Tryon Drive Drainage Improvements

APPENDIX B

Project Special Provisions

FAYETTEVILLE NC
AMERICA'S CAN DO CITY

31 41 40 Vibration Monitoring and Foundation Protection

33 42 13 Precast Reinforced Concrete Box Culvert

Utility Project Special Provisions

SECTION 31 41 40
VIBRATION MONITORING AND FOUNDATION PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Provide labor, equipment, and material to perform required vibration monitoring and foundation protection as specified herein and indicated on the Drawings. Work shall include, but not be limited to, the following:
   1. Pre-construction structural inspection of each building requiring foundation protection to evaluate the existing structural condition of each building.
   2. Furnish and install foundation protection measures in compliance with design.
   3. Design of vibration monitoring plan and provide vibration monitoring for the buildings designated on the Drawings.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 00425 Excavation/Backfilling
   2. Section 00435 Trenching
   3. Section 00475 Storm Sewer
   4. Section 00490 Precast Drainage Structures

1.03 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Document Management:
   1. Pre-construction Structural Inspection Report (SIR), as described herein.
   2. Geotechnical Engineer recommendations for additional buildings which should be considered for foundation protection based on proposed construction. Alternatively, Geotechnical Engineer statement shall indicate if no additional buildings need foundation protection.
   3. If Contractor proposes alternate means to protect foundations, Contractor shall submit a proposed Foundation Protection Plan (FPP) drawings and/or details showing proposed foundation protection measures, sealed by a North Carolina registered professional engineer (experienced in foundation protection measures). Approval of alternate means to protect foundations is not guaranteed and is at the sole discretion of the Engineer and Owner. Foundation protection measures shall prevent construction related damage to buildings which are in the vicinity of the Work.
   4. Vibration Monitoring Plan (VMP), sealed by a North Carolina registered professional engineer (Geotechnical) showing equipment type, locations, and allowable vibration level. Allowable vibration level shall be determined in the VMP but shall not exceed the level specified herein.
      a. Equipment, locations, and allowable vibration levels shall be selected by the Contractor to prevent damage to buildings in the vicinity of the Work.
   5. Monthly vibration monitoring reports.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PRECONSTRUCTION STRUCTURAL INSPECTION REPORT

A. Prior to beginning construction, the Contractor shall hire a third party testing firm to perform a pre-construction condition assessment to document the conditions of buildings and other sensitive structures adjacent to the construction area. The assessment shall be performed on all adjacent properties designated for foundation protection on the Drawings and any other properties as directed by the Engineer or Owner. The assessment shall include video and photographic documentation of all exteriors including building foundations, and installation of crack monitors on cracks that might occur or expand due to construction vibrations. Provide all documentation described above to the Owner and Engineer prior to beginning the operation.

B. The purpose of the pre-construction condition assessment is to evaluate the existing structural condition of each building. The assessment shall be attended by the Contractor, the Owner, and the property owner/resident if available. Contractor shall notify the property owner two weeks prior to the inspection and request that the property owner or his/her representative be present for the assessment.

C. The Contractor's third party testing firm shall document the findings of the inspection in a report (the Structural Inspection Report or SIR), which shall include the condition of each building inspected and video and photographs taken at the time of inspection.

D. The Contractor shall sign the report and shall obtain signature of the third party testing firm, the Owner, and the property owner to signify that all are in agreement with the findings and conclusions of the existing condition of the building at the time of the assessment.

3.02 CRACK MONITORING DURING CONSTRUCTION

A. During construction, the third party testing firm shall perform (or more frequently if recommended by the third party testing firm or Contractor) readings twice weekly (minimum) of the crack monitors installed prior to construction. Provide readings to the Owner within 48 hours of taking the reading. If crack monitoring readings confirm that crack width is not increasing, Contractor may request reduced frequency of readings, but in no case shall crack monitors be read less than once per week. More frequent readings may be required by Owner or Engineer if construction activities could result in greater earth borne vibrations. Testing firm shall notify the Owner immediately if monitoring indicates that construction contributed to crack widening. The testing firm shall prepare a detailed plan for repairing the structure and the Contractor shall repair the structure at no cost to the Owner. Contractor shall submit a plan for review that proposes alternate construction methods to address the vibration problems and minimize further damage.

