CALL NO. 320

CONTRACT ID. 251101

MORGAN COUNTY

FED/STATE PROJECT NUMBER FD04 088 0460 014-015

DESCRIPTION KY 191/US 460 IMPROVEMENTS

WORK TYPE GRADE & DRAIN WITH ASPHALT SURFACE

PRIMARY COMPLETION DATE 8/15/2025

LETTING DATE: January 23,2025

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN STANDARD TIME January 23,2025. Bids will be publicly announced at 10:00 AM EASTERN STANDARD TIME.

PLANS AVAILABLE FOR THIS PROJECT.

REQUIRED BID PROPOSAL GUARANTY: Not less than 5% of the total bid.

TABLE OF CONTENTS

PART I

SCOPE OF WORK

ADMINISTRATIVE DISTRICT - 10

CONTRACT ID - 251101

FD04 088 0460 014-015

COUNTY - MORGAN

PCN - DE08804602501
FD04 088 0460 014-015

KY 191/US 460 IMPROVEMENTS KY 191/US 460 IMPROVEMENTS, A DISTANCE OF 0.25 MILES.GRADE & DRAIN WITH ASPHALT SURFACE SYP NO. 10-9017.00.

GEOGRAPHIC COORDINATES LATITUDE 37:53:51.00 LONGITUDE 83:17:07.00

ADT 6,320

COMPLETION DATE(S):

COMPLETED BY 08/15/2025 APPLIES TO ENTIRE CONTRACT

CONTRACT NOTES

INSURANCE

Refer to Kentucky Standard Specifications for Road and Bridge Construction, current edition.

PROPOSAL ADDENDA

All addenda to this proposal must be applied when calculating bid and certified in the bid packet submitted to the Kentucky Department of Highways. Failure to use the correct and most recent addenda may result in the bid being rejected.

BID SUBMITTAL

Bidder must use the Department's electronic bidding software. The Bidder must download the bid file located on the Bid Express website (www.bidx.com) to prepare a bid packet for submission to the Department. The bidder must submit electronically using Bid Express.

JOINT VENTURE BIDDING

Joint venture bidding is permissible. All companies in the joint venture must be prequalified in one of the work types in the Qualifications for Bidders for the project. The bidders must get a vendor ID for the joint venture from the Division of Construction Procurement and register the joint venture as a bidder on the project. Also, the joint venture must obtain a digital ID from Bid Express to submit a bid. A joint bid bond of 5% may be submitted for both companies or each company may submit a separate bond of 5%.

UNDERGROUND FACILITY DAMAGE PROTECTION

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. When prescribed in said directives, the contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom shall be contacted through their individual Protection Notification Center. Non-compliance with these directives can result in the enforcement of penalties.

REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY

Pursuant to KRS 176.085(1)(b), an agency, department, office, or political subdivision of the Commonwealth of Kentucky shall not award a state contract to a person that is a foreign entity required by KRS 14A.9-010 to obtain a certificate of authority to transact business in the Commonwealth ("certificate") from the Secretary of State under KRS 14A.9-030 unless the person produces the certificate within fourteen (14) days of the bid or proposal opening. If the

foreign entity is not required to obtain a certificate as provided in KRS 14A.9-010, the foreign entity should identify the applicable exception. Foreign entity is defined within KRS 14A.1-070.

For all foreign entities required to obtain a certificate of authority to transact business in the Commonwealth, if a copy of the certificate is not received by the contracting agency within the time frame identified above, the foreign entity's solicitation response shall be deemed non-responsive or the awarded contract shall be cancelled.

Businesses can register with the Secretary of State at https://secure.kentucky.gov/sos/ftbr/welcome.aspx .

SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT

Questions about projects during the advertisement should be submitted in writing to the Division of Construction Procurement. This may be done by email to kytc.projectquestions@ky.gov. The Department will attempt to answer all submitted questions. The Department reserves the right not to answer if the question is not pertinent or does not aid in clarifying the project intent.

The deadline for posting answers will be 3:00 pm Eastern Daylight Time, the day preceding the Letting. Questions may be submitted until this deadline with the understanding that the later a question is submitted, the less likely an answer will be able to be provided.

The questions and answers will be posted for each Letting under the heading "Questions & Answers" on the Construction Procurement website (www.transportation.ky.gov/construction-procurement). The answers provided shall be considered part of this Special Note and, in case of a discrepancy, will govern over all other bidding documents.

HARDWOOD REMOVAL RESTRICTIONS

The US Department of Agriculture has imposed a quarantine in Kentucky and several surrounding states, to prevent the spread of an invasive insect, the emerald ash borer. Hardwood cut in conjunction with the project may not be removed from the state. Chipping or burning on site is the preferred method of disposal.

INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES

Identification of excess material sites and borrow sites shall be the responsibility of the Contractor. The Contractor shall be responsible for compliance with all applicable state and federal laws and may wish to consult with the US Fish and Wildlife Service to seek protection under Section 10 of the Endangered Species Act for these activities.

ACCESS TO RECORDS

The state agency certifies that it is in compliance with the provisions of KRS 45A.150, "Access to contractor's books, documents, papers, records, or other evidence directly pertinent to the contract." The Contractor, as defined in KRS 45A.030, agrees that the contracting agency, the

Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this agreement for the purpose of financial audit or program review. The Contractor also recognizes that any books, documents, papers, records, or other evidence, received during a financial audit or program review shall be subject to the Kentucky Open Records Act, KRS 61.870 to 61.884. Records and other prequalification information confidentially disclosed as part of the bid process shall not be deemed as directly pertinent to the agreement and shall be exempt from disclosure as provided in KRS 61.878(1)(c).

BOYCOTT PROVISIONS

If applicable, the contractor represents that, pursuant to KRS 45A.607, they are not currently engaged in, and will not for the duration of the contract engage in, the boycott of a person or an entity based in or doing business with a jurisdiction with which Kentucky can enjoy open trade. **Note:** The term Boycott does not include actions taken for bona fide business or economic reasons, or actions specifically required by federal or state law.

If applicable, the contractor verifies that, pursuant to KRS 41.480, they do not engage in, and will not for the duration of the contract engage in, in energy company boycotts as defined by KRS 41.472.

LOBBYING PROHIBITIONS

The contractor represents that they, and any subcontractor performing work under the contract, have not violated the agency restrictions contained in KRS 11A.236 during the previous ten (10) years, and pledges to abide by the restrictions set forth in such statute for the duration of the contract awarded.

The contractor further represents that, pursuant to KRS 45A.328, they have not procured an original, subsequent, or similar contract while employing an executive agency lobbyist who was convicted of a crime related to the original, subsequent, or similar contract within five (5) years of the conviction of the lobbyist.

SPECIAL NOTE – BUY AMERICA REQUIREMENTS AND BUILD AMERICA, BUY AMERICA (BABA) ACT 10/26/2023

1.0 BUY AMERICA REQUIREMENT.

Follow the "Buy America" provisions as required by 23 U.S.C. § 313 and 23 C.F.R. § 635.410. Except as expressly provided herein all manufacturing processes of steel or iron materials including but not limited to structural steel, guardrail materials, corrugated steel, culvert pipe, structural plate, prestressing strands, and steel reinforcing bars shall occur in the United States of America, including the application of:

- Coating,
- Galvanizing,
- Painting, and
- Other coating that protects or enhances the value of steel or iron products.

The following are exempt, unless processed or refined to include substantial amounts of steel or iron material, and may be used regardless of source in the domestic manufacturing process for steel or iron material:

- Pig iron,
- Processed, pelletized, and reduced iron ore material, or
- Processed alloys.

The Contractor shall submit a certification stating that all manufacturing processes involved with the production of steel or iron materials occurred in the United States.

Produce, mill, fabricate, and manufacture in the United States of America all aluminum components of bridges, tunnels, and large sign support systems, for which either shop fabrication, shop inspection, or certified mill test reports are required as the basis of acceptance by the Department.

Use foreign materials only under the following conditions:

1) When the materials are not permanently incorporated into the project; or
2) When the delivered cost of such materials used does not exceed 0.1 percent of the total Contract amount or $2,500.00, whichever is greater.

The Contractor shall submit to the Engineer the origin and value of any foreign material used.

2.0 – BUILD AMERICA, BUY AMERICA (BABA)

Contractor shall comply with the Federal Highway Administration (FHWA) Buy America Requirement in 23 C.F.R. § 635.410 and all relevant provisions of the Build America, Buy America Act (BABA), contained within the Infrastructure Investment and Jobs Act, Pub. L. No. 117-58, §§ 70901-52 enacted November 15, 2021. The BABA requires iron, steel, manufactured products, and construction materials used in infrastructure projects funded by federal financial assistance to be produced in the United States. Comply with 2 C.F.R § 184.

BABA permits FHWA participation in the Contract only if domestic steel and iron will be used on the Project. To be considered domestic, all steel and iron used, and all products manufactured from steel and iron must be produced in the United States and all manufacturing processes, including application of a coating, for these materials must occur in the United States. Coating includes all processes that protect or enhance the value of the material to which the coating is applied. This requirement does not preclude a minimal use of foreign steel and iron materials, provided the cost of such materials does not exceed 0.1% of the total contract amount under the Contract or $2,500.00 whichever is greater.

BABA permits FHWA participation in the Contract only if all "construction materials" as defined in the Act are made in the United States. The Buy America preference applies to the following construction materials

incorporated into infrastructure projects: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); Fiber optic cable; optical fiber; lumber; engineered wood; and drywall. Contractor will be required to use construction materials produced in the United States on this Project. The Contractor shall submit a certification stating that all construction materials are certified to be BABA compliant.

Finally, BABA permits the continuation of FHWA's current general applicability waivers for manufactured products, raw materials, and ferryboat parts, but these waivers are subject to reevaluation, specifically the general applicability waiver for manufactured products.

The Contractor has completed and submitted, or shall complete and submit, to the Cabinet a Buy America/ Build America, Buy America Certificate prior to the Cabinet issuing the notice to proceed, in the format below. After submittal, the Contractor is bound by its original certification.

A false certification is a criminal act in violation of 18 U.S.C. § 1001. The Contractor has the burden of proof to establish that it is in compliance.

At the Contractor's request, the Cabinet may, but is not obligated to, seek a waiver of Buy America requirements if grounds for the waiver exist under 23 C.F.R. § 635.410(c) or will comply with the applicable Buy America requirements if a waiver of those requirements is not available or not pursued by the Cabinet.

Please refer to the Federal Highway Administration's Buy America webpage for more information.

Buy America - Construction Program Guide - Contract Administration - Construction - Federal Highway Administration (dot.gov)

BUY AMERICA / BUILD AMERICA, BUY AMERICA (ACT) MATERIALS CERTIFICATE OF COMPLIANCE

The Contractor hereby certifies that it will comply with all relevant provisions of the Build America, Buy America Act, contained within the Infrastructure Investment and Jobs Act, Pub. L. NO. 117-58, §§ 70901-52, the requirements of 23 U.S.C. § 313, 23 C.F.R. § 635.410 and 2 C.F.R § 184.

Date Submitted:_____

Contractor:_____

Signature:_____

Printed Name:_____

Title:_____

NOTE: THIS CERTIFICATION IS IN ADDITION TO ANY AND ALL REQUIREMENTS OUTLINED IN THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND/OR SPECIAL NOTES CONTAINED IN THE PROJECT PROPOSAL.

SPECIAL NOTE FOR RECIPROCAL PREFERENCE

RECIPROCAL PREFERENCE TO BE GIVEN BY PUBLIC AGENCIES TO RESIDENT BIDDERS

By reference, KRS 45A.490 to 45A.494 are incorporated herein and in compliance regarding the bidders residency. Bidders who want to claim resident bidder status should complete the Affidavit for Claiming Resident Bidder Status along with their bid in the electronic bidding software. Submittal of the Affidavit should be done along the bid in Bid Express.

April 30, 2018

ASPHALT MIXTURE

Unless otherwise noted, the Department estimates the rate of application for all asphalt mixtures to be 110 lbs/sy per inch of depth.

INCIDENTAL SURFACING

The Department has included in the quantities of asphalt mixtures established in the proposal estimated quantities required for resurfacing or surfacing mailbox turnouts, farm field entrances, residential and commercial entrances, curve widening, ramp gores and tapers, and road and street approaches, as applicable. Pave these areas to the limits as shown on Standard Drawing RPM-110-06 or as directed by the Engineer. In the event signal detectors are present in the intersecting streets or roads, pave the crossroads to the right of way limit or back of the signal detector, whichever is the farthest back of the mainline. Surface or resurface these areas as directed by the Engineer. The Department will not measure placing and compacting for separate payment but shall be incidental to the Contract unit price for the asphalt mixtures.

OPTION B

Be advised that the Department will control and accept compaction of asphalt mixtures furnished on this project under OPTION B in accordance with Sections 402 and 403.

Tim Tharpe - Director
Phone (502) 564-3020
FAX (502) 564-7759

DIVISION OF TRAFFIC OPERATIONS

PROJECT MATERIALS RELEASE FORM
FOR SIGNAL AND LIGHTING

Note: Email form with signatures to KYTC's warehouse (kim.stamper@ky.gov) at least two (2) days prior to arrival for pickup. Ensure Contractor's delivery driver has a copy of form with signatures. Failure to do either may result in long delays or refusal to distribute materials upon arrival.

Item Number: **10_9017.00**

County: **Morgan**

Description: **US 460 & KY 191**

Signals		
3	T-02-0009	Siemens 3 Section Signal
1	T-02-0032	Siemen 3 section backplate
1	T-02-0040	Siemen 5 section, 12 inch signal (poly)
2	T-02-0090	Pedestrian signal housing
1	T-02-0310	LED Module 12" yellow arrow
1	T-02-0320	LED Module 12" green arrow
4	T-02-0330	LED Module 12" red ball
4	T-02-0340	LED Module 12" yellow ball
4	T-02-0350	LED Module 12" green ball
2	T-02-0365	LED Countdown Pedestrian Module

Special items		
1	T-02-0650	Pedstl.top mntg.bkt One-way
1	T-02-0670	Pedestal
2	T-06-0710	Ped Detector Pole Mount FSA Box
2	T-17-0015	9 X 15 Countdown Ped Sign DBL Sided
1		complete solar school flasher system

Poles		
1	T-04-0020	Steel Strain Pole 30 foot

REQUIRED

Electrical Contractor Supervisor _____ Contact number for Supervisor _____

Project Engineer _____ Contact number for Project Engineer _____

Project Engineer attests that the mentioned contractor is the actual electrical contractor on this project

Signature of Project Engineer or Designee _____

SPECIAL NOTE FOR EXCESS & BORROW MATERIAL SITES

MORGAN COUNTY - KY 191/US 460

ITEM NO. 10-9017.00

Identification of excess material site(s) and/or borrow site(s) shall be the responsibility of the contractor. The contractor shall be responsible for compliance with all applicable state and federal regulations. The contractor shall also consult with the District 10 Environmental Coordinator for information pertaining to state and federal agencies that may require consultation prior to use of excess material site(s) and/or borrow site(s). Following is a list of potential agencies:

- U.S. Fish and Wildlife Services, Section 7 &10 of the Endangered Species Act.
- U.S. Army Corps of Engineers, Section 404 of the Clean Water Act.
- Kentucky Division of Water on Section 401 of the Clean Water Act.
- Kentucky State Historic Preservation Office, Section 106 of the National Historic Preservation Act and Archaeology & Historic clearances.
- Other applicable federal and state agencies.

Mitigation fee shall be paid by the contractor prior to use of excess material site(s) and/or borrow site(s).

nesbitt engineering, inc.
providing proven solutions since 1976
227 North Upper Street
Lexington, KY 40507-1016

Technical Specifications

KY 191 & US 460 Improvements Project
Utility Relocation
Item No 10-9017.00
City of West Liberty
Morgan County, Kentucky

November 2023

TABLE OF CONTENTS
TECHNICAL SPECIFICATIONS

DIVISION 1
GENERAL REQUIREMENTS

DIVISION 2
SITE WORK

DIVISION 5
METALS

DIVISION 15
MECHANICAL

DIVISION 17
Natural Gas

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 WORK INCLUDED

The Contractor shall furnish all necessary labor, machinery, tools, apparatus, equipment, materials, service, other necessary supplies and perform all work including all excavation and backfilling (without additional compensation, except where specifically set out in these specifications) at the unit or lump sum bid price for the items or work described under PART 2 of this section.

1.02 PROGRESS AND PAYMENTS SCHEDULES

A. Within fifteen (15) days after the date of formal execution of the AGREEMENT, the Contractor shall prepare and submit to the Engineer, for approval, a construction schedule which depicts the Contractor's plan for completing the contract requirements and show work placement in dollars versus contract time. **The Contractor's construction schedule must be approved by the Engineer before any payments will be made on this contract.**

B. Within fifteen (15) days after the date of formal execution of the CONTRACT AGREEMENT, the Contractor shall prepare and submit to the Engineer, for approval, a periodic estimate which depicts the Contractor's cost for completing the contract requirements and show by major unit of the project work, the Contractor's dollar value for the material and the labor (two separate amounts) to be used as a basis for the periodic payments. The Contractor's periodic estimate must be approved by the Engineer before any payments will be made on this contract.

C. The Engineer's decision as to sufficiency and completeness of the Contractor's construction schedule and periodic estimate will be final.

D. The Contractor must make current, to the satisfaction of the Engineer, the construction schedule and periodic estimate each time he requests a payment on this contract.

E. The Contractor's construction schedule and periodic estimate must be maintained at the construction site available for inspection and shall be revised to incorporate approved change orders as they occur.

F. When the Contractor requests a payment on this contract, it must be on the approved periodic estimate and be current. Further, the current periodic estimate and construction schedule (both updated and revised) shall be submitted for review and approval by the Engineer before monthly payments will be made by the Owner. The Contractor shall

submit six (6) current copies of each (periodic estimate and construction schedule) when requesting payment.

1.03 CONDITIONS FOR PAYMENT

A. The Owner will make payments for acceptable work in place and materials properly stored on-site. The value of payment shall be as established on the approved construction schedule and periodic estimate, EXCEPT the Owner will retain ten percent (10%) of the work in place and a percentage as hereinafter listed for items properly stored or untested.

B. No payment will be made for stored materials unless a proper invoice from the supplier is attached to the pay request. Further, no item whose value is less than $1,000.00 will be considered as stored materials for pay purposes.

C. Payment for pipeline items shall be limited to eighty percent (80%) of the bid price until the pipeline items have been tested and accepted by the Engineer.

D. Payment for equipment items shall be limited to eighty-five percent (85%) of their scheduled value (materials portion only) until they are set in place. Eighty-five percent (85%) payment for stored materials and equipment shall be contingent on proper on-site storage as recommended by the manufacturer or required by the Engineer.

E. Payment for equipment items set in-place shall be limited to ninety percent (90%) of their scheduled value until they are ready for operation and have been certified by the manufacturer. Ninety percent (90%) payment for installed equipment shall be contingent on proper routine maintenance of the equipment in accordance with the manufacturer's recommendations.

F. Payment for equipment items set in place and ready for operation shall be limited to ninety-five percent (95%) of their scheduled value until all acceptance tests have been completed and the required manufacturer's pre-startup operator's training has been completed.

G. Payment for the labor portion of equipment items will be subject only to the degree of completeness and the appropriate retainage.

H. The Owner may reduce the percent of retainage once the project has achieved satisfactory progress and is at the fifty percent (50%) mark. If the percent of retainage is reduced, the dollar amount of retainage for work-in-place will not be reduced but will remain constant following the fifty percent (50%) constructed status. The retainage on the equipment items shall be determined as defined hereinbefore.

I. Additionally, the Owner may reinstate the retainage to a full ten percent (10%) of the scheduled value of work-in-place and material items should the Owner, at its discretion, determine that the Contractor is not making

satisfactory progress or there is other specific cause for such withholding.

1.04 CLAIMS FOR EXTRA WORK

A. If the Contractor claims that any instructions by Drawings or otherwise involve extra cost, he shall give the Engineer written notice of said claim within ten (10) days after the receipt of such instructions, and in any event before proceeding to execute the work, stating clearly and in detail the basis of his claim or claims. No such claim shall be valid unless so made.

B. Claims for additional compensation for extra work, due to alleged errors in spot elevations, contour lines, or bench marks, will not be recognized unless accompanied by certified survey data, made prior to the time the original ground was disturbed, clearly showing that errors exist which resulted, or would result, in handling more material, or performing more work than would reasonably be estimated from the Drawings and/or topographical maps issued.

C. Any discrepancies which may be discovered between actual conditions and those represented by the topographical maps and/or Drawings shall at once be reported to the Engineer, and work shall not proceed, except at the Contractor's risk, until written instructions have been received by him from the Engineer.

D. If, on the basis of the available evidence, the Engineer determines that an adjustment of the Contract Price or time is justifiable, the procedure shall then be as provided herein for "Changes in the Work".

E. By execution of this Contract, the Contractor warrants that he has visited the site of the proposed work and fully acquainted himself with the existing site conditions relating to construction and labor, and that he fully understands the facilities, difficulties, and restrictions attending the execution of the work under this Contract. The Contractor further warrants that he has thoroughly examined and is familiar with the Drawings, Specifications and all other documents comprising the Contract. The Contractor further warrants that by execution of this Contract his failure when he was bidding on this Contract to receive or examine any form, instrument or document, or to visit the site and acquaint himself with conditions there existing, in no way relieves him from any obligation under the Contract, and the Contractor agrees that the Owner shall be justified in rejecting any claim based on facts regarding which he should have been on notice as a result thereof.

1.05 DETERMINATION OF THE VALUE OF EXTRA (ADDITIONAL) OR OMITTED WORK

A. The value of extra (additional) or omitted work shall be determined in one or more of the following ways:

1. On the basis of the actual cost of all the items of labor (including on-the-job supervision), materials, and use of equipment, plus a

maximum 15 percent for added work or a minimum 15 percent for deleted work which shall cover the Contractor's general supervision, overhead and profit. In case of subcontracts, the 15 percent (maximum for added work and minimum for deleted work) is interpreted to mean the subcontractor's supervision, overhead and profit, and an additional 5 percent (maximum for added work and minimum for deleted work) may then be added to such costs to cover the General Contractor's supervision, overhead and profit. The cost of labor shall include required insurance, taxes and fringe benefits. Equipment costs shall be based on current rental rates in the areas where the work is being performed but, in no case shall such costs be greater than the current rates published by the Associated Equipment Distributors, Chicago, Illinois.

2. By estimate and acceptance in a lump sum.

3. By unit prices named in the Contract or subsequently agreed upon.

B. Provided, however, that the cost or estimated cost of all extra (additional) work shall be determined in advance of authorization by the Engineer and approved by the Owner.

C. All extra (additional) work shall be executed under the conditions of the original Contract. Any claim for extension of time shall be adjusted according to the proportionate increase or decrease in the final total cost of the work unless negotiated on another basis.

D. Except for over-runs in contract unit price items, no extra (additional) work shall be done except upon a written Field Order Directive, or Change Order from the Engineer, and no claim on the part of the Contractor for pay for extra (additional) work shall be recognized unless so ordered in writing by the Engineer.

PART 2 – PRODUCTS

Standard Sanitary Sewer Bid Item Descriptions

S BYPASS PUMPING This item shall include all labor, equipment, and materials needed to complete a bypass pumping and/or hauling operation for diversion of sewage during sanitary sewer construction. Examples of such operations when bypass pumping and/or hauling may be necessary is during force main tie-ins, manhole invert reconstruction, insertion of new manholes into existing mains, or other similar construction. There may be more than one bypass pumping/hauling operation on a project. This item shall be paid for each separate bypass pumping/hauling

operation occurrence as called out on the plans or directed by the engineer and actually performed. There will be no separate bid items defined for length, duration, or volume of sewage pumped or hauled in each occurrence. If a bypass pumping/hauling operation is called out on the plans; but, conditions are such that the bypass pumping/hauling operation is not needed or utilized, no payment will be made under this item. The contractor shall draw his own conclusions as to what labor, equipment, and materials may be needed for each bypass pumping/hauling occurrence. The contractor should be prepared to handle the maximum volume of the sewer being bypassed, even during a storm event. This item shall not be paid separately, but shall be considered incidental, when bypass pumping and/or hauling is needed during cast-in-place-pipe (CIPP) and/or point repair operations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA).

S CIPP LATERAL SERVICE INVSTIGATION This item shall include all equipment, materials, labor and incidentals necessary to enter the sewer in compliance with all safety/confided space requirements and perform the identification, assessment and pre-measurement of all existing and abandoned laterals for the placement of Cured-In-Place-Pipe lining. This item shall be in payment for all lateral service investigation for all sewer segments to be lined as a part of this contract. This bid item shall include bypass pumping when required. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Payment for this item shall be LUMP SUM (LS).

S CIPP LATERAL REINSTATEMENT This item is to pay for installing a Cured-In-Place-Pipe liner in service laterals and service/mainline connections to stabilize structural defects and construction inadequacies. This bid item shall include all labor, equipment, materials and incidentals necessary to perform the service lateral reinstatement in accordance with the plans and specifications. Work under this item shall include bypass pumping, `1`sewer flow control, pre-installation cleaning, sealing connections to existing sewer main, pre- and post- construction CCTV inspection and final testing of the CIPP system. This item shall also include the "top hat" required by the specifications. All CIPP lateral reinstatements shall be paid under this item regardless of the size or length of reinstatement. No separate bid items of varying sizes or length of CIPP lateral reinstatement will be provided in the contract. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Payment for this item shall be EACH (EA) for each CIPP lateral reinstatement complete and ready for use.

S CIPP LINER This bid Item is to pay for rehabilitation of existing sanitary sewers using the Cured-In-Place-Pipe method. This bid item description applies to all CIPP sizes included in the contract. All CIPP Liner items of all varying sizes shall include all labor, materials, customer notification, testing, necessary permits, ingress and egress procedures, bypass pumping, pre-construction video, sediment and root removal, dewatering, traffic control, erosion and sediment control, excavation pits, removal and replacement of manhole frames and covers as necessary to facilitate the lining work, sealing at manholes and service connections, clearing and grubbing, pipeline cleaning, re-cleaning and video inspection as many times as necessary, debris collection and disposal, root removal, pre- and post-construction video inspection, all digital inspection footage, final report preparation and approval, the cost of potable water from the Owner, required compliance tests, site restoration, site cleanup, sealing of liner at

manholes, acceptance testing and all other rehabilitation work and incidentals not included under other pay items necessary to complete the rehabilitation per the plans and specifications. There will be no separate payment for acceptance testing of the lined pipe; but shall be considered incidental to this item. Pay under this item shall be by each size bid in the contract. Pay measurement shall be from center of manhole to center of manhole. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S CIPP PROTRUDING LATERAL REMOVAL This item includes all equipment, materials, labor and incidentals necessary to enter the sewer in compliance with all safety/confined space requirements, remove a sufficient amount of the protruding tap to insure a proper and safe Cured-In-Place-Pipe lining insertion and perform pre-installation CCTV. This bid item shall include bypass pumping when required. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Payment for this item shall be EACH (EA) for each protruding lateral removed.

S CONCRETE PIPE ANCHOR This item shall be constructed on the sewer pipe at the locations shown on the plans in accordance with sanitary sewer specifications and standard drawings. Payment for concrete anchors will be made at the contract unit price each in place complete and ready for use. Each concrete anchor of sewer pipe or force main shall be paid under one bid item per contract regardless of the sizes of carrier pipe being anchored in the contract. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized in order to minimize the impact of open cut for the installation of force main or gravity sewer under streets, creeks, and etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore whether used as a carrier pipe or an encasement of a separate carrier pipe. This item shall also include pipe anchors at each end of the bore when specified to prevent the creep or contraction of the bore pipe. Carrier pipe installed within a bore pipe shall be paid separately under pipe items. Payment under this item shall not be size specific and no separate bid items will be established for size variations. The bore pipe sizes to be included under this item shall be as shown on the plans and/or in the specifications. Any and all directional bores in each contract shall be paid under one directional bore bid item included in the contract regardless of size. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S ENCASEMENT CONCRETE Includes all labor, equipment, excavation, concrete, reinforcing steel, backfill, restoration, and etc., to construct the concrete encasement of the sewer or force main as shown on the plans, and in accordance with the specifications and standard drawings. Payment under this item shall be in addition to the carrier pipe as paid under separate bid items. Carrier pipe is not included in this bid item. Any and all concrete encasement shall be paid under one bid item included in the contract regardless of the size of the carrier pipe or the volume of concrete or

steel reinforcement as specified in the plans and specifications. No separate bid items will be established for size variations. Measurement of pay quantity shall be from end of concrete to end of concrete. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

S ENCASEMENT STEEL BORED This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, labor, and equipment to bore and install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The sizes of encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches
Range 4 = All encasement sizes greater than 14 inches to and including 18 inches
Range 5 = All encasement sizes greater than 18 inches to and including 24 inches
Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S ENCASEMENT STEEL OPEN CUT This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, labor, and equipment to open cut install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The size encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches
Range 4 = All encasement sizes greater than 14 inches to and including 18 inches
Range 5 = All encasement sizes greater than 18 inches to and including 24 inches
Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item.

Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S FORCE MAIN This description shall apply to all PVC and ductile iron and polyethylene/plastic pipe bid items of every size and type, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing wire with test boxes (if required by specification), polyethylene wrap (when specified), labor, equipment, excavation, bedding, restoration, testing, backfill, and etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings complete and ready for use. No additional payment will be made for rock excavation. This bid item includes material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. This item shall also include pipe anchors on polyethylene pipe runs as shown on the plans or required by the specifications to prevent the creep or contraction of the pipe. Measurement of quantities under this item shall be through fittings, encasements, and directional bores (only when a separate carrier pipe is specified within the directional bore pipe). No separate payment will be made under pipe items when the directional bore pipe is the carrier pipe. Measurements shall be further defined to be to the center of tie-in where new pipe contacts existing pipe at the center of connecting fittings, to the outside face of vault or structure walls, or to the point of main termination at dead ends. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S FORCE MAIN AIR RLS/VAC VLV This bid item description shall apply to all force main air release/vacuum valve installations of every size except those defined as "Special".
This item shall include the air release/vacuum valve, main to valve connecting line or piping, manhole/vault/structure, access casting or doors, tapping the main, labor, equipment, excavation, proper backfill and restoration required to install the air release/vacuum valve at the location shown on the plans or as directed in accordance with the specifications and standard drawings complete and ready for use. All air release/vacuum valves on a project shall be paid under one bid item regardless of size. No separate pay items will be established for size variations. Only in the case of the uniqueness of a particular air release/vacuum valve would a separate bid item be established. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S FORCE MAIN DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized in order to minimize the impact of open cut for the installation of sewer or force main under streets, buildings, creeks, and etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore whether used as a carrier pipe or an encasement of a separate carrier pipe. This item shall also include pipe anchors at each end of the bore when specified to prevent the creep or contraction of the bore pipe. Carrier pipe installed within a bore pipe shall be paid separately under pipe items. Payment under this item

shall not be size specific and no separate bid items will be established for size variations. The bore pipe sizes to be included under this item shall be as shown on the plans and/or in the specifications. Any and all directional bores in each contract shall be paid under one directional bore bid item included in the contract regardless of size. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S FORCE MAIN POINT RELOCATE This item is intended for payment for horizontal and/or vertical relocation of a short length of an existing main at the locations shown on the plans. This bid item is to be used to relocate an existing force main at point locations such as to clear a conflict at a proposed drainage structure, pipe or any other similar short relocation situation, and where the existing pipe material is to be reused. The contractor shall provide any additional pipe or fitting material needed to complete the work as shown on the plans and specifications. The materials provided shall be of the same type and specification as those that exist. Substitution of alternative materials shall be approved by the engineer in advance on a case by case basis. New polyethylene wrap is to be provided (if wrap exists or is specified in the specifications to be used). If it is necessary that the pipe be disassembled for relay, payment under this item shall also include replacement of joint gaskets as needed. Bedding and backfill shall be provided and performed the same as with any other pipe installation as detailed in the plans and specifications. Payment under this item shall be for each location requiring an existing main to be relocated horizontally or vertically regardless of pipe size or relocation length. No separate pay items will be established for pipe size variations or relocation segment length variations. Force Main Relocate shall not be paid on a linear feet basis; but shall be shall be paid EACH (EA) at each location when complete and placed in service. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.

S FORCE MAIN TAP SLEVE/VALVE RANGE 1 OR 2 This item shall include the specified tapping sleeve, valve, valve box, concrete pad around valve box (when required in specifications or plans), labor, and equipment to install the specified tapping sleeve and valve, complete and ready for use in accordance with the plans and specifications. The size shall be the measured internal diameter of the live pipe to be tapped. The size tapping sleeve and valve to be paid under sizes 1 or 2 shall be as follows:

Range 1 = All live tapped main sizes up to and including 8 inches
Range 2 = All live tapped main sizes greater than 8 inches

Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S FORCE MAIN TIE-IN This bid description shall be used for all force main tie-in bid items of every size except those defined as "Special". This item includes all labor, equipment, excavation, fittings, sleeves, reducers, couplings, blocking, anchoring, restoration, testing and backfill required to make the force main tie-in as shown on the plans and in accordance with the specifications complete and ready for use. This bid item shall include purge and sanitary disposal of any sewage from any abandoned segments of force main. Pipe for tie-ins shall be paid under separate bid items.

Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S FORCE MAIN VALVE This description shall apply to all force main valves of every size required in the plans and specifications, except those bid items defined as "Special". Payment under this description is to be for gate or butterfly force main valves being installed with new force main. This item includes the valve as specified in the plans and specifications, polyethylene wrap (if required by specification), labor, equipment, excavation, anchoring (if any), valve box and valve stem extensions, backfill, concrete pad around valve box (if required by specification), restoration, testing, and etc., required to install the specified valve at the location shown on the plans in accordance with the specifications and standard drawings complete and ready for use. If required on plans and/or proposed adjoining DIP is restrained, force main valves shall be restrained. Force main valve restraint shall be considered incidental to the force main valve and adjoining pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S FORCE MAIN VALVE BOX ADJUST Includes all labor, equipment, valve box and valve stem extensions (if required), excavation, backfill, concrete pad around valve box (when specified in specifications or plans), restoration, and etc., to adjust the top of the force main valve box to finished grade complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LATERAL CLEANOUT This item shall be for payment for installation of a cleanout in a service lateral line. This item shall include furnishing and installation of a tee, vertical pipe of whatever length required, and threaded cap. The cleanout shall extend from the lateral to final grade elevation. The size of the cleanout shall be equivalent to the size of the lateral. The cleanout materials shall meet the same specification as those for the lateral. The cleanout shall be installed at the locations shown on the plans or as directed by the engineer. Only one pay item shall be established for cleanout installation. No separate pay items shall be established for size or height variances. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LATERAL LOCATE This bid item is to pay for all labor, equipment, and materials needed in locating an existing sanitary sewer service lateral for tie-in of the lateral to new mainline sewers and/or for the relocation of a lateral. This bid item shall be inclusive of any and all methods and efforts required to locate the lateral for tie-in or relocation of the lateral. Locating methods to be included under this items shall include, but are not limited to, those efforts employing the use of video cameras from within an existing sanitary sewer main or lateral, electronic locating beacons and/or tracers inserted into the sanitary sewer main or lateral, careful excavation as a separate operation from mainline sewer or lateral excavation, the use of dyes to trace the flow of a lateral, or any combination of methods required to accurately locate the lateral. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be

paid EACH (EA).

S LATERAL LONG SIDE This bid item description shall apply to all service lateral installations of every size up to and including 6 inch internal diameter, except those lateral bid items defined as "Special". This item includes the specified piping material, main tap, bends, clean outs, labor, equipment, excavation, backfill, testing, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for service lateral installations where the ends of the lateral connection are on opposite sides of the public roadway. The new lateral must cross the centerline of the public roadway to qualify for payment as a long side lateral. The length of the service lateral is not to be specified. Payment under this item shall not be restricted by a minimum or maximum length. The contractor shall draw his own conclusions as to the length of piping that may be needed. Payment under this item shall include boring, jacking, or excavating across the public roadway for placement. Placement of a service lateral across a private residential or commercial entrance alone shall not be reason to make payment under this item. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LATERAL SHORT SIDE This bid item description shall apply to all service lateral installations of every size up to and including 6 inch, except those lateral bid items defined as "Special". This item includes the specified piping material, main tap tee, bends, clean outs, labor, equipment, excavation, backfill, testing, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for lateral installations where both ends of the lateral connection are on the same side of the public roadway, or when an existing lateral crossing a public roadway will remain and is being extended, reconnected, or relocated with all work on one side of the public roadway centerline as shown on the plans. The length of the service lateral is not to be specified and shall not be restricted to any minimum or maximum length. Payment shall be made under this item even if the lateral crosses a private residential or commercial entrance; but, not a public roadway. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LINE MARKER This item is for payment for furnishing and installing a sewer utility line marker as specified by the utility owner specifications and plans. A line marker may consist of a post or monument of whatever materials specified and shall include markings and/or signage on same as specified by plans or specifications. This item shall include all labor, equipment, and materials needed for complete installation of the marker. This item shall be paid EACH (EA) when complete.

S MANHOLE Payment under this item is for the installation of new 4 foot interior

diameter sanitary sewer manhole. Payment for manholes will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE ABANDON/REMOVE Payment under this item is for the partial removal and/or filling of any sanitary sewer manhole regardless of size or depth that no longer serves any purpose. Payment shall be made regardless of whether the manhole is or is not in conflict with other work. Any manhole requiring partial removal, but not total removal, in order to clear a conflict with other work shall be paid under this item. All manholes partially removed shall be removed to a point at least one foot below final grade, one foot below roadway subgrade, or one foot clear of any other underground infrastructure, whichever is lowest. If partial removal of an abandoned manhole is elected by the contractor, the remaining manhole structure shall be refilled with flowable fill. Payment for disposal of a sanitary sewer manhole will be made under this item only. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE ADJUST TO GRADE Payment under this item is for the adjustment of sanitary sewer casting elevation on all sizes of existing sanitary manholes. This work shall be performed in accordance with the sanitary sewer specifications. Payment shall be made under this bid item regardless of the amount of adjustment necessary to a sanitary sewer manhole casting or diameter of the manhole. Work under this pay item may be as simple as placing a bed of mortar under a casting; but, shall also be inclusive of installation of adjusting rings, and /or addition, removal, or replacement of barrel sections. The existing casting is to be reused unless a new casting is specified on the plans. New casting, when specified, shall be paid as a separate bid item. Anchoring of the casting shall be incidental to this item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE CASTING STANDARD Payment under this bid items is for furnishing of a new standard traffic baring casting for sanitary manholes meeting the requirements of the sanitary sewer specifications and standard drawings. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when installed.

S MANHOLE CASTING WATERTIGHT Payment under this bid item is for furnishing of a new watertight traffic baring casting for sanitary manholes meeting the requirements

of the sanitary sewer specifications and standard drawings. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when installed.

S MANHOLE RECONSTRUCT INVERT This bid item is to pay for all labor, equipment, and material for rework of the manhole bench to redirect or eliminate flow, such as when the flow of a pipe or pipes are being removed or redirected. This work will be as specified in the plans, specifications, or directed by the engineer. This work may consist of, but is not limited to, removal of concrete and/or placement of concrete in elimination or redirect of flow. This item shall also include providing and placement of a rubber seal or boot as required by utility specification, standard drawing or plan. The contractor shall draw his own conclusions as to the effort and scope of work needed to comply with the specifications, standard drawings, and plans. No payment shall be made under this bid when MANHOLE TAP EXISTING, or MANHOLE TAP EXISTING ADD DROP are being paid at the same location, as this type of work is included in those items. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE TAP EXISTING This bid item is to pay for all labor, equipment, and material for coring one opening in an existing manhole base, addition of a rubber seal as specified, and rework of the manhole bench to direct the additional pipe flow. The bid item shall be paid for each core opening added to a single manhole. This bid item shall also include any rework of the existing manhole bench due to the elimination of other existing pipes and flow. This work will be as specified in the plans, specifications, or directed by the engineer. This work may consist of, but is not limited to, removal of concrete and/or placement of concrete in the addition, elimination, or redirect of flow. The contractor shall draw his own conclusions as to the effort and scope of work needed to comply with the specifications, standard drawings, and plans. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE TAP EXISTING ADD DROP This bid item is to pay for all labor, equipment, and material for coring one opening in an existing manhole base, addition of a rubber seal as specified, addition of a vertical drop pipe to the outside of the manhole, placement of reinforcing steel and concrete to encase vertical pipe, and rework of the manhole bench to direct the additional pipe flow. The bid item shall be paid for each drop added to a single manhole. This bid item shall also include any rework of the existing manhole bench due to the elimination of other existing pipes and flow. This work will be as specified in the plans, specifications, or directed by the engineer. This work may consist of, but is not limited to, removal of concrete and/or placement of concrete in the addition, elimination, or redirect of flow. The contractor shall draw his own conclusions as to the effort and scope of work needed to comply with the specifications, standard drawings, and plans. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE WITH DROP Payment under this item is for the installation of new 4 foot interior diameter sanitary sewer manhole with drop. Payment for drop manholes

will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Drop manholes shall include concrete base, barrel sections, drop materials, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE WITH LINING Payment under this item is for the installation of new 4 foot interior diameter sanitary sewer manhole with corrosion resistant lining. Payment for manholes will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, lining, excavation, backfilling, air testing, restoration, and cleanup in accordance with the standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE WITH TRAP Payment under this item is for the installation of a new manhole with trap. Payment for trap manholes will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Trap manholes shall include concrete base, manhole structure and trap materials, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup. All materials, except casting, shall be new and unused. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S PIPE This description shall apply to all PVC and ductile iron gravity sewer pipe bid items of every size and type 8 inches internal diameter and larger, except those bid

items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, tap tees and couplings for joining to existing similar or dissimilar pipes), polyethylene wrap (if required by specification), labor, equipment, excavation, bedding, restoration, pressure or vacuum testing, temporary testing materials, video inspection, backfill, and etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings complete and ready for use. This bid item shall include material and placement of flowable fill under existing and proposed pavement, and wherever specified on the plans or in the specifications. No additional payment will be made for rock excavation. Measurement of quantities under this item shall be through fittings and encasements to a point at the outside face of manhole barrels, or to the point of main termination at dead ends or lamp holes. Carrier pipe placed within an encasement shall be paid under this item and shall include casing spacers and end seals. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S PIPE POINT REPAIR This item is to be used to pay for repair of short lengths of existing sanitary sewer pipe that, through prior video inspection or other means, are known to have pre- existing failure. Pipe Point Repair may be needed in preparation for installation of cured-in-place-pipe (CIPP) lining or other instances where failure is known and repair is prudent. The size of pipe shall not be defined in separate bid items. All diameter sizes of point repair shall be paid under this one item. The materials to be used to make the repair shall be as defined on the plans or in the specifications. This bid item shall include all excavation, pipe materials, joining materials to connect old and new pipe, bedding, and backfill to complete the repair at the locations shown on the plans or as directed by the engineer, complete and ready for use. This bid item shall include bypass pumping when required. Measurement shall be from contact point to contact point of old and new pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

S PUMP STATION This item is for payment for installation of sanitary pump stations including above or below ground structure for housing of the pumps. This item shall include all pumps, piping, fittings, valves, electrical components, building materials, concrete, any other appurtenances, labor, equipment, excavation, and backfill, to complete the pump station installation as required by the plans, standard drawings, and specifications, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LUMP SUM (LS) for each when complete.

S STRUCTURE ABANDON This item is to be used to pay for abandonment of larger above or below ground sewer structures such as air release/vacuum valve vaults, pump stations, tanks, etc. Payment under this time shall not be limited to size or scope; however structures with connecting pipes of 2 inches or less shall not be paid under this item; but, shall be considered incidental to sewer construction, (i.e., abandonment of standard air release/vacuum valves up to and including 2 inches would not be paid under this item). Payment under this item shall include all labor, equipment, and compacted fill or flowable fill for abandonment of the structure in place and restoration complete. No separate bid items will be established for size or structure variations.

Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S STRUCTURE REMOVAL This item is to be used to pay for removal of larger above or below ground sewer structures such as air release/vacuum valve vaults, pump stations, tanks, and etc. Payment under this time shall not be limited to size or scope; however, structures with connecting pipes of 2 inches or less shall not be paid under this item; but, shall be considered incidental to sewer construction, (i.e., removal of standard air release/vacuum valves and their structure up to and including 2 inches would not be paid under this item). Payment under this item shall include all labor, equipment, and compacted backfill for removal of the structure and restoration complete. No separate bid items will be established for size or structure variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Standard Water Bid Item Descriptions

W AIR RELEASE VALVE This bid item description shall apply to all air release valve installations of every size except those defined as "Special". This item shall include the air release valve, main to valve connecting line or piping, manhole, vault, structure, access casting or doors, tapping the main, labor, equipment, excavation, proper backfill and restoration required to install the air release valve at the location shown on the plans or as directed in accordance with the specifications and standard drawings complete and ready for use. All air release/vacuum valves on a project shall be paid under one bid item regardless of size. No separate pay items will be established for size variations. Only in the case of the uniqueness of a particular air release valve would a separate bid item be established. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

BOLLARDS This item is for payment for furnishing and installing protective guard posts at above ground utility installations. A bollard may consist of, but not limited to, a steel post set in concrete or any other substantial post material. This item shall include all labor, equipment, and materials needed for complete installation of the bollard as specified by the utility owner specifications and plans. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

NOTE: A bid code for this item has been established in standard roadway bid items and shall be used for payment of this item. The bid code is 21341ND

W CAP EXISTING MAIN This item shall include the specified cap, concrete blocking and/or mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the cap at the location shown on the plans or as directed in accordance with the specifications. This item is not to be paid on new main installations. This pay item is only to be paid to cap existing mains. Caps on new mains are incidental to the new main. Any and all caps on existing mains shall be paid under one bid item included

in the contract regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized in order to minimize the impact of open cut for the installation of water main under streets, creeks, and etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore whether used as a carrier pipe or an encasement of a separate carrier pipe. This item shall also include pipe anchors at each end of the bore when specified to prevent the creep or contraction of the bore pipe. Carrier pipe installed within a bore pipe shall be paid separately under pipe items. Payment under this item shall not be size specific and no separate bid items will be established for size variations. The bore pipe sizes to be included under this item shall be as shown on the plans and/or in the specifications. Any and all directional bores in each contract shall be paid under one directional bore bid item included in the contract regardless of size. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W ENCASEMENT CONCRETE Includes all labor, equipment, excavation, concrete, reinforcing steel, backfill, restoration, and etc., to construct the concrete encasement of the water main as shown on the plans, and in accordance with the specifications and standard drawings. Payment under this item shall be in addition to the carrier pipe as paid under separate bid items. Carrier pipe is not included in this bid item. Any and all concrete encasement shall be paid under one bid item included in the contract regardless of the size of the carrier pipe or the volume of concrete or steel reinforcement as specified in the plans and specifications. No separate bid items will be established for size variations. Measurement of pay quantity shall be from end of concrete to end of concrete. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W ENCASEMENT STEEL BORED This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, labor, and equipment to bore and install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The sizes of encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches
Range 4 = All encasement sizes greater than 14 inches to and including 18 inches
Range 5 = All encasement sizes greater than 18 inches to and including 24 inches
Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item. Please refer to the Utility

Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W ENCASEMENT STEEL OPEN CUT This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, labor, and equipment to open cut and install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The size encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches
Range 4 = All encasement sizes greater than 14 inches to and including 18 inches
Range 5 = All encasement sizes greater than 18 inches to and including 24 inches
Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W FIRE HYDRANT ADJUST Includes all labor, equipment, excavation, materials, and backfill to adjust the existing fire hydrant using the fire hydrant manufacturer's extension kit for adjustments of 18" or less. Adjustments greater than 18" require anchoring couplings and vertical bends to adjust to grade. The Contractor will supply and install all anchor couplings, bends, fire hydrant extension, concrete blocking, restoration, granular drainage material, etc, needed to adjust the fire hydrant complete and ready for use as shown on the plans, and in accordance with the specifications and standard drawings. This also includes allowing for the utility owner inspector to inspect the existing fire hydrant prior to adjusting, contractor returning unusable fire hydrants to the utility owner warehouse and picking up a replacement hydrant. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete and ready for use.

W FIRE HYDRANT ASSEMBLY Includes all labor, equipment, new fire hydrant, isolating valve and valve box, concrete pad around valve box (when specified in specifications or plans), piping, anchoring tee, anchoring couplings, fire hydrant extension, excavation, concrete blocking, granular drainage material, backfill, and restoration, to install a new fire hydrant assembly as indicated on plans and on standard drawings compete and ready for use. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W FIRE HYDRANT RELOCATE This item includes all labor and equipment to remove the existing fire hydrant from its existing location and reinstalling at a new location. This item shall include a new isolating valve and valve box, concrete pad around valve box (when required in specifications or plans), new piping, new anchoring tee, anchoring couplings, fire hydrant extensions, concrete blocking, restoration, granular drainage

material, excavation, and backfill as indicated on plans, specifications, and on standard drawings compete and ready for use. This item shall also include allowing for utility owner inspector to inspect the existing fire hydrant prior to reuse, contractor returning unusable fire hydrants to the utility owner warehouse and picking up a replacement hydrant for use, if the existing fire hydrant is determined unfit for reuse. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W FIRE HYDRANT REMOVE This bid item includes removal of an abandoned fire hydrant, isolating valve, and valve box to the satisfaction of the engineer. The removed fire hydrant, isolating valve and valve box shall become the property of the contractor for his disposal as salvage or scrap. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W FLUSH HYDRANT ASSEMBLY This item shall include the flushing hydrant assembly, service line, tapping the main, labor, equipment, excavation, backfill, and restoration required to install the flush hydrant at the location shown on the plans and in accordance with the specifications and standard drawings, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W FLUSHING ASSEMBLY This item shall include the flushing device assembly, service line, meter box and lid, tapping the main, labor, equipment, excavation, backfill, and restoration required to install the flushing device at the location shown on the plans and in accordance with the specifications and standard drawings, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W LEAK DETECTION METER This item is for payment for installation of a water meter at main valve locations where shown on the plans for detection of water main leaks. The meter shall be of the size and type specified in the plans or specifications. This item shall include all labor, equipment, meter, meter box or vault, connecting pipes between main and meter, main taps, tapping saddles, casting, yoke, and any other associated material needed for installation of a functioning water meter in accordance with the plans and specifications, complete and ready for use. No separate payment will be made under any other contract item for connecting pipe or main taps. Any and all leak detection meters shall be paid under one bid item included in the contract regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete and ready for use.

W LINE MARKER This item is for payment for furnishing and installing a water utility line marker as specified by the utility owner specifications and plans. A line marker may consist of a post or monument of whatever materials specified and shall include markings and/or signage on same as specified by plans or specifications. This item shall include all labor, equipment, and materials needed for complete installation of the marker. This item shall be paid EACH (EA) when complete.

W MAIN POINT RELOCATE This item is intended for payment for horizontal and/or vertical relocation of a short length of an existing main at the locations shown on the plans. This bid item is to be used to relocate an existing water main at point locations such as to clear a conflict at a proposed drainage structure, pipe or any other similar short relocation situation, and where the existing pipe material is to be reused. The contractor shall provide any additional pipe or fitting material needed to complete the work as shown on the plans and specifications. The materials provided shall be of the same type and specification as those that exist. Substitution of alternative materials shall be approved by the engineer in advance on a case by case basis. New polyethylene wrap is to be provided (if wrap exists or is specified in the specifications to be used). If it is necessary that the pipe be disassembled for relay, payment under this item shall also include replacement of joint gaskets as needed. Bedding and backfill shall be provided and performed the same as with any other pipe installation as detailed in the plans and specifications. Payment under this item shall be for each location requiring an existing main to be relocated horizontally or vertically regardless of pipe size or relocation length. No separate pay items will be established for pipe size variations or relocation segment length variations. Water Main Relocate shall not be paid on a linear feet basis; but, shall be Paid EACH (EA) at each location when complete and placed in service. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.

W METER This item is for payment for installation of all standard water meters of all sizes 2 inches ID or less as specified on the plans. This item shall include all labor, equipment, meter, meter box, casting, yoke, and any other associated material needed for installation of a functioning water meter in accordance with the plans and specifications, complete and ready for use. This item shall include connections to the new or existing water service line. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W METER ADJUST This item includes all labor, equipment, excavation, materials, backfill, restoration, and etc., to adjust the meter casting to finished grade (whatever size exists) at the location shown on the plans or as directed in accordance with the specifications and standard drawings complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W METER RELOCATE This item includes all labor, equipment, excavation, additional fittings, disinfection, testing, restoration, and etc., to relocate the existing water meter (whatever size exists), meter yoke, meter box, casting, and etc., from its old location to the location shown on the plans or as directed, in accordance with the specifications and standard drawings complete and ready for use. The new service pipe (if required) will be paid under short side or long side service bid items. Any and all meter relocations of 2 inches or less shall be paid under one bid item included in the contract regardless of size. Each individual relocation shall be paid individually under this item; however, no separate bid items will be established for meter size variations of 2 inches ID or less. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W METER VAULT SIZE RANGE 1 OR 2 This item is for payment for installation of an underground structure for housing of a larger water meter, fittings, and valves as required by the plans and specifications. This item shall include all labor, equipment, excavation, concrete, manhole castings or access doors, the specified meter(s) valve(s), all piping, and fitting materials associated with installing a functioning meter and vault in accordance with the plans, standard drawings, and specifications, complete and ready for use. The size shall be the measured internal diameter of the meter and piping to be installed. The size meter vault to be paid under size 1 or 2 shall be as follows:

Size Range 1 = All meter and piping sizes greater than 2 inches up to and including 6 inches
Size Range 2 = All meter and piping sizes greater than 6 inches

This item shall be paid EACH (EA) when complete. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.

W METER/FIRE SERVICE COMBO VAULT This item is for payment for installation of an underground structure for housing of a water meter and fire service piping, fittings, and valves as required by the plans and specifications. This item shall include all labor, equipment, excavation, concrete, manhole castings or access doors, the specified meter(s), valve(s), all piping, and fitting materials associated with installing a functioning meter and fire service vault in accordance with the plans and specifications, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W METER WITH PRESSURE REDUCING VALVE (PRV) This item is for payment for installation of all standard water meters with pressure reducing valves (PRV) of all sizes 2 inches ID or less as specified on the plans. This item shall include all labor, equipment, meter, PRV, meter box, casting, yoke, and any other associated material needed for installation of a functioning water meter with PRV in accordance with the plans and specifications, complete and ready for use. This item shall include connections to the new or existing water service line. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W PIPE This description shall apply to all PVC, ductile iron, and polyethylene/plastic pipe bid items of every size and type to be used as water main, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing wire with test boxes (if required by specification), polyethylene wrap (when specified), labor, equipment, excavation, bedding, restoration, testing, sanitizing, backfill, and etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings complete and ready for use. No additional payment will be made for rock excavation. This bid item includes material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. This item shall include all temporary and permanent materials and equipment required to pressure test and sanitize mains including, but not limited to, pressurization pumps, hoses, tubing, gauges, main taps, saddles, temporary main end caps or plugs and blocking, main end taps for flushing, chlorine liquids or tablets for sanitizing, water for testing/sanitizing and flushing (when not supplied by the utility), chlorine neutralization equipment and materials, and

any other items needed to accomplish pressure testing and sanitizing the main installation. This item shall also include pipe anchors, at each end of polyethylene pipe runs when specified to prevent the creep or contraction of the pipe. Measurement of quantities under this item shall be through fittings, encasements, and directional bores (only when a separate carrier pipe is specified within the directional bore pipe). Measurements shall be further defined to be to the center of tie-in where new pipe contacts existing pipe at the center of connecting fittings, to the outside face of vault or structure walls, or to the point of main termination at dead ends. No separate payment will be made under pipe items when the directional bore pipe is the carrier pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W PLUG EXISTING MAIN This item shall include the specified plug, concrete blocking and/or anchoring, labor, equipment, excavation, backfill, and restoration required to install the plug in an existing in-service main that is to remain at the location shown on the plans or as directed in accordance with the specifications. Any and all plugs on all existing in-service mains shall be paid under one bid item included in the contract regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

NOTE: This utility bid item is not to be paid on new main installations or abandoned mains. This pay item is to plug existing in-service mains only. Plugs on new mains are incidental to the new main just like all other fittings.

NOTE: Plugging of existing abandon mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications For Road And Bridge Construction and paid using Bid Code 01314 Plug Pipe.

W PRESSURE REDUCING VALVE This description shall apply to all pressure reducing valves (PRV) of every size required in the plans and specifications except those bid items defined as "Special". Payment under this description is to be for PRVs being installed with new main. This item includes the PRV as specified in the plans and specifications, polyethylene wrap (if required by specification), labor, equipment, excavation, anchoring (if any), pit or vault, backfill, restoration, testing, disinfection, and etc., required to install the specified PRV at the location shown on the plans in accordance with the specifications and standard drawings complete and ready for use. If required on plans and/or proposed adjoining DIP is restrained, PRVs shall be restrained. PRV restraint shall be considered incidental to the PRV and adjoining pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W PUMP STATION This item is for payment for installation of pumps and an above or below ground structure for housing of the pumps. This item shall include all pumps, piping, fittings, valves, electrical components, building materials, concrete, any other appurtenances, labor, equipment, excavation, and backfill, to complete the pump station installation as required by the plans, standard drawings, and specifications, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LUMP SUM (LS) when complete.

