CALL NO. 309

CONTRACT ID. 121043

KENTON COUNTY

FED/STATE PROJECT NUMBER FD04 SPP 059 0016-NEWLOC

DESCRIPTION TAYLOR MILL ROAD(KY 16)

WORK TYPE BRIDGE WITH GRADE, DRAIN & SURFACE

PRIMARY COMPLETION DATE 280 WORKING DAYS

LETTING DATE: October 19, 2012

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN DAYLIGHT TIME October 19, 2012. Bids will be publicly announced at 10:00 AM EASTERN DAYLIGHT TIME.

ROAD PLANS

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

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PART I

SCOPE OF WORK

CONTRACT ID - 121043 ADMINISTRATIVE DISTRICT - 06

PROJECT(S) IDENTIFICATION AND DESCRIPTION:

COUNTY - KENTON PCN - DE05900161243
FD04 SPP 059 0016-NEWLOC
TAYLOR MILL ROAD(KY 16) RECONSTRUCT KY 16 FROM SUNBRIGHT DRIVE TO BLACKSTONE COURT.
BRIDGE WITH GRADE, DRAIN & SURFACE. SYP NO. 06-00344.30.
GEOGRAPHIC COORDINATES LATITUDE 38^59'12" LONGITUDE 84^46'12"

COMPLETION DATE(S):
280 WORKING DAYS
APPLIES TO ENTIRE 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 Expedite Bidding Program available on the Internet web site of the Department of Highways, Division of Construction Procurement. (www.transportation.ky.gov/contract)

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 is advised that the Underground Facility Damage Protection Act of 1994, became law January 1, 1995. It is the contractor's responsibility to determine the impact of the act regarding this project, and take all steps necessary to be in compliance with the provision of the act.

SPECIAL NOTE FOR PIPE INSPECTION

Contrary to Section 701.03.08 of the 2012 Standard Specifications for Road and Bridge Construction and Kentucky Method 64-114, certification by the Kentucky Transportation Center for prequalified Contractors to perform laser/video inspection is not required on this contract. It will continue to be a requirement for the Contractor performing any laser/video pipe inspection to be prequalified for this specialized item with the Kentucky Transportation Cabinet-Division of Construction Procurement.

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 fax (502) 564-7299 or 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/contract). The answers provided shall be considered part of this Special Note and, in case of a discrepancy, will govern over all other bidding documents.

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. (See attachment)

09/26/2012

Commonwealth of Kentucky
Finance and Administration Cabinet
OFFICE OF THE SECRETARY
Room 383, Capitol Annex
702 Capital Avenue
Frankfort, KY 40601-3462
(502) 564-4240
Fax (502) 564-6785

Steven L. Beshear
Governor

Lori H. Flanery
Secretary

SECRETARY'S ORDER 11-004

FINANCE AND ADMINISTRATION CABINET

Vendor Document Disclosure

WHEREAS, in order to promote accountability and transparency in governmental operations, the Finance and Administration Cabinet believes that a mechanism should be created which would provide for review and assistance to an Executive Branch agency if said agency cannot obtain access to documents that it deems necessary to conduct a review of the records of a private vendor that holds a contract to provide goods and/or services to the Commonwealth; and

WHEREAS, in order to promote accountability and transparency in governmental operations, the Finance and Administration Cabinet believes that a mechanism should be created which would provide for review and assistance to an Executive Branch agency if said agency cannot obtain access to documents that it deems necessary during the course of an audit, investigation or any other inquiry by an Executive Branch agency that involves the review of documents; and

WHEREAS, KRS 42.014 and KRS 12.270 authorizes the Secretary of the Finance and Administration Cabinet to establish the internal organization and assignment of functions which are not established by statute relating to the Finance and Administration Cabinet; further, KRS Chapter 45A.050 and 45A.230 authorizes the Secretary of the Finance and Administration Cabinet to procure, manage and control all supplies and services that are procured by the Commonwealth and to intervene in controversies among vendors and state agencies; and

NOW, THEREFORE, pursuant to the authority vested in me by KRS 42.014, KRS 12.270, KRS 45A.050, and 45A.230, I, Lori H. Flanery, Secretary of the Finance and Administration Cabinet, do hereby order and direct the following:

I. Upon the request of an Executive Branch agency, the Finance and Administration Cabinet ("FAC") shall formally review any dispute arising where the agency has requested documents from a private vendor that holds a state contract and the vendor has refused access to said documents under a claim that said documents are not directly pertinent or relevant to the agency's inquiry upon which the document request was predicated.

II. Upon the request of an Executive Branch agency, the FAC shall formally review any situation where the agency has requested documents that the agency deems necessary to

conduct audits, investigations or any other formal inquiry where a dispute has arisen as to what documents are necessary to conclude the inquiry.

III. Upon receipt of a request by a state agency pursuant to Sections I & II, the FAC shall consider the request from the Executive Branch agency and the position of the vendor or party opposing the disclosure of the documents, applying any and all relevant law to the facts and circumstances of the matter in controversy. After FAC's review is complete, FAC shall issue a Determination which sets out FAC's position as to what documents and/or records, if any, should be disclosed to the requesting agency. The Determination shall be issued within 30 days of receipt of the request from the agency. This time period may be extended for good cause.

IV. If the Determination concludes that documents are being wrongfully withheld by the private vendor or other party opposing the disclosure from the state agency, the private vendor shall immediately comply with the FAC's Determination. Should the private vendor or other party refuse to comply with FAC's Determination, then the FAC, in concert with the requesting agency, shall effectuate any and all options that it possesses to obtain the documents in question, including, but not limited to, jointly initiating an action in the appropriate court for relief.

V. Any provisions of any prior Order that conflicts with the provisions of this Order shall be deemed null and void.

SPECIAL NOTE FOR RECIPROCAL PREFERENCE

Reciprocal preference to be given by public agencies to resident bidders

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

ASPHALT MIXTURE

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

INCIDENTAL SURFACING

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

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.

Right-of-Way Certification Form

Revised 2/22/11

☐ Federal Funded ☑ Original

☑ State Funded ☐ Re-Certification

This form must be completed and submitted to FHWA with the PS&E package for federal-aid funded Interstate, Appalachia, and Major projects. This form shall also be submitted to FHWA for all federal-aid projects that fall under Conditions No. 2 or 3 outlined elsewhere in this form. When Condition No. 2 or 3 apply, KYTC shall resubmit this ROW Certification prior to construction contract Award. For all other federal-aid projects, this form shall be completed and retained in the KYTC project file.

Date: June 5, 2012

Project Name: KY 16 - Taylor Mill Road
Letting Date:
Project #: FD04 C059 6471401R
County: Kenton
Item #: 6-344.30 & 6-344.40
Federal #:

Description of Project: All Right of Way on these projects was acquired under R/W Item No. 6-344.11

Projects that require NO new or additional right-of-way acquisitions and/or relocations

☐ The proposed transportation improvement will be built within the existing rights-of -way and there are no properties to be acquired, individuals, families, and businesses ("relocatees") to be relocated, or improvements to be removed as a part of this project.

Projects that require new or additional right-of-way acquisitions and/or relocations

■ Per 23 CFR 635.309, the KYTC hereby certify that all relocatees have been relocated to decent, safe, and sanitary housing or that KYTC has made available to relocatees adequate replacement housing in accordance with the provisions of the current FHWA directive(s) covering the administration of the Highway Relocation Assistance Program and that at least one of the following three conditions has been met. (Check those that apply.)

■ **Condition 1.** All necessary rights-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. Fair market value has been paid or deposited with the court.

☐ **Condition 2.** Although all necessary rights-of-way have 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. Trial or appeal of 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. Fair market value has been paid or deposited with the court for most parcels. Fair market value for all pending parcels will be paid or deposited with the court prior to AWARD of construction contract. (See note 1 below.)

Note 1: The KYTC shall re-submit a right-of-way certification form for this project prior to AWARD of all Federal-Aid construction contracts. Award must not to be made until after KYTC has obtained full legal possession and fair market value for all parcels has been paid or deposited with the court and FHWA has concurred in the re-submitted right-of-way certification.

Right-of-Way Certification Form

Revised 2/22/11

☐ **Condition 3.** The acquisition or right of occupancy and use of a few remaining parcels are not complete and/or some parcels still have occupants. However, all remaining occupants have had replacement housing made available to them in accordance with 49 CFR 24.204. The KYTC is hereby requesting authorization to advertise this project for bids and to proceed with bid letting even though the necessary rights-of-way will not be fully acquired, and/or some occupants will not be relocated, and/or the fair market value 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. A full explanation and reason for this request, including identification of each such parcel and dates on which acquisitions, payments, and relocations will be completed, is attached to this certification form for FHWA concurrence. (See note 2.)

Note 2: The KYTC may request authorization on this basis only in unique and unusual circumstances. Proceeding to bid letting shall be the exception and never become the rule. In all cases, the KYTC shall make extraordinary efforts to expedite completion of the acquisition, payment for all affected parcels, and the relocation of all relocatees prior to AWARD of all Federal-Aid construction contracts or force account construction.

Approved: DANIEL R. WHITE (Printed Name) _____ (Signature) Right-of-Way Supervisor

Approved: DAVID L. ORR (Printed Name) _____ 9/25/12 (Signature) KYTC, Director of ROW &Utilities

Approved: _____ (Printed Name) _____ (Signature) FHWA, ROW Officer (when applicable)

Right-of-Way Certification Form

Revised 2/22/11

Date: June 5, 2012

Project Name: KY 16 - Taylor Mill Road
Project #: FD04 C059 6471401R
Item #: 6-344.30 & 6-344.40
Letting Date: _____

County: Kenton
Federal #: _____

This project has 74 total number of parcels to be acquired, and 27 total number of individuals or families to be relocated, as well as 0 total number of businesses to be relocated.

70 Parcels where acquired by a signed fee simple deed and fair market value has been paid

4 Parcels have been acquired by IOJ through condemnation and fair market value has been deposited with the court

_____ Parcels have not been acquired at this time (*explain below for each parcel*)

_____ Parcels have been acquired or have a "right of entry" but fair market value has not been paid or has not been deposited with the court *(explain below for each parcel)*

_____ Relocatees have not been relocated from parcels ____, ____, ____, ____, ____, ____, and ____ *(explain below for each parcel)*

Parcel #	Name/Station	Explanation for delayed acquisition, delayed relocation, or delayed payment of fair market value	Proposed date of payment or of relocation

There are 0 billboards and/or 0 cemeteries involved on this project.

There are 0 water or monitoring wells on parcels ____, ____, ____, ____, and ____. All have been acquired and are the responsibility of the project contractor to close/cap.

