CALL NO. 100

CONTRACT ID. 241306

BREATHITT COUNTY

FED/STATE PROJECT NUMBER NHPP 0151 (090)

DESCRIPTION KY 15

WORK TYPE GRADE & DRAIN WITH ASPHALT SURFACE

PRIMARY COMPLETION DATE 375 WORKING DAYS

LETTING DATE: March 21,2024

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN DAYLIGHT TIME March 21,2024. Bids will be publicly announced at 10:00 AM EASTERN DAYLIGHT TIME.

PLANS AVAILABLE FOR THIS PROJECT.

DBE CERTIFICATION REQUIRED - 5%

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 - 241306

NHPP 0151 (090)

COUNTY - BREATHITT

PCN - DE01300152406
NHPP 0151 (090)

KY 15 IMPROVE KY 15 FROM THE INTERSECTION OF THE NEW KY15/30 TO INTERSECTION OF KY1812, A DISTANCE OF 02.73 MILES.GRADE & DRAIN WITH ASPHALT SURFACE SYP NO. 10-00376.00.

GEOGRAPHIC COORDINATES LATITUDE 37:33:28.00 LONGITUDE 83:22:46.00

ADT 14,000

COMPLETION DATE(S):

375 WORKING Days	APPLIES TO CONTRACT

CONTRACT NOTES

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 contractor, as defined in KRS 45A.030 (9) 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 contract for the purpose of financial audit or program review. Records and other prequalification information confidentially disclosed as part of the bid process shall not be deemed as directly pertinent to the contract and

shall be exempt from disclosure as provided in KRS 61.878(1)(c). 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.

In the event of a dispute between the contractor and the contracting agency, Attorney General, or the Auditor of Public Accounts over documents that are eligible for production and review, the Finance and Administration Cabinet shall review the dispute and issue a determination, in accordance with Secretary's Order 11-004.

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.

FEDERAL CONTRACT NOTES

The Kentucky Department of Highways, in accordance with the Regulations of the United States Department of Transportation 23 CFR 635.112 (h), hereby notifies all bidders that failure by a bidder to comply with all applicable sections of the current Kentucky Standard Specifications, including, but not limited to the following, may result in a bid not being considered responsive and thus not eligible to be considered for award:

102.02 Current Rating
102.13 Irregular Bid Proposals
102.09 Proposal Guaranty
102.08 Preparation and Delivery of Proposals
102.14 Disqualification of Bidders

CIVIL RIGHTS ACT OF 1964

The Kentucky Transportation Cabinet, Department of Highways, in accordance with the provisions of Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 U.S.C. §§ 2000d to 2000d-4) and the Regulations, hereby notifies all bidders that it will affirmatively ensure that any contract entered into pursuant to this advertisement, disadvantaged business enterprises will be afforded full and fair opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, sex, age (over 40), religion, sexual orientation, gender identity, veteran status, disability, income- level, or Limited English Proficiency (LEP)in consideration for an award.

NOTICE TO ALL BIDDERS

To report bid rigging activities call: 1-800-424-9071.

The U.S. Department of Transportation (DOT) operates the above toll-free “hotline” Monday through Friday, 8:00 a.m. to 5:00 p.m. eastern time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the “hotline” to report such activities.

The “hotline” is part of the DOT’s continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

SECOND TIER SUBCONTRACTS

Second tier subcontracts are acceptable per Section 108.01 of the Standard Specifications for Road and Bridge Construction. S u b - Contractors fulfilling a disadvantaged business enterprise goal on a project may enter into a 2nd tier subcontract with a Non-DBE Subcontractor. However, in this instance, none of the work subcontracted to the Non-DBE Contractor will count toward fulfilling the established Disadvantaged Goal for the project.

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

It is the policy of the Kentucky Transportation Cabinet ("the Cabinet") that Disadvantaged Business Enterprises ("DBE") shall have the opportunity to participate in the performance of highway construction projects financed in whole or in part by Federal Funds in order to create a level playing field for all businesses who wish to contract with the Cabinet. To that end, the Cabinet will comply with the regulations found in 49 CFR Part 26, and the definitions and requirements contained therein shall be adopted as if set out verbatim herein.

The Cabinet, contractors, subcontractors, and sub-recipients shall not discriminate on the basis of race, color, national origin, or sex in the performance of work performed pursuant to Cabinet contracts. The contractor shall carry out applicable requirements of 49 CFR 26 in the award and administration of federally assisted highway construction projects. The contractor will include this provision in all its subcontracts and supply agreements pertaining to contracts with the Cabinet.

Failure by the contractor to carry out these requirements is a material breach of its contract with the Cabinet, which may result in the termination of the contract or such other remedy as the Cabinet deems necessary.

DBE GOAL

The Disadvantaged Business Enterprise (DBE) goal established for this contract, as listed on the front page of the proposal, is the percentage of the total value of the contract.

The contractor shall exercise all necessary and reasonable steps to ensure that Disadvantaged Business Enterprises participate in a least the percent of the contract as set forth above as goals for this contract.

OBLIGATION OF CONTRACTORS

Each contractor prequalified to perform work on Cabinet projects shall designate and make known to the Cabinet a liaison officer who is assigned the responsibility of effectively administering and promoting an active program for utilization of DBEs.

If a formal goal has not been designated for the contract, all contractors are encouraged to consider DBEs for subcontract work as well as for the supply of material and services needed to perform this work.

Contractors are encouraged to use the services of banks owned and controlled by minorities and women.

CERTIFICATION OF CONTRACT GOAL

Contractors shall include the following certification in bids for projects for which a DBE goal has been established. BIDS SUBMITTED WHICH DO NOT INCLUDE CERTIFICATION OF DBE PARTICIPATION WILL NOT BE ACCEPTED. These bids will not be considered for award by the Cabinet and they will be returned to the bidder.

"The bidder certifies that it has secured participation by Disadvantaged Business Enterprises ("DBE") in the amount of _____ percent of the total value of this contract and that the DBE participation is in compliance with the requirements of 49 CFR 26 and the policies of the Kentucky Transportation Cabinet pertaining to the DBE Program."

The certification statement is located in the electronic bid file. All contractors must certify their DBE participation on that page. DBEs utilized in achieving the DBE goal must be certified and prequalified for the work items at the time the bid is submitted.

DBE PARTICIPATION PLAN

Lowest responsive bidders must submit the *DBE Plan/ Subcontractor Request*, form TC 14-35 DBE, within 5 days of the letting. This is necessary before the Awards Committee will review and make a recommendation. **The project will not be considered for award prior to submission and approval of the apparent low bidder's DBE Plan/Subcontractor Request.**

The DBE Participation Plan shall include the following:

1. Name and address of DBE Subcontractor(s) and/or supplier(s) intended to be used in the proposed project;
2. Description of the work each is to perform including the work item, unit, quantity, unit price and total amount of the work to be performed by the individual DBE. The Proposal Line Number, Category Number, and the Project Line Number can be found in the "material listing" on the Construction Procurement website under the specific letting;
3. The dollar value of each proposed DBE subcontract and the percentage of total project contract value this represents. DBE participation may be counted as follows;
   a) If DBE suppliers and manufactures assume actual and contractual responsibility, the dollar value of materials to be furnished will be counted toward the goal as follows:
      - The entire expenditure paid to a DBE manufacturer;
      - 60 percent of expenditures to DBE suppliers that are not manufacturers provided the supplier is a regular dealer in the product involved. A regular dealer must be engaged in, as its principal business and in its own name, the sale of products to the public, maintain an inventory and own and operate distribution equipment; and
      - The amount of fees or commissions charged by the DBE firms for a bona fide service, such as professional, technical, consultant, or managerial services and assistance in the procurement of essential personnel, facilities, equipment, materials, supplies, delivery of materials and supplies or for furnishing bonds, or insurance, providing such fees or commissions are determined to be reasonable and customary.
   b) The dollar value of services provided by DBEs such as quality control testing, equipment repair and maintenance, engineering, staking, etc.;

c) The dollar value of joint ventures. DBE credit for joint ventures will be limited to the dollar amount of the work actually performed by the DBE in the joint venture;
4. Written and signed documentation of the bidder's commitment to use a DBE contractor whose participation is being utilized to meet the DBE goal; and
5. Written and signed confirmation from the DBE that it is participating in the contract as provided in the prime contractor's commitment.

AFTER PROJECT AWARD AND BEFORE NOTICE TO PROCEED/WORK ORDER IS ISSUED (SEE SECTION 103.06, STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION

Prime Contractors awarded a federally funded project with a DBE Goal greater than zero will be required to submit DBE Subcontract Agreement Form, TC 14-36, along with the attached FHWA 1273 and Certificate of Liability Insurance for each DBE Firm submitted as part of the previously approved DBE Utilization Plan (TC 14-35). A signed quote or purchase order shall be attached when the DBE subcontractor is a material supplier or broker.

The Certificate of Liability Insurance submitted must meet the requirements outlined in Section 107.18 of the Standard Specifications for Road and Bridge Construction.

Changes to ***APPROVED*** DBE Participation Plans must be approved by the Cabinet. The Cabinet may consider extenuating circumstances including, but not limited to, changes in the nature or scope of the project, the inability or unwillingness of a DBE to perform the work in accordance with the bid, and/or other circumstances beyond the control of the prime contractor.

CONSIDERATION OF GOOD FAITH EFFORTS REQUESTS

If the DBE participation submitted in the bid by the apparent lowest responsive bidder does not meet or exceed the DBE contract goal, the apparent lowest responsive bidder must submit a Good Faith Effort Package to satisfy the Cabinet that sufficient good faith efforts were made to meet the contract goals prior to submission of the bid. Efforts to increase the goal after bid submission will not be considered in justifying the good faith effort, unless the contractor can show that the proposed DBE was solicited prior to the letting date. DBEs utilized in achieving the DBE goal must be certified and prequalified for the work items at the time the bid is submitted. One complete set (hard copy along with an electronic copy) of this information must be received in the Division of Contract Procurement no later than 12:00 noon of the tenth calendar day after receipt of notification that they are the apparent low bidder.

Where the information submitted includes repetitious solicitation letters it will be acceptable to submit a sample representative letter along with a distribution list of the firms solicited. Documentation of DBE quotations shall be a part of the good faith effort submittal as necessary to demonstrate compliance with the factors listed below which the Cabinet considers in judging good faith efforts. This documentation may include written subcontractors' quotations, telephone log notations of verbal quotations, or other types of quotation documentation.

The Good Faith Effort Package shall include, but may not be limited to information showing evidence of the following:

1. Whether the bidder attended any pre-bid meetings that were scheduled by the Cabinet to inform DBEs of subcontracting opportunities;
2. Whether the bidder provided solicitations through all reasonable and available means;
3. Whether the bidder provided written notice to all DBEs listed in the DBE directory at the time of the letting who are prequalified in the areas of work that the bidder will be subcontracting;
4. Whether the bidder followed up initial solicitations of interest by contacting DBEs to determine with certainly whether they were interested. If a reasonable amount of DBEs within the targeted districts do not provide an intent to quote or no DBEs are prequalified in the subcontracted areas, the bidder must notify the Disadvantaged Enterprise Business Liaison Officer (DEBLO) in the Office for Civil Rights and Small Business Development to give notification of the bidder's inability to get DBE quotes;
5. Whether the bidder selected portions of the work to be performed by DBEs in order to increase the likelihood of meeting the contract goals. This includes, where appropriate, breaking out contract work items into economically feasible units to facilitate DBE participation, even when the prime contractor might otherwise perform these work items with its own forces;
6. Whether the bidder provided interested DBEs with adequate and timely information about the plans, specifications, and requirements of the contract;
7. Whether the bidder negotiated in good faith with interested DBEs not rejecting them as unqualified without sound reasons based on a thorough investigation of their capabilities. Any rejection should be so noted in writing with a description as to why an agreement could not be reached;
8. Whether quotations were received from interested DBE firms but were rejected as unacceptable without sound reasons why the quotations were considered unacceptable. The fact that the DBE firm's quotation for the work is not the lowest quotation received will not in itself be considered as a sound reason for rejecting the quotation as unacceptable. The fact that the bidder has the ability and/or desire to perform the contract work with its own forces will not be considered a sound reason for rejecting a DBE quote. Nothing in this provision shall be construed to require the bidder to accept unreasonable quotes in order to satisfy DBE goals;
9. Whether the bidder specifically negotiated with subcontractors to assume part of the responsibility to meet the contract DBE goal when the work to be subcontracted includes potential DBE participation;
10. Whether the bidder made any efforts and/or offered assistance to interested DBEs in obtaining the necessary equipment, supplies, materials, insurance and/or bonding to satisfy the work requirements of the bid proposal; and
11. Any other evidence that the bidder submits which may show that the bidder has made reasonable good faith efforts to include DBE participation.

FAILURE TO MEET GOOD FAITH REQUIREMENT

Where the apparent lowest responsive bidder fails to submit sufficient participation by DBE firms to meet the contract goal and upon a determination by the Good Faith Committee based upon the information submitted that the apparent lowest responsive bidder failed to make sufficient reasonable efforts to meet the contract goal, the bidder will be offered the opportunity to meet in person for administrative reconsideration. The bidder will be notified of the Committee's decision within 24 hours of its decision. The bidder will have 24 hours to request reconsideration of the Committee's decision. The reconsideration meeting will be held within two days of the receipt of a request by the bidder for reconsideration.

The request for reconsideration will be heard by the Office of the Secretary. The bidder will have the opportunity to present written documentation or argument concerning the issue of whether it met the goal or made an adequate good faith effort. The bidder will receive a written decision on the reconsideration explaining the basis for the finding that the bidder did or did not meet the goal or made adequate Good Faith efforts to do so.

The result of the reconsideration process is not administratively appealable to the Cabinet or to the United States Department of Transportation.

The Cabinet reserves the right to award the contract to the next lowest responsive bidder or to rebid the contract in the event that the contract is not awarded to the low bidder as the result of a failure to meet the good faith requirement.

SANCTIONS FOR FAILURE TO MEET DBE REQUIREMENTS OF THE PROJECT

Failure by the prime contractor to fulfill the DBE requirements of a project under contract or to demonstrate good faith efforts to meet the goal constitutes a breach of contract. When this occurs, the Cabinet will hold the prime contractor accountable, as would be the case with all other contract provisions. Therefore, the contractor's failure to carry out the DBE contract requirements shall constitute a breach of contract and as such the Cabinet reserves the right to exercise all administrative remedies at its disposal including, but not limited to the following:

- Suspension of Prequalification;
- Disallow credit toward the DBE goal;
- Withholding progress payments;
- Withholding payment to the prime in an amount equal to the unmet portion of the contract goal; and/or
- Termination of the contract.

PROMPT PAYMENT

The prime contractor will be required to pay the DBE and Non-DBE Subcontractors within seven (7) working days after he or she has received payment from the Kentucky Transportation Cabinet for work performed or materials furnished.

CONTRACTOR REPORTING

All contractors must keep detailed records and provide reports to the Cabinet on their progress in meeting the DBE requirement on any highway contract. These records may include, but shall not be limited to payroll, lease agreements, cancelled payroll checks, executed subcontracting agreements, etc. Prime contractors will be required to complete and submit a ***signed and notarized*** Affidavit of Subcontractor Payment (TC 18-7) and copies of checks for any monies paid to each DBE subcontractor or supplier utilized to meet a DBE goal. These documents must be completed and signed within 7 days of being paid by the Cabinet.

Payment information that needs to be reported includes date the payment is sent to the DBE, check number, Contract ID, amount of payment and the check date. Before Final Payment is made on this contract, the Prime Contractor will certify that all payments were made to the DBE subcontractor and/or DBE suppliers.

******* IMPORTANT *******

Please mail the original, signed and completed TC (18-7) Affidavit of Subcontractor Payment form and all copies of checks for payments listed above to the following address:

Office for Civil Rights and Small Business Development
6th Floor West 200 Mero Street
Frankfort, KY 40622

The prime contractor should notify the KYTC Office for Civil Rights and Small Business Development seven (7) days prior to DBE contractors commencing work on the project. The contact in this office is Mr. Tony Youssefi. Mr. Youssefi's current contact information is email address – tyousseffi@ky.gov and the telephone number is (502) 564-3601.

DEFAULT OR DECERTIFICATION OF THE DBE

If the DBE subcontractor or supplier is decertified or defaults in the performance of its work, and the overall goal cannot be credited for the uncompleted work, the prime contractor may utilize a substitute DBE or elect to fulfill the DBE goal with another DBE on a different work item. If after exerting good faith effort in accordance with the Cabinet's Good Faith Effort policies and procedures, the prime contractor is unable to replace the DBE, then the unmet portion of the goal may be waived at the discretion of the Cabinet.

PROHIBITION ON TELECOMMUNICATIONS EQUIPMENT OR SERVICES

In accordance with the FY 2019 National Defense Authorization Act (NDAA), 2 CFR 200.216, and 2 CFR 200.471, Federal agencies are prohibited, after August 13, 2020, from obligating or expending financial assistance to obtain certain telecommunications and video surveillance services and equipment from specific producers. As a result of these regulations, contractors and subcontractors are prohibited, on projects with federal funding participation, from providing telecommunication or video surveillance equipment, services, or systems produced by:

- Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities)
- Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities)

LEGAL REQUIREMENTS AND RESPONSIBILITY TO THE PUBLIC – CARGO PREFERENCE ACT (CPA).

(REV 12-17-15) (1-16)

SECTION 7 is expanded by the following new Article:

102.10 **Cargo Preference Act – Use of United States-flag vessels.**

Pursuant to Title 46CFR Part 381, the Contractor agrees

- To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels.
- To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, 'on-board' commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph 1 of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Division of National Cargo, Office of Market Development, Maritime Administration, Washington, DC 20590.
- To insert the substance of the provisions of this clause in all subcontracts issued pursuant to this contract.

TRAINEES

In Compliance with the "TRAINING SPECIAL PROVISION" included in Part III of the Proposal, the Contractor will be required to employ a trainee(s) for this contract.

NATIONAL HIGHWAY

Be advised this project is on the NATIONAL HIGHWAY SYSTEM.

JPC RIDE QUALITY

The Department will apply JPC Ride Quality requirements on this project in accordance with Section 501.03.19(B).

FUEL AND ASPHALT PAY ADJUSTMENT

The Department has included the Contract items Asphalt Adjustment and Fuel Adjustment for possible future payments at an established Contract unit price of $1.00. The Department will calculate actual adjustment quantities after work is completed. If existing Contract amount is insufficient to pay all items on the contract with the adjustments, the Department will establish additional monies with a change order.

ASPHALT PAVEMENT RIDE QUALITY CATEGORY A

The Department will apply Pavement Rideability Requirements on this project in accordance with Section 410, Category A.

OPTION A

Be advised that the Department will accept compaction of asphalt mixtures furnished for driving lanes and ramps, at 1 inch (25mm) or greater, on this project according to OPTION A in accordance with Section 402 and Section 403 of the current Standard Specifications. The Department will require joint cores as described in Section 402.03.02 for surface mixtures only. The Department will accept compaction of all other asphalt mixtures according to OPTION B.

MATERIAL TRANSFER VEHICLE (MTV)

Provide and use a MTV in accordance with Sections 403.02.10 and 403.03.05.

Special Note For Disadvantaged Business Enterprise Liaison:

As part of the enhanced Public Information Plan, the contractor is responsible to identify and designate a person (on contractor's payroll) as the Disadvantaged Business Enterprise (DBE) liaison that will develop and implement DBE outreach program. The DBE Liaison will develop an industry outreach plan and coordinate with local and regional DBE firms to facilitate their participation in the Project. The DBE Liaison shall also provide the Cabinet with a Monthly Status Report.

No additional compensation shall be paid to the contractor for identifying and designating a DBE liaison and will be considered incidental to the project.

SPECIAL NOTE
General Utility Coordination

The Contractor shall communicate, cooperate, and coordinate with the Department, the utility owners, and potentially affected third parties, as necessary for the utility relocation work. The Contractor shall be responsible for all coordination needed to ensure that the road construction and utility relocation work may concurrently and effectively take place.

This item shall include assignment of a Utility Coordinator for the project to coordinate plans, work and schedules directly with the utility companies and KYTC personnel. The Utility Coordinator shall be a licensed professional engineer with project management experience. This item includes responsibility to ensure the project progresses efficiently and in accordance with the proposed contract documents. The Department may consult the Utility Coordinator on matters of utility work design, construction, cost, and/or schedule. Any changes in the proposed scope, design, construction, cost, and/or schedule for the utility work shall be approved by the Department. This item includes conducting monthly coordination meetings with involved utility companies and as needed on project site visits to manage utility relocation activity, resolve conflicts with the road activity, and minimize impact to the project. The department shall be invited to Utility Coordination meetings.

The Contractor shall invite all the utility owners to the preconstruction meeting. A two weeks' notice shall be sent to all utility owners prior to the pre-construction meeting.

Power poles at the following stations shall not be disturbed or removed prior to the pump station shown on U6 of the Sewer Line Relocation Plans has been installed.

Station 45+87.42, LT 42.18'
Station 46+58.13, LT 38.61'

The Contractor shall coordinate with Frontier Gas on minimizing the interruption to service during winter months.

The Contractor shall coordinate with Thacker and Grigsby on avoiding impact to existing buried Fiber Optic lines along the project corridor. Prior to construction, all Fiber Optic lines shall be marked and surveyed and submit to the Construction Engineer. Please refer to the Thacker and Grigsby relocation reference file for additional information on the location of the buried Fiber Optic lines. Any damages to the buried Fiber Optic lines will be the responsible of the contractor to repair. This work is incidental to the bid item "Utility Coordination".

The Department will consider payment as full compensation for all work required under this note.

Code	Item Description	Unit
24845EC	Utility Coordination	Lump Sum

SPECIAL NOTE FOR EXCESS MATERIAL SITES

Breathitt COUNTY
KY 15
ITEM 10-376.00

The construction activities of this project may result in a considerable amount of excess material. It is the contractor's responsibility to dispose of material in compliance with the United States Army Corps of Engineers (USACE) and Kentucky Division of Water (DOW) rules and regulations pertaining to discharges into U.S. Waters.

PART A: PERMITTED SITES

Documents and reports for environmental studies, which include historic, archaeological surveys, biological assessments, etc., have been conducted by the KYTC and approved by the appropriate regulatory agencies for an excess material site.

The KYTC has prepared Section 404 & 401 permits for the excess material sites that is available for the contractor to use for this KYTC project.

The KYTC has acquired temporary easement to the excess material site.

The KYTC is not responsible for damages or repairs to sites or accesses to sites located outside of state right of way.

Excess Material Site :

Parcel 47
Darrell McIntosh

The contractor shall notify the KYTC on the waste site(s) that will be used during construction. The contractor must notify the KYTC prior to tree clearing in the excess material sites. The location of the excess material site and the permitted limit of the site are identified on the Roadway Plans, Sheet R54. It is the contractor's responsibility to review the Sections 404 & 401 permits and maintain compliance with the 401 & 404 permits throughout the duration of the project.

PART B: INFORMATION FOR POTENTIAL EXCESS MATERIAL SITES

Any work associated with the excess material site will be incidental to the excavation cost including but not limited to the following items: Erosion Control Devices, Clearing and Grubbing, Seeding and Protection, Temporary and Permanent Drainage Ditches, and Structures (including pipes, culverts, etc.).

The contractor must contact the utility companies to determine if relocations of existing utilities (underground and overhead) are necessary. Costs associated with utility relocation resulting from the use of these excess material sites will be the responsibility of the contractor.

The contractor shall abide by Section 205 in the Standard Specifications for Road and Bridge Construction Manual for excess material disposal.

If the contractor chooses to use other excess material site(s) (rather than or in addition to) the KYTC's identified excess material sites, or modify the identified excess material sites, it will be the responsibility of the contractor to acquire the necessary permits and certifications, and other required environmental document(s) and clearances. The Contractor shall contact the Highway District Office if there are questions related to required environmental document(s). When applying for new or modified permits obtain approval from the KYTC and obtain the new permit in the Contractor's name from the USACE. If the site requires tree removal work, the contractor must coordinate with the KYTC – Environmental Analysis prior to any tree clearing at the excess material sites. The contractor shall also comply with any local ordinances. No additional contract time or payment will be allowed for this process.

Based on the clearances acquired by KYTC for the excess material site, KYTC will contribute up to but not to exceed $43,616 (with no clearing of trees from June 1 - July 31) into the Imperiled Bat Conservation Fund for mitigation fee required for selected excess material sites Any excess contribution amount required is the responsibility of the contractor.

Based on the clearances acquired by KYTC for the excess material site, KYTC will contribute up to but not to exceed $1,155,990 (1243 EIU) into the stream mitigation fee required for selected excess material site. Any excess contribution amount required is the responsibility of the contractor.

Questions concerning any potential impacts to "Waters of the United States" should be brought to the attention of the KYTC Environmental Coordinator and the appropriate District Office for the Corps of Engineers for determination, prior to disturbance. An addendum to an existing approved USACE permit is no longer allowed. Any revision to the existing USACE permit will require the contractor to start and submit a new USACE permit. Any fees associated with obtaining new or modified permit approvals for the disposal of excess material from the USACE or other appropriate regulatory agencies are the responsibility of the contractor.

No claim shall be made against the KYTC on account of acquiring a new USACE permit.

SPECIAL NOTE
Lane Closures, Traffic Stoppages, and Disincentives

The Maintenance of Traffic phase notes identify the minimum number of lanes that shall be open at a time, hours for road closure operations, hours for blasting operations, and disincentives fees. Please refer to Sheet R63 of the Maintenance of Traffic Plans for additional details. Stoppage will also not be allowed during the holidays and special events listed in the plans and proposal documents.

Special Note Concerning Environmental Training Specified by Permit:

In accordance with Section 213.02.02 of Kentucky Standard Specifications for Road and Bridge Construction (latest edition), a qualified erosion and sediment control inspector who has successfully completed the KEPSC-RI qualification training and testing course is required. A record of training qualification will be maintained by the contractor and a copy provided to the resident engineer within 10 days of employment and annually thereafter for as long as the contractor is under contract.

Breathitt Co. Item #10-376.00

SPECIAL NOTE FOR HDPE PIPE AND LINER

1.0 Intent
To specify appropriate rehabilitation materials and installation methods to strengthen an existing reinforced concrete box culvert to a useful condition. The design service life of the restored culvert shall be at least 75 years.

1.1 Notice to Bidders
Bidders are cautioned to read the specifications carefully, as there may be special requirements not commonly offered by the pipe liner manufacturer. Note that pipe liners not meeting the specifications in every aspect may not be accepted.

1.2 Contractor
The contractor or the contractor's sub-contractor performing installation of the lining and grout placement shall have a minimum of 3 years of experience with the process and must have successfully completed a minimum of 3 pipe lining projects of similar nature. The contractor shall submit a list of these projects including the owner, engineer, addresses, phone numbers and dates that said projects were completed with bid submission.

2.0 Reference Specifications
Standard specifications, including ASTM, which are made a part hereof by such reference and shall be the latest edition and revision:

- ASTM D3350 specification for polyethylene plastics pipe and fittings materials
- ASTM D1248 specification for polyethylene plastics molding and extrusion materials
- ASTM D2321 standard practice for underground installation of thermoplastics pipe for sewers and other gravity flow applications
- ASTM D2412 standard test method for determination of loading characteristics of plastic pipe by parallel plate loading
- ASTM D3212 standard specification for joints for drain and sewer plastic pipes using flexible elastometric seals
- ASTM F585 practice for insertion of flexible polyethylene pipe into existing sewers
- ASTM F894 specification for polyethylene (pe) large diameter profile wall sewer and drain pipe
- ASTM C796 specification for standard test method for foaming agents for use in cellular concrete (grout)
- ASTM F477 specification for elastomeric seals (gaskets) for joining plastic pipe

3.0 Liner Pipe Raw Material Requirements

3.1. The pipe shall be manufactured from a high-density polyethylene (HDPE) 3408/3608 material which meets or exceeds the minimum cell classification 335444C or higher when classified in accordance with ASTM D3350.

3.2. The polyethylene raw material shall contain a minimum of 2% well-dispersed finely divided carbon black for UV stabilization. Additives which can be conclusively proven not to be detrimental to the pipe may also be used provided that the pipe produced meets or exceeds all requirements of this specification.

3.3. The pipe shall contain no recycled compound except that generated in the manufacturer's own plant from resin of the same specification and from the same raw material supplier.

3.4. Compliance with the requirements of Section 3 of this specification shall be certified in writing by the pipe supplier upon request.

3.5. The pipe material shall be resistant to corrosion from hydrogen sulfide and pH values between 2 and 13.

3.6. At KYTC's discretion, compliance with the above requirements may be required through material testing performed by the contractor, sub-contractor, or fabricator. Official certification of results shall be presented to KYTC in order to gain approval and acceptance.

4.0 Liner Pipe Requirements

4.1. The liner pipe shall be Spirolite style profile wall HDPE manufactured and supplied by ISCO industries, Inc. in Corsicana, TX or pre-approved equal. No products produced outside the USA shall be accepted.

4.2. The pipe shall be manufactured per the requirements of ASTM F894 with dimensions and tolerances in accordance with the manufacturer's internal standards. The nominal inside diameter of the pipe shall be true to the specified pipe size. The pipe shall be manufactured by the winding of high-density polyethylene profile or profiles onto suitably sized mandrels. It shall be produced to constant internal diameters.

4.3. The sections of pipe shall have a ring stiffness constant (RSC) based off the pipe class as determined by the pipe diameter, cover depth and flood elevation. RSC shall be a minimum of 160 lbs/ft as defined in ASTM F894.

4.4. The pipe shall be open or closed profile as defined by ASTM F894 and manufactured in laying lengths up to 20 feet with an integral bell and gasketed spigot meeting ASTM D3212.

4.5. The pipe shall be homogenous throughout and free from visible cracks, holes, foreign inclusions or other injurious defects. The pipe shall be as uniform as commercially practical in color, opacity, density, and other physical properties.

4.6. The liner outside diameter should allow for sufficient clearance to accommodate the slip-lining process.

4.7. Structural capacity: The liner pipe shall have sufficient strength and stiffness to safely resist: 1) external hydrostatic pressures generated by ground water levels above the top of the pipe and/or by grouting pressures (if appropriate); 2) a fill height of 41.5 feet with no live load, and 3) a fill height of 6.5 feet with HL-93 live load. The nominal unit weight of saturated soil shall be assumed as 120 pounds per cubic foot. When grouted, the liner pipe will act as though it is buried in soil; thus, flexible pipe/soil backfill design equations apply. The contractor shall submit documentation proving the pipe meets these requirements before installation begins.

4.8. Each segment of the liner pipe shall have a male and female end.

4.9. Each segment of the liner pipe shall be permanently marked by the manufacturer with the manufacturer's name and applicable ASTM designation. The marking shall be such that it will not be removed during handling, shipping, or placing.

4.10. At KYTC's discretion, compliance with the above requirements may be required through material testing performed by the contractor, sub-contractor, or fabricator. Official certification of results shall be presented to KYTC in order to gain approval and acceptance.

5.0 Grout Requirements

5.1. The cellular concrete grout shall be designed in accordance with ASTM C796 except as herein modified.

5.2. The admixtures, retarders, and plasticizers used in the grout shall be in accordance with the foam concentrate supplier's specifications.

5.3. The grout shall be made using the preformed foam process using foam generating equipment calibrated daily by the foam manufacturer to produce a precise and predictable volume of foam. The foam concentrate shall be certified by the manufacturer to have specific liquid/foam expansion ratio at a constant dilution ratio with water.

5.4. The specific job mix shall be submitted to the engineer by either the foam concentrate supplier or the certified or licensed grouting contractor for approval prior to use on the contract. The mix shall have a minimum 24-hour penetration resistance of 100 psi and a minimum 28-day compressive resistance of 900 psi. The

grout density shall be 40 pcf (±3 pcf). The grout viscosity shall be 20 seconds or less. The mix shall be tested by a laboratory approved by the engineer or shall be approved based on prior acceptable performance on engineer contracts.

5.5. Grout mixed off site shall be delivered to the job site in a truck mixer filled to half its capacity. The foam concentrate shall then be added to the cement mix in the truck and mixed to a uniform consistency. Grout mixed on site shall be batched in a deck mate or similar device. Small batches of approximately 1 cubic yard shall be mixed and pumped in a continuous operation.

5.6. For each day worked or for each 100 cubic yards placed, four test cylinders shall be collected by the construction inspector or his delegate. The test cylinders shall have a diameter of 3" diameter x height of 6" and be cast atthe point of placement of the grout. Sampling, molding, curing, and compressive strength testing of the cylinders shall be in accordance with ASTM C 495, except as modified herein.

5.7. Curing shall be and testing shall be in accordance with ASTM C495 except the bearing surface may be ground or cut with a dry saw to meet surface tolerance. The specimens shall not be capped. Specimens shall be tested in compression as soon as possible to minimize drying. If more than one specimen is removed from the moist storage at the same time, these specimens shall be covered with a damp cloth until time of testing. The contractor shall also provide a Type A certification for the compressive strength of the grout.

5.8. At KYTC's discretion, compliance with the above requirements may be required through material testing performed by the contractor, sub-contractor, or fabricator. Official certification of results shall be presented to KYTC in order to gain approval and acceptance.

Construction Requirements

6.0 Quality Control and Quality Assurance

A signed and dated quality control plan (QCP) shall be prepared and submitted to the engineer for acceptance at least 15 days prior to the start of slip-lining the pipe. No work may begin until written notice has been received that the QCP has been accepted by the engineer. Acceptance of the QCP will in no way relieve the contractor of responsibility for installation procedures and testing requirements. The QCP shall include, as a minimum,

- QC representative name
- documentation verifying the QC Representative is not an employee of the contractor and has experience with at least 3 previous HDPE pipe lining operations
- contractor's method for cleaning and preparation of the existing culvert
- method for joining pipe joints
- personnel and certification of the personnel who will be joining HDPE pipes
- method and frequency of destructive and non-destructive testing on the joints
- initial testing of the first joining at each HDPE pipe installation location

- corrective action that will be taken if defective or non-passing joints are found
- grouting process including the daily calibration process procedures for the foam generating equipment
- inspection of bulkheads
- specific job mix of the foam concentrate
- grouting procedure and grouting process to ensure complete filling of voids
- corrective action to be taken if the foam compressive strength does not meet specifications
- plan if the installation of the foam causes damage or deflection to the pipe liner

The cost of training and certifying an installer, pipe liner, incidentals, and all costs associated with the development of an acceptable QCP shall be included in the cost of the pay items in this section.

7.0 Quality Control (QC) Representative on Site

The QC Representative shall either be a manufacturer's representative or a professional engineer with experience inspecting slip lining of pipes and hydrophilic systems. A QC representative shall be present at the jobsite at the following milestones:

- Cleaning and preparation of the existing culvert
- Initial testing of the first joint at each pipe liner installation location, joining of the pipe liner
- Inspection of bulkheads
- Grouting procedure and process to ensure 100% filling of voids
- Project clean-up

The contractor shall provide a minimum of 24-hour notice to the QC Representative prior to performing any of the above milestones. The qc person does not supersede the responsibility of the contractor.

8.0 Installation Procedures

The following installation procedures should be adhered to unless otherwise specified or approved by KYTC and the Engineer of Record. In general, the installation requirements of ASTM F585 shall be followed unless amended by this document.

8.1. Inspection and Cleaning

Prior to commencing the liner installation, the existing culvert shall be cleaned, all foreign material shall be removed, de-watered, and water shall be kept out until the liner placement operation is complete and grout has sufficiently cured.

Prior to commencing the liner installation operation, steps shall be taken by the contractor to verify that a liner meeting the minimum inside diameter requirements can be successfully

placed inside the existing culvert. If it is discovered prior to installation that a liner with the required inside diameter cannot fit, the inside and outside diameters of a substitute liner shall be submitted to the engineer for approval. If this discovery is not made until after the liner installation has begun, the partially installed liner shall be removed at the contractor's expense. Inside and outside diameters for a substitute liner shall then be submitted to the engineer for approval. The following steps shall be taken:

- The existing culvert shall have a mandrel passed through it. The outside diameter (O.D.) of the mandrel shall not be less than the O.D. of the proposed slip-liner pipe plus 1-inch (annular grout space). A segment of the slip-liner pipe may be used as a mandrel, but this test segment shall not be used as a permanent slip-liner.
- Alternately the mandrel procedure can be performed virtually using 3D laser point cloud tools.
- Alternately the inside diameter of the culvert can be measured by man entry.

In situations where the condition of the existing culvert requires that a substitute liner be utilized, there will be no reduction in payment for the installation of the substitute liner. There will be no additional payment for the additional grout required to fill the larger void between the existing culvert and the smaller liner.

There will be no payment for the installation or removal of any liner that cannot be successfully installed due to the condition of the existing culvert. There will be no payment for a liner meeting the minimum inside diameter requirements that does not fit.

8.2. Host Culvert Preparation
To ensure flow of grout around the full circumference of the liner pipe the contractor shall determine if it is necessary to install rails (wood or metal) to guide the liner pipe during its' insertion. Similarly, the need to attach bracing to the top or bottom of the host culvert to limit possible liner pipe flotation during grouting, shall be assessed. The contractor's installation plan shall be reviewed with the owner's representative.

8.3. Insertion of the Liner Pipe
A variety of pushing (jacking) techniques can be used to insert the liner pipe into the existing culvert. The jacking force must be uniformly distributed around the perimeter of the liner pipe to avoid the possibility of damaging the pipe due to a concentrated jacking load.

Alternatively, the HDPE pipe can be inserted into the host culvert with a power winch and steel cable connected to the end of the pipe in an appropriate manner. The pipe manufacturer's recommendations should be followed regarding the most appropriate method of attaching the cable to the liner pipe. If required, a special pulling head may be attached to the end of the liner pipe to facilitate easy connection of the pulling cable. Additionally, a combination of pushing and jacking may be used.

If the existing culvert or any other object not designated for removal is damaged while performing this work, it shall be considered unauthorized work and repaired or replaced with

no additional payment. If the contractor fails to comply, the engineer will have authority to cause unauthorized work to be removed; and to deduct the costs from any monies due or to become due.

8.4. Pipe Joining
The liner pipe shall be joined in the field by means of integral bell and spigot joints as per manufacturer's recommended procedures. No welding of any type (butt fusion, electrofusion, extrusion welding) shall be accepted.

8.5. Grouting of the Annular Space
Grout shall be injected into the space between the existing culvert and the liner. The injection operation shall provide sufficient grout to fill all voids between the existing culvert and the liner over the entire structure length but shall also be performed in a manner that does not distort the liner. Injection of the grout in lifts, use of spacers, or other safeguards shall be taken to keep the liner in position and prevent the liner from floating. The pressure developed in the space between the liner and the existing culvert shall not exceed 2 psi or the liner manufacturer's recommended maximum value.

All existing culverts, storm drains, underdrain pipes, drain tile, or other pipes that are directly connected to the lined structure shall be perpetuated. Grout shall not leak through the liner at these connections.

9.0 Payment

The Department will pay for the completed and accepted quantities under the following. The Pay Unit of “Each” refers to each individual test.

Code	Pay Item	Pay Unit
24786EN	HDPE Pipe	L.F.
24583EC	HDPE Pipe Liner	L.F.

The Department will consider payment as full compensation for all work required herein.

SPECIAL NOTE FOR STOP LOGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Manufacture and Installation of East Dam Riser Structure stainless steel stop logs

B. Scope:
   1. Contractor shall furnish all labor, materials, equipment and supplies required to install and prepare for operation the East Dam Riser Structure stop logs, guide frames and stop log lifter as shown on the Contract Drawings and as specified herein.

1.2 SUBMITTALS

A. Contractor shall submit the following information to confirm compliance with the Project Drawings, Specifications and Special Notes.
   1. Shop Drawings providing complete description of all materials including the material thickness of all structural components of the stop logs, guide frames and stop log lifter.
   2. Installation drawings showing all details of construction, components required for installation, dimensions, and anchor rod locations.
   3. Maximum bending stress and deflection of the stop logs under the maximum design head.
   4. Provide the name of the company and location of the manufacturing facility that will fabricate the Equipment.
   5. Mill certificates for all steel used to fabricate the Equipment
   6. Manufacturer's product datasheet for all materials used in installation of anchor rods (if applicable) and guide frame, including proposed grout material.

1.3 QUALITY ASSURANCE

A. Definitions
   1. "Equipment" refers to all materials, equipment, and hardware required for fabrication and installation of the stop logs, stop log guides and stop log lifter.

B. Referenced Standards:
   1. American Institute of Steel Construction (AISC):
      a. 360 – Specifications for Structural Steel Buildings.
   2. United States Army Corps of Engineers (USACE):
      a. EM 1110-2-2107 – Design of Hydraulic Steel Structures
   3. American Welding Society (AWS)
      a. D1.6 – Structural Welding Code- Stainless Steel

C. Qualifications:
   1. All of the Equipment specified under this Section shall be furnished by a single manufacturer with a minimum of 20 years' experience designing and manufacturing stop logs. The manufacturer shall have manufactured stop logs for a minimum of 20 projects.
   2. The specification is based on the Stainless-Steel Stop Log as manufactured by Waterman Valve, LLC of Exeter, California. Contractor may use this product and manufacturer, or an approved equal.

PART 2 - PRODUCTS

2.1 GENERAL

A. Stop log assemblies shall be as specified herein and have the characteristics and dimensions shown on the Contract Drawings.

B. When in use, leakage shall not exceed 0.05 gpm/ft of wetted seal perimeter.
C. The stop logs shall incorporate a continuous resilient seal along the bottom edge of each stop log. Vertical seals shall be mechanically fastened to the guide frame rails.
D. Stop logs shall be of the height as shown in the Contract Drawings and shall function properly when stacked in any order.
E. Stop logs shall be designed to be self-draining, non-buoyant, and shall drop into place under their own weight, without any downward pressure necessary.
F. All structural components of the stop logs shall be fabricated of stainless steel and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
G. All structural components of the guide frames shall be fabricated of stainless steel and shall have adequate strength to prevent distortion during normal handling, during installation and while in service.
H. All welds shall be performed by welders with AWS D1.6 certification. Weldments shall be passivated to remove weld burn and scale.
I. All stainless steel to have mill finish.

2.2 MATERIALS

A. The stop log components shall consist of the following materials:
   1. ASTM A240 Type 304 for all steel including Stop Logs, Frame Guides and Invert
   2. ASTM D2000 for Lip Seals
   3. ASTM A593 and 594 for all Fasteners and Anchor Rods

The Manufacturer and/or Contractor may propose alternative material(s) for approval by the Engineer.

2.3 FRAME GUIDES

A. The frame guides or grooves and invert member shall be constructed of stainless steel with a minimum thickness of 1/4-inch.
   1. The stop log frame may be embedded into the East Dam Riser structure concrete wall or mounted directly to the wall with stainless steel anchor rods as indicated on the Contract Drawings.
   2. Gussets shall be provided as necessary to support the guide members in an unseating head condition. The gussets shall extend to support the outer portion of the frame guides and shall be positioned to ensure that the load is transferred to the anchor bolts.
   3. An invert member shall be provided across the bottom of the guides. The invert member shall be of the flush bottom type.

2.4 STOP LOGS

A. The stop logs shall be constructed of formed stainless steel shapes with a minimum thickness of 1/4-inch.
   1. The stop logs shall each be 6 inches in height, as indicated on the Contract Drawings.
   2. Maximum bending stress shall not exceed 18,000 psi at maximum operating head.
   3. Two attachment slots shall be provided in the top of each stop log for removal and installation using the stop log lifter.
   4. Each stop log shall be outfitted with a stainless-steel identification tag.

2.5 SEALS

A. Each stop log shall be outfitted with a continuous resilient lip seal along the bottom edge of each log.
   1. The continuous lip seal shall be constructed of neoprene in accordance with ASTM D2000 and shall be mechanically retained to the stop log.
   2. The lip seal shall be activated by a combination of the weight of the stop log and the differential water pressure, which pushes the seal against the inside of the groove assembly.
   3. Stop logs that utilize rubber “J” seals or “P” seals are not acceptable.

2.6 LIFTER

A. One stop log lifter shall be furnished for each different guide frame width.
   1. The lifter shall be constructed of stainless steel and shall be outfitted with ultra-high molecular weight polyethylene (UHMW) guide bars and stainless-steel fasteners.
   2. The lifter shall be provided with lifting hooks that automatically engage lifting pins through the slots in the top of the stop logs. A lanyard release will be incorporated into the design.
   3. The lifter shall be capable of installing and removing all stop logs of the same width at the same time.

2.7 ANCHOR RODS

A. Anchor rods shall be provided by the stop log manufacturer for mounting the guide frames.
   1. Quantity and location shall be determined by the stop log manufacturer.
   2. If epoxy type anchor rods are provided, the stop log manufacturer shall provide the studs and nuts.
   3. For surface mount installations, anchor bolts shall have a minimum diameter of 1/2-inch.
   4. For embedded mount installations, anchor bolts shall have a minimum diameter of 3/8-inch.

PART 3 - EXECUTION

3.1 COMPATABILITY

A. Contractor to ensure the stop logs (including stop log guides and stop log lifter) are compatible with the East Dam Riser Structure concrete outline as shown on the Contract Drawings.

B. Any proposed modifications to East Dam Riser Structure concrete outline must be submitted for review and approval by the Engineer.

C. The Contractor is responsible for performing field measurements as required to ensure proper fit of the stop logs, stop logs guides and stop log lifter in the East Dam Riser Structure wall slot.

3.2 DELIVERY

A. The Contractor shall handle and store all steel members above ground on skids or other supports.

B. The Contractor shall protect all steel members during storage on site from physical damage, including protection from foreign materials and corrosive substances.

3.3 INSTALLATION

A. Contractor is solely responsible for safety.

B. Construction means and methods and sequencing of work is the prerogative of the Contractor.

C. Adequate temporary bracing to provide safety, stability and to resist all loads to which the partially complete structure may be subjected, including wind, construction activities, and operation of Equipment, is the responsibility of the Contractor.

D. Installation of the stop logs, guide frames and appurtenances shall be done in a workmanlike manner. It shall be the responsibility of the Contractor to handle, store and install the Equipment specified in this Section in strict accordance with this Special Note and the manufacturer's recommendations.

E. The Contractor shall review thoroughly the installation drawings and installation instructions prior to installing the guide frames.

F. The guide frames shall be installed in a true vertical plane, square and plumb.

G. The Contractor shall fill the void in between the guide frames and the wall with non-shrink grout in accordance with the manufacturer’s recommendations.

3.4 FIELD TESTING

A. After installation, all stop logs shall be field tested in the presence of the Owner's Field Representative to ensure that all items of Equipment are in full compliance with this Section. The stop logs shall be inserted into the guide frames to confirm that they operate in accordance with this Special Note.

B. Each stop log assembly shall be water tested by the Contractor, at the discretion of the Owner's Field Representative, to confirm that leakage does not exceed the specified allowable leakage.

C. Equipment that fails field testing to the satisfaction of the Owner's Field Representative may be replaced at the expense of the Contractor.

END OF SECTION

11C

SPECIAL NOTE FOR DRILLED SHAFTS

1.0 DESCRIPTION. Furnish all equipment, materials and labor necessary for constructing reinforced concrete drilled shafts in cylindrically excavated holes according to the details shown on the plans or as the Engineer directs. Construct the shaft to the lines and dimensions shown on the plans, or as the Engineer directs. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

2.0 MATERIALS.

2.1 Concrete. Use Class A Modified concrete unless otherwise shown on the plans. The slump at the time of placement shall be 6.5 to 9.5 inches, the coarse aggregate shall be size 67, 68, 78, 8 or 9M, and the water/cementitious material ratio shall not exceed 0.45. Include water reducing and retarding admixtures. Type F high range water reducers used in combination with retarding admixtures or Type G high range water reducers fully meeting trial batch requirements are permitted and Class F fly ash is permitted in conformance with Section 601. Design the mix such that the concrete slump exceeds 4 inches at 4 hours after batching. If the estimated concrete transport, plus time to complete placement, exceeds 4 hours, design the concrete to have a slump that exceeds 4 inches or more for the greater time after batching and demonstrate that the slump requirement can be achieved after the extended time period using a trial batch.

Perform trial batches prior to beginning drilled shaft construction in order to demonstrate the adequacy of the proposed concrete mix. Demonstrate that the mix to be used will meet the requirements for temperature, slump, air content, water/cementitious material ratio, and compressive strength. Use the ingredients, proportions and equipment (including batching, mixing, and delivery) to be used on the project. Make at least 2 independent consecutive trial batches of 3 cubic yards each using the same mix proportions and meeting all specification requirements for mix design approval. Submit a report containing these results for slump, air content, water/cement ratio, temperature, and compressive strength and mix proportions for each trial batch to the Engineer for review and approval. Failure to demonstrate the adequacy of the concrete mix, methods, or equipment to the Engineer is cause for the Engineer to require appropriate alterations in concrete mix, equipment, and/or method by the Contractor to eliminate unsatisfactory results. Perform additional trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment.

2.2 Steel Reinforcement. Provide Grade 60 deformed bars conforming to Section 811 of the Standard Specifications. Rail steel is permitted for straight bars only. Place according to Section 602 of the Standard Specifications, this Special Note, and the plans. Use non-corrosive centering devices and feet to maintain the specified reinforcement clearances.

2.3 Casings. Provide casing meeting the requirements of ASTM A 252 Grade 2 or better unless otherwise specified. Ensure casing is smooth, clean, watertight, true and straight, and of ample strength to withstand handling, installation, and extraction stresses and the pressure of both concrete and the surrounding earth materials. Ensure the outside diameter of casing is not less than the specified diameter of shaft.

Use only continuous casings. Cut off the casing at the prescribed elevation and trim to within tolerances prior to acceptance. Extend casing into bedrock a sufficient distance to stabilize the shaft excavation against collapse, excessive deformation, and/or flow of water if required and/or shown on the plans.

Install from the work platform continuous casing meeting the design thickness requirements, but not less than 3/8 inch, to the elevations shown on the plans. When drilled

shafts are located in open water areas, extend casings above the water elevation to the plan tip elevation to protect the shaft concrete from water action during concrete placement and curing. All casing is permanent unless temporary casing is specified in the contract drawings or documents. Permanent casing is incidental to the applicable drilled shaft unit bid price unless noted otherwise in the contract. Temporary casing may be required for drilled shafts not socketed into bedrock. If temporary surface casings are used, extend each casing up to the work platform. Remove all temporary surface casing prior to final acceptance unless otherwise permitted by the Central Office Construction Engineer.

Ensure casing splices have full penetration butt welds conforming to the current edition of AWS D1.1 with no exterior or interior splice plates and produce true and straight casing.

2.4 Slurry. When slurry is to be used for installation of the Drilled Shaft, submit a detailed plan for its use and disposal. The plan should include, but not be limited to the following:

1) Material properties
2) Mixing requirements and procedures
3) Testing requirements
4) Placement procedures
5) Disposal techniques

Obtain the Central Office Division of Construction's approval for the slurry use and disposal plan before installing drilled shafts.

2.5 Tremies. Provide tremies of sufficient length, weight, and diameter to discharge concrete at the shaft base elevation. Ensure the tremie diameter is least 6 times the maximum size coarse aggregate to be used in the concrete mix and no less than 10 inches. Provide adequate wall thickness to prevent crimping or sharp bends that restrict concrete placement. Support tremies used for depositing concrete in a dry drilled shaft excavation so that the free fall of the concrete does not cause the shaft excavation to cave or slough. Maintain a clean and smooth tremie surface to permit both flow of concrete and unimpeded withdrawal during concrete placement. Do not allow any aluminum parts to contact the concrete. Construct tremies used to deposit concrete for wet excavations so that they are watertight and will readily discharge concrete.

2.6 Concrete Pumps. Provide pump lines with a minimum diameter of 5 inches and watertight joints.

2.7 Drop Chutes. Do not use aluminum drop chutes.

3.0 CONSTRUCTION.

3.1 Preconstruction.

3.1.1 Prequalification. The Department will require prequalification by the Division of Construction Procurement before accepting a bid for the construction of Drilled Shafts.

3.1.2 Pre-Bid Inspection. Inspect both the project site and all subsurface information, including any soil or rock samples, prior to submitting a bid. Contact the Geotechnical Branch (502-564-2374) to schedule a viewing of the subsurface information. Failure to inspect the project site and view the

subsurface information will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project.

3.1.3 Drilled Shaft Installation Plan. Upon request, the Department will review a Drilled Shaft Installation Plan. Submit the plan no later than 45 calendar days prior to constructing drilled shafts. Items covered in this plan should include, but not be limited to the following:

1) Name and experience record of jobsite drilled shaft superintendent and foremen in charge of drilled shaft operations for each shift.
2) List and size of proposed equipment including cranes, drills, augers, bailing buckets, final cleaning equipment, de-sanding equipment, slurry pumps, core sampling equipment, tremies or concrete pumps, casings, etc.
3) Details of overall construction operation sequence and the sequence of shaft construction in the bents or groups.
4) Details of shaft excavation methods including methods to over-ream or roughen shaft walls, if necessary.
5) Details of slurry when the use of slurry is anticipated. Include methods to mix, circulate, and de-sand the proposed slurry. Provide details of proposed testing, test methods, sampling methods, and test equipment.
6) Details of proposed methods to clean shaft and inside of casing after initial excavation.
7) Details of reinforcement handling, lifting, and placement including support and method to center in shaft. Also include rebar cage support during concrete placement and temporary casing removal.
8) Details of concrete placement including procedures for concrete tremie or pump. Include initial placement, raising during placement, and overfilling of the shaft to expel contaminated concrete.
9) Required submittals including shop drawings and concrete design mixes.
10) Other information shown in the plans or requested by the Engineer.
11) Special considerations for wet construction.
12) Details of environmental control procedures to protect the environment from discharge of excavation spoil, slurry (natural and mineral), and concrete over-pour.

The Division of Construction will review the submitted procedure and provide comments and recommendations. The Contractor is responsible for satisfactory construction and ultimate performance of the Drilled Shaft.

3.2 General Construction. Construct drilled shafts as indicated in the plans or described in this Special Note by either the dry or wet method. When the plans describe a particular method of construction, use this method unless the Engineer permits otherwise. When the plans do not describe a particular method, propose a method on the basis of its suitability to the site conditions. Approval of this proposed method is contingent upon the satisfactory results of the technique shaft.

The construction of the first drilled shaft or technique shaft will be used to determine if the methods and equipment used by the contractor are sufficient to produce a completed shaft meeting the requirements of the plans and specifications. Ability to control dimensions and alignment of excavations within tolerances; to seal the casing into impervious materials; to prevent caving or deterioration of subsurface materials by the use of slurry or other means; to

properly clean the completed shaft excavation; to construct excavations in open water areas when required by the plans; to establish methods for belling or over-reaming when required by the plans; to determine the elevation of ground water; to satisfactorily handle, lift, place, and support the reinforcement cage; to satisfactorily place concrete meeting the specifications within the prescribed time frame; and to satisfactorily execute any other necessary construction operations will be evaluated during construction of the first shaft(s). Revise the methods and equipment as necessary at any time during the construction of the first shaft when unable to satisfactorily carry out any of the necessary operations described above or unable to control the dimensions and alignment of the shaft excavation within tolerances. Accurately locate technique so they may be used in the finished structure unless directed otherwise in the contract document or by the Engineer.

If at any time the Contractor fails to satisfactorily demonstrate, to the satisfaction of the Engineer, the adequacy of methods or equipment and alterations are required, additional technique shafts will be required at no additional cost to the Department and with no extension of contract time. Additional technique shafts shall be located as near as possible to the proposed production shafts but in a location as not to interfere with other construction activities. Once approval has been given to construct production shafts, no changes will be permitted in the methods or equipment used to construct the satisfactory shaft without written approval of the Engineer.

Do not make a claim against the Department for costs of construction delays, or any materials, labor, or equipment that may be necessary due to the Contractor's failure to furnish drilled shafts of a length sufficient to obtain the required bearing values, or for variations in length due to subsurface conditions that may be encountered. Soundings, boring logs, soil profiles, or other subsurface data included in the Contract documents are used by the Department for design and making preliminary estimates of quantities and should be used only at the risk of the Contractor for determining equipment, materials, or labor necessary for drilling shafts as required by the contract.

When necessary, set temporary removable surface casing. Use surface casing of sufficient length to prevent caving of the surface soils and to aid in maintaining shaft position and alignment. Pre-drilling with slurry and/or over-reaming to the outside diameter of the casing may be required to install the surface casing at some sites.

Provide equipment capable of constructing shafts to the deepest shaft depth shown in the plans plus 15 feet, 20 percent greater than the longest shaft (measured from the ground or water surface to the tip of the shaft), or 3 times the shaft diameter, whichever is greater. Blasting excavation methods are not permitted.

Use permanent casing unless otherwise noted in the Contract. Place casing as shown on the plans before beginning excavation. If full penetration cannot be attained, the Engineer may direct that excavation through the casing be accomplished and the casing advanced until reaching the plan tip elevation. In some cases, over-reaming to the outside diameter of the casing may be required before placing the casing. Cut off the casing at the prescribed elevation and leave the remainder of the casing in place. Do not use vibratory hammers for casing installation within 50 feet of shafts that have been completed less than 24 hours.

3.2.1 Dry Construction Method. Use the dry construction method only at sites where the ground water table and soil conditions (generally stiff to hard clays or rock above the water table) make it feasible to construct the shaft in a relatively dry excavation and where the sides and bottom of the shaft are stable and may be visually inspected by the Engineer prior to placing the concrete. The dry construction method consists of drilling the shaft excavation, removing accumulated seepage water and loose material from the excavation, and placing the shaft concrete in a relatively dry excavation.

11C

3.2.2 Wet Construction Method. Use the wet construction method at all sites where it is impractical to excavate by the dry method. The wet construction method consists of drilling the shaft excavation below the water table, keeping the shaft filled with water (including natural slurry formed during the drilling process) or slurry as defined in part 2.4 of this Special Note, de-sanding and cleaning the slurry as required, final cleaning of the excavation by means of a bailing bucket, air lift, submersible pump or other approved devices and placing the shaft concrete (with a tremie or concrete pump beginning at the shaft bottom) which displaces the water or slurry as concrete is placed.

Where drilled shafts are in open water areas, construct the shafts by the wet method using casings extending from above water elevation to the plan casing tip elevation to protect the shaft concrete from water action during placement and curing. Install the casing in a manner that will produce a positive seal at the bottom of the casing.

3.3 Slurry. When the Contractor elects to use slurry, adjust construction operations so that the slurry is in contact with the bottom 5 feet of the shaft for less than 4 hours unless the Engineer approves otherwise. If the 4-hour limit is exceeded, over-ream the bottom 5 feet of shaft.

3.4 Cleaning. Over-reaming, cleaning, or wire brushing the sidewalls of the shaft excavation and permanent casings may be necessary to remove the depth of softening or to remove excessive slurry cake buildup as indicated by sidewall samples or other test methods employed by the Engineer. Over-ream around the perimeter of the excavation a minimum depth of 1/2 inch and maximum depth of 3 inches.

3.5 Subsurface Exploration. Take subsurface exploration borings when shown on the plans or as the Engineer directs to determine the character of the material that the shaft extends through and the material directly below the shaft excavation. Complete subsurface exploration borings prior to beginning excavation for any drilled shaft in a group. Unless directed otherwise, extend subsurface exploration borings a minimum depth of 3 shaft diameters but not less than 10 feet below the bottom of the anticipated tip of drilled shaft excavation as shown on the plans. For subsurface exploration borings where soil sampling is required use thin-wall tube samples and perform standard penetration tests according to the Department's current Geotechnical Manual. When shafts extend into bedrock, soil samples are not required unless otherwise specified. Perform rock core drilling according to the Department's Geotechnical Manual. When the Engineer directs, perform additional subsurface exploration borings prior to drilled shaft construction. Measure soil samples and/or rock cores and visually identify and describe them on the subsurface log according to the Department's current Geotechnical Manual. Subsurface exploration borings must be performed by contractors/consultants prequalified by the Department's Division of Professional Services for Geotechnical Drilling Services at the time that field work begins.

The Engineer or geotechnical branch representative may be on-site during the subsurface exploration process to evaluate the soil and/or rock core samples. The Engineer or geotechnical branch representative will determine the need to extend the borings to depths greater than the depths previously specified. Handle, label, identify, and store soil and/or rock samples according to the Department's current Geotechnical Manual and deliver them with the subsurface logs to the geotechnical branch's rock core lab in Frankfort within 24-hours of completing the borings, unless directed otherwise.

The Engineer will inspect the soil samples and/or cores and determine the final depth of required excavation (final drilled shaft tip elevation) based on evaluation of the material's suitability. The Engineer will establish the final tip elevations for shaft locations, other than

those for which subsurface exploration borings have been performed, based on the results of the subsurface exploration. Within 15 calendar days after completion of the subsurface exploration borings, the Engineer will notify the contractor of the final tip elevations for shaft locations.

3.6 Excavations. The plans indicate the expected depths, the top of shaft elevations, and the estimated bottom of shaft elevations between which the drilled shafts are to be constructed. Drilled shafts may be extended deeper when the Engineer determines that the material encountered while drilling the shaft excavation is unsuitable and/or is not the same as anticipated in the design of the drilled shaft. Drilled shafts may be shortened when the Engineer determines the material encountered is better than that anticipated.

Begin drilled shaft excavation the excavation, excavation inspection, reinforcement placement, and concrete placement can be completed as one continuous operation. Do not construct new shafts within 24 hours adjacent to recently completed shafts if the center-to-center spacing is less than 3 shaft diameters.

Dispose of excavated material removed from the shaft according to the Standard Specifications or the contract documents.

Do not allow workmen to enter the shaft excavation for any reason unless both a suitable casing has been installed and adequate safety equipment and procedures have been provided to the workmen entering the excavation. Recommended Procedures for the Entry of Drilled Shaft Foundation Excavations, prepared by ADSC: The International Association of Foundation Drilling provides guideline recommendations for down-hole entry of drilled excavations.

3.7 Obstructions. Remove subsurface obstructions at drilled shaft locations. Such obstructions may include man-made materials such as old concrete foundations or natural materials such as boulders. Blasting is not permitted.

3.8 Inspections of Excavations. Provide equipment for checking the dimensions and alignment of each shaft excavation. Determine the dimensions and alignment of the shaft excavation under the observation and direction of the Engineer. Provide equipment necessary to verify shaft cleanliness for the method of inspection selected by the Engineer.

Measure final shaft depths with a weighted tape or other approved methods after final cleaning. Ensure the base of each shaft has less than ½ inch of sediment at the time of concrete placement. For dry excavations, do not allow the depth of water to exceed 3 inches for tremie or pump methods of concrete placement. Verify shaft cleanliness to the Engineer using direct visual inspection or other method the Engineers determines acceptable. Video camera or underwater inspection procedures may be used if specified in the plans. Inspect the side surfaces of rock sockets to ensure they are rough and of such condition to ensure bond between the shaft concrete and the rock. Calipers, bent rods, or other devices may be used to inspect the diameter and roughness of rock sockets. When the Engineer directs, mechanically roughen surfaces found to be smooth.

3.9 Reinforcing Steel Cage Fabrication and Placement. Assemble the reinforcing steel cage, consisting of longitudinal bars, ties, spirals, cage stiffener bars, spacers, centering devices, and other necessary appurtenances and place as a prefabricated unit immediately after the shaft excavation is inspected and accepted, and just prior to concrete placement.

Tie the reinforcing steel with 100 percent double-wire ties and provide support so that it will remain within allowable tolerances for position. Locate splices as shown on the plans. Splice no more than 50 percent of the longitudinal reinforcing within 2-lap splice lengths of any location or within 3 feet of the splice location if approved mechanical connectors are used. All splices are to be in accordance with plan details. Use bands, temporary cross ties,

etc. as required to provide a reinforcement cage of sufficient rigidity to prevent racking, permanent deformations, etc. during installation.

Use concrete centering devices or other approved non-corrosive centering devices at sufficient intervals along the length of the reinforcement cage to ensure concentric spacing for the entire cage length. As a minimum, provide a set of non-corrosive centering devices at intervals not exceeding 5 feet throughout the length of the shaft. When the size of the longitudinal reinforcement exceeds one inch in diameter the minimum spacing may be increased to 10 feet. As a minimum, provide a set of centering devices within 2 feet of the top and 2 feet of the bottom of the shaft. In addition provide one set of centering devices 2 feet above and 2 feet below each change in shaft diameter. Provide feet (bottom supports) at the bottom of the shaft on vertical bars. As a minimum, provide non-corrosive centering devices at 60 degree intervals around the circumference of the shaft to maintain the required reinforcement clearances. Ensure the centering devices maintain the specified annular clearance between the outside of the reinforcing cage and the side of the excavated hole or casing.

Concrete centering devices and feet will be constructed of concrete equal in quality and durability to the concrete specified for the shaft. Use epoxy coated centering devices fabricated from reinforcing steel. Use feet (bottom supports) of adequate size and number to assure the rebar cage is the proper distance above the bottom as determined by part 3.11 3) of this Special Note. The feet are not intended to support the weight of the cage. In the event that the shaft has been excavated below the anticipated tip elevation, extend the reinforcing cage at the tip (low) end by lap splices, mechanical connectors, or welded splices conforming to the Standard Specifications. In this instance, splices need not be staggered and 100 percent of the reinforcing bars may be spliced at a given location. The bottom 12 inches of the shaft may not be reinforced when below plan tip elevation.

During concrete placement, support the reinforcing cage at or near the top of shaft such that the concrete feet are positioned approximately one inch above the bottom of shaft excavation. Not sooner than 24 hours after the completion of concrete placement, remove temporary supports. Provide the needed equipment, including extra cranes if necessary, to provide this cage support.

Prior to placing the reinforcement cage, demonstrate to the satisfaction of the Engineer that the fabrication and handling methods to be used will result in a reinforcing cage placed in the proper position, with the proper clearances, and without permanent bending, squashing, or racking of the reinforcement cage. During this demonstration bring the cage to an upright position, lower into a shaft excavation, and support as if for concrete placement.

Check the elevation of the top of the reinforcing cage before and after the concrete is placed. If the reinforcing cage is not maintained within the specified tolerances, correct to the satisfaction of the Engineer. Do not construct additional shafts until the contractor has modified his reinforcing cage support to obtain the required tolerances.

3.10 Concrete Placement. Place concrete according to the applicable portions of the Standard Specifications and with the requirements set forth herein. Do not apply the provisions of the Special Note 6U for Structural Mass Concrete.

Place concrete as soon as practical after reinforcing steel placement but no later than 4 hours after completion of the shaft excavation. Place concrete continuously from the bottom to above the top elevation of the shaft. For shafts that extend above ground or water surface, place concrete continuously after the shaft is full until good quality concrete is evident at the top of the shaft. Form any portion of the shaft above ground with a removable form or other approved method to the dimensions shown on the plans.

For shafts constructed in the wet with the top of the shaft below the water surface and below top of casing, place concrete to approximately one shaft diameter but no less than 2 feet above the top of shaft elevation. Remove contaminated concrete and deleterious material, as

determined by the Engineer, accumulated above the top of shaft elevation immediately after completing concrete placement. Deleterious material and contaminated concrete may be airlifted under a head of water or slurry provided that the head is maintained at or near the exterior water surface elevation. Carefully remove any concrete remaining above plan top of shaft after curing and excess casing removal.

Place concrete either by free fall, through a tremie, or concrete pump. Use the free fall placement method in dry holes only. The maximum height of free fall placement is 20 feet. Do not allow concrete placed by free fall to contact either the reinforcing cage or hole sidewall. Drop chutes may be used to direct concrete to the base during free fall placement.

Place concrete in the shaft in one continuous operation. Maintain a minimum slump of 4 inches or more throughout the placement for 4 hours after batching. Adjust approved admixtures in the concrete mix for the conditions encountered on the job so that the concrete remains in a workable plastic state throughout the placement. Perform slump loss tests to demonstrate that the concrete will maintain a 4-inch or greater slump for a period of time equal to the estimated transport plus the 2-hour placement time, but not less than 4 hours.

When the Engineer determines the concrete placement methods and/or equipment during construction of any technique and/or production shafts to be inadequate, make appropriate alterations to eliminate unsatisfactory results.

Drilled shafts not meeting the concrete placement requirements of this Special Note or contract plans are unacceptable. Correct all unacceptable completed shafts to the satisfaction of the Engineer.

3.10.1 Tremie Placement. Tremies may be used for concrete placement in either wet or dry holes. Extend the tremie to the shaft base elevation before starting underwater placement. Valves, bottom plates, or plugs may be used only if concrete discharge can begin approximately 2 inches above the excavation bottom. Remove plugs from the excavation unless otherwise approved by the Engineer. Maintain tremie discharge at or near the bottom of excavation as long as practical during concrete placement. Immerse tremie discharge end as deep as practical in the concrete but not less than 10 feet.

If at any time during the concrete pour the tremie line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete surface, the entire drilled shaft is considered defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as directed by the Engineer, and repour the shaft.

3.10.2 Pumped Concrete. Concrete pumps and lines may be used for concrete placement in either wet or dry excavations. Do not begin concrete placement until the pump line discharge orifice is at the shaft base elevation.

For wet excavations, use a plug or similar device to separate the concrete from the fluid in the hole until pumping begins. Remove the plug unless otherwise approved by the engineer.

Ensure the discharge orifice remains at least 10 feet below the surface of the fluid concrete. When lifting the pump line during concrete placement, reduce the line pressure until the orifice has been repositioned at a higher level in the excavation.

If at any time during the concrete pour the pump line orifice is removed from the fluid concrete column and discharges concrete above the rising concrete level, the Department will consider the shaft defective. In such case, remove the reinforcing cage and concrete, complete any necessary sidewall cleaning or over-reaming as the Engineer directs, and repour the shaft.

3.10.3 Drop Chutes. Drop chutes may be used to direct placement of free fall concrete in excavations where the maximum depth of water does not exceed one inch. Do not use the free fall method of placement in wet excavations. Concrete may be placed through either a hopper at the top of the tube or side openings as the drop chute is retrieved during concrete placement. Reduce the height of free fall and/or reduce the rate of concrete flow into the excavation if the concrete placement causes the shaft excavation to cave or slough, or if the concrete strikes the reinforcing cage or sidewall. When the Engineer determines free fall placement cannot be accomplished satisfactorily, use either tremie or pumping to accomplish the pour.

3.11 Construction Tolerances. The following construction tolerances apply to drilled shafts unless otherwise stated in the contract document:

1) Construct drilled shaft within 3 inches of plan position in the horizontal plane at the top of the shaft.
2) Do not vary the vertical alignment of a shaft excavation from the plan alignment by more than 1/4 inch per foot of depth or 6 inches total.
3) Maintain the top of the reinforcing steel cage no more than 6 inches above and no more than 3 inches below plan position.
4) All casing diameters shown on the plans refer to O.D. (outside diameter) dimensions. The casing dimensions are subject to American Pipe Institute tolerances applicable to regular steel pipe. A casing larger in diameter than shown in the plans may be used, at no additional cost, with prior approval by the Department.
5) Maintain the top of shaft concrete within ± 3 inches from the plan top of shaft elevation, measured after excess shaft concrete has been removed.
6) Design excavation equipment and methods so that the completed shaft excavation will have a planar bottom. Maintain the cutting edges of excavation equipment normal to the vertical axis of the equipment within a tolerance of ± 3/8 inch per foot of diameter. The tip elevation of the shaft has a tolerance of ± 6 inches from final shaft tip elevation unless otherwise specified in the plans.

Drilled shaft excavations and completed shafts not constructed within the required tolerances are unacceptable. Correct all unacceptable shaft excavations and completed shafts to the satisfaction of the Engineer. When a shaft excavation is completed with unacceptable tolerances, present corrective measures designed by a registered Professional Engineer for approval.

4.0 MEASUREMENT.

4.1 Drilled Shafts. The Department will not measure for payment any trial batches required to demonstrate the adequacy of the concrete mix, method, or equipment; concrete required to fill an oversized casing or oversized excavation; obstruction removal; over-reaming or sidewall cleaning; inspection work or inspection equipment; materials or work necessary, including engineering analyses and redesign, to alter unacceptable work methods or to complete corrections for unacceptable work; and will consider them incidental to the Drilled Shaft. Unless noted otherwise in the contract documents, casing is incidental to the drilled shaft.

4.1.1 Drilled Shaft, Common. The Department will measure the length, in linear feet, of drilled shaft above the top of rock elevation shown on the plans. The

Department will consider this quantity Drilled Shaft, Common regardless of the character of material actually encountered.

4.1.2 Drilled Shafts, Solid Rock. The Department will measure the length, in linear feet, of drilled shaft below the top of rock elevation shown on plans. The Department will consider this quantity Drilled Shafts, Solid Rock regardless of the character of material actually encountered during excavation.

4.2 Technique Shaft. The Department will pay for technique shaft at the contract unit price per each as detailed on the plans or as directed by the Engineer. This will constitute full compensation for all costs incurred during installation as described herein for 'Drilled Shaft' or in the contract documents. No additional compensation beyond the number of technique shafts allowed for in the plans will be permitted for additional technique shafts required because of failure to demonstrate adequacy of methods.

4.3 Rock Coring and Rock Sounding. The Department will measure Rock Sounding and Rock Coring shown on the plans, as specified in part 3.5 of this Special Note, and as the Engineer directs, in linear feet to the nearest 0.1-foot. If soil samples are specified in the contract documents they will be incidental to the unit price bid for Rock Sounding. The Department will not measure or pay for subsurface exploration performed deeper than the elevations indicated on the plans and/or in this Special Note, unless directed by the Engineer, and will consider it incidental to these items of work. Additionally, the Department will consider all mobilization, equipment, labor, incidental items, and operations necessary to complete the boring operations incidental to these items of work.

5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
-----	Drilled Shaft, Diameter*, Common	Linear Foot
-----	Drilled Shaft, Diameter*, Solid Rock	Linear Foot
-----	Technique Shaft	Each
20745ED	Rock Sounding	Linear Foot
20746ED	Rock Coring	Linear Foot

* *See Plan Sheets for sizes of shafts*.

The Department will consider payment as full compensation for all work required in this note.

June 15, 2012

SPECIAL NOTE FOR CONTROL GATES

01.00 DESCRIPTION. Furnish all calculations, drawings, materials, equipment, and labor necessary to design, construct, install, and test the four (4) control gate systems at the Panbowl Lake East Dam culvert riser structure and Washington Avenue culvert inlet and outlet structures. The structures are located adjacent to Kentucky Route 15 (KY 15) in Jackson, KY (Breathitt County).

The equipment provided under this section shall be designed, fabricated, assembled, erected, and placed in proper operating condition in full conformity with the drawings, specifications, and recommendations of the equipment Manufacturer(s) unless exceptions are noted by the Engineer.

Gates and operators shall be supplied with all the necessary parts and accessories (including gate assembly, side guides, stem, fasteners, anchors rods, couplings, thimbles, gaskets, where applicable) indicated herein, on the Contract Plans or as indicated on the Shop Drawings, specified, or otherwise required for a complete and properly operating installation. All gates, operators, and accessories shall be the latest standard product of a Manufacturer regularly engaged in the production of fabricated water control gates.

To ensure compatibility of all components directly related to the control gates, unit responsibility for each gate, actuator, and accessories as described in this section shall be the responsibility of the gate manufacturer unless specified otherwise. Any gates with electric motor actuators shall be comprised, at minimum, of a gate, guide system, and actuator provided by a single manufacturer. The control system for gates with electric motor actuators may be provided by the gate Manufacturer or a separate Controls Vendor.

01.01 Reference Standards. Standards referenced in this section include, but are not necessarily limited to, those listed below. Unless specified otherwise, the most recent document is referenced.

- KYTC Standard Specifications for Road and Bridge Construction Edition of 2019 Including Supplemental Specifications effective with the Letting of May 26, 2022
- United States Army Corps of Engineers (USACE):
    - EM 1110-2-2107 – Design of Hydraulic Steel Structures
    - EM 1110-2-2610 – Mechanical and Electrical Design for Lock and Dam Operating Equipment
- American Gear Manufacturers Association (AGMA)
    - ANSI/AGMA 2001- Fundamental Rating Factors and Calculation Methods for Involute Spur and Helical Gear Teeth
    - ANSI/AGMA 6010 - Standard for Spur, Helical, Herringbone and Bevel Enclosed Drives
    - ANSI/AGMA 6013 – Standard for Industrial Enclosed Gear Drives
- American Institute of Steel Construction (AISC)
    - AISC 325 – Steel Construction Manual
    - AISC 360 – Specification for Structural Steel Buildings
- American Society of Mechanical Engineers (ASME)
    - ASME B1.1 – Unified Inch Screw Threads
    - ASME B4.1 – Preferred Limits and Fits for Cylindrical Parts
    - ASME B46.1 – Surface Texture
- American Society for Testing and Materials (ASTM)

  - ASTM A126 – Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings
  - ASTM A240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
  - ASTM A276 – Standard Classification for Stainless and Heat Resisting Steel Bars and Shapes
  - ASTM A312 – Standard Specification for Seamless and Welded Austenitic Stainless Steel Pipes
  - ASTM A536 – Standard Specification for Ductile Iron Castings
  - ASTM A564 – Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
  - ASTM B22 – Standard Specification for Bronze Castings for Bridges and Turntables
  - ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications
  - ASTM D2000 – Standard Classification System for Rubber Products in Automotive Applications
  - ASTM D4020 – Standard Specification for Ultra-High-Molecular-Weight Polyethylene Molding and Extrusion Materials
  - ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
  - ASTM F594 – Standard Specification for Stainless Steel Nuts
- American Welding Society (AWS)
  - D1.6 – Structural Welding Code – Stainless Steel
- American Water Works Association (AWWA)
  - AWWA C561 – Fabricated Stainless-Steel Slide Gates
- National Electrical Manufacturer's Association (NEMA)
- National Electric Code (NEC)
- Underwriters Laboratory (UL)

01.02 Definitions. This provision indicates terminology used in this Section and in other Contract Documents that coordinate with this Section. Such terminology may or may not be indicated using initial capital letters and, when used in relation to the Work of this Section, have the meanings indicated below.

- Manufacturer: the control gate Manufacturer
- Contractor: company retained by KYTC for the purchase, design, and installation of the control gates and ancillary systems/equipment.

01.03 Submittals. Submittals shall be in accordance with KYTC Standard Specification 834.35 – Documentation and as specified herein.

Submit the following to the Engineer for each of the four (4) control gates:

- Shop Drawings detailing the gate, electrical components and assemblies, and providing all details required for construction, alignment and installation, including, but not limited to, dimensions, thimble locations and anchor bolt locations. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, conduit routing, conduit details, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection

between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.

- Manufacturer's operation and maintenance manuals. Provide both electronic (PDF) and hard copies of Operation and Maintenance Manuals with a complete set of as built drawings. All manuals and parts lists must be bound separately, be approximately 8-1/2 inches by 11 inches, printed on good quality paper and bound between flexible, durable covers. Drawings incorporated in the manual and/or parts lists may be reduced to page size provided they are clear and easily legible or may be folded into the manual to page size. Photographs and/or catalog cuts of components may be included for identification. Provide manuals for each type of slide gate and gate actuator. Furnish operation and maintenance manuals containing complete information in connection with the operation, lubrication, adjustment, routine and/or special maintenance, disassembly, repair and reassembly of the manual and electric motor driven gate actuators and appurtenances furnished under this section. Furnish copies of the manufacturer's spare parts lists and/or bulletins for the gate actuators and appurtenances. Clearly show all details and parts, and adequately describe all parts or have proper identification marks. Submit the operation and maintenance manual and parts lists at the time of shipment of the gate actuators.
- Manufacturer's installation certificate.
- Manufacturer's equipment warranty.
- Weld Certifications
- Manufacturer's performance affidavit.
- Design calculations demonstrating the gate's (and associated equipment's) ability to resist the required hydrostatic and lifting loads while limiting associated deflections and maintaining gate operability, and lift loads and deflection in conformance to the application requirements. Calculations must clearly state the maximum bending stress and deflection of the gates under maximum hydrostatic design head and list the loads and load combinations considered in design. Design calculations shall be prepared under the direction of a licensed Professional Engineer (PE) in the state of Kentucky and shall bear the signature and seal thereof.
- Contractor's installation and alignment plan. This plan shall provide details of the requirements installation of individual components, an approach method to installation, acceptance criteria, and means of securing each component. This plan shall detail the order in which components be installed and the acceptable alignment criteria of each component with respect to the previous and the system.
- Contractor's equipment alignment measurements.
- A detailed, step-by-step field testing procedure. This procedure shall clearly indicate the actions to be taken during testing and all results/performance for each step that indicate successful completion of that step. For sluice gates, the testing shall include both dry and wet operation in accordance with the Manufacturer's procedures and recommendations. For testing of the electric motor, record the voltage vs current for the duration of both dry and wet operation. Wet operation shall be at a water elevation that, at minimum, is the height of the gate.
- Field Testing Report for each control gate.

01.04 Quality Assurance.

A) Qualifications. Each gate assembly specified under this Section shall be furnished by a single Manufacturer with a minimum of 20-years of experience designing and manufacturing control gates. The Manufacturer shall have manufactured stainless

steel slide gates and cast-iron flap gates of the type described herein for a minimum of 20 similar projects.

To ensure quality and consistency, the control gates listed in this section shall be manufactured and assembled in a facility owned and operated by the gate Manufacturer. Third-party Manufacturers contracted for fabrication and assembly of the control gates will not be permitted.

01.05 Warranty. The Contractor shall provide a warranty for the gates and their actuators against installation, operation, and workmanship defects for a period of two years from the date of project final acceptance. The Vendor(s) shall provide a warranty for the gate(s), actuator(s), control system(s), and ancillary equipment against manufacturing defect for a period of two years from the date of control gate acceptance. Any replacement or repair of gate or actuator equipment due to faulty installation or manufacturing defects shall be the full responsibility of the contractor. KYTC will not provide additional payment for such repairs, or the associated mobilization.

02.00 MATERIALS.

02.01 Control Gate Overview. There are four (4) gates required for the project. A summary of the gate types and sizes can be found in the schedule below. All gates shall be provided from the same vendor.

Equipment Number	Location	Gate Size[1] [feet]	Gate type	Bottom Seating EL. [feet]	Head Rating[2] [feet]	Actuator Elevation [feet]	Primary Operation Type
G1	East Dam Riser Structure	2x2	Sluice	700.00	18	712.5	Hand Operated
G2	East Dam Riser	2x2	Sluice	706.00	12	712.5	Hand Operated
G3	Washington Ave Inlet	8x8	Sluice	701.00	44	743.5	Electric
G4	Washington Ave Outlet	8x8	Flap	700.00	45	N/A	Automatic

Notes:
[1]Clear square opening width by height
[2]Head rating measured to gate invert

2.02 Sluice Gate Components and Materials. The sluice gate systems shall be a non-self-contained system with separate stem guide(s) and actuator. The gate shall raise to allow water to flow below the gate and lower to prevent flow from passing through the gate.

The gates shall be compliant with the latest version of AWWA C561. Specific configurations shall be as noted on the gate schedule and as shown on the contract drawings. Machinery components shall be designed for a normal load case of 100% motor full load torque and an overload case of motor locked rotor torque. Machinery components shall be in compliance with EM 1110-2-2610.

The sluice gate components shall consist of the following materials:

- ASTM A240 Type 304 for all steel including Gate, Frame, Yoke, Cover Slide, Wall Thimbles, Stems, Stem Guides, Wall Brackets, and Pedestals/Invert Members (where applicable).
- ASTM F593 and F594 for all Fasteners and Anchor Rods.
- Ultra high Molecular Weight Polyethylene (UHMWPE) ASTM D4020 for Seat and Stem Sleeves
- Neoprene ASTM D2000 for all seals.

The Manufacturer and/or Contractor may propose alternative material(s) for approval by the Engineer.

Heatless cutting of stainless steel must be utilized to ensure there is no change in corrosion resistance properties of the stainless steel. Cutting methods utilizing heat will not be accepted.

All welds and welding procedures shall be in accordance with AWS D1.6. All welds shall be performed by an AWS-certified welding technician.

A) Sluice Gate Frame and Guide Rails. The sluice gate frames shall be composed of stainless steel (ASTM A240 Type 304) guide rails with UHMW seat/seals upstream and downstream. The seat/seals shall form a tight seal between the frame and the slide (disc). The guides will be of sufficient length to support at least ½ the height of the slide gate when in the fully open position.

The stainless steel (ASTM A240 Type 304) yoke shall not deflect more than $1/360^{th}$ of the span under full head break load.

B) Sluice Gate Stem and Stem Guides. The gate stem shall be solid stainless steel conforming to ASTM A276 Type 304.

Stem guides shall be provided as necessary to ensure that the maximum length-to-radius (L/R) ratio of the unsupported part of the stem is less than or equal to 200.

Stem guides shall be adjustable in two directions with split stem sleeves.

Stem guide brackets shall be fabricated of stainless steel and shall be outfitted with bronze bushings.

Stem threads shall be machine-cut 29-degree full Acme or stub Acme type.

Nominal diameter of the stem shall not be less than the crest of the threaded portion.

C) Sluice Gate Seals. All sluice gates shall be provided with a self-adjusting seal system to restrict leakage and prevent metal-to-metal contact between the gate and gate frame.

Seals shall be constructed of Ultra-High Molecular Weight Polyethylene in accordance with ASTM D4020.

Seals requiring periodic maintenance and adjustments to maintain specified leakage rates will not be permitted.