W REMOVE TRANSITE (AC) PIPE This item shall include all labor, equipment, and materials needed for removal and disposal of the pipe as hazardous material. All work shall be performed by trained and certified personnel in accordance with all environmental laws and regulations.
Any and all transite AC pipe removed shall be paid under one bid item included in the contract regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

W SERVICE LONG SIDE This bid item description shall apply to all service line installations of every size bid up to and including 2 inch inside diameter, except those service bid items defined as "Special". This item includes the specified piping material, main tap, tapping saddle (if required), and corporation stop materials, coupling for connecting the new piping to the surviving existing piping, encasement of 2 inches or less internal diameter (if required by plan or specification), labor, equipment, excavation, backfill, testing, disinfection, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for service installations where the ends of the service connection are on opposite sides of the public roadway and the service line crosses the centerline of the public roadway as shown on the plans. The length of the service line is not to be specified. Payment under this item shall not be restricted by a minimum or maximum length. The contractor shall draw his own conclusions as to the length of piping that may be needed. Payment under this item shall include boring, jacking, or excavating across the public roadway for placement. Placement of a service across a private residential or commercial entrance alone shall not be reason to make payment under this item. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. This pay item does not include installation or relocation of meters. Meters will be paid separately. No additional payment will be made for rock excavation or for special bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W SERVICE SHORT SIDE This bid item description shall apply to all service line installations of every size up to and including 2 inch internal diameter, except those service bid items defined as "Special". This item includes installation of the specified piping material of the size specified on plans, encasement of 2 inches or less internal diameter (if required by plan or specification), main tap, tapping saddle (if required), corporation stop, coupling for connecting the new piping to the surviving existing piping, labor, equipment, excavation, backfill, testing, disinfection, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for service installations were both ends of the service connection are on the same side of the public roadway, or when an existing service crossing a public roadway will remain and is being extended, reconnected, or relocated with all work on one side of the public roadway centerline as shown on the plans. The length of the service line is not to be specified and shall not be restricted to any minimum or maximum length. Payment shall be made under this item even if the service crosses a private residential or commercial entrance; but, not a public roadway.
Private or commercial entrances shall not be considered a public roadway in defining

payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. This pay item does not include installation or relocation of meters. Meters will be paid separately. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W SERVICE RELOCATE This item is for the relocation of an existing water service line where a meter is not involved, and where an existing service line can easily be adjusted by excavating alongside and moving the line horizontally and/or vertically a short distance without cutting the service line to avoid conflicts with road construction. This item shall include excavation, labor, equipment, bedding, and backfill to relocate the line in accordance with the plans and specifications complete and ready for use. Payment under this item shall be for each location requiring relocation. Payment shall be made under this item regardless of service size or relocation length. No separate pay items will be established for size or length variation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W STRUCTURE ABANDONMENT This item is to be used to pay for abandonment of larger above or below ground water structures such as meter vaults, fire pits, pump stations, tanks, and etc. Payment under this time shall not be limited to size or scope; however structures with connecting pipes of 2 inches or less shall not be paid under this item; but, shall be considered incidental to water construction, (i.e., abandonment of standard water meters up to and including 2 inches would not be paid under this item). Payment under this item shall include all labor, equipment, and compacted fill or flowable fill for abandonment of the structure in place and restoration complete. No separate bid items will be established for size or structure variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W STRUCTURE REMOVAL This item is to be used to pay for removal of larger above or below ground water structures such as meter vaults, fire pits, pump stations, tanks, and etc. Payment under this time shall not be limited to size or scope; however structures with connecting pipes of 2 inches or less shall not be paid under this item; but, shall be considered incidental to water construction, (i.e., removal of standard water meters up to and including 2 inches would not be paid under this item). Payment under this item shall include all labor, equipment, and compacted backfill for removal of the structure and restoration complete. No separate bid items will be established for size or structure variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W TAPPING SLEVE AND VALVE SIZE 1 OR 2 This item shall include the specified tapping sleeve, valve, valve box, concrete pad around valve box (when required in specifications or plans), labor, and equipment to install the specified tapping sleeve and valve, complete and ready for use in accordance with the plans and specifications. The size shall be the measured internal diameter of the live pipe to be tapped. The size tapping sleeve and valve to be paid under sizes 1 or 2 shall be as follows:

Size 1 = All live tapped main sizes up to and including 8 inches

Size 2 = All live tapped main sizes greater than 8 inches

Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W TIE-IN This bid description shall be used for all main tie-in bid items of every size except those defined as "Special". This item includes all labor, equipment, excavation, fittings, sleeves, reducers, couplings, blocking, anchoring, restoration, disinfection, testing and backfill required to make the water main tie-in as shown on the plans, and in accordance with the specifications complete and ready for use. Pipe for tie-ins shall be paid under separate bid items. This item shall be paid EACH (EA) when complete.

W VALVE This description shall apply to all valves of every size required in the plans and specifications except those bid items defined as "Special". Payment under this description is to be for gate or butterfly valves being installed with new main. This item includes the valve as specified in the plans and specifications, polyethylene wrap (if required by specification), labor, equipment, excavation, anchoring (if any), valve box and valve stem extensions, backfill, concrete pad around valve box (if required by specification), restoration, testing, disinfection, and etc., required to install the specified valve at the location shown on the plans in accordance with the specifications and standard drawings complete and ready for use. If required on plans and/or proposed adjoining DIP is restrained, valves shall be restrained. Valve restraint shall be considered incidental to the valve and adjoining pipe. This description does not apply to cut-in valves. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE ANCHOR EXISTING This bid item is intended to pay for installation of restraint hardware on an existing valve where no restraint exists to hold the valve in place to facilitate tie-ins and other procedures where restraint is prudent. This work shall be performed in accordance with water specifications and plans. This bid item shall include all labor equipment, excavation, materials and backfill to complete restraint of the designated valve, regardless of size, at the location shown on the plans, complete and ready for use. Materials to be provided may include, but is not limited to, retainer glands, lugs, threaded rod, concrete, reinforcing steel or any other material needed to complete the restraint. Should the associated valve box require removal to complete the restraint, the contractor shall reinstall the existing valve box, the cost of which shall be considered incidental to this bid item. No separate bid items are being provided for size variations. All sizes shall be paid under one bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE BOX ADJUST Includes all labor, equipment, valve box and valve stem extensions (if required), excavation, backfill, concrete pad around valve box (when specified in specifications or plans), restoration, and etc., to adjust the top of the box to finished grade complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE CUT-IN This bid description is for new cut-in valve installations of all sizes

where installation is accomplished by cutting out a section of existing main. This item shall include cutting the existing pipe, supplying the specified valve, couplings or sleeves, valve box, concrete pad around valve box (when required in specifications or plans), labor, equipment, and materials to install the valve at the locations shown on the plans, or as directed by the engineer, complete and ready for use. Any pipe required for installation shall be cut from that pipe removed or supplied new by the contractor. No separate payment will be made for pipe required for cut-in valve installation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE VAULT This item is for payment for installation of an underground structure for housing of specific valve(s) as required by the plans and specifications. This item shall include all labor, equipment, excavation, concrete, manhole castings or doors, the specified valve(s), all piping, and fitting materials associated with installing a functioning valve vault in accordance with the plans, standard drawing, and specifications, complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Standard Gas Bid Descriptions

G DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized in order to minimize the impact of open cut for the installation of gas main under streets, creeks, etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore whether used as a carrier pipe or an encasement of a separate carrier pipe. Carrier pipe installed within a bore pipe shall be paid separately under pipe items.
Payment under this item shall be for all sizes and not be size specific. No separate bid items will be established for size variations. The bore pipe sizes to be included under this item shall be as shown on the plans and/or in the specifications. This bid item shall also include the cost of pre and/or post directional bore gas installation video inspection of adjacent sanitary and storm sewer mains, manholes, and laterals when the utility specifications associated with the contract require such video inspection. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid LINEAR FEET (LF)

G ENCASEMENT STEEL BORED This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, vents, labor, and equipment to bore and install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The sizes of encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches Range 4 = All encasement sizes greater than 14 inches to and including

18 inches Range 5 = All encasement sizes greater than 18 inches to and including 24 inches Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid LINEAR FEET (LF)

G ENCASEMENT STEEL OPEN CUT This item shall include the steel encasement pipe size as specified on the plans and in the specifications, casing spacers, end seals, vents, labor, and equipment to open cut and install the encasement in accordance with the plans and specifications, complete and ready for use. The size shall be the measured internal diameter of the encasement pipe. The size encasement to be paid under the size ranges specified in the bid items shall be as follows:

Range 1 = All encasement sizes greater than 2 inches to and including 6 inches
Range 2 = All encasement sizes greater than 6 inches to and including 10 inches
Range 3 = All encasement sizes greater than 10 inches to and including 14 inches Range 4 = All encasement sizes greater than 14 inches to and including 18 inches Range 5 = All encasement sizes greater than 18 inches to and including 24 inches Range 6 = All encasement sizes greater than 24 inches

(Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.) Payment under this bid item shall not include the carrier pipe. Carrier pipe shall be paid under a separate bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid LINEAR FEET (LF)

G REGULATOR STATION Includes all labor, equipment, materials and restoration, to install a new gas regulator station as indicated on plans and on standard drawings compete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

G MAIN POINT RELOCATE This item is intended for payment for horizontal and/or vertical relocation of a short length of an existing main at the locations shown on the plans. This bid item is to be used to relocate an existing gas main at point locations such as to clear a conflict at a proposed drainage structure, pipe or any other similar short relocation situation. All new materials are to be used. The materials provided shall be of the same type and specification as those that exist. Substitution of alternative materials shall be approved by the engineer in advance on a case by case basis. Payment under this item shall be for each location requiring an existing main to be relocated horizontally or vertically regardless of pipe size or relocation length. No separate pay items will be established for pipe size variations or relocation segment length variations. Main Point Relocate shall not be paid on a linear feet basis; but, shall be Paid EACH (EA) at each location when complete and placed in service. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.

G PIPE This description shall apply to all polyethylene/plastic and steel pipe bid items of every size and type to be used as gas main, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing

wire with test boxes (if required by specification), corrosion protective coatings of steel pipe and fittings, labor, equipment, excavation, bedding, restoration, testing, backfill, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings complete and ready for use. No additional payment will be made for rock excavation. This bid item shall also include material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. This bid item shall also include the cost of pre and/or post directional bore gas installation video inspection of adjacent sanitary and storm sewer mains, manholes, and laterals when the utility specifications associated with the contract require such video inspection. Measurement of quantities under this item shall be through fittings, encasements, and directional bores (only when a separate carrier pipe is specified within the directional bore pipe). Measurements shall be further defined to be to the center of tie-in where new pipe contacts existing pipe at the center of connecting fittings, to the outside face of vault or structure walls, or to the point of main termination at dead ends. No separate payment will be made under pipe items when the directional bore pipe is the carrier pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid LINEAR FEET (LF)

G SERVICE LONG SIDE This bid item description shall apply to all service line installations of every size bid up to and including 2 inch inside diameter, except those service bid items defined as "Special". This item includes the specified piping material, main tap, coupling for connecting the new piping to the surviving existing piping, encasement of 2 inches or less internal diameter (if required by plan or specification), labor, equipment, excavation, backfill, testing, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for service installations where the ends of the service connection are on opposite sides of the public roadway and the service line crosses the centerline of the public roadway as shown on the plans. The length of the service line is not to be specified. Payment under this item shall not be restricted by a minimum or maximum length. The contractor shall draw his own conclusions as to the length of piping that may be needed. Payment under this item shall include boring, jacking, or excavating across the public roadway for placement. Placement of a service across a private residential or commercial entrance alone shall not be reason to make payment under this item. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. This pay item does not include installation or relocation of meters. Meters will be paid separately. This bid item shall also include the cost of pre and/or post directional bore gas installation video inspection of adjacent sanitary and storm sewer mains, manholes, and laterals when the utility specifications associated with the contract require such video inspection. No additional payment will be made for rock excavation or for special bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

G SERVICE SHORT SIDE This bid item description shall apply to all service line installations of every size up to and including 2 inch internal diameter, except those service bid items defined as "Special". This item includes installation of the specified piping material of the size specified on plans, encasement of 2 inches or less internal diameter (if required by plan or specification), main tap, coupling for connecting the new

piping to the surviving existing piping, labor, equipment, excavation, backfill, testing, and restoration, at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready for use. This bid item is to pay for service installations were both ends of the service connection are on the same side of the public roadway, or when an existing service crossing a public roadway will remain and is being extended, reconnected, or relocated with all work on one side of the public roadway centerline as shown on the plans. The length of the service line is not to be specified and shall not be restricted to any minimum or maximum length. Payment shall be made under this item even if the service crosses a private residential or commercial entrance; but, not a public roadway. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. This pay item does not include installation or relocation of meters. Meters will be paid separately. This bid item shall also include the cost of pre and/or post directional bore gas installation video inspection of adjacent sanitary and storm sewer mains, manholes, and laterals when the utility specifications associated with the contract require such video inspection. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

G SERVICE RELOCATE This item is for the relocation of an existing gas service line where a meter is not involved, and where an existing service line can easily be adjusted by excavating alongside and moving the line horizontally and/or vertically a short distance without cutting the service line to avoid conflicts with road construction. This item shall include excavation, labor, equipment, bedding, and backfill to relocate the line in accordance with the plans and specifications complete and ready for use. Payment under this item shall be for each location requiring relocation. Payment shall be made under this item regardless of service size or relocation length. No separate pay items will be established for size or length variation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

G TIE-IN This bid description shall be used for all main tie-in bid items of every size except those defined as "Special". This item includes all labor, equipment, excavation, fittings, sleeves, reducers, couplings, restoration, testing and backfill required to make the gas main tie-in as shown on the plans, and in accordance with the specifications complete and ready for use. Pipe for tie-ins shall be paid under separate bid items. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

G VALVE This description shall apply to all valves of every size and type required in the plans and specifications except those bid items defined as "Special". Payment under this description is to be for gas valves being installed with new main. This item includes the valve as specified in the plans and specifications, protective coating and corrosion protection, labor, equipment, excavation, valve box and valve stem extensions, backfill, restoration, testing, etc. required to install the specified valve at the location shown on the plans in accordance with the specifications and standard drawings complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications

shall be referenced. Paid EACH (EA) when complete.

G VALVE BOX ADJUST Includes all labor, equipment, valve box and valve stem extensions (if required), excavation, backfill, concrete pad around valve box (when specified in specifications or plans), restoration, etc. to adjust the top of the box to finished grade complete and ready for use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. Paid EACH (EA) when complete.

PART 3 QUANTITIES OF ESTIMATE

A. Wherever the estimated quantities of work to be done and materials to be furnished under this contract are shown in any of the documents, including the Bid Proposal, they are given for use in comparing bids and the right is especially reserved except as herein otherwise specifically limited, to increase or diminish them as may be deemed reasonably necessary or desirable by the Owner to complete the work contemplated by this contract, and such increase or diminution shall not give cause for claims or liability for damages. The Engineer will not be financially responsible for any omissions from the Contract Documents and therefore not included by the Contractor in his proposal.

B. Aerial photographs utilized for plan sheets in the Contract Documents are indicated at an approximate scale and shall not be scaled for quantity take-offs. The quantities listed in the bid schedule are given for use in comparing bids and may not be the actual quantities to be installed. It is the Contractor's responsibility to field verify the bid item quantities to be installed prior to the ordering of materials. Payment on unit price contracts are based on actual quantities installed. The Owner or Engineer will not be financially responsible for any shortage of the bid items or overrun of bid items ordered for the quantities.

C. The actual quantities of all materials to be used for this project shall be field verified prior to the Contractor ordering the necessary materials. The quantity listed in the bid schedule is given for use in comparing bids and may increase or diminish as may be deemed necessary or as directed by the Owner. Any such increase or diminution shall not give cause for claims or liability for damages. The Engineer or Owner will not be financially responsible for any charges incurred for restocking of materials ordered.

- END OF SECTION -

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

A. This section specifies the general methods and requirements of submissions applicable to the following WORK-related submittals:

1. General Procedures for Submittals
2. Construction Schedule
3. Schedule of Values and Payments
4. Schedule of SHOP DRAWING Submittals
5. SHOP DRAWINGS, Product Data, Samples and O&M Instructions
6. Construction Photographs
7. Test Reports
8. Manufacturer's Certificates
9. Manufacturer's Instructions
10. Contractor's Responsibility
11. Submission Requirements
12. Resubmission Requirements

Additional general submissions requirements are contained in paragraphs 5.1 through 5.7 of the General Conditions. The CONTRACTOR is responsible for the submittal of all weekly payrolls, monthly utilization and other required forms and reports, including reports and forms from his SUBCONTRACTORS. The prompt submittal of all required reports and forms will help to insure the timely processing of pay request. Detailed submittal requirements will be specified in the technical SPECIFICATIONS sections.

1.02 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times:

The CONTRACTOR shall prepare and transmit each submittal sufficiently in advance of performing the related WORK or other applicable activities, or within the time specified in the individual WORK section of the

SPECIFICATIONS, so that the installation will not be delayed by processing times including disapproval and re-submittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the WORK.

1.03 CONSTRUCTION SCHEDULE

A. In addition to the progress schedule requirements specified in Article 3 of the General Conditions, the CONTRACTOR shall, within ten (10) days after the NOTICE TO PROCEED provide and submit to the ENGINEER for review the schedule he plans to maintain in order to successfully construct the WORK within the time allotted. The schedule shall account for all WORK of the CONTRACTOR and his SUBCONTRACTORS.

B. The CONTRACTOR shall update the schedule information monthly and submit the update information to the ENGINEER at the same time the pay estimate is prepared. The schedule shall contain all of the items of the periodic estimate and pay schedule.

C. The CONTRACTOR bears full responsibility for scheduling all phases and stages of the WORK including his SUBCONTRACTOR WORK to insure its successful prosecution and completion within the time specified in accordance with all provisions of these SPECIFICATIONS.

D. Refer to Section 01310 for additional requirements.

1.04 SCHEDULE OF VALUES AND PAYMENTS

A. Within the (10) days after award of the Contract the CONTRACTOR shall submit to the OWNER in triplicate, a breakdown of the pay items, including a schedule of values and a schedule of payments. This breakdown shall be subject to approval by the OWNER, and when so approved shall become the basis for determining progress payments and for negotiation of CHANGE ORDERS, if required.

1.05 SCHEDULE OF SHOP DRAWING SUBMITTALS

A. The CONTRACTOR shall, within ten (10) days after the NOTICE TO PROCEED provide and submit to the ENGINEER for review a SCHEDULE OF SHOP DRAWING SUBMITTALS. The schedule shall account for all materials used by the CONTRACTOR and his SUBCONTRACTORS.

B. The schedule shall be organized to reflect the respective specification division under which it applies.

1.06 SHOP DRAWINGS, PRODUCT DATA, SAMPLES AND O & M INSTRUCTIONS

A. Shop Drawings

1. SHOP DRAWINGS, as defined in the General Conditions, and as specified in the technical SPECIFICATIONS include, but are not necessarily limited to custom-prepared data such as fabrication and erection/installation DRAWINGS, scheduled information, setting diagrams, actual shop WORK manufacturing instructions, custom templates, special wiring diagrams, coordination DRAWINGS, individual system of equipment inspection and test reports including performance curves and certifications, as applicable to the WORK.

2. All details on SHOP DRAWINGS submitted for review shall show clearly the relation of the various parts to the main member and lines of the structure, and where correct fabrication of the WORK depends upon field measurements, such measurements shall be made and noted on the SHOP DRAWINGS before being submitted for review by the ENGINEER.

3. Unless otherwise specified, the CONTRACTOR is not required to resubmit SHOP DRAWINGS on existing equipment. The CONTRACTOR shall, however, be responsible for obtaining all SHOP DRAWINGS and/or other information from the manufacturer necessary to complete the installation and startup of existing equipment.

B. Product Data

1. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare parts listing, and printed product warranties, as applicable to the WORK.

C. Samples

1. Samples specified in individual sections, included, but are not necessarily limited to, physical examples of the WORK such as sections of manufactured or fabricated WORK, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effects, graphic symbols, and units of WORK to be used by the ENGINEER or OWNER for independent inspection and testing, as applicable to the WORK.

D. Operation and Maintenance Instructions

1. O&M instructions shall conform to Article 5 of the General Conditions (Section 00710) and the particular requirements of the individual sections.

2. Refer to Section 01785 for additional requirements.

1.07 CONSTRUCTION PHOTOGRAPHS

A. Miscellaneous photographs as directed by the ENGINEER or OWNER.

1. Photographs are required on this PROJECT and are the responsibility of the CONTRACTOR. Photographs shall be 3" x 5" color snapshots taken with a standard 35mm camera, or a digital camera with 8 MP minimum. CONTRACTOR shall be responsible for the taking, development, labeling and organizing of the photographs. All photographs shall be identified as to location, date and subject matter. Photographs shall be arranged in a photo album(s) by location, subject matter and date taken. Upon completion of the project, the CONTRACTOR shall supply the OWNER with the negatives or digital photo files. The later, if provided, shall be supplied on CD media in .jpg format.

2. Upon completion of the project, the CONTRACTOR shall provide three (3) professional-quality 8 x 10 color aerial photographs. Prior to photographing, the CONTRACTOR shall confirm with the ENGINEER that the site is ready. The photo shall also be provided in digital format (.jpg) on CD media.

3. The CONTRACTOR, before final payment is made, shall deliver one (1) set of photographic prints and negatives/.jpg’s to the OWNER, one (1) set of prints to the ENGINEER, and one aerial photograph to each. Both sets of prints shall be arranged in a photo album(s) and labeled as outlined above.

4. No pay item has been set up for the photographs. The CONTRACTOR shall allow for a minimum of 200 - 3" x 5" color photographs (taken and arranged as outlined above) in his BID.

1.08 TEST REPORTS

A. Submit for the Architect/Engineer's knowledge as contract administrator or for the Owner.

B. Submit test reports for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

1.09 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification sections, submit certification by the manufacturer, installation/application subcontractor, or the Contractor to Architect/Engineer, in quantities specified for Product Data.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

1.10 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Architect/Engineer for delivery to owner in quantities specified for Product Data.

1.11 CONTRACTOR'S RESPONSIBILITY

A. The CONTRACTOR shall review SHOP DRAWINGS, product data and samples prior to submission to determine and verify the following:

1. Field measurements

2. Field construction criteria

3. Catalog numbers and similar data

4. Conformance with the SPECIFICATIONS

B. All SHOP DRAWINGS submitted by SUBCONTRACTORS for review shall be sent directly to the CONTRACTOR for preliminary checking. The CONTRACTOR shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

C. The CONTRACTOR shall check all SUBCONTRACTOR'S SHOP DRAWINGS regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the DRAWINGS and SPECIFICATIONS. DRAWINGS found to be inaccurate or otherwise in error shall be returned to the SUBCONTRACTORS for correction before submission thereof.

D. Each shop drawing, WORKING drawing, sample and catalog data submitted by the CONTRACTOR shall have affixed to it a certification statement, signed by the CONTRACTOR. The certification shall state that the CONTRACTOR represents that he has determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and has

checked and coordinated each item with other applicable review SHOP DRAWINGS and all Contract requirements.

E. The CONTRACTOR shall notify the OWNER in writing, at the time of submittal, of any deviations in the submittals from the requirements of the CONTRACT DOUCMENTS.

F. The CONTRACTOR should include the notation “Critical Path” on critical path submittals.

G. The review of SHOP DRAWINGS, samples or catalog data by the ENGINEER shall not relieve the CONTRACTOR from his responsibility with regard to the fulfillment of the terms of the Contract.

H. No portion of the WORK requiring a shop drawing, WORKING drawing, sample or catalog data shall be started nor shall any materials be fabricated or installed prior to the review or qualified review SHOP DRAWINGS and data shall be at the CONTRACTOR'S risk. The OWNER will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

I. PROJECT WORK, materials, fabrication, and installation shall conform with reviewed SHOP DRAWINGS, WORKING DRAWINGS, applicable samples, and catalog data.

1.12 SUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make submittals promptly in accordance with the accepted schedule, and in such sequence as to cause no delay in the WORK or in the WORK of any other CONTRACTOR.

B. Number of submittals required:

1. SHOP DRAWINGS: Submit six (6) copies.

2. Operation and Maintenance Instructions: Submit six (6) copies.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.

2. The PROJECT title, contract number, and submittal number.

3. CONTRACTOR identification.

4. The names of:

a. CONTRACTOR

b. SUPPLIER

c. Manufacturer

5. Identification of the product, with the specification section number.

6. Field dimensions, clearly identified as such.

7. Relation to adjacent or critical features of the WORK or materials.

8. Applicable standards, such as ASTM or Federal Specification numbers.

9. Identification of revisions on re-submittals.

10. An 8-inch x 3-inch blank space for CONTRACTOR'S and ENGINEER'S stamps.

D. Submittals shall be clear and legible. Submittals with facsimile copies will be automatically rejected.

1.13 RESUBMISSION REQUIREMENTS

A. The CONTRACTOR shall make any corrections or changes in the submittals required by the ENGINEER and resubmit until accepted, in accordance with the following:

1. SHOP DRAWINGS and Product Data:

a. Revise initial DRAWINGS or data, and resubmit as specified for the initial submittal.
b. Indicate any changes which have been made other than those requested by the ENGINEER.

2. Samples:

a. Submit new samples as required for initial submittal.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 01500

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.01 SANITARY FACILITIES

A. The CONTRACTOR shall construct and maintain sanitary facilities for his employees and employees of the subcontractors. The CONTRACTOR shall, at completion of the Contract Work, properly dispose of these sanitary facilities.

1.02 UTILITIES

A. The CONTRACTOR shall be totally responsible for installation, maintenance and cost of his and his sub-contractor’s telephone service.

B. The CONTRACTOR shall install meters at all his points of use of electric, water, and natural gas utilities. The CONTRACTOR shall pay the monthly billed cost from the servicing utility for the CONTRACTOR'S use of these utilities. The CONTRACTOR shall pay any initial installation costs.

C. If CONTRACTOR requires other utilities, he shall obtain and pay for them.

1.03 MAINTENANCE OF SERVICE IN EXISTING UTILITIES

A. Where the existing utilities must be disturbed during construction under this Contract, their operation and function shall be maintained by the CONTRACTOR to such a degree that service to customers will be interrupted for minimum time periods only. Such disturbances and any maintenance use of these lines shall constitute no cost to the OWNER. The OWNER shall be notified of interruptions in sufficient time to prepare for them and shall agree to the hour, date, and duration of them before they are undertaken.

B. Should shutdowns in service be in excess of the time of duration agreed upon, and such excessive shutdown time be due to the CONTRACTOR'S negligence, faulty Work and/or inability to perform, then and in that event, the CONTRACTOR shall be held liable to the OWNER for any and all damages that may accrue to the OWNER, by reason of such excessive shutdown periods.

C. Digging through services with trenching machines will not be permitted. Upon damage to utility services, such services shall be repaired immediately and tested to the satisfaction of the ENGINEER. The CONTRACTOR shall notify all utility users of impending interruption of service and shall notify all utility users of impending interruption of service

and shall be responsible for all damage resulting from same. Payment for necessary disconnection and reconnection of utility services shall be included as a part of the CONTRACTOR'S bid and no extra compensation will be made for same.

D. The CONTRACTOR shall at all times maintain on hand an adequate supply of repair materials and tools with which to make repair to damaged water, gas and sewer lines. Should the CONTRACTOR inadvertently damage existing utilities, he shall make immediate repair thereto and in no event shall he leave the site before such repair has been made and proven to be successful.

E. As far as possible, the locations and sizes of existing mains are indicated on the drawings; however, exact locations, pipe materials and sizes cannot be guaranteed. It shall be the responsibility of the CONTRACTOR to locate and uncover existing lines. The CONTRACTOR shall provide all connecting fittings of the correct size and type for each connection to existing lines.

1.04 PROPERTY PROTECTION

A. Care is to be exercised by the CONTRACTOR in all phases of construction, to prevent damage and/or injury to the OWNER'S and/or other property.

B. The CONTRACTOR shall avoid unnecessary injury to trees and shall remove only those authorized to be removed by written consent of the OWNER. Fences, gates, and terrain damaged or disarranged by the CONTRACTOR'S forces shall be immediately restored in their original condition or better.

1.05 CONSTRUCTION WARNING SIGNS

A. The CONTRACTOR shall provide construction warning signs for each location where he is working in the state highway right-of-way or in City or County streets. He will further provide flag men as required and shall abide by all Kentucky Transportation Cabinet, Department of Highways safety rules, including size, type and placement of construction signs.

1.06 RESIDENT OBSERVER OFFICE

A. No office is required.

1.07 EXCAVATION

A. No separate payment for solid rock excavation will be made under this Contract, unless specifically noted on the Bid Form. All excavation shall be considered unclassified, except in locations where solid rock excavation is paid for on a unit price basis.

1.08 ACCESS ROADWAYS

A. The CONTRACTOR shall construct all access roadways needed during construction, and the planned access roadways for the completed project. The CONTRACTOR shall maintain access roadways continuously during the construction period.

B. The CONTRACTOR shall maintain all existing roadways within the project site which are used for any purpose by construction operations. The degree and frequency of maintenance shall be adequate to keep existing roadways in a condition at least equal to their condition prior to construction. Road maintenance shall include dust control and sweeping.

1.09 RESPONSIBILITY FOR TRENCH SETTLEMENT

A. The CONTRACTOR shall be responsible for any settlement caused by the construction, that occurs within one (1) year after the final acceptance of this Contract by the OWNER. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock away from the construction area. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Damaged limbs shall be trimmed and damaged tree trunks shall be treated with wound dressing.

1.10 DAMAGE TO CROPS, LIVESTOCK AND VEGETATION

A. The CONTRACTOR shall protect crops, livestock and vegetation against damage or injury from construction operations at all times. Crops damaged or equipment access obtained outside of the easements provided shall be the responsibility of the CONTRACTOR. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock away from the construction area.

B. Ornamental shrubbery and tree branches shall be temporarily tied back, where appropriate, to minimize damage. Damaged limbs shall be trimmed and damaged tree trunks shall be treated with wound dressing.

1.11 WASTE DISPOSAL

A. The CONTRACTOR shall dispose of waste, including hazardous waste, off-site in accordance with all applicable laws and regulations.

1.12 CONTRACTOR'S TRAILERS AND MATERIAL STORAGE

A. The location of the CONTRACTOR'S and Subcontractor's office, work trailers and parking areas for the project shall be subject to the OWNER'S approval.

B. The CONTRACTOR'S and Subcontractor's material storage yards for the project shall be subject to the OWNERS approval.

1.13 JURISDICTIONAL DISPUTES

A. It shall be the responsibility of the CONTRACTOR to pay all costs that may be required to perform any of the work shown on the Drawings or specified herein in order to avoid any work stoppages due to jurisdictional disputes. The basis for subletting work in question, if any, shall conform with precedent agreements and decisions on record with the Building and Construction Trades Department, AFL-CIO, dated June, 1973, including any amendments thereto.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Extent of earthwork is indicated on the DRAWINGS.

1. Preparation of sub-grade for embankments and outlet works is included as part of this WORK.

2. Engineered fill course for support of concrete slabs is included as part of this WORK.

3. Backfilling of structures, headwalls, channels, manholes and trenches is included as part of this WORK.

B. Excavation for Mechanical/Electrical WORK

Excavation and backfill required in conjunction with underground mechanical and electrical appurtenances is included as WORK of this Section.

C. Definition

“Excavation” consists of removal of material encountered to sub-grade elevations indicated and subsequent disposal of materials removed.

1.02 RELATED WORK

A. Dewatering is included in this Division, Section 02140.

B. Erosion and sedimentation control is included in this Division, Section 02270.

C. Piping is included in this Division, Section 02610 and 02700.

D. Landscaping is included in this Division, Section 02900.

1.03 QUALITY ASSURANCE

A. Codes and Standards

Perform excavation WORK in compliance with applicable requirements of governing authorities having jurisdiction.

B. Testing and Inspection Services

Employ, at CONTRACTOR'S expense, testing laboratory acceptable to the OWNER and the ENGINEER to perform soil testing and inspection service for quality control during earthwork operations.

1.04 SUBMITTALS

A. Test Reports

Submit following reports directly to the ENGINEER from the testing services, with copy to CONTRACTOR:

1. Test reports on borrow material.

2. Verification of each cutoff trench elevation and embankment sub-grade elevation.

3. Field density test reports, one per 3,000 S.F. per lift.

4. One optimum moisture-maximum dry density curve for each type of soil encountered, per ASTM D-698.

1.05 JOB CONDITIONS

A. Site Information

1. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that OWNER will not be responsible for interpretation or conclusions drawn therefrom by CONTRACTOR. Data are made available for convenience of CONTRACTOR.

2. Additional test borings and other exploratory operations may be made by CONTRACTOR at no cost to OWNER.

B. Existing Utilities

Locate existing underground utilities in areas of WORK. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

C. Use of Explosives

Do not bring explosives onto site or use in WORK without prior written permission from authorities having jurisdiction. Contact Kentucky Department of Mines and Minerals for information. CONTRACTOR is solely responsible for handling, storage, and use of explosive materials when their use is permitted.

D. Protection of Persons and Property

1. Barricade open excavations occurring as part of this WORK and post with warning lights.

    a. Operate warning lights as directed by authorities having jurisdiction.

    b. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 PRODUCTS

2.01 SOIL MATERIALS

A. Definitions

1. Sub-base material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.

2. Backfill and fill materials: Satisfactory soil materials free of debris, waste, frozen materials, vegetable, and other deleterious matter.

3. Embankment Materials

All fill materials shall be obtained from required excavations and from the proposed borrow areas if shown on the CONTRACT DRAWINGS. The selection, blending, routing and disposition of materials shall be subject to the approval of the ENGINEER.

a. Materials - Impervious Clay Core

Core fill materials shall consist of residual overburden soils within the proposed excavation and borrow areas. These soils consist primarily of brown clays classified as CH or CL using the Unified Soil Classification System.

Fill materials shall contain no sod, organic topsoil, brush, roots or other deleterious materials. Fill material shall be rock free and shall be approved by the ENGINEER prior to fill placement.

b. Materials - Random Earth and Rock Zones

Fill material shall consist of non-organic soil or weathered rock with a maximum particle size of 12 inches. Rock materials from the borrow area shall be excavated by ripping methods. No blasting will be allowed without written permission from the OWNER.

2.02 EMBANKMENT DRAINAGE MATERIALS

A. No. 57 crushed stone is specified in this Division, Section 02255.

B. Filter fabric for use with the embankment drain location at the downstream face of the impervious core, where called for in this Section, on the DRAWINGS or as determined by the ENGINEER shall be Mirafi 140N as manufactured by Celanese Corporation, New York, NY 10036, or equal.

PART 3 EXECUTION

3.01 STRIPPING AND TOPSOILING

A. Before excavation and grading is commenced for structures, the embankment, outlet works or other WORK described hereinafter (except pipelines and manholes) or before material is removed from borrow pits, (impoundment area) the topsoil shall be removed from the areas affected and stockpiled. When final grading is accomplished, the topsoil shall be spread evenly over the disturbed area, except within the impoundment area. Rough grading shall have been carried approximately 6 inches below finished grade (except solid rock, where it shall be carried 12 inches below finished grade) and brought back up to grade with topsoil as set out herein.

3.02 EXCAVATION

A. All excavation to be unclassified standard excavation includes excavation to sub-grade elevations indicated including excavation of earth, rock (at depth shown on DRAWINGS), bricks, wood, cinders, and other debris.

B. Differing Site Conditions

1. Should the CONTRACTOR, during the course of construction, encounter subsurface or latent physical conditions differing materially from the subsurface information provided, or unknown physical conditions of an unusual nature differing materially from those ordinarily encountered and generally recognized as inherent in WORK of the character provided for in this CONTRACT, he shall immediately notify the ENGINEER in writing of the conditions encountered.

2. Upon receipt of such notice, the ENGINEER shall promptly investigate the conditions described by the CONTRACTOR and shall advise the CONTRACTOR in writing of the decision and/or disposition of the conditions encountered.

C. Unanticipated Material

1. No classification of excavation will be made when unanticipated material is encountered in WORK:

    a. Excavation includes excavation of pavements and other obstructions visible on ground surface; underground structures, utilities, and other items indicated to be demolished and removed; together with earth and other materials encountered that are not classified as unauthorized excavation.

D. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific direction of ENGINEER. Unauthorized excavation, as well as remedial WORK directed by ENGINEER, shall be at CONTRACTOR'S expense.

1. Under footings or foundation bases fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to the ENGINEER.

2. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by the ENGINEER.

E. Additional Excavation

1. When excavation has reached required sub-grade elevations, notify the ENGINEER who will make an inspection of conditions.

    a. If unsuitable bearing materials are encountered at required sub-grade elevations, carry excavations deeper and replace excavated material as directed by the ENGINEER.

    b. Removal of unsuitable material and its replacement as directed will be paid on basis of CONTRACT conditions relative to changes in WORK using Unit Price Modification prices.

F. Stability of Excavations

1. Slope sides of excavations to comply with Federal, State and local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

2. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

G. Shoring and Bracing

Provide materials for shoring and bracing, such as sheet piling, uprights, stringers, and cross-braces, in good serviceable condition.

1. Establish requirements for trench shoring and bracing to comply with Federal, State and local codes and authorities having jurisdiction.

2. Maintain shoring and bracing in excavations regardless of time period excavation progresses.

3. Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops as required and leave permanently in place.

H. Dewatering

1. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding PROJECT site and surrounding area.

   a. Do not allow water to accumulate in excavation. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of sub-grades and foundations. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

   b. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavation to collecting or runoff areas. Do not use trench excavations as temporary drainage ditches.

2. Prevent impoundment of water behind embankment during construction and prior to acceptance of OWNER.

3. See this Division, Section 02140 for additional requirements.

I. Material Storage

1. Stockpile satisfactory excavated materials where directed, until required for backfill or fill. Place, grade, and shape stockpiles for proper drainage.

   a. Dispose of excess soil material and waste materials as herein specified.

J. Excavation for Structures

1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for inspection.

2. In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other WORK.

K. Excavation for Pavements

1. Cut surface under pavements to comply with cross-sections, elevations, and grades as shown on DRAWINGS.

L. Trench Excavation

1. The CONTRACTOR shall include in his lump sum BID all trenching and backfill necessary for installation of all pipelines as planned and specified. Trenching shall include clearing and grubbing of all trash, weeds, briars, trees and stumps encountered in the trenching. The CONTRACTOR shall dispose of such material at no extra cost to the OWNER. Shrubs shall be removed, maintained and replanted in the same or adjacent location as the ENGINEER may direct. Trenching also includes such items as pipe and small creek crossings; cutting, moving or repairing damage to fences, posts, gates, and other surface structures regardless of whether shown on the DRAWINGS.

2. All existing facilities shall be protected from danger or damage while pipelines are being constructed and backfilled, and from damage due to settlement of the backfill.

3. In the event any existing structure is damaged, repair and restoration shall be made at once and backfill shall not be replaced until this is done. Restoration and repair shall be such that the damaged structure is equal to or better than its original condition and can serve its purpose as completely as before. All such restoration and repair shall be done without extra cost to the OWNER.

4. Trenches must be dug to lines and grades shown on the DRAWINGS. Hand trenching will be required in areas where machine trenching would result in undue damage to existing structures and facilities.

5. Excavation shall be open trenches.

6. Sheeting and shoring of trenches shall be provided at the expense of the CONTRACTOR where necessary to protect life, property

and the new or existing structures from damage or to maintain maximum permissible trench widths at top of pipe. All necessary materials, including, but not limited to, sheeting, sheet piling, trench jacks, braces, shores and stringers, shall be used to hold trench walls. Sheeting and shoring may be withdrawn as the trenches are being backfilled, after backfill has been tamped over top of the pipe at least 18 inches. If removal before backfill is completed to surface endangers adjacent structures, such as buildings, pipelines, street paving, and sidewalks, then the sheeting and shoring shall be left in place until such danger has passed, and then pulled if practical. Voids caused by sheeting withdrawal shall be backfilled and tamped. If not withdrawn, sheeting shall be cut off at least 18 inches below final surface grade, so there is no obstruction at the ground level.

7. Where sub-grade of trench has insufficient stability to support the pipeline and hold it to its original grade, the ENGINEER may order stabilization by various means. Exclusive of dewatering normally required for construction, and instability caused by neglect of the CONTRACTOR, the necessary stabilization shall be paid for at unit price set up in the CONTRACT. In the event no particular BID price is applicable, then the payment for stabilization will be negotiated.

8. The location of the pipelines and their appurtenances as shown are those intended for the final construction. However, conditions may present themselves before or after construction on any line is started that would indicate desirable changes in location. The OWNER reserves the right to make reasonable changes in line and structure locations without extra cost, except as may be determined by extra units of materials and construction actually involved. The OWNER is under no obligation to locate pipelines, so they may be excavated by machine.

9. Tunneling may be used as an alternate to open-cut trenching, at no extra cost to the OWNER. The annular space between plates and excavation shall be either permanently placed pea gravel or sand, pumped grout (3 parts sand and 1 part Portland cement by volume) or other suitably installed material approved by the ENGINEER. Backfilling shall be kept close to the heading and completed after each day's WORK. Where grout is used for backfill, injection holes with threaded plugs shall be provided in liner plates at various levels and in sufficient number to effectively grout the void around the tunnel. A minimum of 3 grout holes shall be provided in each 8 feet of tunnel length. Grout shall be injected in the lower holes first, proceeding upward as the void is filled. Plugs shall be installed after each hole is filled and grout stops shall be provided behind plates as necessary to ensure complete filling of the void. In tunneling under buildings, the CONTRACTOR will be responsible for all damage resulting from his operations and methods of excavation and backfilling. Boring

may also be used as an alternate to tunneling or open-cut trenching, at no extra cost to the OWNER.

10. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 6" to 9" clearance on both sides of pipe or conduit.

    a. Excavate trenches to depth indicated or required. Carry depth of trenches for piping to establish indicated flow lines and invert elevations. Beyond building perimeter, keep bottoms of trenches sufficiently below finish grade to avoid freeze-ups.

    b. Where rock is encountered, carry excavation 6 inches below required elevation and backfill with a 6-inch layer of crushed stone or gravel prior to installation of pipe.

    c. For pipes or conduit 3 inches or less in nominal size and for flat-bottomed, multiple-duct conduit units, excavate to sub-base depth indicated or, if not indicated, then to 2 inches below bottom of WORK to be supported.

    d. For pipes or conduit 6 inches or larger in nominal size, tanks, and other mechanical/electrical WORK indicated to receive sub-base, excavate to sub-base depth indicated or, if not otherwise indicated, to 6 inches below bottom of WORK to be supported.

    e. Except as otherwise indicated, excavate for exterior water-bearing piping (water, steam, condensate, drainage) so top of piping is no less than 2 feet 6 inches below finish grade.

    f. Grade bottoms of trenches as indicated on DRAWINGS, notching under pipe bells to provide solid bearing for entire body of pipe.

    g. Concrete is specified in Division 3.

    h. Do not backfill trenches until tests and inspections have been made and backfilling authorized by the ENGINEER. Use care in backfilling to avoid damage or displacement of pipe systems.

    i. For piping or conduit less than 2 feet 6 inches below surface of roadways, provide 4-inch thick concrete base slab support. After installation and testing of piping or conduit, provide minimum 4-inch thick encasement (sides and top) of concrete prior to backfilling or placement of roadway sub-base.

M. Cold Weather Protection

1. Protect excavation bottoms against freezing when atmospheric temperature is less than 35°F (1°C).

3.03 COMPACTION

A. General

1. Control soil compaction during construction providing minimum percentage of density specified for each area classification indicated below.

a. Percentage of maximum density requirements: Compact soil to not less than the following percentages of maximum density for soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D698; and not less than the following percentage of relative density, determined in accordance with ASTM D2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils). CONTRACTOR is responsible for providing one optimum moisture content - maximum dry density curve in accordance with the above referenced ASTM standards for each soil type encountered.

b. Structures, building slabs and steps, pavements: Compact top 12 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 100 percent maximum density for cohesive material or 95 percent relative density for cohesionless material.

c. Lawn or unpaved areas: Compact to 6 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 90 percent maximum density for cohesive soils and 90 percent relative density for cohesionless soils.

d. Walkways: Compact top 6 inches of sub-grade and each 8 inch loose, uncompacted layer of backfill or fill material at 95 percent maximum density for cohesive material or 95 percent relative density for cohesionless material.

2. Subgrade and backfill for sewers located in fill areas shall be compacted to not less than 95 percent maximum density.

B. Moisture Control

1. Where sub-grade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface or sub-grade, or layer of soil material, to prevent free water from appearing on surface during or subsequent to compaction operations.

2. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by deicing, harrowing, or pulverizing until moisture content is reduced to a satisfactory value.

3.04 BACKFILL AND FILL

A. General

1. Place acceptable soil material in layers to required sub-grade elevations, for each area classification listed below.

a. In excavations, use satisfactory excavated or borrow material.

b. Under grassed areas, use satisfactory excavated or borrow material.

c. Under walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both.

d. Under steps, use sub-base material.

e. Under building slabs, use engineered fill material for a minimum depth of 6 inches.

f. Sub-base material or satisfactory excavated or borrow material may be used below engineered fill at building slabs.

g. Under piping and conduit, use sub-base material where sub-base is indicated under piping or conduit; shape to fit bottom 90° of cylinder.

B. Backfill excavations as promptly as WORK permits, but not until completion of the following:

1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing, and backfilling of voids with satisfactory materials. Cut off temporary sheet piling driven below

bottom of structures and remove in manner to prevent settlement of the structure or utilities, or leave in place if required.

5. Removal of trash and debris.

6. Permanent or temporary horizontally supported walls.

C. Ground Surface Preparation

1. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface, except as otherwise specified in Section 02200-3.05 for embankments.

2. When existing ground surface has a density less than that specified under “Compaction” for particular area classification, break up ground surface, pulverize, adjust moisture condition to optimum moisture content, and compact to required depth and percentage of maximum density.

D. Placement and Compaction

1. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

a. Before compaction, add moisture to each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

b. Place backfill and fill materials evenly adjacent to structures, piping, or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

E. Backfilling Trenches

1. Backfilling shall be accomplished as soon as practical after pipe has been laid and jointing and alignment approved. Packing of crushed rock between joints shall be the usual procedure as the laying progresses. This is in order to avoid danger of misalignment from slides, flooding or other causes. The

ENGINEER shall be given a maximum of 24 hours for inspection before backfilling.

2. The backfill over the pipe shall be in accordance with the standard details shown on the DRAWINGS for bedding and backfilling pipe.

3. In case maximum permissible trench widths (as designated by the pipe manufacturer) are exceeded, the CONTRACTOR shall furnish crushed rock backfill to a minimum of 12 inches over the top of pipe at no extra cost to the OWNER.

4. After the foregoing cover requirements over top of the pipe have been met, rock may be used in the backfill in pieces no larger than 12 inches in any dimension and to an extent not greater than one-half the backfill materials used. If additional earth is required for backfilling, it must be obtained and placed by the CONTRACTOR at no additional cost to the OWNER. Filling with rock and earth shall proceed simultaneously, such that no voids are left in the rock. After cover requirements over top of pipe have been met, backfilling may be employed without tamping, provided caution is used in quantity per dump and uniformity of level of backfilling. Surplus material shall be uniformly ridged over trench and excess rock hauled away, with no rock over 1-1/2 inch diameter in the top 6 inches. Ridged backfill shall be confined to the width of the trench and no higher than needed for replacement of settlement of backfill. All rock over 1-1/2 inch diameter shall be broomed to remove all earth and loose rock, all immediately following backfilling.

5. In the case of street, highway, railroad, sidewalk and driveway crossings; or within any roadway paving; or about manholes, valve and meter boxes; the backfill must be mechanically tamped in not over 6 inch layers, measured loose. Alternate method of compacting backfill shall be used, if refill material is in large hard lumps (crushed rock excepted) which cannot be consolidated without leaving voids.

6. In the case of tunnels, the annular space between plates and excavation shall be either permanently placed pea gravel or sand, pumped grout (3 parts sand and 1 part Portland cement by volume) or other suitably installed material approved by the ENGINEER. Backfilling shall be kept close to the heading and completed after each day's WORK. Where grout is used for backfill, injection holes with threaded plugs shall be provided in liner plates at various levels and in sufficient number to effectively grout the void around the tunnel. A minimum of 3 grout holes shall be provided in each 3 feet of tunnel length. Grout shall be injected in the lower holes first, proceeding upward as the void is filled. Plugs shall be installed after each hole is filled and grout stops shall be provided behind plates as necessary to ensure complete filling of the void.

7. Where traffic on streets, driveways, railroads, sidewalks and highways requires temporary surfacing, backfilling shall be terminated 4 inches below original ground level and 4 inches to 6 inches of dense graded aggregate shall be placed on the trench. Backfills shall be maintained easily passable to traffic at original ground level, until acceptance of PROJECT or replacement of paving or sidewalks.

8. Excavated materials from trenches and tunnels in excess of that required for backfill shall be disposed of on the plant lot, as directed by the ENGINEER.

9. The CONTRACTOR shall protect all sewer, gas, electric, telephone, water, and drain pipes of conduits from damage while pipelines are being constructed and backfilled, and from danger due to settlement of trench backfill.

10. No extra payment shall be made for backfilling of any kind, except as specified herein before. Backfilling shall be included as a part of the Unit Price BID. No extra payment will be made to the CONTRACTOR for supplying outside materials for backfill.

11. On completion of the PROJECT, all backfills shall be dressed; holes filled; and surplus material hauled away. All permanent walks, street paving, roadway, etc., shall be restored and seeding and sodding performed as required.

3.05 EMBANKMENTS

A. Borrow Excavation

Should insufficient quantities of suitable soil fill material for construction of the embankment be located within the designated areas, where shown on the PLANS, the CONTRACTOR shall obtain suitable soil material conforming to the requirements of the “Materials” SPECIFICATIONS at no additional cost to the OWNER.

Excavation areas shall be excavated and finally dressed in a manner such that no steep or unstable side slopes or other hazardous or unsightly conditions exist.

To the extent that they are needed, all suitable materials shall be used in the construction of permanent earth fill or rock fill. The suitability of materials for specific purposes will be determined by the ENGINEER. The CONTRACTOR shall not waste or otherwise dispose of suitable excavated materials.

B. Foundation Preparation

Foundations for earth fill shall be stripped of all topsoil to remove vegetation and other deleterious materials or shall be excavated as specified.

Except as otherwise specified for foundation benches, earth foundation surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill or otherwise acceptably scored and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the earth fill, and the surface materials of the foundation shall be compacted and bonded with the first layer of earth fill as specified for subsequent layers of earth fill.

When the original ground surface is sloping at rate of 15 percent or greater, perpendicular to the embankment axis, embankment foundation benches shall be constructed as shown on the CONTRACT DRAWINGS. Preparation of the foundation shall proceed as described in the previous paragraph.
Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two inches in depth normal to the slope and shall be at such a moisture content that the earth fill can be compacted against them to effect a good bond between the fill and the abutments.

C. Fill Placement

Fill shall not be placed until the required excavation and foundation preparation have been completed and the foundation has been inspected and approved by the ENGINEER. Fill shall not be placed upon a frozen surface, nor shall snow, ice or frozen material be incorporated in the fill.

Fill shall be placed in approximately horizontal layers. The thickness of each layer before compaction shall not exceed twelve inches (12”). Materials placed by dumping in piles or windrows shall be spread uniformly to not more than the specified thickness before being compacted. Hand compacted fill, including fill compacted by manually directed power tampers, shall be placed in layers whose thickness before compaction does not exceed six inches (6”).

Adjacent to pipe or structures, fill shall be placed in a manner which will prevent damage to the pipes or structures and will allow the pipes or structures to assume the loads from the fill gradually and uniformly. The height of the fill adjacent to a structure shall be increased at approximately the same rate on all sides of the structures.

Earth fill for embankments shall also be placed so as to meet the following additional requirements:

1. The distribution of materials, throughout the zone shall be essentially uniform, and the fill shall be free from voids, pockets, streaks or layers of material differing substantially in texture or graduation from the surrounding material.

2. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed.

3. The top surfaces of embankments shall be maintained approximately level during construction, except that a crown or cross-slope of not less than 2 percent shall be maintained to insure effective drainage. If the DRAWINGS or SPECIFICATIONS require or the ENGINEER directs that fill be placed at a higher level in one part of an embankment than another, the top surface of each part shall be maintained as specified above.

4. Embankments shall be constructed in continuous layers except where openings to facilitate construction or to allow the passage of stream flow during construction are specifically authorized.

5. Embankments built at different levels as described under (3) or (4) above shall be constructed so that the slope of the bonding surfaces between embankment in place and embankment to be placed is not steeper than 3 feet horizontal to 1 foot vertical. The bonding surface of the embankment in place shall be stripped of all loose material, and shall be scarified, moistened and recompacted when the new fill is placed against it as needed to insure a good bond with the new fill and to obtain the specified moisture content and density in the junction of the in place and new fill.

6. Embankment materials shall be placed in the zones (impervious core and random earth and rock) shown on the CONTRACT DRAWINGS. Prior to fill placement in the cutoff trench, the bottom of the cut off trench shall be inspected by the ENGINEER. All fractures or joints shall be clean and filled with mortar or concrete unless otherwise directed by the ENGINEER.

7. Fill placement shall then proceed in accordance with CONTRACT PLANS AND SPECIFICATIONS and in a manner such that no steep or unstable slopes or other hazardous or unsightly conditions exist. Fill material used shall conform to requirements of the “Materials” SPECIFICATIONS previously mentioned.

8. Rocks placed in the random earth and rock zones shall be kept at least 2 feet below the embankment surface. The rock shall not be dumped into final position, but shall be distributed by blading or dozing in a manner that will ensure proper placement in the embankment so that voids, pockets and bridging will be eliminated.

D. Compaction

Each layer of fill shall be compacted as necessary to make density of the fill matrix not less than the minimum density specified. The fill matrix is defined as the portion of the fill material finer than the maximum particle size used in the compaction test method specified. Embankment fill shall be compacted to minimum field densities equal to or greater than 95 percent of maximum dry density as determined by the Standard Procter Maximum Dry Density test method ASTM D-698. Moisture content may vary optimum, -2 percent to +1 percent as also determined by ASTM D-698.

CONTRACTOR shall provide one moisture content vs. dry density relationship curve as determined by standard test method ASTM D-698 to help determine optimum moisture content and maximum dry density for each soil type encountered during construction prior to placement in the embankment.

Fill adjacent to structures shall be compacted to a density equivalent to that of the surrounding fill by means of hand tamping or manually directed power tampers or plate vibrators. Heavy equipment shall not be operated within 2 feet of any structure. Vibrating rollers shall not be operated with 5 feet of any structure. Compaction by means of drop weights operating from a crane or hoist will not be permitted.

The passage of heavy equipment will not be allowed: (a) over cast-in place conduits prior to 14 days after placement of the concrete; (b) over cradled pre-cast conduits prior to 7 days after placement of the concrete cradle; or (c) over any type of conduit until the backfill has been placed above the top surface of the structure to a height equal to one-half of the clear span width of the structure or pipe or 2 feet, whichever is greater.

E. Testing

During the course of the WORK, the CONTRACTOR will perform such tests as are required to identify the materials, to determine compaction characteristics, to determine moisture content, and to determine density of fill in place. These tests performed by the CONTRACTOR will be used to verify that the fills conform to the requirements of the SPECIFICATIONS. Such tests are intended to provide the CONTRACTOR with the information required by him for the proper execution of the WORK.

Submittals shall be per Section 02200, paragraph 1.04 A.

F. Removal and Replacement of Defective Fill

Fill placed at densities lower than the specified minimum density or at moisture contents outside the specified acceptable range of moisture content or otherwise not conforming to the requirements of the SPECIFICATIONS shall be reworked to meet the requirements or removed and replaced by acceptable fill. The replacement fill, the foundation, and the surfaces upon which the fill is placed shall conform to

all requirements of the SPECIFICATIONS for foundation preparation, approval, placement, moisture control and compaction.

3.06 GRADING

A. General

1. Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between such points and existing grades.

B. Grading Outside Building Lines

1. All materials used for backfill around structures shall be of a quality acceptable to the ENGINEER and shall be free from large or frozen lumps, wood and other extraneous material. All spaces excavated and not occupied by footings, foundations, walls or other permanent WORK shall be refilled with earth up to the surface of the surrounding ground, unless otherwise specified, with sufficient allowance for settlement. In making the fills and terraces around the structures, the fill shall be placed in layers not exceeding 12 inches in depth and shall be kept smooth as the WORK progresses. Each layer of the fill shall be rolled with an approved type roller and/or be compacted. When it is not practicable to compact sections of the fill immediately adjacent to buildings or structures by rolling, then such sections shall be thoroughly compacted by means of mechanical tamping or hand tamping as may be required by the conditions encountered. All fills shall be placed so as to load structures symmetrically.

2. As set out herein before, rough grading shall be held below finished grade and then the topsoil which has been stockpiled shall be evenly spread over the surface. The grading shall be brought to the levels shown on the DRAWINGS or to the elevations established by the ENGINEER. Final dressing shall be accomplished by hand WORK or machine WORK, or a combination of these methods as may be necessary to produce a uniform and smooth finish to all parts of the re-grade. The surface shall be free from clods greater than 2 inches in diameter. Excavated rock (6 inches maximum size) may be placed in the fills, but it shall be thoroughly covered. Rock placed in fills shall not be closer than 12 inches from finished grade.

3. Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

a. Finish surfaces free from irregular surface changes, and as follows:

(1) Lawn or unpaved areas: Finish areas to receive topsoil to within not more than 0.10 ft. above or below required sub-grade elevations.

(2) Walks: Shape surface of areas under walks to line, grade, and cross-section, with finish surface not more than 0.10 ft. above or below required sub-grade elevation.

(3) Pavements: Shape surface of areas under pavement to line, grade, and cross-section, with finish surface not more than 0.04 ft. above or below required sub-grade elevation.

C. Grading Surface of Fill Under Building Slabs

1. Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 0.04 ft. when tested with a 10ft. straightedge.

D. Compaction

1. After grading, compact sub-grade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

3.07 PAVEMENT SUB-BASE COURSE

A. General

1. Sub-base course consists of placing sub-base material, in layers of specified thickness, over sub-grade surface to support a pavement base course.

B. Grade Control

1. During construction, maintain lines and grades including crown and cross-slope of sub-base course.

C. Shoulders

1. Place shoulders along edges of sub-base course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each sub-base course layer. Compact and roll at least a 12 inch width of shoulder simultaneously with compacting and rolling of each layer of sub-base course.

D. Placing

1. Place sub-base course material on prepared sub-grade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting sub-base material during placement operations.

2. When a compacted sub-base course is shown to be 6 inches thick or less, place material in a single layer. When it is shown to be more than 6 inches thick, place material in equal layers, such that no single layer shall be more than 6 inches or less than 3 inches in thickness when compacted.