Form Effective Date: April 1, 2006
Last Revised: February 22, 2011

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
FD04 059 64714 01U
TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
ITEM NO. 6-344.30

GENERAL PROJECT NOTE ON UTILITY PROTECTION

GENERAL NOTES AND NOTICES RELATIVE TO ALL UTILITIES

The information provided below in these Special Notes for Utility Clearance, Impact on Construction may not be exact nor complete. The information provided is for the contractor's use in planning the execution of the work. It shall be the road contractor's responsibility to verify the completeness and/or accuracy of all such information being furnished.

Flowable Fill Requirement

The road contractor MUST use flowable fill as the backfill media any place gas, water, and sewer lines cross under existing or proposed roadway surfaces. It should also be noted that the cost of the flowable fill shall be incidental to the cost of the gas, water, or sewer line being installed.

Maintenance of Utility Services

All existing gas, water, and sanitary sewer services are to be maintained throughout road construction. Temporary gas, water, and sewer facilities to maintain service are to be provided and paid for by the road contractor as incidental to road construction. No additional compensation will be paid the contractor for temporary work and materials to maintain existing gas, water, and sewer services. **No unauthorized discharge of sewage due to the road contractor's work will be allowed.**

Utility Shutdowns

The contractor shall notify the utility owner(s) of all planned shutdowns of utility mains or utility service to customers at least three business days in advance. Advance notice will allow for customers to be notified by the utility owner. Any unannounced disruption of gas, water, or sanitary sewer services or mains that inconveniences any customer is to be avoided.

Damage to Utilities

Any intentional or accidental disruption of service due to damage to gas, sewer, or water mains caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for the Cabinet to charge liquidated damages in the amount of five thousand dollars per day ($5,000/day) per occurrence against the contractor until such time as the utility main is restored.

Any intentional or accidental disruption of any individual gas, water, or sewer service caused by any of the contractor's operations without three days advance notice to the utility owner shall be cause for the Cabinet to charge liquidated damages in the amount of five hundred dollars per day ($500/day) per occurrence against the contractor until such time as service is restored.

In the case of a main disruption, liquidated damages shall be charged at the main disruption rate only. Liquidated damages shall not be charged in addition for service disruptions when a main disruption is involved.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
FD04 059 64714 01U
TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
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Utility Inspection

The Utility Owners will provide inspection when utility work is being performed by the contractor on their respective utility owner's facilities. It will be the road contractor's responsibility to notify the appropriate utility owner for inspection.

External Utility Permits

Kentucky Division of Water permits for water and sanitary sewer relocation construction were not available before bidding. These items will be distributed at the preconstruction meeting.

Abandoned Utilities

The contractor shall safeload the entire length of all abandoned pipes 6 inches in diameter and larger under proposed pavement and under any existing pavement that is to remain. The contractor shall safeload the entire length of all abandoned pipes 15 inches and larger which will be located outside of proposed pavement but within project limits. Appropriate bid items have been included in the road contract. The safeloading criteria above shall be observed unless otherwise directed by the Section Engineer or his representative.

Utility Phasing

The contractor should be aware that some utilities will need to be relocated first to accommodate the relocation of others. The contractor should review the plans and draw his own conclusions as to the phasing of the work of various utilities. The contractor should pay close attention to the proximity of construction of new facilities when working in the vicinity of existing water mains to prevent blow-outs.

NOTE: DO NOT DISTURB THE FOLLOWING UTILITIES LOCATED WITHIN THE PROJECT DISTURB LIMITS

Not Applicable

The Contractor is fully responsible for protection of all utilities listed above

THE FOLLOWING COMPANIES ARE RELOCATING/ADJUSTING THEIR UTILITIES WITHIN THE PROJECT LIMITS AND WILL BE COMPLETE PRIOR TO CONSTRUCTION

Not Applicable

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
FD04 059 64714 01U
TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
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THE FOLLOWING COMPANIES HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE COMPANY OR THE COMPANY'S SUBCONTRACTOR AND IS TO BE COORDINATED WITH THE ROAD CONTRACT

DUKE ENERGY (ELECTRIC), INSIGHT COMMUNICATIONS (CATV), AND CINCINNATI BELL TELEPHONE overhead utility relocation is not expected to be complete until April 1, 2013. Prior to and after April 1, 2013, working days will not be charged for utility relocation delays that are impacting controlling operations. Once work has begun by the roadway contractor, additional compensation for delay costs, due to utility delays prior to April 1, 2013, will not be considered. The road contractor is expected to cooperate and coordinate with these utility owners until completion of these utility relocations.

The Department will consider submission of a bid as the Contractor's agreement to not make any claims for additional compensation due to delays or other conditions created by the operations or relocation of overhead utilities of Duke Energy, Insight Communications, or Cincinnati Bell Telephone. Working days will not be charged for those days on which work on Duke Energy, Insight Communications, or Cincinnati Bell Telephone facilities causes delays to road work, as provided in the current edition of the KY Standard Specifications for Road and Bridge Construction. Should a difference of opinion arise as to the rights of the Contractor and others working within the limits of, or adjacent to the project, the KYTC Resident Engineer will decide as to the respective rights of the various parties involved in order to assure the completion of the Department's work in general harmony and in a satisfactory manner, and his decision shall be final and binding upon the Contractor.

The contractor shall be aware that there are new utility poles to be placed prior to embankment construction that will be in the embankment area. The contractor may be required to provide small mechanical compaction equipment and hand tools for use to insure compaction of the embankment placed around these poles. The provision and use of this equipment shall be considered incidental to the road contract.

KENTON COUNTY FISCAL COURT has a weather siren located near right of centerline at approximately station 131+25. This siren is to be relocated to 53 feet right of station 126+50. This work should be complete by December 1, 2012.

Overhead utility companies and Kenton Co. Fiscal Court will have performed tree trimming and cutting within the project prior to road contract bidding. These utility companies have been given permission by the Cabinet to leave tree trimmings and cuttings on the ground in the areas from which they come. It will be the road contractor's responsibility to remove all tree trimming and cutting debris left by the utility companies, within proposed and existing right-of-way, and within temporary and permanent easements, as a part of clearing and grubbing. No additional compensation will be considered for the removal of this tree debris.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
FD04 059 64714 01U
TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
ITEM NO. 6-344.30

THE FOLLOWING COMPANIES HAVE FACILITIES TO BE RELOCATED/ADJUSTED BY THE ROAD CONTRACTOR AS INCLUDED IN THIS CONTRACT

NORTHERN KENTUCKY WATER DISTRICT facilities are to be relocated by the road contractor as shown on plans inserted into the roadway plans with specifications contained in the proposal. Alignment changes to proposed water facilities to accommodate unforeseen field conditions are possible. However, it is the responsibility of the roadway contractor to communicate any proposed main alignment changes to the water district inspector and the KYTC Section Engineer or their designated representative prior to actually modifying the proposed main alignment.

SANITATION DISTRICT NO. 1 facilities are to be relocated by the road contractor as shown on plans inserted into the roadway plans with specifications contained in the proposal. Alignment changes to proposed sewer facilities to accommodate unforeseen field conditions are possible. However, it is the responsibility of the roadway contractor to communicate any proposed main alignment changes to the sewer district inspector and the KYTC Section Engineer or their designated representative prior to actually modifying the proposed main alignment.

DUKE ENERGY (GAS) facilities shall be relocated by the road contractor using plans inserted into the grade and drain plans and specifications inserted in the project proposal.

Only those contractors preapproved by the gas company and listed at the end of the gas specifications inserted in the proposal can perform gas relocation construction on this project. The prequalified contractors listed may or may not be prequalified by the Transportation Cabinet. It will be the bidder's responsibility to verify prequalification with the Cabinet. Duke Energy provided this listing. The fact that a contractor is included on this list does not preclude that contractor from having to be prequalified by the Transportation Cabinet.

Alignment changes to proposed gas facilities to accommodate unforeseen field conditions are possible. However, it is the responsibility of the roadway contractor to communicate any proposed gas main alignment changes to the Duke Energy gas inspector and the KYTC Section Engineer or their designated representative prior to actually modifying the proposed gas main alignment.

Contrary to recent practices in District 6, gas prices will not be frozen in this contract, nor will there be a Gas Utility Coordination item included in the contract. Gas work under this contract shall be freely bid by the contractor.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
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TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
ITEM NO. 6-344.30

SPECIAL CAUTION NOTE – PROTECTION OF UTILITIES

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.

BEFORE YOU DIG

The contractor is instructed to call 1-800-752-6007 to reach KY 811, the one-call system for information on the location of existing underground utilities. The call is to be placed a minimum of two (2) and no more than ten (10) business days prior to excavation. The contractor should be aware that owners of underground facilities are not required to be members of the KY 811 one-call Before-U-Dig (BUD) service. The contractor must coordinate excavation with the utility owners, including those whom do not subscribe to KY 811. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area.

Please Note: The information presented in this Utility Note is informational in nature and the information contained herein is not guaranteed.

SPECIAL NOTES FOR UTILITY CLEARANCE

IMPACT ON CONSTRUCTION

KENTON COUNTY
FD04 059 64714 01U
TAYLOR MILL ROAD (KY-16)
FROM SUNBRITE DRIVE TO BLACKSTONE COURT
ITEM NO. 6-344.30

AREA UTILITIES CONTACT LIST

Utility Company/Agency	Contact Name	Contact Information

For utility contact information, contact KYTC District 6 Utility Section

Specifications for Gas Main Replacement within STATE OF KENTUCKY ROAD PROJECTS

Revised for:

KYTC Item 6-344.30

TAYLOR MILL ROAD

Duke Energy Job No.
3303369 Taylor Mill Road Ph. 3

September, 2012

1.0 GENERAL

1.1 Scope of Work

Gas main relocation work required for the proposed Taylor Mill Road Phase 3 project consists of the following work:

- Installing approximately 8,628' of 4" and 8" gas main
- Renewing C-M and M-C services as needed
- Completing 15 tie-ins (Tie-ins to be completed or paid for by Duke Energy)

A Gas Contractor, approved by both Duke Energy and KYTC, shall perform the gas facility relocation work. **The General Contractor, awarded the KYTC road project, shall hire an approved Gas Contractor.** A Duke Energy Inspector will oversee all piping work performed by the Gas Contractor. Transportation Cabinet inspectors will primarily oversee vertical and horizontal placement of the main, all backfill, traffic control work, and record pay quantities for gas work in the road contract in consultation with the gas inspector.