All seals shall be bolted or otherwise mechanically fastened to the frame or slide and shall be mounted so as not to obstruct the clear gate opening.

The seal system shall be durable and shall be designed to accommodate high velocities and frequent cycling without loosening or damage.

The seal system shall be factory tested to confirm negligible wear (less than 0.01 inches) and proper sealing. The factory testing shall consist of an accelerated wear test comprised of a minimum of 25,000 open-close cycles using a well-agitated sand/water mixture to simulate fluidized grit.

A resilient bottom seal shall be set into the invert member of the frame which shall be formed in a manner to protect 3 sides of the seal only exposing the side that will come in contact with the slide. Disc-mounted invert seals exposing additional surface area will not be permitted.

The top seal design shall incorporate a self-cleaning wiping function that prevents debris from building-up above the top seal and causing premature wear of the seats, seals, and gate face.

The UHMW seats shall impinge on the slide (disc) by way of a continuous loop cord seal. Seal designs incorporating resilient seals such as "J-bulb" or "P" seals that come in direct contact with the friction surface of the slide will not be considered.

The cord seal shall function as a seal between the frame and the UHMW, and as a spring force to maintain contact between the UHMW and the slide (disc).

Seals shall be replaceable without removing the frame from the wall. In the case of embedded gates, they shall be constructed in a manner that allows replacement of the seals without removal of the gate frame from the embedment.

The allowable leakage rate for the slide gates in this specification shall be half the allowable leakage listed in the latest revision of AWWA C561 (i.e. 0.05 gpm/ft) of wetted seal perimeter in seating head and unseating head conditions.

D) Sluice Gate Slide Cover. The gate slide cover shall be stainless steel (ASTM A240 Type 304) plate reinforced with structural shapes welded to the plate.

The slide cover shall not deflect more than 1/720th of the span, or 1/16" at the seated sealing surface of the gate under maximum specified head.

The stem to gate connection shall be either the clevis type, with structural members welded to the slide and a bolt or bolts to act as a securing method, or a threaded and bolted (or keyed) thrust nut supported in a welded nut pocket.

The clevis, or pocket and yoke, of the gate shall be capable of taking, without damage, at least twice the rated thrust output of the operator at 40 pounds of pull on a hand wheel or hand crank, and at locked-rotor stall of a motor operator.

The slide cover shall be constructed with vertical and horizontal reinforcement ribs.

E) Anchor Hardware. Anchor hardware (including anchor bolts, rods, and wall thimbles) shall be provided by the slide gate Manufacturer.

The size, quantity, and location of the anchor hardware shall be designed and selected by the slide gate Manufacturer. Design calculations shall be prepared under the direction of a licensed Professional Engineer (PE) in the state of Kentucky. All anchor hardware shall be designed in coordination with the design of the concrete inlet structure.

The wall thimble shall be F-type or E-type. Thimble depth shall be equal to the thickness of the concrete wall in which the thimble is to be mounted.

The wall thimbles shall be designed to allow thorough and uniform concrete placement during installation.

The wall thimble shall be installed square and plumb, and the front face shall be sufficiently flat to provide a proper mounting surface for the gate frame.

F) Sluice Gate Actuator. Control Gates G1 and G2 shall be hand powered operation. Control Gate G3 shall be primarily operated via an electric motor and feature a secondary (back-up) means of manual operation.

a. **Manual Actuator.** Manual gate operation shall consist of a handwheel or manual crank-operated gearbox.

All materials and equipment required for gate operation shall be supplied by the Contractor and Manufacturer.

The gate manufacturer shall select the proper gear ratio to ensure that the gate can be operated with no more than a 40 pound effort when the gate is in the closed position and experiencing the maximum operating head.

An arrow with the word “OPEN” shall be permanently attached or cast onto the operator to indicate the direction for opening the gate.

Handwheel operators shall be fully enclosed and shall have a cast aluminum housing.

Handwheel operators shall be provided with a threaded cast bronze lift nut to engage the operating stem.

Handwheel operators shall be equipped with roller bearings above and below the operating nut.

Positive mechanical seals shall be provided above and below the operating nut to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.

The handwheel shall be removable and shall have a minimum diameter of 15inches

Crank-operated gearboxes shall be fully enclosed and shall have cast aluminum or ductile iron housing.

Gearboxes shall have either single or double gear reduction depending upon the lifting capacity required.

Gearboxes shall be provided with a threaded cast bronze lift nut to engage the operating stem.

Bearings shall be provided above and below the flange on the operating nut to support both opening and closing thrusts.

Gears shall be steel with machined cut teeth designed for smooth operation.

The pinion shaft shall be stainless steel and shall be supported on ball or tapered roller bearings.

Positive mechanical seals shall be provided on the operating nut and the pinion shafts to exclude moisture and dirt and prevent leakage of lubricant out of the hoist.

The crank shall be cast aluminum or cast iron with a revolving nylon grip.

The crank shall be removable and shall be at an elevation between 36” and 60” above the walkway.

b. The primary actuator shall be an electric motor. The secondary actuator shall be a manual operator including a clutch mechanism to prevent manual operation when the electric motor is operable.

The electric motor shall be mounted on the stem at the operating platform as shown on the contract drawings. The unit must consist of complete, compact, rugged assemblies specially designed and manufactured for the required service by a manufacturer regularly engaged for at least 5 years in the production of this type of device, and be delivered completely wired, assembled and ready for installation. All parts of the lift mechanism must be designed to move the gate slide at a rate of approximately 1 foot per minute under the specified operating head condition. The actuator must be designed in conformance with the latest edition of standard practices of AGMA 6010. Gate actuation

forces must follow the requirements as shown in Appendix A of AWWA C560 and AWWA C561.

The electric motor for the gate actuator must have a continuous duty rating, be coordinated for operation with an electric service as provided by Kentucky Power, have sufficient horsepower to operate the actuator unit through the full gate travel in both directions without exceeding the full load ampere rating, and conform to applicable requirements of NEMA MG 1. All bearings must be the anti friction type.

All components including the motor, reversing contactors and overload relays, pushbuttons, indicating lights, control transformer, reductions gearing, stem lift nuts, bearings and limit switches, must be enclosed in NEMA Type 4 enclosures and mounted on a cast iron pedestal with flanged base plate, complete with stainless steel anchor bolts and silicon bronze or stainless steel nuts. Design the pedestals to position the handwheel approximately 3 feet above the operating room floor on the standard slide gate installation.

A) Reduction gearing must consist of generated helical gears of heat-treated steel. Worms are to be of hardened alloy steel with threads ground and polished. The worm gear must be in one piece of high strength cast bronze. Run all reduction gearing in lubricant. All gears, the stem lift nuts and other working components must be carried on heavy duty ball or tapered roller bearings adequate for all torque and thrust loads imposed by operation of the gate at the specified maximum heads. Provide suitable seals at all points as required to retain the lubricant. Design the motor actuator to permit manual operation of the unit in event of power failure or as necessary during servicing.

B) Provide a handwheel, and an arrow with the word "OPEN" cast on the rim of the wheel, indicating the direction of opening. Effort required to operate the actuator manually with the gate in motion must not exceed 40 pounds at the wheel rim, and 80 pounds at the wheel rim to unseat the gate. The motor actuator must include a built-in clutch mechanism so that the handwheel will not rotate during motor operation nor turn during manual operation. Locate a dial type indicator at the top of the motor actuator to show gate position during both hand and motor operation. The indicator must be graduated to show "FULL OPEN" when the bottom of the gate is at the fully open position. House the indicator in a watertight enclosure. Indicators which are of the 3-position type showing fully open, fully shut or in an intermediate position are not acceptable. The actuator must be able to watch the indicator from the same position one stands in to operate the controls.

C) The operating unit must include a built in, lost motion device which will permit the motor to attain full speed after which a hammer blow must be imparted to the hoisting mechanism to initiate gate motion in either the opening or closing direction of travel. Supply bronze lift nuts, made in two pieces with accurately machined splines or keys and threads. The two-piece nut consists of an outer member, having a flange or flanges on the exterior and splines on the interior, which mates with an inner member having splines on the exterior and threads on the interior. The outer member must be mounted in the unit housing. Secure the inner member to the outer member by either a threaded retainer ring or another suitable arrangement.

D) After the gate has been either completely closed or securely supported in the partially open position, this inner member must be capable of being easily removed by disassembling its retaining arrangement and turning the handwheel. Each stem nut must be adequately designed, factory tested and inspected with the stem with which it will operate. Run each nut by hand throughout the length of the stem with which it will operate. Suitable marks must be used to identify the matched sets once they have been established in the shop. The internal thread must have the lower or non-working face relieved 1/64 inch to ensure that the threads will bottom out before wedging can occur. Drill the lift nut or otherwise provide with adequate oil recesses and passages to ensure passage of lubricant to all interior threaded surfaces of the nut. The internal arrangement of the motor actuator units must be such that all moving parts run in lubricant, with adequate fittings and seals provided to retain the lubricant. Use lubricant per recommendations by the gate actuator manufacturer.

The closing and opening travel of each gate must be protected against overload by torque-responsive mechanical switches, one for each direction of travel. Provide geared limit switches for stopping the gate at both the fully closed and the normal fully open positions. The torque switches must be operative during the entire travel of the gate to protect the stem and gate against possible damage in the event an obstruction is met. The torque switches must function without auxiliary relays or other devices and be field-adjustable to ensure (1) stopping the lowering operation of the gate should the stem load for any reason become compressive to a degree greater than the normal seating requirements, and (2) stopping the raising operation should a 100 percent overload develop. Provide position limit switches that are adjustable and of the intermediate gear type, governed by rotation of the motor driving mechanism. Internal motor control wiring and motor power wiring must be provided complete to a suitable terminal block in the limit switch compartment, and clearly mark terminal blocks in a suitable manner to facilitate external control and power connections under another section of these specifications. All internal wiring must be not smaller than No. 12 stranded copper conductor with not less than 3/64-inch thick "NEOPRENE" or equal insulation and not less than a 1/64-inch thick "NEOPRENE" or equal jacket.

02.03 Flap Gates. The flap gate for Washington Avenue Outlet Structure shall consist of the following materials:

- Cast Iron per ASTM A126, Class B for Frame and Cover
- Ductile Iron per ASTM A536, Gr. 65-45-12 for Pivot Lug
- Stainless Steel ASTM A240 Type 304 for Hinge Link
- Commercial Bronze for Bronze Bushing and Washers
- ASTM F593 and F594 for Fasteners and Anchor Rods

The Manufacturer and/or Contractor may propose alternative material(s) for approval by the Engineer.

A) The flap gate frame shall be cast of flatback design, with seating surface inclined from vertical at a minimum of 2.5 degrees and a maximum of 5 degrees to assure positive closure. For flatback gates mounted to thimbles or flanges, the gate flange shall be machined and drilled to match.

B) Cover shall be cast iron, cast in one piece, with reinforcing ribs, designed to withstand the seating head specified. An integral cast-on lifting eye shall be provided for manual operation. All machined surfaces shall have a minimum 63 micro inch finish.

C) Seating surfaces for frame and cover shall be one of the following:
- Machined iron
- Bronze seats impacted into dovetail grooves on the frame and cover.
- Bronze seats impacted into dovetail grooves within the frame with neoprene seat bonded into a dovetail groove in the cover to cushion the cover upon closing.
- Bronze seats impacted into dovetail grooves in cover with the neoprene seat bonded into the dovetail groove in the frame.

D) Gate shall be provided with an adjustable, double pivoted hinge linkage so designed to permit complete seating, full opening and with stops or other arrangement to prevent the cover from rotating sufficiently to become wedged in the open position. Pivot lugs mounted to the frame shall be adjustable to allow adjustment of hinge links without having to remove the cover from the gate. The hinge links shall be bronzed bushed stainless steel. Optional hinge links of ductile iron, stainless steel (both bronze-bushed), and manganese bronze may be specified. All assembly hardware shall be type 18-8 stainless steel, 316 or 304 as specified.

E) Finish of all cast iron shall be painted with manufacturer's standard shop coat paint, to be approved by the Engineer. Structural steel hinge links shall be galvanized. All bronze and stainless steel parts do not require further finish.

F) The flap gate shall incorporate lifting lug(s) on the exterior face to permit manual opening of the gate by maintenance personnel.

02.04 Electrical Equipment Support Pedestals and/or Racks. This Section is applicable to Control Gate G3. Supports for electrical equipment shall be designed and constructed using structural shapes (angles, channels, and/or I-beams) or preformed channel strut made from stainless steel (ASTM A240 Type 304).

A) Acceptable Preformed Strut Manufacturers:
- Unistrut Building Systems.
- B-Line by Eaton.
- Globe Strut.
- Superstrut by Thomas & Betts.

02.05 Electric Service. This Section is applicable to Control Gate G3. Coordinate an electric service installation with the local electric utility (Kentucky Power and Light: 1-800-572-1113) in compliance with the KYTC Standard Specification 716.03.01 Utility Requirements. The desired electric service location is on the south side of Nathan Lane, just east of Washington Avenue, directly across Nathan Lane from the corner property with address, 701 Washington Avenue, Jackson, KY 41339. Coordinate the available voltage and service type with the selection of the control gate G3 electrical equipment.

Provide utility compliant equipment and support structure including a meter, meter base, service-rated double throw disconnect switch (padlockable in all three positions), an

outdoor rated portable generator receptacle, ground rod(s), and all conduit and wiring connections.

The meter socket shall comply with KYTC Standard Specification section 834.24.

The disconnect switch shall be rated NEMA 3R for consistency with the requirements of KYTC Standard Specification section 834.25.

02.06 Control Cabinet. This Section is applicable to Control Gate G3. Provide a control cabinet assembly on the operator control platform at the top of the inlet structure and control gate G3 structure at the end of the pedestrian bridge. The cabinet shall be equipped with pilot devices and a reversing motor starter for control gate operation, din rail mounted circuit breakers, and a 10 KVA transformer (mounted inside the cabinet to provide 120 VAC if the electric service voltage and sluice gate actuator requirements are higher). Pilot devices for control of the sluice gate shall be mounted in the front door of the cabinet so that the cabinet need not be opened for gate operation.

The Control Cabinet shall be fabricated by a UL 508 certified supplier.

Equipment to be mounted outside the control cabinet but wired back into the control cabinet shall include a service rated disconnect switch (to switch incoming power), a 120 VAC duplex receptacle with weatherproof cover which allows power cords to be safely plugged in while the cover is locked in the closed position, a disconnect switch to control power from the control cabinet to the gate actuator, and an area light to illuminate the operator platform.

Equipment to be wired back to the control cabinet but located on the inlet side of the inlet structure shall include a warning horn, flashing beacon, and warning sign to read, "Flashing Beacon Indicates Gate Opening or Closing."

Provide all conduit and wiring from the point of electric service to the control cabinet and disconnect switches and from the control cabinet and disconnect switches to the gate motor actuator as required for a fully operational system.

Pilot devices may vary as long as the general functionality described in the Description of Operation is provided.

A) Pilot Devices. Pilot devices shall be compliant with the following general requirements:

- Standards: NEMA ICS 5, UL 508.
- Heavy-duty NEMA 4/4X/13 corrosion-resistant/watertight/oiltight.
- Mounting hole: 30.5 mm.
- Contact blocks: 10 amp, NEMA A600 rated, number as required to fulfill functions shown or specified.
- Legend plate shall be detailed on the Shop Drawings. Legend plates shall be made of corrosion / weather resistant material with permanent marking made by machine engraving or machine stamping. Hand engraving, such as would be done with an engraving pencil, is not acceptable. Plates must be screwed or bolted into place.
- Indicating lights shall be full voltage type and provided with a push to test feature or the equivalent thereof.

B) Enclosures. Industrial Control Panels shall be NEMA 4X rated with the following characteristics:

- Seams continuously welded and ground smooth.
- No knockouts.
- External mounting flanges.
- Continuously hinged door and stainless steel screws and clamps.

- Door with oil-resistant gasket.
- Back plane mounting panels: Steel with white enamel finish.
- Interiors shall be white or light gray in color.
- Wire management duct:
    - Bodies: PVC with side holes.
    - Cover: PVC snap-on.
    - Size as required.
- Floor stand kits made of same material as the enclosure.
- Weld nuts for mounting optional panels and terminal kits.
- Ground bonding jumper from door, across hinge, to enclosure body.
- Standards: NEMA 250, UL 508.
- 120 VAC, single phase, 60 hertz, space heater to prevent moisture condensation on electrical components.
- Compartment with copies of operations and maintenance manual with all wiring diagrams, as manuals
- drawings, and troubleshooting and maintenance information.

C) Motor Starter. The motor starter shall be a suitable sized amperage rated reversing starter with its coils rated for operation on 120 VAC, single phase, 60 hertz current. The starter shall be equipped with 3 overload relays of the automatic reset type. Overload status shall be displayed via pilot light on the control panel. Controls shall provide the functionality described within this specification.

D) Transformers. Control transformers shall comply with KYTC Standard Specification section 834.22.07.

General purpose dry-type transformers with windings 600 volts or less shall be two-winding, 60 hertz, and self-cooled in accordance with UL 506. Ensure windings have a minimum of two 2.5 percent taps above and below nominal voltage.

02.07 Auxiliary Devices.

A) Pedestrian Alarm Horn. The alarm horn shall be of the vibrating horn type with the following characteristics:

- Edwards 870, 874, 876, 878EX series or approved equal.
- Heavy-duty die cast housing with corrosion resistant finish.
- Adjustable volume: 78 to 103 dB at 10 feet.
- Voltage: 120 VAC or as required.
- Enclosures/mountings: NEMA 4X surface mounting in wet areas.

B) Pedestrian Alarm Light. Alarm light shall be of the heavy-duty strobe type with the following characteristics:

- Weatherproof shatter resistant polycarbonate lens and cast base.
- Immune to shock and vibration, no moving parts.
- Xenon flash tube providing a minimum of 65 single flashes per minute.
- Enclosures/mountings: NEMA 4X surface mounting in wet areas.

C) Photocells. Photocells shall comply with KYTC Standard Specification section 834.22.08.

D) Circuit Breakers. Circuit breakers shall comply with KYTC Standard Specification section 834.22.11.

E) Receptacles. Receptacles shall be located on the operator's platform on or near the Control Cabinet and shall have the following characteristics:

- Duplex, straight blade, Standard Specification grade.
- Brass triple wipe line contacts.
- One-piece grounding system with double wipe brass grounding contacts and self-grounding strap.
- Rated 20 A, 125 VAC.
- High impact nylon body.
- Receptacle body color: Black.
- Exterior: Feed-through type ground fault circuit interrupter with test and reset buttons.
- Configuration: NEMA 5-20R.
- Cover plate: Weather resistant zinc plated or aluminum, gasketed, self-closing cover using stainless steel spring. Receptacle shall be usable while the cover is closed.
- Standards: UL 498, UL 514A, UL 943; NEMA WD 1, NEMA/ANSI WD 6.

F) Outlet Boxes. Outlet boxes shall be surface mounted and constructed with zinc plated cast iron or die-cast copper free aluminum with manufacturer's standard finish. Boxes shall be provided with threaded hubs and grounding screws and shall meet the requirements of UL 514A.

G) Area Light Fixture. Provide an LED light fixture with 3000K color temperature rated for outdoor use. The fixture shall provide the equivalent lighting of a 300 watt incandescent bulb. Fixture shall be capable of photocell control.

02.08 Conduits and Wiring. This Section is applicable to Control Gate G3. Conduits routed from the electric utility shall be overhead or underground as coordinated with the utility. Conduits shall run underground between the project electric service pad and the Washington Avenue end of the pedestrian walkway. Conduits shall be routed along the side of the walkway between the two ends of the walkway. Conduits shall be supported from the inlet structure in the area at the top of the inlet structure.

Provide conduits and wiring in accordance with the following KYTC Standard Specification sections:

716.03.04 – Conduit Installation

716.03.05 – Underground Warning Tape

716.03.06 – Backfilling and Disturbed Areas

716.03.07 – Wiring Installation

834.05 – Conduit

835.17 – Wire and Cable.

02.09 Grounding. Provide grounding in accordance with KYTC Standard Specification sections 706.03.11 – Grounding Installation, and 834.04 – Ground Rods.

02.10 Padlocks. Provide padlocks for all lockable disconnect switches and the control cabinet in accordance with KYTC Standard Specification section 834.26 – Padlocks. Padlocks shall be provided both to secure the positions of the disconnect switch operators and to secure the enclosures from unauthorized access.

02.11 Safety Disconnect Switches. Provide safety NEMA 4X disconnect switches for incoming power to the control cabinet and outgoing power to the gate motor actuator.

Ensure safety switches comply with NEMA KS 1, and are the heavy-duty type with enclosure, voltage, current rating, number of poles, and fusing as required. Ensure switch construction is such that, when the switch handle in the "ON" position, the cover or door cannot be opened. Cover release device is coinproof and so constructed that an external tool is used to open the cover. Make provisions to lock the handle in the "OFF" position. Ensure the switch is not capable of being locked in the "ON" position.

Provide switches of the quick-make, quick-break type and terminal lugs for use with copper conductors.

Ensure safety color coding for identification of safety switches conforms to ANSI Z535.1.

02.12 High Water Warning System. This Section is applicable to Control Gate G3. Furnish and install a High-Water Warning System (HWWS) to monitor high water conditions at the Washington Avenue inlet structure with electric slide gate. The system shall be specifically designed for monitoring high water level conditions and providing alarm notification at the pedestrian bridge entrance on Washington Avenue.

The HWWS shall include equipment in three locations:

Pedestrian Bridge entrance at Washington Avenue. Provide a flashing beacon, audible horn, public sign, a mounting support for these items, and conduit and wiring routed back to the Control Cabinet.

Control Cabinet at the top of the inlet structure and gate G3 at the end of the pedestrian bridge. Equip the control cabinet with a microprocessor-based controller which can be programmed with a high-water level, a water-level display visible on the control face of the cabinet, and outputs to drive the beacon and horn at the pedestrian bridge entrance on Washington Avenue. Ensure the HWWS controller provides the capability to turn on or turn off the flashing beacons and horn.

Side of gate G3 inlet structure. Provide a pulse radar liquid level sensor on a bracket aimed at the water entering the inlet structure, and conduit and wiring routed back to the Control Cabinet.

A) Beacon with Horn. The high-water level alarm horn shall provide a super bright flashing LED integrated with a horn synchronized with the flashing LED. Additional characteristics shall include:

- Edwards 51XRB or approved equal.
- Polycarbonate double Fresnel lens (amber color).
- Cast metal base that can be used as a junction box.
- Volume: 85 dB at 10 feet.

- Voltage: 120 VAC or as required.
- Operating temperature: -31 to +150 degrees F.
- Enclosures/mountings: NEMA 4X surface mounting in wet areas.

B) Pulsed Radar Liquid Level Sensor and Display. The high-water level sensor shall be a Flowline EchoPulse LR30 or approved equal with:

- Rugged IP68 sensor with 304 stainless steel mounting bracket
- 26 GHz. Pulse radar.
- Wall or cabinet mounted display with windowed enclosure rated IP67.
- Sensing range 12" to 98.4'.
- Power supply as needed.
- Attach to outlet structure at Washington Avenue as shown in the plans
- Program to signal an alarm and flashing beacon when water surface elevation is in excess of elevation 712.0.

C) Warning Sign. A high-water level warning sign shall be mounted on the beacon / horn support post. Sign shall read, "Call City of Jackson at 606.666.7069 if flashing." Fabricate sign in accordance with KYTC Signing Specification Sheet T002.

03.00 EXECUTION

03.01 Installation. Installation of the gates shall be performed in accordance with standard industry practices. It shall be the responsibility of the Contractor to handle, store, and install the equipment specified in this Section in strict accordance with the Manufacturer's recommendations.

The Contractor shall review the installation drawings and installation instructions prior to installing the gates.

The Contractor shall fill any void between the guide frames and the structure with non-shrink grout as shown on the installation drawing and in accordance with the grout manufacturer's recommendations. Grout shall be a durable weather-rated material suitable for the intended application and design.

The sluice gate frames shall be installed in a true vertical plane, square and plumb, with no twist, convergence, or divergence between the vertical legs of the guide frame. The frame cross rail shall be adjusted as required to maintain consistent seal compression across the full width of the gate.

Alignment of the machinery equipment shall be to the Manufacturer's recommendations. Contractor shall measure and record the alignment and submit a report for each gate.

03.02 Description of Operation for Control Gate G3. The electrical and control system shall be configured to support operation as follows:

1. Verify that the disconnect switch at the point of electrical service is in either the Utility or the Generator position and that power is available.
2. Verify that the incoming power disconnect switch at the Control Cabinet is in the ON position.
3. Verify that the gate actuator power disconnect switch at the Control Cabinet is in the ON position.
4. Verify that the Sluice Gate Open / Off / Close selector switch is in the Off position.
5. Insert the appropriate key into the Control Power key switch to turn on control power. Turning on control power shall initiate or enable the following operations:
    a. The control cabinet gate position pilot lights should turn on.

b. The warning beacon near the electrically operable gate should start to flash.
c. Operation of the warning horn via the Horn pushbutton is enabled.
d. The ability to select the operating mode (On / Off / Auto) for the area lights is enabled. The Auto mode operates the area light according to photocell input.

6. Verify that the Overload pilot light is not On.
7. Pull out the E-Stop pushbutton to enable gate operation.
8. Alert any people in the vicinity of the electrically operable gate by using the Horn pushbutton to sound the horn near the electrically operable gate.
9. Open or close the gate by selecting the Open or Close position of the Open / Off / Close selector switch, respectively.
10. Verify limit switch feedback of gate position. The green "Open" pilot light should be on when the gate is fully open. The green "Closed" pilot light should be on when the gate is fully closed. The red "Not Open or Closed" light should be on at all times when the gate is not either fully open or fully closed.
11. Stop movement of the gate at any time by selecting the Off position of the Open / Off / Close selector switch. If this action fails to stop operation of the gate actuator, push the E-STOP pushbutton in.
12. When gate operation has concluded, verify that the area light remains in the desired operating mode (On / Off / Auto), push in the E-STOP pushbutton, turn off the Control Power keyswitch, and remove the Control Power key.
13. Lock off the gate actuator disconnect switch in the Off position. This provides a second means (in addition to the Control Power switch) of discouraging unauthorized operation of the gate.
14. Leave the incoming power disconnect switch at the control cabinet and the electric service disconnect switch locked in the On position to maintain power to the area light and HWWS. During maintenance work, these disconnect switches may also be locked in the Off position.
15. Upon a high-water condition, as sensed by the HWWS and indicated via beacon and horn (at the Washington Avenue entrance to the pedestrian bridge leading to the sluice gate operator's platform), the beacon and horn may be turned off at the control cabinet. The HWWS beacon and horn operation shall be turned back on after water has receded below the alarm level.

03.03 Field Testing. After installation, all gates will be field tested in the presence of the KYTC's Representative to ensure that all items of equipment are in full compliance with this Special Note. Each gate assembly shall be dry and water tested up to a maximum of five times by the Contractor at the discretion of the Owner's Field Representative, to confirm that leakage does not exceed the specified allowed leakage.

Each sluice gate shall be cycled to confirm that they operate without binding, scraping, or distorting. The effort to open and close manual operators shall be measured and shall not exceed the maximum operating effort specified above. Electric motor actuators shall function smoothly and without interruption.

A high-water level shall be simulated to verify operation of the horn and beacon.

Flap gates shall be monitored following installation to ensure automatic operation under the specified unseating head.

A mobile / portable generator shall be brought to the site for testing and acceptance testing of the electrical system under generator power. This generator shall be sized by the Contractor to address all system loads simultaneously, including but not limited to the gate,

lighting, and all auxiliary equipment. All necessary temporary connections, equipment maintenance, and fueling shall also be the Contractor's responsibility.

03.04 Maintenance. After completion of the installation, the Contractor must maintain and protect the gates and gate actuators and keep them ready for operation at any time until all gates have been accepted.

03.05 Final Inspection. A final inspection shall be conducted by the Owner or their representative after successful completion of a gate's field test. A punch list shall be generated detailing any remaining work to be completed.

03.06 Acceptance. A gate shall be considered complete when all the following conditions have been met.

A) Gate is installed.
B) Gate has been successfully field tested.
C) All submittals and reports have been submitted and accepted.
D) Operations and Maintenance manuals have been submitted and accepted.
E) All punch list items have been completed.

4.0 PAYMENT. The work shall be paid for under the following Pay Items. No partial payments shall be issued – this work shall be paid upon completion

PAY ITEM #	PAY ITEM DESCRIPTION	UNIT
24939ED	FLOOD GATE	EA
25086EC	AUTOMATED SLIDE GATE	EA
24886EC	FLAP GATE	EA

04.01 Control Gates G1 and G2. The design, procurement, alignment, installation, and testing of control gates G1 and G2 shall be paid under the FLOOD GATE pay item.

04.02 Control Gate G3. The design, procurement, alignment, installation, and testing of control gate G3 and related electrical service and equipment shall be paid under the AUTOMATED SLIDE GATE pay item.

04.03 Control Gate G4. The design, procurement, alignment, installation, and testing of control gate G4 shall be paid under the FLAP GATE pay item.

END OF SECTION

SPECIAL NOTE FOR NON-DESTRUCTIVE TESTING OF DRILLED SHAFTS

Breathitt County
Improvements to KY 15 Corridor at Panbowl Lake
Item No. 10-376.0

The following sections provide the requirements for Crosshole Sonic Logging of the drilled shaft foundations, schedule requirements for submittals, reporting requirements and Contractor/Testing Subcontractor/Department responsibilities. The purpose of the non-destructive testing is to evaluate the structural soundness of the drilled shafts.

References to the “Department” refer to the Kentucky Department of Highways and/or consultants acting on behalf of the Department.

In all cases, the Department reserves the right to request raw data, field notes and/or other available information that may be necessary to evaluate the results of testing specified in this Special Note. Upon request, provide any available information at no additional cost to the Department.

In all cases, the Department reserves the right to perform testing to obtain independent results of testing specified in this Special Note. Upon request, provide any assistance required for Department personnel to perform such testing at no additional cost to the Department.

At the request of the Engineer, personnel representing the Contractor (including testing subcontractors) and the Department may be required to attend a pre-test meeting to discuss procedures related to testing, reports, reviews, etc. This meeting will be at no additional cost to the Department.

Unless noted otherwise, the Department will respond to the Contractor regarding acceptability of submittals referenced in this Special Note within ten (10) business days. A “Business Day” is defined as any day except Saturdays, Sundays and Holidays, as defined in Section 101.03 of the Standard Specifications.

1.0 Crosshole Sonic Logging

1.1 Description

Crosshole Sonic Logging (CSL) is a nondestructive method to test the integrity of drilled shafts in accordance with ASTM D6760. It is the responsibility of the Contractor to supply all equipment and materials necessary to perform this testing and for obtaining the services of a CSL Testing Firm, which is experienced with CSL testing in accordance with Section 2.4.1 of this note and approved by the Department, to perform the testing.

The Contractor will be responsible for providing:

1. access tubes to be used for CSL testing of the drilled shafts;
2. watertight shoes, watertight caps, and non-shrink grout;
3. suitable working space and access to every shaft;
4. any other equipment, materials, or assistance necessary to accomplish the testing.

1.2 Materials

1.2.1 Access Tubes

1. Provide access tubes meeting the requirements below:
   a. 2 inch ID schedule 40 steel pipe conforming to ASTM A 53, Grade A or B, Type E, F, or S;
   b. contains round, regular internal diameters free of defects or obstructions, including any at pipe joints;
   c. capable of permitting the free, unobstructed passage of a 1.5-inch-diameter source and receiver probes; and
   d. watertight and free from corrosion with clean internal and external faces to ensure passage of the probes and a good bond between the concrete and the tubes.
2. Provide watertight shoes on the bottom and removable watertight caps on the top of the tubes.
3. The Engineer will accept access tubes based on visual inspection and certification that the steel pipe meets the requirements above.

1.2.2 Grout

Provide non-shrink grout to fill the access tubes and any cored holes at the completion of the CSL tests. Use grout conforming to Section 601.03.03 of the Standard Specifications.

1.3 Execution

1.3.1 Access Tube Installation

1. Install access tubes spaced evenly.
2. Securely attach the CSL tubes that are along the inside periphery to the spiral reinforcement. Wire-tie the tubes a minimum of every 3 ft. so they will stay in position during placement of reinforcement and concrete. Place the tubes so they will be parallel with each other and as near to vertical as possible in the finished shaft. Even moderate bending of the tubes will result in large regional variations in the data.
3. Place the tubes approximately 3 to 6 inches above the shaft tip, at least 3 ft. above the top of rebar cage, at least 3 ft. above the free water level (if above the ground surface), at least 1 ft. above the top of concrete, and at least 3 ft. above the top of casing. Under no circumstances may the tubes be allowed to come to rest on the bottom of the excavation.
4. Ensure that any joints in the tubes are watertight and no residual putty is remaining on the outside of the couplers.
5. Tubes may be extended with mechanical couplings. Do not use duct tape or other wrapping material to seal the joints. Welding of joints is prohibited.
6. During placement of the reinforcement cage, exercise care so that the tubes will not be damaged to the extent that would prevent a 1.5-inch diameter probe from passing through them.
7. After placing the reinforcing cage and before beginning concrete placement, **fill the tubes with clean potable water** and cap or seal the tube tops to keep debris out of the tubes. Replace the watertight caps immediately after filling the tubes with water.
8. Immediately before placing concrete, use a weighted tape to investigate all tubes to make sure that there are no bends, crimps, obstructions or other impediments to the free passage of the testing probes. Additionally, check to ensure there are no water leaks.
9. During removal of the caps from the tubes, exercise care so as not to apply excess torque, hammering, or other stresses which could break the bond between the tubes and concrete.
10. Immediately after concrete placement, recheck each access tube to ensure that the water level is at the top of the tube. (This is due to the potential for air bubbles entrapped in the tube to rise during the pour and lower the water level in the tube.)
11. After concrete placement and before the beginning of CSL testing, inspect the access tubes and report any access tubes that the 1.5 inch diameter test probe cannot pass through to the Engineer. The Engineer will evaluate whether the CSL testing can be successfully performed without the impacted tube(s); the Engineer may require the Contractor to, at its own expense, replace one or more tubes with 2-inch-diameter holes cored through the concrete for the entire length of the shaft, excluding the bottom 6 inches. Unless directed otherwise by the Engineer, locate core holes approximately 6 inches inside the reinforcement such that it does not damage the reinforcement. For each core hole drilled, record a log with descriptions of inclusions and voids in the cored holes and submit a copy of the log and photographs to the Engineer. Preserve the cores, identify as to location and make available for inspection by the Engineer.

1.3.2 Grouting

After completion of the CSL testing, evaluation of results and upon being directed by the Engineer, remove the water from the access tubes and any cored holes (if applicable). Completely fill the tubes and holes with approved grout using the tremie method. After grouting, cut the tubes flush with the tops of the drilled shafts.

1.4 CSL Testing and Evaluation of Test Results

Make submittals in accordance with the Project requirements for submittals. See Table 2 below.

Table 2 – Schedule of CSL Submittals

Submittal Number	Submittal Item	Deadline	Event
1	Technical Proposal with CSL Testing Firm qualifications	45 business days before	Start of Drilled Shaft Construction
2	CSL Testing Reports	5 business days after	Completion of testing on an individual drilled shaft
Provide all submittals and reports in .pdf format			

1.4.1 Technical Proposal (Including Example Report)

Submit a technical proposal prepared by the CSL Testing Firm that addresses the testing procedures and required qualifications and experience of the testing firm. Include sufficient documentation to show that the firm and the person overseeing the work on this project meet the requirement of having CSL testing, data interpretation and reporting experience on at least three similar deep foundation projects.

With the technical proposal, include an example CSL test report prepared in accordance with the reporting requirements below. Include any costs associated with the example report in the applicable unit bid prices for CSL testing. If deviations from the specified reporting requirements are noted during review, the Department may (depending on the extent of the deviations) elect to require the testing to confirm that they can meet the requirements in production test reports rather than resubmit the example report. The purposes of this report are for the CSL testing firm to demonstrate their understanding of the reporting requirements and capability to meet them and to ensure that Department personnel are familiar with and understand the testing firm's reporting format and style. The ultimate objective of this requirement is to facilitate timely reviews of production test reports and reduce the potential for delays in shaft acceptance. Failure to submit an acceptable example report may result in disqualification of the testing firm.

1.4.2 Testing

1. Provide access to the top of the shaft for testing personnel and equipment.

2. Perform CSL testing in accordance with ASTM D 6760.
3. Perform CSL testing on all completed shafts, including a second test when directed by the Engineer. Perform the first test after the shaft concrete has cured a minimum of 72 hours and no more than 10 days (unless directed otherwise by the Engineer) and has obtained a minimum strength of 3000 psi. Perform the second test after the shaft concrete has cured at least 28 days and obtained a minimum strength of 4000 psi. (Based on prior experience with similar shaft diameters, numerous flaws and defects were encountered on shafts tested at about 14 days and significant improvement was noted upon retesting at about 30 to 40 days.) The Department may waive the 28 day CSL testing on some shafts if acceptance can be granted based on the 72-hour to 10-day test results after evaluating the improvement noted between the 72-hour to 10-day and 28-day tests on previously-tested shafts. The intent is to perform 28 day testing on the earlier shafts constructed at each pier and eliminate 28 day testing on the later shafts constructed at each pier.
4. Obtain logs as shown below unless directed otherwise by the Engineer.

Substructure Unit	Tubes	Perimeter Logs	Major Diagonal Logs	Minor Diagonal Logs
Pier 1	4	4	2	6

5. If during testing, it is apparent that tube debonding has occurred, the Contractor may consider flooding the top of the shaft and retesting immediately; it is possible that water may flow into gaps between the tubes and concrete and provide continuity for the sonic waves.
6. If the CSL testing firm or Contractor believes that additional testing is required (such as CSL retesting, Angled CSL, Crosshole Tomography Analysis, or Sonic Echo/Impulse Response, etc.), contact the Engineer immediately. The Department will review the test report(s) to evaluate whether additional testing is required. If the additional testing indicates that any drilled shaft on which additional testing was required is acceptable, the Department will pay for the direct cost of additional testing by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft concrete is unacceptable, the additional testing will be at the expense of the Contractor. The Department will not pay for additional testing performed at the discretion of the Contractor or testing firm that is not directed and/or agreed upon by the Department.

1.4.3 Test Reports

1. Submit a test report prepared by the CSL Testing Firm within 5 business days of completion of testing which, as a minimum, contains:
   a. Date of test;
   b. Plan Shaft No. and Reference Elevation (i.e. zero depth elevation) and notation of water level in the tubes at the time of testing;
   c. Schematic showing a plan view of the access tube locations;

d. CSL logs with reference elevations;
e. CSL logs presented for each tube pair tested with any discontinuity zones indicated on the logs and discussed in the report as appropriate;
f. Analyses of **both** pulse first arrival time (FAT) versus depth **and** wave speed versus depth;
g. Include nested signal peak (i.e. “waterfall”) diagrams as a function of time plotted vs. depth. Clearly indicate the FAT picks used to obtain wave speed vs. depth.
h. Analyses of pulse energy/amplitude versus depth.
i. Tables which indicate tube pairs, vertical extents, and magnitude (FAT % delay and/or energy decrease) of flaw and defect zones, as defined in Section 2.4.5 of this Special Note.
j. A narrative portion of the report will be used to present items a thru i.

2. Plot data to a scale that will allow adequate evaluation of data variations. The Department reserves the right to request scale adjustments.
3. Complete all reports using English units.

1.4.4. Evaluation of CSL Test Results

1. Allow direct communication between the CSL Testing Firm and the Department. If the CSL Testing Firm is different than other testing firms on the project, allow direct communication between the CSL and other testing firms.
2. The Department will review the CSL test results in the test report to evaluate whether or not the drilled shaft integrity is acceptable. Within 10 business days after receiving a test report, the Engineer will report to the Contractor whether the construction is acceptable or additional analyses are needed. The Department will also use the results of other non-destructive and materials testing, construction records, etc. to evaluate the condition of the shafts.
3. Continue with construction of the structure above the drilled shafts only after receiving written approval from the Engineer to do so, based on evaluation of the CSL test results and other applicable test results, construction records, etc.
4. If the CSL records are inconclusive (e.g. records do not clearly indicate discontinuity, good conditions or missing data), the Department may require additional testing, such as CSL retesting, Angled CSL, Crosshole Tomography Analysis or concrete cores to sample the concrete in question to verify shaft conditions. After completing report reviews, the Department will discuss options for additional testing with the Contractor and/or testing firm(s) and/or complete evaluation of all test results prior to directing the Contractor to obtain concrete cores. The Department will not pay for additional testing performed at the discretion of the Contractor or testing firm that is not directed and/or agreed upon by the Department. If core samples are needed, obtain cores with a minimum diameter of 2 inches using a double tube core barrel at a minimum of 4 locations selected by the Department, unless directed otherwise by the Engineer. Unless directed otherwise by the Engineer, locate core holes approximately 6 inches

inside the reinforcement such that they do not damage the reinforcement. For each core hole drilled, record a log with descriptions of inclusions and voids in the cored holes and submit a copy of the log to the Engineer. Place the cores in core boxes as shown in Exhibit 10 of the KYTC Geotechnical Guidance Manual properly marked showing the shaft depth at each interval of core recovery. Transport the cores and logs to the Geotechnical Branch in Frankfort for inspection and testing unless directed otherwise by the Engineer. Only after being directed by the Engineer grout the core holes in accordance with Section 2.3.2 above.

5. If the additional testing or evaluation of cores indicate that concrete for any drilled shaft on which additional testing or coring was required is acceptable, the Department will pay for the direct cost of additional testing and concrete coring and grouting by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft concrete is unacceptable, the additional testing and concrete coring and grouting will be at the expense of the Contractor.
6. If discontinuities are found, an independent structural and/or geotechnical consultant hired by the Contractor will perform structural and/or geotechnical evaluation at the expense of the Contractor. Use consultants who are prequalified by KYTC in applicable areas. Alternatively, the Engineer may require the Department's designer to perform the referenced evaluations and the Department may require the cost of these evaluations to be borne by the Contractor. Based on the design criteria established for the structure and the evaluation, the Engineer will assess the effects of the defects on the structural performance of the drilled shaft. If the results of the analyses indicate that there is conclusive evidence that the discontinuity will result in inadequate or unsafe performance under the design loads, as defined by the design criteria for the structure, the Engineer will reject the shaft.
7. If any shaft is rejected, provide a plan for remedial action to the Department for approval. Any modifications to the foundation shafts and/or other substructure elements caused by the remedial action will require calculations and working drawings by consultant(s) hired by the Contractor (or the Department's designer), at the expense of the Contractor, which will be subject to review by the Department. Begin remediation operations only after receiving approval from the Engineer for the proposed remediation. All remedial action will be at no cost to the Department and with no extension of contract time.

1.4.5. Evaluation Criteria

The Department will generally use the criteria below for evaluation of the shafts but may vary the criteria based on other available information.

Satisfactory	Good (G)	FAT increase 0 to 10%
Anomaly	Questionable (Q)	FAT increase 11 to 20%
Flaw	Poor/Flaw (P/F)	FAT increase 21 to 30%
Defect	Poor/Defect (P/D)	FAT increase >31%
The Department will consider energy reductions in conjunction with FAT increases and reserves the right to vary the anomaly, flaw and defect criteria based on energy reductions.		

- Flaws must be addressed if they affect more than 50% of the profiles.
- Defects must be addressed if they affect more than one profile (i.e. the result of complete investigation from bottom to top between two tubes) at the same depth.
- “Addressing” a Flaw or Defect may include an evaluation by tomography if the concern is localized (e.g. not across the full section), and/or, depending on the depth to the concern, additional measures like core drilling, repair or replacement, repeat tests after a longer waiting time or testing by other methods (gamma-gamma, low strain, high strain).
- Flaws or Defects covering the entire cross section define a full layer concern requiring repair.
- Anomalies will require evaluation and may need to be addressed based on the results of the evaluation.

Continue with placement of reinforcement and concrete above the top of shaft only after receiving written approval from the Engineer to do so, based on evaluation of the CSL and other applicable test results.

3.0 Measurement and Payment

3.1 Method of Measurement CSL Testing

The Department will pay for the authorized and accepted quantities of “CSL Testing” at the contract unit price per each shaft tested. This will constitute full compensation for all costs associated with providing access for testing personnel and equipment, performing the CSL Testing in a single shaft, and reporting the results to the Engineer. The Department will pay 50% of the unit price upon successful completion of the required testing and the remainder upon final acceptance of all required reports.

Installation of CSL Access Tubing is incidental to the applicable contract unit bid price for Drilled Shaft, Common, and Drilled Shaft, Solid Rock. This will constitute all costs and delays

associated with installing the CSL Access Tubing in a single shaft, including but not limited to providing and installing access tubing, providing and installing all required bracing for access tubes, providing and placing grout in access tubes.

The Department will pay for the direct cost of additional testing and concrete coring, authorized by the Engineer, required to investigate shafts with inconclusive CSL records if evaluation of the additional testing or cores indicates that concrete for that drilled shaft is acceptable using a change order. This will constitute full compensation for all costs and delays associated with performing additional tests, obtaining, and delivering concrete cores to the Geotechnical Branch, and grouting core holes.

3.2 Payment

The Department will pay for the completed and accepted quantities under the following. The Pay Unit of “Each” refers to each individual test.

Code	Pay Item	Pay Unit
21321NC	CSL Testing (4 tubes)	Each

The Department will consider payment as full compensation for all work required herein.

Special Note for Secant Shaft Cutoff Wall

Washington Avenue – Panbowl Lake Dam (Item # 10-376.00)

1.0 DESCRIPTION

1.1 This work is for the construction of a permanent “Secant Shaft Cutoff Wall” that will serve as a seepage cutoff wall at the Washington Avenue Embankment of the Panbowl Lake Dam System. Use an approved Specialty Subcontractor that has the expertise and capability to complete the work required by this Special Note. Only Subcontractors pre-qualified by the Kentucky Department of Highways (the "Department”) as a Specialty Contractor for “Grouting for Ground Improvements” (Work Item I39) OR “Jet Grouting” (Work Item J20) may perform the work required by this Special Note.

1.2 The Department will conduct a mandatory pre-bid conference for the KY15 project. Any Company that is interested in bidding on the KY15 Project and their cutoff wall Specialty Subcontractor shall be represented at the conference and field review. The purpose of the conference is to familiarize all prospective bidders and specialty subcontractors with the contract requirements within the scope of the contract.

1.3 Subsurface data from the geotechnical exploration(s) are included in the Construction Plans and this Special Note with Appendices. Rock cores are available for viewing at the Geotechnical Building in Frankfort, 502-564-2374. Subcontractors must call a minimum of two (2) days in advance to schedule a viewing of rock cores. Project related information, including the Geotechnical Report(s), are accessible on the Department’s Construction Procurement webpage.

1.4 The prospective bidders are responsible to familiarize themselves with the available geotechnical data, which provides further information regarding the anticipated soil and bedrock conditions, that will affect the installation of the secant shaft cutoff wall. The Washington Avenue Embankment is known to be constructed from uncontrolled fill material from past roadway cuts and excavations. The embankment fill is likely non-homogenous and may contain varying percentages of soils, boulders, shot rock, and other deleterious construction waste. Available subsurface information, including driller’s subsurface logs and limited laboratory testing results, can be found on the Geotechnical Sheets of the Construction Drawings and in Appendix B of this Special Note. Additionally, the Construction Drawings includes an assumed and extrapolated bedrock line along the cutoff wall alignment based on the project borings (both core and sample types). Subsurface conditions, including bedrock elevations and composition of embankment fill, may likely vary at locations between borings or at locations where borings were not performed. Failure to inspect the project site and view the available rock cores and review other geotechnical data will result in the forfeiture of the right to file a claim based on site conditions and may result in disqualification from the project.

2.0 SCOPE OF WORK

2.1 Definitions:

- Primary Shafts: Initial unreinforced vertical shafts typically constructed using rotary drilling methods, at prescribed intervals.
- Secondary Shafts: Unreinforced vertical shafts installed in between and slightly into primary shafts to a specified overlap.
- Hard/Hard Secant Shafts: The concrete in each primary and secondary shaft has the same compressive strength, which is a higher strength structural grade concrete. For this project, all primary and secondary shafts will be unreinforced. A select number of secondary shafts will include a non-structural steel cage to allow for Crosshole Sonic Logging (CSL) Testing.

2.2 The contract item "Secant Shaft" and “Secant Shaft With Lightweight Concrete” includes furnishing materials, labor, tools, equipment, and other incidental items required for the construction and testing of permanent hard/hard secant shafts as described herein. See the Construction Plans for an overview of the secant shaft cutoff wall.

2.3 Secant shaft cutoff wall construction includes drilling continuous overlapping shafts; and providing and backfilling the excavation created by drilling with concrete.

2.4 Secant shaft cutoff wall construction requires disturbing an existing embankment dam***. Construction within and in the vicinity of embankment dams requires special care and effort compared to general construction. Special care is required to prevent damage, slope instability, and the creation of seepage pathways within the embankment.*** For Example, special care should include, but is not limited to, limiting temporary surcharge loads from stockpiled material (e.g., drill spoils) or equipment and not utilizing downhole pressurized drilling methods to advance the secant shafts. The submittal Section (4.2) of this Special Note requires detailed information on staging, sequencing, and equipment related to the construction of the cutoff wall. The Subcontractor should take into account any special care required to perform work within an embankment dam during bidding and should consult all requirements of this Special Note and the Construction Plans for details.

2.5 Subject to the requirements in the Construction Plans and this Special Note, select the installation method and equipment to meet the performance requirements specified herein.

2.6 In construction of the secant shaft cutoff wall, consider the potential risks involved due to slope failure and generation of seepage pathways. Embankment integrity, slope stability, wall alignment, and preservation of wall condition are the Subcontractor’s responsibilities from the beginning of work until final acceptance. Damage to property (public or private) or to the wall itself during construction is the responsibility of the Subcontractor. Construct the secant shaft cutoff wall system to ensure that the wall system will function as intended.

2.7 The main body of this Special Note is general for permanent hard/hard secant shafts. Refer to the Appendix or Appendices for any project specific requirements.

2.8 Construction Plans are defined as plans prepared by the Department and/or authorized representative containing the secant shaft wall profile and layout, details, subsurface data, etc., to be used by the Secant Shaft Cutoff Wall Subcontractor to construct the wall. These plans are included in the Bid Proposal.

2.9 References to the “Department” refer to the Kentucky Department of Highways and/or consultants acting on behalf of the Department.

3.0 REFERENCES

The documents below apply to this work. Unless noted otherwise, use the current edition as of the letting date of this project.

1. Construction Plans and Plan Notes.
2. The "Kentucky Standard Specifications for Road and Bridge Construction", Current Edition with supplements. This document may be referred to as "Specifications" or "Standard Specifications" elsewhere in this Special Note.
3. The Department Manuals "Kentucky Methods", "List of Approved Materials", and "Field Sampling and Testing Practices".
4. American Society for Testing and Materials (ASTM) Standards, Current Edition.
5. American Association of State Highway and Transportation Officials (AASHTO) Standards, Current Edition.
6. FHWA Publication FHWA NHI-99-025, "Earth Retaining Structures" (NHI Course No. 13236 – Module 6), April 1999.
7. USACE EM 1110-2-1901, “Seepage Analysis and Control for Dams”, April 1993.
8. AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.
9. AISC Steel Construction Manual for the design of structural hardware applies if the design is not covered in the AASHTO Standard Specifications for Highway Bridges, Current Edition, with all interims.
10. FHWA Publication FHWA-NHI 18-024, “Drilled Shafts: Construction Procedures and Design Methods” (NHI Course No. 132014), September 2018.
11. Virginia Tech, “Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport”, by Jeremy P. Britton, August 8, 2001.

4.0 EXPERIENCE REQUIREMENTS AND SUBMITTALS

Requirements for personnel experience and pre-construction submittals, **including submittal deadlines**, are in this section. Do not begin construction of the secant shaft cutoff wall, other than stockpiling of wall materials, until the Engineer receives and accepts all submittals required in this section. Additional submittals and records required during and after construction may be included in other sections of this Special Note. The use of electronic submittals (preferably in .pdf format) will expedite the approval process.

4.1 Personnel Experience Requirements: The Department considers a satisfactory record of experience in both permanent secant shafts serving as a hydraulic barrier and earthen embankment dam construction important to successfully complete this work. Use personnel meeting the requirements below on this project and submit one (1) electronic copy of all information necessary to verify that they meet the requirements. Submit this information no later than seven (7) calendar days after receiving Notice of Award. **Submit this information to Wes Ratliff at the following email address:** wes.ratliff@ky.gov. As a minimum, include the following for each project necessary to satisfy the requirements:

1. The names and current phone numbers of the Owner's representative(s) who can verify that the Subcontractor meets the requirements.
2. The dates of construction.
3. The type (temporary/permanent) of structure.
4. The secant shaft diameter and overlap.
5. The maximum shaft depth.
6. Subsurface and bearing conditions.

The Department will review the experience requirements and respond to the Subcontractor within fourteen (14) calendar days. Review and acceptance by the Engineer is for evidence of the required experience and does not in any way relieve the Subcontractor of full responsibility for the successful and satisfactory completion of the work.

4.1.1 Project Engineer Experience Requirements:
Use an engineer meeting the requirements below to have overall technical responsibility for secant shaft construction on this project. It is not necessary for the Project Engineer to be on-site daily. Consultants or manufacturers' representatives may not be used to satisfy these requirements. The requirements for the Project Engineer are:

a. Licensed Professional Engineer in the U.S.
b. A minimum of five (5) years design and/or construction experience on secant shafts serving as a hydraulic barrier and/or other seepage cutoff walls, with experience on a minimum of five (5) projects of similar size and complexity, constructed in the past five (5) years.
c. An employee of the Secant Shaft Cutoff Wall Subcontractor.

4.1.2 On-Site Supervisor Experience Requirements:
Use an on-site supervisor (project manager, superintendent, etc.) meeting the requirements below to be responsible for the daily secant shaft construction activities on this project. Consultants or manufacturers' representatives may not be used to satisfy the requirements of this section. The requirements for the On-Site Supervisor are:

a. A minimum of three (3) years construction experience on secant shafts serving as a hydraulic barrier and/or other seepage cutoff walls, with experience on a minimum of three (3) projects of similar size and complexity, constructed in the past three (3) years.
b. An employee of the Secant Shaft Cutoff Wall Subcontractor.

The On-Site Supervisor and the Project Engineer may be the same person if that person meets all the stated requirements. The Department will consider allowing a team of more than one supervisor to satisfy these requirements and perform the associated functions, subject to certain conditions at the discretion of the Engineer. The Department may consider related experience with other similar types of specialty construction.

4.1.3 The Engineer may suspend work on the wall if the Subcontractor substitutes unqualified and/or unapproved personnel or if the personnel are not performing the required duties. If work is suspended due to substitution of unqualified and/or unapproved personnel, the Subcontractor is fully liable for all costs resulting from the suspension of work. No adjustment in contract time resulting from this suspension of work will be allowed.

4.2 Construction and Materials Submittals: Submit six (6) hard copies or one (1) electronic copy of the following **no later than fourteen (14) calendar days after receiving Notice to Begin Work.**

1. The proposed start date and proposed wall construction sequence and schedule including:
   a. Plan describing how surface water will be diverted, controlled, and disposed of.
   b. Proposed hard/hard secant shaft installation plan, including the installation sequence, and tip elevation of each shaft. The plan should refer to each secant shaft by the numeric designations shown in the Construction Drawings.
   c. Drawings (e.g., plans, elevations, section views, etc.), methods, and sequencing to describe the various activities required to complete the permanent guide wall, including dimensions, concrete strength, reinforcement, and formwork, in accordance with this Special Note. Identify the materials and material sources for use in the construction of the guide wall.
   d. Proposed methods and equipment for drilling, including the type of equipment, manufacturer, and model number.
   e. Proposed plan to confirm secant shafts are seated the required depth into bedrock. Additionally, include equipment and methods for verifying

the cleanliness of the shaft bottoms prior to concrete placement.

f. Proposed verticality measurement methods and devices, including the identification of procedures and/or equipment for measuring effective shaft overlap, wall thickness, and continuity with depth to the required tolerances and capable of identifying locations of deviations. The methods should include both a measurement device in the excavation equipment and a secondary device approved by the Engineer. The devices may include internal inclinometers, sonic imaging devices, gyroscopic tracking, accelerometers, ultrasonic drilling monitors, pendulum measurements or an alternate method approved by the Engineer. All devices should have a horizontal accuracy of 2 inches of better. Include descriptions, photographs, manufacturer's information and accuracy range, schedule of measurements, calibrations, and data format to be provided. This should include the equipment necessary to process, record and transmit data for rendering and identifications of deviations.

g. Proposed method and equipment for backfilling excavation created from the drilling, including placing concrete. This should include data on conveying equipment and methods for depositing concrete in the shafts.

h. The name of the independent vibration consultant responsible for monitoring services over the duration of shaft installation, along with a list of at least three previously completed projects of similar scope and purpose. The vibration consultant must have minimum of five years of experience in vibration monitoring.

i. Information on provisions for working in the proximity of both overhead and underground facilities or utilities.

j. Information on methods to be used for cold and hot weather concrete placement and protection.

2. Provide a list and calibration schedule for all equipment, devices, instrumentation, and sensors that require initial or continuing calibration by the manufacturer or are otherwise necessary to maintain tolerances. Include information on the accuracy of the test and frequency of calibration. Provide calibration reports for the equipment and devices used to execute the work described in this Special Note.

3. A plan that includes a description of the personnel, equipment and testing procedures to be used for the verification testing work required by this Special Note. The plan shall include the testing firm proposed for each verification testing operation and include a description of their qualifications and experience in performing that operation. Additionally, include a description, details, and data on the proposed method of drilling and sampling including drilling equipment to be used for performing the verification cores. Provide a description, details, and data on the proposed equipment and methods of both water pressure and falling head (permeability) testing and grouting the verification holes, which includes calibration requirements and certificates applicable to the equipment. Include

a schematic of the pressure test setup showing the layout of the equipment and illustrating how all equipment is arranged in the core hole. Include procedures for establishing the maximum test pressures based on test depth.

4. Plan for correcting out-of-tolerance secant shafts.

5. Certification of land surveyor to be utilized for specified portions of the secant shaft work.

6. Product technical data including:
   a. Acknowledgement that products submitted meet the requirements of standards referenced.
   b. Manufacturer's installation instructions.

7. Submit as-built drawings for the secant shafts showing completed dimensions and details, as well as the installation sequence and location.

8. Concrete submittal, for both conventional and light weight, including:
   a. type of mixer or batch plant;
   b. water/cement ratio;
   c. type of additives;
   d. type of cement;
   e. unit weight;
   f. mix design;
   g. design strength;
   h. slump;
   i. air content;
   j. permeability (lightweight concrete only); and
   k. mix verification testing.

9. Shaft installation records as required by this Special Note, including a summary of location coordinates, vertical deviation reports, and hole deviation plots of in-place secant shafts.

10. Any other documentation required to verify that proposed construction procedures and materials fully comply with all requirements in the contract documents.

The Department will complete the review within fourteen (14) calendar days after receiving each submittal; the Department will not extend the specified completion date for this review period. Unacceptable methods or documentation, as judged by the Engineer, will be cause for withholding acceptance. The Subcontractor is fully liable for all costs resulting from acceptance being withheld; the Department will not extend the specified completion date as the result of not accepting the construction and materials submittals. Review and acceptance by the Engineer is for evidence of work to be performed and does not in any way relieve the Subcontractor of full responsibility for the successful and satisfactory completion of the work.

4.3 Secant Shaft Cutoff Wall Pre-Construction Meeting: A Pre-Construction Meeting to discuss the secant shaft cutoff wall construction will be required. This meeting will be held after all secant shaft wall submittals in Section 4.1 and 4.2 have been received, reviewed, and accepted by the Department, and at least five (5) working days prior to the beginning of secant shaft wall construction. The purpose of the meeting is to discuss construction procedures, personnel, and equipment to be used. The following will be expected to attend:

- Representing the Contractor and Subcontractors - Contractor Representative, Subcontractor Representative, Project Engineer, and On-Site Supervisor. Also, representatives of the Surveyor, if different than the Secant Shaft Cutoff Wall Subcontractor or Contractor.
- Representing the Department – Section Engineer, Central Office Construction Engineer, Geotechnical Branches Representative, and others as deemed appropriate by the Section Engineer.

If the Subcontractor's key personnel change or if the Subcontractor proposes a significant revision to secant shaft construction procedures, additional Pre-Construction meetings may be required at the discretion of the Engineer.

5.0 MATERIALS

Provide materials conforming to the requirements below when the materials are required by this Special Note, the Construction (Contract) Plans, or elsewhere in the Contract Documents.

5.1 Concrete: A mixture of cement, water, and aggregate.

5.1.1 Conventional for Secant Shaft Backfill:

1. Conventional, or normal, weight concrete shall conform to Section 601 of the Standard Construction Specifications for Class A Modified, unless indicated elsewhere in this Special Note.
2. Type I cement conforming to Section 801 of the Standard Construction Specifications and ASTM C 150.
3. Minimum 28-day compressive strength of 3,500 pounds per square inch (psi) when tested using applicable portions of ASTM C-39.
4. Slump between 7 and 9-inches as determined in accordance with ASTM C143.
5. Admixtures such as retarders and water reducers may be used.
6. Fly ash Class F may be used.

5.1.2 Lightweight Concrete for Secant Shaft Backfill Adjacent to Existing Reinforced Concrete Box Culvert (RCBC):

1. Uniformly pre-saturate lightweight aggregate and allow to drain before use. At the time of use, ensure that the aggregates are in a saturated surface dry condition to minimize water absorption.

2. Provide lightweight aggregate conforming to AASHTO M 195, with the following additions:
   a. Produce aggregate by fusing raw shale, slate, or clay in a rotary kiln;
   b. Minimum durability factor of 90% when tested in accordance with AASHTO T 161; and
   c. Coarse aggregate shall conform to the gradation requirements for size 3/4 inch to No. 4, as shown in Table 1 of AASHTO M 195.
3. Coarse Aggregate:
   a. Maximum Sodium Sulfate Soundness Loss (AASHTO T 104): 9%
   b. Maximum L A Abrasion (AASHTO T 96): 40%
   c. Maximum Absorption (AASHTO T 85): 10%
4. Fine Aggregate:
   a. Maximum Sodium Sulfate Soundness Loss (AASHTO T 104): 10%
   b. Maximum L A Abrasion (AASHTO T 96): 40%
5. Minimum 28-day compressive strength of 4,000 pounds per square inch (psi) when tested using applicable portions of ASTM C-39.
6. Minimum Cement Content of 620 pounds per cubic yard.
7. Maximum Water/Cement Ratio of 0.40 pound per pound.
8. Slump between 7 and 9-inches as determined in accordance with ASTM C143.
9. Permeability less than or equal to $1x10^{-6}$ cm/s when determined in accordance with ASTM D5084 (Falling Head).
10. Maximum unit weight of 115 pounds per cubic foot (pcf) when determined in accordance with KM 64-324 / ASTM C567.
11. Air content between 4.5 and 7.5 percent tested in accordance with KM 64-303.
12. Admixtures such as retarders and water reducers may be used.
13. Fly ash Class F may be used.

5.1.3 Guide wall

1. Permanent Portion of Guide wall: Conventional, or normal, weight concrete conforming to Section 601 of the Standard Construction Specifications for Class B or equivalent with approval from the Engineer. Concrete shall have a minimum 28-day compressive strength of 2,500 psi.
2. Temporary Portion of Guide Wall (Blockouts): Flowable fill conforming to Section 601.03.03 of the Standard Construction Specifications or Alternative Mixture approved by the Engineer.

5.2 Material Delivery, Handling, and Storage:
Comply with the Standard Specifications.

5.3 Delivery and Storage:
Ready mix trucks shall be used to deliver concrete in accordance with Standard Specifications.

6.0 MATERIALS TESTING AND ACCEPTANCE

6.1 Materials Sampling and Testing shall be in accordance with Section 106 of the Standard Specifications, the Department's current "Kentucky Methods", the current "Manual of Field Sampling and Testing Practices", and other referenced documents.

6.2 Conventional weight concrete sampling and testing will be performed by the Department at the minimum frequencies indicated in the Manual of Field Sampling and Testing Practices or as necessary to determine the quality. Concrete will be sampled and tested for air content, slump, and temperature. Casting of cylinders will occur every 100 cubic yards placed, or daily, whichever is greater. The tests shall be performed according to the procedures outlined by the applicable ASTM or Kentucky Method. Concrete compressive strength specimens will be cast and tested for compressive strength according to KM 64-305 and ASTM C 39, respectively. In cases of failures, the Department will evaluate concrete cylinder results according to KM 64-314 to determine whether in-place investigation may be necessary.

6.3 Use only materials accepted by the Department. The Engineer may suspend work on the cutoff wall if the Subcontractor does not have acceptance of materials to be used and there is no other work on the wall that may be done. If work is suspended due to lack of material acceptance, the Subcontractor is fully liable for additional cost from the suspension of work. No additional contract time resulting from the suspension of work will be allowed.

6.4 Concrete mix designs and aggregate sources shall be approved prior to use.

6.5 An independent testing firm shall sample and test the lightweight concrete utilized as backfill for secant shafts located adjacent to the existing RCBC. The testing firm shall not be comprised of individuals responsible for the production of the cutoff wall and may not be directly employed by the general contractor, cutoff wall Specialty Subcontractor, or any other subcontractor responsible for any construction activities on the cutoff wall.

Prior to use of lightweight concrete, a trial batch shall be mixed per the Standard Specifications and according to the approved proportions, including any admixtures. Gradations and specific gravities for aggregates used in the trial batch shall reflect the characteristics of the stockpiles to be used in the production mix. Trial batch concrete specimens shall be tested for compressive strength and unit weight according to ASTM C 39 and KM 64-324, respectively. Test trial concrete specimens for permeability in accordance with ASTM D5084, Method B (Falling Head). Certified tests reports shall be submitted to the Engineer for review and approval prior to use for secant shaft backfill.

Production sampling and testing of lightweight concrete shall be performed by the independent testing firm in accordance with the frequency and methods presented in Subsections 6.1 and 6.2. In addition to the tests required by these subsections,

test the lightweight concrete for unit weight in accordance with KM 64-324.

7.0 CONSTRUCTION

Construct the permanent hard/hard secant shafts according to the Construction Plans, the Standard Specifications, and the requirements below in a manner that creates a continuous hydraulic barrier through the embankment. In all cases, provide materials and personnel conforming to the Materials Section and Personnel Experience Requirements of this Special Note.

7.1 Preconstruction Condition Survey:

1. Perform preconstruction condition survey of structures, embankment slopes, and utilities within 300 feet of the secant shaft installation operations.
2. Perform outreach to the owner of the structures, either the Department or Private Owners, 28 days before performing the preconstruction condition survey.
3. Obtain written permission from the owner of the structure (for private owners) prior to accessing the structure.
4. The preconstruction condition survey must include video and photographic documentation of the exterior and interior of above ground structures and of the interior of underground structures.
5. Video documentation must be in high definition, and show existing conditions and highlight, where possible, existing cracks, deteriorated concrete, exposed and corroded reinforcement, cracked or broken brick or mortar, and other signs of distress.
6. For utilities, perform the survey when the greatest extent of the interior is exposed. Provide supplementary artificial lighting as needed.
7. The video must include annotation with location and structure nomenclature which describes any areas of distress over the video and time code superimposed on the video.
8. Photographs must be accompanied by sketches or descriptions that indicate the location and direction of each photograph.
9. For each structure surveyed, provide a Pre-Construction Condition Survey Report following completion of the survey. The report must contain all documentation associated with the survey including DVD copies. In the report, include notes, sketches, photographs, and videos. Provide general information, such as location details and structure type, as well as particular information on materials, condition, existing damage, aperture and persistence of cracks, and disrepair observed during visual survey. Provide a graphical depiction of locations of damage or other features of concern.
10. Submit the Preconstruction Condition Survey Reports no later than 28 days before the commencement of secant shaft installation.
11. The subcontractor accept responsibility for damages to existing adjacent or adjoining structures created by secant shaft work and repair any damages to these structures without cost to the owner/Department.

7.2 Vibration Control:

1. Perform vibration monitoring during the secant shaft installation operations.
2. Engage the services of a qualified, independent vibration consultant to conduct the vibration monitoring.
   a. The vibration consultant must have minimum of five years of experience in vibration monitoring.
   b. Before the installation of vibration monitors, submit to the Department the name of the vibration consultant and a list of at least three previously completed projects of similar scope and purpose.
3. Perform vibration monitoring using seismographs and geophones within 300 feet from the secant shaft installation activity at locations identified by the independent vibration consultant.
4. Do not begin the secant shaft installation before baseline readings of ambient vibrations are collected.
5. The vibration during the secant shaft installation activities must be limited to a peak particle velocity of not more than 2 inches per seconds.
6. During secant shaft installation activities, monitor the vibrations to ensure the limits are not exceeded.
7. If the limits are exceeded, cease the secant shaft installation activity causing the vibration until the vibration consultant, Department's representative and the Engineer are on site to observe the structures nearest to the vibration monitor which has exceeded the limits. Submit an alternative installation method or plan for limiting vibration levels to the Engineer for review and approval before continuing to install secant shafts.
8. The subcontractor is responsible for all damages resulting from the secant shaft installation operations and must take whatever measures necessary to maintain peak particle velocity within the specified limit.
9. After completion of the project, remove the vibration monitors off the site and restore the monitoring locations back to their original condition.

7.3 Preparation:

1. Do not begin secant shaft installation until the earthwork in the area where secant shafts are to be installed has been completed to the extent that grade elevation is as indicated on the details shown in Construction Plans.

7.4 Installation Records:

1. Maintain a secant shaft record for each shaft installed.
2. Indicate on the installation record: installation dates and times, total drilling time, dimensions of casing used, shaft location, top of bedrock elevations, tip elevations, ground elevations, and quantity of concrete placed.
3. Document and report on biaxial vertical deviation readings for each secant shafts, as required by this Note.
4. Record any unusual problems during installation.
5. Submit complete records to Engineer.

7.5 Location and Placement:

1. Install secant shafts straight and plumb to the dimensions shown on the Construction Plans. Ensure the wall is in accordance with the horizontal and vertical alignment indicated in the Construction Plans and this Special Note.

2. Prior to installation, construct a permanent guide wall to ensure the secant shafts are placed and installed to the correct alignment shown in the Construction Plans. The guide wall should have vertical sides that aid in installing plumb shafts to the tolerances of this Special Note. If required, provide other temporary means such as wales, templates, or guide structures, to ensure that the secant shafts are properly installed.
3. The design and construction of the permanent guide wall is the responsibility of the Subcontractor. Provide guide wall submittals, including drawings, required by Section 4.2 of this Note to the Engineer for review and approval. Do not begin construction of the guide wall without approval by the Engineer. The design and construction methods shall be site specific and based on the anticipated site and subsurface conditions, as well as the installation equipment. The methods shall ensure stability and limit under-cutting into the existing embankment.
4. The guide wall should be design and constructed to resist loading from secant shaft installation and other site activities that could result in damage. Positive drainage of surface water away from the guide wall should be provided.
5. The permanent guide wall shall be constructed to the minimum dimensions shown on the Construction Plans. At a minimum, the guide wall should extend 2.5 feet below the top elevation of the secant shafts and should be at least 8 feet wide (i.e, at least 2-feet beyond the shafts on each side of the wall).
6. Concrete meeting the minimum strength requirement of this Special Note should be utilized for the outside (i.e., permanent) part of guide wall surrounding the secant shafts. The temporary portion of the guide wall should include overlapping inner secant shaft footprints. The shaft footprints should be infilled with flowable fill, or other approved alternative mixture, that is penetrable by secant shaft installation equipment. Where used, flowable fill shall meet the requirements of Section 601.03.03 of the Standard Construction Specifications. The guide wall shall remain in place upon completion of the secant shaft cutoff wall.
7. If site conditions allow, the guide wall shall be constructed in its entirety prior to the installation of secant shafts. At a minimum, the guide wall shall be in place at least 40 feet both up- and down-station from the location of shaft installation and the guide wall concrete shall have achieved a minimum compressive strength of 1,000 psi.

7.6 Secant Shaft Installation:

1. Provide equipment and methods required to construct the secant shaft cutoff wall to a depth at least 10 vertical feet lower than the lowest shaft tip elevation shown on the Construction Plans.
2. Secant shafts shall be plumb (i.e., vertical) with out-of-plumbness not to exceed 0.4% verticality (e.g., 2.4-inches for a 50-foot shaft), except for specific instances noted in this Note or if a more stringent tolerance is required to maintain wall continuity. The top elevation of the shafts must be within 1/2 inch horizontally and 2 inches vertically of the location indicated in the Construction Plans. Correct any deviations exceeding the required tolerance.

Approval by the engineer is required for secant shafts installed out-of-tolerance but that still maintain the required effective wall thickness along the entire secant shafts. Overlapping shafts that do not satisfy the requirements of this Note for effective wall thickness will be rejected, despite if they satisfy the above requirements for verticality and location.

3. During drilling or excavation of the shafts, make frequent inspections on the plumbness and alignment of the shafts. The verticality of each secant shaft shall be measured using a sensor or measuring device installed directly on the excavation equipment. The sensor should be capable of providing biaxial deviations along the entire length of the secant shafts. In addition, an ultrasonic drilling monitor or other secondary measuring device approved by the engineer shall be used on every tenth shaft installed to verify plumbness in addition to the sensor installed on the equipment. The secondary equipment should be capable of measurements to the required tolerances and identifying deviations.
4. Plumbness, or verticality, must be maintained, measured, and documented prior to placing concrete.
5. In addition to limiting out-of-plumbness to 0.4%, secant shafts shall meet the minimum effective wall thickness shown in Figure A below. The effective wall thickness shall be a minimum of 12-inches through the full depth of the cutoff wall. A joint overlap of at least 1.5-inches is required to maintain the minimum effective wall thickness.

Minimum Requirements for Joint Overlap and Effective Wall Thickness

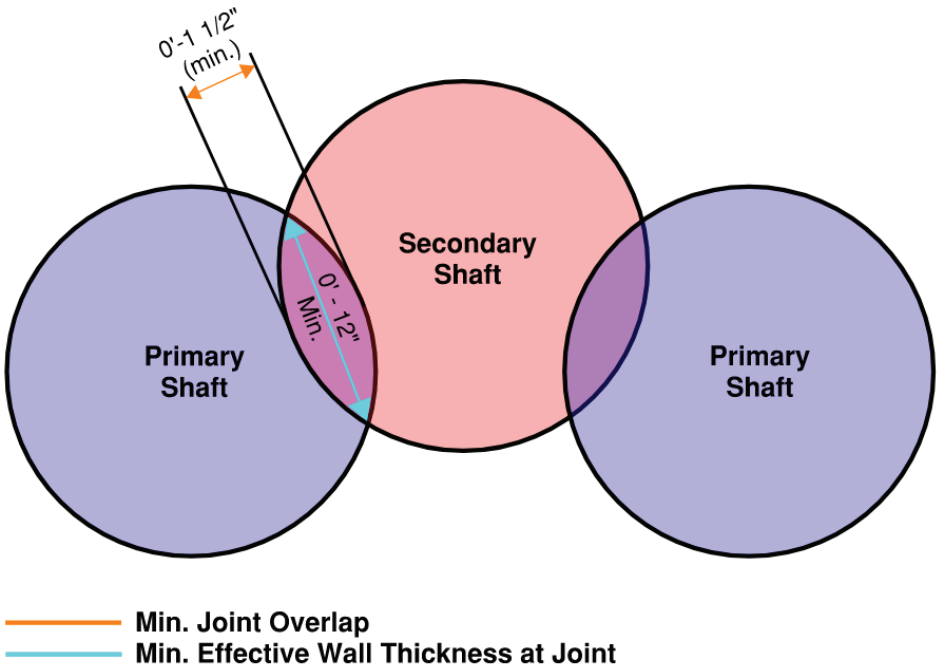


Figure A: Minimum Joint Overlap and Effective Wall Thickness for Out-of-Plumb Shafts

6. Provide equipment of a design, type, size, capacity, and mechanical condition to effectively construct the secant shaft cutoff wall to the required depth, elevation, tolerance, and dimension that is also capable of excavating into adjacent concrete to effectively form water-tight joints.

7. Use methods to install secant shafts that will not cause damage to nearby buildings, structures, or embankments.
8. Do not disturb or alter the existing 10'x10' RCBC through the Washington Avenue Embankment during installation of the secant shafts except as required by the abbreviated sequence of construction in the Construction Plans. Both protection of and damage to the existing RCBC during construction of the secant shafts is the responsibility of the cutoff wall Specialty Subcontractor. Repair of any damage resulting from shaft installation shall be performed without additional costs to the Department and with no extension of contract time. The use of lightweight concrete backfill is required for secant shafts located above and immediately adjacent to the existing RCBC in order to reduce loads on the culvert side walls and roof (See Subsection 7.7.3).
9. Use rotary drive equipment with sufficient torque to advance temporary steel casing as required by this Note and the Construction Plans. Temporary steel casing shall extend marginally into the top of bedrock to confirm the full diameter of the secant shaft is filled with concrete and there are no inclusions of soil reducing overlap. The temporary steel casing shall be advanced concurrent with drilling.
10. Do not use installation methods that may result in hydro-fracturing or erosion of the embankment, foundation soils or non-rock intervals.
11. Maintain the stability of the secant shafts using temporary, purpose-built flush joint steel casing that is reasonably watertight. During drilling, provide positive protection against cave-in, displacement, or loss of surrounding ground into or adjacent to the shafts. Casings must be of sufficient strength to resist drilling torque and the earth and groundwater pressures without distortion. The outside diameter (OD) of the temporary casing shall be at least the required size of the secant shafts.
12. Do not perform casing installation or secant shaft excavation operations within a clear distance of three shaft diameters of a newly poured secant shaft where concrete was placed within the previous 24 hours or until the concrete has reached a minimum compressive strength of 1,000 psi. For 47-inch diameter secant shafts, the required clear distance is 11'-9" for working adjacent to secant shafts poured within the previous 24 hours. To be constructed on the same day, the minimum difference between the numeric designation show on the Construction Plans for secants shafts shall be five (e.g., Shaft "6" – Shaft "1" = 5). In specific instances and with approval from the Engineer, secant shafts may be installed closer to newly poured shafts if there are previously completed shafts between the newly poured shaft and on-going casing installation/excavation operations.
13. Before excavating secondary shafts, both adjacent primary shafts shall have attained a minimum unconfined compressive strength of 1,000 psi. Variance in these restrictions requires approval by the Engineer. Any variance should demonstrate the proposed distances and concrete compressive strengths satisfy criteria and tolerances of this special note.
14. Install secant shafts 2 feet into competent bedrock, or as directed by the Engineer. Estimated shaft tip elevations are shown in the Construction Plans, based on previously taken soil and core borings. Contact the

Engineer should any secant shaft encounter bedrock, or equipment refusal, at elevations 3-feet or more above the estimated tip elevations shown in the Construction Plans. Do not continue the installation of subsequent secant shafts until directed by the Engineer.

15. If at any time during drilling a secant shaft is found to be out-of-tolerance, the secant shaft must be re-aligned and/or re-drilled to the requirements of this Special Note. In specific instances and with approval from the Engineer, secant shafts may be installed out-of-tolerance if the adjacent shafts are determined to be within-tolerance to the extent that overlap and the required minimum effective wall thickness are maintained along the entire length of all secant shafts. In no instances shall the effective width be less than the requirement of this Special Note and the Construction Plans.
16. Drilling should be performed in a manner that eliminates obstruction including but not limited to boulders, rocks, rubble, existing foundations, or timbers that may prevent the installation of shafts into bedrock, threaten shaft damage or cause shafts to drift from the required location.
17. Obstructions restricting installation of secant shafts to the specified bedrock penetration of 2 feet must be removed.
18. Shafts must extend up to the elevation indicated in the secant shaft schedule provided in the Construction Plans. A tolerance of up to 2 inches above the indicated top of shaft elevation will be permitted.

7.7 Concrete Placement

1. Prior to concrete placement, clean the bottom of each shaft with a muck bucket or other approved method. Continue cleaning until all loose soil, debris, cobbles, and other deleterious material have been removed.
2. Do not start concrete placement until verification measurements (i.e, final depth sounding and verticality measurement), bottom cleaning, and quality confirmation have been completed, and the Engineer has accepted the shaft for concrete placement. Concrete shall be placed within 3 hours after reaching the required tip elevation to ensure proper depth and cleanliness unless otherwise directed by the Engineer. If the concrete cannot be (or is not) placed within the allotted time, the secant shaft must be re-inspected and reapproved by the Engineer prior to the placement of concrete.
3. Use lightweight concrete backfill to construct secant shafts located above and immediately adjacent to the existing 10’x10’ RCBC through the Washington Avenue Embankment. The lightweight concrete mix shall be approved based on trial batch tests performed prior to use and shall meet requirements of this Special Note for unit weight and permeability. Protection of the existing RCBC shall be provided as necessary to prevent damage during the installation of secant shafts located adjacent to and above the RCBC. Any damage to the existing RCBC during construction of the secant shafts is the responsibility of the cutoff wall Specialty Subcontractor. Repair of any damage shall be performed without additional costs to the Department and with no extension of contract time.
4. Remove or reduce all cement balls or other improperly mixed concrete consisting of round lumps of cement, sand, and coarse aggregate as they exit the discharge chute of the mixer truck. A screen or other similar device may be required to capture or reduce the size of the cement balls. All cement

balls greater than 3-inches in diameter shall be reduced or wasted.

5. Concrete shall be placed using tremie or free-fall methods. The method used to place concrete shall be determined based on the groundwater conditions present in secant shaft. If more than three inches of water is present at the bottom of the shaft, the tremie method shall be used. If less than three inches of water is present at the bottom of the shaft, either tremie or free-fall methods can be used, provided flow rates are satisfactory, as discussed below. Shafts containing less than three inches of water in the bottom prior to concrete placement are considered “dry”. The flow of water into the shaft must be less than 12 inches per hour to use the free-fall method (See Item 6 below for details on testing flow rate into the shaft).
6. Visually inspect drill spoils during installation for the presence of excess water or moisture. Upon completion, use a flashlight or other high beam light capable of illuminating the bottom of the shaft to visibly confirm the presence of water. If visual inspection indicates the presence of water in the bottom of the shaft upon completion of drilling, a weighted tape should be used to measure the depth of water. If the bottom of the shaft is not visible from the surface, measure the depth of water using an electronic water level indicator. The in-flow rate and water level should be checked between hole completion and immediately prior to concrete placement. In-flow rates should be determined over a known time interval using water depths determine from either a weighted tape or electronic water level indicator.
7. Dewater secant shafts for free-fall concrete placement using drill buckets, water pumps, or other methods approved by the Engineer if more than 3-inches of water is present upon drill completion. Measure the depth of water and in-flow rate as required by this Special Note to confirm the secant shaft is “dry” prior to concrete placement.
8. Do not place concrete using the free-fall method without approval from Engineer or Inspector.
9. The flow of concrete shall be directed to the center of the shaft with a drop chute, funnel, or other approved centralizing device to keep the concrete from hitting the side of the shaft if free-fall method is used. A discharge deflector shall be used if required by the Engineer. Place concrete continuously to ensure no cold joints form.
10. A funnel and solid steel sections of pipe shall be used during concrete placement if the tremie method is required. Place the tremie pipe within 2 feet of the bottom of the secant shaft at the start of concrete placement. Always maintain a minimum of 10 feet of concrete above the bottom of the tremie pipe during placement. A sacrificial plug shall be used at the end of tremie pipe when inserting the pipe into water or concrete.
11. When using the tremie method, place concrete to the top of the casing and continue placement until all ground water and laitance is expelled. Once the casing is removed and there is no longer groundwater, concrete may be placed to the top of the secant shaft using the free-fall method.
12. A funnel-shaped hopper is required at the top of tremie pipes of a size capable of receiving and passing the concrete into the pipe at the capacity rate of the batching, mixing, and conveying equipment. The hopper shall not be made of aluminum.
13. Use a tremie pipe of a sufficient diameter to allow the free flow of concrete. The pipe should have a minimum nominal diameter of 10 inches or as

approved by the Engineer.

14. Tremie pipe shall be made of steel and have watertight joints. Each section of pipe shall have threaded or gasketed slip coupled connections. For coupled connections, additional external rubber seals shall be provided around the coupling.
15. The tremie pipe and hopper shall be supported by means of a platform with bracing support to hold the pipe securely in place. Vertical movement should only occur when sections of pipe are removed to adjust the embedment depth. Means for lifting the pipe shall be stable and not allow the pipe to bounce. Horizontal movement of the tremie pipe will not be permitted.
16. Concrete shall be kept a minimum of 10 feet above the bottom of the temporary casing during extraction to ensure that concrete backfills the annular space created by the casing. A weighted tape should be used to confirm the required concrete head is maintained throughout placement.
17. Place concrete continuously without significant interruptions or delays.
18. Do not perform troweling, or other specialty concrete finishes, on the exposed top surface of completed secant shafts. A roughened finish should be used to promote a proper interface bond between the top of the secant shaft and the overlying road bed material.
19. Immediately after placement, concrete shall be protected from premature drying, extremes in temperature, rapid temperature change, and mechanical damage. Materials and equipment needed for adequate curing and protection shall be available prior to concrete placement.
20. Cover the tops of freshly poured secant shafts with insulated concrete blankets if the temperature drops below 40^{o} F. Once the required minimum 28-day compressive strength has been attained and confirmed with appropriate testing, concrete blankets are no longer required. If cold or hot weather concrete curing is not required, cover the top of the secant shafts with plywood sheeting for at least 24-hours following concrete placement.
21. Concrete shall be protected from damaging effects of rain for at least 12 hours and from flowing water or other fluids for at least 14 days. No excessive heat including welding, equipment exhaust, or heaters shall be permitted near concrete or concrete embedments at any time.