3.08 BUILDING SLAB ENGINEERED FILL COURSE

A. General

1. Engineered fill course consists of placement of fill material, in layers of indicated thickness, over sub-grade surface to support concrete building slabs.

B. Placing

1. Place fill material on prepared sub-grade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting material during placement operations.

2. When a compacted course is shown to be 6 inches or less, place material in a single layer. When it is shown to be more than 6 inches thick, place material in equal layers, such that no single layer shall be more than 6 inches or less than 3 inches in thickness when compacted.

3.09 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction

1. Allow testing service to inspect and report to the ENGINEER on findings and approve sub-grades and fill layers before further construction WORK is performed.

    a. Perform field density tests in accordance with ASTM D 1556 (sand cone method), ASTM D 2167 (rubber balloon method), or ASTM D 2992 (nuclear density method), as applicable.

    b. Footing sub-grade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing sub-grade may be based on a visual comparison of each sub-grade with related tested strata, when acceptable to ENGINEER.

c. Paved areas and building slab sub-grade: Make at least one field density test of sub-grade for every 2,000 square feet of paved area or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying building slab or paved area, but in no case less than three tests.

d. Foundation wall backfill: Take at least two field density tests, at locations and elevations as directed.

B. If in the opinion of the ENGINEER, based on testing service reports and inspection, sub-grade or fills which have been placed are below specified density, CONTRACTOR shall provide additional compaction and testing at no additional expense to the OWNER.

3.10 MAINTENANCE

A. Protection of Graded Areas

1. Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

B. Reconditioning Compacted Areas

1. Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and compact to required density prior to further construction.

C. Settling

1. Where settling is measurable or observable at excavated areas during general PROJECT warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent WORK, and eliminate evidence of restoration to greatest extent possible.

3.11 BASIS FOR PAYMENT

Payment for excavation shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for all excavation, trenching and backfilling required for other work, such as structures, pipelines, etc., shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 02326

STEEL CASING PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Steel casing pipe shall be furnished and installed as shown on the DRAWINGS and specified herein.

1.02 RELATED WORK

A. Erosion and sedimentation control is included in this Division, Section 02270.

B. Piping is included in this Division, Section 02700.

C. Landscaping is included in this Division, Section 02900.

PART 2 PRODUCTS

2.01 STEEL CASING PIPE

A. Steel casing or jack pipe shall be plain end steel pipe with a minimum yield strength of 35,000 psi and tensile strength of 60,000 psi per API-5L Grade B material. The steel pipe supplied shall be manufactured by the seamless, electric-weld, submerged are weld or gas metal-arc weld process as specified in API-5L. Certifications of 35,000 psi minimum yield strength shall be furnished by the CONTRACTOR.

B. The inside diameter shall be at least 2 inches greater than the largest outside diameter of the carrier pipe, joint or couplings for carrier pipe less than 6" in diameter and at least 4" greater for carrier pipe 6" and over in diameter unless otherwise noted on the plan sheets. In all cases, the casing pipe shall be great enough to allow the carrier pipe to be removed subsequently without disturbing the casing pipe or roadbed.

C. Casing pipe shall have minimum wall thickness as shown in the following table:

Nominal Diameter (Inch)	Nominal Thickness (Inch)	Nominal Diameter (Inch)	Nominal Thickness (Inch)
6	0.280	20	0.375
8 - 12	0.250	24	0.375
14 - 18	0.312	30 - 36	0.500

PART 3 EXECUTION

3.01 TUNNELING, BORING OR JACKING

A. Boring or jacking as specified herein shall be located as shown on DRAWINGS. All other casing pipe installations shall be open cut trench.

B. Tunneling under paving, railroads, buildings and underground structures is included as an alternate to boring or repaving required by open cut trenching at no extra cost to the OWNER. Bore and casing pipe is also included as an alternate to tunneling. Backfilling of tunnels shall be mechanically tamped in not more than 3-inch layers and with material rendered suitable for tamping before being placed in tunnel unless otherwise shown on the DRAWINGS. No payment will be made for tunnels less than 3 feet long.

C. In tunneling under buildings, the CONTRACTOR will held responsible for all damage by his operations and methods of excavation and backfilling.

D. Should the CONTRACTOR elect and receive permission to tunnel and bore, other than locations designated on the DRAWINGS or required by the ENGINEER to be tunneled or bored, the entire compensation therefore shall be the same as the unit prices bid for installation in open trench, including paving replacement, but not including bore or unit prices.

E. At locations where tunneling or boring or jacking is called for on the DRAWINGS, in addition to the unit prices for permanent tunnel, tunnel liner, temporary tunnel, boring or jacking and/or casing pipe, payment will be made for furnishing and laying carrier pipe inside the tunnel or casing pipe. No payment will be made for separate trench and backfill unit price items where permanent tunnel, tunnel liner, temporary tunnel, boring or jacking and/or casing pipe unit prices is paid.

F. Boring or jacking under highways, railroads, sidewalks, pipelines, etc., shall be done at the locations shown on the DRAWINGS. It shall be performed by mechanical means and accurate vertical and horizontal alignment must be maintained. When shown on the DRAWINGS, casing pipe shall be used and shall be installed inside bored holes concurrently with boring, or jacking.

3.02 STEEL CASING PIPE INSTALLATION

A. Steel casing pipe shall be of the size and wall thickness as shown on the DRAWINGS or specifications.

B. When casing pipe is jacked, concurrent with boring, all joints shall be solidly welded. The weld shall be such that the joint shall be of such strength to withstand the forces exerted from the boring and jacking operation as well as the vertical loading imposed on the pipe after installation. The weld shall also be such that it provides a smooth, non-obstructing joint in the interior of the pipe, which will allow easy installation of the carrier pipe without hanging or abrasion to the carrier pipe upon installation.

C. When casing pipe is installed in open trench or permanent tunnel, it shall be bedded and backfilled as specified in Division 2. When casing pipe is installed in temporary tunnel, it shall be laid accurately to alignment of proposed pipeline and at an elevation below proposed pipeline necessary to support it at the planned elevation. Bedding and backfill for casing pipe in temporary tunnel shall be as specified in Division 2.

D. Casing pipe in open trench, permanent tunnel and temporary tunnel shall be joined by welding such that it will not be moved out of alignment or grade and will prevent backfill material from entering joint. Where casing pipes are shown on the DRAWINGS to be equipped with vent pipes, vents shall be installed as shown on the DRAWINGS with cost of the same included in the price bid for the casing pipe unless otherwise specified.

3.03 CARRIER PIPE IN CASING PIPE INSTALLATION

A. Pipeline Spacers

Carrier pipes shall be centered inside casing pipe throughout the length of the casing pipe. Centering shall be accomplished by the installation of polyethylene pipeline spacers attached to the casing pipe in such a manner as to prevent the dislodgment of the spacers as the carrier pipe is pulled or pushed through the casing pipe. Spacers shall be of such dimensions to provide (1) full supportive load capacity of the carrier pipe and contents; (2) of such thickness to allow installation and/or removal of the pipe; and (3) to allow no greater than 1/2-inch movement of the carrier pipe within the casing pipe after the carrier pipe is installed. Installation shall be in accordance with the manufacturer’s recommendations.

B. Upon completion of installation of the carrier pipe, the annular space at the ends of the cover pipe shall be sealed to prevent the entrance of groundwater, silt, etc., into the casing pipe. The seal shall be a manufactured product specially made for this purpose. The seal shall be the best seal type constructed of synthetic rubber with stainless steel banding straps. Seals may be of the "pull-on" or "wrap around" type as manufactured by Advance Products and Systems, Inc. or equal.

3.04 BASIS FOR PAYMENT

Steel Casing Pipe shall be paid for at the unit price bid or lump sum bid and shall include all work incidental to making a complete installation such as excavation, carrier pipe, bedding, backfill, painting, testing, disinfection, cleanup, seeding, etc.

END OF SECTION

SECTION 02610

GENERAL PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to install and test pipe and fittings as shown on the Drawings and required by the Specifications.

B. Piping shall be located substantially as shown. The ENGINEER reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes or for other reasons. Pipe fitting notation is for the CONTRACTOR'S convenience and does not relieve him from laying and jointing different or additional items where required without additional compensation.

C. Wherever the word pipe or piping is used it shall mean pipe and fittings unless otherwise noted.

D. All references to Standards/Specifications shall mean the latest revision.

1.02 RELATED WORK

A. Trenching, backfilling and compacting are included in this Division, Section 02200.

B. Concrete is included in Division 3, Section 03300.

1.03 DESCRIPTION OF SYSTEM

A. Piping shall be installed substantially as shown on the Drawings so as to form a complete smooth flow path and workable system.

B. The piping and materials specified herein are intended to be standard types of pipe for use in transporting the fluids as indicated on the Drawings. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and the manufacturer's recommendations.

1.04 QUALIFICATIONS

A. All pipe and fittings under this section shall be furnished by manufacturers who are fully experienced, qualified, and regularly engaged in the manufacture of the materials to be furnished.

1.05 SUBMITTALS

A. The CONTRACTOR shall submit to the ENGINEER for review in accordance with Division 1, Section 01300, complete sets of shop drawings showing layout and details of materials, joints and methods of construction and installation of the pipe, specials and fittings required.

B. Before fabrication and/or shipping of the pipe is begun, the CONTRACTOR shall submit for approval a schedule of pipe lengths for the entire job. All pipe furnished under the Contract shall be fabricated in full accordance with the approved Drawings.

1.06 INSPECTION

A. The manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The manufacturer shall furnish to the ENGINEER a notarized affidavit stating all pipe meets the requirements of applicable ASTM Specifications, these Specifications, and the joint design with respect to square ends and out-of-round joint surfaces.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE

A. General

1. Ductile iron pipe shall be centrifugally cast of ductile iron conforming to ASTM Specifications A 746 latest revision. The pipe design conditions shall be as follows:

   a. Pressure: Minimum of 250 psi operating plus 100 psi surge allowance.

   b. Trench Loading: Laying condition Type 4 unless otherwise specified on Drawings. Trench depth not less than 2’ nor more than that shown on the Drawings.

   c. Metal Design Strengths: Bursting Tensile 40,000 psi
   Modulus of Rupture 90,000 psi

2. The manufacturing tolerances included in the nominal thickness shall not be less than specified by ANSI/AWWA C150/A21.50, latest revision.

3. Minimum wall thickness shall be 0.33 inches (Class 52), or more if required for minimum operating pressure of 250 psi.

4. Pipe may be furnished in 18', or 20' nominal laying lengths; and the weight of any single pipe shall not be less than the tabulated weight by more than 5 percent for pipe 12” or smaller in diameter, nor by more than 4 percent for pipe larger than 12” in diameter.

5. The hydrostatic and acceptance tests for the physical characteristics of the pipe shall be as specified in ANSI/AWWA C151/A21.51, latest revision.

6. Any pipe not meeting the ANSI/AWWA specifications quotes above shall be rejected in accordance with the procedure outlined in the particular specification.

7. The ENGINEER shall be provided with 3 copies of a certification by the manufacturer that the pipe supplied for this Contract has been tested in accordance with the referenced specifications and is in compliance therewith.

8. The net weight, class or nominal thickness and sampling period shall be marked on each pipe. The pipe shall also be marked to show that it is ductile iron.

9. Unless otherwise noted, joints for ductile iron pipe will be "push-on" type consisting of a rubber gasket installed in a recess in the bell.

10. Ductile iron pipe must be used within 200 feet of underground petroleum storage tanks and shall have gaskets designed for this purpose such as Nitrile Butadiene (NBR), approved equal or better.

B. Lining and Coating Ductile Iron Pipe

1. All buried ductile iron pipe shall have manufacturer's outside coal tar or asphaltic base coating and a cement lining and bituminous seal coat on the inside. Cement mortar lining and bituminous seal coat inside shall conform to ANSI/AWWA C104/A21.4 latest revision.

C. Fittings for Ductile Iron Pipe-3" and larger

1. Ductile Iron fittings only shall be used with the ductile iron pipe.

2. Mechanical joint fittings shall be used with underground pipe.

3. Rubber-gasket joints shall conform to ANSI/AWWA C111/A21.11 latest revision for centrifugally cast ductile iron water pipe.

4. All Working Pressures - Fittings shall conform to ANSI/AWWA Specifications C110/A21.10 latest revision for 250 psi water working pressure plus water hammer. Ductile iron fittings shall be ductile cast iron per ASTM Specifications A536, latest revision.

5. All fittings shall be cement lined and bituminous coated per Federal Specifications WW-P-421b.

D. Ductile Iron Pipe and Fittings - Smaller than 3”

1. Small size ductile iron pipe shall conform to ANSI Specifications A21.12 (AWWA C 112) latest revision. Fittings shall conform to ANSI Specifications A21.10 (AWWA C 110) latest revision.

2. Pipe may be furnished with either mechanical joints or slip-on joints. Buried fittings shall be furnished with mechanical joints.

E. Flanged Cast Iron Pipe and Flanged Coupling Adapters for Flexible Couplings

1. Non-buried ductile iron pipe and fittings shall be flanged unless otherwise specified.

2. Flanged cast iron pipe and fittings shall have dimensions facing and drilling for ANSI Class 125 flanges (125 psi steam working pressure; 250 psi water working pressure).

3. Where flanges are pit cast integrally with pipe in vertical position in dry sand molds, flanged pipe shall be AWWA Class “B” or latest revision of ANSI Specifications A21.2, Class 50 pipe for sewage, sludge, gas and air service and Class 150 pipe for all types of water service.

4. Where flanged pipe is made up by threading plain end, centrifugally cast pipe, screwing on specially designed long hub flanges, and refacing across both the face of the flange and the end or pipe, flange shall be per ANSI Specification B16.1 latest revision and pipe shall be Class 150 per ANSI Specification A21.6 latest revision.

5. Either of the foregoing methods of manufacture of flanged pipe will be acceptable, but when plain ends of flanged pipe are to fit into mechanical joint bells, then the outside diameter of the pipe shall be such that the joint can be made.

6. CBS (rubber and cloth both sides) gaskets 1/16” in thickness shall be used in connecting flanged piping. Nuts and bolts for use in making flanged connections shall have hexagonal heads, be of proper lengths and with U.S. standard threads. The tensile strength of steel used in the bolts shall be not less than 55,000 psi.

7. Flanged Coupling Adapters for flanged pipe shall be a mechanical joint cast to a special flanged joint using a neoprene “O-ring”, in place of the usual 1/16” rubber ring gasket. The mechanical bell and special flanged joint piece shall be of high grade gray cast iron with bolt circle, bolt size and spacing conforming to ASA B16.1 Specifications latest revision. Mechanical joint follower flange shall be of ductile or malleable iron with high

strength/weight ratio design. Bolts shall be fine grained, high tensile, malleable iron with malleable iron hexagon nuts.

8. Flanged Coupling Adapters for 12" and smaller cast iron pipe shall be Smith-Blair #912; Dresser style 127; or approved equal. For pipe larger than 12", flexible couplings shall be Smith-Blair #913; Dresser style 128; or approved equal. All flexible couplings shall be furnished with anchor studs.

F. Mechanical Joint Restraints

1. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron material in accordance with ASTM A536.

2. Ductile iron gripping wedges shall be heat treated within a range of 370 to 470 BHN.

3. Three (3) test bars shall be incrementally poured per production shift as per Underwriter's Laboratory (U.L.) specifications and ASTM A536. Testing for tensile, yield and elongation shall be done in accordance with ASTM E8.

4. Chemical and nodularity tests shall be performed as recommended by the Ductile Iron Society, on a per ladle basis.

2.02 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. PVC pipe shall comply with ASTM D01784 and shall be Type 1, Grade 1, with pressure and SDR rating as shown on the drawings or indicated in the proposal form. All PVC pipe shall conform to the latest revisions of the following specifications:

ASTM D2241 (PVC plastic pipe SDR-PR and Class T)
Commercial Standard CS 256 (pressure rated type)
National Sanitation Foundation Testing Laboratories (NSF)

B. The name of the manufacturer of the plastic pipe to be used must be found on the current listing of Plastic Materials for Potable Water Application, published by the NSF (National Sanitation Foundation), Ann Arbor, Michigan, and must meet the requirements of the Standard Specifications for Polyvinyl Chloride (PVC) Plastic Pipe, D1785, published by ASTM (American Society for Testing and Materials).

C. Pipe lengths shall not exceed 40 feet. Wall thickness shall be in accordance with CS-256 and ASTM D-2241. Pipe ends shall be beveled to accept the gasketed coupling. Rubber gasketing shall conform to ASTM 1869.

D. Samples of pipe, physical and chemical data sheets shall be submitted to the ENGINEER for approval and his approval shall be obtained before

pipe is purchased. The pipe shall be homogenous throughout and free from cracks, holes, foreign inclusions or other defects. The pipe shall be as uniform as commercially practical in color. Pipe shall have a ring painted around spigot ends in such a manner as to allow field checking of setting depth of pipe in the socket.

E. Pipe must be delivered to the job site by means which will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical.

F. The couplings and fittings shall be furnished by the pipe manufacturer and shall accommodate the pipe for which they are to be used. They shall have a minimum pressure rating of 200 psi. Insertion depth of the pipe in the coupling shall be controlled by an internal PVC mechanical stop in the coupling which will allow for a thermal expansion and contraction. Couplings method shall allow for half of each end of the pipe. Couplings shall permit 5 degree deflection (2-1/2 degrees each side) of the pipe without any evidence of infiltration, cracking or breaking. Couplings shall have rubber seals factory installed.

G. Pipe markings shall include the following, marked continuously down the length:

Manufacturer's Name
Nominal Size
Class Pressure Rating
PVC 1120
NSF Logo, and
Identification Code

H. Lubricant shall be water soluble, nontoxic, be non-objectionable in taste and odor imparted to the fluid, be non-supporting of bacteria growth and have no deteriorating effect on the PVC or rubber gaskets.

2.03 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS (SCHEDULE 80)

A. General

Schedule 80 PVC pipe shall be as manufactured by the Celanese Piping Systems, Inc., or approved equal. To ensure installation uniformity, all piping system components shall be the products of one manufacturer.

B. Materials

1. Pipe and fittings shall be manufactured from a PVC compound which meets the requirements of Type 1, Grade 1 polyvinyl chloride as outlined in ASTM D-1784. A Type 1, Grade 1 compound is characterized as having the highest requirements for

mechanical properties and chemical resistance. Fittings shall be socket type and shall conform to the requirements of ASTM D-2467.

2. Compound from which pipe is produced shall have a design stress rating of 200 psi at 73° F., listed by the Plastics Pipe Institute (PPI).

3. Materials from which pipe and fittings are manufactured shall have been tested and approved for conveying potable water by the National Sanitation Foundation (NSF).

C. Solvent Cement

All socket type connections shall be joined with PVC solvent cement complying to ASTM D-2564. Cement shall have a minimum viscosity of 2000 cps.

D. Installation

Installation shall be in strict accordance with the manufacturer's printed instructions. Printed installation instructions shall be submitted and approved by the ENGINEER prior to shipment of the pipe.

E. Testing

1. Pressure Pipe - Refer to Paragraph 3.02 of this Division.

2. Vacuum Pipe - All pipe intended for use under partial vacuum shall be tested by subjection to 24 inches of mercury vacuum; allowing 15 minutes to stabilize and thereafter lose not more than 1% vacuum pressure per hour over a minimum 4 hour test period. This test must be met or exceed prior to final acceptance.

2.04 HIGH DENSITY POLYETHYLENE PIPE

A. General

1. High density polyethylene pipe shall be Adyl "D" polyethylene pipe manufactured by E.I. DuPont DeNemours and Co., Inc., or "Driscopipe" as manufactured by Phillips Product Co., Inc., or approved equal.

B. Materials for Polyethylene Pipe

1. The polyethylene pipe and fittings shall be made of polyethylene resins classified in ASTM D 1248 as Type III, Category 5, Grade P34 (pipe designation PE 3408 defined per ASTM D 3035 latest revision), having specific base resin densities of 0.942 g/cc minimum and 0.955 g/cc maximum, respectively; and having melt

indexes of 0.4 g/10 min. maximum and 0.15 g/0.10 min. minimum, respectively.

2. Pipe made from these resins must have a long-term strength rating of 1,600 psi or more.

3. The polyethylene resin shall contain antioxidants and shall be stabilized with carbon black against ultra-violet degradation to provide protection during processing and subsequent weather exposure.

4. The polyethylene resin compound shall have a resistance to environmental stress cracking as determined by the procedure detailed in ASTM D 16930 latest revision, Condition B with sample preparation by procedure C of not less than 200 hours.

C. Polyethylene Pipe and Fittings

1. Polyethylene pipe furnished and installed under this Contract shall be of nominal outside diameter shown on the Drawings, and shall be designed for a normal internal working pressure and earth cover over top of the pipe to suit the conditions of proposed use.
2. Each length of pipe shall be marked, at no more than 10 foot intervals, with the following information:

   Nominal pipe size
   Type plastic material - PE3408
   Pipe pressure rating
   Manufacturer’s name, trademark and code

3. All pipe shall be made from virgin material. No rework compound.

4. Pipe shall be homogenous throughout, and be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.

5. Fittings for the polyethylene pipe line shall be molded for fabricated from the same material as specified hereinbefore for the high density polyethylene pipe.

6. Fittings for bends 22-1/2 degrees or greater shall be provided as shown on the Drawings. For alignment changes of less than 20 degrees deflection, the pipe may be laid in curves with a radius of 80 feet or greater.

7. All run-of-the-pipe fittings shall be fusion welded into the pipe line. Tee branches shall be of the size shown on the Drawings and shall be furnished with flanged ends per ANSI B-16.1. All fittings shall be factory made.

8. Fittings shall be capable of withstanding the same pressure and loading conditions specified for the pipe.

9. Wye Branches shall be true wyes.

D. Pipe Jointing

1. Pipe to be joined by leak-proof, thermal, butt fusion joints. All fusion must be done by personnel trained by the pipe supplier using tools approved by the pipe supplier.

2. The fusion machine shall have hydraulic pressure control for fusing 2 pipe ends together; it shall include pressure fusion indicating gauges to correctly monitor fusion pressures. The machines shall be equipped with an electric or gasoline engine powered facing unit to trim irregularities from the pipe ends. The heating plate on the fusion machine shall be electrically heated and thermostatically controlled and shall contain a temperature gauge for monitoring temperature.

3. Joint strength must be equal to that of adjacent pipe as demonstrated by tensile test. In addition, results of tensile impact testing of joint should indicate a ductile rather than a brittle fracture. External appearance of fusion bead should be smooth without significant juncture groove.

4. Threaded or solvent cement joints and connections are not permitted.

E. Joining, Terminating or Adapting by Mechanical Means

1. The polyethylene pipe shall be connected to systems or fittings of other materials by means of an assembly consisting of a polyethylene flange adapter butt-fused to the pipe, a backup ring of either cast iron, steel, or high silica aluminum alloy made to ANSI B-16.1 dimensional standards (with modified pressure ratings), bolts of compatible material (insulated from the fittings where necessary) and a gasket of reinforced black rubber, asbestos-rubber compound or other material approved by the ENGINEER, cut to fit the joint. In all cases, the bolts shall be drawn up evenly and in line.

2. Termination of valves, or fittings such as tees, bonds, etc., made of other materials shall be by the flange assemblies specified hereinbefore. The pipe adjacent to these joints and to joints themselves must be rigidly supported for a distance of one pipe diameter or 1 foot, whichever is greater, beyond the flange assembly.

F. Tools and Procedures

1. Fusion jointing and other procedures necessary for correct assembly of the polyethylene pipe and fittings will be done only by personnel trained in those skills by the pipe supplier.

2. Only those tools designed for aforementioned procedures and approved by the pipe supplier shall be used for assembly of pipe and fittings to ensure proper installation.

2.05 COPPER PIPE AND FITTINGS

A. Exterior copper pipe shall be Type K pipe (ASTM B88 latest revision), with compression fittings. Joints shall be drawn up firmly and shall be tested before backfilling and any leakage stopped.

B. Wherever copper pipes pass through walls or floors, they shall have wrought or cast iron sleeves, for easy removal. Pipes passing through structural beams shall be placed as near as possible to the top of the beam under the floor slab.

2.06 UNDERGROUND UTILITY WARNING TAPES

A. Non-metallic underground utility warning tapes shall be installed directly above all buried pipe.

B. The tape shall a pigmented polyolefin film with a printed message on one side that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil.

C. The minimum overall thickness of the tape shall be 4.0 mils and the width shall not be less than 3” and a minimum unit length of 1000 ft/roll. The tape shall be color coded and imprinted with the message as follows:

Type of Utility	Color Code	Legends
Water	Safety Precaution Blue	Caution Buried Water Line Below
Sewer	Safety Green	Caution Buried Sewer Line Below

D. Underground marking tape shall be “Terra Tape” as manufactured by Reef Industries, or approved equal.

E. Installation of marking tapes shall be per manufacturer’s recommendations and shall be as close to the grade as is practical for optimum protection and delectability. Allow a minimum of 18” between the tape and the line.

F. Payment for detectable tapes shall be included in the linear foot price BID of the piping BID item(s).

2.07 DETECTABLE TRACER WIRE AND FLEXIBLE PIPELINE MARKERS

A. 12 gauge TRACER WIRE shall be placed directly on top of all forcemain and shall be attached to the pipe at 5 ft intervals maximum. Tracer wire segments shall be 800 feet maximum and shall terminate at each air release valve manhole, or a structure the same as a clean-out box. Contractor shall leave three feet of coiled slack at each termination point.

B. A FLEXIBLE FIBER REINFORCED flat composite pipeline marker shall be installed above the force main approximately every 500 feet at a location designated by the ENGINEER.

C. The marker shall be manufactured of a fiber reinforced composite material. The reinforcement material shall be comprised of both lineal strands and horizontal mesh mats. The marker post must be flat in shape with rails on both sides. Marker shall be at least 3 ¾" wide. A 2 $^{7}/_{8}$" wide decal must fit on each side of the marker. The back side of the post shall have a rounded rib down the center and two small ribs on the sides to act as guides for the decals. Decals will be placed on both sides to ensure that a warning message can be seen from both directions.

D. The marker shall be capable of withstanding a minimum of 10 vehicle impacts at 55 M.P.H. with a car bumper.

E. The marker shall be coated with a coloring which matches the color of the post. The coating shall totally stop ultraviolet light from reaching the resin portion of the post. The coating shall not fade, peel, or blister after a minimum of 2,000 hours in a QUV Weatherometer.

F. The marker post shall remain flexible from -40^{o} F to +140^{o} F.

G. Decals shall be fade resistant and remain legible after a minimum of 2,000 hours in a QUV Weatherometer. Decal graphics shall include the internation Do0Dig symbol. Decals shall be placed on both sides of the post.

H. Marker shall be Rhino 3-Rail, with Rhino Force Main Sewer Warning decal GD-5314C, or approved equal.

PART 3 EXECUTION

3.01 LAYING PIPE IN COMMON TRENCH

A. Pipelines, force mains and sewers laid in same trench shall, in all cases, be laid on original earth, regardless of divergence in their elevations. Pipe shall never be laid in backfill or one above the other. The CONTRACTOR shall include payment for all trenching and backfilling in his lump sum bid.

3.02 PRESSURE PIPE INSTALLATION - GENERAL

A. General

1. Pipe shall be handled with such care as necessary to prevent damage during installation. The interior of the pipe shall be kept clean and the pipe shall be installed to the lines and grades shown on the Drawings. Pipe shall be installed according to instructions and with tools recommended by the manufacturer. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged or capped.

2. Ductile Iron fittings only shall be used with the PVC pipe.

3. Mechanical joint fittings shall be used with underground pipe.

4. Fittings less than 4-inches in diameter shall be of the mechanical joint type and be firmly blocked to original earth or rock to prevent water pressure from springing pipe sideward or upward. Concrete or other blocking material approved by the ENGINEER shall be placed such that it does not cover the pipe joints, nuts, and bolts.

5. Fittings 4-inches in diameter and greater shall be of the mechanical joint type and firmly restrained to prevent water pressure from springing pipe sideward or upward. The mechanical restraint shall be the Series 2000PV produced by EBAA Iron, Inc. or approved equal.

6. Pipes shall be free of all structures other than those planned. Openings and joints to concrete walls shall be constructed as shown on the Drawings.

7. Ductile iron or steel pressure pipe, 4 inch diameter or larger, entering a structure below original earth level, unsupported by original earth for a distance of more than 6 feet shall be supported by Class "2500" concrete, where depth of such support does not exceed 3 feet, and by Class "4000" concrete piers each 6 feet, where depth exceeds 3 feet. All other pressure pipe entering buildings or basins below original earth and having a cover of more than 24 inches of earth, or under roadway, shall be supported as shown in detail on the Drawings. All piers required will be paid for in accordance with the appropriate specification hereinbefore. Class "2500" concrete required will be included in the payment for furnishing and laying the particular pipe, in order to discourage excessive excavation outside the limits of structures. Pipes entering structures shall have flexible joint within 18 inches of exterior of structure, and also from point of leaving concrete support to original earth or crushed stone bedding.

B. Pressure Pipe Laying

1. Pressure pipe shall first be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer. A copy of such instructions shall be available at all times at the site of the work.

2. All pipes must be forced and held together, or “homed” at the joints, before sealing ground level and unsupported by original earth for a distance of more than 6 feet shall be supported by concrete to original ground where depth of such support does not exceed 3 feet. When depth exceeds 3 feet, beams with piers shall be used for support.

3. Trench excavation for pipe laying must be of sufficient width to allow the proper jointing and alignment of the pipe. Trenches in earth or rock shall be dug deep enough to ensure 30” minimum cover over top of the pipe, unless otherwise indicated on the Drawings.

4. Trench line stations shall be set ahead of the trenching at least each 100 feet of pipeline. Trenches shall be dug true to alignment of stakes. Alignment of trenches or pipes in trench must not be changed to pass around obstacles such as poles, fences and other evident obstructions without the approval of the ENGINEER. Lines will be laid out to avoid obstacles as far as possible, consistent with maintenance of alignment necessary to finding the pipeline in the future and avoiding obstruction of future utilities and structures.

5. Cut pieces of pressure pipe 18” or more in length may be used in fitting to the specials and valves and fitting changes in grade and alignment. Cut ends shall be even enough to make first class joints.

C. Testing Pressure Pipe

1. Pressure and leakage tests shall be conducted in accordance with ANSI/AWWA C600.

2. The CONTRACTOR shall furnish all necessary equipment for pressure testing.

3. Inspection of pipe laying shall in no way relieve the CONTRACTOR of the responsibility for passing tests, stopping leakage, or correcting poor workmanship.

4. Underground pipelines will not be finally accepted until leakage is less than allowable by ANSI/AWWA C600. In case leakage exceeds this amount, the CONTRACTOR shall locate and repair leaks until the entire pipeline will pass the required test. All leakage shall be stopped in exposed piping. The pumping equipment shall be disconnected during test.

5. The CONTRACTOR shall furnish meter or suction tank, pipe test plugs and bypassing piping and make all connections for conducting the above tests. The pumping equipment used shall be compressed air, centrifugal pump or other pumping equipment which will not place shock pressures on the pipeline. Power

plunger pumps will not be permitted or us on closed pipe system for any purpose.

3.03 DUCTILE IRON PIPE INSTALLATION

A. Pipe shall be handled with such care as necessary to prevent damage during installation. The interior of the pipe shall be kept clean and the pipe shall be laid to the lines and grades shown on the Drawings and/or as established by the ENGINEER.

B. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged or capped. Care should be taken to prevent flotation of pipe in the event the trench should flood.

C. Fitting shall be firmly blocked to original earth or rock to prevent water pressure from springing pipe sideward or upward. Concrete or other blocking material shall be placed such that it does not cover the pipe joints, nuts and bolts.

D. Pipes shall be free of all structures other than those planned. Openings and joints to concrete walls shall be constructed as shown on the Drawings. Any cast iron pipe entering a structure below original ground level and unsupported by original earth for a distance of more than 6 feet shall be supported by concrete to original ground where depth of such support does not exceed 3 feet. When depth exceeds 3 feet, beams with piers shall be used for support.

E. All pipes entering buildings or basins below original earth level, which have less than 6 feet span between wall and original earth and having a cover of more than 24 inches of earth, or under roadway, must be adequately supported as approved by the ENGINEER or shown on the Drawings. All such supports are to be included in the contract price and no extra payment will be made for same.

F. Pipes entering structures shall have a flexible joint within 18” of exterior of structure, or from point of leaving concrete support to original earth or rock bedding.

G. Cast iron pipe shall be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer.

H. All pipes must be forced and held together, or “homed” at the joints, before sealing or bolting. Pipe must be aligned as each joint is placed, so as to obtain straight lines and grades. Curves and changes in grades shall be laid in such a manner that maximum allowable joint deflection is not exceeded.

I. Cut pieces of cast iron pipe 18” or more in length, may be used in connecting valves and fittings and for changes in grade and alignment. Cut ends shall be even enough to make first class joints.

J. Sufficient excavation for bell holes will be required for tightening of bolts. No pipe shall be laid resting on rock, blocking, or other unyielding objects except where laid above ground on piers or in permanent tunnels.

3.05 HIGH DENSITY POLYETHYLENE PIPE INSTALLATION

A. General

1. High density polyethylene pipe shall be installed in strict accordance with the manufacturer's recommendations and these Specifications.

2. The CONTRACTOR shall have the manufacturer furnish all necessary technical assistance, installation instruction and jointing supervision required to ensure that the pipe is properly installed. The CONTRACTOR shall furnish the services of a technical representative of the manufacturer to supervise the joining, bedding, laying and backfilling of at least the first 200 feet of pipe.

3. Upon satisfactory completion of the initial jointing, bedding, laying and backfilling of the first 300 feet of pipe, the CONTRACTOR shall furnish the ENGINEER a written statement from the manufacturer's technical representative certifying that he has witnessed the work in progress and approves the techniques being used and the results obtained by the CONTRACTOR.

4. The manufacturer's technical representative shall have had previous experience with similar work, and be fully qualified to supervise and demonstrate proper procedures for jointing and laying the high density polyethylene pipe.

B. Bedding

1. The laying condition for the high density polyethylene pipe will be on a 6" pad of loose soil with mechanically compacted earth (to a 90 percent of maximum density as determined by Standard Proctor density test) to the centerline of the pipe.

2. At the CONTRACTOR'S option, he may substitute a 6" pad of No. 8 crushed stone below the bottom of the pipe and backfill to the centerline of the pie with No. 8 crushed stone.

C. Grade and Alignment

1. Polyethylene pipe shall be laid to predetermined grades and lines as indicated by the Contract Drawings. Grade lines shall be established either by means of offset grade stakes or by direct levels.

3.06 INSTALLING FLANGED OR THREADED PIPE AND FITTINGS

A. The CONTRACTOR shall clean off all rush and dirt and paint all threads with red lead, before assembling, and the pipe shall be installed with flanges and pipes plumb and level, showing no leakage. Unions shall be included in threaded pipe runs to allow for easy removal of pipes. All valve operating devices shall be in locations and of types shown on the Drawings. They shall be accurately plumbed, leveled, supported and braced for smooth operation. Flanged joints shall be assembled with appropriate flanges, gaskets, and bolting. The clearance between flange faces shall be such that the connections can be gasketed and bolted tight without imposing undue strain on the piping system. Flange faces shall be parallel and the bores concentric; gaskets shall be centered on the flange faces so as not to project into the bore. Bolting shall be lubricated before assembly to ensure uniform bolt stressing. The flange bolts shall be drawn up and tightened in staggered sequence in order to prevent unequal gasket flange spacing. When a raised face is joined to a companion flange with a flat face, the raised face shall be machined down to a smooth matching surface and a full face gasket shall be used.

3.08 PVC PIPE INSTALLATION

PVC pipe shall be installed in accordance with the manufacturer's instructions and the "General" provisions under 3.01 and 3.02 in this Section.

3.09 STERILIZATION OF POTABLE WATER PIPE

A. Upon completion of the work and cleaning up, and prior to final acceptance, the CONTRACTOR shall sterilize all new distribution system improvements which will be in contact with drinking water, including potable water pipe and connections thereto (including pumps and pump piping).

B. Sterilization shall be accomplished by filling the facilities with water containing at least fifty (50) parts per million available chlorine utilizing a contact time of 24 hours. A residual of at least 25 parts per million, at the end of the 24 hour contact time, is required. No portion of the new work shall be placed in service prior to sterilization. At the end of the sterilization period, all sterilized surfaces and areas shall be thoroughly flushed with treated water and drained from the system, as directed by the OWNER.

C. CONTRACTOR shall make an allowance in his bid to cover cost of filling the new water mains. The CONTRACTOR shall be billed for all water used for the construction and testing at a rate equal to the rate that the OWNER must pay the supplier.

D. CONTRACTOR will be responsible for notifying the Health Department to observe sterilization test and shall be responsible for all sampling, including coordination, mailing and retesting, if required.

3.10 Testing Waterline Pipe

1. Pressure and leakage tests shall be conducted in accordance with ANSI/AWWA C600.

2. The CONTRACTOR shall furnish all necessary equipment for pressure testing.

3. Inspection of pipe laying shall in no way relieve the CONTRACTOR of the responsibility for passing tests, stopping leakage, or correcting poor workmanship.

4. The piping shall be complete, and thrust blocks shall have been in place for less than 10 days prior to be tested.

5. Piping shall be tested at a static pressure of 150 pounds per square inch over a period of not less than eight consecutive hours. The test will be considered successful when the pressure drop over the test period is 5 psi or less. If the pressure drop exceeds 5 psi, repair the leaks and repeat the test. After repairs have been made the test shall be conducted, again. Piping will be accepted once pressure loss does not exceed 5 psi.

6. Underground pipelines will not be finally accepted until leakage is less than allowable by ANSI/AWWA C600. In case leakage exceeds this amount, the CONTRACTOR shall locate and repair leaks until the entire pipeline will pass the required test. All leakage shall be stopped in exposed piping. The pumping equipment shall be disconnected during test. Allowable leakage is calculated by the following:

   L: Allowable leakage, gallons per hour
   S: Length of pipe, feet
   D: Nominal diameter, inches
   P: Average test pressure, psi

$$L = \frac{(SD\sqrt{P})}{133{,}200}$$

7. The CONTRACTOR shall furnish meter or suction tank, pressure recorder, pressure gauges, pipe test plugs and bypassing piping and make all connections for conducting the above tests. The pumping equipment used shall be compressed air, centrifugal pump or other pumping equipment which will not place shock pressures on the pipeline. Power plunger pumps will not be permitted or us on closed pipe system for any purpose.

3.10 BASIS FOR PAYMENT

Piping shall be paid for at the unit price bid or lump sum bid and shall include all work incidental to making a complete installation such as excavation, bedding, backfill, painting, testing, disinfection, cleanup, seeding, paving, etc.

END OF SECTION

SECTION 02700

SEWAGE AND DRAINAGE PIPING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to install and test pipe and fittings as shown on the DRAWINGS and required by the SPECIFICIATIONS.

B. Piping shall be located substantially as shown. The ENGINEER reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes or for other reasons. Pipe fitting notation is for the CONTRACTOR'S convenience and does not relieve him from laying and jointing different or additional items where required without additional compensation.

C. Wherever the word pipe or piping is used it shall mean pipe and fittings unless otherwise noted.

1.02 RELATED WORK

A. Trenching, backfilling and compacting are included in this Division, Section 02200.

B. Concrete is included in Division 3, Section 03300.

C. General Piping

1.03 DESCRIPTION OF SYSTEM

A. Piping shall be installed substantially as shown on the DRAWINGS so as to form a complete smooth flow path and workable system.

B. The piping and materials specified here in are intended to be standard types of pipe for use in transporting the fluids as indicated on the DRAWINGS. The pipe and fittings shall be designed, constructed, and installed in accordance with the best practices and methods and the manufacturer’s recommendations.

1.04 QUALIFICATIONS

A. All pipe and fittings under this section shall be furnished by manufacturers who are fully experienced, qualified, and regularly engaged in the manufacture of the materials to be furnished.

1.05 SUBMITTALS

A. The CONTRACTOR shall submit to the ENGINEER for review in accordance with Division 1, Section 01300, complete sets of SHOP DRAWINGS showing layout and details of materials, joints and methods of construction and installation of the pipe, specials and fittings required.

B. Before fabrication and/or shipping of the pipe is begun, the CONTRACTOR shall submit for approval a schedule of pipe lengths for the entire job. All pipe furnished under the CONTRACT shall be fabricated in full accordance with the approved DRAWINGS.

C. Submit to the ENGINEER within 30 days after execution of the CONTRACT a list of materials to be furnished, the names of the SUPPLIERS and the approximate date of delivery of materials to the site.

1.06 INSPECTION

A. The manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The manufacturer shall furnish to the ENGINEER a notarized affidavit stating all pipe meets the requirements of applicable ASTM SPECIFICIATIONS, these SPECIFICIATIONS, and the joint design with respect to square ends and out-of-round joint surfaces.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE (FORCE MAIN AND GRAVITY SEWER APPLICATIONS)

A. General

1. Ductile iron pipe shall be centrifugally cast of ductile iron conforming to ASTM Specification A-746-82, or latest revision. Unless noted otherwise on the DRAWINGS, all ductile iron pipe shall have a wall thickness not less than 0.33 inch (Class 52).

2. The manufacturing tolerances included in the nominal thickness shall not be less than specified by ANSI/AWWA C150/A21.50-latest revision.

3. Pipe may be furnished in 18’ or 20’ nominal laying lengths; and the weight of any single pipe shall not be less than the tabulated weight by more than 5 percent for pipe 12 inches or smaller in diameter, not by more than 4 percent for pipe larger than 12 inches in diameter.

4. The hydrostatic and acceptance tests for the physical characteristics of the pipe shall be as specified in ANSI/AWWA C151/A21.51-latest revision.

5. Any pipe not meeting the ANSI/AWWA SPECIFICIATIONS quoted above shall be rejected in accordance with the procedure outlined in the particular specification.

6. The ENGINEER shall be provided with 3 copies of a certification by the manufacturer that the pipe supplied for this CONTRACT has been tested in accordance with the referenced SPECIFICIATIONS and is in compliance therewith.

7. The net weight, class or nominal thickness and sampling period shall be marked on each pipe. The pipe shall also be marked to show that it is ductile iron.

8. Unless otherwise noted, joints for ductile iron pipe will be “push-on” type consisting of a rubber gasket installed in a recess in the bell.

9. Ductile iron pipe must be used within 200 feet of underground petroleum storage tanks and shall have gaskets designed for this purpose such as Nitrile Butadiene (NBR), approved equal or better.

B. Lining and Coating Ductile Iron Pipe

1. All ductile iron pipe and fittings shall have manufacturer’s outside coal tar or asphaltic base coating. The inside lining shall be one of the following protective coatings:

a. Calcium Aluminate Cement Mortar with Sealcoat (ANSI/AWWA C104/A21.4);

b. Coal Tar Epoxy (20 to 40 mil, nominal);

c. Amine Cured Novalac Epoxy (40 mil, nominal);

d. Polyethylene (40 mil, nominal)

e. Polyurethane (40 mil, nominal).

C. Fittings for Ductile Iron Pipe - 3” and Larger

Fittings shall be the same as specified in Section 02610, Paragraph 2.02 C of these SPECIFICIATIONS.

D. Ductile Iron Pipe and Fittings - Smaller than 3”

Fittings shall be the same as specified in Section 02610, Paragraph 2.02 D of these SPECIFICIATIONS.

E. Flanged Cast Iron Pipe and Flanged Coupling Adapters for Flexible Couplings

Fittings shall be the same as specified in Section 02610, Paragraph 2.02 E of these SPECIFICIATIONS.

F. Mechanical Joint Restraints shall be the same as specified in Section 02610, Paragraph 2.02 F of these SPECIFICIATIONS.

2.02 POLYVINYLCHLORIDE (PVC) PIPE AND FITTINGS (GRAVITY SEWER APPPLICATIONS)

A. PVC pipe used for gravity sewer applications shall meet all requirements of ASTM specification D3034-latest revision. Pipe and fittings shall meet the extra strength minimum of SDR-35 of that specification.

B. All pipe and fittings shall be inspected at the factory and on the job site. Testing of PVC pipe and fittings shall be accomplished in conformance with the latest revision of ASTM D3034, ASTM D2444, ASTM D2412 and ASTM D2152. The manufacturer shall submit 5 copies of certification of test for each lot of material represented by shipment to the job site.

C. The pipe shall be homogeneous throughout and free from cracks, holes foreign inclusions or other defects. The pipe shall be as uniform in color as commercially practical. PVC pipe shall have a ring painted around spigot ends in such a manner as to allow field checking of setting depth of pipe in the socket.

D. Pipe must be delivered to job site by means which will adequately support it, and not subject it to undue stresses. In particular, the load shall be so supported that the bottom rows of pipe are not damaged by crushing. Pipe shall be unloaded carefully and strung or stored as close to the final point of placement as is practical. Pipe shall not be stored outside where subject to sunlight.

E. Jointing of PVC pipe shall be by a natural rubber ring inserted into the belled end of the pipe or double hub joints. Solvent weld joints are not acceptable.

F. The PVC pipe manufacturer shall provide special fittings, acceptable to the ENGINEER to make water-tight connections to manholes.

2.03 POLYVINYLCHLORIDE (PVC) PIPE AND FITTINGS (FORCE MAIN APPLICATIONS)

A. General

1. PVC pipe used for force main applications shall meet all the requirements of ASTM specification D2241-latest revision. The PVC cell classification shall be 1245B as defined under ASTM D1784.

2. Elastomeric gaskets shall comply with the requirements specified in ASTM F477.

3. Joints shall comply with the requirements specified in ASTM D3139.

4. PVC pipe shall be as manufactured by IPEX, J-M Manufacturing or approved equal.

5. The lubricant used for joint assembly shall be a water soluble lubricating and shall not be detrimental to the gasket or the pipe.

6. The manufacturer shall, upon written request by the purchaser, furnish an affidavit that all basic materials used in pipe production meet the requirements of this recommended standard.

7. Pipe shall be homogeneous throughout. It shall be free from voids, cracks, inclusions and other defects. It shall be uniform as commercially practical in color, density, and other physical properties. Pipe surfaces shall be free from nicks and scratches. Joining surfaces of spigots and joints shall be free from gouges and imperfections that could cause leakage.

8. Pipe shall be nominal sizes and dimension ratio as shown on the DRAWINGS or specified elsewhere. Pipe outside diameters shall be consistent with iron pipe sizes (IPS), to assure the pipe can be directly connected to ductile iron fittings without adapters or complicated procedures.

9. Pipe shall be a standard green color representative of sewer pipe.

B. Testing and Certification

1. The manufacturer shall be subject to random inspection and evaluation by an independent third party in order to assure the purchaser of full compliance with this specification. The third party shall report all findings to the purchaser upon request. The third-party selection shall be subject to the approval of the OWNER and shall be provided at no additional cost to the OWNER.

2. The third-party inspector shall have free access to those parts of the manufacturer’s plant involved in WORK performed to meet the requirements of this recommended standard. The manufacturer shall afford the third-party inspector reasonable facilities needed to determine if the pipe meets the requirements of this recommended standard.

3. Certification: Upon request by the OWNER, the manufacturer shall furnish a certificate of conformance to specified standards.

Upon request by the OWNER, the manufacturer shall furnish production standard dimensions and tolerances of the joint and gasket.

4. Test Preparation

   a. Testing shall be performed at 73.4°F + 36°F (23°C + 2°C) unless otherwise specified. Care shall be exercised to condition test specimens to the proper temperature before testing. In cases of disagreement, specimens shall be conditioned in accordance with Procedure A of ASTM D618.

   b. Selection of pipe specimens for testing, if not specified in this recommended standard, shall be as agreed upon by the purchaser and manufacturer.

5. Test Methods

   a. All measurements shall be made in accordance with ASTM D2122.

   b. Flatten three (3) specimens of pipe, 2 inches long, between parallel plates in a suitable press until the distance between the plates is 5% of the original outside diameter of the pipe, or the walls touch, whichever occurs first. The rate of flattening shall be uniform and such that the compression is completed within two (2) to five (5) minutes. Remove the applied load and examine the specimen for evidence of splitting, cracking or breaking.

   c. The extrusion quality test shall be performed in accordance with ASTM D2152. This procedure determines the extrusion quality as indicated by reaction to immersion in anhydrous acetone. The test distinguishes between fused and unfused PVC. After completion of test procedure, remove the specimen and examine for evidence of flaking or disintegration.

   d. The design of the gasket joint provided on the PVC pipes shall comply with ASTM D3139.

   e. Impact testing shall be performed in accordance with ASTM D2444.

   f. The manufacturer shall hydrostatically proof-test all pipe, including the joint, that is marked with the designation number of piece of pipe, whether ANSI/AWWA C905-latest revision at 73.4°F + 3.6°F (23°C +2°). Each piece of pipe, whether standard or random length shall be proof-tested at

twice the pressure rating of the pipe. The test shall be run for a minimum dwell of 5 seconds.

g. Impact Resistance Requirements

1. TUP Weight shall be 20 lb. or 30 lb.

2. TUP shall have a 1/2” radius nose piece.

3. Sample lengths shall be 12” O.A.L.

4. Ten samples shall be tested and all shall pass. Any failures shall result in rejection.

5. All samples shall bass a minimum impact of 220 ft. lbs.

6. Test Frequency

a. The dimensions of pipe and joints shall be measured at the beginning of each extrusion run and hourly thereafter.

b. The flattening test shall be performed at the beginning of each extrusion run and once every twenty-four hours thereafter.

c. The extrusion quality test shall be performed at the beginning of each extrusion run of each specific material on size, and every two hours thereafter. The test shall also be run immediately following any change from established running conditions that could affect extrusion quality.

d. The joint integrity test shall be performed by the manufacturer to evaluate gasket joint design whenever the design of the joint or the gasket is changed.

e. The impact test shall be performed every two hours during the extrusion run.

f. The hydrostatic proof test shall be performed every twenty-four hours during the extrusion run.

C. Quality Control Records.

1. The manufacturer shall maintain for a period of not less than two years a record of all quality control tests and shall, if requested, submit the pertinent record to the purchaser.

D. Markings

1. Pipe and couplings shall bear identification markings that will remain legible during the normal handling, storage, and installation. Markings shall be applied in a manner that will not weaken or damage the pipe or coupling. Marking shall be applied at intervals of not more than five (5) feet on the pipe.
2. Marking on the pipe and coupling shall include the following:

    a. Nominal size and OD base (e.g. 24CI)

    b. PVC

    c. Dimension ratio and pressure rating (e.g. DR25 PR165)

    d. UNI-B-11

    e. Manufacturer's name or Trademark

    f. Manufacturer's production code to include day, month, year, shift, plant and extruder of manufacture.

    g. Certification seals pertaining to entire documents or specific sections, if desired or requested.

3. Special Marking: If plant inspection is made by a third-party inspector, a special marking of no more than three (3) letters, as specified by the OWNER may be added to markings on the pipe and coupling.

4. Double Assembly Lines: Pipe shall be supplied with twin assembly lines on the spigot to guard against over-assembly.

2.07 DETECTABLE UNDERGROUND UTILITY WARNING TAPES

A. Detectable underground utility warning tapes which can be located from the surface by a pipe detector shall be installed directly above non-metallic (PVC, polyethylene, concrete) pipe.

B. The tape shall consist of a minimum thickness of 0.35 mils solid aluminum foil encased in a protective inert plastic jacket that is impervious to all known alkalis, acids, chemical reagents and solvents found in the soil.

C. The minimum overall thickness of the tape shall be 5.5 mils and the width shall not be less than 2" with a minimum unit weight of 2-1/2 pounds/1" x 1000'. The tape shall be color coded and imprinted with the message as follows:

Type of Utility	Color Code	Legends
Water	Safety Precaution Blue	Caution Buried Water Line Below
Sewer	Yellow	Caution Buried Gas Line Below
Gas	Safety Green	Caution Buried Sewer Line Below

D. Detectable underground tape shall be “Detect Tape” as manufactured by Allen Systems or approved equal.

E. Installation of detectable tapes shall be per manufacturer’s recommendations and shall be as close to the grade as is practical for optimum protection and delectability. Allow a minimum of 18” between the tape and the line.

F. Payment for detectable tapes shall be included in the linear foot price BID of the piping BID item(s).

G. Immediately below the tape, the Contractor shall install one unspliced No. 12 A.W.G. conductor. Each end of the conductor shall terminate at an accessible location such as an air release manhole or pump station valve box. A separate valve box shall be installed for accessing the terminal end of a conductor where a force main discharges to a manhole.

H. Payment for detectable tapes shall be included in the linear foot price BID of the piping BID item(s).

2.08 DETECTABLE TRACER WIRE

A. A 12-gauge, solid-wire conductor, tracer wire shall be placed directly on top of all force mains and shall be attached to the pipe at 5 ft intervals maximum. Tracer wire segments shall be 800 feet maximum and shall terminate at each air release valve manhole, or a structure the same as a clean-out box. Contractor shall leave three feet of coiled slack at each termination point.

2.09 FLEXIBLE FIBER REINFORCED PIPELINE MARKER

A. A flexible fiber reinforced flat composite pipeline marker shall be installed above the force main approximately every 500 feet at a location designated by the ENGINEER.

B. The marker shall be manufactured of a fiber reinforced composite material. The reinforcement material shall be comprised of both lineal strands and horizontal mesh mats. The marker post must be flat in shape with rails on both sides. Marker shall be at least 3 ¾” wide. A 2 $^{7}/_{8}$ ” wide decal must

fit on each side of the marker. The back side of the post shall have a rounded rib down the center and two small ribs on the sides to act as guides for the decals. Decals will be placed on both sides to ensure that a warning message can be seen from both directions.

C. The marker shall be capable of withstanding a minimum of 10 vehicle impacts at 55 M.P.H. with a car bumper.

D. The marker shall be coated with a coloring which matches the color of the post. The coating shall totally stop ultraviolet light from reaching the resin portion of the post. The coating shall not fade, peel, or blister after a minimum of 2,000 hours in a QUV Weatherometer.

E. The marker post shall remain flexible from -40^{o} F to +140^{o} F.

F. Decals shall be fade resistant and remain legible after a minimum of 2,000 hours in a QUV Weatherometer. Decal graphics shall include the internation Do0Dig symbol. Decals shall be placed on both sides of the post.

G. Marker shall be Rhino 3-Rail, with Rhino Force Main Sewer Warning decal GD-5314C, or approved equal.

PART 3 EXECUTION

3.01 LAYING NON-PRESSURE PIPE - GENERAL

A. General

1. All pipe may be tested for uniform diameter, straightness and defects before laying. Rejected pipe shall be removed from the PROJECT.

2. All pipe after being inspected and accepted shall be laid to the lines and grades shown on the DRAWINGS. The CONTRACTOR shall furnish all labor and materials for staking out lines and grades. All gravity pipelines shall be laid to constant grades between invert elevations shown on the DRAWINGS. Grades shown on DRAWINGS are invert of pipe, unless specifically noted otherwise. The pipe lengths shall be fitted together and matched to form a smooth and uniform invert.

3. Sub-grade, undercut, bedding and backfilling under, around and over the pipe shall all be in accordance with the details shown on the DRAWINGS. No pipe shall be laid until the sub-grade is properly in place.

4. Unnecessary walking upon the completed pipelines shall be avoided until trench has been backfilled to over the top of the pipe.

5. The interior of the pipe shall be cleaned of all dirt, jointing materials and superfluous materials of every description. When laying of pipe is stopped, the end of the pipe shall be securely plugged or capped. Care should be taken to prevent flotation of the pipe in the event the trench should floor. The CONTRACTOR will be responsible for relaying and/or relocating pipe if the pipe is laid before trenching has progressed far enough to eliminate the possibility of grade conflicts or realignment on account of existing structures, pipelines, or conduits.

6. In trench conditions where pipe is in danger of sinking below grade or floated out of grade or line, or where backfill materials are such a fluid nature that such movements of pipe might take place during the placing of the backfill, the pipe shall be weighted or secured permanently in place.

7. Pipes shall be laid free from all structures other than those planned. Openings in and joints to contact walls shall be constructed as shown on the DRAWINGS.

8. Non-pressure pipes entering structures underground and unsupported by original earth for a distance of more than 3', shall be supported by Class "B" concrete, where depth of such support does not exceed 3'. All pipes entering buildings or basins, below original ground, which are higher than 3' depth above sub-grade, span more than 3' depth above sub-grade, span more than 3' between wall and original earth, and with more than 24" of cover or under a roadway, shall be supported by concrete beams with piers at 6' intervals between structural wall and edge of excavation for the structure, in order to prevent breakage from settlement of backfill about the structure. Concrete and reinforcing steel for these supports shall be in the lump sum portion of the CONTRACT; and no extra payment will be allowed. Pipe entering structures shall have flexible joint within 18" of exterior of structure or from point of leaving concrete support.

9. No backfilling except for securing pipe in place, shall be done until the ENGINEER has inspected the joints, alignment, and grade in the section laid. Such inspection, however, does not relieve the CONTRACTOR of liability in case of defective joints. Joints that show leakage will not be accepted. If after backfilling and inspection, any joints are found that are allowing groundwater to enter the sewer, such joints shall be sealed by the CONTRACTOR.

10. Flexible thermoplastic sewer pipe installation shall conform to ASTM D-2321, latest revision.

11. Ductile iron pipe installation shall conform to AWWA C-600-82, or latest revision.

12. It shall be solely the responsibility of the Contractor to ensure that all existing lateral connections and cleanouts are located, replaced, and re-connected to the new gravity sewer pipe.

B. Pipe Bedding

1. Pipe bedding for gravity sewers shall be as shown on the DRAWINGS. Crushed stone used for bedding shall be size shown, and shall comply with State Highway Department Standards.

3.02 TESTING SANITARY SEWERS PIPE

Note: Before entering any confined space, follow all local, state and federal safety precautions.

A. A wetted interior pipe surface is desirable and will produce more consistent test results. Where practical, clean the line with cleaning balls, manufactured by Cherne Industries Incorporated or approved equal, prior to testing, to wet the pipe surface and eliminate debris.

