
SECTION 01200 – MEASUREMENT AND PAYMENT

(Revised 4/14/20)

SELECTED LINKS TO SECTIONS WITHIN THIS SPECIFICATION

[Earthwork](#)

[Trenching, Backfilling & Compaction](#)

[Sanitary Sewer](#)

[Water Distribution](#)

Measurements for purposes of payment shall be in accordance with the unit quantities stated in the proposal as defined below. Prices for the following bid items shall include all labor, materials, tools, equipment, and other incidentals necessary to complete the work as shown on the plans and in accordance with The City of Lynchburg Manual of Specifications and Standard Details.

1.1 TRENCHING, BACKFILLING & COMPACTION OF UTILITIES

A. Pavement Cut and Removal, Asphalt Concrete:

Measurement: Asphalt concrete pavement cut and removed will be measured in square yards regardless of the existing pavement depth. Refer to **Standard Details 25.18, 26.01, and 27.01** for calculation of pavement removal dimensions for utility trench patches.

Payment: Asphalt concrete pavement cut and removed will be paid for at the contract unit price per square yard for bituminous pavement cut and removed, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

B. Pavement Cut and Removal, Unreinforced Concrete:

Measurement: Unreinforced concrete pavement cut and removed will be measured in square yards regardless of the existing pavement depth. Refer to **Standard Details 25.19, 26.01, and 27.01** for calculation of pavement removal dimensions for utility trench patches.

Payment: Unreinforced concrete pavement cut and removed will be paid for at the contract unit price per square yard for unreinforced concrete pavement cut and removed, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

C. Pavement Cut and Removal, Reinforced Concrete:

Measurement: Reinforced concrete pavement cut and removed will be measured in square yards regardless of the existing pavement depth. Refer to **Standard Details 25.19, 26.01 and 27.01** for calculation of pavement removal dimensions for utility trench patches.

Payment: Reinforced concrete pavement cut and removed will be paid for at the contract unit price per square yard for reinforced concrete pavement cut and removed, including all material, equipment, and labor to saw cut pavement, remove and dispose of surplus material.

D. Extra Depth Excavation – All Pipes:

Measurement: Extra depth excavation for pipelines will be measured by the cubic yard. Refer to **Standard Details 26.01 and 27.01** for trench width and depths allowed in calculated Extra Depth Excavation. Trench length will be calculated from center of structure to center of structure, e.g., manhole, lampstack, drop inlet.

Payment: Extra depth excavation will be paid for at the contract unit price per cubic yard for extra depth excavation and shall include all material, equipment, and labor required for excavation. The price shall also include all shoring, trench boxes, dewatering, traffic control, and safety devices required.

E. Foundation Stone:

Measurement: Foundation stone for pipelines will be measured by the cubic feet of foundation stone placed in the trench in accordance with **Standard Details 26.01 and 27.01**. Trench width shall also be measured in accordance with **Standard Details 26.01 and 27.01**. Cubic feet of foundation stone material placed will be converted to tons using the weight of 145 pounds per cubic feet.

Payment: Foundation stone will be paid for at the contract unit price for foundation stone by the ton. Price shall include removal and disposal of unusable material and placement of stone, complete in place.

F. Bedding Stone: (Not a pay item, incidental to other items bid)

G. Compacted Aggregate Backfill:

Measurement: Compacted aggregate backfill will be measured by the cubic feet of material placed in accordance with Standard Details 26.01 and 27.01. Trench width shall also be measured in accordance with these details. Cubic feet of material calculated will be converted to tons using the weight of 145 pounds per cubic foot.

Payment: Compacted aggregate backfill will be paid for at the contract unit price per ton for aggregate backfill and shall include all materials, equipment, and labor required to furnish and compact, complete in place, VDOT No. 21A stone in the locations designated by the City Engineer.

H. Coarse Granular Aggregate Backfill:

Measurement: Coarse granular aggregate backfill will be measured by the cubic feet of material placed in accordance with **Standard Details 26.01 and 27.01**. Trench width shall also be measured in accordance with these details. Cubic feet of material calculated will be converted to tons using the weight of 145 pounds per cubic foot.

Payment: Coarse granular aggregate backfill will be paid for at the contract unit price per ton for aggregate backfill and shall include all materials, equipment, and labor required to furnish and consolidate, complete in place, VDOT No. 57 stone in the locations designated by the City Engineer.

I. Trench (Select) Borrow Backfill:

Measurement: Trench borrow will be measured by the cubic yard of material installed in the trench, limiting the trench width to a maximum of the pipe outside diameter plus 2 feet.

Payment: Trench borrow will be paid for at the contract unit price by the cubic yard and shall include all material, equipment, and labor to furnish, haul, place, and compact the approved material, complete in place, in the locations as designated on the drawings or as approved by the City Engineer.

J. Trench Rock:

Measurement: Trench rock excavation will be measured by the City Engineer or his representative in its original position, after which the rock shall be excavated to the depth specified by the City Engineer and then measured by the cubic yard. Refer to **Standard Details 26.01 and 27.01** for allowable width of rock removal in trench. Rock excavation shall consist of the removal and satisfactory disposal of all materials, which are classified as rock in the opinion of the Engineer. No payment shall be made for rock removal by ripping. Refer to Section 02220-*Trenching, Backfilling and Compaction of Utilities – paragraph -Trench Rock Excavation* for definition of materials classified as rock.

Payment: Trench rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, and equipment to excavate and dispose of rock off site.

K. Trench Patching for New Pipe Installation – Permanent and Temporary:

See Section 1.6 Base Course & Paving

L. Excavation and Backfill:

Measurement and Payment: In accordance with Section 02220, *Trenching, Backfilling, and Compaction of Utilities*, all excavation and backfill, excluding select borrow backfill, shall be included in the cost of the other items bid – not a pay item.

M. Maintenance Stone for Pipe Installation:

Measurement: Maintenance stone for pipe installation will be measured by the square yard (6 inches thick) of material placed per the direction of the City Engineer's representative.

Payment: Maintenance stone for pipe installation will be paid for at the contract unit price per square yard (6 inches thick) for aggregate backfill on a one time basis and shall include all materials, equipment, and labor required to furnish and compact, complete in place, VDOT No. 21A stone in the locations designated by the City Engineer.

N. **Non-Metallic Warning Tape: (Not a pay item, incidental to other items bid)**

O. **Metallic Locating Wire: (Not a pay item, incidental to other items bid)**

1.2 SANITARY SEWER

A. **Sewer Pipe (including Carrier Pipe, except for bored and jacked applications):**

Measurement: Sewer pipe will be measured from the exact beginning of the pipe to the end of the line. No deductions in length will be made for branches and appurtenances along the line.

Payment: Sewer pipe will be paid for at the contract unit price per linear foot for pipe of the type and size specified, complete in place (including stone bedding), at the 4-foot minimum depth to top of pipe. This price shall include trench excavation (excluding rock), warning tape, tracing wire (as applicable per specifications), shoring or use of trench box, installation, dewatering, backfilling, compaction, testing of failed trenches, disposal of excess material, and pressure testing.

B. **Bored and Jacked Sewer Pipe:**

Measurement: Bored and jacked sewer pipe of the type and diameter specified will be measured by the linear foot that is installed by the boring and jacking method.

Payment: Bored and jacked sewer pipe will be paid for at the contract unit prices per linear foot per diameter per type of pipe bored and shall include the carrier pipe and any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts.

C. **Encasement Pipe (Bored):**

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear foot of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe bored, complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City Engineer. Carrier pipe shall be paid for separately.

Encasement of sewer lines by the dry bore and jacking method shall include any and all excavation, including the boring pit, any backfill, the encasement pipe, bore, jacking, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

D. Encasement Pipe (Open Cut):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe installed by the open cut method, complete in place. Carrier pipe shall be paid for separately.

Encasement of sewer lines by the open cut method shall include any and all excavation, including, any backfill, the encasement pipe, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

E. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

Payment: Tunneling will be paid for at the contract unit price per linear foot for diameter installed. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City Engineer. Carrier pipe shall be paid for separately.

The tunneling method shall include any and all excavation, including the boring pit, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

F. Manholes - Standard:

Measurement: Standard manholes will be measured by the vertical foot of the manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest 1/10-foot.

Payment: Standard manholes will be paid for at the contract unit price per vertical foot, complete in place including excavation. Price shall include complete invert pouring and forming of concrete in accordance with the standards and drawings, rubber boots, bedding stone, bolting castings to cone, gaskets, vent pipe if required, external wrap, vacuum testing, backfill, compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

G. Manholes – Drop (Interior and Exterior):

Measurement: Drop manholes will be measured the same as for a standard manhole in vertical feet of manhole constructed plus, a separate measurement per vertical foot per drop height as shown on **Standard Details 27.04 and 27.05**. The drop height shall be from invert of the lower line to invert of the upper line.

Payment: Drop manholes will be paid in vertical feet at the contract unit price of regular manhole plus a separate payment per linear foot for drop height (DH) as shown on **Standard Details 27.04 and 27.05** and measured from the invert of lower line to the invert of upper line including pipe, bends, concrete, bedding stone, and excavation. Price is to include strapping to casting (as applicable), concrete, tees, elbows, plugs/caps, stone, backfill and compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

H. Manholes – Doghouse:

Measurement: Doghouse manholes will be measured the same as for a standard manhole in vertical feet of manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest 1/10 -foot.

Payment: Doghouse manholes will be paid for at the contract unit price per vertical foot, complete in place, including excavation. Price shall include pouring of concrete footing and invert, invert forming in accordance with the standards and drawings, bedding stone, bolting castings to cone, gaskets, external wrap, backfill, compaction, complete in place. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

I. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings, as shown on **Standard Details 25.08 and 27.02**, will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price per vertical foot, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non-shrink grout as well as installation of the external grade/riser sealant.

J. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, complete in place, as shown on **Standard Details 27.10 and 27.11**.

K. Appurtenances:

Measurement: Wye Branches, tees, bends, etc. will be measured by the number of units installed of each size.

Payment: Wye branches, tees, bends, etc. will be paid for at the contract unit price per each, complete in place for each size.

L. Building Connection Service Pipe:

Measurement: Building connection service pipe will be measured from the outside end of the wye or 45-degree bend to the combination wye for the cleanout, in linear feet.

Payment: Building connection service pipe will be paid for at the contract unit price per linear foot per size of pipe, complete in place for a 4-foot depth above top of pipe, including warning tape and locating wire. All depths greater than 4 feet will be paid as "extra depth excavation." Any temporary pumps required to by-pass sewer around work areas shall be provided at no additional cost.

M. Cleanout Assembly:

Measurement: Cleanout assemblies will be measured on an each basis. No measurement will be made for the following items that are included in the cleanout assembly measurement: combination wye, adapter, and plug, 45-degree bend, 24" long SCH 40 PVC extension with solvent weld cap, warning tape, locating wire and cleanout assembly.

Payment: Cleanout assemblies will be paid for at the contract unit price per each for cleanout assemblies per size and shall include all labor, material, equipment necessary for installation, complete in place.

N. Cleanout Vertical Pipe:

Measurement: Cleanout vertical pipe will be measured from top of the combination wye to cap in linear foot.

Payment: Cleanout vertical pipe will be paid for per linear foot per size at the contract unit price, complete in place, including excavation, locating wire, and all materials, labor, and equipment and shall include full compensation for any final adjustments to grade once finish grade is established.

O. Lampstack Vertical Pipe:

Measurement: Vertical pipe for lampstacks will be measured from the 45-degree bend to the cap, excluding the lampstack cap and concrete collar, in vertical feet.

Payment: Vertical pipe for lampstacks will be paid for per linear foot per diameter of pipe at the contract unit price, complete-in-place, including excavation, all materials, labor and equipment and shall include full compensation for any final adjustments.

P. Lampstack Frame and Cover:

Measurement: Lampstack frame and covers will be measured on an each basis and includes the concrete collar and lampstack cap in accordance with **Standard Detail 27.13**.

Payment: Lampstack frame and covers will be paid for at the contract unit price per each and covers the frame and cover, concrete collar, and lampstack cap, complete-in-place, including all materials, labor, and equipment and shall include full compensation for any final adjustments.

Q. Service Saddles on Existing Lines:

Measurement: Service saddles for taps placed on existing lines will be measured on an each basis per size installed. See **Standard Detail 27.16**.

Payment: Service saddles for taps placed on existing lines will be paid for at the contract unit price per each, complete in place. Any temporary pumps required to by-pass sewer around work areas shall be provided at no additional cost.

R. Machine Core Existing Manholes:

Measurement: Machine core of existing manholes will be measured on an each basis.

Payment: Machine core of existing manholes will be paid for at the contract unit price per each. Price shall include all labor, equipment, and materials to machine core drill and install the neoprene flexible boot and adjustable band, complete in place.

S. Manhole Abandonment:

Measurement: Manhole abandonment will be measured on an each basis.

Payment: Manhole abandonment will be paid for at the contract unit price per each, complete in place in accordance with Section 02730, *Sanitary Sewer*.

T. Fernco Flexible Couplings:

Measurement: Fernco couplings will be measured on an each basis of the size required.

Payment: Fernco couplings will be paid for at the contract unit price per each of the size required. Price shall include a concrete support cradle 4 inches thick, extending to the springline of the fitting. The concrete shall extend for 6 inches of either edge of the fernco. Price shall include all labor, equipment, and materials to install the coupling, complete in place.

U. Harco Rigid Fittings:

Measurement: Harco rigid fittings will be measured on an each basis of the size required.

Payment: Fittings will be paid for at the contract unit price per each of the size required. Price shall include all labor, equipment, and materials to install the fitting, complete in place.

V. Rehab/Lining of Sanitary Sewers:

Measurement: Rehab/lining of existing sanitary sewer lines will be measured on a per foot basis of each size of line.

Payment: Rehab/lining of existing sanitary sewer lines (installation of a flexible liner) will be paid for at the contract unit price per foot of each size line by the cured-in-place pipe process or folded and formed process. Price shall include all material, equipment, and labor, pre-insertion cleaning and television inspection, insertion and curing of liner, sealing liner at manholes, testing, and final television inspection for a complete in place

lining. Price does not include point repairs or repairs to manholes. Price shall include bypass pumping for 8-inch and 10-inch liners. Liners 12 inches and larger shall be paid for separately under the bypass pumping unit prices for pump size and mobilization/demobilization of set up.

W. Reinstatement of Laterals in Lined Sections:

Measurement: Reinstatement of laterals will be measured on an each basis of 4- and 6-inch service existing connections reinstated.

Payment: Reinstatement of laterals will be paid for at the contract unit price per each of 4- and 6-inch service connections. Price shall include all labor, equipment, and materials to reinstate the service laterals complete in place including determination of location of existing laterals by use of pre-lining video, use of dye to determine active laterals, and use of remote operated cutter.

X. Manhole Scour Protection – Sacrificial Concrete:

Measurement: Application of sacrificial concrete in a manhole will be measured on an each basis per manhole (based on 8 feet of depth of manhole coverage).

Payment: Application of sacrificial concrete in a manhole will be paid for at the contract unit price per each manhole. Price shall include all labor, equipment, and materials to apply the concrete complete in place.

Y. Manhole Scour Protection - Coating:

Measurement: Application of coating in a manhole will be measured on an each basis per manhole (based on 8 feet of depth of manhole coverage).

Payment: Application of coating in a manhole will be paid for at the contract unit price per each manhole. Price shall include all labor, equipment, and materials to apply the coating complete in place.

Z. LPFM Sewer Pipe:

Measurement: LPFM sewer pipe will be measured from the exact beginning of the pipe to the end of the line. No deductions in length will be made for branches and appurtenances along the line.

Payment: LPFM sewer pipe will be paid for at the contract unit price per linear foot for pipe of the type and size specified, complete in place (including stone bedding), at the 3-foot minimum depth to top of pipe as shown in **Standard Detail 27.25**. This price shall include trench excavation (excluding rock), warning tape, tracing wire (as applicable per specifications), shoring or use of trench box, installation, dewatering, backfilling, compaction, testing of failed trenches, disposal of excess material, and pressure testing.

AA. LPFM Air Release Valve:

Measurement: LPFM air release valves will be measured on an each basis.

Payment: LPFM air release valves will be paid for at the contract unit price, in terms of one complete concrete structure and air release assembly, and shall include

excavations, backfilling, testing, device, and concrete structure, for a complete in place installation as shown in **Standard Detail 27.27**. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

BB. LPFM Flushing Cleanout:

Measurement: LPFM flushing cleanout assemblies will be measured on an each basis.

Payment: LPFM flushing cleanout assemblies will be paid for at the contract unit price per each for cleanout assemblies and shall include all labor, material, and equipment necessary for a complete in place installation as shown in **Standard Detail 27.28**.

CC. LPFM Terminal Flushing Cleanout (End of Line):

Measurement: LPFM terminal flushing cleanout assemblies will be measured on an each basis.

Payment: LPFM terminal flushing cleanout assemblies will be paid for at the contract unit price per each for cleanout assemblies and shall include all labor, material, and equipment necessary for a complete in place installation as shown in **Standard Detail 27.30**.

DD. LPFM Flushing Cleanout Pipe Intersection:

Measurement: LPFM flushing cleanout pipe intersection assemblies will be measured on an each basis.

Payment: LPFM flushing cleanout pipe intersection assemblies will be paid for at the contract unit price per each for cleanout assemblies and shall include all labor, material, and equipment necessary for a complete in place installation as shown in **Standard Detail 27.31**.

EE. LPFM Lateral Connection:

Measurement: LPFM lateral connection will be measured on an each basis.

Payment: LPFM lateral connection will be paid for at the contract unit price per each for cleanout assemblies and shall include all labor, material, and equipment necessary for a complete in place installation as shown in **Standard Detail 27.33** including valve box and lid.

FF. LPFM Connection to Terminal Manhole:

Measurement: LPFM connection to terminal manhole will be measured on an each basis.

Payment: LPFM connection to terminal manholes will be paid for at the contract unit price per each for cleanout assemblies and shall include all labor, material, and equipment necessary for a complete in place installation as shown in **Standard Detail 27.29**.

GG. Rehabilitation of Existing Manholes (in developed areas):

Measurement: Rehabilitation of existing manholes will be measured by the vertical foot per specified diameter of the manhole and per type of liner installed. Manholes shall be measured along the centerline of the manhole from the lowest point of the invert of the outgoing pipe and recorded to the nearest 1/10-foot. This pay item is intended for manholes that are in a location such that the rehabilitation equipment can be parked adjacent to the manhole. This includes maintained areas allowing vehicle access such as grassed areas and gravel roads.

Payment: Rehabilitation of existing manholes will be paid for at the contract unit price per vertical foot of each diameter manhole, complete in place. Price shall include all material, equipment, incidentals and labor to clean/prepare manhole and apply/cure the rehabilitation system. New frames and covers; and internal and external seals, when requested, will be paid for separately.

HH. Internal Manhole Frame Seals/Sealant (in developed areas)

Measurement: Internal manhole frame seals/sealant will be measured on an each basis for each internal manhole frame installed. This pay item is intended for manholes that are in a location such that the rehabilitation equipment can be parked adjacent to the manhole. This includes maintained areas allowing vehicle access such as grassed areas and gravel roads.

