SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

A. The work of this contract comprises the general construction for the installation of extensions and improvements to the existing water system, owned and operated by the Southwest Regional Water District, Hamilton, Ohio, in accordance with the plans, specifications and bid proposal forms.

B. Contractor shall furnish and install, test and place into operation the improvements and related appurtenances necessary to provide a complete and operational system in accordance with the design indicated by the plans, specifications and contract documents.

C. The project covered by these plans and specifications is composed of one (1) contract division of work to be completed on a furnish-and-install basis, as follows: **Oxford-Millville Road Water Main Extension.**

D. The work in general to be carried out under the separate contract divisions is as described above and set forth in the "Special Conditions".

E. Project Description: **Install 7,238 ft of 8-inch ductile iron water main and appurtenances in Hanover Township, Butler County, Ohio.**

1.02 WORK SEQUENCE

A. Construct work in stages and of the proper sequence to maintain the distribution system in full operation at all times except as agreed to by Owner.

B. The Contractor shall start work and carry it on at such point or points and in such order of precedence and at times and seasons as may be deemed necessary by the Owner and as directed by the Engineer and shall complete the various parts of the work in accordance with the progress schedule approved by the Engineer.

1.03 COMMUNICATIONS

A. No construction shall be commenced without approval of the Engineer and the Owner. When such approval is requested, the Contractor shall advise as to method of operations, materials and equipment on hand to do the work, and estimate completion time to allow proper scheduling of system operations.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01400

QUALITY CONTROL

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. General Quality Control.

B. Manufacturers' Field Services.

1.02 RELATED REQUIREMENTS

A. Conditions of the Contract: Inspection and testing required by governing authorities.

1.03 QUALITY CONTROL, GENERAL

A. Maintain quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

1.04 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require manufacturer to provide qualified staff personnel to observe field conditions, conditions of installation, quality of workmanship, start-up of equipment, test, adjust and balance equipment as applicable and to make appropriate recommendations.

B. Representative shall submit written report to Engineer listing observations and recommendations.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01530

BARRIERS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the Work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of Work.

1.02 RELATED REQUIREMENTS

A. Section 01010: Summary of Work

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

2.02 FENCING

A. Materials to Contractor's option, as appropriate to serve required purpose.

2.03 BARRIERS

A. Materials to Contractor's option, as appropriate to serve required purpose.

PART 3 EXECUTION

3.01 GENERAL

A. Install facilities of a neat and reasonable uniform appearance, structurally adequate for required purposes.

B. Maintain barriers during entire construction period.

C. Relocate barriers as required by progress of construction.

3.02 TREE AND PLANT PROTECTION

A. Preserve and protect existing trees and plants at site which are designated to remain, and those adjacent to site.

B. Consult with Architect/Engineer, and remove agreed-on roots and branches which interfere with construction.
   1. Employ qualified tree surgeon to remove, and to treat cuts.

C. Protect root zones of trees and plants:

1. Do not allow vehicular traffic or parking.
2. Do not store materials or products.
3. Prevent dumping of refuse or chemically injurious materials or liquids.
4. Prevent puddling or continuous running water.

D. Carefully supervise excavating, grading and filling, and subsequent construction operations, to prevent damage.

E. Replace, or suitably repair, trees and plants designed to remain which are damaged or destroyed due to construction operations.

3.03 REMOVAL

A. Completely remove barricades, including foundations, when construction has progressed to the point that they are no longer needed, and when approved by the Architect/Engineer.

B. Clean and repair damage caused by installation, fill and grade areas of the site to required elevations and slopes, and clean the area.

END OF SECTION

SECTION 01535

PROTECTION AND REPAIR OF PRIVATE PROPERTY

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish, install all material and labor required to protect and/or repair all damaged private property.

B. This shall include but not be limited to fences, tiles, shrubbery, garden plots and trees.

1.02 RELATED REQUIREMENTS

A. Section 01530: Barriers

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Materials shall be new, suitable for the intended purpose.

2.02 FENCING

A. New fence materials shall be used that match the type of fence being repaired.

2.03 TILE

A. New tile of the same size and quality of the existing cut tile shall be used.

PART 3 EXECUTION

3.01 GENERAL

A. Install repairs in neat appearance and with good workmanship.

3.02 FENCES

A. All cutting of fence should be avoided if possible.

B. Fences should be let down from existing splices or corner post if possible.

C. The repairs to the fence shall be installed to match the existing fence and to the satisfaction of the property owner.

3.03 DRAINAGE TILE

A. Drainage tile which is broken or damaged in any way during the construction of the water mains shall be replaced for a distance of 2 feet each side of trench with a section of solid pipe of the same diameter. The replacement pipe shall be installed with pea gravel backfill from bottom of trench to 6" above top of replacement pipe and 1 foot each way from the

centerline of replacement pipe along the trench. In all cases, the repair of drainage tile shall be to the satisfaction of the property owner.

END OF SECTION

SECTION 01540

SECURITY

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Provide a project security program, to:
   1. Protect Work, stored products and construction equipment from theft and vandalism.
   2. Protect premises from entry by unauthorized persons.

1.02 RELATED REQUIREMENTS

A. Section 01530 - Barriers

B. Section 01610 - Product Handling

C. Section 01620 - Storage and Handling

1.03 MAINTENANCE OF SECURITY

A. Initiate security program promptly after job mobilization, when enclosure fence and gate are installed.

B. Maintain security program throughout construction period, until Owner occupancy or Owner acceptance precludes the need for Contractor security.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01560

TEMPORARY CONTROLS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Provide and maintain methods, equipment and temporary construction, as necessary to provide controls over environmental conditions at the construction site and related areas under Contractor's control; remove physical evidence of temporary facilities at completion of work.

1.02 DUST CONTROL

A. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere.

1.03 WATER CONTROL

A. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
   1. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff.

B. Provide, operate and maintain hydraulic equipment of adequate capacity to control surface water.

C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.

1.04 RODENT CONTROL

A. Provide rodent control as necessary to prevent infestation of construction or storage area.
   1. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.
   2. Should the use of rodentcides be considered necessary, submit an informational copy of the proposed program to Owner with a copy to Architect/Engineer. Clearly indicate:
      a. The area or areas to be treated.
      b. The rodentcides to be used, with a copy of the manufacturer's printed instructions.
      c. The pollution preventative measures to be employed.

B. The use of any rodentcide shall be in full accordance with the manufacturer's printed instructions and recommendations.

1.05 DEBRIS CONTROL

A. Maintain all areas under Contractor's control free of extraneous debris.

B. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
   1. Provide containers for deposit of debris.
   2. Prohibit overloading of trucks to prevent spillages on access and haul routes.
      a. Provide periodic inspection of traffic areas to enforce requirements.

C. Schedule periodic collection and disposal of debris.
   1. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.

1.06 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
   1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.
   1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.
   1. Prevent toxic concentrations of chemicals.
   2. Prevent harmful dispersal of pollutants into the atmosphere.

1.07 EROSION CONTROL

A. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sediment from migrating from the worksite.
   1. Hold the areas of bare soil exposed at one time to a minimum. In no case, can more than one total acre of ground be disturbed without restoration, including seeding and mulching.
   2. Provide temporary control measures such as berms, dikes, drains, temporary sediment basin, straw bale barrier, silt fence, storm drain inlet protection, temporary seeding, etc.
   3. Provide control measures to minimize silts and sediments from entering waterways, streams, and storm sewers.
   4. Construction in highly erosive soils as defined by the Natural Resource and Conservation Service and steep slopes requires the installation of erosion control mats.

B. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.

C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

D. The Contractor shall construct, maintain, monitor, and inspect the erosion control methods used and modify as appropriate to minimize erosion.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01610

PRODUCT HANDLING

PART 1 GENERAL

1.01 DESCRIPTION

A. Transportation and Handling: Material shipments to job site.

1.02 DELIVERY

A. Deliver materials, supplies or equipment to project site during working hours.

B. Deliveries made during other than normal working hours must be received by an authorized agent of Contractor involved or be received by other means which shall be the sole responsibility of that Contractor.

C. No employee of the Owner is authorized to receive any shipment designated for this Project.

D. The Owner assumes no responsibility for receiving any shipments designated for this Project.

E. Any materials delivered in the presence of Owner's representative shall be accounted for by the respective contractor.

F. Under no circumstances may shipments be directed to or in care of the Owner.

1.03 HANDLING

A. General Contractor, Subcontractor, Manufacturer or Supplier furnishing materials under this Contract shall identify, ship, address, consign, etc., all such materials to the Contractor who may be charged therewith by giving the name of the Contractor, the name of the Project, the street or post office address and the city.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01620

STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Provide secure storage and protection for products to be incorporated into the Work, and maintenance and protection for Products after installation and until completion of the Work.

1.02 STORAGE

A. Store products immediately on delivery, and protect until installed in the Work.
   1. Store in accordance with manufacturer's instructions, with seals and labels intact and legible.

B. Store Products subject to damage by elements in substantial weathertight enclosures.
   1. Maintain temperatures within ranges required by manufacturer's instructions.
   2. Provide humidity control for sensitive products, as required by manufacturer's instructions.
   3. Store unpacked products on shelves, in bins or in neat piles, accessible for inspection.

C. Exterior Storage:
   1. Provide substantial platforms, blocking or skids to support fabricated products above ground, prevent soiling or staining.
      a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
   2. Store loose granular materials on solid surfaces such as paved areas, or provide plywood or sheet materials to prevent mixing with foreign matter.
      a. Provide surface drainage to prevent flow or ponding of rainwater.
      b. Prevent mixing of refuse or chemically injurious materials or liquids.

D. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
   1. State of storage facilities is adequate to provide required conditions.
   2. Required environmental conditions are maintained on continuing basis.
   3. Surfaces of products exposed to elements are not adversely affected.
      a. Any weathering of products, coatings and finishes is acceptable under requirements of Contract Documents.

B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.
   1. Comply with manufacturer's instructions on scheduled basis.
   2. Space heaters which are part of electrical equipment shall be connected and operated continuously until equipment is placed in service.

1.04 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.

B. Control traffic to prevent damage to equipment and surfaces.

C. Provide coverings to protect finished surfaces from damage.
   1. Cover projections, wall corners, and jambs, sills and soffits of openings, in areas used for traffic and for passage of products in subsequent work.
   2. Protect finished floors and stairs from dirt and damage:
      a. In areas subject to foot traffic, secure heavy paper, sheet goods, or other materials in place.
      b. For movement of heavy products, lay planking or similar materials in place.
      c. For storage of products, lay tight wood sheathing in place.
      d. Cover walls and floor of elevated cars, and surfaces of elevator car doors, used by construction personnel.

D. Waterproofed and roofing surfaces:
   1. Prohibit use of surfaces for traffic of any kind, and for storage of any products.
   2. When some activity must take place in order to carry out the Contract, obtain recommendations of installer for protection of surface.
      a. Install recommended protection, remove on completion of that activity.
      b. Redistrict use of adjacent unprotected areas.