3.03 VIBRATION MONITORING DURING CONSTRUCTION

A. All vibration monitoring equipment shall be in place and operational prior to beginning any excavation activity or foundation protection installation.

B. Prior to installation of monitoring equipment the Contractor shall notify adjacent property owners of the proposed excavation activities and purpose of vibration

monitoring equipment installation. The Contractor shall install the vibration monitor(s) along the side of the building closest to the excavation operations at the locations specified in the VMP. In each case, the distance from the excavation trench to the building being monitored should be determined and placed on the permanent print-out of the vibrations which are recorded.

C. The third party testing firm shall monitor vibrations at each location designated for foundation protection on the Drawings. Exact locations of monitoring equipment shall be recommended by the testing firm. The VMP shall include the proposed monitoring locations for Engineer / Owner approval. Adjustments may be made to the locations upon approval. The sensitivity range of the seismograph shall be selected such that the recording is initiated below the maximum allowable particle velocity of 1 in/sec and extends above the highest expected intensity. Specific activities of the vibration source (i.e., excavation) shall be indexed in time to allow correlation with the arrivals on the vibration.

D. The maximum allowable particle velocity is 1 in/sec. The Contractor shall notify the Engineer and Owner immediately if monitors indicate that the vibrations are above the criteria established. Operations causing the vibrations shall be suspended until a revised construction plan has been developed by the testing firm to eliminate the particle velocity exceedance. The exceedance shall be resolved by the Contractor at no additional cost to the Owner.

E. The vibration monitors shall consist of digital seismographs that display the particle velocities and associated frequencies plotted against the criteria established for this project. Each seismograph shall contain geophones with response capability in three mutually perpendicular axes or components; one vertical and two horizontal (radial and transverse). The frequency response of the geophones shall be linear from at least 4 Hz to more than 200 Hz. The sensitivity shall range from less than 0.02 in/sec to more than 5.0 in/sec. Monitors by Instantel is one type of seismograph that is suitable for this project.

F. For manual equipment a trained technician shall review and verify that the threshold values are not exceeded, at least twice daily during vibration monitoring operations. Additionally the equipment shall be set to sound an alarm to notify on site construction personal when the threshold value has been exceeded.

G. Vibration monitors shall be field calibrated by the testing firm before each recording period. The transducer shall be positioned with the longitudinal axis toward the vibration source. Transducers must be adequately coupled with the ground. Operation and calibration of all equipment shall be per manufacturer's recommendations. Vibration records shall be collected in waveform plot or strip chart plot. The peak vector sum of the particle velocity in longitudinal, transverse, and vertical planes shall be shown along with the respective dominant or principle frequencies. The highest recorded particle velocity (i.e., the vector sum of the three orthogonal directions), when indexed to a particle vibration event, shall be reported as the peak particle velocity. The recorded peak particle velocity shall be compared to criteria appropriate for the subject of concern.

H. If at any time during the operation the vibration levels exceed tolerable levels (in inches/second per the approved VMP) the Contractor shall stop work immediately and coordinate with the Engineer and the certified Geotechnical Engineer to develop acceptable methods to reduce vibration levels below the designated tolerable level.

I. The Engineer and Owner shall be notified immediately of any complaint received by the Contractor. The Contractor shall immediately review those construction activities inducing the vibration and prepare a report documenting all relevant data such as the time and date of the complaint, a description of the construction activities and operations, data from the monitoring instruments for the subject time/date, complaint information (including photographs, if possible) of the alleged damage. The Contractor shall submit for review a detailed plan for repair and revised construction plan to address the vibration problems to minimize further damage and complaints. The Contractor shall perform necessary repairs at no additional cost to the Owner.

J. The testing firm shall provide monthly vibration monitoring reports containing the results of the crack monitors and vibration monitors during those activities that generate earth borne vibrations, including but not limited excavation operations. The report shall document that the firm has provided the work described herein and shall be prepared by a professional experienced in analyzing and evaluating the results of the vibration monitoring.

3.04 FOUNDATION PROTECTION INSTALLATION

A. Foundation protection measures shall be installed and/or constructed by a qualified contractor. The foundation protection contractor shall have a minimum of ten (10) years of experience in the installation of the foundation protection measures. The foundation protection construction contractor shall coordinate the work with individual property owners and work will only be permitted Monday through Friday between the hours of 9:00 a.m. and 4:00 p.m. (EST). Weekend work will not be permitted unless approved by the Owner and the property owner(s).