Payment: Internal manhole frame seals/sealant will be paid for at the contract unit price per each internal manhole frame sealed and approved. Price shall include all material, equipment, incidentals, and labor to clean/prepare the internal frame and cone the area, and to install the frame seal/sealant.

II. External Manhole Frame Seals (in developed areas)

Measurement: External manhole frame seals will be measured on an each basis for each external manhole frame installed. This pay item is intended for manholes that are in a location such that the rehabilitation equipment can be parked adjacent to the manhole. This includes maintained areas allowing vehicle access such as grassed areas and gravel roads.

Payment: External manhole frame seals will be paid for at the contract unit price per each external manhole frame sealed and approved. Price shall include all material, equipment, incidentals, and labor to clean/prepare the external frame and cone the area, and to install the frame seal.

JJ. Rehabilitation of Existing Manholes – (in undeveloped/unmaintained areas):

Measurement: Rehabilitation of existing manholes will be measured by the vertical foot per specified diameter of the manhole and per type of liner installed. Manholes shall be measured along the centerline of the manhole from the bottom of the frame to the lowest point of the invert of the outgoing pipe and recorded to the nearest 1/10-foot. This pay item is intended for manholes that are in a location such that the rehabilitation equipment cannot be parked adjacent to the manhole. This includes areas that require construction equipment assistance to access the work site or require manually carrying materials to the work site. This includes unmaintained areas and wooded areas. Maximum off road distance traveled to work site shall not exceed 1,000 feet.

Payment: Rehabilitation of existing manholes will be paid for at the contract unit price per vertical foot of each diameter manhole, complete in place. Price shall include all material, equipment, incidentals and labor to clean/prepare manhole and apply/cure the rehabilitation system. New frames and covers; and internal and external seals, when requested, will be paid for separately.

KK. Internal Manhole Frame Seals/Sealant (in undeveloped/unmaintained areas)

Measurement: Internal manhole frame seals/sealant will be measured on an each basis for each internal manhole frame installed. This pay item is intended for manholes that are in a location such that the rehabilitation equipment cannot be parked adjacent to the manhole. This includes areas that require construction equipment assistance to access the work site or require manually carrying materials to the work site. This includes unmaintained areas and wooded areas. Maximum off road distance traveled to work site shall not exceed 1,000 feet.

Payment: Internal manhole frame seals/sealant will be paid for at the contract unit price per each internal manhole frame sealed and approved. Price shall include all material, equipment, incidentals, and labor to clean/prepare the internal frame and cone the area, and to install the frame seal/sealant.

LL. External Manhole Frame Seals (in undeveloped/unmaintained areas)

Measurement: External manhole frame seals will be measured on an each basis for each external manhole frame installed. This pay item is intended for manholes that are in a location such that the rehabilitation equipment cannot be parked adjacent to the manhole. This includes areas that require construction equipment assistance to access the work site or require manually carrying materials to the work site. This includes unmaintained areas and wooded areas. Maximum off road distance traveled to work site shall not exceed 1,000 feet.

Payment: External manhole frame seals will be paid for at the contract unit price per each external manhole frame sealed and approved. Price shall include all material, equipment, incidentals, and labor to clean/prepare the external frame and cone the area, and to install the frame seal.

MM. Bypass Pumping - 4-inch pump:

Measurement: Bypass pumping with a 4-inch pump will be measured on a per each daily basis for a pumping rate of between 250 gpm and 1,000 gpm. Engineer will provide expected sewer flows for each project.

Payment: Bypass pumping with a 4-inch pump will be paid for at the contract unit price per each per day, per 24 hours of continuous service. Price shall include all items referenced in Section 02770- *Sewer Flow Control*, including but not limited to fuel, fueling, pump and wet well and maintenance of each, spare pump, auto dialer, enclosure (as required per the specification).

NN. Bypass Pumping - 6-inch pump:

Measurement: Bypass pumping with a 6-inch pump will be measured on a per each daily basis for a pumping rate of between 1,000 gpm and 2,000 gpm. Engineer will provide expected sewer flows for each project.

Payment: Bypass pumping with a 6-inch pump will be paid for at the contract unit price per each per day, per 24 hours of continuous service. Price shall include all items referenced in Section 02770 – *Sewer Flow Control*, including but not limited to fuel, fueling, pump and wet well and maintenance of each, spare pump, auto dialer, enclosure (as required per the specification).

OO. Bypass Pumping - Mobilization/De-mobilization for 4- or 6-inch Pump and Pipe Less than 300 LF:

Measurement: Bypass Pumping - Mobilization/De-mobilization for 4- or 6-inch Pump and Pipe Less than 300 LF will be paid once per project regardless of the number of pumps required. Pipe will be measured as total length from suction to discharge. When more than one duty pump is needed to cover normal daily flows, total length of duty pump piping will be measured. Spare pump piping will not be included in measurement nor paid additional.

Payment: Bypass pumping mobilization/de-mobilization for 4- or 6-inch pump and pipe of less than 300 LF will be paid for once at the contract unit price per project. Price shall include all items referenced in Section 02770- *Sewer Flow Control* relating to mobilization and demobilization including pump setup/takedown, mobilization, demobilization, piping install/removal, etc.

PP. Bypass Pumping - Mobilization/De-mobilization for 4- or 6-inch Pump and Pipe 300 to 1,000 LF:

Measurement: Bypass Pumping - Mobilization/De-mobilization for 4- or 6-inch Pump and Pipe Less than 300 LF will be paid once per project regardless of the number of pumps required. Pipe will be measured as total length from suction to discharge. When more than one duty pump is needed to cover normal daily flows, total length of duty pump piping will be measured. Spare pump piping will not be included in measurement nor paid additional.

Payment: Bypass pumping mobilization/de-mobilization for 4- or 6-inch pump and pipe of less than 300 LF will be paid for once at the contract unit price per project. Price shall include all items referenced in Section 02770- *Sewer Flow Control* relating to mobilization and demobilization including pump setup/takedown, mobilization, demobilization, piping install/removal, etc.

1.3 WATER DISTRIBUTION

A. Water Pipe (including Carrier Pipe except for bored and jacked applications):

Measurement: Water pipe will be measured by the linear foot. All pipe will be measured from the exact beginning of the pipe to the end of the line without deduction for fittings (I.e. fittings and valves). Hydrant leads will also be measured as pipe.

Payment: Water pipe will be paid for at the contract unit price per linear foot of the type and size pipe specified, complete in place. This price shall include trench excavation (excluding rock), shoring, or use of trench box, installation, warning tape, locating wire (as required per applicable specification), dewatering, backfilling, compaction, testing of failed trenches, disposal of excess material, pressure testing, chlorinating, and proper disposal of chlorinated water. Payment for mechanical joint pipe shall also include accessory kits.

B. Bored and Jacked Water Main Pipe:

Measurement: Bored and jacked water pipe of the type and diameter specified will be measured by the linear feet installed by the boring and jacking method.

Payment: Bored and jacked water pipe will be paid for at the contract unit prices per linear foot per diameter per type of pipe bored and shall include the carrier pipe and any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off grade or alignment shall be rejected or corrected in a manner approved by the City Engineer.

C. Encasement Pipe (Bored):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe bored and shall include any and all excavation, including the boring pit, any backfill, dewatering, etc., complete in place. However, the bore shall be paid one time on a linear foot basis and no extra compensation will be paid for failures and the subsequent withdrawal and re-jacking attempts. Lines either off on grade or alignment shall be rejected or corrected in a manner approved by the City Engineer. Carrier pipe shall be paid for separately.

Encasement of water lines by the dry bore and jacking method shall include any and all excavation, including the boring pit, any backfill, the encasement pipe, bore, jacking, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

D. Encasement Pipe (Open Cut):

Measurement: Steel casing pipe of the wall thickness and diameter specified will be measured by the linear feet of steel casing pipe installed.

Payment: Steel casing pipe will be paid for at the contract unit prices per linear foot per diameter per thickness for steel casing pipe installed by the open cut method, complete in place. Carrier pipe shall be paid for separately.

Encasement of water lines by the open cut method shall include any and all excavation, any backfill, the encasement pipe, spiders, drain pipe, french drain, the end seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

E. Tunneling:

Measurement: Tunneling will be measured by the linear feet of tunnel installed.

Payment: Tunneling will be paid for at the contract unit price per linear foot for diameter installed. Lines either off grade or alignment shall be rejected or corrected in a manner approved by the City Engineer.

The tunneling method shall include any and all excavation, including the boring pit, any backfill, steel liner plates and bolts, ventilation system for workers, lagging, spiders, grout plugs, sand-cement grouting of voids, steel drain pipe, french drain, concrete paved invert, the ends seals, dewatering, clean up, restoration and any other work required for a complete in place installation.

F. Valves:

Measurement: Gate valves, butterfly valves, double detector check valves and tapping valves, will be measured on an each basis of the size and type of valve installed.

Payment: Gate valves, butterfly valves, double detector check valves and tapping valves, will be paid for at the contract unit price, complete-in-place. This price shall include providing and installing the valve box.

G. Valve Boxes : (not a pay item)

H. Air and Vacuum Release Valves:

Measurement: Air and vacuum release valves will be measured on an each basis.

Payment: Air and vacuum release valves will be paid for at the contract unit price per air and vacuum valve for the size specified, complete in place. This price shall include the saddle, brass corporation stop, valve, street ells and screen, (excluding the manhole and frame and cover), and other incidentals as shown on **Standard Detail 26.11**.

I. Wet Tap:

Measurement: Wet taps will be measured on an each basis.