E. Lawns and Landscaping:
   1. Prohibit traffic of any kind across planted lawn and landscaped areas.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 01700

PROJECT CLOSEOUT

PART 1 GENERAL

1.01 RELATED REQUIREMENTS SPECIFIED ELSEWHERE

A. Time of Final Payment: Standard Agreement for Construction Projects.

B. Completion; Waiver of Claims: General Conditions.

1.02 SUBSTANTIAL COMPLETION

A. Submit written certification to Engineer that project or designated portion of project is substantially complete.

B. The Engineer, Contractor, Southwest Regional Water District and Owner will make an inspection within seven days after receipt of certification.

C. Should Engineer consider that work is substantially complete:
   1. Contractor shall prepare and submit to Engineer a list of items to be completed or corrected as determined by the inspection.
   2. Engineer will prepare and issue a Certificate of Substantial Completion, complete with signatures of Engineer, Owner and Contractor, accompanied by Contractor's list of items to be completed or corrected as verified and amended by the Engineer.
   3. Owner occupancy of project or designated portion of project:
      a. Contractor shall perform final cleaning in accordance with Section 01500.
      b. Owner will occupy project under provisions stated in Certificate of Substantial Completion.
   4. Contractor: Complete work listed for completion or correction within designated time stated on Certificate of Substantial Completion.

D. Should Engineer consider that work is not substantially complete:
   1. He shall immediately notify Contractor, in writing, stating reasons.
   2. Contractor: Complete work and send second written notice to Engineer certifying that project or designated portion of project is substantially complete.
   3. Southwest Regional Water will reinspect work.

1.03 FINAL INSPECTION

A. Prior to final inspection, the Engineer, Contractor, Southwest Regional Water Engineer and Owner will make a prefinal inspection to determine a final punch list of items that need corrected. When these items have been corrected, the Contractor shall submit written certification that:
   1. Contract Documents have been reviewed.
   2. Work has been completed and inspected in accordance with Contract Documents.
   3. Equipment and systems have been tested in presence of Owner's representative (Engineer) and are operational.
   4. Project is completed and ready for final inspection.

B. Southwest Regional Water will make final inspection within seven (7) days after receipt of certification.

C. Should Southwest Regional Water Engineer consider that work is finally complete in accordance with requirements of Contract Documents, he shall request Contractor to make project closeout submittals.

D. Should Southwest Regional Water Engineer consider that work is not finally complete:
   1. He shall notify contractor, in writing, stating reasons.
   2. Contractor shall take immediate steps to remedy the stated deficiencies and send second written notice to Engineer certifying that work is complete.
   3. Engineer will reinspect work.

1.04 SUBMITTALS

A. Record Drawings:
   1. Contractor shall: Keep up to date one (1) set of prints on the project at all time with all changes, errors, deviations, omissions and all corrections noted plainly therein.
   2. After acceptance of the project by Owner, certify on title sheet that the information contained is true and accurate.
   3. Submit "Record Drawings" on one (1) complete set of prints to Engineer prior to certification of final payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Maintain at the site for the Owner one record copy of:
   1. Drawings
   2. Specifications
   3. Addenda
   4. Change Orders and other Modifications to the Contract
   5. Architect/Engineer Field Orders or written instructions
   6. Approved Shop Drawings, Product Data and Samples
   7. Field Test records

1.02 RELATED REQUIREMENTS

A. Shop Drawings, Product Data and Samples.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain documents in a clean, dry, legible condition and in good order. Do not use record documents for construction purposes.

B. Make documents and samples available at all times for inspection by Architect/Engineer.

1.04 RECORDING

A. Label each document "PROJECT RECORD" in neat large printed letters.

B. Record information concurrently with construction progress.
   1. Do not conceal any work until required information is recorded.

C. Drawings; Legibly mark to record actual construction:
   1. Depths of various elements of foundation in relation to finish grade.
   2. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
   3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.
   4. Field changes of dimension and detail.
   5. Changes made by Field Order or by Change Order.
   6. Details not on original contract drawings.

D. Specifications and Addenda; Legibly mark each Section to record:
   1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.
   2. Changes made by Field Order or by Change Order.

1.05 SUBMITTAL

A. At Contract close-out, deliver Record Documents to Architect/ Engineer for the Owner.

B. Accompany submittal with transmittal letter in duplicate, containing:
   1. Date
   2. Project title and number
   3. Contractor's name and address
   4. Title and number of each Record Document
   5. Signature of Contractor or his authorized representative.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF SECTION

SECTION 02110

CLEARING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Clear required sites of plant life and grass.

B. Remove root system of trees and shrubs.

C. Remove surface debris.

1.02 RELATED WORK

A. Section 01560 – Temporary Controls.

B. Section 02215 - Excavation.

1.03 REGULATORY REQUIREMENTS

A. Conform to applicable State and Local codes for disposal of debris.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.01 CLEARING

A. Clear areas required for access to site and execution of Work.

B. Remove trees and shrubs within designated areas. Grub out stumps, roots, and surface rock.

C. Clear undergrowth and deadwood.

3.02 PROTECTION

A. Protect existing plant growth and features to remain upon completion of construction.

B. Protect bench marks and existing work from damage or displacement.

C. Maintain designated site access for vehicle and pedestrian traffic.

3.03 REMOVAL

A. Remove debris from site.

END OF SECTION

SECTION 02215

EXCAVATION

PART 1 GENERAL

1.01 WORK INCLUDED

A. General excavation

B. Dewatering

C. Shoring excavations

1.02 RELATED WORK

A. Section 01400 - Quality Control

B. Section 01410 - Testing Laboratory Services

C. Section 02220 - Backfilling

D. Section 02221 - Trenching

E. Section 03001 - Concrete

1.03 PROTECTION

A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.

B. Underpin adjacent structures which may be damaged by excavation work.

C. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

D. Grade excavation top perimeter to prevent surface water run-off into excavation.

1.04 CLASSIFICATION

A. The excavation on this project is considered to be unclassified, unless pay items are provided in the bid schedule. The Contractor shall remove all unacceptable materials encountered.

1.05 QUALITY ASSURANCE

A. The Contractor shall employ the services of a qualified soils engineer to conduct in place testing and make recommendations for over excavation, backfill and dewatering.

PART 2 PRODUCTS

2.01 MATERIALS

A. Subsoil: Excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches and debris.

B. Pea Gravel: Mineral aggregate graded 1/4 inch (6 mm) to 5/8 inch (16 mm); free of soil, subsoil, clay, shale, or foreign matter.

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.02 EXCAVATION

A. Excavate subsoil required for structure slabs, construction operations, and other work.

B. All excavated material shall be piled in a manner that will not hamper the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve pit covers, valve boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Ditches shall be kept clear or other satisfactory provisions made for road drainage, and natural watercourses shall not be obstructed.

C. Correct unauthorized excavation at no cost to Owner.

D. Fill over-excavated areas under structure bearing surfaces as directed by the Engineer.

3.03 DEWATERING

A. Where required, dewatering will be performed, as directed by the Contractor's Soils Engineer and approved by the Engineer. Cost shall be included in the applicable unit price of the base bid.

3.04 FIELD QUALITY CONTROL

A. Provide for visual inspection of bearing surfaces.

END OF SECTION

SECTION 02220

BACKFILLING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Backfilling and compaction requirements

1.02 RELATED WORK

A. Section 02215 - Excavation

B. Section 02221 - Trenching

1.03 REFERENCES

A. ANSI/ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

B. ODOT Item 613, Type 1

PART 2 PRODUCTS

2.01 SELECT FILL MATERIALS

A. Type A - Coarse Stone: Gravel: Pit run, angular, crushed, washed natural stone; free of shale, clay, friable materials and debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 inches (50 mm)	100
1 inch (25 mm)	95
3/4 inch (19 mm)	95 to 100
5/8 inch (16 mm)	75 to 100
3/8 inch (9 mm)	55 to 85
No. 4	35 to 60
No. 16	15 to 35
No. 40	10 to 25
No. 200	5 to 10

B. Type B - Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; 1/4 inch minimum to 5/8 inch maximum size; graded in accordance with ANSI/ASTM C136.

C. Type C - Sand: Natural river or bank sand; washed, free of clay, shale, organic matter; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
No. 4	100
No. 14	10 to 100
No. 50	5 to 90
No. 100	4 to 30
No. 200	0

D. Type C – Pipefill: ODOT 603 Type 2 (formerly known as 310).

2.02 COMMON BACKFILL

A. When the type of backfill material is not indicated on the drawings or specified, the Contractor may backfill with the excavated material, provided that such material consists of loam, clay, sand, gravel or other materials that, in the opinion of the Engineer, are suitable for backfilling. If excavated material is indicated on the drawings or specified for backfill, and there is a deficiency due to a rejection or part thereof, the Contractor shall remove and dispose of the rejected material and shall provide acceptable fill material, all under pay item "Furnish and install bedding and backfill material in areas where excavated material is not suitable, including removal of excavated material, per C.Y."

B. All backfill material, unless otherwise specified, shall be free from cinders, ashes, refuse, vegetable and organic material, boulders, cobbles, rocks or stone or other material that in the opinion of the Engineer is unsuitable. For PVC pipe, Common Backfill will not be allowed in the initial backfill area from the bottom of the trench to 12 inches above the top of the pipe. For ductile iron pipe, Common Backfill containing smooth rock or stone up to 6 inches in its largest dimension may be used from the bottom of the trench to 12 inches above the pipe. For both PVC and ductile iron pipe, the remaining backfill may be Common Backfill containing no stones or rock larger than 75% of the trench width in its largest dimension.

2.03 LOW STRENGTH MORTAR BACKFILL

A. Low strength mortar backfill shall be used for pavement repairs made to county highways in accordance to the detail in the detail drawings. Low strength mortar backfill shall meet the requirements of ODOT Item 613. The mixture must be of flowable consistency.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify stockpiled fill to be reused is approved.

B. Verify areas to be backfilled are free of debris, snow, ice, or water and ground surfaces are not frozen.

C. Verify underground tank anchoring to foundation slab to avoid flotation after backfilling.

D. All disturbed areas shall be restored to at least preconstruction conditions.

3.02 PREPARATION

A. When necessary, compact subgrade surfaces to density requirements for backfill materials.

B. Cut out soft areas of subgrade not readily capable of insitu compaction. Backfill with Type A and compact to density equal to requirements for subsequent backfill material.

3.03 BACKFILLING AROUND STRUCTURES

A. Backfill areas to contours and elevations. Use unfrozen materials.

B. Backfill systematically, as early as possible, to allow maximum time for natural settlement. Do not backfill over porous, wet, or spongy subgrade surfaces.

C. Place and compact select fill materials in continuous layers not exceeding 6 inches loose depth.

D. Place and compact common fill material in continuous layers not exceeding 12 inches loose depth.

E. Maintain optimum moisture content of backfill materials to attain required compaction density.

F. Remove surplus backfill materials from site.

G. Leave stockpile areas completely free of excess fill materials.

3.04 BACKFILLING TRENCHES

A. For PVC pipe: All trenches shall be backfilled from the bottom of the trench to 12 inches above the top of the pipe with Select Fill Material, Type C, placed in layers of six inches and compacted by mechanical tamping. Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously. The Contractor shall place the backfill around the pipe in such a manner as to confirm there are no void spaces and subsequently compact the fill by flooding if necessary. The Contractor shall use special care in placing this portion of the backfill so as to avoid damaging or moving the pipe. The remainder of the trench shall be backfilled with Common Backfill, placed in 12 inch layers and mechanically tamped.