1.2 Acceptable Gas Contractors

Installation of gas facilities on this project is limited to the following seven (7) Gas Contractors due to their pre-qualification for such work with Duke Energy:

1. AMS Construction
2. Henkles & McCoy
3. Miller Pipeline
4. RLA Investments

At the end of these specifications is a phone list for the Duke Energy approved Gas Contractors. Any Duke Energy approved gas contractor intended to be used for gas construction by the prime road contractor must also be pre-qualified with the Kentucky Transportation Cabinet. Any gas contractor desiring to be pre-qualified by the Cabinet may do so by making application to the Cabinet's Division of Contract Procurement by calling 502-564-3500. It shall be the bidder's responsibility to verify a gas contractor's pre-qualifications. **Department of Transportation regulations prohibit any non-qualified contractor from performing any gas main work. This includes, but is not limited to excavation, main lowering, pipe installation, service installation, and back filling.**

1.3 Standards

In addition to these specifications, all facilities must be installed in accordance with the 2007 Advanced Main Replacement Program (AMRP) Specifications, the Duke Energy's Gas Division Specifications (GD-150 Composite), CFR part 192, and all applicable specifications. These General and Technical Provisions shall be made a part of this project contract by reference. Copies are available from Duke Energy. Where the following specifications and those referenced are in conflict, the following specifications shall govern and take precedence.

1.4 Definitions

Where the word "**Engineer**" appears in these specifications or on the gas plans, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet (KYTC) Resident Engineer or his/her designated representative and the Duke Energy Engineer or his/her designated representative jointly. Both Engineers must mutually agree upon all decisions made with regard to the gas line construction. The Transportation Cabinet, Resident Engineer shall make all final decisions in all disputes. The Resident Engineer is ultimately responsible for the engineering supervision of the road contract.

Where the word "**Gas Inspector**" or "Inspector" appears in these specifications or on the gas plans, it shall be understood the "Inspector" is the Duke Energy Gas Inspector or his designated representative.

Where the words "**Resident Engineer**" appears in these specifications or on the gas plans, it shall be understood the "**Resident Engineer**" is the KYTC Resident Engineer or his designated representative.

Where the word "**Road Contractor**" appears in these specifications or on the gas plans, it shall be understood the "**Road Contractor**" is the General Contractor that was awarded the road improvement project by KYTC and that hired the Gas Contractor for the gas replacement work.

Where the word "**Gas Contractor**" appears in these specifications or on the gas plans, it shall be understood the "**Gas Contractor**" is the Duke Energy and KYTC approved contractor hired by the Road Contractor to perform the gas replacement work within the KYTC Road Project.

1.5 Video Taping

Duke Energy recommends that the Gas Contractor videotape every project prior to starting. The video is extremely important in settling disputes with governing agencies.

1.6 Permits & Fees

All permits for the replacement work will be obtained by Duke Energy, and will be provided to the Gas Contractor by the Gas Inspector prior to the start of work. Duke Energy will pay all permit fees except cut/fill fees. Cut/fill fees required for dumpsites will not be paid by Duke Energy except for material dumped for main tie-ins where the Gas Contractor is paid directly by Duke Energy on a time and material (T&M) basis. The Gas Contractor will be responsible for

all tree damage unless the damage was a result of a direct order by the Engineer. Clean up and restoration on all projects must be in compliance with KYTC and local governmental agencies and must be approved by the Duke Energy Inspector. It is the sole responsibility of the Gas Contractor to check with governing agencies for work hour restrictions. No compensation will be given for restricted work hours or crews working at night.

1.7 Training

Duke Energy will require the Gas Contractor to qualify all necessary personnel on polyethylene fusion and mechanical connections. Duke Energy will provide training to the Gas Contractor on the renewal of services by insertion and mechanical, installation of meter sets, turn off, turn on and appliance light up. Gas Contractors will be trained for free on Duke Energy policies associated with spotting unacceptable meter locations and the identification of tin meters and mercury regulators. Only Duke Energy personnel shall handle mercury regulators. Safety procedures, grounding procedures, and a review for sizing services will also be covered in the training.

1.8 Security

Picture ID's are required for all Gas Contractor employees. Gas Contractor personnel are required to show their ID's whenever asked by customers or Duke Energy Personnel.

2.0 MATERIAL

2.1 Duke Energy Supplied Materials

Duke Energy will provide all:

- Steel and polyethylene pipe,
- Steel and polyethylene pipe fittings, flanges, adapters, couplings, etc.
- Valves and valve assemblies,
- Regulators,
- Regulator vaults or enclosures,
- Cathodic protection material,
- Other associated gas pipe materials required for the replacement work.

This job consists of two gas mains being installed parallel to each other. One gas main will be a distribution main operated at 60 psig and will be constructed with 2", 4" and 6" yellow medium density polyethylene (MDPE) pipe. The other gas main will be constructed with 6" and 8" epoxy coated steel, Grade B or stronger, and will be operated at over 100 psig.

2.1.1 Material Delivery and Tracking

Duke Energy supplied material will be delivered, as the Gas Contractor needs it. Material for the entire project will not be delivered all at once. It will be the responsibility of the Gas Contractor to meet the delivery truck, to track material received, and to provide weekly reports showing material received, material used, and material remaining. The material assigned to a specific project is to be used on that project only. All surplus materials, at the end of the project, are to be returned to the storeroom or a credit requisition completed allocating the material to another job. The material must be returned or requisitioned to another job in the same condition that it was received. A certain percentage of waste will be applied to the pipe. All other unaccounted, damaged or material left unprotected will be the responsibility of the Gas Contractor.

Service Material will be delivered to each Gas Contractor yard. Each Gas Contractor will be required to provide an adequate shelter area with shelves to organize all the service material. The Gas Contractor will provide a person to receive material, organize and reorder material as needed.

2.2 Contractor Supplied Materials

The Gas Contractor is required to provide all materials and equipment other than as indicated on the construction drawings that are necessary to construct the project. All welding materials such as welding rods, grinding wheels, clamps, etc is to be provided by the Gas Contractor.

Pipe Bedding
Pipe bedding shall meet the requirements for Pipe Bedding as contained in Kentucky Department of Highways, Standard Specifications for Road and Bridge Construction.

Flowable Fill / Low Strength Mortar Mix
Flowable fill & Low Strength Mortar shall meet the requirements of the Kentucky Department of Highways, Standard Specifications for Road and Bridge Construction. Low Strength Mortar is required as backfill under all existing and proposed KYTC roads.

Surface Restoration Materials (Temporary and Permanent)
All restoration materials shall meet the requirements of the appropriate sections of Kentucky Department of Highways, Standard Specifications for Road and Bridge Construction.

2.3 Contractor Requirements for Coiled MDPE Pipe Delivery & Handling

Pipe trailers will be a requirement for handling coiled pipe. Brecon, Duke Energy's material storage facility, does not have the equipment necessary to deliver 6" coiled pipe to the job site. Duke Energy will make every effort to have the large diameter coils delivered to the Gas Contractors' material holding area at the start of each project. If Duke Energy is unable to make these arrangements, it will be necessary for the Gas Contractor to pick up these large diameter coils at Brecon. Duke Energy will pay the Gas Contractor for pick up and delivery in these cases.

The coil dimensions of the current Performance Pipe (Driscopipe/Plexco) product that the trailer will need to be able to accommodate is:

Pipe Size	Coil Footage	Wt. Per Coil	Min. Coil ID	Max. Coil OD	Width
2"	500'	315 lbs.	51"	78"	13"
3"	315'	422 lbs.	68"	96"	15"
4"	500'	1110 lbs.	68"	94"	41"
6"	500'	2040 lbs.	84"	120"	50"

The capacity of the trailer must be able to accept all current known coil sizes from all major manufacturers of 2", 3", 4" and 6" PE pipe.

2.3.1 Loading System

The trailer will need to have some form of loading mechanism in which the trailer can be field loaded from a Brecon material truck at the job site or loaded at the pipe yard at the Brecon facility. If the trailer does not have a loading mechanism then the Gas Contractor should make provisions to have the necessary equipment available to safely load the coils without damaging the pipe.

2.3.2 Rerounding/Taming equipment

The Trailer shall be equipped with the necessary equipment to re-round the coiled pipe and remove the curvature conditions created in the pipe by the coiling process. There are no definable parameters to the approved straightness, however pipe should be able to lie flat in a

trench when straightening is complete as well as not cause additional stress to pipe when inserting.

3.0 JOINING PIPE

3.1 Welding Steel Pipe

All welds will be made in accordance with Duke Energy's Gas Division welding specifications. The Gas Contractor is responsible for ensuring that the proper Welding Specification is used for the grades and wall thicknesses of pipes being welded together.

Specification No. 501-2	Standard Welding Procedure SA-II-A-II: For Steel Pipe With O.D. from 2 3/8" to, and including 12 ¾ " and wall thickness 0.188" to, but not including 0.250"
Specification No. 501-3	Standard Welding Procedure SA-III-A-III: For Steel Pipe with O.D. greater than 12 ¾ " and wall thickness 0.250" to, but not including 0.344"
Specification No 501-20	Standard welding Procedure SA-F1-A-V: for fillet welds on steel pipe for socket –weld couplings, slip-on flanges, and full encirclement welding sleeves.

All welders must be pre-qualified in accordance with Duke Energy's Gas Division specifications prior to the start of construction. All testing for welders will be in accordance with API Standard 1104, Section 3.3 at the Gas Contractor's cost. The Inspector will visually inspect all welds.

3.2 Joining Plastic Pipe

Butt fusion will be considered the primary method of joining longitudinal sections of MDPE main. Rotary scrapers will be required when joining 4" and larger pipe in the trench. Electro-fusion may be used at the discretion of the Inspector. Electro-fusion couplings are the second choice in joining MDPE pipe. Two couplings are required per Duke Energy Gas Standards when joining directionally drilled pipe.

Bar clamps must be used to secure 2" pipe and larger pipe when joined by electrofusion. Personnel found joining pipe without the proper line up clamps and fusion equipment will lose their fusion cards. **NO SECOND CHANCES WILL BE GIVEN FOR SHORT CUTS TAKEN WHEN JOINING PIPE.**

When installing plastic valves using electrofusion couplings a 3 ft pup-piece of pipe should be fused to the valve prior to electrofusion so that the coupling could be cut-off in case of incomplete/improper fusion.

4.0 GAS MAINS

4.1 Inspection

The road contractor must contact Duke Energy (Chuck Allen 513-287-2588) 1 month prior to the beginning of any gas main work so that Duke Energy can plan for the construction project. Duke Energy will provide a Gas Inspector on all main replacement projects. The Inspector will have multiple projects to cover and will not be on site at all times. No changes to the project drawings shall be made without the joint consent of the Duke Energy Engineer or Gas Inspector AND the KYTC Resident Engineer or his inspector. The Gas Inspector will record the as-built location of the gas main, track the pay and non-pay item quantities, and provide general guidance to the Gas Contractor and assistance to the Resident Engineer. **The Gas Inspector works for Duke Energy and not the Road Contractor.**

4.2 Depth and Location of Main

As of October 27, 2004, KYTC requires that all newly installed underground utilities be buried at a minimum depth of 42" under roadways, ramps, and ditch lines, and 30" in all other areas within state right-of-way.

