVICE IN ITS PACKAGE OR OTHERWISE PROTECTED UNTIL IT IS TIME TO CONNECT CONDUCTORS.
3. DO NOT REMOVE SURFACE PROTECTION, SUCH AS PLASTIC FILM AND SMUDGE COVERS, UNTIL THE LAST POSSIBLE MOMENT.
4. CONNECT DEVICES TO BRANCH CIRCUITS USING PIGTAILS THAT ARE NOT LESS THAN 6 INCHES IN LENGTH.
5. WHEN THERE IS A CHOICE, USE SIDE WIRING WITH BINDING-HEAD SCREW TERMINALS. WRAP SOLID CONDUCTOR TIGHTLY CLOCKWISE, 2/3 TO 3/4 OF THE WAY AROUND TERMINAL SCREW.
6. USE A TORQUE SCREWDRIVER WHEN A TORQUE IS RECOMMENDED OR REQUIRED BY THE MANUFACTURER.
7. WHEN CONDUCTORS LARGER THAN NO. 12 AWG ARE INSTALLED ON 15- OR 20-A CIRCUITS, SPLICE NO. 12 AWG PIGTAILS FOR DEVICE CONNECTIONS.
8. TIGHTEN UNUSED TERMINAL SCREWS ON THE DEVICE.
9. WHEN MOUNTING INTO METAL BOXES, REMOVE THE FIBER OR PLASTIC WASHERS USED TO HOLD DEVICE MOUNTING SCREWS IN YOKES, ALLOWING METAL-TO-METAL CONTACT.
E. DEVICE PLATES: DO NOT USE OVERSIZED OR EXTRA-DEEP PLATES. REPAIR WALL FINISHES AND REMOUNT OUTLET BOXES WHEN STANDARD DEVICE PLATES DO NOT FIT FLUSH OR DO NOT COVER ROUGH WALL OPENING.

3.2 IDENTIFICATION
A. RECEPTACLES: IDENTIFY PANELBOARD AND CIRCUIT NUMBER FROM WHICH SERVED. USE HOT, STAMPED OR ENGRAVED MACHINE PRINTING WITH BLACK-FILLED LETTERING ON FACE OF PLATE, AND DURABLE WIRE MARKERS OR TAGS INSIDE OUTLET BOXES.

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ELECTRICAL SPECIFICATIONS
sheet
E3

date: DATE APRIL 30, 2013
commission: 12-1010
drawn by: DMK

ELECTRICAL SPECIFICATIONS (CONTINUED):

3.3 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS AND PREPARE TEST REPORTS.

1. TEST INSTRUMENTS: USE INSTRUMENTS THAT COMPLY WITH UL 1436.
2. TEST INSTRUMENT FOR CONVENIENCE RECEPTACLES: DIGITAL WIRING ANALYZER WITH DIGITAL READOUT OR ILLUMINATED LED INDICATORS OF MEASUREMENT.

B. TESTS FOR CONVENIENCE RECEPTACLES:

1. LINE VOLTAGE: ACCEPTABLE RANGE IS 105 TO 132 V.
2. PERCENT VOLTAGE DROP UNDER 15-A LOAD: A VALUE OF 6 PERCENT OR HIGHER IS NOT ACCEPTABLE.
3. GROUND IMPEDANCE: VALUES OF UP TO 2 OHMS ARE ACCEPTABLE.
4. GFCI TRIP: TEST FOR TRIPPING VALUES SPECIFIED IN UL 1436 AND UL 943.
5. USING THE TEST PLUG, VERIFY THAT THE DEVICE AND ITS OUTLET BOX ARE SECURELY MOUNTED.
6. THE TESTS SHALL BE DIAGNOSTIC, INDICATING DAMAGED CONDUCTORS, HIGH RESISTANCE AT THE CIRCUIT BREAKER, POOR CONNECTIONS, INADEQUATE FAULT CURRENT PATH, DEFECTIVE DEVICES, OR SIMILAR PROBLEMS. CORRECT CIRCUIT CONDITIONS, REMOVE MALFUNCTIONING UNITS AND REPLACE WITH NEW ONES, AND RETEST AS SPECIFIED ABOVE.

END OF SECTION

SECTION 262816 - ENCLOSED SWITCHES

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 SUMMARY

A. SECTION INCLUDES:

1. NONFUSIBLE SWITCHES.
2. ENCLOSURES.

1.3 SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF ENCLOSED SWITCH, ACCESSORY, AND COMPONENT INDICATED. INCLUDE DIMENSIONED ELEVATIONS, SECTIONS, WEIGHTS, AND MANUFACTURERS' TECHNICAL DATA ON FEATURES, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, ACCESSORIES, AND FINISHES.

1. ENCLOSURE TYPES AND DETAILS FOR TYPES OTHER THAN NEMA 250, TYPE 1.
2. CURRENT AND VOLTAGE RATINGS.
3. SHORT-CIRCUIT CURRENT RATINGS (INTERRUPTING AND WITHSTAND, AS APPROPRIATE).