B. For Ductile pipe: All trenches shall be backfilled from the bottom of the trench to 12 inches above the top of the pipe with Common Backfill, placed in layers of six inches and compacted by mechanical tamping. Backfilling material shall be deposited in the trench for its full width on each side of the pipe, fittings, and appurtenances simultaneously. The Contractor shall place the backfill around the pipe in such a manner as to confirm there are no void spaces and subsequently compact the fill by flooding if necessary. The Contractor shall use special care in placing this portion of the backfill so as to avoid damaging or moving the pipe. The remainder of the trench shall be backfilled with Common Backfill, placed in 12 inch layers and mechanically tamped.

C. For A and B above, if the native material is not acceptable for use as Common Backfill, the replacement material shall be paid as "Furnish and install bedding and backfill in areas where excavated material is not suitable, including removal of excavated material, per C.Y."

D. When the trench crosses a driveway or other access, the Contractor shall backfill the trench immediately to restore access. He shall check all such areas every day to see if any settlement has occurred and if so, shall backfill again to maintain a smooth surface.

E. All concrete or asphaltic driveways and entrances, as well as parking areas, consisting of crushed stone, gravel, concrete, or asphaltic surfaces, including those in public rights-of-way, damaged by the construction shall be repaired and replaced with like material to the original grade. All damaged curbs and sidewalks shall also be replaced with like material to the original grade. All trench backfilling, replacements and repairs shall be included in the unit price of the pipe unless pay items are provided in the Bid Schedule.

F. Secure piping to prevent floatation or movement during placement of low strength mortar backfill. Do not place additional fill material over low strength mortar backfill until surface water is gone.

G. All areas disturbed by construction shall be restored to at least the original preconstruction conditions, and to the satisfaction of the Engineer.

H. One year from substantial completion of the project the Contractor shall return to the site and backfill or smooth out any settlement that has occurred in the entire length of the pipeline. Any areas thus repaired shall be provided with supplemental topsoil and shall be seeded, mulched and fertilized according to the original restoration requirements..

END OF SECTION

SECTION 02221

TRENCHING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Excavate trenches for utilities as detailed on the plans.

B. Compacted bed and compacted fill over utilities.

C. Compaction requirements

1.02 RELATED WORK

A. Section 02215 - Excavation

B. Section 02220 - Backfilling

1.03 PROTECTION

A. Protect excavations by shoring, bracing, sheet piling, underpinning, or other methods required to prevent cave-in or loose soil from falling into excavation.

B. Underpin adjacent structures which may be damaged by excavation work.

C. Notify Architect/Engineer of unexpected subsurface conditions and discontinue work in affected area until notification to resume work.

PART 2 PRODUCTS

2.01 SELECT FILL MATERIALS

A. Type A, B and C - As detailed in Backfilling Section 02220.

2.02 COMMON BACKFILL MATERIALS

A. As detailed in Backfilling, Section 02220

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining which pass through work area.

C. Upon discovery of unknown utility or concealed conditions, discontinue affected work; notify Engineer.

3.02 TRENCH EXCAVATION

A. The trench shall be dug so that the pipe can be laid to the alignment and depth required, and it shall be excavated only so far in advance of pipe laying to prevent unusual lengths of trench standing open over nights and weekends. The width of the trench shall be ample to permit the pipe to be laid and joined properly and the backfill to be placed and compacted. Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing, and handling of valves and fittings.

B. In the course of excavation, the Contractor may encounter stones or boulders. These large stones or boulders shall be stockpiled and disposed of in an acceptable manner. Boulders and large stones shall be removed to provide a clearance of at least 6 inches below and on each side of all pipe, valves and fittings.

C. The specified minimum clearances are the minimum clear distances that will be permitted between any part of the pipe and appurtenances being laid and any part, projection, or point of such rock, boulder or stone.

D. Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, refuse, vegetable or other organic material, or large pieces of fragments of inorganic material that in the judgment of the Engineer should be removed, the Contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer. Before the pipe is laid, the subgrade shall be relaid with thoroughly compacted Common Backfill containing no stones or rock larger than 75% of the trench width in its largest dimension.

E. The Contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures or utilities both known and unknown, may be determined and he shall be held responsible for the repair of such structures if broken or otherwise damaged. Whenever it is necessary to excavate to determine the location of existing underground structures, the Contractor shall make exploration and excavation for such purposes.

F. When rock is encountered and the Contractor determines that blasting will be required, he shall contact the Owner and the Engineer prior to any blasting. A conference will be held to discuss the blasting operation which will include a review of safety and other procedures. All blasting will be conducted in strictest conformance to any and all Municipal, State or Federal laws and regulations covering these operations. If blasting is not conducted in an expert manner at all times, the Engineer reserves the right to suspend blasting and require the work to proceed without it.

G. When rock is encountered and the Contractor determines that specialized equipment will be required to remove it, he shall contact the Owner and the Engineer prior to any removal. A conference call will be held to discuss the operation and the proposed removal procedures and depth of rock to be removed. The Engineer and Owner will determine if the rock method proposed qualifies for payment under rock removal and disposal. Small rocks and shelf rock removable by standard excavation equipment do not qualify for reimbursement. All excavation removed by standard excavation equipment will not qualify as rock.

H. As the trench is excavated, the contractor shall:
   1. Separate the topsoil and lay aside for placing back on top of trench
   2. Separate, remove, and dispose of "unsuitable backfill"
   3. Remove and dispose of rock

4. Provide Select Fill or Common Backfill bedding and backfill as required
5. Provide replacement fill as required

END OF SECTION

SECTION 02485

SEEDING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Preparation of sub grade to receive topsoil.

B. Spreading topsoil.

C. Seeding and fertilizing.

D. Seed protection on slopes.

E. Maintaining seeded areas until acceptance.

F. Temporary seeding.

1.02 QUALITY ASSURANCE

A. Supply the following submittals:
   1. Seed Label from proposed seed if other than specified.
   2. Analysis of existing topsoil including pH, P, K and organic material.
   3. Analysis of imported topsoil including same elements.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver grass seed in original containers showing analysis of seed mixture, percentage of pure seed, seed percentage germination, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

1.04 TEMPORARY SEEDING

A. Temporary seeding is to be applied to areas during construction to reduce damages from sediment and runoff and if lawn restoration falls between June 1 and August 15.

PART 2 PRODUCTS

2.01 GROWING MEDIA

A. Existing Topsoil: Existing topsoil shall be stripped and stockpiled before excavation for later distribution. A minimum 4" of topsoil shall be distributed before seeding. If insufficient topsoil was stripped and stockpiled, then Contractor shall provide the balance needed to provide the minimum. Topsoil shall meet the following requirements: Natural, fertile agricultural soil capable of sustaining vigorous plant growth, not in frozen or muddy condition, containing not less than 6% organic matter, and corrected to pH value of 5.9 to 7.0. Free from subsoil, slag, clay, stones, lumps, live plants, roots, sticks, crabgrass, noxious weeds, and foreign matter.

Existing topsoil to be verified by Contractor and Owner as to quantity and suitability before redistribution.

B. Fertilizer: 12-18-12 starter commercial type with 50% of the elements derived from organic sources is slow release. Fertilizer shall be evenly spread at 200 lbs per acre.

C. Fertilizer for temporary seeding: 12-12-12 and evenly spread at 200 lbs per acre.

2.02 SEED

A. Seed Mixture. Permanent seeding for lawns: Team Mates Plus by the Lesco Company or approved equal that has 70% turf type tall fescue blend of three varieties, 20% of perennial rye blend of three varieties and 10% Kentucky blue grass of three varieties; free of noxious weeds. Even spread at a rate of 350 lbs per acre or 8-10 lbs per 1000 square feet with equipment designed for the broadcast of seed. Temporary seeding shall be done with Annual Rye grass at a rate of 200 lbs/ acre or 5 lbs per 1000 square feet.

B. Seeding Dates: Permanent seeding may not be done between June 1 and August 15, unless Contractor provides supplemental watering to establish a good stand of grass. If the Contractor does not provide supplemental watering during this period, then temporary seeding should be done. Permanent seeding shall then follow commencing August 15.

C. There will be no charge for water used by Contractor for watering grass.

D. This seed specification is intended for lawns and road right-of-way. If restoration is to be done in farm fields or pastures, then a different seed mixture as approved by the Owner and by the individual property owner will be required.

2.03 ACCESSORIES

A. Mulching Material: Oat or wheat straw, reasonably free from weeds, foreign matter detrimental to plant life, and in dry condition. Mulching shall also be applied to permanent and temporary seeding.

B. Mulching Material for Hydroseeding: Wood or wood cellulose fiber free of growth or germination inhibiting ingredients.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect existing underground improvements from damage. Temporary Seeding: Rough grade to +/- 2 inches removing all debris exceeding 2 inches in any dimension; apply the annual grass and straw at the specified rates. Permanent Seeding: Cultivate soil to 4 inch depth removing all stones, roots, debris larger than 1 inch in any direction. Rake out evenly smoothing out all lumps and depressions with a grade tolerance of +/- ¼ inch. If permanent seeding is installed following temporary seeding, then Contractor shall cultivate area 4" depth removing all stones, roots, debris larger than 1" in any direction. Rake out evenly smoothing out all lumps and depressions with a grade tolerance of +/- ¼ inch. Spread seed mix, fertilizer, then straw mulch. Lawn will not be accepted until a permanent stand of grass is established and meets the acceptance criteria.

B. Straw mulch. Straw of wheat or oats is preferred and shall provide a minimum 1" cover over the seeded and fertilized soil. No soil shall be visible through the straw cover. Hydroseeding is not recommended, but can be permitted in special situations with Owner approval of method and material to be used. Along road ways and other areas where straw could be displaced by wind or traffic, it is recommended to tactify straw with water and/or tactifier solution by spraying overtop of straw. Straw blankets can also be used in lieu of tactifying straw.

3.02 SEED PROTECTION ON SLOPES AND HIGHLY EROSIVE SOILS

A. Cover seeded highly erosive soils and also seeded slopes where grade is 3:1 or greater with jute matting or with Owner-approved erosion control matting. Roll matting down over slopes without stretching or pulling. This includes areas that receive temporary seeding.

B. Lay matting smoothly on soil surface, burying top end of each section in narrow 6 inches trench. Leave 12 inches overlap from top roll over bottom roll. Leave 4 inches overlap over adjacent section.

C. Staple outside edges and overlaps at 36 inches intervals.

D. Lightly dress slopes with topsoil to ensure close contact between matting and soil.

E. In ditches, unroll matting in direction of flow. Overlap ends of strips 6 inches (150 mm) with upstream section on top.

3.03 MAINTENANCE PERIOD

A. Maintenance Period: Until final acceptance.

3.04 MAINTENANCE

A. Maintain surfaces and supply additional topsoil where necessary, including areas affected by erosion.

B. Water to ensure uniform seed germination and to keep surface of soil damp.

C. Apply water slowly so that surface of soil will not puddle and crust.

D. After first mowing, water grass sufficient to moisten soil from 3 inches to 5 inches deep.

E. After first mowing, fertilize newly seeded grass with a fertilizer of 30-10-10 or equivalent at a rate of 150 lbs per acre with 50% of the nitrogen in a slow release or organic form. Please advise SRWD representative on the date and time this is to be done, so that a site inspections can verify.