B. All new pipe shall be low-pressure air tested to insure the integrity of the pipe and joints.

C. Air testing shall be performed by the CONTRACTOR using equipment manufactured by Cherne Industries Incorporated or approved equal. Equipment used shall meet the following minimum requirements:

1. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.

2. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.

3. All air used shall pass through a single control panel.

4. Three (3) individual hoses shall be used for the following connections:

a. From control panel to pneumatic plugs for inflation.

b. From control panel to sealed line for introducing the low pressure air.

c. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

D. Air testing procedures shall follow guidelines outlined in ASTM SPECIFICIATIONS C828, C924 and Uni-Bell B6, (see ASTM C828, C924 and Uni-Bell B6). All pneumatic plugs shall be seal tested before being

used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to the manufacturer's recommended inflation pressure. The sealed pipe shall be pressurized to 5 PSIG. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to manufacturer's recommended inflation pressure. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 PSIG. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 PSIG minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable" if the allocated line pressure decreases less than one PSI in the time shown for the given diameters in the following table:

Nominal Pipe Size Inches	Time Minutes per 100 Feet
4	0.3
6	0.7
8	1.2
10	1.5
12	1.8
15	2.1
18	2.4
21	3.0
24	3.6

In areas where ground water is known to exist, the height in feet shall be divided by 2.35 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 PSIG.)

If the installation fails to meet this requirement, the CONTRACTOR shall, at his own expense, determine the source of leakage. He shall perform a leak location test and then repair or replace all defective materials and/or workmanship.

E. Joints

Individual joint air tests shall be performed on pipe over 24" in diameter according to the following instructions: (see ASTM C1103-89)

1. Determine test pressure. Test pressure for large diameter pipe should be 3.5 PSIG (.24 bar). In addition, .43 PSIG (0.3 bar) is added to the 3.5 PSIG (.24 bar) for every foot of water head above the top of the pipeline, to a maximum pressure of 15 PSIG (1.03 bar). (i.e. 10 ft. of water head above a 60" diameter pipe would

require a test pressure of 10 x .43 = (4.3 PSIG) + 3.5 PSIG) = 7.8 PSIG required test pressure.)

2. Position the Joint Tester so the end elements (inflatable pneumatic rings) are located on both sides of the joint to be tested. Inflate the end elements to 50 PSIG 93.4 bar).

3. Pressurize center cavity with air or water to test pressure calculated in Step 1 above. Allow pressure to stabilize (approx. 10-15 seconds) and turn off pressure source.

4. If the pressure in the cavity holds or drops less than 1 PSIG (.68 bar) in 5 seconds, the pipe joint shall be found to be acceptable. If the pressure drops over 1 PSIG the joint is defective and should be repaired.

5. When the joint test is completed all pressure must be exhausted from center cavity to 0 PSIG and then from the end elements to 0 PSIG. The Joint Tester can then be transported and positioned on the next joint to be tested.

   The equipment used must be manufactured by Cherne Industries Incorporated or approved equal.

F. Deflection Test

Mandrel test (deflection test) shall be performed by the CONTRACTOR in order to verify the roundness and proper installation of the pipeline.

1. Mandrels shall be approved by the ENGINEER with proving rings prior to use and shall meet the following requirements:

   a. Mandrel Sizing: The outside diameter of the mandrel shall be fabricated to the following SPECIFICATION:

      Base Pipeline Diameter – (Percent of deflection limit times base pipeline diameter) = Mandrel diameter. In accordance with ANSI/ASTM D-3034 and F-679.

   b. Mandrel Construction: The mandrel shall be of open design to prevent debris build-up from occurring between the channels of adjacent fins which in-turn causes erratic test results. The fin sets shall number at least (9) and be removable from the mandrel core by unscrewing the wing-nut and loosening the end caps which secure the fins in position. The contact area of the fins shall be equal to the nominal inside diameter of the pipe. Gauges of various diameters shall be assembled by substituting fin sets of appropriate dimension.

Equipment used must be manufactured by Cherne Industries Incorporated or approved equal.

2. Deflection Test

The deflection test shall consist of testing pipe for proper installation by the method outlined: (Set ASTM D3034)

After the pipeline has been installed and backfill materials have been compacted to their required standard densities (called out in ASTM D 2321 or other applicable standard), the mandrel shall be pulled by hand through the pipeline with a suitable rope or cable that is connected to an eyebolt at one end of the gauge. A similar rope or cable shall be attached to the eyebolt at the opposite end of the mandrel and tension shall be applied to it. This will insure that the mandrel maintains its correct position during testing and also to remove the mandrel if it should be lodged in an excessively deflected pipeline. Winching or other means of forcing the mandrel through the pipeline are unacceptable. Pipeline deflection testing performed within thirty (30) days of installation shall have a deflection not exceeding 5% of the base inside pipe diameter as established by ASTM Standards D3034 and F679 listed in the following table:

Deflection Gauge Dimensions: SDR 35

Nominal Size	Average I.D.	Base I.D.	5% Deflection Gauge
6"	5.893	5.742	5.46
8"	7.891	7.665	7.28
10"	9.864	9.563	9.08
12"	11.737	11.361	10.79
15"	14.374	13.898	13.20
18"	17.564	16.976	16.13
21"	20.707	20.004	19.00
24"	23.296	22.480	21.36
27"	26.258	25.327	24.06

Pipeline deflection testing performed thirty days (30) beyond the date of installation shall have a deflection not exceeding 7.5% of the nominal inside diameter or as established otherwise by the applicable governing body.

3. A permanent record of all testing with locations where excessive pipeline deflections occur shall be kept by the CONTRACTOR and forwarded to the ENGINEER after completion of testing on each line.

4. The CONTRACTOR shall immediately replace all sections of pipe which deflect more than 5% (or 7 1/2%).

5. All materials and labor required for testing and replacement of pipelines shall be furnished by the CONTRACTOR and the cost thereof included in the prices BID for furnishing and laying sewers.

3.03 PRESSURE PIPE INSTALLATION - GENERAL

A. General

1. Pipe shall be handled with such care as necessary to prevent damage during installation. The interior of the pipe shall be kept clean and the pipe shall be installed to the lines and grades shown on the DRAWINGS. Whenever pipe laying is stopped, the end of the pipe shall be securely plugged or capped.

2. Fittings shall be firmly blocked as described in Section 02610, Paragraph 3.02 A of these SPECIFICIATIONS.

3. Pipes shall be free of all structures other than those planned. Openings and joints to concrete walls shall be constructed as shown on the DRAWINGS.

4. **It shall be solely the responsibility of the Contractor to ensure that all existing grinder pumps, lateral connections and cleanouts are located, replaced, and re-connected to the new gravity sewer pipe.**

B. Pressure Pipe Laying

1. Pressure pipe shall first be thoroughly cleaned at joints, then joined according to instructions and with tools recommended by the manufacturer. A copy of such instructions shall be available at all times at the site of the WORK.

2. All pipes must be forced and held together, or “homed” at the joints, before sealing or bolting. Pipe must be aligned as each joint is placed, so as to obtain straight lines and grades. Curves and changes in grades shall be laid in such a manner that maximum allowable joint deflection is not exceeded. If the manufacturer’s specification prohibits deflection at a joint, all curvature must be provided though deflection of the pipe within the tolerances permitted by the manufacturer.

3. Trench excavation for pipe laying must be of sufficient width to allow the proper jointing and alignment of the pipe. Trenches in earth or rock shall be dug deep enough to insure 30” minimum cover over top of the pipe, unless otherwise indicated on the DRAWINGS.

4. Trench line stations shall be set ahead of the trenching at least each 100 feet of pipeline. Trenches shall be dug true to alignment

of stakes. Alignment of trenches or pipes in trench must not be changed to pass around obstacles such as poles, fences and other evident obstructions without the approval of the ENGINEER. Lines will be laid out to avoid obstacles as far as possible, consistent with maintenance of alignment necessary to finding the pipeline in the future and avoiding obstruction of future utilities an structures.

6. Cut pieces of pressure pipe 18” or more length may be used in fitting to the specials and valves and fitting changes in grade and alignment. Cut ends shall be even enough to make first class joints.

7. Pipe shall maintain a consistent positive or negative slope between air release and/or vacuum valves, and shall not create highpoints in the force main other than at air release and/or vacuum valve locations as shown on the DRAWINGS.

C. Testing Pressure Pipe – Hydrostatic Testing

1. Test procedures shall meet the requirements of ANSI/AWWA C600.

2. The piping shall be complete, and thrust blocks shall have been in place for not less than 10 days prior to being tested.

3. Test closed-end pressure piping as follows:

a. Expel all air from the piping prior to the application of test pressure. Tap the piping at high points, if necessary, to release all air from the piping. Plug taps after the test is successfully completed. Plugs shall be watertight.

b. Test piping at a static pressure of 150 pounds per square inch over a period of not less than eight consecutive hours. The test will be considered successful when the pressure drop over the test period is 5 pounds per square inch or less. If the pressure drop exceeds 5 pounds per square inch, repair the leaks and repeat the test. Repair leaks and repeat the test until the pressure drop over the test period is 5 pounds per square inch or less.

4. Test open-end pressure piping and ductile iron sewer piping as follows:

a. The ends of piping being tested shall have test plugs or caps adapted with a tap of adequate diameter to fill and pressurize the system with water.

b. When a section is terminated at a manhole with a plain end (spigot), the pipe must extend into the manhole of sufficient

length to accommodate a restraining cap. The benchwall shall be formed in the manhole after the test section has been approved.

c. Water shall be introduced into the section to be tested at the lower end. The upper end shall have an orifice at the top of the plug or cap to expel air when filling the system with water. All air shall be expelled from the pipe.

d. The test plugs or caps shall be capable of withstanding an internal pressure of 175 psi.

e. Gravity flow systems shall be tested in conformance with Section 13 of ANSI/AWWA C600, at 50 pounds per square inch over a period of not less than one hour. The system will not be acceptable until all leaks have been repaired.

f. Pumped flow systems shall be subjected to an internal pressure equal to 50% more than the maximum operating pressure, but in no case less than 50 psig or greater than 120 psig.

g. Hydrostatic tests may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed in such as way as to prevent blowouts. Inasmuch as a force of 2,500 pounds is exerted on an 8-inch plug by an internal pipe pressure of 50 psi, it should be realized that sudden expulsion of a poorly installed plug or cap can be dangerous. As a safety precaution, no one shall be allowed in the manholes when the pipe is pressurized.

3.04 VALVE LEAKAGE TESTING

Test valves for leakage at the same time that the connected pipelines are tested. See pressure testing requirements. Protect or isolate any parts of valves, operators, or control and instrumentation systems whose pressure rating is less than the pressure test. Valves shall show zero leakage. Repair or replace valves showing leaks and retest.

3.05 VALVE FIELD TESTING

A. Operate manual valves through 10 full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. If valves stick or bind, repair or replace the valve and repeat the tests.

B. Gear operators shall operate valves from full open to full close through 10 cycles without binding or sticking. The pull required to operate handwheel or chainwheel-operated valves shall not exceed 80 pounds. The torque required to operate valves having 2-inch AWWA nuts shall not exceed 150 ft lbs. If operators stick or bind or if pulling forces and

torques exceed the values stated previously, repair or replace the operators and repeat the tests. Operators shall be fully lubricated in accordance with the manufacturer's recommendations prior to operating.

3.06 FINAL CLEAN-UP

Before completion of the CONTRACT, all backfill shall be reshaped, holes filled and surplus material hauled away, and all permanent walks, street, driveway and highway paving, and sod, replaced and reseeding performed.

The CONTRACTOR shall be responsible for clean-up, grading, seeding, sodding or otherwise restoring all areas that he disturbs, even if these areas are within the WORK limits of other CONTRACTORS on this PROJECT.

The WORK shall not be accepted until the right-of-way of roads and all private property has been cleared of all rubbish and loose stone, and also all equipment, excess material and temporary structures. All property which has been damaged in the course of the WORK shall be restored in a manner fully acceptable to the property owner.

3.07 BASIS FOR PAYMENT

A. Piping shall be paid for at the unit price bid and shall include all work incidental to making a complete installation such as, excavation, bedding, backfill, testing, cleanup, seeding, etc.

END OF SECTION

SECTION 02733

MANHOLES

PART 1 GENERAL

1.01 SCOPE OF WORK

The WORK to be performed includes the furnishing of all labor, materials, equipment and services necessary for the construction of all manholes and wet wells, including reinforced concrete rings, bases, barrels, steps, frames and covers, invert construction, stubs and all other appurtenances.

PART 2 PRODUCTS

2.01 MANHOLES

Precast concrete manholes shall consist of precast reinforced concrete sections, a conical or flat slab top section and a base section conforming with the typical manhole details as shown on the DRAWINGS.

Precast manhole sections shall be manufactured, tested and marked in accordance with the latest provisions of ASTM SPECIFICATION C-478.

Manholes shall be constructed of specified materials to the sizes, shapes and dimensions and at the location shown on the DRAWINGS or as otherwise directed by the ENGINEER. The height or depth of the manhole will vary with the location, but unless shown otherwise on the DRAWINGS, shall be such that the top of the manhole frame will be at finish grade in pavement and 2 inches above ground surface elsewhere and the invert will be at the designated elevations. Wall thickness of precast concrete manholes shall be as shown on the DRAWINGS.

Manholes shall be constructed of precast reinforced concrete manhole rings, unless specified otherwise. Form and dimensions shall be as shown on DRAWINGS. Bases for manholes shall be poured as shown on DRAWINGS.

The minimum compressive strength of the concrete for all sections shall be 4,000 psi.

Corrosion resistant additive such as Xypex ADMIX C-1000 (dye) or approved equal concrete waterproofing admix shall be added to the concrete during the batching operation to provide corrosion resistance. 3% of the required weight of Portland Cement shall be added as Xypex. The amount of cement shall remain the same and not be reduces. A colorant shall be added to verify the Xypex ADMIX was added to the concrete. Colorant shall be added at the ADMIX manufacturing facility, not at the concrete batch plant. Xypex ADMIX must be added to the concrete at the time of batching. It is recommended that the ADMIX powder be added first to the rock and sand and blended thoroughly for 2-3

minutes before adding cement and water. The total concrete mass should be blended using standard practices to insure homogeneous mixture.

The admixture manufacturer shall furnish a qualified concrete technician employed by the manufacturer, to assist in the proper field batching and use of the specified admixtures if requested by the Engineer. The technician shall visit the site at the beginning of concrete operations and as requested during construction. In addition, the manufacturer shall furnish the ready mix plant with accurate and dependable equipment for the proper dispensing of admixture.

The maximum allowable absorption of the concrete shall not exceed 8 percent of the dry weight.

The ends of each reinforced concrete manhole riser section and the bottom end of the manhole top section shall be so formed that when the manhole risers and the top are assembled, they will make a continuous and uniform manhole.

Joints of manhole sections shall be of the tongue and groove type with performed plastic gasket meeting the requirements of Federal SPECIFICATION SS-S-00210, "Sealing Compound, Performed Plastic for Pipe Joints" Type 1, Rope Form. The sealing compound shall be produced form blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength. It shall be supplied in extruded rope-form of suitable cross-section and of such sizes as to seal the joint space when the manhole sections are set. The sealing compound shall be protected by a suitable removable two-piece wrapper. Joint sealant shall be Concrete Sealants, Inc., CS-102 and CS-202 or approved equal. Double joint sealant (one on each bench of the tongue and groove) shall be provided.

Joints of manhole sections shall also be installed with a self-adhesive external sealing band, meeting the requirements of ASTM E-1745, C-877 and C-900 specifications. Sealant shall be Concrete Sealants, Inc., CS-212 or approved equal.

Each section of the precast manhole shall have not more than two (2) holes for the purpose of handling and setting. These holes shall be tapered and shall be plugged with rubber stoppers or mortar after installation.

2.02 Manhole Castings

Manhole rims, toe pockets and covers shall be cast iron conforming to the minimum requirements of Federal SPECIFICATION WW-1-652 or to the latest ASTM SPECIFICATION A-48, for Class 30 gray iron castings. All castings shall be made accurately to the required dimensions, fully interchangeable, sound, smooth, clean and free from blisters and/or other defects. Defective castings which have been plugged or otherwise treated shall not be used. All castings shall be thoroughly cleaned and painted or coated with bituminous paint. Each casting shall have its actual weight in pounds stenciled or painted on it in white

paint.

Manhole frames and covers shall be of the size and weights shown on the DRAWINGS and as manufactured by the J.R. Hoe & Sons, Neenah Foundry Co. No R1772-C, Clow No. F-3245-1 or equal. Sanitary sewer manhole covers shall have the word "Sanitary Sewer" cast on the top in letters 2 inches high.

Watertight manhole covers shall be equal to J.R. Hoe & Sons, Neenah Foundry Co., or equal. The size and weights shall be as shown on the DRAWINGS. Payment shall be as a cost difference between regular and watertight frames and covers.

2.03 Manhole Steps

Manhole steps shall be reinforced with three-eighths inch (3/8") Re-bar and shall have a polypropylene plastic coating identical to the dimensions of cast iron manhole steps. They shall be produced specifically for use as manhole steps. Spacing of steps shall be built into the walls of all manholes.

Manhole steps shall be installed in each section of the manhole in accordance with the details on the DRAWINGS.

2.04 Line Connectors

All manholes shall have rubber and/or neoprene line connectors for the installation of the line such as Kor-N-seal or approved equal.

2.05 Internal Drop Manholes

Internal drop structures shall be installed in all manhole structures where called for on the drawings, and on all influent lines into pump stations.

A. The structure shall consist of a RELINER drop bowl manufactured by Duran Inc., or approved equal, a drop pipe and a turn-out at the base of the drop. All force main discharges shall include a force line hood.

B. The appropriately sized drop pipe of SDR 35 PVC, or as noted on the drawing, shall be securely attached to the manhole wall using stainless steel RELINER adjustable clamping brackets and stainless-steel fasteners.

C. The connection of drop bowl to drop pipe shall be by flexible external pipe coupler.

D. The turn-out at the base end of the drop pipe shall be accomplished with a cast-in RELINER drop end flume system or an appropriately angled PVC pipe elbow.

E. The clamping pipe supports shall consist of 304 stainless-steel with 18-8 stainless nuts and bolts.

PART 3 EXECUTION

3.01 INSTALLATION

Manhole inverts shall be constructed of 1:2 grout in accordance with details on the DRAWINGS and inverts shall have the same cross-section as the invert of the sewer which they connect. The manhole invert shall be carefully formed to the required size and grade by gradual and even changes in sections. Changes in direction of flow through the sewer shall be made to a true curve with as large as radius as the size of the manhole will permit. Only inverts with a smooth trowel finish will be acceptable.

The cast iron frame for the manhole cover shall be set at the required elevation and properly anchored to the masonry. Where manholes are constructed in paved areas, the top surface of the frame and cover shall be tilted to conform to the exact slope, crown and grade of the existing adjacent pavement.

Masonry WORK shall be allowed to set for a period of not less than 24 hours. Outside forms, if any, then shall be removed and the manhole backfilled and compacted in the manner provided in these SPECIFICIATIONS. All loose or waste material shall be removed from the interior of the manhole. The manhole cover then shall be placed and the surface in the vicinity of the WORK cleaned off and left in a neat and orderly condition.

After backfilling has been completed, the excavated area, if located in a street, alley or sidewalk, shall be provided with a temporary surface.

A bench shall be provided in each side of any manhole channel when the pipe diameter(s) are less than the manhole diameter. The bench should be sloped no less than ½ inch per foot (4%). No lateral sewer, service connection, or drop manhole pipe shall discharge onto the surface of the bench. (From “10-States Stds.”)

3.02 TESTING

A. Vacuum tests shall be conducted on newly constructed manholes. Preliminary manhole testing shall take place following construction after all connections are made, and before backfilling. Test results derived from this test will allow time for necessary repairs to be completed before further construction proceeds and hinders such repairs. Final tests must be performed after the manhole has been backfilled.

B. Equipment:

1. Manhole vacuum tester assembly and vacuum pumps shall be manufactured by Cherne Industries Incorporated or approved equal.

2. Pneumatic plugs shall be manufactured by Cherne Industries Incorporated or approved equal. These plugs shall have a sealing

length equal to or greater than the diameter of the connecting pipe to the be sealed.

C. Procedures:

1. Plug all manhole entrances and exits other than the manhole top access using suitably sized pneumatic or mechanical pipeline plugs and follow all manufacturer's recommendations and warnings for proper and safe installation of such plugs. Plugs should be inserted a minimum of 6" beyond manhole wall. Make sure such plugs are properly rated for the pressures required for the test. The standard test of 10" Hg. (mercury) is equivalent to approximately 5 PSIG (.3 bar) backpressure. Unless such plugs are mechanically restrained, it is recommended that the plugs are used with a minimum two times (2x) safety factor or a minimum of 10 PSIG (0.7 bar) backpressure usage rating.

   CAUTION: BRACE INVERTS IF LINES ENTERING THE MANHOLE HAVE NOT BEEN BACKFILLED TO PREVENT PIPE FROM BEING DISLODGED AND PULLED INTO THE MANHOLE.

2. Install the vacuum tester head assemble at the top access of manhole. Adjust the cross brace to ensure that the inflatable sealing element inflates and seals against the straight top section of the manhole or the ring assembly, if possible. (If using a "plate" style manhole tester, position the plate on the manhole ring assembly.)

3. Attach the vacuum pump assembly to the proper connection on the test head assemble. Make sure the vacuum inlet/outlet valve is in the closed position.

4. Following safety precautions and manufacturer's instructions, inflate sealing element to the recommend maximum inflation pressure.

   CAUTION: DO NOT OVER INFLATE!

5. Start the vacuum pump and allow pre-set RPM to stabilize.

6. Open the inlet/outlet ball valve and evacuate the manhole to 10" Hg. (approximately negative 5 PSIG, 0.3 bar).

   CAUTION: DO NOT PRESSURIZE MANHOLE! THIS MAY RESULT IN MANHOLE DAMAGE AND/OR RESULT IN MANHOLE TEST HEAD DISLODGING FROM MANHOLE INLET!

7. Close vacuum inlet/outlet ball valve and monitor vacuum for specified test period (see Minimum Test Times for Various

Manhole Diameters table on the following page). If vacuum does not drop in excess of 1" Hg., manhole is considered acceptable and the manhole passes the test. If manhole fails the test, complete necessary repairs and repeat test procedure until satisfactory results are obtained.

Minimum Test Times for Various Manhole Diameters									
Depth, Feet	**Diameter, Inches**								
	30	33	36	42	48	54	60	66	72
	Time, Seconds								
0 to 8	11	12	14	17	20	23	26	29	33
10	14	15	18	21	25	29	33	36	41
12	17	18	21	25	30	35	39	43	49
14	20	21	25	30	35	41	46	51	57
16	22	24	29	34	40	46	52	58	67
18	25	27	32	38	45	52	59	65	73
20	28	30	35	42	50	53	65	72	81
22	31	33	39	46	55	64	72	79	89
24	33	36	42	51	59	64	78	87	97
26	36	39	46	55	64	75	85	94	105
28	39	42	49	59	69	81	91	101	113
30	42	45	53	63	74	87	98	108	121

(The valves listed above are taken from ASTM SPECIFICATION C1244-93 "Standard Test Method for Concrete Manholes by the Negative Air Pressure (Vacuum) Test.")

D. Repeat the above test procedure after backfilling manhole for final acceptance test.

All plugs and equipment used must be manufactured by Cherne Industries Incorporated or approved equal.

3.05 BASIS FOR PAYMENT

A. Manholes shall be paid for at the unit price bid and shall include all work incidental to making a complete installation such as excavation, bedding, backfill, testing, cleanup, seeding, etc. Pump station wetwells shall be included in the lump sum cost for the respective pump station.

END OF SECTION

SECTION 02900

LANDSCAPING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Landscape development work in this phase is generally limited to seeding and sodding.

1.02 RELATED WORK

A. Sub-grade elevations, excavation, filling, and grading required to establish elevations shown on Drawings are not specified in this Section. Refer to this Division, Section 02200.

B. Erosion and sediment control are included in this Division, Section 02270.

1.03 SCOPE OF WORK

A. Sod shall be placed on all slopes steeper than 3:1 except for dam embankment slopes. All other surfaces including dam embankment slopes shall be fertilized and seeded as specified hereinafter, except for those surfaces to be paved or rip-rapped.

B. Fertilizing and seeding shall be performed on all disturbed areas within the limits of work of this contract which are not specified to be sodded and are not occupied by structures, road, concrete slab walls, etc. or within the impoundment area.

PART 2 PRODUCTS

2.01 QUALITY OF SOD

A. Sod shall be well-rooted Kentucky Blue Grass sod or other approved pasture sod, completely free from noxious weeds. and reasonably free from objectionable grasses, weeds and stones or other foreign materials. The source of the sod shall be available for inspection and approval by the ENGINEER prior to stripping.

B. Sections of sod stripped may vary in length not to exceed 8 feet but shall be of uniform width of not less than 10 inches nor more than 18 inches, and shall be cut to a depth of not less than 1 inch and not more than 2 inches. The above widths and lengths are required to ensure proper handling without undue tearing and breaking. Sod from light sand or heavy clay will not be accepted. When cut in strips, the sod shall be rolled with the grass folded inside. The sod shall be cut by means of an approved mechanical sod cutter. During dry weather, the sod shall be watered before stripping to ensure its vitality and to prevent the loss of

soil from the roots. Sod shall be rejected if permitted to decay or dry out to the extent that, in the judgment of the ENGINEER, its survival is doubtful.

2.02 PLACING SOD

A. The sod bed shall be shaped to a smooth even surface and shall be graded such that the sod, when in place, shall be flush with any adjacent turfed area, pavement or other structures, except when otherwise directed by the ENGINEER. Prior to placing of the sod, fertilizer (10-20-10 - Ratio - 25 lbs. per one thousand square feet), Agricultural Limestone (Ratio - 75 lbs. per one thousand square feet), shall be applied, harrowed, raked or otherwise incorporated into the soil. After application of above, the sod bed, if dry, shall be moistened to the loosened depth.

B. No sod shall be placed when the temperature is below 32°F. No frozen sod shall be placed, nor shall any sod be placed on frozen soil. Sod shall not be placed during extremely dry weather unless authorized, in writing, by the ENGINEER and provided that immediately after placing, the wood is covered with a 1 inch thickness of straw mulch.

C. The sod shall be carefully placed by hand so that each section closely joins the adjacent sections without overlapping. All open spaces or gaps shall be plugged with sod cut to the same size and shape.

D. The sod, after it is placed, shall be wetted thoroughly and tamped or rolled to incorporate the roots with the sod bed and to ensure tight joints between strips.

E. All sodded areas shall be kept thoroughly moist for 2 weeks after sodding.

2.03 FERTILIZING AND SEEDING

A. This work consists of furnishing all labor, equipment and materials and in performing all operations in connection with the fertilizing and seeding of all the finished graded areas not specified to be sodded or occupied by structures, roads, concrete slabs, sidewalks, walls, etc., and including grassed areas destroyed or damaged by the CONTRACTOR.

B. The areas to be seeded shall be thoroughly tilled to a depth of at least 4" by deicing, harrowing, or other approved methods until the condition of the soil is acceptable to the ENGINEER. After harrowing or deicing, the seed bed shall be dragged and/or hand raked to finished grade.

C. Fertilizer shall be 25 lbs. of 10-20-10 or equivalent per 1,000 square feet. The incorporation of the fertilizer and the agricultural lime (Ratio - 75 lbs. per one thousand square feet) may be a part of the tillage operation and shall be applied not less than 24 hours nor more than 48 hours before the seed is to be sown.

D. The seed mixture to be sown for dry land areas shall be in the following proportions:

Common Name	Proportion By Weight	% of Purity	% of Germination
Kentucky Bluegrass	40	90	85
Chewings Fescue	25	90	85
Italian Rye Grass	20	90	85
Red Top	10	90	85
White Clover	5	95	90

The seed mixture for stream bank and wet soil areas shall be in the following proportions and applied at the noted rates:

Scientific Name	Common Name	Pure Live Seed (PLS) Ounces/Acre
Andropogon gerardii	Big bluestem grass	66
Calamagrostis canadensis	Blue joint grass	4
Elymus canadensis	Canada wild rye	16
Panicum virgatum	Switch grass	2
Sorghastrum nutans	Indian grass	2
Scientific Name	Common Name	Pure Live Seed (PLS) Ounces/Acre
Spartina pectinata	Prairie cord grass	6
Agrostis alba	Redtop	8
Avena sativa	Seed oats	360
Lolium multiflorum	Annual rye	100
Phleum pratense	Timothy	20
Aster ericoides	Heath aster	2
Aster novae-angliae	New England aster	1.25
Baptisia leucantha	White wild indigo	1.5
Cassia fasciculata	Partridge pea	3.5
Coreopsis tripteris	Tall coreopsis	1.25
Desmodium illinoense	Illinois tick trefoil	1
Eryngium yuccifolium	Rattlesnake master	3
Gentiana andrewsii	Bottle gentian	1
Helenium autumnale	Sneezeweed	1.25
Helianthus grosseserratus	Sawtooth sunflower	2

Lespedeza capitata	Round-headed bush clover	3
Liatris spicata	Marsh blazing star	4
Monarda fistulosa	Prairie bergamot	0.75
Parthenium integrifolium	Wild quinine	2.5
Physostegia virginiana	False dragon; Obedient plant	1
Pycnanthemum virginianum	Common mountain mint	0.5
Ratibida pinnata	Yellow coneflower	3.5
Rudbeckia hirta	Black-eyed susan	1.5
Rudbeckia laciniata	Wild golden glow	2
Rudbeckia subtomentosa	Sweet black-eyed susan	1.25
Silphium integrifolium	Rosin weed	2
Silphium laciniatum	Compass plant	3
Silphium perfoliatum	Cup plant	3
Silphium terebinthinaceum	Prairie dock	2
Solidago juncea	Early goldenrod	2
Solidago rigida	Stiff goldenrod	2
Solidago rugosa	Rough goldenrod	2.5
Tradescantia ohioensis	Common spiderwort	1.25
Vernonia altissima taeniotricha	Hairy tall ironweed	3
Veronicastrum virginicum	Culver's root	1
Zizia aurea	Golden alexanders	0.5

E. All seed shall be fresh and clean and shall be delivered mixed, in unopened packages, bearing a guaranteed analysis of the seed and mixture.

F. Seed shall be broadcast either by hand or approved sowing equipment at the rate of ninety (90) pounds per acre (two pounds per 1,000 square feet), uniformly distributed over the area. Broadcasting seed during high winds will not be permitted. The seed shall be drilled or raked into a depth of approximately 1/2 inch and the seeded area shall be lightly raked to cover the seed and rolled. Drill seeding shall be done with approved equipment with drills not more than 3 inches apart. All ridges shall be smoothed out, and all furrows and wheel tracks, shall be removed.

G. Seed may be sown during the following periods:

February 1 to April 15
August 15 to October 15

H. Seed may not be sown at any other time except with the written approval of the ENGINEER.

I. After the seed has been sown, the areas so seeded shall be mulched with clean straw at the rate of one (1) bale per 2,000 feet (approximately 1

inch loose depth). Mulch on slopes shall be held in placed with binder twine staked down at approximately 18 inch centers or by other equally acceptable means.

J. Areas seeded shall be protected until a uniform stand develops, when it will be accepted and the CONTRACTOR relieved of further responsibility for maintenance. Displaced mulch shall be replaced or any damage to the seeded area shall be repaired promptly, both in a manner to cause minimum disturbance to the existing stand of grass. If necessary to obtain a uniform stand, the CONTRACTOR shall re-fertilize, re-seed and re-mulch as needed. Scattered bare spots up to one (1) square yard in size will be allowed up to a maximum of 10 percent of any area.

PART 3 EXECUTION

3.01 SEQUENCE OF WORK

A. All finish grading in a general area shall be complete before sodding or fertilizing and seeding begins.

3.02 BASIS FOR PAYMENT

A. Payment for sod or fertilizing and seeding shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for all landscaping required for other work, such as structures, pipelines, etc., shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 05540

CASTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, and equipment required to install castings as shown on the Drawings and specified herein. Included in this section are manhole covers, steps, valve boxes, and hatch covers.

1.02 RELATED WORK NOT INCLUDED

A. Concrete work is included in Division 3.

B. Surface preparation and furnishing of castings is included in Division 9, Section 09900.

1.03 SUBMITTALS

The CONTRACTOR shall submit to the ENGINEER, in accordance with Division 1, Section 01300, copies of construction details of castings proposed for use.

PART 2 MATERIALS

2.01 GENERAL

A. All castings shall be gray iron, conforming to the requirements of the ASTM Standards, Designation A48 - latest revision, Class 35B.

2.02 MANHOLE CASTINGS

A. Frames and Covers

1. Sanitary sewer manhole castings shall consist of cast iron frames and 22-3/4 inch diameter covers, having a combined weight of not less than 350 pounds for out of traffic locations and 460 pounds for traffic locations. The frame shall be at least 7 inches high overall. Manhole covers must set neatly in the frame, with contact surfaces machined smooth for even bearing. The top of the cover shall be flush with the frame edge. The top of the cover shall sufficient corrugations to prevent slipperiness and be marked in large letters “SANITARY SEWER.” Covers shall have one pick hole only, about 1-1/2 inches wide and 3/4 inch deep with 3/8 inch square undercut at rear and 3/4 inch square undercut on sides. Covers on sanitary sewer manholes must not be perforated and shall be as manufactured by J.R. Hoe & Sons, Inc. or approved equal.

2. Storm sewer manhole castings shall consist of cast iron frames and 22-3/4 inch diameter grate type covers, having a combined weight of not less than 460 pounds. The frames shall be at least 7 inches high overall. Manhole covers must set neatly in the frame with contact surfaces machined smooth for even bearing. The top of the cover shall be flush with the frame edge. The castings shall be Neenah Foundry Company with type “D” grate, or approved equal.

B. Steps

1. Cast iron or polypropylene plastic encapsulated steel manhole steps shall be patterns shown on the detail Drawings, and have corrugated treads. In case of need for non-protruding steps, shop drawings of special inset cast iron steps shall be reviewed by and be acceptable to the ENGINEER.

2. If a step constructed of another material is going to be considered, shop drawings will need to be submitted far enough in advance to allow consideration.

3. It is intended that the cast iron step be Neenah Foundry Company's R-1980-E, or equal, and the polypropylene plastic encapsulated steel step be M.A. Industries PS-1, or equal.

2.03 VALVE BOXES

A. Slip Type for Iron Body Gate Valves

1. Valve boxes for 2 inch through 10 inch valves shall be the 2 piece slip type, without screw, of sufficient length to allow for 36 inches of cover over the top of the pipe, Tyler 6855 series, model #562-A, or approved equal. The inner section shall have a minimum inside diameter of 5-1/4 inches with a hood type base that will cover the packing gland on a 2 inch through 10 inch valve (minimum of 8 inches inside diameter). The base of the top section shall be flanged at least 1-1/4 inches. The caps shall be circular with a corrugated surface and have pick holes in the periphery and be marked “Water”, “Gas”, “Sewer”, or “Air” according to use. For 12 inch through 16 inch valves, the valve boxes shall be Opelika Foundry Company No. 4907 for cast iron or approved equal.

2. Valve boxes for valves in the horizontal position shall be Opelika Foundry Company No. 4907 for cast iron or approved equal, with a base that is sized to allow covering of the bevel gear case and centering of the operating nut in the valve box.

PART 3 EXECUTION

3.01 INSTALLATION

A. The installation of castings is generally covered under specifications for pipe work and manholes. Castings shall be leveled, plumbed, secured, and installed in accordance with the Drawings.

END OF SECTION

SECTION 15100

VALVES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials, equipment, and incidentals required, and install complete and ready for operation, all valves and appurtenances as show on the Drawings and as specified herein.

1.02 RELATED WORK

A. Excavation, backfill and grading are included in Division 2

B. Painting is included in Division 9, Section 09960.

C. Electrical is included in Division 16.

1.03 SYSTEM DESCRIPTION

A. All of the equipment and materials specified herein is intended to be standard for use in controlling the flow of wastewater, sludge, water, air or chemicals, depending on the applications.

1.04 QUALITY ASSURANCE

A. All of the types of valves and appurtenances shall be products of well-established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. All materials of construction shall be of an acceptable type and shall be designated for the pressure and temperature at which they are to be operated, for the materials they are to handle and for the use for which they are intended. The materials shall meet established technical standards of quality and strength necessary to assure safe installations and conform to applicable standards. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

1.05 REFERENCES

A. Kentucky Basic Building Code.

B. Kentucky State Plumbing Law, Regulations and Code

1.06 SUBMITTALS

A. Copies of all materials required to establish compliance with these Specifications shall be submitted in accordance with the provisions of Division 1, Section 01300. Submittals shall include at least the following:

1. Certified drawings showing all important details of construction and dimensions.

2. Descriptive literature, bulletins, and/or catalogs of the equipment.

3. The total weight of each item.

4. A complete total bill of materials.

5. A list of the manufacturer's recommended spare parts.

1.07 OPERATING INSTRUCTIONS

A. Operating and maintenance instructions shall be furnished to the ENGINEER as provided in Division 1. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions, etc., that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General

1. All valves and appurtenances shall be of the size shown on the Drawings and as far as possible all equipment of the same type shall be from one manufacturer.

2. All valves and appurtenances shall have the name of the maker, flow directional arrows, and the working pressure for which they are designed cast in raised letters on some appropriate part of the body.

3. All buried valves shall open left (counterclockwise). Insofar as possible, all valves shall open counterclockwise.

2.02 VALVES

A. Plug Valves

Eccentric plug valves shall be used in shut-off applications for pump stations and where the valves are scheduled for infrequent use.

Eccentric plug valves 3 to 12 inches in diameter shall be rated for 175 psi working pressure. The body and cover shall be cast iron conforming to ASTM A126, Class B. Flange ends shall comply with ANSI B16.1, Class 125 standards. Mechanical joint ends shall comply with AWWA C11/ANSI 21.11. The entire seat surface shall be protected by a welded nickel seat of minimum 1/8" thickness. The plug shall be cast iron ASTM A126, Class B. The portion of the plug in the valve body cavity shall be coated with Buna-N rubber using an injection-mold process. Valve bonnet shall be full sealed and bolted to the body for ease of maintenance. The seal between the body and the bonnet shall be an O-ring. Stem packing shall be Buna-N multiple "V" ring stem packing seals, conforming to AWWA C504 and AWWA C507 standards. The packing seal shall be held in place with an adjustable gland follower. Shaft bearings shall be sintered 316 stainless steel for both the upper and lower trunnions. Bearings shall be permanently lubricated. 3" valves shall be quarter-turn and shall be supplied with a position indicator marked at 10-degree increments. Valves 4" and larger shall be equipped with a worm gear operator. Eccentric plug valves shall be Clow F-5412, F-5413 or approved equal.

B. Ball Valves

Ball valves shall be used in shut-off applications for residential grinder pump stations.

Ball valves shall be rated for a minimum of 225 psi working pressure. Valves 2 inch and smaller shall be PVC body construction, with EPDM seals, PTFE ball seats, double stem seals. Valves shall operate at full port when open, be a true union with solvent cement socket ends. The valves shall be manufactured by George Fischer, Hayward or approved equal.

C. Swing Check Valves

Check valves for Polyvinyl Chloride (PVC) pipelines shall be swing type and shall meet the material requirements of ASTM Specification D2241-latest revision. The valves shall be PVC body with full flow design. Valves shall have an angle seat and PVC weighted and shielded flapper that will retain a backpressure up to 125 psi. The valves shall be manufactured by Flo Control Inc. or approved equal.

1. When there is no flow through the line, the weighted flapper shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the water-way to allow full flow.

2. Valves shall be so constructed that the body may easily be removed and replaced without removing the valve from the line.

D. Y Check Valves

Check valves for PVC pipelines shall be Y-type. The valves shall be PVC body with Viton seals, rated for150 psi working water pressure. The disk guide shall be a PVC coil. The valves shall be manufactured by George Fischer, Hayward, or approved equal.

1. Valves shall be so constructed that the plunger assembly can be easily accessed for cleaning.

2. Valves shall be so constructed such full flow may be achieved. Minimal back pressure shall be necessary to seat the plunger.

E. Sewage Air/Vacuum Valves

1. Sewage Air/Vacuum Valves shall be furnished and installed at the locations shown on the PLANS. The valves shall be combination air valves for sewage as manufactured by A.R.I Flow Control Accessories sewage, Kfar Charuv, 12932 Israel or approved equal.

2. The valves shall be the size shown on the PLANS and be A.R.I Model D-025 or approved equal.

3. The valves shall be designed to allow entrapped air to escape from the pipeline when pumps are started and close water tight when liquid enters the valves. When the sewage line is filled, the valves shall allow air to reenter when draining, to prevent vacuum or water column separation. The valves shall allow unrestricted venting or re-entry of air through it, during filling or draining of the force main. The complete valve shall withstand 500 psi test pressure.

4. Inlet and outlet blow off valves, and five (5) feet of hose for flushing shall be provided with each valve. Fittings shall be ¾" hose connections.

5. The body and cover of each valve assembly shall be constructed of reinforced nylon. The lower float, stem and hardware shall all be constructed of 316 stainless steel conforming to ASTM A240. The upper float shall be constructed of foamed polypropylene. The seal plug assembly, shall be constructed of reinforced nylon. O-rings shall be constructed of Buna-N rubber.

F. Waterline Combination Air Release Valves

1. Combination Air Release Valves shall be furnished and installed at the locations shown on the PLANS. The valves shall be kinetic air valves for sewage as manufactured by A.R.I Flow Control Accessories sewage, Kfar Charuv, Israel or approved equal.

2. The valves shall be the size shown on the PLANS and be A.R.I. Model D-40 "BARAK" or approved equal.

3. The valves shall be designed to allow entrapped air to escape from the pipeline when pumps are started and close water tight when liquid enters the valves via a float and roll seal arrangement. In the event of a vacuum on the pipeline, the valves shall allow air to enter the pipe. Working pressures shall be as follows:
¾" & 1" valve: 3-150 psi
2" valve: 2-230 psi

4. Inlet and outlet blow off valves, and five (5) feet of hose for flushing shall be provided with each valve. Fittings shall be ¾" hose connections.

5. The body, of each valve assembly shall be constructed of high strength reinforced nylon. All wetted parts shall be corrosion resistant

G. Mud Valves

1. Mud valves shall be of the iron body, bronze mounted type with non-rising stems, flanged ends, extension stem with t-bar. The frame, yoke and gate shall be sturdily proportioned for strength and rigidity and be of cast iron conforming to ASTM specifications A126, Class B. the stem, stem nuts and seats shall be bronze. The stem shall be machined with accurately cut threads. The valves shall be Troy-Valve A-25600, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the ENGINEER before they are installed.

B. After installation, all valves and appurtenances shall be tested at least one hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the ENGINEER.

C. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign material cleaned out of valve openings, etc.; all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced at no additional cost to the OWNER.

D. Buried valves and valve boxes shall be set with the valve stem vertically aligned in the center of the box. Valves shall be set on firm foundation

and supported by tamping selected excavated material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.

3.02 SHOP PAINTING

A. Interior surfaces of all valves, the exterior surfaces of buried valves, and miscellaneous piping appurtenances shall be given a shop finish of an asphalt varnish conforming to Federal Specification TT-V51e for Varnish Asphalt.

B. The exterior surface of various parts of the valves, operators, and miscellaneous piping shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter one shop coat of an approved rust-inhibitive primer, such as Inertol Primer No. 621, shall be applied in accordance with the instructions of the paint manufacturer.

C. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

D. Field painting is specified under Division 9, Section 09960.

3.03 INSPECTION AND TESTING

A. The various pipelines in which the valves and appurtenances are to be installed are specified to be field tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable to the ENGINEER.

B. Various valves, or appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the ENGINEER.

END OF SECTION

SECTION 15101

LARGE VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required and install complete and ready for operation all valves and appurtenances where shown on the Drawings as specified herein.

B. The equipment specified herein includes the following:

1. Gate valves with boxes for yard piping
2. Gate valves for inside service
3. Butterfly valves for yard piping
4. Butterfly valves for inside service
5. Plug valves for yard piping
6. Plug valves for interior or above ground service
7. Ball valves
8. Check valves
9. Air and vacuum relief valves (piping application)
10. Automatic air release valves
11. Shock absorbers
12. Service clamps
13. Expansion joints
14. Pressure-reducing valves
15. Back Pressure Sustaining Valves

C. The work of this Section shall include the installation of valve tags furnished by the CONTRACTOR. All exposed valves provided under this Section shall be tagged.

1.02 RELATED WORK NOT INCLUDED

A. Excavation, backfill, fill and grading is included in Division 2.

B. Piping is included in the respective sections of Division 2 and 15.

C. Valves, hydrants, meters and service lines for distribution system application are included in Division 2.

D. Valves and service accessories on all plumbing systems are included in this Division, Section 15100.

E. Pipe hangers and supports are included in this Division, Section 15094.

F. Electrical is included in Division 16.

1.03 DESCRIPTION OF SYSTEMS

A. All of the equipment and materials specified herein is intended to be standard for use in controlling the flow of wastewater, sludges, water, air or chemicals, depending on the applications.

1.04 QUALIFICATIONS

A. All of the types of valves and appurtenances shall be products of well-established firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these SPECIFICATIONS as applicable.

1.05 SUBMITTALS

A. Complete shop drawings of all valves and appurtenances shall be submitted to the ENGINEER in accordance with the requirements of Division 1.

B. Furnish all information required in Division 1.

1.06 OPERATING INSTRUCTIONS

A. Manufacturer's operating and maintenance instructions as set forth in Division 1 shall be furnished to the ENGINEER for equipment furnished under this Section.

1.07 TOOLS

A. Special tools, if required for normal operation and maintenance, shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. General

1. All valves and appurtenances shall be of the size shown on the PLANS and as far as possible all equipment of the same type shall be from one manufacturer.

2. All valves and appurtenances shall have the name of the maker, flow-directional arrows, and the working pressure for which they are designed cast in raised letters on some appropriate part of the body.

3. Handwheel operator shall be no less than 12-inch diameter.

4. Except as otherwise shown on the PLANS or specified herein, all valves with operators located 7 feet or more above the operating floor shall be provided with chain-wheel operators complete with chain guides and galvanized steel chain.

5. All buried valves shall open left (counterclockwise). Insofar as possible, all valves shall open counterclockwise.

6. All butterfly valves, gate valves and plug valves 8 inches or larger shall be furnished with gear operators and gear cases conforming to the requirements of AWWA C504 or as shown on the PLANS.

2.02 VALVES

A. Butterfly Valves for Buried Service

1. Butterfly valves and operators for buried service shall conform to AWWA C504, except as hereinafter provided. Butterfly valves shall be rated for Class 150B and both valve and operator shall be especially designed for service buried in the ground where the ground water may at times completely submerge the valve and operator, and shall be of the totally enclosed type.

2. The valve bodies shall be of cast iron conforming to ASTM A48-CL 40. Valve ends shall be mechanical joint meeting ANSI Specification A21.11.

3. Except as otherwise specified herein, valve shafts shall be of Type 304 stainless steel. Shaft seals shall be rubber O-ring seals. Shafts having a minimum torsional strength equivalent to shafts specified in Section 3.3 of AWWA C504 and completely isolated from the pipeline contents shall be furnished. Connections between shafts and discs shall be designed to transmit full shaft torque.

4. If the rubber seat is in the body, the disc shall be of an alloy cast iron conforming to ASTM A436 Type I with the periphery machined to a smooth spherical surface. If the rubber seat is mounted on the disc edge it shall be held in place by a one-piece Type 304 stainless steel retaining ring and stainless steel screws, the disc shall be of ASTM A48, Class 40 cast iron and a mating Type 304 stainless steel ring shall be installed in the valve body.

5. The unit shall be permanently lubricated with grease or oil. A standard AWWA 2 inch square operating nut shall be provided on the input shaft and it shall have a cap to center the valve box. Valves shall open to the left (counterclockwise).

6. Valve and operator assemblies shall be given two coats of asphalt varnish conforming to Section 4 of AWWA C504.

7. An Affidavit of Compliance in accordance with Section 1.5 of AWWA C504 shall be furnished to the ENGINEER prior to shipment of valves to the job site.

8. Valve boxes shall be provided for each buried valves. Valve boxes and appurtenances are specified in Division 5, Section 05540.

9. Four tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.

B. Butterfly Valves (for Interior Service)

1. Butterfly valves and operators shall conform to the AWWA Standard Specification for rubber seated butterfly valves Designation C504, except as hereinafter specified. Valves shall have a minimum 150-psi pressure rating and be equal to those manufactured by Allis-Chalmers, Henry Pratt Company, or equal.

2. Butterfly valves shall be flanged end with face-to-face dimensions in accordance with Table 3 of the above mentioned AWWA Specification for short-body valve, or wafer type.

3. Valve seats shall be full resilient seats retained in the body or the disc edge in accordance with Section 3.5 of the above mentioned AWWA Specification. If the resilient seat is in the body, the disc shall be of an alloy cast iron conforming to ASTM A436 Type 1 with the periphery machined to a smooth spherical surface. If the resilient seat is mounted on the disc edge, it shall be held in place by a one-piece Type 304 stainless steel retaining ring and stainless screws, the disc shall be of ASTM A48, Class 40 cast iron and a mating Type 304 stainless steel ring shall be installed in the valve body. Resilient seats shall be Hycar or equal for water service and Nordel or equal for air service.

4. The valve body shall be constructed of close grain cast iron per ASTM A126, Class B with integrally cast hubs for shaft bearing housings of the through boss-type. Permanently self-lubricating body bushings shall be provided and shall be sized to withstand bearing loads. Stuffing box of liberal dimensions shall be provided at the operator end of the vane shaft, arranged so that the packing can be replaced by removing the bronze follower without removing the operator. Packing shall be of the Chevron type as manufactured by Garlock Packing Company. A sealing element utilizing O-rings shall also be acceptable.

5. The valve shaft shall be of Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greater dynamic or seating torque.

6. In general, the butterfly valve operators shall conform to the requirements of Section 3.8 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.

7. Gearing for the operators where required shall be totally enclosed in a gear case in accordance with Section 3.8.3 of the above mentioned AWWA Standard Specification.

8. The manual operators shall conform to Section 3.8.2 of the above mentioned AWWA Standard Specifications, insofar as applicable. Valves shall have Handwheel or lever operators and open left, or counterclockwise. Operators shall have indicators to show position of the valve disc. Operators shall be rigidly attached to the valve body.

C. Gate Valves and Appurtenances for Yard Piping

1. Gate valves for water shall meet the requirements of AWWA C509 covering resilient seated gate valves. Valves shall be rated for 200-psi working pressure and a minimum of 400-psi test pressure. The wedge shall be of cast iron completely encapsulated with rubber. The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429. They shall have non-rising cast bronze stems (unless otherwise shown on the PLANS) and be fitted with “O-ring” seals. The operating nuts shall be 2-inch square. All valves shall open left, or counterclockwise. Stuffing boxes shall be the “O-ring” type with two rings located above thrust collar; the two rings shall be replaceable with valve fully open and subjected to full rated working pressure. Gate valves shall be mechanical joint, ANSI Standard 21.11 except where shown otherwise. The body and bonnet shall be coated with a fusion coating both interior and exterior to meet C50. Each valve shall have maker’s name, pressure rating and year in which manufactured cast on the body. Gate valves shall be as manufactured by Mueller Co., or approved equal.

2. Tapping sleeves shall be as manufactured by the Ford Meter Box Company, Inc., with cadmium-plated cast iron nuts and bolts. Sleeves shall be of cast iron, designated for working pressures not less than 200 psi. Lead gaskets shall be provided for the full area of the sleeve flanges.

3. Tapping valves shall conform to the requirements specified above for gate valves except that one end shall be flanged and one mechanical. Tapping valves shall be provided with an over-sized opening to permit the use of full sized cutters.

4. Four tee-handled gate wrenches of suitable length shall be furnished to operate all valves with valve boxes.

D. Gate Valves for Inside Service

1. See Section 15100 of these SPECIFICATIONS for gate valves 2-1/2" in diameter and smaller.

2. Gate valves 3" and larger in size, unless otherwise specified shall be iron body, bronze mounted, solid wedge gate valves with flanged ends and conforming to the AWWA Standard Specification for Gate Valve for Water and Sewage Systems, Designation C509-latest revision, insofar as applicable and in addition to the following requirements:

a. Valve shall be outside screw and yoke type with rising stem (unless otherwise shown on the PLANS).

b. Flanges shall be faced and drilled to ANSI B16.1 125 pound template, unless otherwise shown on the PLANS.

c. Bronze gate rings shall be fitted into grooves of dovetail or similar shape in the gates. For grooves or other shapes, the rings shall be firmly attached to the gates with bronze rivets.

d. Handwheels shall turn counterclockwise to open the valves. Handwheels shall be of ample size and shall have an arrow and the word "OPEN" cast thereon to indicate the direction of opening.

e. Stuffing box follower bolts shall be of steel and the nuts shall be of bronze.

f. The design of the valves shall permit packing the valves without undue leakage while they are wide open and in service.

g. O-ring stuffing boxes may be used.

h. Gate valves for pipeline installation shall be housed in an adjustable two-piece cast iron valve box and have a cover with the word "Water" or "Sewer" stamped or cast.

i. Gate valves with spur gears shall be housed to accommodate the offset of the operating nut.

E. Gate Valves For 16 and 24 Inch Distribution Mains

1. General

Valves to be installed on 16 and 24-inch high service and transmission lines shall conform to the

latest revision of AWWA Standard C-509 covering resilient seated gate valves. These large diameter valves shall be as manufactured by Clow Valve Co., M & H Valve Co., or approved equal.

2. Design

The valves shall be either, **non-rising stem**, opening by turning stem left or right and provided with **2" square operating nut or handwheel** with the word Open and an Arrow cast in the metal to indicate direction to open.

The wedge shall be of cast iron completely encapsulated with rubber.

The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429.

Stems for NRS assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS & Y stems shall be on bronze bar stock. The NRS stem stuffing box shall be the o-ring seal type with two rings located above thrust collar; the two rings shall be replaceable with valve fully open and subjected to full rated working pressure.

There shall be two low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of wedge and shall be made of solid bronze. There shall be a smooth unobstructed waterway free of all pockets, cavities and depressions in the seat area.

3. Materials

All cast iron shall conform to ASTM-A-126 Class C. Castings shall be clean and sound without defects that will impair their service. No plugging or welding of such defects will be allowed.

Stems shall be manganese bronze having a minimum tensile strength of 60,000 psi, a minimum yield of 20,000 psi.

Bolts shall be electro-zinc plated steel with hex heads and hex nuts in accordance with ASTM A-307 and A-563, respectively.

4. Testing

Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to twice the specified working pressure of 250 psi.

5. Coating AWWA

The body and bonnet shall be coated with a fusion coating both interior and exterior to meet C550.

6. Marking

Valves shall be marked with name of manufacturer, the year of manufacture, the maximum working pressure and size of valve.

F. Plug Valves for Interior or Above Ground Service

1. Plug valves shall be manufactured in accordance with AWWA C-504, shall be of the 1/4 turn, eccentric, non-lubricated type, serviceable under full line pressure, and capable of sealing in both directions at the rated pressure. Valves shall have a minimum port area of 80% of the nominal pipe size. The valve body shall be of cast iron, 30,000 psi tensile strength with added nickel and chromium, ASTM A-126, Class B, 175 psi rating. Valve ends shall be flanged. The valve plug shall be ductile iron conforming to ASTM A-536, Grade 65-45-12 with neoprene resilient facing. The valve seating design shall be resilient and of the continuous interface type having consistent opening/closing torques and shall be non-jamming in the closed position. Closure shall be accomplished by means of an off-set plug design with a resilient seating face that achieves full 360 degree seating contact. Valves shall be of the bolted bonnet design. The resilient faced plug shall be replaceable without removing the valve body from the line. The valve body seating area shall be corrosion resistant by a welded-in overlay of high nickel content. Sprayed or plated seating surfaces will not be acceptable. Valves shall have permanently lubricated Type 316 stainless steel bearings on the upper and lower plug stem journal. Bearings shall be replaceable. Packing shall be Buna N (Vee Type) rated for 150 psig working pressure. Packing shall be adjustable and valves shall be designed such that they can be repacked without removing the bonnet. All exposed nuts, bolts, springs, and washers shall be zinc plated, except exposed hardware for submerged valves that shall be of stainless steel.

2. All valves shall be equipped with gear actuators and handwheel operators (unless otherwise shown on the PLANS). All gearing shall be enclosed suitable for running in oil with seals provided on all shafts to prevent entry of dirt and water into the actuator. All

shaft bearings shall be furnished with permanently lubricated bronze bearing bushings. Actuator shall clearly indicate valve position and an adjustable stop shall be provided. Construction of actuator housing shall be semi-steel. Hardware on actuators shall be of the same materials as the valves.

3. All valves and actuators shall be as manufactured by DeZurik Corporation or equal.

4. All plug valves shall be installed so that the direction of flow through the valve is in accordance with the manufacturer's recommendations.

G. 3-Way Plug Valves

1. Valves shall be of the non-lubricated taper plug type and shall have resilient faced plugs for drip tight shutoff. End connections shall be flanged and shall be drilled to ANSI 125 pound standard. Valves shall be semi-steel and shall have stainless steel bearings in the upper and lower journal areas. The three-way valve shall be furnished as standard with a plug to shut off one port at a time.

2. The valve shall be furnished with a resilient facing bonded to the plug sealing surface and shall have double handwheel actuators. The actuator shall be of the worm and gear type and shall have one handwheel to lift and reseat the plug and one handwheel to rotate the plug. Handwheel actuators shall be totally enclosed and shall have seals and gaskets to prevent entry of dirt, water or corrosive atmosphere. Actuators shall have corrosion resistant bearings on the gear sector. Actuators shall provide plug rotation up to 360^{o}.

3. The 3-way valves, actuators and accessories shall be as manufactured by DeZurik Corporation, or equal.

H. Plug Valves for Yard Piping

1. Plug valves for yard piping shall be as specified above for interior plug valves, except valves shall have mechanical joint ends and stainless steel hardware. Buried actuators shall be as specified above and shall be of buried, submerged service with seals on all covers and shafts and all exposed hardware of stainless steel. Provide valve box, stem extension, and operating nut as specified above for gate valves.