B. Foundation protection measures shall be installed in accordance with the approved Drawings.

C. The depth of each foundation protection measure shall be recorded. The contractor shall record the indicated bearing and final depth for each installed foundation protection measure and provide sketches showing the address, location of and spacing between foundation protection measures for each building. A legible hard copy of the installation log shall be submitted to the Owner upon completion of work at each building.

D. Foundation protection measures shall be installed and completed prior to trench excavation for pipe removal or pipe installation. Trench excavation shall not be permitted within twenty (20) feet of a building shown to require foundation protection unless the foundation protection measures have been installed, completed, and accepted.

END OF SECTION

SECTION 33 42 13
PRECAST REINFORCED CONCRETE BOX CULVERT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Work covered by this section consists of providing precast reinforced concrete culvert or arch culvert (culvert), precast reinforced concrete culvert bend (bend), or precast reinforced concrete culvert transition (transition) in accordance with the Drawings and Specifications. The Work shall also include the construction of such joints and connections to other culverts, pipes, drainage structures, endwalls, and steps as may be necessary to complete the work shown on the Drawings.

1.02 RELATED SECTIONS

A. The following Sections have work that is directly related to this Section. This does not relieve the Contractor of his responsibility of proper coordination of all the work:
   1. Section 00425 Excavation/Backfilling
   2. Section 00435 Trenching
   3. Section 00475 Storm Sewer
   4. Section 00485 Flowable Fill
   5. Section 00490 Precast Drainage Structures

1.03 REFERENCES

A. The latest revision, at the time of bidding, of the publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.
   1. North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures (Measurement and Payment provisions do not apply)
   2. ASTM C1577 - Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers Designed According to AASHTO LRFD.
   3. In case of conflict, this specification section shall govern.

1.04 SUBMITTALS

A. Submit the following in accordance with Section 01 33 00, Document Management:
   1. Affidavit of Compliance: Affidavit shall attest that supplied products conform to the referenced standard and this specification and that tests set forth in each applicable referenced publication have been performed and that test requirements have been met.
   2. The designs of the precast culverts, bends, and/or transitions are the responsibility of the Contractor and are subject to review, comments, and approval. Include all details in the drawings, including the size and spacing of the required reinforcement necessary to build the precast culverts, bends, and/or transitions and the laying schedule. A North Carolina Registered Professional Engineer shall seal the drawings and design calculations. The shop drawings must show the proposed openings (top and sides) and reinforcing for pipe connections, joint material, joint sealer wrap including manufacturer installation instructions, handling devices or holes, structure openings, direction of flow arrow, minimum flow area, joint straps, weep holes

(if applicable) , sills/baffles (if applicable), and precast holes for steps (if applicable).

3. The Contractor shall submit the manufacturer's certification for the culvert, bend, and/or transition sections and those products to be used in the installation. The Contractor shall also submit the manufacturer's certification for the sills/baffles if required per Drawings.
4. All box culvert submittals shall incorporate a minimum of three weeks review time for the Engineer. Contractor shall not place any orders or cast any concrete until Engineer approval is granted.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver culvert, bend, and/or transition in the field as near as practicable to the place where it is to be installed. Where necessary to move the culvert, bend, and/or transition within the site, it shall be done in such a manner as not to injure the component and shall follow manufacturer recommendations.

B. Handling devices or holes are permitted in each culvert, bend, and/or transition section for the purpose of handling and laying. Remove all handling devices flush with concrete surfaces as directed. Fill holes in a neat and workmanlike manner with an approved non-metallic non-shrink grout, concrete, or hole plug.

PART 2 PRODUCTS

2.01 GENERAL

A. Installation of the culvert, bend, and/or transition shall conform to Section 414, Box Culvert Excavation of the NCDOT Standard Specifications and this Section and other applicable Sections in the Technical Specifications. Technical Specifications shall take precedence in the event of a conflict.

2.02 DESIGN AND MANUFACTURE

A. Culvert, bend, and/or transition sections shall conform to ASTM C-1577 Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers or ASTM C-1786 Standard Specification for Segmental Precast Reinforced Concrete Box Sections for Culverts, Storm Drains, and Sewers in the latest edition of the AASHTO LRFD Bridge Design Specifications (HL-93 loading). Provide a precast culvert that meets the requirements of NCDOT Standard Specifications Section 1077 and any other applicable parts of the NCDOT Standard Specifications.