B. SHOP DRAWINGS: FOR ENCLOSED SWITCHES. INCLUDE PLANS, ELEVATIONS, SECTIONS, DETAILS, AND ATTACHMENTS TO OTHER WORK.

C. OPERATION AND MAINTENANCE DATA: FOR ENCLOSED SWITCHES TO INCLUDE IN EMERGENCY, OPERATION, AND MAINTENANCE MANUALS. IN ADDITION TO ITEMS SPECIFIED IN DIVISION 1 SECTION "OPERATION AND MAINTENANCE DATA," INCLUDE THE FOLLOWING:

1.4 QUALITY ASSURANCE

A. SOURCE LIMITATIONS: OBTAIN ENCLOSED SWITCHES, COMPONENTS, AND ACCESSORIES, WITHIN SAME PRODUCT CATEGORY, FROM SINGLE SOURCE FROM SINGLE MANUFACTURER.

B. 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.

C. COMPLY WITH NFPA 70.

1.5 PROJECT CONDITIONS

A. ENVIRONMENTAL LIMITATIONS: RATE EQUIPMENT FOR CONTINUOUS OPERATION UNDER THE FOLLOWING CONDITIONS UNLESS OTHERWISE INDICATED:

1. AMBIENT TEMPERATURE: NOT LESS THAN MINUS 22 DEG F AND NOT EXCEEDING 104 DEG F.
2. ALTITUDE: NOT EXCEEDING 6600 FEET.

1.6 COORDINATION

A. COORDINATE LAYOUT AND INSTALLATION OF SWITCHES, AND COMPONENTS WITH EQUIPMENT SERVED AND ADJACENT SURFACES. MAINTAIN REQUIRED WORKSPACE CLEARANCES AND REQUIRED CLEARANCES FOR EQUIPMENT ACCESS DOORS AND PANELS.

PART 2 - PRODUCTS

2.1 NONFUSIBLE SWITCHES

A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:

1. EATON ELECTRICAL INC.; CUTLER-HAMMER BUSINESS UNIT.
2. GENERAL ELECTRIC COMPANY; GE CONSUMER & INDUSTRIAL - ELECTRICAL DISTRIBUTION.
3. SIEMENS ENERGY & AUTOMATION, INC.
4. SQUARE D; A BRAND OF SCHNEIDER ELECTRIC.

B. TYPE HD, HEAVY DUTY, SINGLE THROW, 240-V AC, 1200 A AND SMALLER: UL 98 AND NEMA KS 1, HORSEPOWER RATED, LOCKABLE HANDLE WITH CAPABILITY TO ACCEPT THREE PADLOCKS, AND INTERLOCKED WITH COVER IN CLOSED POSITION.

C. ACCESSORIES:

1. EQUIPMENT GROUND KIT: INTERNALLY MOUNTED AND LABELED FOR COPPER AND ALUMINUM GROUND CONDUCTORS.
2. LUGS: MECHANICAL TYPE, SUITABLE FOR NUMBER, SIZE, AND CONDUCTOR MATERIAL.

2.2 ENCLOSURES

A. ENCLOSED SWITCHES: NEMA AB 1, NEMA KS 1, NEMA 250, AND UL 50, TO COMPLY WITH ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.

1. INDOOR, DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1.
2. OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.

PART 3 - EXECUTION

3.1 EXAMINATION

A. EXAMINE ELEMENTS AND SURFACES TO RECEIVE ENCLOSED SWITCHES FOR COMPLIANCE WITH INSTALLATION TOLERANCES AND OTHER CONDITIONS AFFECTING PERFORMANCE OF THE WORK.

B. PROCEED WITH INSTALLATION ONLY AFTER UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.

3.2 INSTALLATION

A. INSTALL INDIVIDUAL WALL-MOUNTED SWITCHES WITH TOPS AT UNIFORM HEIGHT UNLESS OTHERWISE INDICATED.

B. COMPLY WITH NECA 1.

3.3 IDENTIFICATION

A. IDENTIFY FIELD-INSTALLED CONDUCTORS, INTERCONNECTING WIRING, AND COMPONENTS; PROVIDE WARNING SIGNS.

B. LABEL EACH ENCLOSURE WITH ENGRAVED METAL OR LAMINATED-PLASTIC NAMEPLATE.

3.4 FIELD QUALITY CONTROL

A. PERFORM TESTS AND INSPECTIONS.

B. ACCEPTANCE TESTING PREPARATION:

1. TEST INSULATION RESISTANCE FOR EACH ENCLOSED SWITCH.
2. TEST CONTINUITY OF EACH CIRCUIT.

C. ADJUST MOVING PARTS AND OPERABLE COMPONENTS TO FUNCTION SMOOTHLY, AND LUBRICATE AS RECOMMENDED BY MANUFACTURER.

END OF SECTION

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ELECTRICAL SPECIFICATIONS

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