I. Ball Valves

1. See Section 15100 of these SPECIFICATIONS.

J. Check Valves

1. Check valves for cast iron and ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Specification C508-latest revision Swing-Check Valves for ordinary water-works service. The valves shall be iron body, bronze mounted, single disc, 150 psi working water pressure, non-shock, and hydrostatically tested at 300 psi. Ends shall be 125 lb. ANSI B16.1 flanges.

    a. When there is no flow through the line the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the water-way.

    b. Check valves shall have bronze seat and body rings, extended bronze hinge pins and bronze nuts on the bolts of bolted covers.

    c. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and spring. Springs with various tensions shall be provided and springs approved by the ENGINEER shall be installed.

K. Automatic Air and Vacuum Relief Valves for Vertical Turbine Pumps

1. Combination air and vacuum valves for vertical turbine pumps shall be equal to APCO Air Valves for Vertical Turbine Pumps, per APCO Bulletin 586, as manufactured by Valve and Primer Corp., Schaumburg, Illinois, or approved equal.

2. Valves shall be the size shown on the drawings and shall be equipped with an automatic air release valve, such as APCO Valve No. 55, or approved equal.

3. Air valves for vertical turbine pumps shall be designed to allow large quantities of air to escape out the orifice when the pump is started and close water tight when the liquid enters the valve. The air valve shall also permit large quantities of air to re-enter through the orifice when the pump is stopped to prevent a vacuum from forming in the pump column.

4. The valve shall consist of a body, cover, baffle, float and seat. The valve shall be designed to prevent prematurely shut-off. The seat shall be fastened into the valve cover, without distortion, and shall be easily removed, if necessary.

5. The entire float and baffle assembly must be shrouded with a perforated water diffuser to prevent the water column entering the

valve, from slamming the float shut and eliminate water hammer in the system.

6 The float shall be stainless steel, designed to withstand a minimum of 1,000 psi, or approved equal. The float shall be center guided and not free floating for positive seating.

7. The discharge orifice shall be fitted with an automatic air release valve in order to vent small pockets of air. This valve shall consist of a body, cover, float and seat, and shall be rated at a working pressure of 150 psi.

8. The body, cover, and baffle of this valve assembly shall be constructed of cast iron, conforming to ASTM A48 Class 30, or approved equal. The float shall be stainless steel, conforming to ASTM A240, or approved equal. The seats shall be BUNA-N and the water diffuser shall be brass, or approved equal. All flanges shall be 125# ANSI.

L. Air Release Valves

1. Combination Air Valve Assemblies

a. Sizes 1-inch through 6-inch. Valve shall be single body, double orifice, allowing air to exit when filling a pipeline, and air to enter when draining. Orifices shall operate independently; the smaller release orifice shall be capable of opening when the larger is in the closed position.

b. The valve shall be designed to prevent premature closing. The closing mechanism shall be either needle and seat and be Buna-N, or of the rolling seal type made of Rubber E.P.DM., and attached to the valve cover to ensure drop-tight shut-off. The float shall be stainless steel, hermetically sealed, and designed to withstand pressures up to 1000 pounds per square inch, or approved equal. The float shall be of corrosion resistant materials in accordance with ASTM A240, or approved equal. The plug shall be bronze and in accordance with ASTM B124, or approved equal. The body, cover, and leverage frame shall be cast iron/Delrin and shall be in accordance with ASTM A126 GR, B and ASTM D2133, reinforced Nylon, or approved equal.

c. Valve exterior shall be painted with Red Oxide Phenolic Primer, or approved equal as accepted by the FDA for use in contact with potable water.

d. Valve to be APCO Model (corresponding to size) Combination Air Valve as manufactured by Valve & Primer Corp., Schaumburg, Illinois, U.S.A., or approved equal.

1. Air valves shall be installed as shown in the plans, housed in a valve box with cover. Valve boxes for air valves shall be carefully set to grade with covers at grade.

2. Air Release (Vent) Valve Assemblies

   a. Air Vent Valve No. 50, or approved equal. Valve shall operate under pressure, allowing entrapped air to escape from a pipeline. Orifices shall operate by means of a simple lever mechanism (stainless steel, ASTM A240), rolling seal mechanism, or approved equal to prevent water from escaping as or after air is expelled.

   b. The closing mechanism shall be either needle and seat and be Buna-N, or of the rolling seal type made of Rubber E.P.DM., and attached to the valve cover to ensure drop-tight shut-off. The float shall be stainless steel, hermetically sealed, and designed to withstand pressures up to 1000 pounds per square inch, or approved equal. The float shall be of corrosion resistant materials in accordance with ASTM A240, or approved equal. The seat shall be of stainless steel, or approved equal. The seat shall have an orifice of 3/32 inches, or approved equal to operate up to 175 pounds per square inch (psi), or a 1/16 inch orifice when operation at pressures higher than 175 psi, or approved equal. The body shall be cast iron, ASTM A48, Class 30, or approved equal, and shall have a ½ inch NPT female threaded inlet and outlet, and be rated for 350 psi test pressure.

   c. Valve exterior shall be painted with Red Oxide Phenolic Primer, or approved equal as accepted by the FDA for use in contact with potable water.

   d. Valve to be APCO Model 50 Air Vent Valve as manufactured by Valve & Primer Corp., Schaumburg, Illinois, U.S.A., or approved equal.

M. Shock Absorbers

1. Shock absorbers shall be supplied on the plant water distribution piping where shown on the PLANS. The shock absorbers shall be Model 1485-1 as manufactured by Josam Manufacturing Company, Michigan City, Indiana or approved equal.

N. Service Clamps

1. Service clamps shall have malleable or ductile iron bodies, which extend at least 160 degrees around the circumference of the pipe and shall have neoprene gaskets cemented to the saddle body.

Bodies shall be tapped for either corporation stop threads of IPS as required. Clamps with tap sizes 1 inch and smaller shall be of the single strap design. Clamps with tap sizes larger than 1 inch shall be of the double strap design.

2. Service clamps shall be Style 91 or 291 as manufactured by Dresser Industries, Inc., Type 311 or 313 as manufactured by Smith-Blair, Inc. or equal.

O. Expansion Joints

1. Expansion joints shall be single arch type of butyl rubber construction with carcass of high grade woven cotton or suitable synthetic fiber and individual solid steel ring reinforcement. Soft rubber fillers shall be integrally cured into the arches to prevent settling of material into the arch. Joints shall be constructed to pipeline size and to meet working pressure and corrosive conditions similar to the line where installed. Joints shall have full faced fabric reinforced butyl flanges integral with body. Split type steel backup rings shall be provided to ensure a good joint. Rings shall be designed for mating the ANSI Standard 150 lb. flanges. Joints shall have a working pressure rating of 140 psig (minimum). All joints shall be finish coated with Hypalon paint.

2. Expansion joints shall be furnished with control units. Control units shall consist of two (2) drilled plates, stretcher bolts, and rubber washers backed by metal washers. The stretcher bolts shall prevent over-elongation of the joint. Extra nuts shall be provided on the stretcher bolts on the inside of the plate to prevent over-compression. All nuts, bolts and plates shall be galvanized.

3. Expansion joints shall be Style 500B as manufactured by Mercer Rubber Company, Style 4140 by Uniroyal Company, or equal.

P. Pressure Reducing Valves

1. Pressure reducing valves shall be of the single seated balanced design type globe body with threaded inlet and outlet ports. It shall be diaphragm operated, spring loaded permitted adjustment over a range of no less than 30 psi.

2. The body shall be bronze construction with bronze or stainless steel stem and furnished with a replacement rubber seat.

3. The pressure reducing valves shall be G-A Industries, APCO, or equal.

Q. Mud Valves

1. Mud valves shall be flanged end, rising stem type.

2. Bodies shall be cast iron. The stem, stem nut, disk ring, and seat ring shall be bronze. Bolts and nuts shall be rustproof steel.

3. Handwheel operator and floorstand shall be furnished where shown on the PLANS.

4. Provide stem guides for maximum unsupported stem length of 5 feet.

5. The valves shall be Clow F-3085, or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All valves and appurtenances shall be installed in the locations shown on the PLANS, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the ENGINEER before they are installed.

B. After installation, all valves and appurtenances shall be tested at least 1 hour at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If a joint proves to be defective, it shall be repaired to the satisfaction of the ENGINEER.

C. Install all brackets, extension rods, guides, the various types of operators and appurtenances as shown on the PLANS that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the CONTRACTOR shall check all plans and figures, which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.

D. All materials shall be carefully inspected for defects in workmanship and materials; all debris and foreign material cleaned out of valve openings, etc.; all operating mechanisms operated to check their proper functioning, and all nuts and bolts checked for tightness. Valves and other equipment, which do not operate easily or are otherwise defective, shall be repaired or replaced at no additional cost the OWNER.

E. Buried flanged or mechanical joints shall be made with cadmium plated bolts. All exposed bolts and nuts shall be cadmium plated. All exposed bolts and nuts shall be heavily coated with two (2) coats of bituminous paint comparable to Inertol No. 66 Special Heavy.

F. Buried valves and valve boxes shall be set with the stem vertically aligned in the center of the gate box. Valves shall be set on a firm foundation and supported by tamping selected excavated material under the sides of the valve. The valve box shall be supported during backfilling and maintained in vertical alignment with the top flush with finish grade.

3.02 SHOP PAINTING

A. Interior surfaces of all valves, the exterior surfaces of buried valves and miscellaneous piping appurtenances shall be given a shop finish of an asphalt varnish conforming to Federal Specification TT-V51e for Varnish Asphalt.

B. The exterior surface of various parts of valves, operators, floor stands and miscellaneous piping shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter on shop coat an approved rust-inhibitive primer (such as specified in Section 09900) shall be applied in accordance with the instructions of the paint manufacturer.

C. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating.

D. Field painting is included under Division 9.

3.03 INSPECTION AND TESTING

A. The various pipe lines in which the valves and appurtenances are to be installed are specified to be field tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable or the ENGINEER.

B. Various regulating valves, strainer, or other appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the ENGINEER.

END OF SECTION

SECTION 15123

COUPLINGS, FLANGED COUPLING ADAPTERS, AND SERVICE SADDLES

PARTI GENERAL

1.01 SUMMARY

A. Section Includes:

1. Couplings, flanged coupling adapters, and service saddles required for piping connections. Some products specified in this Section may not be required for this Contract. Refer to piping system specification section(s) and Drawings to determine particular products to be provided under this Contract.

1.02 SUBMITTALS

A. Not required for products identical to those specified by name of manufacturer and model type.

B. For products other than those specified by name of manufacturer and model number, submit information in accordance with requests for substitutions or "Or

C. Submit information for products that vary from specified requirements regardless of manufacturer name.

PART2 PRODUCTS

2.01 COUPLINGS

A. Couplings for connecting plain-end steel or ductile iron pipe of same outside diameter:

1. Dresser Style 38.
2. Smith-Blair Product No. 411.

B. Stainless steel couplings for stainless steel aeration piping:

1. Brico Depend-0-Lok Air Master Couplings

a. Housing and closure plates: ASTM A-240-T-304L stainless steel.
b. Sealing plates: T-304 stainless steel.
c. Gaskets:ASTMD2000-EPDMfor-20deg.F.to300deg.F.
d. Hardware: ASTM A-276 T-304 stainless steel.

C. Transition couplings for connecting plain-end steel or ductile iron pipe of different outside diameter:

1. Dresser Style 162.
2. Smith-Blair Product No. 413.

D. Insulating couplings for connecting plain-end steel or ductile iron pipe and stopping flow of electrical current:

1. Dresser Style 39.
2. Smith-Blair Product No. 416.

E. Pressure rating shall be greater than test pressure of piping system.

F. Materials:

1. Middle Ring and Gaskets: As selected by manufacturer. Suitable for fluid service and maximum . operating temperature of piping system.
2. Followers: Ductile iron or steel.
3. Bolts and Nuts: Manufacturer's standard.

2.02 FLANGED COUPLING ADAPTERS

A. Flanged coupling adapters for connecting plain-end steel or ductile iron pipe to flanged pipe, fitting, valve, instrument, or equipment item:

1. Dresser Style 128.
2. Smith-Blair Product No. 913.

B. Pressure rating shall be greater than test pressure of piping system. Materials:

1. Flange: Steel, faced and drilled to 150 Ib. class in conformance with ANSI B16.5.
2. Body: Steel.
3. Follower: Ductile iron or steel.
4. Gasket: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system
5. Bolts and Nuts: Manufacturer's standard.

2.03 SERVICE SADDLES

A. Service saddles for tapping pipe sizes 18 in. and smaller shall be double strap design.

1. Power Seal Stainless Steel
2. Ford FS303 Stainless Steel

B. Service saddles for tapping pipe sizes larger than 18 in. shall be triple strap design. 1. Smith-Blair Product No. 366.

C. Materials

1. Body: Malleable iron or ductile iron.
2. Straps: Steel.
3. Nuts and Washers: Manufacturer's standard.
4. Gasket: As selected by manufacturer. Suitable for fluid service and maximum operating temperature of piping system.

2.04 ANCHORS

A. Provide anchors including, but not limited to, tie rods, lugs, harness assemblies, flanged spool pieces, friction collars and hardware for each coupling, and flanged coupling adapter. Anchors shall restrain pipe to prevent movement out of each coupling and flanged coupling adapter.

B. Design each anchor to sustain force developed by test pressure of piping system.

C. Anchor studs placed perpendicular to longitudinal axis of pipe is unacceptable.

D. Anchorage with welded attachments to ductile iron piping is unacceptable.

2.05 COATINGS

A. Coatings for couplings, flanged coupling adapters, and service saddles shall be same material as coatings for connected pipe.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's written instructions.

END OF SECTION

TABLE OF CONTENTS

Contents

Definition of Terms

Owner: The organization or its representative authorizing and administering the construction project.

Contractor: The organization or its representative performing the construction.

Operating Utility: The organization or its representative operating the gas utility affected by the construction.

Roadway Authority: The authority or agency with jurisdiction over the roadway.

Approved Equal: A substitute in materials that is considered by the **Operating Utility** to be equal to the item listed in the specifications or standards.

TECHNICAL PROVISIONS

TP 1.0 EXCAVATION, TRENCHING, AND BACKFILLING FOR NATURAL GAS FACILITIES

1.1 Scope of Work

All work to comply with US Department of Transportation Pipeline Safety Regulations, Title 49 Code of Federal Regulations, Part 192. The work covered by this section includes the furnishing of all plant, labor, tools, equipment, and material, and performing all operations in connection with excavating, trenching and backfilling, for installations of all natural gas utility pipelines, related structures and accessories. This includes the necessary clearing and grubbing, pavement cutting, compaction, pavement restoration, grading, and cleanup, all in accordance with these Technical Provisions and applicable drawings.

If there is a conflict between these Technical Provisions and any other section of the specifications and/or drawings, then the most stringent, as determined by the Owner shall apply.

1.2 Layout and Staking

All layout and staking for site work shall be performed by a licensed engineer or land surveyor, approved by the Owner, who is to be paid by the Contractor, unless other arrangements are negotiated. Copies of survey notes shall be submitted to the Owner, with one or more copies to remain on the job site at all times.

1.2.1 Right-of -Way Clearing And Preparation for Steel Pipe

Right-of-Way to be established and cleared by KYTC's general roadway contractor.

1.2.2 Protection Of Rights And Property Of Others

Where the pipeline crosses fenced enclosures, the Contractor shall open the fences and install temporary gates prior to stringing any pipe. The contractor shall notify the land users and obtain consent prior to the installation of gates and where practical, comply with land user's wishes in connection therewith. The Contractor shall be responsible for any loss or inconvenience caused to the land user resulting from negligence on the part of the Contractor or his employees by virtue of the fence having been opened or gates not being closed. Upon completion of construction, all fences shall be restored in a satisfactory manner and to conditions equivalent to those prior to construction.

1.3 Safety Precautions

Contractor is required to comply with MUTCO (Manual for Uniform Traffic Control) for signing and barricades.

~~Where conditions at road crossings are altered in such a manner as to make such locations dangerous to traffic, the Contractor shall comply with local or state regulations relative to placing appropriate warning signals and flares at such locations; or in the absence of such regulations, contractor shall place such traffic signs which shall be visible during the day and appropriate flares visible at night at a safe distance from excavation areas in both directions. In addition, when in the opinion of the inspector, barricades or guardrails are necessary; the contractor shall provide the same at no additional cost to the Owner.~~

~~The Contractor shall take due precaution to avoid damage to existing pipeline, water mains or any other underground or overhead facilities. The contractor shall solely be responsible for damages to such facilities and shall hold and save the Owner harmless against any actions or claims arising in connection therewith. The waterlines and any other existing underground utilities shall be marked by the Contractor prior to digging in these designated areas. The Contractor shall notify the owner twenty-four (24) hours prior to digging near water lines or other existing underground utilities.~~

1.3.1 EXCAVATION SAFETY

Good judgment and decision making are crucial when planning an excavation. Follow appropriate procedures when working in an excavation where soil is instable or escaping gas could be present. Prior to any excavation, consider alternatives that would reduce or eliminate the exposure to cave-ins or escaping gas.

When determining if a gas or fire hazard exists, consider the amount of gas escaping, the pipeline's operating pressure and condition, the depth and size of excavation, the wind speed and direction, the relative humidity and air temperature, and the combustible materials and degree of confinement of the area around the leak. These factors determine the scope of a potential gas leak or fire, and must be evaluated against proximity to houses, buildings, woods and grasslands which could easily ignite.

BEFORE Excavating:

1) Park all vehicles upwind of the proposed excavation site. If there is no wind, check the atmosphere around the vehicles for gas buildup before starting any engines. Periodically check the area for gas buildup while the work is proceeding.

2) Allow only authorized personnel near the excavation site.

3) Make ready all materials for shoring.
4) Remove the fire extinguisher from the service vehicle and place it within 15 feet upwind of the excavation site.
5) Place traffic warning signs around the work site when appropriate.
6) Keep all sources of ignition away from the proposed work area.
7) When necessary, reduce pressure as much as practical on lines where gas is or could be escaping.

WHILE Excavating:

1) Use vent pipe or other equipment to redirect escaping gas away from the gas leak.
2) Where there is escaping gas, wear gloves and goggles and any personal protective equipment appropriate for the situation. Wear a respirator along with a rescue harness and life line if there is apparent hazard due to escaping gas. If there is any doubt whether a hazardous condition exists, wear a breathing apparatus and a rescue harness and line. Also wear flame retardant coveralls and gloves.
3) For each employee wearing a breathing apparatus and rescue harness, another employee will assist at grade level and attend the life line, also wearing a respirator.
4) Install shoring as required.
5) No employee shall be in the trench within 8 feet of a trenching chain, backhoe bucket or digging wheel while in operation.
6) No employee shall approach a trench bank where a slip or a cave-in might carry them into the digging machine.

1.3.2 ENTERING AND EXITING EXCAVATIONS

Employees may not jump into the excavation or use the pipe to climb out of an excavation.

When workers are in excavations 4 feet deep or more, provide ladders extending from the floor of the excavation to at least 3 feet above grade, OR ensure the banks are sloped or stepped so the workers may walk out.

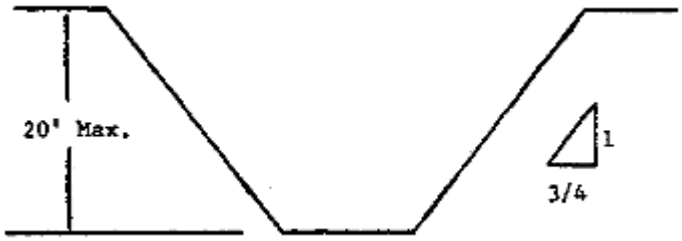
The maximum travel distance to an exit or ladder cannot exceed 25 feet.

1.3.3 SLOPING - TRENCHES 5 FEET OR DEEPER

In any trench or excavation, 5 feet deep or deeper where personnel work, slope as directed in figures below. Excavated material shall be placed no closer

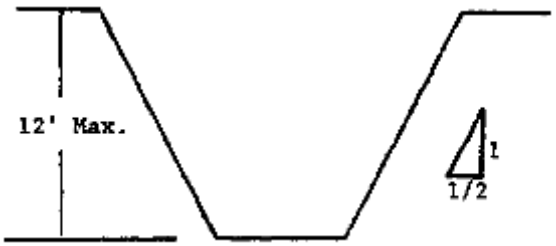
than 2 feet to the edge of the excavation.

All simple slope excavation 20 feet or less in depth shall have a maximum allowable slope of ¾-to-1.



SIMPLE SLOPE - General

Short Term exception: Simple slope excavations which are open 24 hours or less and which are 12 feet or less in depth may have a maximum allowable slope of ½-to-1.



SIMPLE SLOPE – Short Term

1.3.4 TRENCH SHORING

In trenches or excavations deeper than 5ft, provide shoring protection as shown in the OSHA table:

TIMBER TRENCH SHORING -- MINIMUM TIMBER REQUIREMENTS *

SOIL TYPE A P_a = 25 X H + 72 psf (2 ft Surcharge)

DEPTH OF TRENCH (FEET)	SIZE (ACTUAL) AND SPACING OF MEMBERS **													
	CROSS BRACES						WALES		UPRIGHTS					
	HORIZ. SPACING (FEET)	WIDTH OF TRENCH (FEET)					VERT. SPACING (FEET)	SIZE (IN)	VERT. SPACING (FEET)	MAXIMUM ALLOWABLE HORIZONTAL SPACING (FEET)				
		UP TO 4	UP TO 6	UP TO 9	UP TO 12	UP TO 15				CLOSE	4	5	6	8
5 TO 10	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				2X6	
	UP TO 8	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---					2X8
	UP TO 10	4X6	4X6	4X6	6X6	6X6	4	8X8	4			2X6		
	UP TO 12	4X6	4X6	6X6	6X6	6X6	4	8X8	4				2X6	
10 TO 15	UP TO 6	4X4	4X4	4X6	6X6	6X6	4	Not Req'd	---				3X8	
	UP TO 8	4X6	4X6	6X6	6X6	6X6	4	8X8	4		2X6			
	UP TO 10	6X6	6X5	6X6	6X8	6X8	4	8X10	4			2X6		
	UP TO 12	6X6	6X6	6X6	6X8	6X8	4	10X10	4				3X8	
15 TO 20	UP TO 6	6X6	6X6	6X6	6X8	6X8	4	6X8	4	3X6				
	UP TO 8	6X6	6X6	6X6	6X8	6X8	4	8X8	4	3X6				
	UP TO 10	8X8	8X8	8X8	8X8	8X10	4	8X10	4	3X6				
	UP TO 12	8X8	8X8	8X8	8X8	8X10	4	10X10	4	3X6				
OVER 20	SEE NOTE 1													

* Mixed oak or equivalent with a bending strength not less than 850 psi.
** Manufactured members of equivalent strength may by substituted for wood.

1.3.5 TRENCH EXITS

In trenches or excavations 4ft or deeper, provide exit steps or ladders within 25ft of working personnel.

1.4 Temporary Bridges And Backfilling

Road Crossings. Where the pipeline ditches crosses public road or private roads or drives, the Contractor shall install adequate, temporary bridges the full width of the road to ensure safety of traffic over the ditch until the pipe can be installed and properly backfilled. Where necessary, the Contractor shall provide stock crossing for property owners or tenants or for moving equipment from one location to another.

1.5 Operations During Inclement Weather

In order to protect the owners rights-of-way and the interest of other adjacent to said rights-of-way against undue damage, work shall not be carried on during inclement weather or other conditions which in the opinion of the inspector would damage said rights-of-way or property of others. When so advised or requested by the inspector, the Contractor shall cease operations until the inclement conditions have ceased or improve.

1.6 Unloading, Storing, Hauling And Stringing Steel Pipe

~~The Contractor shall deliver the pipe to a predetermined location. The Contractor shall notify the Owner of the expected delivery date of the pipe and the approximate rate of delivery. The Contractor shall be responsible for loading and delivering the pipe to the jobsite and stringing all pipes. In the event for any reason the pipe cannot be strung along the alignment when delivered to the site the Contractor, at his own expense, shall be responsible for unloading the pipe and stockpiling the pipe until such time that he may be able to string it along the alignment. The temporary storage of any pipe shall be at or near the job site. Any easement required for storage space shall be the responsibility of the Contractor.~~

~~The Contractor shall be responsible for the pipe after receipt and shall repair any damages to the pipe resulting from loading, unloading and hauling to the site of work. The unloading, hauling, stringing or storing shall be done in such a manner that the pipe will not be damaged. In no event shall the pipe be rolled or dropped from stringing trucks and care shall be taken not to damage the pipe insulation or distort the circular ends of the pipe.~~

1.6.1 POLYETHYLENE PIPE

Polyethylene (PE) pipe is a product which is able to withstand normal installation handling. However, rough handling can damage the pipe wall. Take care to avoid pushing or pulling the pipe over or around sharp projections. The pipe can be damaged by dropping it from excessive heights or dropping heavy objects upon it, particularly, during cold weather. Avoid kinking, scratching or buckling. Cut out any section of pipe which has been damaged in this manner (scratches over a depth of 10% of pipe wall thickness).

1.6.2 TRANSPORTING POLYETHYLENE PIPE

Shipping - Fork lift operators are to use caution when unloading or loading PE pipe to prevent damage of the pipe with the forks or tines of the lift truck. Coils of pipe are strapped or palletized for easy unloading or loading. When unloading or loading straight sections of pipe, allow for some bending in the middle of the lift. Position fork lift tines as far apart as possible to reduce the amount of bending. Roll pipe down inclined planks when unloading from a truck bed, to keep damage to a minimum. Do not drop pipe to the ground. Never drop the pipe onto hard pavements or rock terrain from truck beds. This is particularly important when unloading pipe at temperatures below 40°F. Under these conditions, the pipe is stiffer and easily damaged from impact.

When breaking down bulk backs or mini-bundles, take care to stand clear of the pipe while strapping is being cut.

1.6.3 STRINGING POLYETHYLENE PIPE

Reel trailers can be helpful when stringing coiled pipe out for direct burial, plant-in, or insertion renewal. When trenching, string coiled pipe out on the ground upon arrival at the job site. This allows time for the coil set to relax and will simplify handling and emplacement of the pipe.

When uncoiling pipe by hand, cut only those straps on the coil which are necessary to unroll outer coils. Cut internal bands whenever necessary as the coil is unrolled.

If silo packs are not to be re-handled and individual coils are used, cut the large steel bands which tie the silo pack to the pallet. If the pallet strapping has caused any deformation of pipe, removing the straps will allow deformed areas to return to normal shape. Any damaged sections of pipe 10% of wall thickness, must be cut out.

Inspect the pipe as it is being uncoiled and during installation to make sure no damage to the pipe during shipment and handling to the job site has occurred.

1.6.4 COLD WEATHER HANDLING

When handling polyethylene pipe at temperatures below 40°F, use extra caution to prevent impact to pipe. Always be careful when cutting the straps on coils of pipe because the outside end of a coil may spring out when the strapping is removed. Uncoil the pipe that is to be installed and let it straighten out prior to installation. This can be done by gradually uncoiling the pipe and covering it with dirt at intervals to keep it from coiling again.

1.6.5 MATERIAL STORAGE

Store all material in a manner that will prevent damage or deterioration. Store material with machined surfaces, valves, fittings and coating materials off the ground and out of the weather.

Store all plastic pipe and tubing in a manner to minimize damage from crushing, piercing or cutting. Protect all stored plastic pipe from direct sunlight.

Other precautions - When moving the pipe, continually support it in a way so as to minimize movement of the pipe on its supports. Do not carry supplies or equipment on top of plastic pipe. Avoid damage from sharp edges and other

projections. Protect the pipe from excessive heat. Be particularly careful of open flames. Do not place an open flame or torch across pipe surfaces.

1.7 Protection of Existing Utilities

It shall be the Contractor's responsibility to determine the locations of all known existing underground utilities not shown on the drawings and to confirm the exact locations of those existing utilities shown on the drawings. All existing utilities shall be protected from damages during excavation and backfilling of trenches and if damaged, shall be repaired at the expense of the Contractor.

1.8 Excavation

1.8.1 General

It is expected that all excavation required for the performance of the work shall be made by open cut methods unless otherwise shown on the drawings or as required by applicable encroachment permits.

1.8.2 Grading

All grading in the vicinity of the construction shall be controlled to prevent surface water from flowing into the excavation. Any water accumulated in the excavation shall be removed by pumping or other approved methods at the contractor’s expense. During excavation, material suitable for embedment and backfilling shall be piled in an orderly manner a sufficient distance back from the edges of the bank to avoid overloading and to prevent slides or cave-ins. Material unsuitable for backfilling shall be hauled from the job site and disposed of by the Contractor at approved disposal sites.

1.8.3 Pavement Cutting

Where it is necessary to remove sections of asphalt pavement, the asphalt shall be clean-cut with approved equipment in a neat line 6-inches back from the outside edge of the excavation in order to provide a key when restored.

Where it is necessary to remove sections of concrete pavement, the concrete shall be saw-cut to a depth of not less than 1-1/2-inches with neat vertical lines in such a manner that the adjoining surfaces will not be damaged.

Whenever it is necessary to remove concrete or pavement, the broken surface materials shall be hauled away for disposal. Asphalt and concrete chunks cannot be placed in the ditch as backfill.

1.8.4 Excavation For Steel Pipe

~~Alignment of the pipeline shall be staked by the Owner, unless other arrangements are specified. The Contractor shall clear the rights-of-way and dig the ditch along the staked alignment. Ditching operations shall be kept ahead of welding and laying operations.~~

~~The ditch shall be finished to a minimum width of eighteen inches (18") and to sufficient depth to provide a minimum cover of forty-two inches (42") over the pipe (to top of pipe) or to the covers as indicated on the drawings. At locations where the ditch crosses roads, streets, highways, ditches, arroyos or other drainage depressions and at points where the contour of the earth may require greater depths to eliminate unnecessary bending of the pipe, the Contractor shall excavate to allow for a minimum cover of five feet (5'). In following the contour of the ground along the alignment, bends in the pipe will be kept to minimum by cutting the ditch deeper at the crest of hills and approaches to road crossing and arroyos. Unnecessary bending of the pipe shall be eliminated by operating the ditching machine at various depths at such locations in lieu of finish grading the ditch bottom where practicable.The finished ditch shall be free of loose rock or hard clods of earth, which could injure or damage the pipe coating when lowering the pipe into the ditch.~~

~~All road and highway crossings shall be made in accordance with the requirements of the respective public authority having jurisdiction over the same and also to the satisfaction of the inspector. Crossings that are paved or have hard surfaced highways generally shall be bored.~~
~~The Contractor shall be responsible for keeping the ditch in good condition until final in-place bedding of the pipe. No claims shall be made against the owner for cribbing, bracing or the use of other materials required to prevent caving of ditch banks. If bank caving occurs while lowering the pipe into the ditch in such a manner as to result in improper bedding of the pipe, or reduce the cover to minimum of less than forty-two inches (42"), the Contractor shall re-excavate the ditch and clean around the pipe until the desired condition is obtained to the satisfaction of the inspector.~~

1.8.5 Protection of Excavations

The Contractor shall provide suitable sheathing, shoring and bracing to protect all excavations as required, and provide safe working conditions, as directed by the Owner and in conformance with applicable OSHA, and all other safety regulations. Damages resulting from settlements, slides, cave-ins, flooding, pipeline breaks, and other causes shall be repaired by the Contractor at his expense. Suitable signs shall be so placed as to show in advance where construction, barricades, or detours exists.

The Contractor shall at all times perform his work so as to insure the least possible

obstruction to traffic, inconveniences to the general public and the residents in the vicinity of the work, and to insure the protection of persons and property in a manner satisfactory to the Owner. No road or street shall be closed to the public except with the permission of the proper authority. Fire hydrants on or adjacent to the work site shall be kept accessible to firefighting equipment at all times. Temporary provisions shall be made by the Contractor to insure the use of sidewalks, and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches.

1.8.6 Rock Excavation

~~If given special consideration, rock is considered to exist when excavation cannot be accomplished using a 790E John Deere Class track hoe with a rock bucket without stressing the machine. The Owner shall be the sole party in determining the existence of rock and the appropriate means of removal. The quantity of rock shall be determined in cubic yards of material removed. All other trenching and excavations, regardless of materials encountered, equipment used, or methods required for excavation, will be unclassified.~~

1.8.7 Excavation for Structures

~~Excavation for items such as sewer lines, valves, waterlines, steam tunnels, culverts, subterranean form work, and other structures shall be to the necessary depth and sufficient width to leave at least 12-inches of space between the structure's outer surface and the embankment or shoring used to stabilize the banks.~~

1.8.8 Over-Excavation

Whenever solid or loose rock, rocky soil with rocks larger than three inches in their largest dimension, or otherwise unsuitable soils which are incapable of properly supporting the pipe or structure are encountered in the trench bottom, all unsuitable material, as determined by the Owner, shall be over-excavated to a minimum depth of 6-inches below the pipe or structure and removed.

Except at locations where over-excavation is required, care shall be taken not to excavate below the depths indicated. In the event of accidental over-excavation, the trench bottom grade will be restored in the same manner as areas intentionally over-excavated.

1.8.9 Trench Excavation

Make the trench wide enough so that the pipe coating will not be damaged, pipe will not be bent, and there is room for backfill around the pipe. Make the trench uniform in grade with the bottom corners crumbed-out. This provides the full

ditch width for slack in the pipeline. Be sure that the trench bottom is free of rock, cinders, aggregate, welding rod, wood blocks and other debris. Remove and pile spoil from the trench in a manner that will minimize land owner or public inconvenience and complaints. Avoid covering manhole covers, fire hydrants, mail boxes, etc., with trench spoil. Cut and store sod from established grass so it may be re-laid after construction area is restored to final grade.

For lines larger than 2-inch, or for special conditions, the trenching width shall be as stated on the plans. The trench width above the level of the top of the pipe may be as wide as necessary for shoring or sheathing and for proper installation of the work.

The depth of all trenches shall be as indicated on the drawings. If not otherwise specified, the depth of all trenches shall be in accordance with the specifications for the installation of natural gas line.

Unless otherwise required by applicable permits to be less, the maximum length of trench that may be left open at any one time shall not exceed 100 feet.

In distribution systems where trenching across streets, lay temporary bridging across the trench to accommodate vehicles.

Excavate by hand those locations where trees, shrubbery or valuable plants are encountered or where the use of trenching equipment will result in unnecessary damage to the property crossed.

TRENCH DIMENSIONS

Trench dimensions shall be as noted on Plans.

~~Unless otherwise specified by a controlling road authority or construction specifications, dig the trench for pipelines, mains and service lines to the depth and width specified in the following tables. Minimum cover dimensions are from the top of the pipe to the top of the finished grade.~~

~~TRANSMISSION PIPELINES~~

~~Class Location~~	~~Normal~~	~~Rock~~
~~Class 1~~	~~30"~~	~~18"~~
~~Class 2-3-4~~	~~36"~~	~~24"~~
~~Roads, RR, ROW ditches~~	~~36"~~	~~24"~~

~~**DISTRIBUTION MAINS**~~

~~O.D. Pipe~~	~~Min Width~~	~~Normal Cover*~~	~~Rock~~
~~< 2-inch~~	~~3”~~	~~30”~~	~~24”~~
~~2 to 4-inch~~	~~8”~~	~~30”~~	~~24"~~
~~6-inch~~	~~12”~~	~~30”~~	~~24”~~
~~8-inch~~	~~18”~~	~~30”~~	~~24”~~

~~* DOT requires mains to have a minimum of 24" cover in normal conditions, and 18” in rock. These utility specs allow for 6” additional clearance for top-mounted tapping tees and service lines, and can be relaxed if necessary where no service lines exist.~~

~~**SERVICE LINES**~~

O.D. Pipe	Min Width	Normal	Rock
4"	8"	24" *	18"
2 to 3"	8"	18-24" *	18"
< 2"	3"	18-24" *	18"

~~* DOT requires service lines within the boundaries of public right-of-way such as a street or alley, whether paralleled or under-crossed, to have a minimum of 18" cover. The preferred depth is 30” if feasible.~~

~~Service lines in private property must be 12” deep per DOT, but the Utility prefers at least 18” of cover.~~

1.9 Placement and Compaction of Pipe Embedment and Backfill Material

1.9.1 Pipe Embedment

Pipe embedment is defined as that material required to bring the trench bottom up to grade and that material placed alongside and above the pipe to a level of at least 6-inches over the top of the pipe. Pipe embedment shall be selected earth or sand, which contains no stones, dry or frozen lumps greater than 3/4-inch in diameter, or other unsuitable material as defined by the Owner. Embedment and the first 6-inches of backfill above the top of the pipe in rock excavation shall be done in the presence of the Owner. Any backfilling, done in violation of this provision shall be cause for removal and replacement at the expense of the Contractor even though the work is found to be in accordance with these specifications.

Bedding: Bedding is that portion of pipe embedment zone beneath the pipe. If the native soil is suitable for bedding, the bottom of the trench shall be accurately shaped to provide uniform bearing and support for the entire length of the pipe.

Imported bedding material shall likewise be placed to provide uniform and adequate longitudinal support under the pipe. Bedding material shall be placed and compacted in lifts not to exceed 6-inches in loose measure.

Haunching: Haunching is that portion of the pipe embedment zone from the bottom of the pipe to the springline of the pipe. Haunching material shall be placed and hand tamped to provide adequate side support to the pipe while avoiding both vertical and lateral displacement of the pipe from proper alignment.

Initial Backfill: Initial backfill is that portion of the pipe embedment zone from the springline of the pipe to a minimum level of 6-inches above the top of the pipe. Initial backfill material shall be placed and compacted in lifts not to exceed 6-inches in loose measure. Compaction shall be performed in such a manner so as to avoid damage and disturbance of the embedded pipe.

Final Backfill: Final backfill is defined as that material used in the area between the Initial Backfill and the existing ground surface. Material shall be placed and compacted in lifts not to exceed 6-inches in loose measure except as otherwise specified.

1.9.2 COVER

~~Install all buried piping with a minimum cover of 30" for pipeline or mains (24" in trenched rock) and 18" for service lines in customer yards or lawns. (See Excavation section.)~~

Where an underground structure prevents the installation of pipe with minimum cover, provide a casing, bridge or shield to prevent damage to the pipe.

1.9.3 BACKFILLING

After the pipe has been lowered in the trench but prior to backfilling, inspect and remove all welding rod, skids, brush, rocks or any other debris in the trench.

After the lowered pipe in the trench has been inspected and after all coating damage has been repaired and tested, backfill the trench to prevent floating of the pipe, in the event water enters the trench. Conduct the backfill operation so that a minimum amount of trench remains open at any one time.

Backfill material adjacent to the pipe and up to six inches above the pipe shall be of suitable dirt free from rocks, hard clods, cinders and other types of debris. Take precaution in placing and packing the initial backfill so the pipe coating and fittings beneath will not be damaged. If the soil removed from the trench is not suitable for backfill, sand shall be used to bed the pipe up to six inches above

the top of the pipe. Rockshield 3/16" minimum thickness may be substituted when suitable backfill is not available.

1.9.4 TAMPING

Machine tamp backfill at all locations required by ordinances, permit specifications or at locations determined by the inspector. Exercise care near the pipe so that the coating and fittings will not be damaged by the tamping operation.

1.9.5 SETTLEMENT PRECAUTIONS

Where the pipe is trenched across roads, backfill the part which crosses the road as soon as possible after the pipe is laid. Backfill these crossing in six inch layers and machine tamp each layer to the equivalent compaction of the adjacent undisturbed soil, or to the specifications by the permit.

1.9.6 CROWN

Scrape and crown all loose dirt in the construction area up over the trench in a straight line as far as practical.

1.9.7 PLASTIC PIPE BACKFILLING PRECAUTIONS

Earth loading, except where settling causes bending stress, should not excessively stress PE or PVC pipe in normal installations. Ways to prevent stress are:

1) Join pipe to fittings in straight lines to prevent excessive bending.

2) Grade and backfill evenly to prevent uneven settlement.

3) The use of protective sleeves and proper compaction techniques for service branches and transition fittings. Material six inches around the top and bottom of the pipe shall be free of all biodegradable items, rocks cinders, ½" in diameter or larger dirt clods. Tamp backfill material beneath and around all service connections, fusions or fittings. Complete backfill in connections, fusions, or fittings. Complete backfill in successive layers to uniformly fill the trench without voids.

1.9.8 Compaction Requirements

Unless otherwise specified by permit issued by the roadway authority or by special arrangement between the Operating Utility and the Owner, bedding, haunching, initial backfill, final backfill, and gravel resurfacing shall be compacted to the following percentages of maximum density as determined by ASTM D 1557 (If using Standard Proctor ASTM D 698, add 5% to all compaction

requirements listed in the table below). In-place densities of materials shall be determined by the sand-cone method, ASTM D 1557 or by nuclear method, ASTM D 2922.

Percent of Maximum Density – D1557

Backfill Location	Bedding Backfill	Haunching Backfill	Initial Backfill	Final Backfill
Roadway Rights-of-Way Within Roadway Prism	95% *	95%	95%	95%
Roadway Rights-of-Way Outside of Roadway Prism	90% *	90%	90%	95%
All Other Conditions	85%	85%	85%	85%

*or the existing conditions within the undisturbed bottom of the trench.

1.10 Imported Backfill

1.10.1 Imported Pipe Embedment

If the native soil is unsuitable, the Contractor shall import suitable pipe embedment material. Pipe embedment shall be select earth or sand which contains no stones, dry lumps, or frozen lumps greater than 3/4-inches in diameter and shall be defined as 100% passing 3/4-inches, 40-99% passing # 4 sieve and 30% or less passing #200 sieve. Unsuitable material is defined as solid or loose rock, soils with rocks larger than 3/4-inches in their largest dimension, or other unsuitable soils which are, as determined by the Owner, incapable of properly supporting the pipe

1.10.2 Imported Final Backfill

If the native soil is unsuitable for use as final backfill, the Contractor shall import suitable final backfill. Imported final backfill may be any material, which is locally available and is capable of being compacted to the required density. This material shall be free of boulders and rocks larger than 6-inches in their smallest dimension, frozen clumps of dirt, organic material, or rubble, which could damage the pipe.

1.11 Bedding and Backfill for Structures

1.11.1 Bedding

~~Bedding material for structures is defined as that material beneath the structure. This material shall be as specified in the standard detail for each structure.~~

1.11.2 Backfill

~~All backfill must meet compaction requirements. The material and the required compaction of such shall be the same as that specified for in the final backfill on pipelines, or as specified in the drawings.~~

1.12 Settlement of Adjacent Structures

Throughout the warranty period of the contract, the Contractor shall be required to fill and compact any areas where settlement has taken place and shall also be responsible for the settlement of any adjacent structure or object caused by any excavation performed under his contract.

1.13 Surface Restoration and Resurfacing

1.13.1 Surface Restoration

Replace the cut or damaged areas of all paved or asphalt surfaced areas in a manner approved or specified by the authority having jurisdictional; included are streets, highways, alleys, driveways, sidewalks and any other hard surface under-crossings.

Resurface graded dirt, gravel or crushed rock road crossings to their original condition and in an approved or specified manner by the authority having jurisdiction.

Where the pipeline crosses farming or ranching areas, level out the backfill so the difference in surface elevation between the top of the backfill and the normal surface of the ground does not exceed 12 inches. Make an opening in the crowned backfill to permit drainage and prevent the damming water.

After construction, restore all roads, hillsides, creek banks, levees and other areas to the original condition or profile, unless other arrangements are agreed to by both the land owner or the authority having jurisdiction and the company.

Protect backfill area from erosion. Where erosion is possible, construct dams or dikes with earth-filled sacks and seed construction area with rye grass or other quick growing grasses.

Restore surface drainage into the original channels it followed prior to construction.

1.13.2 Clean Up

Keep the right-of-way skids, defective materials, and all other construction debris immediately behind the operation.

Scrape and crown up all loose dirt on the right-of-way over the ditch in a straight line as far as practical rust.

1.13.3 Roadway Patching

Whenever existing roadways are disturbed during the course of construction, the
Contractor shall restore the roads to their original condition.

For ease of compaction, the Contractor may use well graded gravel, crushed stone, or flow-able fill from a Ready Mix plant as backfill as approved by the roadway agency. For final backfill, the material shall be clean, vary in size from 3/8-inches to 1-1/4-inches with not more than 10 percent of the material less than 3/8-inches in size and shall be compacted in 6-inch layers or as directed by the Owner. Flowable fill is defined as one bag concrete, with gradations of 100% passing the 3/8 sieve, and less than 25% passing the #200 sieve. The slump should be between 5” and 8”, and the 28 day strength should be between 50 psi and 150 psi.

Surfacing shall be replaced where the roadway has gravel, crushed stone, asphalted, or concrete surfacing. Gravel or crushed stone shall be replaced in quantities and locations as directed by the Owner, or as required by the roadway permitting authority. Asphalt mix or concrete surfacing shall be replaced, and in the case of asphalt, appropriately compacted (e.g., tamped) in the roadway to a depth equal to existing roadway surface but not less than 2-inches in asphalt or 6-inches in concrete. A compacted stabilized gravel or crushed stone base 6-inches in depth shall be placed in the roadway at all locations where surfacing is required prior to placement of the bituminous or concrete wear course, unless other requirements are stipulated by the roadway authority.

The Contractor shall obtain any and all necessary written permissions, easements, and permits from federal, state, and county agencies prior to beginning any roadway excavation.

TECHNICAL PROVISIONS

TP 2.0 NATURAL GAS LINE SEPARATION REQUIREMENTS

2.1 General

The requirements are to be followed to provide safety by separation of utilities and use of special piping materials. All measurements shall be the clearance between pipes (pipe O.D. to pipe O.D.).

2.2 CROSSING UTILITIES OR UNDERGROUND STRUCTURES

These guidelines apply to new crossings, whether installed by the gas Utility or another entity across gas utility structures.

In most cases, the new line will cross *under* the existing facility, unless the existing structure is known to be deep enough to allow adequate clearance and depth of cover for the new line. Close coordination with the other entity is usually required.

Wherever practical, the existing pipeline, electric or phone cable, water-sewer line, culvert or other structure should be exposed before the new crossing is made. Exposure should be done by hand digging the last 18-24" near utility locate marks, or vacuum-based daylighting or similar equipment.

A gas utility representative *must* be present when directional drilling to cross gas facilities, and the targeted crossing is within 36" of the estimated location of the gas facility. Post-construction leak survey may be required.

Minimum clearance of 12 inches *or one pipe diameter*, whichever is greater, is required between the pipe being installed and the facilities being crossed. If this separation is not possible due to crowded conditions, then a permanent separator shall be inserted between the structures to prevent contact from settling or ground movement. Such separator shall be designed to avoid damage or undue stress to PE pipe or pipe coating, and shall be made of plastic or treated wood to ensure long life.

2.3 Vertical Separation of Natural Gas Lines and Other Utilities

2.03.01 Gas Above All Utilities

When gas lines cross other utilities, the gas line shall cross above all utilities, with a minimum vertical separation of 12 inches. If necessary, the depth of the gas line may be reduce to meet a 12 inch vertical separation, but must not be less than

24 inches for mains or 18 inches for services, measured from top of pipe to grade. When a minimum of 24 inches for the mains and 18 inches for the services cannot be met, then the gas line must cross below the utility in question. This will be permitted only at the concurrence of Frontier Gas or its Representative. When the 12 inch vertical separation cannot be met, a compacted soil or concrete barrier will be used or other methods approved by Frontier Gas or its Representative. **NOTE: For electric and gas line crossings, if the vertical separation is less than 18 inches, the contractor shall place a 4-inch thick by 3-foot square concrete slab between the centerlines of the crossing utilities.**

2.4 Gas Line Separation from Manholes

No gas pipe shall pass through, under, or come into contact with any part of a sewer manhole.

2.5 Gas Line Separation Within 5 feet of a Structure

This section shall apply to that portion of gas service lines located within five feet of the house. For new construction, all service lines shall have a 5 feet minimum horizontal separation. The service lines can be laid closer than 5 feet, if the bottom of the gas service line is at least 12-inches above the top of the sewer or water service line with no joints until the separation requirement is met**. Gas service lines and meter risers shall not be placed under or within 3 horizontal feet of doors or windows that may be opened, and any vents or other opening into the building, and shall meet the National Plumbing Code, and National Electric Code.**

2.6 Separations Between Gas Lines and Components of the Sewage Disposal System

Gas lines shall not be installed within 10 feet of a septic tank, within 25 feet of a drain field, or 20 feet from an outhouse. Also, gas lines shall not be installed within 50 feet of the perimeter fence of an **individual** lagoon, or within 100 feet of the perimeter fence of a **community** lagoon.

TECHNICAL PROVISIONS

TP 3.0 GAS MAINS, GAS SERVICE LINES, AND APPURTENANCES

3.1 Scope of Work

The work covered by this section includes the furnishing of all plant, labor, tools, equipment, and material; performing all operations in connection with the construction of gas mains, including the placing of all necessary valves, fittings, and appurtenances, and the construction of gas service lines, including saddles tap tees, valves, risers, gas stops, gas meters, and appurtenances, in accordance with these technical provisions and applicable drawings.

3.2 Gas Mains

3.2.1 General

This section covers the requirements for polyethylene and steel pipes and fittings for underground gas distribution systems. The piping construction shall be performed in accordance with engineered construction plans provided by the Owner. Pipe, fittings and the installation shall meet the applicable requirements of the U.S. Department of Transportation, Pipeline Safety Regulations, Title 49, Code of Federal Regulations, Part 192.

All work shall be inspected by an Authorized Representative of the Owner who shall have the authority to halt construction if, in his opinion, these specification of standard construction practices are not being followed. Whenever any portion of this technical provision is violated, the Owner shall by written notice order further construction to cease until all deficiencies are corrected.

3.2.2 Polyethylene (PE) Pipe and Fittings

Materials used for the manufacture of polyethylene pipe and fusible fittings shall be ASTM D 2513 Gas PE 2406/2708 Yellow IPS medium-density polyethylene compound, meeting cell classification numbers 345464C for black and 345464E for stripes, and 345564C for yellow pipe per ASTM D 3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

The polyethylene pipe shall be manufactured and tested in accordance with the latest published edition of ASTM D 2513, specification "Thermoplastic Gas Pressure Pipe, Tubing and Fittings, ASTM D 2683 specification, "Socket-type Polyethylene Fittings for outside Diameter-Controlled Polyethylene Pipe", ASTM D 3261, "Butt Fusion Polyethylene

(PE) Plastic Fittings for Polyethylene", Plastic Pipe and Fittings, and to the U.S. Department of Transportation Title 49, Part 192, "Transportation of Natural and or Other Gas by Pipeline - Minimum Safety Regulations". The same manufacturer shall supply polyethylene pipe and heat fusion fittings. Pipe and fittings from different manufacturers shall not be interchanged.

The pipe shall be the four equally spaced longitudinal yellow stripes extruded into the pipe OD or the yellow pipe highly visible identification of gas service and in compliance with APWA/ULCC standards for color-coding of gas distribution lines. The pipe shall be equal to Performance Yellowstripe® 8300, SDR 11. The designation PE 3408 and indication of pipe size, material, manufacture, pressure rating, and temperature rating, and as appropriate, type and grade shall be stamped or die-marked on the pipe. The die stamp must have a blunt or rounded edge that will minimize stress concentration.

All fittings for 4 inch and above Polyethylene shall be butt-fusion; no mechanical fittings will be accepted.

The polyethylene pipe maximum allowable operating pressure (MAOP) may not exceed 100 psig for plastic pipe used in distribution systems. The following table shows the typical data represented by Performance pipes. All dimensions are Iron Pipe Size (IPS) with the Standard Dimensions Ratio (SDR) equal to 11.

Nominal Size (in.)	**Outside Diameter** (in.)	**Minimum Wall** (in.)	**Inside Diameter** (in.)	**MAOP** (psig per CFR Part 192 @ 100 F or less)
1	1.315	0.120	1.075	100
2	2.375	0.216	1.943	100
3	3.5	0.318	2.825	100
4	4.5	0.409	3.682	100

All joints are to be mechanically joined, socket fusion, and or butt fusion as specified by the manufactures' procedures in accordance with ASTM D 2513, Category 1, Joining, and the requirements of the Owner.

The installation of all polyethylene pipes must provide enough flexibility to allow for expansion and contraction of the material with temperature changes. It is desirable to slightly snake the pipe in the trench prior to trimming and joining adjacent sections.

Plastic pipe with scratches, gouges, or grooves deeper than one-tenth (0.10) the wall thickness on the OD of the pipe shall be rejected. Localized pipe

damage may be cut out and the undamaged portion of the pipe may be used with the approval of the Owner. The damaged sections of pipe shall be completely destroyed or immediately removed from the job site.

3.2.3 PLASTIC PIPE INSTALLATION- (POLYETHYLENE)

Join PE pipe above grade or in the ditch as the situation dictates. Plan joining in the ditch to insure that you have enough space for proper alignment. Avoid bucking, gouging, and other damage when lowering into the ditch. Lay the pipe so that there are no bends with a radius less than 20 times the pipe diameter and no fusions within 3 feet of anybend.

Align all pipe and fitting fusions straight and flat. Install and tape protective sleeves at all service branches and transition fittings to protect against bending and shear forces. Extremely cold weather makes polyethylene pipe more stiff and increases the likelihood of impact failure. Federal standards require that the installation of polyethylene be far enough away from steam lines, hot water lines, power lines and other sources of heat to avoid temperatures in excess of 140°F. Generally, a 12 inch separation is enough.

Because PE pipe contracts as it cools, snake the pipe in the bottom of the trench. This provides "slack" for the pipeline to cool and contract in the ditch prior to backfilling.

Note: Make final tie-ins or branch connections in the early morning, if possible. At this time, the pipe is cool and has contracted due to the cooler night temperatures. Early morning connections will help minimize stress due to contraction.

3.2.4 CONTROL OF STATIC ELECTRICITY ON PLASTIC PIPE

Static electrical charges develop by friction on the surface of plastic pipe in two ways:

- □ By physical handling of the pipe in storage, shipping and installation.
- □ By the flow of gas containing dust, rust, scale or dirt particles. Static charges present a serious hazard during hot-tapping, purging, tie-in operations and leak repair on plastic pipe because they are proven sources of ignition. The voltage generated by this friction can reach levels in excess of 10,000 volts. This is more than enough current to cause gas to ignite.

Before attempting repair on plastic pipe, remove the static charge "voltage" and shut off the blowing gas. Do this in the following manner.

1) Dig a safe work area 5-15 feet upstream of the blowing gas. If the system is fed from both directions, dig a safe work area 5-15 feet on both sides of the leak.

2) Shut off the flow of gas by placing squeeze off tools on the pipe in the work area(s).

3) When the gas has stopped blowing, determine if the area is safe to work in by taking a CGI reading. If the area is not safe to enter, ventilate to a safe working atmosphere.

4) Wet down the pipe in the leak area with a mixture of water and biodegradable soap (mix one ounce soap to one gallon of water).

5) After wetting down the pipe, wet down the work area (ground). When wetting down the pipe and ground area, start at the outside edges of the leak area and move toward the leak.

6) Wrap one end of a cotton rag, burlap cloth or a ground kit (see Purchasing) around the pipe (on both sides of the leak) and allow the other end to contact the ground. During the repair, keep the material wet and in contact with both the pipe and the ground at all times.

7) When the repair is complete, wash off the soapy water with clean water.
Soap can have a bad, long term effect if left on the plastic pipe.

During cold weather, add an ethylene glycol antifreeze to the soap mixture to keep it from freezing. Be sure you wash this off of the plastic pipe when you are through. For additional information, see Section 2: Safety.

3.2.5 INSTALLATION OF LOCATING WIRE

To locate plastic pipe with the use of electronic pipe locator, install no smaller than
#12AWG copper wire with direct-bury insulation along the pipe. Locating wire should be 6" above top of pipe. The separation is necessary to avoid damage to the pipe in the event that the wire is heated by contact with an electrical circuit or struck by lightning.

When pulling a pipe under a bored crossing, tie and tape the wire to the end of the main so it will follow the pipe. This is the only time the wire is permitted to be in direct contact with the main.

Outside the bore, maintain 6" separation of the locating wire and pipe. Make all locator wire splices with splice capsules, bolt- or crimp-type connectors, or resin core solder. Coat the connection with a dielectric sealant, cold-seal butyl tape or equivalent. These connections prevent the loss of continuity due to corrosion on the surface of the wire.

Extend the locator wire above ground at each meter riser or at specially located junction boxes to provide connection for pipe locating instruments. Where location wire is extended above ground level at meter sets, place the wire in back of the meter bar post and tape it in place. (An alternative would be to tape the end of the wire in back of the service valve.)

When renewing steel mains and services by insertion, cadweld No. 12 insulated locating wire to steel pipe on both sides of a void, then to old steel service and from old steel service bring wire above ground at the meter riser.

A 1 lb. bare magnesium anode can be attached at the end of the locator wire at each main stub end to facilitate pipe locator operation.

3.2.6 CHANGES IN DIRECTION of PE PIPE

Avoid excessive bending in polyethylene piping systems, particularly at joints. Poor pipe laying and backfilling procedures increase the potential for failure and can result in bending stresses which exceed the material strength. Where pipe end section includes a butt fusion joint, the radius (R) is not to be less than 125 times the pipe diameter. Where pipe bend section does not include a fusion joint, the bend radius (R) may be a minimum of 20 times the pipe diameter.