B. The concrete mixture shall meet the requirements for Single Cell Box Sections shown in Table 1077-1 in Section 1077 Precast Concrete Units of the NCDOT Standard Specifications. Movement of the precast culvert, bend, and/or transition sections should be minimized during the initial curing period. Any damage caused by moving or handling during the initial curing phase will be grounds for rejection of that precast section. Air entrain the concrete in accordance with Section 1077 5(A) Portland Cement Concrete of the NCDOT Standard Specifications. For dry cast manufacturing, air entrainment is not required.

C. Each culvert, bend, and/or transition section shall be checked at the plant for fitment and numbered which shall correspond to the laying schedule.

D. All openings shown on the Drawings in the culvert, bend, and/or transition shall be formed during the manufacturing process.

E. Precast reinforced concrete box culverts shall meet the minimum flow area listed on the Drawings for each culvert. If flow area is not specifically listed on the drawings, it shall be calculated by multiplying the culvert span and height dimensions shown on the drawings to calculate the waterway flow area (i.e. 12'x4' box culvert shall have a 48 square foot waterway flow area). Culvert minimum waterway area shown on the Drawings shall be verified with the manufacturer for the culvert sizes due to manufacturing differences.

2.03 JOINTS

A. Produce the precast reinforced concrete culvert, bend, and/or transition section with tongue and groove ends. Design and form these ends of the culvert, bend, and/or transition section so, when the sections are laid together, they make a continuous line of culvert sections with a smooth interior free of appreciable irregularities in the flowline. The internal joint formed at the tongue and groove ends of the precast units shall be sealed with either bitumen/butyl sealant or closed-cell neoprene material conforming to ASTM C990 Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants or C1677 Standard Specification for Joints for Concrete Box, Using Rubber Gaskets. The internal joint material shall be installed in accordance with the manufacturer's recommendations.

2.04 JOINT SEALER WRAP

A. Seal the external joint with an outside sealer wrap conforming to ASTM C877 Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections that is at least 12 inches wide and covers the joint on both the sides and the top of the culvert, bend, and/or transition sections. Use ConWrap CS-212 from Concrete Sealants, Inc., EZ Wrap from Press-Seal Gasket Corporation, Seal Wrap from Mar-Mac Manufacturing Co., Inc., Cadilloc External Pipe Joint from Cadilloc, or an approved equal for the outside sealer wrap. If the outside sealer wrap is not applied in a continuous strip along the entire joint, a 12 inch minimum lap of the outside sealer wrap is permitted. Before placing the outside sealer wrap, clean and prime the area receiving the outside sealer wrap in accordance with the sealer wrap manufacturer recommendations.

B. Cover the external joint with a 3-foot strip of filter fabric centered on the joint, with minimum 18" overlap. Filter fabric shall conform to type 4 requirements in Section 1056 of the NCDOT Standard Specifications.

2.05 JOINT CONNECTION STRAPS

A. Box culvert sections shall be joined together using PL3/8x4x2' hot dip galvanized straps, centered on box culvert section joints (minimum of two (2) per joint). A minimum of 4 epoxy bolts with washers shall fasten the straps to the interior of the box culvert sections with a minimum of 6" embedment length.

PART 3 EXECUTION

3.01 INSTALLATION

A. Contractor shall contact the Owner and Engineer for inspection and acceptance of the precast units prior to installation. A minimum of 48 hours' notice shall be given to the Owner and Engineer for inspection.

B. Ensure that equipment of the correct lifting capacity is available to install precast concrete culverts, bends, and/or transitions. Site conditions must be checked well in advance of shipping to ensure proper equipment location and to avoid any lifting restrictions. The lift anchors or holes provided in each section are only means to lift the elements unless otherwise approved by manufacturer.

C. In no case shall equipment operating in excess of the design load be permitted over the precast concrete culvert, bend, or transition units unless otherwise approved by manufacturer.

D. No construction equipment shall cross the bare precast concrete culvert, bend, or transition units. The Contractor shall refer to the manufacturer's specifications for additional restrictions.