7.8 Inspection of Shaft Installation:

1. Perform continuous inspection during secant shaft installation.
2. Visually inspect drill spoils to confirm the presence of competent rock over the 2-foot shaft length embedded into bedrock.
3. Inspect all secant shaft verticality reports for compliance with tolerance requirements established in these Special Notes.

7.9 Survey Data:

1. Submit an as-built survey showing actual location and top elevation of each secant shaft within 7 calendar days of completing the wall installation. Do not proceed with placing roadway surface or rock roadbed until the Engineer has reviewed the survey. Present a survey in such form that it gives deviation from plan location in two perpendicular directions and elevations of each shaft to nearest half inch. Survey must be prepared and certified by a land surveyor

licensed in the state of Kentucky.

7.10 Site Drainage Control:

1. Provide positive control and discharge of all surface water that will affect construction.
2. Maintain all pipes or conduits used to control surface water during construction.
3. Repair damage caused by surface water at no additional cost. Upon substantial completion of the wall, remove surface water control pipes or conduits from the site. Alternatively, with the approval of the Engineer, pipes or conduits that are left in place, may be fully grouted and abandoned or left in a way that protects the structure and all adjacent facilities from migration of fines through the pipe or conduit and potential ground loss.

7.11 Verification Testing:

Perform verification testing on secant shafts according to the Construction Plans, the Standard Specifications, and the requirements below. In all cases, provide personnel and methods consistent with the approved testing plan submittal required by this Special Note. The testing locations for each core, water pressure test, falling head test, and CSL test are included on the Construction Plans. The results of water pressure tests will not be used as an acceptance criterion for the secant shafts but will be a supplemental in-situ test performed for information only. In addition, the Department may elect to perform other supplemental tests including, but not limited to, laboratory permeability tests on cores and closed-circuit television (CCTV) video camera inspections of core holes. CCTV inspections will allow the Department to visually assess the quality of concrete along the hole sidewalls and the integrity of the interface joints. Construction operations shall not impede the Department's ability to perform any supplemental tests properly and safely. Aid the Department, as needed, to allow for all Department performed supplemental tests beyond those specified in this Special Note. Shaft excavation is not permitted within 50 feet of the verification testing. All verification tests and associated core holes shall be accessible to the Engineer.

1. Secant Shaft Concrete Core Holes:

   Five percent (5%) of all secant shafts (4 shafts) shall be cored full depth through the center of the shaft extending five (5) feet into bedrock. The center core hole locations are shown on the Construction Plans. Concrete shall reach a minimum strength of 1500 psi before coring. Cores shall be extracted in up to 10-foot sections (maximum) or as practical, inspected, photographed, and logged in standard KYTC core boxes. Logging, handling, and storage of cores shall be performed in accordance with KYTC's current *Geotechnical Guidance Manual*. Core holes shall be NQ-3 (1.775" diameter) sized and performed in the center of the secant shaft. All holes shall remain open until the concrete cores have been accepted by the Engineer. If core holes are to remain open overnight, install a removable water-tight cap on the top of the holes.

Core holes shall be tremie backfilled with a neat cement grout mix, batched on-site, consisting of a mixture approximately of 7 gallons of water to 94 lbs. of portland cement. The tremie pipe should be inserted to full depth of the verification core hole. When grout vents at the surface, the tremie shall be gradually withdrawn, maintaining grout in the pipe until completely removed. The top of the hardened grout shall be flush with the permanent guide wall or adjacent surface. Continued backfilling of the core holes may be required if settlement of the grout is observed at any point over the contract time.

The concrete cores should be free of voids, inclusions of entrapped material, open or in-filled cracks, honeycombing, cold joints, uncemented aggregates, and open or in-filled concrete-rock contact. The verification cores should demonstrate continuity and cleanliness at the bedrock foundation contact. Contact the Engineer should any of these defects be encountered during verification coring or if a single core run has a recover of less than 95%.

2. Water Pressure Tests in Core Holes:

Three percent (3%) of all secant shafts (2 shafts) shall be cored along the interface joint and have single-packer water pressure test(s) performed within the core hole. The water pressure test locations are shown on the Construction Plans. Cores shall be extracted in up to 5-foot sections (maximum) or as practical, inspected, photographed, and logged in standard KYTC core boxes. Logging, handling, and storage of cores shall be performed as discussed above. Core holes shall be PQ-3 (3.270” core diameter) sized and performed along joint interface of the primary and secondary secant shafts. Reverse rotary drilling should be considered to produce a cleaner core hole that may be less suspectable to packer leakage. As noted above, the results of these tests will not be used as an acceptance criterion but will be a supplemental in-situ test performed for information only.

Each 5-foot core section shall be visually inspected upon recovery to ensure the core remains on the interface joint. Immediately terminate coring, regardless of depth, if a recovered core section no longer contains the interface joint. Single-packer water pressure tests shall be performed at interval lengths not exceeding 10-feet as coring advances, which allows for the detection of localized high- or low-permeability zones along the interface joint. All permeability test cores shall terminate at a maximum depth of 5 feet above the bottom of concrete (shaft tip).

A single-packer system shall be used to estimate the in-situ permeability along the interface joint. Perform in-situ permeability tests in accordance with the U.S. Army Corps of Engineers (USACE), 1980, Standard RTH 381-80, “Suggested Method for In Situ Determination of Rock Mass Permeability Using Water Pressure Tests”. The maximum test pressure shall be based on

the guidance of RTH 381-80 and should not exceed 0.5 psi per foot of depth (measured from the top of the shaft to the middle of the test interval) to prevent damage to the concrete and interface joint but should not be less than 0.4 psi per foot to account for the water pressure head expected during a flood event. For intervals at greater depths, the test pressure should not exceed 17.5 psi based on the maximum anticipated hydraulic loading conditions at the embankment dam. A minimum of three tests, each at an increased pressure, are required for each test interval. Procedures for establishing test pressures shall be submitted prior to construction as required by this Special Note.

The maximum interface joint permeability shall not exceed $1x10^{-6}$ cm/sec. Contact the Engineer should the estimated permeability exceed $1x10^{-6}$ cm/sec.

The packer system and test pressure shall be chosen by the testing firm to minimize or eliminate packer leakage during testing. All packers shall be at least 18-inches long, but longer packers are desired (greater than 3 to 4 feet). Longer packers provide additional bond length for successful seating against the core hole sidewalls. The packer sleeves shall have an allowable working pressure of at least 500 psi to help prevent water leakage. Prior to pressure testing, surge the core hole with water to remove cuttings, dust, and concrete fragments that may inhibit a proper seal of the packer against the sidewall. If leakage is noted with the approved packer, the testing firm shall be prepared to perform the tests with sliding-end pneumatic, cup leather or mechanical packers in attempt to minimize leakage. To ensure the best possible seal, additional inflation (or tightening) of packers should be accomplished under each test pressure.

All core holes required for permeability tests shall remain open until the tests have been accepted by the Engineer. If holes are to remain open overnight, install a removable water-tight cap on the top of the holes. Core holes shall be tremie backfilled as described above for the verification concrete cores.

3. 24-Hour Falling Head Permeability Tests in Core Holes

Four percent (4%) of all secant shafts (3 shafts) shall be cored along the interface joint and have a 24-hour falling head permeability test performed within the core hole. Advance the cores for the falling head test at locations different than those for water pressure tests and at the locations shown in the Construction Plans. Cores shall be performed, extracted, logged, and terminated as discussed above for the water pressure tests. Falling head tests should be performed on the entire core interval, and not on 10-foot interval lengths (max.) as required for the pressure tests.

Other requirements of the water pressure test, including the maximum joint

permeability, hole protection, and grouting, apply to the falling head permeability test. The maximum interface joint permeability shall not exceed $1x10^{-6}$ cm/sec. Contact the Engineer should the estimated permeability exceed $1x10^{-6}$ cm/sec.

Execute the falling head test as follows. The test data should be reduced as shown in this Section. The methods presented below are based on pilot-scale evaluations of cutoff walls performed at Virginia Polytechnic Institute and State University (Virginia Tech) and documented in "*Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport*" prepared by Jeremy P. Britton (August 8, 2001). The hydraulic conductivity should be estimated using the Hvorslev (1951) method which is provided below as Formula 1 and in Chapter 2 (p. 13) of the referenced guidance as Eq. 2-8. This method incorporates a 2D shape factor that accounts for the finite width of the cutoff wall and the proximity of the test core hole to the secant shaft walls. The 2D shape factors for use with the Hvorslev method is based on the width of the cutoff wall, B, and the test hole diameter, D. Shape factors are provided below as Figure 1 and were adapted from Figure 5-16a in Chapter 5 of the referenced guidance. Figure 1 omits shape factors that consider the influence of filter cakes because this is not a soil-bentonite cutoff wall.

a) After completion of the core hole, install an automated water level recorder in the core hole. Allow the water level in the hole introduced by coring operations to stabilize. A stable water level is defined as a water level that is constant or rising at a rate less than 5 inches per hour. The stable water level shall be used as the initial water level for permeability measurement and subsequent calculations.
b) Record the water level prior to filling the core hole and initiate the falling head test by filling the hole with clean water to the top of the hole corresponding to the of the wall template/guide wall. Begin taking and recording readings in accordance with the approved testing plan.
c) Collect readings until ninety (90%) percent of the water head above the previously identified stable water level is reached or twenty-four (24) hours has passed, whichever comes first. The test duration shall not be less than 4 hours.

d) Calculate permeability using the following formula. Example calculations are shown below.

$$K\,(cm/sec) = \frac{0.508 * A * \ln(H1/H2)}{F(t2 - t1)} \qquad \textbf{[Formula 1]}$$

Where:
K = hydraulic conductivity (permeability), cm/seconds;

A = cross sectional area of the test core hole, ft^2;

t = elapsed time, minutes;

H2 = head at time t2, ft;

H1 = head at time t1, ft;

F = Shape factor determined from Figure 1 below; and

On Figure 1 below:
L = length of test core hole (i.e., depth of core), ft;

B = element thickness (i.e., effective wall thickness) measured perpendicular to the wall axis at the verification hole location, ft; and

D = diameter of test hole, ft.

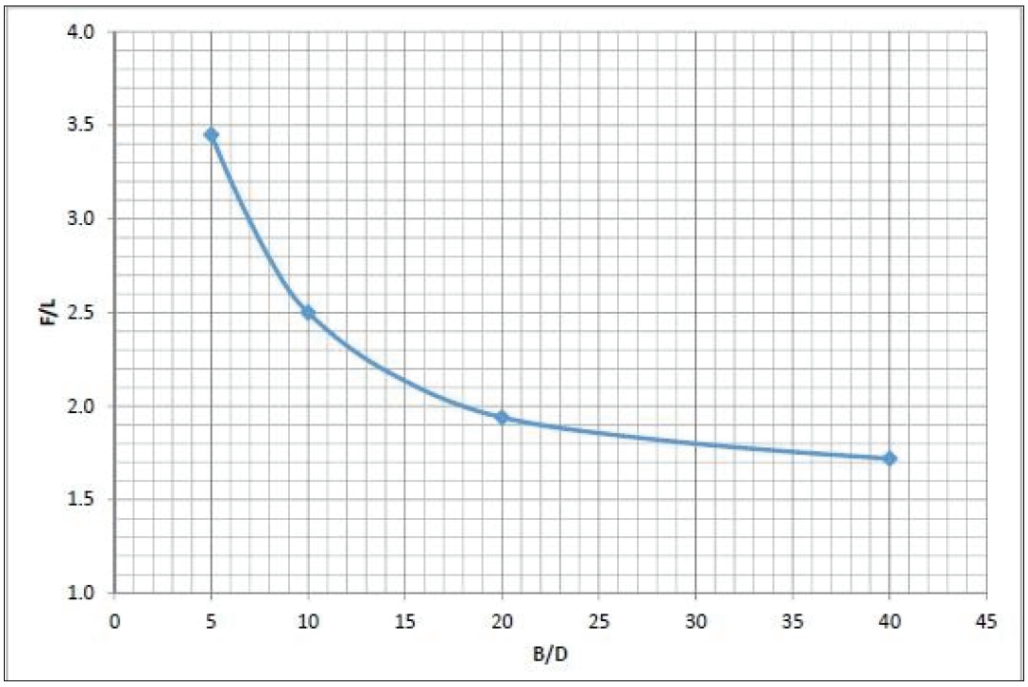


Figure 1. Secant Shaft Cutoff Wall Shape Factor for Core Hole Falling Head Permeability Test with Long Screened Interval Compared to Hole Diameter

(Adapted from "*Soil-Bentonite Cutoff Walls: Hydraulic Conductivity and Contaminant Transport",* Chapter 5, Figure 5-16a, page 132)

Example Calculations:

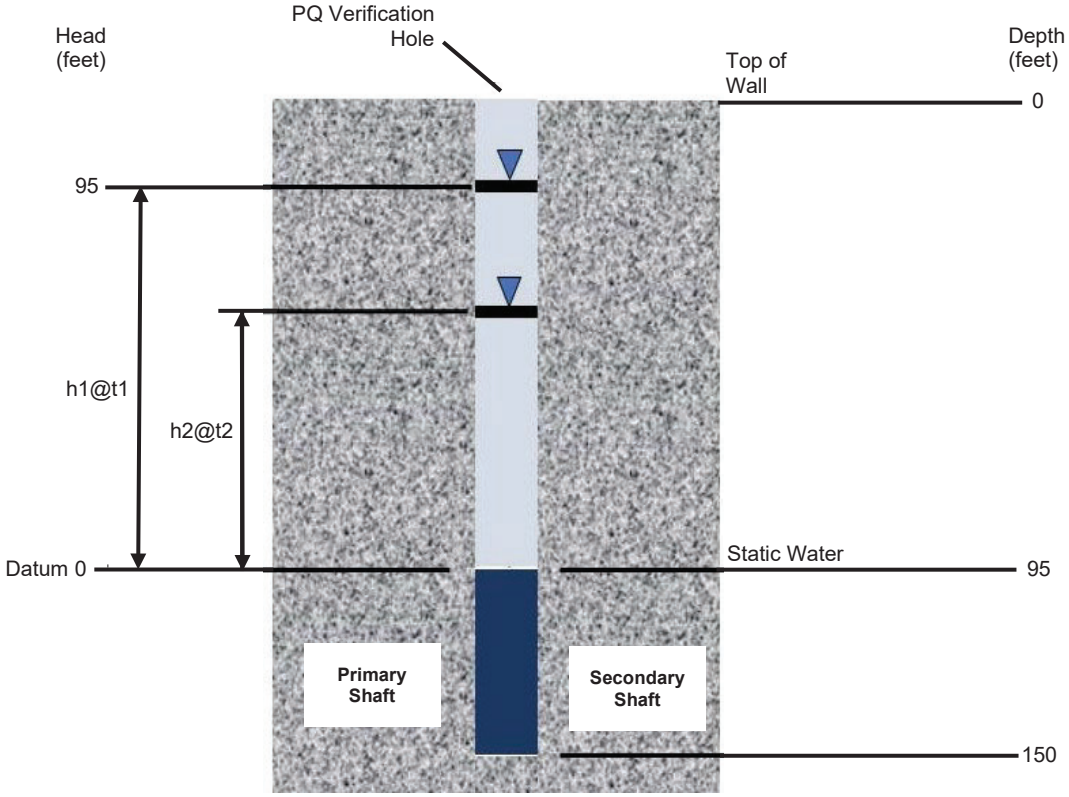


Figure 2: Core Hole Configuration for Falling Head Permeability Test Example Calculation

Assume the following (See Figures 1 to 3):

- Depth to Static Water Level = 95 feet
- Length of Core Hole, L = 150 feet
- Core Hole Diameter, D = 0.4025 feet (PQ-Sized)
- Core Hole Area, A = 0.127 ft^2
- Effective Wall Thickness, B = 2 feet
- B/D = 4.97 (~5) –
  - From Figure 1, F/L = 3.45

  Therefore,

  F = 3.45*L

  = 3.45*150 feet

  F = 517.5 feet

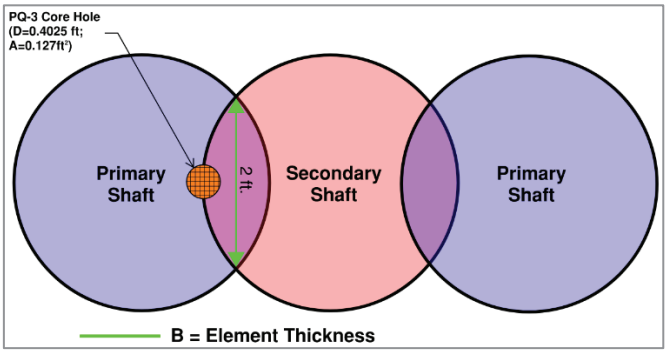


Figure 3: Effective Wall Thickness, B, for Falling Head Permeability Test Example

Times			Water Levels					
Interval No.	t1 (min)	t2 (min)	Initial (feet)	Final (feet)	h1 (feet)	h2 (feet)	k (ft/min)	k (cm/sec)
1	0.00	0.50	0.00	0.53	95.00	94.47	2.75E-06	1.39E-06
2	0.50	1.00	0.53	1.15	94.47	93.85	3.23E-06	1.64E-06
3	1.00	2.00	1.15	2.14	93.85	92.86	2.60E-06	1.32E-06
4	2.00	3.00	2.14	2.97	92.86	92.03	2.20E-06	1.12E-06
5	3.00	4.00	2.97	3.64	92.03	91.36	1.79E-06	9.11E-07
6	4.00	5.00	3.64	4.24	91.36	90.76	1.62E-06	8.21E-07
7	5.00	10.00	4.24	5.53	90.76	89.47	7.03E-07	3.57E-07
8	10.00	15.00	5.53	5.95	89.47	89.05	2.31E-07	1.17E-07
9	15.00	20.00	5.95	6.39	89.05	88.61	2.43E-07	1.24E-07
10	20.00	30.00	6.39	7.11	88.61	87.89	2.00E-07	1.02E-07
11	30.00	40.00	7.11	7.79	87.89	87.21	1.91E-07	9.68E-08
12	40.00	60.00	7.79	8.89	87.21	86.11	1.56E-07	7.91E-08
13	60.00	80.00	8.89	9.91	86.11	85.09	1.46E-07	7.43E-08
14	80.00	100.00	9.91	10.97	85.09	84.03	1.54E-07	7.81E-08
Total Test Duration	0.00	100.00	0.00	10.97	95.00	84.03	3.01E-07*	1.53E-07*

* Calculated using water level measurements over the entire test duration (i.e., from t1 = 0 min to t2 = 100 min).

4. Cross-Hole Sonic Logging (CSL) Testing:

   CSL testing shall be performed within three secondary secant shafts. CSL Testing shall be performed at the locations shown the Construction Plans. Perform tests in accordance with the Special Note for Non-Destructive Testing in Secant Shafts included as Appendix C.

5. Supplemental Cores:

   Supplemental cores may be required when a defect has been encountered during verification testing or where deviation from the approved installation methods lead the Engineer to suspect other defects may be present. Locations of supplemental cores shall be determined by the Engineer. Drill and log the supplemental cores in the same manner as all standard verification cores unless otherwise directed by the Engineer. Supplemental cores are to be performed at no additional cost to the Department.

8.0 ACCEPTANCE REQUIREMENTS

8.1 Acceptance Criteria:

The secant shaft cutoff wall shall function as a long term, durable barrier against detrimental seepage flow and soil transport. The Department will evaluate the severity, frequency, and extent of defects to assess the cutoff wall elements. A secant shaft is considered acceptable when the following criteria are met:

1. The secant shaft is installed a minimum of 2-feet into competent bedrock near the estimated elevations shown in the Construction Plans.
2. The secant shaft satisfies the placement and installation criteria of Section 7.0 of this Special Note, including requirements for plumbness (verticality), joint overlap, effective wall thickness, and horizontal alignment established in Section 7.6.
3. Material tests, including but not limited to concrete tests, satisfies the material requirements of this Special Note established in Section 5.0.
4. The results of the verification testing program detailed in Section 7.11 do not indicate secants shaft defects, abnormalities, or in-situ falling head permeabilities greater than those required by this Special Note (See Section 7.11.3). The results of the water pressure tests are not included as part of the acceptance criterion.

8.2 Secant Shaft Rejection:

If a secant shaft does not satisfy the acceptance criterion outlined above, the Engineer will implement the procedures below.

1. The Engineer will evaluate the installation records and will reject secant shafts, installation methods, and/or materials that do not satisfy the requirements of this Special Note. The Subcontractor shall propose alternative methods and/or materials for both a replacement and subsequent shafts. Upon receiving approval from the Engineer, install the replacement secant shafts as described by this Special Note or the approved alternative method. Methods of modifying completed shafts in lieu of replacement may be presented for review by the Engineer. Install replacement secant shafts or modify completed shafts at no additional cost to the Department and with no extension of contract time.
2. Subcontractor modifications may include but are not limited to; modifying the installation methods; modifying the installation equipment; and/or drilling additional secant shafts. Any modifications to the installation method and/or equipment must be approved by the Engineer prior to implementing. The secant shafts may not be shortened beyond the lengths shown in the Construction Plans, including the required bedrock embedment.

9.0 RECORDS

Provide the Engineer with one (1) electronic copy of the following final records:

1. As-built drawings showing:
   a. The actual location of the secant shafts, including any deviation from specified tolerances and Contract location.
   b. The actual shaft tip and top elevation for each secant shaft.
   c. The diameter, overlap, and effective wall thickness of each secant shaft.
   d. The locations of any instrumentation installed and any required instrumentation records.
   e. The actual location of the permanent guide wall.
   f. Finished ground line elevations along the wall alignment.
   g. Type and location of any remedial work.
2. Other records as required by Section 106 of the Standard Specifications.
3. Construction Records including:
   a. Subcontractor's name.
   b. Drill rig operator's name.
   c. Date and time of start and finish of installation for each shaft.
   d. Description of soils and rock encountered including upper and lower elevations and boundaries of each material type.
   e. Installation difficulties, unusual conditions, and/or subsurface anomalies.
   f. Deviations, quality issues, failing verification tests and corrective actions.
   g. Groundwater conditions, if encountered.
   h. Concrete records including: date, time and method concrete was placed; mix design and volume of concrete placed v. theoretical volume.
   i. Verticality reports reporting shaft deviation in two directions. Provide labels, units, and orientation. Include hole deviation plots at the base of the wall (shaft tips) showing deviations measured perpendicular and parallel to wall alignment, effective wall thickness, and shaft overlap.
   j. Other raw and processed data used to analyze excavations.
4. Verification testing reports including:
   a. Drill logs, concrete core logging, pictures of concrete cores.
   b. In-situ permeability test data and results with calculations.

10.0 MEASUREMENT AND PAYMENT

10.1 The Department will pay for the accepted quantities of "Secant Shafts" and "Secant Shafts With Lightweight Concrete" at the contract unit bid price per "Linear Foot" of secant shaft installed and will measure quantities as shown in the Construction Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for constructing the permanent secant shaft cutoff wall as described herein and shown in the Construction Plans. This may include but is not limited to the following items: installing a permanent concrete guide wall (including overlap flowable fill), drilling shafts, measuring verticality, placing concrete (either normal weight or lightweight), removing temporary casing, all required submittals and records, and other incidental items necessary to provide a complete permanent secant shaft cutoff wall. Earth moving, drainage, and any other earthwork necessary to complete this wall and not included in other bid items, is included as an incidental part of this work.

10.2 Additional areas and lengths of wall, required due to unforeseen foundation conditions or other reasons and approved in writing by the Engineer, will be paid at the contract unit prices. In the event a decrease in the linear feet of secant shafts is required, subject to acceptance by the Department, payment will be reduced due to the decrease in the linear feet drilled.

10.3 All measurement will be based on plan dimensions or dimensions as ordered in writing.

10.4 Refer to an Appendix to this Special Note for Project Specific Measurement and Payment information.

Special Note for Secant Shaft Cutoff Wall
Appendix A – Project Specific Requirements

Washington Avenue – Panbowl Lake Dam (Item # 10-376.00)

A1.0 SECANT SHAFT CUTOFF WALL SUBCONTRACTOR REQUIREMENTS

The requirements for the Secant Shaft Cutoff Wall specialty Subcontractor are below. Submit applicable documentation, including references, that the secant shaft cutoff wall specialty Subcontractor is pre-qualified by the Department for "Grouting for Ground Improvements" (Work Item I39) OR "Jet Grouting" (Work Item J20).

A2.0 SUBSURFACE CONDITIONS

The boring logs from drilling performed in 2021 and 2022 are presented on the Soil Profile Sheets in the Construction Plans. Subsurface conditions may vary between boring locations. Boulders and cobbles are known to be present within the dam embankment fill and will be encountered during secant shaft cutoff wall installation.

A3.0 ADDITIONAL CORE BORINGS

Contact the Engineer to request additional core borings if required to better characterize the bedrock surface along the secant shaft cutoff wall. A request does not guarantee approval for additional core borings. Additional core borings will only be approved if it is deemed that insufficient geotechnical data exists at select locations of the secant shaft cutoff wall. If approved, additional core borings will be performed by the Department's Geotechnical Services Branch. The estimated bedrock surface shown in the Construction Plans is based on interpolation and/or extrapolation from available data which includes auger and SPT sampler refusal elevations. Coring was only performed in a select number of the borings along the secant shaft cutoff wall to confirm bedrock conditions.

A4.0 LOCATIONS OF EXISTING STRUCTURE UNITS

Approximate locations and elevations of the existing structures and pavement are provided in the Construction Plans. These locations are based on survey data and plans in the Department's archives. However, the Department does not guarantee the accuracy of these locations. Field verify the locations of existing structure units prior to installing secant shafts.

The existing highway plans are Drawing No. HES 15-1(14). The existing plans are primarily for KY 15 but contain limited alignment and section information at STA 1096+34.30 for Washington Avenue. Washington Avenue is designated as "Jackson Spur" in these drawings. Plans for information only are accessible on the Department's Construction Procurement webpage, along with other project related information including the Geotechnical and Hydrologic and Hydraulic (H&H) Report(s).

A5.0 STAGING AREA

The location selection for the secant shaft cutoff wall construction staging area is the responsibility of the Subcontractor. This area shall be used for parking, equipment and material storage. If an on-site staging area is desired by the Subcontractor, written request to the Department shall be submitted describing the specific location of the proposed staging area. If on-site, the Subcontractor is responsible for any necessary signage, fencing, safety, sediment/erosion control, improvements, restorations, etc. in these areas.

A6.0 DRILLING WITHIN EMBANKMENT DAMS

Drilling is required to install the secant shafts to the elevations shown on the Construction Plans. Exercise extreme care while drilling and backfilling within the embankment. Drilling shall be performed by rotary drilling techniques using temporary steel casing, soil and/or rock augers, and core barrels. Under no circumstances shall drilling be performed with the aid of water, air, or other downhole pressurized methods. Concrete backfilling of the shaft and annular space created by drilling shall be performed through temporary steel casing by the free-fall, tremie method or other approved non-*pressurized* method. Drill holes shall not be left unsupported at any point during construction and should always either be cased or backfilled. Temporary casing required by this Note shall only be extracted once concrete placement has commenced and a minimum of 10 feet of concrete is maintained above the tip of the casing (See Subsections 7.6 and 7.7). Alternatively, drill spoils may be used in accordance with Section A9.0 to temporarily support drill holes during a storm event or elevated pool levels. The cost of repairing any damage to the embankment or embankment slopes will be at the expense of the Subcontractor and with no extension of contract time.

The estimated bedrock elevations provided in the Construction Plans are based on the subsurface investigation performed in 2021 and 2022 as part of the Phase I, II, and III investigations. Variations in both the bedrock surface and distribution of boulders may occur between boring locations. The Subcontractor is responsible for reviewing the subsurface investigation results provided in this Special Note and in the Construction Plans. The bedrock depths shown on the Plan are considered an estimate and will depend on the exact subsurface conditions along the entire secant shaft wall alignment.

A7.0 GROUNDWATER CONTROL

Groundwater measurements were collected during the Phase I and Phase II subsurface investigation at the time of drilling. Measured groundwater elevations within the borings at the time of drilling ranged from approximately 705 to 692 ft, corresponding to depths of 41 to 51 feet below the ground surface (BGS). The groundwater elevation is expected to be greatly influenced by the water elevation in Panbowl Lake and the North Fork of the Kentucky River. The Subcontractor shall be prepared for encountering groundwater during drilling and providing any necessary measures to control the groundwater.

A8.0 SITE INSPECTIONS

During construction, inspect the conditions of both the up- and downstream embankment slopes daily for signs of ground movement or distress in the vicinity of the wall. Notify the Engineer immediately if signs of movements such as new cracks, sloughing, or increased size of old cracks are observed. If the Engineer determines that the movements exceed those anticipated for typical secant shaft construction and requires corrective action, immediately take corrective actions necessary to stop the movement or perform repairs at no additional cost to the Department.

A9.0 PROVISIONS FOR WALL INSTALLATION DURING STORM EVENT

The North Fork of the Kentucky River (NFKYR) is subject to flash flooding that results in highly variable pool elevations over a short duration. For example, the 2-year flood elevation on the NFKYR is 722.1 feet, which is 8.9 feet higher than the normal pool for Panbowl Lake and 22.1 feet higher than the normal pool for the river. Installing secant shafts within the embankment prism during periods of elevated pool level in NFKYR requires extreme care and monitoring to prevent embankment loss or other embankment damage during construction. Shaft installation during elevated pool conditions on the NFKYR could result in high exit gradients at the base of shaft excavations. Such excessive exit gradients may lead to a quick condition where foundation material at the excavation level may boil or heave.

Special provisions are required for installing secants shafts No. 25 to No. 64, which are in the embankment prism, during storm events or periods of elevated pool. Installation, including the presence of open shafts (i.e., cased without backfill), is not permitted when the pool elevation of NFKYR is above or forecasted to be above elevation 710 feet in an effort to limit vertical exit gradients at the base of the excavation. When water conditions are at or above El. 710, shaft installation shall cease for shaft No. 25 to No. 64 to allow for a return to normal operating pool levels. Based on the flashy nature of the NFKRY, water elevations often only remain elevated for a short duration before returning to normal pool conditions. Ceasing work shall include temporarily backfilling any open shaft excavations with on-site drill spoils to at least 5-feet above the forecasted pool level of the NFKYR. Sufficient drilling spoils shall always remain stockpiled and readily accessible for backfilling operations in the event of a sudden or unforecasted storm event. The Department will not extend the specified completion date during this period, and this does not in any way relieve the Subcontractor of full responsibility for the successful and satisfactory completion of the work.

The subcontractor shall ensure that soil or other deleterious materials are not present at cold joints resulting from the premature termination of concrete operations during rising pool levels. This may occur if a partially filled concrete shaft is backfilled with drill spoils when pool levels quickly rise above El. 710 feet. Remove all soil backfill using the approved drilling method for shaft installation. Additionally, the top surface of the concrete shaft shall be roughened using drill tooling and properly cleaned (e.g., flushing-pumping with water) to ensure a soil seam is not present at the cold joint. A soil filled joint could impact the cutoff wall's ability to properly function as an impermeable, hydraulic barrier. Prior to the continuation of concrete placement, inspect the concrete surface of the shaft for the

presence of soil or other deleterious material. The inspection may consist of using a flashlight or other high beam light capable of illuminating the concrete surface. If the concrete is not visible from the surface, a camera inspection or other approved method shall be used to inspect the surface for the presence of soil. Do not continue concrete placement without the Engineer's approval.

Additionally, shaft excavations shall only be left without backfill overnight if drilling operations are scheduled to continue the following day and there is not a storm event or pool increase forecasted between the end and start of work. All shafts shall be completely backfilled with drill spoil if shaft installation is halted for one day or more (e.g., stop installation on Saturday and continue Monday). The cutoff wall subcontractor shall closely monitor forecasted river levels during storm events and stage equipment such that they are not at elevations potentially impacted by flood waters.

Secant shafts located above and immediately adjacent to the existing reinforced concrete box culvert (RCBC) through Washington Ave. shall only be constructed once all cofferdams and dewatering systems are in-place in accordance with the Maintenance of Water and Flood Protection Plan. Sequencing of construction tasks, height of cofferdams, and other factors are critical to maintaining acceptable water levels within Panbowl Lake and protecting this area from flooding. The provisions of this section and the Maintenance of Water and Flood Protection Plan both apply to secant shafts constructed adjacent to the existing RCBC.

A10.0 FIELD ADJUSTMENTS AND CONSTRUCTION TOLERANCES

Field adjustments of individual shaft locations may be necessary due to the existing structure units or other considerations. The Engineer shall be notified prior to making adjustments to the locations that exceed the specified tolerances. Secant shafts that deviate from the Construction Plans shall be approved by the Engineer prior to installation.

A11.0 CONSTRUCTION SEQUENCE

To minimize traffic impacts to Breathitt County High School, the Subcontractor shall begin construction of the secant shaft cutoff wall at STA 103+00, designated in the Construction Plans as the beginning of the wall.

A12.0 SECANT SHAFT DEMONSTRATION PROGRAM

A secant shaft demonstration program shall be executed on Shaft No. 1 through No. 5, beginning at STA 103+00, to confirm the approved materials and installation procedures can produce a continuous, hydraulic barrier through Washington Avenue to the required depths shown on the Plans. Conduct the demonstration program using production secant shafts and do not construct sacrificial, test shafts. The demonstration program shall include the installation, verification testing, and acceptance of Shafts No. 1 through No. 5 in accordance with this Special Note and the Construction Plans. Shafts constructed and tested as part of the program will be evaluated utilizing the acceptance requirements in Section 8.0 of the main body of this Special Note.

Verification testing required along this wall interval includes a center concrete core (Shaft No. 1), a CSL Test (Shaft No. 2), and an interface joint concrete core with a 24-hour falling head permeability test (Shafts No. 3/No. 4). Refer to the Construction Plans for the location of each verification test type. Do not continue the installation of subsequent shafts until verification test reports have been submitted, reviewed, and approved by the Engineer. The demonstration program is incidental to bid items for “Secant Shafts” and “Secant Shafts With Lightweight Concrete”. No additional compensation or extension of contract time will be made for the demonstration test program.

A13.0 PROVISIONS FOR WALL INSTALLATION AT THE EXISTING RCBC

An abbreviated construction sequence for installing lightweight secant shafts above and adjacent to the existing RCBC through Washington Avenue is provided in the Construction Plans. Deviation from the general progression of this sequence is not permitted except by formal approval KYTC Division of Construction and Geotechnical Services Branch. Certain ancillary aspects of the construction sequence may only be altered with written approval from the Engineer. The existing flap gate on the outlet of the RCBC shall be maintained and remain fully operational during all work within the RCBC as required by this Special Note and the Construction Plans.

The abbreviated construction sequence includes exterior grouting of the existing RCBC and the use of lightweight concrete backfill for the secant shafts. The exterior grouting program shall be fully executed in accordance with the Construction Plans prior to the installation of any secant shafts above and beside the existing RCBC. Additionally, secant shafts constructed over and immediately beside the RCBC shall be constructed using lightweight concrete in accordance with this Special Note. Lightweight concrete is required at these locations to minimize both lateral and compressive loads on the existing RCBC from the new cutoff wall.

A14.0 SUMMARY OF SPT SAMPLE AND CORE BORINGS

The Phase I investigation consisted of performing two continuous Standard Penetration Test (SPT) and Shelby Tube (ST) sample borings in June of 2021 along the northbound lane of the Washington Avenue embankment. An additional seven SPT sample borings and two SPT sample borings with rock coring were performed along the same area in May of 2022 as part of the Phase II investigation. Subsequently, an additional two SPT sample borings with rock coring were performed as part of the Phase III investigation to further reduce information gaps related to the bedrock surface. SPT "N" values, auger refusal depths, and depths to bedrock confirmed by rock coring are provided in the table below. The Subcontractor shall use the information provided in the table below to verify the estimated bedrock line shown on the Construction Plans, as well as to identify appropriate methods for installing the shafts that meets the requirements of this Special Note.

Hole No.	North (Y)	East (X)	Elev. (Z)	SPT Sample (1)		Auger Refusal Depth (ft.)	Bedrock Depth (ft.)	Bedrock Core		
				Sample Depth (ft.)	SPT "N" Value			Sample Depth (ft.)	RQD (%)	REC (%)
B-122	3735052.16	5607781.84	742.9	52.5-52.6	50/0.1'	52.5	--	--	--	--
B-123	3735035.94	5607786.34	743.3	52.5-52.5	50/0.0'	52.5	53.3	53.3-55.8	36	100
								55.8-58.3	32	100
B-124	3734974.62	5607802.10	744.9	51.2-51.3	50/0.1'	51.2	--	--	--	--
B-125	3734955.24	5607807.19	745.4	44.6-45.0	50/0.4'	44.6	--	--	--	--
B-126	3734935.91	5607812.30	746.1	51.8-51.8	50/0.0'	51.8	--	--	--	--
B-127	3734916.58	5607817.41	746.7	50.0-50.2	50/0.2'	50.0	--	--	--	--
B-128	3734897.24	5607822.49	746.4	51.1-51.2	50/0.1'	51.1	--	--	--	--
B-129	3734877.89	5607827.56	748.0	--	--	51.0	52.5	52.5-55.0	44	96
								55.0-57.5	92	100
B-130	3734858.55	5607832.65	748.5	52.0-52.2	50/0.2'	52.0	--	--	--	--
B-201	3734926.32	5607814.82	746.3	--	--	48.7	48.7	48.7-50.2	33	87
								50.2-55.2	94	96
								55.2-60.2	96	100
B-202	3734984.51	5607800.18	744.6	51.1-51.3	50/0.2'	51.1	51.3	51.3-56.1	79	92
								56.1-61.1	100	100
								61.1-63.1	100	100
B-6 (2021)	3735032.00	5607752.00	743.3	51.0-51.3	50/0.3'	51.0	--	--	--	--
B-7 (2021)	3735014.00	5607788.00	743.9	51.0-51.1	50/0.1'	51.0	--	--	--	--
					Minimum	44.6	48.7		32.0	87.0
					Average	50.7	51.5		70.6	97.1
					Maximum	52.5	53.3		100.0	100.0

Notes:
(1) SPT samples shown are those taken at boring termination where auger refusal was experience or the top of bedrock.

A15.0 TOP OF BEDROCK ELEVATIONS

The Phase I, II, and III subsurface explorations for this project consisted of both rock core borings (with varying quantities of soil sampling) and SPT sample borings performed to auger refusal. Sample locations and intervals are shown on the Driller's Subsurface Log in Appendix B. The embankment is known to be constructed of rock fill consisting of shot rock, boulders, cobbles, and varying amounts of rock fragments, as confirmed at select locations of the subsurface investigation. Therefore, the "auger refusal" depths associated with the SPT sample borings do not necessarily correspond to competent bedrock but could indicate the presence of hard soil, weathered bedrock, boulders, or rock remnants. The bedrock depths presented in A10.0 are based on the Geologist or Engineer's evaluation of rock core specimens obtained from the rock core borings.

The plot of "Assumed Rockline" shown in the Construction Plans is based on interpolation and/or extrapolation from available bedrock data including some refusal elevations from SPT borings. The plotted "Assumed Rockline" elevations shall be considered an estimate and the nature of the top of bedrock beyond and between boring locations will likely vary. As required by this Special Note, the secant shafts shall be installed two feet into competent bedrock. The actual rockline may occur at elevations higher or lower than the assumed rockline shown in the Construction Plans. Preparations shall be made to account for variability in the rockline.

Despite efforts to define a reasonable top of bedrock elevation, it will be necessary to establish procedures to evaluate the encountered top of bedrock elevations during construction. Submit a plan and proposed criteria to confirm that bedrock has been encountered, rather than a boulder, when drilling for the cutoff wall. The plan should include measures to ensure each shaft is individually installed the required depth into bedrock. In developing these criteria, consider at least:

- known subsurface conditions;
- equipment being used;
- operator experience; and
- prior experience in similar subsurface conditions with boulders present.

The use of a single operator and an operator with experience installing secant shafts in similar subsurface conditions is important to the successful completion of this work.

A16.0 PIEZOMETERS

KYTC's Geotechnical Services Branch will install vibrating wire piezometers at locations determined by the Department prior to the start of secant shaft installation. Piezometers will be installed within the Washington Avenue embankment and at various other structures across the KY 15 – Panbowl Lake project site for water level monitoring. The vibrating wire piezometers shall be supplied by the Specialty Cutoff Wall Subcontractor in accordance with Geotechnical and Plans Notes in the Construction Drawings. The piezometers, readout, dataloggers, and other ancillary equipment should be manufactured by Geokon to be compatible with existing KYTC equipment. Readouts and data loggers

will become property of KYTC upon completion of project. Contact the Geotechnical Services Branch prior to ordering items from Geokon to ensure the correct items are purchased.

Notice should be provided to the Geotechnical Services Branch prior to construction of the cutoff wall and other nearby KY15 – Panbowl Lake structures to permit the installation of the piezometers. If the site is not accessible to drilling equipment or KYTC personnel, the Contractor or their subcontractors shall provide access. The Contractor, or their subcontractors, will be responsible for constructing and backfilling trenches for the piezometer wiring, which will be installed by the Department. Rock backfills should not be used in the wiring trenches. Instrumentation destroyed by the Contractor, Specialty Cutoff Wall Subcontractor, or any other subcontractor shall be replaced at the Contractor's expense. Survey each piezometer and provide survey data to the department once piezometers are installed.

A17.0 MEASUREMENT AND PAYMENT

A17.1 The Department will measure and pay for the accepted quantity of "Secant Shafts" and “Secant Shafts With Lightweight Concrete” as described in the Construction Plans, Section 10 of this Special Note, and below, at the contract unit bid price per Linear Foot of secant shaft. The Department considers payment as full compensation for all costs and delays associated with secant shafts including but not limited to all materials, concrete, handling, storing, labor, equipment, tools, demonstration program, and incidentals necessary to complete the work as necessary by this Special Note.

A17.2 Measurement of “Secant Shafts” and “Secant Shafts With Lightweight Concrete” will be in linear foot drilled, to the nearest foot, from the shaft tip to the top elevation and horizontal limits shown on the Construction Plans. Waste spoil generated by the removal of the secant shaft overlaps will not result in a deduction in payment. Secant shafts extending above the top elevation and beyond the horizontal limits shown on the Constructions Plans will be considered as waste. Payment will not be made for rejected secant shafts or secant shafts classified as waste by the Engineer. For secant shafts directed to be terminated before reaching the estimated tip elevation shown in the Construction Plans, the payment reduction will be measured as the difference between the total length of shaft shown on the plans for that location and the length of shaft installed below the plan top elevation.

A17.3 The “Secant Shafts” and “Secant Shafts With Lightweight Concrete” quantities shown in the Construction Plans are based on interpretations of existing subsurface data and horizontal projections of known bedrock surface and boulder/obstruction fields. Variations in the elevation of the bedrock surface and boulder/obstruction fields may occur between boring and coring locations. The “Secant Shafts” and “Secant Shafts With Lightweight Concrete” quantities shown in the Construction Plans shall therefore be considered an estimate and may fluctuate based on the exact subsurface conditions along secant shaft element of the cutoff wall.

A17.4 Adjustment of base bid unit quantities for “Secant Shafts” and “Secant Shafts With Lightweight Concrete” shall be made in accordance with contract unit prices. Adjustment will be made on the total linear foot of each item performed. In the event a decrease in quantity of secant shafts is required, subject to acceptance by the Department, payment will be reduced in accordance with the contract unit prices. Additional areas of secant shafts required where the bedrock surface and boulder/obstruction fields differs from those shown in the Construction Plans or for other unforeseen conditions, will be paid at the contract unit prices.

A17.5 The Department will pay for cutoff wall verification tests at the contract unit bid prices for “Secant Shafts Concrete Cores”, “24-Hour Faling Head Tests in Cores”, and “Water Pressure Tests in Cores (Single Packer)” at the quantities shown in the Construction Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for performing secant shaft cores and in-situ permeability tests as described herein and shown in the Construction Plans.

A17.6 The Department will measure and pay for the accepted quantity of "Vibration Monitoring" as described in Section 7.2 of this Special Note at the Contract Lump Sum Bid Price. The measurement and payment of “Vibration Monitoring” will include the preconstruction condition survey as described in Section 7.1 of this Special Note. The Department considers payment as full compensation for all costs and delays associated with monitoring vibrations and the preconstruction condition survey including but not limited to all materials, labor, equipment, tools, and incidentals necessary to complete the work as necessary by this Special Note.

A17.7 The Department will pay for piezometers at the contract unit bid price for “Vibrating Wire Piezometer” at the quantities shown in the Construction Plans. This will constitute full compensation for all costs including materials, equipment, and other incidental items required for supplying and facilitating the installation of vibrating wire piezometers as described herein and shown in the Construction Plans. This bid item includes four (4) Geokon Model 4500DP and four (4) Geokon Model 4500S vibrating wire piezometers. The Model 4500DP shall be 170 kPa range with 400 feet cable. The Model 4500S shall be 350 kPa with 400 feet of cable. Incidental to this bid item is one (1) Geokon Model GK-404 handheld readout, four (4) 5' E-rods with reaction wings (Geokon part number 4500DP-4), and four (4) AW/LHT adaptors (Geokon part number 4500 DP-3). Trenching and backfilling for piezometer wiring shall be included in the Contractor’s unit price for roadway excavation.

The Department will pay for piezometer data loggers at the contract unit bid price for “Vibrating Wire Data Logger (4-Channel)” at the quantity shown in the Construction Plans. This will constitute full compensation for all costs including materials, equipment, and other incidental items for supplying data loggers as described herein and shown in the Construction Plans. This bid item includes four (4) Geokon 4-Channel Vibrating Wire Dataloggers, custom Model 8940-04C-CBLX, equipped with a rechargeable battery pack and barrel jack bulkhead. Incidentals to this bid item are four (4) accessory kits with USB-C cables (Geokon part number KIT-GEONET-C) and four (4) 8900 Series 10-Watt solar panel kits (Geokon part number 8900-SOL-10W-BRJ).

Both the Geokon GK-404 handheld readout and the Geokon 8940-04C-CBLX Dataloggers with solar panels will become property of KYTC upon completion of project. Contact the KYTC Geotechnical Services Branch prior to ordering items from Geokon to ensure the correct items are purchased.

A17.8 The Department will measure and pay for the accepted quantity of “Soil Grouting” around the exterior of the existing RCBC through Washington Avenue as described in the Construction Plans at the contract unit bid price per Cubic Yard of grout. This will constitute full compensation for all costs and delays including materials, grout, equipment, handling, disposal, storing, labor, tools, and other incidental items required for supplying and facilitating the exterior grouting program as described herein and shown in the Construction Plans. The quantity of grout shall not exceed 33 cubic yards which corresponds to approximately 90% of the theoretical full

replacement volume for the exterior grout window shown on the Construction Plans. The quantity of grout shown on the Construction Plans shall therefore be considered an estimate and may change based on the exact soil conditions around the existing RCBC barrel.

A17.9 The Department will pay for verification tests for the exterior grouting program of the existing RCBC through Washington Avenue at the contract unit bid prices for "Pressure Test of Soil Grout" and "CCTV Soil Grouting Inspection" at the quantities shown in the Construction Plans. This will constitute full compensation for all costs including materials, labor, tools, equipment, and other incidental items required for performing pressure tests and CCTV inspection of the exterior grouting program as described herein and shown in the Construction Plans. The quantities shown in the Construction Plans are based on the minimum number of required tests for each test type. The number of tests shown on the Construction Plans shall therefore be considered an estimate, representing the minimum quantity of tests, and may increase based on the exact soil conditions around the existing RCBC barrel.

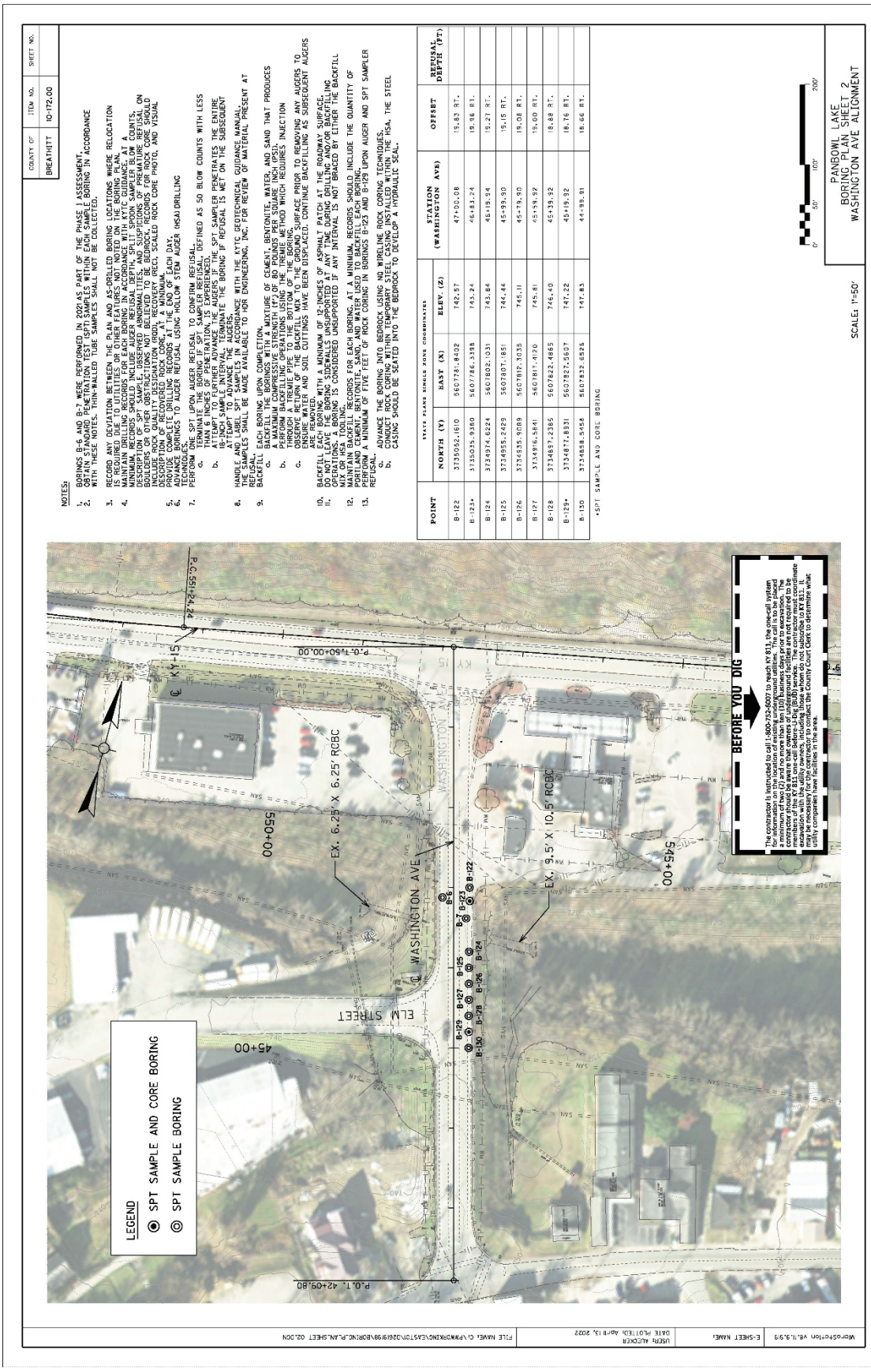
A17.10 Adjustment of base bid unit quantities for "Soil Grouting", "Pressure Test of Soil Grout" and "CCTV Soil Grouting Inspection" shall be made in accordance with contract unit prices. Adjustments, both reductions and additions, will be made on the total quantity of each item performed. Areas requiring additional or reduced exterior grouting or verification testing due to subsurface conditions differing from those shown in the Construction Plans or for other unforeseen conditions, will be paid at the contract unit prices.

Code	Pay Item	Pay Unit
26207ED	Secant Shafts	Linear Foot
26212EC	Secant Shafts With Lightweight Concrete	Linear Foot
24550EC	Vibration Monitoring	Lump Sum
26203EC	Secant Shaft Concrete Cores	Each
26202EC	Water Pressure Tests in Cores (Single Packer)	Each
26201EC	24-Hour Falling Head Permeability Tests in Cores	Each
24843EC	Vibrating Wire Piezometer	Each
26213EC	Soil Grouting	Cubic Yard
26222ED	Vibrating Wire Data Logger (4-Channel)	Each
26223ED	Pressure Test of Soil Grout	Each
26224ED	CCTV Soil Grouting Inspection	Each

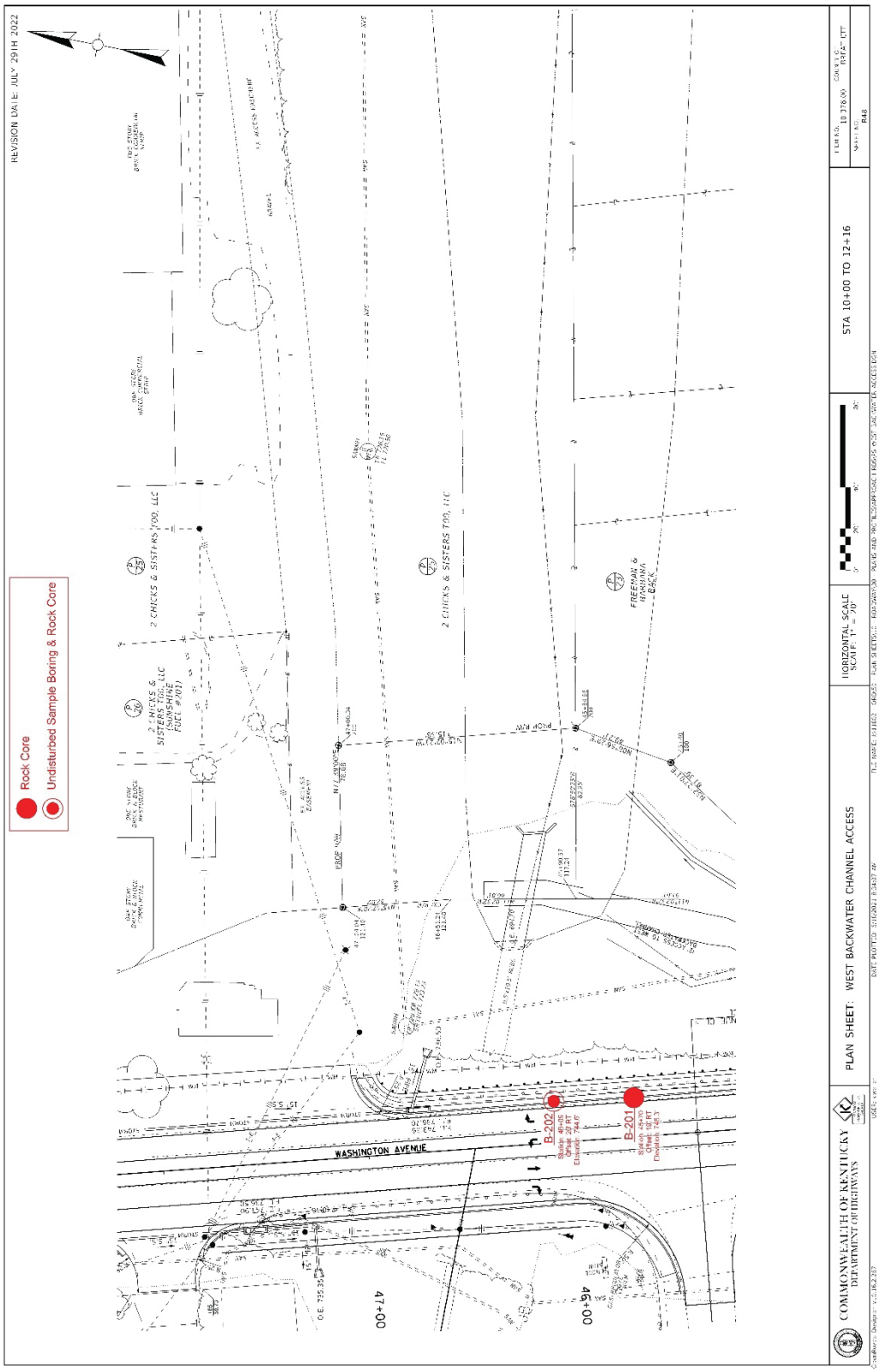
Special Note for Secant Shaft Cutoff Wall
Appendix B – Data from Previous Subsurface Explorations

Washington Avenue – Panbowl Lake Dam (Item # 10-376.00)

This drawing was produced in 2021 and contains the locations of the undisturbed borings performed in 2021 as part of the Phase I investigation.



This drawing was produced in 2022 and contains the locations of the undisturbed borings and core borings performed in 2022 as part of the Phase II investigation.



This drawing was produced in 2022 and contains the locations of the undisturbed borings and core borings performed in 2022 as part of the Phase III investigation.

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 11/11/21

Page 1 of 2

Project ID: ***M-004-2021***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: _

Hole Number ***B-6***	Immediate Water Depth ***NA***	Start Date ***06/25/2021***	Hole Type ***sample***
Surface Elevation ***743.3'***	Static Water Depth ***NA***	End Date ***06/25/2021***	Rig_Number ***03-D50***
Total Depth ***51.3'***	Driller ***Horn, Grant***	Latitude(83) ***37.556806***	
Location ***46+88.00 14.0' Lt.***		Longitude(83) ***-83.381403***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
742.5	0.8	Asphalt.						
741.3	2.0	Aggregate Base.						
			ST-1	2.0-3.0	1.0		ST	
			SS-1	3.0-3.9		13-50/0.40'	SPT	
5								5
			SS-2	4.5-6.0		7-10-5	SPT	
			SS-3	6.0-7.5		5-9-7	SPT	
			SS-4	7.5-9.0		12-25-7	SPT	
10			SS-5	9.0-10.5		5-13-8	SPT	10
			SS-6	10.5-12.0		5-6-4	SPT	
			SS-7	12.0-13.5		5-4-3	SPT	
		Brown and gray, moist, clayey silt with shale.	SS-8	13.5-15.0		3-7-5	SPT	
15			SS-9	15.0-16.5		3-3-4	SPT	15
			ST-2	16.5-18.5	2.0		ST	
20			ST-3	18.5-20.5	2.0		ST	20
			SS-10	20.5-22.0		3-3-4	SPT	
			ST-4	22.0-24.0	1.5		ST	
25			ST-5	24.0-26.0	1.9		ST	25
717.3	26.0							
			SS-11	26.0-27.5		3-5-6	SPT	
			ST-6	27.5-29.5	1.7		ST	
30			ST-7	29.5-31.5	1.9		ST	30
			SS-12	31.5-33.0		4-6-7	SPT	
			ST-8	33.0-35.0	1.6		ST	
35		Brown, wet, clayey silt with rock fragments.	SS-13	35.0-36.5		2-3-4	SPT	35
			SS-14	36.5-38.0		4-7-9	SPT	
			ST-9	38.0-40.0	2.0		ST	
40								40
			SS-15	40.0-41.5		3-7-10	SPT	
700.3	43.0		SS-16	41.5-43.0		3-6-9	SPT	
			ST-10	43.0-43.0	0.0	12-6-6	ST	
45		Dark gray, wet, silty clay.	SS-17	43.0-44.5			SPT	45
697.3	46.0		ST-11	44.5-46.5	1.8		ST	
		Dark gray, wet, silty sand with rock fragments.	SS-18	46.5-48.0		0-0-0	SPT	
			SS-19	48.0-49.5		5-10-14	SPT	
50								50

Driller's Subsurface Log for B-6 from Phase I Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 11/11/21

Page 2 of 2

Project ID: ***M-004-2021***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: _

Hole Number ***B-6***	Immediate Water Depth ***NA***	Start Date ***06/25/2021***	Hole Type ***sample***
Surface Elevation ***743.3'***	Static Water Depth ***NA***	End Date ***06/25/2021***	Rig_Number ***03-D50***
Total Depth ***51.3'***	Driller ***Horn, Grant***	Latitude(83) ***37.556806***	
Location ***46+88.00 14.0' Lt.***		Longitude(83) ***-83.381403***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
692.3	51.0	Dark gray, wet, silty sand with rock fragments.	SS-20	49.5-51.0		7-11-17	SPT	
692.0	51.3	(Weathered shale).	SS-20	49.5-51.0		7-11-17	SPT	
			SS-21	51.0-51.3		50/0.29'	SPT	
		(Bottom of Hole 51.3') (Refusal @ 51.3)						

55 60 65 70 75 80 85 90 95 100

Driller's Subsurface Log for B-6 from Phase I Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 11/11/21

Page 1 of 2

Project ID: ***M-004-2021***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: _

Hole Number ***B-7***	Immediate Water Depth ***NA***	Start Date ***06/28/2021***	Hole Type ***sample***
Surface Elevation ***743.9'***	Static Water Depth ***NA***	End Date ***06/28/2021***	Rig_Number ***03-D50***
Total Depth ***51.1'***	Driller ***Horn, Grant***	Latitude(83) ***37.556755***	
Location ***46+62.00 15.0' Rt.***		Longitude(83) ***-83.381283***	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
742.9	1.0	Asphalt.						
742.2	1.7	Aggregate Base.						
739.9	4.0	Brown, moist, clayey silt with rock fragments.	ST-1	2.0-4.0	2.0		ST	
5			ST-2	4.0-4.5	0.3	50/0.40'	ST	5
			SS-1	4.5-4.9			SPT	
			SS-2	6.0-7.5		5-10-15	SPT	
			SS-3	7.5-9.0		8-7-10	SPT	
10		Brown and gray, wet, clayey silt with shale.	SS-4	9.0-10.5		5-6-7	SPT	10
			SS-5	10.5-12.0		4-5-5	SPT	
			SS-6	12.0-13.5		4-5-5	SPT	
15 728.9	15.0		SS-7	13.5-15.0		3-6-3	SPT	15
			SS-8	15.0-16.5		1-3-2	SPT	
			ST-3	16.5-18.5	1.4		ST	
20			SS-9	18.5-20.0		2-3-4	SPT	20
			SS-10	20.0-21.5		2-4-5	SPT	
			SS-11	21.5-23.0		1-3-3	SPT	
25			ST-4	23.0-25.0	1.6		ST	25
			ST-5	25.0-27.0	1.6		ST	
			SS-12	27.0-28.5		2-3-3	SPT	
		Brown, wet, clayey silt with rock fragments.	SS-13	28.5-30.0		3-3-9	SPT	
30			SS-14	30.0-31.5		1-4-6	SPT	30
			SS-15	31.5-33.0		3-4-4	SPT	
			SS-16	33.0-34.5		2-3-4	SPT	
35			ST-6	34.5-36.5	2.0		ST	35
			ST-7	36.5-38.5	1.4		ST	
40			SS-17	38.5-40.0		3-4-4	SPT	40
			SS-18	40.0-41.5		2-3-4	SPT	
701.9	42.0		SS-19	41.5-43.0		2-4-3	SPT	
45		Gray, wet, silty clay with rock fragments and sand.	ST-8	43.0-45.0	1.7		ST	45
697.4	46.5		ST-9	45.0-46.5	1.5		ST	
		Gray, wet, silty sand.	SS-20	46.5-48.0		5-4-4	SPT	
			SS-21	48.0-49.5		0-1-2	SPT	
50								50

Driller's Subsurface Log for B-7 from Phase I Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 11/11/21

Page 2 of 2

Project ID: ***M-004-2021***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: _

Hole Number ***B-7***	Immediate Water Depth ***NA***	Start Date ***06/28/2021***	Hole Type ***sample***
Surface Elevation ***743.9'***	Static Water Depth ***NA***	End Date ***06/28/2021***	Rig_Number ***03-D50***
Total Depth ***51.1'***	Driller ***Horn, Grant***	Latitude(83) ***37.556755***	
Location ***46+62.00 15.0' Rt.***		Longitude(83) ***-83.381283***	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
692.9	51.0	Gray, wet, silty sand.	SS-22	49.5-51.0		4-4-12	SPT	
692.8	51.1	(Weathered shale).	SS-22	49.5-51.0		4-4-12	SPT	
			SS-23	51.0-51.1		50/0.10'	SPT	
		(Bottom of Hole 51.1') (Refusal @ 51.1)						

55 60 65 70 75 80 85 90 95 100

Driller's Subsurface Log for B-7 from Phase I Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-122***	Immediate Water Depth ***NA***	Start Date ***05/19/2022***	Hole Type ***sample***
Surface Elevation ***742.9'***	Static Water Depth ***NA***	End Date ***05/19/2022***	Rig_Number ***03-D50***
Total Depth ***52.6'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***47+00.08 19.8' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
741.6	1.3	Asphalt.						
740.5	2.4	Aggregate Base.						
		Overburden.						
690.4	52.5		SS-1	52.5-52.6		50/0.10'	SPT	
		(Bottom of Hole 52.6') (Refusal @ 52.5)						

Driller's Subsurface Log for B-122 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 2

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-123***	Immediate Water Depth ***51.3 (05/17/22)***	Start Date ***03/17/2022***	Hole Type ***core and sample***
Surface Elevation ***743.3'***	Static Water Depth ***NA***	End Date ***03/17/2022***	Rig_Number ***03-D50***
Total Depth ***58.3'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***46+83.24 20.0' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
742.2	1.1	Asphalt.						
741.0	2.3	Aggregate Base.						
		Overburden.						Water level after coring @ 17.4
690.8	52.5							
690.0	53.3	Weathered shale. (Begin Core)	SS-1	52.5-52.5		50/0.01'	SPT	Casing advancer @ 52.5-53.3
688.4	54.9	Gray shale, silty.	36 / -	2.5	2.5	100		
688.0	55.3	Clay seam.						55.8
685.0	58.3	Gray shale, silty.	32 / -	2.5	2.5	100		58.3

Driller's Subsurface Log for B-123 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 2 of 2

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-123***	Immediate Water Depth ***51.3 (05/17/22)***	Start Date ***03/17/2022***	Hole Type ***core and sample***
Surface Elevation ***743.3'***	Static Water Depth ***NA***	End Date ***03/17/2022***	Rig_Number ***03-D50***
Total Depth ***58.3'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***46+83.24 20.0' Rt.***		Longitude(83) __	

Lithology		Description	Overburden	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth		Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
65		(Bottom of Hole 58.3')							65
70									70
75									75
80									80
85									85
90									90
95									95
100									100
105									105
110									110
115									115
120									120

Driller's Subsurface Log for B-123 from Phase II Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-124***	Immediate Water Depth ***NA***	Start Date ***05/18/2022***	Hole Type ***sample***
Surface Elevation ***744.9'***	Static Water Depth ***NA***	End Date ***05/18/2022***	Rig_Number ***03-D50***
Total Depth ***51.3'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***46+19.94 19.3' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
743.6	1.3	Asphalt.						
742.7	2.2	Aggregate Base.						
		Overburden.						
693.7	51.2		SS-1	51.2-51.3		50/0.10'	SPT	
		(Bottom of Hole 51.3') (Refusal @ 51.3)						

Driller's Subsurface Log for B-124 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-125***	Immediate Water Depth ***40.9 (05/16/22)***	Start Date ***05/16/2022***	Hole Type ***sample***
Surface Elevation ***745.4'***	Static Water Depth ***NA***	End Date ***05/16/2022***	Rig_Number ***03-D50***
Total Depth ***45.0'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***45+99.90 19.2' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
744.2	1.2	Asphalt.						
743.0	2.4	Aggregate Base.						
		Overburden.	SS-1	34.1-35.6		8-5-6	SPT	**Diffiult drilling @ 33.7-34.3**
700.8	44.6							
700.4	45.0	Weathered shale.	SS-2	44.6-45.0		50/0.40'	SPT	
		(Bottom of Hole 45.0') (Refusal @ 45)						

Driller's Subsurface Log for B-125 from Phase II Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-126***	Immediate Water Depth ***NA***	Start Date ***05/18/2022***	Hole Type ***sample***
Surface Elevation ***746.1'***	Static Water Depth ***NA***	End Date ***05/18/2022***	Rig_Number ***03-D50***
Total Depth ***51.8'***	Driller ***Grant Yeary***	Latitude(83) __	
Location ***45+79.90 19.1' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
745.0	1.1	Asphalt.						
743.7	2.4	Aggregate Base.						
		Overburden.						**Difficult drilling @ 12.2-13.3**
694.3	51.8							
			SS-1	51.8-51.8		50/0.00'	SPT	
		(Bottom of Hole 51.8') (Refusal @ 51.8)						

Driller's Subsurface Log for B-126 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-127***	Immediate Water Depth ***NA***	Start Date ***05/17/2022***	Hole Type ***sample***
Surface Elevation ***746.7'***	Static Water Depth ***NA***	End Date ***05/17/2022***	Rig_Number ***90-D120***
Total Depth ***50.2'***	Driller ***Grant Horn***	Latitude(83) __	
Location ***45+59.92 19.0' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
745.6	1.1	Asphalt.						
744.2	2.5	Aggregate Base.						
		Overburden.						
697.2	49.5							
696.5	50.2	Weathered shale.	SS-1	50.0-50.2		50/0.20'	SPT	
		(Bottom of Hole 50.2') (Refusal @ 50.2)						

Driller's Subsurface Log for B-127 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-128***	Immediate Water Depth ***NA***	Start Date ***05/16/2022***	Hole Type ***sample***
Surface Elevation ***746.4'***	Static Water Depth ***NA***	End Date ***05/16/2022***	Rig_Number ***90-D120***
Total Depth ***51.2'***	Driller ***Grant Horn***	Latitude(83) __	
Location ***45+39.92 18.9' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden						
745.4	1.0	Asphalt.						
744.4	2.0	Aggregate Base.						
		Overburden.						
696.4	50.0							
695.2	51.2	Weathered Shale.	SS-1	51.1-51.2		50/0.10'	SPT	
		Rock Core						
		(Bottom of Hole 51.2') (Refusal @ 51.2)						

Driller's Subsurface Log for B-128 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 2

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-129***	Immediate Water Depth ***NA***	Start Date ***05/17/2022***	Hole Type ***core and sample***
Surface Elevation ***748.0'***	Static Water Depth ***NA***	End Date ***05/17/2022***	Rig_Number ***90-D120***
Total Depth ***57.5'***	Driller ***Grant Horn***	Latitude(83) __	
Location ***45+19.99 12.0' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description	Sample No. / Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
		Overburden						
746.9	1.1	Asphalt.						
745.5	2.5	Aggregate Base.						
5								5
10								10
15								15
20								20
25		Overburden.						**Difficult drilling @ 22-23** 25
30								30
35								35
40								40
45								45
50								50
697.0	51.0							
695.5	52.5	Weathered shale. (Begin Core)						**Casing advancer @ 51-52.5**
55		Gray shale, silty.	44 / -	2.5	2.4	96		55.0 55
690.5	57.5		92 / -	2.5	2.5	100		57.5
60								60

Driller's Subsurface Log for B-129 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 2 of 2

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-129***	Immediate Water Depth ***NA***	Start Date ***05/17/2022***	Hole Type ***core and sample***
Surface Elevation ***748.0'***	Static Water Depth ***NA***	End Date ***05/17/2022***	Rig_Number ***90-D120***
Total Depth ***57.5'***	Driller ***Grant Horn***	Latitude(83) __	
Location ***45+19.99 12.0' Rt.***		Longitude(83) __	

Lithology		Description	Sample No.	Depth (ft)	Rec. (ft)	SPT Blows	Sample Type	Remarks
Elevation	Depth	Overburden / Rock Core	Std/Ky RQD	Run (ft)	Rec (ft)	Rec (%)	SDI (JS)	
65		(Bottom of Hole 57.5')						65
70								70
75								75
80								80
85								85
90								90
95								95
100								100
105								105
110								110
115								115
120								120

Driller's Subsurface Log for B-129 from Phase II Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 5/25/22

Page 1 of 1

Project ID: ***M-003-2022*** Item Number: ***10-00172.00***	***Breathitt - KY-15 MP 13.8-14.6***	Project Type: ***Miscellaneous Dam*** Project Manager: _

Hole Number ***B-130***	Immediate Water Depth ***NA***	Start Date ***05/16/2022***	Hole Type ***sample***
Surface Elevation ***748.5'***	Static Water Depth ***NA***	End Date ***05/16/2022***	Rig_Number ***90-D120***
Total Depth ***52.2'***	Driller ***Grant Horn***	Latitude(83) __	
Location ***44+99.91 18.7' Rt.***		Longitude(83) __	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
747.5	1.0	Asphalt.						
746.0	2.5	Aggregate Base.						
		Overburden.						
698.0	50.5							
696.3	52.2	Gray, Weathered shale.	SS-1	52.0-52.2		50/0.20'	SPT	
		(Bottom of Hole 52.2') (Refusal @ 52.2)						

Driller's Subsurface Log for B-130 from Phase II Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 12/22/22

Page 1 of 2

Project ID: ***M-005-2022***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: ***Eric Scott***

Hole Number ***201***	Immediate Water Depth ***NA***	Start Date ***12/16/2022***	Hole Type ***core***
Surface Elevation ***746.3'***	Static Water Depth ***NA***	End Date ***12/16/2022***	Rig_Number ***0095-320***
Total Depth ***60.2'***	Driller ***James Roark***	Latitude(83)	
Location ***45+70.00 19.0' Rt.***		Longitude(83)	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
744.9	1.4	Blacktop.						
744.5	1.8	DGA.						
		Medium stiff, brown, moist, silty clay.						
739.8	6.5							
		Medium stiff, gray, moist, silty clay with boulders (Shale).						
705.1	41.2							
		Soft, gray, wet, sand.						
697.6	48.7	(Begin Core)						
		Gray shale.	33 / -	1.5	1.3	87		

Driller's Subsurface Log for B-201 from Phase III Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 12/22/22

Page 2 of 2

Project ID: ***M-005-2022***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: ***Eric Scott***

Hole Number ***201***	Immediate Water Depth ***NA***	Start Date ***12/16/2022***	Hole Type ***core***
Surface Elevation ***746.3'***	Static Water Depth ***NA***	End Date ***12/16/2022***	Rig_Number ***0095-320***
Total Depth ***60.2'***	Driller ***James Roark***	Latitude(83)	
Location ***45+70.00 19.0' Rt.***		Longitude(83)	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
								50.2
55		Gray shale.	94 / -	5.0	4.8	96		55.2 55
			96 / -	5.0	5.0	100		
60 686.1	60.2							60.2 60
65		(Bottom of Hole 60.2')						65
70								70
75								75
80								80
85								85
90								90
95								95
100								100

Driller's Subsurface Log for B-201 from Phase III Investigation (Cont'd)

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 12/22/22

Page 1 of 2

Project ID: ***M-005-2022***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: ***Eric Scott***

Hole Number ***202***	Immediate Water Depth ***NA***	Start Date ***12/15/2022***	Hole Type ***core and sample***
Surface Elevation ***744.6'***	Static Water Depth ***NA***	End Date ***12/15/2022***	Rig_Number ***0095-320***
Total Depth ***63.1'***	Driller ***James Roark***	Latitude(83)	
Location ***46+09.00 20.0' Rt.***		Longitude(83)	

Lithology Elevation	Lithology Depth	Description (Overburden / Rock Core)	Sample No. Std/Ky RQD	Depth (ft) Run (ft)	Rec. (ft) Rec (ft)	SPT Blows Rec (%)	Sample Type SDI (JS)	Remarks
743.2	1.4	Blacktop.						
742.7	1.9	DGA.						
		Medium stiff, brown, moist, silty clay.						
			1	4.6-6.6	1.2		ST	
738.0	6.6		2	6.6-8.1	1.3	6-18-12	SPT	
		Medium stiff, gray, moist, silty clay with boulders.	3	9.6-11.1	1.0	5-7-5	SPT	
730.0	14.6		4	14.6-16.1	1.5	3-4-4	SPT	
			5	19.6-21.1	0.9	1-3-3	SPT	
			6	24.6-26.1	1.3	1-4-3	SPT	
		Medium stiff, gray, moist, silty clay.	7	29.6-31.1	1.4	1-5-5	SPT	
			8	34.6-36.1	1.3	1-3-4	SPT	
			9	39.6-41.1	1.5	2-3-4	SPT	
698.8	45.8		10	44.6-46.1	1.5	0-3-4	SPT	
		Soft, gray, wet, sandy clay.						

Driller's Subsurface Log for B-202 from Phase III Investigation

Drilling Firm: Horn & Associates Inc
For: Division of Structural Design
Geotechnical Branch

DRILLER'S SUBSURFACE LOG

Printed: 12/22/22

Page 2 of 2

Project ID: ***M-005-2022***	***Breathitt - KY-15 MP 16.8-17.9***	Project Type: ***Miscellaneous***
Item Number: ***10-00376.00***		Project Manager: ***Eric Scott***

Hole Number ***202***	Immediate Water Depth ***NA***	Start Date ***12/15/2022***	Hole Type ***core and sample***
Surface Elevation ***744.6'***	Static Water Depth ***NA***	End Date ***12/15/2022***	Rig_Number ***0095-320***
Total Depth ***63.1'***	Driller ***James Roark***	Latitude(83)	
Location ***46+09.00 20.0' Rt.***		Longitude(83)	

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample No. / Std/Ky RQD	Depth (ft) / Run (ft)	Rec. (ft) / Rec (ft)	SPT Blows / Rec (%)	Sample Type / SDI (JS)	Remarks
693.3	51.3	Soft, gray, wet, sandy clay.	(Begin Core)	11 11 12	49.6-51.1 49.6-51.1 51.1-53.3	1.5 1.5 0.2	4-18-22 4-18-22 50/0.20'	SPT SPT SPT	
55				79 / -	4.8	4.4	92		55
		Gray shale.							56.1
60				100 / -	5.0	5.0	100		60
									61.1
681.5	63.1			100 / -	2.0	2.0	100		63.1
65		(Bottom of Hole 63.1')							65
70									70
75									75
80									80
85									85
90									90
95									95
100									100

Driller's Subsurface Log for B-202 from Phase III Investigation (Cont'd)

Special Note for Secant Shaft Cutoff Wall
Appendix C – Non-Destructive Testing in Secant Shafts

Washington Avenue – Panbowl Lake Dam (Item #10-376.00)

The following sections provide the requirements for non-destructive testing (Crosshole Sonic Logging) of the secant shafts, schedule requirements for submittals, reporting requirements and responsibilities of the cutoff wall specialty Subcontractor, Testing Subcontractor, and Department. The purpose of the non-destructive testing is to evaluate the integrity of the secant shafts, to potentially detect air-, soil- or debris-filled voids or other discontinuities that may affect the shaft's ability to function as a continuous hydraulic barrier.

In all cases, the Department reserves the right to request raw data, field notes and/or other available information that may be necessary to evaluate the results of testing specified in this Special Note Appendix. Upon request, provide any available information at no additional cost to the Department.

In all cases, the Department reserves the right to perform testing to obtain independent results of testing specified in this Special Note Appendix. Upon request, provide any assistance required for Department personnel to perform such testing at no additional cost to the Department.

At the request of the Engineer, personnel representing the cutoff wall specialty Subcontractor (including testing subcontractors) and the Department may be required to attend a pre-test meeting to discuss procedures related to testing, reports, reviews, etc. This meeting will be at no additional cost to the Department.

The Department will respond to the cutoff wall specialty Subcontractor regarding acceptability of submittals referenced in this Appendix within ten (10) business days. A "Business Day" is defined as any day except Saturdays, Sundays, and Holidays, as defined in Section 101.03 of the Standard Specifications.

3.0 Crosshole Sonic Logging

3.1 Description

Crosshole Sonic Logging (CSL) is a nondestructive method to test the integrity of drilled shafts in accordance with ASTM D6760. It is the responsibility of the cutoff wall specialty Subcontractor to supply all equipment and materials necessary to perform this testing and for obtaining the services of a CSL Testing Firm, which is experienced with CSL testing in accordance with Section 3.4.1 of this Appendix and approved by the Department, to perform the testing.

The cutoff wall specialty Subcontractor will be responsible for providing the following:

1. Access tubes to be used for CSL testing of the secant shafts;
2. Watertight shoes, watertight caps, and non-shrink grout;

3. Suitable working space and access to every shaft; and
4. Any other equipment, materials, or assistance necessary to accomplish the testing.

3.2 Materials

3.2.1 Access Tubes

1. Provide access tubes meeting the requirements below:

    a. 2-inch inside diameter (ID) schedule 40 steel pipe conforming to ASTM A 53, Grade A or B, Type E, F, or S;
    b. Round, regular internal diameters free of defects or obstructions, including any at pipe joints;
    c. Capable of permitting the free, unobstructed passage of a 1.5-inch-diameter source and receiver probes; and
    d. Watertight and free from corrosion with clean internal and external faces to ensure passage of the probes and a good bond between the concrete and the tubes.

2. Provide watertight shoes on the bottom and removable watertight caps on the top of the access tubes.
3. The Engineer will accept access tubes based on visual inspection and certification the steel pipe meets the requirements of this Appendix.

3.2.2 Grout

Provide non-shrink grout to fill the access tubes and any cored holes at the completion of the CSL tests. Use grout conforming to Section 601.03.03 of the Standard Specifications.

3.3 Execution

3.3.1 Access Tube Installation

1. Install four evenly spaced access tubes within each secondary shaft at the locations shown in the Construction Plans.
2. Securely attach the CSL access tubes to the inside periphery of the spiral or hoop reinforcement. Wire-tie the tubes a minimum of every 3 feet so they will stay in position during placement of concrete. Place the tubes so they are parallel with each other and as near to vertical as possible in the finished shaft. Even moderate bending of the tubes will result in large regional variations in the data.
3. Place the access tubes from 6 inches above the shaft tip to at least the top of permanent guide wall (top of concrete). Under no circumstances may the tubes be allowed to come to rest on the bottom of the excavation.
4. Ensure that any joints in the tubes are watertight.
5. Tubes may be extended with mechanical couplings. Do not use duct tape or other wrapping material to seal the joints. Welding of joints is prohibited.
6. Install threaded bottom cap to ensure watertight seal on tubes.
7. During placement of the access tubes and reinforcement cage, exercise care so

that the tubes will not be damaged to the extent that would prevent a 1.5-inch diameter probe from passing through them.

8. After placing the reinforcement cage and before beginning concrete placement, **fill the tubes with clean potable water** and cap or seal the tube tops to keep debris out of the tubes. Replace the watertight caps immediately after filling the tubes with water.
9. Immediately before placing concrete, use a weighted tape to investigate all tubes to make sure that there are no bends, crimps, obstructions or other impediments to the free passage of the testing probes. Additionally, check to ensure there are no water leaks.
10. During removal of the caps from the tubes, exercise care so as not to apply excess torque, hammering, or other stresses which could break the bond between the tubes and concrete.
11. Immediately after concrete placement, recheck each access tube to ensure that the water level is at the top of the tube (this is due to the potential for air bubbles entrapped in the tube to rise during the pour and lower the water level in the tube).
12. After concrete placement and before the beginning of CSL testing, inspect the access tubes and report any access tubes that the 1.5-inch diameter test probe cannot pass through to the Engineer. The Engineer will make an evaluation to determine if the CSL testing can be successfully performed without the tube(s); the Engineer may require the cutoff wall specialty Subcontractor to, at its own expense, replace one or more tubes with 2-inch-diameter holes cored through the concrete for the entire length of the shaft, excluding the bottom 6 inches. Unless directed otherwise by the Engineer, locate core holes approximately 6 inches inside the reinforcement such that it does not damage the reinforcement. For each core hole drilled, record a log with descriptions of inclusions and voids in the cored holes an submit a copy of the log and photographs to the Engineer. Preserve the cores, identifying the core location. Make cores available for inspection by the Engineer.

3.3.2 Grouting

After completion of the CSL testing, evaluation of results, and upon being directed by the Engineer, remove the water from the access tubes and any cored holes and completely fill the tubes/holes with approved the grout mix. Water may be removed by displacement during tremie grouting. After grouting, cut the tubes flush with the tops of the drilled secant shafts.

3.4 CSL Testing and Evaluation of Test Results

Make submittals in accordance with the Project requirements for submittals. See Table 1 below.

Table 1 – Schedule of CSL Submittals

Submittal Number	Submittal Item	Deadline	Event
1	Technical Proposal with CSL Testing Firm qualifications	10 business days before	Start of Secant Shaft Construction
2	CSL Testing Reports	5 business days after	Completion of testing on an individual secant shaft

Note: Provide all submittals and reports in .pdf format

3.4.1 Technical Proposal

Submit a technical proposal prepared by the CSL Testing Firm that addresses the testing procedures and required qualifications and experience of the testing firm. Include at least three (3) similar deep foundation projects for which the testing organization has been engaged in CSL testing. Use personnel having experience in CSL testing and interpretation on a minimum of three (3) similar deep foundation projects.

3.4.2 Testing

1. Provide access to the top of the shaft for testing personnel and equipment.
2. Perform CSL testing in accordance with ASTM D 6760.
3. Perform CSL testing on secant shafts after the shaft concrete has cured at least 72 hours and has obtained a minimum strength of 2500 psi.
4. Obtain logs as shown in Table 2 below unless directed otherwise by the Engineer.