Pipe Size	Min. 90° Radius 'A' with joint	Min. 90° Radius 'B' no joint
3/4" NPS	10.9 ft	1.8 ft
1" NPS	13.8 ft	2.2 ft
1.25" NPS	17.5 ft	2.8 ft
2" NPS	26.2 ft	4.2 ft
3" NPS	36.2 ft	5.8 ft
4" NPS	46.9 ft	7.5 ft
6" NPS	67.5 ft	11 ft

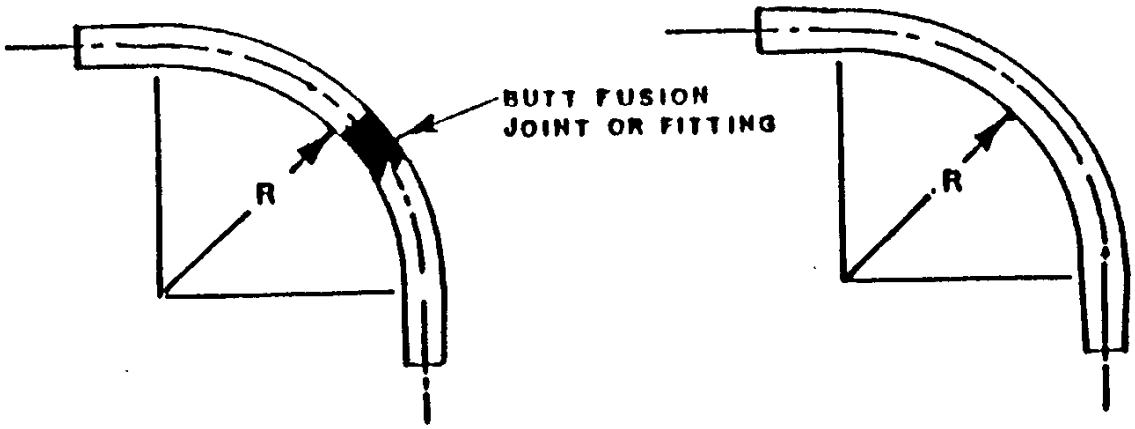


Figure A

Figure B

Fittings for tight spaces – where changes of direction are needed in shorter distances than allowed above, use butt fused fittings available in 45° or 90° angle bends.

3.2.7 Joining of polyethylene pipes

To produce strong gastight joints, written procedures for butt fusion, socket fusion, and Permanent mechanical joining of polyethylene pipe and fittings for underground gas distribution systems shall be observed by following the manufacturer's instructions for installation. All joining shall be made according to procedures that have been qualified and approved by the Utility and in accordance with Title 49, CFR, Part 192, §192.273 (b), §192.283 (a) and §192.285 (a) **also 192.281 and 192.287**.

All persons making heat fusion joints or making inspections shall be qualified to make joints in reference to an approved qualified fusion procedures, by means of an Operator Qualification process through the state of Kentucky. Each operator must be annually qualified by taking the written tests and with hands- on training required by Operator's Qualification. Records of qualified personnel and certification of qualification training received not more than 12 months shall be maintained before commencing construction. The Contractor shall ensure that all persons making heat fusion are qualified in accordance with this section.

This section provides the Utility's qualified procedures for making heat fusion joints on plastic polyethylene (PE) pipe.

Butt fusion is the preferred method to join 2-inch and larger pipe. Electrofusion (EF) is the preferred method for joining pipe or tubing smaller than 2-inch, and for installing tapping and high-volume tees.

Socket and side-saddle tee fusions made with a heating iron are not approved under *any* conditions.

3.2.7.1 QUALIFIED JOINING PROCEDURES

The utility has adopted the Qualified Pipe Joining Procedures and Procedures for Qualification of Pipe Joiners of the Plastics Pipe Institute (*www.plasticpipe.org*). Manufacturer bulletins describing these procedures are available online. A procedures bulletin for one of the largest PE pipe manufacturers is included as a part of this Section.

3.2.7.2 QUALIFICATION OF PIPE JOINERS – BUTT FUSION

Individuals involved with installing PE pipe shall be trained and qualified to use the approved equipment and installation procedures for butt fusion of PE pipe. The candidate for PE pipe joiner qualification shall complete adequate training, and under the guidance of a qualified inspector shall fabricate test assemblies for each type of PE pipe in use by the Utility. The assemblies shall be fabricated and tested in accordance with the pipe manufacturer's procedures.

The proficiency of qualified personnel shall be reviewed annually. A person must be re- qualified, if during any 12 month period that person does not make any joints under that procedure or has 3 joints or 3% of the joints made, whichever is greater, found to be unacceptable by testing under 4 9 CF R Part 192.513. A person shall remain qualified provided satisfactory field joints for each fusion method made by that person have been evaluated by qualified inspectors at intervals of not more than twelve months.

3.2.7.3 RE-TEST

If a person fails to qualify, in the inspector’s opinion, due to conditions outside the control of the person, the inspector may correct the faulty conditions and give the person a second opportunity to qualify.

3.2.7.4 JOINER QUALIFICATION DOCUMENTATION

A record shall be kept of each person's qualification test and shall include the name, date, test results and record of qualification.

3.2.7.5 CONTRACTOR QUALIFICATIONS

When a contractor is installing or making repairs on PE pipe, each prospective PE joiner shall be qualified to make PE joints under the Utility procedures. Qualification can be done under the inspection of a utility inspector who has been qualified by appropriate training to evaluate the acceptability of PE pipe joints; or by another gas utility or authority acceptable to the Utility.

3.2.7.6 PE BUTT FUSION PROCEDURES

PE pipe butt fusion joints shall be made in accordance with the pipe manufacturer's qualified procedures.

PE butt fusion joints shall be made with equipment designed and manufactured for this purpose. Equipment includes a clamping device, a motorized pipe facing machine, and an electric heating iron.

Heating Irons are the critical link in butt fusion. General information for heating irons:

- Use only Frontier Gas-approved heating irons and heating iron faces.
- Heating irons are thermostatically controlled, electrically heated tools powered by 110 V AC power, used for making butt fusion connections.
- The coated heating iron faces must be kept clean to ensure sound connections. Use a soft wooden stick and a non-synthetic cloth to clean the heater faces. Do not use metal instruments such as knives, wire brushes, etc., because they will damage the Teflon-type coating. Carefully clean the heater faces after each use, including the vent holes. Use 99% isopropyl alcohol to clean all soiled surfaces.
- If the faces are damaged or their Teflon coating becomes contaminated with charred material, they may not be used to make fusions and must be cleaned, recoated, or replaced. Recoating of faces by unauthorized methods or using foreign substances on the faces is prohibited. To prevent damage, store the heating iron assemblies in bags or other appropriate containers.

□ Heating iron repairs, other than temperature adjustments, may only be made by an authorized repair facility.

□ A single heating iron will accommodate a variety of heating iron face sizes. Do not unbolt and change the faces while the iron is hot, do not over-tighten bolts.

□ The heating iron face temperature for all butt fusions shall be 500°F ± 10°F. Use a pyrometer or suitably accurate device to check the heating tool *surface* temperature before each use. Do not use temperature crayons or sticks. The heater gauge indicates *internal* temperature, not the external heater *surface* temperature.

□ Allow the heater and faces to stabilize at the proper temperature for at least 5 minutes before using.

□ To change the temperature setting of the heating iron: some have a simple adjustment knob to set the correct temperature. For others with an adjustment screw: unplug the heating iron while adjusting the temperature; turn the adjustment screw in the base of the heating head, clockwise to lower the temperature or counterclockwise to raise the temperature. Turning the adjustment screw 1/8 of a turn adjusts the setting approximately 10°F. (This estimate is only a guide - actual adjustment will vary.)

General procedure for butt fusion (may vary slightly by pipe manufacturer):

1) Cut the pipe so that the ends are square. Remove any burrs or shavings. Clamp the pipe into the butt fusion machine and adjust the pipe supports.

2) Open the butt fusion machine carriage and lock the facer into the machine. Ensure that the pipe is in contact with the facer and the carriage is in the open position before the jaws are closed and secured. Be sure the jaws are tight before proceeding.

3) Start the facing tool and, using light force on the carriage lever, advance the pipe ends into the facing blades. Continue advancing the pipe until the carriage travel stops and the facer motor speeds up. This indicates the carriage feed has stopped and the last cut has tapered off.

4) Stop the motor, retract the carriage, and remove the facing

tool. Remove the shavings with a clean rag or brush. Do not contaminate the ends of the pipe with dirt or oil from the hands or dirty gloves.

5) Close the carriage and check that the pipe ends are properly aligned. If the ends are not properly aligned or there are gaps large enough to slide writing paper into, reposition the pipe and repeat the facing procedure.

6) Ensure the heating iron temperature is correct and, with the carriage open, hang the iron in the machine between the pipe ends.

7) Close the carriage and, using light force, hold the pipe ends against the heating iron.

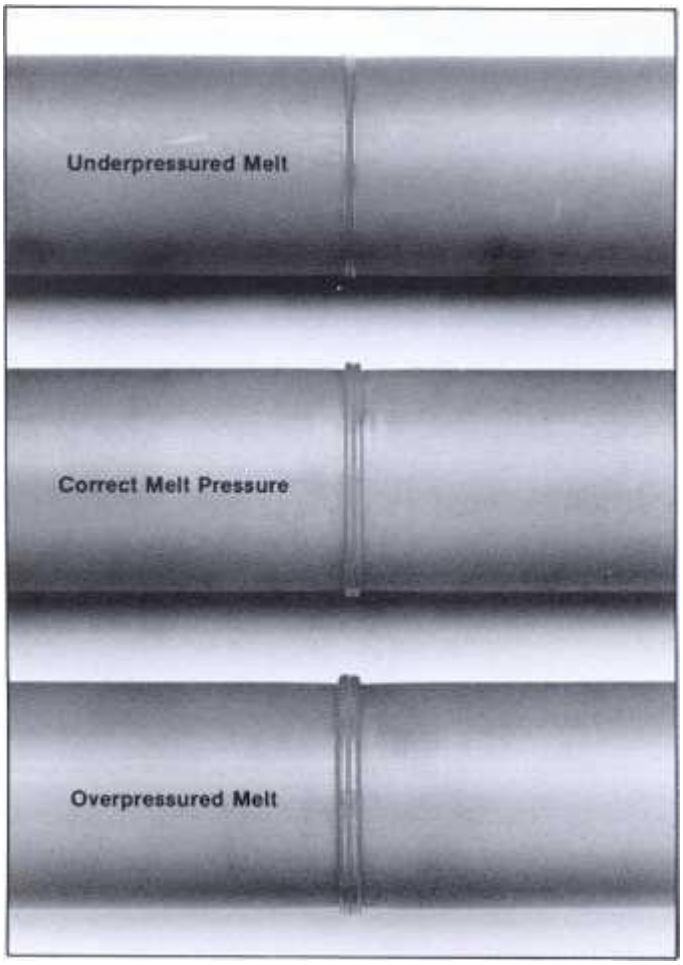
8) When a small melt bead develops around both pipe ends, relax the force on the carriage handle but maintain contact between the pipe and the heating iron. Begin the required heating time.

9) Open the fusion machine carriage back and remove the heating iron quickly and carefully. Do not drag or strike the iron against the melted pipe ends.

10) Bring the pipe ends together quickly, but do not slam them together. Use sufficient force to cause the fusion bead to roll over and roughly double its size. Continue to hold with the same force for the required minimum *holding* time.

11) Open the jaws, retract the carriage, and carefully remove the pipe. Do not air test, pressurize, or handle roughly until the total *cooling* time has passed.

12) Visually inspect the butt fusion along the entire fusion area for the proper bead appearance. If the appearance is unacceptable, determine the cause. Cut out the fusion bead and make corrections. Repeat the procedure.



Butt fusion - melt bead results vary with hand pressure on the carriage handle.

3.2.7.7 REPAIR OF PE PIPE

Successful repair of PE pipe depends on the type of damage or pipe flaw:

- □ Bad fusions – Using the inspection procedures as a guide, unacceptable PE fusions shall be cut out as a cylinder and replaced.

- □ Cylinder - All manufacturing imperfections and significantly damaged portions of PE pipe shall be cut out as a cylinder and replaced.

- □ EF Saddles - On certain types of cuts, scrapes, punctures and other external pipe damage of limited size, an electrofusion EF saddle tee can be electro-fused over the damaged area as a permanent repair. The fusion cannot be performed around leaking gas. This method CANNOT be

used to cover apparent manufacturing defects in new pipe, nor can several saddles be daisy-chained together to cover a larger area. On such a repair, cut off the outlet neck of the saddle tee so it cannot be tapped and used for a service tee.

- Repair Clamp - The use of a repair clamp is sometimes necessary to temporarily stanch a gas leak, but a repair clamp is not allowed as a permanent repair.

3.2.7.8 DISSIMILAR FUSION PROCEDURES

The indiscriminate mixing of types and wall thicknesses of PE pipe is discouraged. However, mixed PE joining may be unavoidable as pipe technology evolves.

Dissimilar PE pipe types may be butt-fused, but only if special procedures are developed and fully qualified under DOT regulation, and joiners are trained and qualified before any work is started. This is time-consuming and expensive, and every combination of PE resin and wall thickness have to be qualified.

For this utility the *only* approved method of joining dissimilar PE pipe is to use electrofusion or EF couplings under the procedures in this manual.

3.2.8 PE PIPE ELECTROFUSION PROCEDURES GENERAL

This procedure describes fusing polyethylene (PE) pipe with Electrofusion (EF) fittings. Electrofusion is a heat fusion process that joins a fitting to pipe by heating an internal electrical coil in the fitting. This coil is energized by an Electrofusion processor.

Electrofusion is the approved method for installing saddle tap tees and joining service lines. Electrofusion is approved for joining 2-inch and larger pipe, in situations where butt fusion is preferred but considered impractical. Applicable DOT codes and many generic procedures are the same as for PE butt fusion.

3.2.8.1 ELECTROFUSION SYSTEMS

Universal EF mode processors and fittings are approved for use in this joining procedure. Other EF systems and fittings may be approved for use according to the manufacturers recommendations.

Universal EF mode processors use “bar code” technology. A bar code label attached to each fitting contains all the fusion parameters. When

the bar code reader is moved over the bar code, the EF processor identifies the manufacturer, size and type of fitting, and automatically adjusts the fusion time and amperage for the specific fitting and ambient temperature.

EF processors are not explosion proof and may not be used in an explosive atmosphere. Escaping gas must be stopped or vented away from the processor and from any fitting connections.

EF processors require a 110V AC power supply capable of supplying adequate power to the largest anticipated EF fitting. For most utility operations a 5000 watt generator is the minimum size recommended. If so equipped, the auto-throttle switch should be turned off. If an extension cord is used, it shall be constructed of #10 AWG or larger, 3-wire cord and shall not exceed 100ft length.

3.2.8.2 QUALIFICATION OF PE JOINERS - ELECTROFUSION

Individuals involved with installing PE pipe shall be trained and qualified to use the approved equipment and installation procedures for EF joining of PE pipe.

The candidate for EF joiner qualification shall complete adequate training and under the guidance of a qualified inspector shall make a 2-inch EF coupling fusion. If EF saddle taps are used, the test shall include a 2-inch EF saddle tee.

The fused coupling shall be visually examined and cut into three longitudinal straps. The straps shall be inspected for adequate fusion. The saddle fusion shall be cut across the pipe into three sections and inspected for adequate fusion. Persons inspecting joints in PE pipe must be qualified by training or experience in the procedure to evaluate the acceptability of the joints.

The proficiency of qualified personnel shall be reviewed annually. A person must be re- qualified, if during any 12 month period that person does not make any joints under that procedure or has 3 joints or 3% of the joints made, whichever is greater, found to be unacceptable by testing under Part 192.513. A person shall remain qualified provided satisfactory field joints made by that person have been evaluated by qualified examiners at intervals of not more than twelve months.

3.2.8.3 RE-TEST

If a person fails to qualify, in the instructor's considered opinion, due to conditions outside the control of the person, the instructor may

correct the faulty conditions and give the person a second opportunity to qualify.

3.2.8.4 JOINER QUALIFICATION DOCUMENTATION

A record shall be kept of each person's qualification test and shall include the name, date, test results and record of qualification.

3.2.8.5 ELECTROFUSION PROCEDURE – COUPLING

EF Couplings are the most common EF fittings. These are used to join pipe together, and coupling ends are often incorporated into tees, ells and other common pipe fittings. The EF fitting should be left in its protective bag until ready for use. General EF procedure:

1) Cut the pipe ends to make a square, even surface. Remove any burrs or shavings.

2) Clean pipe ends inside and out with a clean, dry cloth to remove any dirt or contaminants. Pipe preparation and contamination removal are critical to EF.

3) To determine insertion or stab depth on couplings, measure half the length of the coupling and mark the depth with a wavy line. For ease of installation, a stab depth indicator and internal fitting stops are a molded part of most EF couplings.

4) Scrape pipe ends to remove any oxidation or surface contamination in the entire area to be covered by the coupling. DO NOT use any tool but the specific PE pipe scraping tool made for the specific pipe size. For best results, secure scraping tool on pipe and make no more than two passes on any spot. As PE scrapings build up, remove the scraping tool and clean blade area with a clean, dry cloth.

5) Continue scraping until the wavy stab depth marks are mostly removed and the fusion area is completely presented with un-oxidized, virgin material. In the event of out-of-round pipe, it is important to assure an even scrape is achieved around the entire circumference of the pipe. A rubber pipe stopper or internal stiffener can be placed in the end of the pipe to aid rounding.

6) Remove the EF fitting from the bag. Inspect the fitting for obvious defects in the molding and electrical pins and coils.

If necessary, clean the coil side of the fitting with cotton cloth and 99% isopropyl alcohol.

7) Place pipe ends and coupling together by using the internal fitting stops. The maximum gap between pipe ends should not exceed ¼" for 2-inch pipe and ½" for 3 to 8-inch pipe.

8) Maintaining stab depth, place all pipe junctions into proper clamping tools to secure pipe from movement during the fusion cycle. For best results, alignment clamps should be placed as close to the fitting as possible. The fitting should still slide freely.

9) Connect the processor to an adequate AC power source with the proper extension cord. (DC current can damage the processor). If a generator is used it should be up to speed before plugging in the processor.

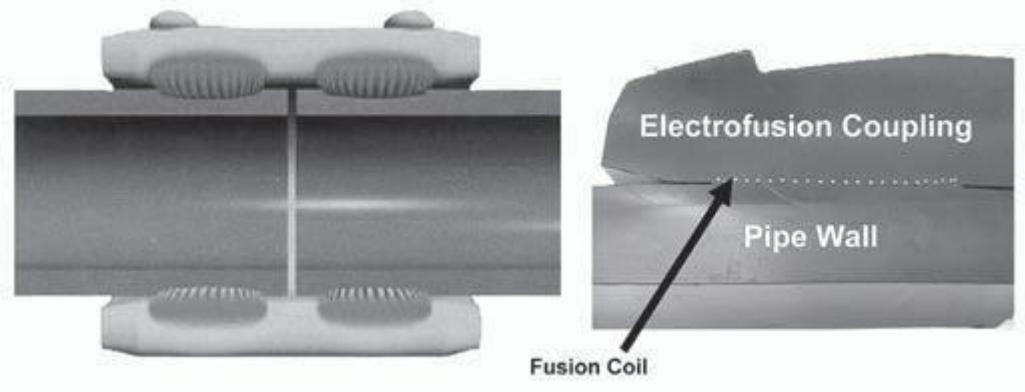
10) Perform the EF operation by following the appropriate EF processor procedure. Read the barcode on the fitting, attach the processor leads to the terminals on the fitting, and prepare for fusion as directed.

11) Press START button to begin fusion cycle. Fusion cycle time will count down on the visual display, and some processors display output volts or amps. When fusion cycle is complete, the processor should indicate a successful fusion.

12) If any diagnostic fault, shutdown or other fusion message appears during the process, refer to the manual for fault messages.

13) Disconnect the processor leads from the fitting.

14) Clamping device should remain in place to secure pipe and fitting during the recommended cooling time. After removing clamps, inspect the joint and cut out if necessary. Additional cooling time should be allowed before subjecting the joint to bending, burial, pressure testing, or similar handling and backfill stress.



Cross section of a typical EF coupling with internal electric heating coils.

3.2.8.6 ELECTROFUSION PROCEDURE - SADDLE

EF Saddle fittings are used for tapping tees and high-volume tees suitable for hot taps on active lines. Generally, most of the preparation and fusion steps of the EF Coupling procedure apply to the EF Saddle, with a few additional steps:

1) For saddle fusion clean the joining area with a clean dry cloth.

2) Center fitting on pipe and mark length of fusion area. Scrape entire pipe surface covered by the fitting.

3) Position saddle on scraped surface and position saddle clamp on it. Slide clamping tool onto edges of saddle fitting until clamp is squarely aligned beneath the fitting. Tighten clamp to secure fitting in place.

4) Visually inspect the saddle tee. If the connection is not acceptable, abandon the saddle fitting in place. Cut off the neck of the fitting so it cannot be used. Move to another location along the pipe and repeat the procedure.

Outlet pipe can be fused to the saddle tee outlet with EF coupling or butt fusion.

DO NOT perform EF saddle fusion or hot tapping on live PE Mains with more than 60 psig internal pressure.

EF Saddle tees can be used for certain types of surface damage repair, see section on Repair of PE Pipe.

3.2.9 Steel Pipe (X-tru Coated & Black) and Fittings for Gas Mains

3.2.9.1 STEEL PIPE INSTALLATION

~~Support pipe in trench on undisturbed earth, well compacted soil or sand in ditch bottom. Avoid sand pads placed at intervals for support under the pipe, as they impede compaction under the pipe. Install all overbends so that the pipe at the point of the bend clears the high point of the ditch bottom by at least six inches. At side bends, bend and lower the pipe so it lays against the outside wall at the bottom of the trench. At sag bends, rest the pipe evenly and firmly on the ditch bottom.~~

3.2.9.2 CHANGES IN DIRECTION of STEEL PIPE

~~On long pipelines, directional changes must be designed to accommodate pigging. Most pipeline bends are low angle and can be made with a bending machine, or bending shoe for smaller pipe. Use five radius (5R) welded sweep elbows for abrupt changes in pipeline direction. If sweeps are not available, 3R elbows may be trimmed for some short bends <30° for pipe larger than 2 inch, if the arc length as measured along the crotch is a minimum of one inch.~~

~~Distribution mains will usually change direction with 3R welded elbows. DO NOT use wrinkle bend or miter bend.~~

3.2.9.3 FIELD COATING of WELD JOINTS & FITTINGS

~~Coat all weld joints, ends, sweeps, elbows and other fittings and any coating voids with standard materials compatible with the steel pipe coating.~~

3.2.9.4 INSPECTION & REPAIR OF COATING

~~For long sections of steel pipelines, all pipe coating shall undergo a high voltage electrical inspection in accordance with NACE Standard for "jeeping" or holiday detection. All holidays and defects disclosed by this inspection shall be repaired before the pipe is lowered into the ditch.~~

3.2.9.5 LOWERING IN OPERATION

~~Use belt slings, padded calipers, or rubber tired cradles to handle the pipe. DO NOT use chain, wire rope or steel reinforced belting. Do not assemble more pipe than can be handled and positioned in the trench safely.~~

~~Take care to prevent damage to the coating. Prevent electrical contacts between the carrier pipe and casing, intersections with other utilities, etc.~~

3.2.9.6 CORROSION CONTROL

~~After pipe is placed in the trench and prior to backfill, install corrosion control devices such as magnesium anodes, test leads, insulators. Reference Handling & Installing Magnesium Anode Section and the drawings for detailed installation instructions.~~

3.2.9.7 NIGHT CAPS

(For steel or PE pipe.) At the end of each day's construction or whenever work is delayed for an extended period of time, plug or cap all open ends of any installed pipe with a suitable cap that will prevent the entry of water, mud, etc. Compression fittings or wooden tapered plugs may be used for this purpose. Do not use rags, tape, etc.

Where the line is joined into long sections for pulling across highways, railways, streets and other crossings, cap the inactive end of the pipe while fusing.

3.2.9.8 ADDITIONAL PROTECTION

Protect each pipe line from washouts, unstable soil, floods, landslides or other hazards that may cause the pipeline or above grade facilities to move or be subject to abnormal loads.

~~The pipes and fittings to be used shall be for high pressure (60psi-400psi) natural gas distribution. The pipes furnished by Contractor shall consist typically of 4" steel pipe coated with Performance polyethylene extruded coating; .035" minimum coating thickness, .010" adhesive thickness, 4.5" coating cutback, 4" adhesive cutback and with plastic end caps on each end, in accordance with American Society for Testing and Materials (ASTM) D-1238. Steel pipe: Standard 4" diameter by 40-45 foot double random lengths with plain beveled ends, .237" specified wall thickness, 4.50" outside diameter, 4.026" inside diameter shall be provided through a manufacturer and in accordance with the American Petroleum Institute (API) specification 5L, Grade B, Product Specification Level (PSL) 2, Electric Resistant Weld (ERW).~~

~~Thinner wall 4-inch .188/8.66#/ft. ERW pipe with the same extruded~~

coating as above is permissible as approved by the owner for buried installations **only**.

The 6" pipes shall consist of 6.625" O.D, .280" wall thickness, 6.065" I.D. with plain beveled ends and double random lengths. Complete with .010" adhesive coating and a .035" Yellow Performance Polyethylene extrude coating, 4" adhesive coating cutback and 4 ½" polyethylene coating cutback, with end caps, in accordance with API 5L Grade B, ERW steel pipes and ASTM D-1238. The pressure, which pushes a pipeline to transmission status, differs from pipe to pipe. The specified minimum yield strength (SMYS) of pipe differs from brand to
brand. NTUA uses API 5L, Grade B pipe, which has specified minimum yield strength of 35,000 psi. The Hoop stress in a steel pipe is determined by its pressure, diameter, and thickness by the formula:

S = Hoop Stress
P = Operating Pressure

S = P x D 2 x T
D = Outside Diameter, inches
T = Wall Thickness, inches

Example: 4-inch pipe operating at 200 psi has an outside diameter of 4.5 and a wall thickness of 0.237 and a Hoop stress of 1898.7 psi.

The following table shows the different pressures produced, for a particular size pipe, given a Hoop stress that is at 20% SMYS.

Pipe Size (in.)	**Outside Diameter** (in.)	**Wall Thickness** (in.)	**20% SMYS** (psi)	**Max. Pressure** (psi)
2	2.375	0.154	7000	908
4	4.5	0.237	7000	738
6	6.625	0.280	7000	592
8	8.625	0.322	7000	523

The following table is a list of the dimensions for standard API 5, Grade B plain-end pipes:

Nominal Size (in)	**Outside Diameter** (in)	**Wall Thickness** (in)	**Weight Per Foot** (lb/ft.)	**Inside Diameter** (in)
1	1.315	0.133	1.68	1.049
2	2.375	0.154	3.75	2.076
4	4.5	0.237	11.00	4.026
6	6.625	0.280	19.45	6.065

The following table lists the dimensions for various other schedule type pipes called out for and utilized at different applications throughout the distributions system of natural gas.

		NOMINAL WALL THICKNESS (in.)	
Nominal Pipe size (in.)	**Outside Diameter** (in.)	**Schedule 40**	**Schedule 80**
1	1.315	0.133	0.179
2	2.375	0.154	0.218
4	4.5	0.237	0.337
6	6.625	0.280	0.432
8	8.625	0.322	0.500

Weld elbows and tees are to be standard black schedule 40, nominal pipe size, long radius butt weld fittings, preferred vendors, Vincent Supply, Red Man, or equal to as approved by Owner.

3.2.10 Welding of Steel Pipe

Swabbing: Each joint of pipe shall be swabbed with an appropriate disc of proper diameter to remove dirt, mill scale, and other foreign substances before placing the joint in alignment for welding.

Welding equipment and supplies: All welding machines, line up clamps, beveling machines and other equipment and supplies used in connection with welding work shall be furnished by the contractor. Said welding equipment shall be satisfactory to the owner and shall be kept in good mechanical condition so as to produce sound, high quality welds. Any equipment not satisfactory to the owner or his representative must be replaced with satisfactory equipment.

~~*Type and Method of Welding*: All welding shall be electric "shielded arc" process. Three or more beads shall be required and the size of rods used shall be according to the thickness of the pipe and as specified by the Inspector. Stubs of welding rods shall not be disposed of in the ditch; instead, stubs and rejected welding rods shall be collected in containers and disposed of at the end of the day as directed by the inspector. As an example, for 2-inch through 4-inch pipe, the first bead shall be weld E6010, 1/8" or 5P+ welding rods. The third bead shall be capped with a Shield Arc 85, 5/32" or 3/16" welding rods.~~

~~*Qualification of Welders*: The contractor shall only use skilled workman certified for welding. Each welder employed by the Contractor shall be required to pass Pipeline (Fixed) Bellhole Welding Tests. For making such tests specimens one inch (1") in width shall be cut from the nipples at right angles to the weld. The strip specimen shall be subject to tensile, root bend and face bend tests. The manner of performing the tests and the tests result shall be in accordance with API 104, *Standards for Welding Pipelines and Related Facilities*. The cost of all welding tests shall be borne by the contractor. In the event that neither the owner nor the Contractor is satisfied with the test results, the welder shall not be employed.~~

~~*Further Test of Welders*: As a further test on the quality of the welding, the owner may request that a weld line be cut at the concurrence of the inspector. The cut-out and subsequent tie-in cost of the test specimen shall be at the expense of the contractor.~~

~~*Tests of Welds in the Line*: The owner may employ tests or other means considered desirable to test the work of welders by inspection of welds in the line. If the cut- out methods of welds is employed, the owner may, with the concurrence of the Inspector, cut out and test any section designated by him. Any test that fails shall disqualify the welder from doing any welding on the said project and shall prompt another cut-out test at a random location selected by the Owner. If this second test fails, the contractor shall x-ray the entire exposed section of line at his expense. If problems exist in the x-ray process, at the Owner's discretion, the contractor may be required to pressure test the entire section(s) of line already installed at the contractor's expense.~~

~~*Replacement of Line at Tests Welds*: When welding the line together after test welds have been cut out, one replacement weld shall be used if it is practicable to pull the line back into position: otherwise, two welds shall be made by fitting a "pup joint" which shall have a minimum length of forty-eight inches (48").~~

~~*Cleaning and Beveling*: Prior for aligning for welding, beveled ends of each pipe joint shall be thoroughly cleaned of all paint, rust, mill scale, dirt or other foreign matter to avoid defects in welds. Any satisfactory method of cleaning, subject to approval of the Inspector, may be used for cleaning~~

operations. When necessary to maintain correct alignment and spacing of pipe, the contractor shall cut and bevel all pipe ends as required. Such precutting and beveling shall be preformed at the Contractor's expense using a beveling machine approved by the owner.

Aligning and Welding: Aligning and welding the pipe shall conform to the following conditions and requirements:

a. The root opening (space between abutting ends) shall not be less than sixteenth of an inch (1/16") and no more than one eighth of an inch (1/8"). The alignment of abutting pipe ends shall be such as to minimize the offset in pipe surfaces. The offset shall not exceed one sixteenth of an inch (1/16").
b. When the pipe is welded together above the ground, the working clearance around the pipe at the weld shall not be less than sixteen inches (16"). When the pipe is welded in the trench, the bell hole shall be sufficient to provide the welder ready access to the joint. All position welds shall be made with the pipe resting on skids at the specified height over or at the side of the ditch.
c. When performing Manual Arc Welding, the entire root bead shall be deposited with the pipe held in a stationary position.
d. Welded pipe joints are to be made with a minimum of three beads. The proper amperage for the size and type of rod shall be maintained at all times to assure proper fusion and maximum penetration. The first bead shall be applied completely around the pipe. Prior to applying additional beads, each preceding bead shall be cleaned of all scale, coating and slag. After completing the welded joint, it shall be cleaned free of scale and oxide.
e. When aligning the pipe over the ditch for positioning welding, no tack welds shall be permitted. Instead, each joint shall be held in alignment by means of a line-up clamp while the stringer bead is applied. The first bead shall be applied around the pipe from top center to bottom center. The line-up clamp shall be left in position until a continuous seal has been applied on each side of the pipe joint. After the line-up clamp has been removed, the hot pass bead shall be applied immediately before the stringer bead cools. Each bead shall be cleaned of scale, slag, dirt, etc. satisfactory to the inspector prior to application of a succeeding bead.
f. The filler and finish beads shall be such that the completed weld shall have a substantially uniform cross-section around the entire circumference of the pipe. At no point shall the crown be below the outside surface of the pipe and preferably shall be crowned slightly above the same, but, it shall not be raised above the metal of the pipe more than one sixteenth of an inch (1/16"). The face of the completed weld should be approximately one eighth of an inch (1/8") wider that the width of the original groove. No miter welds shall be permitted. The completed weld shall be free of pin holes, air pockets, non-metallic inclusions, oxides or any other defects.

g. Welding shall not be permitted when weather conditions are unsatisfactory which, in the opinion of the Inspector, would impair the quality of the welds. The Contractor shall provide wind breaks which will give adequate protection to the welder and welding operations when in the opinion of the Inspector such equipment is necessary.

h. It shall be the responsibility of the Contractor to protect all welding rod from moisture. Welding rod found damaged in any manner as a result of negligence of the Contractor shall be replaced at the expense of the Contractor. Any welding rod found to be defective should be discarded.

3.2.11 Laying of Steel Pipe

Bending and Slack: The pipe shall be laid to conform to the bottom of the ditch. Bending shall be required only when changes in grade are such that the pipe will not lie naturally in the bottom to provide proper cover unless bent. All bends shall be made cold by the use of sectional bending shoe, which will not flatten or reduce the wall thickness of the pipe or produce wrinkles. Care shall be taken to avoid buckling of the pipe or weakening of welds. The curvature of all bends is to be distributed throughout as great a length of pipe possible. No heated or fire bends shall be allowed. The coating of the pipe shall be protected in all instances, including any bending process.

Slack: The necessary amount of slack is to be obtained by laying the line alternately over to the side of the ditch.

Under Lines and Conduit Crossing: Where the pipeline crosses existing water gas, oil, or sewer lines, the pipeline shall be laid under the existing a minimum of twelve inches (12”), or as may be directed by the Inspector.

Night Capping: The open end of the pipe shall be securely closed at the end of each day’s work by tack welding a suitable metal cover over the ends of the pipe or installing patented nightcaps to prevent the entrance of water, trash, small animals or other obstructions. Caps shall not be removed until work is again resumed. Where the lines are left apart at intervals for pigging or to be later tied-in under roads, highways, etc., both ends shall be fully capped.

Spacing of Stringer Beads: The first bead welding operations shall not be advanced ahead of finished welding operations to the extent that the section of line having unfinished welds might be damaged as a result of expansion or contraction of the pipe from temperature changes. Should a section of line or joints with unfinished welds be damaged as a result of falling from skids, or for any other reason, it shall be repaired by the Contractor at no cost to the Owner.

3.2.12 Coating And Wrapping Joints

If coated and wrapped pipe is to be installed, the coating shall be carefully protected and preserved during hauling and installing in the ditch. Prior to placing in the ditch, all pipe shall be carefully inspected, all holidays and other defects or damages shall be repaired to the satisfaction of the Inspector.

Prior to welding, the pipe covering shall be removed from the surface where heat from the welding operations will damage the coating, Wet burlap sacks or similar material shall be placed around the pipe to protect the pipe area subject to heat damage. After installation of accessories, all bare piping, connections, fitting and other parts of the piping work subject to galvanic corrosion shall be protected prior to backfilling.
Protective covering to be field-applied shall consist of initial coating of Polyken primer No. 1027 Series and a final wrap tape No. 900 Series furnished by the Contractor. Strict adherence shall be made to the manufacture's instructions and recommendations in the application of the covering material.

Prior to application of the tape, the existing coating shall be trimmed back to remove any damaged section of coating to a point where the existing coating is tightly bonded to the pipe. All surfaces shall be repaired by wire brush and wiped clean and dry. A coating of primer shall first be applied prior to the pipe on half-lap and shall be neatly formed around corners and irregular surfaces. The application shall be performed in such a manner that the tape shall tightly adhere and be securely bonded to the pipe or fittings and to preceding layers to form protective covering which will prevent air and moisture from coming in contact with metal surfaces. The applied tape shall overlap shop-applied pipe covering by not less than four inches (4") at pipe ends and by not less than two inches (2") on both sides of holidays or damaged areas of existing coatings and at pipe taps. The tape shall be applied in a neat and workman like manner without loose ends, unnecessary wrinkles, bulges, changes in wrapping direction, etc.

The Contractor shall properly store to prevent damage, theft, deterioration or waste of coating and wrapping materials consigned to the job. Primer paint shall be stored in the Contractor's warehouse or storage bin at all times and only hauled to the site for one day's requirements. Only enough coating materials for one day's supply are to be hauled directly to the site of the project where they are to be used. They shall not be strung or dumped along the rights-of-way.

The Contractor, at his own expense, shall run a holiday detector over the complete pipeline in the presence of the Inspector immediately prior to placing the pipe into the ditch. Any holiday or pinholes detected by the holiday detector shall be immediately repaired by removing a portion of the coating and applying a coat of primer and wrapping the detected area with at

~~least two complete turns of wrapping tape. The repaired point of the pipe shall then be retested to determine if the repairs were effective. The holiday detector used shall be of the type recommended by the manufacture of the coating materials and shall in no case be operated at a higher voltage than that specified by the coating manufacture. The above described testing shall be done at all times in the presence of the Inspector.~~

3.2.13 Tracing Wire

All buried Polyethylene gas pipe lines will require No. 12 underground insulated Tracing Wire to be placed 12" maximum above the gas pipe. All Tracing Wire must have continuous contact throughout the gas system. Connections will need to be completed with underground rated wire connectors supplied by Contractor.

3.2.14 Warning Tape

Warning tape is to be supplied by NTUA. Warning tape is to be installed at a minimum of 10" below finish grade, and at a maximum of 24" above the top of the pipe.

3.2.15 Carsonite Signs

Yellow carsonite signs and decals are to be installed by the Contractor. Carsonite signs are to be installed at all elbows, bends, tees, valves and on continuous straight lines-of-sight at 500 foot increments, unless the terrain requires more frequent placement. Carsonite signs are to be offset approximately 1 foot from the centerline of the gas line installation.

3.3 Valves For Gas Mains

3.3.1 Key Valves

All key valves shall meet or exceed DOT, CFR 49 Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards" and ANSI B16.40; "1985 American National standard for Manually Operated Thermoplastic Gas Shut-off Valves in Gas Distribution Systems", ASTM D-2513, "Standard Specification for Thermo-plastic Gas Pressure Pipe, Tubing and Fittings".

Distribution or service 2-inch or 4-inch shut-off valves are to be polyethylene (PE) 3408, with 2-inch wrench head. The 2-inch size shall be joined using butt fusion, but 4-inch size shall be the butt fusion outlet ends only to accommodate SDR 11 pipe~~. Buried steel valves are to be full port, steel body, weld-by-weld, ball valves, with non-rising stem, and 2" wrench head~~. Valve working pressure rating shall be 100 psig for intermediate pressure (5 psig – 60 psig) and 740 psig for high pressure

mains (100psig – 400 psig) minimum or as specified by the Owner. All high pressure valves shall be self-lubricating and manufactured by Baylon. Other valves may be Permaserts, Rock Wells, Nordstorm, Baylon, or approved equal. No flange type valve shall be permitted for underground service, but shall be used on various above ground facilities.

3.3.2 Valve Box and Cover

The valve box and cover shall be of cast iron construction and shall be engraved with the word "gas".

3.3.3 Valve Installation

Before installing the valve, care shall be taken to see that all foreign material and objects are removed from the interior of the valve. All valves that are welded must be open during the welding process. The valve shall be opened and closed to see that all moving parts are in working order, and left open during pressure testing procedures.

All valves key stems shall be set at a 90 degrees vertical angle and joined to the pipe in the manner determined by the type of valve. Valve box bases shall be set over the valve in such a manner that the valve box does not touch or transfer stress to the valve. Old rubber mats or cut and shaped tires may be used under the fabricated valve box to provide a cushion between the body of the valve and pipe section of the valve box.

3.4 Gas Main Crossings

3.4.1 Road Crossings

The original surface pavement on all open cut roadways shall be either cut square or sawed straight. As with open cut, if boring is required the steel conduit shall be extended from right-of-way to right-of-way. The Contractor shall obtain written permission from the appropriate agency prior to beginning any roadway excavation. Backfill within the limits of a roadway prism may require special compaction in accordance with the requirements of the roadway crossing permits.

Surfacing shall be replaced where the roadway has gravel, concrete, or asphalted paving in the same thickness as were removed, or as specified by the Owner, and completed as soon as possible following backfilling.

Gas line road crossings shall be installed within specified wall thickness steel casing unless otherwise specified. The casing ends shall be supported with compacted soil to prevent sagging, and the ends shall be secured with approved rubber end boot in sizes 6" x 2", 8" x 4" or 10" x 6" size depending the size of the casing and the pipe. The insulator boots at the ends must be clamped with stainless steel straps to hold the boots in place.

Properly sized centralizers must be paced 10 feet apart on the entire pipe within the casing to keep the pipe and black steel pipe casing separated.

~~Within streets and roads that do not require casing, hole-hogging under the road is an alternative construction technique. Steel or PE pipe can be installed through the bored hole, but the ground must be free of rocks and other debris to control depth and prevent PE pipe from damage.~~

3.4.2 STREAM OR DITCH CROSSINGS

For stream or river crossings, use a minimum cover of 60 inches measured from the lowest part of the existing or proposed channel to the top of, the pipe or river weight. Do not bend line sags within 15 feet either side of the top of the high banks. If sufficient pipe depth can be maintained approaching the banks, use a gentle upward curve rather than a sag bend. Reference Plan Details.

Use precast concrete river weights to counter pipe floatation in the water way and in the flood plain where frequent flooding occurs. Refer to the construction drawing for specific weight, size, quantity and spacing requirements.

3.4.3 BRIDGE CROSSINGS

When a pipe is attached at a bridge crossing it must meet the following conditions

1) Electrically isolate the pipe above grade at each end of the crossing.

2) Install fire valves at the upstream side of the bridge for single feed lines. Install fire valves at both ends of the bridge for looped feed lines. reference typical drawing for general details. Where permits are required, verify and meet specification requirements. for general information, refer to the Bridge Crossing diagram.

3) On longer crossings of more than 300 feet, where temperature differences can cause the pipe to expand and contract, use expansion joints or loops.

3.4.4 CROSSINGS

Do not case pipelines or steel mains which cross the ROW of highways and roads, railroads and other public thoroughfares except as follows:

- □ Cannot attain adequate minimum cover.
- □ If installed by the auger method, the carrier pipe is subject to damage

due to soil or rock conditions in the road bed.

- □ When casing is required by authorities responsible for the construction and maintenance of the highway, road, railroad or other public thoroughfares.
- □ When casing is needed for physical protection of the carrier pipe.

3.4.5 COVER

Use a minimum of 48 inches of cover over the pipe in the ditch line for highways, roads, and railroad crossings. However, if additional cover is required by jurisdictional authorities, meet that minimum.

At locations where open trench crossings are specified, backfill the trench with suitable material and pneumatically tamped back to the equivalent compaction of the adjacent undisturbed earth. If the material excavated from the trench is not suitable for backfill, obtain suitable material from another source. Restore the road surface to its original condition.

3.4.6 CASING INSULATION CHECK

Check at each step to see the carrier pipe is electrically insulated from the casing pipe:

- □ Immediately following installation of carrier pipe in the casing pipe.
- □ At completion of tie-in prior to backfill.
- □ After backfilling is completed.
- □ If a short is detected, correct before construction proceeds.

3.4.7 RAILROAD CROSSINGS

When required, install pipelines or mains crossing under railroads in steel casings. Construction of all railroad crossings including all details shall comply with the specifications required by the railroad or other authority having jurisdiction.

3.4.8 HIGHWAY CROSSINGS

Construct all highway crossings, including all details, to state highway specifications. Refer to Plan Details.

3.4.9 DRILLING, AUGERING & PUSHING

Directable boring tools are preferred for installation of pipe under paved highways, streets and driveways, high-traffic rural roads, ditches and streams, and other areas with high impacts to people and environment. Such tools include directional drills, road boring augers, pushing tools

and mechanical “moles”.

Driveways and sidewalks should be bored or pushed, and not excavated or tunneled with a chain trencher.

3.4.10 BORING

Reference specific permit requirements regarding boring methods. Fill all voids developed under hard surface (concrete and/or asphalt) using pressure grouting. Grout consists of sand-cement slurry, a minimum of two bags of cement per cubic yard of mix.

When voids develop under graded gravel, crushed rock or dirt surfaces, excavate and backfill with a suitable material. Pneumatically tamp to the equivalent compaction of the adjacent undisturbed earth. Replace surface material to original condition.

3.5 Gas Service Connections Materials

3.5.1 Polyethylene (PE) Pipe

ASTM D 2513 Gas PE 2406/2708 Yellow medium-density, SDR 11 pipe shall be 2, and 1 inch Iron Pipe Size (IPS), 100 psi operating pressure and in conformance with ASTM D 2513. The pipe shall be produced from a high density ultra-high molecular weight PE pipe compound. The designation PE 3408 and indication of pipe size, material, manufacture, pressure rating, and temperature rating, and as appropriate, type and grade shall be stamped or die-marked on the pipe. The die stamp must have a blunt or rounded edge that will minimize stress concentration. The pipe shall have yellow stripes indicating the national color code of natural gas, or can be yellow pipe.

3.5.2 Service Line Fittings and Connections

Fittings and connections for natural gas service line shall be ASTM D 2513 Gas PE 2406/2708 Yellow medium-density, SDR 11. Pipe shall be marked ASTM D 2513 to indicate size, material, manufacture, pressure and temperature rating, and as appropriate, type, grade, brand and model. Heat-fusion or socket-fusion joining must be completed following the manufacturer’s instructions. Mechanical joining of PE piping must contain a rigid and **not** a split tubular stiffener, and be compatible with the plastic being joined. **NO** electric fusion, adhesive joints, or compression fittings shall be permitted.

3.5.3 FIELD COATING of WELD JOINTS & FITTINGS

~~Coat all weld joints, ends, sweeps, elbows and other fittings and any coating voids with standard materials compatible with the steel pipe coating.~~

3.5.4 PROTECTIVE SLEEVES

Use protective sleeves for all saddle tee connections. Sleeves protect the joint between the service line and the saddle fitting from shearing off. Use electrical tape to secure sleeves to service tee. Sleeves can also be used for transition fittings and other applications where high shearing forces may damage a joint.

3/4-inch service	12” long sleeve
1 or 1.25-inch service	20” long sleeve

3.5.5 STEEL MAIN TO PE SERVICE LINES

~~When connecting a PE service line to a steel main, use an approved weld-on steel service tee. Weld the steel service tee to the main by the metal arc process (see Welding Procedures section).~~

~~After the PE service line length has been established and cut, connect the PE tubing to the service tee with a steel-PE transition. Steel connection can be welded or threaded; PE connection is butt weld or electrofusion coupling.~~

~~The PE tracer wire should be Cadwelded to the steel main. Pressure test service line (see Pressure Testing section).~~

3.5.6 PE SERVICE LINE RISER INSTALLATION

Use an approved service riser to connect PE service lines to a meter set.

1) Meter bracket must support meter, regulator, and service line riser.
2) Terminate service riser 12" above grade with a minimum of 24" below grade.
3) Install a meter stop valve with a locking device. Size to be as per riser outlet size.
4) Follow manufacturer's installation instruction to join the riser to service line.
5) Place service line in trench, keep the service line straight and flat to prevent kinking and pinch off.
6) Pressure test completed service line using testing procedures, Section 660.
7) Hand backfill and tamp around the houses' foundation and under service riser with enough force to prevent stress and sheering loads on

the riser and PE pipe and to prevent settling.

3.5.7 STEEL SERVICE LINE RISER INSTALLATION

~~Construct the service riser at the meter set as follows:~~

1) ~~For service line pipe 3/4" to 1", cold-bend the riser to 90° using an 18" radius bending shoe.~~
2) ~~For service line risers larger than 1", use a long radius weld elbow to make the 90° direction change.~~

~~Cold bend service line pipe, as follows:~~

~~1) For fusion bond epoxy coated pipe, inspect for damage in the bend area. Repair these areas with approved materials.~~
~~2) For coal tar coated pipe, remove coating from all bend areas and recoat with approved coating repair materials.~~

~~Pressure test the service line before tapping into the main (see Pressure Test section).~~

3.5.8 TAPPING THE MAIN & PURGING THE SERVICE LINE

After the installation has been tested, tap and purge the service line of all air (see Purging section).

If the service tee is a self-tapping punch-it, use the tee manufacturer's companion tools for tapping.

For a non-self-tapping tee on a steel line, use a tapping machine.

Before applying the completion cap on a steel service tee, pipe dope the threads to prevent leakage through the tee's cap or plug.

3.5.9 SHUT OFF & RESTORE SERVICES

Most services can be turned off and on using the punch tee as a valve. Service tees will likely not completely turn off the flow of gas enough to ensure gas-free work on the service line.

3.5.3 Saddles Tees (Electron Fusion Tap Tees Only)

Saddle tees shall be specific for the type, size, and pressure rating of the mainline as recommended by the saddle manufacturer. Each saddle tap tee used to make a hot tap must be designed for the minimum operating

pressure of 100 psig. Saddles shall be full-encirclement, mechanical tapping tees or fusion-type saddles constructed of medium-density ASTM D 2513 Gas PE 2406/2708 Yellow. Mechanical saddles must be designed to ensure a reliable, gas tight, connection, and must provide a body sleeve that threads and locks itself to the main. Saddles and saddle components must meet or exceed the requirements of ASTM D 2513, ISO 4437, CSA B137.4. The Preferred manufacturer is the Perfection Saddle Tees. Compression saddle tees are not acceptable.

3.5.4 Service Valves (for 2" and above service connections)

Service valves shall meet or exceed DOT, Pipeline Safety Regulations Title 49, CFR, Part 192, §192.145 and 192.191, ANSI B16.40, ASTM D-2513, ASTM A 126, ASTM 126 and API 6D. Valves are to be Polyvalve constructed of 3408 high density PE.

3.5.5 Excess Flow Valve (EFV)

Under CFR, Title 49, Part 192, §192.381, Service Lines: Excess flow valve performance standards: excess flow valves are installed on a service line that operate continuously throughout the year at not less than 10 psig. The valve shall close automatically at flows 50% above the customer's established flow rate, and allow pressures to equalize across the valve at 5 percent of the manufacturer's specified closure flow rate, up to a maximum of 20 cubic feet per hour. The EFV shall be marked and identified on the as-built drawings. All EFV shall be designed for a trip flow rate of 400 standard cubic feet per hour. The EFV shall be installed 12" downstream at the service tap connection and as shown on the detail drawing, two 1" high density 3408 PE couplings will be utilized as additional fittings to install Perfection Corporation Excess Flow Valve for 1" gas service lines. Fusible or Permasert EFVs as manufactured by Perfection are recommended.

3.5.6 Gas Anodeless Risers

Anodeless gas Risers shall meet ASTM D 2513, Category 1, ANSI B 1.20, ANSI B 31.8, US DOT 192, NFPA-58, and CSA B 137.4. The gas carrying steel pipe nipple shall meet the requirements of ASTM A53 pipe. All risers shall be factory leak tested to 150 psig. Polyethylene tubing shall be 1" or 2" IPS, medium density 2406 PE. The steel pipe coating shall be fusion bonded epoxy (FBE), and shall be 3 to 10 mils in thickness, with the epoxy coating continuing through half the threaded nipple. Risers shall be pre-bent, 36-inch horizontal length and 30-inch vertical rise, with a PE 2406 pig tail as manufactured by Perfection. The entire steel casing of the anodeless riser shall be primed with #1027 Polyken primer and taped with #900 Polyken tape. Tracing wire clamps shall be installed on the shield riser located 1-inch just below the gas stop.

Risers shall be compacted in place to provide a rigid and sturdy setting.

3.5.7 Gas Stop

Gas stop must meet ANSI B16.33, ANSI B1.20.1, shall be 1" FIPT Inlet /Outlet x 1" Insulated Union with Threaded Tailpiece, 100 psig. Black Iron Body-Brass Plug, Flat Head with Lockwings.. Larger size valves shall be a specified on the project drawings.

3.6 Gas Service Line Installation

Gas service lines and appurtenances shall be installed in accordance with TP 1.0, Excavation, Trenching, and Backfilling for Gas Utilities, and TP 2.0, Gas Line Separation Requirements. A minimum of 1.5 feet of cover is required for gas service lines.

Service lines shall be cut using tools specifically designed to leave a smooth, even, and square end on the pipe. The cut ends shall be reamed to the full inside diameter of the pipe. Pipe ends are to be connected using fittings that seal to the outside surface of the pipe, which shall be cleaned and smoothly finish before installation.

All 1 and 2-inch service connections to gas mains 2-inch and larger of PE pipe 3408 SDR11 shall be made using saddles tees depending on the anticipated load and distance from the point of tap to the metering point. Particular care shall be exercised to assure that the main is not damaged by the installation of the saddle. The saddle shall be aligned on the gas main so that it is at a 90-degree angle above the top of the pipe.

When making service connections to steel pipe, a sacrificial anode is to be placed on the existing steel main a minimum of 12" away from the steel service tap.

3.7 Pressure Test

Pressure tests shall be according to the DOT, Part 192, Subpart J, Test Requirements,
§192.513, each segment of plastic pipeline must be tested in accordance with this section.

3.7.1.1 SCOPE

This section covers the Utility standards for pressure testing of all distribution facilities. All distribution facilities shall be tested in accordance with these standards. This includes replacements and extensions to the system for services and mains. This also includes testing for reinstating service lines.

3.7.1.2 APPLICABLE CODES AND REGULATIONS

DOT 192 OPS Title 49 CFR Part 192.725 and Subpart J

3.7.1.3 TESTING SAFETY

Care shall be exercised when releasing the test pressure from a pipe segment under test. No work shall be performed on a segment under test pressure. No work shall be done on any connected service or fitting until the test pressure is released. During pressure tests, no person shall be allowed to stand in front of a cap secured by a compression coupling, or at the end of a pipe segment under test.

3.7.1.4 TESTING MAINS AND SERVICES

All steel or PE mains and services operating at 60 psig or less shall be tested at 100 psig. All mains and service lines operating at a pressure above 60 psig shall be tested at 1.5 times the maximum allowable operating pressure (MAOP).

3.7.1.5 DISTRIBUTION FACILITIES TEST DURATION

The test pressure must hold steady for 1 hour for each 100 cu. ft. of volume, unless a means of reading less than 1 psi increments of pressure is available. No main should be tested for less than 1 hour and no test should be more than 24 hours. Tests for up to 3 hours may be made using an indicating gauge. For longer tests, a pressure recorder should be used.

Pipe length for 100 cu ft of volume (1 hr test):

1¼-inch	10,000 feet
2-inch	4,340 feet
3-inch	1,960 feet
4-inch	1,135 feet
6-inch	498 feet
8-inch	288 feet

Individual service lines should be tested for a minimum of 15 minutes but no longer than one hour.

3.7.1.6 RECORDS

Test records should include a description of the facility tested, date test duration, pressure chart (if applicable), test medium used, and name of person who made or witnessed the test. Document with a Pressure Test Report

3.7.1.7 TESTING FOR REINSTATING SERVICE LINES

Disconnected service lines shall be tested in the same manner as new service lines. If the line is temporarily disconnected from the main, it should be tested from the point of disconnection to the service line valve. However, if provisions are made to maintain continuous service, such as installation of a bypass, any part of the original used to maintain continuous service need not be tested.

3.7.2 Steel Pipe

~~All test equipment, labor, appurtenances, and materials, and the performance of all operations in accordance with the specifications are the responsibility of the Contractor; however, the operating utility reserves the right to inspect all testing equipment and review all testing procedures.~~

~~*Testing Completed Line(General)*: Prior to the pipeline being completely installed and backfilled - or any portions thereof - the Contractor shall make arrangements to fill the line, or sections thereof, with compressed air to a pressure of 600 psig and test the completed line for leaks in accordance with the duration chart below. The maximum length for any line or segment thereof to be tested is one mile. All 24- hour tests shall have a chart recorder installed to record the variations in pressure. The inspector shall always be present during testing operations and will identify sections to be tested according to the inspector's best judgment. The Contractor shall furnish all equipment necessary for testing, at no cost to the Owner. Short sections of line to be installed under roads or highways shall be plugged and tested as above described before cleaning and coating of the pipe.~~

~~When testing, the pressure should be elevated above the 600 psig test pressure until the gauges have stabilized and then the system may be bled down to 600 psig. Pressure gauges used in the test shall be graduated at a maximum of 10 psi increments. The duration of the test shall be accordance with the Duration Test Chart~~

~~**Nominal Pipe Size (Inches)**~~	~~**Minimum Test Time < 100 ft.**~~	~~**Minimum Test Time 100—500 ft.**~~	~~**Minimum Test Time 500–1000 ft.**~~	~~**Minimum Test Time > 1000 ft.**~~
~~**Above 2"**~~	~~**1 Hour**~~	~~**5 Hours**~~	~~**10 Hours**~~	~~**24 Hours**~~

~~*Pigging the Line*: To ensure that the completed line is free from water, dirt, small animals and other foreign objects, as well as defective workmanship such as flatten bends, the Contractor shall run a construction-type pig through the entire line, driven by compressed air. The pig shall be furnished and maintained by the Contractor, and it shall meet the approval of the Inspector.~~

~~*Method Of Pigging:* The pig must not be removed from any section of the line except in the presence of the Inspector. When a section of line has been~~

~~pigged, that portion of the line shall be immediately tied into other pigged and tested sections in the presence of the Inspector. If the pig section cannot be tied into prior-tested section immediately, it shall be night-capped in the presence of the inspector, and the nightcap shall not be removed for tie-in purposes except in the presence of the inspector.~~

~~*Care And Maintenance of the Pig*: The metal disc of the pig shall be maintained at a diameter of one-half inch (1/2") less than the inside diameter of the pipe. If the disc becomes worn, it shall be built up with welding to maintain the required diameter. When, in the opinion of the Inspector, the rubber cups have become excessively worn or out-of-round, the contractor shall replace them with new cups.~~

~~*Failed Test Of Completed Lines*: If loss in pressure indicates the need for repairs, the Contractor shall make such examination as may be necessary and perform such repairs at his own expense as may be required by the owner. Tests and repairs shall be repeated by the Contractor until the specified pressure has been maintained for a 24-hour period or to the satisfaction of the owner.~~

3.7.3 Observation of Tests

Prior to the performance of the pressure test, the contractor shall have all equipment set up and ready for operation, and shall have performed an abbreviated test on the line to determine if the section should pass. The Contractor shall notify both the Frontier and the Frontier Representative a minimum of three working days in advance of the date that the Contractor plans to perform the pressure tests.