E. No backfill shall be placed over or against any elements until they have been approved by the Engineer. Complete backfill in accordance with Section 00425, Excavation/Backfilling and applicable compaction requirements shown on the Drawings and NCDOT specifications.

F. Bedding for precast culverts, bends, and transitions shall meet the requirements of Section 414 of the NCDOT Standard Specifications, ASTM C1675, and as specified on the Drawings. Excavate to the depth shown on the Drawings, minimum 12 inches below the bottom of barrel and footings. Place backfill in the excavation as shown on the Drawings, including NCDOT #57 stone, NCDOT Type 2 geotextile full wrap around #57 stone foundation material. Place 6" leveling course (as defined in ASTM C1675) on top of #57 stone foundation layer. Bedding shall extend minimum 12 inches outside of the culvert or footings. The geotextile wrap shall be placed perpendicular to the culvert barrel and wrap around the #57 stone layer with a minimum lap of 2 feet to be provided.

G. Precast concrete units shall be placed at the beginning of the outlet end of the culvert with the groove end being laid upgrade. Tongue sections shall be laid into the groove sections. Positive means shall be provided to pull each section firmly into the previously placed section so that the joints are tightly homed. Use a "come-along", box pullers or other approved methods to create a positive means of joining box culvert, bend, or transition sections. Construction equipment shall not have direct contact with the culvert, bend, and/or transition sections. The load of the culvert, bend, and/or transition sections shall be suspended by a lifting device during joining procedure.

H. Place multiple, parallel lines of a culvert such that the separation between the lines of culvert has a minimum width of 3 inches. Fill the separation between multiple lines of culvert with non-excavatable flowable fill. Use flowable fill that meets the requirements listed in Section 00485, Flowable Fill.

3.02 CONCRETE BAFFLES/SILLS

A. If Concrete Baffles or Sills are proposed, they are to be included in the manufacturer's design and installed per manufacturer's specifications.

3.03 INVERT FILL MATERIAL

A. The culvert shall be filled with native soil if shown on the Drawings. Native material consists of material that is excavated from the stream bed or floodplain at the project site during culvert construction. Only material that is excavated from the stream bed may be used to line the low flow channel or culvert barrel. Rip rap may be used to supplement the native material. If rip rap is used, native material shall be placed on top to fill voids and provide a flat surface for animal passage. Native material is subject to approval by the Engineer and may be subject to permit conditions. If native material is not available, the Engineer shall approve an alternate source of material.

B. The material shall be compacted as little as possible but firm enough to walk on without leaving footprints, with voids filled such that water flows over, not under or through.

3.04 INSPECTION AND ACCEPTANCE

A. The Contractor shall provide an inspection report by a structural engineer stating that the concrete box culvert has been installed in accordance with the plans and specifications and that the installed culvert is free from cracking, damage, or other defects which would compromise the structural integrity or water-tightness of the installed culverts.

B. The inspection report shall include photos and video of the interior of the installed culvert, especially of any defects identified during the inspection.

C. Any defects in material or workmanship or damage identified by the inspection report shall be repaired by the Contractor using a method approved by the Owner at no additional cost to the Owner.

D. After repair of pipes, Contractor shall provide follow up inspection report at no additional cost to the Owner. Engineer shall review report make determinations regarding acceptability of the repaired pipes. The Engineer shall provide report and determinations to the City for review and approval.

E. Contractor shall not receive final payment until Owner acceptance of the installed box culvert.

END OF SECTION

UTILITY CONSTRUCTION PROJECT SPECIAL PROVISIONS

PART 1 - GENERAL

1. MISCELLANEOUS UTILITY CONSTRUCTION

All proposed utility construction shall be in conformance with the applicable requirements of the Fayetteville PWC Master Specifications, Fayetteville PWC Utility Details on the Drawings, and the project Contract Documents. If a discrepancy should arise between these specifications, the more stringent shall govern.

The existing water and sewer utilities proposed to be relocated or replaced are owned by PWC (hereafter "Owner"). The Contractor shall provide access for the Owners' representatives to all phases of construction. The Owner shall be notified two weeks prior to commencement of any work and one week prior to service interruption. Only authorized personnel of the Owners shall operate valves in the existing public water distribution or sewer collection systems.

PART 2 – UTILITY PAY ITEMS

General

Measurement and payment for utility construction shall conform to the pay items listed herein. Any work necessary to construct the utilities and appurtenances shown on the Drawings that is not specified as a pay item is considered incidental to the project and no direct payment shall be made.