Table 2 – Schedule of CSL Logs

Substructure Unit	No. of Access Tubes	Perimeter Logs	Major Diagonal Logs	Minor Diagonal Logs
Secant Shafts	4	4	2	0

5. If during testing it becomes apparent tube debonding has occurred, the cutoff wall specialty Subcontractor may consider flooding the top of the shaft and retesting immediately; it is possible that water may flow into gaps between the tubes and concrete and provide continuity for the sonic waves.
6. If the CSL Testing Firm believes that additional testing is required (such as Angled CSL, Crosshole Tomography, Singlehole Sonic Logging, or Sonic Echo/Impulse Response, etc.), contact the Engineer immediately. The Department will determine if additional testing is required. If the results of the additional testing indicates that any drilled shaft on which additional testing was required is acceptable, the Department will pay for the direct cost of

additional testing by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft is unacceptable, the additional testing will be at the expense of the cutoff wall specialty Subcontractor.

3.4.3 Test Reports

1. Submit a test report prepared by the CSL Testing Firm within 5 business days of completion of testing which, at a minimum, contains:
   a. Date of test;
   b. Plan Secant Shaft No., reference elevation, and water level in the tubes at the time of testing;
   c. Schematic showing a plan view of the access tube locations;
   d. CSL logs with reference elevations;
   e. CSL logs for each tube pair tested with any discontinuity zones indicated on the logs and discussed in the report as appropriate;
   f. Analyses of **both** pulse first arrival time (FAT) versus depth **and** velocity versus depth;
   g. Include nested signal peak (i.e. “waterfall”) diagrams as a function of time plotted vs. depth. Clearly indicate the FAT picks used to obtain velocity vs. depth;
   h. Analyses of pulse energy/amplitude versus depth;
   i. Tables which indicate tube pairs, vertical extents, and magnitude (FAT % delay and/or energy decrease) of flaw and defect zones, as defined in Section 3.4.5 of this Special Note; and
   j. A narrative portion of the report to present items a thru i.
2. Plot data to a scale that will allow adequate evaluation of data variations. The Department reserves the right to request scale adjustments.
3. Complete all reports using English units.

3.4.4. Evaluation of CSL Test Results

1. Allow direct communication between the CSL Testing Firm and the Department. If the CSL Testing Firm is different than other testing firms on the project, allow direct communication between the CSL and other testing firms.
2. The Department will review the CSL test results in the test report to evaluate whether or not the drilled shaft integrity is acceptable. Within 10 business days after receiving a test report, the Engineer will report to the cutoff wall specialty Subcontractor whether the construction is acceptable or additional analyses are needed. The Department will also use the results of other non-destructive and materials testing, construction records, etc. to evaluate the condition of the shafts.
3. Perform CSL testing on the first secondary secant shaft constructed. and continue drilling operations on subsequent shafts in accordance with this Special Note unless directed otherwise by the Engineer.
4. Commence construction of the structure above the secant shafts only after

receiving written approval from the Engineer to do so. Approval is based on evaluation of the CSL test results and other applicable test results, construction records, etc.

5. If the CSL records are inconclusive (e.g. records do not clearly indicate discontinuity, good conditions or missing data), the Department may require additional testing, such as Angled CSL, Singlehole Sonic Logging, or concrete cores, to evaluate the concrete conditions within the shaft in question. If core samples are needed, obtain cores with a minimum diameter of 2 inches using a double tube core barrel at a minimum of 4 locations selected by the Department, unless directed otherwise by the Engineer. Locate core holes approximately 6 inches inside the steel reinforcement, or at other locations selected by the Engineer, such that they do not damage the reinforcement. For each core hole drilled, record a log with descriptions of inclusions, voids, or abnormalities in the cored holes and submit a copy of the log to the Engineer. Place the cores in core boxes as shown in Exhibit 10 of the current version of the *KYTC Geotechnical Guidance Manual,* properly labeling the shaft depth at each interval of core recovery. Transport the cores and logs to the Geotechnical Services Branch in Frankfort for inspection and testing unless directed otherwise by the Engineer. Only after being directed by the Engineer, grout the core holes in accordance with Section 3.3.2 of this Appendix.
6. If the additional testing or evaluation of cores indicate that concrete for any secant shaft on which additional testing or coring was required is acceptable, the Department will pay for the direct cost of additional testing, concrete coring, and grouting by change order. If the additional testing or evaluation of cores indicates that the concrete for any drilled shaft concrete is unacceptable, the additional testing, concrete coring, and grouting will be at the expense of the cutoff wall specialty Subcontractor.
7. If discontinuities or other defects are found, an independent structural and/or geotechnical consultant hired by the cutoff wall specialty Subcontractor will perform a structural and/or geotechnical evaluation at the expense of the cutoff wall specialty Subcontractor. Use consultants who are prequalified by KYTC in applicable areas. Alternatively, the Engineer may require the Department's designer to perform the referenced evaluations and the Department may require the cost of these evaluations to be borne by the cutoff wall specialty Subcontractor. Based on the design criteria established for the structure and the results of the independent evaluation, the Engineer will assess the effects of the defects on the performance of the secant shaft cutoff wall. If the results of the analyses indicate that there is conclusive evidence that the discontinuity will result in inadequate or unsafe performance, as defined by the design criteria for the structure, the Engineer will reject the secant shaft.
8. If any secant shaft is rejected, provide a plan for remedial action to the Department for approval. Any modifications to the secant shafts and/or other substructure elements caused by the remedial action will require calculations and working drawings by consultant(s) hired by and at the expense of the cutoff wall specialty Subcontractor (or the Department's designer), which will be subject to review by the Department. Begin remediation operations only

after receiving approval from the Engineer for the proposed remediation. All remedial action will be at no cost to the Department and with no extension of contract time.

3.4.5. Evaluation Criteria

The Department will generally use the criteria below in Table 3 for evaluation of the shafts but may vary the criteria based on other available information (e.g. construction records, etc.)

Table 3 – Evaluation Criteria for CSL Test Results

Satisfactory	Good (G)	FAT increase 0 to 10% **and** Energy Reduction < 6 dB
Anomaly	Questionable (Q)	FAT increase 11 to 20% **and** Energy Reduction of < 9 dB
Flaw	Poor/Flaw (P/F)	FAT increase 21 to 30% **or** Energy Reduction of 9 to 12 dB
Defect	Poor/Defect (P/D)	FAT increase >31% **or** Energy Reduction > 12 dB

- Flaws must be addressed if they affect more than 50% of the profiles.
- Defects must be addressed if they affect more than one profile (i.e. the result of complete investigation from bottom to top between two tubes) at the same depth.
- "Addressing" a Flaw or Defect may include an evaluation by tomography if the concern is localized (e.g. not across the full section), and/or, depending on the depth to the concern, additional measures like core drilling, repair or replacement, repeat tests after a longer waiting time or testing by other methods (gamma-gamma, low strain, high strain).
- Flaws or Defects covering the entire cross section define a full layer concern requiring repair.
- Anomalies will require evaluation and may need to be addressed based on the results of the evaluation.

Continue with placement of structures and other construction above the top of shaft only after receiving written approval from the Engineer to do so. Approval will be granted based on evaluation of the CSL and other applicable test results.

3.5 Method of Measurement CSL Testing

The Department will pay for the authorized and accepted quantities of "CSL Testing" at the contract unit price per each secant shaft tested. This will constitute full compensation for all costs associated with providing access for testing personnel and equipment, performing the CSL testing in a single secant shaft, and reporting the results to the Engineer.

Installation of CSL access tubing is incidental to the applicable unit price for CSL Testing. This will constitute all costs and delays associated with installing the CSL access tubing in a single secant shaft, including but not limited to providing and installing access tubing,

providing and installing all required bracing for access tubes, and providing and placing grout in access tubes.

The Department will pay for the direct cost of additional testing and concrete coring, authorized by the Engineer, required to investigate shafts with inconclusive CSL records if evaluation of the additional testing or cores indicates that concrete for that drilled shaft is acceptable using a change order. This will constitute full compensation for all costs and delays associated with performing additional tests, obtaining and delivering concrete cores to the Geotechnical Services Branch, and grouting core holes.

3.6 Payment

The Department will pay for the completed and accepted quantities under the following. The Pay Unit of “Each” refers to each individual shaft.

Code	Pay Item	Pay Unit
21321NC	CSL Testing (4 Tubes)	Each

The Department will consider payment as full compensation for all work required under this Section.

SPECIAL NOTE

For Tree Removal

Breathitt County
IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812
Item No. 10-376

NO CLEARING OF TREES 5 INCHES OR GREATER (DIAMETER BREAST HEIGHT) FROM **JUNE 1 THROUGH JULY 31**

If there are any questions regarding this note, please contact Danny Peake, Director, Division of Environmental Analysis, 200 Mero Street, Frankfort, KY 40601, Phone: (502) 564-7250.

SPECIAL NOTE FOR PIPELINE INSPECTION

1.0 DESCRIPTION. The Department will perform visual inspections on all pipe on the project. A video inspection will be required on projects having more than 250 linear feet of storm sewer and/or culvert pipe and on routes with an ADT of greater than 1,000 vehicles. Conduct video inspections on all pipe located under the roadway and 50 percent of the remaining pipe not under the roadway. Storm sewer runs and outfall pipes not under the roadway take precedence over rural entrance pipes. Contractors performing this item of work must be prequalified with the Department in the work type J51 (Video Pipe Inspection and Cleaning). Deflection testing shall be completed using a mandrel in accordance with the procedure outlined below or by physical measurement for pipes greater than 36inches in diameter. Mandrel testing for deflection must be completed prior to the video inspection testing. Unless otherwise noted, Section references herein are to the Department's Standard Specifications for Road and Bridge Construction, current edition.

2.0 VIDEO INSPECTION. Ensure pipe is clear of water, debris or obstructions. Complete the video inspection and any necessary measurement prior to placing the final surface over any pipe. When paving will not be delayed, take measurements 30 days or more after the completion of earthwork to within 1 foot of the finished subgrade. Notify the Engineer a minimum of 24 hours in advance of inspection and notify the Engineer immediately if distresses or locations of improper installation are logged.

2.1 INSPECTION FOR DEFECTS AND DISTRESSES

A) Begin at the outlet end and proceed through to the inlet at a speed less than or equal to 30 ft/minute. Remove blockages that will prohibit a continuous operation.

B) Document locations of all observed defects and distresses including but not limited to: cracking, spalling, slabbing, exposed reinforcing steel, sags, joint offsets, joint separations, deflections, improper joints/connections, blockages, leaks, rips, tears, buckling, deviation from line and grade, damaged coatings/paved inverts, and other anomalies not consistent with a properly installed pipe.

C) During the video inspection provide a continuous 360 degree pan of every pipe joint.

D) Identify and measure all cracks greater than 0.1" and joint separations greater than 0.5".

E) Video Inspections are conducted from junction to junction which defines a pipe run. A junction is defined as a headwall, drop box inlet, curb box inlet, manhole, buried junction, or other structure that disturbs the continuity of the pipe. Multiple pipe inspections may be conducted from a single set up location, but each pipe run must be on a separate video file and all locations are to be referenced from nearest junction relative to that pipe run.

F) Record and submit all data on the TC 64-765 and TC 64-766 forms.

3.0 MANDREL TESTING. Mandrel testing will be used for deflection testing. For use on Corrugated Metal Pipe, High Density Polyethylene Pipe, and Polyvinyl Chloride Pipe, use a mandrel device with an odd number of legs (9 minimum) having a length not less than the outside diameter of the mandrel. The diameter of the mandrel at any point shall not be less than the diameter specified in Section 3.6. Mandrels can be a fixed size or a variable size.

3.1 Use a proving ring or other method recommended by the mandrel manufacturer to verify mandrel diameter prior to inspection. Provide verification documentation for each size mandrel to the Engineer.

3.2 All deflection measurements are to be based off of the AASHTO Nominal Diameters. Refer to the chart in section 3.6.

3.3 Begin by using a mandrel set to the 5.0% deflection limit. Place the mandrel in the inlet end of the pipe and pull through to the outlet end. If resistance is met prior to completing the entire run, record the maximum distance achieved from the inlet side, then remove the mandrel and continue the inspection from the outlet end of the pipe toward the inlet end. Record the maximum distance achieved from the outlet side.

3.4 If no resistance is met at 5.0% then the inspection is complete. If resistance occurred at 5.0% then repeat 3.1 and 3.2 with the mandrel set to the 10.0% deflection limit. If the deflection of entire pipe run cannot be verified with the mandrel then immediately notify the Engineer.

3.5 Care must be taken when using a mandrel in all pipe material types and lining/coating scenarios. Pipe damaged during the mandrel inspection will be video inspected to determine the extent of the damage. If the damaged pipe was video inspected prior to mandrel inspection then a new video inspection is warranted and supersedes the first video inspection. Immediately notify the Engineer of any damages incurred during the mandrel inspection and submit a revised video inspection report.

3.6 AASHTO Nominal Diameters and Maximum Deflection Limits.

Base Pipe Diameter	AASHTO Nominal Diameter	Max. Deflection Limit	
		5.0%	10.0%
(inches)	(inches)	(inches)	
15	14.76	14.02	13.28
18	17.72	16.83	15.95
24	23.62	22.44	21.26
30	29.53	28.05	26.58
36	35.43	33.66	31.89
42	41.34	39.27	37.21
48	47.24	44.88	42.52
54	53.15	50.49	47.84
60	59.06	56.11	53.15

4.0 PHYSICAL MEASUREMENT OF PIPE DEFLECTION. Alternate method for deflection testing when there is available access or the pipe is greater than 36 inches in diameter, as per 4.1. Use a contact or non-contact distance instrument. A leveling device is recommended for establishing or verifying vertical and horizontal control.

4.1 Physical measurements may be taken after installation and compared to the AASHTO Nominal Diameter of the pipe as per Section 3.6. When this method is used, determine the smallest interior diameter of the pipe as measured through the center point of the pipe (D2). All measurements are to be taken from the inside crest of the corrugation. Take the D2 measurements at the most deflected portion of the pipe run in question and at intervals no greater than ten (10) feet through the run. Calculate the deflection as follows:

% Deflection = [(AASHTO Nominal Diameter - D2) / AASHTO Nominal Diameter] x 100%

Note: The Engineer may require that preset monitoring points be established in the culvert prior to backfilling. For these points the pre-installation measured diameter (D1) is measured and recorded. Deflection may then be calculated from the following formula:

$$\% \text{ Deflection} = [(D1 - D2) / D1] (100\%)$$

4.2 Record and submit all data.

5.0 DEDUCTION SCHEDULE. All pipe deductions shall be handled in accordance with the tables shown below.

FLEXIBLE PIPE DEFLECTION	
Amount of Deflection (%)	Payment
0.0 to 5.0	100% of the Unit Bid Price
5.1 to 9.9	50% of the Unit Bid Price [(1)]
10 or greater	Remove and Replace [(2)]

[(1)] Provide Structural Analysis for HDPE and metal pipe. Based on the structural analysis, pipe may be allowed to remain in place at the reduced unit price. [(2)] The Department may allow the pipe to remain in place with no pay to the Contractor in instances where it is in the best interest to the public and where the structural analysis demonstrates that the pipe should function adequately.

RIGID PIPE REMEDIATION TABLE PIPE	
Crack Width (inches)	Payment
≤ 0.1	100% of the Unit Bid Price
Greater than 0.1	Remediate or Replace [(1)]

(1) Provide the Department in writing a method for repairing the observed cracking. Do not begin work until the method has been approved.

6.0 PAYMENT. The Department will measure the quantity in linear feet of pipe to inspect. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
24814EC	Pipeline Inspection	Linear Foot
10065NS	Pipe Deflection Deduction	Dollars

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 EXPERIMENTAL KYCT AND HAMBURG TESTING

1.0 General

1.1 Description. The KYCT (Kentucky Method for Cracking Test) and the Hamburg test results will help determine if the mixture is susceptible to cracking and rutting. During the experimental phase, data will be gathered and analyzed by the Department to determine the durability of the bituminous mixes. Additionally, the data will help the Department to create future performance-based specifications which will include the KYCT and Hamburg test methods.

2.0 Equipment

2.1 KYCT Testing Equipment. The Department will require a Marshall Test Press with digital recordation capabilities. Other CT testing equipment may be used for testing with prior approval by the Department.

2.2 Water Baths. One or more water baths will be required that can maintain a temperature of 77^{o} +/- 1.8^{o} F with a digital thermometer showing the water bath temperature. Also, one water bath shall have the ability to suspend gyratory specimen fully submerged in water in accordance with AASHTO T-166, current edition.

2.3 Hamburg Wheel Track Testing. The department encourages the use of the PTI APA/Hamburg Jr. test equipment to perform the loaded wheel testing. The Department will allow different equipment for the Hamburg testing, but the testing device must be approved by the Department prior to testing.

2.4 Gyratory Molds. Gyratory molds will be required to assist in the production of gyratory specimens in accordance with AASHTO T-312, current edition.

2.5 Ovens. Adequate (minimum of two ovens) will be required to accommodate the additional molds and asphalt mixture necessary to perform the acceptance testing as outlined in Section 402 of the Kentucky Standard Specifications for Road and Bridge Construction, current edition.

2.6 Department Equipment. The Department will provide gyratory molds, PINE 850 Test Press with digital recordation, and CT testing equipment to assist during this experimental phase so data can be gathered. Hamburg test specimens will be submitted to the Division of Materials for testing on the PTI APA/Hamburg Jr if the asphalt contractor or district materials office does not have an approved Hamburg testing device.

3.0 Testing Requirements

3.1 Acceptance Testing. Perform all acceptance testing and aggregate gradation as according with Section 402 and Section 403 of the Kentucky Standard Specifications for Road and Bridge Construction, current edition.

3.2 KYCT Testing. Perform crack resistance analysis (KYCT) in accordance with the current Kentucky Method for KYCT Index Testing during the mix design phase and during the plant production of all surface mixtures. For mix design approvals, submit KYCT results on the Department MixPack. For Class 4 mixtures, submit ingredient materials to the Division of Materials for verification.

3.2.1 KYCT Frequency. Obtain an adequate sample of hot mix asphalt to ensure the acceptance testing, gradation, and KYCT gyratory samples can be fabricated and is representative of the bituminous mixture. Acceptance specimens shall be fabricated first, then immediately after, fabricate the KYCT samples with the gyratory compactor in accordance with Section 2.4 of this Special Note. Analysis of the KYCT specimens and gradation will be required one per sublot produced from the same asphalt material and at the same time as the acceptance specimen is sampled and tested.

3.2.2 Number of Specimens and Conditioning. Fabricate specimens in accordance with the Kentucky Method for KYCT Index Testing. Contrary to the method, for field specimens, fabricate a minimum of 3 and up to 6 test specimens. The specimens shall be compacted at the temperature in accordance with KM 64-411. KYCT mix design specimens shall be short-term conditioned uncovered for four hours at compaction temperature in accordance with KM 64-411. Contrary to the Kentucky Method, plant produced bituminous material shall be short-term conditioned immediately after sampling for two hours uncovered in the oven at compaction temperature in accordance with KM 64-411. Additionally, fabricated specimens shall be allowed to cool in air (fan is permissible) for 30 minutes +/- 5 minutes and conditioned in a 77 °F water bath for 30 minutes +/- 5 minutes. To ensure confidence and reliability of the test results provided by KYCT testing and Hamburg testing, reheating of the asphalt mixture is prohibited.

3.2.3 Record Times. For each sublot, record the time required between drying aggregates in the plant to KYCT specimen fabrication. The production time may vary due to the time that the bituminous material is held in the silo. Record the preconditioning time when the time exceeds the one-hour specimen cool down time as required in accordance with The Kentucky Method for KYCT Index Testing. The preconditioning time may exceed an hour if the technician is unable to complete the test on the same day or within the specified times as outlined in The Kentucky Method for KYCT Index Testing. The production time and the preconditioning time shall be recorded on the AMAW.

3.2.4 File Name. As according to section 7.12 of The Kentucky Method for KYCT Index Testing, save the filename with the following format: “CID_Approved Mix Number_Lot Number_Sublot Number_ Date”

3.3 Hamburg Testing. Perform the rut resistance analysis (Hamburg) in accordance with AASTHO T-324, not to exceed 20,000 passes for all bituminous mixtures during the mix design phase and production. For mix design approvals, submit Hamburg results on the Department MixPack. For Class 4 mixtures, submit ingredient materials to the Division of Materials for informational verification.

3.3.1 Hamburg Testing Frequency. Perform testing and analysis per lot of material. The plant produced bituminous material sampled for the Hamburg test does not have to be obtained at the same time as the acceptance and KYCT sample. If the Hamburg test sample is not obtained at the same time as the KYCT sample, determine the Maximum Specific Gravity of the KYCT sample in accordance with AASHTO T-209 coinciding with the Hamburg specimens.

3.3.2 Record Times. Record the production time as according to section 3.2.3 in this special note. Also record the time that the specimens were fabricated and the time the Hamburg testing was started. All times shall be recorded on the AMAW.

3.3.3 File Name. Save the Excel spreadsheet with the following file name; "Hamburg_CID_Approved Mix Number_Lot Number_Sublot Number_Date" and upload the file into the AMAW.

4.0 Data

Submit the AMAW and all test data that was obtained for acceptance, gradation, KYCT, and Hamburg testing within five working days once all testing has been completed for a lot to Central Materials Lab and the District Materials Engineer. Also, any data and or comments that the asphalt contractor or district personnel deem informational during this experimental phase, shall also be submitted to the Central Materials Lab and the District Materials Engineer. Any questions or comments regarding any item in this Special Note can be directed to the Central Office, Division of Materials, Asphalt Branch.

5.0 Payment

Any additional labor and testing equipment that is required to fabricate and test the KYCT and Hamburg specimens shall be considered incidental to the asphalt surface line item. The Department will perform the testing for the KYCT and Hamburg specimens if a producer does not possess the proper equipment.

June 15th, 2022

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)**
10-376.00	Breathitt	12F0 FD52 013 9440701R	NHPP 0151090
PROJECT DESCRIPTION	Improve KY 15 from the Intersection of new KY15/30 to Intersection of KY 1812.		

☐ **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	24	EXCEPTION (S) Parcel #	ANTICIPATED DATE OF POSSESSION WITH EXPLANATION
Number of Parcels That Have Been Acquired			
Signed Deed	14		
Condemnation	10		
Signed ROE			

Notes/ Comments (Text is limited. Use additional sheet if necessary.)

ROE was obtained on all condemnation parcels: P6, P7, P19, P20, P21, P23, P24, P25, P42, P43

LPA RW Project Manager		Right of Way Supervisor	
Printed Name		Printed Name	
Signature		Signature	Aric Skaggs 2024.01.09 13:33:36 -05'00'
Date		Date	

Right of Way Director		FHWA	
Printed Name		Printed Name	
Signature	2024.01.09 15:19:53 -05'00'	Signature	
Date		Date	

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
0NHPP0151090
FD52 013 9440701U
Mile point: 16.750 TO 17.900
IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812. (2020CCR)
ITEM NUMBER: 10-376.00

PROJECT NOTES ON UTILITIES

The contractor should be aware that there is UTILITY WORK INCLUDED IN THIS ROAD CONSTRUCTION CONTRACT. The Contractor shall review the GENERAL UTILITY NOTES AND INSTRUCTIONS which may include KYTC Utility Bid Item Descriptions, utility owner supplied specifications, plans, list of utility owner preapproved subcontractors, and other instructions. 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.

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work proposed, it is unlikely to conflict with the existing utilities beyond minor facility adjustments. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Resident Engineer. The Kentucky Transportation Cabinet maintains the right to remove or alter portions of this contract if a utility conflict occurs. The utility facilities as noted in the previous section(s) have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

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. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom are to be contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
0NHPP0151090
FD52 013 9440701U
Mile point: 16.750 TO 17.900
IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812. (2020CCR)
ITEM NUMBER: 10-376.00

NOTE: DO NOT DISTURB THE FOLLOWING FACILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

Thacker-Grigsby Telephone Company, Inc. – Telephone (See Special Note – General Utility Coordination)

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

Not applicable

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

See supplemental plans (reference utility relocation for AT&T, AEP, and Thacker & Grigsby) for further detail.

SLM Construction Inc. - CATV, Completion date: 9/30/2024

Crystal Broadband Networks - CATV, Completion date: 9/30/2024

Thacker-Grigsby Telephone Company, Inc. - Telephone, Completion date: 9/30/2024

American Electric Power - Electric, Completion date: 7/30/2024

The pole numbers shown below (existing American Electric Power poles) will be removed from the project:

- 1084-319
- 1084-195
- 1084-326
- 1084-188
- 1084-187

UTILITIES AND RAIL CERTIFICATION NOTE

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ITEM NUMBER: 10-376.00

- 1084-186
- 1084-185
- 1084-259
- 1083-900
- 1084-325
- 1083-926
- 1083-834
- 1083-534
- 1083-614
- 1083-186
- 1083-179 – To remain in place until the operation of the new pump station. See sheet U-006.
- 1083-609 – To remain in place until the operation of the new pump station. See sheet U-006.
- 1083-009
- 1083-615
- 1083-939
- 1083-616 – To remain in place powering current traffic signals until new traffic signals are constructed for intersection at KY & Washington Ave.
- 1083-617
- 1083-618
- 1083-938
- 1083-897
- 1083-333
- 1083-016

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
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ITEM NUMBER: 10-376.00

- 1083-819
- 1083-301
- 1083-213
- 1083-889
- 1083-917
- 1083-329
- 1083-330

New poles for American Electric Power will be placed most nearly at the following centerline stations and offsets:

KY 15 TIE Centerline

- STA 108+00 LT 60’
- STA 110+23 LT 73’

KY 15 Centerline

- STA 511+60 LT 131’
- STA 512+20 LT 80’
- STA 515+00 LT 74’
- STA 517+25 LT 61’
- STA 518+30 LT 109’
- STA 561+32 LT 88’
- STA 564+70 RT 95’
- STA 566+77 LT 60’
- STA 567+28 LT 70’

UTILITIES AND RAIL CERTIFICATION NOTE

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ITEM NUMBER: 10-376.00

KY 1812 Centerline

- STA 52+36 RT 112’
- STA 53+10 RT 62’
- STA 53+60 RT 21’

Washington Ave Centerline

- STA 42+49 LT 48’
- STA 47+80 LT 72’

AT&T - KY - Telephone, Completion date: 12/30/2024

The pole numbers shown below (existing AT&T telephone poles) will be removed from the project:

- P12X1
- P12X4X1
- P12X4X1APP
- P10
- P2
- P1
- P1X1
- P3
- P33
- P37

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
0NHPP0151090
FD52 013 9440701U
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ITEM NUMBER: 10-376.00

- P2865
- P2866
- P1-2
- P2
- P12X12X1
- P12X12
- P12X12X2
- P4
- P5

The following poles will be placed by AT&T throughout the job:

- Four 55-2
- Six 50-2
- Five 45-4
- Two 50-4
- One 30-5
- Two 45-2
- Two 40-4
- One 30-4

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
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ITEM NUMBER: 10-376.00

THE FOLLOWING FACILITY OWNERS HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

City of Jackson – Water

The following underground facilities will be relocated/adjusted by the roadway contractor throughout the project during construction:

- 4,682 LF of 10” SDR17 PVC Waterline
- 1,730 LF of 6” SDR17 PVC Waterline
- 828 LF of 10” Ductile Iron Waterline with Nitrile Gaskets
- 470 LF of 12” HDPE DR9 I.P.S. Waterline, Horizontal Directional Drill (10”FM)
- 164 LF of 8” HDPE DR9 I.P.S. Waterline, Horizontal Directional Drill (6”FM)
- 212 LF of 14.00” Sch. 20 Steel Casing Pipe, Open Cut
- 361 LF of 10.75” Sch. 20 Steel Casing Pipe, Open Cut
- Five 3/4” Combination Air Release Valve Assemblies
- 10 Flushing Hydrant Assemblies
- 18 10” D.I.M.J. Gate Valve & Boxes
- Six 6” D.I.M.J. Gate Valve & Boxes
- 25 Waterline Markers

City of Jackson – Sewer

The following underground facilities will be relocated/adjusted by the roadway contractor throughout the project during construction:

- 1,084 LF of 12" SDR35 PVC Gravity Sanitary Sewer Pipe
- 1,968 LF of 8" SDR35 PVC Gravity Sanitary Sewer Pipe

UTILITIES AND RAIL CERTIFICATION NOTE

Breathitt County
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ITEM NUMBER: 10-376.00

- Four 4" Lateral Cleanout
- 628 LF of Horizontal Directional Drilling - 18" Steel Casing (For 12" Gravity)
- 2,182 LF of Horizontal Directional Drilling - 8" HDPE (For 6" FM including pipe)
- 450 LF of Horizontal Directional Drilling - 6" HDPE (For 4" FM including pipe)
- 716 LF of Horizontal Directional Drilling - 4" HDPE (For 3" FM including pipe)
- 422 LF of 12" Sch 20 Steel Casing Pipe, Open Cut (8" Gravity)
- 592 LF of 10.75" Sch 20 Steel Casing Pipe to be Open Cut (6" FM)
- 741 LF of 8.625" Sch 20 Steel Casing Pipe to be Open Cut (3" & 4" FM)
- 17 4' Diameter Concrete Manholes - Type B
- One 4' Diameter Concrete Drop Manhole - Type B
- 15 Standard Manhole Castings
- Three Watertight Manhole Castings
- Five Abandon/Remove Concrete Manhole
- Rehab Catholic Church Lift Station
- Rehab Citizens Bank Lift Station
- Rehab LBJ Lift Station
- New Wendy's Lift Station
- New Court Street Lift Station
- New Bus Barn Lift Station
- Remove Existing High School Lift Station
- 18 Sanitary Sewer Line Marker for Force Main
- 2,020 LF of 3" SDR21 PVC Force Main Sanitary Sewer Line
- 1,002 LF of 4” SDR21 PVC Force Main Sanitary Sewer Line

UTILITIES AND RAIL CERTIFICATION NOTE

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ITEM NUMBER: 10-376.00

- 5,960 LF of 6” SDR21 PVC Force Main Sanitary Sewer Line
- 10 Force Main Air Release Valves
- Four 3” Force Main Gate Valves and Boxes
- Two 4” Force Main Gate Valves and Boxes
- 12 6” Force Main Gate Valves and Boxes

Kentucky Frontier Gas – Natural Gas

The following underground facilities will be relocated/adjusted by the roadway contractor throughout the project during construction:

- 5,711 LF of 4” Gas Pipe Polyethylene/Plastic
- 949 LF of 2” Gas Pipe Polyethylene/Plastic
- 168 LF of 1” Gas Pipe Polyethylene/Plastic
- 1502 LF of 4” Gas HDD Pipe Polyethylene/Plastic
- Nine Gas Pipe Plug/Abandon
- 884 LF of 8" ID Sch 20 Steel Casing Pipe to be Open Cut
- 40 LF of 4" ID Sch 20 Steel Casing Pipe to be Open Cut
- 168 LF of 3" ID Sch 20 Steel Casing Pipe to be Open Cut
- 18 4” Gas Valves Polyethylene/Plastic
- Three 2” Gas Valves Polyethylene/Plastic
- 16 Gas Line Markers

RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

☒ **No Rail Involvement** ☐ **Rail Involved** ☐ **Rail Adjacent**

UTILITIES AND RAIL CERTIFICATION NOTE

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ITEM NUMBER: 10-376.00

AREA FACILITY OWNER CONTACT LIST

Facility Owner	Address	Contact Name	Phone	Email
American Electric Power - Electric	1400 E. Main St. Hazard KY 41701	Robert Pigman	8007566937	rgpigman@aep.com
AT&T - KY - Telephone	102 Walters Rd Pikeville KY 41501	Jack Salyer	6064249328	js2299@att.com
City of Jackson - Sewer	333 Broadway Jackson KY 41339	Laura Thomas	6066667069	laura.thomas@cityofjacksonky.org
City of Jackson - Water	333 Broadway Jackson KY 41339	Laura Thomas	6066667069	laura.thomas@cityofjacksonky.org
Crystal Broadband Networks - CATV	PO Box 580 Clay City KY 40312	Fareed Saghir	6066633439	fsaghir@crystalbn.com
Kentucky Frontier Gas, LLC - Natural Gas	2963 Route 321 N. Prestonsburg KY 41653	Mike Harris	6068862431	hpowers@kyfrontiergas.com
SLM Construction Inc. - CATV	520 Fox Ridge Drive Princeton TX 75407	Sharon Bennet	8172317383	sharonb@slmconstructioninc.com
Thacker-Grigsby Telephone Company, Inc. - Telephone	PO Box 789 Hindman KY 41822	Freddie Williams	6067859500	f.williams@tgtel.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.

Standard Gas Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

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.

G CAP EXISTING MAIN This item shall include the specified cap, labor, equipment, excavation, backfill, and restoration required to install a steel or polyethylene/plastic cap on an existing main, when the main is to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to cap new main installations or mains that are to be abandoned. Caps on new mains are to be considered incidental to the new main, as are other fittings on new mains, and are not to be paid under this item. All caps on existing mains shall be paid under this one bid item included in the contract, regardless of size or material. No separate bid items will be established for size or material 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.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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 and peripherals required to be installed within a bore pipe shall be paid separately under pipe items. Payment under this item shall be for all sizes of bores and not be size specific. No separate bid items will be established for bore size variations. The bore pipe sizes to be included under this item shall be those shown on the plans and/or in the specifications. This bid item shall also include the cost of pre and/or post directional bore 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. This item shall be paid LINEAR FEET (LF) when complete.

G ELECTRONIC ID MARKER This bid item is to pay for labor, equipment, computer programing, and installation of an electronic ID marker at the locations shown on the plans, or as directed by the engineer. The marker may be in the form of a ball, disk, cylinder, post, or other shape as required by specification and may be buried, at-grade, or above-grade, as specified. 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.

NOTE: This bid item is not for payment of standard non-electronic markers or monuments. A separate "Line Marker" bid item is established for this purpose.

G ENCASEMENT STEEL BORED This item shall include the steel encasement pipe size as specified on the plans and in the specifications, excavation, bore pit shoring in compliance with all federal, state, local, and utility owner requirements, casing spacers, end seals, vents, backfill, labor, and equipment to bore and install the encasement complete and ready-for-use in accordance with the plans and specifications. 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

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.

Note: Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.

G ENCASEMENT STEEL OPEN CUT This item shall include the steel encasement pipe size as specified on the plans and in the specifications, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, casing spacers, end seals, vents, backfill, labor, and equipment to open cut and install the encasement complete and ready-for-use in accordance with the plans and specifications. 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

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.

Note: Encasement sizes of 2 inches internal diameter or less shall not be paid separately; but, shall be considered incidental to the carrier pipe.

G FARM TAP AND REGULATOR This item is for the installation of gas service tap and regulator assembly on a gas transmission main. This item shall include excavation, labor, equipment, all tapping, piping, fittings, and regulator materials to install the farm tap and regulator assembly, complete and ready-for-use, in accordance with the plans, specifications, and standard drawings. Only one pay item has been established for Farm Tap and Regulator installations. Payment shall be made under this item regardless of farm tap service and regulator size. No separate pay items will be established for size 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.

G LINE MARKER This item is for payment for furnishing and installing a gas 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.

NOTE: This bid item is not for payment of "Electronic ID Markers". Electronic ID Markers are paid under a separate bid item.

G MAIN ABANDON This bid item is for payment of abandonment of gas mains that are to be left in place, as shown on plans and only when nitrogen purge is to be employed. If the main is to be left in place without nitrogen purge, no payment shall be made under this item. All work shall be done in accordance with the plans, specifications, and all pipeline safety regulations. This bid item is for all work to abandon and nitrogen purge gas main, regardless of size or length. 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 the entire project when complete.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

Any pipe requiring removal that does not require disposal as hazardous waste will be considered incidental to roadway excavation.

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. Payment under this item is to be made only when the pipe must be cut to accomplish the relocation. 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 specifications as those that exist or as specified in plans and specifications. This item includes replacement of tracing wire, pipe, fittings, labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, bedding, backfill, restoration, etc., required to complete the relocation of main at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. For steel pipe, this bid item shall include corrosion coating of the pipe as needed, replacement or relocation of all cathodic protection anodes, lead wire, test boxes or stations, and any accessories. 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. 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. 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.

G MAIN RELOCATE/LOWER IN-PLACE This item is intended for payment for horizontal and/or vertical relocation of an existing steel or polyethylene/plastic main at the locations shown on the plans, where the main has sufficient slack that it can be relocated without cutting the pipe. This bid item is to be used to relocate an existing gas main to clear a conflict at a proposed drainage structure, pipe, road subgrade, or any other similar relocation situation. This item includes replacement of tracing wire, labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, bedding, backfill, restoration, etc., required to complete the relocation of the main at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. For steel pipe, this bid item shall include corrosion recoating of the pipe as needed, replacement or relocation of all cathodic protection anodes, lead wire, test boxes or stations, and any accessories. This bid item shall include material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. Measurement of quantities under this item shall be from end to end of exposed pipe. Payment shall be made under this item regardless of pipe size to be relocated. No separate bid items are provided for varying pipe sizes. 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 LINEAR FEET

(LF) when complete.

G METER AND REGULATOR This bid item description shall be used for all meter and regulator bid items of every size, except those defined as "Special". These pay items are for all labor, equipment, and materials needed for the installation of a service meter and regulator assembly at the locations shown on the plans, or as directed by the engineer in accordance with specifications and standard drawings, complete and ready-for-use. Materials to be provided under this bid item shall include, but are not limited to: meter, regulator, piping, fittings, building anchoring brackets, and hardware needed to create and install the assembly. 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.

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 specifications), corrosion protective coatings of steel pipe and fittings, labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, bedding, restoration, pressure 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. For steel pipe, this bid item shall include all cathodic protection anodes, lead wire, test boxes or stations, and any accessories. No additional payment will be made for rock excavation. This bid item shall 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 valves (including horizontal measurements through above grade valves), 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 tees at branch mains, at tie-ins at the point where new pipe or fittings contacts existing pipe, 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. 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 LINEAR FEET (LF) when complete.

G PIPE HAZARDOUS WASTE DISPOSAL This bid item is to be paid only when there is abandoned gas pipe that must be removed and disposed of as hazardous waste due to either internal contamination and/or hazardous external coatings. This item shall include all labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, materials needed for removal and disposal of the pipe, and backfill. All work shall be performed by trained and certified personnel, in accordance with all environmental and pipeline laws and regulations. Any and all 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. Method of measurement shall be from end to end of each pipe section removed from the site. Any pipe removed that does not require disposal as hazardous waste shall not be paid under this item but shall be considered incidental to roadway construction. 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.

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, complete and ready-for- use. Only one pay item has been established for regulator station installations. Payment shall be made under this item

regardless of regulator station size. No separate pay items will be established for size 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.

NOTE: This item is to be used to pay for regulator stations to reduce the pressure of gas from a higher pressure main to feed a lower pressure main. This item is not to be used to pay for regulators used on individual customer service lines.

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 specifications), labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, 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. New service line installations shall be installed to the length required to accommodate the road work; but shall not extend beyond the road right-of-way, temporary roadway easement, or permanent gas easement line, whichever is greatest. Any service replacement found to be needed beyond project limits will need to be accomplished by the utility owner, in consultation with the property owner. Service line replacement beyond project limits is not to be performed as part of road contract work. 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. This item shall be 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 specifications), main tap, coupling for connecting the new piping to the surviving existing piping, labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, 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 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. New service line installations shall be installed to the length required to accommodate the road work; but not extend beyond the road right-of-way, temporary roadway easement, or permanent gas easement line, whichever is greatest.

Any service replacement found to be needed beyond project limits will need to be accomplished by the utility owner, in consultation with the property owner. Service line replacement beyond project limits is not to be performed as part of road contract work. 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. This item shall be 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 has sufficient slack, such that it 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, shoring in compliance with all federal, state, local, and utility owner requirements, 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.

G SERVICE TEST AND RELIGHT This work includes all labor, equipment, and materials for turning off and on a gas service line, testing the service for leaks, relighting pilots on customer appliances. This item also includes separating existing service facilities for testing, air testing, and re-connecting the meter set. All work is to be performed according to utility owner approved specifications and procedures. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

G TIE-IN This bid description shall be used for all polyethylene/plastic or steel gas main tie-in bid items of every size, except those that include a temporary bypass or are defined as "Special". This item includes all labor, equipment, excavation, shoring in compliance with all federal, state, local, and utility owner requirements, 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. No additional payment will be made for rock excavation. This bid item shall also include material and placement of flowable fill backfill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. 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.

When this bid item is used, no separate payment is to be made under GAS TIE-IN EXCAVATION AND BACKFILL, GAS TIE-IN PIPE PREPARATION, and GAS TIE-IN SHORING bid items since these efforts are incidental to the above G TIE-IN bid description.

G TIE-IN EXCAVATION AND BACKFILL This bid item is for payment for only the excavation and backfill services of utility owner performed tie-ins. This bid item is employed due to utility owner request for excavation, shoring, and backfill assistance. Shoring for tie-in excavation shall be considered incidental to this bid item. Shoring shall be provided to whatever extent required to be in compliance with all federal, state, local, and utility owner requirements to protect all workers including utility owner workers. The shoring shall be left in place until the tie-in is made by the utility owner regardless of how much time that may be. The contractor shall draw his own conclusions on how long the shoring may need to be left in place at each locaiton. No separate payment will be made for rock excavation. The excavation shall be made to the dimensions required by the utility owner regardless of the materials encountered. This bid item shall also include disposal of excavated material deemed to be unsuitable for

backfill, procurement of suitable backfill material as required by specification or on plans, compaction and restoration. Backfill materials to be provided by the contractor may consist of, but is not limited to, sand or flowable fill as may be required. Payment under this item shall be by volume of actual excavation measured in the field. 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 measured and paid by CUBIC YARD (CY) when complete.

Payment shall not be made under this item if the entirety of the tie-in is being performed by the contractor and is being paid under a G TIE-IN bid item contained in the contract. Excavation, and backfill for pipe tie-ins being made entirely by the contractor is considered incidental to G TIE-IN bid items contained in the contract.

G TIE-IN PIPE PREPARATION This bid item is for the gas contractor to make ready all polyethylene/plastic and/or steel tie-in fittings and piping short of cutting of the existing main. Separate bid items are provided for polyethylene/plastic mains and steel mains. No separate bid items are provided for size variations or on an individual location basis. Only separate bid items for two material type are provided. Payment is to be made under these items when the gas utility owner is to make the final cut-in of the existing main and tying of the new main to the existing main. One lump sum item is provided for the combined entirety of all polyethylene/plastic tie-in preparations on a project and one lump sum item is provided for the combined entirety of all steel tie-in preparations on a project. This item shall include fusing or welding of all pipe and fittings needed to make the tie-in location ready for completion by the utility owner. 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 the entirety of the project for each material type when complete.

Payment shall not be made under this item if the entirety of the tie-in is being performed by the contractor and is being paid under a G TIE-IN bid item contained in the contract. Tie-in pipe preparation for tie-ins being made entirely by the contractor is considered incidental to G TIE-IN bid items contained in the contract.

G TIE-IN W/BYPASS This bid description shall be used for all polyethylene/plastic or steel gas main tie-in bid items that include temporary bypass of every size, except those defined as "Special". This item includes all labor, equipment (including tapping, stopple, and/or squeeze equipment), excavation, shoring in compliance with all federal, state, local, and utility owner requirements, permanent and temporary fittings (including, but not limited to: tees, split tees, bends, reducers, plugs, caps, and couplings), temporary bypass piping, restoration, testing, and backfill required to make the gas main tie-in with temporary bypass as shown on the plans, and in accordance with the specifications, complete and ready-for-use. Mainline pipe for tie-ins shall be paid under separate bid items. This bid item shall also include material and placement of flowable fill backfill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. 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.

The tie-in size reflected in the bid item reflects the nominal internal diameter size of the existing main gas line being tied-in, not the bypass pipe size.

G VALVE This description shall apply to all buried 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. This item shall be paid EACH (EA) when complete.

G VALVE ABOVE GRADE This description shall apply to all above grade valve assemblies 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 above grade gas valves being installed with new main. This item includes the above grade valve, pipe, and fittings as specified in the plans, specifications, and standard drawings. This bid items shall also include protective coating and corrosion protection, labor, equipment, excavation, backfill, restoration, testing, etc., required to install the specified above grade 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. This item shall be paid EACH (EA) when complete.

G VALVE BOX ADJUST This item 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. This item shall be paid EACH (EA) when complete.

G VALVE BOX REMOVE This item includes all labor, equipment, restoration materials, disposal and any other effort for removal of a valve box, leaving the valve in place. 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.

G VALVE REMOVE This item includes all labor, equipment, and restoration materials for cutting of existing pipe and any other effort necessary for total removal of an existing valve and valve box. This bid item shall include disposal of the valve and box, unless plans or specifications state the valve and box are to be salvaged and delivered to the utility owner for reuse. No separate pay items are to be established for size variations. All valve removals, regardless of size, shall be paid under this one pay 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.

If plugging of existing abandoned mains is needed after valve removal, the work shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

G WELD X-RAY INSPECTION This description shall apply to all radiographic x-ray inspections of steel pipe joints of every size, within the pipe size ranges given in the bid item text. This bid includes all labor, equipment, and materials to assess the acceptability of the weld in order to comply with specifications, industry and regulatory standards. 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) for each pipe joint inspected.

Standard Water Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

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. 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 is 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 on an existing main to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to cap new main installations or mains that are to be abandoned. This pay item is only to be paid to cap existing mains to be left in service. Caps on new mains are to be considered incidental to the new main, as are other fittings, and are not to be paid under this item. All caps on existing mains shall be paid under this 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.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W CATHODIC PROTECTION This item is for providing and installing all cathodic protection materials to iron pipe and fittings, as specified in plans and specifications, complete and ready-for-use. Materials to be supplied and installed by the contractor shall include, but are not limited to, anodes, wire, fusion kits, test stations, and/or marker posts. All cathodic protection required for the entire project shall be paid under this one 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 LUMP SUM (LS) when complete.

W DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized to minimize the impact of open-cut for the installation of water 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. 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 This item shall include all labor, equipment, excavation, concrete, reinforcing steel, backfill, restoration, 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 encasements 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 This item 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 This item 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 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 to reinstall 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 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 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, as 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. 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 LINE STOP SIZE 1 OR 2 This item shall include the line stop saddle/sleeve, valve, completion plug and any other material, labor, and equipment necessary to complete the line stop as indicated in the plans and/or specifications. This installation shall allow the waterline system to operate as usual without any interruption of service. The size shall be the measured internal diameter of the live pipe to be tapped. The line stop size 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 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 location 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 specifications 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 in diameter or less as specified on the plans. This item shall include all labor, equipment, meter, meter box, casting, yoke, and any other associated materials 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, 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, etc., to relocate the existing water meter (whatever size exists), meter yoke, meter box, casting, 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 the short side or long side service bid item. 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 in diameter 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 large 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 in diameter or less,

as specified on the plans. This item shall include all labor, equipment, meter, PRV, meter box, casting, yoke, and any other associated materials 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 item shall apply to all pipe of every size and type material 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 specifications), polyethylene wrap (when specified), labor, equipment, excavation, bedding, backfill, restoration, testing, sanitizing, 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, as well as 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. When owner specifications require, this bid item shall include contractor preparation of as-built drawings to be provided to the engineer and/or utility owner at the end of construction. 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 mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the plug on an existing main to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to plug new main installations or mains that are to be abandoned. This pay item is only to be paid to plug existing mains that are to be left in service. Plugs on new mains are to be considered incidental to the new main, as are other fittings, and are not to be paid under this item. All plugs on existing mains left in service shall be paid under this 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.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W PRESSURE REDUCING VALVE This item 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, 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 the 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 item 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), 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 plans or specifications), 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 item 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 plans or specifications), 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 where 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. 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. 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 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 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, etc. Payment under this item 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 complete restoration. 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, etc. Payment under this item 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 complete restoration. 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 item 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.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W VALVE This item 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 specifications), labor, equipment, excavation, anchoring (if any), valve box and valve stem extensions, backfill, concrete pad around valve box (if required by specifications), restoration, testing, disinfection, 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 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 are 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 This item include 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. This item shall be paid EACH (EA) when complete.

W VALVE BOX REMOVE This item is in payment for all labor, equipment, restoration materials, disposal, and any other effort for removal of a valve box, leaving the valve in place. 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 item 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 REMOVE This item is in payment for all labor, equipment, and restoration materials for cutting of existing pipe and any other effort necessary for total removal of an existing valve and valve box. This bid item shall include disposal of the valve and box, unless plans or specifications state the valve and box are to be salvaged and delivered to the utility owner for reuse. No separate pay items are to be established for size variations. All valve removals, regardless of size, shall be paid under this one pay 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.
If plugging of existing abandoned mains is needed after valve removal, the work shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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 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 EACH (EA) when complete.

Standard Sanitary Sewer Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

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 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 INVESTIGATION This item shall include all equipment, materials, labor, and incidentals necessary to enter the sewer, in compliance with all safety/confided space requirements to 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 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, 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 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, 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 This item includes all labor, equipment, excavation, concrete, reinforcing steel, backfill, restoration, 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 encasements 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 item description shall apply to all PVC, 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 stations (if required by specifications), polyethylene wrap (when specified), 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 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 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, 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 location shown on the plans. This bid item is to be used when the existing pipe material is to be reused when relocating 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. 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 specifications 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 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 item 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.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

S FORCE MAIN VALVE This item 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, 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 This item 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 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 LAMPHOLE Payment under this item is for the installation of a lamphole along or at the end of a gravity sewer pipe for inspection and cleaning of a sewer pipe. Lampholes shall include, but are not limited

to bends, tees, vertical pipe, casting, any other materials specified, excavation, backfilling, air testing, restoration, and cleanup in accordance with the plans, specifications, and standard drawings, complete and ready-for-use. Payment shall be made under this bid item regardless of lamphole size. No separate pay items will be established for size variations. All materials shall be new and unused. No additional compensation will be paid for lamphole height variations. All vertical pipe required to construct the lamphole, regardless of height, shall be considered incidental to this item. No additional payment will be made for rock excavation. Cleanouts on pipes 6 inches or less are not considered lampholes and are not to be paid under this item. Only lampholes on pipes 8 inches or larger are to be paid under this item. Cleanouts on pipes 6 inches or less are to be paid under pay item S LATERAL CLEANOUT. 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 variations. Payment under this item is for cleanouts on pipe of 6 inches or less. Cleanouts on pipes of 8 inches or greater are considered lampholes and shall be paid under the S LAMPHOLE 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.

S LATERAL LOCATE This item description 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 all methods and efforts required to locate the lateral for tie-in or relocation of the lateral. Locating methods to be included under this item 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 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 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 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. Placement of a service lateral across a private residential or commercial entrance along 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. 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 at the contract unit price, 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 when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting shall be paid as a separate bid item. Anchoring of a 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. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. 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 full or partial removal, disposal, and/or filling of any sanitary sewer manhole, regardless of size or depth, that no longer serves any purpose. All manholes partially removed shall be removed to a point at least 12 inches below final grade, 12 inches below roadway subgrade, or 12 inches clear of any other underground infrastructure, whichever is lowest. If partial removal of an abandoned manhole is elected, the remaining manhole structure shall be filled with flowable fill. Flowable fill shall be considered incidental to this bid item. Plugging of pipes entering and exiting within an abandoned manhole that is left in place partially or in whole shall be considered incidental to this item. All sanitary sewer castings shall be salvaged and securely stockpiled for reuse on new sanitary sewer manholes. Salvage of manhole castings for reuse on the project shall be considered incidental to this

bid item. Any casting that is not needed for reuse, is not reusable, or is directed by the engineer not to be reused shall be disposed of by the contractor. 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.

Plugging or safeloading of pipes required at locations outside of manholes when manholes are removed in total shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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 item is for the furnishing of a new, standard, traffic-bearing casting for sanitary manholes that meets 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 item is for the furnishing of a new, watertight, traffic-bearing casting for sanitary manholes that meets 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 OVERSIZED Payment under this item is for the installation of a new manhole greater than the standard 4-foot interior diameter. Payment for oversized manholes will be made at the contract unit price 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 when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting 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. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. 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 RECONSTRUCT INVERT This item is to pay for all labor, equipment, and material for

the rework of an existing 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 specifications, standard drawings, or plans. 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 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 item is to pay for all labor, equipment, and material for coring one opening in an existing manhole base and one opening in a manhole wall for cleanout, addition of rubber seals 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. This 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, standard drawings, 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, 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 salvaged 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 a new 4-foot interior

diameter sanitary sewer manhole with corrosion-resistant lining. Payment for manholes with lining will be made at the contract unit price, 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. 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 made 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 item description shall apply to all gravity and force-main sewer pipe bid items, of every size and type of material 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, backfill, restoration, pressure or vacuum testing, temporary testing materials, video inspection, 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 lampholes. 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 structures 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 item 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 complete restoration. 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.

Manhole abandonment shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

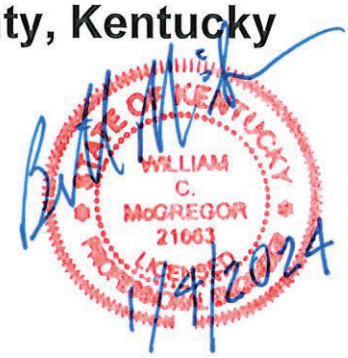
S STRUCTURE REMOVAL This item is to be used to pay for removal of larger above or below ground sewer structures, such as air release/vacuum valve vaults, pump stations, tanks, etc. Payment under this item shall not be limited to size or scope; however, structures with connecting pipes of 2 inches or 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 structures, 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 complete restoration. 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.

Manhole removal shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

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

Technical Specifications

City of Jackson
KY15 Widening (Item No. 10-376.00)
Utility Relocation
Breathitt County, Kentucky



August 2023

TABLE OF CONTENTS
KYTC STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (CURRENT EDITION) IS TO BE USED

ADDITIONAL TECHNICAL SPECIFICATIONS

DIVISION 1

GENERAL REQUIREMENTS

DIVISION 2

SITE WORK

SITE WORK (cont.)

DIVISION 5

METALS

DIVISION 9

FINISHES

DIVISION 11

EQUIPMENT

EQUIPMENT (cont.)

DIVISION 15

MECHANICAL

DIVISION 16

ELECTRICAL

GAS SPECIFICATIONS PACKAGE

GAS MAIN

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 1

GENERAL REQUIREMENTS

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 SCOPE OF WORK COVERED BY THE CONTRACT

A. These SPECIFICATIONS and the accompanying DRAWINGS describe the WORK to be done and the materials to be furnished for construction of the KY 15 Utility Relocation Project for the Kentucky Transportation Cabinet (KYTC) and the City of Jackson, KY.

B. The proposed WORK is located primarily along KY 15 and Washington Ave. in Breathitt County, KY, as shown on the drawings.

C. Base Bid Contract WORK includes but is not limited to:

1. Approximately 6,859 LF of 6, 8 and 10-inch PVC water mains including 1,046 LF of Horizontal Directional Drill.

2. Approximately 933 LF of 6 and 10-inch Ductile Iron water main with Nitrile Gaskets.

3. Approximately 2,162 LF of Sewer Force Main including 2,162 LF of Horizontal Directional Drill.

4. Approximately 3,621 LF of 8-inch to 12-inch Gravity Sewer Lines.

5. Approximately 21 of 4-foot diameter concrete manholes including 1 drop manhole.

6. Installation of 3 new solid handling lift stations, upgrade of 1 existing lift station, rehabilitation of 1 lift station and the decommission of an existing lift station.

7. Approximately 8,432 LF of 2 and 4-inch PE gas mains including 2,121 LF of Horizontal Directional Drill.

8. Various Pressure Water, Sewer and Gas System Appurtenances.

1.02 RELATED REQUIREMENTS

A. Refer to the CONTRACT AGREEMENT for a listing of the CONTRACT DOCUMENTS.

B. Refer to Section 00700, paragraph 25 for coordination with other contractors.

1.03 WORK SEQUENCE

A. This project includes WORK that must be properly sequenced and collection system and all other utilities. Sequencing information in this Section is intended to identify constraints with respect to maintenance of existing service, and to assist the CONTRACTOR in planning the WORK. This information does not relieve the CONTRACTOR from his responsibility to complete the WORK on time.

B. All existing sewer, water and gas services must remain active during construction and residential and commercial traffic flow shall be maintained during construction.

Existing septic systems serve the area now and will remain in service until final hook-up to the completed collection system. The contractor is responsible for all existing laterals to be hooked into new gravity sewers. Construction of new lateral lines on private property will be the responsibility of the property owner.

C. The CONTRACTOR shall plan, schedule and accomplish the WORK of this Contract to avoid interruption of system service. Should any such interruptions become necessary, the CONTRACTOR shall notify the OWNER and ENGINEER in writing of such need as far ahead of the interruption as possible, but in no case less than one (1) week. The CONTRACTOR must state in his notification of need to interrupt the existing system at least the following:

1. Construction sequence to minimize the interruption time and propose a time-of-day that WORK would be accomplished.

2. Expected length of time of the interruption.

3. Alternate procedures in the event the expected time is exceeded.

4. List of all equipment and material that must be on hand to complete the WORK.

D. The ENGINEER shall review the CONTRACTOR'S written notification, and the ENGINEER and OWNER must concur that the proposed interruption is acceptable prior to commencement of the interruption

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

END OF SECTION

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. construction schedule
2. schedule of submittals
3. SHOP DRAWINGS, product data, samples
4. construction photographs
5. inspection videotape recordings.

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 ensure the timely processing of pay requests. Detailed submittal requirements will be specified in the technical SPECIFICATIONS sections.

1.02 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 updated 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.

1.03 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.

1.04 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 the 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 of 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.

1.05 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: One (1) electronic copy in PDF format.

2. Operation and Maintenance Instructions: One (1) electronic copy in PDF format.

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 and an index of all items in the submittal.

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.

1.06 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.

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 digital color snapshots taken with a standard camera or cell phone. 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.

2. The CONTRACTOR, before final payment is made, shall deliver one (1) set of photographic digital files to the OWNER one (1) set of digital files to the ENGINEER each on a separate CD or Thumb Drive. Both sets of files shall be arranged in a subdirectory structure of a photo album(s) and labeled as outlined above.

3. No pay item has been set up for the photographs. The CONTRACTOR shall allow for a minimum of 300 - color photographs (taken and arranged as outlined above) in his BID.

1.08 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.

1.09 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.

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 the 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 the 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 utility lines 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 utility 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.

C. Temporary fences shall be provided at no extra cost to the OWNER wherever necessary to keep livestock or pets away from the construction area. All fences disturbed for construction purposes shall be temporarily replaced in a timely fashion and maintained daily throughout the project.

D. 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.

1.05 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

Not 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, mud and debris removal 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 and pets 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. Any permanent damage or removal not specified in the plans to trees or shrubbery shall be the responsibility of the CONTRACTOR at no additional cost to the OWNER.

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 01510

SURFACE WATER POLLUTION PREVENTION PLAN

PART 1 GENERAL

1.01 EROSION CONTROL MEASURES

All disturbed areas require erosion control. Erosion control shall consist of both natural and manmade barriers to the transport of sediment from the project area to surrounding areas not disturbed under this project.

This specification focuses on the requirement to avoid introduction of sediment into streams and other natural and manmade waterways and conveyances. A second focus is to prevent the deposition of sediment onto traffic surfaces.

A sediment pond is required to be constructed and completed prior to disturbance of the project area. All storm water run-offs from the project area will be routed to the sediment pond, where practical. Any areas not practical to route to the sediment pond shall be protected by the construction of silt fences between the disturbed area and the receiving stream. Silt fence placement shall be approved by the OWNER or his representative. Prior to beginning construction of the sediment pond, a silt fence will be constructed downstream from the downstream toe of the sediment pond to prevent silt from the construction of the embankment entering the stream.

Run-on diversion ditches will be constructed and lined as required in the PLANS and SPECIFICATIONS around the project area to intercept surface run-off from adjacent areas and prevent this run-off from impacting the project area. Run-on ditches will be constructed in the locations and to the dimensions shown on the PLANS. Surface water from adjacent areas shall not be routed to the sediment pond, but rather routed around the sediment pond area.

PART 2 BEST MANAGEMENT PRACTICES

1.01 TEMPORARY BMP'S FOR

On-site storage tanks – On site storage tanks shall have a containment structure constructed around the tank. The containment structure shall be impervious to the substance stored in the tank and shall have a volume equal to 1.5 times the volume of the storage tank. Provisions shall be made to evacuate any water accumulation inside the containment structure to prevent loss of containment volume.

Stockpile areas – Stockpile areas shall have a silt fence constructed at the lower portion of the stockpile area to trap any sediment generated from the stockpile area.

Parking areas – Parking areas shall have a silt fence constructed at the lower perimeter of the parking area to trap any sediment generated from

the parking area. Additionally, should the parking area be adjacent to a paved public road, a gravel pad shall be constructed at the entrance from the public road to the parking area to prevent tracking of sediment onto the paved public road.

Equipment maintenance areas – Equipment maintenance areas shall have a silt fence constructed along the lower perimeter of the maintenance area to trap any sediment generated from the maintenance area.

Excavation areas – Excavation areas shall have a silt fence constructed at the lower perimeter of the excavation area to trap any sediment generated from the excavation area.

All temporary BMP's shall be maintained in accordance with the operations and maintenance plan until such time as permanent BMP's are constructed and completed, or until such time as the controlled area has been regraded, mulched, seeded and vegetation has been restored to the area.

1.02 PERMANENT BMP'S

Permanent BMP's shall consist of diversion ditches, sediment control structures, vegetation restoration and leachate containment lagoon.

1.03 OPERATIONS AND MAINTENANCE PLAN

The CONTRACTOR shall implement the following Best Management Practices (**BMP**) and shall maintain these BMP's until no longer needed or the completion of the project. The CONTRACTOR shall not remove any BMP without the agreement of the OWNER or his representative.

The CONTRACTOR shall have the sole responsibility for compliance with the requirements of the Storm Water Pollution Prevention Plan (**SWPPP**) as described in these BID DOCUMENTS and shall be required to have a full and complete understanding of the SWPPP and the required BMP's contained in the SWPPP. It shall also be the responsibility of the CONTRACTOR to submit to the Kentucky Division of Water a completed Notice of Intent (**NOI**) prior to beginning work on this project and to submit a completed Notice of Termination (**NOT**) to the Kentucky Division of Water at the completion of this project.

Copies of the above forms are contained in this SECTION.

The required BMP's, the locations to be used, inspection frequency, and approved maintenance actions are shown in the following table.

Location	BMP	Inspection Frequency	Maintenance Action
On-site Storage Tanks	Containment Structure	1. Daily 2. After rain event	Remove captured water, check for leakage
Stockpile Areas	Silt Fence	1. Weekly 2. After rain event 3. Prior to forecast storm	Clean out surplus silt, repair fence as needed
Parking Areas	Silt Fence Gravel Entrance Pad	1. Weekly 2. After rain event	Clean out surplus silt, repair fence as needed. Add gravel to pad as needed
Equipment maintenance areas	Silt Fence	1. Weekly 2. After rain event	Remove surplus silt, repair fence as needed.
Excavation Areas	Silt Fence	1. Weekly 2. After rain event 3. Prior to forecast storm	Remove surplus silt, repair fence as needed
Project Perimeter	Diversion Ditch	1. Weekly 2. After rain event	Remove accumulated sediment, install erosion protection after completion
Leachate Collection System Termination	Leachate Lagoon	1. Daily 2. After rain event 3. Prior to forecast storm	Remove any observed obstructions, check for electrical supply presence
Sediment Pond	Sediment Pond	1. Weekly 2. After rain event 3. Prior to forecast storm	Remove any observed obstructions in spillway systems, remove any surplus sediment accumulation
Landfill Cap	Vegetation	1. Weekly 2. After rain event	Establish vegetation as quickly as possible. Repair any rills or gullies four (4) inches or greater in depth.

1.04 CONTINUING EDUCATION

All personnel actively involved in this project, whether associated with the Design A/E or the General Contractor, shall be notified of this SWPPP and shall be given the opportunity to review the S.O.P. prepared by the DOE for SWPPP's.

The General Contractor (CONTRACTOR), before beginning work, shall formally review the SWPPP with his site management staff, including the site superintendent, key foremen, safety officers, designated workmen, etc., as well as with any subsequent replacements. Failure to understand the details of the SWPPP will not be accepted as an excuse for violations.

1.05 OPERATION AND MAINTENANCE GUIDELINES

The CONTRACTOR's jobsite superintendent and project manager shall familiarize themselves with the SWPPP and the requirements of the SOP developed by the DOE.

The CONTRACTOR shall assemble a Maintenance Logbook to be kept on site and accessible by DOW, Project A/E, DOE, etc. Logbook shall include the following:

a. Copy of the NOI
b. Copy of the General Permit
c. Copy of the SWPPP (may be kept separate if sheet size dictates)
d. Maintenance Log Sheets

The CONTRACTOR shall inspect all BMP's on the project at intervals as stipulated on the SWPPP or in the Log Book.

The Contractor shall promptly repair, clean out, replace, or otherwise perform required maintenance of every BMP at stipulated intervals or after a significant rain event. The CONTRACTOR shall make a formal notification to the A/E of any BMP's that do not appear to be functioning properly or that may need review.

END OF SECTION

KPDES FORM NOI-SW

Kentucky Pollutant Discharge Elimination System (KPDES)

Notice of Intent (NOI)
for Storm Water Discharges
Associated with Industrial Activity Under the KPDES General Permit

Submission of this Notice of Intent constitutes notice that the party identified in Section I of this form intends to be authorized by a KPDES permit issued for storm water discharges associated with industrial activity. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM (See Instructions on back)

I. Facility Operator Information

Name:		**Phone:**	
Address:		**Status of Owner/Operator:**	
City, State, Zip Code:			

II. Facility/Site Location Information

Name:			
Address:			
City, State, Zip Code:			
County:			
Site Latitude: (degrees/minutes/seconds)		**Site Longitude: (degrees/minutes/seconds)**	

III. Site Activity Information

MS4 Operator Name:							
Receiving Water Body:							
Are there existing quantitative data?	**Yes** ☐ **If Yes, submit with this form.** **No** ☐						
SIC or Designated Activity Code Primary		**2nd**		**3rd**		**4th**	
If this facility is a member of a Group Application, enter Group Application Number:							
If you have other existing KPDES Permits, enter Permit Numbers:							

IV. Additional Information Required FOR CONSTRUCTION ACTIVITIES ONLY

Project Start Date:		**Completion Date:**	
Estimated Area to be disturbed (in acres):			
Is the Storm Water Pollution Prevention Plan in Compliance with State and/or Local Sediment and Erosion Plans?	**Yes** ☐ **No** ☐		

V. 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, 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.

Printed or Typed Name:			
Signature:		**Date:**	

Revised June 1999

Kentucky Pollutant Discharge Elimination System (KPDES)
Instructions
Notice of Intent (NOI) for Storm Water Discharges Associated with Industrial Activity
To Be Covered Under The KPDES General Permit

WHO MUST FILE A NOTICE OF INTENT (NOI) FORM
Federal law at 40 CFR Part 122 prohibits point source discharges of stormwater associated with industrial activity to a water body of the Commonwealth of Kentucky without a Kentucky Pollutant Discharge Elimination System (KPDES) permit. The operator of an industrial activity that has such a storm water discharge must submit a NOI to obtain coverage under the KPDES Storm Water General Permit. If you have questions about whether you need a permit under the KPDES Storm Water program, or if you need information as to whether a particular program is administered by the state agency, call the **Storm Water Contact, Industrial Section, Kentucky Division of Water at (502) 564-3410.**

WHERE TO FILE NOI FORM
NOIs must be sent to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601

COMPLETING THE FORM
Type or print legibly in the appropriate areas only. If you have any questions regarding the completion of this form call the **Storm Water Contact, Industrial Section, at (502) 564-3410.**

SECTION I - FACILITY OPERATOR INFORMATION
Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same as the name of the facility. The responsible party is the legal entity that controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Enter the appropriate letter to indicate the legal status of the operator of the facility.

F = Federal	M = Public (other than federal or state)
S = State	P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION
Enter the facility's or site's official or legal name and complete street address, including city, state, and ZIP code.

SECTION III - SITE ACTIVITY INFORMATION
If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, borough, county, parish, district, association, or other public body which is designed or used for collecting or conveying storm water.)

If the facility discharges storm water directly to receiving water(s), enter the name of the receiving water.

Indicate whether or not the owner or operator of the facility has existing quantitative data that represent the characteristics and concentration of pollutants in storm water discharges. If data is available submit with this form.

List, in descending order of significance, up to four 4-digit standard industrial classification (SIC) codes that best describe the principal products or services provided at the facility or site identified in Section II of this application.

If the facility listed in Section II has participated in Part 1 of an approved storm water group application and a group number has been assigned, enter the group application number in the space provided.

If there are other KPDES permits presently issued for the facility or site listed in Section II, list the permit numbers.

SECTION IV - ADDITIONAL INFORMATION REQUIRED FOR CONSTRUCTION ACTIVITIES ONLY
Construction activities must complete Section IV in addition of Sections I through III. Only construction activities need to complete Section IV.

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

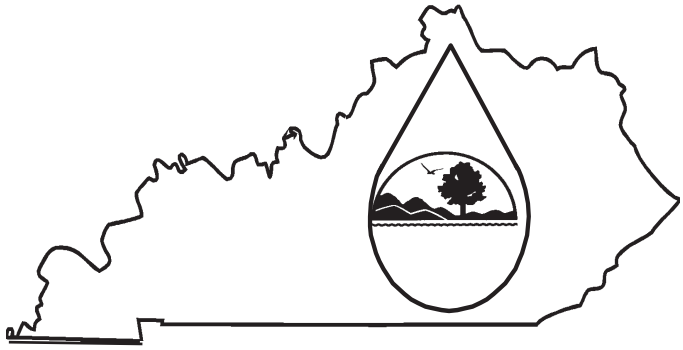
SECTION V - CERTIFICATION
Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer,which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authroity to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

KPDES FORM NOT-SW



Kentucky Pollutant Discharge Elimination System (KPDES)

NOTICE OF TERMINATION (NOT)
of Coverage Under the KPDES General Permit for Storm Water Discharges Associated with Industrial Activity

Submission of this Notice of Termination constitutes notice that the party identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the KPDES program.

ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.
(Please see instructions on back before completing this form.)

I. PERMIT INFORMATION
KPDES Storm Water General Permit Number:
Check here if you are no longer the Operator of the Facility: ☐
Check here if the Storm Water Discharge is Being Terminated: ☐
II. FACILITY OPERATOR INFORMATION
Name:
Address:
City/State/Zip Code:
Telephone Number:
III. FACILITY/SITE LOCATION INFORMATION
Name:
Address:
City/State/Zip Code:

Certification: I certify under penalty of law that all storm water discharges associated with industrial activity from the identified facility that are authorized by a KPDES general permit have been eliminated or that I am no longer the operator of the facility or construction site. I understand that by submitting this Notice of Termination, I am no longer authorized to discharge storm water associated with industrial activity under this general permit, and that discharging pollutants in storm water associated with industrial activity of waters of the Commonwealth is unlawful under the Clean Water Act and Kentucky Regulations where the discharge is not authorized by a KPDES permit. I also understand that the submittal of this Notice of Termination does not release an operator from liability for any violations of this permit or the Kentucky Revised Statutes.

NAME (Print or Type)	TITLE
SIGNATURE	DATE

INSTRUCTIONS
NOTICE OF TERMINATION (NOT) OF COVERAGE UNDER THE KPDES GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH INDUSTRIAL ACTIVITY

Who May File a Notice of Termination (NOT) Form
Permittees who are presently covered under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Storm Water Discharges Associated with Industrial Activity may submit a Notice of Termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at 40 CFR 122.26 (b)(14), or when they are no longer the operator of the facilities.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with industrial activity from the construction site that are authorized by a KPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles have been employed.

Where to File NOT Form
Send this form to the following address:

Section Supervisor
Inventory & Data Management Section
KPDES Branch, Division of Water
14 Reilly Road, Frankfort Office Park
Frankfort, KY 40601

Completing the Form
Type or print legibly in the appropriate areas and according to the instructions given for each section. If you have questions about this form, call the Storm Water Contact, Industrial Section, at (502) 564-3410.

Section I - Permit Information
Enter the existing KPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, **call the Storm Water Contact, Industrial Section at (502) 564-3410.**

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II - Facility Operator Information
Give the legal name of the person, firm, public organization, or any other entity that operates the facility or site described in this application. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation, rather than the plant or site manager. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information
Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code. If the facility lacks a street address, indicate the state, the latitude and longitude of the facility to the nearest 15 seconds, or the quater, section, township, and range (to the nearest quarter section) of the approximate center of the site.

Section IV - Certification
Federal statutes provide for severe penalties for submitting false information on this application form. Federal regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, State, Federal, or other public facility: by either a principal executive

SECTION 01570

PROTECTION OF ENVIRONMENT

PART I GENERAL

1.01 SUMMARY

A. CONTRACTOR, in executing Work, shall maintain Work areas on- and off-site free from environmental pollution that would be in violation of federal, state or local regulations.

B. Submit Stormwater Discharge Plan in accordance with Section 01300.

1.02 PROTECTION OF STORM SEWERS

A. Prevent construction material, pavement, concrete, earth or other debris from entering existing storm sewer or sewer structure.

1.03 PROTECTION OF WATERWAYS

A. Observe rules and regulations of State of Kentucky and agencies of U.S. government prohibiting pollution of lakes, streams, rivers or wetlands by dumping of refuse, rubbish, dredge material or debris.

1. Permits obtained by OWNER are on file with OWNER.

2. Other permits shall be obtained by CONTRACTOR at CONTRACTOR'S cost.

B. Provide holding ponds or approved method which will divert flows, including storm flows and flows created by construction activity, to prevent excessive silting of waterways or flooding damage to property.

C. Comply with procedures outlined in U.S. EPA manuals entitled, "Guidelines for Erosion and Sedimentation Control Planning and Implementation," Manual EPA-72-015 and "Processes, Procedures, and Methods to Control Pollution Resulting from All Construction Activity," Manual EPA 43019-73-007.

1.04 STORMWATER DISCHARGE AND EROSION CONTROL

A. CONTRACTOR shall, if required by State regulation, prepare a Stormwater and erosion control plan which shall be submitted to Kentucky Department for Environmental Protection, Division of Water (DOW), and the ENGINEER. Stormwater control and erosion control methods to be used are to be coordinated with the means, methods and procedures which the CONTRACTOR will use on the project and

according to specific site criteria. The CONTRACTOR alone has the ability to determine which methods of control are appropriate to use and will not conflict with his operations. As such the CONTRACTOR alone shall prepare the plan and implement the plan in accordance with the best control technologies available. It is anticipated that silt fencing, ditch checks on steep slopes, culvert and inlet protections with silt fence or hay bales, and temporary seeding in areas not completed will all be required.

B. CONTRACTOR shall, if required, comply with Kentucky DOW, KPDES Storm Water permit for construction site activities. The CONTRACTOR is required to prepare the permit application, submit application and documentation as required by Kentucky DOW, revisions requested by regulatory agencies or the OWNER, and comply with following.

1. Notice of Intent (NOI).

2. Storm Water Pollution Plan.

3. Erosion Control Plan: Temporary and Permanent Measures

1.05 DISPOSAL OF EXCESS EXCAVATED AND OTHER WASTE MATERIALS

A. Excess excavated material not required or not suitable for backfill and other waste material shall be disposed of in accordance with local regulatory requirements.

B. Provide watertight conveyance for liquid, semi-liquid or saturated solids which tend to bleed during transport. Liquid loss from transported materials is not permitted, whether being delivered to construction site or hauled away for disposal. Fluid materials hauled for disposal must be specifically acceptable at selected disposal site.

1.06 PROTECTION OF AIR QUALITY

A. Minimize air pollution by requiring use of properly operating combustion emission control devices on construction vehicles and equipment and encourage shutdown of motorized equipment not in use.

B. Do not burn trash on construction site.

C. If temporary heating devices are necessary for protection of Work, they shall not cause air pollution.

1.07 THAWING OF FROZEN GROUND

A. Obtain permit from appropriate local authority before building fire to thaw frozen ground and comply with conditions of permit.

B. Use fuel which does not create air pollution or inconvenience public.

C. ENGINEER reserves right to prohibit fires for thawing whenever deemed undesirable.

1.08 USE OF CHEMICALS

A. Chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant or of other classification, shall be approved by U.S. EPA or U.S. Department of Agriculture or any other applicable regulatory agency.

B. Use and disposal of chemicals and residues shall comply manufacturer's instructions.

1.09 NOISE CONTROL

A. Conduct operations to cause least annoyance to residents in vicinity of Work and comply with applicable local ordinances.

B. Equip compressors, hoists, and other apparatus with mechanical devices necessary to minimize noise and dust. Equip compressors with silencers on intake lines.

C. Equip gasoline or oil-operated equipment with silencers or mufflers on intake and exhaust lines.

D. Line storage bins and hoppers with material that will deaden sounds.

E. Conduct operation of dumping rock and of carrying rock away in trucks so as to cause minimum of noise and dust.

F. Route vehicles carrying rock, concrete or other material over such streets as will cause least annoyance to public and do not operate on public streets between hours of 6:00 p.m. and 7:00 a.m., or on Saturdays, Sundays or legal holidays unless approved by OWNER.

1.10 DUST CONTROL

A. Due to close geographic location of Project to other off-site facilities take special care in providing and maintaining temporary site roadways, OWNER'S existing roads, and public roads used during construction operations in clean, dust free condition.

B. Comply with local environmental regulations for dust control. If CONTRACTOR'S dust control measures are considered inadequate by ENGINEER, ENGINEER may require CONTRACTOR to take additional dust control measures.

1.11 FUELS AND LUBRICANTS

A. Comply with local, state and federal regulations concerning transportation and storage of fuels and lubricants.

B. Fuel storage area and fuel equipment shall be approved by OWNER prior to installation. Submit containment provisions to OWNER for approval.

C. Report spills or leaks from fueling equipment or construction equipment to OWNER and cleanup as required.

D. OWNER may require CONTRACTOR to remove damaged or leaking equipment from Project site.

1.12 PILE AND SHEATHING DRIVING NOISE

A. If piles are required, use only pile-driver hammers with mufflers capable of significantly reducing noise and use barriers or shielding techniques as necessary to comply with applicable federal, state, and local ordinances.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

(Not Used)

END OF SECTION

SECTION 01785

OPERATION AND MAINTENANCE (O&M) DATA

PART I GENERAL

1.01 SUMMARY

A. Compile data and related information in manuals appropriate for OWNER'S operation and maintenance (O&M) of each item of equipment identified in other Specification sections.

1.02 QUALITY ASSURANCE

Preparation of data shall be performed by personnel:

A. Trained and experienced in O&M of described equipment.

B. Familiar with requirements of this section.

C. Skilled as technical writer to extent required to communicate essential data.

D. Skilled as drafter competent to prepare required drawings.

1.03 FORM OF MANUALS

A. Components:

1. Size: 8-1/2 in. by 11 in., or 11 in. by 17 in. folded, with standard 3-hole punching.

2. Paper: 20-lb minimum, white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten. Handwritten data is not acceptable.

4. Drawings:

a. Bind in with text.

b. Fold larger drawings and place in clear plastic pockets punched for inserting into binder. Place identification on the outside of each pocket.

5. File: Electronic Copy of the entire manual in a PDF format shall be submitted with the paper copy on a CD or Thumb Drive.

B. Cover Label: Label each binder cover and spine with typed or printed title "OPERATION AND MAINTENANCE INSTRUCTIONS" and following:

1. Project title.

2. Name(s) of applicable building(s) or structure(s) as shown on Drawings in which equipment located.

3. Name of equipment as set forth in Contract Documents.

4. Specification section number for equipment as set forth in Contract Documents.

C. Binders:

1. Commercial quality D-Ring binder with durable and cleanable plastic covers. Paperboard and laminated paperboard covers are not acceptable.

2. Do not fill binders to more than 75% of capacity.

3. When multiple binders are used for an item of equipment, organize contents into related groupings. Each binder cover shall bear identification of specific contents.

1.04 SUBMITTAL SCHEDULE

A. Submit 4 copies of complete O&M data, bound in binders bearing identification label, for review within 30 days after time CONTRACTOR receives approved Shop Drawings and other submittals for equipment from ENGINEER.

B. ENGINEER'S review and acceptance of O&M data will be only for conformance with requirements of this section, for form of submittal and organization of data and completeness of information provided, but not for technical content or coordination between individual suppliers of equipment or system(s).

C. CONTRACTOR shall review O&M submittal and complete Form 1, Contractor Submittal Form, attached to this section indicating requirements of this section have -been met before submitting to ENGINEER. ENGINEER will reject submittals without completed Form 1.

D. ENGINEER will be sole judge of completeness of data.

1.05 PAYMENTS

A. Progress payment for equipment delivered, stored or installed under these Contract Documents will not be made until O&M data is approved by ENGINEER.

B. Progress payments for control systems packaged with equipment will not be made until O&M data incorporated into equipment and control system manual is approved by ENGINEER.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

3.01 GENERAL CONTENTS OF DATA

A. Each manual shall contain equipment data pertaining to not more than one Specification section number indicated in Contract Documents.

B. Title Sheet: First page in data listing following:

1. Title: "OPERATION AND MAINTENANCE INSTRUCTIONS."

2. Title of Project: As shown on Contract Documents.

3. Name(s) of applicable building(s) or structure(s) in which equipment is located.

4. Name of equipment as described in Contract Documents.

5. Specification section number for equipment.

6. CONTRACTOR'S name, address, and telephone number.

7. Subcontractor's name, address, and telephone number if equipment is provided by Subcontractor.

8. CONTRACTOR'S or Subcontractor's purchase order number, manufacturer's shop order number or other such numbers required for parts and service ordering.

9. Manufacturer's name, address, and telephone number.

10. Name, address, and telephone number for local source of supply for parts and service.

C. Equipment List: Immediately following title sheet containing following:

1. Completed Form 1, Contractor's Submittal Form.

D. Table of Contents: Immediately following equipment list. Arrange in logical, systematic order and shall include as minimum each tabbed divider. Each page shall be numbered.

E. Tabbed Dividers: Insert tabbed section dividers between each major

section.

1. Provide title of section on each tab.

2. Provide table of contents for each tabbed section, arranged in systematic order.

F. Equipment Data Sheets: Provide catalog sheets showing configuration, manufacturer's specifications, models, options, and styles of equipment and major components being provided. Product data sheets will show project specific information with inapplicable information deleted by crossing out or removal. Include in tabbed section(s).

G. Text:

1. Include only those sheets applicable to Project.

2. Each sheet shall:

a. Identify specific equipment or part installed.

b. Identify text applicable to equipment or part installed.

c. Do not include inapplicable information.

H. Drawings: .

1. Supplement text with drawings to clearly illustrate following:

a. Equipment and components.

b. Relations of component parts of equipment and systems.

c. Control and flow diagrams.

2. Actual drawings of equipment from manufacturer. "Typical" drawings are not acceptable, unless they accurately illustrate actual installation.

I. Specially written information, as required to supplement text for particular installation.

1. Provide explanation of interrelationships of equipment and components, and effects one component has on another or entire system.

2. Provide overall instructions and procedures for equipment tying in instructions and procedures for separate components into unified instructional package.

3. Provide glossary of special terms used by manufacturer.

4. Organize in consistent format under separate headings for different procedures.

5. Provide logical sequence of instructions for each procedure.

J. Copy of each warranty, bond or service contract issued.

1. Provide an information sheet for OWNER'S personnel to explain following.

a. Proper procedures in the event of failure or malfunction to prevent voiding warranty.

b. Instances affecting validity of warranties or bonds.

3.02 SPECIFIC DATA FOR EACH EQUIPMENT AND SYSTEMS

A. For each item of equipment and system include:

1. Completed Equipment Data Form typewritten on copy of Form 2 to Section 01785.

2. Description of equipment and component parts:

a. Function, normal operating characteristics, and limiting conditions.

b. Performance curves, engineering data, and tests as applicable.

c. Complete nomenclature and commercial number of replaceable parts.

d. Complete nameplate data.

e. P&ID numbers for equipment as indicated on Drawings.

3. Operating Procedures:

a. Startup, break-in, and normal operating instructions.

b. Regulation, control, stopping, shutdown, and emergency instructions.

c. Summer and winter operating instructions, as applicable.

d. Special operating instructions.

4. Maintenance Procedures:

a. Routine maintenance operations.

b. Guide to troubleshooting.

c. Disassembly, repair, and reassembly instructions.

d. Alignment, adjusting, and checking instructions.

5. Servicing and Lubrication Schedule:

a. List of lubricants required and quantity to be applied.

b. Schedule of lubrication.

c. Schedule for other routine maintenance.

6. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.

7. Description of sequence of operation of controls.

8. Manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

a. Predicted life of parts subject to wear.

b. Items recommended to be stocked as spare parts and quantities of same.

9. Approved control diagrams such as ladder diagrams, instrumentation loop diagrams, and electrical schematics as appropriate.

10. Bill of material.

11. Other data as required under applicable Specification sections.

B. Each electric and electronic system, as applicable to equipment such as switchgear, motor control centers, panelboards, switchboards, starters, breakers, and relays shall include:

1. Description of System and Component Parts:

a. Function, normal operating characteristics, and limiting conditions.

b. Performance curves, engineering data, rating tables, and tests as applicable.

c. Complete nomenclature and commercial number of

replaceable parts.

d. Complete nameplate data.

e. P&ID numbers for equipment as set forth on Drawings.