F. Replant damaged grass areas showing root growth failure, deterioration, bar or thin spots, and eroded areas.

G. Irrigation: If soil moisture is deficient, supply new seedlings with adequate water for plant growth until they are firmly established. This is especially true when seeding is done late in planting season, in abnormally dry or hot season, or on adverse sites.

3.05 RESTORATION

A. Restore pavement, concrete, grassed areas, planted areas and all disturbed non-paved areas damaged during execution of all work.

3.06 ACCEPTANCE

A. Seeded areas will be accepted at end of maintenance period when seeded areas are properly established and otherwise acceptable. There shall be no bare spots larger than 4 inches in any direction, and overall the lawn shall have a minimum cover of permanent grass species of turf type tall fescue, perennial ryegrass, and Kentucky bluegrass of 90%. Annual grass or broadleaf weeds does not constitute permanent grass cover. Areas unacceptable may require weed control measures and "Slit Seeding". Slit seeding shall be done with a piece of equipment that is designed specifically for that purpose with a slit spacing of not more than 3 inches, depth set at not less than ½", and the permanent seed mixture sown at a rate of 200 lbs per acre.

END OF SECTION

SECTION 02511

REPAIR OF CRUSHED STONE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Prepare sub-grade.

B. Place, distribute and level base course and topping course.

C. Compact as required.

1.02 RELATED WORK

A. Section 02513 - Asphaltic Concrete Paving.

1.03 REFERENCE STANDARDS

A. Section 02220: Backfilling

B. Section 02221: Trenching

C. Section 02513: Asphaltic Concrete Paving

PART 2 PRODUCTS

2.01 MATERIALS

A. Products to conform to Ohio Department of Transportation specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. As per Ohio Department of Transportation specifications.

B. All trench cuts made in the existing pavement for the purpose of installing water mains shall be filled and compacted in 6" lifts to within 6 inches of the existing surface with a Select Fill Type A approved granular material. The remaining depth shall be filled with aggregate meeting requirements of Item 304 of the Ohio Department of Transportation specifications and future settlement maintained until that section of main and appurtenances are installed, tested, and approved by A/E. The cuts in the pavement shall be neat and straight. The pavement shall be cut to insure a clean break in pavement.

C. Excavated material may be used for backfill if it is approved as suitable granular material by the A/E. All unsuitable material shall be hauled from the site and disposed of at the Contractor cost.

D. The Contractor shall be required to maintain the excavated areas to existing grade on a daily basis until the excavated area is resurfaced.

E. The Contractor shall prevent dust nuisance from all temporary surfaces by applying calcium chloride, or bituminous material, or other suitable dust preventative as may be required.

F. All repair work shall be done to the satisfaction of the governing agency having authority.

G. Should the Contractor fail or refuse to maintain any streets or roads in a satisfactory manner as herein specified within twenty four (24) hours after having been notified to do so, the Owner may directly, or by contract, proceed to make the necessary repairs and retain the cost of repair out of funds due on contract.

H. The Contractor shall be paid for repair of crushed stone paving per linear foot of water main, as allowed for in the proposal forms.

END OF SECTION

SECTION 02513

REPAIR OF ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Prepare sub-grade to receive base course.

B. Place stabilizing base courses, work and compact.

C. Prime base course, place asphalt pavement.

1.02 RELATED WORK

A. Section 02220 - Backfilling

B. Section 02221 - Trenching

C. Section 02511 - Crushed Stone Paving

1.03 REFERENCE STANDARDS

A. Ohio Department of Transportation specifications, latest edition.

PART 2 PRODUCTS

2.01 MATERIALS

A. Products to conform to Ohio Department of Transportation standard specifications, latest edition.

B. Granular Sub-base: Crushed rock screenings; free from shale, clay, organic matter and debris, graded as shown in detail on plan sheets. See Section 02511, 3.01.B of these specifications.

C. Primer: Homogeneous medium curing liquid asphalt; of type recommended for asphaltic paving; of grade to suit job conditions.

2.02 ASPHALT PAVEMENT MATERIALS

A. Surface and binder course shall be supplied by local asphalt producer whose design mix has been accepted as per Ohio Department of Transportation specifications, Section 401.

PART 3 EXECUTION

3.01 PREPARATION

A. All trench cuts made in the existing pavement for the purpose of installing water mains shall be filled within 10 inches of the existing surface with Type A Select Fill Material (Section 02220) unless the pavement is county or state highway and it shall in that case be filled

within 10 inches of the existing surface with low strength mortar backfill (Section 02220). The remaining depth shall be filled with aggregate meeting requirements of Item 304 of the Ohio Department of Transportation specifications, and future settlement maintained until that section of main and appurtenances are installed, tested, and approved by A/E. The pavement shall be cut to insure a clean break in pavement. The cuts in the pavement shall be neat and straight and parallel with each other.

B. Excavated material may be used for backfill if it is approved as suitable granular material by the A/E. All unsuitable material shall be hauled from the site and disposed of at the Contractor cost.

C. The Contractor shall be required to maintain the excavated areas to existing grade on a daily basis until the excavated area is resurfaced.

D. The Contractor shall prevent dust nuisance from all temporary surfaces by applying calcium chloride, or bituminous material, or other suitable dust preventative as may be required.

E. Street and road and driveway repair shall be as follows:
   1. All repair shall be done in accordance with ODOT Specification, Section 400, as it applies to the following specifications.
   2. As soon as possible after the installation of the facilities, the trench shall be cleaned out a minimum of 3" below the existing pavement. A minimum of 7" of aggregate shall be remaining.
   3. Aggregate shall be compacted and primed with bituminous material as per ODOT specification, Item 408 and 702, at a rate of 0.4 gallon per square yard.
   4. The edge of the existing pavement shall have a tack coat of bituminous material as per ODOT Specification, Item 407 and 702, applied.
   5. A minimum of 3" of ODOT 404 hot asphaltic concrete shall be installed and compacted.
   6. Seal joints with rubber-based hot-applied sealant, taking care to fill the entire depth of the joint, and to leave neat and straight edges.
   7. Where the berm of the street or road is damaged, a minimum of 7" deep by 12" wide from the edge of pavement shall be filled with compacted aggregate. Cost shall be included in the unit cost of the main.

F. All repair work shall be done to the satisfaction of the governmental office having jurisdiction.

G. Should the Contractor fail or refuse to maintain any streets or roads in a satisfactory manner as herein specified within twenty four hours after having been notified to do so, the Owner may directly, or by contract, proceed to make the necessary repairs and retain the cost of repair out of funds due on contract.

H. The Contractor shall be paid for repair of driveway pavement per linear foot of water main and for highway pavement repair per square yard of highway surface, as allowed in the Bid Schedule.

~~I. The Contractor shall be paid for unavoidable damage to pavement under "Repair of incidental damage to pavement", per square yard, as allowed for in the Bid Schedule.~~

END OF SECTION

SECTION 02515

REPAIR OF CONCRETE DRIVEWAYS AND SIDEWALKS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Prepare sub-grade to receive base course.

B. Place stabilizing base courses, work and compact.

C. Prime base course, place concrete pavement.

1.02 RELATED WORK

A. Section 02220 - Backfilling

B. Section 02221 - Trenching

C. Section 02511 - Crushed Stone Paving

1.03 REFERENCE STANDARDS

A. Ohio Department of Transportation specifications, latest edition.

PART 2 PRODUCTS

2.01 MATERIALS

A. Products to conform to Ohio Department of Transportation standard specifications, latest edition.

B. Granular Sub-base: Crushed rock screenings; free from shale, clay, organic matter and debris, graded as shown in detail on plan sheets. See Section 02511, 3.01.B of these specifications.

C. Primer: Homogeneous medium curing liquid; of type recommended for concrete paving; of grade to suit job conditions.

2.02 CONCRETE PAVEMENT MATERIALS

A. Driveways: ODOT Item 452.

B. Sidewalks: Concrete meeting the following criteria: 3,200 psi 7-day compressive strength; 4,000 psi 28-day compressive strength; water/cement ratio 0.50 by weight; entrained air 5-7%; fly ash content maximum 25% of cement content; slump 3" maximum due to water; high range water reducer may be added on site.

PART 3 EXECUTION

3.01 PREPARATION

A. All trench cuts made in the existing pavement for the purpose of installing water mains shall be filled and compacted in 6" lifts within 13 inches of the existing surface with Type A Select Fill granular material. The remaining depth shall be filled with aggregate meeting requirements of Item 304 of the Ohio Department of Transportation specifications, and future settlement maintained until that section of main and appurtenances are installed, tested, and approved by A/E. The cuts in the pavement shall be neat and straight. The pavement shall be cut to insure a clean break in pavement. Cuts in driveways shall be along the nearest existing construction or expansion joints, and shall be agreed upon with the District representative prior to cutting.

B. Excavated material may be used for backfill if it is approved as suitable granular material by the A/E. All unsuitable material shall be hauled from the site and disposed of at the Contractor cost.

C. The Contractor shall be required to maintain the excavated areas to existing grade on a daily basis until the excavated area is resurfaced.

D. The Contractor shall prevent dust nuisance from all temporary surfaces by applying calcium chloride, or bituminous material, or other suitable dust preventative as may be required.

E. Street and road repair shall be as follows:

1. All repair shall be done in accordance with ODOT Specification, Section 400, as it applies to the following specifications.
2. As soon as possible after the installation of the facilities, the trench shall be cleaned out a minimum of 6" below the existing pavement. A minimum of 7" of aggregate shall be remaining.
3. Aggregate shall be compacted and primed as per ODOT specification.
4. The edge of the existing pavement shall have a tack coat as per ODOT Specification.
5. A minimum of 6" of ODOT Item 452 concrete shall be installed.
6. Where the berm of the street or road is damaged, a minimum of 7" deep by 12" wide from the edge of pavement shall be filled with compacted aggregate. Cost shall be included in the unit cost of the main.

F. All repair work shall be done to the satisfaction of the governmental office having jurisdiction.

G. Should the Contractor fail or refuse to maintain any streets or roads in a satisfactory manner as herein specified within twenty four hours after having been notified to do so, the Owner may directly, or by contract, proceed to make the necessary repairs and retain the cost of repair out of funds due on contract.

H. The Contractor shall be paid for road repair per linear foot of road surface, for sidewalk repair per linear foot, and for driveway repair per square foot, as allowed for in the Bid Schedule.

END OF SECTION

SECTION 13300

WATER DISTRIBUTION SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Under this section of the specifications all water distribution piping and appurtenances shall be furnished and installed.

B. The work covered by this section of the specifications shall include, in general, furnishing and installation of all distribution piping, fittings, valves, hydrants, valve vaults, pumping units, road and stream crossings, metered services, service lines, connections to existing mains, testing, disinfection and etc., unless covered in separate sections.

1.02 RELATED SECTIONS

A. All applicable sections of these specifications and the plans.

1.03 QUALITY ASSURANCE

A. Products/materials - AWWA Standards.

B. Installation - AWWA Standards.

C. All products, devices, materials, and accessories shall be new and never before used. They shall be clean and/or restored to like new condition prior to approval of submittal by the Engineer.