X" (Material) Water Line

Description

Install water line of the specified material and diameter as shown on the Drawings, and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment

X" Water Line shall be measured along a horizontal plane and paid per linear foot of water line installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install water line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Ductile Iron Water Line Fittings

Description

Install water line fittings as shown on the Drawings and in accordance with PWC Master

Specifications Section 02660.

Measurement and Payment
Ductile Iron Water Line Fittings shall be measured in paid per pound of water line fittings installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install ductile iron water line fittings and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X" Gate Valve

Description
Install gate valves of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Gate Valve shall be measured in paid per each gate valve installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install gate valves and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X" Tapping Sleeve & Valve

Description
Install tapping sleeve & valves of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Tapping Sleeve & Valve shall be measured in paid per each tapping sleeve & valve installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install tapping sleeve & valves and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Water Main Kill-Out

Description
Install water main kill-outs of the specified size as shown on the Drawings and in accordance

with PWC Master Specifications Section 02660.

Measurement and Payment
Water Main Kill-Out shall be measured in paid per each water main kill-out installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

All work shall be in accordance with PWC standard detail W.22. Work shall include all costs to cut the existing water main, plug the end of the abandoned pipe with brick and mortar, steel plate/ductile iron cap (or other plug as approved by PWC), ductile iron pipe stiff knee, mechanical joint sleeve with megalug restraining gland (DIP) and mechanical joint cap, transition fitting, cap blocks, concrete encasement, excavation, shoring, disposal of removed water main, bedding material, installation of the stiff knee at the specified line and grade, bedding, backfill, compaction, all required compaction testing, and all labor, materials, equipment, and incidentals necessary to complete the work for each kill-out shall be considered incidental, and no specific payments will be made.

X" Insertion Valve

Description
Install insertion valves of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Insertion Valve shall be measured in paid per each insertion valve installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, thrust restraint, roadway subgrade and unpaved surface restoration, testing, and all other work required to install insertion valves and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X" Transition Coupling

Description
Install transition couplings of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
X" Transition Coupling shall be measured in paid per each transition coupling installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install transition couplings and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Fire Hydrant

Description
Install fire hydrants as shown on the Drawings and in accordance with PWC Master Specifications Section 02660.

Measurement and Payment
Fire Hydrant shall be measured in paid per each fire hydrant installed and placed in satisfactory service and accepted by the Owner.

Ductile Iron fittings, valves, and water pipe for fire hydrant legs required for fire hydrant installation shall be measured and paid separately under the applicable pay items. All other work required to furnish and install fire hydrants, testing, and placing into fully operational service shall be considered incidental to the project and no specific payment will be made.

Hydrant Leg

Description
Install hydrant legs to connect fire hydrants to the potable water main as shown on the Drawings and in accordance with PWC Master Specifications Section 02660 with 6-inch restrained joint PC350 ductile iron pipe.

Measurement and Payment
Hydrant Leg shall be measured in and paid per linear foot of hydrant leg installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

All other work required to connect fire hydrants to the potable water main and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X" Steel Encasement Pipe

Description
Install steel encasement pipes of the specified size as shown on the Drawings and in accordance with PWC Master Specifications Section 02301.

Measurement and Payment
Steel Encasement Pipe shall be measured in and paid per linear foot of steel encasement pipe installed and placed in satisfactory service and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, thrust restraint, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install encasement pipes and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Reconnect Water Meter

Description
Reconnect water meters as shown on the Drawings and as directed by the Owner or Engineer.

Reconnect water meters by reconnecting the water meter to the main (existing or proposed, as shown on the Drawings) via a new tap, in accordance with the detail drawings for water service connections and abandoning the existing service line from the water meter to the existing main, including replacing the existing corporation stop with a tapered brass plug.

For water meters being reconnected to existing water mains, the Owner or authorized representative may allow the existing water service tap and corporation stop to remain in place.

Relocated water meters shall meet applicable requirements of PWC Master Specifications Section 02660.

Measurement and Payment
Reconnect Water Meter shall be measured and paid per each meter satisfactorily reconnected, tested, disinfected, placed into fully operational service as shown on the Drawings or as directed by the Owner or Engineer, and accepted by the Owner.