2. Circuit Directories of Panelboards:

a. Electrical service.

b. Controls.

c. Communications.

3. Complete instrumentation loop diagrams with tabulated listing of components in each control circuit or loop.

4. Operating Procedures:

a. Routine and normal operating instructions.

b. Sequences required.

c. Special operating instructions.

5. Maintenance Procedures:

a. Routine maintenance operations.

b. Guide to troubleshooting.

c. Disassembly, repair, and reassembly instructions.

d. Adjustment and checking instructions.

6. Manufacturer's printed instructions regarding safety precautions for both (a) protection of personnel operating equipment and systems and (b) prevention of damage to equipment and systems.

7. List of original manufacturer's spare parts and recommended quantities maintained in storage.

8. Other data as required under pertinent sections of Specifications.

C. Prepare and include additional data when the need for such data becomes apparent during instruction of OWNER'S personnel or as requested by OWNER.

FORM 1 TO SECTION 01785 Page 1 of 5
CONTRACTOR SUBMITTAL FORM

TO: (Engineer) (Address) (City, State, Zip) (Attn:)		DATE:	
		SPECIFICATION SECTION TITLE:	
		SECTION NO.;	
		MANUFACTURER/ VENDOR:	
FROM: (Contractor) (Address) (City, State, Zip)		NO. OF COPIES SUBMITTED TO ENGINEER:	
		SIGNATURE OF CONTRACTOR:	

GENTLEMEN:
We have checked the O&M manual submittal dated, _____, 20_____, and have found it to be in accordance with the requirements of Specification Section 01785 as noted below.

FORMAT
Size: 8-1/2 x 11 or 11x17
Paper: 20-lb minimum
Text: Printed data/neatly typed
Drawings: Standard size bound in text; in text-size labeled envelopes
Tabbed Section Dividers
Cover Label: Title
Project name
Building/structure ID
Equipment name
Specification section
Binders: Plastic Cover

FORM 1 TO SECTION 01785 Page 2 of 5
CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
			GENERAL CONTENTS
			• One specification only
			• Title Page
			- Title
			- Project title
			- Building/structure ID
			- Equipment name
			- Specification section number
			- Contractor ID
			- Subcontractor ID
			- Purchase order data
			- Manufacturer ID
			- Service/parts supplier ID
			• Product List
			•Table of Contents
			• Tabbed Sections
			- Pertinent data sheets
			- Annotated as needed
			•Text
			- Pertinent to project
			- Annotated
			• Drawings
			- Illustrate product and components
			- Control and flow diagrams

FORM 1 TO SECTION 01785 Page 3 of 5
CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
			GENERAL CONTENTS
			• Special Information
			- Interrelationships of equipment and components
			- Instructions and procedures provided
			- Instructions organized in consistent format
			- Instructions in logical sequence
			- Glossary
			• Warranty, Bond, Service Contract
			SPECIFIC CONTENTS (EQUIPMENT/SYSTEMS ONLY)
			• Description of Unit and Components
			- Equipment functions
			- Normal operating characteristics
			- Limiting conditions
			- Performance curves
			- Engineering data
			- Test data
			- Replaceable parts list (with numbers)
			- Nameplate data
			- P&ID numbers
			• Operating Procedures
			- Startup
			- Routine/normal operation
			- Regulation and control
			- Stopping and shutdown
			- Emergency

FORM 1 TO SECTION 01785 Page 4 of 5
CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
SPECIFIC CONTENTS (EQUIPMENT/SYSTEMSONLY)			
			• Operating Procedures (continued)
			- Seasonal operation
			- Special instructions
			• Maintenance Procedures
			- Routine/normal instructions
			- Troubleshooting guide
			- Disassembly/reassembly/repair
			• Servicing and Lubrication
			- List of lubricants
			- Lubrication schedule
			- Maintenance schedule
			• Safety Precautions/Features
			• Sequence of Operation of Controls
			• Assembly Drawings
			• Parts List and Illustrations
			- Predicted life
			- Spare parts list
			• Control Diagrams/Schematics
			• Bill of Materials
			• Completed Equipment Data Form per Specification
			• Other Data as Required

FORM 1 TO SECTION 01785 Page 5 of 5
CONTRACTOR SUBMITTAL FORM

Provided	Not Applicable	Page No.	
SPECIFICCONTENTS (EQUIPMENT/SYSTEMS ONLY)			
			• Description
			- Equipment functions
			- Normal operating characteristics
			- Performance curves
			- Engineering data
			- Test data
			- Replaceable parts list (with numbers)
			- Nameplate data
			- P&ID numbers
			• Panelboard Directories
			- Electrical
			- Controls
			- Communications
			• Instrumentation Loops
			- Diagrams
			- Components list each circuit/loop
			• Maintenance Procedures
			- Routine/normal instructions
			- Troubleshooting guide
			- Disassembly/reassembly
			- Adjusting and checking
			• Safety Precautions/Features
			• Spare Parts List
			• Additional Data

FORM 2 TO SECTION 01785 **Page 1 of 4**
EQUIPMENT DATA FORM

PROJECT NAME			
CONTRACT NO.			
CONTRACTOR			
EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT. NO.*	
LOCATION			
MANUFACTURER			
PURCHASED FROM			
VENDOR ORDER NO.		PURCHASE $	
DATE OF PURCHASE			
LOCAL SUPPLIER			
ADDRESS			
PHONE NO.			
MODEL NO.			
NO. OF UNITS	SERIAL NOS.		

*By Owner

FORM 2 TO SECTION 01785 Page 2 of 4
EQUIPMENT DATA FORM

NAMEPLATE DATA

ELECTRIC MOTOR		**PUMP/HVACUNIT**	
MANUFACTURER		MANUFACTURER	
TYPE	[ ]AC [ ]DC	TYPE	
HORSEPOWER		SIZE	
RPM		CAPACITY	
VOLTAGE		PRESSURE	
AMPERAGE		ROTATION	
PHASE		IMPELLER SIZE	
FRAME		IMPELLER MATERIAL	
DRIVE/REDUCER		**OTHER (I&C)**	
MANUFACTURER		MANUFACTURER	
TYPE	[ ]GEAR [ ]V-BELT [ ] CHAIN [ ]VARIDRIVE	TYPE	
		SIZE	
SERVICE FACTOR		CAPACITY	
RATIO		RANGE	

FORM 2 TO SECTION 01785 **Page 3 of 4**
EQUIPMENT DATA FORM

MAINTENANCE SUMMARY

EQUIPMENT NO.	ASSET NO.*
DESCRIPTION	MAINT. NO.*
MAINTENANCE OPERATION:	**FREQUENCY:**
List briefly each maintenance operation required and refer to specific information in Manufacturer's Manual, if applicable. Refer by symbol to "Lubricant List" for Lubrication Operation.	List required frequency of each maintenance operation.

*By Owner

FORM 2 TO SECTION 01785 Page 4 of 4
EQUIPMENT DATA FORM

LUBRICANT/RECOMMENDED SPARE PARTS LIST

EQUIPMENT NO.		ASSET NO.*	
DESCRIPTION		MAINT.NO.*	

LUBRICANT LIST

REFERENCE SYMBOL	LUBRICANT TYPE (MILITARY STANDARD)	RECOMMENDED LUBRICANT AND MANUFACTURER
List symbols in "maintenance operation" (Page 3).	List general lubricant type.	List specific lubricant name, viscosity, and manufacturer.

RECOMMENDED SPARE PARTS LIST

PART NO.**	DESCRIPTION	UNIT	QUANTITY	UNIT COST

ADDITIONAL DATA AND REMARKS

- By Owner
- ** Identify parts provided by this contract with two asterisks.
- Note: Attach additional sheets if necessary; identify each sheet at top with equipment number and description.

END OF SECTION

SECTION 01788

PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 SUMMARY

A. Maintain at site one record copy of:

1. Drawings.
2. Project Manual.
3. Addenda.
4. Change orders and other modifications to Contract.
5. ENGINEER field orders, written instructions, or clarifications.
6. Approved submittals.
7. Field test records.
8. Construction photographs.
9. Associated permits.
10. Certificates of inspection and approvals.

1.02 SUBMITTALS

A. At Substantial Completion:

1. Deliver one marked up set of Drawings to ENGINEER for use in preparation of record drawings.

B. Accompany submittals with transmittal letter containing following.

1. Date.
2. Project title and number.
3. CONTRACTOR'S name and address.
4. Title of record document.
5. Signature of CONTRACTOR or authorized representative.

PART 2 PRODUCTS

(Not Used)

PART 3 EXECUTION

3.01 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in CONTRACTOR'S field office on-site apart from documents used for construction.

1. Provide files and racks for storage of documents.

2. Provide secure storage space for storage of samples.

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

C. Make documents and samples available for inspection by ENGINEER or OWNER.

D. Failure to properly maintain record documents may be reason to delay a portion of progress payments until records comply with Contract Documents.

3.02 RECORD DOCUMENTS

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

B. Maintain record set of Drawings and Specifications legibly annotated to show all changes are made during construction.

1. Graphically depict changes by modifying or adding to plans, details, sections, elevations, or schedules.

2. Make changes on each sheet affected by changes.

C. Record information concurrently with construction progress.

1. Do not conceal Work until required information is recorded.

2. Record changes made by Written Amendment, Field Order, Change Order or Work Directive Change.

3. Give particular attention to concealed equipment and materials that would be difficult to measure and record at later date.

D. Drawings:

1. Graphically depict changes by modifying or adding to plans, details, sections, elevations, or schedules.

2. Make changes on each sheet affected by changes.

3. Dimensions:

a. Depths of various elements of foundation in relation to finish first floor datum.

b. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.

4. Location of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of structure.

5. Details not on original Drawings.

6. Location and identification of exposed interior piping, including those shown schematically on Drawings.

7. Size of equipment and location including connections.

8. Electrical and Instrumentation:

a. Horizontal and vertical locations and size of underground cable, conduit, and duct runs dimensioned from established building lines.

b. Plan location and size of interior concealed and exposed feeders.

c. Size and location of access panels.

d. Variations from original Drawings.

E. Specifications:

1. Mark Specification sections to show substantial variations in actual Work performed in comparison with text of Specifications and modifications.

2. Include variations in products delivered to site and from manufacturer's installation instructions and recommendations.

3. Give particular attention to substitutions and selection of options and similar information.

4. Note related record drawing information and Product Data.

END OF SECTION

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 2

SITE WORK

SECTION 02050

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to perform all demolition and removal work as shown on the Drawings and as specified herein. All work shall be carried out in accordance with the Department of Labor:

1. Occupational and Health Hazards (29 CFR - Part 1910).

2. Safety and Health Regulations for Construction (29 CFR - Part 1518).

3. Any applicable local ordinances or codes.

B. None of the existing river bank slope protection hand placed rip rap may be removed. Sheet piling may be driven through the rip rap and it may be covered by the new construction; however, the rip rap is to remain in place throughout construction.

C. Any removal work shall be carried to the limits necessary for construction of the new work, as specified hereinafter as directed by the ENGINEER.

1.02 RELATED WORK

A. Concrete work is included in Division 3.

B. Trench, backfilling, and compacting is included in Division 2.

1.03 SUBMITTALS

A. Demolition and Removal Plan

The CONTRACTOR shall submit to the ENGINEER for his review and acceptance a plan for demolition and removal work, in accordance with the requirements of Division 1, Section 01300. After the contract is awarded and prior to the commencement of the work, the CONTRACTOR shall meet with the ENGINEER and OWNER and discuss the demolition and removal plan. The plan shall include a schedule for disconnection of utility services and procedures for the careful removal and disposal of materials, and coordination with other work or City activity in progress. Included in the plan must be a detailed description of the methods and equipment to be used for each operation and the sequence of operations.

1. Do not proceed with demolition until the ENGINEER has given

written acceptance of the demolition plan.

2. Obtain all demolition permits required, including any necessary transportation permits, and submit copies of these to the ENGINEER.

B. The demolition plan submitted for approval shall specifically describe in detail the proposed methods and sequences of implementation of demolition work to be performed in connection with facilities, processes, and systems or parts thereof, the operation of which cannot be interrupted. The CONTRACTOR shall provide and operate at his own expense any temporary equipment, connections, bypasses, or other means necessary to assure continuous operation of facilities which in the opinion of the OWNER cannot be interrupted. Following the completion of work, any such temporary provisions shall be removed from the site to the satisfaction of the OWNER, unless otherwise directed.

1.04 PROTECTION

A. Erect barriers, fences, guardrails, enclosures, chutes, and shoring to protect personnel, structures, and utilities remaining intact.

B. Protection of Existing Work

Existing work to remain shall be protected from damage. Work damaged by the CONTRACTOR shall be repaired to match existing work at no additional cost to the OWNER, as directed by the ENGINEER. Provide temporary support and shoring as required for existing materials until new work is installed.

C. Protection of Utilities

Existing utilities that are indicated or the locations of which are made known to the CONTRACTOR prior to demolition work shall be protected from damage. Damaged utilities shall be repaired as directed by the ENGINEER at no additional cost to the OWNER.

D. Protection of Personnel

Where the safety of personnel is endangered in the area of removal work, barricades for traffic shall be used and advance notice shall be given to the ENGINEER prior to beginning any such work.

E. Wherever piping is removed for disposition, adjacent pipe and headers that are to remain in service shall be maintained in service as reconnection is accomplished.

F. Use of Saw Cuts and Pneumatic Hammers

Saw cuts shall be used wherever applicable. Pneumatic hammers shall only be used with the approval of the ENGINEER.

G. Use of Explosives

Use of explosives will not be allowed on this project without the approval of the KYTC and the ENGINEER. Blasting approval shall be confined to only the approved areas. No blasting will be allowed outside of approved locations.

H. Carry out all demolition work in accordance with the accepted demolition plan and applicable permit requirements.

PART 2 PRODUCTS

None this Section.

PART 3 EXECUTION

3.01 INSPECTION

A. Verify that the use of the facilities and related equipment to be demolished has been discontinued.

B. Do not commence work until conditions are acceptable to the ENGINEER.

3.02 PREPARATION

A. Arrange for and verify termination of utility services, including removal of existing utility company appurtenances.

3.03 DEMOLITION

A. Perform demolition in accordance with the accepted demolition plan, applicable permit requirements, and as directed by the ENGINEER.

3.04 DISPOSAL

A. Debris and Rubbish Control: Debris and rubbish shall be removed and transported in a manner that will prevent spillage on streets or adjacent areas.

B. Regulations: Federal, state, and local regulations regarding hauling and disposal shall be complied with.

END OF SECTION

SECTION 02110

SITE CLEARING AND GRUBBING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and equipment required and perform all clearing, grubbing and stripping of topsoil complete as shown on the DRAWINGS and as specified herein.

1.02 RELATED WORK

Not applicable to this CONTRACT.

1.03 SUBMITTALS

Not applicable to this CONTRACT.

PART 2 PRODUCTS

Not applicable to this CONTRACT.

PART 3 EXECUTION

3.01 GENERAL

A. The proposed areas designated for embankment construction, impoundments, ditches and channel changes, borrow pits, etc., (except any portions thereof that may be reserved) shall be cleared of all trees, timbers, brush, stumps, rubbish and other debris. All this material, unless otherwise specified, shall be burned or otherwise removed, as may be directed and without injury to adjoining property. Burning must be in compliance with any applicable regulations covering open burning and smoke abatement. Where clearing is to be done, all stumps and roots shall be grubbed. No debris will be allowed to be left under or in the embankments. In felling trees near structures and wire lines, necessary precautions must be exercised in order to prevent damage to wire lines, structures, the facilities of others. Payment for all clearing and grubbing shall be incidental to the prices bid for doing other work.

3.02 TREES

A. Trees (3" caliper and larger) shall not be disturbed by construction without written permission from the OWNER, except in those areas to be cleared. Trees disturbed by construction shall be replaced by the CONTRACTOR with same size and type at no additional cost to the OWNER.

B. Trees and shrubs disturbed by construction shall be replaced by the

CONTRACTOR with the same size and type at no additional cost to the OWNER. Trees and shrubs shall be purchased locally from a reputable nursery specializing in this field.

END OF SECTION

SECTION 02140

DEWATERING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Furnish all labor and equipment required to dewater all excavations. Dewatering of all excavations shall be the responsibility of the CONTRACTOR, and no additional compensation will be allowed for same unless specifically included as a BID item.

1.02 RELATED WORK

A. Earthwork is included in Division 2, Section 02200.

1.03 SUBMITTALS

Not applicable to this CONTRACT.

PART 2 PRODUCTS

Not applicable to this CONTRACT.

PART 3 EXECUTION

3.01 GENERAL

A. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, backfill or other material or structure in the excavation. Dewatering shall include proper removal of any and all liquid, regardless of its source, from the excavation and the use of all practical means available to prevent surface runoff from entering any excavation. No extra payment shall be made for dewatering.

B. No sanitary sewer shall be used for the disposal of water from trenches or other excavations. (From “10-States’ Standards)

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 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 maxium 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 02255

CRUSHED STONE AND DENSE GRADED AGGREGATE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish and install crushed stone for miscellaneous uses as shown on the Drawings, as called for in the Specifications, or as may be directed in writing by the ENGINEER.

B. Sizes, types, and quality of crushed stone are specified in this Section, but its use for replacement of unsuitable material, pavement base, and similar uses is specified in detail elsewhere in the Specifications. The ENGINEER may order the use of crushed stone for purposes other than those specified in other sections, if, in his opinion, such use is advisable.

PART 2 PRODUCTS

2.01 MATERIALS

A. When referred to in these Specifications, crushed stone shall be Number 57 graded in accordance with the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, 2000 Edition.

B. When referred to in these Specifications, dense graded aggregate (DGA) shall be crushed stone classified by the Kentucky Transportation Cabinet, Department of Highways, Standard Specifications for Road and Bridge Construction, 2000 Edition, and conforming to the following requirements:

Sieve Size	Percent Passing
1 Inch	100
3/4 Inch	70 - 100
3/8 Inch	50 - 80
#4	30 - 65
#30	10 - 40
#200	4 - 13

PART 3 EXECUTION

3.01 INSTALLATION

A. Crushed stone shall be placed in uniform layers not greater than 6 inches deep and shaped by power equipment to required lines, grades, cross sections, and depths. No minimum compacted density, method of compaction, or compaction equipment is required since a nominal amount of compaction effort with vibration can establish the desired inter-granular locking of the aggregate under controlled placement depth. Acceptable compaction can be achieved with pneumatic-tired and tracked vibratory equipment and vibratory rollers.

B. All compaction operations shall be performed to the satisfaction of the ENGINEER.

C. Crushed stone shall be placed in those areas as shown on the Drawings and as may be directed by the ENGINEER.

3.02 BASIS FOR PAYMENT

Payment for crushed stone or DGA shall be made on a unit price or a lump sum basis where a separate bid item is provided. Otherwise payment for crushed stone or DGA required for other work show on the PLANS shall be made on a unit price or lump sum basis bid for that work.

END OF SECTION

SECTION 02320

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SECTION DESCRIPTION

The work specified in this section consists of furnishing and installing underground utilities using the horizontal directional drilling (HDD) method of installation, also commonly referred to as directional boring or guided horizontal boring. This work shall include all services, equipment, materials, and labor for the complete and proper installation, testing, restoration of underground utilities and environmental protection and restoration.

1.02 REFERENCES

Specification 02610 – High Density Polyethylene (HDPE) Pipe and Fittings shall be used as a reference.

1.03 QUALITY ASSURANCE

The requirements set forth in this document specify a wide range of procedural precautions necessary to ensure that the very basic, essential aspects of a proper directional bore installation are adequately controlled. Strict adherence shall be required under specifically covered conditions outlined in this specification. Adherence to the specifications contained herein, or the Engineer's approval of any aspect of any directional bore operation covered by this specification, shall in no way relieve the Contractor of their ultimate responsibility for the satisfactory completion of the work authorized under the Contract.

1.04 SUBMITTALS

A. WORK PLAN

Prior to beginning work, the Contractor must submit to the Engineer a general work plan outlining the procedure and schedule to be used to execute the project. Plan should document the thoughtful planning required to successfully complete the project.

B. EQUIPMENT

Contractor will submit specifications on directional drilling equipment to be used to ensure that the equipment will be adequate to complete the project.

C. MATERIALS

Specifications on material to be used shall be submitted to Engineer. Material shall include the pipe, fittings and any other item which is to be an installed component of the project.

PART 2 EQUIPMENT REQUIREMENTS

2.01 EQUIPMENT

The directional drilling equipment shall consist of a directional drilling rig of sufficient capacity to perform the bore and pullback the pipe, a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project.

2.02 DRILLING SYSTEM

A. DRILLING RIG

The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull hollow drill pipe into the ground at a variable angle while delivering a pressurized fluid mixture to a guidable drill (bore) head. The machine shall be anchored to the ground to withstand the pulling, pushing and rotating pressure required to complete the crossing. The hydraulic power system shall be self-contained with sufficient pressure and volume to power drilling operations. Hydraulic system shall be free of leaks. Rig shall have a system to monitor and record maximum pull-back pressure during pull-back operations.

B. DRILL HEAD

The drill head shall be steerable by changing its rotation and shall provide the necessary cutting surfaces and drilling fluid jets.

C. MUD MOTORS (if required)

Mud motors shall be of adequate power to turn the required drilling tools.

D. DRILL PIPE

Shall be constructed of high quality 4130 seamless tubing, grade D or better, with threaded box and pins. Tool joints should be hardened to 32-36 RC.

2.03 GUIDANCE SYSTEM

The Guidance System shall be of a proven type and shall be setup and operated by personnel trained and experienced with this system. The Operator shall be aware of any magnetic anomalies and shall consider such influences in the operation of the guidance system if using a magnetic system.

2.04 DRILLING FLUID (MUD) SYSTEM

A. MIXING SYSTEM

A self-contained, closed, drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid composed of bentonite clay, potable water and appropriate additives. Mixing system shall be able to molecularly shear individual bentonite particles from the dry powder to avoid clumping and ensure thorough mixing. The drilling fluid reservoir tank shall be sized for adequate storage of the mud. Mixing system shall continually agitate the drilling fluid during drilling operations.

B. DRILLING FLUIDS

Drilling fluid shall be composed of clean water and an appropriate additive. Water shall be from a clean source with a pH of 8.5 – 10 and/or as per mixing requirements of the Manufacturer. Water of a lower pH or with excessive calcium shall be treated with the appropriate amount of sodium carbonate or equal. The water and additives shall be mixed thoroughly and be absent of any clumps or clods. No hazardous additives may be used. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall.

C. DELIVERY SYSTEM

The mud pumping system shall have a minimum capacity to supply mud in accordance with the drilling equipment pull-back rating at a constant required pressure. The delivery system shall have filters in-line to prevent solids from being pumped into the drill pipe. Connections between the pump and drill pipe shall be relatively leak-free. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. A berm, minimum of 12" high, shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps and or vacuum truck(s) of sufficient size shall be in place to convey excess drilling fluid from containment areas to storage facilities.

2.05 OTHER EQUIPMENT

A. PIPE ROLLERS

Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe while being hydro-tested and during pull-back operations. Sufficient number of rollers shall be used to prevent excess sagging of pipe.

B. PIPE RAMMERS

Hydraulic or pneumatic pipe rammers may only be used if necessary and with the authorization of the Engineer.

C. RESTRICTIONS

Other devices or utility placement systems for providing horizontal thrust other than those previously defined in the preceding sections shall not be used unless approved by the Engineer prior to commencement of the work. Consideration for approval will be made on an individual basis for each specified location. The proposed device or system will be evaluated prior to approval or rejection on its potential ability to complete the utility placement satisfactorily without undue stoppage and to maintain line and grade within the tolerances prescribed by the particular conditions of the project.

PART 3 - EXECUTION

3.01 GENERAL

The Engineer must be notified 48 hours in advance of starting work. The Directional Bore shall not begin until the Engineer is present at the job site and agrees that proper preparations for the operation have been made. The Engineer approval for beginning the installation shall in no way relieve the Contractor of the ultimate responsibility for the satisfactory completion of the work as authorized under the Contract. It shall be the responsibility of the Engineer to provide inspection personnel at such times as appropriate without causing undue hardship by reason of delay to the Contractor.

3.02 PERSONNEL REQUIREMENTS

All personnel shall be fully trained in their respective duties as part of the directional drilling crew and in safety.

3.03 DRILLING PROCEDURE

A. SITE PREPARATION

1. Prior to any alterations to work-site, contractor shall photograph or video tape entire work area, including entry and exit points. One copy of which shall be given to Engineer and one copy to remain with contractor for a period of one year following the completion of the project.

2. Work site as indicated on drawings, within right-of-way, shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

B. DRILL PATH SURVEY

Entire drill path shall be accurately surveyed with entry and exit stakes placed in the appropriate locations within the areas indicated on drawings. If contractor is using a magnetic guidance system, drill path will be surveyed for any surface geo-magnetic variations or anomalies.

C. ENVIRONMENTAL PROTECTION

Contractor shall place silt fence between all drilling operations and any drainage, wetland, waterway or other area designated for such protection by contract documents, state, federal and local regulations. Additional environmental protection necessary to contain any hydraulic or drilling fluid spills shall be put in place, including berms, liners, turbidity curtains and other measures. Contractor shall adhere to all applicable environmental regulations. Fuel or oil may not be stored in bulk containers within 200' of any waterbody or wetland.

D. SAFETY

Contractor shall adhere to all applicable state, federal and local safety regulations and all operations shall be conducted in a safe manner.

E. PIPE

Pipe shall be welded/fused together in one length, if space permits. Pipe welds will be X-rayed prior to being placed in bore hole. Pipe will be placed on pipe rollers before pulling into bore hole with rollers spaced close enough to prevent excessive sagging of pipe.

F. PILOT HOLE

1. Pilot hole shall be drilled on bore path with no deviations greater than 5% of depth over a length of 100'. In the event that pilot does deviate from bore path more than 5% of depth in 100', Contractor will notify Engineer and Engineer may require Contractor to pull-back and re-drill from the location along bore path before the deviation.

2. In the event that a drilling fluid fracture, inadvertent returns or returns loss occurs during pilot hole drilling operations, contractor shall cease drilling, wait at least 30 minutes, inject a quantity of drilling fluid with a viscosity exceeding 120 seconds as measured by a March funnel and then wait another 30 minutes. If mud fracture or returns loss continues, contractor will cease operations and notify Engineer. Engineer and

contractor will discuss additional options and work will then proceed accordingly.

G. REAMING

Upon successful completion of pilot hole, contractor will ream bore hole to a minimum of 25% greater than outside diameter of pipe using the appropriate tools. Contractor will not attempt to ream at one time more than the drilling equipment and mud system are designed to safely handle.

H. PULL-BACK

1. After successfully reaming bore hole to the required diameter, contractor will pull the pipe through the bore hole. In front of the pipe will be a swivel. Once pull-back operations have commenced, operations must continue without interruption until pipe is completely pulled into borehole. During pull-back operations contractor will not apply more than the maximum safe pipe pull pressure at any time.

2. In the event that pipe becomes stuck, contractor will cease pulling operations to allow any potential hydro-lock to subside and will commence pulling operations. If pipe remains stuck, contractor will notify Engineer. Engineer and contractor will discuss options and then work will proceed accordingly.

3.04 PIPE TESTING

A. Sections 02620 and 02715 shall be followed in its entirety following pull-back of the pipe.

1. All mains shall be swabbed.

2. All mains shall be chlorinated.

3.05 Basis For Payment

A. 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, etc.

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 02600

WATER DISTRIBUTION PIPE

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 KYTC Standard Specifications for Road and Bridge Construction, most current edition, Division 200 & 700.

B. Concrete is included in KYTC Standard Specifications for Road and Bridge Construction, most current edition, Division 600.

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 potable water 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 ductile iron pipe shall have 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.

2. All buried ductile iron pipe shall have manufacturer’s outside coal tar or asphaltic base coating.

3. All above grade ductile iron pipe shall have the following coating system:

   A. System Type: MCU/Epoxy.

   B. Surface Preparation: Surface Preparation: NAPF 500-03-03 Power Tool Cleaning.

C. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.

D. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.*[May require two coats if brush or roller applied].*

E. Total DFT: 6.5 to 9.5 mils.

F. Finish Color: As indicated on the drawings, or color schedule.

G. Coatings shall be Tnemec Company Incorporated, Sherwin-Williams, or approved equal.

4. All surface preparation and coating application shall be per the manufacturer's recommendations.

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 re-facing 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., United States Plastic Corp., 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 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.

2.05 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.

2.06 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. 10 gauge, single strand TRACER WIRE shall be placed directly on top of all PIPE 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.

A. A FLEXIBLE FIBER REINFORCED flat composite pipeline marker shall be installed above the force main approximately every 2000 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.

Red – Electric	Orange - Communication
Yellow – Gas	Blue – Potable Water
Green – Sewer	Purple – Reclaimed water

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, Grainger, 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.

4. 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.

3.04 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.

3.05 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.

3.06 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.

3.07 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.

3.08 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 no 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.

3.09 BASIS FOR PAYMENT

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, painting, testing, disinfection, cleanup, seeding, warning tape, tracer wire, warning signs, 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.

C. Sewage and Drainage Pipe is Included in Section 02700.

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 REINFORCED CONCRETE PIPE

A. Except as otherwise specified herein, pipe shall conform to ASTM Standard Specifications for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe, Designation C 76 latest revision, Class IV, Wall B. The tabulated reinforcement given in the tables shall be the minimum required. The pipe interior shall be smooth and even, free from roughness, projections, indentations, offsets, or irregularities of any kind. The concrete mass shall be dense and uniform. The supplier is responsible for the performance of all inspection requirements as specified in ASTM C 76 latest revision. A complete set of records of the tests shall be submitted to the ENGINEER.

B. Non-air-entraining portland cement conforming to ASTM Specifications C 150 latest revision, Type II shall be used, except as otherwise approved in writing to the ENGINEER. The use of a non-bleeding, water-reducing, dispersing agent may be permitted subject to the specific approval of the ENGINEER. The use of any other admixture will not be permitted.

C. Fine aggregate shall consist of washed inert natural sand conforming to the requirements of ASTM Specifications C 33 latest revision, except for gradation, with a maximum loss of 7.5 percent when subjected to 5 cycles of the soundness test using magnesium sulfate. Coarse aggregate shall consist of well-graded crushed stone or washed gravel conforming to the requirements of ASTM Specifications C 33 latest revision, except for gradation, with a maximum loss of 7.5 percent when subjected to 5 cycles of the soundness test using magnesium sulfate.

D. The 28-day compressive strength of the concrete, as indicated by cores cut from the pipe shall be not less than 4,000 psi. The concrete mass shall be dense and uniform. The average absorption shall not exceed 5.0 percent of the dry weight and no specimen shall exceed 5.3 percent of the dry weight. Reinforcement shall be circular for all concrete pipe. Reinforcement in the bell and spigot shall be adequate to prevent damage to concrete during shipping, handling and installation. Core indicating reinforcing steel having less than 85 percent bond shall be cause for rejection of the lot of pipes.

E. Pipe may be rejected for any of the following reasons:

1. Exposure of any wires and positioning spacers or chairs used to hold the reinforcement case in position, or steel reinforcement in any surface of the pipe, except for ends of longitudinal reinforcing.

2. Transverse reinforcing steel found to be in excess of 1/4 inch out of specified position after the pipe is molded.

3. Any shattering or flaking of concrete at a crack.

4. Air bubble voids (bugholes) on the interior and exterior surfaces of the pipe exceeding 1/4 inch in depth unless properly and soundly pointed with mortar or other approved material.

5. Unauthorized application of any wash coat of cement or grout.

6. A deficiency greater than 1/4 inch from the specified wall thickness.

7. A variation from the specified internal diameter in excess of 1 percent or interior surfaces which have been reworked after placing of concrete. The variation in internal diameter permitted herein does not apply to gasket contact surface in gasketed joint pipe.

8. A hollow spot (identified by tapping the internal surface of the pipe) which is greater than 30 inches in length or wider than 3 times the specified wall thickness. Repair of such defective areas not exceeding these limitations may be made.

9. Defects that indicate imperfect molding of concrete; or any surface defect indicating honeycomb or open texture (rock pockets) greater in size than an area equal to a square with a side dimension of 2-1/2 times the wall thickness or deeper than two times the maximum graded aggregate size; or local deficiency of cement resulting in loosely bonded concrete, the area of which exceeds, in size, the limits of area described in paragraph 8 above when the defective concrete is removed.

Repair of such defects not exceeding these limits may be made.

10. Any of the following cracks:

    a. A crack having a width of 0.005 inch to 0.01 inch throughout a continuous length of 36 inches or more.

    b. A crack having a width of 0.01 inch to 0.03 inch or more throughout a continuous length of 1 foot or more.

    c. A crack greater than 0.0005 inch extending through the wall of the pipe and having a length in excess of the wall thickness.

    d. Any crack showing two visible lines of separation for a continuous length of 2 feet or more, or an interrupted length of 3 feet or more anywhere in evidence, both inside and outside.

    e. Cracks anywhere greater than 0.03 inch in width.

F. Pipe shall have a minimum laying length of approximately 8 feet except for closure and other special pieces as approved by the ENGINEER. The CONTRACTOR shall have available at the site of the work sufficient pipe for various lengths to affect closure at manholes or structures that cannot be relocated to accommodate standard lengths. Short lengths of pipe made for closure, etc., may be used in the pipeline at the end of construction if properly spaced. The length of the incoming and outgoing concrete pipe at each structure shall not exceed 4 feet, except where the joint is cast flush with the exterior wall of the structure. Maximum laying length shall not exceed 16 feet, but the installation of 16-foot lengths will depend upon the ability of the CONTRACTOR to handle such lengths of pipe in deep sheeted trenches, comply with trench width requirements, maintain the integrity of the sheeting and avoid disturbance to adjacent ground. If in the opinion of the ENGINEER the use of 16-foot lengths is impracticable, shorter lengths shall be used.

G. Fittings and Bends

1. The manufacturer shall submit the proposed method of fabrication of bends and special pieces to the ENGINEER for approval. All such fittings shall conform to all applicable requirements of this Specification.

2. Pipe for use on curved sections shall be fabricated by beveling one or both ends sufficient to produce the radius of curvature required. Joint deflection shall not be utilized to produce the radius of curvature required. Reinforced concrete bends shall be cast to the degree of curvature required or fabricated by cutting the pipe at the required angle and then rejoining the sections.

3. Steel wall fittings to be used in the walls of the cast-in-place structures shall be equal to those manufactured by Interpace Corp., and shall be compatible with rubber and steel joints of reinforced concrete pipe and pre-stressed concrete cylinder pipe where applicable.

H. Joints for Concrete Pipe

1. Joints for concrete pipe shall be the tongue and groove or bell and spigot type of joint with provisions for using a round rubber “O-ring” gasket in a recess in the spigot end of the pipe. The bevel on the bell of the pipe shall be between 1-1/2 degrees and 2-1/2 degrees and the annular open space at the gasket when the joint is made up and pipes are centered and in line shall not exceed 3/16 inches. The faces of pipe in contact with the gasket shall be true, and free of irregularities.

2. The round rubber “O-ring” gaskets shall conform to ASTM C 443 latest revision Specifications for Joints for Circular Concrete Sewer and Culver Pipe using Rubber Gaskets. Two gaskets and a manufacturer’s test report shall be submitted to the ENGINEER for tests at least 30 days before the CONTRACTOR is to joint any of the pipe. Manufacturer’s test report shall state that specimens of the gaskets where subjected to tensile tests of approximately 100 psi before and after immersion and heating tests, and they showed an elongation of at least 25 percent. Upon release from the tensile tests, it shall be noted in each specimen shall return to its original length.

3. The gaskets shall be designed and manufactured so that the completed joints will withstand an internal water pressure in excess of 20 psi for a period of 10 minutes without showing any leakage by the gasket or displacement of it, see ASTM C 443-latest revision. The pipe manufacturer shall provide facilities for testing the effectiveness of the joints against leakage and one such test may be required for each 500 feet of pipe for an internal or external pressure against the joint of at least 20 psi for a period of 10 minutes.

2.02 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 350 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. All ductile iron pipe shall have a minimum pressure class rating of 350 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 tank locations 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.

2.03 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.

2.04 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.

2.05 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.

2.06 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.

2.07 PRE-STRESSED CONCRETE PRESSURE PIPE, AWWA C-301 LATEST REVISION

A. General

1. Pre-stressed concrete pressure pipe shall be of the pre-stressed steel cylinder type, conforming to AWWA C301, latest revision. This standard covers two types of pre-stressed pipe: (a) pipe with steel cylinder lined with a concrete core (lined cylinder pipe, 16”-48”), and (b) pipe with a steel cylinder embedded in a concrete core (embedded cylinder pipe, 54” - 192”).

2. All concrete pipe supplied for this project shall have internal cores placed as specified in either paragraph 3.6.9 (centrifugal method

of 16” - 48” LCP) or paragraph 3.6.10 (vertical method for 54” - 192” ECP) of AWWA C301. Concrete pipe manufactured using other methods of core placement will not be approved.

3. The pipe shall be made by a manufacturer experienced in producing pipe of the type and size specified herein.

B. Design

1. The pipe shall be designed to withstand, with bedding and backfill as detailed in these documents (Drawings and Specifications), the indicated design pressure and the maximum trench loading which will be applied after the backfill is in place, plus an allowance of 50% for water hammer.

2. The laying condition for the pipeline shall be as is indicated on the Contract Drawings. Unless otherwise indicated, the live load shall be computed according to AASHO H-20 for one truck including AASHO recommended impact factors. The resulting design live loading is to be reduced by the load factors shown for the laying condition specified, to achieve the equivalent 3-edge bearing load.

C. Shop Drawings and Markings on Pipeline Materials

1. The CONTRACTOR shall furnish to the ENGINEER for his review sepia copies of the shop drawings, design calculations and complete laying schedule, prior to the manufacture of any materials. Pipe, fittings and specials shall not be made until the ENGINEER has reviewed these drawings.

2. The laying schedule shall be followed, in detail, during installation of the pipeline and appurtenances. The pipe and fitting identification shown on the schedule shall coincide with markings on the pipe and fittings.

D. Fittings and Specials

1. The drawings show the location of outlets, connections and appurtenances to be installed along the pipeline. The pipe manufacturer shall furnish all fittings and special pieces required for closures, curves, bends, and branches, together with connections or adapters for air valves, blow-offs, main line valves, and other pipe connections where shown on the Drawings.

2. The fittings and specials shall conform to the requirements of AWWA C301 Type “B” and shall be furnished and installed as shown on the Drawings or as required.

3. Bevel pipe may be used where the required deflection of the pipeline is more than is allowed by the joint opening method in straight pipe, yet less than that required for an elbow or special

fitting. The difference in length of opposite sides (Laying length) shall be no more than one inch per foot of internal diameter of the pipe.

E. Material

1. Pre-stressing wire shall conform to ASTM A648 and will be 6 gauge minimum thickness and Class III.

F. Joints

1. Joints for pipe and fittings shall be of steel ring, bell and spigot, rubber gasket type and shall conform to AWWA C301, latest revision. Exposed portions of the joint rings shall be protected by a zinc metalized coating, having a minimum thickness of 0.004 inch.

2. Where required by the Contact Drawings, the CONTRACTOR shall furnish and install restrained joints designed to meet the same specifications as the pipe. Restrained joints for concrete pressure pie shall be “Snap Ring” or “Harness Clamp” as manufactured by Price Brothers Company and/or GHA-Lock Joint. If requested, the CONTRACTOR shall also furnish calculations supporting the restrained joint design, all at no additional cost to the OWNER.

G. Testing and Certifications

1. The manufacturer of the pipe shall furnish to the ENGINEER five copies of certified reports containing the results of control test of cement, concrete (standard test cylinders), steel sheet, pre-stressing wire and hydrostatic test on all steel cylinders (except plain end pieces).

2. Each steel cylinder, with joint ring welded to its ends, shall be subjected to a hydrostatic test which stresses the steel to a unit stress of at least 20,000 psi, but not greater than 25,000 psi and all welds shall be inspected for soundness and water-tightness.

3. The test shall comply with AWWA C301 in all respects and the pipe manufacturer shall submit an affidavit of compliance to the OWNER stating that the pipe and fittings have been designed, manufactured and tested according to Specifications.

4. The OWNER reserves the right to witness the testing of materials by the pipe manufacturer or have same performed by an independent testing service. The manufacturer shall make all laboratory facilities available to the OWNER and shall notify the ENGINEER at least 24 hours in advance of start of production of the pipeline materials for the project.

PART 3 EXECUTION

3.01 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).

3.02 DETECTABLE TRACER WIRE

A. Size 10 AWG, solid-wire conductor, tracer wire shall be placed directly on top of all force mains/watermains and shall be attached to the pipe at 5 ft intervals maximum. Tracer wire segments shall be 800 feet maximum and shall terminate at either a metal post (details shown in the plans), an air release valve manhole, or a structure the same as a clean-out box. Contractor shall attach wire at each termination point (post) as shown on the plans.

3.03 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.

3.04 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.

3.05 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.

3.06 CONCRETE PIPE INSTALLATION

A. Bedding shall be placed and compacted to give complete vertical and lateral support for the lower section of the pipe as indicated on the Drawings. A depression shall be left in the supporting material at the joint to prevent contamination of the rubber gasket immediately before being forced home. Before the pipe is lowered into the trench, the spigot and bell must be cleaned and free from dirt. Gasket and bell shall be lubricated by a vegetable lubricant which is not soluble in water, furnished by the pipe manufacturer, and harmless to the rubber gasket. The pipe shall be properly aligned in the trench to lessen the possibility of fouling the gasket. As soon as the spigot is centered in the bell of the previously installed pipe, it shall be forced home with jacks or come-alongs. After the gasket is compressed and before the pipe is brought fully home, each gasket shall be carefully checked for proper position around the full circumference of the joint. Steel inserts shall be used to check the final position of the gasket. The jacks or come-alongs shall be anchored sufficiently back along the pipeline (a minimum of 5 lengths) so that the pulling force will not dislodge the pieces of pipe already in place. Only a jack or come-along shall be employed to force the pipe home smoothly and evenly and hold the pipe while backfilling is in progress. Under no circumstances shall crowbars alone be used nor shall any of the motor-driven equipment be used.

B. As soon as the pipe is in place and before the come-along is released backfill shall be placed and compacted as indicated on the drawings for at least one-half the length of pipe. Not until this backfill is placed shall the come-along be released. If any motion at joints can be detected, a greater amount of backfill shall be placed before pressure is released.

C. The CONTRACTOR shall carefully regulate his equipment and construction operations such that the loading of the pipe does not exceed the loads for which the pipe is designed and manufactured. Any pipe damaged during construction operations shall promptly and satisfactorily be repaired at the CONTRACTOR’S expense.

3.07 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.

3.08 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.

3.09 INSTALLATION OF AWWA C301 PRE-STRESSED CONCRETE PRESSURE PIPE

A. The interior of the pipe shall, as the work progresses, be cleaned of all dirt, jointing materials and superfluous materials of every description. When laying of pipe is stopped for any reason, the exposed end of the pipe shall be closed with a plug or cap (plywood used if neat fitting) fitted into each open pipe end. Precautions must be taken to prevent flotation of the pipe, should water enter the trench prior to putting the pipeline in operation.

B. Before assembling a joint, the spigot end of the pipe shall be thoroughly cleaned. The inside of the bell end of the pipe and the gasket shall be cleaned and lubricated with lubricant as recommended by the manufacturer. The gasket shall then be placed around the spigot end so it is properly seated in the circumferential groove to maintain uniform tension in the gasket all around the pipe. The spigot end shall then be aligned with the bell end of the pipe and carefully entered into the bell.

C. The joint shall be checked to determine if the gasket is in the proper position. The joints of pipe 24 inches or larger shall be checked from the inside of the pipe. Before the spigot is thrust completely home, steel spacers shall be inserted in the seat of the bell to leave a half-inch clearance. A feeler gauge shall then be inserted into the recess to check the position of the gasket. If the gasket cannot be felt all around the pipe, the spigot shall be removed. If the gasket is not damaged it may be reused, but both the gasket and the joint shall be relubricated. After it has been determined the gasket is in its proper position, the joint spacers shall be removed and the pipe pushed or pulled completely home. The joints of pipe smaller than 24 inches may be checked from the outside of the pipe by inserting a feeler gauge into the flare of the bell to assure that no portion of the gasket is protruding.

D. After the joint is assembled, a cloth band is placed around the joint recess and wired or strapped in position to provide a means of pouring grout in the recess. A grout composed of one part cement and two parts sand is poured into the joint recess beneath the band. Measures should be taken to assure the entire recess around the pipe is completely filled.

E. As an alternative to placing grout around the outside of the joint, the CONTRACTOR may install a polyurethane foam loop impregnated with cement. The installed foam loop shall be under compression around the entire circumference of the pipe. The foam loop shall be Flex-Protex, as manufactured by Alva-Tech, or approved equal. Joints located next to valves shall be grouted for three joints each direction from the valve and all restrained joints shall also be grouted only.

F. When a change in alignment or grade is required by articulating the joint, in accordance with the manufacturer's laying schedule, then the joint shall be opened the specified amount.

3.10 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.

3.11 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.

3.12 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, etc.

END OF SECTION

SECTION 02640

METERS, INDIVIDUAL PRESSURE REDUCING VALVES, AND SERVICE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section describes the service meters, individual pressure reducing valves, and service lines to be provided, their materials, construction, type, and installation.

B. All meters shown on the plan sheets shall be 5/8 inch by 3/4 inch, unless otherwise noted.

C. All meters and appurtenances shall be compatible with the OWNERS existing system as shown in Section 11500 of these Specifications.

PART 2 PRODUCTS

2.01 METERS

A. SERVICE METER ASSEMBLY

1. Service meters to be furnished under this Contract shall be cold water rotating disc type with hermetically sealed and magnetically driven registers. Meters shall be first-line quality of the manufacturer and be in compliance with AWWA Standard C700, or latest revisions. Any type or make of meter supplied must have been manufactured and marketed in the U.S.A. for at least five (5) years. A bond may be submitted to waive this experience clause. The bond, if needed, shall be of an amount adequate for replacement of the meters and shall be held for five (5) years.

2. The main case shall be high grade waterworks bronze, with hinged, single lid cover and raised characters cast on them to indicate the direction of flow. Each meter must have the manufacturer’s serial number stamped on the lid. Working pressure shall be not less than 150 pounds per square inch. Standard frost bottom meters with non-ferrous strainers snug against the main case shall be provided.

3. The measuring chamber shall be of corrosion-resistant thermoplastic material. The chamber shall be of the two piece design, equipped with a disc made of hard rubber and as near to the specific gravity of water as possible. Discs shall be of the three piece design of the thrust roller type.

4. The register shall be straight reading U.S. gallon type. The register unit shall be completely encased and hermetically sealed, and driven by permanent magnets. There shall be a test index circle, divided into 100 equal parts, and shall have a red center sweep test hand. Water meters shall be Badger low profile model with Orion radio read attachments. This meter is a proprietary item for synchronization with the existing water system (see Section 11500). Registers shall be guaranteed by the manufacturer for a period of at least fifteen (15) years.

5. New Service Meters shall include meter box and cover, meter, coppersetter with dual check valves, four feet (4') of pipe and corporation stop, plus six feet (6') of pipe and adapter on the customer's side of meter. (This latter item is to prevent the customer or his plumber from disarranging or loosening the meter after the CONTRACTOR has already set the meter in its proper position.) Where the main line is in the highway right-of-way, meter shall be set as close to the right-of-way fence as practicable (as shown in the plans).

6. New meters shall be installed at each service connection unless directed otherwise by the ENGINEER. To allow for continuity of service, the brand and type of meter boxes, meter box covers and the setters are proprietary items and will be specified below.

   To match the existing units in the system, meters shall be Sensus SRII Manual Read.

   Meter boxes shall be Old Castle Precast brand PVC pipe non-corrugated smooth wall inside and out, twenty-four inches (24") deep x eighteen inches (18") diameter. The meter box cover shall be Sigma model LC218, 18" solid flat lid. Meters shall be five-eighths inch by three-fourths inch (5/8" x 3/4"), unless shown otherwise on the plans. Meter connections shall be made by means of McDonald coppersetters (#720-207WDDD) having a cutoff, dual check and three-fourths inch (3/4") spud. Prefabricated coppersetters tub assemblies shall not be used. When shown on the plans (Standard Details) an angle check valve shall be furnished on the meter outlet side of the coppersetter. (The size of meter box stated is for five-eighths inch by three-fourths inch (5/8" x 3/4") meter.) For larger meters, meter box size shall be in accordance with standard practice. Service saddles shall be McDonalds model #3891 to match the existing system.

7. Meters shall be set in a workmanlike manner with backfill neatly compacted in place. In yards, pastures and other grassed areas, top of meter box will be one-half inch (1/2") above grade, otherwise two inches (2") above grade. In all cases surface drainage shall be directed away from the meter box and not allowed to pool nearby. The grade around the boxes should not

excessively humped to prevent mowing or other maintenance of the area surrounding the box.

2.02 SERVICE LINES

A. Unless indicated otherwise on the plans, all service lines shall be three quarter inch (¾-inch) 200 psi Polyethylene tubing. A generous loop of Polyethylene tubing shall be included with the length required for the meter setting. A corporation stop, Mueller H-15008 to match existing installations in the city, or approved equal, shall be used on each service line at the main line connection.

B. Open cut shall be used on all city streets, county roads and private driveways during the construction of this KYTC roadway. Black topped private driveways shall also be jacked under. In all cases where lines are under traffic, a minimum cover of thirty inches (42”) shall be provided. All long side service connections will be constructed in a casing pipe. All backfill shall be puddled or compacted by air tampers in layers no greater than six inches (6”) in depth.

C. Existing service meters shall be disconnected from existing water mains and delivered to the city maintenance yard.

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° F to +140° 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). Straw Erosion Control Blankets shall be used on all slopes, drainage channels and shorelines. Straw Blankets shall be Non-Toxic and Biodegradable and staked at approximately 18-inch centers or by other equally acceptable means. Net Straw Erosion Control Blankets shall have photodegradable netting and applied the same as Straw Erosion Control Blankets.

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

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 5

METALS

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 is included in KYTC Standard Specifications for Road and Bridge Construction, most current edition, Division 600.

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., Neenah Foundry Company, 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 no 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, J.R. Hoe & Sons, Inc., 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, screw type, of sufficient length to allow for 36-inches of cover over the top of the pipe. 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. A concrete collar shall be poured with typical dimensions of 24” x 24” x 6” deep as shown in the detail drawing. 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.

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

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 9

FINISHES

SECTION 09960

COATING SYSTEMS FOR WASTEWATER TREATMENT FACILITY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Coating systems for wastewater processing facilities.

1.2 RELATED SECTIONS

A. Section 09250 – Gypsum Drywall.

B. Section 08120 – Hollow Metal Doors and Frames.

C. Section 15075 - Mechanical Identification: Identification of mechanical equipment & piping.

D. Section 13120 – Specification for Metal Building.

E. Section 16195 – Electrical Identification: Identification of electrical equipment.

1.3 REFERENCES

A. ASTM D 16 - Terminology Relating to Paint, Varnish, Lacquer, and Related Products.

B. ASTM D 4263 - Indicating Moisture in Concrete by the Plastic Sheet Method.

C. ASTM F 1869 - Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

D. International Concrete Repair Institute (ICRI) Guideline No. 03732 - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays.

E. NACE RP0188 - Standard Recommended Practice, Discontinuity (Holiday) Testing of Protective Coatings.

F. NAPF 500-03-04 Abrasive Blast Cleaning.

G. NAPF 500-03-03 Power Tool Cleaning.

H. SSPC-SP 1 - Solvent Cleaning.

I. SPPC-SP 5/NACE 1 - White Metal Blast Cleaning.

J. SSPC-SP 6/NACE 3 - Commercial Blast Cleaning.

K. SSPC-SP 10/NACE 2 - Near-White Metal Blast Cleaning.

L. SSPC-SP 13/NACE 6 - Surface Preparation of Concrete.

1.4 DEFINITIONS

A. Definitions of Painting Terms: ASTM D 16, unless otherwise specified.

B. Dry Film Thickness (DFT): Thickness of a coat of cured paint measured in mils (1/1000 inch).

C. Exposed Surface: A surface is considered exposed if it is subject to contact with air and/or water after installation is complete. Surfaces hidden in walls, above ceilings, in pipe chases, etc., are considered exposed. Metal to like metal surfaces, steel embedded in concrete, or similar embedded work products are not considered exposed.

1.5 SUBMITTALS

A. Comply with Section 01300 - Submittal Procedures.

B. Product Data: Submit manufacturer's product data for each coating, including generic description, complete technical data, surface preparation, and application instructions.

C. Color Samples: Submit manufacturer’s color samples showing full range of standard colors.

D. Manufacturer’s Quality Assurance: Submit manufacturer’s certification that coatings comply with specified requirements and are suitable for intended application.

E. Applicator’s Quality Assurance: Submit list of a minimum of 5 completed projects of similar size and complexity to this Work. Include for each project:

1. Project name and location.

2. Name of owner.

3. Name of contractor.

4. Name of engineer.

5. Name of coating manufacturer.

6. Approximate area of coatings applied.

7. Date of completion.

F. Warranty: Submit manufacturer's standard warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Specialize in manufacture of coatings with a proven successful experience.

2. Able to demonstrate successful performance on comparable projects.

3. Single Source Responsibility: Coatings and coating application accessories shall be products of a single manufacturer.

B. Applicator's Qualifications:

1. Experienced in application of specified coatings on projects of similar size and complexity to this Work.

2. Applicator's Personnel: Employ persons trained for application of specified coatings.

C. Preapplication Meeting: Convene a preapplication meeting two [2] weeks before start of application of coating systems. Require attendance of parties directly affecting work of this section, including Contractor, Engineer, applicator, and manufacturer's representative. Review the following:

1. Environmental requirements.

2. Protection of surfaces not scheduled to be coated.

3. Surface preparation.

4. Application.

5. Repair.

6. Field quality control.

7. Cleaning.

8. Protection of coating systems.

9. One-year inspection.

10. Coordination with other work.

D. Mock-Ups: Prepare 2 foot x 2 foot mock-up for each coating system specified using same materials, tools, equipment, and procedures intended for actual surface preparation and application. Obtain Engineer's approval of mock-ups. Retain mock-ups to establish intended standards by which coating systems will be judged.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying:

1. Coating or material name.

2. Manufacturer.

3. Color name and number.

4. Batch or lot number.

5. Date of manufacture.

6. Mixing and thinning instructions.

B. Storage:

1. Store materials in a clean dry area and within temperature range in accordance with manufacturer's instructions.

2. Keep containers sealed until ready for use.

3. Do not use materials beyond manufacturer's shelf life limits.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Weather:

1. Air and Surface Temperatures: Prepare surfaces and apply and cure coatings within air and surface temperature range in accordance with manufacturer's instructions.

2. Surface Temperature: Minimum of 5 degrees F (3 degrees C) above dew point.

3. Relative Humidity: Prepare surfaces and apply and cure coatings within relative humidity range in accordance with manufacturer's instructions.

4. Precipitation: Do not prepare surfaces or apply coatings in rain,

snow, fog, or mist.

5. Wind: Do not spray coatings if wind velocity is above manufacturer's limit.

B. Ventilation: Provide ventilation during coating evaporation stage in confined or enclosed areas in accordance with AWWA D 102.

C. Dust and Contaminants:

1. Schedule coating work to avoid excessive dust and airborne contaminants.

2. Protect work areas from excessive dust and airborne contaminants during coating application and curing.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Tnemec Company Incorporated, or approved equal.

B. When submitting for consideration coatings proposed to be substituted as equivalent to the specified coatings, the CONTRACTOR shall submit to the ENGINEER notarized certificates on the letterhead of the firm manufacturing the proposed substitution certifying that the proposed substitution is the equivalent of the specified material in quality and performance, and that the proposed substitution is suitable for the intended use. The CONTRACTOR shall also submit to the ENGINEER on the letterhead of the firm manufacturing the proposed substitution a list of installations similar to the installation for which the products are being proposed, at which installations the proposed products have performed reliably in similar service; this list shall include the name, address, and telephone number of the OWNER of each installation, and the name of that OWNER'S employee who is responsible for maintenance and construction.

C. Substitutions which decrease the film thickness, the number of coats applied, change the generic type of coating, or fail to meet the performance criteria of the specified materials will not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.

2.2 COATING SYSTEMS FOR STEEL - STRUCTURAL, TANKS, PIPE, EQUIPMENT, AND MISCELLANEOUS

A. Exterior Exposed:

1. System Type: MCU/epoxy/urethane.
2. Surface Preparation: SSPC-SP 6.
3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.
4. Intermediate Coat: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.
5. Finish Coat: Series 1074 Endura-Shield. DFT 2.0 to 3.0 mils.
6. Total DFT: 6.5 to 9.5 mils.
7. Finish Color: As indicated on the drawings.

B. Interior Exposed:

1. System Type: MCU/epoxy.
2. Surface Preparation: SSPC-SP 6.
3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.
4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils. *[May require two coats if brush or roller applied].*
5. Total DFT: 6.5 to 9.5 mils.
6. Finish Color: As indicated on the drawings.

C. H2S Gas Exposed:

1. System Type: MCU/Perma-Glaze.
2. Surface Preparation: SSPC-SP 5.
3. Primer: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.
4. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.
5. Total DFT: 30.0 to 40.0 mils.
6. Finish Color: [5021 Gray] [5022 Beige].

D. Immersion:

1. System Type: MCU/epoxy.

2. Surface Preparation: SSPC-SP 10.

3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.

3. Intermediate Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

5. Total DFT: 10.5 to 15.5 mils.

6. Finish Color: As indicated on the drawings.

2.3 COATING SYSTEMS FOR GALVANIZED STEEL AND NONFERROUS METAL - PIPE AND MISCELLANEOUS FABRICATIONS

A. Exterior Exposed:

1. System Type: Epoxy/urethane.

2. Surface Preparation: SSPC-SP 1 - Solvent Cleaning and etch.

3. Primer: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.

4. Finish Coat: Series 1074. DFT 2.0 to 3.0 mils.

5. Total DFT: 4.0 to 6.0 mils.

6. Finish Color: As indicated on the drawings, or color schedule.

B. Interior Exposed:

1. System Type: Epoxy.

2. Surface Preparation: SSPC-SP 1 - Solvent Cleaning and etch.

3. Primer: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.

4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.

5. Total DFT: 4.0 to 6.0 mils.

6. Finish Color: As indicated on the drawings, or color schedule.

C. H2S Gas Exposed:

1. System Type: MCU/Perma-Glaze.

2. Surface Preparation: SSPC-SP 1 - Solvent Cleaning and severely etch.

3. Primer: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

4. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

5. Total DFT: 30.0 to 40.0 mils.

6. Finish Color: [5021 Gray] [5022 Beige].

D. Immersion:

1. System Type: Epoxy.

2. Surface Preparation: SSPC-SP 1 followed by abrasive blast.

3. Primer Coat: Series N69 Hi-Build Epoxoline II. DFT 3.0 to 5.0 mils.

4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

5. Total DFT: 7.0 to 11.0 mils.

2.4 COATING SYSTEMS FOR DUCTILE OR CAST IRON - PIPE, PUMPS, AND VALVES

A. Exterior Exposed:

1. System Type: MCU/epoxy/urethane.

2. Surface Preparation: NAPF 500-03-03 Power Tool Cleaning.

3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.

4. Intermediate Coat: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.

5. Finish Coat: Series 1074 Endura-Shield. DFT 2.0 to 3.0 mils.

6. Total DFT: 6.5 to 9.5 mils.

7. Finish Color: As indicated on the drawings, or color schedule.

B. Below Ground (Buried):

1. System Type: Coal tar epoxy.

2. Surface Preparation: NAPF 500-03-04 Abrasive Blast Cleaning.

3. Finish Coat: Series 46H-413 Hi-Build Tneme-Tar. DFT 14.0 to 20.0 mils.

4. Total DFT: 14.0 to 20.0 mils.

5. Finish Color: As indicated on the drawings, or color schedule.

C. Interior Exposed:

1. System Type: MCU/Epoxy.

2. Surface Preparation: Surface Preparation: NAPF 500-03-03 Power Tool Cleaning.

3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.

4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils. *[May require two coats if brush or roller applied].*

5. Total DFT: 6.5 to 9.5 mils.

6. Finish Color: As indicated on the drawings, or color schedule.

D. H2S Gas Exposed:

1. System Type: MCU/Perma-Glaze.

2. Surface Preparation: Surface Preparation: NAPF 500-03-04 Abrasive Blast Cleaning.

3. Primer: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

4. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

5. Total DFT: 30.0 to 40.0 mils.

6. Finish Color: [5021 Gray] [5022 Beige].

E. Immersion:

1. System Type: MCU/Epoxy.

2. Surface Preparation: NAPF 500-03-04 Abrasive Blast Cleaning.

3. Primer: Series 1 Purpleprime. DFT 2.5 to 3.5 mils.

4. Intermediate Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

5. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

6. Total DFT: 10.5 to 15.5 mils.

2.5 COATING SYSTEMS FOR PVC

A. Exterior Exposed:

1. System Type: Epoxy/urethane.
2. Surface Preparation: Scarify.
3. Primer: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.
4. Finish Coat: Series 1074 Endura-Shield. DFT 2.0 to 3.0 mils.
5. Total DFT: 4.0 to 6.0 mils.
6. Finish Color: As indicated on the drawings, or color schedule.

B. Interior Exposed:

1. System Type: Epoxy.
2. Surface Preparation: Scarify.
3. Primer: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.
4. Finish Coat: Series N69 Hi-Build Epoxoline II. DFT 2.0 to 3.0 mils.
5. Total DFT: 4.0 to 6.0 mils.
6. Finish Color: As indicated on the drawings.

2.6 COATING SYSTEMS FOR INSULATED PIPE

A. Interior/Exterior Exposed:

1. System Type: Acrylic.
2. Surface Preparation: Clean and dry.
3. Primer: Series 28 Tufcryl. DFT 1.5 to 2.0 mils.
4. Finish Coat: Series 28 Tufcryl. DFT 1.5 to 2.0 mils.
5. Total DFT: 2.0 to 3.0 mils.
6. Finish Color: As indicated on the drawings, or color schedule.

2.7 COATING SYSTEMS FOR PRECAST CONCRETE, CAST-IN-PLACE CONCRETE, AND DENSE CONCRETE MASONRY UNITS

A. Exterior Exposed:

1. System Type: Acrylate.

2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.

3. Primer: Series 156 Enviro-Crete. Spreading Rate 125 sf/gal.

4. Finish Coat: Series 156 Enviro-Crete. Spreading Rate 200 sf/gal.

6. Finish Color: As indicated on the drawings.

B. Below Grade (Soil Side):

1. System Type: Coal tar epoxy.

2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.

3. Primer: None.

4. Finish Coat: 46H-413 Hi-Build Tneme-Tar. DFT 14.0 to 20.0 mils.

5. Total DFT: 14.0 to 20.0 mils.

6. Finish Color: Black.

C. H2S Gas Exposed and Severe Immersion:

1. System Type: Perma-Shield H2S/Perma-Glaze.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5

3. Surfacer: Series 218 MortarClad and/or Series 219 MortarCast.

4. First Coat: Series 434 Perma-Shield H2S. Nominal DFT 125 mils.

5. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

6. Total DFT: Over 140 mils.

7. Finish Color: [5021 Gray] [5022 Beige].

D. Immersion:

1. System Type: Epoxy.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline

03732, CSP-3.

3. Primer: Series N69 Hi-Build Epoxoline II. DFT 3.0 to 5.0 mils.

4. Intermediate Coat: Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

5. Finish Series N69 Hi-Build Epoxoline II. DFT 4.0 to 6.0 mils.

6. Total DFT: 11.0 to 17.0 mils.

7. Finish Color: As indicated on the drawings, or color schedule.

E. Interior Exposed:

1. System Type: Epoxy [Spay apply, or addition coats may be required].

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-3.

3. Primer: Series 113 H.B. Tneme-Tufcoat. DFT 4.0 to 6.0 mils. Roll or backroll.

4. Finish Coat: Series 113 H.B. Tneme-Tufcoat. DFT 4.0 to 6.0 mils.

5. Total DFT: 8.0 to 12.0 mils.

6. Finish Color: As indicated on the drawings, or color schedule.

2.8 COATING SYSTEMS FOR CONCRETE FLOORS

A. Mild Exposure:

1. System Type: Silicate Blend.

2. Surface Preparation: Clean & Dry. No curing compounds.

3. Primer: Series 629 CT Densifyer 201. 300-350 sq. ft./gal.

4. Finish Coat: 629 CT Densifyer 201. 350-400 sq. ft./gal.

6. Total DFT: N/A.

7. Finish Color: As selected by Architect from manufacturer's standard colors.

B. Heavy Traffic and Chemical Exposure :

1. System Type: Aggregate-filled epoxy/urethane.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5.

3. First Coats: Series 237 Power-Tread, double broadcast. DFT 1/8 inch.

4. Intermediate Coat: Series 280 Tneme-Glaze. DFT 6.0 to 8.0 mils.

5. Finish Coat: Series 290 CRU. DFT 2.0 to 3.0 mils.

6. Total DFT: Greater than 1/8 inch.

7. Finish Color: As indicated on the drawings. [Limited Color Selection]

8. Finish Texture: As required by the Engineer.

C. H2S Gas Exposed:

1. System Type: Perma-Shield H2S/Perma-Glaze.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5

3. Surfacer: Series 218 MortarClad and/or Series 219 MortarCast.

4. First Coat: Series 434 Perma-Shield H2S. Nominal DFT 125 mils.

5. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

6. Total DFT: Over 140 mils.

7. Finish Color: [5021 Gray] [5022 Beige].

D. Decorative:

1. System Type: Ceramic-filled epoxy.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5.

3. First Coats: Series 222 Deco-Tread, double broadcast. DFT 1/8 inch.

4. Finish Coat: Series 284 Deco-Clear. DFT 8.0 to 10.0 mils.

5. Total DFT: Greater than 1/8 inch.

6. Finish Color: As indicated on the drawings.

7. Finish Texture: As required by the Engineer.

E. High-Build Epoxy/Urethane Floor Coating

1. Surface Preparation: Shot Blast or Mech. Abrade (ICRI CSP 3-5).

2. Primer for concrete: Series 281 Tneme-glaze. DFT 6.0 to 8.0 mils.

3. Base Coat: Series 224 Deco-Fleck (broadcast flake to refusal or as directed by Engineer). Liquid DFT 8.0 to 10.0 Mils.

4. Grout Coat: Series 224 Deco-Fleck. DFT 8.0 to 10.0 Mils.

5. Intermediate Coat: Series 224 Deco-Fleck. DFT 8.0 to 10.0 Mils.

6. Finish Coat: Series 295 Clear CRU. DFT 2.0 to 3.0 Mils

7. Total DFT: 24.0 to 31.0 Mils.

8. Finish Color & Pattern: As selected by Architect from manufacturer's standard colors.

2.9 COATING SYSTEMS FOR SECONDARY CONTAINMENT

A. Chemical Storage Containment Area

1. System Type: High-solids epoxy.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5.

3. Primer: Series 201 Epoxoprime. DFT 6.0 to 8.0 mils.

4. Intermediate Coat: Series 275 Stranlock. DFT 25.0 to 40.0 mils.

5. Finish Coat: Series 282 Tneme-Glaze. DFT 8.0 to 12.0 mils.

6. Total DFT: 39.0 to 60 mils.

7. Finish Color: As indicated on the drawings. [Limited Color Selection]

B. Floors, Severe Chemical, Abrasion, and Traffic Exposure:

1. System Type: Aggregate-filled epoxy novalac.

2. Surface Preparation: SSPC-SP 13/NACE 6 and ICRI Guideline 03732, CSP-5.

3. First Coats: Series 239 Chemtread, double broadcast. DFT 1/8 inch.

4. Finish Coat: Series 282 Tneme-Glaze. DFT 6.0 to 8.0 mils.

5. Total DFT: Greater than 1/8 inch (125 mils).

6. Finish Color: As indicated on the drawings. [Limited Color Selection]

2.10 COATING SYSTEMS FOR POROUS CONCRETE MASONRY UNITS

A. Exterior Exposed:

1. System Type: Siloxane/Silane Water Repellent/ Methylmethacrylate Acrylic Stain.

2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.

3. First Coat: Series 662 Prime-A-Pell Plus. Spreading rate 65 to 85 sq. ft/gal.

4. Second Coat: Series 662 Prime-A-Pell Plus. Apply second coat wet-on-wet to saturation. Block receiving accent stain do not require a second coat.

5. Accent Stain: Series 607 Conformal Stain. Spreading rate 75 to 100 sq. ft/gal per coat. Apply two coats.

6. Total DFT: N/A.

7. Finish Color: As selected by Architect from manufacturer's standard colors.

B. Interior Exposed:

1. System Type: Cementious Acrylic/epoxy.

2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.

3. Primer: Series 130 Masonry Filler. Spreading rate 80 to 100 sq. ft/gal.

4. Intermediate Coat: 113 H.B. Tneme-Tufcoat. DFT 2.0 to 3.0 mils.

5. Finish Coat: Series 113 H.B. Tneme-Tufcoat. DFT 2.0 to 3.0 mils.

6. Total DFT: 4.0 to 6.0 mils plus filler.

7. Finish Color: As selected by Architect from manufacturer's standard colors.

C. H2S Gas Exposed:

1. System Type: Perma-Shield H2S/Perma-Glaze.

2. Surface Preparation: SSPC-SP 13/NACE 6. Clean and dry.

3. Primer: Series 130 Masonry Filler. Spreading rate 80 to 100 sq. ft/gal.

4. First Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

5. Finish Coat: Series 435 Perma-Glaze. DFT 15.0 to 20.0 mils.

6. Total DFT: 30.0 to 40.0 mils plus filler.

7. Finish Color: [5021 Gray] [5022 Beige].

2.11 COATING SYSTEMS FOR PLASTER, GYPSUM BOARD, AND WOOD

A. Interior Exposed:

1. System Type: Epoxy/acrylic-epoxy.

2. Surface Preparation: Clean and dry.

3. Primer: Series 151-1051 Elasto-Grip FC. DFT 1.0 to 1.5 mils.

4. Intermediate Coat: Series 113 H.B. Tneme-Tufcoat. DFT 2.0 to 3.0 mils.

5. Finish Coat: Series 113 H.B. Tneme-Tufcoat. DFT 2.0 to 3.0 mils.

6. Total DFT: 5.0 to 7.5 mils.

7. Finish Color: As selected by Architect from manufacturer's standard colors.

2.12 ACCESSORIES

A. Coating Application Accessories:

1. Accessories required for application of specified coatings in accordance with manufacturer's instructions, including thinners.

2. Products of coating manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which coating systems are to be applied. Notify Engineer of areas or conditions not acceptable. Do not begin surface preparation or application until unacceptable areas or conditions have been corrected.

3.2 PROTECTION OF SURFACES NOT SCHEDULED TO BE COATED

A. Protect surrounding areas and surfaces not scheduled to be coated from damage during surface preparation and application of coatings.

B. Immediately remove coatings that fall on surrounding areas and surfaces not scheduled to be coated.

3.3 SURFACE PREPARATION OF STEEL

A. Prepare steel surfaces in accordance with manufacturer's instructions.

B. Fabrication Defects:

1. Correct steel and fabrication defects revealed by surface preparation.

2. Remove weld spatter and slag.

3. Round sharp edges and corners of welds to a smooth contour.

4. Smooth weld undercuts and recesses.

5. Grind down porous welds to pinhole-free metal.

6. Remove weld flux from surface.

C. Ensure surfaces are dry.

D. Immersion or Below Grade Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 10/NACE 2. Create a blast profile of 1.5 to 2.5 mils.

E. Exterior Exposed or Interior Exposed Surfaces: Remove visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 6/NACE 3. Create a blast profile of 1.5 to 2.5 mils.

F. H2S Gas Exposed: Remove visible oil, grease, dirt, dust, mill scale, rust,

paint, oxides, corrosion products, and other foreign matter in accordance with SSPC-SP 10/NACE 1. Create a blast profile of at least 3.0 mils.

G. Abrasive Blast-Cleaned Surfaces: Coat abrasive blast-cleaned surfaces with primer before visible rust forms on surface. Do not leave blast-cleaned surfaces uncoated for more than 8 hours.

H. Shop Primer: Prepare shop primer to receive field coat in accordance with manufacturer's instructions. Removal all unknown shop primers and re-prime in accordance with this specification.

3.4 SURFACE PREPARATION OF GALVANIZED STEEL AND NONFERROUS METAL

A. Prepare galvanized steel and nonferrous metal surfaces in accordance with this specification and the coating manufacturers instructions.

B. Ensure surfaces are dry.

C. Immersion Service: Clean surfaces by abrasive blasting.

D. Remove Rust From Galvanized Steel:

1. Remove white rust from galvanized steel by hand or power brushing.

2. Do not damage or remove galvanizing.

E. Increase mechanical adhesion under moderate to severe conditions, such as exterior exposure or chemical environments, by abrasive blast and/or chemical cleaning.

3.5 SURFACE PREPARATION OF DUCTILE OR CAST IRON

A. Prepare ductile or cast iron surfaces in accordance with NAPF 500-03-04 Abrasive Blast Cleaning or NAPF 500-03-03 Power Tool Cleaning and the coating manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.6 SURFACE PREPARATION OF PVC

A. Prepare PVC surfaces in accordance with manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

C. Scarify PVC surfaces.

3.7 SURFACE PREPARATION OF INSULATED PIPE

A. Prepare insulated pipe surfaces in accordance with manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

3.8 SURFACE PREPARATION OF CONCRETE

A. Interior, Wet Substrate:

1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.

2. Allow concrete to cure for a minimum of 28 days.

3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.

4. Abrasive blast surface to remove laitance and solid contaminants and to provide clean, sound substrate with uniform anchor profile.

5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

6. Fill holes, pits, voids, and cracks with manufacturer approved surfacer.

7. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

B. Exterior and Interior Dry:

1. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.

2. Allow concrete to cure for a minimum of 14 days.

3. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.

4. Level concrete protrusions and mortar spatter.

5. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

6. Fill hairline cracks less than 1/64 inch (0.4 mm) in accordance with

manufacturer's instructions.

7. Prepare cracks wider than 1/64 inch (0.4 mm), moving cracks, gaps, and expansion joints in accordance with manufacturer's instructions.

8. Ensure surfaces are clean, dry, and free of oil, grease, chalk, form release agents, and other contaminants.

3.9 SURFACE PREPARATION OF CONCRETE FLOORS

A. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

C. Allow concrete to cure for a minimum of 28 days before coating.

D. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.

E. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

3.10 SURFACE PREPARATION OF SECONDARY CONTAINMENT

A. Prepare secondary containment surfaces in accordance with manufacturer's instructions.

B. Prepare concrete surfaces in accordance with manufacturer's instructions, SSPC-SP 13/NACE 6, and ICRI 03732.

C. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

D. Allow concrete to cure for a minimum of 28 days before coating.

C. Test concrete for moisture in accordance with ASTM D 4263 and, if necessary, F 1869.

D. Verify that the pH of the cleaned concrete surfaces to be coated is within the range of to 8 to 11. Application of coating materials outside this range will not be permitted without written approval from the Engineer.

3.11 SURFACE PREPARATION OF POROUS CONCRETE MASONRY UNITS

A. Prepare porous concrete masonry unit surfaces in accordance with manufacturer's instructions and SSPC-SP 13/NACE 6.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

C. Allow mortar to cure for a minimum of 28 days before coating.

D. Level protrusions and mortar spatter.

3.12 SURFACE PREPARATION OF PLASTER

A. Prepare plaster surfaces in accordance with manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

C. Allow plaster to cure and dry out for a minimum of 28 days before coating.

D. Do not coat over plaster containing free water, lime, or other soluble alkaline salts.

E. Remove plaster nibs and other protrusions.

F. Patch voids and cracks with approved materials and after dry, sand flush with surface.

3.13 SURFACE PREPARATION OF GYPSUM BOARD

A. Prepare gypsum board surfaces in accordance with manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, and other contaminants.

C. Sand joint compound smooth and feather edge.

D. Avoid heavy sanding of adjacent gypsum board surfaces, which will raise nap of paper covering.

E. Do not apply putty, patching pencils, caulking, or masking tape to drywall surfaces to be painted.

F. Lightly scuff-sand tape joints after priming to remove raised paper nap. Do not sand through primer.

3.14 SURFACE PREPARATION OF WOOD

A. Prepare wood surfaces in accordance with manufacturer's instructions.

B. Ensure surfaces are clean, dry, and free of oil, grease, dirt, dust, surface deposits of sap or pitch, and other contaminants.

C. Seal knots and pitch pockets.

D. Sand rough spots with the grain.

E. Fill cracks and holes with approved materials after primer is dry. Sand flush with surface when filler is hard.

F. Lightly sand between coats.

3.15 APPLICATION

A. Apply coatings in accordance with manufacturer's instructions.

B. Mix and thin coatings, including multi-component materials, in accordance with manufacturer's instructions.

C. Keep containers closed when not in use to avoid contamination.

D. Do not use mixed coatings beyond pot life limits.

E. Use application equipment, tools, pressure settings, and techniques in accordance with manufacturer's instructions.

F. Uniformly apply coatings at spreading rate required to achieve specified DFT.

G. Apply coatings to be free of film characteristics or defects that would adversely affect performance or appearance of coating systems.

H. Stripe paint with brush critical locations on steel such as welds, corners, and edges using specified primer. Apply and additional strip coat of the intermediate coating material in immersion areas.

I. Roll or backroll the first coat of epoxy or block filler applied to concrete or interior block substrates to work the material into the substrate.

3.16 REPAIR

A. Materials and Surfaces Not Scheduled To Be Coated: Repair or replace damaged materials and surfaces not scheduled to be coated.

B. Damaged Coatings: Touch-up or repair damaged coatings. Touch-up of minor damage shall be acceptable where result is not visibly different from adjacent surfaces. Recoat entire surface where touch-up result is visibly different, either in sheen, texture, or color.

C. Coating Defects: Repair in accordance with manufacturer's instructions coatings that exhibit film characteristics or defects that would adversely affect performance or appearance of coating systems.

3.17 FIELD QUALITY CONTROL

A. Required Inspections and Documentation:

1. Verify coatings and other materials are as specified.

2. Verify surface preparation and application are as specified.

3. Verify DFT of each coat and total DFT of each coating system are as specified using wet film and dry film gauges.

4. Coating Defects: Check coatings for film characteristics or defects that would adversely affect performance or appearance of coating systems.

a. Check for holidays on interior steel immersion surfaces using holiday detector.

5. Report:

a. Submit written reports describing inspections made and actions taken to correct nonconforming work.
b. Report nonconforming work not corrected.

c. Submit copies of report to Engineer and Contractor.

B. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of coating systems.

3.18 CLEANING

A. Remove temporary coverings and protection of surrounding areas and surfaces.

3.19 PROTECTION OF COATING SYSTEMS

A. Protect surfaces of coating systems from damage during construction.

3.20 ONE-YEAR INSPECTION

A. Owner will set date for one-year inspection of coating systems.

B. Inspection shall be attended by Owner, Contractor, Engineer, and manufacturer's representative.

C. Repair deficiencies in coating systems as determined by Engineer in accordance with manufacturers instructions.

3.21 SCHEDULES

A. Coating System Schedule:
Refer to the drawings for coating system schedules.

B. Color Schedule:
To facilitate identification of piping in plants and pumping stations the following color scheme shall be utilized:

Raw Sludge Line	Brown with black bands
Sludge recirculation suction line	Brown with yellow bands
Sludge draw off line	Brown with orange bands
Sludge recirculation discharge line	Brown
Sludge gas line	Orange (or red)
Natural gas line	Orange (or red) with black bands
Nonpotable water line	Blue with black bands
Potable water line	Blue
Chlorine line	Yellow
Sulfur dioxide	Yellow with red bands
Sewage (wastewater) line	Gray
Compressed air line	Green
Water lines for heating	Blue with 6-in. red band on 30-in. centers
Fuel oil/diesel	Red
Plumbing drains and vents	Black
Polymer	Purple

In situations where two colors do not have sufficient contrast to easily differentiate between them, a six-inch (6”) band of contrasting color shall be on one of the pipes at approximately 30 inch (30”) intervals. The name of the liquid or gas shall also be on the pipe. Provide arrows indicating the direction of flow.

END OF SECTION

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 11

EQUIPMENT

SECTION 11310

WENDY'S, BUS GARAGE & HOLY CROSS DUPLEX SUBMERSIBLE LIFT STATIONS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

The CONTRACTOR shall furnish all labor, materials, equipment and services for manufacturing, assembling, delivering, installing, testing and placing in service the sewage pumping station including pumps, motors, controls, basins, and appurtenances as noted on the drawings.

1.02 DEFINITIONS

When the term "pumping unit" is used, it shall be deemed to mean a pump or pumps, complete with, but not limited to, drive motor, accessories, appurtenances, and all associated equipment.

1.03 CONTRACT DRAWINGS

The contract drawings are intended to show a general arrangement of pumping equipment, controls, connected piping and valves. The pump manufacturer shall furnish each pumping unit complete with motor and all components necessary for the intended function of the unit.

1.04 RELATED WORK

A. Special and general requirements for WORK are included in Divisions 0 and 1.

B. Piping is specified in Division 2 and 15.

C. Valves are included in Division 15.

D. Electrical is specified in Division 16.

1.05 SUBMITTALS

A. SHOP DRAWINGS shall be submitted in accordance with Division 1, Section 01300.

B. SHOP DRAWINGS shall include detail installation drawings and dimensions as well as performance data.

C. The CONTRACTOR shall provide operation and maintenance manuals in accordance with Division 1, Section 01300.

1.06 FIELD TESTING

A. After start-up of the pumps, a representative of the manufacturer shall perform FIELD testing to verify the pump head, capacity and efficiencies are in compliance with the performance curve.

B. The CONTRACTOR shall furnish test equipment as necessary, including but not limited to direct-reading RMS wattmeter with potential and current transformers, calibrated test gages, calibrated flow measuring device, and a sufficient supply of water.

C. Each pump shall be operated at three points on the pump curve, one point being the specified design operating point the TDH, flow rate and efficiency shall be determined for each point and compared with the performance curve.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the complete requirement of these SPECIFICATIONS, manufacturers offering products which may be incorporated into the WORK include but are not limited to the following:

1. Myers

2. Or approved equal. All pumps that are proposed as an equal to the pump specified herein must be approved before bids are received or they will not be considered equal.

B. If pumps are proposed other than those specified herein, all lift stations relative to this specification shall contain pumps of a common manufacturer.

2.02 EQUIPMENT

A. General

All pumps and motor assemblies shall be FM listed for Class 1, Group D Explosion – Proof Service. Pumping units shall be designed and built for the specified operation without overheating, without excessive vibration or strain and requiring only generally acceptable maintenance.

The pumps shall be **solid handling sewage pumps with recessed type impeller capable of passing a 3" diameter sphere.** The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose and no need for personnel to enter the pump well. Each pump shall be fitted with

a stainless steel chain of adequate strength and length to permit raising the pump for inspection and removal.

All major parts, such as stator casing, oil casing, sliding bracket and volute shall be of gray iron. All surfaces coming into contact with sewage shall be protected by a coating resistant to sewage. All exposed nuts and bolts shall be of stainless steel. The discharge flange shall be **four (4)** inch standard.

B. Motors

Pump motor shall be of the sealed submersible type rated as listed on the pump schedule, at 60 Hertz. **Motors shall be three phase, 230V**.

Three phase motors shall be NEMA B type. Stator winding shall be of the open type with Class F insulation good for 155°C (311°F) maximum operating temperature. Winding housing shall be filled with a clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as flame path for seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be heat shrunk into motor housing.

A heat sensor thermostat shall be attached to and imbedded in the winding and be connected in series with the motor starter contactor coil to stop motor if temperature of winding is more than 120°C (248°F).

C. Seals

The motors shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

Upper seal face shall be silicon carbide and lapped to a flatness of one light band. Lower seal shall be silicon carbide.

A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control panel. This signal shall not stop the motor but shall act, as a warning only, indicating service is required.

D. Impeller

The pump impeller shall be cast ductile iron and of the recessed type. Pump-out vanes shall be used on back shroud. Impeller shall be dynamically balanced. Impeller shall be driven by stainless steel key and impeller held in position with lock screw and washer.

Impeller and motor shall have a top lift-out case so that the assembly can be removed without disturbing any piping.

E. Pump Case

The volute case shall be cast iron and have a flanged center line discharge. **Discharge flange shall be 4" standard** with bolt holes straddling center line.

F. Pump and Motor Castings

The pump shall be painted with waterborne hybrid acrylic/alkyd paint.to provide a high level of corrosion and chemical protection.

G. Bearing End Cap

Upper motor bearing cap shall be a separate casting for ease of mounting and replacement. All fasteners shall be stainless steel.

H. Power Cables

Power cord and control cord shall be double sealed. The power and control conductor shall be single strand sealed with epoxy potting compound and then clamped in place with rubber seal bushing to seal outer jacket against leakage and to provide for strain pull. Cords shall withstand a pull of 300 pounds to meet UL requirements. Minimum cable length shall be as required by equipment and controls location shown on the DRAWINGS.