The Frontier Representative shall observe the testing to verify that the testing was performed according to the specifications and that the test data were properly and accurately recorded. The Contractor will complete the required certification forms and submit them to Frontier Gas for approval. A letter of approval or disapproval of the test results and line installation will be sent from Frontier Gas to the Contractor.

The pipe inspections will follow all 49 CFR, Part 192.241, 192.235, 192.231, 192.225, 192.227, 192.243, and all other sections. Exhibit A shall be completed and filed with the utility

3.7.4 Purging of Newly Installed PE Service and Distribution Systems

After the new distribution system has been pressure tested, the system shall be purged with air at 100 psig to assure that all debris has been removed from the piping. Prior to purging, all gas stop plugs are to be removed, and each individual gas stop shall be operated quickly to assure that the connection at each of the saddle tees has been completely punched. Then

the gas stop plugs shall be reinstalled and the stop left closed.

The outlet purging location shall be at the furthest riser and stop at the end of the segment being purged. The gas stop, initially closed, shall be opened slowly at the start, until the full ¼ turn is reached. Leave the stop valve open until pressure subsides. Once all purging is completed, it is very important that the riser used to purge the system be completed resealed. During the purging process, a representative of the utility shall be present.

The purging practices will follow 49CFR, Part 192.629, Purging of Pipelines. A slug of inert gas - nitrogen gas - must be released into the line before the introduction of gas into the system. Each individual service lateral shall be purged and ready for meter services.

3.8 Drainage Control

~~*Erosion Checks*: Erosion checks as shown on the plans shall be bladed or dozed across the finish backfill by the Contractor, or as directed by the Engineer, to prevent runoff from ponding or flowing along the pipeline or rights-of-way.~~

~~*Ditching*: The Contractor shall construct drainage control ditches in accordance with details shown on the drawings at locations determined by the Inspector after installation and backfilling operations have been completed. The bid price for the ditches shall be included in the unit bid prices, and no separate additional payment will be made thereafter.~~

3.9 Blow Down Station

~~Blow Down Stations on High Pressure Gas Main are to be installed 3 to 4 Miles apart or as specified by owner. Blow Down Stations shall consist of one major above ground flange valve that can control the gas main flow. Two 2" screw type valves are to be install on the relief stack on each side if the valve so that the station can isolate the upstream or downstream of the section. The owner in all projects will specify the construction and design.~~

TECHNICAL PROVISIONS

TP 4.0 NATURAL GAS CATHODIC TEST STATION

4.1 Cathodic Test Station

411 General

This subpart prescribes minimum requirements for the protection of metallic pipelines from external, internal, and atmospheric corrosion. All metallic materials must have an external protection coating meeting the DOT, 49 CFR.

The Contractor shall install all cathodic test stations as indicated on design drawings and as recommended by the Owner and shall comply with the following design, construction, and material specification as follows:

All test station materials shall meet the minimum requirements of the National Association of Cathodic Engineer (NACE) approved specification to uniform with the CFR, DOT, Part 192, Sub Part I- Requirements for Corrosion Control, §192.769, External Corrosion Control; Test Station, and §192.471 External Control; Test Leads. The test station shall have an orange body with a red cap. The size of the test station shall be 3" nominal pipe size conduit and 6 feet in length. The test stations shall have five lead test terminals with "Warning – Gas Pipeline" (capitalized) and two NTUA logos imprinted on the orange body and shall be Big Fink Cathodic Protection Test Station, item # (501-385-OR), the product recommended is manufactured by COTT Manufacturing Co., 19755 Nordhoff Place, Chatsworth, CA. 91311-6606. Telephone number is 1-800-423-6387.

412 TEST WIRE ATTACHMENT

The following procedures for attaching test wires to steel pipe is the Owner's recommendation: file the point on the pipe to which the wires are to be attached to a rough bright surface to allow a good bond between the pipe and the weld metal; clean the surface to remove any metal filing debris. Cut the test wires to the required length, depending on the buried depth of steel pipe and length of test station. Sufficient slack should be provided to allow for backfilling and to insure there is enough wire above the ground for connections to the terminal.

NOTE: The test wire shall be the NACE standard white 12TW, with the plastic insulation. Other materials needed for wire attachment: Copper Adapter Sleeves, Cadweld Cartridges and Handicap.

Prepare the test wire by stripping approximately 1.5 inches of insulation from the wire end that is to be welded. Slip a copper sleeve over the wire end and crimp the sleeve tightly to the wire or bend the wire over the end of the sleeve. Place the tin disc in the Cadweld mold to hold the Thermit powder; pour the

contents of the cartridge (5 gram charge) into the mold.

NOTE: Be sure the "to open" end of the cartridge is opened and not the bottom end. This insures that the starting powder necessary to ignite the Thermit powder will be on top after the contents of the cartridge have been poured into the mold. It may be necessary to squeeze the cartridge with the thumb and forefinger to loosen the starting powder. Be very careful to keep the starting powder charge dry, as it takes only a small amount of moisture to prevent the charges from igniting.

Continue the wire and steel pipe set up by wrapping the wire around the pipe, then tie off the wire allowing at least 6" of wire from the end for Cadwelding. Place the mold over the prepared area of the pipe and insert the wire end into the small opening at the bottom of the mold. Clean the hinged top of the mold and ignite the charge with the flint gun through the opening of the mold. After the mold has cooled down, remove it from the pipe. File or brush any oxidized material from the weld. Be sure a good bond exists between the weld and the steel pipe, and that the wire is firmly attached. After all loose particles have been cleaned from around the weld, apply one coat of Polyken Primer #1027 and install the Handicap patch over the weld. Make sure the bulb containing the grease is placed over the welded area. Tape both ends of the Handicap patch with 2" #900 Polyken tape and squeeze the bulb containing the grease with thumb and forefinger to provide an airtight seal.

413 TEST POST INSTALLATION

For initial stability of the cathodic test station post, insert a one-foot length of ¾" PVC or steel through the 3 inch by 6 feet test station. The insert shall be at right angle to the post and approximately 6 inches from the lower end of the post.

Bring the attached test wires up through the post, allowing two feet slack in each lead. Place the test station in an upright position directly over the pipeline so that the lower end of the post is three feet below grade. Then backfill dirt around the post.

To attach the test wires to the test terminal, strip one inch of plastic insulation from the end of each of the test leads. With needle nosed pliers, round the stripped ends to fit on the test terminal. Attach the test leads to the test box as required. If the test station is at a foreign line crossing, indicate which lead is from the foreign line and which lead is from the NTUA line inside the terminal box.

TECHNICAL PROVISIONS

TP 5.0 NATURAL GAS METERS AND APPURTENANCES

5.1 Scope of Work

This subpart prescribes minimum requirements for installing customer meters and service regulators.

5.2 General

Each gas meter must be installed outside the building at a readily accessible location and protected from corrosion and other damages. All meter installations shall conform to DOT, Title 49, Part 192, §192.353, §192.355, §192.357, and §192.359 and the Owner's design and specifications requirements.

5.3 Materials

5.3.1 Residential Standard Gas Meters

The Owner shall supply the American AC-250 - temperature compensated, unless otherwise specified, and factory calibrated. Meter shall be diaphragm type natural gas meters, and have a maximum flow rate of 250 cubic feet/ hour (SCFH). The meter ferrule size shall be 20 Lt. (per ANSI B-109-1), swivel washers model no.001-61-154-02, and include the black iron swivel nut model no. 001-41-166-00. The index assembly type shall be the odometer type reading plastic with drains, clear polycarbonate index box and the kit part no. 001-63-656-50; consisting of Rockseal plug, seal cup, seal spacer and mounting screws. Meter is to be die-cast aluminum alloy to provide corrosion protection with minimum weight. All residential meter will be installed according to the Owner's design and specification; all meters must be soap tested at all fittings, and any leak detected will be immediately repaired.

5.3.2 Commercial Standard Gas Meters

The Owner shall provide (unless otherwise specified) and maintain commercial American Meters - intermediate and large capacity diaphragm gas meters numbers: 415, 750, 1000, 1600, 3000, 5000 or 10,000. The Invensys gas meter shall be temperature compensated for natural gas with specific gravity of .60. The maximum cubic feet/ hour (SCHF) demand shall be determined for each project. The meter ferrule size shall be 45 Lt. The pressure on the meter shall be limited to 67% of the manufacture's shell test pressure as published according the Pipeline Safety and Regulation. The indexes shall be standard direct reading plastic

for the smaller meters, or brass for the 750s through 10,000. The index cover box shall be clear lexan UV stabilized clear poly-carbon Rockseal.

The Contractor at his expense shall install the meter assembly as delineated by the Owner's specifications and designs. Upon completion of constructing the meter loop, all fittings must be soap-tested, and any leaks shall be immediately repaired.

5.3.3 Gas Service Regulators

All gas service regulators shall be supplied and maintained by the Owner, unless other arrangements are specified. Smaller service regulators are to be American 1800 B-2 1" x 1" pipe size, straight through body, diaphragm type assembly with internal relief valve (IRV). The blue spring ranges part No. 143-08-021-01 with 3/16" orifice size having a maximum inlet pressure of 100 psi and an outlet pressure range of 5" to 8 1/2" water column. The manufacture shall be Invensys, Equimeter, or equal as approved by Owner.

Each regulator must be installed so as to minimize anticipated stresses upon the connecting piping and regulator. All nipples shall be Schedule 40. Connections may not be made to, or used with easily damaged material when installing the meters or regulators.

Regulators must be rain and insect resistance, and be located at a place where gas from the vent can escape freely into the atmosphere and away from any opening into the building, and must be protected from damage.

For all meters assemblies sizes 3000 and above, overpressure protection shall be designed to protect the customer's piping system. This overpressure protection device may be a relief valve, monitor regulator, shut-off device, or any similar device approved by the owner.

5.4 Gas Meter Loop Requirements

Vents, windows that open, doors, or other openings into the building; or electric equipment and meters, or any heat generating device shall not be allowed either over or within 36" of the gas meter loop. Also the meter shall not be installed within 36" of the end of a building unless specifically exempted by the utility. There must be approximately 4" between ground level and the bottom of the meter.

All gas stub-outs are to be 1" NPT and extended 8" out from the exterior wall of the building and be at a minimum of 20" from finish grade ground level. Gas stub outs are to be capped or taped to protect threads.

5.4.1 Gas Meter Activation

Letter of Certification: The scheduling for activating the meter will be

initiated upon the receipt of "Letter of Certification". This certification must include a copy of the Plumber License Contract Number and a written affidavit showing the results of the house piping tests according to the National Plumbing Code identifying the house or houses that were tested, with dates, time duration, and testing pressure.

Load and Pressure: Load and inlet pressures must correspond with all planning documents. Any changes will need to be approved by Frontier Gas.

Activating Gas Meter: Once all required documents are received, the Owner will schedule the activation of the gas meter with the customer or Contractor. The customer must arrange to have a representative or plumber present when the gas is activated. The Utility will supply the required pressure as accurately as possible down stream of the gas meter under peak load. Once the deliverable pressure is set, for the 3000 and above meters, the relief valve also shall be set. The multiplier check sheet, any variation in delivery pressure (from a 7" WC), the safety inspection report sheet, and all other required customer information shall be forward to the respective District for billing purposes.

Gas Meter Fencing: All 3000 and above gas meter shall be fenced. If the customer constructs a retaining wall, the utility may wave the requirement for fencing. The six-foot chain link fence will be sized according to the Meter Loop length, and the fencing or retaining wall shall have a minimum four-foot clearance around the meter and appurtenances. As part of the fencing, the utility will require either one or two gates – or a double gate – depending on the size and location of the meter.

Gas Meter Guard Rail: Four-inch guardrails will be installed in heavily traffic areas as determined by the utility.

5.5 Gas Regulator Station

Owner shall supply the gas regulators, unless other arrangements are specified. Regulators for city gate and farm taps will be determined for each installation. Contractor shall install as specified by Gas Utility's specification and designs.

EXHIBIT A

GAS LINE PRESSURE TEST CERTIFICATION

PROJECT NAME AND NUMBER:_

GENERAL LOCATION OF LINE TESTED: _____
(Town/State)

DATE TEST WAS CONDUCTED:

TEST INSTRUMENT USED: (Serial number may be assigned by NTUA personnel)
(√ - type of instrument used and fill in information)

	Type	Manufacturer	Model/Serial number
	1. Gauges		
	2. Chart Recorder		
	3. Dead Weight		

PRESSURE TEST RESULTS

:Size of Pipe	Type of Pipe	Length of Pipe	Pounds Tested At	Duration Time	Results Pass / Fail	

REMARKS:

_____

_____

THE ABOVE TEST INFORMATION IS HEREBY CERTIFIED BY:

NAME (Print): TITLE:

SIGNATURE: DATE:

COMPANY:

ADDRESS:

WITNESS:

CERTIFICATION RECEIVED BY: _ON:

227 North Upper Street
Lexington, Kentucky
40507-1016
Tel (859) 233-3111
Fax (859) 259-2717

SPECIAL PROVISION FOR WASTE AND BORROW SITES

Obtain U.S. Army Corps of Engineer's approval before utilizing a waste or borrow site that involves "Waters of the United States". The Corps of Engineers defines "Waters of the United States" as perennial or intermittent streams, ponds or wetlands. The Corps of Engineers also considers ephemeral streams, typically dry except during rainfall but having a defined drainage channel, to be jurisdictional waters. Direct questions concerning any potential impacts to "Waters of the United States" to the attention of the appropriate District Office for the Corps of Engineers for a determination prior to disturbance. Be responsible for any fees associated with obtaining approval for waste and borrow sites from the U.S. Army Corps of Engineer or other appropriate regulatory agencies.

1-296 Waste & Borrow Sites
01/02/2012

SPECIAL NOTE FOR NON-TRACKING TACK COAT

1. DESCRIPTION AND USEAGE. This specification covers the requirements and practices for applying a non-tracking tack asphalt coating. Place this material on the existing pavement course, prior to placement of a new asphalt pavement layer. Use when expedited paving is necessary or when asphalt tracking would negatively impact the surrounding area. This material is not suitable for other uses. Ensure material can "break" within 15 minutes under conditions listed in 3.2.

2. MATERIALS, EQUIPMENT, AND PERSONNEL.

2.1 Non-Tracking Tack. Provide material conforming to Subsection 2.1.1.

2.1.1 Provide a tack conforming to the following material requirements:

Property	Specification	Test Procedure
Viscosity, SFS, 77 ˚ F	20 – 100	AASHTO T 72
Sieve, %	0.3 max.	AASHTO T 59
Asphalt Residue[1], %	50 min.	AASHTO T 59
Oil Distillate, %	1.0 max.	AASHTO T 59
Residue Penetration, 77 ˚ F	0 - 30	AASHTO T 49
Original Dynamic Shear (G*/sin δ), 82 ˚ C	1.0 min.	AASHTO T 315
Softening Point, ˚ F	149 min.	AASHTO T 53
Solubility, %	97.5 min.	AASHTO T 44

[1] Bring sample to 212 ˚F over a 10-15 minute period. Maintain 212 ˚F for 15-20 minutes or until 30-40 mL of water has distilled. Continue distillation as specified in T59.

2.2. Equipment. Provide a distributor truck capable of heating, circulating, and spraying the tack between 170 ˚F and 180 ˚F. Do not exceed 180 ˚F. Circulate the material while heating. Provide the correct nozzles that is recommend by the producer to ensure proper coverage of tack is obtained. Ensure the bar can be raised to between 14" and 18" from the roadway.

2.3. Personnel. Ensure the tack supplier has provided training to the contractor on the installation procedures for this product. Make a technical representative from the supplier available at the request of the Engineer.

3. CONSTRUCTION.

3.1 Surface Preparation. Prior to the application of the non-tracking tack, ensure the pavement surface is thoroughly dry and free from dust or any other debris that would inhibit adhesion. Clean the surface by scraping, sweeping, and the use of compressed air. Ensure this preparation process occurs shortly before application to prevent the return of debris on to the pavement. If rain is expected within one hour after application, do not apply material. Apply material only when the surface is dry, and no precipitation is expected.

3.2 Non-tracking Tack Application. Placement of non-tracking tack is not permitted from October 1st to May 15th. When applying material, ensure the roadway temperature is a minimum of 40˚F and rising. Prior to application, demonstrate competence in applying the tack according to this note to the satisfaction of the Engineer. Heat the tack in the distributor to between 170 – 180 ˚F. After the initial heating, between 170 – 180 ˚F, the material may be sprayed between 165 ˚F and 180 ˚F. Do not apply outside this temperature range. Apply material at a minimum rate of 0.70 pounds (0.08 gallons) per square yard. Ensure full coverage of the material on the pavement surface. Full coverage of this material is critical. Increase material application rate if needed to achieve full coverage. Schedule the work so that, at the end of the day's production, all non-tracking tack is covered with the asphalt mixture. If for some reason the non-tracking tack cannot be covered by an asphalt mixture, ensure the non-tracking tack material is clean and reapply the non-tracking tack prior to placing the asphalt mixture. Do not heat material more than twice in one day.

3.3 Non-tracking Tack Certification. Furnish the tack certification to the Engineer stating the material conforms to all requirements herein prior to use.

3.4 Sampling and Testing. The Department will require a sample of non-tracking tack be taken from the distributor at a rate of one sample per 15,000 tons of mix. Take two 1 gallon samples of the heated material and forward the sample to the Division of Materials for testing within 7 days. Ensure the product temperature is between 170 and 180 °F at the time of sampling.

4. MEASUREMENT. The Department will measure the quantity of non-tracking tack in tons. The Department will not measure for payment any extra materials, labor, methods, equipment, or construction techniques used to satisfy the requirements of this note. The Department will not measure for payment any trial applications of non-tracking tack, the cleaning of the pavement surface, or furnishing and placing the non-tracking tack. The Department will consider all such items incidental to the non-tracking tack.

5. PAYMENT. The Department will pay for the non-tracking tack at the Contract unit bid price and apply an adjustment for each manufacturer's lot of material based on the degree of compliance as defined in the following schedule. Non-tracking tack will not be permitted for use from October 1st to May 15th. During this timeframe, the department will allow the use of an approved asphalt emulsion in lieu of a non-tracking tack product but will not adjust the unit bid price of the material. When a sample fails on two or more tests, the Department may add the deductions, but the total deduction will not exceed 100 percent.

Non-Tracking Tack Price Adjustment Schedule						
Test	Specification	100% Pay	90% Pay	80% Pay	50% Pay	0% Pay
Viscosity, SFS, 77 ˚ F	20 – 100	19 - 102	17 - 18 103 - 105	15 - 16 106 - 107	14 108 - 109	≤13 ≥ 110
Sieve, %	0.30 max.	≤ 0.40	0.41 - 0.50	0.51 - 0.60	0.61 - 0.70	≥ 0.71
Asphalt Residue, %	50 min.	≥49.0	48.5 – 48.9	48.0 – 48.4	47.5-47.9	≤ 47.4
Oil Distillate, %	1.0 max.	≤1.0	1.1-1.5	1.6 - 1.7	1.8-1.9	>2.0
Residue Penetration, 77 ° F.	30 max.	≤ 31	32 - 33	34 - 35	36 - 37	≥ 38
Original Dynamic Shear (G*/sin δ), 82 ˚ C	1.0 min.	≥0.95	0.92 – 0.94	0.90 – 0.91	0.85 - 0.89	≤ 0.84
Softening Point, º F	149 min.	≥145	142 - 144	140 - 141	138 - 139	≤ 137
Solubility, %	97.5 min.	≥ 97.0	96.8 – 96.9	96.6 – 96.7	96.4 – 96.5	≤ 96.3

Code	Pay Item	Pay Unit
24970EC	Asphalt Material for Tack Non-Tracking	Ton

Revised: May 23, 2022

SPECIAL NOTE FOR DOUBLE ASPHALT SEAL COAT

Use RS-2 or RS-2C asphalt material that is compatible with the seal aggregate. Apply the first course of asphalt seal coat at the rate of 3.2 lbs/sy of asphalt and 30 lbs/sy of size #78 seal coat aggregate. Apply the second course at 2.8 lbs/sy of asphaltt and 20 lbs/sy of size #9M seal coat aggregate. The Engineer may adjust the rate of application as conditions warrant. Use caution in applying liquid asphalt material to avoid over spray getting on curbs, gutter, barrier walls, bridges, guardrail, and other roadway appurtenances.

The Department will not measure any surface preparation required prior to applying the asphalt seal coat, but shall be incidental to “Asphalt Material for Asphalt Seal Coat”.

1-3215 Double Asphalt Seal Coat
01/02/2012

Special Note for Fixed Completion Date and

Liquidated Damages

Morgan County

Item No. 10-9017.00

Liquidated Damages in the amount specified in the Standard Specifications, per calendar day, will be assessed for each day work remains incomplete beyond the Specified Project Completion Date. This project has a Fixed Project Completion Date of August 15, 2025.

Lane closure will not be allowed after July 31, 2025. All work requiring lane closure(s) have to be completed prior to July 31, 2025.

Contrary to Section 106.09 of the current edition of the Standard Specifications for Road and Bridge Construction. If the contractor fails to reopen any lane closure to traffic by July 31, 2025, the contractor will be assessed liquidated damages of $5,000 per day while the lane closure is in effect.

All penalties or Liquidated Damages will be assessed cumulatively and charged concurrently when applicable.

TEAM KENTUCKY TRANSPORTATION CABINET

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY & UTILITIES

TC 62-226
Rev. 01/2016
Page 1 of 1

RIGHT OF WAY CERTIFICATION

☒ Original	☐ Re-Certification	RIGHT OF WAY CERTIFICATION	
ITEM #	**COUNTY**	**PROJECT # (STATE)**	**PROJECT # (FEDERAL)**
10-9017.00	Morgan	1100 FD04 088 1317601R	N/A
PROJECT DESCRIPTION			
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection to the entrance to Morgan County High			

☐ **No Additional Right of Way Required**

Construction will be within the limits of the existing right of way. The right of way was acquired in accordance to FHWA regulations under the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, as amended. No additional right of way or relocation assistance were required for this project.

☒ **Condition # 1 (Additional Right of Way Required and Cleared)**

All necessary right of way, including control of access rights when applicable, have been acquired including legal and physical possession. Trial or appeal of cases may be pending in court but legal possession has been obtained. There may be some improvements remaining on the right-of-way, but all occupants have vacated the lands and improvements, and KYTC has physical possession and the rights to remove, salvage, or demolish all improvements and enter on all land. Just Compensation has been paid or deposited with the court. All relocations have been relocated to decent, safe, and sanitary housing or that KYTC has made available to displaced persons adequate replacement housing in accordance with the provisions of the current FHWA directive.

☐ **Condition # 2 (Additional Right of Way Required with Exception)**

The right of way has not been fully acquired, the right to occupy and to use all rights-of-way required for the proper execution of the project has been acquired. Some parcels may be pending in court and on other parcels full legal possession has not been obtained, but right of entry has been obtained, the occupants of all lands and improvements have vacated, and KYTC has physical possession and right to remove, salvage, or demolish all improvements. Just Compensation has been paid or deposited with the court for most parcels. Just Compensation for all pending parcels will be paid or deposited with the court prior to AWARD of construction contract

☐ **Condition # 3 (Additional Right of Way Required with Exception)**

The acquisition or right of occupancy and use of a few remaining parcels are not complete and/or some parcels still have occupants. All remaining occupants have had replacement housing made available to them in accordance with 49 CFR 24.204. KYTC is hereby requesting authorization to advertise this project for bids and to proceed with bid letting even though the necessary right of way will not be fully acquired, and/or some occupants will not be relocated, and/or the just compensation will not be paid or deposited with the court for some parcels until after bid letting. KYTC will fully meet all the requirements outlined in 23 CFR 635.309(c)(3) and 49 CFR 24.102(j) and will expedite completion of all acquisitions, relocations, and full payments after bid letting and prior to AWARD of the construction contract or force account construction.

Total Number of Parcels on Project	3	**EXCEPTION (S) Parcel #**	**ANTICIPATED DATE OF POSSESSION WITH EXPLANATION**
Number of Parcels That Have Been Acquired		Parcel 1	Deed has been signed, anticipate check deliverey by 12/20/2024
Signed Deed	3		
Condemnation			
Signed ROE			

Notes/ Comments (Text is limited. Use additional sheet if necessary.)
Parcel 3 also has a sign to be moved by 1/20/2025

LPA RW Project Manager		Right of Way Supervisor	
Printed Name		Printed Name	Edgar Raleigh II
Signature		Signature	Edgar Raleigh II Digitally signed by Edgar Raleigh II Date: 2024.12.17 10:57:00 -05'00'
Date		Date	12/11/2024

Right of Way Director		FHWA	
Printed Name		Printed Name	
Signature	2024.12.17 13:32:16 -05'00'	Signature	
Date		Date	

TEAM KENTUCKY TRANSPORTATION CABINET

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY & UTILITIES

TC 62-226
Rev. 01/2016
Page 2 of 1

RIGHT OF WAY CERTIFICATION

UTILITIES AND RAIL CERTIFICATION NOTE

Morgan County
No federal number available
FD04 088 1317601U
Mile point: 14.600 TO 14.700
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection to the entrance to Morgan County High School. at Morgan County High School (2020BOP) (2021SCHSAF)
ITEM NUMBER: 10-9017.00

PROJECT NOTES ON UTILITIES

City of West Liberty has Water and Sewer facilities that will be relocated by the roadway contractor. Mountain Telephone facilities will be relocated prior to construction. Any work pertaining to these utility facilities is defined in the bid package and is to be carried out as instructed by the Kentucky Transportation Cabinet. The contractor will be responsible for any coordination or adjustments that are discussed or quantified in the proposal.

NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

Licking Valley RECC - Electric

The Contractor is fully responsible for protection of all utilities listed above

THE FOLLOWING FACILITY OWNERS ARE RELOCATING/ADJUSTING THEIR FACILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

Mountain Telephone Cooperative - Telephone, Completion date: 12/1/2023

UTILITIES AND RAIL CERTIFICATION NOTE

Morgan County
No federal number available
FD04 088 1317601U
Mile point: 14.600 TO 14.700
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection to the entrance to Morgan County High School. at Morgan County High School (2020BOP) (2021SCHSAF)
ITEM NUMBER: 10-9017.00

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE OWNER OR THEIR SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT

Not Applicable

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

City of West Liberty Water and Sewer.

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

☒ **No Rail Involvement** ☐ **Rail Involved** ☐ **Rail Adjacent**

Form Revised 6/24/16

UTILITIES AND RAIL CERTIFICATION NOTE

Morgan County
No federal number available
FD04 088 1317601U
Mile point: 14.600 TO 14.700
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection to the entrance to Morgan County High School. at Morgan County High School (2020BOP) (2021SCHSAF)
ITEM NUMBER: 10-9017.00

AREA FACILITY OWNER CONTACT LIST

Facility Owner	Address	Contact Name	Phone	Email
City of West Liberty - Sewer	565 Main Street West Liberty KY 41472	Joe Hinton	6063595319	WLiberty@mrtc.com
City of West Liberty - Water	565 Main Street West Liberty KY 41472	Kevin Cantrell	6067919822	WLiberty@mrtc.com
Licking Valley RECC - Electric	271 Main Street West Liberty Ky 41472	Wes McKinney	6067433179	wesm@lvrecc.com
Mountain Telephone Cooperative - Telephone	P.O. Box 399 West Liberty KY 41472	Steve Gullett	6067433121	sgullett@mountaintelephone.com

GENERAL UTILITY NOTES AND INSTRUCTIONS APPLICABLE TO ALL UTILITY WORK MADE A PART OF THE ROAD CONSTRUCTION CONTRACT

The contractor should be aware the following utility notes and KYTC Utility Bid Item Descriptions shall supersede, replace and take precedence over any and all conflicting information that may be contained in utility owner supplied specifications contained in the contract, on plans supplied by the utility owner, or any utility owner specifications or information externally referenced in this contract.

Where information may have been omitted from these notes, bid item descriptions, utility owner supplied specifications or plans; the KYTC Standard Specifications for Road and Bridge Construction shall be referenced.

PROTECTION OF EXISTING UTILITIES

The existing utilities shown on the plans are shown as best known at the time the plans were developed and are to be used as a guide only by the Contractor. The Contractor shall use all means at his disposal to accurately locate all existing utilities, whether shown on the plans or not, prior to excavation. The contractor shall protect these utilities during construction. Any damage to existing utilities during construction that are shown or not shown on the plans shall be repaired at the Contractor's expense.

PREQUALIFIED UTILITY CONTRACTORS

Some utility owners may require contractors that perform relocation work on their respective facilities as a part of the road contract be prequalified or preapproved by the utility owner**. Utility contractors may be added via addendum if KYTC is instructed to do so by the utility owner. Potential contractors must seek prequalification from the utility owner. Any revisions must be sent from the utility owner to KYTC a minimum of one week prior to bid opening.** Those utility owners with a prequalification or preapproval requirement are as follows:

> ***"No contractors are required to be prequalified or preapproved by the utility owner(s) to perform utility relocation work under this contract.")***

The bidding contractor needs to review the above list and choose from the list of approved subcontractors at the end of these general notes as identified above before bidding. When the list of approved subcontractors is provided, only subcontractors shown on the following list(s) will be allowed to work on that utility as a part of this contract. In such instances, the utility subcontractor is not required to be prequalified with the KYTC Division of Construction Procurement.

IF A UTILITY SUPPLIED CONTRACTOR LIST IS NOT PROVIDED

When the above list of approved subcontractors for the utility work is not provided, the utility work can be completed by the prime contractor, or a prime contractor-chosen subcontractor. In such instances, the subcontractor shall be prequalified with the KYTC Division of Construction Procurement in the work type of "Utilities" (I33). Those who would like to become prequalified may contact the Division of Construction Procurement at (502) 564-3500. Please note: it could take up to 30 calendar days for prequalification to be approved. The prequalification does not have to be approved prior to the bid, but must be approved before the subcontract will be approved by KYTC and the work can be performed.

CONTRACT ADMINISTRATION RELATIVE TO UTILITY WORK

All utility work is being performed as a part of a contract administered by KYTC; there is not a direct contract between the utility contractor and utility owner. The KYTC Section Engineer is ultimately responsible for the administration of the road contract and any utility work included in the contract.

SUBMITTALS AND CORRESPONDENCE

All submittals and correspondence of any kind relative to utility work included in the road contract shall be directed to the KYTC Section Engineer, a copy of which may also be supplied to the utility owner by the contractor to expedite handling of items like material approvals and shop drawings. All approvals and correspondence generated by the utility owner shall be directed to the KYTC Section Engineer. The KYTC Section Engineer will relay any approvals or correspondence to the utility contractor as appropriate. At no time shall any direct communication between the utility owner and utility contractor without the communication flowing through the KYTC Section Engineer be considered official and binding under the contract.

ENGINEER

Where the word "Engineer" appears in any utility owner specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet (KYTC) Section Engineer or designated representative and the utility owner engineer or designated representative jointly. Both engineers must mutually agree upon all decisions made with regard to the utility construction. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

INSPECTOR OR RESIDENT PROJECT REPRESENTATIVE

Where the word "Inspector" or "Resident Project Representative" appears in the utility specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Inspector" or "Resident Project Representative" is the utility owner inspector and KYTC inspector jointly. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

NOTICE TO UTILITY OWNERS OF THE START OF WORK

One month before construction is to start on a utility, the utility contractor shall make notice to the KYTC Section Engineer and the utility owner of when work on a utility is anticipated to start. The utility contractor shall again make confirmation notice to the KYTC Section Engineer and the utility owner one week before utility work is to actually start.

UTILITY SHUTDOWNS

The Contractor shall not shut down any active and in-service mains, utility lines or services for any reason unless specifically given permission to do so by the utility owner. The opening and closing of valves and operating of other active utility facilities for main, utility line or utility service shut downs are to be performed by the utility owner unless specific permission is given to the contractor by the owner to make shutdowns . If and when the utility owner gives the contractor permission to shutdown mains, utility lines or utility services, the contractor shall do so following the rules, procedures and regulations of the utility owner. Any permission given by the utility owner to the contractor to shutdown active and in-service mains, utility lines or services shall be communicated to the KYTC Section Engineer by the utility owner that such permission has been given.

Notice to customers of utility shut downs is sometimes required to be performed by the utility contractor. The contractor may be required; but, is not limited to, making notice to utility customers in a certain minimum amount of time in advance of the shut down and by whatever means of communication specified by the utility owner. The means of communication to the customer may be; but is not limited to, a door hanger, notice by newspaper ad, telephone contact, or any combination of communication methods deemed necessary, customary and appropriate by the utility owner. The contractor should refer to the utility owner specifications for requirements on customer notice.

Any procedure the utility owner may require the contractor to perform by specification or plan note and any expense the contractor may incur to comply with the utility owner's shut down procedure and notice to customers shall be considered an incidental expense to the utility construction.

CUSTOMER SERVICE AND LATERAL ABANDONMENTS When temporary or permanent abandonment of customer water, gas, or sewer services or laterals are necessary during relocation of utilities included in the contract, the utility contractor shall perform these abandonments as part of the contract as incidental work. No separate payment will be made for service line and lateral abandonments. The contractor shall provide all labor, equipment and materials to accomplish the temporary or permanent abandonment in accordance with the plans, specifications and/or as directed by the engineer. Abandonment may include, but is not limited to, digging down on a water or gas main at the tap to turn off the tap valve or corporation stop and/or capping or plugging the tap, digging down on a sewer tap at the main and plugging or capping the tap, digging down on a service line or lateral at a location shown on the plans or agreeable to the engineer and capping or plugging, or performing any other work necessary to abandon the service or lateral to satisfactorily accomplish the final utility relocation.

STATIONS AND DISTANCES

All stations and distances, when indicated for utility placement in utility relocation plans or specifications, are approximate; therefore, some minor adjustment may have to be made during construction to fit actual field conditions. Any changes in excess of 6 inches of plan location shall be reviewed and approved jointly by the KYTC Section Engineer or designated representative and utility owner engineer or designated representative. Changes in location without prior approval shall be remedied by the contractor at his own expense if the unauthorized change creates an unacceptable conflict or condition.

RESTORATION

Temporary and permanent restoration of paved or stone areas due to utility construction shall be considered incidental to the utility work. No separate payment will be made for this work. Temporary restoration shall be as directed by the KYTC Section Engineer. Permanent restoration shall be "in-kind" as existing.

Restoration of seed and sod areas will be measured and paid under the appropriate seeding and sodding bid items established in the contract for roadway work.

BELOW ARE NOTES FOR WHEN "INST" ITEMS ARE IN THE CONTRACT MEANING THE UTILITY COMPANY IS PROVIDING CERTAIN MATERIALS FOR UTILITY RELOCATION

MATERIAL

Contrary to Utility Bid Item Descriptions, those bid items that have the text **"Inst"** at the end of the bid item will have the major components of the bid item provided by the utility owner. No direct payment will be made for the major material component(s) supplied by the utility company. All remaining materials required to construct the bid item as detailed in utility bid item descriptions, in utility specifications and utility plans that are made a part of this contract will be supplied by the contractor. The contractor's bid price should reflect the difference in cost due to the provided materials.

The following utility owners have elected to provide the following materials for work under this contract:

"No materials are being supplied by the utility owner(s). All materials are to be supplied by the contractor per bid item descriptions, utility specifications and utility plans."

SECURITY OF SUPPLIED MATERIALS

If any utility materials are to be supplied by the utility owner, it will be the responsibility of the utility contractor to secure all utility owner supplied materials after delivery to the project site. The utility contractor shall coordinate directly with the utility owner and their suppliers for delivery and security of the supplied materials. Any materials supplied by the utility owner and delivered to the construction site that are subsequently stolen, damaged or vandalized and deemed unusable shall be replaced with like materials at the contractor's expense.

Kentucky Transportation Cabinet

Highway District 10

And

_____(2), Construction

Kentucky Pollutant Discharge Elimination System Permit KYR10 Best Management Practices (BMP) plan

Groundwater protection plan

For Highway Construction Activities

For KYTC SYP #10-9017.00

[Construct dedicated right turn lane from US 460 to entrance to Morgan County High School]

Project: PCN ## -

Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – Kentucky Transportation Cabinet, District _10_

2. Resident Engineer: (2)

3. Contractor name: (2)
   Address: (2)

   Phone number: (2)
   Contact: (2)
   Contractors agent responsible for compliance with the KPDES permit requirements (3):

4. Project Control Number (2)

5. Route (Address) KY 191 from US 460 intersection to the Morgan County High School Entrance.

6. Latitude/Longitude (project mid-point) 37°53'51", -83°17'07" (1)

7. County (project mid-point) Morgan (1)

8. Project start date (date work will begin): (2)

9. Projected completion date: (2)

A. Site description:

1. Nature of Construction Activity (from letting project description)
   Roadway widening/improvement along KY 191 from intersection of US 460 to entrance to high school. Excavation and embankment and constructing of culvert pipes and pavement. (1)

2. Order of major soil disturbing activities (2) and (3)

3. Projected volume of material to be moved
   1480 cubic yards to be placed. (1)

4. Estimate of total project area (acres) Approximately 1.6 acre (1)

5. Estimate of area to be disturbed (acres) Approximately 1.5 acre (1)

6. Post construction runoff coefficient will be included in the project drainage folder. Persons needing information pertaining to the runoff coefficient will contact the resident engineer to request this information.

7. Data describing existing soil condition (2)

8. Data describing existing discharge water quality (if any) (1) & (2)

9. Receiving water name Caney Creek

10. TMDLs and Pollutants of Concern in Receiving Waters: (1 DEA)

11. Site map – Project layout sheet plus the erosion control sheets in the project plans that depict Disturbed Drainage Areas (DDAs) and related information. These sheets depict the existing project conditions with areas delineated by DDA (drainage area bounded by watershed breaks and right of way limits), the storm water discharge locations (either as a point discharge or as overland flow) and the areas that drain to each discharge point. These plans define the limits of areas to be disturbed and the location of control measures. Controls will be either site specific as designated by the designer or will be annotated by the contractor and resident engineer before disturbance commences. The project layout sheet shows the surface waters and wetlands.

12. Potential sources of pollutants:

The primary source of pollutants is solids that are mobilized during storm events. Other sources of pollutants include oil/fuel/grease from servicing and operating construction equipment, concrete washout water, sanitary wastes and trash/debris. (3)

B. Sediment and Erosion Control Measures:

KyTC BMP Plan for Project PCN ## - ####

1. Plans for highway construction projects will include erosion control sheets that depict Disturbed Drainage Areas (DDAs) and related information. These plan sheets will show the existing project conditions with areas delineated by DDA within the right of way limits, the discharge points and the areas that drain to each discharge point. Project managers and designers will analyze the DDAs and identify Best Management Practices (BMPs) that are site specific. The balance of the BMPs for the project will be listed in the bid documents for selection and use by the contractor on the project with approval by the resident engineer.

   Projects that do not have DDAs annotated on the erosion control sheets will employ the same concepts for development and managing BMP plans.

2. Following award of the contract, the contractor and resident engineer will annotate the erosion control sheets showing location and type of BMPs for each of the DDAs that will be disturbed at the outset of the project. This annotation will be accompanied by an order of work that reflects the order or sequence of major soil moving activities. The remaining DDAs are to be designated as “Do Not Disturb” until the contractor and resident engineer prepare the plan for BMPs to be employed. The initial BMP’s shall be for the first phase (generally Clearing and Grubbing) and shall be modified as needed as the project changes phases. The BMP Plan will be modified to reflect disturbance in additional DDA’s as the work progresses. <u>All DDA’s will have adequate BMP’s in place before being disturbed.</u>

3. As DDAs are prepared for construction, the following will be addressed for the project as a whole or for each DDA as appropriate:

   - Construction Access – This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary mulch and/or vegetation.
   - At the beginning of the project, all DDAs for the project will be inspected for areas that are a source of storm water pollutants. Areas that are a source of pollutants will receive appropriate cover or BMPs to arrest the introduction of pollutants into storm water. Areas that have not been opened by the contractor will be inspected periodically (once per month) to determine if there is a need to employ BMPs to keep pollutants from entering storm water.
   - Clearing and Grubbing – The following BMP’s will be considered and used where appropriate.
     - Leaving areas undisturbed when possible.
     - Silt basins to provide silt volume for large areas.

- Silt Traps Type A for small areas.
- Silt Traps Type C in front of existing and drop inlets which are to be saved
- Diversion ditches to catch sheet runoff and carry it to basins or traps or to divert it around areas to be disturbed.
- Brush and/or other barriers to slow and/or divert runoff.
- Silt fences to catch sheet runoff on short slopes. For longer slopes, multiple rows of silt fence may be considered.
- Temporary Mulch for areas which are not feasible for the fore mentioned types of protections.
- Non-standard or innovative methods.

➢ Cut & Fill and placement of drainage structures - The BMP Plan will be modified to show additional BMP's such as:
- Silt Traps Type B in ditches and/or drainways as they are completed
- Silt Traps Type C in front of pipes after they are placed
- Channel Lining
- Erosion Control Blanket
- Temporary mulch and/or seeding for areas where construction activities will be ceased for 21 days or more.
- Non-standard or innovative methods

➢ Profile and X-Section in place – The BMP Plan will be modified to show elimination of BMP's which had to be removed and the addition of new BMP's as the roadway was shaped. Probably changes include:
- Silt Trap Type A, Brush and/or other barriers, Temporary Mulch, and any other BMP which had to be removed for final grading to take place.
- Additional Silt Traps Type B and Type C to be placed as final drainage patterns are put in place.
- Additional Channel Lining and/or Erosion Control Blanket.
- Temporary Mulch for areas where Permanent Seeding and Protection cannot be done within 21 days.
- Special BMP's such as Karst Policy

➢ Finish Work (Paving, Seeding, Protect, etc.) – A final BMP Plan will result from modifications during this phase of construction. Probably changes include:
- Removal of Silt Traps Type B from ditches and drainways if they are protected with other BMP's which are sufficient to control erosion, i.e. Erosion Control Blanket or Permanent Seeding and Protection on moderate grades.
- Permanent Seeding and Protection
- Placing Sod
- Planting trees and/or shrubs where they are included in the project

- BMP's including Storm Water Management Devices such as velocity dissipation devices and Karst policy BMP's to be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed are : (1)

C. Other Control Measures

1. No solid materials, including building materials, shall be discharged to waters of the commonwealth, except as authorized by a Section 404 permit.

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease containers, liquids of any kind, soluble materials, etc.) will be collected and stored in appropriate covered waste containers. Waste containers shall be removed from the project site on a sufficiently frequent basis as to not allow wastes to become a source of pollution. All personnel will be instructed regarding the correct procedure for waste disposal. Wastes will be disposed in accordance with appropriate regulations. Notices stating these practices will be posted in the office.

2. Hazardous Waste

All hazardous waste materials will be managed and disposed of in the manner specified by local or state regulation. The contractor shall notify the Resident Engineer if there any hazardous wastes being generated at the project site and how these wastes are being managed. Site personnel will be instructed with regard to proper storage and handling of hazardous wastes when required. The Transportation Cabinet will file for generator, registration when appropriate, with the Division of Waste Management and advise the contractor regarding waste management requirements.

3. Spill Prevention

The following material management practices will be used to reduce the risk of spills or other exposure of materials and substances to the weather and/or runoff.

- **Good Housekeeping:**

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job

- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite

➢ **Hazardous Products:**

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- Contractor will follow procedures recommended by the manufacturer when handling hazardous materials
- If surplus product must be disposed of, manufacturers' or state/local recommended methods for proper disposal will be followed

The following product-specific practices will be followed onsite:

➢ **Petroleum Products:**

Vehicles and equipment that are fueled and maintained on site will be monitored for leaks, and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products onsite will be stored in tightly sealed containers, which are clearly labeled and will be protected from exposure to weather.

The contractor shall prepare an Oil Pollution Spill Prevention Control and Countermeasure plan when the project that involves the storage of petroleum products in 55 gallon or larger containers with a total combined storage capacity of 1,320 gallons. This is a requirement of 40 CFR 112.

This project (will / will not) (3) have over 1,320 gallons of petroleum products with a total capacity, sum of all containers 55 gallon capacity and larger.

- **Fertilizers:**

Fertilizers will be applied at rates prescribed by the contract, standard specifications or as directed by the resident engineer. Once applied, fertilizer will be covered with mulch or blankets or worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

- **Paints:**

All containers will be tightly sealed and stored indoors or under roof when not being used. Excess paint or paint wash water will not be discharged to the drainage or storm sewer system but will be properly disposed of according to manufacturers' instructions or state and local regulations.

- **Concrete Truck Washout:**

Concrete truck mixers and chutes will not be washed on pavement, near storm drain inlets, or within 75 feet of any ditch, stream, wetland, lake, or sinkhole. Where possible, excess concrete and wash water will be discharged to areas prepared for pouring new concrete, flat areas to be paved that are away from ditches or drainage system features, or other locations that will not drain off site. Where this approach is not possible, a shallow earthen wash basin will be excavated away from ditches to receive the wash water

- **Spill Control Practices**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup**:**

- Manufacturers' recommended methods for spill cleanup will be clearly posted. All personnel will be made aware of procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area. Equipment and materials will include as appropriate, brooms, dust pans, mops, rags, gloves, oil absorbents, sand, sawdust, and plastic and metal trash containers.
- All spills will be cleaned up immediately after discovery.
- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contract with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state/local agency as required by KRS 224 and applicable federal law.
- The spill prevention plan will be adjusted as needed to prevent spills from reoccurring and improve spill response and cleanup.

- Spills of products will be cleaned up promptly. Wastes from spill clean up will be disposed in accordance with appropriate regulations.

D. Other State and Local Plans

This BMP plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials. Upon submittal of the NOI, other requirements for surface water protection are incorporated by reference into and are enforceable under this permit (even if they are not specifically included in this BMP plan). This provision does not apply to master or comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit issued for the construction site by state or local officials. (1)

E. Maintenance

1. The BMP plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.

- Maintenance of BMPs during construction shall be a result of weekly and post rain event inspections with action being taken by the contractor to correct deficiencies.

- Post Construction maintenance will be a function of normal highway maintenance operations. Following final project acceptance by the cabinet, district highway crews will be responsible for identification and correction of deficiencies regarding ground cover and cleaning of storm water BMPs. The project manager shall identify any BMPs that will be for the purpose of post construction storm water management with specific guidance for any non-routine maintenance. (1)

F. Inspections

Inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.

- Inspections will be conducted by individuals that have successfully completed the KEPSC-RI course as required by Section 213.02.02 of the Standard Specifications for Road and Bridge Construction, current edition.
- Inspection reports will be written, signed, dated, and kept on file.
- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 70 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

G. Non – Storm Water discharges

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

- Water from water line flushings.
- Water form cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

H. Groundwater Protection Plan (3)

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

_____ 2. (e) land treatment or land disposal of a pollutant;

_____ 2. (f) Storing, …, or related handling of hazardous waste, solid waste or special waste, …, in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

_____ 2. (g) …. Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

_____ 2. (j) Storing or related handling of road oils, dust suppressants, …., at a central location;

_____ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

_____ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

Or, check the following only if there are no qualifying activities

_____ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

The contractor is responsible for the preparation of a plan that addresses the

KyTC BMP Plan for Project PCN ## - ####

401 KAR 5:037 Section 3. (3) Elements of site specific groundwater protection plan:

(a) General information about this project is covered in the Project information;
(b) Activities that require a groundwater protection plan have been identified above;
(c) Practices that will protect groundwater from pollution are addressed in section C. Other control measures.
(d) Implementation schedule – all practices required to prevent pollution of groundwater are to be in place prior to conducting the activity;
(e) Training is required as a part of the ground water protection plan. All employees of the contractor, sub-contractor and resident engineer personnel will be trained to understand the nature and requirements of this plan as they pertain to their job function(s). Training will be accomplished within one week of employment and annually thereafter. A record of training will be maintained by the contractor with a copy provide to the resident engineer.
(f) Areas of the project and groundwater plan activities will be inspected as part of the weekly sediment and erosion control inspections
(g) Certification (see signature page.)

KyTC BMP Plan for Project PCN ## -

Contractor and Resident Engineer Plan certification

The contractor that is responsible for implementing this BMP plan is identified in the Project Information section of this plan.

The following certification applies to all parties that are signatory to this BMP plan:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Further, this plan complies with the requirements of 401 KAR 5:037. By this certification, the undersigned state that the individuals signing the plan have reviewed the terms of the plan and will implement its provisions as they pertain to ground water protection.

Resident Engineer and Contractor Certification:

(2) Resident Engineer signature

Signed _____title_____, _____
Typed or printed name[2] signature

(3) Signed _____title_____, _____
Typed or printed name[1] signature

1. Contractors Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

2. KyTC note: to be signed by the Chief District Engineer or a person designated to have the authority to sign reports by such a person (usually the resident engineer) in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601 Reference the Project Control Number (PCN) and KPDES number when one has been issued.

Sub-Contractor Certification

The following sub-contractor shall be made aware of the BMP plan and responsible for implementation of BMPs identified in this plan as follows:

Subcontractor

Name:
Address:
Address:

Phone:

The part of BMP plan this subcontractor is responsible to implement is:

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System permit that authorizes the storm water discharges, the BMP plan that has been developed to manage the quality of water to be discharged as a result of storm events associated with the construction site activity and management of non-storm water pollutant sources identified as part of this certification.

Signed _____title_____, _____
Typed or printed name[1] signature

1. Sub Contractor Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

SPECIAL NOTE

Filing of eNOI for KPDES Construction Stormwater Permit

County: Morgan **Route: US 460**

Item No.: 10-9017.00 **KDOW Submittal ID: 472195**

Project Description: Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection.

A Notice of Intent for obtaining coverage under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Stormwater Discharges Associated with Construction Activities (KYR10) has been drafted, copy of which is attached. Upon award, the Contractor will be identified in Section III of the form as the "Building Contractor" and it will be submitted for approval to the Kentucky Division of Water. The Contractor shall be responsible for advancing the work in a manner that is compliant with all applicable and appropriate KYTC specifications for sediment and erosion control as well as meeting the requirements of the KYR10 permit and the KDOW.

Upon award of the project, the appropriate District Project Delivery & Preservation Branch is Responsible for providing the eNOI preparer (Brandy Fletcher) with the Contractor's name, address and CID #. The project eNOI preparer is responsible for completing and submitting the eNOI document.

The eNOI preparer will notify the appropriate Project Delivery & Preservation Branch when the NOI is approved. The approved NOI will be placed in Site Manager. This will need to be accomplished prior to any on-site work.

This note confirms with the Joint Design (05-2017)/Construction (02-2017) Memorandum issued on March 28, 2017.

If there are any questions regarding this note, please contact Danny Peake, Director, Division of Environmental Analysis, TCOB, 200 Mero Street, Frankfort, KY 40622, Phone: (502) 564-7250.

EROSION CONTROL NOTES

ALL SILT CONTROL DEVICES SHALL BE SIZED TO RETAIN A VOLUME OF 3,600 CUBIC FEET PER DISTURBED CONTRIBUTING ACRE.

THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS TO MINIMIZE THE AMOUNT OF DISTURBED GROUND DURING EACH PHASE OF CONSTRUCTION. THE CONTRACTOR SHALL COMPUTE THE VOLUME NECESSARY TO CONTROL SEDIMENT DURING EACH PHASE OF CONSTRUCTION. AS WORK PROCEEDS, SILT TRAPS MAY BE ADDED OR REMOVED IN ORDER TO ACHIEVE THE BEST MANAGEMENT PLAN. THE REQUIRED VOLUME AT EACH ADDED SILT TRAP SHALL BE COMPUTED AS UP GRADIENT CONTRIBUTING AREAS ARE DISTURBED OR ARE STABILIZED TO THE SATISFACTION OF THE ENGINEER. THE REQUIRED VOLUME CALCULATION FOR EACH SILT TRAP SHALL BE DETERMINED BY THE CONTRACTOR AND VERIFIED BY THE ENGINEER. THE REQUIRED VOLUME AT EACH SILT TRAP MAY BE REDUCED BY THE FOLLOWING AMOUNTS:

- UPGRADIENT AREAS NOT DISTURBED (ACRES).
- UPGRADIENT AREAS THAT HAVE BEEN RECLAIMED AND PROTECTED BY EROSION CONTROL BLANKET OR OTHER GROUND PROTECTION MATERIAL SUCH AS TEMPORARY MULCH.(ACRES).
- THE USE OF TEMPORARY MULCH IS ENCOURAGED.
- UPGRADIENT AREAS THAT HAVE BEEN PROTECTED BY SILT FENCE (ACRES). AREAS PROTECTED BY SILT FENCE SHALL BE COMPUTED AT A MAXIMUM RATE OF 100 SQUARE FOOT PER LINEAR FOOT OF SILT FENCE.
- UPGRADIENT AREAS THAT HAVE BEEN PROTECTED BY SILT TRAPS (ACRES).

THE EROSION CONTROL PLAN SHALL BE ANNOTATED AS THE WORK PROCEEDS BY THE CONTRACTOR TO DETAIL THE SELECTION OF EACH EROSION CONTROL DEVICE USED AND THE VOLUME PROVIDED BY EACH SILT TRAP IN ACCORDANCE WITH THE DOCUMENTATION PROCEDURES ESTABLISHED BY THE DIVISION OF CONSTRUCTION.

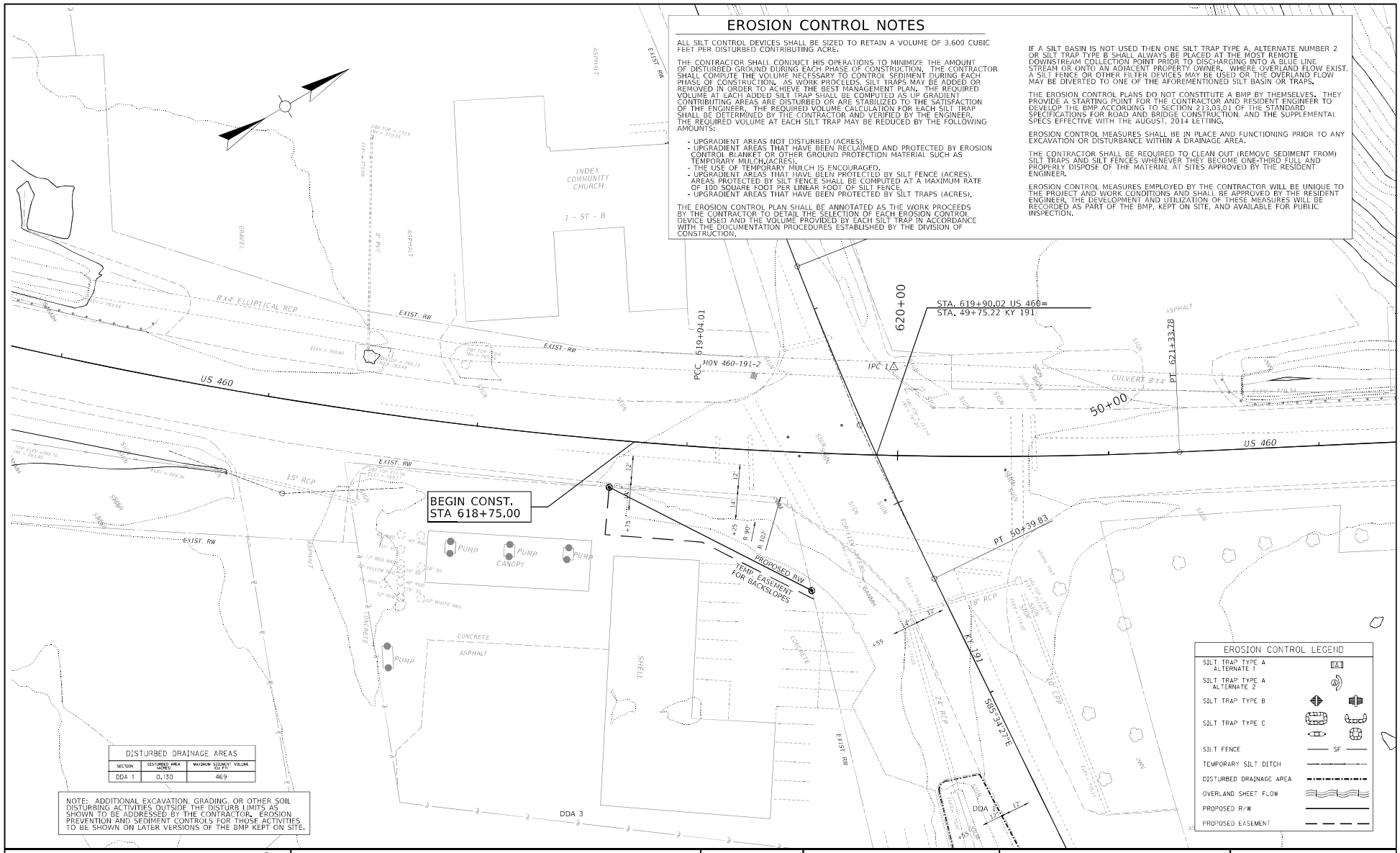
IF A SILT BASIN IS NOT USED THEN ONE SILT TRAP TYPE A, ALTERNATE NUMBER 2 OR SILT TRAP TYPE B SHALL ALWAYS BE PLACED AT THE MOST REMOTE DOWNSTREAM COLLECTION POINT PRIOR TO DISCHARGING INTO A BLUE LINE STREAM OR ONTO AN ADJACENT PROPERTY OWNER, WHERE OVERLAND FLOW EXIST. A SILT FENCE OR OTHER FILTER DEVICES MAY BE USED OR THE OVERLAND FLOW MAY BE DIVERTED TO ONE OF THE AFOREMENTIONED SILT BASIN OR TRAPS.

THE EROSION CONTROL PLANS DO NOT CONSTITUTE A BMP BY THEMSELVES. THEY PROVIDE A STARTING POINT FOR THE CONTRACTOR AND RESIDENT ENGINEER TO DEVELOP THE BMP ACCORDING TO SECTION 213.03.01 OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AND THE SUPPLEMENTAL SPECS EFFECTIVE WITH THE AUGUST, 2014 LETTING.

EROSION CONTROL MEASURES SHALL BE IN PLACE AND FUNCTIONING PRIOR TO ANY EXCAVATION OR DISTURBANCE WITHIN A DRAINAGE AREA.