All mains are to be installed at the depth or elevation, and location specified on the project drawings. No changes to the project drawings shall be made without the joint consent of the Duke Energy Engineer or the Gas Inspector AND the KYTC Resident Engineer or his inspector. The Duke Energy Engineer has designed the proposed gas main location to avoid conflicts with proposed and existing utilities and grades. Changes to the planned alignment without the consent of the Duke Energy Engineer AND KYTC Resident Engineer may result in conflicts with other proposed facilities. **It is the responsibility of the Road Contractor to stake the proposed alignment of the gas mains for the Gas Contractor.** Spreadsheets containing the coordinates (Station and Offset) and top of main elevations of the proposed alignment are attached to end of these specifications.

4.3 Installation Methods

Direct bury is the preferred installation method for the gas main replacement work within the Road Project. Directional drilling of main is an alternative installation method that will be considered by the Duke Energy Engineer AND the KYTC Resident Engineer on a case-by-case basis. The following paragraphs discuss these installation methods.

4.3.1 Direct Bury

The trench shall be excavated to accommodate the minimum specified cover over the main from proposed final grade, the pipe outside diameter, and a minimum of 4 inches of bedding material below the pipe. Where the main is being constructed within proposed ditch lines, across final pavements, and along final roadways, the trench shall be excavated to accommodate a minimum of 48 inches of cover over the main from final grade. The minimum cover shall be increased to 60 inches when crossing streams. Plastic mains crossing State of Kentucky maintained roadways shall be encased in steel pipe of sufficient diameter (see GD-150) to contain the main. The

minimum trench width shall be 24 inches + the outside diameter the gas pipe. The Gas Contractor shall string the pipe along the trench and join the pipe. Services shall be installed with a minimum horizontal separation from the existing service of 12 inches.

Once the pipe has been joined, the contractor shall lift and carefully lower the pipe into the center of the trench. The Gas Contractor is cautioned to handle the pipe carefully so as to minimize damage to the pipe. Additional bedding material shall be placed around the pipe and compacted in equal lifts so as to avoid lateral displacement. Bedding material shall be placed in lifts not to exceed 6 inches compacted depth. Bedding material shall be placed to a level approximately 12 inches above the pipe barrel. Bedding material shall not exceed the approximate 12 inches level over the pipe barrel. The bedding material under, around, and over the pipe shall be compacted using a vibratory compactor.

Once the pipe has been placed, trench excavated material or flowable fill shall be used to backfill the remainder of the trench. Trench excavated material shall be placed in the trench and shall be compacted to 95% maximum standard Proctor density with hand operated equipment. The Gas Contractor may use flowable fill for trench backfill at his cost. **When installing gas mains under existing or proposed KYTC roadways, the contractor must backfill with flowable fill to the subgrade elevation.** The cost of this flowable fill shall be incidental to the gas bid items. Granular material shall not be used as trench backfill.

4.3.2 Directional Drilling

Directional drilling is an accepted method for pipe installation and must comply with all the guidelines set forth in this specification. **The Duke Energy Engineer must approve all directional drilling.** The Gas Contractor must record the location and depth of the directional-drilled gas main at an interval of fifty (50) feet or less. The Gas Contractor shall excavate a test hole at least every 200-feet of bore to verify the location and depth of the drilled gas main.

For all directional-drilled gas main, the location and depth of all sewer laterals shall be determined and documented prior to drilling to insure there is no conflict between the proposed gas main and the existing sewer. A Sewer Lateral Location Plan must be submitted to Duke Energy and approved prior to the Gas Contractor performing any directional drill work; no additional money will be paid for this plan. **The gas contractor must perform a pre and post camera of all sewer lines and laterals.** Acceptable methods for locating the laterals are a camera or by physically uncovering the lateral. The Gas Contractor must install a sewer tag on every sewer clean out. Duke Energy will supply these tags.

4.4 Backfill

Backfill shall be compacted to 95% optimum density throughout the project regardless of location unless otherwise shown in the plans or directed by the Engineer. Granular backfill will not be allowed.

4.4.1 Flowable Fill (Low Strength Mortar Material)

When installing gas mains under existing or proposed roadway pavement, or when shown on the plans, the contractor must backfill with flowable fill to the subgrade elevation.

4.5 Lowering Main in Place

The Gas Contractor shall excavate along existing gas mains and lower the top of the mains in place to the elevations specified on the Gas Plans. The length of trench either side of the point to be lowered, required to ensure stresses are minimized in the pipe after it is lowered, is specified on the Gas Plans. Lowering mains in place shall be accomplished by:

- Excavate trench along both sides the existing main so it transitions down from the bottom of the main at one end of the trench to below the required top of pipe elevation at the point or length to be lowered, and then transitions back up to the bottom of the main at the opposite end of the trench. Excavate the soil from over and under the main as the trench is excavated. Additional trench depth should be excavated to accommodate sand bedding.
- Support the exposed steel mains at a minimum of 50-foot intervals and MDPE mains at a minimum of 100-foot intervals (unless specified otherwise on the plans) using side booms, track-hoes, blocking/skids, or sling supported from a beam or section of pipe placed across the trench width.
- Clean the pipe and visually check line for any damage. The protective coating on steel mains should be jeeped for holidays. Make repairs as needed per Duke Energy standards.
- Bed the bottom of the trench with 6" of sand.
- Lift the pipe using slings and side booms or track-hoes. Remove the pipe supports and lower the main into the trench. Adjust supports before lifting the main so they are not at or near girth welds.
- Check the top of main elevation at the point or over the points to be lowered to see if the top has been lowered to or below the elevation specified.

The lowering of main in place shall only be done by Duke Energy approved Gas Contractors or Duke Energy Crews.

4.6 Damage to Gas Facilities

The Gas Contractor must notify the Duke Energy Inspector whenever gas leaks or any questionable situation is encountered. The Gas Contractor shall not repair any active services or mains that may be damaged during construction.

4.7 Casing Pipe

4.7.1 Casing Under State of Kentucky Roads

All plastic piping placed under existing or proposed State of Kentucky Roads shall be encased in coated steel pipe, unless an exception has been received from KYTC. The top of the casing pipe shall be a minimum of 4 feet below final grade of all roads between opposing roadside ditch

lines. All welded joints shall be water tight and coated. The casing shall be cathodically protected with anodes. The ends of the casing pipe shall be sealed with link seals, foam, or other water resistant material. A test connection and test box shall be located at one end of the casing pipe.

4.7.2 Casing under Railroad Tracks

Agreements between Duke Energy and the Railroad must be signed before any utility work is performed on Railroad property. Railroad crossings require steel mains encased in steel casing if the top of the casing pipe is installed between 5.5 feet and 10 feet below the base of the rails. Un-cased steel mains can be installed if the top of the main is installed below 10 feet from the base of the rails. The Gas Contractor shall follow the terms and conditions outlined in the Crossing Agreement.

Railroad personnel are required to be present at the time of the crossing. The Gas Contractor must notify the Railroad before the crossing. Bored and Jacked installations shall have a borehole diameter essentially the same as the outside diameter of the casing pipe. The top of the casing pipe shall be more than 5.5-feet below the base of the railway rail. The carrier pipe shall be centered in the casing pipe and sealed and vented in accordance with Duke Energy Standards.

4.8 Leak Testing

Leak Testing shall be performed on all newly installed gas main. The contractor must supply all test gauges and the appropriate certification to Duke Energy prior to performing any air leak test on installed piping facilities. The testing equipment must be certified annually and the certification sent to Duke Energy Gas Engineering. The contractor will also be required to have certified purging equipment.

4.9 Hydrostatic Testing

The contractor must supply all labor, equipment, and material to perform and complete the hydrostatic testing of all installed feeder line. Dead weight testers, temperature, and pressure recorders (8" diameter minimum chart size) must be certified for accuracy within the last 6 months of their use date. The contractor will also be required to have certified purging equipment. The minimum test pressure is 750 psi (1.5 x design MAOP) and the preferred test media is water. The maximum test pressure should not exceed 50% of the pipes SMYS. If elevation differences between the low and high spot along a test section are significant, pressure gauges should be placed at these locations to ensure that the minimum test pressure of 750 psi is reached for the entire length of main. The minimum hydrostatic test length is 8-hours. All hydrostatic test waters shall be disposed of in accordance with local and state regulations.

4.10 Gas Main Tie-Ins

The Gas Contractor will be required to complete most tie-ins. However, **Duke Energy reserves the right to perform all tie-ins to the existing gas mains.** On steel mains, tie-ins will require the installation and tapping of TD Williamson fittings. Tie-ins on polyethylene mains will require squeezing off the main and installing the appropriate saddles. Tie-ins on cast-iron mains

will require making appropriate taps for connecting. The Gas Contractor will be required to have the following equipment:

- T D Williamson equipment for 2" through 6" steel mains. The Gas Contractor is not required to purchase 8" and 12" T D Williamson and other pertinent equipment; however, Duke Energy would like the Gas Contractor to own this equipment.
- Squeeze-off equipment for 2-inch through 8-inch polyethylene,
- Stopper bags for 2-inch through 12- inch cast iron.
- 4-inch and smaller guillotine saws,
- Electro-fusion equipment,
- Air Test and Hydrostatic Testing Equipment, and
- Other pertinent equipment necessary to tie in 2-inch through 6-inch steel and polyethylene mains.

It will be the responsibility of the Gas Contractor to meet with the Duke Energy inspector, prior to scheduling any tie in work, to discuss the equipment and personnel necessary to perform the work. Duke Energy will provide pressure crews to assist on tie in and purging activities.

Wipe test are required when performing tie-ins over 4" in diameter. The Gas Contractor must notify the Gas Inspector whenever liquid condensate is visible in the existing mains. The Road Contractor is responsible to provide a space for a roll off box if it is determined that there is PCB contaminated pipe on site. The Gas Contractor is responsible to keep the roll off box covered at all times. Duke Energy will provide the roll off box and dispose of any PCB contaminated pipe found on site.

The Gas Contractor must supply all labor, equipment, and material necessary to abandon mains that are replaced in the road project. This work includes purging, capping, sealing, cutting, or removing and disposing of sections of abandoned main.