Insulations of power and control cord shall be type SOOW or W. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame.

I. Lift Out Rail

1. COMPONENTS – The lift-out rail system shall be of non-sparking design and shall be listed for explosion-proof service. Each lift-out system consists of a discharge and rail support elbow that bolts to bottom of wet well, a brass seal flange that mounts to pump, stainless steel top rail support guides and guide/support brackets that mount to pump. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.

2. ELBOW - Discharge elbow shall be integrally cast into the base assembly.

3. GUIDE RAILS - Two rail pipes shall be used to guide the pump from the surface to the discharge base connection. The guide rails shall be schedule 40 stainless steel pipe, of a diameter recommended by the manufacturer (not less than 1-1/4 inches). The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to the access hatch frame. Systems deeper than 20 feet shall use an intermediate guide supports for each 10 feet of wet well depth.

J. Lifting Chains

An adequate length of stainless steel lifting chain, of adequate strength as recommended by the manufacturer, shall be supplied for removing each pump. The chain shall be of sufficient length and shall include an adequate number of lifting rings for easy removal. Length shall be 3' greater than overall wet well depth. A stainless steel fabricated hook shall be provided for each chain. These hooks shall be secured to the hatch frame with stainless steel bolts and nuts before the hatch is cast into concrete.

K. Discharge Piping and Bolts

Piping within the station shall be either flanged joint cement lined ductile iron with proper bolts and gaskets or HDPE welded pipe and fittings as specified in the DRAWINGS. All concrete anchor bolts used for any part of this station installation shall be stainless steel. All flange bolts shall be stainless steel.

L. Top Rail Support Plates

One (1) each stainless steel top rail support plate shall be provided for each installed pump. This plate shall be fabricated of aluminum plate and shall contain expandable rubber bushings to accept the stainless steel guide rails. These rubber bushings when completely tightened shall provide for a tight, vibration free guide rail installation. Notched openings in the rail support plates shall provide for horizontal adjustment. All fasteners shall be stainless steel.

M. Gravity Sewers/Force Main Inflows

All gravity sewers/force mains entering the wet well shall be as shown on the PLANS. All gravity sewers and force main inflow pipes shall extend 3" within the inside of the wet well. A Link-Seal (or equal) and Non-shrink grout shall be used to seal all pipe penetrations within the wet well. Gravity sewer discharges will be funneled to the bottom of the wet well with a correctly sized (based on inflow pipe diameter) Drop Bowl by Reliner (or equal) attached to a vertical SDR 35 drop pipe with supports. Force main sewer discharges will be similarly equipped with drop bowl and drops of equal size to the inflow. The force main will be funneled by

a correctly sized (based on force main pipe diameter) Drop Bowl with hood attachment attached by 4 stainless steel bolts.

Link-Seal or Kor-N-Seal gaskets will be used in conjunction with non-shrink grout to seal all pipe penetrations within the wet well as shown on the detail drawings.

N. Discharge Piping

All piping shall be installed plumb and without strains or binds. Piping shall be properly supported. Any fabricated pipe supports used shall be stainless steel or auminum.

Contractor is to consult pump manufacture for clearance between pumps before setting pump base. Contractor is to also confirm clearance for removal of pumps through hatch at that time.

O. Pipe Fittings - Flanged

All flanged pipe fittings shall be ductile iron, cement lined AWWA type. Flange bolts shall be stainless steel. All flange bolts shall be assembled using “Never Seeze”. Flanges shall not interfere with the removal of the pumps.

P. Pipe Fittings - Mechanical Joint

All mechanical joint pipe fitting shall be ductile iron cement lined with restrained joint connections. All mechanical joint fittings shall be properly blocked as required.

Q. Guide Rails

All guide rails shall be type 304, schedule 40 stainless steel. When HDPE is used for the piping between the pumps and the valve vault, the mounting of the interim guide rail supports must not be connect to the HDPE piping. The supports must be tied into the side of the concrete wet well (see the DRAWINGS for details).

R. Access Hatches - Wet Well and Valve Vault

There shall be furnished and installed one (1) aluminum access hatch for lift station wet well and one for valve vault. Wet well hatches shall be sized to allow removal of all pumping equipment. The hatch shall be of non-skid design and designed to handle a weight of 300 pounds per square foot. A positive hold open bar shall be provided to secure the hatch in the open position. Stainless steel bolts for mounting each rail support plate shall be furnished so that each set of guide rails can mount directly to the access hatch.

All hinges and hinge bolts shall be stainless steel. All hinge bolt nuts shall be tack welded to prevent removal of bolts. All fasteners used on the hatches shall be stainless steel.

All areas of hatch frames that will be in contact with concrete shall be coated with bitumastic paint.

All single door wet well hatches shall be equal to Halliday Products or U. S. FOUNDRY type A.P.S. All double door wet well hatches shall be equal to Halliday Products or U. S. FOUNDRY type A.P.S.

All wet well hatches shall be furnished with factory installed stainless steel bolts for securing the guide rail support plates, float mounting bracket, chain hooks and cable strain reliefs. Holes for these bolts shall be drilled and tapped at the factory. Bolts as required shall be threaded into the hatch frame from the concrete side and secured with stainless steel nuts.

All bolts shall be installed to prevent interference when closing the hatch. An adequate offset of the hatch stiffeners shall be made so that FIELD installation of the guide rail top support plates will not interfere with closing of the hatch.

Each wet well shall be supplied with a protective grating panel as manufactured by Halliday Products, of Orlando, Florida shall be 1-inch (25 kg.) aluminum “I” bar grating with Safety Orange powder-coated finish. Grating shall be hinged and shall be supplied with a positive latch to maintain unit in an upright position. Grating shall have a 6-in. (152mm) viewing area on each lateral unhinged side for visual observation and limited maintenance. Grating support ledges on 300 lbs. psf (1464 kg. per sq. meter) loaded access covers shall incorporate nut rail with a minimum of four (4) stainless steel spring nuts. A padlock hasp for owner-supplied padlock shall be provided.

S. Wet Well and Valve Vault

Where required, lift station basin and valve vault extensions and/or lids shall be precast reinforced concrete pipe in conformance with ASTM C478 (LR) constructed as shown on the DRAWINGS. Both wet well and valve vault concrete construction shall contain Xypex C-1000 additive or approved equal. The interior of the basin, and interior piping shall be protective coated per Division 9 of these specifications. Also refer to other requirements in Section 02733.

T. Duplex Control Panel

The pump manufacturer shall provide a duplex stainless steel control panel as shown on plans and in accordance with all applicable electrical codes. The gages and controls placed in the panel shall be digital. A 120-volt, 15-amp convenience outlet will be included in the face of the panel. Where telemetry is specified in the plans, a separate panel shall be used for the radio-based telemetry for monitoring of pumps and floats.

The stainless steel control panel enclosure will be lockable, NEMA 4X rated and of adequate dimensions to allow for the required equipment to be fully enclosed. Panel shall include a single 120 volt, 15 amp

convenience outlet (and where specified in the DRAWINGS a circuit for odor control blower fan). The control panel shall be powered with both surge protection and lighting protection for the panel components.

The panel shall be wired with quick connections that will match up with a portable generator for backup power. When this connection is made, an integrated disconnect will prevent the generator from energizing the connected electrical power lines.

The control panel will be mounted offset from the wet well and valve vault and the cables routed through an NEMA4 junction box on the wet well. The panel will be mounted on slotted strut channel and either set into natural ground or (in an flood prone area) supported by an elevated platform (see the DRAWINGS for details). The cables from the junction box to the control panel will run underground in PVC conduit of adequate size.

This panel will be exposed to direct sunlight and rain fall without any protection. The panel shall be a clasp type enclosure. Enclosures with caulk strips in the door panel for a rain seal will not be acceptable.

U. Junction Box Mounting

The junction box shall be mounted on a vented single wide pedestal 24-inches above the wet well as shown on the plans, on a base of sufficient strength to accommodate the weight of the panel. All necessary hardware to mount the frame and control panel shall be stainless steel. Seal offs will be included in all cable passages into the junction box to prevent gases from entering the panel.

This panel will be exposed to direct sunlight and rain fall without any protection. The panel shall be a clasp type enclosure. Enclosures with caulk strips in the door panel for a rain seal will not be acceptable.

V. Elapsed Time Meter

An E.T.M. shall be provided for each pump to record the actual running time of the motor. The E.T.M. shall be energized by an auxiliary contact from the motor starter or contactor and be wired in parallel with the pump run light. The E.T.M. shall have a maximum reading of 99,999.99 hours. The E.T.M. shall be non-resettable.

W. Intrinsically Safe Relays

Intrinsically safe relays shall be provided for the float switches in the wet well. The float switches shall be incapable of releasing sufficient electrical or thermal energy under normal conditions to cause ignition of a specific hazardous atmospheric mixture suitable for use in Division I locations. The intrinsically safe relay shall read circuits up to 3,000 Ohms resistance. The power transmitted through the float switch shall be held to a maximum of 12 VDC and 3 MA. Standard simplex panels shall use

two relays (pump off-on, high water), standard duplex panels shall use three relays (pump off-on, override, high water).

X. Motor Heat Sensor and Seal Leak Circuitry for Explosion Proof Pumps

The control panel shall contain motor heat sensor and seal leak circuitry required for explosion proof pumps. The seal leak circuitry shall contain a test switch and light that will allow the integrity of the circuit to be tested. The motor heat sensor circuitry shall require a manual reset for either a tripped heat sensor or a tripped thermal overload contact. Either of which shall also signal an indicating light.

Y. Alarm Light

The control panel shall be fitted with a red lexan (polycarbonate) alarm light. The light shall be 3” high by 3 1/2” diameter. The lens shall be mounted on top of the enclosure with a neoprene gasket. The lens shall not be able to be removed from the exterior of the enclosure. The lens may be removed by entering the interior of the enclosure and removing four (4) #8 screws. The bulb shall be 40-watt minimum high intensity medium base type. The bulb shall be easily replaced by removing a thumb screw from the support bracket on the interior of the panel. The alarm light shall have a bright glow during high water conditions. The alarm light will go out when the water level drops.

Z. Alarm Horn

An audible alarm horn shall be provided to indicate an alarm condition. The horn shall be energized by either the alarm float switch or the alarm test switch and operate in conjunction with the alarm light. The horn shall be weatherproof and be rated for 103 DB at 10 feet.

AA. Identification Nameplate - Accessories

Each piece of equipment shall be provided with a stainless steel nameplate, securely fastened in place and clearly inscribed with the manufacturer’s name, year of manufacturer, serial number, and principal rating data. A second identical nameplate shall be provided for each submersible pump and affixed to the control panel.

The CONTRACTOR shall furnish with each type, kind or size of pumping unit, two sets of any special suitably marked high-grade tools, gauges and fixtures which may be needed to adjust, operate, maintain or repair the equipment. Such tools and accessories shall be furnished in neat, special steel cases fitted with locks and keys and delivered to the ENGINEER prior to the initial operation of equipment.

AB. Float Level Switches

If the lift station detail DRAWINGS indicates that a Transducer will be utilized in the wet well, two emergency float level switches for sewage lift

stations shall be mechanically activated (no mercury) and shall be normally open (N.O) or normally closed (N.C.) as required. The two floats will be set at a minimum of 6" above or below the transducer settings to prevent false readings and interference.

If the lift station details DRAWINGS indicates that only floats will be used in the wet well (no transducer in the wet well), four water level floats float level switches for sewage lift stations shall be mechanically activated (no mercury) and shall be normally open (N.O) or normally closed (N.C.) as required. The elevations of the four conditions that will activate the floats will be specified on the DRAWINGS and will be at the condition of Pump OFF, Pump ON, Second Pump ON and Emergency Alarm.

Cable shall be flexible 18-gauge, 2 conductor (UL, CSA) SJOW, water-resistant (CPE), and of a length appropriate for the specific application. Float shall be approximately 2.75 inches diameter x 5 inches long, constructed of high impact, corrosion resistant, polypropylene housing for use in sewage and water up to 60°C (140°F), up to 30 feet deep. Electrical rating shall be 5 amps, 125/250 VAC, 50/60 Hz. Floats shall be equipped with external weights. Floats shall monitor emergency high level (above both pump starts) and emergency low level (below pump off) and be separated from the submersible transducer. Floats shall be SJE Signal Master or Approved Equal.

2.03 PUMP SCHEDULE

Lift Station	Flow (gpm)	Head (TDH)	Make	Model	Impeller (in)	Power Phase	Speed (rpm)	Power (HP)
Wendy's Duplex Lift Station	207	53	Myers	4RX	7.75	3	1750	7.5
Bus Garage Duplex Lift Station	190	42	Myers	4RX	7.13	3	1750	7.5
Holy Cross Duplex Lift Station	330	33	Myers	4RX	7.13	3	1750	7.5

Notes: **Motor shall be 230V, 3-phase, 60 Hertz**.
All pumps shall have a 4" discharge diameter. **All pumps shall have a 5-year manufactures warranty. The warranty period is to begin on the date of manufacture's startup.**

PART 3 EXECUTION

3.01 PAINTING

A. Painting shall be in accordance with Division 9.

3.02 FIELD SERVICE

A. A qualified manufacturer's representative shall inspect the installation and be present at the initial start-up and pump tests to confirm each pump capacity and efficiency.

3.03 INSTALLATION

A. Work shall be performed in a workmanship manner in accordance with manufactures recommendations.

END OF SECTION

SECTION 11311

COURT STREET DUPLEX SUBMERSIBLE LIFT STATION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

The CONTRACTOR shall furnish all labor, materials, equipment and services for manufacturing, assembling, delivering, installing, testing and placing in service the sewage pumping station including pumps, motors, controls, basins, and appurtenances as noted on the drawings.

1.02 DEFINITIONS

When the term "pumping unit" is used, it shall be deemed to mean a pump or pumps, complete with, but not limited to, drive motor, accessories, appurtenances, and all associated equipment.

1.03 CONTRACT DRAWINGS

The contract drawings are intended to show a general arrangement of pumping equipment, controls, connected piping and valves. The pump manufacturer shall furnish each pumping unit complete with motor and all components necessary for the intended function of the unit.

1.04 RELATED WORK

A. Special and general requirements for WORK are included in Divisions 0 and 1.

B. Piping is specified in Division 2 and 15.

C. Valves are included in Division 15.

D. Electrical is specified in Division 16.

1.05 SUBMITTALS

A. SHOP DRAWINGS shall be submitted in accordance with Division 1, Section 01300.

B. SHOP DRAWINGS shall include detail installation drawings and dimensions as well as performance data.

C. The CONTRACTOR shall provide operation and maintenance manuals in accordance with Division 1, Section 01300.

1.06 FIELD TESTING

A. After start-up of the pumps, a representative of the manufacturer shall perform FIELD testing to verify the pump head, capacity and efficiencies are in compliance with the performance curve.

B. The CONTRACTOR shall furnish test equipment as necessary, including but not limited to direct-reading RMS wattmeter with potential and current transformers, calibrated test gages, calibrated flow measuring device, and a sufficient supply of water.

C. Each pump shall be operated at three points on the pump curve, one point being the specified design operating point the TDH, flow rate and efficiency shall be determined for each point and compared with the performance curve.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with the complete requirement of these SPECIFICATIONS, manufacturers offering products which may be incorporated into the WORK include but are not limited to the following:

1. Myers

2. Or approved equal. All pumps that are proposed as an equal to the pump specified herein must be approved before bids are received or they will not be considered equal.

B. If pumps are proposed other than those specified herein, all lift stations relative to this specification shall contain pumps of a common manufacturer.

2.02 EQUIPMENT

A. General

All pumps and motor assemblies shall be FM listed for Class 1, Group D Explosion – Proof Service. Pumping units shall be designed and built for the specified operation without overheating, without excessive vibration or strain and requiring only generally acceptable maintenance.

The pumps shall be **solid handling submersible sewage pumps with 2-vane enclosed impeller capable of passing a 3-3/16" diameter sphere.** The design shall be such that pumping units will be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose and no need for personnel to enter the pump

well. Each pump shall be fitted with a stainless steel chain of adequate strength and length to permit raising the pump for inspection and removal.

All major parts, such as stator casing, oil casing, sliding bracket and volute shall be of gray iron. All surfaces coming into contact with sewage shall be protected by a coating resistant to sewage. All exposed nuts and bolts shall be of stainless steel. The discharge flange shall be **six (6)** inch standard.

B. Motors

Pump motor shall be of the sealed submersible type rated as listed on the pump schedule, at 60 Hertz. **Motors shall be three phase, 230V**.

Three phase motors shall be NEMA B type. Stator winding shall be of the open type with Class H insulation good for 150°C maximum operating temperature. Winding housing shall be filled with a clean high dielectric oil that lubricates bearings and seals and transfers heat from windings and rotor to outer shell. Air-filled motors which do not have the superior heat dissipating capabilities of oil-filled motors shall not be considered equal.

Motor shall have two heavy duty ball bearings to support pump shaft and take radial and thrust loads and a sleeve guide bushing directly above the lower seal to take radial load and act as flame path for seal chamber. Ball bearings shall be designed for 50,000 hours B-10 life. Stator shall be heat shrunk into motor housing.

A heat sensor thermostat shall be attached to and imbedded in the winding and be connected in series with the motor starter contactor coil to stop motor if temperature of winding is more than 130°C. Thermostat to reset automatically when motor cools to safe operating temperature. The common pump, motor shaft shall be 416 stainless steel.

C. Seals

The motors shall be protected by two mechanical seals mounted in tandem with a seal chamber between the seals. Seal chamber shall be oil filled to lubricate seal face and to transmit heat from shaft to outer shell.

Seal face shall be carbon and ceramic and lapped to a flatness of one light band. Lower seal shall be silicon carbide.

A double electrode shall be mounted in the seal chamber to detect any water entering the chamber through the lower seal. Water in the chamber shall cause a red light to turn on at the control panel. This signal shall not stop the motor but shall act, as a warning only, indicating service is required.

D. Impeller

The pump impeller shall be ductile iron and of the 2-vane solids handling enclosed type. Vanes inlet tips shall be carefully rounded to prevent stringy material from catching in vanes. Pump-out vane shall be used in front and back chambers. Impeller shall be dynamically balanced. Impeller shall be driven by stainless steel key and impeller held in position with lock screw and washer.

Impeller and motor shall have a top lift-out case so that the assembly can be removed without disturbing any piping. Impeller neck shall run in bronze ware ring that is pressed into volute case.

E. Pump Case

The volute case shall be cast iron and have a flanged center line discharge. **Discharge flange shall be 6" standard** with bolt holes straddling center line. A bronze ware ring shall be pressed into case for guiding impeller neck and to prevent corrosion freeze-up. Ware ring to be held from rotating by locking with stainless steel set screw in end of ring.

F. Pump and Motor Castings

The pump shall be painted with waterborne hybrid acrylic/alkyd paint.to provide a high level of corrosion and chemical protection. All fasteners shall be 302 stainless steel.

G. Bearing End Cap

Upper motor bearing cap shall be a separate casting for ease of mounting and replacement.

H. Power Cables

Power cord and control cord shall be double sealed. The power and control conductor shall be single strand sealed with epoxy potting compound and then clamped in place with rubber seal bushing to seal outer jacket against leakage and to provide for strain pull. A third sealing area shall be provided by a terminal board to separate the cable entry chamber from the motor chamber. Cords shall withstand a pull of 300 pounds to meet UL requirements. Minimum cable length shall be as required by equipment and controls location shown on the DRAWINGS.

Insulations of power and control cord shall be type SOOW or W. Both control and power cords shall have a green carrier ground conductor that attaches to motor frame.

I. Lift Out Rail

1. COMPONENTS – The lift-out rail system shall be of non-sparking design and shall be listed for explosion-proof service. Each lift-out system consists of a discharge and rail support elbow that bolts to bottom of wet well, a brass seal flange that mounts to pump,

stainless steel top rail support guides and guide/support brackets that mount to pump. All exposed nuts, bolts, and fasteners shall be 300 series stainless steel.

2. ELBOW - Discharge elbow shall be integrally cast into the base assembly.

3. GUIDE RAILS - Two rail pipes shall be used to guide the pump from the surface to the discharge base connection. The guide rails shall be schedule 40 stainless steel pipe, of a diameter recommended by the manufacturer (not less than 1-1/4 inches). The weight of the pump shall bear solely on the discharge base and not on the guide rails. Rail systems which require the pump to be supported by legs which might interfere with the flow of solids into the pump suction will not be considered equal. The guide rails shall be firmly attached to the access hatch frame. Systems deeper than 20 feet shall use an intermediate guide for each 20 feet of wet well depth.

J. Lifting Chains

An adequate length of stainless steel lifting chain, of adequate strength as recommended by the manufacturer, shall be supplied for removing each pump. The chain shall be of sufficient length and shall include an adequate number of lifting rings for easy removal. Length shall be 3' greater than overall wet well depth. A stainless steel fabricated hook shall be provided for each chain. These hooks shall be secured to the hatch frame with stainless steel bolts and nuts before the hatch is cast into concrete.

K. Discharge Piping and Bolts

Piping within the station shall be either flanged joint cement lined ductile iron with proper bolts and gaskets or HDPE welded pipe and fittings as specified in the DRAWINGS. All concrete anchor bolts used for any part of this station installation shall be stainless steel. All flange bolts shall be stainless steel.

L. Top Rail Support Plates

One (1) each stainless steel top rail support plate shall be provided for each installed pump. This plate shall be fabricated of aluminum plate and shall contain expandable rubber bushings to accept the stainless steel guide rails. These rubber bushings when completely tightened shall provide for a tight, vibration free guide rail installation. Notched openings in the rail support plates shall provide for horizontal adjustment. All fasteners shall be stainless steel.

M. Gravity Sewers/Force Main Inflows

All gravity sewers/force mains entering the wet well shall be as shown on the PLANS. All gravity sewers and force main inflow pipes shall extend

3" within the inside of the wet well. A Link-Seal (or equal) and Non-shrink grout shall be used to seal all pipe penetrations within the wet well. Gravity sewer discharges will be funneled to the bottom of the wet well with a correctly sized (based on inflow pipe diameter) Drop Bowl by Reliner (or equal) attached to a vertical SDR 35 drop pipe with supports. Force main sewer discharges will be similarly equipped with drop bowl and drops of equal size to the inflow. The force main will be funneled by a correctly sized (based on force main pipe diameter) Drop Bowl with hood attachment attached by 4 stainless steel bolts.

Link-Seal or Kor-N-Seal gaskets will be used in conjunction with non-shrink grout to seal all pipe penetrations within the wet well as shown on the detail drawings.

N. Discharge Piping

All piping shall be installed plumb and without strains or binds. Piping shall be properly supported. Any fabricated pipe supports used shall be stainless steel or auminum.

Contractor is to consult pump manufacture for clearance between pumps before setting pump base. Contractor is to also confirm clearance for removal of pumps through hatch at that time.

O. Pipe Fittings - Flanged

All flanged pipe fittings shall be ductile iron, cement lined AWWA type. Flange bolts shall be stainless steel. All flange bolts shall be assembled using "Never Seeze". Flanges shall not interfere with the removal of the pumps.

P. Pipe Fittings - Mechanical Joint

All mechanical joint pipe fitting shall be ductile iron cement lined with restrained joint connections. All mechanical joint fittings shall be properly blocked as required.

Q. Guide Rails

All guide rails shall be type 304, schedule 40 stainless steel. When HDPE is used for the piping between the pumps and the valve vault, the mounting of the interim guide rail supports must not be connect to the HDPE piping. The supports must be tied into the side of the concrete wet well (see the DRAWINGS for details).

R. Access Hatches - Wet Well and Valve Vault

There shall be furnished and installed one (1) aluminum access hatch for lift station wet well and one for valve vault. Wet well hatches shall be sized to allow removal of all pumping equipment. The hatch shall be of non-skid design and designed to handle a weight of 300 pounds per square foot. A positive hold open bar shall be provided to secure the

hatch in the open position. Stainless steel bolts for mounting each rail support plate shall be furnished so that each set of guide rails can mount directly to the access hatch.

All hinges and hinge bolts shall be stainless steel. All hinge bolt nuts shall be tack welded to prevent removal of bolts. All fasteners used on the hatches shall be stainless steel.

All areas of hatch frames that will be in contact with concrete shall be coated with bitumastic paint.

All single door wet well hatches shall be equal to Halliday Products or U. S. FOUNDRY type A.P.S. All double door wet well hatches shall be equal to Halliday Products or U. S. FOUNDRY type A.P.S.

All wet well hatches shall be furnished with factory installed stainless steel bolts for securing the guide rail support plates, float mounting bracket, chain hooks and cable strain reliefs. Holes for these bolts shall be drilled and tapped at the factory. Bolts as required shall be threaded into the hatch frame from the concrete side and secured with stainless steel nuts.

All bolts shall be installed to prevent interference when closing the hatch. An adequate offset of the hatch stiffeners shall be made so that FIELD installation of the guide rail top support plates will not interfere with closing of the hatch.

Each wet well shall be supplied with a protective grating panel as manufactured by Halliday Products, of Orlando, Florida shall be 1-inch (25 kg.) aluminum “I” bar grating with Safety Orange powder-coated finish. Grating shall be hinged and shall be supplied with a positive latch to maintain unit in an upright position. Grating shall have a 6-in. (152mm) viewing area on each lateral unhinged side for visual observation and limited maintenance. Grating support ledges on 300 lbs. psf (1464 kg. per sq. meter) loaded access covers shall incorporate nut rail with a minimum of four (4) stainless steel spring nuts. A padlock hasp for owner-supplied padlock shall be provided.

S. Wet Well and Valve Vault

Where required, lift station basin and valve vault extensions and/or lids shall be precast reinforced concrete pipe in conformance with ASTM C478 (LR) constructed as shown on the DRAWINGS. Both wet well and valve vault concrete construction shall contain Xypex C-1000 additive or approved equal. The interior of the basin, and interior piping shall be protective coated per Division 9 of these specifications. Also refer to other requirements in Section 02733.

T. Duplex Control Panel

The control center shall be built in a NEMA 4X stainless steel enclosure with intrinsically safe barriers and shall be suitable for the specified horsepower and voltage for the pumping equipment. The outer door of

the panel shall be hinged dead front with provisions for locking with a padlock. Inside shall be a separate hinged panel to protect all electrical components. Hand-Off-Automatic (H-O-A) switches, run lights, circuit breakers, etc. shall be mounted such that only the faces protrude through the inside swing panel. All switches, lights and resets shall be oil tight.

A main circuit breaker, along with individual pump breakers shall be provided. A separate circuit breaker shall be supplied for power to the control circuit. The control center shall include a control voltage transformer to reduce supply voltage to 115-volt, single (1) phase to be used for all control functions except the level circuit and associated relays which shall be provided with 24 volt control voltage. A green run light and H-O-A switch shall be provided for each pump. A terminal strip shall be provided to make field connections of pump power leads, float switches, seal sensor leads, heat sensor leads, and remote monitor panel interconnections.

A time delay relay shall be provided to delay start of second pump should power outage occur. Pump disable discrete inputs shall cause the alternator to skip over disabled pump(s).

The control system shall incorporate a Primex Levelview variable speed pump controller. Display shall show levels in feet and tenths of feet.

The duplex panel shall incorporate connections for heat sensors which shall be installed in the pumps. The connection shall disconnect the starter upon high temperature signal and shall automatically reconnect when condition has been corrected or motor temperature has returned to normal.

Circuitry and connections for seal fail monitoring shall also be provided. The panel shall have a seal failure alarm light for each pump. This alarm shall indicate failure of the lower mechanical seal in the pump. This shall be an alarm light only and shall not shut down the pump(s).

The control center shall include an hour meter for each pump to register the elapsed operating time of each pump.

The control center shall have a high-level alarm built into the main enclosure. The alarms shall consist of a flashing alarm light with red Lexan plastic cover or red glass globe with metal guard mounted on top of the enclosure which that it is visible from all directions.

A condensate heater shall be provided to protect against condensation inside the enclosure. The heater shall be placed so as not to damage any other component or wiring in the control center.

the control center shall include lightning protection and a phase monitor relay to shut down the control circuit and protect the equipment due to loss of phase or phase reversal. The three-phase sequence voltage relay shall be of the 8-pin connector type.

The control center shall incorporate an alternator selector switch to allow selection of automatic alternation or manual selection of the lead pump.

An interior GFI convenience outlet with 20 amp breaker and suitable transformer or power supply to provide 110 volt single (1) phase power to the convenience outlet. This circuit will also power the external odor control blower fan where specified on the DRAWINGS.

In order to maintain unit responsibility and warranty on the pumping equipment and control center, the control center must be furnished by the pump manufacturer as suitable for operation with the pumping equipment.

A two-float back-up control system shall be provided; should the transducer for pump controller fail, the back-up system shall start/stop the pumps as needed.

The control panel manufacturer shall provide adequate cooling/ventilation to ensure the control enclosure remains at an optimum operating temperature.

U. Pump Controller

The pump control device shall be able to control up to four pumps to perform liquid level control. The device must be capable of controlling any mix of constant speed and variable speed pumps. It shall be capable of alternating the pumps, and shall provide lag pump delays and high and low level alarms.

The pump control device shall be standard “off the shelf” equipment with published literature and fully tested hardware and operating program. The device must be field configurable from the front of the unit, and require no special tools or software to set-up or operate. It shall be a microprocessor-based device and not require a battery to maintain the operating program. All set-up values shall be stored in non-volatile memory.

The pump control device shall be UL listed as Industrial Control Equipment, UL 508.

A numerical level display must be provided on the front of the unit. It shall have a 3 digit, 7 segment LED display and show levels in feet and tenths of feet.

The pump controller shall not require an external power supply or any external I/O modules to be a fully functioning unit. An isolated analog input (4-20mA) with zero and span adjustments must be provided for the wet-well level input. Relay outputs must be provided as standard for high and low level alarms and for the control of up to four pumps. Up to four analog outputs (4-20mA) must be available, as an option, for VFD speed control when needed. Up to four isolated analog inputs (4-20mA) inputs must also be available, as an option, for use when needed as telemetry

inputs. All electrical connections, for power or I/O, must be by quick-disconnect, phoenix-style connectors.

The pump control device must have at least 18 discrete inputs. The inputs must be transient protected and be programmable for the following functions:

- Pump disable with HOA in OFF, or pump fault
- External Alternator Selector Switch
- All pump disable – for connection to Phase Monitor
- Limit number of pumps, called to run, while on emergency power
- Alternation by External Time Clock
- Call pump last – for connection to VFD/Bypass logic
- Pump disable upon low level – for connection to low level float switch
- Float switch backup
- A variety of telemetry functions

Trouble shooting features must include a fault indicator on the front of the unit and retrievable fault codes that aid in diagnosing most common problems.

Status of the discrete inputs must also be viewable from the front of the unit.

A level simulation feature must also be available from the front of the unit. If left in the level simulation mode, the controller must reset to normal operation after sixty seconds.

Menu selectable First-On/First-Off or First-On/Last-Off alternation sequences must be available.

Pump disable discrete inputs must cause the alternator to skip over disabled pumps.

Where VFDs are required to match pumping rate with in-flow rate, the control device must provide an isolated analog output (4-20mA) for each VFD for speed control. Menu selectable parameters must be available to form a linear wet-well level versus pump speed curve.

The Controller must have provisions for float back-up control built into the unit.

The Controller must contain an internal power supply to power the level input transducer.

The controller must be able to give an indication for the low and high level alarms based on the transducer input or separate discrete inputs.

V. Level Controls:

Components

a) The wet well level shall be monitored by a submersible wet well level sensing transducer that sends a 4-20MA signal to the control.
b) The transducer shall be MJK 3400, 0-30' with 39' of cord.
c) A back-up high level mercury type float switch shall be provided for high level alarm. UL listed for 508-14 classification.

W. VFD – Variable Frequency Drive

Products:
Acceptable Manufacturers:
Danfoss VLT Aqua

General:

a) Furnish complete VFD as specified herein or on the drawings for loads designated to be variable speed. VFD's shall be both constant and variable torque rated.
b) The manufacturer of the VFD shall demonstrate a continuous period of manufacturing and development of VFD's for a minimum of 25 years. VFD's that are brand-labeled will not be acceptable.
c) The VFD selected shall be able to source the motor's full load nameplate amperage (fundamental RMS) on a continuous basis and shall be capable of running the motor at its nameplate RPM, voltage, current, and slip without having to utilize the service factor of the motor.
d) The VFD shall be capable of running either variable or constant torque loads. In variable torque applications, the VFD shall provide a CT-start feature and shall be able to provide full torque at any speed up to the base speed of the motor. In either CT or VT mode, the VFD shall be able to provide its full rated output current continuously and 110% of rated current for 60 seconds.
e) The VFD shall have temperature-controlled cooling fans for quiet operation, minimized internal losses, and greatly increased fan life.

X. Junction Box Mounting

The junction box shall be mounted on a vented single wide pedestal 24-inches above the wet well as shown on the plans, on a base of sufficient strength to accommodate the weight of the panel. All necessary hardware to mount the frame and control panel shall be stainless steel. Seal offs will be included in all cable passages into the junction box to prevent gases from entering the panel.

This panel will be exposed to direct sunlight and rain fall without any protection. The panel shall be a clasp type enclosure. Enclosures with caulk strips in the door panel for a rain seal will not be acceptable.

Y. Elapsed Time Meter

An E.T.M. shall be provided for each pump to record the actual running time of the motor. The E.T.M. shall be energized by an auxiliary contact from the motor starter or contactor and be wired in parallel with the pump

run light. The E.T.M. shall have a maximum reading of 99,999.99 hours. The E.T.M. shall be non-resettable.

Z. Intrinsically Safe Relays

Intrinsically safe relays shall be provided for the float switches in the wet well. The float switches shall be incapable of releasing sufficient electrical or thermal energy under normal conditions to cause ignition of a specific hazardous atmospheric mixture suitable for use in Division I locations. The intrinsically safe relay shall read circuits up to 3,000 Ohms resistance. The power transmitted through the float switch shall be held to a maximum of 12 VDC and 3 MA. Standard simplex panels shall use two relays (pump off-on, high water), standard duplex panels shall use three relays (pump off-on, override, high water).

AA. Motor Heat Sensor and Seal Leak Circuitry for Explosion Proof Pumps

The control panel shall contain motor heat sensor and seal leak circuitry required for explosion proof pumps. The seal leak circuitry shall contain a test switch and light that will allow the integrity of the circuit to be tested. The motor heat sensor circuitry shall require a manual reset for either a tripped heat sensor or a tripped thermal overload contact. Either of which shall also signal an indicating light.

AB. Alarm Light

The control panel shall be fitted with a red lexan (polycarbonate) alarm light. The light shall be 3” high by 3 1/2” diameter. The lens shall be mounted on top of the enclosure with a neoprene gasket. The lens shall not be able to be removed from the exterior of the enclosure. The lens may be removed by entering the interior of the enclosure and removing four (4) #8 screws. The bulb shall be 40-watt minimum high intensity medium base type. The bulb shall be easily replaced by removing a thumb screw from the support bracket on the interior of the panel. The alarm light shall have a bright glow during high water conditions. The alarm light will go out when the water level drops.

AC. Alarm Horn

An audible alarm horn shall be provided to indicate an alarm condition. The horn shall be energized by either the alarm float switch or the alarm test switch and operate in conjunction with the alarm light. The horn shall be weatherproof and be rated for 103 DB at 10 feet.

AD. Identification Nameplate - Accessories

Each piece of equipment shall be provided with a stainless steel nameplate, securely fastened in place and clearly inscribed with the manufacturer’s name, year of manufacturer, serial number, and principal rating data. A second identical nameplate shall be provided for each submersible pump and affixed to the control panel.

The CONTRACTOR shall furnish with each type, kind or size of pumping unit, two sets of any special suitably marked high-grade tools, gauges and fixtures which may be needed to adjust, operate, maintain or repair the equipment. Such tools and accessories shall be furnished in neat, special steel cases fitted with locks and keys and delivered to the ENGINEER prior to the initial operation of equipment.

AE. Float Level Switches

If the lift station detail DRAWINGS indicates that a Transducer will be utilized in the wet well, two emergency float level switches for sewage lift stations shall be mechanically activated (no mercury) and shall be normally open (N.O) or normally closed (N.C.) as required. The two floats will be set at a minimum of 6” above or below the transducer settings to prevent false readings and interference.

If the lift station details DRAWINGS indicates that only floats will be used in the wet well (no transducer in the wet well), four water level floats float level switches for sewage lift stations shall be mechanically activated (no mercury) and shall be normally open (N.O) or normally closed (N.C.) as required. The elevations of the four conditions that will activate the floats will be specified on the DRAWINGS and will be at the condition of Pump OFF, Pump ON, Second Pump ON and Emergency Alarm.

Cable shall be flexible 18-gauge, 2 conductor (UL, CSA) SJOW, water-resistant (CPE), and of a length appropriate for the specific application. Float shall be approximately 2.75 inches diameter x 5 inches long, constructed of high impact, corrosion resistant, polypropylene housing for use in sewage and water up to 60^{o}C (140^{o}F), up to 30 feet deep. Electrical rating shall be 5 amps, 125/250 VAC, 50/60 Hz. Floats shall be equipped with external weights. Floats shall monitor emergency high level (above both pump starts) and emergency low level (below pump off) and be separated from the submersible transducer. Floats shall be SJE Signal Master or Approved Equal.

2.03 PUMP SCHEDULE

Lift Station	Flow (gpm)	Head (TDH)	Make	Model	Impeller (in)	Power Phase	Speed (rpm)	Power (HP)
Court Street Duplex Lift Station (VFD) normal day	660	48	Myers	6VCX	9.00	3	1750	20
Court Street Duplex Lift Station (VFD) Flood stage	925	48	Myers	6VCX	9.00	3	1750	20

Notes: **Motor shall be 230V, 3-phase, 60 Hertz**.
All pumps shall have a 6" discharge diameter. **All pumps shall have a 5-year manufactures warranty. The warranty period is to begin on the date of manufacture's startup.**

PART 3 EXECUTION

3.01 PAINTING

A. Painting shall be in accordance with Division 9.

3.02 FIELD SERVICE

A. A qualified manufacturer's representative shall inspect the installation and be present at the initial start-up and pump tests to confirm each pump capacity and efficiency.

3.03 INSTALLATION

A. Work shall be performed in a workmanship manner in accordance with manufactures recommendations.

END OF SECTION

SECTION 11316

ACTIVATED CARBON ADSORBER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. **General.** Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other related specification sections, apply to this section. The Contract Documents indicate specific *required* features of the equipment, but do not purport to cover *all* details of design and construction

1.2 DESCRIPTION OF WORK

A. **Scope of Work**. The Contractor shall provide all labor, tools, equipment, and materials necessary to furnish and install the odor control system in accordance with the drawings and as specified.

1.3 QUALITY ASSURANCE

A. All components of the carbon adsorber system shall be provided by a single manufacturer who shall have sole-source responsibility for the equipment elements detailed herein.

B. The manufacturer of the system shall be recognized in the design and production of carbon adsorption air treatment systems. Upon request, the manufacturer shall provide with the submittal data, a list of five (5) carbon adsorption air treatment installations associated with the treatment of hydrogen sulfide and other malodorous compounds. The list shall include contact names, telephone numbers, and length of service for each named installation.

1.4 SUBMITTALS

A. **Product Data**. Include with product data, accessories, options, dimensions, weights, and list of special tools.

B. **Typical Performance Data**. Submit typical performance data and curves for preliminary review of the equipment to be furnished. Such data shall be based on actual tests of similar equipment and include sufficient data to demonstrate suitability of the equipment for the conditions specified.

C. **Shop Drawings**. Shop drawings shall be submitted showing materials, accessories, coatings, dimensional layouts, anchor bolts, sectional views of construction, specifications, wiring diagrams, and a bill of materials.

D. **Operation and Maintenance (O&M) Manuals**. Submit O&M manuals in accordance with Specifications prior to delivery of the equipment.

E. **Field Service**. Submit manufacturer's installation inspection report.

1.5 JOB CONDITIONS

A. **Coordination**. Coordinate all work with other trades to prevent delays, errors, and/or omissions.

1.6 DELIVERY, STORAGE, AND HANDLING

A. **Delivery**. All units shall be shipped assembled as much as practical. All units shall be labeled with all labeling intact and legible with item name, model number, size, and manufacturer's name.

B. **Storage**. All units, accessories, and components shall be stored in the manufacturer's original package, under cover and protected from damage.

C. **Handling**. Handle all units and components in accordance with the manufacturer's instructions. Use lifting rings and canvas harnesses for lifting to prevent scratching or abrading finished surfaces.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The odor control system components specified under this section shall be the end products of Carbtrol Corporation, Bridgeport, CT. (800) 242-1150 or equal.

2.2 CAST ALUMINUM FAN WITH TEFC MOTOR

A. The fan body, fan impeller and fan support base shall be fabricated from cast aluminum.

B. The fan design shall minimize sound propagation at the specified capacity.

C. The fan motor/blower shall be a 1/3 HP, premium efficiency, 3450 RPM, 1 phase, 115V, 60HZ, explosion-proof motor rated for continuous duty. The air discharge will be 4” OD and be fitted with a discharge screen. The motor shall be totally enclosed, fan-cooled (TEFC) type.

D. FERNCO-type flex connectors shall be supplied to connect the fan inlet and outlet to PVC ductwork.

E. The fan shall have a housing drain fitting.

2.3 MANUAL MOTOR STARTER

A. A combination motor starter shall be provided that includes overload protection, manual start/stop function, and disconnect capability with lockout function.

B. The combination starter shall be housed in a fiberglass or 304SS NEMA 4X enclosure or fitted into the control panel of the pump station.

2.3 SOUND ENCLOSURE/RAIN HOOD (WEATHER SHROUD)

A. The system shall be provided with a sound attenuation package.

B. This package shall consist of a foam adder to the Rain Hood and acoustic enclosure placed over the odor control fan.

C. The unit will be fitted with a Rain Hood option to protect the unit weather from damage. The Rain Hood (or weather shroud) is to be constructed from 20 gage galvannealed metal and painted inside and out with 1 coat of prime and two coats of white enamel.

2.4 MEDIA CONTAINER

A. The activated carbon media container shall have an Epoxy Phenolic Lining for Corrosion Protection.

B. The media container shall have an open top with a lid fabricated from the same material as the body of the media container.

C. The inlet and outlet connections of the media container shall be 2” diameter. The pressure drop through the canister shall be no greater than 3.5 inches (0.13 psi) at 100 CFM.

D. One bung fitting will be on each canister to allow for ease of draining.

E. Inlet connection shall include a 2” diameter FERNCO coupling.

2.5 ACTIVATED CARBON MEDIA

A. The activated carbon media shall be virgin (not reactivated) carbon media derived from either lignite coal, bituminous coal, or coconut shell. No chemicals shall be present on the media or as part of the media.

The base material shall be coconut shells.

B. The Mean particle diameter shall pass a 4x8 mesh and with no more than 10% greater than 4 mesh or more than 5% smaller than 8 mesh.

C. The media shall be Carbtrol Type CSV Air Purification Carbon, or equal. Each canister will contain 200 pounds of Carbon Media.

PART 3 – EXECUTION

3.1 EXAMINATION

A. **Site Verification of Conditions**. Prior to installation of equipment, verify that:

1. All clearances have been met.

2. Bases, anchors, supports, and openings are located correctly and are of the proper size and material.

3.2 INSTALLATION

A. **General**. All odor control equipment shall be installed in accordance with the manufacturer's instruction and the conforming shop drawings, including all gasket seals, isolation dampeners, cleanouts, drains, gauges, motors, controls, and power wiring.

B. A small level concrete pad with rebar shall be poured to set the odor control system barrel. A penetration in the pad will allow the buried conduit from the control panel to access the pump on top of the odor control barrel. Vertical steel posts will be incorporated into the body of the pad as need to secure the electrical conduit and the body of the odor control barrel and hood to prevent movement by wind.

3.3 REPAIRS/RESTORATION

A. **Damages**. Any damage to the equipment, or chips, dents, scratches, stains, or other disfiguring of surrounding floors, walls, and/or accessories shall be repaired or replaced to the satisfaction of the Owner and/or Engineer/Architect at no additional cost to the Owner.

3.4 CLEANING

A. **Surface**. The equipment and surrounding areas shall be cleaned of all foreign material, grease, and oil stains.

B. **Protection**. After cleaning, provide protective covering for each piece of equipment.

3.5 FIELD QUALITY CONTROL

A. **Manufacturer's Field Service**

1. Perform field inspection of all components prior to placing in operation and submit manufacturer's installation inspection report addressing the following:

   a. List of deficiencies found.

   b. Recommended corrective action for all deficiencies.

   c. Certification by manufacturer's representative that items are properly installed, aligned, and adjusted.

3.6 DEMONSTRATION

A. **Visual**. The Contractor, Owner, and/or Engineer/Architect shall inspect the equipment for visual deficiencies.

B. **Tests**. Dry and wet tests shall be performed, and the equipment adjusted as specified. Verify and note in the operational demonstration log that all design conditions for schedule requirements and motor nameplate data have not been equaled or exceeded for the entire demonstration period.

C. **System Start-up**. Start-up will commence following a visual inspection and check out of the system.

D. **Operator Training**. Operator training on the carbon adsorber system shall be conducted.

3.7 PROTECTION

A. **Requirements**. The Contractor shall be responsible for provisions to protect the equipment after installation, but prior to acceptance by the Owner. The Contractor shall remove all protective measures installed at completion and acceptance of the project.

END OF SECTION

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 15

MECHANICAL

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 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 lb. 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

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS - DIVISION 16

ELECTRICAL

SECTION 16100

GENERAL PROVISIONS

PART 1 GENERAL

1.01 The General and Special Conditions and all other CONTRACT DOCUMENTS are applicable to WORK under this section of the SPECIFICATIONS. All the WORK under this section of the SPECIFICATIONS shall be governed by any alternates and unit prices called for in the FORM OF PROPOSAL insofar as they affect this portion of the WORK.

1.02 Include furnishing of all labor, materials, equipment and other related items required to complete the WORK called for and indicated on the CONTRACT DRAWINGS and specified for a complete system, including excavation, backfilling and tamping. Classification of excavation and payment for same shall be in accordance with applicable provisions of these SPECIFICATIONS.

1.03 Abbreviations of organizations and publications:

NEC	-	National Electrical Code
UL	-	Underwriters Laboratories, Inc.
IPCEA	-	Insulated Power Cable Engineers Association
ANSI	-	American National Standards Institute
OSHA	-	Occupational Safety Health Act

1.04 All materials shall be new and the best of their respective kinds unless otherwise specified and shall be listed by the UL and shall be so labeled. All equipment shall conform to the latest approved standards of the IEEE, NEMA, ANSI and OSHA.

PART 2 COOPERATION

2.01 Check with other trades on the scope of their WORK and coordinate on all locations of various items of equipment and outlets before they are finally placed and connected. Any relocation of material or equipment necessitated by failure to coordinate WORK shall be at no cost to the OWNER.

2.02 Do not cut the WORK of any other trade without first consulting the ENGINEER'S representative. Repair any WORK damaged employing the services of the trade whose WORK is damaged.

PART 3 SCOPE

3.01 The WORK covered by this section of the CONTRACT shall include the furnishing of all labor, materials, tools and equipment necessary to complete the electrical WORK as herein specified, or implied and as shown or implied on the CONTRACT DRAWINGS.

3.02 The CONTRACTOR shall note that most of the electrical conduit, boxes and wiring are existing. The CONTRACTOR shall visit the site prior to BID and satisfy themselves as to the extent of existing WORK and new WORK required to complete the project as indicated. Submission of a BID will be interpreted that the visit has been done and no extra will be allowed for additional WORK as a result of not doing the inspection of existing conditions.

PART 4 DRAWINGS AND SPECIFICATIONS

4.01 The CONTRACT DRAWINGS and SPECIFICATIONS are intended to cover all WORK enumerated under the respective headings. Examine all CONTRACT DRAWINGS and SPECIFICATIONS to determine any references to WORK of an electrical nature and be guided accordingly in prosecuting the electrical WORK. The CONTRACT DRAWINGS are diagrammatic only, as far as final location is concerned. Any item of WORK not clearly included, specified or shown, and any errors or conflict between CONTRACT DRAWINGS, SPECIFICATIONS, codes and field conditions shall be clarified by a written request to the ENGINEER prior to bidding, otherwise all labor and materials required to make good any damage or defect in finished WORK caused by such error, omission or conflict shall be provided at no additional cost to the OWNER.

PART 5 CODE COMPLIANCE, INSPECTION AND CERTIFICATES

5.01 The minimum standards for all electrical WORK shall be the 1996 revision of the NEC. Whenever and wherever OSHA and/or federal, state and/or local laws or regulations and/or design require higher standards than the NEC, then these laws and/or regulations and/or design shall be followed.

5.02 Furnish electrical inspection by a licensed electrical inspector. Notify the electrical inspector in writing, immediately upon the start of the WORK with a copy of the notice to the ENGINEER. The inspector shall be scheduled for rough as well as finished WORK. Approval from the electrical inspector will not be allowed as reason for deviation from the CONTRACT DRAWINGS and SPECIFICAITONS. All cost incidental to the electrical inspection shall be borne by the CONTRACTOR.

PART 6 CLEANING

6.01 At the completion of the WORK required under this contract and just prior to acceptance by the OWNER, thoroughly clean all exposed equipment fittings, fixtures and accessories.

PART 7 CONNECTIONS TO EQUIPMENT BY OTHERS

7.01 Provide all conduit, boxes and wire with required connections, including any disconnect switches required by NEC to all electrically powered or controlled equipment furnished and set in place by others. Examine all divisions of the SPECIFICATIONS and all CONTRACT DRAWINGS to determine location and size of all electrically powered or controlled equipment.

PART 8 PHASING

8.01 Verify the rotation of all three phase motors with the trade furnishing equipment. These motors shall be "bumped" or run uncoupled in the presence of the trade furnishing the equipment to insure proper rotation.

PART 9 SPECIAL NOTE

9.01 All openings in electrical equipment, enclosures, cabinet outlets and junction boxes shall be by means of standard knockouts or shall be sawed or drilled. The use of a cutting torch is prohibited.

PART 10 PIPE SLEEVES AND FIRE RATING OF OPENINGS

10.01 Wherever conduit pass through floor slabs in other than slab on grade construction, steel sleeves shall be provided for each conduit. Sleeves shall project 3/8" above slab and spaces between conduit and sleeves shall be caulked with a material which will provide a fire rating substantially the same as the unpierced floor.

10.02 Holes through walls and ceilings, chases, shafts, etc., for the passage of cable or conduit shall be made so as to substantially preserve the integrity of the fire rating of such surfaces or passages in accordance with NEC 300-21.

10.03 Where conduit penetrates the roof, such penetration shall be through an opening approved by manufacturer of the roof.

PART 11 EXCAVATION AND BACKFILLING

11.01 Perform all excavation and backfilling required for completion of WORK indicated on the CONTRACT DRAWINGS and specified herein. Classification of excavation and prices for excavation shall be in accordance with the applicable division of these SPECIFICATIONS.

11.02 Backfill material for conduit or direct bury cable unless otherwise specified and/or noted on the DRAWINGS shall be clean earth, free from rock and debris, thoroughly tamped in six inch (6") layers to the finished grade.

11.03 During the progress of the project, the premises shall be kept reasonably clean and free from accumulate rubbish and debris. Proper care shall be exercised to protect all trees, shrubbery, and etc., in the vicinity of the work. All surplus earth shall be disposed of as directed by the ENGINEER.

11.04 Compaction of backfill in place shall be 95% of maximum density.

PART 12 OPERATING INSTRUCTIONS AND MAINTENANCE MANUALS

12.01 At completion of the CONTRACT, the OWNER shall be provided with two (2) bound copies of operations and maintenance instructions for the various items of the electrical equipment, including existing motor control center, new panelboards, service equipment, lighting fixtures, etc.

12.02 In addition to manufacturer's approved SHOP DRAWINGS, manual shall include: (a) A listing of equipment (identified in accordance with the DRAWINGS nomenclature, e.g. LF-1, M.D.P. etc.) and distribution or supplier of the equipment. In case of lighting fixtures, the type replacement lamp including recommended voltage and other necessary designation shall be included.

12.03 Instructions shall be included for routine checking of circuit breakers and fused switches.

PART 13 LABELING

13.01 All lighting and power panels, telephone cabinets, switches in distribution equipment, safety switches for remote equipment and all other items noted for labeling shall be properly identified in accordance with the designations shown on the DRAWINGS or the function they perform. This paragraph applies to both new and existing equipment.

13.02 Labels shall be 1/4" high, white letters on laminated phenolic engraving stock suitably cemented to the inside of the recessed panels and on the face of surface mounted panels and other equipment.

PART 14 FISH WIRE

14.01 All conduit required under this contract which do not receive conductors, shall be provided with a 14 gauge galvanized steel fish wire or approved nylon wire.

PART 15 "OR EQUAL" CLAUSE

15.01 The SPECIFICATIONS covering this WORK are open; wherever a specific manufacturer's item is specified, it is intended as a standard to be met and items which are approved equal or superior will be accepted.

PART 16 WARRANTY

16.01 CONTRACTOR shall include in BID price the warranty of all labor and equipment that is a part of this CONTRACT, including existing equipment that is reused, for a period of one year from the date of final completion.

END OF SECTION

SECTION 16900

CUSTOM CONTROL PANELS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Equipment controls and control panels shall be as specified herein and as shown on the Contract Drawings.

B. Certain equipment starters contain nonresettable elapsed time meters as shown in the Contract Drawings. Also, certain motor starters have remote control devices and require connections to operate these control devices as shown on starter schematics (control circuits).

C. All starters contain red “on” lights, control transformers, and auxiliary contacts to operate as defined on the control circuits of the Contract Drawings. Reset pushbuttons shall also be provided for overloads built into the starters.

1.02 REFERENCES

A. NFPA 79 – All control panels shall comply with NFPA 79.

B. NEC – All control panels shall comply with NEC article 409.

C. UL508 – All control panels shall be listed to UL508 and shall bear the UL label.

D. UL698 – All control panels with circuit extensions into hazardous areas shall be listed to UL698 and shall bear the UL label.

1.03 RELATED WORK

A. All motor controls, starters, pushbuttons, pilot lights, and other miscellaneous devices shall comply with Section 16440 – MOTOR CONTROL.

1.04 SUBMITTALS

A. Panel and enclosure plan and elevation drawings depicting all components and wiring duct

B. Complete wiring diagrams

C. Catalog cut-sheets on all components, with options clearly indicated and non-applicable items clearly excluded.

D. Enclosure heat gain calculation – Shall indicate the maximum temperature inside the enclosure on a 100°F day taking into account heat losses and inefficiencies of all panel components. Heat gain shall include the effects of radiation (if located outside) and air-

conditioners or ventilation fans. The maximum operating temperature of all major equipment and panel components shall be listed. The heat transfer calculation shall be based on the enclosure manufacturer's published heat transfer data. This manufacturer's data or curve shall be submitted with the calculation for review.

E. Shop Drawings shall be clearly marked and or highlighted as to which product, type, option, etc. is being submitted. Product literature with one or more styles / configurations for a single product shall have a written description of use for each of the styles / configurations represented on the literature. For example: Device boxes – Styles shall be listed as: For masonry walls, for electrical devices, for ceiling mounted light fixtures, etc

F. O&M manuals shall be submitted in accordance with Section 16010. They shall include all field modifications made such that the wiring diagrams exactly match the field-installed equipment and control panels. They shall also include complete cut-sheets, product data, operation, and maintenance information.

1.05 CUSTOM CONTROL PANELS

A. All control panels furnished under this Contract shall be manufactured in accordance with industry standards and as herein specified. Some control panels are specified to be furnished with the equipment controlled and others are to be furnished by the Contractor, as written elsewhere.

B. Control panels shall be as manufactured by Control Interface, Inc., Sewell Electronics, or other panel vendor. Panel construction shall comply with OSHA and other code requirements as applicable and may be attested to by UL listing the panels as an assembly. Otherwise, panel modifications as required by the Electrical Inspector shall be performed by the supplier at no extra cost to the Owner.

C. Control panels to be furnished on this project shall be wired to function according to schematics shown on the Contract Drawings. All Control Panels shall be manufactured using "relay logic", or PLC'S (Programmable Logic Controllers) as shown on schematics (control circuits) located in the Contract Drawings. In addition to the requirements shown on the Contract Drawings, the panels shall adhere to additional requirements as written herein, and in the utilization equipment specifications.

D. Enclosures shall be dead front with all operator devices accessible without opening the enclosure door. All relays, timers, terminal strips, etc., shall be mounted to a subpanel inside the enclosure. All wiring must be stranded and sized to be protected by a 20 A/IP circuit breaker. Supplemental overcurrent protection may be used in lieu of oversized wiring. All panels mounted outside shall have operator devices mounted on an inner door with an outdoor door that is blank.

E. All terminal strips and lugs shall be of a type UL listed to terminate the size and quantity of wires encountered. Where conduits enter the boxes, if they are NEMA 4 or 3R, sealing locknuts or hubs must be used to maintain the box rating.

F. Enclosures shall be provided with a locking hasp and any exterior hardware shall be stainless steel or other corrosion resistant material. Wet location or outdoor mounted enclosures shall comply with Article 1.04 below.

G. Elementary control schematics and connection diagrams showing the spatial relationship of components and wiring shall be submitted for review. Also, a bill of materials, drawing of device arrangement on front, and enclosure fabrication drawings shall be submitted. Further, descriptive literature is required on all components. A copy of the shop drawings shall be furnished and stored in a pocket inside the enclosure.

H. Sleeve type wire markers or other “permanent” type marker shall be installed on all wires, keynoted back to the elementary schematic or the connection diagram, and all terminals identified.

1.06 CONTROL PANEL ENCLOSURES FOR OUTDOOR/WET LOCATIONS

A. General

1. The purpose of this Specification is to provide details of an enclosure that protects internal equipment from rain, dust, vandalism, and other conditions found in an outdoor environment or otherwise harsh environment.

2. The manufacturer shall provide part numbers on all components for repair purposes. Enclosure shall be single or double door as required.

3. Control panel enclosure sizing shall be by supplier in accordance with appropriate standards and codes.

B. Performance

1. The enclosure(s) will meet or exceed the requirements of a NEMA 4X rating and shall be UL listed.

C. Cabinet Construction

1. General

a. The cabinet and door or doors shall be constructed from 5052-H32 sheet aluminum alloy which has a thickness of 0.125 inch. External welds shall be made by using the Heliarc welding method, whereas internal welds will be made by the wire welding method. All welds shall be neatly formed and free of cracks, blow holes and other irregularities.

b. All inside and outside edges of the cabinet shall be free of burrs.

c. The cabinet shall be designed with a sloped top to prevent the accumulation of water on its top surface.

d. The door openings shall be double flanged on all 4 sides which increases strength around openings and keeps dirt and liquids from entering the enclosure when the door is opened.

e. Door restraints shall be provided to prevent door movements in windy conditions.

2. Door Hardware

a. The cabinet door or doors will be a minimum of 80 percent of the from surface area and shall be hinged on the right side when facing the cabinet (right and left outside edges for double door enclosures).

b. Each door shall be furnished with a gasket that satisfies the physical properties as found in UL508 table 21.1 and shall form a weathertight seal between the cabinet and door. Enclosures with caulk strips in the door panel for a rain seal will not be acceptable.

c. The hinges shall be continuous and bolted to the cabinet and door utilizing ¼-20 stainless steel carriage bolts and ny-lock nuts.

d. The hinges will be made of 0.093 inch thick aluminum and shall have a 3" open width with a 0.250 inch diameter stainless steel hinge pin.

e. The hinge pin shall be capped top and bottom by weld to render it tamper proof.

f. All bolt holes shall be gasketed.

g. The latching mechanism shall be a 3-point draw roller type. The panel shall be a clasp type enclosure.

h. The center catch and pushrods shall be cadmium plated, Type II, Class 1 or equal.

i. Pushrods will be turned edgewise at the outward supports and shall be 0.250 inch by 0.750 inch steel, minimum.

j. Rollers shall have a minimum diameter of 0.875 inch and will be made of nylon. The center catch shall be fabricated from 0.140 inch steel, minimum.

k. An operating handle shall be furnished.

l. The handle shall be stainless steel with a ¾ inch diameter shank.

m. The latch handle shall have a provision for padlocking in the closed position.

n. A light/alarm bracket shall be provided.

3. Switch Compartment

a. A switch compartment, with removable back panel, is to be supplied on the enclosure main door. It shall be large enough to include all operating devices.

b. The switch compartment door opening shall be double flanged on all four

sides for strength and to prevent liquids or dirt from dropping into the compartment when the door is open.

c. The door shall be furnished with a gasket that satisfies the physical properties as found in UL508 Table 21.1 and will form a weathertight seal between cabinet and door.

d. The switch compartment door shall have a tight key lock. Five keys shall be furnished with each lock.

e. The switch compartment door hinge shall be 0.063 inch stainless steel with a 0.120 diameter stainless steel hinge pin.

D. Equipment Mounting

1. Adjustable Channels

a. The enclosure shall be equipped with two adjustable “C” mounting channels on both side walls and back wall of the enclosure, allowing versatile positioning of shelves or panels.

b. The mounting channels shall provide infinite vertical and horizontal adjustment and not limit the positioning of shelves or panels. All mounting hardware will be furnished.

2. Shelves

a. If equipment is to be shelf mounted, the enclosure shall be provided with shelves fabricated from 5052-H32 aluminum having a thickness of 0.125 inch.

b. The shelf depth shall be a minimum of 10.5 inches. The enclosure will have provision for positioning shelves or panels to within 4 inches of the bottom and to within 8 inches of the top of the enclosure.

3. Aluminum Back Panel

a. If the equipment is to be panel mounted, the enclosure shall be provided with a 5052-H32 aluminum back panel having a thickness of 0.125 inch.

b. The panel shall be natural finish. All mounting hardware will be furnished.

4. Print Storage Pocket

a. A control panel shop drawing storage pocket shall be provided inside the enclosure at a convenient location.

E. Cabinet Finish

1. Unless otherwise specified, the outside surface of the cabinet shall have a smooth, uniform, natural polish finish.

F. Cabinet Mounting

1. Pole or Wall Mounted Enclosure

a. Enclosures intended for pole or wall mounting shall be provided with stiffener plates with a thickness of 0.125 inch aluminum welded to top and bottom of rear wall for added strength and rigidity.

b. All mounting holes must be gasketed.

2. Pedestal Mounted Enclosure

a. Enclosures intended for pedestal mounting shall be provided with a reinforced base plate. If the enclosure is fabricated from 0.125 inch thick aluminum, the base plate will be a thickness of 0.250 inch thick aluminum.

b. All mounting holes must be gasketed.

3. Pad Mounted Enclosure

a. A solid plate shall be bolted and gasketed in place on the bottom of the enclosure to provide a weathertight seal.

G. Acceptable Manufacturers

1. Cabinet is to be manufactured by Hennessy Products, Inc., or a UL listed equivalent.

1.07 SYSTEM DESCRIPTION

A. General

1. The systems description section of these Specifications is supplementary to the descriptions in other Divisions of the Specifications and to the Contract Drawings. Refer also to the equipment specifications and controls shown on the Contract Drawings.

B. Sewage Pump Stations

1. The sewage pumps shall be controlled by soft starters. The starters shall be mounted with all control circuitry as described herein, in a NEMA 4X exterior enclosure with a full dead front interior.

2. Each pump starter shall have an H-O-A (hand-off-automatic) selector switch. In H position, the unit shall run continuously and on A position, the unit shall be controlled by wet well level. Each starter shall be equipped with a phase failure relay such that if one phase fails to reach proper voltage level, the relay shall disconnect power to all phases.

3. The pump control panel shall also have an alarm light which signifies wet well level and a **manual** alternator switch for selection of lead and lag pumps. All external connections to the panel shall be made through terminal strips. For further details, see Division 11 and the Drawings.

PART 2 - PRODUCTS

2.01 TEMPERATURE CONTROL DEVICES

A. Electric Heater for Control Panels

1. Provide an electric heater for exterior control panels
2. Heater shall be sized as indicated on the Contract Drawings, or shall be sized and submitted in the Enclosure Heat Gain calculation
3. The heater shall include an integral thermostat, adjustable from 0°F to 100°F, and a fan
4. Heater housing shall be anodized aluminum
5. Fan shall have ball bearings and shall be designed for continuous operation
6. Terminal strip shall accept both solid and stranded wire
7. The heater shall be UL Recognized and CSA listed
8. The heater shall be Hoffman's thermostatically controlled fan-driven heater, or equal.

2.02 POWER SUPPLIES

A. DC Power Supplies

1. DC power supplies shall be switched mode and Din-rail mountable.
2. Input power range shall be from 85-264 VAC.
3. Output voltage range shall be as needed with a tolerance of 1%. Output voltage shall be adjustable up and down at least 10% from the nominal value.
4. The power supply shall include an internal input fuse.
5. Power supply shall have a "DC Ok" signaling LED.
6. Operating temperature rating shall be –25 C to +70 C and up to 95% relative humidity.
7. Output power shall be buffered for full output power ride through for 20 milliseconds in the event of a power outage.
8. The power supply shall be able to supply 150% of its continuous capacity for short periods of time.
9. The power supply shall have internal short circuit protection with automatic recovery.
10. The power supply shall be Phoenix Contact, Sola, Allen-Bradley, or equal.

2.03 OVERCURRENT PROTECTION

A. Main 3-Phase Breakers – Shall be thermal-magnetic, molded-case, Type FA or KA as needed, Square D or equal. Provide service entrance rating where indicated on the Drawings as being used in a service entrance application.

B. Power Fuses – Utilize Class J fuses and fuse blocks. Fuse blocks must have protective cover. Fuses may only be used where indicated on the Drawings. Otherwise, use circuit breakers.

2.04 MISCELLANEOUS PANEL COMPONENTS

A. Terminal Blocks, #10 conductor size and smaller.

1. Terminal blocks shall be Din-rail mountable IEC style with minimum width of 6.2 mm. They shall be rated for conductors from #10 to #24 AWG. Current rating shall be 30A, minimum. Terminal blocks shall be finger-safe. Double level terminal blocks may be utilized where necessary to conserve space.
2. Screw clamp terminal blocks are required. Terminal blocks that rely upon spring pressure only for conductor termination are not acceptable.
3. Provide cross connection bridges, partition plates, end anchors, zack strip labels, and all other components necessary for a complete installation. Each block shall be labeled with a machine-printed label. No more than 2 conductors may be landed under on single terminal block terminal screw.
4. Utilize the following terminal block colors:
    a. 120V Power – Black
    b. 120V Control – Red
    c. 120V Neutral – White
    d. Equipment Grounding – Green or Green/Yellow
    e. DC Positive – Blue
    f. DC Negative/Grounded – Gray
    g. Conductor energized from remote source: Yellow
5. Terminal blocks shall be manufactured by Phoenix Contact, Allen-Bradley, or equal.

B. Fuse blocks (control circuits) – Fuse blocks shall be finger safe and shall have LED indication when the fuse is blown. Fuses may be used only where indicated on the Drawings; otherwise use circuit breakers.

C. Conductor Labels – Shall be the heat-shrink type, machine printed. Brady, or equal.

D. Intrinsic Safety Barriers – Provide UL listed intrinsic safety barriers for circuit extensions into hazardous areas. The barriers shall be Phoenix Contact, or equal.

PART 3 - EXECUTION

3.01 LABELING

A. Provide labels for all conductors and components.

B. Legends for starter nameplates shall be taken from the one line diagram in the Contract Drawings. Wire and miscellaneous component labels shall match the O&M manual wiring diagrams.

END OF SECTION

JACKSON – KY15 WIDING (ITEM NO. 10-376.00)

TECHINICAL SPECIFICATIONS

GAS MAIN CONSTRUCTION

PROVIDED BY FRONTIER GAS

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.

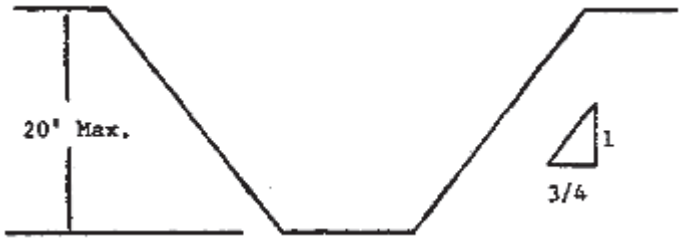
The maximum travel distance to an exit or ladder cannot exceed 25 feet.

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 any bend.

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

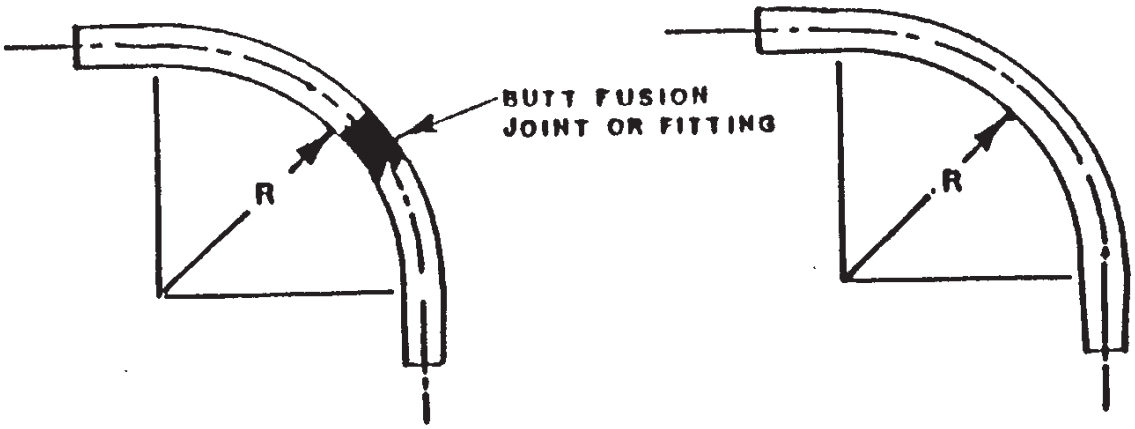


Figure A

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.

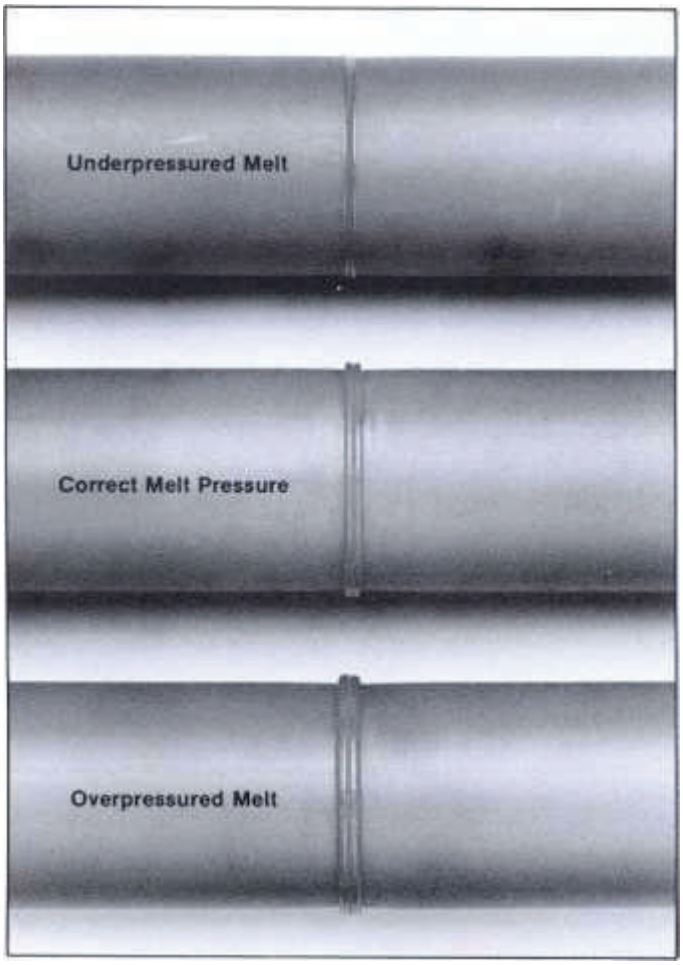
8) When a small melt bead develops around both pipe ends, relax the force on the carriage handle but maintain contact between the pipe and the heating iron. Begin the required heating time.

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.

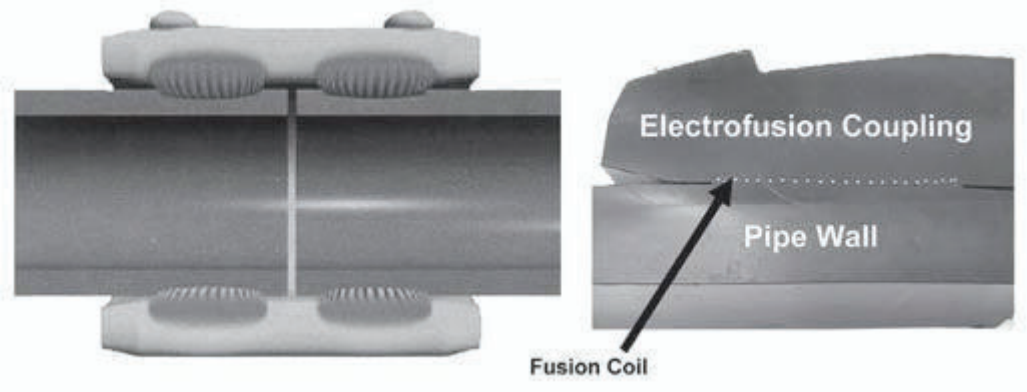
10) Perform the EF operation by following the appropriate EF processor procedure. Read the barcode on the fitting, attach the processor leads to the terminals on the fitting, and prepare for fusion as directed.

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

4.1.1 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.

4.1.2 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.~~

~~4.13 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:

ANDY BESHEAR
GOVERNOR

REBECCA W. GOODMAN
SECRETARY

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION

ANTHONY R. HATTON
COMMISSIONER

300 SOWER BOULEVARD
FRANKFORT, KENTUCKY 40601

February 9, 2023

Danny Peake
Kentucky Transportation Cabinet (KYTC)
200 Mero St
Frankfort, KY 40622

Re: §401 Water Quality Certification
Letter of Permission No.: WQC2023-010-7
KY 15 - Breathitt Co
Kentucky Highway 15 Improvements Project
AI No.: 78951; Activity ID: APE20220001
KYTC Item No.: 10-376.00
USACE ID No.: LRL-2018-540-cdb
North Fork Kentucky River and UTs
Breathitt, Kentucky

Dear Danny Peake:

Pursuant to Section 401 of the Clean Water Act (CWA) and 40 CFR 121.7(c), the Commonwealth of Kentucky certifies it has reasonable assurances that applicable water quality standards under Kentucky Administrative Regulations Title 401, Chapter 10, established pursuant to Sections 301, 302, 303, 304, 306, and 307 of the CWA, will not be violated by the above referenced project provided that the U.S. Army Corps of Engineers authorizes the activity under a federal license or permit, and the attached conditions are met. An individual Water Quality Certification is not necessary for this activity provided that this project has satisfies the Transportation Letter of Permission from the U.S. Army Corps of Engineers (Letter of Permission for Transportation Projects, Corps ID No. LRL-2006-259, issued October 03, 2007 and revised October 28, 2010 and September 11, 2020) and all conditions of the attached Water Quality Certification - Letter of Permission Authorizing Transportation Projects are met. If construction does not commence within five years of the date of this letter, this certification will become void.

This letter transmits to you a copy of our Water Quality Certification (WQC) for the Letter of Permission Authorizing Transportation Projects for the Kentucky Transportation Cabinet – Kentucky Highway 15 Improvements Project in Breathitt County, Kentucky, in accordance with plans included in the "Application for Permit to Construct Across or Along a Stream and/or Water Quality Certification" received 11/21/2022, Pre-Filing Meeting Request received 11/21/2022, application package received 11/21/2022, Certification Request received 1/27/2023, and alternative analysis received on 1/23/2023, including impacts to 1,136 linear feet of ephemeral stream, 1,554 linear feet of intermittent stream, 2,758 linear feet of perennial stream, and 0.168 acres of wetland. Compensatory mitigation will be accomplished through purchasing 2,606 stream EIUs and 0.4 wetland AMUs from an approved in-lieu fee program. A receipt of

purchase must be submitted to the Kentucky 401 Water Quality Certification Section before construction begins.

Although an Individual WQC is not needed, other permits from the Division of Water may be required. If the project will disturb one acre or more of land, or is part of a larger common plan of development or sale that will ultimately disturb one acre or more of land, a Kentucky Pollution Discharge Elimination System (KPDES) stormwater permit shall be required from the Surface Water Permits Branch. This permit requires the development of a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP must include erosion prevention and sediment control measures. Contact: Surface Water Permits Branch (SWPB) Support (502-564-3410 or SWPBSupport@ky.gov). If the project needs to develop a Groundwater Protection Plan (GPP), impacts a Wellhead Protection Areas (WHPAs) or Sinkhole contact the Watershed Management Brach (502-564-3410).

All future correspondence on this project must reference **AI No. 78951**. Please contact Wesley Harrod by phone at 502-782-6589 or email at Wesley.Harrod@ky.gov if you have any questions.

Sincerely,

Samantha Vogeler

Samantha Vogeler, Supervisor
Water Quality Certification Section
Kentucky Division of Water

SV:WH
Attachment

cc: Jacob Travelstead, KYTC: Frankfort (via email: jacob.travelstead@ky.gov)
Andrew Logsdon, KYTC: Frankfort (via email: Andrew.Logsdon@ky.gov)
Dave Harmon, KYTC: Frankfort (via email: Dave.Harmon@ky.gov)
Crystal Byrd, USACE: Louisville District (via email: Crystal.D.Byrd@usace.army.mil)
Lee Andrews, USFWS: Frankfort (via email: kentuckyes@fws.gov)
Malissa McAlister, Kentucky River Basin Coordinator (via email: mmcalister@uky.edu)
Ashton Johnson, Hazard Regional Field Office (via email: Ashton.Johnson@ky.gov)
Seth Bishop, RES (via email: sbishop@res.com)

Water Quality Certification -- Letter of Permission Authorizing Transportation Projects (LRL-2006-259-pgj- Date: 11 Sept 2020)

This Water Quality Certification is issued December 28, 2020, by the Kentucky Division of Water, 401 Water Quality Certification Program in conformity with the requirements of Sections 301, 302, 304, 306 and 401, as amended (33 U.S.C. §1341), of the Clean Water Act, as well as Kentucky Statute KRS 224.16-050 and Kentucky Administrative Regulations Title 401, Chapter 9 and 10.

The Commonwealth of Kentucky hereby certifies under Section 401 of the Clean Water Act (CWA) that it has reasonable assurances that applicable water quality standards under Kentucky Administrative Regulations Title 401, Chapter 10, established pursuant to Sections 301, 302, 304, 306 and 307 of the CWA, will not be violated for the activities covered by this general certification, provided that the conditions in this general certification are met. Activities that do not meet the conditions of this certification require an Individual Section 401 Water Quality Certification.

For this and all permits, the definition of surface water is as per 401 KAR 10:001 Chapter 10, Section 1(80): Surface Waters mean those waters having well-defined banks and beds, either constantly or intermittently flowing; lakes and impounded waters; marshes and wetlands; and any subterranean waters flowing in well-defined channels and having a demonstrable hydrologic connection with the surface. Lagoons used for waste treatment and effluent ditches that are situated on property owned, leased, or under valid easement by a permitted discharger are not considered surface waters of the commonwealth.

As required by 40 CFR Part 121 – State Certification of Activities Requiring a Federal License or Permit, all conditions include a statement explaining why the condition is necessary to assure that any discharge authorized under the general permit will comply with water quality requirements and a citation to federal, state, or tribal law that authorizes the condition. The statements and citations are included with each condition. The statements are written entirely at the end of the certification under the section *Statements of Necessity*.

In addition to all the restrictions and conditions of the U.S. Army Corps of Engineers, Louisville District Letter of Permission Issuance (LRL-2006-259-pgj) hereby incorporated into this certification (included herein), the following 401 Water Quality Certification criteria applies to all transportation projects certified under a Certified Letter of Permission issued by the Kentucky Division of Water, 401 Water Quality Certification Program:

1. The Kentucky Division of Water shall be notified of the scheduled start of construction activities at least two weeks before the start of construction and upon the substantial completion of construction no later than two week post-construction. [Statement G and citations KRS 224.10-100, KRS 224.70-110, 401 KAR 10:030 Section 1; and 401 KAR 10:031 Section 2(1)(a)]

2. As-built drawings shall be submitted to the Kentucky Division of Water within 90 days after substantial completion of construction. [Statement H and citations KRS 224.10-100, KRS 224.70-110, 401 KAR 10:030 Section 1; and 401 KAR 10:031 Section 2(1)(a)]

Certification of Transportation Letter of Permission

3. A copy of the receipt for purchase of credits for compensatory mitigation shall be submitted to the Division of Water prior to any construction activity for projects requiring mitigation. [Statement I and citations KRS 224.10-100, KRS 224.70-110, 401 KAR 10:030 Section (1); and 401 KAR 10:031 Section 2(1)(a)]

4. Activities occurring within surface waters identified by the Kentucky Division of Water as designated or candidate Outstanding State or National Resource Waters, Cold Water Aquatic Habitat, or Exceptional Waters are not authorized under this General Certification and require an Individual Certification. [Statement A and citations KRS 224.70-110, 401 KAR 10:030, Section 1(1), Section 1(2), & Section 1(3); and 401 KAR 10:031, Section 4(2) & Section 8]

5. The activity will not occur within surface waters identified as perpetually-protected mitigation sites (e.g., deed restriction or conservation easement). [Statement C and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3); and 40 C.F.R. 230.97]

6. The Kentucky Division of Water may require submission of a formal application for an individual certification for any project if the project has been determined to likely have a significant adverse effect upon water quality or degrade the waters of the Commonwealth so that existing uses of the water body or downstream waters are precluded. [Statement A and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

7. The proposed relocation of an existing stream or channel will be designed and constructed to ensure the stability of the relocated stream or channel. Stream habitat enhancements, such as bioengineering methods and/or best management practices for protecting water quality will be considered, on a case-by-case basis, during the design process. Documentation must be provided if stream habitat enhancements will not be used for the proposed stream relocation. [Statement A and B and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

8. Erosion and sedimentation pollution control plans and Best Management Practices must be designed, installed, and maintained in effective operating condition at all times during construction activities so that violations of state water quality standards do not occur. [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

9. Sediment and erosion control measures, such as check-dams constructed of any material, silt fencing, hay bales, etc., shall not be placed within surface waters of the Commonwealth, either temporarily or permanently, without prior approval by the Kentucky Division of Water's Water Quality Certification Section. If placement of sediment and erosion control measures in surface waters is unavoidable, design and placement of temporary erosion control measures shall not be conducted in such a manner that may result in instability of streams that are adjacent to, upstream, or downstream of the structures. All sediment and erosion control devices shall be removed and the natural grade restored within the completion timeline of the activities. [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

Certification of Transportation Letter of Permission

10. Measures shall be taken to prevent or control spills of fuels, lubricants, or other toxic materials used in construction from entering the watercourse. [Statements A and D and citations [KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

11. Removal of riparian vegetation shall be limited to that necessary for equipment access. [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

12. To the maximum extent practicable, all in-stream work under this certification shall be performed under low-flow conditions [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

13. Heavy equipment (e.g. bulldozers, backhoes, draglines, etc.), if required for this project, should not be used or operated within the stream channel. In those instances in which such in-stream work is unavoidable, then it shall be performed in such a manner and duration as to minimize turbidity and disturbance to substrates and bank or riparian vegetation. [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

14. Any fill shall be of such composition that it will not adversely affect the biological, chemical, or physical properties of the receiving waters and/or cause violations of water quality standards. If rip-rap is utilized, it should be of such weight and size that bank stress or slump conditions will not be created because of its placement. [Statements A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

15. If there are water supply intakes located downstream that may be affected by increased turbidity and suspended solids, the permittee shall notify the operator when such work will be done. [Statement E and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

16. Should evidence of stream pollution or jurisdictional wetland impairment and/or violations of water quality standards occur as a result of this activity (either from a spill or other forms of water pollution), the Kentucky Division of Water shall be notified immediately by calling (800) 928-2380. [Statement A and D and citations KRS 224.70-110, 401 KAR 10:030, Section 1(3)(b) & Section 1(4)(b); and 401 KAR 10:031, Section 2 & Section 4]

This Water Quality Certification does not have an expiration date, however if the need for changes develop or if the U.S. Army Corps of Engineers, Louisville District makes modifications to the Letter of Permission (LRL-2006-259-pgj- Date: 11 Sept 2020) then a new certification may be issued.

Certification of Transportation Letter of Permission

Statements of Necessity:

A. This condition is necessary to protect waters categorized under the anti-degradation policy to protect the designated and existing uses and to maintain the associated water quality criteria necessary to protect these water resources.

B. This condition is necessary to protect existing uses and the level of water quality necessary to protect those existing uses shall be assured in impaired water.

C. This condition is necessary for long-term protection of compensatory mitigation sites.

D. This condition is necessary to provide for the prevention, abatement, and control of all water pollution and to conserve water resources for legitimate uses, safeguard from pollution the uncontaminated waters, prevent the creation of any new pollution, and abate any existing pollution.