D. The front end of each load of pipe shall be completely tarped to prevent fumes from entering pipe.

1.04 SUBMITTALS

A. Provide shop drawings in accordance with Section 01340.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE (NOT C-900)

A. Polyvinyl chloride (PVC) pipe for water distribution and transmission mains shall be pressure rated pipe with push-on gasketed joints as manufactured by Certain-Teed Products Corp., Valley Forge, Penn.; Johns-Manville, New York, N.Y.; Anesite Division, Clow Corp., Chicago, Illinois; or an Engineer approved equal product.

B. Rigid PVC (polyvinyl chloride) pressure pipe described herein shall be designed to carry portable water at pressures (including surge) up to the maximum class rating.

C. Material used to produce the pipe shall conform to ASTM D1784, Type 1, Grade 1, 2000 psi design stress.

D. The standard dimensional ratio for the pipe shall be SDR 21 through 13.5 as called for in the contract documents and as indicated on the Engineer's drawings (plans).

E. All PVC pipe shall conform to the latest revisions of ASTM Specification D2241 and Department of Commerce Specification PS22-PR (SDR-PR) for pressure rated pipe.

F. Pipe identification code marking shall include the following data, and shall be marked continuously down each pipe length.

1. Nominal size
2. Type of material
3. SDR, Class Pressure Rating
4. Manufacturer's name
5. NSF (National Sanitation Foundation Seal of Approval)

G. Markings of pipe-printing shall be color coded for pressure class identification. Pipe shall be furnished with a minimum of one (1) contrasting color circumferential stripe painted on the plain end or uncoupled end of each length to allow field checking of pipe construction joints, said stripes shall indicate manufacturer's recommended F-stop mark.

H. Each lot shipment of pipe and related materials shall include a shipment itemized check list for recording damages and/or deficiencies.

I. Plastic pipe shall be installed in accordance with the manufacturer's published instructions, modified only as may be directed herein or by the Engineer. PVC pipe installation shall comply with applicable paragraphs of Part 3 of this Section.

J. All fittings shall be Mechanical Joint Ductile Iron and shall be restrained.

K. All PVC material for pipe shall be light gray, light blue or white in color to minimize material heat gain. The use of white pipe is encouraged.

L. The PVC pipe joints shall be designed and manufactured so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint (single rubber gasket joint) shall be assembled by positioning a continuous, molded, rubber ring gasket in an annular recess in the pipe bell end socket and the forcing of the plain end of the entering pipe into the socket, thereby compressing that gasket radially to the pipe to form a positive seal. The gasket and the annular recess shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled. Details of the joint design and assembly shall be in accordance with the manufacturer's standard practice. The joints shall be so designed so as to provide for the thermal expansion of contraction experienced with a total temperature change of at least 75° in each joint per length of pipe.

M. All rubber gaskets incorporated in the assembled push-on joints of PVC pipe shall meet the requirements of ASTM F477 on elastomeric seals, conform to the standard ASTM E-1869 and applicable requirements of ASA Standard A21.11.

2.02 AWWA C-900 POLYVINYL CHLORIDE (PVC) PIPE

A. AWWA C-900 polyvinyl chloride (PVC) pipe shall meet all requirements of AWWA C-900, latest edition, and shall be of the dimension ratio or pressure class rating indicated on the

plans and in the Bid Schedule. Fittings shall be mechanical joint ductile iron and shall be restrained.

B. Where joint restraint is required for push-on joints, it shall be provided by restraint devices (harnesses) as manufactured by Uni-Flange or approved equal.

2.03 AWWA C-905 POLYVINYL CHLORIDE (PVC) PIPE (14" THRU 36")

A. AWWA C-905 polyvinyl chloride (PVC) pipe shall meet all requirements of AWWA C-905, latest edition, shall be CI outside diameter, and shall be of the dimension ratio or pressure class rating as indicated in the Bid Schedule. Fittings shall be mechanical joint ductile iron and shall be restrained.

B. Where joint restraint is required for push-on joints, it shall be provided by restraint devices (harnesses) as manufactured by Uni-Flange (Block Buster Series 1350) or approved equal.

2.04 RESTRAINED JOINT POLYVINYL CHLORIDE (PVC) PIPE

A. Restrained Joint Polyvinyl Chloride (PVC) Pipe shall meet the performance requirements of AWWA C-900, "Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings 4" thru 12" for Water Distribution" and shall be furnished in cast iron pipe equivalent outside diameters with Certa-Lok, or equal, restrained rubber gasketed joints.

B. Minimum pressure class shall be 150 psi. Where pipe is used in conjunction with PVC SDR 17 or AWWA C-900 Class 200 pipe, the restrained joint pipe shall be minimum Class 200.

C. Each length of pipe and each coupling shall be factory tested at four (4) times the pressure class, minimum 600 psi, for five (5) seconds.

D. Pipe and couplings shall not fail when subjected to the following test as specified in AWWA C-900: sustained pressure, burst pressure, flattening and extrusion quality.

2.05 DUCTILE IRON (DI) PIPE

A. Ductile iron pipe shall conform in all respects to ANSI A21.51 (AWWA C-151) and ANSI A21.50 (AWWA C-150) latest revisions, except as modified herein. D.I. pipe shall be minimum Class 350 for 4" thru 12" and for larger pipe shall be as noted on the plans and/or in the Bid Schedule. All interior surfaces of the pipe and fittings shall have a factory applied bituminous coated cement mortar lining per ANSI A-21-4. The standard coating for buried piping and fitting shall be a bituminous coating and shall conform to ANSI Specification A21-10 (AWWA C-110), Section 10-8 and ANSI Specification A21.51 (AWWA C-151).

B. Five percent of the pipe furnished shall be manufactured and inspected so as to insure that whenever a cut is made at any point along the pipe barrel, the cut end will socket properly into a push-on joint bell. This pipe shall be identified by a painted green stripe along the length of the pipe barrel.

C. Ductile iron non-restrained joint pipe shall be of the push-on joint type meeting the requirements of AWWA C-151/ANSI A21.51 and AWWA C-111/ANSI A21.11. The pipe shall be "Tyton Joint" pipe - U.S. Pipe and Foundry, "Super Bell Tite" - Clow Corp. or "American Fastite Joint" pipe - American Cast Iron Pipe Company or equal.

D. Push-on type joints shall have an annular recess in the pipe socket to accommodate a single rubber gasket. Plain ends shall be suitably beveled to permit easy entry into the bell. The gasket and annular recess of the socket shall be so designed and shaped that the gasket is locked in place against displacement as the joint is assembled.

E. Mechanical joints shall be bolted and of the stuffing box type and shall consist of a bell, with exterior flange and interior recess for the sealing gasket, a pipe or fitting plain end, a sealing gasket, a follower gland, tee-head bolts and hexagon nuts.

F. Restrained joints of the flexible, positive locking type shall have pipe barrel thickness remaining at grooves cut for restraint not less than the nominal wall thickness of the class specified. Ductile iron restrained joint pipe shall be "Lok-Tyton" joint type - U.S. Pipe and Foundry Co., "Lok-Fast" joint pipe - American Cast Iron Pipe Co., or "Super-Lock" joint pipe - Clow Corp. or Engineer approved equal. This type of joint is acceptable whenever restraint is required.

G. Each piece of pipe shall bear the manufacturer's name or trademark, the year in which it was produced, the letters "DI" or words "DUCTILE" and the standard thickness class designation.

H. "MegaLug" type joint restraints are required at mechanical joint fittings; the following manufacturers are acceptable: EBAA Iron and Ford.

I. Where joint restraint is required for push-on joints, it shall be provided by "FieldLok" type gaskets as approved by the pipe manufacturer.

2.06 POLYETHYLENE (PE) PIPE FOR DIRECTIONAL DRILLING

A. The water service piping 1" to 3" diameter pipe shall be high performance, high molecular weight, high density polyethylene pipe, Driscoplex 5,100, as manufactured by C.P. Chem. Performance Pipe, Plano, Texas, Endopoly as manufactured by Endot Industries, or equal, and shall conform to ASTM D 1248 (Type III, Class C, Category 5, P34). Minimum cell classification values shall be 355434C as referenced in ASTM D 3350.

B. The water distribution piping 4" and larger shall be high density, extra high molecular weight, Driscoplex 3408 PE as manufactured by C.P. Chem. Performance Pipe, Plano, Texas, Lamson Vylon Pipe, Cleveland, Ohio, or equal, and materials shall meet ASTM D-3350 Cell Classifications 345464C or 345464E.

C. The Owner or the specifying Engineer may request certified lab data to verify the physical properties of the materials supplied under this specification ormay take random samples and have them tested by an independent laboratory.

D. The P.E. pipe supplied under this specification shall be iron pipe (I.P.S.) O.D. SDR 7, 200 psi, unless otherwise specified.

E. The P.E. pipe sizes ½" through 3" diameter shall meet all applicable requirements of AWWA-C-901.

F. The P.E. pipe sizes 4" through 22" diameter shall meet all applicable requirements of AWWA C-906.

G. Polyethylene piping shall have NSF certification for potable water use.

2.07 RIVER CROSSING PIPE

A. River crossing pipe shall be flexible joint ductile iron pipe. The following specifications shall apply:

Ductile Iron Pipe - Shall be centrifugally cast, boltless flexible joint pipe and meet the requirements of ANSI/AWWA C151/A21.51-96 and C110-A21.10-87 for ductile iron pipe. The joint components, not centrifugally cast shall conform with the requirements of ASTM A339, Grade 80-60-03 or ASTM A138, Grade 9-60. Ductile Iron Pipe shall be "Flex-Lok" boltless, ball joint, flexible joint pipe as manufactured by American Cast Iron Pipe Company, or equal.

Classes and thicknesses of pipe shall be as per the following chart:

Nominal Pipe Size	D.I. ASA Thickness Class No.	D.I. Working Pressure	D.I. Nominal Thickness Inches
4"	54	250	.35
6"	54	250	.37
8"	55	250	.42
10"	55	250	.44
12"	56	250	.49
14"	56	250	.51
16"	57	250	.55

Pipe shall be furnished in nominal laying lengths of 20'-6". Pipe shall be coated outside and cement lined seal coated inside in accordance with ANSI/AWWA C104/A21.4 - latest edition.

The maximum design deflection for the joint is 15°; however, a deflection of no more than 12° will be permitted.

2.08 NOT USED

2.09 DUCTILE IRON FITTINGS AND ACCESSORIES

A. Ductile iron fittings shall be Class 350 ductile iron mechanical joint compact fittings conforming to ANSI Specification A21.53 (AWWA C153) and ANSI 21.11 (AWWA C-111). All lining and coating for fittings shall be as specified for pipe. The fittings shall be designed to withstand the same pressures as required for the adjoining pipe and shall have the same type of joints.

B. Fittings shall be coated outside with a standard bituminous material equal to that specified for ductile-iron pipe under AWWA Specification C-110 or C-153.

C. Fittings shall be as manufactured by U.S. Pipe and Foundry Co., American Cast Iron Pipe Co., Clow Corp. or Engineer approved equal.