Tie-ins on many Duke Energy mains are pressure and/or temperature dependant. Duke Energy will not allow tie-ins to be made on most mains between November 1 and April 30 if the temperature is below 45 degrees Fahrenheit. During this time of year tie-ins will be looked at on a case by case basis by Duke Energy's Gas Control and Pressure Departments to evaluate the feasibility of completing the tie-in.

Any tie-in completed by the gas contractor will be paid for by Duke Energy. Tie-in work will not be included in the road contract.

4.11 Restoration

All gas facility replacement work will likely be performed within the limits of the KYTC Road Project during its active construction by the Road Contractor. **Final restoration of all areas is the responsibility of the Road Contractor**; however, the Gas Contractor may have to perform some restoration to maintain traffic and insure public safety. All areas, which are disturbed during gas main construction, which are outside of road construction limits, shall be replaced in-kind. All restoration shall be performed to the satisfaction of the KYTC Resident Engineer. The

KYTC Resident Engineer shall approve all temporary and permanent restoration materials and their placement. Contractors will be responsible for maintenance of any restoration they install.

5.0 GAS SERVICES

The Gas Contractor will be required to renew customer services from the gas main to the customer's service meter. The service lines are broken into two portions: the main to curb cock portion (M-C) and the curb cock to service meter portion (C-M). The M-C portion of the gas service line is usually contained entirely within road right-of way. The C-M portion of a service line is mostly on private property, but a portion of it may be within road right-of-way. Duke Energy and its contractors are solely responsible for gas work performed outside the road construction limits.

The Gas Contractor is required to complete all associated Job Control Forms (JCF's) with the service work. JCF's must be completed within one day of the completion of the service work. JCF's which are not filled out correctly will be returned to the contractor for correction.

5.1 Main to Curb (M-C) Services

M-C services are broken up between short-side and long-side M-C. M-C short side services are less than 15 feet in length, regardless of the installation conditions. M-C long side services are over 15 feet in length and usually cross under roadways. It is possible to have all long side (crossover) services on a project. The main to curb portion of the service lines must be installed at the depth of the relocated main, this is particularly critical when crossing existing or proposed roads with the long-side piping.

5.2 Curb to Meter (C-M) Services

C-M services that do not pass the required pressure test or services that are metallic (steel or copper) will be renewed. The renewal work shall include turning on and off the services, separating existing facilities for testing, excavating, air testing, rebuilding of the meter set, setting a new meter bracket, replacing the meter as required, and re-lighting the customer appliances. Renewed C-M service lines shall be installed at a minimum depth of 18 inches on customer owned property.

Existing polyethylene services shall be reconnected to the new mains if it passes testing. The Gas Contractor will be required to turn off and to re-light customer appliances in accordance with the planned service replacement work and the Duke Energy approved procedures. The Gas Contractor shall red tag all customer bad appliances and notify the Gas Inspector of the problem. Duke Energy will deal with the customer. Contact the gas inspector whenever anything unacceptable is found.

Conversion projects where gas services must be converted from standard pressure to intermediate or high pressure will require the installation of regulators and vent piping. The Gas Contractor must make arrangements with the Gas Inspector to Leak Survey every C-M service

the same day it is installed. All service holes outside the pavement area are to be covered with ¾" plywood and flasher barricade.

The Gas Contractor will be required to replace tin meters and mercury regulators associated with the renewal of curb to meter services. This replacement cost must be included in the curb to meter renewal unit price. Duke Energy will train Gas Contractors for free on the policies associated with spotting unacceptable meter and house service line locations and the identification of tin meters and mercury regulators. Only Duke Energy personnel shall handle mercury regulators. If the household service lines or meters are found in an unacceptable location, the meters may be relocated to the outside.

6.0 DESCRIPTION OF PAY ITEMS

This section describes the gas utility pay items for this project. Pay items are broken up in to two categories:

1.) Pay items billed to the Road Contractor; and
2.) Pay items billed to Duke Energy directly.

6.1 Pay Items Billed to the Road Contractor

The Gas Contractor shall invoice the Road Contractor for all contracted pay items under **Section 7.1** according to the actual units installed. **The Road Contractor shall pay the Gas Contractor for any work performed at the Road Contractor's request that is outside the items contracted with the Road Contractor and that was not pre-approved by Duke Energy and the Cabinet; Duke Energy shall not be billed for this work.** The Road Contractor shall pay the Gas Contractor for actual quantities installed and not for those estimated on the bid sheet. The Road Contractor shall be reimbursed by KYTC. KYTC will bill Duke Energy for the gas facility work after the entire Road Project is completed.

6.1.1 Length of Gas Main Installed

The length of gas main will be **paid on a linear foot or meter basis** based on the type and size of pipe installed. Payment will only be made for main that has been placed into service. Each size pipe shall be measured along the centerline of the pipe through fittings and casements from end to end. Where the pipe changes size, the particular size pipe shall be measured to the center of the transition fitting. No payment will be made for temporary offsets. **No additional payment will be made for rock excavation or extra depth; bidders must draw their own conclusions as to the subsurface conditions to be encountered.**

This item shall include all costs for labor, equipment, and materials (besides pipe and fittings) necessary to install the gas main. Installation of gas main shall include costs for the following:

- Mobilization,
- Saw cutting pavement,
- Traffic Control (flag-persons, arrow-boards, signs, plates, etc). Gas Contractors should be able to take advantage of the Road Contractors Traffic Control.
- Excavating the trench to the proper depth and width or drilling **in rock or soil**,
- Removal and disposal of spoil,
- Bores required to install 6-inch and smaller mains,
- Stringing the pipe along trench,
- Fusing or welding the pipe,
- Test welds or fusions,
- Sand bedding material,
- Flowable Fill or Low Strength Mortar backfill under existing and proposed roads and as required,
- Bedding the pipe,
- Lifting the joined pipe into trench,

- Coating welds and couplings,
- Excavation for utility location, including test holes,
- Installing tracer wire and test boxes,
- Installing anodes and test boxes,
- Backfilling the trench,
- Air testing,
- All temporary restoration
- All final restoration outside the disturbed road limits (including seed) as required in accordance with the plans and specifications.

No additional payments will be made for restoration and backfill if mains are directional drilled instead of direct buried.

6.1.2 Lower Main In Place

Gas mains lowered in place will be **paid on a linear foot or meter basis** of excavated trench per the size of pipe to be lowered. If service lines have to be relocated for the lowering, they will be paid for under the appropriate bid item. **No additional payment will be made for rock excavation, flowable fill, or extra depth.**

6.1.3 Boring – No Casing

This unit will be **paid on a linear foot or meter basis** for bores required to install 8 inch and larger steel main. The cost for bores required to install 6-inch and smaller mains must be included in the main installation unit price. This unit shall be reported for payment by size of the pipe installed in the bore regardless of the size of the bore and shall include all costs associated with completing the bore as well as setting up the bore machine. The cost of installing the gas main in the bore is in addition to the cost of the actual bore and should be reported for payment under length of gas main installed.

6.1.4 Boring With Steel Casing

This unit will be **paid on a linear foot or meter basis** for the size of the casing installed in the bore regardless of the size of the bore and shall include joining, excavation, the installation of all insulators, seals and vents in accordance with Engineering Standard 2.12.1. The Gas Contractor shall be paid for installing the gas main in the casing on a linear foot or meter basis per type and size of main in addition to the length of casing installed. No additional payment will be made for boring through rock.

6.1.5 Steel Casing – No Bore (Open Cut)

This unit will be **paid on a linear foot or meter basis** for the size of the casing installed in the trench. This work shall include joining the casing pipe, coating welds, installing anodes, installing test connections and test boxes, and sealing ends around carrier pipe. The Gas Contractor shall be paid for installing the gas main in the casing on a linear foot or meter basis per type and size of main in addition to the length of casing installed.

6.1.6 Valve Assembly

Valve assemblies will be **paid for on a lump sum basis** for the type and size of valve installed. The unit price for each valve installation includes setting the valve box to proper grade and the installation of pressure stems in accordance with the appropriate standard. For steel valves, the cost of welding the companion flanges, bolting the valve to the companion flange or welding the valve directly onto the line is included in the valve installation unit.

When installing plastic valves using electrofusion couplings a 3 ft pup-piece of pipe should be fused to the valve prior to electrofusion so that the coupling could be cut-off in case of incomplete/improper fusion.

6.1.7 Main Tie-Ins

Main tie-ins will be **paid on a lump sum basis** based on the size and type of main. The lump sum costs shall include:

- All time associated with separating the existing facilities and reconnecting to the new main,
- Preparation of any and all by-pass requirements,
- Installation of fittings, such as TD Williamson,
- Excavation, without regard to the classification of the materials.
- Preparing cast iron mains by installing appropriate saddles and making appropriate taps in accordance with standards,
- Abandonment of the existing facilities to include purge and sealing the main ends in accordance with standards,
- Transportation and cleaning of the T D Williamson equipment,
- Traffic Control (Flag-persons, arrow- boards, signs, and plates). Gas Contractors should be able to take advantage of the Road Contractors Traffic Control.
- Backfill material including Low Strength Mortar as required
- Surface restoration

Duke Energy reserves the right to allocate work to company personnel at any time to provide assistance with the tie-ins to insure completion in a timely manner.

6.1.8 Services - Main to Curb (M-C) Short Side & Long Side

Main to Curb (M-C) service work shall be **paid on a lump sum basis**. This item shall include all labor, equipment, and materials, necessary to install the gas service. This bid item includes installing 4 inch x 1 inch plastic stab tee, 1 inch plastic cap (at tee and end of service), plastic curb box (bottom and top), curb box lid, and necessary 1 inch plastic pipe with tracer wire. This item also includes air testing service and tapping tee. Services shall be installed with a 12-inch horizontal separation from the existing service.

M-C service work shall include all costs for the Gas Contractor's completion of all associated paperwork (JCF's, etc). Any temporary or permanent hard or soft surface restoration required for main to curb or curb to meter service installations outside the limits of road construction shall

be considered incidental to the contract. No separate payment shall be made for restoration outside the limits of road construction. The Gas Inspector must be notified after a failed service line has been repaired so a record of the event can be logged and the inspector can verify that the repair was adequate.

6.1.9 Gas Facility Coordination

A bid item has been established in the road contract for "Gas Utility Coordination" which can be freely **bid by the Road Contractor**; this is not a bid item for the Gas Contractor. KYTC will pay the Road Contractor this bid amount **for coordinating the gas facility work within the Road Project**.