Water service line required for reconnection of water meters shall be measured and paid separately under the applicable pay item.

Reconnections which utilize an existing corporation stop at the potable water main will not be measured nor paid.

All other work required to reconnect water meters and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Relocate Water Meter

Description
Relocate water meters as shown on the Drawings and as directed by the Owner or Engineer.

Relocate water meters by moving the existing water meter assembly (box, yoke, setter, meter, etc), to the location shown on the Drawings or as directed by the Owner, installing sufficient water service line to place the meter back in fully operational service, and making final connections to the customer’s plumbing system and the proposed water main.

Relocated meters may be placed back in service by connection to the existing service line from the water main, provided that the existing service line is of copper material and the connection point is not under proposed pavement, sidewalk, curb, or gutter. Couplers or other splices in water service lines shall not be permitted under roadway pavement, sidewalks, curbs, or gutters.

For water meters being relocated which will connect to existing water mains, the Owner or authorized representative may allow the existing water service tap and corporation stop to remain in place.

Relocated water meters shall meet applicable requirements of PWC Master Specifications Section 02660.

Measurement and Payment
Relocate Water Meter shall be measured and paid per each meter satisfactorily relocated, tested, disinfected, and placed into fully operational service as shown on the Drawings or as directed by the Owner or Engineer, and accepted by the Owner.

Water service line required for relocation of water meters shall be measured and paid separately under the applicable pay item.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, water service line, fittings as necessary to make final connections, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to relocate water meters place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Water Service Line

Description
Install water service line to connect water meters to the potable water main as shown on the Drawings and as directed by the Owner or Engineer.

Water service line shall meet applicable requirements of PWC Master Specifications Section 02660. Trenchless methods shall be used for all water service line under roadways, curbs, sidewalks, and other paved areas.

Measurement and Payment
Water Service Line shall be measured and paid per linear foot of water service line installed, tested, disinfected, placed in satisfactory service, and accepted by the Owner.

Water service line required for reconnection or relocation of water meters shall be measured and paid under this pay item.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to relocate water meters place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X” (Material) Sanitary Sewer

Description

Install sanitary sewer line of the specified material and diameter as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
X" (Material) Sanitary Sewer shall be measured along a horizontal plane and paid per linear foot of sanitary sewer line installed, tested, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, reconnection of all existing sewer service laterals, bedding, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install sanitary sewer line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Sanitary Sewer Cleanout

Description
Install sanitary sewer cleanouts as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
*Sanitary Sewer Cleanout (*or *SSCO)* shall be measured and paid per each sanitary sewer cleanout installed, tested, placed in satisfactory service, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, reconnection of all existing sewer service laterals, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Sewer Service Line

Description
Install sewer service line (or "laterals") to connect sanitary sewer cleanouts to the sanitary sewer main as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
Sewer Service Line shall be measured and paid per linear foot of sewer service line installed, tested, placed in satisfactory service and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, trenchless installation as applicable, reconnection of all existing sewer services, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer line and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X' DIA Sanitary Sewer Manhole

Description
Install precast concrete sanitary sewer manholes of the specified diameter as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Measurement and Payment
X' DIA Sanitary Sewer Manhole (or *SSMH)* of depth 0-feet to 6-feet, measured from finished rim elevation to lowest invert, regardless of type (doghouse or standard), shall be measured and paid per each manhole satisfactorily installed, tested, and accepted by the Owner.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, connection to proposed or existing piping, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install sanitary sewer manholes and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

X' DIA Manhole Wall

Description
Install precast concrete riser sections of the specified diameter and in accordance with the Drawings and PWC Master Specifications Section 02730 for proposed manholes whose total height, as measured from finished rim elevation to lowest invert, exceeds 6-feet.

Measurement and Payment
Manholes of depth 0-feet to 6-feet, measured from finished rim elevation to lowest invert, regardless of type (doghouse or standard) shall be measured and paid per each under the applicable pay item in the bid proposal. When the depth exceeds 6-feet, the additional depth shall be measured vertically to the nearest tenth of a foot under *X' DIA Manhole Wall* and paid per linear foot for satisfactorily installed precast concrete manholes.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, testing, and all other work required to install manhole walls and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Remove Fire Hydrant

Description
Remove fire hydrants as shown on the Drawings.