Payment: Wet taps will be paid for at the contract unit price per tap for the size specified, complete in place. Wet tap price shall include furnishing all materials, equipment, and labor to make a wet tap on an existing line, to include valve, valve box, tapping sleeve, anchor blocks, excavations, backfill, and testing of sleeve.

J. Fire Hydrants (High Pressure and Low Pressure):

Measurement: Fire hydrants will be measured by the number of hydrants installed on an each basis as per **Standard Detail 26.09**

Payment: Fire Hydrants will be paid for at the contract unit price per each to include all labor, materials, equipment necessary to install the hydrant including one-half cubic yard of VDOT #57 stone, accessory kits, megalugs, concrete pad, fabric, testing and disinfecting, painting, complete in place. When there is change in the plans, which results in the need for a longer extension of the fire hydrant barrel, the extension beyond the depth of 4 feet shall be paid for at the contract unit price per vertical foot of barrel for the fire hydrant extension. No additional compensation will be made for hydrants located on either high or low pressure systems.

K. Installation of Fire Hydrants on Existing Water Mains:

Measurement: Installation of fire hydrants on existing mains will be measured accordingly with each specific line item used for such installation. For example, items such as fire hydrants, pipe, pavement cuts, fittings, seeding and grading, etc. shall be measured under appropriate item description.

Payment: Installation of fire hydrants on existing mains including megalugs will be paid for accordingly with each specific line used for such installation. For example, items such as fire hydrants, pipe, pavement cuts, fittings, seeding and grading, etc. shall be paid under appropriate item description.

L. Relocation of Existing Fire Hydrants:

Measurement: Relocation of an existing fire hydrant by the method of removing and reinstalling a city owned fire hydrant at another location will be measured on an each basis.

Payment: Relocation of an existing fire hydrant by the method of removing and reinstalling a city owned fire hydrant at another location will be paid for on an each basis, at a lump sum price, to include the required concrete pad, that is agreed upon and approved by the City Engineer prior to commencing any work.

M. Fittings:

Measurement: Fittings will be measured by the pound.

Payment: Fittings will be paid for at the contract unit price by the pound based on manufacturer's published weights and shall include all material, equipment, and labor to install, test, disinfect, complete in place.

N. Flexible Couplings:

Measurement: Flexible couplings will be measured by the number of each size installed.

Payment: Flexible couplings will be paid for at the contract unit price per flexible coupling for the size specified, to include installation, complete in place.

O. Mechanical Thrust Restraint, Megalugs, Retainer Glands and Retainer Clamps:

Measurement: Mechanical thrust restraint, megalugs, retainer glands, and retainer clamps will be measured in pounds of the specified size installed.

Payment: Mechanical thrust restraint, megalugs, retainer glands, and retainer clamps will be paid for at the contract unit price per pound for the type retainer specified, complete in place. The price shall include all nuts, bolts, eyebolts, gaskets, and special retainer washers required for assembly.

P. Tie Rods:

Measurement: Tie Rods will be measured by the linear foot of the specified size installed.

Payment: Tie Rods will be paid for at the contract unit price per linear foot for the specified size installed.

Q. Manholes for Air Release/Vacuum Valves and other Water Valves:

Measurement: Manholes for air release and vacuum valves and other water valves will be measured by the vertical height from the top of the footing to the bottom of the frame casting and recorded to the nearest 1/10-foot.

Payment: Manholes for air release and vacuum valves and other water valves will be paid for at the contract unit price per vertical foot for manholes, complete in place. The price shall include the concrete foundation and drainage material as shown on **Standard Details 26.11 and 26.07**. Cost for manholes is to include all installation, backfill, compaction, etc. The valve and the manhole frame casting are to be paid as separate items from the manhole.

R. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings, as shown on **Standard Details 25.08 and 27.02**, will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price per vertical feet, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non-shrink grout.

S. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, to include bolting the frame and cover to the structure, complete in place, as shown on **Standard Detail 26.23**.

T. Vaults:

Measurement: Installation of vaults will be measured accordingly with each specific line item used for such installation. For example, items such as valves, fire hydrants, pipe, pavement cuts, fittings, formed concrete, etc. shall be measured under appropriate item description.

Payment: Installation of vaults will be paid for accordingly with each specific line item used for such installation. For example, items such as valves, fire hydrants, pipe, pavement cuts, fittings, formed concrete, etc. shall be paid for and include all work as defined under the appropriate costs for that item description. Any additional costs for an item that does not have a specific price or is not included in other costs must be approved by the City Engineer prior to commencing any work.

U. Water Meter Box and Assembly (Replacement of Existing Connection Only):

Measurement: Water meter box and assemblies will be measured on an each basis.

Payment: Water meter box and assemblies will be paid for at the contract unit price per size indicated on drawings, in terms of one complete box and meter connection assembly, and shall include excavations, backfilling, testing, chlorinating, bacteriological testing, meter box, angle valve, iron yoke, yoke ell, cast iron top, and corporation stop, complete in place. If replacing an existing meter box, cost shall include removal and disposal of the old meter box and assembly. If meter box does not require tying into existing service, pigtail shall be crimped. Cost for either circumstance shall be included in other items bid.

V. Water Meter Box and Assembly (New Construction Only):

Measurement: Water meter box and assemblies will be measured on an each basis.

Payment: Water meter box and assemblies will be paid for at the contract unit price per size indicated on drawings, in terms of one complete box and meter connection assembly, and shall include excavations, backfilling, testing, chlorinating, bacteriological testing, meter box, angle valve, iron yoke, dual check valve, cast iron top, and corporation stop, complete in place. If replacing an existing meter box, cost shall include removal and disposal of the old meter box and assembly. If meter box does not require tying into existing service, pigtail shall be crimped. Cost for either circumstance shall be included in other items bid.

W. Copper Pipe for Water Services (Open Cut):

Measurement: Copper pipe for water services will be measured by the linear foot from the center of the water main to the center of the water meter box and including pigtails.

Payment: Copper pipe for water services will be paid for at the contract unit price per linear foot of the size indicated on the drawings and shall include all equipment, labor, and materials for installation, to include testing and disinfection, complete in place, at a minimum depth of 24 inches below the top of the meter box.

X. Copper Pipe for Water Services (by Jacking or Boring):

Measurement: Copper pipe by jacking or boring will be measured by the linear foot from the center of the water main to the center of the water meter box.

Payment: Copper pipe by jacking or boring will be paid for at the contract unit price per linear foot of the size indicated on the drawings and shall include all equipment, labor,

and materials for installation to include testing and disinfection, complete in place, at a minimum of 24 inches below the top of the meter box.

Y. Removal of Asbestos Cement Pipe:

Measurement: Removal of asbestos cement pipe will be measured based on the following definition: when the amount of pipe to be removed is less than 12 feet, the item will be measured on an each basis. When the amount removed exceeds 12 feet, the item will be measured on an each basis plus the bid price per linear foot for pipe removed in excess of 12 feet.

Payment: Removal of asbestos cement pipe will be paid for at the contract unit price per each up to 12 feet of removal then after 12 feet, an additional payment will be made on top of the each basis, per linear foot and shall include all labor, materials, and equipment to excavate, remove and properly disposal of pipe.

Z. Dechlorination: (Not a pay item, incidental to other items bid)

AA. 2-inch Tie-In:

Measurement: 2-inch tie ins will be paid for on an each basis.

Payment: 2-inch tie ins will be paid for at the contract unit price per each including the corporation stop, tapping saddle, curb stop and valve box. Price shall include all labor, materials and equipment to install, test, and disinfect each assembly.

BB. Water Line Cut and Cap:

Measurement: Water line cut and caps for water line abandonment will be paid for on an each basis per line size.

Payment: Water line cut and caps will be paid for at the contract unit price per each and shall include all labor, materials, and equipment to excavate, cut, cap, anchor, and backfill. Asphalt patches will be paid for separately.

1.4 STORM DRAINAGE

A. Storm Pipe (including Carrier Pipe):

Measurement: Storm pipe will be measured from the exact beginning of the pipe to the end of the pipe.

Payment: Storm pipe will be paid for at the contract unit price per linear foot for pipe of the type and size specified, complete in place (including stone bedding), at the 4-foot minimum depth to top of pipe. This price shall include trench excavation (excluding rock), warning tape, locating wire (as required per applicable specifications) shoring or use of trench box, installation, pumping, joint compound, gaskets, backfilling, compaction, and disposal of excess material.

B. Manholes - Standard:

Measurement: Standard manholes will be measured by the vertical foot of manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest 1/10-foot.

Payment: Standard manholes will be paid for at the contract unit price per vertical foot, complete in place, including excavation. Price shall include complete invert pouring and forming of concrete in accordance with the standards and drawings, bedding stone, bolting castings to cone, gaskets, backfill, and compaction. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

C. Manholes – Doghouse:

Measurement: Doghouse manholes will be measured the same as for a standard manhole in vertical feet of manhole constructed. Manholes shall be measured from the lowest point of the invert to the top of the concrete casting and recorded to the nearest 1/10-foot.

Payment: Doghouse manholes will be paid for at the contract unit price per vertical foot, complete in place, including excavation. Price shall include pouring of concrete footing and invert, invert forming in accordance with the standards and drawings, bedding stone, bolting castings to cone, gaskets, backfill, and compaction. Adjusting rings, frames, covers, and concrete riser rings shall be paid for separately.

D. Manhole Precast Concrete Riser Ring:

Measurement: Manhole precast concrete riser rings, as shown on **Standard Details 25.08 and 27.02**, will be measured from the top of the precast structure to the bottom of the frame, on a vertical foot basis.