KYTC and Duke Energy have established unit prices for gas facility items listed in the Road Project Bid. These are the unit prices that Duke Energy agrees to pay KYTC and KYTC will use to pay the Road Contractor for actual quantities installed by the Gas Contractor. The Road Contractor may likely want to pay the Gas Contractor according to these negotiated rates; however, it is not required. The Road Contractor may pay the Gas Contractor at whatever unit price is negotiated between them (either higher or lower than the preset unit price).

6.2 Pay Items Billed to Duke Energy

The Gas Contractor shall invoice Duke Energy directly for all work, requested by Duke Energy, not included in the road contract including all tie-ins, Curb to Meter service renewal related work and any additional work determined necessary by the Duke Energy Engineer. The Gas Contractor will be paid for, if possible, according to the current calendar years negotiated rates submitted for the Accelerated Main Replacement Program (AMRP).

The Gas Contractor shall only bill one project per invoice; do not send two or more projects on one invoice. The Gas Contractor shall not add any items to the pay sheets after the Gas Inspector has signed them. Additional pay items shall be placed on a separate pay sheet and signed by the Duke Energy Inspector.

The Road Contractor shall pay the Gas Contractor for any work performed at the Road Contractor's request that is outside the items contracted with the Road Contractor and that was not pre-approved by Duke Energy and the Cabinet; Duke Energy shall not be billed for this work.

6.2.1 Services - Curb to Meter (C-M)

Curb to Meter service renewal will be **paid on a lump sum basis** by line size (1" or 1-1/4", 2", 3", 4", etc) and type of installation (direct bury, drill, or insertion). The curb to meter price shall apply to a service up to seventy (70) feet. Any footage required over 70 feet will be paid at the price of $ 7.00 per foot (excluding insertions). Payment for curb to meter services will be made when they are placed into service and the restoration and appropriate paperwork is complete on a street.

C-M service work shall include all costs for the Gas Contractor's completion of all associated paperwork (JCF's, etc). Any temporary or permanent hard or soft surface restoration required for main to curb or curb to meter service installations outside the limits of road construction shall be considered incidental to the contract. No separate payment shall be made for restoration outside the limits of road construction. The Gas Inspector must be notified after a failed service line has been repaired so a record of the event can be logged and the inspector can verify that the repair was adequate.

6.2.2 Test & Re-Light

Test & Re-Light work will be **paid on a lump sum basis** for polyethylene C-M service lines that pass the required pressure test. The Test & Re-Light work includes turning on and off the gas service, separating existing facilities for testing, air testing, re-connecting the meter set, and re-lighting the customer appliances.

If flexible risers are encountered, they will be replaced at the test and relight unit price plus an agreed unit price of $75.00 for each additional hole excavated. If additional holes are necessary, they shall be added to the road contract by change order at the agreed unit price of $75 each.

Duke Energy may also arrange for direct payment to the contractor for additional holes in lieu of a change to the road contract.

6.2.3 Meter Relocation

The cost to move meters from an unacceptable location shall be included in the C-M service unit cost; no additional payment will be made. Any house-line piping that must be relocated will be negotiated and paid for directly to the Gas Contractor by Duke Energy on a time and material basis. In the case where the meter is in an acceptable location and the customer asks the Gas Contractor to relocate the meter outside, the Gas Contractor must negotiate a price with the customer for any house line piping that must be relocated.

When moving remote meters to the outside, the Contractor must reuse the existing meter, re-attach the remote reader and verify that reads of the meter and the remote are the same. When moving meters outside make sure to replace a non-temperature compensated meter with a temperature compensated meter.

6.2.4 Pressure Conversion Projects

Replacement projects where gas services must be converted from standard pressure to intermediate or high pressure will require the installation of regulators and vent piping. The installation of regulator vent piping will be paid on an agreed pre-set lump sum price of $55.00 for piping up to 10-feet in length and be paid on an agreed pre-set linear foot or meterage price of $2.50 per foot for lengths over ten feet . Any additional holes will be paid at an agreed pre-set price of $75.00 each.

6.2.5 Large C-M Service Reconnection to M-C

The reconnection of polyethylene or coated steel C-M services 2" and larger to the M-C portion of the service line will be negotiated and paid for directly by Duke Energy on an hourly basis.

7.0 INVOICING

It is the Gas Contractor's responsibility to know how, by whom, and for what he is being paid.

The Gas Contractor shall invoice the Road Contractor for all work performed to complete items listed under **Section 7.1** and for any extra work negotiated with the Road Contractor. The Road Contractor then invoices KYTC for this work. The Gas Contractor shall talk to the Resident Engineer if the Road Contractor is behind in paying the invoices.

The Gas Contractor shall invoice Duke Energy for all work performed to complete items not included in the road contract and for any extra items (contract addendums) directly negotiated and intended to be paid by Duke Energy. These invoices shall be sent to: Duke Energy at 139 E. 4th Street, Room 460A, Cincinnati, OH, 45201, to the attention of the sponsoring engineer. These addendum items should not be invoiced with items that were bid.

7.1 Weekly Pay Sheets

The Gas Contractor must **meet** with the Duke Energy Inspector and the Resident Engineer or inspector on a **weekly basis** to sign off on all pay sheets (preferably Friday evening or Monday morning). The pay sheets must describe all T&M work and break out the costs according to the appropriate Duke Energy work code. The daily sheets should clearly identify the start and stop times for the T&M on each date along with the inspector's signature for approval on that date.

Duke Energy Pre-qualified Gas Contractor Phone Numbers (REVISED 9/4/2012)

AMS Construction - 8915 Blue Ash Road, Cincinnati Ohio 45242
Phone- 513-794-0410 Fax: 513-794-0414
Owner: Kim Stephenson, Cell Phone - 513-503-9370

Henkels & McCoy Inc. - 13338 E. Broad Street , Rt 16, Pataskala, OH 43062
Office: 740-927-1737ext#24 FAX: 740-927-9632

Miller Pipeline - 4990 Scioto Darby Road, Hilliard Ohio 43026
Office: 1-614-777-8377 Fax: 614-777-4224
Contact: Steve Ferrell, Cell Phone - 1-614-270-6048

RLA Investments – 603 Sheperd Lane, Cincinnati, Ohio 45215
Office: 513-554-1469 Fax: 513-554-1221
Contact: Scott Moody, Cell Phone – 513-623-4258

Water Specifications

Section I

DESCRIPTION OF BID ITEMS

1. DUCTILE IRON PIPE (ALL SIZES) Includes the specified pipe, tracing wire with test boxes, polyethylene wrap, labor, equipment, excavation, bedding, restoration, disinfection, testing, backfill, etc. required to install the specified pipe at the location 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. Paid LINEAR FEET (LF)

2. RESTRAINED JOINT DUCTILE IRON PIPE (ALL SIZES) Includes the specified pipe, pipe gaskets that develop a wedging action between pairs of high-strength stainless steel elements spaced around the gasket and shall meet the material requirements of ANSI/AWWA C111/A21.11 (Field Lok®, Field Lok 350®, Fast-Grip® or approved equal) (restrained joints shall be capable of withstanding a maximum joint pressure of 250 psi. unless otherwise noted) .tracing wire with test boxes, polyethylene wrap, labor, equipment, excavation, bedding, restoration, disinfection, testing, backfill, etc. required to install the specified pipe at the location 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. Paid LINEAR FEET (LF).

3. TEES, ANCHORING TEES, BENDS, CROSSES, REDUCERS, AND INCREASERS (ALL SIZES) Includes the specified ductile iron mechanical joint fitting, polyethylene wrap, labor, equipment, excavation, blocking, anchoring, disinfection, backfill, restoration, etc. to install the specified fitting at the locations shown on the plans in accordance with the specifications and standard drawing complete and ready for use. If a restrained joint system is required on the plans, bends, tees, etc. shall be restrained with an approved restraint device system which shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C110/A21.10 (Megalug Series 1100®, MJ Field Lok® or approved equal) Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings. Restrained joints shall be capable of withstanding a maximum joint pressure of 250 psi. unless otherwise noted. Paid EACH (EA) when complete.

4. VALVES (ALL SIZES) Includes the specified resilient seat gate valve for valve sizes of 12" and smaller, and butterfly valves for larger valves, 250 psi working pressure, polyethylene wrap, labor, equipment, excavation, anchoring (if any), valve box and valve stem extensions, backfill, 2'x2'x4" concrete pad (if outside paved or concrete areas), 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 DIP is restrained, valves shall be restrained using mechanical joint restraint devices consisting of multiple gripping wedges incorporated into a follower gland compatible with all mechanical joints (Megalug Series 1100®, MJ Field Lok® or approved equal) Paid EACH (EA) when complete.

4. COPPER SERVICE (ALL SIZES and TYPES) Includes the specified copper service, labor, equipment, excavation, backfill, testing, disinfection, and restoration to install the pipe 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 or for bedding required in rock excavation. Paid LINEAR FEET (LF)

5. RECONNECT TO SERVICE or CONNECT COPPER SERVICE TO SERVICE LINE (ALL SIZES) Includes all labor and materials, including fittings and bends necessary to connect new service line to existing service line. Paid EACH (EA) when complete.

6. RELOCATE WATER METERS (ALL SIZES) Includes all labor, equipment, excavation, materials, 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 required new service pipe will be paid under separate bid items. Paid EACH (EA) when complete.

7. RECONNECT TO MAIN or CONNECT COPPER SERVICE TO MAIN (ALL SIZES) Includes all labor and materials, including fittings, bends, valves, tracing wire jumper necessary to connect service line to the water main. Where the reconnect is made to an existing main this item includes reusing the existing service tap or abandoning the existing service tap by shutting off the curbstop at the existing main and disconnecting the copper service which is being abandoned. Paid EACH (EA) when complete.

8. ADJUST WATER METER TO GRADE Include 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. Paid EACH (EA) when complete.

9. TIE-IN TO (ALSO, CONNECT TO) EXISTING MAIN (ALL SIZES) Includes all labor, equipment, excavation, fittings, sleeves, couplings, blocking, anchoring, restoration, disinfection, testing and backfill required to make the 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 and shall be measured thru tie-in fittings. Paid EACH (EA) when complete.

10. ADJUST FIRE HYDRANT TO GRADE 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 Northern Kentucky Water District's Inspector to inspect the existing fire hydrant prior to adjusting, returning unusable fire hydrants to the Northern Kentucky Water District Warehouse and picking up a replacement hydrant and piping for use if the existing fire hydrant is determined unfit for adjustment. If it is determined by the Northern Kentucky Water District that the existing hydrant is unfit for adjustment the District will supply the hydrant and piping necessary to make adjustment. The Contractor shall furnish the equipment, labor and materials (other than fire hydrant and piping) to install the hydrant, piping, 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. No additional payment will be made for rock excavation. Paid EACH (EA) when complete.