Remove fire hydrants by disconnecting the fire hydrant leg from the water main and installing a ductile iron mechanical joint plug directly into the hydrant tee. If the hydrant tee is not accessible,

and the hydrant valve is within 4-feet of the water main, close the valve, install a ductile iron mechanical joint plug in the outlet side of the valve, and remove the valve box.

For fire hydrants to be removed that are connected to water mains specified on the Drawings to be abandoned, a ductile iron plug is not required at the hydrant tee.

The remaining hydrant leg shall be removed along with the fire hydrant. Fire hydrants removed shall be preserved and provided to the Owner or disposed of by the Contractor at the Owner's discretion. Materials removed shall become the property of the Contractor and shall be properly disposed of in accordance with all federal, state, and local regulations.

Measurement and Payment
Remove Fire Hydrant shall be measured and paid per each fire hydrant satisfactorily removed.

Trenching and excavation, protection of and coordination with any conflicting utilities, backfill, roadway subgrade and unpaved surface restoration, and all other work required to remove fire hydrants shall be considered incidental to the project and no specific payment will be made.

Remove Manhole

Description
Remove manholes as shown on the Drawings and in accordance with PWC Master Specifications Section 02730.

Remove utility manholes by removing the entirety of the manhole base, riser(s), cone, ring, and cover.

Measurement and Payment
Remove Manhole shall be measured and paid per each manhole satisfactorily removed.

Trenching and excavation, protection of and coordination with any conflicting utilities, backfill, roadway subgrade and unpaved surface restoration, and all other work required to remove manholes shall be considered incidental to the project and no specific payment will be made.

Abandon X" Utility Pipe

Description
Remove or abandon existing utility pipes as shown on the Drawings.

All utility piping to be abandoned within the project limits that is in conflict with proposed work shall be removed entirely. Utility piping to be abandoned shall be removed if within 2-feet of finished grade. All other utility piping to be abandoned shall be emptied of all contents and filled to at least 90% full with flowable fill or removed entirely.

Cap or plug existing pressure pipes at the locations shown on the Drawings and in accordance with PWC Master Specifications Section 02660. Contractor shall provide adequate thrust

restraint for caps or plugs installed on pressure pipes for abandonment.

Materials removed shall become the property of the Contractor and shall be properly disposed of in accordance with all federal, state, and local regulations.

Measurement and Payment
Abandon X" Utility Pipe shall be measured and paid per linear foot of pipe satisfactory abandoned or removed.

Cored Connection to Existing Manhole

Description
Connect proposed sanitary sewer piping into existing manholes as shown on the Drawings.

Core drill into the existing manhole with a hole diameter sufficient to accommodate a rubber booted connection in accordance with and the PWC Master Specifications Section 02730 for the proposed connecting sanitary sewer. Seal penetration with rubber boot and non-shrink hydraulic cement. Restore manhole interior lining, if present, in accordance with the liner manufacturer's requirements.

Measurement and Payment
Cored Connection to Existing Manhole shall be measured and paid per each satisfactory corrected connection of proposed piping to existing manholes.

Connections of proposed piping to existing manholes where the proposed invert matches the existing invert are considered incidental to the sewer line and no specific measurement nor payment will be made.

Connections of proposed manholes to existing piping are considered incidental to the manhole and no specific measurement nor payment will be made.

Trenching and excavation, protection of and coordination with any conflicting utilities, bedding, backfill, roadway subgrade and unpaved surface restoration, and all other work required to install cored connections to existing manholes, and place into fully operational service shall be considered incidental to the project and no specific payment will be made.

Sanitary Sewer Bypass Pumping

Description
Perform sanitary sewer bypass pumping as necessary to facilitate installation of the proposed sanitary sewer replacements and relocations as shown on the Drawings, as specified in the Utility Bypass Pumping Notes, and in accordance with PWC Master Specifications Section 02732. Minimize bypass pumping to the extent practicable and acceptable to the Owner.

Measurement and Payment
Sanitary Sewer Bypass Pumping shall be measured in paid as a lump sum for sanitary sewer

bypass.

Bypass plan (sealed by NC Licensed Professional Engineer), implementation, monitoring, maintenance, removal, and all other work required for a fully operational sanitary sewer bypass, acceptable to the Owner, shall be considered incidental to the project and no specific payment will be made.

END OF SECTION