Payment: Manhole precast concrete riser rings will be paid for at the contract unit price, complete in place, and shall include all labor, material, and equipment necessary to adjust the height of the manhole frame and cover by inserting a precast concrete riser ring on top of the manhole and sealing the joint with mastic and non-shrink grout.

E. Manhole Frames and Covers – Standard and Waterproof:

Measurement: Manhole frames and covers will be measured on an each basis.

Payment: Manhole frames and covers will be paid for at the contract unit price per each, complete in place, as shown on **Standard Detail 27.10**.

F. Precast Drop Inlets and Bases, VDOT standard:

Measurement: Precast Drop Inlets, VDOT standard, will be measured on an each basis and shall include the following base /manhole heights and inlet lengths based on the particular style of inlet as stated below:

DI-1,	Standard inlet top,	H=2'
DI-2A,	L=2.5',	H=2'
DI-2B,	L=4',	H=2'
DI-2C,	L=6',	H=2'
DI-3A,	L=2.5',	H=2'
DI-3B,	L=4',	H=2'
DI-3C,	L=6'	H=2'
DI-7,	Standard inlet top,	H=2'

Measurement of extra length for inlets will be in linear foot.

Extra height for the base/manhole will be measured as the height from the lowest invert to the bottom of the flat top assembly minus 2 feet. It shall be rounded to the nearest 1/10-foot and recorded in vertical feet.

Payment: Precast drop inlets, VDOT standard, will be paid for at the contract unit price per each plus a separate payment for extra inlet lengths and base/manhole heights greater than those defined in the above measurement description. Price shall include

all labor, material, and equipment necessary for installation of precast drop inlet and flat top assembly, including providing and installing disk label, pouring of concrete invert, invert forming, and mortaring of required components, complete in place.

G. Flared End Section, VDOT Standard:

Measurement: Flared end section, VDOT standard, will be measured on an each basis.

Payment: Flared end section, VDOT standard, will be paid for at the contract unit price per each of the size indicated on the drawings and shall include all equipment, labor, materials for installation, excavation, backfill, sealing and mortaring, complete in place.

H. Endwalls, VDOT Standard:

Measurement: Endwalls, VDOT standard, will be measured on an each basis.

Payment: Endwalls, VDOT standard, will be paid for at the contract unit price per each of the size and type indicated on the drawings and shall include all equipment, labor, materials for installation, excavation, backfill, sealing and mortaring, complete in place.

I. Manhole Abandonment:

Measurement: Manhole abandonment will be measured on an each basis.

Payment: Manhole abandonment will be paid for at the contract unit price per each, complete in place, in accordance with Section 02730, *Sanitary Sewer*.

1.5 EARTHWORK

A. Offsite Borrow:

Measurement: Off-site borrow will be measured in its original position by cross sectioning the area excavated for borrow. The number of cubic yards will be computed from cross section measurements by the average end method. When it is impractical to measure the borrow, and if approved by the City Engineer, vehicular measurements will be made in accordance with *VDOT Road and Bridge Specifications*, Section 109.01.

Payment: Off-site borrow will be paid at the contract unit price per cubic yard for material placed, compacted, and complete in place, including all excavation, loading, hauling, erosion control of borrow source, placement, spreading and compaction of borrow material.

B. Onsite Borrow: Material obtained from the site by cut and fill areas or other areas onsite that are designated to be used as borrow material is not a pay item for material but payment will be made by regular excavation.

C. Regular Excavation:

Measurement: Regular excavation will be measured in its original position by cross sectioning the excavation area. The number of cubic yards will be computed from cross section measurements by the average end method. When it is impractical to measure by cross-section method, other acceptable methods, involving three-dimensional measurements may be used if approved by the City Engineer.

In cut sections, excavation of topsoil and root mat and material down to a point of 1 foot below elevation of the top of earthwork or to the depth specified on the plans will be measured at regular excavation. When areas of unsuitable material are shown on the plans, excavation down to a point of 1 foot below the elevation of such material shown on the plans will be measured as regular excavation.

In fill sections, excavation of topsoil and root mat and material down to an elevation of 1 foot below the bottom of topsoil and root mat will be measured at regular excavation. When areas of unsuitable material are shown on the plans, excavation down to a point 1 foot below the elevations of such material shown on the plans will be measured at regular excavation.

Payment: Regular excavation will be paid at the contract unit price per cubic yard of excavation and shall include all labor, equipment, and material required, complete in place, including all excavation, loading, moving of cut and fill material, placement, spreading and compaction of material.

D. Rock Excavation:

Measurement: Rock excavation will be measured by the City Engineer or his representative in its original position, after which the rock shall be excavated to the depth specified by the City Engineer and then measured by the cubic yard. Rock excavation shall consist of the removal and satisfactory disposal of all materials, which are classified as rock in the opinion of the Engineer. No payment shall be made for rock removal by ripping. Refer to Section 02200- *Earthwork- paragraph Rock Excavation* for definition of materials classified as rock.

Payment: Rock excavation will be paid for at the contract unit price per cubic yard for rock excavation and shall include all labor, materials, and equipment to excavate and dispose of rock off site.

E. Undercut Excavation:

Measurement: The material shown on the plans as undercut excavation or determined by the City Engineer to be unsuitable and designated as undercut excavation and not included in regular excavation will be measured by cross sectioning the undercut area. The number of cubic yards will be computed by average end method. When it is impractical to measure by cross-section method because of erratic locations of isolated deposits, other acceptable methods, involving three-dimensional measurements may be used if approved by the City Engineer.

When unsuitable material must be removed from an area of the project where undercut is not shown on the plans, unsuitable material removed after reaching an elevation 1 foot below the top of the earthwork in cut sections and 1 foot below the bottom of topsoil and root mat in fill sections will be measured as undercut excavation. Unsuitable material removed after reaching an elevation 1 foot below the top of earthwork in cut sections, or 1 foot below the elevation of such material shown on the plans, or 1 foot below original ground in fill sections where topsoil and root mat are not required to be removed, will be measured as undercut excavation.

Payment: Undercut excavations will be paid for at the contract unit price per cubic yard for undercut excavation and shall include all labor, equipment, and material required, complete in place, including all excavation and disposal of material.

F. Pavement Cut and Removal:

Measurement: Pavement cut and removal shall consist of the removal and satisfactory disposal of all materials that may be designated for removal by the City Engineer or shown to be removed on plans. Pavement cut and removed shall be measured by the square yard in terms of material removed from its original positions. No payment for materials removed without authorization from the City Engineer or beyond the lines and grades set by the City Engineer.

Payment: Pavement cut and removal will be paid for at the contract unit price per square yard. The price shall include all labor, equipment, and materials necessary to remove and dispose of, off site, any required structures, complete in place, including sawing or cutting the existing pavement if required.

G. Concrete Cut and Removal:

Measurement: Concrete cut and removal shall consist of the removal and satisfactory disposal of all materials in concrete structures that may be designated for removal by the City Engineer or shown to be removed on plans. These structures shall include sidewalks, concrete pavement, and other minor structures; measured by the square yard in terms of material removed from its original positions. No payment for materials removed without authorization from the City Engineer or beyond the lines and grades set by the City Engineer.

Payment: Concrete cut and removal will be paid for at the contract unit price per square yard. The price shall include all labor, equipment, and materials necessary to remove and dispose of, off site, any required structures, complete in place, including sawing or cutting the existing concrete if required.

H. Other: Other items shall be paid for as stated in the Proposal.**1.6 BASE COURSE & PAVING****A. Foundation Stone:**

Measurement: Foundation stone for roadways will be measured by the cubic feet of foundation stone placed. Cubic feet of foundation stone material placed will be converted to tons using the weight of 145 pounds per cubic feet.

Payment: Foundation stone, if approved by the City Engineer, will be paid for at the contract unit price for foundation stone by the ton. Price shall include removal and disposal of unusable material and placement of stone, complete in place.

B. Aggregate Base Course:

Measurement: Aggregate base course will be measured in square yards of the thickness as shown on the plans (or in tons, only if approved by the City Engineer). When the ton unit is specified, the quantity shall be determined on scales equipped with a dial and an automatic printer, all of which have been approved and sealed in accordance with Section 109, *VDOT Road and Bridge Specifications*.

Payment: Aggregate base course will be paid at the contract unit price bid for square

yards of a specified depth as shown on the plans or unit price bid per ton for Type I, size 21A or 21B aggregate base. Price shall include all material, equipment and labor required to furnish and install the stone, complete in place.

C. Portland Cement Treated Aggregate:

Measurement: Portland cement treated aggregate will be measured in square yards of material with thickness as shown on the plans or as directed by the City Engineer.

Payment: Portland cement treated aggregate will be paid at the contract unit price bid for square yards with thickness as shown on the plans or as directed by the City Engineer. This price shall include all material, equipment and labor required to furnish and install the Portland cement treated aggregate, complete in place.

D. Asphalt Concrete Pavement:

Measurement: Asphalt concrete pavement shall be measured in tons of the type specified as evidenced by plant delivery tickets. For all overlays, field measurements and calculations will be made also for use as a comparison between estimated and actual tonnage used. If quantity differences are found, without justification, measurement will be based on field measurement basis. Measurement for new roadways will be based on plan quantities and field measurement, not tonnage tickets.

Payment: Asphalt concrete pavement will be paid for at the contract unit price bid per ton for the type of Asphalt concrete specified. This price shall be full compensation for asphalt concrete pavement, complete in place, including all materials, labor, tools, equipment, tack coat, maintenance of traffic and all other incidentals necessary. Adjusting manholes, lampstacks, cleanouts, valve boxes, etc. will be paid separately at the bid price for each when adjusted by the Contractor.

Price Adjustment for Asphalt Material: Bid items which contain asphalt material will be subject to price adjustment by the City as set for herein.