11. AIR RELEASE VALVES (ALL SIZES) This item shall include the air release valve, copper service line, manhole and lid, 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. Paid EACH (EA) when complete.

12. FIRE HYDRANT ASSEMBLY Includes all labor, equipment, excavation, materials and backfill to install fire hydrant. The Contractor will supply and install all anchor couplings, bends, fire hydrant extension, concrete blocking, restoration, granular drainage material, etc, needed to install the fire hydrant complete and ready for use as shown on the plans, and in accordance with the specifications and standard drawings. No additional payment will be made for rock excavation. Paid EACH (EA) when complete.

13. RELOCATE FIRE HYDRANT: Includes allowing for Northern Kentucky Water District's Inspector to inspect the existing fire hydrant prior to reuse, returning unusable fire hydrants to the Northern Kentucky Water District Warehouse and picking up a replacement hydrant for use if the existing fire hydrant is determined unfit for reuse. Includes all labor, equipment, excavation, materials and backfill to relocate existing fire hydrant to valve, pipe, and anchoring tee as indicated on plans and on standard drawings contained in the plans. The pipe, valve and anchoring tee shall be paid under separate bid items when required. The Contractor to supply and install all anchoring couplings, fire hydrant extensions, concrete blocking, restoration, granular drainage material, etc, needed to install the fire hydrant complete and ready for use as shown on the plans, and in accordance with the specifications and standard drawings. No additional payment will be made for rock excavation. Paid EACH (EA) when complete.

14. REMOVE FIRE HYDRANT Includes all labor, equipment, excavation, backfill, restoration, materials, etc. required to remove the existing fire hydrants as shown on the plans, and in accordance with the specifications and standard drawings of the Northern Kentucky Water District. All removed fire hydrants which are not reused, shall be returned the NKWD. Paid EACH (EA) when complete.

15. PLUG AND BLOCK (ALL SIZES) This item shall include the specified plug and any labor, equipment, excavation, concrete, backfill and restoration required to install the plug and blocking at the location shown on the plans or as directed in accordance with the specifications. Paid EACH (EA) when complete.

16. ADJUST AIR RELEASE VALVE TO GRADE (ALL SIZES) Includes all labor, equipment, excavation, additional fittings, piping, couplings, meter box, disinfection, testing, restoration, etc. to adjust the existing air release valve (whatever size exists), etc. from its old location to proper grade as shown on the plans or as directed, in accordance with the specifications and standard drawings complete and ready for use. Paid EACH (EA) when complete

17. ADJUST WATER VALVE BOX TO GRADE Includes all labor, equipment, valve box and valve stem extensions (if required), excavation, backfill, 2'x2'x4" concrete pad, restoration, etc. to adjust the top of the box to finished grade complete and ready for use. Paid EACH (EA) when complete.

18. FLUSHING DEVICE (ALL SIZES) This item shall include the flushing device assembly, copper service line, meter vault and lid, tapping the main, labor, equipment, excavation, proper 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 of the Northern Kentucky Water District, complete and ready for use.. Paid EACH (EA) when complete.

19. WATER METER 2" (Temporary) Includes all labor, equipment, excavation, materials, additional fittings, disinfection, testing, restoration, etc. to install a temporary 2" meter setting at the location shown on the plans or as directed, in accordance with the specifications and standard drawings complete and ready for use. This work includes installing bypass piping around the existing meter vault, removal of the existing meter from the existing meter vault, installation of a temporary meter setting including the removed meter, 30"' meter crock, custom setter, connections to existing service lines, etc. Paid EACH (EA) when complete

Section II
GENERAL INSTRUCTIONS AND SPECIAL NOTES

1. WATER SHUTDOWNS The Contractor after approval by the NKWD's representative shall notify all affected NKWD's customers a minimum of 48 hours prior to interrupting water service. Notification shall be made by the Contractor using the Northern Kentucky Water District "Interruption of Service Notice". All NKWD's customers shall be notified prior to having their water turned-off to have ample time to draw water for use until service is restored. Under no circumstance shall a customer of the NKWD be without water service overnight. Commercial customers may have additional requirement such as temporary water feed, special shut-down times, etc. If water service or existing water system cannot be interrupt during normal daytime hours due to water needs or high demands, the contractor may be required to conduct the work at night or on the weekend. This work is considered an incidental to the project. No active water main shall be shut down without prior approval of Northern Kentucky Water District. Tie-ins on this project may have to be scheduled at night, on weekends or other off peak hours.

2. 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 affected utilities, whether shown on the plans or not, prior to excavation and 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.

3. STATIONS AND DISTANCES All stations and distances indicated in the plans or specifications are approximate, therefore, some minor adjustment may have to be made during construction to fit actual field conditions.

4. FIRE HYDRANT DISCONNECTION No fire hydrant shall be removed from service without prior approval of Northern Kentucky Water District, and the proper fire authority.

5. RESIDENT ENGINEER "Resident Engineer" as referred to in the specifications or in the plans shall mean the Kentucky Department of Highways Engineer in charge of the project and his inspectors.

6. WATER MAIN INSPECTION Northern Kentucky Water District and their inspectors, and the resident engineer and his inspectors shall be jointly responsible for inspection of water line facilities installation. Where the phrase "as directed" appears in these specifications without defining who is doing the directing, it shall be understood "as directed" means jointly directed by the Resident Engineer and Northern Kentucky Water District

7. PRIOR INSPECTION OF EXISTING METER SETTINGS The Contractor with the Northern Kentucky Water District's inspector shall make an inspection of all meter settings to adjusted or relocated prior to construction. Any meter setting not up to Northern Kentucky Water District standard shall be noted and parts furnished to the Contractor by the Northern Kentucky Water District for installation as needed. Any water meter setting, fire hydrant or any other water facilities that are to be relocated, adjusted, reused or remain and are damaged by the Contractor shall be repaired at the contractors expense. Any old water meter settings removed and not reused shall be turned over to the Northern Kentucky Water District.

8. SPECIAL BACKFILL NOTE No sand or granular material shall be used for backfill above 12" over the top of the pipe or around structures. Only compacted soil or flowable fill shall be used unless approved or otherwise directed by the Resident Engineer. Flowable Fill is required under existing and proposed pavement.

9. GENERAL SAFETY For the security and safety of people in and adjacent to trenches or construction operations, the "Manual of Accident Prevention in Construction" published by the Associated General Contractors Association of America, the "Manual On Uniform Traffic Control Devices" published by the Federal Highway Administration, and the safety regulations of the appropriate state and local agencies shall be followed when specifically applicable, or by similarity of operation or as necessary for adequate protection.

10. MATERIAL HANDLING Pipe, fittings, valves, hydrants, and accessories shall be loaded, unloaded, and handled by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against other pipe.

11. PROTECTION OF PAVEMENT Where main construction is located in or adjacent to pavements, all construction equipment shall have rubber tires. Crawler equipment will be permitted when there is no danger of damaging pavement.

12. NOISE, DUST AND ODOR CONTROL The Contractors construction activities shall b conducted so as to eliminate all unnecessary noise, dust, and odors. The use of oil or other materials, for dust control, which may cause tracking will not be permitted.

13. EXCAVATION AND CONSTRUCTION MATERIALS All excavated material and all construction materials in prosecution of the work shall be deposited so as not to endanger the work, create unnecessary annoyance to the public, or interfere with natural drainage courses. During the course of the work, all material piles shall be kept trimmed up and maintained in a neat, workmanlike manner. All material piles shall be kept a reasonable distance away from roadways so as not to cause a hazard and block the motorists view.

14. PROTECTION OF TREES, SHRUBS, AND OTHER ITEMS TO REMAIN Special care shall be taken by the Contractor to avoid unnecessary damage to trees or shrubs and their root systems or any other items shown to remain. Should the Contractor do unnecessary damage to any item shown to remain, the item shall be repaired or replaced at the contractors expense. Should unnecessary damage be caused to items to remain and is determined not repairable, the Contractor shall compensate the owner for the loss if any.

15. UNACCEPTABLE EXCAVATED TRENCH MATERIAL Any excavated trench material which is determined unacceptable for backfill shall be removed from the area and wasted at a location acquired by the Contractor and approved by the Resident Engineer. Acceptable backfill material shall be acquired by the Contractor at a location approved by the Resident Engineer. The disposition and handling of unacceptable material and the acquisition and handling of acceptable material shall be at the Contractors expense.

16. BLASTING ROCK No blasting of rock shall be performed without specific permission of the Resident Engineer. Blasts shall be properly covered and all utilities and structures in the area shall be properly protected. Warning shall be given to all persons in the area who could be affected by the blasting. Blasting shall be at the risk of the Contractor who shall be liable for all damages to persons or property caused by the blasting. All blasting shall be

performed in accordance with all regulations of the Kentucky Department of Mines and Minerals and all other governing agencies having jurisdiction. The Kentucky Department of Mines and Minerals, area emergency response agencies, utility companies with utilities in the area shall be notified of the blasting sufficiently in advance.

17. ABANDONED VALVES The valve boxes shall be removed from all abandoned valves prior to final roadway paving. This shall be done to the satisfaction of the Engineer. Paving over a valve box without removing same will not be acceptable. No separate payment will be made for removal of valve boxes but shall be considered incidental to water line construction.

18. SALVAGED AND STOCKPILED ITEMS The Contractor shall salvage all items in a workmanlike manner. Any item damaged by the Contractor thru negligence shall be replaced with new items at the contractors expense. All salvaged items to be stockpiled and picked up by NKWD, shall be stored in a safe place until pickup. The Contractor is to notify NKWD at 859-578-9898 when salvaged items are available for pickup.

20. CONSTRUCTION PROCEDURE The successful contractor to prepare construction procedure with respect to the installation of water utilities. The Sequence and Procedure of Water Utilities Construction shall be approved by the Northern Kentucky Water District's Engineering Department prior to the beginning of the water utilities relocations.

Section III
MATERIAL SPECIFICATIONS

1. CONCRETE All concrete shall be Class A in accordance with KYDOH Standard Specs. for Road and Bridge Construction current edition and shall be placed in accordance with same unless otherwise noted. The concrete shall be placed to the dimensions as required in the plans or specifications. Reinforcing steel shall be placed in the concrete as required in the plans or specifications.

2. CONCRETE REINFORCING STEEL All reinforcing steel shall be Grade 40. The size, location, placement, and quantity shall be as required in the plans or specifications.

3. WATER MAIN

   A. **DUCTILE IRON PIPE**. Ductile iron pipe shall meet the requirements of ANSI A21.51 (AWWA C151)

      1. Material. The chemical constituents shall meet the physical property recommendations of ASTM A536 to ensure that the iron is suitable for satisfactory drilling and cutting.