THE CONTRACTOR SHALL BE REQUIRED TO CLEAN OUT (REMOVE SEDIMENT FROM) SILT TRAPS AND SILT FENCES WHENEVER THEY BECOME ONE-THIRD FULL AND PROPERLY DISPOSE OF THE MATERIAL AT SITES APPROVED BY THE RESIDENT ENGINEER.

EROSION CONTROL MEASURES EMPLOYED BY THE CONTRACTOR WILL BE UNIQUE TO THE PROJECT AND WORK CONDITIONS AND SHALL BE APPROVED BY THE RESIDENT ENGINEER. THE DEVELOPMENT AND UTILIZATION OF THESE MEASURES WILL BE RECORDED AS PART OF THE BMP, KEPT ON SITE, AND AVAILABLE FOR PUBLIC INSPECTION.



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

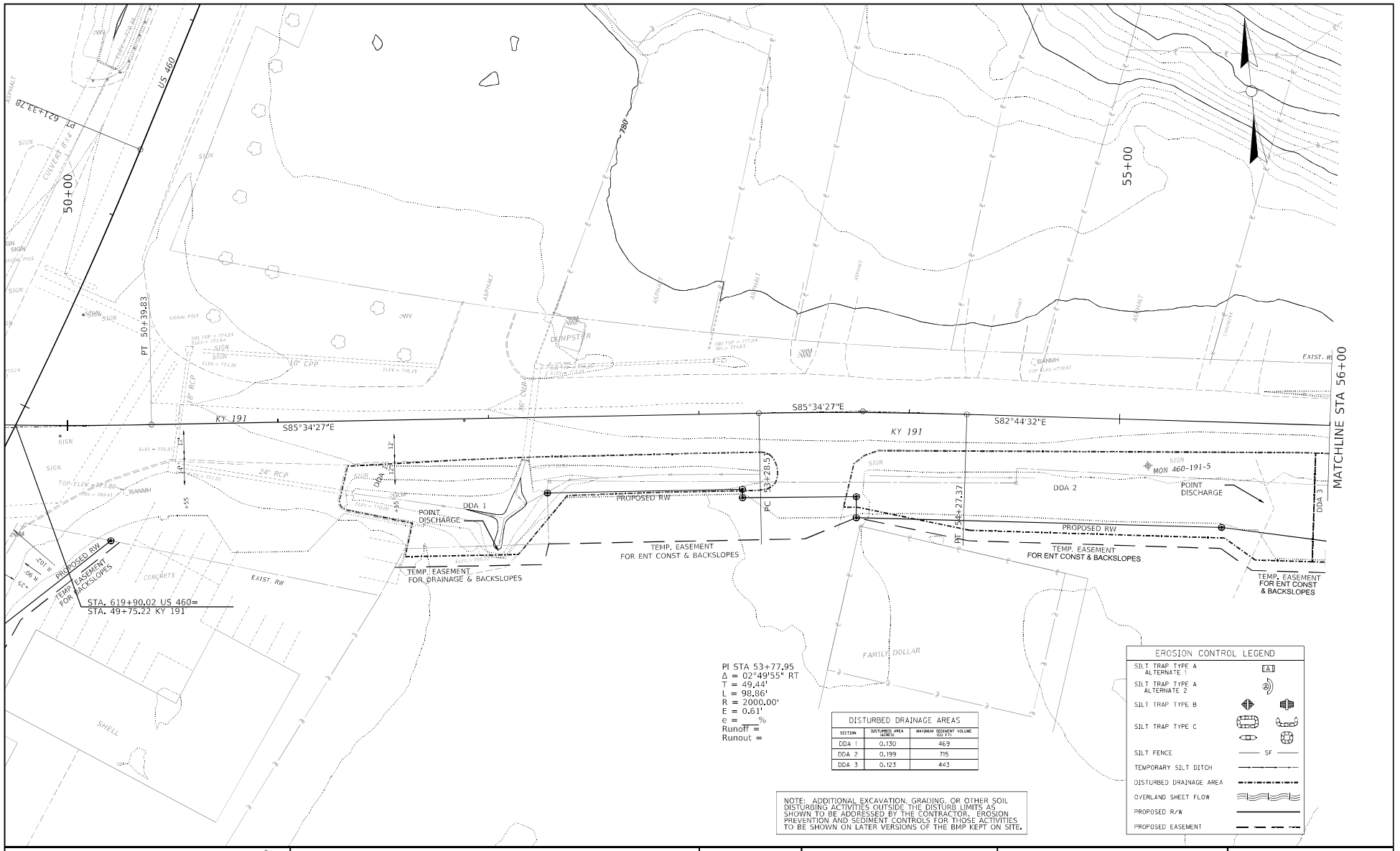
DRAWING TITLE: MORGAN EROSION CONTROL PLAN SHEET

HORIZONTAL SCALE
SCALE: 1" = 20'
0' 20' 40' 80'

STA 616+00 TO 622+00

ITEM NO. 10-9017.00
COUNTY OF Morgan
SHEET NO. R20

OpenRoads Designer v10.16.2.267 USER: travis-m DATE PLOTTED: 4/25/2023 2:54:25 PM FILE NAME: C:\PW_WORKDIR\D0120970\10_9017_00_R_EROSION_CONTROL_PLAN.DGN



COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

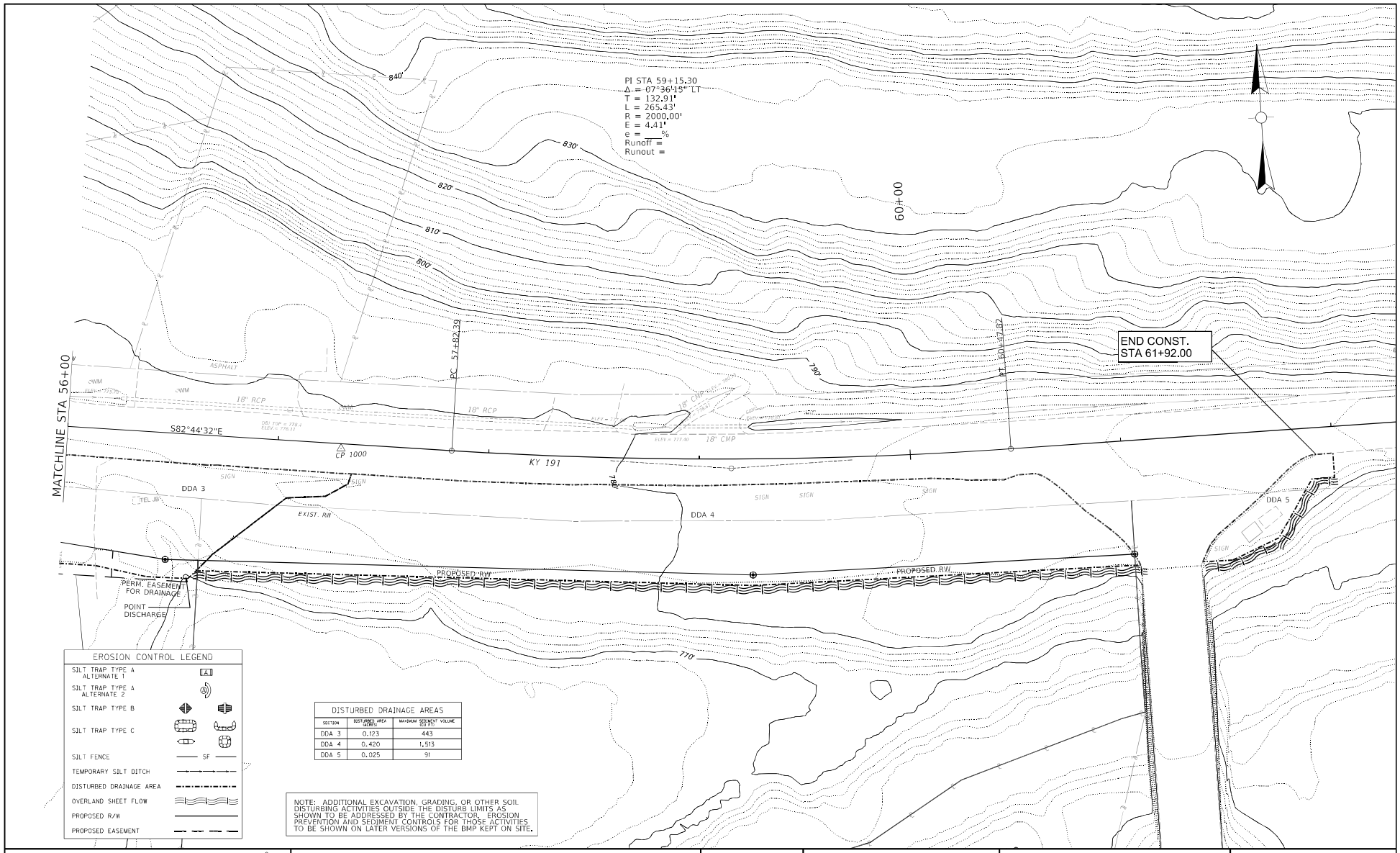
DRAWING TITLE: MORGAN EROSION CONTROL PLAN SHEET

HORIZONTAL SCALE
SCALE: 1" = 20'
0' 20' 40' 80'

STA 49+75.22 TO 56+00

ITEM NO. 10-9017.00
COUNTY OF Morgan
SHEET NO. R21

OpenRoads Designer v10.16.0.80 USER: travis-m DATE PLOTTED: 4/3/2023 5:03:31 PM FILE NAME: C:\PW_WORKDIR\D0120970\10_9017_00_R_EROSION_CONTROL_PLAN.DGN


PI STA 59+15.30
Δ = 07°36'15" LT
T = 132.91'
L = 265.43'
R = 2000.00'
E = 4.41'
e = ___%
Runoff =
Runout =
60+00
PC 57+82.39
PT 60+47.82
END CONST.
STA 61+92.00
MATCHLINE STA 56+00
S82°44'32"E
CP 1000
KY 191
DDA 3
DDA 4
DDA 5
EXIST. RW
PROPOSED RW
PERM. EASEMENT FOR DRAINAGE
POINT OF DISCHARGE
18" RCP
18" CMP
ASPHALT
SIGN
840'
830'
820'
810'
800'
790'
780'
770'
EROSION CONTROL LEGEND
SILT TRAP TYPE A ALTERNATE 1
SILT TRAP TYPE A ALTERNATE 2
SILT TRAP TYPE B
SILT TRAP TYPE C
SILT FENCE
TEMPORARY SILT DITCH
DISTURBED DRAINAGE AREA
OVERLAND SHEET FLOW
PROPOSED R/W
PROPOSED EASEMENT
DISTURBED DRAINAGE AREAS
SECTION | DISTURBED AREA (ACRES) | MAXIMUM SEDIMENT VOLUME (CU FT)
DDA 3 | 0.123 | 443
DDA 4 | 0.420 | 1,513
DDA 5 | 0.025 | 91
NOTE: ADDITIONAL EXCAVATION, GRADING, OR OTHER SOIL DISTURBING ACTIVITIES OUTSIDE THE DISTURB LIMITS AS SHOWN TO BE ADDRESSED BY THE CONTRACTOR. EROSION PREVENTION AND SEDIMENT CONTROLS FOR THOSE ACTIVITIES TO BE SHOWN ON LATER VERSIONS OF THE BMP KEPT ON SITE.
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
DRAWING TITLE: MORGAN EROSION CONTROL PLAN SHEET
HORIZONTAL SCALE
SCALE: 1" = 20'
0' 20' 40' 80'
STA 56+00 TO 61+92
ITEM NO. 10-9017.00
COUNTY OF Morgan
SHEET NO. R22
OpenRoads Designer v10.16.2.267
USER: travis-m
DATE PLOTTED: 10/3/2024 3:18:54 PM
FILE NAME: C:\PW_WORKDIR\D0120970\10_9017_00_R_EROSION_CONTROL_PLAN.DGN

KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)

Notice of Intent (NOI) for coverage of Storm Water Discharge Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000

Click here for Instructions (Controls/KPDES_FormKYR10_Instructions.htm)

Click here to obtain information and a copy of the KPDES General Permit. (https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Documents/KYR10PermitPage.pdf)

(*) indicates a required field; (✓) indicates a field may be required based on user input or is an optionally required field

Reason for Submittal:(*)	Agency Interest ID:	Permit Number:(✓)
Application for New Permit Coverage	Agency Interest ID	KPDES Permit Number

If change to existing permit coverage is requested, describe the changes for which modification of coverage is being sought:(✓)

ELIGIBILITY:
Stormwater discharges associated with construction activities disturbing individually one (1) acre or more, including, in the case of a common plan of development, contiguous construction activities that cumulatively equal one (1) acre or more of disturbance.

EXCLUSIONS:
The following are excluded from coverage under this general permit:
1) Are conducted at or on properties that have obtained an individual KPDES permit for the discharge of other wastewaters which requires the development and implementation of a Best Management Practices (BMP) plan;
2) Any operation that the DOW determines an individual permit would better address the discharges from that operation;
3) Any project that discharges to an Impaired Water listed in the most recent Integrated Report, §305(b) as impaired for sediment and for which an approved TMDL has been developed.

SECTION I -- FACILITY OPERATOR INFORMATION (PERMITTEE)

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
Kentucky Transportation Cabinet	Corbett	MI	Caudill

Mailing Address:(*)	City:(*)	State:(*)	Zip:(*)
Corbett.Caudill@ky.gov	Jackson	Kentucky	41339

eMail Address:(*)	Business Phone:(*)	Alternate Phone:
Corbett.Caudill@ky.gov	6066668841	Phone

SECTION II -- GENERAL SITE LOCATION INFORMATION

Project Name:(*)	Status of Owner/Operator(*)	SIC Code(*)
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection	State Government	1611 Highway and Street Constr

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
Kentucky Transportation Cabinet	Corbett	MI	Caudill

Site Physical Address:(*)
US 460

City:(*)	State:(*)	Zip:(*)
West Liberty	Kentucky	41472

County:(*)	Latitude(decimal degrees)(*)DMS to DD Converter (https://www.fcc.gov/media/radio/dms-decimal)	Longitude(decimal degrees)(*)
Morgan	37.897298	83.2845336

SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION

Project Description:(*)
Constructing a dedicated right-turn lane from the US 460 and KY 191 intersection

a. For single projects provide the following information

Total Number of Acres in Project:(✓) Project Acres	Total Number of Acres Disturbed:(✓) Disturbed Acres
Anticipated Start Date:(✓)	Anticipated Completion Date:(✓)

b. For common plans of development provide the following information

Total Number of Acres in Project:(✓) # Acre(s)	Total Number of Acres Disturbed:(✓) # Acre(s)
Number of individual lots in development, if applicable:(✓) # lot(s)	Number of lots in development:(✓) # lot(s)
Total acreage of lots intended to be developed:(✓) Project Acres	Number of acres intended to be disturbed at any one time:(✓) Disturbed Acres
Anticipated Start Date:(✓)	Anticipated Completion Date:(✓)

List Building Contractor(s) at the time of Application:(*)

	Company Name	
+		

SECTION IV -- IF THE PERMITTED SITE DISCHARGES TO A WATER BODY THE FOLLOWING INFORMATION IS REQUIRED

Discharge Point(s):

	Unnamed Tributary?	Latitude	Longitude	Receiving Water Name	
1		37.89711	83.2829779		Delete
2		37.8972386	83.2832727		Delete
3		37.8972986	83.2845336		Delete
+					

SECTION V -- IF THE PERMITTED SITE DISCHARGES TO A MS4 THE FOLLOWING INFORMATION IS REQUIRED

Name of MS4:

Date of application/notification to the MS4 for construction site permit coverage:
Date

Discharge Point(s):(*)

	Latitude	Longitude	
+			

SECTION VI -- WILL THE PROJECT REQUIRE CONSTRUCTION ACTIVITIES IN A WATER BODY OR THE RIPARIAN ZONE?

Will the project require construction activities in a water body or the riparian zone?:(*)	
If Yes, describe scope of activity: (✓)	describe scope of activity
Is a Clean Water Act 404 permit required?:(*)	

Is a Clean Water Act 401 Water Quality Certification required?:(*)

SECTION VII -- NOI PREPARER INFORMATION

First Name:(*) Brandy
M.I.: MI
Last Name:(*) Fletcher
Company Name:(*) Kentucky Transportation Cabinet

Mailing Address:(*) 473 Highway 15 South
City:(*) Jackson
State:(*) Kentucky
Zip:(*) 41339

eMail Address:(*) Brandy.Fletcher@ky.gov
Business Phone:(*) 6066668841
Alternate Phone: Phone

SECTION VIII -- ATTACHMENTS

Facility Location Map:(*) Upload file

Supplemental Information: Upload file

SECTION IX -- CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:(*) Corbett Caudill
Title:(*) Executive Director

First Name:(*) Corbett
M.I.: MI
Last Name:(*) Caudill

eMail Address:(*) Corbett.Caudill@ky.gov
Business Phone:(*) 6066668841
Alternate Phone: Phone
Signature Date:(*) 12/6/2024

Click to Save Values for Future Retrieval | Click to Submit to EEC

KENTUCKY TRANSPORTATION CABINET
COMMUNICATING ALL PROMISES (CAP)

Item No. **10 - 9017** **County:** **Morgan** **Route:** **460** **Project Manager:** **MIN JIANG**

Item No. **10 - 9017** **County:** **Statewide** **Route:** **0** **Project Manager:** **MIN JIANG**

12/5/24

CAP #	Date of Promise	Promise made to:	Location of Promise:	CAP Description
1	8/8/24	District 10	Parcel 1	KYTC's contractor shall communicate with owner(s) of Parcel 1, APB, LLC, in advance of any construction activities on the property and easement acquired. KYTC's contractor shall also attempt to lessen impacts to APB, LLC business activities as much as is practicable. Access to and from the gas pumps shall not be blocked off at any time.

PART II

SPECIFICATIONS AND STANDARD DRAWINGS

STANDARD SPECIFICATIONS

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2019* and *Standard Drawings, Edition of 2020.*

SUPPLEMENTAL SPECIFICATIONS

The contractor shall use the Supplemental Specifications that are effective at the time of letting. The Supplemental Specifications can be found at the following link:
http://transportation.ky.gov/Construction/Pages/Kentucky-Standard-Specifications.aspx

1I

SPECIAL NOTE FOR PORTABLE CHANGEABLE MESSAGE SIGNS

This Special Note will apply when indicated on the plans or in the proposal.

1.0 DESCRIPTION. Furnish, install, operate, and maintain variable message signs at the locations shown on the plans or designated by the Engineer. Remove and retain possession of variable message signs when they are no longer needed on the project.

2.0 MATERIALS.

2.1 General. Use LED Variable Message Signs Class I, II, or III, as appropriate, from the Department's List of Approved Materials.

Unclassified signs may be submitted for approval by the Engineer. The Engineer may require a daytime and nighttime demonstration. The Engineer will make a final decision within 30 days after all required information is received.

2.2 Sign and Controls. All signs must:

1) Provide 3-line messages with each line being 8 characters long and at least 18 inches tall. Each character comprises 35 pixels.
2) Provide at least 40 preprogrammed messages available for use at any time. Provide for quick and easy change of the displayed message; editing of the message; and additions of new messages.
3) Provide a controller consisting of:
   a) Keyboard or keypad.
   b) Readout that mimics the actual sign display. (When LCD or LCD type readout is used, include backlighting and heating or otherwise arrange for viewing in cold temperatures.)
   c) Non-volatile memory or suitable memory with battery backup for storing pre-programmed messages.
   d) Logic circuitry to control the sequence of messages and flash rate.
4) Provide a serial interface that is capable of supporting complete remote control ability through land line and cellular telephone operation. Include communication software capable of immediately updating the message, providing complete sign status, and allowing message library queries and updates.
5) Allow a single person easily to raise the sign to a satisfactory height above the pavement during use, and lower the sign during travel.
6) Be Highway Orange on all exterior surfaces of the trailer, supports, and controller cabinet.
7) Provide operation in ambient temperatures from -30 to + 120 degrees Fahrenheit during snow, rain and other inclement weather.
8) Provide the driver board as part of a module. All modules are interchangeable, and have plug and socket arrangements for disconnection and reconnection. Printed circuit boards associated with driver boards have a conformable coating to protect against moisture.
9) Provide a sign case sealed against rain, snow, dust, insects, etc. The lens is UV stabilized clear plastic (polycarbonate, acrylic, or other approved material) angled to prevent glare.
10) Provide a flat black UV protected coating on the sign hardware, character PCB, and appropriate lens areas.
11) Provide a photocell control to provide automatic dimming.

1I

12) Allow an on-off flashing sequence at an adjustable rate.
13) Provide a sight to aim the message.
14) Provide a LED display color of approximately 590 nm amber.
15) Provide a controller that is password protected.
16) Provide a security device that prevents unauthorized individuals from accessing the controller.
17) Provide the following 3-line messages preprogrammed and available for use when the sign unit begins operation:

/KEEP/RIGHT/⇒⇒⇒/
/KEEP/LEFT/⇐⇐⇐/
/LOOSE/GRAVEL/AHEAD/
/RD WORK/NEXT/**MILES/
/TWO WAY/TRAFFIC/AHEAD/
/PAINT/CREW/AHEAD/
/REDUCE/SPEED/**MPH/
/BRIDGE/WORK/***0 FT/
/MAX/SPEED/**MPH/
/SURVEY/PARTY/AHEAD/
/MIN/SPEED/**MPH/
/ICY/BRIDGE/AHEAD/ /ONE LANE/BRIDGE/AHEAD/
/ROUGH/ROAD/AHEAD/
/MERGING/TRAFFIC/AHEAD/
/NEXT/***/MILES/
/HEAVY/TRAFFIC/AHEAD/
/SPEED/LIMIT/**MPH/
/BUMP/AHEAD/
/TWO/WAY/TRAFFIC/

*Insert numerals as directed by the Engineer.
Add other messages during the project when required by the Engineer.

2.3 Power.

1) Design solar panels to yield 10 percent or greater additional charge than sign consumption. Provide direct wiring for operation of the sign or arrow board from an external power source to provide energy backup for 21 days without sunlight and an on-board system charger with the ability to recharge completely discharged batteries in 24 hours.

3.0 CONSTRUCTION. Furnish and operate the variable message signs as designated on the plans or by the Engineer. Ensure the bottom of the message panel is a minimum of 7 feet above the roadway in urban areas and 5 feet above in rural areas when operating. Use Class I, II, or III signs on roads with a speed limit less than 55 mph. Use Class I or II signs on roads with speed limits 55 mph or greater.

Maintain the sign in proper working order, including repair of any damage done by others, until completion of the project. When the sign becomes inoperative, immediately repair or replace the sign. Repetitive problems with the same unit will be cause for rejection and replacement.

Use only project related messages and messages directed by the Engineer, unnecessary messages lessen the impact of the sign. Ensure the message is displayed in either one or 2 phases with each phase having no more than 3 lines of text. When no message is needed, but it is necessary to know if the sign is operable, flash only a pixel.

When the sign is not needed, move it outside the clear zone or where the Engineer directs. Variable Message Signs are the property of the Contractor and shall be removed from the project when no longer needed. The Department will not assume ownership of these signs.

4.0 MEASUREMENT. The final quantity of Variable Message Sign will be

1I

the actual number of individual signs acceptably furnished and operated during the project. The Department will not measure signs replaced due to damage or rejection.

5.0 PAYMENT. The Department will pay for the Variable Message Signs at the unit price each. The Department will not pay for signs replaced due to damage or rejection. Payment is full compensation for furnishing all materials, labor, equipment, and service necessary to, operate, move, repair, and maintain or replace the variable message signs. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
02671	Portable Changeable Message Sign	Each

Effective June 15, 2012

SPECIAL NOTE FOR BARCODE LABEL ON PERMANENT SIGNS

1.0 DESCRIPTION. Install barcode label on sheeting signs. Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, current edition.

2.0 MATERIALS. The Department will provide the Contractor with a 2 inch x 1 inch foil barcode label for each permanent sheeting sign. A unique number will be assigned to each barcode label.

The Contractor shall contact the Operations and Pavement Management Branch in the Division of Maintenance at (502) 564-4556 to obtain the barcode labels.

3.0 CONSTRUCTION. Apply foil barcode label in the lower right quadrant of the sign back. Signs where the bottom edge is not parallel to the ground, the lowest corner of the sign shall serve as the location to place the barcode label. The barcode label shall be placed no less than one-inch and no more than three inches from any edge of the sign. The barcode must be placed so that the sign post does not cover the barcode label.

Barcodes shall be applied in an indoor setting with a minimum air temperature of 50°F or higher. Prior to application of the barcode label, the back of the sign must be clean and free of dust, oil, etc. If the sign is not clean, an alcohol swab shall be used to clean the area. The area must be allowed to dry prior to placement of the barcode label.

Data for each sign shall include the barcode number, MUTCD reference number, sheeting manufacturer, sheeting type, manufacture date, color of primary reflective surface, installation date, latitude and longitude using the North American Datum of 1983 (NAD83) or the State Plane Coordinates using an x and y ordinate of the installed location.

Data should be provided electronically on the TC 71-229 Sign Details Information and TC 71-230 Sign Assembly Information forms. The Contractor may choose to present the data in a different format provided that the information submitted to the Department is equivalent to the information required on the Department TC forms. The forms must be submitted in electronic format regardless of which type of form is used. The Department will not accept PDF or handwritten forms. These completed forms must be submitted to the Department prior to final inspection of the signs. The Department will not issue formal acceptance for the project until the TC 71-229 and TC-230 electronic forms are completed for all signs and sign assemblies on the project.

4.0 MEASUREMENT. The Department will measure all work required for the installation of the barcode label and all work associated with completion and submission of the sign inventory data (TC 71-229 and TC 71-230).

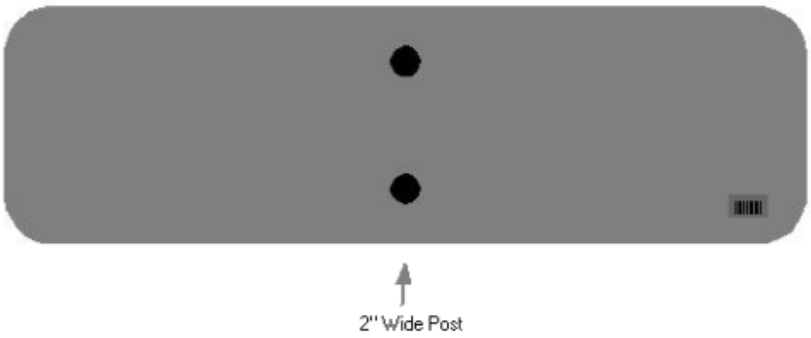
The installation of the permanent sign will be measured in accordance to Section 715.

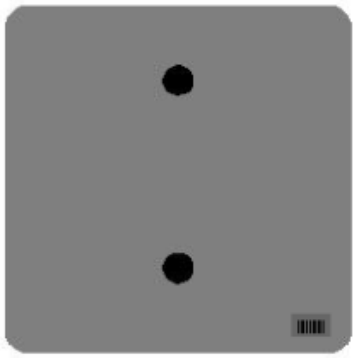
5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24631EC	Barcode Sign Inventory	Each

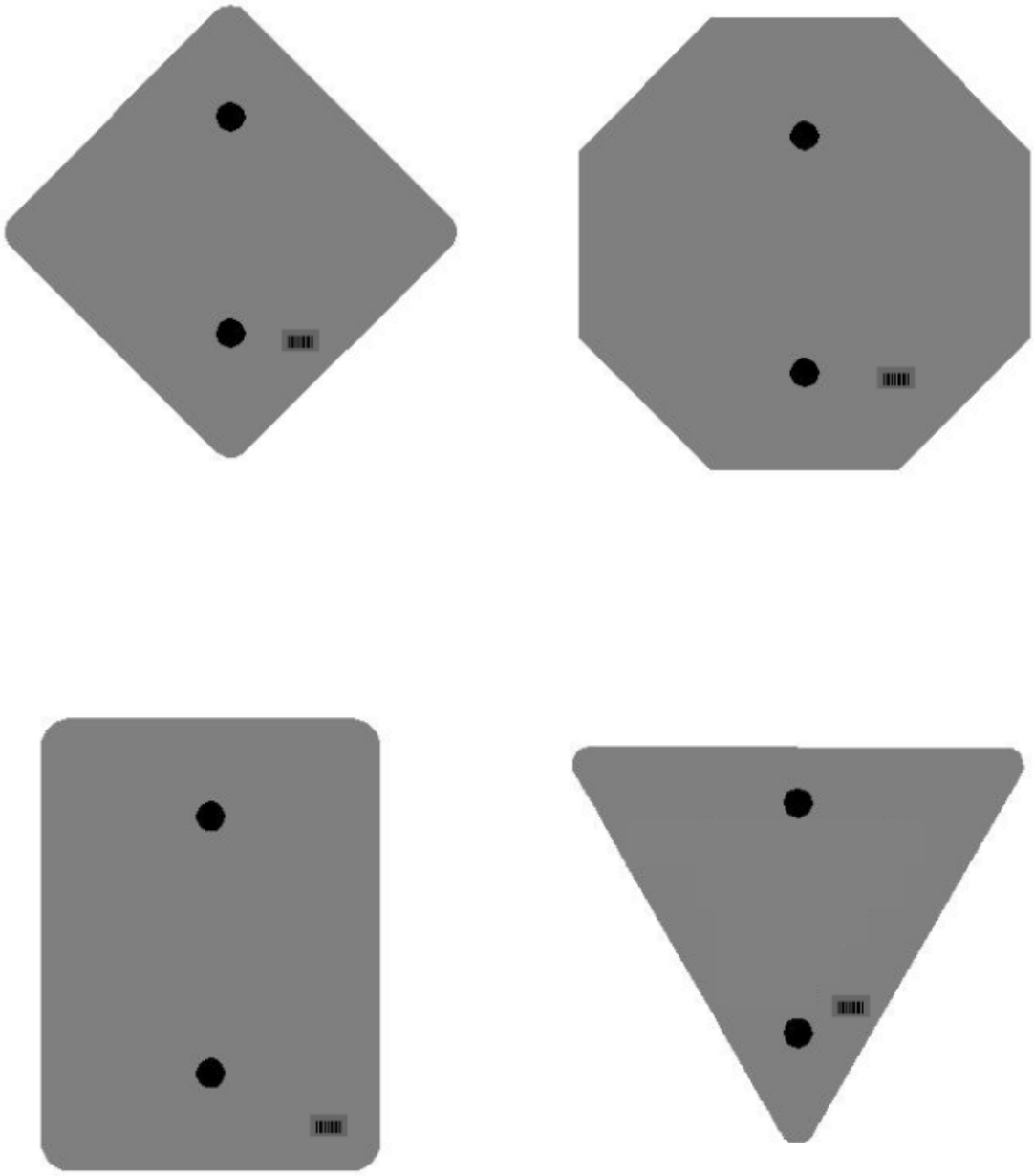
The Department will not make payment for this item until all barcodes are installed and sign inventory is complete on every permanent sign installed on the project. The Department will make payment for installation of the permanent sign in accordance to Section 715. The Department will consider payment as full compensation for all work required under this special note.

One Sign Post

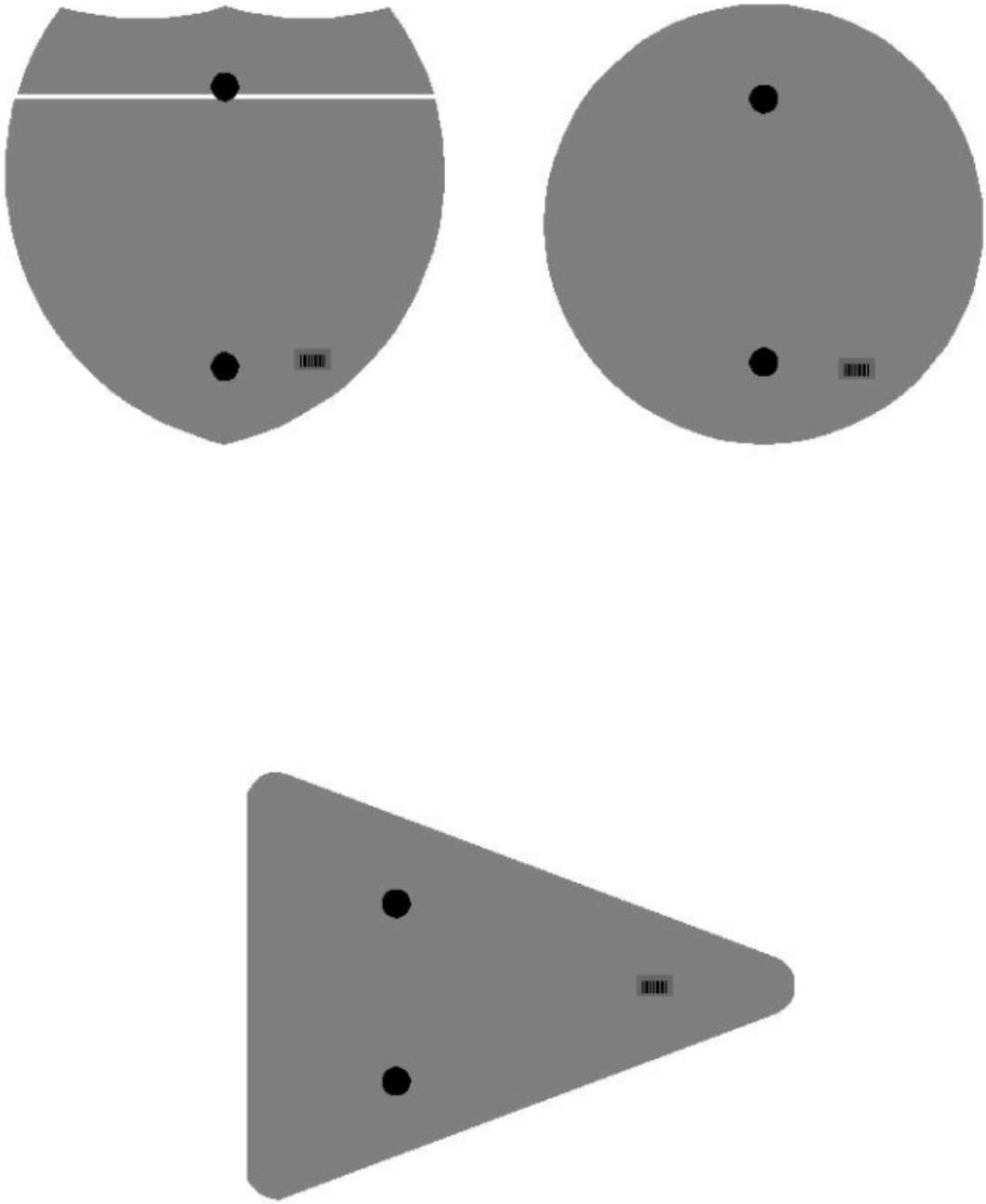




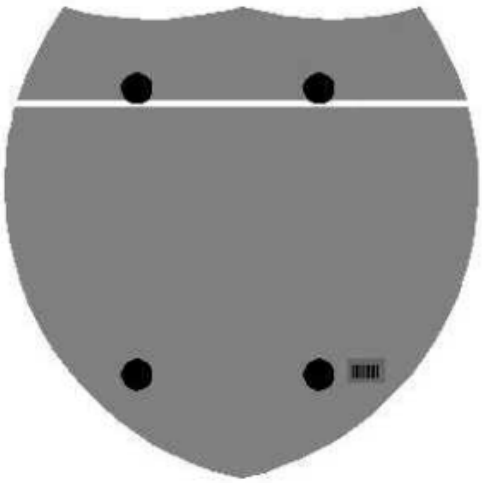
One Sign Post



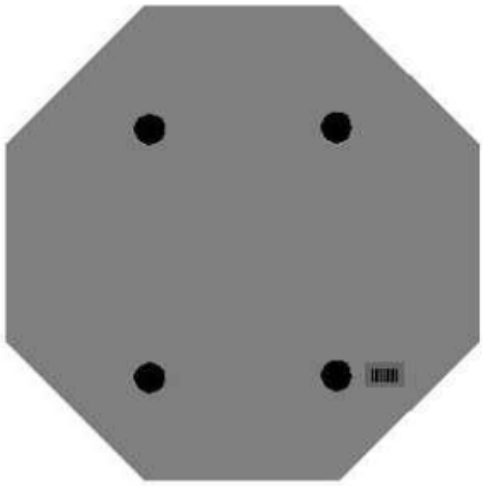
One Sign Post



Double Sign Post

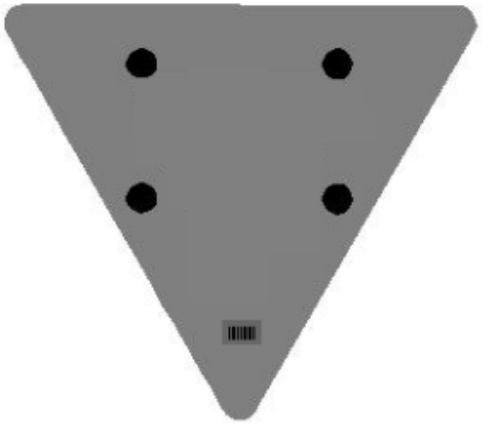


Interstate
Shield



48" Stop

2 Post Signs



11N

SPECIAL NOTE FOR LONGITUDINAL PAVEMENT JOINT ADHESIVE

1. DESCRIPTION. This specification covers the requirements and practices for applying an asphalt adhesive material to the longitudinal joint of the surface course of an asphalt pavement. Apply the adhesive to the face of longitudinal joint between driving lanes for the first lane paved. Then, place and compact the adjacent lane against the treated face to produce a strong, durable, waterproof longitudinal joint.

2. MATERIALS, EQUIPMENT, AND PERSONNEL.

2.1 Joint Adhesive. Provide material conforming to Subsection 2.1.1.

2.1.1 Provide an adhesive conforming to the following requirements:

Property	Specification	Test Procedure
Viscosity, 400 ° F (Pa·s)	4.0 – 10.0	ASTM D 4402
Cone Penetration, 77 ° F	60 – 100	ASTM D 5329
Flow, 140 ° F (mm)	5.0 max.	ASTM D 5329
Resilience, 77 ° F (%)	30 min.	ASTM D 5329
Ductility, 77 ° F (cm)	30.0 min.	ASTM D 113
Ductility, 39 ° F (cm)	30.0 min.	ASTM D 113
Tensile Adhesion, 77 ° F (%)	500 min.	ASTM D 5329, Type II
Softening Point, ° F	171 min.	AASHTO T 53
Asphalt Compatibility	Pass	ASTM D 5329

Ensure the temperature of the pavement joint adhesive is between 380 and 410 °F when the material is extruded in a 0.125-inch-thick band over the entire face of the longitudinal joint.

2.2. Equipment.

2.2.1 Melter Kettle. Provide an oil-jacketed, double-boiler, melter kettle equipped with any needed agitation and recirculating systems.

2.2.2 Applicator System. Provide a pressure-feed-wand applicator system with an applicator shoe attached.

2.3 Personnel. Ensure a technical representative from the manufacturer of the pavement joint adhesive is present during the initial construction activities and available upon the request of the Engineer.

3. CONSTRUCTION.

3.1 Surface Preparation. Prior to the application of the pavement joint adhesive, ensure the face of the longitudinal joint is thoroughly dry and free from dust or any other debris that would inhibit adhesion. Clean the joint face by the use of compressed air.

Ensure this preparation process occurs shortly before application to prevent the return of debris on the joint face.

3.2 Pavement Joint Adhesive Application. Ensure the ambient temperature is a minimum of 40 ^{o} F during the application of the pavement joint adhesive. Prior to applying the adhesive, demonstrate competence in applying the adhesive according to this note to the satisfaction of the Engineer. Heat the adhesive in the melter kettle to the specified temperature range. Pump the adhesive from the melter kettle through the wand onto the vertical face of the cold joint. Apply the adhesive in a continuous band over the entire face of the longitudinal joint. Do not use excessive material in either thickness or location. Ensure the edge of the extruded adhesive material is flush with the surface of the pavement. Then, place and compact the adjacent lane against the joint face. Remove any excessive material extruded from the joint after compaction (a small line of material may remain).

3.3 Pavement Joint Adhesive Certification. Furnish the joint adhesive's certification to the Engineer stating the material conforms to all requirements herein prior to use.

3.4 Sampling and Testing. The Department will require a random sample of pavement joint adhesive from each manufacturer's lot of material. Extrude two 5 lb. samples of the heated material and forward the sample to the Division of Materials for testing. Reynolds oven bags, turkey size, placed inside small cardboard boxes or cement cylinder molds have been found suitable. Ensure the product temperature is 400°F or below at the time of sampling.

4. MEASUREMENT. The Department will measure the quantity of Pavement Joint Adhesive in linear feet. The Department will not measure for payment any extra materials, labor, methods, equipment, or construction techniques used to satisfy the requirements of this note. The Department will not measure for payment any trial applications of Pavement Joint Adhesive, the cleaning of the joint face, or furnishing and placing the adhesive. The Department will consider all such items incidental to the Pavement Joint Adhesive.

5. PAYMENT. The Department will pay for the Pavement Joint Adhesive at the Contract unit bid price and apply an adjustment for each manufacturer's lot of material based on the degree of compliance as defined in the following schedule. When a sample fails on two or more tests, the Department may add the deductions, but the total deduction will not exceed 100 percent.

11N

Pavement Joint Adhesive Price Adjustment Schedule						
Test	Specification	100% Pay	90% Pay	80% Pay	50% Pay	0% Pay
Joint Adhesive Referenced in Subsection 2.1.1						
Viscosity, 400 ° F (Pa•s)			3.0-3.4	2.5-2.9	2.0-2.4	≤1.9
ASTM D 3236	4.0-10.0	3.5-10.5	10.6-11.0	11.1-11.5	11.6-12.0	≥ 12.1
Cone Penetration, 77 ° F			54-56	51-53	48-50	≤ 47
ASTM D 5329	60-100	57-103	104-106	107-109	110-112	≥ 113
Flow, 140 ° F (mm) ASTM D 5329	≤ 5.0	≤ 5.5	5.6-6.0	6.1-6.5	6.6-7.0	≥ 7.1
Resilience, 77 ° F (%) ASTM D 5329	≥ 30	≥ 28	26-27	24-25	22-23	≤ 21
Tensile Adhesion, 77 ° F (%) ASTM D 5329	≥ 500	≥ 490	480-489	470-479	460-469	≤ 459
Softening Point, ° F AASHTO T 53	≥ 171	≥ 169	166-168	163-165	160-162	≤ 159
Ductility, 77 ° F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9
Ductility, 39 ° F (cm) ASTM D 113	≥ 30.0	≥ 29.0	28.0-28.9	27.0-27.9	26.0-26.9	≤ 25.9

Code	Pay Item	Pay Unit
20071EC	Joint Adhesive	Linear Foot

May 7, 2014

PART III

EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

LABOR AND WAGE REQUIREMENTS
APPLICABLE TO OTHER THAN FEDERAL-AID SYSTEM PROJECTS

I. APPLICATION

1. These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work or by subcontract. The contractor's organization shall be construed to include only workmen employed and paid directly by the contractor and equipment owned or rented by him, with or without operators.

2. The contractor shall insert in each of his subcontracts all of the stipulations contained in these Required Provisions and such other stipulations as may be required.

3. A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

II. NONDISCRIMINATION OF EMPLOYEES

AN ACT OF THE KENTUCKY
GENERAL ASSEMBLY TO PREVENT
DISCRIMINATION IN EMPLOYMENT
KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (forty and above); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age forty (40) and over. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, except that such a notice or advertisement may indicate a preference, limitation, or specification based on religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, when religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age forty (40) and over, in admission to, or employment in any program established to provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administrating agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

Revised: January 25, 2017

EXECUTIVE BRANCH CODE OF ETHICS

In the 1992 regular legislative session, the General Assembly passed and Governor Brereton Jones signed Senate Bill 63 (codified as KRS 11A), the Executive Branch Code of Ethics, which states, in part:

KRS 11A.040 (7) provides:

No present or former public servant shall, within six (6) months following termination of his office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.

KRS 11A.040 (9) states:

A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:

a) The date of leaving office or termination of employment; or
b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not as a way to obtain private benefits.

If you have worked for the executive branch of state government within the past six months, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 1025 Capital Center Drive, Suite 104, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: May 23, 2022

Kentucky Equal Employment Opportunity Act of 1978

The requirements of the Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) shall apply to this Contract. The apparent low Bidder will be required to submit EEO forms to the Division of Construction Procurement, which will then forward to the Finance and Administration Cabinet for review and approval. No award will become effective until all forms are submitted and EEO/CC has certified compliance. The required EEO forms are as follows:

- EEO-1: Employer Information Report
- Affidavit of Intent to Comply
- Employee Data Sheet
- Subcontractor Report

These forms are available on the Finance and Administration's web page under ***Vendor Information, Standard Attachments and General Terms*** at the following address: **https://www.eProcurement.ky.gov**.

Bidders currently certified as being in compliance by the Finance and Administration Cabinet may submit a copy of their approval letter in lieu of the referenced EEO forms.

For questions or assistance please contact the Finance and Administration Cabinet by email at **finance.contractcompliance@ky.gov** or by phone at 502-564-2874.

EMPLOYEE RIGHTS
UNDER THE FAIR LABOR STANDARDS ACT

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

FEDERAL MINIMUM WAGE
$7.25 PER HOUR
BEGINNING JULY 24, 2009

OVERTIME PAY

At least 1½ times your regular rate of pay for all hours worked over 40 in a workweek.

CHILD LABOR

An employee must be at least **16** years old to work in most non-farm jobs and at least **18** to work in non-farm jobs declared hazardous by the Secretary of Labor.

Youths **14** and **15** years old may work outside school hours in various non-manufacturing, non-mining, non-hazardous jobs under the following conditions:

No more than

- **3** hours on a school day or **18** hours in a school week;
- **8** hours on a non-school day or **40** hours in a non-school week.

Also, work may not begin before **7 a.m.** or end after **7 p.m.**, except from June 1 through Labor Day, when evening hours are extended to **9 p.m.** Different rules apply in agricultural employment.

TIP CREDIT

Employers of "tipped employees" must pay a cash wage of at least $2.13 per hour if they claim a tip credit against their minimum wage obligation. If an employee's tips combined with the employer's cash wage of at least $2.13 per hour do not equal the minimum hourly wage, the employer must make up the difference. Certain other conditions must also be met.

ENFORCEMENT

The Department of Labor may recover back wages either administratively or through court action, for the employees that have been underpaid in violation of the law. Violations may result in civil or criminal action.

Employers may be assessed civil money penalties of up to $1,100 for each willful or repeated violation of the minimum wage or overtime pay provisions of the law and up to $11,000 for each employee who is the subject of a violation of the Act's child labor provisions. In addition, a civil money penalty of up to $50,000 may be assessed for each child labor violation that causes the death or serious injury of any minor employee, and such assessments may be doubled, up to $100,000, when the violations are determined to be willful or repeated. The law also prohibits discriminating against or discharging workers who file a complaint or participate in any proceeding under the Act.

ADDITIONAL INFORMATION

- Certain occupations and establishments are exempt from the minimum wage and/or overtime pay provisions.
- Special provisions apply to workers in American Samoa and the Commonwealth of the Northern Mariana Islands.
- Some state laws provide greater employee protections; employers must comply with both.
- The law requires employers to display this poster where employees can readily see it.
- Employees under 20 years of age may be paid $4.25 per hour during their first 90 consecutive calendar days of employment with an employer.
- Certain full-time students, student learners, apprentices, and workers with disabilities may be paid less than the minimum wage under special certificates issued by the Department of Labor.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WHD U.S. Wage and Hour Division

WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Wage and Hour Division

WHD Publication 1088 (Revised July 2009)

PART IV

INSURANCE

Refer to
Kentucky Standard Specifications for Road and Bridge Construction,
current edition

PART V

BID ITEMS

PART IV

BID ITEMS

251101

PROPOSAL BID ITEMS

Report Date 12/19/24

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	2,195.00	TON		$	
0020	00100		ASPHALT SEAL AGGREGATE	5.70	TON		$	
0030	00103		ASPHALT SEAL COAT	.70	TON		$	
0040	00212		CL2 ASPH BASE 1.00D PG64-22	124.00	TON		$	
0050	00214		CL3 ASPH BASE 1.00D PG64-22	1,301.00	TON		$	
0060	00296		ASPHALT PRIME COAT	2.10	TON		$	
0070	00301		CL2 ASPH SURF 0.38D PG64-22	55.00	TON		$	
0080	00388		CL3 ASPH SURF 0.38B PG64-22	313.00	TON		$	
0090	02101		CEM CONC ENT PAVEMENT-8 IN	248.00	SQYD		$	
0100	24970EC		ASPHALT MATERIAL FOR TACK NON-TRACKING	3.00	TON		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0110	00190		LEVELING & WEDGING PG64-22	6.40	TON		$	
0120	01000		PERFORATED PIPE-4 IN	330.00	LF		$	
0130	01740		CORED HOLE DRAINAGE BOX CON-4 IN	5.00	EACH		$	
0140	01810		STANDARD CURB AND GUTTER	228.00	LF		$	
0150	01880		BARRIER HEADER CURB	207.00	LF		$	
0160	02014		BARRICADE-TYPE III	4.00	EACH		$	
0170	02159		TEMP DITCH	944.00	LF		$	
0180	02160		CLEAN TEMP DITCH	472.00	LF		$	
0190	02200		ROADWAY EXCAVATION	1,480.00	CUYD		$	
0200	02242		WATER	13.00	MGAL		$	
0210	02429		RIGHT-OF-WAY MONUMENT TYPE 1	8.00	EACH		$	
0220	02430		RIGHT-OF-WAY MONUMENT TYPE 1A	3.00	EACH		$	
0230	02432		WITNESS POST	3.00	EACH		$	
0240	02483		CHANNEL LINING CLASS II	35.00	TON		$	
0250	02545		CLEARING AND GRUBBING 1.5 ACRES	1.00	LS		$	
0260	02562		TEMPORARY SIGNS	216.00	SQFT		$	
0270	02585		EDGE KEY	24.00	LF		$	
0280	02607		FABRIC-GEOTEXTILE CLASS 2 FOR PIPE	1,179.00	SQYD	$2.00	$	$2,358.00
0290	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0300	02671		PORTABLE CHANGEABLE MESSAGE SIGN	4.00	EACH		$	
0310	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		$	
0320	02677		ASPHALT PAVE MILLING & TEXTURING	56.20	TON		$	
0330	02701		TEMP SILT FENCE	944.00	LF		$	
0340	02703		SILT TRAP TYPE A	1.00	EACH		$	
0350	02704		SILT TRAP TYPE B	1.00	EACH		$	
0360	02705		SILT TRAP TYPE C	1.00	EACH		$	
0370	02706		CLEAN SILT TRAP TYPE A	1.00	EACH		$	
0380	02707		CLEAN SILT TRAP TYPE B	1.00	EACH		$	
0390	02708		CLEAN SILT TRAP TYPE C	1.00	EACH		$	
0400	02720		SIDEWALK-4 IN CONCRETE	48.00	SQYD		$	

251101

PROPOSAL BID ITEMS

Report Date 12/19/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0410	02726		STAKING	1.00	LS		$	
0420	04939		REMOVE POLE REMOVE LIGHT POLE	1.00	EACH		$	
0430	05950		EROSION CONTROL BLANKET	1,212.00	SQYD		$	
0440	05952		TEMP MULCH	2,895.00	SQYD		$	
0450	05953		TEMP SEEDING AND PROTECTION	2,172.00	SQYD		$	
0460	05963		INITIAL FERTILIZER	.19	TON		$	
0470	05964		MAINTENANCE FERTILIZER	.11	TON		$	
0480	05985		SEEDING AND PROTECTION	2,393.00	SQYD		$	
0490	05992		AGRICULTURAL LIMESTONE	2.00	TON		$	
0500	06510		PAVE STRIPING-TEMP PAINT-4 IN	6,585.00	LF		$	
0510	06514		PAVE STRIPING-PERM PAINT-4 IN	4,810.00	LF		$	
0520	06516		PAVE STRIPING-PERM PAINT-8 IN	455.00	LF		$	
0530	06565		PAVE MARKING-THERMO X-WALK-6 IN	294.00	LF		$	
0540	06568		PAVE MARKING-THERMO STOP BAR-24IN	106.00	LF		$	
0550	06569		PAVE MARKING-THERMO CROSS-HATCH	20.00	SQFT		$	
0560	06574		PAVE MARKING-THERMO CURV ARROW	10.00	EACH		$	
0570	06575		PAVE MARKING-THERMO COMB ARROW	4.00	EACH		$	
0580	06576		PAVE MARKING-THERMO ONLY	2.00	EACH		$	
0590	08100		CONCRETE-CLASS A	14.00	CUYD		$	
0600	20071EC		JOINT ADHESIVE	1,301.00	LF		$	
0610	20550ND		SAWCUT PAVEMENT	1,301.00	LF		$	
0620	21289ED		LONGITUDINAL EDGE KEY	1,301.00	LF		$	
0630	22664EN		WATER BLASTING EXISTING STRIPE	358.00	LF		$	
0640	23158ES505		DETECTABLE WARNINGS	44.00	SQFT		$	
0650	24814EC		PIPELINE INSPECTION	247.00	LF		$	

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0660	00440		ENTRANCE PIPE-15 IN	54.00	LF		$	
0670	00521		STORM SEWER PIPE-15 IN	59.00	LF		$	
0680	00522		STORM SEWER PIPE-18 IN	18.00	LF		$	
0690	00524		STORM SEWER PIPE-24 IN	161.00	LF		$	
0700	00526		STORM SEWER PIPE-30 IN	8.00	LF		$	
0710	00528		STORM SEWER PIPE-36 IN	40.00	LF		$	
0720	01202		PIPE CULVERT HEADWALL-15 IN	1.00	EACH		$	
0730	01310		REMOVE PIPE	98.00	LF		$	
0740	01456		CURB BOX INLET TYPE A	3.00	EACH		$	
0750	01487		CURB BOX INLET TYPE F	2.00	EACH		$	
0760	01490		DROP BOX INLET TYPE 1	1.00	EACH		$	
0770	01493		DROP BOX INLET TYPE 2	1.00	EACH		$	
0780	01585		REMOVE DROP BOX INLET	1.00	EACH		$	
0790	02625		REMOVE HEADWALL	1.00	EACH		$	
0800	08100		CONCRETE-CLASS A INTERMEDIATE PIPE ANCHOR	3.06	CUYD		$	

Section: 0004 - SIGNING

251101

PROPOSAL BID ITEMS

Report Date 12/19/24

Section: 0004 - SIGNING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0810	06406		SBM ALUM SHEET SIGNS .080 IN	36.25	SQFT		$	
0820	06407		SBM ALUM SHEET SIGNS .125 IN	12.25	SQFT		$	
0830	06410		STEEL POST TYPE 1	87.00	LF		$	
0840	21373ND		REMOVE SIGN	1.00	EACH		$	
0850	24631EC		BARCODE SIGN INVENTORY	10.00	EACH		$	
0860	24751ED		REMOVE STORE & REINSTALL REMOVE STORE & REINSTALL	3.00	EACH		$	

Section: 0005 - TRAFFIC SIGNAL MODIFICATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0870	04780		FUSED CONNECTOR KIT	2.00	EACH		$	
0880	04793		CONDUIT-1 1/4 IN	30.00	LF		$	
0890	04820		TRENCHING AND BACKFILLING	30.00	LF		$	
0900	04841		CABLE-NO. 14/2C	440.00	LF		$	
0910	04844		CABLE-NO. 14/5C	435.00	LF		$	
0920	04845		CABLE-NO. 14/7C	315.00	LF		$	
0930	04885		MESSENGER-10800 LB	160.00	LF		$	
0940	04932		INSTALL STEEL STRAIN POLE	1.00	EACH		$	
0950	20093NS835		INSTALL PEDESTRIAN HEAD-LED	2.00	EACH		$	
0960	20188NS835		INSTALL LED SIGNAL-3 SECTION	3.00	EACH		$	
0970	20189NS835		INSTALL LED SIGNAL-5 SECTION	4.00	EACH		$	
0980	21743NN		INSTALL PEDESTRIAN DETECTOR	2.00	EACH		$	
0990	22939ND		INSTALL LUMINAIRE POLE	1.00	EACH		$	
1000	23157EN		TRAFFIC SIGNAL POLE BASE	5.10	CUYD		$	
1010	23235EC		INSTALL PEDESTAL POST	1.00	EACH		$	
1020	24601EC		INSTALL INSTALL (SCHOOL FLASHER)	1.00	EACH		$	
1030	24955ED		REMOVE SIGNAL EQUIPMENT	1.00	EACH		$	

Section: 0006 - GAS

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1040	16008		G ENCASEMENT STEEL OPEN CUT RANGE 1	65.00	LF		$	
1050	16015		G PIPE POLYETHYLENE/PLASTIC 02 INCH	183.00	LF		$	
1060	16041		G TIE-IN POLYETHYLENE/PLASTIC 02 INCH	2.00	EACH		$	
1070	16049		G VALVE POLYETHYLENE/PLASTIC 02 INCH	1.00	EACH		$	

Section: 0007 - SEWER

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1080	15000		S BYPASS PUMPING	1.00	EACH		$	
1090	15094		S MANHOLE ADJUST TO GRADE	1.00	EACH		$	
1100	15136		S LATERAL LOCATE	1.00	EACH		$	

251101

PROPOSAL BID ITEMS

Report Date 12/19/24

Section: 0008 - WATER

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1110	14012		W ENCASEMENT STEEL OPEN CUT RANGE 1	70.00	LF		$	
1120	14013		W ENCASEMENT STEEL OPEN CUT RANGE 2	50.00	LF		$	
1130	14056		W PIPE PVC 02 INCH	125.00	LF		$	
1140	14059		W PIPE PVC 06 INCH	70.00	LF		$	
1150	14091		W TIE-IN 02 INCH	2.00	EACH		$	
1160	14094		W TIE-IN 06 INCH	2.00	EACH		$	
1170	14102		W VALVE 02 INCH	1.00	EACH		$	
1180	14105		W VALVE 06 INCH	1.00	EACH		$	

Section: 0009 - DEMOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1190	02569		DEMOBILIZATION	1.00	LS		$	