The base price index for liquid asphalt materials will be determined by Virginia Department of Highways & Transportation from a survey of at least six (6) terminals locate in Virginia or adjacent States using the average f.o.b. selling price of the material on the date of receipt of bids. The current price index for liquid asphalt material will be determined from a survey of the same six terminals using the average f.o.b. selling price of the material on the first of each month. In the event the Department is unable to secure price quotes for liquid asphalt material from at least six terminals as a result of causes beyond the Department's control, data from the remaining terminals surveyed will be used in determining the indexes.

The indexes will be final and incontestable. The list of terminals surveyed and the base price index are available from the Department upon request.

The amount of adjustment applied to the unit price bid will be based upon the difference between the Base Price Index and the Current Price Index. The Contractor is hereby advised that adjustments as a result of differences in Current and Base Price Indexes will not be made in unit bid prices, for items designated as price adjustment items, when such difference is less than 10%. In the event the Current Price Index is greater than the Base Price Index, the price for designated liquid asphalt material and for designated bid items which contain asphalt material, placed during that estimate period, will be

increased by an equal dollar amount per ton or gallon, as applicable, of liquid asphalt material incorporated in the work. In order to receive payment for an increase in price adjustment, the Contractor shall, on the first of the month prior to the estimate date, submit written certification to the Engineer that he has had an increase in the purchase price in liquid asphalt or asphalt cement for each type used. In the event the Current Price Index is less than the Base Price Index, the price for designated liquid asphalt material and for designated bid items which contain asphalt material, placed during that estimate period, will be decreased by an equal amount per ton or gallon, as applicable, of liquid asphalt material incorporated in the work. Such decrease will not be effected when the Contractor certifies in writing on the first of the month prior to the estimate date that a decrease has not occurred in the purchase price of each type of liquid asphalt or asphalt cement used. The quantity of liquid asphalt concrete mixtures for which adjustment is applicable will be determined from the percent shown on the approved job mix formula in use during the estimate period.

No adjustments will be made for liquid asphalt material used as a prime or tack coat when such material is not shown as a separate pay item in the contract. The quantity of designated liquid asphalt materials(s) for which adjustment is applicable will be determined from the gallons incorporated in the work during the estimate period.

For the purpose of price adjustment under this provision, certain surveyed asphalt materials will be considered as representatives of those items designated for adjustment. The index representation is as follows:

Asphalt Cements are based upon the index for AC-20.

Anionic Emulsions are based upon the index for RS-2.

Cationic Emulsions are based upon the index for the individual average of each type of the cationic emulsions.

Cutbacks are based upon the index for RC-250.

The current price index on the first of the month will be applicable for adjustments of estimates during the month.

When a schedule is completed prior to the conclusion of an estimate period, the most recent index prior to the date of completion will be used for price adjustment.

An apparent attempt to unbalance bids in favor of items subject to price adjustment may result in rejection of the bid proposal.

E. Tack Coat: (Not a pay item, incidental to other items bid)

F. Prime Coat:

Measurement: Liquid asphalt material will be measured by the square yard and cover aggregate by the square yard.

Payment: Liquid asphalt material will be paid for at the contract unit price bid per square yard. Cover stone will be paid for at the contract unit price bid per square yard. This price shall include all labor, equipment, and materials to furnish, install, and maintenance of the treatment until surface course is applied, complete in place.

G. Seal Coat:

Measurement: Liquid asphalt material will be measured by the square yard and cover

aggregate by the square yard.

Payment: Liquid asphalt material will be paid for at the contract unit price bid per square yard. Cover stone will be paid for at the contract unit price bid per square yard. This price shall include all labor, equipment, and materials to furnish and install, complete in place.

- H. **Pavement Repair or Street Rehab:** This item shall cover pavement repair in areas where it becomes necessary to remove and replace the existing pavement in failed areas or areas where patching is required as part of roadway work or in locations as otherwise requested by the City Engineer. Refer to **Standard Details 25.18, 25.18A, 25.19, 25.20, 25.21, 25.22** for required depths and pavement types.

Measurement: Work and materials for pavement repair will be measured in the following manner.

- 1). **Asphalt pavement and concrete pavement cut and removal for street repair** will be measured in square yards of pavement, temporary maintenance stone, or other material removed.
- 2). **Aggregate base stone for pavement repair** will be measured in square yards.
- 3). **Aggregate base stone for surface treated pavement repair** will be measured in square yards.
- 4). **Asphalt base for pavement repair** will be measured in square yards.
- 5). **Asphalt surface for pavement repair** will be measured in square yards.
- 6). **Surface treatment for surface treated pavement repair** will be measured in square yards.
- 7). **Temporary pavement repair** will be measured in terms of square yards.

Payment: Work and materials for pavement repair will be paid for in the following manner.

- 1). **Asphalt and concrete cut and removal for pavement repair** will be paid for at the contract unit bid price per square yard. This price shall include all labor, equipment, and material to sawcut, excavate, remove and dispose of material, and all work and grading to prepare the surface for paving, complete in place.
- 2). **Aggregate base stone for pavement repair** will be paid for at the contract unit price bid per square yard (at a specified depth as shown on applicable details or as directed by the City Engineer) for Type I aggregate base. This price shall include all labor, equipment, and material necessary to furnish and install the stone, complete in place.
- 3). **Aggregate base stone for surface treated pavement repair** will be paid for at the contract unit price bid per square yard (at a specified depth as shown on applicable details or as directed by the City Engineer) for Type I aggregate base. This price shall include all labor, equipment, and material necessary to furnish and install the stone, complete in place.

- 4). **Asphalt base for pavement repair** will be paid for at the contract unit price bid per square yard (at a specified depth as shown on applicable details or as directed by the City Engineer) for the type of base mix as shown on the plans or as directed by the City Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, complete in place.
- 5). **Asphalt surface for pavement repair** will be paid for at the contract unit price bid per square yard at a specified depth as shown on applicable details or as directed by the City Engineer. This price shall include all labor, materials, and equipment, including tack, necessary to furnish and install the asphalt, complete in place.
- 6). **Surface treatment for surface treated pavement repair** will be paid for at the contract unit price bid per square yard for surface treatment for pavement repair. This price shall be full compensation for one prime coat and two seal coats, complete in place.
- 7). **Temporary pavement repair** will be paid for at the contract unit price bid per square yard for temporary pavement repair at a specified depth as shown on applicable details or as directed by the City Engineer.

I. **Pavement Profiling:**

Measurement: Pavement profiling will be measured in square yards for each 1 inch depth of material profiled and removed.

Payment: Pavement profiling will be paid for at the contract unit price bid per square yards per 1 inch depth and shall include all labor, materials, and equipment necessary to remove and dispose of the material, complete in place.

J. **Trench Patching for New Pipe Installation - Permanent and Temporary:**

Measurement: Trench patching will be measured in square yards per patch type. Refer to **Standard Details 25.18, 25.19, 25.20, 25.21 and 25.22** for calculation of widths, measurement will be made based on minimum dimensions shown.

Payment: Trench patching will be paid for at the contract unit price bid in square yards per patch type as shown in **Standard Details 25.18, 25.19, 25.20, 25.21 and 25.22**. and shall include all labor, materials, and equipment necessary to install the patch, complete in place. Pavement cut and removed for this item will be paid for separately, see trenching section of these specifications.

K. **Emulsified Asphalt Slurry Seal Surfaces:**

Measurement: Emulsified asphalt slurry seal will be measured in square yards based on surface measurements.

Payment: Emulsified asphalt slurry seal will be paid for at the contract unit price bid in square yards for the type of seal specified and shall include all labor, equipment, and materials necessary, complete in place.

L. Adjusting Manholes, Lampstacks, and Valves for Resurfacing:

Measurement: Manhole, lampstack, and valve box adjusting will be measured on an each basis for the type of structure adjusted.

Payment: Manhole, lampstack, and valve box adjusting by the method of removing and adjusting the frame and cover as shown on **Standard Detail 25.08** will be paid for at the contract unit price per each for adjusting manholes, lampstacks, and valves, and shall include all labor, equipment, and materials necessary for a complete in place installation.

M. Manhole, Valve Box, and Lampstack Adjusting Rings for Resurfacing:

Measurement: Manhole, valve box, and lampstack adjusting rings, will be measured on an each basis for the type of ring installed.

Payment: Manhole, valve box, and lampstack adjusting rings, as shown on **Standard Detail 25.09**, will be paid on an each basis for the type of ring installed at the contract unit price and shall include all labor, material, and equipment necessary to place inserting ring in existing frame, complete in place, including countersinking holes and installation of epoxy.

N. Manhole, Valve Box, and Lampstack Replacement for Resurfacing:

Measurement: Manhole, valve box, and lampstack replacement will be measured on an each basis for the type of frame installed.

Payment: Manhole, valve box, and lampstack replacement for resurfacing will be paid on an each basis for the type of frame installed at the contract unit price and shall include all labor, material, and equipment necessary to remove and install a new frame, complete in place. Refer to **Standard Details 27.02, 27.13, and 26.16** for installation.

O. Type 1, Aggregate Stone for Shoulder Restoration after Paving:

Measurement: Shoulder stone for restoration after paving will be measured by the cubic feet as shown on the plans or as directed by the City Engineer. Cubic feet of stone material placed will be converted to tons using the weight of 145 pounds per cubic feet.

Payment: Shoulder stone for restoration after paving will be paid for at the contract unit price by the ton. Price shall include all labor, equipment, and materials necessary for furnishing and placing of stone, complete in place.

P. Maintenance Stone for Pipe Installation:

Measurement: Maintenance stone for pipe installation will be measured by the square yard (6 inches thick) of material placed per the direction of the City Engineer's representative.