E. This condition is necessary to protect domestic water supply use.

F. This condition is necessary to evaluate, develop, and improve best-management practices in conservation plans, compliance plans, and forest stewardship management plans; establish statewide and regional agriculture water quality plans; and otherwise promote soil and water conservation activities that protect waters of the Commonwealth from the adverse impacts of agriculture operations within the Commonwealth.

G. This condition is necessary for the Division of Water to be informed of the ongoing activity for the purposes of site visits to ensure implementation of Kentucky Regulatory Statutes and Administrative Regulations; the Division will monitor the environment to afford more effective and efficient control practices, to identify changes and conditions in ecological systems, and to warn of emergency conditions.

H. This condition is necessary for the Division of Water to monitor the environment to afford more effective and efficient control practices, to identify changes and conditions in ecological systems, and to warn of emergency conditions.

I. This condition is necessary to allow the impact to occur. Compensatory mitigation is the method to approve impacts and entire loss of a water resource. The Division can approve necessary impacts and loss based on the confidence that the resource will be replaced and not taken form the watershed entirely. Compensatory mitigation is the method of compliance for the Commonwealth's water quality standards.

Violation of Kentucky state water quality standards may result in civil penalties and remediation actions.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 DR. MARTIN LUTHER KING JR PL
LOUISVILLE, KY 40202

September 5, 2023

Regulatory Division
South Branch (RDS)
ID No. LRL-2018-00540

Mr. Andrew Logsdon
Kentucky Transportation Cabinet (KYTC)
Division of Environmental Analysis
200 Mero Street
Frankfort, Kentucky 40622

Dear Mr. Logsdon,

This is in response to your request for a Department of the Army (DA) permit to reconstruct a segment of Kentucky Highway 15 from the previously improved section of KY 15 east to the intersection of KY 3068 and KY 1812. (KYTC Item No. 10-376.00). The project is located within the city limits of Jackson in Breathitt County, Ky. (Latitude: 37.557841, N/Longitude: -83.367163 W). We have reviewed your application and have made the following determinations: The work is minor in nature, will not have a significant impact on the environment, and should encounter no opposition.

Based on these determinations, your proposed work satisfies the Transportation Letter of Permission (LOP) criteria, as specified in our regulations. Therefore, you are authorized, in accordance with 33 USC 1344, to place fill material into approximately 2,043 linear feet of perennial stream, 1,554 linear feet of intermittent stream, 1,136 linear feet of ephemeral stream and 0.168 acre of wetland. This permission is granted with the following Special Conditions:

a. All work authorized by this permit shall be performed in strict compliance with the attached plans, dated November 21, 2022, for KYTC Item No. 10-376.00, which are a part of this permit. Any modification to these plans affecting the authorized work shall be approved by the U.S. Army Corps of Engineers prior to implementation.

b. The Permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit. A copy of this permit, including all conditions, drawings and attachments shall be available at the project site during the construction phase of this project. A description of the authorized work, as provided in

the DA permit on ENG FORM 4336, shall be displayed at the project site during construction.

c. The Permittee shall comply with all conditions of the Section 401 WQC No. WQCLOP2023-010-7, dated February 9, 2023, issued by the KDOW, which are incorporated herein by reference.

d. The permittee shall purchase 2,172 stream EIUs and 0.3 wetland AMUs from an approved mitigation bank and provide receipt of payment to the Corps. If no mitigation bank is available, the permittee shall provide receipt of payment to the Corps from the Kentucky Department of Fish and Wildlife Resources (KDFWR) Stream and Wetland Mitigation Program (FILO) for the purchase of 2,606 stream EIUs and 0.4 wetland AMUs. Credits must be purchased prior to the discharge of fill material into waters of the United States. Please note that the cost per credit is determined by KDFWR, in accordance with the requirements set forth in 33 CFR 332.8, and may increase or decrease. Inquiries regarding credit purchase may be made directly to KDFWR by calling Mr. Clifford Scott at (502) 564-5101, by email at: clifford.scott@ky.gov, or in writing at: Kentucky Department of Fish and Wildlife Resources, Division of Fisheries, #1 Sportsman's Lane, Frankfort, Kentucky, 40601.

e. To compensate for the removal of 26.12 acres of potential habitat for the Indiana bat, the permittee shall comply with the processes identified in the 2020 Programmatic Biological Opinion.

f. This Department of the Army permit does not authorize you to take an endangered species, in particular the Indiana bat. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with "incidental take" provisions with which you must comply). The attached U.S. Fish and Wildlife Service Biological Opinion (BO) contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Department of the Army permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the BO, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Department of the Army permit. The U.S. Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA.

g. Unless otherwise requested in the application and depicted on the approved work plans, culverts greater than 48 inches in diameter shall be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter and less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic organism passage during drought or low flow conditions and maintain the existing channel slope. Culverts shall be constructed in a manner that ensures channel stability.

h. A Section 408 Statement of No Objection was granted for the proposed work subject to the following special conditions:

1. The permittee shall submit a complete, digital set of as-built drawings for this project within 30 days after completion of work.
2. The permittee shall submit digital construction photos to this office for before, during and after construction conditions within 30 days after the project completion.
3. The permittee is responsible for any damage to the Civil Works Project and is required to make necessary repairs to restore it to the as-built conditions, including restoration of sod cover, at the completion of work.
4. The permittee shall notify the USACE Engineering Division one week prior to construction so a USACE representative may have the option to be on site.

i. The Permittee shall comply with the enclosed General Conditions.

j. The time limit for completing the work authorized ends on **September 6, 2028**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least 1 month before the above date is reached.

k. Upon completion of construction, you are to notify the District Engineer. The enclosed Completion Report must be completed and returned to this office.

Enclosed you will find a Notification of Appeal Process (NAP) fact sheet and Request for Appeal (RFA) form. If you request to appeal the Letter of Permission, you must submit a completed RFA form to the Lakes and Rivers Division Office at the following address:

Regulatory Administrative Appeals Officer
ATTN: Ms. Katherine A. McCafferty
U.S. Army Corps of Engineers,
Great Lakes and Ohio River Division
550 Main Street, Room 10780
Cincinnati, Ohio 45202-3222
Office Phone: 513-684-2699, FAX: 513-684-2460
e-mail: katherine.a.mccafferty@usace.army.mil

In order for an RFA to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date of the NAP. Should you decide to submit an RFA form, it must be received at the above address by **November 4, 2023**.

It is not necessary to submit an RFA form to the Division office if you do not object to the determination in this letter.

If you have any questions, please contact this office by writing to the above address, ATTN: CELRL-RDS, or by calling Mrs. Crystal Byrd at (606) 784-9709. All correspondence pertaining to this matter should refer to our ID No. LRL-2018-00540.

FOR THE DISTRICT ENGINEER:

Sincerely,

Eric G. Reusch
Chief, Regulatory Division

Attachments:

LOP General Conditions
NAP Fact Sheet and RFA Form
Completion Report
10-376.00 Plans/Drawings
2020 Programmatic Biological Opinion
Section 408 Statement of No Objection

Copies Furnished:

Richard Clausen; RES Kentucky LLC
rclausen@res.us

Kentucky Division of Water; Director
401WQC@ky.gov

Compliance Certification:

Permit Number: LRL-2018-00540-cdb

Name of Permittee: Kentucky Transportation Cabinet (KYTC)

Date of Issuance: September 05, 2023

Upon completion of the activity authorized by this permit and any mitigation required by this permit, sign this certification and return it to the following address:

U.S. Army Corps of Engineers
CELRL-RDS
P.O. Box 59
Louisville, Kentucky 40201

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Signature of Permittee

Date

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Kentucky Transportation Cabinet (KYTC)	File Number: LRL-2018-00540	Date: 05 Sept 23
Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
X	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/CECW/Pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

SECTION II - REQUEST FOR APPEAL or OBJECTIONS TO AN INITIAL PROFFERED PERMIT

REASONS FOR APPEAL OR OBJECTIONS: (Describe your reasons for appealing the decision or your objections to an initial proffered permit in clear concise statements. You may attach additional information to this form to clarify where your reasons or objections are addressed in the administrative record.)

ADDITIONAL INFORMATION: The appeal is limited to a review of the administrative record, the Corps memorandum for the record of the appeal conference or meeting, and any supplemental information that the review officer has determined is needed to clarify the administrative record. Neither the appellant nor the Corps may add new information or analyses to the record. However, you may provide additional information to clarify the location of information that is already in the administrative record.

POINT OF CONTACT FOR QUESTIONS OR INFORMATION:

If you have questions regarding this decision and/or the appeal process you may contact:	If you only have questions regarding the appeal process you may also contact:
Crystal Byrd US Army Corps of Engineers – Louisville District PO Box 59, Rm 752 Attn: CELRL-RDS Louisville, KY 40201-0059 (502) 315-6711	Katherine A. McCafferty Regulatory Administrative Appeals Officer U.S. Army Corps of Engineers, Great Lakes and Ohio River Division 550 Main Street, Room 10780 Cincinnati, Ohio 45202-3222 Office Phone: 513-684-2699, FAX: 513-684-2460 e-mail: katherine.a.mccafferty@usace.army.mil

RIGHT OF ENTRY: Your signature below grants the right of entry to Corps of Engineers personnel, and any government consultants, to conduct investigations of the project site during the course of the appeal process. You will be provided a 15-day notice of any site investigation, and will have the opportunity to participate in all site investigations.

	Date:	Telephone number:
_____ Signature of appellant or agent.		

GENERAL CONDITIONS:

1. Discharges of dredged or fill material into "waters of the U.S." must be minimized or avoided to the maximum extent practicable at the project site (i.e. on-site). In determining the minimal impact threshold, the Districts will consider the direct, secondary, and cumulative impacts of the fill or work and any mitigation measures.

2. The permittee shall provide a mitigation/monitoring plan for impacts resulting from the placement of fill into "waters of the U.S." in excess of 300 linear feet of intermittent or perennial stream; the filling of greater than 0.10 acre (4,356 sq. feet) of waters of the U.S; or work causing more than minimal effects, to compensate for impacts to the "waters of the U.S." These impact thresholds are applied for each crossing. When mitigation is required, the permittee will develop the mitigation site concurrently with, or in advance of, the site construction unless the Corps determines on a project specific basis that it is not practical to do so. This will ensure that aquatic functions are not lost for long periods of time (e.g. temporal loss) which could adversely affect water quality and wildlife. The requirement for conservation easements or deed restrictions will be determined on a project specific basis.

3. The permittee shall ensure that sedimentation and soil erosion control measures are in place prior to commencement of construction activities. These measures will remain in place and be properly maintained throughout construction. Sedimentation and soil control measures shall include the installation of straw bale barriers, silt fencing and/or other approved methods to control sedimentation and erosion. Sedimentation and erosion controls will not be placed in "waters of the U.S." except if specifically approved by the District.

4. The permittee shall ensure that areas disturbed by any construction activity, including channel and stream banks, are immediately stabilized and revegetated with a combination of non-invasive plants (grasses, legumes and shrubs) which are compatible with the affected area and will not compete with native vegetation.

5. The permittee shall ensure that no in-stream construction activity is performed during periods of high stream flow or during the fish spawning season (April 1 through June 30) without first contacting the Kentucky Department of Fish and Wildlife Resources (KDFWR) for their expertise on impacts to the fishery resource. Additionally, the discharge of dredged and/or fill material in known waterfowl breeding and wintering areas must be avoided to the maximum extent practicable.

6. The permittee will ensure that the activity authorized will not disrupt movement of those aquatic species indigenous to the waterbody, including those species which normally migrate through the area, unless the activity's specific purpose is to impound water.

7. The permittee shall ensure that all construction equipment is refueled and maintained on an upland site away from existing streams, drainageways and wetland areas. Heavy equipment working in wetlands must be placed on mats or other measures must be taken to minimize soil disturbance.

8. The permittee must comply with any case specific special conditions added by the Corps or by the State Section 401 Water Quality Certification (WQC). The conditions imposed in the State Section 401 WQC are also conditions of this LOP.

9. The permittee shall ensure that no activity authorized by the LOP may cause more than a minimal adverse effect on navigation.

10. The permittee shall ensure proper maintenance of any structure or fill authorized by the LOP, in good condition and in conformance with the terms and conditions of the LOP, including maintenance to ensure public safety. The permittee is not relieved of this requirement if the permitted activity is abandoned, although the permittee may make a good faith transfer to a third party. Should the permittee wish to cease to maintain the authorized activity or desire to abandon it without a good faith transfer, the permittee must obtain a modification to the LOP from the Corps, which may require restoration of the area.

11. The permittee shall not perform any work within any Wild and Scenic Rivers or in any river officially designated as a "study river" for possible inclusion in the system, unless the appropriate Federal agency, with direct management responsibility for such river, has determined in writing that the proposed activity authorized by the LOP will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal Land Management agency in the area (e.g. U.S. Forest Service, Bureau of Land Management, the National Parks Service, or the U.S. Fish and Wildlife Service).

12. The permittee shall not perform any work under the LOP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act, or which is likely to destroy or adversely modify the critical habitat of such species. The permittee shall notify the Corps and coordinate the proposed action with the USFWS to determine if any listed species or critical habitat might be affected and/or adversely modified by the proposed work. No activity is authorized under the LOP which “may affect” a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed. At the direction of the Corps, the permittee shall complete the necessary consultation with the USFWS, satisfying the requirements of Section 7(a)(2) of the Endangered Species Act. The permittee shall not begin work until notified by the District Engineer that the requirements of the Endangered Species Act have been satisfied and that the activity is authorized. Authorization of an activity

under the LOP does not authorize the "take" of a threatened or endangered species as defined under the Federal Endangered Species Act. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. Fish and Wildlife Service, both lethal and non-lethal "takes" of protected species are in violation of the Endangered Species Act.

Obligations under Section 7 of the Act must be reconsidered by the Corps Districts if (1) new information reveals impacts of the proposed action may affect listed species or critical habitat in a manner not previously considered, (2) the proposed action is subsequently modified to include activities which were not considered during consultation, or (3) new species are listed or critical habitat designated that might be affected by the proposed action.

13. The permittee shall not perform any activity under the LOP which may affect historic properties listed, or eligible for listing, in the National Register of Historic Places until the District Engineer has complied with the provisions of 33 CFR Part 325, Appendix C. The permittee must notify the District Engineer if the activity authorized by the LOP may affect any historic properties listed, determined to be eligible or which the permittee has reason to believe may be eligible for listing on the National Register of Historic Places, and shall not begin construction until notified by the District Engineer that the requirements of the National Historic Preservation Act have been satisfied and that the activity is authorized. Information on the location and existence of historic resources can be obtained from the Kentucky Heritage Council.

If the permittee discovers any previously unknown historic or archaeological remains while accomplishing the activity authorized by the LOP, work must be immediately stopped and this office immediately notified regarding the discovery. The District will initiate the Federal, Tribal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

14. The permittee shall not perform any work under the LOP where the discharge of dredged and/or fill material will occur in the proximity of a public water supply intake.

15. No activity, including structures or work in “waters of the U.S.” or discharges of dredged or fill material may consist of unsuitable materials (e.g. trash, debris, car bodies, asphalt, etc.) and that materials used for construction or discharge must be free from toxic pollutants in toxic amounts.

16. The permittee shall, to the maximum extent practicable, design the project to maintain pre-construction downstream flow conditions. Furthermore, the work must not permanently restrict or impede the passage of normal or expected high flows and the structure or discharge of fill must withstand expected high flows. The project must provide, to the maximum extent practicable, for retaining excess flows from the site and for establishing flow rates from the site

similar to pre-construction conditions.

17. The permittee shall ensure that all temporary fills, authorized under the LOP, be removed in their entirety and the affected areas returned to pre-construction elevation.

18. Representatives from the Corps of Engineers and/or the State of Kentucky may inspect any authorized activity or mitigation site at any time deemed necessary to ensure compliance with the terms and conditions of the LOP, Section 401 WQC, and applicable laws.

19. All work authorized by this LOP must be completed within five years after the date of the Corps authorization letter. If you find you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least three months before the expiration date.

20. The permittee, after completion of work under the LOP, shall submit a signed certification letter regarding the completed work and required mitigation, if applicable. The certification letter will include a statement that the work was done in accordance with the LOP authorization including compliance with all general and special conditions and completion of mitigation work.

21. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of the LOP.

22. For Section 10 waters, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, LOUISVILLE DISTRICT
600 DR. MARTIN LUTHER KING JR PL
LOUISVILLE, KY 40202

August 23, 2023

Engineering Division

Ms. Laura Thomas
City of Jackson Mayor
333 Broadway Street
Jackson, KY 41339

Dear Ms. Thomas:

I am returning one copy of an approved alteration request (Reference Number 20230058.JAC) for the proposed modification near the Jackson, Ky Bank Stabilization Project. We understand that the project will consist of stabilizing the right descending bank of the Kentucky River immediately downstream of the civil works project (37.556969, -83.386506). The stabilization is needed to protect KY 15 and the Panbowl Lake Dam from future flood events. The proposed alteration involves the construction of an access road from the northern terminus of Court Street, along the right riverbank to the stabilization area. The access road will be permanent to permit maintenance of the stabilized area. The stabilization will start within the civil works project area (approximately Station 25+40 on plans).

We have reviewed the submitted documents and have no objections to the proposed work provided the following special conditions are adhered to:

a. The contractor must submit a complete, digital set of as-built drawings for this project within 30 days after completion of work.

b. The contract must submit digital construction photos to this office for before, during and after construction conditions within 30 days after project completion.

c. The contractor is responsible for any damage to the Civil Works Project and is required to make necessary repairs to restore it to the as-built condition, including restoration of sod cover, at the completion of work.

It should be noted that this approval is for only the work discussed herein. It is the responsibility of the City of Jackson to ensure the work is completed in accordance with the plans and specifications.

This approval will be valid for a period of two years from the date of this letter. Any modification deemed necessary during construction will require additional technical review and approval by this office prior to continuation of construction.

A USACE Regulatory permit is required for this project.

Please notify this office one week prior to construction so a USACE representative may have the option to be on site. If you have any questions regarding this alteration, please address them to your Levee Safety Coordinator, Mr. Jordan Campbell at (502) 315-6846 or jordan.e.campbell@usace.army.mil.

Sincerely,

X

Digitally signed by Ian F. Mitchell
Date: 2023.08.24 11:51:03 -04'00'

Ian F. Mitchell, P.E., LEED AP BD+C
Chief, Engineering Division &
Levee Safety Officer

Enclosures

Special Note For Corps of Engineer Section 408:

In the accordance with the U.S. Army Corps of Engineers' approval of Section 408 for the proposed medication near the Jackson, KY bank stabilization project (reference number 20230058.JAC).

A. The roadway contractor must submit a complete, digital set of as-built drawings for this project to the KYTC District 10 Preconstruction Branch Manager, Aric Skaggs, within 30 days after completion of work.
B. The contractor must submit digital construction photos to the KYTC District 10 Preconstruction Branch Manager, Aric Skaggs, for before, during and after construction condition within 30 days after project completion.
C. The contractor is responsible for any damage to the Civil Works Project and is required to make necessary repairs to restore it to the as-built condition, including restoration of sod cover, at the completion of work.
D. Any modification deemed necessary during construction will require additional technical review and approval by this office prior to continuation of construction.
E. The contractor shall notify the KYTC District 10 Environmental Coordinator, Brandon Baker, one week prior to construction so a USACE representative may have the option to be on site.

Please refer to the 10-376 USACE Section 408 approval letter for additional information.

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 #10-0376.00

[Improve KY 15 from KY 30 intersection to KY 1812 intersection]

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 15 in Breathitt County from MP 16.75 to MP 17.9 (1)
6. Latitude/Longitude (project mid-point) 37°33'28", -83°22'46" (1)
7. County (project mid-point) Breathitt County. (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 15 from MP 16.75 to MP 17.9. Excavation and blasting, constructing of culvert pipes and pavement, and bank stabilization. (1)
2. Order of major soil disturbing activities (2) and (3)
3. Projected volume of material to be moved
   597,331 cubic yards to be excavated. (1)

4. Estimate of total project area (acres) Approximately 55 acre (1)

5. Estimate of area to be disturbed (acres) Approximately 53 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 North Fork Kentucky River, Panbowl Lake.

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:

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)

KyTC BMP Plan for Project PCN ## - ####

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

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: BREATHITT **Route: KY**
Item No.: 10-376.00 **KDOW Submittal ID: 381062**

Project Description: IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812.

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.

EXHIBIT #2

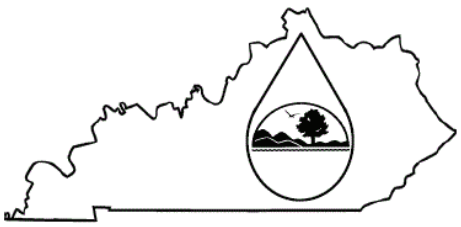
Sep-23

IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812.

KPDES NOI for Stormwater Discharges Associated with Construction Activity Under the KPDES General Permit

Transaction ID:

c9bf78f7-aca8-43b3-b0c3-a085145eba42 To be submitted by the eNOI Preparer



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.
(http://dep.ky.gov/formslibrary/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:(*)
473 Highway 15 South	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(*)
IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION (	State Government	1611 Highway and Street Constructi

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
Kentucky Transportation Cabinet	Corbett	MI	Caudill

Site Physical Address:(*)
KY 15 from the intersection of New KY 15/KY 30 to intersection of KY 1812

City:(*)	State:(*)	Zip:(*)
Jackson	Kentucky	41339

County:(*)	Latitude(decimal degrees)(*)DMS to DD Converter (https://www.fcc.gov/media/radio/dms-decimal)	Longitude(decimal degrees)(*)
Breathitt	37.5584N	83.3687W

SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION

Project Description:(*)
IMPROVE KY-15 FROM THE INTERSECTION OF NEW KY-15/30 TO INTERSECTION OF KY-1812.

a. For single projects provide the following information

Total Number of Acres in Project:(✓)	Total Number of Acres Disturbed:(✓)
Project Acres	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		37.5584	83.3687		Delete
2		37.5585	83.3693		Delete
3		37.5579	83.3703		Delete
4		37.558	83.3703		Delete
5		37.5586	-83.3698		Delete
6		37.5583	-83.372		Delete
7		37.5582	-83.3755		Delete
8		37.5581	-83.3767		Delete
9		37.558	-83.3777		Delete
10		37.5573	-83.3775		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?:(*)	Yes
If Yes, describe scope of activity: (✓)	Bank stabilization and constructing road embankment
Is a Clean Water Act 404 permit required?:(*)	Yes
Is a Clean Water Act 401 Water Quality Certification required?:(*)	Yes

SECTION VII -- NOI PREPARER INFORMATION

First Name:(*) BRANDY	M.I.: MI	Last Name:(*) FLETCHER	Company Name:(*) Company Name
Mailing Address:(*) 473 Highway 15 S	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:(*)		Title:(*)	
Corbett Caudill		Executive Director	
First Name:(*)	M.I.:	Last Name:(*)	
Corbett	MI	Caudill	
eMail Address:(*)	Business Phone:(*)	Alternate Phone:	Signature Date:(*)
corbett.caudill@ky.gov	6066668841	Phone	10/16/2023

Click to Save Values for Future Retrieval | Click to Submit to EEC

KENTUCKY TRANSPORTATION CABINET
COMMUNICATING ALL PROMISES (CAP)

Item No. 10 - 376 **County:** Breathitt **Route:** 15 **Project Manager:** ARIC SKAGGS

1/17/24

CAP #	Date of Promise	Promise made to:	Location of Promise:	CAP Description
1	12/6/22	Citizens Bank / JB Morgan	Parcel 6 - Citizens Bank	KYTC's contractor shall communicate with JB Morgan of Parcel 6, Citizens Bank, in advance of any construction activities on the property and easement acquired. KYTC's contractor shall also attempt to lessen impacts to Citizens Bank's business activities as much as is practicable.
2	1/30/23	P41 Breathitt Co Industrial Development Foundation	P41 Entrance Station 96+00	P41 has granted permission for KYTC to enter the parcel if needed to properly stub-off the entrance within the right of way limits.
3	1/31/23	P22 Breathitt Co Board of Education	P22, Bobcat Lane	Football field drains outfall into the Kentucky River Channel and Access area (sheets R49 A-E). In the even that one is accidentally damaged during construction activities, repairs shall be made at no expense to the school board. Access to Bobcat Lane will not be impeded or closed. Property owner will be granted until 6/1/2023 to move contents of bus garage.
4	2/27/23	City of Jackson	10-376 project limits	KYTC and City of Jackson have entered into a lighting agreement. KYTC Resident Construction Engineer: Please contact Aric Skaggs for details.
5	6/30/23	Sue Clair and Daughters	P21	Sue Clair has requested that she be contacted by the awarded contractor concerning available excess material site(s). She says that she has interest in the material and has availability on her property. 606-666-7097
6	6/30/23	Sue Clair, 2 Chicks & Sisters Too LLC	All properties in the project corridor owned or maintained by the requestor.	Sue Clair and 2 Chicks & Sisters Too LLC are concerned about blasting damage to their properties. They have requested pre-blast surveys be completed on structures owned or managed by them. 606-666-7097, 859-576-7365
7	2/28/23	Cecil Clair	P27	KYTC has agreed to modify the entrance along KY 15 to a 24' wide entrance at the tie down of the parking lot. The plans reflect this agreement.
8	1/31/23	Aric Skaggs	P22, Bobcat Lane	This CAP note supersedes CAP note #3. Football field drains outfall into the Kentucky River Channel and Access area (sheets R49 A-E). In the even that one is accidentally damaged during construction activities, repairs shall be made by the Contractor at no expense to the school board. Access to Bobcat Lane will not be impeded or closed. Property owner will be granted until 6/1/2023 to move contents of bus garage.
9	1/17/24	Aric Skaggs	Project Length	The contractor shall communicate and coordinate with the property owners along the project corridor to maintain reasonable ingress and egress during the normal business hours from 8 AM to 5 PM.
10	1/17/24	Aric Skaggs	District 10 Office Building	The contractor shall notify the Chief District Engineer, Corbett Caudill, at least 10 days prior of working around the sweet gum tree (marked as Do Not Disturb) in front of the District 10 Office Building, at approximately RT. Station 521+00. The contractor shall exercise care when working around the tree to avoid damaging the tree.
11	1/17/24	Aric Skaggs	Parcel 26	The contractor shall provide a minimal of 6 week notification to the property owner and the store manager of Parcel 26, 2 Chicks & Sisters Too, LLC (Sunshine Fuel #201) prior to closing off their entrance to KY 15.

10-376.00
SPECIAL NOTE FOR PRE-BID CONFERENCE

The Department will conduct a Pre-Bid Conference of the subject project on **Monday, March 11th, 2024 from 10:00 AM to 12:00 PM** at:

Kentucky Transportation Cabinet District 10 Office – Main Conference Room
473 Highway 15 South
Jackson, Kentucky 41339

Meeting may be recorded.

Any company that is interested in bidding on the subject project or being part of a joint venture must be represented at the conference by at least **one person of sufficient authority to bind the company**. No individual can represent more than one company. At the conference a roster will be taken of the representatives present. **Only companies represented at the conference will be eligible to have their bids opened at the date of letting.**

Drilling sub-contractor will be required to attend the pre-bid meeting.

The purpose of the conference is to familiarize all prospective bidders with the contract requirements of the contract.

Department of Highways officials present at the conference will answer questions concerning the projects.

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

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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.

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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

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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

11D

SPECIAL NOTE FOR ROCK BLASTING

This Special Note will apply when indicated on the plans or in the proposal. Section references herein are to the Department's Current Standard Specifications for Road and Bridge Construction.

1.0 DESCRIPTION. This work consists of fracturing rock and constructing stable final rock cut faces using presplit blasting and production blasting techniques.

2.0 MATERIALS. Deliver, store, and use explosives according to the manufacturer's recommendations and applicable laws. Do not use explosives outside their recommended use date. Verify date of manufacture and provide copies of the technical data sheets (TDS) and material safety data sheets (MSDS) to the Engineer. Explosives and initiating devices include, but are not necessarily limited to, dynamite and other high explosives, slurries, water gels, emulsions, blasting agents, initiating explosives, detonators, blasting caps, and detonating cord.

3.0 CONSTRUCTION. Furnish copies or other proof of all-applicable permits and licenses. Comply with Federal, State, and local regulations on the purchase, transportation, storage, and use of explosive material. Regulations include but are not limited to the following:

1) KRS 351.310 through 351.9901.
2) 805 KAR 4:005 through 4:165
3) Applicable rules and regulations issued by the Office of Mine Safety and Licensing.
4) Safety and health. OSHA, 29 CFR Part 1926, Subpart U.
5) Storage, security, and accountability. Bureau of Alcohol, Tobacco, and Firearms (BATF), 27 CFR Part 181.
6) Shipment. DOT, 49 CFR Parts 171-179, 390-397.

3.1 Blaster-in-Charge. Designate in writing a blaster-in-charge and any proposed alternates for the position. Submit documentation showing the blaster-in-charge, and alternates, have a valid Kentucky blaster's license. Ensure the blaster-in-charge or approved alternate is present at all times during blasting operations.

3.2 **Blasting Plans.** Blasting plans and reports are for quality control and record keeping purposes. Blasting reports are to be signed by the blaster-in-charge or the alternate blaster-in-charge. The general review and acceptance of blasting plans does not relieve the Contractor of the responsibility whatsoever for conformance to regulations or for obtaining the required results. All blasting plans shall be submitted to the Engineer. The Engineer will be responsible for submitting the plan to the Central Office Division of Construction and the Division of Mine Reclamation and Enforcement, Explosives and Blasting Branch at the following address: 2 Hudson Hollow, Frankfort, Kentucky, 40601.

A) General Blasting Plan. Submit a general blasting plan for acceptance at least 15 working days before drilling operations begin. Include, as a minimum, the following safety and procedural details:

1) Working procedures and safety precautions for storing, transporting, handling, detonating explosives. Include direction on pre and post blast audible procedures, methods of addressing misfires, and methods of addressing inclement weather, including lightning.
2) Proposed product selection for both dry and wet holes. Furnish Manufacturer's TDS and MSDS for all explosives, primers, initiators, and other blasting devices.
3) Proposed initiation and delay methods.
4) Proposed format for providing all the required information for the site specific blasting shot reports.

B) Preblast Meeting. Prior to drilling operations, conduct a preblast meeting to discuss safety and traffic control issues and any site specific conditions that will need to be addressed. Ensure, at a minimum, that the Engineer or lead inspector, Superintendent, blaster-in-charge, and all personnel involved in the blasting operation are present. Site specific conditions include blast techniques; communication procedures; contingency plans and equipment for dealing with errant blast material. The conditions of the General Blasting plan will be discussed at this meeting. Record all revisions and additions made to the blasting plan and obtain written concurrence by the blaster-in-charge. Provide a copy of the signed blast plan to the Engineer along with the sign in sheet from the preblast meeting.

3.3 Preblast Condition Survey and Vibration Monitoring and Control. Before blasting, arrange for a preblast condition survey of nearby buildings, structures, or utilities, within 500 feet of the blast or that could be at risk from blasting damage. Provide the Engineer a listing of all properties surveyed and any owners denying entry or failing to respond. Notify the Engineer and occupants of buildings at risk at least 24 hours before blasting.

Limit ground vibrations and airblast to levels that will not exceed limits of 805 KAR 4:005 through 4:165. More restrictive levels may be specified in the Contract.

Size all blast designs based on vibration, distance to nearest building or utility, blast site geometry, atmospheric conditions and other factors. Ground vibrations are to be controlled according to the blasting standards and scaled distance formulas in 805 KAR 4:020 or by the use of seismographs as allowed in 805 KAR 4:030. The Department will require seismographs at the nearest allowable location to the protected site when blasting occurs within 500 feet of buildings, structures, or utilities.

3.4 Blasting. Drill and blast at the designated slope lines according to the blasting plan. Perform presplitting to obtain smooth faces in the rock and shale formations. Perform the presplitting before blasting and excavating the interior portion of the specified cross section at any location. The Department may allow blasting for fall benches and haul roads prior to presplitting when blasting is a sufficient distance from the final slope and results are satisfactory to the Engineer. Use the types of explosives and blasting accessories necessary to obtain the required results.

Free blast holes of obstructions for their entire depth. Place charges without caving the blast hole walls. Stem the upper portion of all blast holes with dry sand or other granular material passing the 3/8-inch sieve. Dry drill cuttings are acceptable for stemming when blasts are more than 800 feet from the nearest dwelling.

Stop traffic during blasting operations when blasting near any road and ensure traffic does not pass through the Danger Zone. The blaster-in-charge will define the Danger Zone prior to each blast. Ensure traffic is stopped outside the Danger Zone, and in no case within 800 feet of the blast location.

Following a blast, stop work in the entire blast area, and check for misfires before allowing worker to return to excavate the rock.

Remove or stabilize all cut face rock that is loose, hanging, or potentially dangerous. Leave minor irregularities or surface variations in place if they do not create a hazard. Drill the next lift only after the cleanup work and stabilization work is complete.

When blasting operations cause fracturing of the final rock face, repair or stabilize it in an approved manner at no cost to the Department.

Halt blasting operations in areas where any of the following occur:

1) Slopes are unstable;
2) Slopes exceed tolerances or overhangs are created;
3) Backslope damage occurs;
4) Safety of the public is jeopardized;
5) Property or natural features are endangered;
6) Fly rock is generated; or
7) Excessive ground or airblast vibrations occur in an area where damage to buildings, structures, or utilities is possible.
8) The Engineer determines that materials have become unsuitable for blasting

Blasting operations may continue at a reasonable distance from the problem area or in areas where the problems do not exist. Make the necessary modifications to the blasting operations and perform a test blast to demonstrate resolution of the problem.

A) Drill Logs. Maintain a layout drawing designating hole numbers with corresponding drill logs and provide a copy of this information to the blaster prior to loading the hole. Ensure the individual hole logs completed by the driller(s) show their name; date drilled; total depth drilled; and depths and descriptions of significant conditions encountered during drilling that may affect loading such as water, voids, changes in rock type.

B) Presplitting. Conduct presplitting operations in conformance with Subsection 204.03.04 of the Standard Specifications for Road and Bridge Construction.

3.5 Shot Report. Maintain all shot reports on site for review by the Department. Within one day after a blast, complete a shot report according to the record keeping requirements of 805 KAR 4:050. Include all results from airblast and seismograph monitoring.

3.6 Unacceptable Blasting. When unacceptable blasting occurs, the Department will halt all blasting operations. Blasting will not resume until the Department completes its investigation and all concerns are addressed. A blast is unacceptable when it results in fragmentation beyond the final rock face, fly rock, excessive vibration or airblast, overbreak, damage to the final rock face or overhang. Assume the cost for all resulting damages to private and public property and hold the Department harmless.

11D

When an errant blast or fly rock causes damage to or blocks a road or conveyance adjacent to the roadway, remove all debris from the roadway as quickly as practicable and perform any necessary repairs. Additionally, when specified in the Contract, the Department will apply a penalty.

Report all blasting accidents to the Division of Mine Reclamation and Enforcement, Explosives and Blasting Branch at 502-564-2340.

4.0 MEASUREMENT AND PAYMENT. The Department will not measure this work for payment and will consider all items contained in this note to be incidental to either Roadway Excavation or Embankment-in-Place, as applicable. However, if the Engineer directs in writing slope changes, then the Department will pay for the second presplitting operation as Extra Work.

The Department will measure for payment material lying outside the typical section due to seams, broken formations, or earth pockets, including any earth overburden removed with this material, only when the work is performed under authorized adjustments.

The Department will not measure for payment any extra material excavated because of the drill holes being offset outside the designated slope lines.

The Department will not measure for payment any material necessary to be removed due to the inefficient or faulty blasting practices.

July 1, 2022

11F

SPECIAL NOTE FOR TURF REINFORCING MAT

1.0 DESCRIPTION. Install turf reinforcement mat at locations specified in the Contract or as the Engineer directs. Section references herein are to the Department's Current Standard Specifications for Road and Bridge Construction.

2.0 MATERIALS.

2.1 Turf Reinforcement Mat (TRM). Use a Turf Reinforcement Mat defined as permanent rolled erosion control product composed of non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a three-dimensional matrix of sufficient thickness and from the Department's List of Approved Materials. Mats must be 100% UV stabilized materials. For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting exclusively. Ensure product labels clearly show the manufacturer or supplier name, style name, and roll number. Ensure labeling, shipment and storage follows ASTM D-4873. The Department will require manufacturer to provide TRMs that are machine constructed web of mechanically or melt bonded nondegradable fibers entangled to form a three dimensional matrix. The Department will require all long term performance property values in table below to be based on non degradable portion of the matting alone. Approved methods include polymer welding, thermal or polymer fusion, or placement of fibers between two high strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. Ensure that mats designated in the plans as Type 4 mats, are not to be manufactured from discontinuous or loosely held together by stitching or glued netting or composites. Type 4 mats shall be composed of geosynthetic matrix that exhibits a very high interlock and reinforcement capacities with both soil and root systems and with high tensile modulus. The Department will require manufacturer to use materials chemically and biologically inert to the natural soil environments conditions. Ensure the blanket is smolder resistant without the use of chemical additives. When stored, maintain the protective wrapping and elevate the mats off the ground to protect them from damage. The Department will not specify these materials for use in heavily acidic coal seam areas or other areas with soil problems that would severally limit vegetation growth.

2.2 Classifications

The basis for selection of the type of mat required will be based on the long term shear stress level of the mat of the channel in question or the degree of slope to protect and will be designated in the contract. The Type 4 mats are to be used at structural backfills protecting critical structures, utility cuts, areas where vehicles may be expected to traverse the mat, channels with large heavy drift, channels with high shear stresses, and where higher factors of safety, very steep slopes and/or durability concerns are needed as determined by project team and designer and will be specified in the plans by designer.

Properties	Type 1	Type 2	Type 3	Type 4
Maximum Slope (H:V)	1:1	1:1	0.5:1	0.5:1
Un-vegetated Shear	≥ 2.0 lbs/ft^2 (≥ 96 Pa)	≥ 2.0 lb/ft2 (≥ 96 Pa)"	≥ 2.0 lb/ft2 (≥ 96 Pa)	≥ 2.0 lb/ft2 (≥ 96 Pa)

11F

Stress[b, c, d] ASTM D6460				
Vegetated Shear Stress [c, d, e, f] ASTM D6460	≥ 6.0 lbs/ft^2 (≥ 287 Pa)	≥ 8.0 lb/ft2 (≥ 383 Pa)	≥ 10.0 lb/ft2 (≥ 479 Pa)	≥ 12.0 lb/ft2 (≥ 575 Pa)
Seedling Emergence [d] ASTM D7322	≥ 250%	≥ 250%	≥ 250%	≥ 250%
MD Material Tensile Strength [d, f] ASTM D6818	≥ 150 lbs/ft (≥ 2.2 kN/m)	≥ 175 lbs/ft (≥ 2.6 kN/m)	≥ 200 lbs/ft (≥ 2.9 kN/m)	≥ 1,500 lbs/ft (≥ 21.9 kN/m)
TD Material Tensile Strength [d, f] ASTM D6818	≥ 150 lbs/ft (≥ 2.2 kN/m)	≥ 175 lbs/ft (≥ 2.6 kN/m)	≥ 200 lbs/ft (≥ 2.9 kN/m)	≥ 1,500 lbs/ft (≥ 21.9 kN/m)
Mass Per Unit Area [d] ASTM D6566	≥ 8.0 oz/yd^2 (≥ 271 g/m^2))	≥ 8.0 oz/yd^2 (≥ 271 g/m2)	≥ 8.0 oz/yd^2 (≥ 271 g/m2)	≥ 8.0 oz/yd2 (≥ 271 g/m2)
Material Thickness [d] ASTM D6525	≥ 0.25 in (≥ 6.35 mm)	≥ 0.25 in (≥ 6.35 mm)	≥ 0.25 in (≥ 6.35 mm)	≥ 0.25 in (≥ 6.35 mm)
UV Stability [c, e] ASTM D4355	≥ 80% @ 500 hrs	≥ 80% @ 500 hrs	≥ 80% @ 1,000 hrs	≥ 90% @ 1,000 hrs

a. For Type 4 mats, property values tested per ASTM D6818 and D6525 are reported as minimum average roll values (MARVs). MARVs are calculated as the typical minus two standard deviations. Statistically, it yields a 97.7% degree of confidence that any samples taken from quality assurance testing will exceed the value reported.

b. Required minimum shear stress TRM (un-vegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in.) soil loss during successive, minimum 30 minute flow events in large scale testing.

c. Acceptable large-scale testing protocol may include ASTM D6460, or other independent testing deemed acceptable by the engineer. Large-scale performance testing typically involves limited soil types and vegetative stands, therefore it is recommended that an appropriate factor of safety be used in design and product selection (see Guidance Document for further information).

d. Typical values are calculated as the average value, it yields a 50% degree of confidence that any samples taken from quality assurance testing will exceed the value reported.

e. Required minimum shear stress TRM (fully vegetated) can sustain without physical damage or excess erosion (> 12.7 mm (0.5 in.) soil loss during successive, minimum 30 minute flow events in large scale testing.

f. For TRMs containing degradable components, property values must be obtained on the non-degradable portion of the matting alone.

NOTE: TRMs are typically used in hydraulic applications, such as high flow ditches and channels, steep slopes, stream banks, and shorelines, where erosive forcers may exceed the limits of natural, unreinforced vegetation or in areas where limited vegetation establishment is anticipated.

2.3 Quality Assurance Sampling, Testing, and Acceptance

A) Performance Testing: The Department will require AASHTO's NTPEP index testing. The Department will also require the manufacturer to perform internal MARV testing at a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory for tensile strength, tensile elongation, mass per unit area, and thickness once every 24,000 yds of production or whatever rate is required to ensure

97.7% confidence under ASTM D4439& 4354. The Department will require Full scale testing for slope and channel applications shear stress shall be done under ASTM D 6459, ASTM D 6460-07 procedures.

B) Provide TRM listed on the Department's List of Approved Materials. Prior to inclusion on the LAM, the manufacturer of TRM must meet the physical and performance criteria as outlined in the specification and submit a Letter Certifying compliance of the product under the above ASTM testing procedures and including a copy of report from Full Scale Independent Hydraulics Facility that Fully Vegetated Shear Stress meets shear stress requirements tested under D6459 and D6460-07.

C) Contractors will provide a Letter of Certification from Manufacturer stating the product name, manufacturer, and that the product MARV product unit testing results meets Department criteria. Provide Letters once per project and for each product.

D) Acceptance shall be in accordance with ASTM D-4759 based on testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory using Procedure A of ASTM D-4354.

Current mats meeting the above criteria are shown on the Department's List of Approved Materials. Mats that exceed the criteria for KYTC Types 1-4 are available. Contact an erosion control material supplier for more information.

2.4 Fasteners. When the mat manufacturer does not specify a specific fastener, use steel wire U-shaped staples with a minimum diameter of 0.09 inches (11 gauge), a minimum width of one inch and a minimum length of 12 inches. Use a heavier gauge when working in rocky or clay soils and longer lengths in sandy soils as directed by Engineer or Manufacturer's Representative. Provide staples with colored tops when requested by the Engineer.

3.0 CONSTRUCTION., Provide a Manufacturer's Representative on-site to oversee and approve the initial installation of the mat. When requested by the Engineer, provide a letter from the Manufacturer approving the installation. When there is a conflict between the Department's criteria and the Manufacturer's criteria, construct using the more restrictive. The Engineer and Manufacturer's Representative must approve all alternate installation methods prior to execution. Construct according to the Manufacturer's recommendations and the following as minimum installation technique:

3.1 Site Preparation. Smoothly grade areas to be treated with matting and compact. Remove large
rocks, soil clods, vegetation, roots, and other sharp objects that could keep the mat from intimate contact with subgrade. Prepare seedbed by loosening the top 2 to 3 inch of soil.

3.2 Installation. Install mats according to Standard Drawing Sepias "Turf Mat Channel Installation" and "Turf Mat Slope Installation." Install mats at the specified elevation and alignment. Anchor the mats with staples with a minimum length of 12 inches. Use longer anchors for installations in sandy, loose, or wet soils as directed by the Engineer or Manufacturer's Representative. The mat should be in direct contact with the soil surface. Infill and overfill the mat with a minimum of ½" of soil as directed by the Manufacturer.

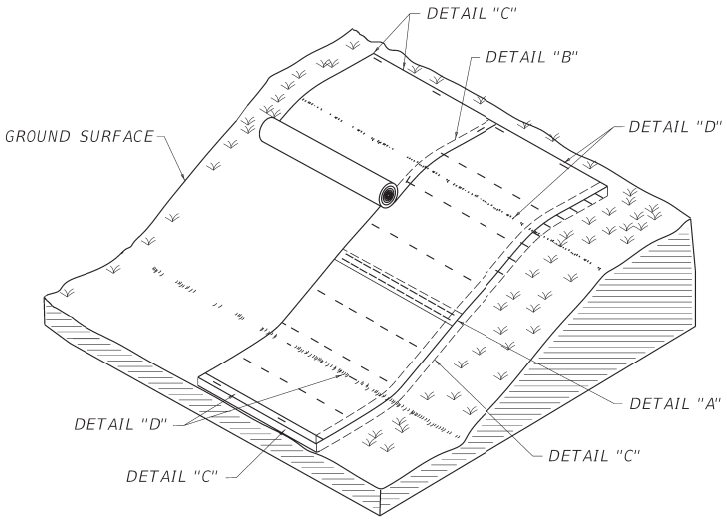
11F

4.0 MEASUREMENT. The Department will measure the quantity of Turf Reinforcement Mat by the square yard of surface covered. The Department will not measure preparation of the bed, providing a Manufacturer's Representative, topsoil, or seeding for payment and will consider them incidental to the Turf Reinforcement Mat. The Department will not measure any reworking of slopes or channels for payment as it is considered corrective work and incidental to the Turf Reinforcement Mat. Seeding and protection will be an incidental item.

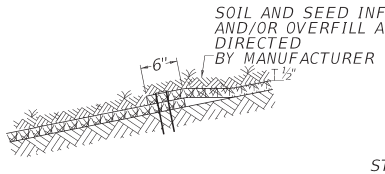
5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

Code	Pay Item	Pay Unit
23274EN11F	Turf Reinforcement Mat 1	Square Yard
23275EN11F	Turf Reinforcement Mat 2	Square Yard
23276EN11F	Turf Reinforcement Mat 3	Square Yard
23277EN11F	Turf Reinforcement Mat 4	Square Yard

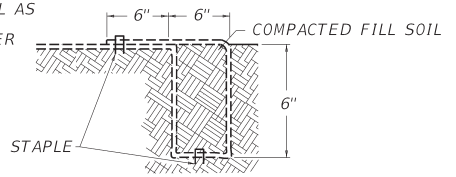
June 29, 2023



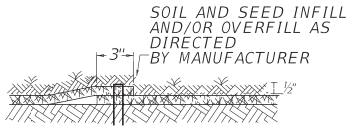
TURF MAT
SLOPE INSTALLATION



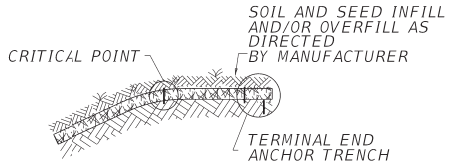
TRANSVERSE OVERLAP
DETAIL "A"

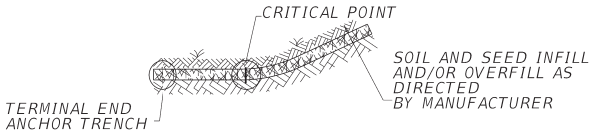


ANCHOR TRENCH
DETAIL "C"



LONGITUDINAL OVERLAP
DETAIL "B"





CRITICAL POINTS
DETAIL "D"

~ NOTES ~

1. CONSTRUCT A 6" X 6" ANCHOR TRENCH AT THE BEGINNING OF THE SLOPE. LINE THE ANCHOR TRENCH WITH TURF REINFORCING MAT LEAVING 12" EXTENDING PAST THE ANCHOR TRENCH. FASTEN THE MAT MATERIAL INTO THE ANCHOR TRENCH ON 12" CENTERS BACKFILL THE TRENCH WITH TOPSOIL AND COMPACT. COVER THE AREA WITH THE REMAINING 12" OF THE MAT'S TERMINAL END LEAVING 6" TO OVERLAP THE TURF REINFORCING MAT. SECURE THE 6" OVERLAP WITH STAPLES ON 12" CENTERS.
2. UNROLL THE MAT DOWN THE SLOPE AND PLACE IN DIRECT CONTACT WITH THE SOIL SURFACE. INSURE THAT THE SOIL SURFACE IS GRADED SMOOTHLY AND DOES NOT CONTAIN IRREGULARITIES.
3. SECURELY FASTEN THE MAT TO THE SOIL BY INSTALLING STAPLES AT A MINIMUM RATE OF 1.5 PER SQ. YD. ANCHORS SHALL BE SELECTED SO THAT THEY HAVE SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. INCREASE ANCHORING FREQUENCY FOR SITE CONDITIONS (LOOSE, SANDY, OR WET SOILS) AS DIRECTED BY THE ENGINEER AND MANUFACTURER'S REPRESENTATIVE.
4. OVERLAP EDGES OF MATS ACCORDING TO THE LONGITUDINAL AND TRANSVERSE OVERLAP DETAILS. STAPLE LONGITUDINAL OVERLAPS WITH 2 ROWS OF STAPLES STAGGERED AT 4". STAPLE TRANSVERSE OVERLAPS WITH 1 ROW OF STAPLES SPACED AT 12'.
5. CONSTRUCT A 6"X 12" ANCHOR TRENCH AT THE TOE OF THE SLOPE FOLLOWING SIMILAR PROCEDURE DENOTED FOR THE TOP OF THE SLOPE ANCHOR TRENCH.
6. ENSURE THAT THE MAT IS IN DIRECT CONTACT WITH THE SOIL SURFACE WITH NO PROJECTIONS OR PROTRUSIONS.
7. INFILL AND OVERFILL THE MAT WITH A MINIMUM OF ½" TOPSOIL. APPLY SEEDING AND PROTETION AS DIRECTED BY THE MANUFACTURER. USE SEED MIX TYPE 1 AS DEFINED IN SECTION 212.03.03. TOPSOIL IS THE SOIL PROFILE DEFINED TECHNICALLY AS "A" HORIZON BY THE SOIL SCIENCE SOCIETY OF AMERICA. USE LOOSE, FRIABLE TOPSOIL THAT IS FREE OF STONES 1" OR GREATER IN OVERALL DIMENSIONS, ADMIXTURE OF SUBSOIL, REFUSE, STUMPS, ROOTS, BRUSH, WEEDS AND OTHER MATERIALS THAT PREVENT THE FORMATION OF A SUITABLE SEED BED. DO NOT USE TOPSOIL FROM SITES HAVING JOHNSON GRASS, CANADA THISTLE, QUACK GRASS, NODDING THISTLE OR EXCESSIVE AMOUNTS OF WEEDS OR THEIR RHIZOMES.

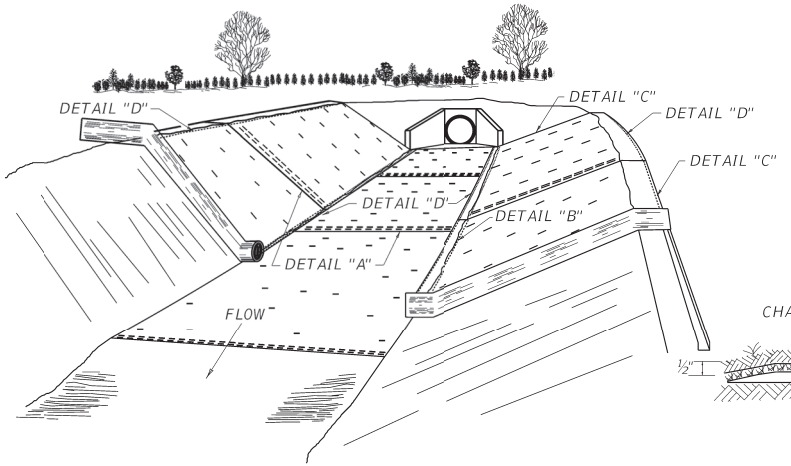
SUBMITTED _____ 01-24-2023
DIVISION DIRECTOR DATE

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
TEAM KENTUCKY

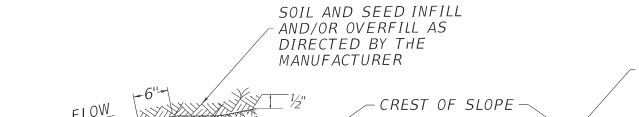
DRAWING TITLE: SEPIA 22 - TURF MAT SLOPE INSTALLATION

ITEM NO. COUNTY OF
SHEET NO.

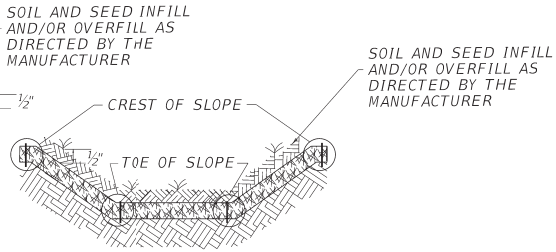
OpenRoads Designer v10.16.2.267 USER: cwillmerdinger FILE NAME: C:\PWWORK\KYTC_CWILLMERDINGER\D2168265\RDI040 - TURF MAT SLOPE INSTALLATION.DGN



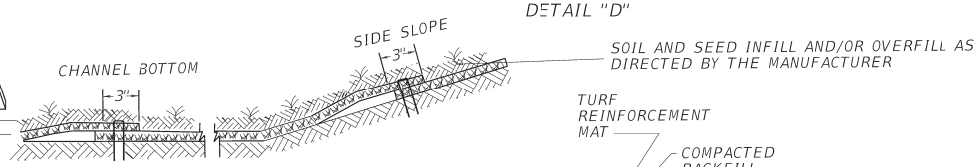
TURF MAT
CHANNEL INSTALLATION



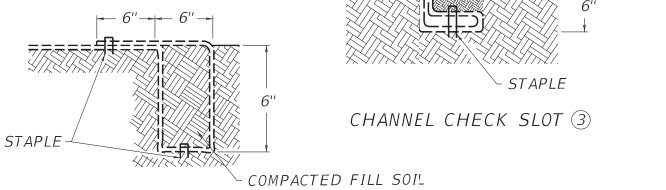
TRANSVERSE OVERLAP
DETAIL "A"



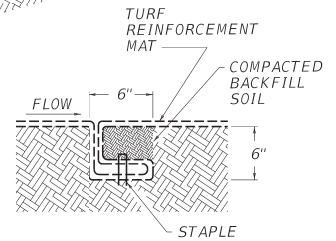
CRITICAL POINTS
DETAIL "D"



LONGITUDINAL OVERLAP
DETAIL "B"



ANCHOR TRENCH
DETAIL "C"



CHANNEL CHECK SLOT ③

~ NOTES ~

1. CONSTRUCT A 6" X 6" ANCHOR TRENCH AT THE UPSTREAM END OF THE CHANNEL. LINE THE ANCHOR TRENCH WITH TURF REINFORCIG MAT LEAVING 12" EXTENDING PAST THE ANCHOR TRENCH. FASTEN THE MAT MATERIAL INTO THE ANCHOR TRENCH ON 12" CENTERS BACKFILL THE TRENCH WITH TOPSOIL AND COMPACT. COVER THE AREA WITH THE REMAINING 12" OF THE MAT'S TERMINAL END LEAVING 6" TO OVERLAP THE TURF REINFORCING MAT. SECURE THE 6" OVERLAP WITH STAPLES ON 12" CENTERS.
2. UNROLL THE MAT PARALLEL TO THE PRIMARY DIRECTION OF WATER FLOW AND PLACE IN DIRECT CONTACT WITH THE SOIL SURFACE. INSURE THAT THE SOIL SURFACE GRADED SMOOTHLY AND DOES NOT CONTAIN IRREGULARITIES.

③ EXCAVATE 6" X 6" CHECK SLOTS EVERY 25' ALONG THE LENGTH OF THE CHANNEL. LINE THE SIDE AND BOTTOM OF THE SLOT WITH THE MAT AND THEN PULL BACK OVER. FASTEN WITH STAPLES ON 12" CENTERS. FILL THE CHECK SLOT WITH TOPSOIL, COMPACT, AND CONTINUE UNROLLING MAT DOWN THE CHANNEL.

4. CONTINUE UNROLLING THE MAT DOWNSTREAM OVER THE COMPACTED SLOT TO THE NEXT CHECK SLOT OR TERMINAL ANCHOR TRENCH. IF MORE THAN ONE SECTION OF MAT, AS SHOWN IN THE TRANSVERSE OVERLAP DETAIL, IS USED OVERLAP UPSTREAM MATS OVER TOP OF THE DOWNSTREAM MAT 6" AND SECURE. IF MATS ARE PLACED PARALLEL TO EACH OTHER ALONG THE CHANNEL, PLACE CHANNEL SECTIONS FIRST, THEN OVERLAP SIDE SLOPE SECTIONS 3" OVER THE CHANNEL SECTIONS AS SHOWN IN THE LONGITUDINAL OVERLAP DETAIL, AND SECURE WITH STAPLES ON 12" CENTERS. PROCEED UP THE SIDE SLOPES IN THE SAME MANNER UNTIL THE TOP OF CHANNEL IS REACHED.
5. SECURE MATS WHILE UNROLLING ON SIDESLOPES AND CHANNEL BOTTOMS WITH STAPLES AT A FREQUENCY THE TABLE INDICATES. USE STAPLES HAVING SUFFICIENT GROUND PENETRATION TO RESIST PULLOUT. INCREASE ANCHORING FREQUENCY AS DIRECTED BY THE ENGINEER AND MANUFACTURER'S REPRESENTATIVE.
6. INFILL AND OVERFILL THE MAT WITH A MINIMUM OF ½" TOPSOIL. APPLY SEEDING AND PROTECTION AS DIRECTED BY THE MANUFACTURER. USE SEED MIX TYPE 1 AS DEFINED IN SECTION 212.03.03. TOPSOIL IS THE SOIL PROFILE DEFINED TECHNICALLY AS "A" HORIZON BY THE SOIL SCIENCE SOCIETY OF AMERICA. USE LOOSE, FRIABLE TOPSOIL THAT IS FREE OF STONES 1" OR GREATER IN OVERALL DIMENSIONS, ADMIXTURE OF SUBSOIL, REFUSE, STUMPS, ROOTS, BRUSH, WEEDS AND OTHER MATERIALS THAT PREVENT THE FORMATION OF A SUITABLE SEED BED. DO NOT USE TOPSOIL FROM SITES HAVING JOHNSON GRASS, CANADA THISTLE, QUACK GRASS, NODDING THISTLE OR EXCESSIVE AMOUNTS OF WEEDS OR THEIR RHIZOMES.

SLOPE GRADE	ANCHORING FREQUENCY
UP TO 2H:1V	1.5 ANCHORS/SQYD
2H:1V TO 1H:1V	2.0 ANCHORS/SQYD
STEEPER THAN 1H:1V AND CHANNEL BOTTOMS	3.0 ANCHORS/SQYD

SUBMITTED W. J. Logan 01-24-2023
DIVISION DIRECTOR DATE

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS
TEAM KENTUCKY

DRAWING TITLE: SEPIA 23 - TURF MAT CHANNEL INSTALLATION

ITEM NO. COUNTY OF
SHEET NO.

OpenRoads Designer v10.16.2.267 USER: cwillmerdinger FILE NAME: C:\PWWORK\KYTC_CWILLMERDINGER\D2168266\RDI041 - TURF MAT CHANNEL INSTALLATION.DGN

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).

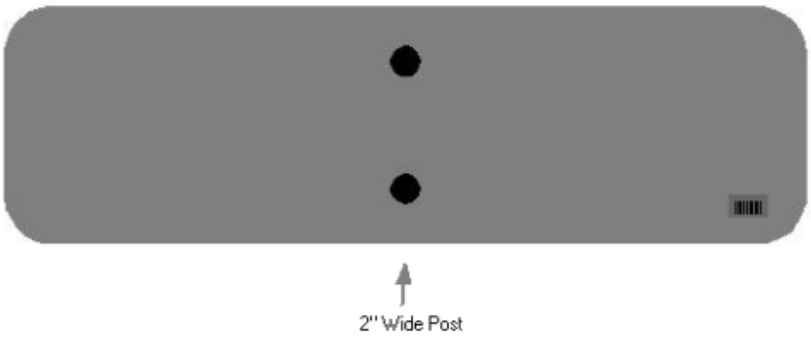
The installation of the permanent sign will be measured in accordance to Section 715.

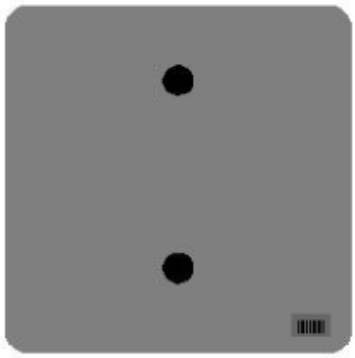
5.0 PAYMENT. The Department will make payment for the completed and accepted quantities under the following:

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





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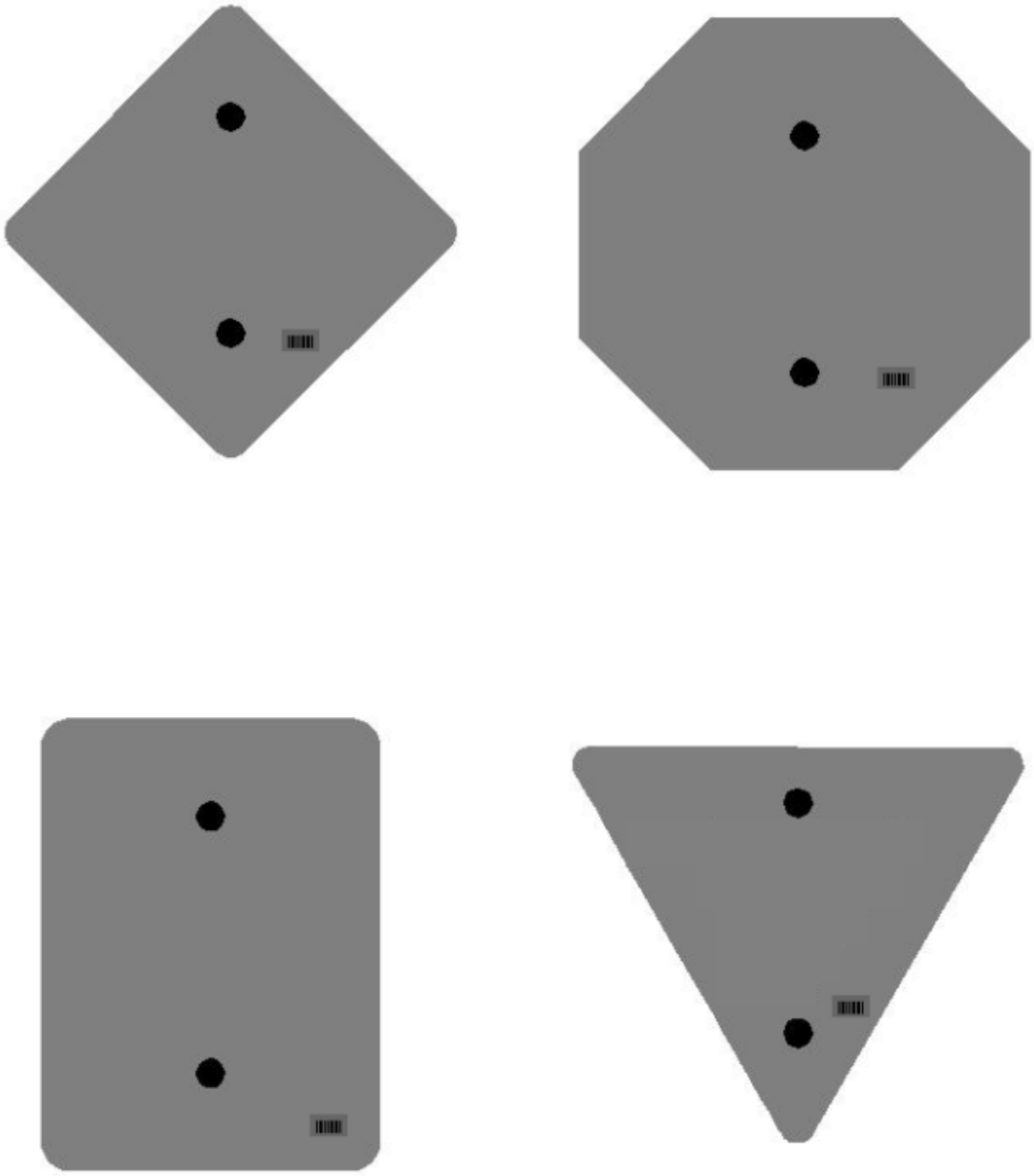

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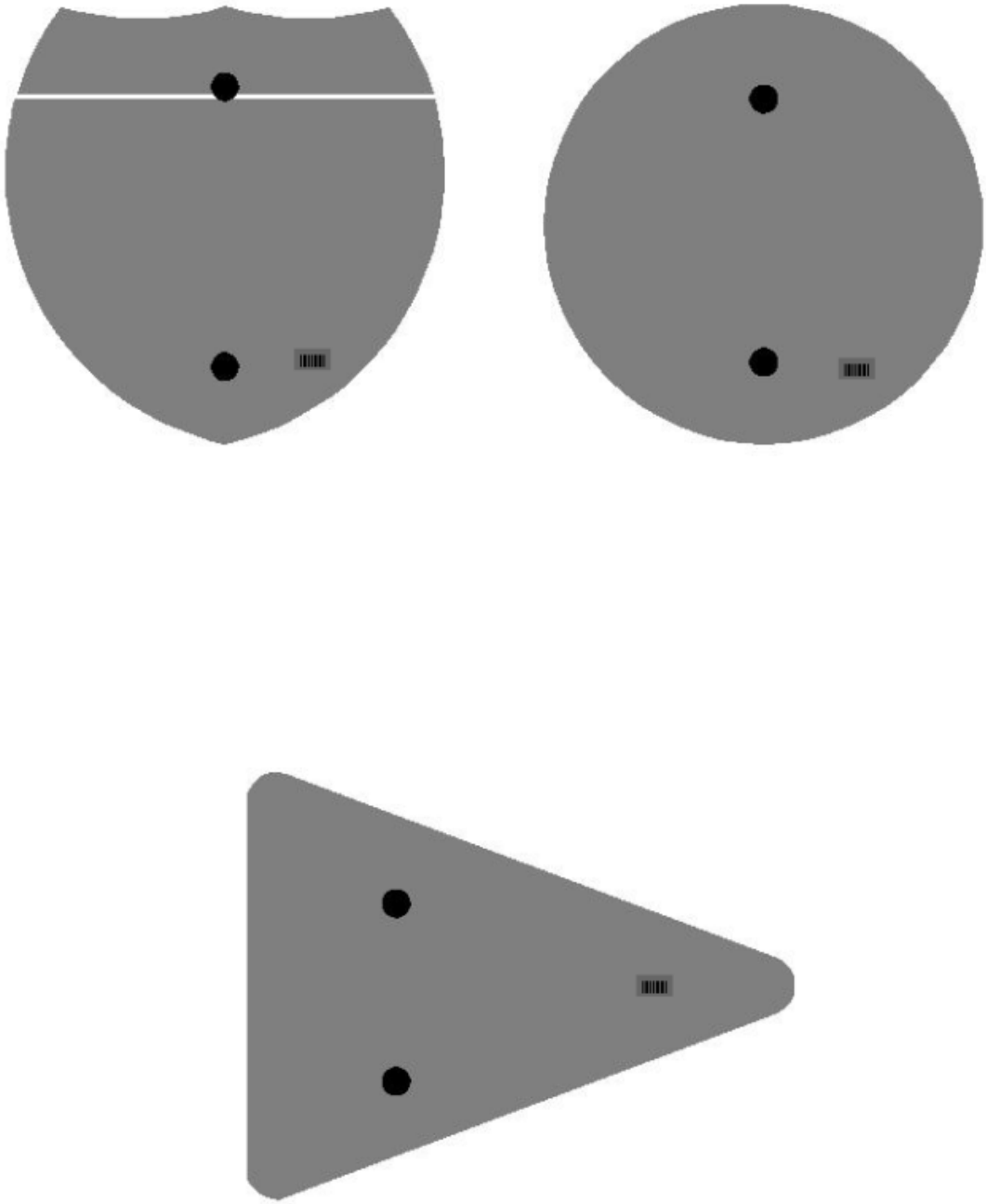
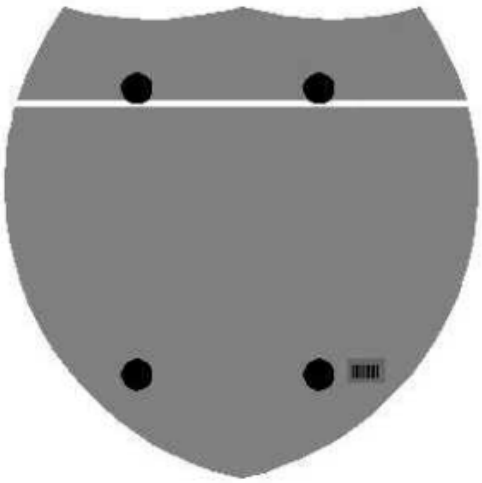
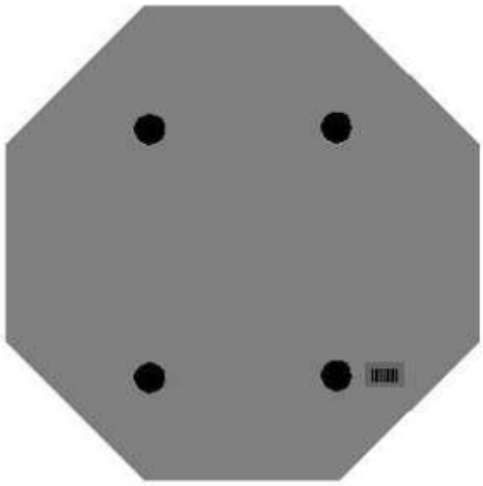


Double Sign Post

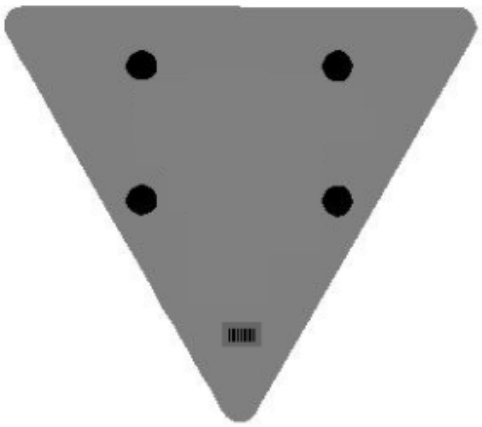


Interstate
Shield



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.

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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.

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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 º 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 º F			54-56	51-53	48-50	≤ 47
ASTM D 5329	60-100	57-103	104-106	107-109	110-112	≥ 113
Flow, 140 º 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 º F (%) ASTM D 5329	≥ 30	≥ 28	26-27	24-25	22-23	≤ 21
Tensile Adhesion, 77 º F (%) ASTM D 5329	≥ 500	≥ 490	480-489	470-479	460-469	≤ 459
Softening Point, º F AASHTO T 53	≥ 171	≥ 169	166-168	163-165	160-162	≤ 159
Ductility, 77 º 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 º 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

FHWA-1273 – Revised October 23, 2023

REQUIRED CONTRACT PROVISIONS
FEDERAL-AID CONSTRUCTION CONTRACTS

I. GENERAL

1. Form FHWA-1273 must be physically incorporated in each construction contract funded under title 23, United States Code, as required in 23 CFR 633.102(b) (excluding emergency contracts solely intended for debris removal). The contractor (or subcontractor) must insert this form in each subcontract and further require its inclusion in all lower tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services). 23 CFR 633.102(e).

The applicable requirements of Form FHWA-1273 are incorporated by reference for work done under any purchase order, rental agreement or agreement for other services. The prime contractor shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider. 23 CFR 633.102(e).

Form FHWA-1273 must be included in all Federal-aid design-build contracts, in all subcontracts and in lower tier subcontracts (excluding subcontracts for design services, purchase orders, rental agreements and other agreements for supplies or services) in accordance with 23 CFR 633.102. The design-builder shall be responsible for compliance by any subcontractor, lower-tier subcontractor or service provider.

Contracting agencies may reference Form FHWA-1273 in solicitation-for-bids or request-for-proposals documents, however, the Form FHWA-1273 must be physically incorporated (not referenced) in all contracts, subcontracts and lower-tier subcontracts (excluding purchase orders, rental agreements and other agreements for supplies or services related to a construction contract). 23 CFR 633.102(b).

2. Subject to the applicability criteria noted in the following sections, these contract provisions shall apply to all work performed on the contract by the contractor's own organization and with the assistance of workers under the contractor's immediate superintendence and to all work performed on the contract by piecework, station work, or by subcontract. 23 CFR 633.102(d).

3. A breach of any of the stipulations contained in these Required Contract Provisions may be sufficient grounds for withholding of progress payments, withholding of final payment, termination of the contract, suspension / debarment or any other action determined to be appropriate by the contracting agency and FHWA.

4. Selection of Labor: During the performance of this contract, the contractor shall not use convict labor for any purpose within the limits of a construction project on a Federal-aid highway unless it is labor performed by convicts who are on parole, supervised release, or probation. 23 U.S.C. 114(b). The term Federal-aid highway does not include roadways functionally classified as local roads or rural minor collectors. 23 U.S.C. 101(a).

II. NONDISCRIMINATION (23 CFR 230.107(a); 23 CFR Part 230, Subpart A, Appendix A; EO 11246)

The provisions of this section related to 23 CFR Part 230, Subpart A, Appendix A are applicable to all Federal-aid construction contracts and to all related construction subcontracts of $10,000 or more. The provisions of 23 CFR Part 230 are not applicable to material supply, engineering, or architectural service contracts.

In addition, the contractor and all subcontractors must comply with the following policies: Executive Order 11246, 41 CFR Part 60, 29 CFR Parts 1625-1627, 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The contractor and all subcontractors must comply with: the requirements of the Equal Opportunity Clause in 41 CFR 60-1.4(b) and, for all construction contracts exceeding $10,000, the Standard Federal Equal Employment Opportunity Construction Contract Specifications in 41 CFR 60-4.3.

Note: The U.S. Department of Labor has exclusive authority to determine compliance with Executive Order 11246 and the policies of the Secretary of Labor including 41 CFR Part 60, and 29 CFR Parts 1625-1627. The contracting agency and the FHWA have the authority and the responsibility to ensure compliance with 23 U.S.C. 140, Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and Title VI of the Civil Rights Act of 1964, as amended (42 U.S.C. 2000d et seq.), and related regulations including 49 CFR Parts 21, 26, and 27; and 23 CFR Parts 200, 230, and 633.

The following provision is adopted from 23 CFR Part 230, Subpart A, Appendix A, with appropriate revisions to conform to the U.S. Department of Labor (US DOL) and FHWA requirements.

1. Equal Employment Opportunity: Equal Employment Opportunity (EEO) requirements not to discriminate and to take affirmative action to assure equal opportunity as set forth under laws, executive orders, rules, regulations (*see* 28 CFR Part 35, 29 CFR Part 1630, 29 CFR Parts 1625-1627, 41 CFR Part 60 and 49 CFR Part 27) and orders of the Secretary of Labor as modified by the provisions prescribed herein, and imposed pursuant to 23 U.S.C. 140, shall constitute the EEO and specific affirmative action standards for the contractor's project activities under this contract. The provisions of the Americans with Disabilities Act of 1990 (42 U.S.C. 12101 et seq.) set forth under 28 CFR Part 35 and 29 CFR Part 1630 are incorporated by reference in this contract. In the execution of this contract, the contractor agrees to comply with the following minimum specific requirement activities of EEO:

a. The contractor will work with the contracting agency and the Federal Government to ensure that it has made every good faith effort to provide equal opportunity with respect to all of its terms and conditions of employment and in their review of activities under the contract. 23 CFR 230.409 (g)(4) & (5).

b. The contractor will accept as its operating policy the following statement:

"It is the policy of this Company to assure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, sex, sexual orientation, gender identity, color, national origin, age or disability. Such action shall include: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship, pre-apprenticeship, and/or on-the-job training."

2. EEO Officer: The contractor will designate and make known to the contracting officers an EEO Officer who will have the responsibility for and must be capable of effectively administering and promoting an active EEO program and who must be assigned adequate authority and responsibility to do so.

3. Dissemination of Policy: All members of the contractor's staff who are authorized to hire, supervise, promote, and discharge employees, or who recommend such action or are substantially involved in such action, will be made fully cognizant of and will implement the contractor's EEO policy and contractual responsibilities to provide EEO in each grade and classification of employment. To ensure that the above agreement will be met, the following actions will be taken as a minimum:

a. Periodic meetings of supervisory and personnel office employees will be conducted before the start of work and then not less often than once every six months, at which time the contractor's EEO policy and its implementation will be reviewed and explained. The meetings will be conducted by the EEO Officer or other knowledgeable company official.

b. All new supervisory or personnel office employees will be given a thorough indoctrination by the EEO Officer, covering all major aspects of the contractor's EEO obligations within thirty days following their reporting for duty with the contractor.

c. All personnel who are engaged in direct recruitment for the project will be instructed by the EEO Officer in the contractor's procedures for locating and hiring minorities and women.

d. Notices and posters setting forth the contractor's EEO policy will be placed in areas readily accessible to employees, applicants for employment and potential employees.

e. The contractor's EEO policy and the procedures to implement such policy will be brought to the attention of employees by means of meetings, employee handbooks, or other appropriate means.

4. Recruitment: When advertising for employees, the contractor will include in all advertisements for employees the notation: "An Equal Opportunity Employer." All such advertisements will be placed in publications having a large circulation among minorities and women in the area from which the project work force would normally be derived.

a. The contractor will, unless precluded by a valid bargaining agreement, conduct systematic and direct recruitment through public and private employee referral sources likely to yield qualified minorities and women. To meet this requirement, the contractor will identify sources of potential minority group employees and establish with such identified sources procedures whereby minority and women applicants may be referred to the contractor for employment consideration.

b. In the event the contractor has a valid bargaining agreement providing for exclusive hiring hall referrals, the contractor is expected to observe the provisions of that agreement to the extent that the system meets the contractor's compliance with EEO contract provisions. Where implementation of such an agreement has the effect of discriminating against minorities or women, or obligates the contractor to do the same, such implementation violates Federal nondiscrimination provisions.

c. The contractor will encourage its present employees to refer minorities and women as applicants for employment. Information and procedures with regard to referring such applicants will be discussed with employees.

5. Personnel Actions: Wages, working conditions, and employee benefits shall be established and administered, and personnel actions of every type, including hiring, upgrading, promotion, transfer, demotion, layoff, and termination, shall be taken without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age or disability. The following procedures shall be followed:

a. The contractor will conduct periodic inspections of project sites to ensure that working conditions and employee facilities do not indicate discriminatory treatment of project site personnel.

b. The contractor will periodically evaluate the spread of wages paid within each classification to determine any evidence of discriminatory wage practices.

c. The contractor will periodically review selected personnel actions in depth to determine whether there is evidence of discrimination. Where evidence is found, the contractor will promptly take corrective action. If the review indicates that the discrimination may extend beyond the actions reviewed, such corrective action shall include all affected persons.

d. The contractor will promptly investigate all complaints of alleged discrimination made to the contractor in connection with its obligations under this contract, will attempt to resolve such complaints, and will take appropriate corrective action

within a reasonable time. If the investigation indicates that the discrimination may affect persons other than the complainant, such corrective action shall include such other persons. Upon completion of each investigation, the contractor will inform every complainant of all of their avenues of appeal.

6. Training and Promotion:

a. The contractor will assist in locating, qualifying, and increasing the skills of minorities and women who are applicants for employment or current employees. Such efforts should be aimed at developing full journey level status employees in the type of trade or job classification involved.

b. Consistent with the contractor's work force requirements and as permissible under Federal and State regulations, the contractor shall make full use of training programs (i.e., apprenticeship and on-the-job training programs for the geographical area of contract performance). In the event a special provision for training is provided under this contract, this subparagraph will be superseded as indicated in the special provision. The contracting agency may reserve training positions for persons who receive welfare assistance in accordance with 23 U.S.C. 140(a).

c. The contractor will advise employees and applicants for employment of available training programs and entrance requirements for each.

d. The contractor will periodically review the training and promotion potential of employees who are minorities and women and will encourage eligible employees to apply for such training and promotion.

7. Unions: If the contractor relies in whole or in part upon unions as a source of employees, the contractor will use good faith efforts to obtain the cooperation of such unions to increase opportunities for minorities and women. 23 CFR 230.409. Actions by the contractor, either directly or through a contractor's association acting as agent, will include the procedures set forth below:

a. The contractor will use good faith efforts to develop, in cooperation with the unions, joint training programs aimed toward qualifying more minorities and women for membership in the unions and increasing the skills of minorities and women so that they may qualify for higher paying employment.

b. The contractor will use good faith efforts to incorporate an EEO clause into each union agreement to the end that such union will be contractually bound to refer applicants without regard to their race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability.

c. The contractor is to obtain information as to the referral practices and policies of the labor union except that to the extent such information is within the exclusive possession of the labor union and such labor union refuses to furnish such information to the contractor, the contractor shall so certify to the contracting agency and shall set forth what efforts have been made to obtain such information.

d. In the event the union is unable to provide the contractor with a reasonable flow of referrals within the time limit set forth in the collective bargaining agreement, the contractor will, through independent recruitment efforts, fill the employment vacancies without regard to race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability; making full efforts to obtain qualified and/or qualifiable minorities and women. The failure of a union to provide sufficient referrals (even though it is obligated to provide exclusive referrals under the terms of a collective bargaining agreement) does not relieve the contractor from the requirements of this paragraph. In the event the union referral practice prevents the contractor from meeting the obligations pursuant to Executive Order 11246, as amended, and these special provisions, such contractor shall immediately notify the contracting agency.

8. Reasonable Accommodation for Applicants / Employees with Disabilities: The contractor must be familiar with the requirements for and comply with the Americans with Disabilities Act and all rules and regulations established thereunder. Employers must provide reasonable accommodation in all employment activities unless to do so would cause an undue hardship.

9. Selection of Subcontractors, Procurement of Materials and Leasing of Equipment: The contractor shall not discriminate on the grounds of race, color, religion, sex, sexual orientation, gender identity, national origin, age, or disability in the selection and retention of subcontractors, including procurement of materials and leases of equipment. The contractor shall take all necessary and reasonable steps to ensure nondiscrimination in the administration of this contract.

a. The contractor shall notify all potential subcontractors, suppliers, and lessors of their EEO obligations under this contract.

b. The contractor will use good faith efforts to ensure subcontractor compliance with their EEO obligations.

10. Assurances Required:

a. The requirements of 49 CFR Part 26 and the State DOT's FHWA-approved Disadvantaged Business Enterprise (DBE) program are incorporated by reference.

b. The contractor, subrecipient or subcontractor shall not discriminate on the basis of race, color, national origin, or sex in the performance of this contract. The contractor shall carry out applicable requirements of 49 CFR part 26 in the award and administration of DOT-assisted contracts. Failure by the contractor to carry out these requirements is a material breach of this contract, which may result in the termination of this contract or such other remedy as the recipient deems appropriate, which may include, but is not limited to:
(1) Withholding monthly progress payments;
(2) Assessing sanctions;
(3) Liquidated damages; and/or
(4) Disqualifying the contractor from future bidding as non-responsible.

c. The Title VI and nondiscrimination provisions of U.S. DOT Order 1050.2A at Appendixes A and E are incorporated by reference. 49 CFR Part 21.

11. Records and Reports: The contractor shall keep such records as necessary to document compliance with the EEO requirements. Such records shall be retained for a period of three years following the date of the final payment to the contractor for all contract work and shall be available at reasonable times and places for inspection by authorized representatives of the contracting agency and the FHWA.

a. The records kept by the contractor shall document the following:

(1) The number and work hours of minority and non-minority group members and women employed in each work classification on the project;

(2) The progress and efforts being made in cooperation with unions, when applicable, to increase employment opportunities for minorities and women; and

(3) The progress and efforts being made in locating, hiring, training, qualifying, and upgrading minorities and women.

b. The contractors and subcontractors will submit an annual report to the contracting agency each July for the duration of the project indicating the number of minority, women, and non-minority group employees currently engaged in each work classification required by the contract work. This information is to be reported on Form FHWA-1391. The staffing data should represent the project work force on board in all or any part of the last payroll period preceding the end of July. If on-the-job training is being required by special provision, the contractor will be required to collect and report training data. The employment data should reflect the work force on board during all or any part of the last payroll period preceding the end of July.

III. NONSEGREGATED FACILITIES

This provision is applicable to all Federal-aid construction contracts and to all related construction subcontracts of more than $10,000. 41 CFR 60-1.5.

As prescribed by 41 CFR 60-1.8, the contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex, sexual orientation, gender identity, or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensure that its employees are not assigned to perform their services at any location under the contractor's control where the facilities are segregated. The term "facilities" includes waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, washrooms, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees. The contractor shall provide separate or single-user restrooms and necessary dressing or sleeping areas to assure privacy between sexes.