D. NOT USED

E. NOT USED

F. Flanged joint fittings shall conform to ANSI A21.10 (AWWA C 110) or ANSI B16.1.

G. All flanged joints shall be furnished with 1/8 inch thick red rubber gaskets. The bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all as specified in Americana Standard for Wrench Head Bolts and Nuts and Wrench Openings (ANSI B18.2). Material for bolts and nuts shall conform to ASTM A-307 Grade B.

2.10 TAPPING SLEEVES

A. Tapping sleeves shall be designed for a water working pressure of 150 pounds, and shall be provided with the necessary test plugs for pressure testing. Dimensions shall be such that the tapping sleeve can be installed on the size and type of pipe for each connection. All material shall be in accordance with AWWA Specifications.

B. Tapping sleeves will be as manufactured by the following:

Company	Model
1. Romac Industries, Inc.	SST
2. Power Seal Co.	3480
3. Ford Meter Box Co.	FAST
4. Smith - Blair	662 or 663
5. JCM	432 (for C-905)

C. Tapping sleeve to have a flange connection to receive a flange by mechanical joint tapping valve, with a proper gasket between the sleeve and valve. The flange on the sleeve may be stainless steel, carbon or ductile. All-thread may NOT be substituted for bolts in the valve-to-sleeve connection.

2.11 TRACE WIRE and WARNING TAPE

A. Warning tape shall be inert bonded layer plastic with metallized foil core, 6 inches wide, resistant to alkalis, acids and other destructive chemical components encountered in soils; APWA Uniform Color Code, brightly colored; imprinted indicating pipe type; Griffolyn Company Terra Tape "D". Trace wire shall be Seton Name Plate Corporation, or as approved, 12 AWG THW wire minimum.

2.12 VALVES

A. All gate valves, shall conform to the latest standard specifications of AWWA C-515 for resilient seated valves. All gate valves installed under this contract shall be of the same class as the pipe on which they are installed. Valves shall have mechanical joint ends, non-rising stems, 2" square operating nut and shall open "left". All bolts on buried valve bodies shall be stainless steel.

B. Buried valves shall be provided with boxes and covers. Boxes shall have adjustable cast iron bodies. All bolts on buried valve bodies shall be stainless steel.

C. Buried butterfly valves shall be deZurik or approved equal and shall conform to the latest standard specifications of AWWA C-504. They shall be gear operated with mechanical joint

ends and capable of operating at 150 psi. Valves shall open "left". All bolts on buried valve bodies shall be stainless steel.

D. Valve boxes shall be fitted with Box Seats (No. 45158) as manufactured by Quality Water Products, Lima/West Carrolton, Ohio (800-288-4668), or approved equal.

2.13 HYDRANTS

A. Hydrants shall be installed at locations shown on the plans. Included with each hydrant shall be its own gate valve and valve box. The hydrant, valve, and tee shall be connected with anchoring pipe. The specific placement of the hydrants shall be determined in the field with the Engineer prior to final installation. Hydrants shall be furnished and installed in accordance with the "Typical Hydrant Installation" detail on the drawings. Hydrant, tee and valve shall be paid as a unit price item; anchoring pipe shall be paid by the linear foot. Hydrants shall be ordered and supplied with factory-applied paint of the color indicated during shop drawing review (generally safety yellow for fire hydrants, or safety red for two-way hydrants). If any hydrants are supplied with an incorrect color, they will be rejected. If paint must be field-applied to repair imperfections caused during handling, the area shall be roughed up, cleaned, and receive two coats of the type and color of paint to match the rest of the hydrant.
   1. Approved Manufacturers: Mueller, M&H, Kennedy, and American-Darling. Also Kupferle for post hydrants only.
   2. Fire and Two-way hydrants: AWWA C502, compression type, 5¼-inch main valve opening, open by turning left (counterclockwise); traffic model with frangible barrel section and stem coupling; positive operating drain valve installed in open position; 6-inch mechanical joint base, designed so water hammer will be prevented when properly operated.
   3. Fire hydrant: Two 2½-inch hose nozzles, and one 4½-inch pumper nozzle. Mueller Centurion A423, M&H Fire 129, Kennedy K81A/D, American-Darling B-84-B-5.
   4. Two-way hydrant: Two 2½-inch hose nozzles. Mueller Centurion A422, M&H Style 129, Kennedy K81A/D, American-Darling B-84-B-5.
   5. Post hydrant: M&H #33, Kupferle Eclipse Post #2.
   6. Suitable for setting in trenches of depths and in locations shown; Contractor responsible for determining hydrant depth of bury based on location shown.
   7. Verify that the direction of opening, hydrant pumper nozzle, operating nut, outlet nozzle cap nuts, and hose threads conform to those in the system before the new hydrants are shipped.

B. Piping:
   1. Ductile Iron Pipe: AWWA C150, AWWA C151, bituminous coated on outside, cement mortar lined with seal coat in accordance with AWWA C104.
   2. AWWA C153 mainline tees with standard mechanical joint branch for connecting to anchoring pipe and fittings, and mechanical joint anchoring type branch when connecting to a watch valve.
   3. Anchoring pipe, plain end mechanical joint type incorporating an integral cast shoulder and follower gland.
   4. Anchoring Pipe Manufacturers: Clow Corporation, American Cast Iron Pipe Company, United States Pipe and Foundry Company, or approved equal.

2.14 LEAK DETECTION METER

A. Components of the leak detection meter assembly on a 6-inch main are as follows: approximately 12 feet of 1-inch IPS Class 200 PE 3408 service line; eight one-inch steel pipe inserts; two Ford F1001-4-PJ corp stops; two 6X1 Ford saddles (S70-604 if main is PVC, FS101-690-CC4 if main is C900, and FRS202-760-CC4 if main is DIP); one Ford VH72-15W-66-44 setter; one Ford C-3T lid; one Ford FC-3 ring; one Mid-States straight-sided PVC 20-inch by 30-inch meter box; two Ford Z66-444 curb stops; two P-93-E Amtex curb stop boxes.

2.15 METERED SERVICES

A. Components of a metered service include:
1. For C-900 pipe, tapping saddle with stainless steel straps, FS101-xxx-CC4 by Ford or equivalent by Mueller or A.Y. McDonald. For ductile iron pipe, tapping saddle as above, or corp stop may be tapped directly in the water main. For PVC pipe, tapping saddle is brass, Ford S70-X04, or equivalent by Mueller or A.Y. McDonald.
2. Cast bronze corp stop with 1" AWWA inlet thread and 1" pack joint for PE pipe (IPS). F1001-4-PJ by Ford or equivalent by Mueller or A.Y. McDonald.
3. AWWA C800 curb stop, bronze or brass, complete with required fittings for connection to service pipe. Z66-444-PJ by Ford or equivalent by Mueller or A.Y. McDonald.
4. Cast iron curb box and cover; adjustable body.
5. Copper meter setter for 5/8 x 3/4 meter with brass 90° self-stabilizing type meter valve with O-ring stem seal and smooth contour unobstructed waterway with dual check valve on outlet side. Integral pack joint for 1" (IPS) PE pipe. Bracing eye for ½" rigid PVC or iron pipe. VH72-15W-66-44PJ by Ford or equivalent by Mueller or A.Y McDonald. For meter facilities with an IPRV and S-tube, as indicated on the drawings, tandem setters shall be used.
6. 1-inch IDR-7 PE 3408/3608 service line with stainless steel inserts. Charter or Owner-approved equal. Must demonstrate that a product other than Charter has the exact same ID.
7. 2" PVC casing pipe, SDR21 or HDPE sized to accommodate the specified 1" service line material.
8. Pigtail on outlet side of meter setter. 1-inch Schedule 40 PVC.
9. Connection to customer service line, when needed. All brass with integral pack joints. Ford, Mueller, A.Y. McDonald.
10. Meter facility. 20" X 30" PVC smooth straight wall meter box with notches. Carson #00202013 or Owner-approved equal. Ring and lid to be Ford C3-T or Owner-approved equal.

PART 3 EXECUTION

3.01 INSTALLATION OF PIPE

A. All pipe shall be installed in accordance with the manufacturer's published instructions and with the applicable sections of AWWA C600 or C605, modified only as may be directed herein or by the Engineer. All piping locations shall be as shown on the plans and staked out prior to installation. The Contractor and Resident Inspector shall agree on the staked location of the water main prior to installation. No installation shall be made without documentation of easement or permit. Construction outside of easement or permit area shall be at the Contractor's expense.

B. Pipe Bury Depth - normal laying depth shall be 48 inches of cover depth minimum regardless of pipe diameter. Depth of cover over water main shall not exceed five feet at any location without Engineer's approval.

C. All piping shall be assembled in accordance with the layout shown on the plans with only such modifications as may be necessary to conform to the final detail dimensions or location of existing water mains, hydrants, existing utilities, tanks, valve vaults, booster stations, valves, county roads, highway and stream crossings, etc. In crossing under ditches and streams the standard depth of trench shall be maintained. Standard fittings shall be used if required to depress the pipe but in no case shall the approach to the crossing be laid at a steeper angle than forty-five degrees (45°) with the horizontal.

D. Trench width at the top of the pipe shall not exceed the pipe diameter plus 18 inches unless approved by the Engineer. For pay items with quantities determined by the trench width, payment shall be determined by assumed vertical trench walls for the actual trench width used, as measured at the top of the pipe, but not exceeding the pipe outside diameter plus 18 inches. Payment will not be made for over removed work or for replacement materials. Pipe shall be installed in the trench as follows:
   1. Ductile iron pipe shall be laid directly on a flat bottom trench or on 4 inches of loose soil bedding containing coupling or bell joint holes with trench shaped to provide continuous contact with the pipe between coupling or bell joint holes as recommended by the pipe manufacturer or as directed by the Engineer. This conforms to Type 2 or Type 3 trenches as per AWWA C600.
   2. PVC or C900 pipe shall be laid atop 4 inches of Select Fill bedding and with bell joint holes.

E. Trace wire shall be connected to each valve and shall be brought up to grade with a minimum of two feet of looped extra wire at each valve and meter facility. Curb boxes with two feet of looped extra wire shall also be installed if distance between valves and meter facilities exceeds 500 feet. Wire shall be securely taped to the water main with 1-1/2" PE tape wrapped around twice at every fitting and at a maximum spacing of 6 feet along the main. If splicing is needed, use 3M Type DBR, or Klick-It Model C8816 by Absolute Automation, or Copperhead Snakebite splicer with filled moisture displacement silicone for corrosion resistant protection, part #SBC-OL Direct Bury Splice Kits or approved equal. Contractor shall schedule a conductivity/locate test and shall repair any defects.

F. If, in the course of construction, ground water is encountered, the Contractor shall, by means of well points or other acceptable methods reduce the water level to the invert of the main or bottom of the structure. The Contractor shall maintain this dewatered condition until the area around the structure has been backfilled to existing grade. No pipe shall be laid in water, or when the trench conditions or the weather is unsuitable for such work, except by permission of the Engineer. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by approved means and no trench water shall be permitted to enter the pipe. It shall be borne in mind that precautions must be taken to prevent empty pipe from floating, should the trench become flooded before backfilling has been completed.

G. Each piece of pipe shall be lowered into trench and installed separately. All pipe shall be laid in the trench so that it is firmly supported on the bedding material or the flat bottom trench throughout its length.