Payment: Maintenance stone for pipe installation will be paid for at the contract unit price per square yard (6 inches thick) for aggregate backfill on a one time basis and shall include all materials, equipment, and labor required to furnish, compact, and maintain complete in place, VDOT No. 21A stone in the locations designated by the City Engineer. Price also includes removal of maintenance stone to allow for installation of

the patch.

Q. Asphalt Concrete Curb: (Asphalt Berm)

Measurement: Asphalt concrete curb will be measured in by the linear foot.

Payment: Asphalt concrete curb will be paid for at the contract unit price bid in linear foot for the VDOT type MC-3C and shall include all labor, equipment, and materials necessary for a complete in place installation.

R. Asphalt Concrete Paved Flumes, Walks, etc.:

Measurement: Asphalt concrete paved flumes, walks, etc. will be measured in square yards for a depth of 4 inches.

Payment: Asphalt concrete paved flumes, walks, etc. will be paid for at the contract unit price bid in square yards for a depth of 4 inches and shall be installed in accordance with applicable VDOT details and specifications, including all labor, equipment, and materials necessary for a complete in place installation.

S. Pavement Reinforcing Fabric:

Measurement: Pavement Reinforcing Fabric will be measured in square yards.

Payment: Pavement Reinforcing Fabric will be paid for at the contract unit price bid in square yards and shall include all labor, equipment and materials necessary for a complete in place installation.

T. Repair of Existing Paved Asphalt Concrete Driveways:

Measurement: Repair of existing paved asphalt concrete driveways will be measured in square yards of paving for reinstatement of existing driveways.

Payment: Repair of existing paved asphalt concrete driveways will be paid for at the contract unit price bid in square yards, including saw cutting, applying tack coat, and paving with 2 inches of asphalt surface mix.

1.7 CURB & GUTTER, DRIVEWAYS, SIDEWALKS, AND MISCELLANEOUS CONCRETE ITEMS

A. New Concrete Sidewalk, 4 inches thick:

Measurement: New sidewalk, 4 inches thick will be measured in square yards of finished concrete.

Payment: New sidewalk, 4 inches thick will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation, as shown on **Standard Detail 25.05** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

B. Replacement of Concrete Sidewalk, 4 inches thick:

Measurement: Replacement of sidewalk, 4 inches thick will be measured in square yards of finished concrete.

Payment: Replacement of sidewalk, 4 inches thick will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing sidewalk, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 25.05** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

C. New Concrete Driveways, Entrances, and Sidewalks, 7 inches thick:

Measurement: New concrete driveways, entrances, and sidewalks, 7 inches thick will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

- 1) In length from face to face of the curb at the back edge of the driveway.
- 2) In width from the back edge of the driveway to the back edge of the curb extended.

Payment: New concrete driveways, entrances, and sidewalks, 7 inches thick will be paid for at the contract unit price bid per square yard at a depth of 7 inches. This price shall include all labor, equipment, and material for excavation, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation, as shown on **Standard Details 25.10, 25.11, 25.12** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

D. Replacement of Concrete Driveways, Entrances, and Sidewalks, 7 inches thick:

Measurement: Replacement of concrete driveways, entrances, and sidewalks, 7 inches thick will be measured in square yards of finished concrete.

Driveways formed in conjunction with standard curb, and curb and gutter, shall be measured in square yards as follows:

- 1) In length from face to face of the curb at the back edge of the driveway.
- 2) In width from the back edge of the driveway to the back edge of the curb extended.

Payment: Replacement of concrete driveways, entrances, and sidewalk, 7 inches thick will be paid for at the contract unit price bid per square yard at depth of 7 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Details 25.10, 25.11, 25.12** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

E. New Concrete Curb and Gutter, City Standard, Combined 6 inches:

Measurement: New concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: New concrete curb and gutter, City standard will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

F. Replacement of Concrete Curb and Gutter, City Standard, Combined 6 inches:

Measurement: Replacement of concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

G. New Concrete Curb and Gutter, City Standard, Combined 4 inches:

Measurement: New concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: New concrete curb and gutter, City standard will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

H. Replacement of Concrete Curb and Gutter, City Standard, Combined 4 inches:

Measurement: Replacement of concrete curb and gutter, City standard will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

I. New Concrete Curb and Gutter, VDOT Standard – CG -6:

Measurement: New concrete curb and gutter, VDOT standard, CG-6 will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: New concrete curb and gutter, VDOT standard, CG-6 will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

J. Replacement of Concrete Curb and Gutter, VDOT Standard - CG-6:

Measurement: Replacement of concrete curb and gutter, VDOT Standard - CG-6 will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

K. New Concrete Curb and Gutter, VDOT Standard – CG -7:

Measurement: New concrete curb and gutter, VDOT standard, CG-7 will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: New concrete curb and gutter, VDOT standard, CG-7 will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

L. Replacement of Concrete Curb and Gutter, VDOT Standard - CG-7:

Measurement: Replacement of concrete curb and gutter, VDOT Standard - CG-7 will be measured per linear foot along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of concrete curb and gutter will be paid for at the contract unit price bid per linear foot. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

M. New Concrete Curb, VDOT Standard - CG-2:

Measurement: VDOT standard concrete curb, CG-2 will be measured in linear feet along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: VDOT standard concrete curb, CG-2 will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **VDOT Road and Bridge Standards, Detail CG-2** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

N. Replacement of Concrete Curb, VDOT Standard - CG-2:

Measurement: Replacement of VDOT standard concrete curb, CG-2 will be measured in linear feet along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of VDOT standard concrete curb, CG-2 will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **VDOT Road and Bridge Standards, Detail CG-2** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

O. New Concrete Curb and Gutter, City Standard, Combined Rolltop:

Measurement: New concrete curb and gutter, City standard, Combined Rolltop, will be measured per linear foot along the face of the curb for the entire length of the work.

Payment: New concrete curb and gutter, City standard, Combined Rolltop, will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

P. New City Standard Straight Curb with Footer:

Measurement: City standard straight curb with footer will be measured in linear feet along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: City standard straight curb with footer will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

Q. Replacement of Standard City Straight Curb with Footer:

Measurement: Replacement of City standard straight curb with footer will be measured in linear feet along the face of the curb for the entire length of the work including portion of curb shaped for handicap ramps and through driveways.

Payment: Replacement of City standard straight curb with footer will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.04** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

R. Facedown Concrete Curb/Sidewalk:

Measurement: Facedown concrete curb will be measured in linear feet along the face of the curb including handicap ramps but excluding driveway openings. Facedown curb is not a pay item through a driveway opening. The sidewalk portion of this line item will be measured in square yards for 4 inches thick sidewalk.

Payment: Facedown concrete curb will be paid in linear foot the contract unit price for 6"X12" face down curb. The sidewalk portion of this item will be paid for as 4 inches thick sidewalk. Both line item prices shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **Standard Detail 25.06** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

S. Concrete Handicap Ramp:

Measurement: Concrete handicap ramps will be measured in square yards of finished concrete with a thickness of 4 inches.

Payment: Concrete handicap ramps will be paid for at the contract unit price bid per square yard at a depth of 4 inches. This price shall include all labor, equipment, and material for excavation, removal and disposal of existing concrete, backfilling, stone bedding, expansion material, formwork, finishing, curing, etc. for a complete in place installation as shown on **Standard Details 25.10, 25.13, 25.15, 25.16, and 25.17** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer. Price does not include detectable warning panels. Panels will be paid for as a separate pay item.

T. Formed Concrete for Retaining Walls, Headwalls, Piers, Steps, and other misc. Concrete Structures:

Measurement: Formed concrete for retaining walls, headwalls, piers, curtain (toe) walls, steps, and other misc. concrete structures will be measured by the cubic yard and class as specified on the drawings or applicable details.

Payment: Formed concrete for retaining walls, headwalls, piers, curtain (toe) walls, steps, and other misc. concrete structures will be paid for at the contract unit price bid per cubic yard for concrete, complete in place. Weep holes, water stops, etc. will be included in the price of concrete for retaining walls. All backfilling will be included in bid

price for concrete. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

The only additional pay items for retaining walls will be:

1. Excavation -will be measured and paid for in cubic yards at the unit price bid for regular excavation.
2. Porous backfill material – will be measured and paid for in tons as coarse granular aggregate backfill.
3. Rebar – will be measured and paid for in pounds as Reinforcing steel bars.

No payment will be made for excavation or any other structures. The only additional pay item for other structures will be reinforcing steel bars.

U. Reinforcing Steel Bars:

Measurement: Reinforcing steel will be measured in pounds of reinforcing by the quantities as shown on the drawings or applicable details.

Payment: Reinforcing steel bars will be paid for at the contract unit price bid per pound and shall include all labor, equipment, and materials to install the bars, complete in place. Payment will be made only for the quantities and dimensions as shown on the drawings or applicable details.

V. Reinforcing Steel Wire Mesh:

Measurement: Reinforcing steel wire mesh will be measured in square yards of 6x6, 10 GA material placed.

Payment: Reinforcing steel wire mesh will be paid for at the contract unit price per square yards of 6x6, 10 GA. and shall include all labor, equipment, and materials to install the wire mesh as shown on the drawings or applicable details, complete in place.

W. Concrete Paved Ditches, VDOT PG-2A, PG-4, PG-5:

Measurement: Concrete paved ditches, VDOT PG-2A, PG-4, PG-5 will be measured per square yard of paved ditch based on measurements as defined on applicable details.