IV. DAVIS-BACON AND RELATED ACT PROVISIONS

This section is applicable to all Federal-aid construction projects exceeding $2,000 and to all related subcontracts and lower-tier subcontracts (regardless of subcontract size), in accordance with 29 CFR 5.5. The requirements apply to all projects located within the right-of-way of a roadway that is functionally classified as Federal-aid highway. 23 U.S.C. 113. This excludes roadways functionally classified as local roads or rural minor collectors, which are exempt. 23 U.S.C. 101. Where applicable law requires that projects be treated as a project on a Federal-aid highway, the provisions of this subpart will apply regardless of the location of the project. Examples include: Surface Transportation Block Grant Program projects funded under 23 U.S.C. 133 [excluding recreational trails projects], the Nationally Significant Freight and Highway Projects funded under 23 U.S.C. 117, and National Highway Freight Program projects funded under 23 U.S.C. 167.

The following provisions are from the U.S. Department of Labor regulations in 29 CFR 5.5 “Contract provisions and related matters” with minor revisions to conform to the FHWA-1273 format and FHWA program requirements.

1. Minimum wages (29 CFR 5.5)

a. *Wage rates and fringe benefits.* All laborers and mechanics employed or working upon the site of the work (or otherwise working in construction or development of the project under a development statute), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of basic hourly wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics. As provided in paragraphs (d) and (e) of 29 CFR 5.5, the appropriate wage determinations are effective by operation of law even if they have not been attached to the contract. Contributions made or costs reasonably anticipated for bona fide fringe benefits under the Davis-Bacon Act (40 U.S.C. 3141(2)(B)) on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph 1.e. of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics must be paid the appropriate wage rate and fringe benefits on the wage determination for the classification(s) of work actually performed, without regard to skill, except as provided in paragraph 4. of this section. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided,* That the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classifications and wage rates conformed under paragraph 1.c. of this section) and the Davis-Bacon poster (WH–1321) must be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

b. *Frequently recurring classifications.* (1) In addition to wage and fringe benefit rates that have been determined to be prevailing under the procedures set forth in 29 CFR part 1, a wage determination may contain, pursuant to § 1.3(f), wage and fringe benefit rates for classifications of laborers and mechanics for which conformance requests are regularly submitted pursuant to paragraph 1.c. of this section, provided that:

(i) The work performed by the classification is not performed by a classification in the wage determination for which a prevailing wage rate has been determined;

(ii) The classification is used in the area by the construction industry; and

(iii) The wage rate for the classification bears a reasonable relationship to the prevailing wage rates contained in the wage determination.

(2) The Administrator will establish wage rates for such classifications in accordance with paragraph 1.c.(1)(iii) of this section. Work performed in such a classification must be paid at no less than the wage and fringe benefit rate listed on the wage determination for such classification.

c. *Conformance.* (1) The contracting officer must require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract be classified in conformance with the wage determination. Conformance of an additional classification and wage rate and fringe benefits is appropriate only when the following criteria have been met:

(i) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(ii) The classification is used in the area by the construction industry; and

(iii) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(2) The conformance process may not be used to split, subdivide, or otherwise avoid application of classifications listed in the wage determination.

(3) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken will be sent by the contracting officer by email to *DBAconformance@dol.gov*. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(4) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the contracting officer will, by email to *DBAconformance@dol.gov*, refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30–day period that additional time is necessary.

(5) The contracting officer must promptly notify the contractor of the action taken by the Wage and Hour Division under paragraphs 1.c.(3) and (4) of this section. The contractor must furnish a written copy of such determination to each affected worker or it must be posted as a part of the wage determination. The wage rate (including fringe benefits where appropriate) determined pursuant to paragraph 1.c.(3) or (4) of this section must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

d. *Fringe benefits not expressed as an hourly rate.* Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor may either pay the benefit as stated in the wage determination or may pay another bona fide fringe benefit or an hourly cash equivalent thereof.

e. *Unfunded plans.* If the contractor does not make payments to a trustee or other third person, the contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program, *Provided,* That the Secretary of Labor has found, upon the written request of the contractor, in accordance with the criteria set forth in § 5.28, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

f. *Interest.* In the event of a failure to pay all or part of the wages required by the contract, the contractor will be required to pay interest on any underpayment of wages.

2. Withholding (29 CFR 5.5)

a. *Withholding requirements.* The contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for the full amount of wages and monetary relief, including interest, required by the clauses set forth in this section for violations of this contract, or to satisfy any such liabilities required by any other Federal contract, or federally assisted contract subject to Davis-Bacon labor standards, that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to Davis-Bacon labor standards requirements and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld. In the event of a contractor's failure to pay any laborer or mechanic, including any apprentice or helper working on the site of the work all or part of the wages required by the contract, or upon the contractor's failure to submit the required records as discussed in paragraph 3.d. of this section, the contracting agency may on its own initiative and after written notice to the contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with paragraph

2.a. of this section or Section V, paragraph 3.a., or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

3. Records and certified payrolls (29 CFR 5.5)

a. *Basic record requirements* (1) *Length of record retention.* All regular payrolls and other basic records must be maintained by the contractor and any subcontractor during the course of the work and preserved for all laborers and mechanics working at the site of the work (or otherwise working in construction or development of the project under a development statute) for a period of at least 3 years after all the work on the prime contract is completed.

(2) *Information required.* Such records must contain the name; Social Security number; last known address, telephone number, and email address of each such worker; each worker's correct classification(s) of work actually performed; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act); daily and weekly number of hours actually worked in total and on each covered contract; deductions made; and actual wages paid.

(3) *Additional records relating to fringe benefits.* Whenever the Secretary of Labor has found under paragraph 1.e. of this section that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B) of the Davis-Bacon Act, the contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits.

(4) *Additional records relating to apprenticeship.* Contractors with apprentices working under approved programs must maintain written evidence of the registration of apprenticeship programs, the registration of the apprentices, and the ratios and wage rates prescribed in the applicable programs.

b. *Certified payroll requirements* (1) *Frequency and method of submission.* The contractor or subcontractor must submit weekly, for each week in which any DBA- or Related Acts-covered work is performed, certified payrolls to the contracting agency. The prime contractor is responsible for the submission of all certified payrolls by all subcontractors. A contracting agency or prime contractor may permit or require contractors to submit certified payrolls through an electronic system, as long as the electronic system requires a legally valid electronic signature; the system allows the contractor, the contracting agency, and the Department of Labor to access the certified payrolls upon request for at least 3 years after the work on the prime contract has been completed; and the contracting agency or prime contractor permits other methods of submission in situations where the contractor is unable or limited in its ability to use or access the electronic system.

(2) *Information required.* The certified payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph 3.a.(2) of this section, except that full Social Security numbers and last known addresses, telephone numbers, and email addresses must not be included on weekly transmittals. Instead, the certified payrolls need only include an individually identifying number for each worker (*e.g.,* the last four digits of the worker's Social Security number). The required weekly certified payroll information may be submitted using Optional Form WH–347 or in any other format desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division website at *https://www.dol.gov/sites/dolgov/files/WHD/legacy/files/wh347/.pdf* or its successor website. It is not a violation of this section for a prime contractor to require a subcontractor to provide full Social Security numbers and last known addresses, telephone numbers, and email addresses to the prime contractor for its own records, without weekly submission by the subcontractor to the contracting agency.

(3) *Statement of Compliance.* Each certified payroll submitted must be accompanied by a “Statement of Compliance,” signed by the contractor or subcontractor, or the contractor's or subcontractor's agent who pays or supervises the payment of the persons working on the contract, and must certify the following:

(i) That the certified payroll for the payroll period contains the information required to be provided under paragraph 3.b. of this section, the appropriate information and basic records are being maintained under paragraph 3.a. of this section, and such information and records are correct and complete;

(ii) That each laborer or mechanic (including each helper and apprentice) working on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in 29 CFR part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification(s) of work actually performed, as specified in the applicable wage determination incorporated into the contract.

(4) *Use of Optional Form WH–347.* The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH–347 will satisfy the requirement for submission of the “Statement of Compliance” required by paragraph 3.b.(3) of this section.

(5) *Signature.* The signature by the contractor, subcontractor, or the contractor's or subcontractor's agent must be an original handwritten signature or a legally valid electronic signature.

(6) *Falsification.* The falsification of any of the above certifications may subject the contractor or subcontractor to civil or criminal prosecution under 18 U.S.C. 1001 and 31 U.S.C. 3729.

(7) *Length of certified payroll retention.* The contractor or subcontractor must preserve all certified payrolls during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

c. *Contracts, subcontracts, and related documents.* The contractor or subcontractor must maintain this contract or subcontract and related documents including, without limitation, bids, proposals, amendments, modifications, and extensions. The contractor or subcontractor must preserve these contracts, subcontracts, and related documents during the course of the work and for a period of 3 years after all the work on the prime contract is completed.

d. *Required disclosures and access* (1) *Required record disclosures and access to workers.* The contractor or subcontractor must make the records required under paragraphs 3.a. through 3.c. of this section, and any other documents that the contracting agency, the State DOT, the FHWA, or the Department of Labor deems necessary to determine compliance with the labor standards provisions of any of the applicable statutes referenced by § 5.1, available for inspection, copying, or transcription by authorized representatives of the contracting agency, the State DOT, the FHWA, or the Department of Labor, and must permit such representatives to interview workers during working hours on the job.

(2) *Sanctions for non-compliance with records and worker access requirements.* If the contractor or subcontractor fails to submit the required records or to make them available, or refuses to permit worker interviews during working hours on the job, the Federal agency may, after written notice to the contractor, sponsor, applicant, owner, or other entity, as the case may be, that maintains such records or that employs such workers, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available, or to permit worker interviews during working hours on the job, may be grounds for debarment action pursuant to § 5.12. In addition, any contractor or other person that fails to submit the required records or make those records available to WHD within the time WHD requests that the records be produced will be precluded from introducing as evidence in an administrative proceeding under 29 CFR part 6 any of the required records that were not provided or made available to WHD. WHD will take into consideration a reasonable request from the contractor or person for an extension of the time for submission of records. WHD will determine the reasonableness of the request and may consider, among other things, the location of the records and the volume of production.

(3) *Required information disclosures.* Contractors and subcontractors must maintain the full Social Security number and last known address, telephone number, and email address of each covered worker, and must provide them upon request to the contracting agency, the State DOT, the FHWA, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or other compliance action.

4. Apprentices and equal employment opportunity (29 CFR 5.5)

a. *Apprentices* (1) *Rate of pay.* Apprentices will be permitted to work at less than the predetermined rate for the work they perform when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Office of Apprenticeship (OA), or with a State Apprenticeship Agency recognized by the OA. A person who is not individually registered in the program, but who has been certified by the OA or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice, will be permitted to work at less than the predetermined rate for the work they perform in the first 90 days of probationary employment as an apprentice in such a program. In the event the OA or a State Apprenticeship Agency recognized by the OA withdraws approval of an apprenticeship program, the contractor will no longer be permitted to use apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(2) *Fringe benefits.* Apprentices must be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringe benefits must be paid in accordance with that determination.

(3) *Apprenticeship ratio.* The allowable ratio of apprentices to journeyworkers on the job site in any craft classification must not be greater than the ratio permitted to the contractor as to the entire work force under the registered program or the ratio applicable to the locality of the project pursuant to paragraph 4.a.(4) of this section. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated in paragraph 4.a.(1) of this section, must be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under this section must be paid not less than the applicable wage rate on the wage determination for the work actually performed.

(4) *Reciprocity of ratios and wage rates.* Where a contractor is performing construction on a project in a locality other than the locality in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyworker's hourly rate) applicable within the locality in which the construction is being performed must be observed. If there is no applicable ratio or wage rate for the locality of the project, the ratio and wage rate specified in the contractor's registered program must be observed.

b. *Equal employment opportunity.* The use of apprentices and journeyworkers under this part must be in conformity with

the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

c. Apprentices and Trainees (programs of the U.S. DOT).

Apprentices and trainees working under apprenticeship and skill training programs which have been certified by the Secretary of Transportation as promoting EEO in connection with Federal-aid highway construction programs are not subject to the requirements of paragraph 4 of this Section IV. 23 CFR 230.111(e)(2). The straight time hourly wage rates for apprentices and trainees under such programs will be established by the particular programs. The ratio of apprentices and trainees to journeyworkers shall not be greater than permitted by the terms of the particular program.

5. Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract as provided in 29 CFR 5.5.

6. Subcontracts. The contractor or subcontractor must insert FHWA-1273 in any subcontracts, along with the applicable wage determination(s) and such other clauses or contract modifications as the contracting agency may by appropriate instructions require, and a clause requiring the subcontractors to include these clauses and wage determination(s) in any lower tier subcontracts. The prime contractor is responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in this section. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and may be subject to debarment, as appropriate. 29 CFR 5.5.

7. Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract as provided in 29 CFR 5.5.

9. Disputes concerning labor standards. As provided in 29 CFR 5.5, disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of eligibility. a. By entering into this contract, the contractor certifies that neither it nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

b. No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of 40 U.S.C. 3144(b) or § 5.12(a).

c. The penalty for making false statements is prescribed in the U.S. Code, Title 18 Crimes and Criminal Procedure, 18 U.S.C. 1001.

11. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under the DBA, Related Acts, this part, or 29 CFR part 1 or 3;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under the DBA, Related Acts, this part, or 29 CFR part 1 or 3; or

d. Informing any other person about their rights under the DBA, Related Acts, this part, or 29 CFR part 1 or 3.

V. CONTRACT WORK HOURS AND SAFETY STANDARDS ACT

Pursuant to 29 CFR 5.5(b), the following clauses apply to any Federal-aid construction contract in an amount in excess of $100,000 and subject to the overtime provisions of the Contract Work Hours and Safety Standards Act. These clauses shall be inserted in addition to the clauses required by 29 CFR 5.5(a) or 29 CFR 4.6. As used in this paragraph, the terms laborers and mechanics include watchpersons and guards.

1. Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek. 29 CFR 5.5.

2. Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph 1. of this section the contractor and any subcontractor responsible therefor shall be liable for the unpaid wages and interest from the date of the underpayment. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or

mechanic, including watchpersons and guards, employed in violation of the clause set forth in paragraph 1. of this section, in the sum currently provided in 29 CFR 5.5(b)(2)* for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph 1. of this section.

* $31 as of January 15, 2023 (See 88 FR 88 FR 2210) as may be adjusted annually by the Department of Labor, pursuant to the Federal Civil Penalties Inflation Adjustment Act of 1990.

3. Withholding for unpaid wages and liquidated damages

a. *Withholding process.* The FHWA or the contracting agency may, upon its own action, or must, upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the contractor so much of the accrued payments or advances as may be considered necessary to satisfy the liabilities of the prime contractor or any subcontractor for any unpaid wages; monetary relief, including interest; and liquidated damages required by the clauses set forth in this section on this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract subject to the Contract Work Hours and Safety Standards Act that is held by the same prime contractor (as defined in § 5.2). The necessary funds may be withheld from the contractor under this contract, any other Federal contract with the same prime contractor, or any other federally assisted contract that is subject to the Contract Work Hours and Safety Standards Act and is held by the same prime contractor, regardless of whether the other contract was awarded or assisted by the same agency, and such funds may be used to satisfy the contractor liability for which the funds were withheld.

b. *Priority to withheld funds.* The Department has priority to funds withheld or to be withheld in accordance with Section IV paragraph 2.a. or paragraph 3.a. of this section, or both, over claims to those funds by:

(1) A contractor's surety(ies), including without limitation performance bond sureties and payment bond sureties;

(2) A contracting agency for its reprocurement costs;

(3) A trustee(s) (either a court-appointed trustee or a U.S. trustee, or both) in bankruptcy of a contractor, or a contractor's bankruptcy estate;

(4) A contractor's assignee(s);

(5) A contractor's successor(s); or

(6) A claim asserted under the Prompt Payment Act, 31 U.S.C. 3901–3907.

4. Subcontracts. The contractor or subcontractor must insert in any subcontracts the clauses set forth in paragraphs 1. through 5. of this section and a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor is responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs 1. through 5. In the event of any violations of these clauses, the prime contractor and any subcontractor(s) responsible will be liable for any unpaid wages and monetary relief, including interest from the date of the underpayment or loss, due to any workers of lower-tier subcontractors, and associated liquidated damages and may be subject to debarment, as appropriate.

5. Anti-retaliation. It is unlawful for any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, or to cause any person to discharge, demote, intimidate, threaten, restrain, coerce, blacklist, harass, or in any other manner discriminate against, any worker or job applicant for:

a. Notifying any contractor of any conduct which the worker reasonably believes constitutes a violation of the Contract Work Hours and Safety Standards Act (CWHSSA) or its implementing regulations in this part;

b. Filing any complaint, initiating or causing to be initiated any proceeding, or otherwise asserting or seeking to assert on behalf of themselves or others any right or protection under CWHSSA or this part;

c. Cooperating in any investigation or other compliance action, or testifying in any proceeding under CWHSSA or this part; or

d. Informing any other person about their rights under CWHSSA or this part.

VI. SUBLETTING OR ASSIGNING THE CONTRACT

This provision is applicable to all Federal-aid construction contracts on the National Highway System pursuant to 23 CFR 635.116.

1. The contractor shall perform with its own organization contract work amounting to not less than 30 percent (or a greater percentage if specified elsewhere in the contract) of the total original contract price, excluding any specialty items designated by the contracting agency. Specialty items may be performed by subcontract and the amount of any such specialty items performed may be deducted from the total original contract price before computing the amount of work required to be performed by the contractor's own organization (23 CFR 635.116).

a. The term “perform work with its own organization” in paragraph 1 of Section VI refers to workers employed or leased by the prime contractor, and equipment owned or rented by the prime contractor, with or without operators. Such term does not include employees or equipment of a subcontractor or lower tier subcontractor, agents of the prime contractor, or any other assignees. The term may include payments for the costs of hiring leased employees from an employee leasing firm meeting all relevant Federal and State regulatory requirements. Leased employees may only be included in this term if the prime contractor meets all of the following conditions: (based on longstanding interpretation)

(1) the prime contractor maintains control over the supervision of the day-to-day activities of the leased employees;
(2) the prime contractor remains responsible for the quality of the work of the leased employees;

(3) the prime contractor retains all power to accept or exclude individual employees from work on the project; and

(4) the prime contractor remains ultimately responsible for the payment of predetermined minimum wages, the submission of payrolls, statements of compliance and all other Federal regulatory requirements.

b. "Specialty Items" shall be construed to be limited to work that requires highly specialized knowledge, abilities, or equipment not ordinarily available in the type of contracting organizations qualified and expected to bid or propose on the contract as a whole and in general are to be limited to minor components of the overall contract. 23 CFR 635.102.

2. Pursuant to 23 CFR 635.116(a), the contract amount upon which the requirements set forth in paragraph (1) of Section VI is computed includes the cost of material and manufactured products which are to be purchased or produced by the contractor under the contract provisions.

3. Pursuant to 23 CFR 635.116(c), the contractor shall furnish (a) a competent superintendent or supervisor who is employed by the firm, has full authority to direct performance of the work in accordance with the contract requirements, and is in charge of all construction operations (regardless of who performs the work) and (b) such other of its own organizational resources (supervision, management, and engineering services) as the contracting officer determines is necessary to assure the performance of the contract.

4. No portion of the contract shall be sublet, assigned or otherwise disposed of except with the written consent of the contracting officer, or authorized representative, and such consent when given shall not be construed to relieve the contractor of any responsibility for the fulfillment of the contract. Written consent will be given only after the contracting agency has assured that each subcontract is evidenced in writing and that it contains all pertinent provisions and requirements of the prime contract. (based on long-standing interpretation of 23 CFR 635.116).

5. The 30-percent self-performance requirement of paragraph (1) is not applicable to design-build contracts; however, contracting agencies may establish their own self-performance requirements. 23 CFR 635.116(d).

VII. SAFETY: ACCIDENT PREVENTION

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

1. In the performance of this contract the contractor shall comply with all applicable Federal, State, and local laws governing safety, health, and sanitation (23 CFR Part 635). The contractor shall provide all safeguards, safety devices and protective equipment and take any other needed actions as it determines, or as the contracting officer may determine, to be reasonably necessary to protect the life and health of employees on the job and the safety of the public and to protect property in connection with the performance of the work covered by the contract. 23 CFR 635.108.

2. It is a condition of this contract, and shall be made a condition of each subcontract, which the contractor enters into pursuant to this contract, that the contractor and any subcontractor shall not permit any employee, in performance of the contract, to work in surroundings or under conditions which are unsanitary, hazardous or dangerous to his/her health or safety, as determined under construction safety and health standards (29 CFR Part 1926) promulgated by the Secretary of Labor, in accordance with Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704). 29 CFR 1926.10.

3. Pursuant to 29 CFR 1926.3, it is a condition of this contract that the Secretary of Labor or authorized representative thereof, shall have right of entry to any site of contract performance to inspect or investigate the matter of compliance with the construction safety and health standards and to carry out the duties of the Secretary under Section 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 3704).

VIII. FALSE STATEMENTS CONCERNING HIGHWAY PROJECTS

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts.

In order to assure high quality and durable construction in conformity with approved plans and specifications and a high degree of reliability on statements and representations made by engineers, contractors, suppliers, and workers on Federal-aid highway projects, it is essential that all persons concerned with the project perform their functions as carefully, thoroughly, and honestly as possible. Willful falsification, distortion, or misrepresentation with respect to any facts related to the project is a violation of Federal law. To prevent any misunderstanding regarding the seriousness of these and similar acts, Form FHWA-1022 shall be posted on each Federal-aid highway project (23 CFR Part 635) in one or more places where it is readily available to all persons concerned with the project:

18 U.S.C. 1020 reads as follows:

"Whoever, being an officer, agent, or employee of the United States, or of any State or Territory, or whoever, whether a person, association, firm, or corporation, knowingly makes any false statement, false representation, or false report as to the character, quality, quantity, or cost of the material used or to be used, or the quantity or quality of the work performed or to be performed, or the cost thereof in connection with the submission of plans, maps, specifications, contracts, or costs of construction on any highway or related project submitted for approval to the Secretary of Transportation; or

Whoever knowingly makes any false statement, false representation, false report or false claim with respect to the character, quality, quantity, or cost of any work performed or to be performed, or materials furnished or to be furnished, in connection with the construction of any highway or related project approved by the Secretary of Transportation; or

Whoever knowingly makes any false statement or false representation as to material fact in any statement, certificate, or report submitted pursuant to provisions of the Federal-aid Roads Act approved July 11, 1916, (39 Stat. 355), as amended and supplemented;

Shall be fined under this title or imprisoned not more than 5 years or both."

IX. IMPLEMENTATION OF CLEAN AIR ACT AND FEDERAL WATER POLLUTION CONTROL ACT (42 U.S.C. 7606; 2 CFR 200.88; EO 11738)

This provision is applicable to all Federal-aid construction contracts in excess of $150,000 and to all related subcontracts. 48 CFR 2.101; 2 CFR 200.327.

By submission of this bid/proposal or the execution of this contract or subcontract, as appropriate, the bidder, proposer, Federal-aid construction contractor, subcontractor, supplier, or vendor agrees to comply with all applicable standards, orders or regulations issued pursuant to the Clean Air Act (42 U.S.C. 7401-7671q) and the Federal Water Pollution Control Act, as amended (33 U.S.C. 1251-1387). Violations must be reported to the Federal Highway Administration and the Regional Office of the Environmental Protection Agency. 2 CFR Part 200, Appendix II.

The contractor agrees to include or cause to be included the requirements of this Section in every subcontract, and further agrees to take such action as the contracting agency may direct as a means of enforcing such requirements. 2 CFR 200.327.

X. CERTIFICATION REGARDING DEBARMENT, SUSPENSION, INELIGIBILITY AND VOLUNTARY EXCLUSION

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, consultant contracts or any other covered transaction requiring FHWA approval or that is estimated to cost $25,000 or more – as defined in 2 CFR Parts 180 and 1200. 2 CFR 180.220 and 1200.220.

1**. Instructions for Certification – First Tier Participants:**

a. By signing and submitting this proposal, the prospective first tier participant is providing the certification set out below.

b. The inability of a person to provide the certification set out below will not necessarily result in denial of participation in this covered transaction. The prospective first tier participant shall submit an explanation of why it cannot provide the certification set out below. The certification or explanation will be considered in connection with the department or agency's determination whether to enter into this transaction. However, failure of the prospective first tier participant to furnish a certification or an explanation shall disqualify such a person from participation in this transaction. 2 CFR 180.320.

c. The certification in this clause is a material representation of fact upon which reliance was placed when the contracting agency determined to enter into this transaction. If it is later determined that the prospective participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the contracting agency may terminate this transaction for cause of default. 2 CFR 180.325.

d. The prospective first tier participant shall provide immediate written notice to the contracting agency to whom this proposal is submitted if any time the prospective first tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances. 2 CFR 180.345 and 180.350.

e. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900-180.1020, and 1200. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

f. The prospective first tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency entering into this transaction. 2 CFR 180.330.

g. The prospective first tier participant further agrees by submitting this proposal that it will include the clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions," provided by the department or contracting agency, entering into this covered transaction, without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 180.300.

h. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. 2 CFR 180.300; 180.320, and 180.325. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. 2 CFR 180.335. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/). 2 CFR 180.300, 180.320, and 180.325.

i. Nothing contained in the foregoing shall be construed to require the establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of the prospective participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

j. Except for transactions authorized under paragraph (f) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency may terminate this transaction for cause or default. 2 CFR 180.325.

* * * * *

2. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – First Tier Participants:

a. The prospective first tier participant certifies to the best of its knowledge and belief, that it and its principals:

(1) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.335;.

(2) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property, 2 CFR 180.800;

(3) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (a)(2) of this certification, 2 CFR 180.700 and 180.800; and

(4) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default. 2 CFR 180.335(d).

(5) Are not a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(6) Are not a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability (USDOT Order 4200.6 implementing appropriations act requirements).

b. Where the prospective participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal. 2 CFR 180.335 and 180.340.

* * * * *

3. **Instructions for Certification - Lower Tier Participants:**

(Applicable to all subcontracts, purchase orders, and other lower tier transactions requiring prior FHWA approval or estimated to cost $25,000 or more - 2 CFR Parts 180 and 1200). 2 CFR 180.220 and 1200.220.

a. By signing and submitting this proposal, the prospective lower tier participant is providing the certification set out below.

b. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department, or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

c. The prospective lower tier participant shall provide immediate written notice to the person to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous by reason of changed circumstances. 2 CFR 180.365.

d. The terms "covered transaction," "debarred," "suspended," "ineligible," "participant," "person," "principal," and "voluntarily excluded," as used in this clause, are defined in 2 CFR Parts 180, Subpart I, 180.900 – 180.1020, and 1200. You may contact the person to which this proposal is submitted for assistance in obtaining a copy of those regulations. “First Tier Covered Transactions” refers to any covered transaction between a recipient or subrecipient of Federal funds and a participant (such as the prime or general contract). “Lower Tier Covered Transactions” refers to any covered transaction under a First Tier Covered Transaction (such as subcontracts). “First Tier Participant” refers to the participant who has entered into a covered transaction with a recipient or subrecipient of Federal funds (such as the prime or general contractor). “Lower Tier Participant” refers any participant who has entered into a covered transaction with a First Tier Participant or other Lower Tier Participants (such as subcontractors and suppliers).

e. The prospective lower tier participant agrees by submitting this proposal that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated. 2 CFR 1200.220 and 1200.332.

f. The prospective lower tier participant further agrees by submitting this proposal that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transaction," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions exceeding the $25,000 threshold. 2 CFR 180.220 and 1200.220.

g. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant is responsible for ensuring that its principals are not suspended, debarred, or otherwise ineligible to participate in covered transactions. To verify the eligibility of its principals, as well as the eligibility of any lower tier prospective participants, each participant may, but is not required to, check the System for Award Management website (https://www.sam.gov/), which is compiled by the General Services Administration. 2 CFR 180.300, 180.320, 180.330, and 180.335.

h. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

i. Except for transactions authorized under paragraph e of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily

excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment. 2 CFR 180.325.

* * * * *

4. Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion--Lower Tier Participants:

a. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals:

(1) is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participating in covered transactions by any Federal department or agency, 2 CFR 180.355;

(2) is a corporation that has been convicted of a felony violation under any Federal law within the two-year period preceding this proposal (USDOT Order 4200.6 implementing appropriations act requirements); and

(3) is a corporation with any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability. (USDOT Order 4200.6 implementing appropriations act requirements)

b. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant should attach an explanation to this proposal.

* * * * *

XI. CERTIFICATION REGARDING USE OF CONTRACT FUNDS FOR LOBBYING

This provision is applicable to all Federal-aid construction contracts and to all related subcontracts which exceed $100,000. 49 CFR Part 20, App. A.

1. The prospective participant certifies, by signing and submitting this bid or proposal, to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any Federal agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

2. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31 U.S.C. 1352. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

3. The prospective participant also agrees by submitting its bid or proposal that the participant shall require that the language of this certification be included in all lower tier subcontracts, which exceed $100,000 and that all such recipients shall certify and disclose accordingly.

XII. USE OF UNITED STATES-FLAG VESSELS:

This provision is applicable to all Federal-aid construction contracts, design-build contracts, subcontracts, lower-tier subcontracts, purchase orders, lease agreements, or any other covered transaction. 46 CFR Part 381.

This requirement applies to material or equipment that is acquired for a specific Federal-aid highway project. 46 CFR 381.7. It is not applicable to goods or materials that come into inventories independent of an FHWA funded-contract.

When oceanic shipments (or shipments across the Great Lakes) are necessary for materials or equipment acquired for a specific Federal-aid construction project, the bidder, proposer, contractor, subcontractor, or vendor agrees:

1. To utilize privately owned United States-flag commercial vessels to ship at least 50 percent of the gross tonnage (computed separately for dry bulk carriers, dry cargo liners, and tankers) involved, whenever shipping any equipment, material, or commodities pursuant to this contract, to the extent such vessels are available at fair and reasonable rates for United States-flag commercial vessels. 46 CFR 381.7.

2. To furnish within 20 days following the date of loading for shipments originating within the United States or within 30 working days following the date of loading for shipments originating outside the United States, a legible copy of a rated, ‘on-board’ commercial ocean bill-of-lading in English for each shipment of cargo described in paragraph (b)(1) of this section to both the Contracting Officer (through the prime contractor in the case of subcontractor bills-of-lading) and to the Office of Cargo and Commercial Sealift (MAR-620), Maritime Administration, Washington, DC 20590. (MARAD requires copies of the ocean carrier's (master) bills of lading, certified onboard, dated, with rates and charges. These bills of lading may contain business sensitive information and therefore may be submitted directly to MARAD by the Ocean Transportation Intermediary on behalf of the contractor). 46 CFR 381.7.

ATTACHMENT A - EMPLOYMENT AND MATERIALS PREFERENCE FOR APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM OR APPALACHIAN LOCAL ACCESS ROAD CONTRACTS (23 CFR 633, Subpart B, Appendix B)
This provision is applicable to all Federal-aid projects funded under the Appalachian Regional Development Act of 1965.

1. During the performance of this contract, the contractor undertaking to do work which is, or reasonably may be, done as on-site work, shall give preference to qualified persons who regularly reside in the labor area as designated by the DOL wherein the contract work is situated, or the subregion, or the Appalachian counties of the State wherein the contract work is situated, except:

a. To the extent that qualified persons regularly residing in the area are not available.

b. For the reasonable needs of the contractor to employ supervisory or specially experienced personnel necessary to assure an efficient execution of the contract work.

c. For the obligation of the contractor to offer employment to present or former employees as the result of a lawful collective bargaining contract, provided that the number of nonresident persons employed under this subparagraph (1c) shall not exceed 20 percent of the total number of employees employed by the contractor on the contract work, except as provided in subparagraph (4) below.

2. The contractor shall place a job order with the State Employment Service indicating (a) the classifications of the laborers, mechanics and other employees required to perform the contract work, (b) the number of employees required in each classification, (c) the date on which the participant estimates such employees will be required, and (d) any other pertinent information required by the State Employment Service to complete the job order form. The job order may be placed with the State Employment Service in writing or by telephone. If during the course of the contract work, the information submitted by the contractor in the original job order is substantially modified, the participant shall promptly notify the State Employment Service.

3. The contractor shall give full consideration to all qualified job applicants referred to him by the State Employment Service. The contractor is not required to grant employment to any job applicants who, in his opinion, are not qualified to perform the classification of work required.

4. If, within one week following the placing of a job order by the contractor with the State Employment Service, the State Employment Service is unable to refer any qualified job applicants to the contractor, or less than the number requested, the State Employment Service will forward a certificate to the contractor indicating the unavailability of applicants. Such certificate shall be made a part of the contractor's permanent project records. Upon receipt of this certificate, the contractor may employ persons who do not normally reside in the labor area to fill positions covered by the certificate, notwithstanding the provisions of subparagraph (1c) above.

5. The provisions of 23 CFR 633.207(e) allow the contracting agency to provide a contractual preference for the use of mineral resource materials native to the Appalachian region.

6. The contractor shall include the provisions of Sections 1 through 4 of this Attachment A in every subcontract for work which is, or reasonably may be, done as on-site work.

KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

EMPLOYMENT REQUIREMENTS
RELATING TO
NONDISCRIMINATION OF EMPLOYEES
(APPLICABLE TO FEDERAL-AID SYSTEM CONTRACTS)

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

Standard Title VI/Non-Discrimination Assurances

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Acts and the Regulations relative to Non-discrimination in Federally-assisted programs of the U.S. Department of Transportation, **Federal Highway Administration**, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

2. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Acts and the Regulations, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR Part 21.

3. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Acts and the Regulations relative to Non-discrimination on the grounds of race, color, or national origin.

4. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the Recipient or the **Federal Highway Administration** to be pertinent to ascertain compliance with such Acts, Regulations, and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the Recipient or the **Federal Highway Administration**, as appropriate, and will set forth what efforts it has made to obtain the information.

5. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the Recipient will impose such contract sanctions as it or the **Federal Highway Administration** may determine to be appropriate, including, but not limited to:

    a. withholding payments to the contractor under the contract until the contractor complies; and/or
    b. cancelling, terminating, or suspending a contract, in whole or in part.

6. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the Recipient or the **Federal Highway Administration** may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the Recipient to enter into any litigation to protect the interests of the Recipient. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Standard Title VI/Non-Discrimination Statutes and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq.*, 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin); and 49 CFR Part 21;
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Federal-Aid Highway Act of 1973, (23 U.S.C. § 324 *et seq.*), (prohibits discrimination on the basis of sex);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq.*), as amended, (prohibits discrimination on the basis of disability); and 49 CFR Part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq.*), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 -- 12189) as implemented by Department of Transportation regulations at 49 C.F.R. parts 37 and 38;
- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

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 TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

TRAINING SPECIAL PROVISIONS

This Training Special Provision supersedes subparagraph 7b of the Special Provision entitled ``Specific Equal Employment Opportunity Responsibilities," (Attachment 1), and is in implementation of 23 U.S.C. 140(a).

As part of the contractor's equal employment opportunity affirmative action program training shall be provided as follows:

The contractor shall provide on-the-job training aimed at developing full journeymen in the type of trade or job classification involved.

The number of trainees to be trained under these special provisions and in this contract is shown in “Special Notes Applicable to Project” in the bid proposal.

In the event that a contractor subcontracts a portion of the contract work, he shall determine how many, if any, of the trainees are to be trained by the subcontractor, provided, however, that the contractor shall retain the primary responsibility for meeting the training requirements imposed by this special provision. The contractor shall also insure that this training special provision is made applicable to such subcontract. Where feasible, 25 percent of apprentices or trainees in each occupation shall be in their first year of apprenticeship or training.

The number of trainees shall be distributed among the work classifications on the basis of the contractor's needs and the availability of journeymen in the various classifications within a reasonable area of recruitment. Prior to commencing construction the contractor shall submit to the Kentucky Transportation Cabinet, Department of Highways for its approval, an acceptable training program on forms provided by the Cabinet indicating the number of trainees to be trained in each selected classification. Failure to provide the Cabinet with the proper documentation evidencing an acceptable training program prior to commencing construction shall cause the Cabinet to suspend the operations of the contractor with (if applicable) working days being charged as usual against the contract time or (if applicable), no additional contract time being granted for the suspension period. The Cabinet will not be liable for the payment of any work performed during the suspension period due to the failure of the contractor to provide an acceptable training program. Said suspension period shall be terminated when an acceptable training program is received by the Cabinet. Furthermore, the contractor shall specify the starting time for training in each of the classifications. The contractor will be credited for each trainee employed by him on the contract work who is currently enrolled or becomes enrolled in an approved program and will be reimbursed for such trainees as provided hereinafter.

Training and upgrading of minorities and women toward journeymen status is a primary objective of this Training Special Provision. Accordingly, the contractor shall make every effort to enroll minority trainees and women (e.g., by conducting systematic and direct recruitment through public and private sources likely to yield minority and women trainees) to the extent that such persons are available within a reasonable area of recruitment. The contractor will be responsible for demonstrating the steps that he has taken in pursuance thereof, prior to a determination as to whether the contractor is in compliance with this Training Special Provision. This training commitment is not intended, and shall not be used, to discriminate against any applicant for training, whether a member of a minority group or not.

No employee shall be employed as a trainee in any classification in which he has successfully completed a training course leading to journeyman status or in which he has been employed as a journeyman. The contractor should satisfy this requirement by including appropriate questions in the employee application or by other suitable means. Regardless of the method used the contractor's records should document the findings in each case. The minimum length and type of training for each classification will be as established in the training program selected by the contractor and approved by the Kentucky Transportation Cabinet, Department of Highways and the Federal Highway Administration shall approve a program if it is reasonably calculated to meet the equal employment opportunity obligations of the contractor and to qualify the average trainee for journeyman status in the classification concerned by the end of the training period. Furthermore, apprenticeship programs registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training, or with a State apprenticeship agency recognized by the Bureau and training programs approved but not necessarily sponsored by the U.S. Department of Labor, Manpower Administration, Bureau of Apprenticeship and Training shall also be considered acceptable provided it is being administered in a manner consistent with the equal employment obligations of Federal-aid highway construction contracts. Approval or acceptance of a training program shall be obtained from the State prior to commencing work on the classification covered by the program. It is the intention of these provisions that training is to be provided in the construction crafts rather than clerk-typists or secretarial-type positions. Training is permissible in lower level management positions such as office engineers, estimators, timekeepers, etc., where the training is oriented toward construction applications. Training in the laborer classification may be permitted provided that significant and meaningful training is provided and approved by the division office. Some offsite training is permissible as long as the training is an integral part of an approved training program and does not comprise a significant part of the overall training.

Except as otherwise noted below, the contractor will be reimbursed for each hour of training given an employee on this contract in accordance with an approved training program. As approved by the engineer, reimbursement will be made for training persons in excess of the number specified herein. This reimbursement will be made even though the contractor receives additional training program funds from other sources, provided such other source does not specifically prohibit the contractor from receiving other reimbursement. Reimbursement for offsite training indicated above may only be made to the contractor where he does one or more of the following and the trainees are concurrently employed on a Federal-aid project; contributes to the cost of the training, provides the instruction to the trainee or pays the trainee's wages during the offsite training period.

No payment shall be made to the contractor if either the failure to provide the required training, or the failure to hire the trainee as a journeyman, is caused by the contractor and evidences a lack of good faith on the part of the contractor in meeting the requirements of this Training Special Provision. It is normally expected that a trainee will begin his training on the project as soon as feasible after start of work utilizing the skill involved and remain on the project as long as training opportunities exist in his work classification or until he has completed his training program. It is not required that all trainees be on board for the entire length of the contract. A contractor will have fulfilled his responsibilities under this Training Special Provision if he has provided acceptable training to the number of trainees specified. The number trained shall be determined on the basis of the total number enrolled on the contract for a significant period.

Trainees will be paid at least 60 percent of the appropriate minimum journeyman's rate specified in the contract for the first half of the training period, 75 percent for the third quarter of the training period, and 90 percent for the last quarter of the training period, unless apprentices or trainees in an approved existing program are enrolled as trainees on this project. In that case, the appropriate rates approved by the Departments of Labor or Transportation in connection with the existing program shall apply to all trainees being trained for the same classification who are covered by this Training Special Provision.

The contractor shall furnish the trainee a copy of the program he will follow in providing the training. The contractor shall provide each trainee with a certification showing the type and length of training satisfactorily completed.

The contractor will provide for the maintenance of records and furnish periodic reports documenting his performance under this Training Special Provision.

1-1-93

General Decision Number: KY20240107 01/05/2024

Superseded General Decision Number: KY20230107

State: Kentucky

Construction Type: Highway

Counties: Adair, Barren, Bell, Breathitt, Casey, Clay, Clinton, Cumberland, Estill, Floyd, Garrard, Green, Harlan, Hart, Jackson, Johnson, Knott, Knox, Laurel, Lawrence, Lee, Leslie, Letcher, Lincoln, Magoffin, Martin, McCreary, Menifee, Metcalfe, Monroe, Morgan, Owsley, Perry, Pike, Powell, Pulaski, Rockcastle, Russell, Taylor, Wayne, Whitley and Wolfe Counties in Kentucky.

HIGHWAY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	. Executive Order 14026 generally applies to the contract. . The contractor must pay all covered workers at least $17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	. Executive Order 13658 generally applies to the contract. . The contractor must pay all covered workers at least $12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be

adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at http://www.dol.gov/whd/govcontracts.

Modification Number	Publication Date
0	01/05/2024

SUKY2015-047 10/20/2015

	Rates	Fringes
BOILERMAKER	$ 24.65	12.94
BRICKLAYER		
Bricklayer	$ 22.90	8.50
Stone Mason	$ 21.50	8.50
CARPENTER		
Carpenter	$ 24.90	14.50
Piledriver	$ 24.55	14.50
CEMENT MASON	$ 21.25	8.50
ELECTRICIAN		
Electrician	$ 29.36	10.55
Equipment Operator	$ 26.90	10.31
Groundsman	$ 17.79	8.51
Lineman	$ 30.09	10.94

When workmen are required to work from bosum chairs, trusses, stacks, tanks, scaffolds, catwalks, radio and T.V. towers, structural steel (open, unprotected, unfloored raw steel), and bridges or similar hazardous locations where workmen are subject to fall, except where using JLG's and bucket trucks up to 75 feet: Add 25% to workman's base rate for 50 to 75 feet, and add 50% to workman's base rate for over 75 feet.

IRONWORKER	$ 27.56	20.57
LABORER		
Group 1	$ 21.80	12.36
Group 2	$ 22.05	12.36
Group 3	$ 22.10	12.36
Group 4	$ 22.70	12.36

GROUP 1: Aging and Curing of Concrete (Any Mode or Method), Asbestos Abatement Worker, Asphalt Plant Laborers, Asphalt Laborers, Batch Truck Dumpers, Carpenter Tenders, Cement Mason Tenders, Cleaning of Machines, Concrete Laborers, Demolition Laborers, Dredging Laborers, Drill Tender, Environmental Laborer - Nuclear, Radiation, Toxic and Hazardous Waste - Level D, Flagmen, Grade Checkers, All Hand Digging and Hand Back Filling, Highway Marker Placers, Landscaping Laborers, Mesh Handlers and Placers, Puddler, Railroad Laborers, Rip-rap and Grouters, Right of Way Laborers, Sign, Guard Rail and Fence Installers (All Types), Signalmen, Sound Barrier Installer, Storm and Sanitary Sewer Laborers, Swampers, Truck Spotters and Dumpers, Wrecking of Concrete Forms, General Cleanup

GROUP 2: Batter Board Men (Sanitary and Storm Sewer), Brickmason Tenders, Mortar Mixer Operator, Scaffold Builders, Burner and Welder, Bushammers, Chain Saw Operator, Concrete Saw Operators, Deckhand Scow Man, Dry Cement Handlers, Environmental Laborers - Nuclear, Radiation, Toxic and

Hazardous Waste - Level C, Forklift Operators for Masonry, Form Setters, Green Concrete Cutting, Hand Operated Grouter and Grinder Machine Operator, Jack Hammers, Lead Paint Abatement, Pavement Breakers, Paving Joint Machine, Pipe Layers - Laser Operators (Non-metallic), Plastic Pipe Fusion, Power Driven Georgia Buggy and Wheel Barrow, Power Post Hole Diggers, Precast Manhole Setters, Walk-behind Tampers, Walk-behind Trenchers, Sand Blasters, Concrete Chippers, Surface Grinders, Vibrator Operators, Wagon Drillers
GROUP 3: Air Track Driller (All Types), Asphalt Luteman and Rakers, Gunnite Nozzleman, Gunnite Operators and Mixers, Grout Pump Operator, Powderman and Blaster, Side Rail Setters, Rail Paved Ditches, Screw Operators, Tunnel Laborers (Free Air), Water Blasters
GROUP 4: Caisson Workers (Free Air), Cement Finishers, Environmental Laborer - Nuclear, Radiation, Toxic and Hazardous Waste - Level A and B, miners and Drillers (Free Air), Tunnel Blasters, and Tunnel Mockers (Free Air), Directional and Horizontal Boring, Air Track Drillers (All Types), Powder Man and Blasters, Troxler and Concrete Tester if Laborer is Utilized

PAINTER		
All Excluding Bridges	$ 19.92	9.57
Bridges	$ 23.92	10.07
PLUMBER	$ 22.52	7.80
POWER EQUIPMENT OPERATOR:		
Group 1	$ 29.95	14.40
Group 2	$ 29.95	14.40
Group 3	$ 27.26	14.40
Group 4	$ 26.96	14.40

GROUP 1: Auto Patrol, Batcher Plant, Bituminous Paver, Cable-Way, Clamshell, Concrete Mixer (21 cu ft or over), Concrete Pump, Crane, Crusher Plant, Derrick, Derrick Boat, Ditching and Trenching Machine, Dragline, Dredge Engineer, Elevator (regardless of ownership when used for hoisting any building material), Elevating Grader and all types of Loaders, Hoe-type Machine, Hoisting Engine, Locomotive, LeTourneau or Carry-all Scoop, Bulldozer, Mechanic, Orangepeel Bucket, Piledriver, Power Blade, Roller (Bituminous), Roller (Earth), Roller (Rock), Scarifier, Shovel, Tractor Shovel, Truck Crane, Well Point, Winch Truck, Push Dozer, Grout Pump, High Lift, Fork Lift (regardless of lift height), all types of Boom Cats, Multiple Operator, Core Drill, Tow or Push Boat, A-Frame Winch Truck, Concrete Paver, Grade-All, Hoist, Hyster, Material Pump, Pumpcrete, Ross Carrier, Sheepfoot, Sideboom, Throttle-Valve Man, Rotary Drill, Power Generator, Mucking Machine, Rock Spreader attached to Equipment, Scoopmobile, KeCal Loader, Tower Cranes,(French, German and other types), Hydrocrane, Tugger, Backfiller Gurries, Self-propelled Compactor, Self-Contained Hydraulic Percussion Drill
GROUP 2: All Air Compressors (200 cu ft/min or greater), Bituminous Mixer, Concrete Mixer (21 cu. ft. or over), Welding Machine, Form Grader, Tractor (50 hp and over), Bull Float,

Finish Machine, Outboard Motor Boat, Brakeman, Mechanic Tender, Whirly Oiler, Tract-air, Road Widening Trencher, Articulating Trucks
GROUP 3: Greaser on Grease Facilities servicing Heavy Equipment
GROUP 4: Bituminous Distributor, Cement Gun, Conveyor, Mud Jack, Paving Joint Machine, Pump, Tamping Machine, Tractor (under 50 hp), Vibrator, Oiler, Air Compressor (under 200 cu ft per minute), Concrete Saw, Burlap and Curing Machine, Hydro Seeder, Power Form Handling Equipment, Deckhand Oiler, Hydraulic Post Driver

SHEET METAL WORKER	$ 20.40	7.80
TRUCK DRIVER		
Driver (3 Tons and Over), Driver (Truck Mounted Rotary Drill)	$ 23.74	14.50
Driver (3 Tons and Under), Tire Changer and Truck Mechanic Tender	$ 23.53	14.50
Driver (Semi-Trailer or Pole Trailer), Driver (Dump Truck, Tandem Axle), Driver of Distributor	$ 23.40	14.50
Driver on Mixer Trucks (All Types)	$ 23.45	14.50
Driver on Pavement Breakers	$ 23.55	14.50
Driver, Euclid and Other Heavy Earth Moving Equipment and Low Boy	$ 24.31	14.50
Driver, Winch Truck and A-Frame when used in Transporting Materials	$ 23.30	14.50
Greaser on Greasing Facilities	$ 24.40	14.50
Truck Mechanic	$ 23.50	14.50
Truck Tender and Warehouseman	$ 23.20	14.50

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other

health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than "SU" or "UAVG" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the "SU" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates the rates are survey rates based on a weighted average

calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor

200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

Fringe benefit amounts are applicable for all hours worked except when otherwise noted.

No laborer, workman or mechanic shall be paid at a rate less than that of a Journeyman except those classified as bona fide apprentices.

Apprentices or trainees shall be permitted to work as such subject to Administrative Regulations adopted by the Commissioner of Workplace Standards. Copies of these regulations will be furnished upon request from any interested person.

Before using apprentices on the job the contractor shall present to the Contracting Officer written evidence of registration of such employees in a program of a State apprenticeship and training agency approved and recognized by the U. S. Bureau of Apprenticeship and Training. In the absence of such a State agency, the contractor shall submit evidence of approval and registration by the U. S. Bureau of Apprenticeship and Training.

The contractor shall submit to the Contracting Officer, written evidence of the established apprenticeship-journeyman ratios and wage rates in the project area, which will be the basis for establishing such ratios and rates for the project under the applicable contract provisions.

TO: EMPLOYERS/EMPLOYEES

PREVAILING WAGE SCHEDULE:

The wages indicated on this wage schedule are the least permitted to be paid for the occupations indicated. When an employee works in more than one classification, the employer must record the number of hours worked in each classification at the prescribed hourly base rate.

OVERTIME:

Overtime is to be paid to an employee at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty (40) hours in such workweek. Wage violations or questions should be directed to the designated Engineer or the undersigned.

Director
Division of Construction Procurement
Frankfort, Kentucky 40622
502-564-3500

NOTICE OF REQUIREMENT FOR AFFIRMATIVE ACTION TO ENSURE EQUAL EMPLOYMENT OPPORTUNITY (Executive Order 11246)

1. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Specifications" set forth herein.

2. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate work force in each trade on all construction work in the covered area, are as follows:

GOALS FOR MINORITY PARTICIPATION IN EACH TRADE	GOALS FOR FEMALE PARTICIPATION IN EACH TRADE
7.0%	6.9%

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally-assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non-federally involved construction.

The Contractor's compliance with the Executive Order and the regulations in CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4, 3(a), and its efforts to meet the goals. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract, and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

3. The Notification of Construction Contract Award Portal (NCAP) is OFCCP's preferred method for receiving construction contract award notifications. The NCAP can be found on OFCCP's website at https://www.dol.gov/agencies/ofccp/ncap. Users who prefer not to use the portal maintain the option to send their notifications via mail, email and facsimile to the OFCCP Regional office in which the work will be performed. The Contractor shall provide written notification to the Director of the Office of Federal Contract Compliance Programs within ten (10) working days of award of any construction subcontract in excess of $10,000.00 at any tier for construction work under the contract resulting from this solicitation. The notification must include: Prime Contract Number (issued by the federal agency or applicant); Name of Awarding Federal Agency, Applicant or Contractor; Contracting Officer, Applicant Representative or Contractor Representative Submitting Notification with name, phone number, email address; Contractor Awarded Contract or Subcontract with name, address, phone number, email address, EIN, dollar amount of the contract, estimated start date of the contract, estimated completion date of the contract, geographical area in which the contract is to be performed (state, county's city (if applicable)).
The notification shall be mailed to:

Regional Director
Office of Federal Contract Compliance Programs
61 Forsyth Street, SW, Suite 7B75
Atlanta, Georgia 30303-8931
Main Number: 404-893-4545 Fax: 404-893-4546
Regional Director Contact: OFCCP-SE@dol.gov
Construction Award Email: OFCCP-SE-ConstructionAward@dol.gov

4. As used in this Notice, and in the contract resulting from this solicitation, the **"covered area"** is Breathitt County.

(Revised: 1/1/2023)

PART IV

INSURANCE

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

PART V

BID ITEMS

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	10,295.00	TON		$	
0020	00020		TRAFFIC BOUND BASE	1,063.00	TON		$	
0030	00100		ASPHALT SEAL AGGREGATE	11.35	TON		$	
0040	00103		ASPHALT SEAL COAT	1.36	TON		$	
0050	00190		LEVELING & WEDGING PG64-22	9,070.00	TON		$	
0060	00212		CL2 ASPH BASE 1.00D PG64-22	1,544.00	TON		$	
0070	00214		CL3 ASPH BASE 1.00D PG64-22	4,544.00	TON		$	
0080	00301		CL2 ASPH SURF 0.38D PG64-22	825.00	TON		$	
0090	00307		CL2 ASPH SURF 0.38B PG64-22	1,409.00	TON		$	
0100	00388		CL3 ASPH SURF 0.38B PG64-22	3,533.00	TON		$	
0110	02073		JPC PAVEMENT-9 IN	5,008.00	SQYD		$	
0120	02084		JPC PAVEMENT-8 IN	588.00	SQYD		$	
0130	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		$	
0140	02677		ASPHALT PAVE MILLING & TEXTURING	3,873.00	TON		$	
0150	24970EC		ASPHALT MATERIAL FOR TACK NON-TRACKING	31.98	TON		$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0160	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM	1.00	LS		$	
0170	01792		ADJUST MANHOLE	3.00	EACH		$	
0180	01810		STANDARD CURB AND GUTTER	10,215.00	LF		$	
0190	01811		STANDARD CURB AND GUTTER MOD	1,270.00	LF		$	
0200	01875		STANDARD HEADER CURB	142.00	LF		$	
0210	01945		MOUNTABLE MEDIAN TYPE 1A	282.00	SQYD		$	
0220	01947		MOUNTABLE MEDIAN TYPE 3A	108.00	SQYD		$	
0230	01987		DELINEATOR FOR GUARDRAIL BI DIRECTIONAL WHITE	24.00	EACH		$	
0240	02014		BARRICADE-TYPE III	30.00	EACH		$	
0250	02091		REMOVE PAVEMENT	743.00	SQYD		$	
0260	02159		TEMP DITCH	3,744.00	LF		$	
0270	02160		CLEAN TEMP DITCH	1,872.00	LF		$	
0280	02200		ROADWAY EXCAVATION	607,693.00	CUYD		$	
0290	02242		WATER	269.00	MGAL		$	
0300	02262		FENCE-WOVEN WIRE TYPE 1	1,293.00	LF		$	
0310	02273		FENCE-4 FT CHAIN LINK	878.00	LF		$	
0320	02289		DOUBLE VEHICULAR WOVEN WIRE GATE	4.00	EACH		$	
0330	02351		GUARDRAIL-STEEL W BEAM-S FACE	2,526.00	LF		$	
0340	02360		GUARDRAIL TERMINAL SECTION NO 1	6.00	EACH		$	
0350	02367		GUARDRAIL END TREATMENT TYPE 1	2.00	EACH		$	
0360	02369		GUARDRAIL END TREATMENT TYPE 2A	4.00	EACH		$	
0370	02381		REMOVE GUARDRAIL	3,688.00	LF		$	
0380	02429		RIGHT-OF-WAY MONUMENT TYPE 1	48.00	EACH		$	
0390	02432		WITNESS POST	48.00	EACH		$	
0400	02483		CHANNEL LINING CLASS II	1,123.00	TON		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0410	02484		CHANNEL LINING CLASS III	615.00	TON		$	
0420	02488		CHANNEL LINING CLASS IV	12,980.00	CUYD		$	
0430	02545		CLEARING AND GRUBBING (APPR 53 ACRES)	1.00	LS		$	
0440	02555		CONCRETE-CLASS B FENCE	13.80	CUYD		$	
0450	02562		TEMPORARY SIGNS	1,000.00	SQFT		$	
0460	02585		EDGE KEY	267.00	LF		$	
0470	02602		FABRIC-GEOTEXTILE CLASS 1	43,672.00	SQYD		$	
0480	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0490	02671		PORTABLE CHANGEABLE MESSAGE SIGN	3.00	EACH		$	
0500	02690		SAFELOADING	71.00	CUYD		$	
0510	02692		SETTLEMENT PLATFORM	2.00	EACH		$	
0520	02696		SHOULDER RUMBLE STRIPS	7,012.00	LF		$	
0530	02701		TEMP SILT FENCE	3,744.00	LF		$	
0540	02703		SILT TRAP TYPE A	59.00	EACH		$	
0550	02704		SILT TRAP TYPE B	59.00	EACH		$	
0560	02705		SILT TRAP TYPE C	59.00	EACH		$	
0570	02706		CLEAN SILT TRAP TYPE A	59.00	EACH		$	
0580	02707		CLEAN SILT TRAP TYPE B	59.00	EACH		$	
0590	02708		CLEAN SILT TRAP TYPE C	59.00	EACH		$	
0600	02720		SIDEWALK-4 IN CONCRETE	7,682.00	SQYD		$	
0610	02726		STAKING	1.00	LS		$	
0620	03171		CONCRETE BARRIER WALL TYPE 9T	2,000.00	LF		$	
0630	03340		STEEL PIPE-2 1/2 IN	58.00	LF		$	
0640	03343		STEEL PIPE-4 IN	58.00	LF		$	
0650	04935		TEMP SIGNAL	1.00	LS		$	
0660	05950		EROSION CONTROL BLANKET	2,370.00	SQYD		$	
0670	05952		TEMP MULCH	192,849.00	SQYD		$	
0680	05953		TEMP SEEDING AND PROTECTION	143,917.00	SQYD		$	
0690	05963		INITIAL FERTILIZER	9.00	TON		$	
0700	05964		MAINTENANCE FERTILIZER	15.00	TON		$	
0710	05985		SEEDING AND PROTECTION	287,835.00	SQYD		$	
0720	05992		AGRICULTURAL LIMESTONE	178.40	TON		$	
0730	06510		PAVE STRIPING-TEMP PAINT-4 IN	48,670.00	LF		$	
0740	06514		PAVE STRIPING-PERM PAINT-4 IN	11,700.00	LF		$	
0750	06542		PAVE STRIPING-THERMO-6 IN W	17,883.00	LF		$	
0760	06543		PAVE STRIPING-THERMO-6 IN Y	14,900.00	LF		$	
0770	06546		PAVE STRIPING-THERMO-12 IN W	1,103.00	LF		$	
0780	06549		PAVE STRIPING-TEMP REM TAPE-B	200.00	LF		$	
0790	06568		PAVE MARKING-THERMO STOP BAR-24IN	630.00	LF		$	
0800	06569		PAVE MARKING-THERMO CROSS-HATCH	340.00	SQFT		$	
0810	06574		PAVE MARKING-THERMO CURV ARROW	68.00	EACH		$	
0820	06575		PAVE MARKING-THERMO COMB ARROW	13.00	EACH		$	
0830	06578		PAVE MARKING-THERMO MERGE ARROW	5.00	EACH		$	
0840	06610		INLAID PAVEMENT MARKER-MW	318.00	EACH		$	
0850	06612		INLAID PAVEMENT MARKER-BY	299.00	EACH		$	
0860	10020NS		FUEL ADJUSTMENT	143,001.00	DOLL	$1.00	$	$143,001.00
0870	10030NS		ASPHALT ADJUSTMENT	81,808.00	DOLL	$1.00	$	$81,808.00
0880	20071EC		JOINT ADHESIVE	6,361.00	LF		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0890	20099ES842		PAVE MARK TEMP PAINT STOP BAR	564.00	LF		$	
0900	20166ES810		TEMPORARY PIPE	180.00	LF		$	
0910	20191ED		OBJECT MARKER TY 3	2.00	EACH		$	
0920	20411ED		LAW ENFORCEMENT OFFICER	120.00	HOUR		$	
0930	20550ND		SAWCUT PAVEMENT	6,361.00	LF		$	
0940	20738NS112		TEMP CRASH CUSHION	2.00	EACH		$	
0950	21289ED		LONGITUDINAL EDGE KEY	6,361.00	LF		$	
0960	21659NN		RELOCATE SIGNAL HEAD	28.00	EACH		$	
0970	22664EN		WATER BLASTING EXISTING STRIPE	2,200.00	LF		$	
0980	23119EN		PEDESTRIAN SAFETY FENCE	293.00	LF		$	
0990	23158ES505		DETECTABLE WARNINGS	675.00	SQFT		$	
1000	23264ES717		PAVE MARK TY 1 TAPE X-WALK-12 IN	401.00	LF		$	
1010	23265ES717		PAVE MARK TY 1 TAPE STOP BAR-24 IN	98.00	LF		$	
1020	23270ES717		PAVE MARK TY 1 TAPE-CURV ARROW	11.00	EACH		$	
1030	23274EN11F		TURF REINFORCEMENT MAT 1	18.00	SQYD		$	
1040	23608EC		YELLOW PAINT FOR MEDIAN SAFETY NOSE	95.00	SQFT		$	
1050	23869EC		PAVE STRIPE-WET REF TAPE-4 IN Y	260.00	LF		$	
1060	23870EC		PAVE STRIPE-WET REF TAPE-4 IN W	494.00	LF		$	
1070	23871EC		PAVE STRIPE-WET REF TAPE-6 IN Y	1,808.00	LF		$	
1080	23872EC		PAVE STRIPE-WET REF TAPE-6 IN W	1,365.00	LF		$	
1090	24814EC		PIPELINE INSPECTION	8,465.00	LF		$	
1100	24845EC		UTILITY COORDINATION	1.00	LS		$	
1110	24864EC		PVC FOLD AND FORM PIPE LINER-30 IN	160.00	LF		$	
1120	24865EC		PVC FOLD AND FORM PIPE LINER-36 IN	222.00	LF		$	
1130	24894EC		REMOVE (PRIVATE RECREATIONAL VEHICLE HOOK-UP-ELECTRICAL)	3.00	EACH		$	
1140	24894EC		REMOVE (PRIVATE RECREATIONAL VEHICLE HOOK-UP-SANITARY SEWER)	3.00	EACH		$	
1150	24894EC		REMOVE (PRIVATE RECREATIONAL VEHICLE HOOK-UP-WATER)	3.00	EACH		$	

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1160	00078		CRUSHED AGGREGATE SIZE NO 2	24.00	TON		$	
1170	00440		ENTRANCE PIPE-15 IN	205.00	LF		$	
1180	00445		ENTRANCE PIPE-30 IN	286.00	LF		$	
1190	00461		CULVERT PIPE-15 IN	269.00	LF		$	
1200	00462		CULVERT PIPE-18 IN	132.00	LF		$	
1210	00464		CULVERT PIPE-24 IN	132.00	LF		$	
1220	00466		CULVERT PIPE-30 IN	58.00	LF		$	
1230	00521		STORM SEWER PIPE-15 IN	5,046.00	LF		$	
1240	00522		STORM SEWER PIPE-18 IN	2,444.00	LF		$	
1250	00524		STORM SEWER PIPE-24 IN	235.00	LF		$	
1260	00526		STORM SEWER PIPE-30 IN	13.00	LF		$	
1270	00528		STORM SEWER PIPE-36 IN	203.00	LF		$	
1280	00529		STORM SEWER PIPE-42 IN	522.00	LF		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1290	01000		PERFORATED PIPE-4 IN	736.00	LF		$	
1300	01005		PERFORATED PIPE EDGE DRAIN-4 IN	9,212.00	LF		$	
1310	01010		NON-PERFORATED PIPE-4 IN	680.00	LF		$	
1320	01020		PERF PIPE HEADWALL TY 1-4 IN	7.00	EACH		$	
1330	01024		PERF PIPE HEADWALL TY 2-4 IN	3.00	EACH		$	
1340	01028		PERF PIPE HEADWALL TY 3-4 IN	12.00	EACH		$	
1350	01032		PERF PIPE HEADWALL TY 4-4 IN	2.00	EACH		$	
1360	01202		PIPE CULVERT HEADWALL-15 IN	13.00	EACH		$	
1370	01204		PIPE CULVERT HEADWALL-18 IN	5.00	EACH		$	
1380	01208		PIPE CULVERT HEADWALL-24 IN	4.00	EACH		$	
1390	01210		PIPE CULVERT HEADWALL-30 IN	8.00	EACH		$	
1400	01214		PIPE CULVERT HEADWALL-42 IN	1.00	EACH		$	
1410	01310		REMOVE PIPE	157.00	LF		$	
1420	01452		S & F BOX INLET-OUTLET-30 IN	1.00	EACH		$	
1430	01456		CURB BOX INLET TYPE A	66.00	EACH		$	
1440	01493		DROP BOX INLET TYPE 2	2.00	EACH		$	
1450	01496		DROP BOX INLET TYPE 3	3.00	EACH		$	
1460	01538		DROP BOX INLET TYPE 7	2.00	EACH		$	
1470	01559		DROP BOX INLET TYPE 13G	1.00	EACH		$	
1480	01580		DROP BOX INLET TYPE 15	2.00	EACH		$	
1490	01650		JUNCTION BOX	3.00	EACH		$	
1500	01705		REMOVE CURB & GUTTER BOX INLET	1.00	EACH		$	
1510	01740		CORED HOLE DRAINAGE BOX CON-4 IN	44.00	EACH		$	
1520	01761		MANHOLE TYPE B	2.00	EACH		$	
1530	02625		REMOVE HEADWALL	1.00	EACH		$	
1540	26131ED		SLOPED AND MITERED HEADWALL-18 IN	1.00	EACH		$	

Section: 0004 - BRIDGE - 28744 RCBC KY 3068 OVER MILLER BRANCH

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1550	02223		GRANULAR EMBANKMENT	544.00	CUYD		$	
1560	02231		STRUCTURE GRANULAR BACKFILL	324.00	CUYD		$	
1570	02690		SAFELOADING	351.80	CUYD		$	
1580	08002		STRUCTURE EXCAV-SOLID ROCK	95.00	CUYD		$	
1590	08003		FOUNDATION PREPARATION	1.00	LS		$	
1600	08100		CONCRETE-CLASS A	499.90	CUYD		$	
1610	08150		STEEL REINFORCEMENT	62,335.00	LB		$	
1620	20465EC		CLEAN CULVERT	1.00	LS		$	

Section: 0005 - BRIDGE - 28745 RCBC KY 15 OVER MILLER BRANCH

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1630	01001		PERFORATED PIPE-6 IN	22.00	LF		$	
1640	02231		STRUCTURE GRANULAR BACKFILL	78.00	CUYD		$	
1650	02403		REMOVE CONCRETE MASONRY	102.30	CUYD		$	
1660	02611		HANDRAIL-TYPE A-1	35.00	LF		$	
1670	02700		SAND	379.00	TON		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1680	08002		STRUCTURE EXCAV-SOLID ROCK	58.00	CUYD		$	
1690	08003		FOUNDATION PREPARATION	1.00	LS		$	
1700	08037		COFFERDAM	1.00	LS		$	
1710	08100		CONCRETE-CLASS A	186.40	CUYD		$	
1720	08150		STEEL REINFORCEMENT	19,166.00	LB		$	
1730	08160		STRUCTURAL STEEL 2403 LBS	1.00	LS		$	
1740	20465EC		CLEAN CULVERT	1.00	LS		$	
1750	24583EC		HDPE PIPE LINER -	294.00	LF		$	
1760	24786EN		HDPE PIPE -	45.00	LF		$	
1770	24798ED		DROP IN GRATE	1.00	EACH		$	
1780	24886EC		FLAP GATE -	2.00	EACH		$	
1790	24939ED		FLOOD GATE	2.00	EACH		$	
1800	26197EC		AASHTO NO 89 STONE	81.00	TON		$	
1810	26198ED		TRASH RACK	72.00	SQFT		$	
1820	26199ED		STOP LOGS	17.00	SQFT		$	

Section: 0006 - BRIDGE - 28746 PEDISTRIAN BR OVER MILLER BRANCH

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1830	02231		STRUCTURE GRANULAR BACKFILL	3.00	CUYD		$	
1840	02281		PEDESTRIAN GATE-CHAIN LINK	1.00	EACH		$	
1850	08003		FOUNDATION PREPARATION	1.00	LS		$	
1860	08019		CYCLOPEAN STONE RIP RAP	68.00	TON		$	
1870	08046		PILES-STEEL HP12X53	153.00	LF		$	
1880	08094		PILE POINTS-12 IN	3.00	EACH		$	
1890	08100		CONCRETE-CLASS A	23.90	CUYD		$	
1900	08104		CONCRETE-CLASS AA	12.20	CUYD		$	
1910	08150		STEEL REINFORCEMENT	5,932.00	LB		$	
1920	08469		EXPANSION DAM-1.5 IN NEOPRENE	12.20	LF		$	
1930	20743ED		DRILLED SHAFT 54 IN-SOLID ROCK	9.00	LF		$	
1940	20744ED		DRILLED SHAFT 60 IN-COMMON	20.00	LF		$	
1950	20745ED		ROCK SOUNDINGS	13.00	LF		$	
1960	20746ED		ROCK CORINGS	22.50	LF		$	
1970	21319NC		CSL ACCESS TUBING (4 TUBES)	1.00	EACH		$	
1980	21321NC		CSL TESTING (4 TUBES)	1.00	EACH		$	
1990	23378EC		CONCRETE SEALING	616.00	SQFT		$	
2000	24567ED		TRUSS BRIDGE SUPERSTRUCTURE	1.00	LS		$	

Section: 0007 - BRIDGE - 28747 RCBC WASHINGTON AVE OVER MILLER BRANCH

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2010	02231		STRUCTURE GRANULAR BACKFILL	182.00	CUYD		$	
2020	02611		HANDRAIL-TYPE A-1	46.00	LF		$	
2030	02612		HANDRAIL-TYPE A-2	58.00	LF		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2040	02700		SAND	657.00	TON		$	
2050	08002		STRUCTURE EXCAV-SOLID ROCK	68.00	CUYD		$	
2060	08003		FOUNDATION PREPARATION	1.00	LS		$	
2070	08037		COFFERDAM (INLET EXTENSION)	1.00	LS		$	
2080	08037		COFFERDAM (OUTLET EXTENSION)	1.00	LS		$	
2090	08100		CONCRETE-CLASS A	551.90	CUYD		$	
2100	08150		STEEL REINFORCEMENT	54,769.00	LB		$	
2110	08160		STRUCTURAL STEEL (844 LBS)	1.00	LS		$	
2120	20465EC		CLEAN CULVERT	1.00	LS		$	
2130	20478ND		FRAME AND LID TY 2	1.00	EACH		$	
2140	21321NC		CSL TESTING (4 TUBES)	3.00	EACH		$	
2150	24550EC		VIBRATION MONITORING	1.00	LS		$	
2160	24583EC		HDPE PIPE LINER -	208.00	LF		$	
2170	24786EN		HDPE PIPE -	111.00	LF		$	
2180	24798ED		DROP IN GRATE	1.00	EACH		$	
2190	24843EC		VIBRATING WIRE PIEZOMETER	8.00	EACH		$	
2200	24884ED		PERMANENT STEEL CASING -	12.00	LF		$	
2210	24886EC		FLAP GATE -	1.00	EACH		$	
2220	25086EC		AUTOMATED SLIDE GATE	1.00	EACH		$	
2230	26197EC		AASHTO NO 89 STONE	323.00	TON		$	
2240	26198ED		TRASH RACK	77.00	SQFT		$	
2250	26201EC		24 HR FALLING HEAD PERM TEST IN CORES	3.00	EACH		$	
2260	26202EC		WATER PSSR TEST IN CORES-SINGLE PACKER	2.00	EACH		$	
2270	26203EC		SECANT SHAFT CONCRETE CORES	4.00	EACH		$	
2280	26207ED		SECANT SHAFTS	3,542.00	LF		$	
2290	26212EC		SECANT SHAFTS WITH LIGHTWEIGHT CONCRETE	237.00	LF		$	
2300	26213EC		SOIL GROUTING	33.00	CUYD		$	
2310	26222ED		VIBRATING WIRE DATA LOGGER (4 CHANNEL)	4.00	EACH		$	
2320	26223ED		PRESSURE TEST OF SOIL GROUTING	4.00	EACH		$	
2330	26224ED		CCTV SOIL GROUTING INSPECTION	4.00	EACH		$	
2340	40130		ROTATING BEACON AND POLE	1.00	EACH		$	
2350	50003		ELECTRICAL	1.00	LS		$	

Section: 0008 - UTILITY - GASLINE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2360	16000		G DIRECTIONAL BORE	2,133.00	LF		$	
2370	16008		G ENCASEMENT STEEL OPEN CUT RANGE 1	260.00	LF		$	
2380	16009		G ENCASEMENT STEEL OPEN CUT RANGE 2	558.00	LF		$	
2390	16015		G PIPE POLYETHYLENE/PLASTIC 02 INCH	871.00	LF		$	
2400	16017		G PIPE POLYETHYLENE/PLASTIC 04 INCH	5,192.00	LF		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2410	16031		G SERVICE LONG SIDE 1 OR 1-1/4 INCH	2.00	EACH		$	
2420	16036		G SERVICE SHORT SIDE 1 OR 1-1/4 INCH	2.00	EACH		$	
2430	16041		G TIE-IN POLYETHYLENE/PLASTIC 02 INCH	3.00	EACH		$	
2440	16043		G TIE-IN POLYETHYLENE/PLASTIC 04 INCH	18.00	EACH		$	
2450	16048		G TIE-IN SPECIAL	4.00	EACH		$	
2460	16049		G VALVE POLYETHYLENE/PLASTIC 02 INCH	5.00	EACH		$	
2470	16051		G VALVE POLYETHYLENE/PLASTIC 04 INCH	23.00	EACH		$	
2480	16056		G VALVE SPECIAL	3.00	EACH		$	
2490	16065		G LINE MARKER	44.00	EACH		$	
2500	16068		G MAIN ABANDON (ENTIRE PROJECT)	1.00	LS		$	
2510	16110		G PIPE POLYETHYLENE/PLASTIC 01 INCH	512.00	LF		$	
2520	40095		SEEDING AND MULCHING	.50	ACRE		$	

Section: 0009 - SEWER

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2530	15000		S BYPASS PUMPING	1.00	EACH		$	
2540	15011		S DIRECTIONAL BORE (10 INCH)	740.00	LF		$	
2550	15011		S DIRECTIONAL BORE (4 INCH)	1,152.00	LF		$	
2560	15011		S DIRECTIONAL BORE (6 INCH)	742.00	LF		$	
2570	15017		S ENCASEMENT STEEL BORED RANGE 4	370.00	LF		$	
2580	15021		S ENCASEMENT STEEL OPEN CUT RANGE 2 (2IN AND 3IN FM)	340.00	LF		$	
2590	15021		S ENCASEMENT STEEL OPEN CUT RANGE 2 (6IN FM)	545.00	LF		$	
2600	15022		S ENCASEMENT STEEL OPEN CUT RANGE 3	180.00	LF		$	
2610	15023		S ENCASEMENT STEEL OPEN CUT RANGE 4	100.00	LF		$	
2620	15023		S ENCASEMENT STEEL OPEN CUT RANGE 4 (12IN GRAVITY)	50.00	LF		$	
2630	15023		S ENCASEMENT STEEL OPEN CUT RANGE 4 (6IN AND 6IN FM)	80.00	LF		$	
2640	15026		S FORCE MAIN AIR RLS/VAC VLV 02 IN	23.00	EACH		$	
2650	15058		S FORCE MAIN PVC 03 INCH	1,030.00	LF		$	
2660	15059		S FORCE MAIN PVC 04 INCH	291.00	LF		$	
2670	15060		S FORCE MAIN PVC 06 INCH	7,898.00	LF		$	
2680	15061		S FORCE MAIN PVC 08 INCH	103.00	LF		$	
2690	15072		S FORCE MAIN TIE-IN 03 INCH	2.00	EACH		$	
2700	15074		S FORCE MAIN TIE-IN 06 INCH	3.00	EACH		$	
2710	15084		S FORCE MAIN VALVE GATE (4 INCH)	3.00	EACH		$	
2720	15084		S FORCE MAIN VALVE GATE (6 INCH)	7.00	EACH		$	
2730	15084		S FORCE MAIN VALVE GATE 8 INCH	1.00	EACH		$	
2740	15089		S LATERAL SHORT SIDE 04 INCH	16.00	EACH		$	
2750	15092		S MANHOLE	20.00	EACH		$	
2760	15093		S MANHOLE ABANDON/REMOVE	13.00	EACH		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2770	15094		S MANHOLE ADJUST TO GRADE	3.00	EACH		$	
2780	15095		S MANHOLE CASTING STANDARD	21.00	EACH		$	
2790	15101		S MANHOLE WITH DROP	1.00	EACH		$	
2800	15112		S PIPE PVC 08 INCH	1,898.00	LF		$	
2810	15113		S PIPE PVC 10 INCH	974.00	LF		$	
2820	15114		S PIPE PVC 12 INCH	427.00	LF		$	
2830	15114		S PIPE PVC 12 INCH (SDR 26 THICK WALL)	292.00	LF		$	
2840	15119		S PUMP STATION (BUS GARAGE LIFT STATION)	1.00	EACH		$	
2850	15119		S PUMP STATION (COURT STREET LIFT STATION)	1.00	EACH		$	
2860	15119		S PUMP STATION (HOLY CROSS LIFT STATION)	1.00	EACH		$	
2870	15119		S PUMP STATION (LBJ LIFT STATION)	1.00	EACH		$	
2880	15119		S PUMP STATION (WENDY'S LIFT STATION)	1.00	EACH		$	
2890	15120		S SPECIAL ITEM (CONNECTION AT WWTP)	1.00	EACH		$	
2900	15122		S STRUCTURE REMOVAL (HIGH SCHOOL LIFT STATION)	1.00	EACH		$	
2910	15122		S STRUCTURE REMOVAL (UNDER WASHINGTON AVENUE)	1.00	EACH		$	
2920	15123		S LINE MARKER (FORCE MAIN)	44.00	EACH		$	
2930	15136		S LATERAL LOCATE	12.00	EACH		$	
2940	40095		SEEDING AND MULCHING	.77	ACRE		$	

Section: 0010 - SIGNING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2950	06406		SBM ALUM SHEET SIGNS .080 IN	370.00	SQFT		$	
2960	06407		SBM ALUM SHEET SIGNS .125 IN	687.00	SQFT		$	
2970	06410		STEEL POST TYPE 1	66.00	LF		$	
2980	06411		STEEL POST TYPE 2	1,413.00	LF		$	
2990	21134ND		REMOVE-STORE AND REINSTALL SIGN	4.00	EACH		$	
3000	24631EC		BARCODE SIGN INVENTORY	95.00	EACH		$	

Section: 0011 - SIGNALIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3010	04740		POLE BASE	2.00	EACH		$	
3020	04780		FUSED CONNECTOR KIT	63.00	EACH		$	
3030	04820		TRENCHING AND BACKFILLING	120.00	LF		$	
3040	04844		CABLE-NO. 14/5C	6,140.00	LF		$	
3050	04845		CABLE-NO. 14/7C	990.00	LF		$	
3060	04886		MESSENGER-15400 LB	1,760.00	LF		$	
3070	04932		INSTALL STEEL STRAIN POLE	16.00	EACH		$	
3080	04953		TEMP RELOCATION OF SIGNAL HEAD	45.00	EACH		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3090	06472		INSTALL SPAN MOUNTED SIGN	13.00	EACH		$	
3100	20093NS835		INSTALL PEDESTRIAN HEAD-LED	24.00	EACH		$	
3110	20188NS835		INSTALL LED SIGNAL-3 SECTION	34.00	EACH		$	
3120	20266ES835		INSTALL LED SIGNAL- 4 SECTION	3.00	EACH		$	
3130	20390NS835		INSTALL COORDINATING UNIT	4.00	EACH		$	
3140	21743NN		INSTALL PEDESTRIAN DETECTOR	24.00	EACH		$	
3150	22939ND		INSTALL LUMINAIRE POLE	2.00	EACH		$	
3160	23068NN		REMOVE & REINSTALL COORDINATING UNIT	4.00	EACH		$	
3170	23157EN		TRAFFIC SIGNAL POLE BASE	67.50	CUYD		$	
3180	23222EC		INSTALL SIGNAL PEDESTAL	3.00	EACH		$	
3190	24601EC		INSTALL (SOLAR POWERED BEACON CONTROLLER)	2.00	EACH		$	
3200	24900EC		PVC CONDUIT-1 1/4 IN-SCHEDULE 80	80.00	LF		$	
3210	24901EC		PVC CONDUIT-2 IN-SCHEDULE 80	240.00	LF		$	
3220	24908EC		INSTALL SIGNAL CONTROLLER-TY ATC	4.00	EACH		$	
3230	24955ED		REMOVE SIGNAL EQUIPMENT	5.00	EACH		$	
3240	26119EC		INSTALL RADAR PRESENCE DETECTOR TYPE A	15.00	EACH		$	

Section: 0012 - LIGHTING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3250	04701		POLE 40 FT MTG HT	40.00	EACH		$	
3260	04724		BRACKET 12 FT	48.00	EACH		$	
3270	04740		POLE BASE	51.00	EACH		$	
3280	04750		TRANSFORMER BASE	40.00	EACH		$	
3290	04761		LIGHTING CONTROL EQUIPMENT	2.00	EACH		$	
3300	04780		FUSED CONNECTOR KIT	96.00	EACH		$	
3310	04793		CONDUIT-1 1/4 IN	8,235.00	LF		$	
3320	04795		CONDUIT-2 IN	1,120.00	LF		$	
3330	04820		TRENCHING AND BACKFILLING	8,205.00	LF		$	
3340	04832		WIRE-NO. 12	2,748.00	LF		$	
3350	04834		WIRE-NO. 6	6,995.00	LF		$	
3360	20391NS835		ELECTRICAL JUNCTION BOX TYPE A	25.00	EACH		$	
3370	21543EN		BORE AND JACK CONDUIT	1,010.00	LF		$	
3380	23778EC		WIRE-NO. 10	16,550.00	LF		$	
3390	24589ED		LED LUMINAIRE	48.00	EACH		$	

Section: 0013 - WATERLINE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3400	14001		W AIR RELEASE VALVE 3/4 INCH	17.00	EACH		$	
3410	14003		W CAP EXISTING MAIN	13.00	EACH		$	
3420	14004		W DIRECTIONAL BORE (10 INCH)	174.00	LF		$	
3430	14004		W DIRECTIONAL BORE (12 INCH)	1,082.00	LF		$	

241306

PROPOSAL BID ITEMS

Report Date 2/23/24

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3440	14014		W ENCASEMENT STEEL OPEN CUT RANGE 3 (10.75 INCH)	277.00	LF		$	
3450	14014		W ENCASEMENT STEEL OPEN CUT RANGE 3 (12 INCH)	125.00	LF		$	
3460	14014		W ENCASEMENT STEEL OPEN CUT RANGE 3 (16 INCH)	170.00	LF		$	
3470	14014		W ENCASEMENT STEEL OPEN CUT RANGE 3 (4 INCH)	90.00	LF		$	
3480	14019		W FIRE HYDRANT ASSEMBLY	10.00	EACH		$	
3490	14021		W FIRE HYDRANT REMOVE	1.00	EACH		$	
3500	14036		W PIPE DUCTILE IRON 06 INCH	847.00	LF		$	
3510	14038		W PIPE DUCTILE IRON 10 INCH	84.00	LF		$	
3520	14059		W PIPE PVC 06 INCH	4,576.00	LF		$	
3530	14060		W PIPE PVC 08 INCH	885.00	LF		$	
3540	14061		W PIPE PVC 10 INCH	916.00	LF		$	
3550	14073		W PIPE POLYETHYLENE/PLASTIC SPECIAL (2 INCH)	29.00	LF		$	
3560	14073		W PIPE POLYETHYLENE/PLASTIC SPECIAL (3/4 INCH)	176.00	LF		$	
3570	14080		W SERV PE/PLST LONG SIDE 3/4 IN	1.00	EACH		$	
3580	14084		W SERV PE/PLST SHORT SIDE 2 IN	1.00	EACH		$	
3590	14085		W SERV PE/PLST SHORT SIDE 3/4 IN	17.00	EACH		$	
3600	14086		W SERVICE SPECIAL (2 INCH COPPER SERVICE LINE)	345.00	EACH		$	
3610	14094		W TIE-IN 06 INCH	7.00	EACH		$	
3620	14095		W TIE-IN 08 INCH	2.00	EACH		$	
3630	14096		W TIE-IN 10 INCH	3.00	EACH		$	
3640	14105		W VALVE 06 INCH	10.00	EACH		$	
3650	14106		W VALVE 08 INCH	5.00	EACH		$	
3660	14107		W VALVE 10 INCH	2.00	EACH		$	
3670	14117		W VALVE CUT-IN 06 INCH	2.00	EACH		$	
3680	14144		W LINE MARKER	24.00	EACH		$	
3690	14151		W SERV COPPER SHORT SIDE 2 IN	2.00	EACH		$	
3700	14152		W SERV COPPER SHORT SIDE 3/4 IN	3.00	EACH		$	
3710	14153		W LEAK DETECTION METER	2.00	EACH		$	

Section: 0014 - TRAINEES

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3720	02742		TRAINEE PAYMENT REIMBURSEMENT (GROUP 2, 3 OR 4 OPERATOR)	1,400.00	HOUR		$	

Section: 0015 - DEMOBILIZATION &/OR MOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3730	02568		MOBILIZATION	1.00	LS		$	
3740	02569		DEMOBILIZATION	1.00	LS		$	