H. As shown on the plans, or as directed by the Engineer, the Contractor shall provide concrete anchors or thrust blocks (against undisturbed earth), joint harness, and concrete encasement

where required. This work shall be included in the unit prices bid for installing pipe, fittings and appurtenances.

I. Pieces of pipe or fitting which are known to be defective shall not be laid or placed. Any defective piece of pipe or fitting discovered after the piping is laid shall be removed and replaced with satisfactory pipe or fitting. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe. Cuts shall be made with proper tools for cutting the pipe. In the event the pipe is damaged as a result of the pipe being cut, the affected joint shall be rejected. Ductile pipe shall be field gaged before cutting.

J. Select Fill bedding shall be required where rock, either loose or solid, is exposed at trench bottom at the required bury depth. It is intended that the pipe at all times is protected against damage from protruding objects and rests on a smooth and continuous bedding of earth or sand. Also, sand bedding shall be required whenever the excavated material is not acceptable, as directed by the ENGINEER.

K. All ductile iron pipe and fittings shall be encased with linear low-density polyethylene film with a minimum thickness of 0.008 in. (8 mil). The materials of the film, the dimensions of the tubes or sheets used, the marking of the film, and the installation of the film shall be according to AWWA C105.

3.02 PRESSURE TESTING

A. After the pipe has been laid and partially backfilled all newly laid pipe, or any valved section of it, including hydrants shall unless otherwise specified, be subjected to hydrostatic testing in accordance with AWWA Specification C-600 or C-605. The Contractor shall furnish all labor, materials, and equipment necessary to test the system as described herein.

B. Allowable leakage shall not exceed the limits established in AWWA Specification C-600 or C-605, latest revision, as measured in a manner approved by the Engineer,

C. If directed by the Engineer or required by the specifications, further leakage tests shall be run upon combined lengths of the newly laid mains.

D. Should any tests of combined sections of pipe laid disclose leakage per mile of pipe greater than that specified or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints and/or pipe and retest the section until the leakage is within the specified allowance.

E. Before applying the specified test pressure, all air should be expelled from the pipe. To accomplish this, valved taps shall be made at points of highest elevation along the water main as required for installation of manual air release valve pits. These air vent installations are necessary for the Contractor to satisfactorily pressure test, flush and sterilize the water mains.

F. The air release valve and combination air/vacuum release valve installations shall be in accordance with the Water Facility Details contained in the plans.

G. Any exposed pipes, fittings, valves, hydrants and joints shall be carefully examined during the test. Any cracked or defective pipes, fittings, valves or hydrants discovered in

consequence of this pressure test shall be removed and replaced with sound material at the Contractor's expense, and the test shall be repeated until satisfactory to the Engineer.

H. The Engineer and/or his authorized representative shall supervise the testing specified herein and complete test results in report form shall be submitted to or filed by the Engineer. The test shall be conducted using pressure gauges furnished by the Owner.

3.03 CONNECTIONS

A. Type A Connection

The Contractor shall furnish and install complete pressure taps where indicated on the plans or indicated in the proposal forms. These taps shall include a mechanical joint tapping sleeve with flanged by mechanical joint tapping valve. The installation shall also include a valve box. A lump sum price for each tap shall be submitted in the proposal forms for all labor, material, and equipment necessary to provide a complete tap as set out above and hereinafter.

The Contractor shall provide competent personnel to make all pressure taps.

The Contractor shall, after the tapping sleeve and valve are installed and properly supported on concrete pads, pressure test the installation at 150 pounds in the presence of the Inspector to prove no leakage is present. After this test and before the tap is made, the Contractor shall provide a poured concrete thrust block behind the tapping sleeve providing a bearing area of not less than 15 square feet against undisturbed soil.

B. Type B Connection

A separate lump sum bid item has been established for each Type B connection which includes cutting into an existing main and installing a tee and/or other fittings, concrete blocking, etc., to provide a complete connection at each location. The cost of abandonment of existing water mains at Type B Connections shall be included in the price bid for Type B Connections. The cost of any valves shown at Type B Connections shall be included separately with the approvpriate bid item(s) for valves.

C. Type C Connection

A separate lump sum bid item has been established for each Type C connection, which includes all connections to the end of an existing main.

D. The Contractor shall include in the lump sum price for each Type B and Type C connection the cost of valving off the existing main, flushing and bleeding air from the existing line once the connection is made. The existing line shall not be valved off until the Contractor has all necessary equipment and materials at the site to make the proper connection.

E. All connections to existing mains shall be provided as indicated on the plans and proposal forms. The Contractor shall provide 7-days notice to the Owner prior to the connection or line outage. All connections shall be under the supervision of the Owner unless directed otherwise by the Engineer.

3.04 DISINFECTION

A. No water distribution piping installed shall be placed in service until it has been pressure tested and disinfected. Disinfection procedures shall be in accordance with AWWA C-601. The continuous feed method must be used. Tablet disinfection is NOT allowed.

B. Contractor shall dechlorinate the water used for disinfection before discharging. The dechlorination procedure shall be approved by the Engineer, and shall result in discharge of water with a chlorine residual of no more than 0.2 ppm. ~~Equipment may be rented from the Owner for this purpose. Neutralizing chemical may be purchased from Owner at cost.~~

C. Samples shall not be taken from flushing hydrants or any unsterilized equipment. Samples may be taken through sampling yokes at individual meter installations or rise pipe from corporation cocks installed in the water main. All sampling locations shall be approved either by the Engineer or the Public Health Agency having jurisdiction.

D. All water required for the filling, hydrostatic testing, disinfection and flushing of water mains shall be obtained from the Owner.

E. After disinfection and flushing, the Contractor shall notify the Owner to secure and obtain satisfactory bacteriological samples and results of the finished water. Disinfection procedures shall be continued until approved samples have been obtained. The Owner shall provide the testing at no cost to the Contractor.

3.05 INSTALLATION OF VALVES

A. The Contractor shall make all valves tight under their working pressure after they have been installed and before they are placed in operation. Any defective parts shall be replaced at the Contractor's expense.

B. All valves shall be pressure tested and sterilized in conjunction with their adjoining piping.

C. Valves shall be installed in accordance with the installation manual furnished by the valve manufacturer. Extreme care shall be used in the handling, storage an installation of these valves to prevent damage or distortion of the equipment and to insure proper performance.

D. Each valve box shall be fitted with a Box Seat as per 13300.2.12.D.

3.06 INSTALLATION OF HYDRANTS

A. Hydrants shall be installed according to the detail included in the Drawings, and shall be cleaned and field coated with enamel paint according to color selection by Owner. Hydrants shall be rotated on the barrel section, at the time of installation, to face the adjacent roadway, or as directed by the Owner.

3.07 RAILROAD CROSSINGS

A. As shown on the plans and as required by the proposal forms, the Contractor(s) shall install welded standard steel casings (Section 13310 Steel Encasement Pipe) under railroads and install water mains by sliding into the steel casing. The Owner shall obtain the necessary permit(s) from the railroad prior to the authorization of the project. The Contractor(s) shall have on the site, during construction of any crossing, a copy of the approved railroad permit. The Contractor shall also provide railroad liability insurance, as required by each railroad company.

3.08 STREAM CROSSINGS

A. As noted on the plans, provide PVC casing for at least the noted length to protect the water main below the flowline of the stream. Casing spacers and end seals shall be as specified in Section 13310 Steel Encasement Pipe.

3.09 LEAK DETECTION METER

A. Tap the main approximately five feet either side of the gate valve indicated on the drawing and install corp stops. Install meter box with ring and lid approximately five feet away from the gate valve. Install setter inside meter box. Use 1-inch PE with steel inserts to connect corp stops to inlet and outlet sides of the setter, installing curb stops at mid-point each side.

3.10 INSTALLATION OF METERED SERVICES

A. Refer to detail in the plans. Main shall not be tapped for services until after pressure testing and disinfection of the main is complete.

B. PE service line shall be bedded in 2 inches of Type C Select Fill (refer to Section 02220.2.01.C). A minimum of 12 inches of Type C Select Fill shall be placed above the PE service line.

C. Trace wire shall be installed with all service lines according to Section 13300-3.01.E. Splices between service line trace wire and water main trace wire shall be made using Mainline-to-Service Connectors by Copperhead Industries, DryConn Direct Bury Lug by King Innovation, or equal.

3.11 ABANDONMENT OF EXISTING FACILITIES

A. Where shown on the plans, water mains to be abandoned shall be cut at the noted locations and completely plugged with concrete (the intention is not to fill the main but to plug the end).

B. Where shown on the plans, valves to be abandoned shall have valves and boxes removed to at least 24 inches below finish grade. Scrap metal shall be given to the District's representative.

C. Where shown on the plans, meter facilities to be abandoned shall have the lid, ring and meter box removed to at least 24 inches below finish grade. The copper setter shall also be removed. Scrap metal shall be given to the District's representative.

END OF SECTION

SECTION 13310

STEEL ENCASEMENT PIPE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General Conditions, Supplementary Conditions (if included), and Division 1 Specifications Sections, apply to this Section.

1.02 SECTION INCLUDES

A. Steel encasement pipe.

1.03 UNIT PRICE - MEASUREMENT AND PAYMENT

A. Steel Encasement Pipe: By the price per linear foot for steel encasement pipe of sizes included in the Bid items, including the cost of necessary inspections, insurance, etc. required by governing authority. Includes steel encasement pipe, installed complete, except for portions of Work for which separate payment is made under this or other Sections.

B. Upon installation, an amount equal to at least 3 percent of the price bid per linear foot will be withheld for completion of testing. Individual circumstances shall determine whether an amount in excess of the percentage indicated will be withheld. When items for which monies are withheld are completed, or partially completed, the amount withheld shall be appropriately reduced. Amounts withheld pursuant to this paragraph shall be in addition to retainage made pursuant to applicable requirements of the Contract Documents.

1.04 REGULATORY REQUIREMENTS

A. OWNER will secure necessary permits. Work not to begin before permit is issued.

B. CONTRACTOR responsible for meeting the requirements of the governing authority, which may include approval of equipment to be used for installation of the encasement pipe, and for notifying the governing authority prior to start of Work.

C. OWNER and ENGINEER shall not be responsible for additional cost to CONTRACTOR for failure to meet governing authority's requirements.

PART 2 PRODUCTS

2.01 STEEL ENCASEMENT PIPE

A. Comply with ASTM A139, Grade B.

B. Minimum Tensile Strength: 60,000 psi.

C. Minimum Yield Strength: 35,000 psi.

D. Wall Thickness: Minimum 0.375 inch

E. Exterior Coating: Bituminous.

F. Joints: Fully welded on circumference.

2.02 PIPE BLOCKING AND FILL

A. Pipe blocking must be done with casing spacers, with a maximum of 1 inch between blocking and steel encasement pipe wall.

B. Casing Spacers:
   1. Manufacturers:
      a. Power Seal Pipeline Products Corporation.
      b. Cascade Waterworks Manufacturing Company.
      c. Advance Products & Systems, Inc.
      d. Or as approved.
   2. Materials: Polyethylene or stainless steel with a liner and UHMW polymer plastic runners.