Payment: Concrete paved ditches, VDOT PG-2A, PG-4, PG-5 will be paid for at the contract unit price per square yard and shall include all labor, equipment, and material for excavation, formwork, stone bedding, backfilling, expansion material, finishing, curing, etc. for a complete in place installation as shown on the **VDOT Details, PG-2A, PG-4, PG-5** and installed at the locations as shown on the construction drawings and/or as directed by the City Engineer.

X. VDOT Handrail, HR-1:

Measurement: VDOT handrail, HR-1 will be measured in linear foot.

Payment: VDOT handrail, HR-1 will be paid for at the contract unit price per linear foot and shall include all labor, equipment, and materials to install the handrail as shown on the **VDOT Detail HR-1**, complete in place.

Y. Tree Well in Sidewalk:

Measurement: Tree wells will be measured on an each basis.

Payment: Tree wells will be paid for at the contract unit price per each and shall include all labor, equipment, and materials to install the tree well as shown on the **Standard Detail 25.07**, complete in place.

Z. Concrete Parking Blocks:

Measurement: Concrete parking blocks will be measured on an each basis.

Payment: Concrete parking blocks will be paid for at the contract unit price per each and shall include all labor, equipment, and materials to install the parking block, complete in place.

AA. Detectable Warning Panel with Truncated Dome (new construction):

Measurement: Detectable warning panels will be measured on an each basis.

Payment: Detectable warning panels will be paid for at the contract unit price and shall include all labor, equipment, and materials to install the panel, complete in place.

BB. Detectable Warning Panel with Truncated Dome (retrofit –existing sidewalk):

Measurement: Detectable warning panels will be measured on an each basis.

Payment: Detectable warning panels will be paid for at the contract unit price and shall include all labor, equipment, and materials to install the panel, complete in place.

1.8 ITEMS MISCELLANOUS TO ALL SECTIONS

A. Clearing and Grubbing, Lightly Wooded Areas:

Measurement: Clearing and grubbing, lightly wooded areas will be measured by the acre. Width shall not exceed width as defined in the disturbing and construction limits criteria of sewer, water, and storm construction. Lightly wooded areas shall be defined as areas where the prevalent vegetation consists of trees less than 12 inches in diameter.

Payment: Clearing and grubbing, lightly wooded areas will be paid for at the contract unit price per acre and shall include all material, equipment, and labor required to clear and grub lightly wooded areas in accordance with these specifications. The price shall also include the removal and disposal of items that cannot be mulched or built into brush piles.

B. Clearing and Grubbing, Heavily Wooded Areas:

Measurement: Clearing and grubbing, heavily wooded areas will be measured by the acre. Width shall not exceed width as defined in the disturbing and construction limits criteria of sewer, water, and storm construction. Heavily wooded areas shall be defined as areas where the prevalent vegetation consists of trees 12 inches or greater in diameter.

Payment: Clearing and grubbing, heavily wooded areas will be paid for at the contract unit price per acre and shall include all material, equipment, and labor required to clear and grub heavily wooded areas in accordance with these specifications. The price shall also include the removal and disposal of items that cannot be mulched or built into brush piles.

C. Temporary Access/ Haul Roads/ Staging Areas:

Measurement: Any grading or excavation required for equipment travel and/or staging areas during the course of construction as well as erosion control, removal, restoration, seeding and ground cover, shall be included in other items bid.

Payment: Included in other items bid. Not a pay item.

D. Flowable Fill Concrete:

Measurement: Flowable fill will be measured by the cubic yard of concrete placed.

Payment: Flowable fill will be paid for at the contract unit price, complete in place, and shall include all materials, labor and equipment to place the concrete in locations as directed by the City Engineer or designated on the plans. This price shall also include any excavation and blocking or forming required.

E. Miscellaneous Unformed Concrete:

Measurement: Miscellaneous Unformed Concrete will be measured by the cubic yard and class as specified on the drawings.

Payment: Miscellaneous Unformed Concrete will be paid for at the contract unit price per cubic yard for unformed concrete for reaction anchor blocks, thrust blocks, collars, footings, and so forth complete and in place, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings and/or as directed by the City Engineer. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

F. Miscellaneous Formed Concrete:

Measurement: Miscellaneous Formed Concrete will be measured by the cubic yard and class as specified on the drawings.

Payment: Miscellaneous Formed Concrete will be paid for at the contract unit price per cubic yard for formed concrete placed that is designated to be paid for as "formed concrete", complete and in place, including all material, equipment, and labor, to place the concrete in the locations shown on the construction drawings and/or as directed by the City Engineer. Payment will be made only for the quantities and dimensions as shown on drawings or applicable details.

G. Seeding and Fine Grading: (Permanent)

Measurement: Seeding and fine grading will be measured in square yards of area seeded. Seeding and fine grading shall be provided as described section in *General Requirements*, Section 01000. Extra compensation will not be made for additional seeding beyond all limits of construction as defined in applicable section.

Payment: Seeding and fine grading will be paid for at the contract unit price per square yard for seeding and fine grading as described in *General Requirements*, Section 01000. No compensation will be made for reseeding, if required.

H. VDOT EC-2:

Measurement: VDOT EC-2 will be measured by the square yard.

Payment: VDOT EC-2 will be paid for at the contract unit price per square yard and shall include all material, labor, and equipment necessary for a complete in place installation.

I. Dry Riprap:

Measurement: Dry Riprap will be measured by the ton.

Payment: Dry Riprap will be paid for at the contract unit price per ton of the size as indicated on the drawings and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation.

J. Grouted Riprap:

Measurement: Grouted Riprap will be measured by the ton.

Payment: Grouted Riprap will be paid for at the contract unit price per ton of the size as indicated on the drawings, with the top 6 inches grouted and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation.

K. Construction Entrance for Erosion Control, (VDOT #1 stone):

Measurement: Construction entrance for erosion control will be measured by the ton of VDOT #1 stone. Calculation shall be based on the length X width X depth of the entrance, as specified in the Erosion & Sediment Control Handbook, and converted to tons.

Payment: Construction entrance for erosion control will be paid for at the contract unit price per ton and shall include all materials (including geotextile fabric), labor, and equipment necessary for a complete in place installation. Payment will be made on a one time basis. No additional payment will be made for maintaining stone.

L. Silt Fence Barrier:

Measurement: Silt fence barrier for erosion control will be measured by the linear foot.

Payment: Silt fence barrier for erosion control will be paid for at the contract unit price

per linear foot and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of silt fence upon stabilization of ground cover.

M. Straw Bale Barrier:

Measurement: Straw bale barrier for erosion control will be measured by the linear foot.

Payment: Straw bale barrier for erosion control will be paid for at the contract unit price per linear foot and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of straw bales upon stabilization of ground cover.

N. Drop Inlet Silt Trap:

Measurement: Drop inlet silt trap for erosion control will be measured on an each basis.

Payment: Drop inlet silt trap for erosion control will be paid for at the contract unit price per each and shall include all material, labor, and equipment necessary for a complete in place installation. The price shall also include the removal and disposal of the trap upon stabilization of ground cover.

O. Traffic Control:

Measurement: Type III Barricades, Lighted Barrels, and Type II Barricades will be measured on an each basis per day. Pilot Trucks will be measured on an hourly basis.

Payment: Type III Barricades, Lighted Barrels, Type II Barricades and Pilot Trucks will be paid for at the contract unit price as determined by the approved traffic control plan and shall include all material, labor, and equipment necessary for a complete installation. The price shall also include removal of these items. All other traffic control items, devices and measures including flagmen are not a pay item and shall be considered incidental to other bid items.

P. Select Tree Removal in maintained residential/commercial yards and City ROW (6" to 15" in diameter):

Measurement: Trees indicated for removal will be measured four (4) feet above the ground including stump and root structure as directed by the City Engineer or his representative. Trees measuring 6 inches to 15 inches will be paid for as indicated below. Trees measuring less than 6 inches will be considered incidental to other bid items. This pay item is intended for select tree removal in well maintained areas only where the contractor is required to exercise caution during removal, including removal near overhead utilities and/or adjacent to an existing structure or dwelling.

Payment: Tree removal will be paid for at the contract unit price per each and shall include all material, equipment, and labor to remove and dispose of trees. No additional compensation will be made for removal and disposal of trees smaller than 6 inches in diameter.

Q. Select Tree Removal in maintained residential/commercial yards and City ROW (over 15" in diameter):

Measurement: Trees indicated for removal will be measured four (4) feet above the ground including stump and root structure as directed by the City Engineer or his representative. Trees measuring greater than 15 inches will be paid for as indicated below. This pay item is intended for select tree removal in well maintained areas only where the contractor is required to exercise caution during removal, including removal near overhead utilities and/or adjacent to an existing structure or dwelling.

Payment: Tree removal will be paid for at the contract unit price per each and shall include all material, equipment, and labor to remove and dispose of trees. No additional compensation will be made for removal and disposal of trees.

R. Horizontal Control Monument:

Measurement: Horizontal Control Monuments will be measured on an each basis.

Payment: Horizontal Control Monuments will be paid for at the contract unit price per each and shall include all material, equipment, and labor necessary for a complete in place installation as shown on the **Standard Detail 25.23**

S. Temporary Seeding (Fall and Winter):

Measurement: Seeding will be measured in square yards of area seeded and shall be provided as described section in *General Requirements*, Section 01000. Extra compensation will not be made for additional seeding beyond all limits of construction as defined in applicable section.

Payment: Seeding and grading will be paid at the contract unit price per square yard for temporary seeding as described in *General Requirements*, Section 01000. No compensation will be made for reseeding, if required.

1.9 GUARDRAIL

Measurement and Payment for Guardrail and appurtenances shall be in accordance with Section 505.04 of VDOT, *Road and Bridge Specifications*, 2002 or latest revision.

END OF SECTION 01200

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