C. End Seals: Wrap around type with sealed joint.
   1. Manufacturers:
      a. Advance Products & Systems, Inc, Model AW
      b. Cascade Waterworks Manufacturing Company, Style CCES.
      c. Or as approved.
   2. Materials: Synthetic rubber seal and Type T-304 stainless steel bands.

PART 3 EXECUTION

3.01 PREPARATION

A. Apply exterior coating a minimum of 48 hours prior to pipe installation.

B. Notify governing authority.

3.02 INSTALLATION

A. Install encasement pipe by boring and jacking, with a minimum 4 feet of cover, except at railroads where cover shall be minimum 5.5 feet. A minimum distance of 5 feet from the edge of pavement is required.

B. Excavate bore pit and receiving pit; follow Section 02215. Shore as required by Laws and Regulations.

C. Boring operations shall be continuous; boring auger never to be more than 1 inch ahead of casing pipe during boring operations.

D. Block pipe in place within encasement pipe to prevent shifting or flotation and maintain proposed grade.

E. Provide end seals; one at each end of encasement pipe.

F. Backfill pits; follow Section 02220.

END OF SECTION

SECTION 13311
HORIZONTAL DIRECTIONAL DRILLING (HDD)

PART 1 GENERAL

1.01 SCOPE

A. Work of this Section includes, but is not limited to:
   1. Horizontal directional drilling.
   2. Pipe installation in bored hole.
   3. Excavation of receiving pit.

B. Related work specified elsewhere:
   1. Section 0340 Shop Drawings, Product Data and Samples
   2. Section 02110 Clearing
   3. Section 02215 Excavation
   4. Section 13300 Water Distribution System

1.02 REGULATORY REQUIREMENTS

A. Perform directional drilling work in compliance with applicable requirements of governing authorities having jurisdiction and obtain all permits as required.

B. Conform to all local, state and federal codes for work and disposal of debris.

C. Maintain traffic control devices in conformance with traffic control plan and authorities having jurisdiction.

D. Permits
   1. Owner shall obtain the necessary right-of-way permits from the state, county, and railroad authorities as applicable. Conditions of such requirements are provided in the appendices of the Project Manual. These conditions shall be considered a part of the project manual and the Contractor shall be bound to such conditions thereof.
   2. Contractor shall obtain and pay for all other local, state, and federal permits as required by the agencies having jurisdiction.

1.03 JOB CONDITIONS

A. General
   1. Where work under this item involves directional drilling under roadways and/or railways, all operations of the Contractor and his agents shall be subordinate to the free and unobstructed use of the roadway and/or railways without delay or danger to life, equipment, or property.
   2. Site Information
      a. Topography and structures shown on the Drawings have been obtained from existing records and are shown for the convenience of the Contractor. Not all structures may be shown. Contractor shall explore ahead of the excavation to determine the exact location of all structures.
      b. Locate and protect existing utilities in work area.
      c. Test soil borings have not been made on the site. No classification of excavated or drilled material will be made. Excavation and drilling includes

all materials regardless of type, character, composition, moisture, or conditions thereof.

d. All excavations shall be shored and braced as required to prevent subsurface subsidence.
e. Access to drilling operations and dewatering of excavations shall be maintained at all times.
f. Closely monitor and detect vertical and horizontal displacement of existing roadways, railways, grades, and utilities.
g. Closely monitor and detect drilling fluid surface seepage.

3. Protection
   a. Guardrails, fences, signs, lights, barricades, barrels, and all other protective items necessary shall be provided in accordance with the requirements of all applicable permits, laws, regulations, and ordinances, and as necessary to prevent damage or injury to private or public property to workers and the general public.
   b. Adequately support and protect structures, utilities, pavements and facilities that are encountered in, or maybe affected by, the work from damage caused by settlement, lateral movement, undermining, seepage, washout and other hazards created by the directional drilling operations.
4. Inspection Costs and Fees
   a. Contractor shall be responsible for the payment of all costs that may result due to the roadway or railway authority's requirements, of whatever nature, including the furnishing of watchmen and supervision by its forces.

1.04 SUBMITTALS

A. Provide in accordance with Section 01340, letters, shop drawings, product data showing materials of construction, installation equipment and details for the HDD operation. Submittals demonstrating all materials conform to the requirements of this section and the Contract Drawings.

B. Pipe

C. Special adaptors and connections

D. Qualifications of the HDD Contractor
   1. Name, business, address and telephone number of the Contractor
   2. Experience in successfully constructing directional drilling operations
   3. List of similar projects performed over the last two years including the name of contact person and telephone number
   4. Certification of workman training
   5. Name(s) of all supervisory personnel to be directly involved with the project.
   6. The Contractor shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the HDD operations will be directly involved with this project.

1.05 RECORD DRAWINGS

A. Provide record of location of all encountered buried utilities remaining or rerouted.

B. Include horizontal and vertical dimensions and elevations.

C. Provide record drawing of bore hole as finally constructed including size and horizontal and vertical dimensions and elevations.

1.06 REFERENCE STANDARDS

A. ASTM – American Standards for the Testing of Materials.

1.07 QUALIFICATIONS

A. HDD Contractor
   1. The HDD Contractor shall be trained and certified to operate the Horizontal Direction Drilling equipment with at least 5 years experience in directional drilling obtained over the last five years. Perform HDD operations under the constant direction of a drilling supervisor who shall remain on site and be in responsible charge throughout the drilling operation. The supervisor shall have supervised directional drilling of a minimum of 5,000 linear feet of pipe.

PART 2 PRODUCTS

2.01 MATERIALS

A. Polyethylene Pipe: Refer to Section 13300, Water Distribution System.

B. Manufactured Transition Fittings: Restrained joint manufactured transition fittings to match diameter of HDPE to water main, Independent Pipe Products Slip Joint Anchor Fittings, or equal.

C. Lubricant shall be bentonite or polymer-based slurry.

D. Cement grout shall consist of a mixture of 1 part cement to 6 parts sand. The amount of cement may be increased or decreased as necessary and as permitted by the Engineer to provide good flowing characteristics.

2.02 EQUIPMENT

A. The drill rig and associated equipment shall be in good condition and capable of completing the project without significant delays.

B. The drill bit and reamers shall have a closed face and shall be capable of supporting the excavated area (face) during excavation and shutdown. The bit shall be full directional in both the horizontal and vertical directions from the drill rig so that the alignment can be maintained during the entire drilling operation.

C. The drill bit shall be capable of drilling through all materials encountered including sand, gravel, glacial till and outwash, organics, marine clay, shale, and limestone.

PART 3 EXECUTION

3.01 PROTECTION

A. Protection of Persons and Property

1. Barricade open excavations occurring as part of this Work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required by state or local agencies.
2. Protect structures, utilities, sidewalks, pavements, and other properties from damages caused by settlement, vibrations, lateral movement, undermining, washout and other hazards created by excavation operations.
3. Comply with the requirements of all agencies having traffic control authority.
4. Protect trees and other plants from damage that are to not to be disturbed.
5. Restore damaged improvements including drainage tile to their original condition, acceptable to parties having jurisdictional ownership.

B. Existing Utilities Protection
1. Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protecting during excavation operations.
2. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult the Owner immediately. Cooperate with the Owner and public or private utility companies in keeping their respective services and facilities in operation. Repair damaged utilities to the satisfaction of the utility owner.
3. Do not interrupt existing utilities occupied and used by the Owner or others, except when permitted in writing, and then only after acceptable temporary utility services have been provided.

3.02 PROCEDURE

A. General
1. Methods and procedures shall conform to the requirements and recommendations of ASTM F1962, Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstructions, Including River Crossings and referenced standards.

B. Equipment
1. Drilling equipment shall be capable of providing the thrust, pullback and reaming operations. Properly secure equipment to ground for operation.
2. Crews shall be trained by the drilling equipment manufacturer and have the proper field experience.
3. Provide a breakaway link designed to prevent the pullback force from exceeding the strength of the pipe as recommended by the pipe manufacturer.
4. Provide a swivel between the reamer and the pipe designed to prevent torsional loads on the pipe during pullback.

C. Boring Procedures
1. Boring shall proceed by creating a pilot drilled hole guided by a drill head capable of being steered in the direction desired.
2. The guidance system shall have the capability of measuring vertical and horizontal positions and roll. The guidance system must meet the following accuracy levels:

Vertical position	+/- 1 inch at	1.5 to 8	feet of depth
	+/- 2 inches at	8 to 12	feet of depth
	+/- 4 inches at	12 to 15	feet of depth
	+/- 6 inches at	15 to 25	feet of depth
Horizontal position	+/- 2 inches at	1.5 to 8	feet of depth
	+/- 4 inches at	8 to 12	feet of depth

	+/- 6 inches at	12 to 15 feet of depth
	+/- 12 inches at	15 to 25 feet of depth
Roll	+/- 0.1 degree over a range of 0 to 360 degrees	

3. A tracking system shall allow the location and depth of the bore head by a manually operated overhead receiver. Document the locations and depth of the drill head at minimum 20-foot intervals and at all obstacles or other changes in soil material that may alter the direction of the drill head.
4. Make visual inspection of the surface above the boring to look for signs of settlement on an hourly basis during the time of active drilling. Establish surface settlement monitoring points above the boring for use in monitoring.
5. Record location of monitoring points with elevations on hard (pavement, concrete, etc.) surfaces to the nearest 0.01 feet. Ground (non-paved or non hard) surface movement (settling or heaving) shall not exceed 0.05 feet. Report any loss of ground, roadway, drives, or sidewalk cracking immediately.
6. Submit an as-built survey of the pilot hole prior to pre-reaming and an as-built survey of the carrier pipe upon work completion, indicating conformance with the specified requirements.
7. HDD operations shall limit vibrations transmitted to surrounding structures so as not to cause damage.
8. Jet fluid, mechanical cutting, or a combination of both shall be utilized in the boring operation.
9. Pullback head shall prevent soil, drilling mud or other material from entering the pipe.
10. Multiple passes of reaming and pullback may be used to gradually enlarge the size of the borehole to permit the installation of the pipe.
11. Drill the borehole to the size required to permit installation of the pipe.
12. Do not exceed maximum pipe deflection as recommended by the pipe manufacturer.
13. Install #6 trace wire with the pipe. Bring the wire to grade in a curb box at each end of the installation.
14. Pressure grout the annular space around the final pipe if the final ream produces a theoretical annular space of more than 0.2 cu. Ft. per linear foot of pipe.
15. Install restrained joints to transition from HDPE to water main. Restrained joints shall incorporate a manufactured HDPE fitting meeting the HDPE pipe pressure rating with collar for backup ring and stainless steel stiffeners (stiffener must be located under the gasket and clamp. The fitting shall include the necessary retraining glands, bell restraint ring, back-up ring, tie rods, etc.

D. DRILLING FLUID

1. Drilling fluid shall be utilized to stabilize the borehole, remove cuttings, cool the drill head and provide lubricant for the drill string.
2. Drilling fluid shall consist of bentonite or polymer additives and shall be considered as non-hazardous by all federal, state and local regulations.
3. All excess drilling fluid shall be promptly removed using vacuum truck equipment and properly disposed of off-site. No wastes shall be left on site or be permitted to migrate from the site. Provide protection of any waste from entering ditches or streams.
4. No drilling fluid shall be allowed to discharge into a ditch or waterway.

END OF SECTION