      2. Minimum Thickness. Unless otherwise shown on the plans, the minimum thickness of the barrel of the pipe shall be Class 50. All pipe shall be clearly marked as to class by the manufacturer.

      3. Coating and Lining. The pipe shall be coated outside with a bituminous coating in accordance with ANSI A 21.51 (AWWA C151) and lined inside with cement mortar and seal coated in accordance with ANSI A21.4 (AWWA- C104).

      4. Fittings & Glands. Fittings and glands shall be ductile iron as specified in Section 3A, "Ductile Iron Fittings".

      5. Polyethylene Encasement. Ductile Iron Pipe shall be encased with Polyethylene film conforming to ANSI A21.5 (AWWA C105)

      6. Tracing Wire - All pipe shall be installed with a 12 gauge solid copper (P.V.C coated) tracing wire taped to the top of the pipe every 5'. Maximum tracing wire length shall be 500' without terminating in a curb stop box. Water main installations that stop short of the permanent fire hydrant tee, the tracing wire shall be terminated in a curb stop box. Splices in the tracing wire shall be kept to minimum and approved by the District. If splices are required, they shall be made with copper split bolt (Ilsco #IK-8 or approved equal) and taped with electrical tape. Should the new pipe be fitted to an existing pipe without a tracing wire, the tracing wire shall be terminated in a curb stop box at the point where the transition is made. Curb stop boxes shall not be located in pavement.

   B. **PIPE JOINTS**

      1. Push on and Mechanical. - Push-on and mechanical joints including accessories shall conform to ANSI A21.11 (AWWA-C111). Bolts shall be high strength COR-

10 tee head with hex nuts. The maximum deflection at push-on joints and/or mechanical joints shall be 5 degrees or as recommended by the Manufacturer.

2. Flanged. - Flanged joints shall meet the requirements of ANSI A21.15 (AWWA C115) or ANSI B16.1

   a. Gaskets. All flanged joints shall be furnished with 1/16 inch thick full face red rubber.
   b. Bolts. Bolts shall have American Standard heavy unfinished hexagonal head and nut dimensions all a specified in ANSI B18.2. For bolts of 1-3/4 inches in diameter and larger, bolt studs with a nut on each end are recommended. Material for bolts and nuts shall conform to ASTM A307, Grade B.

3. Restrained. - If restrained joint system is required on the plans, all pipes, bends, valves, etc. shall be restrained. Special restrained pipe gaskets which develop a wedging action between pairs of high-strength stainless steel elements spaced around the gasket (Field Lok®, Fast-Grip® or approved equal gaskets). Specified ductile iron mechanical joint fitting shall be restrained using mechanical joint restraint devices consisting of multiple gripping wedges incorporated into a follower gland compatible with all mechanical joints (Megalug Series 1100®, MJ Field Lok® or approved equal). Gland body, wedges and wedge actuating components shall be cast from 65-45-12 ductile iron and shall have a working pressure of 250 psi

4. FITTINGS

A. DUCTILE IRON FITTINGS. Ductile Iron Compact Fittings and accessories shall conform to AWWA C153 and Full Body Fittings - and accessories to AWWA C110. Bolts and nuts shall be high strength, corrosion resistant alloy, such as "Cor-Ten" or approved equal.

1. Working Pressures. All fittings and accessories shall be Ductile Iron, rated for a minimum of 200 psi working pressure or as specified herein. The fittings and accessories shall be new and unused. (NOTE: Certain areas of the District's service area require materials used, to be of a higher working pressure than 200 psi.)

2. Coating and Lining. The fittings shall be coated outside with a bituminous coating in accordance with ANSI A21.10 (AWWA C110) and lined inside with cement mortar and seal coated in accordance with ANSI A21.4 (AWWA C104).

3. Fittings and Glands. All pipe fittings shall be mechanical joint fittings. Mechanical joints shall conform to AWWA C111.

4. Polyethylene Encasement. Ductile Iron Fittings shall be encased with polyethylene film conforming to ANSI A21.5 (AWWA C105)

B. JOINTS

1. Mechanical. Mechanical joints including accessories shall conform to ANSI A21.11 (AWWA C111). Glands shall be ductile iron. Bolts shall be high strength COR-10 tee head with hex nuts.

2. Flanged. Flanged joints shall meet the requirements of ANSI A21.15 (AWWA C115) OR ANSI B16.1 and be used with the express approval of the Engineer.

   a. Gaskets. All flanged joints shall be furnished with 1/16 inch thick full face red rubber.

   b. Bolts. Bolts shall be stainless steel and have American Standard heavy unfinished hexagonal head and nut dimensions all a specified in ANSI B18.2. For bolts of 1-3/4 inches in diameter and larger, bolt studs with a nut on each end are recommended. Material for bolts and nuts shall conform to ASTM A307, Grade B.

3. Restrained. If restrained joints is shown on the plans, all pipe, bends, valves, etc. shall be restrained.

   a. Bell and Spigot. Bell and spigot joints shall conform to ANSI A21.6.

5. POLYETHYLENE WRAP

All ductile iron pipe, fittings, valves, and fire hydrant leads shall be polyethylene wrapped, installed according to the current edition of AWWA C105. Ductile iron fittings, valves, and fire hydrant leads used in the installation of P.V.C. pipe shall be included.

A. Material. Polyethylene wrap shall be a minimum of 8-mil polyethylene tube.

B. Installation. The contractor shall cut the roll in tubes 2 feet longer than a standard length of pipe. Each tube shall be slipped over the length of pipe, centering to allow a 1' overlap on each adjacent pipe section. After the lap is made, slack in the tubing shall be taken up for a snug fit and the overlay shall be secured with polyethylene tape.

Pipe shall not be wrapped and stored on site for any period of time, but wrapped and immediately placed in the trench, fittings shall be wrapped prior to installing blocking or pads. (see Standard Drawing #104) Polyvinyl chloride pipe requires no wrap. Odd shaped appurtenances such as valves, tees, fittings, and other ferrous metal pipeline appurtenances shall be wrapped by using a flat sheet of polyethylene. Wrapping shall be done by placing the sheet under the appliances and bringing the edges together, folding twice, and taping down.

6. FIRE HYDRANTS

A. DESCRIPTION. The Contractor shall provide all labor, materials, tools, and equipment required to furnish and install in good workmanlike manner all fire hydrants complete and ready for service where shown on the plans or where directed by the Engineer and as specified herein.

B. FIRE HYDRANTS. Fire hydrants shall conform to AWWA C502. Hydrants shall conform to the standards of the Northern Kentucky Water District as SHOWN on the plans. All fire hydrants shall have auxiliary valves for isolating water flow to the hydrant. All fire hydrants and auxiliary valves shall be positively locked to the water main by restrained joints, hydrant adapters, or other approved method.

Hydrants shall be designed to 200 psi working pressure and shall be shop tested to 300 psi hydrostatic pressure with the main valve both open and closed. The barrel shall have a breakable safety section and/or base bolts just above the ground line. Hydrants shall have a main valve opening of 5 1/4 inches, a 6 inch mechanical joint inlet to be suitable for setting in a trench 1,000 mm (3' 6") deep minimum, and shall be the traffic style hydrant so that the main valve remains closed when the barrel is broken off. Hydrants shall have a dry top and shall be self draining, when the main valve is closed. Self draining hydrants shall drain to dry wells provided exclusively for that purpose. Hydrant drains shall not be connected to storm or sanitary sewers. Hydrants located generally in the Covington System and other areas determined by the Engineer (flood zones) shall have all drain holes plugged prior to installation. Hydrants shall be rotatable in a minimum of eight (8) position in 360 degrees. All hydrants shall have two (2)- two and one half (2 1/2) inch hose nozzles and one (1) steamer or pumper connection threaded to conform to Northern Kentucky Water District Standards: steamer nozzle shall be National Standard Thread and 2 1/2" outlets shall be Northern Kentucky Water District Standard Thread (Old Cincinnati Thread). The operating nut and the nuts of the nozzle caps shall be square in shape, measuring one (1) inch from side to side. Hydrant body shall be painted yellow for areas designed for 150 psi working pressure and red for areas in excess of 150 psi. Hydrants used in areas in excess of 150 psi working pressure shall be designed to operate at the higher pressures and shall have independent operating valves on each 2 1/2" outlet.

All hydrants shall be right hand open, clockwise, except in certain areas of Campbell Co. as specified in Standard Drawings and shall have a direction arrow of operation cast into the dome of the hydrant. Installation per Standard Drawing #109.

C. INSTALLATION. The installation of fire hydrants shall be in conformance with "Mains Installation" section, paragraph "Setting Hydrants".

D. Polyethylene Encasement Fire hydrant tee, anchoring pipe and part of the fire hydrant shoe shall be encased with Polyethylene film conforming to ANSI A21.5 (AWWA C105). .(See Standard Drawing #109)

7. VALVES

A. DESCRIPTION. The Contractor shall provide all labor, materials, tools, and equipment required to furnish and install in good workmanlike manner all valves and accessories complete and ready for service where shown on the plans or where directed by the Engineer and as specified herein.

B. GATE VALVES. Gate valves shall conform to AWWA C509 and shall be cast iron or ductile body, resilient wedge, non-rising stem with rubber "O" ring packing seals. All external dome and packing bolts shall be stainless steel. The valves shall open by turning counter-clockwise. All valves shall have openings through the body of the same circular area as that of the pipe to which they are attached. Valves shall have mechanical joint ends unless otherwise shown on the plans or directed by the District. All valves shall be designed for a working pressure of 250 pounds per square inch (PSI) unless otherwise noted on the plans or in the "Supplemental Specifications". An extension stem shall be furnished if required, to bring the operating nut within 3-1/2 feet of finished grade. Extension stems shall be securely fastened to the valve stem. The

Contractor shall make all valves tight under their working pressures after they have been placed and before the main is placed in operation.

C. TAPPING SLEEVES AND VALVES. Tapping sleeves and valves shall be designed for a working pressure of 250 psi. The tapping sleeve together with the tapping valve shall be tested at 250 psi for visible leakage and pressure drop before the main is tapped. Tapping sleeve and valve used in high pressure areas shall be tested at 350 psi.

1. Tapping Sleeves Tapping sleeves shall be two piece with mechanical joint type ends, and be so designed as to assure uniform gasket pressure and permit centering of the sleeve on the pipe.

2. Tapping Valves Tapping valves shall have a flange on one end for bolting to the tapping sleeve and a mechanical joint type end connection on the outlet with slotted standard flange or other adapters for connection to the tapping machine. All external dome , flange and packing bolts shall be stainless steel. The valves shall open by turning counterclockwise. Tapping valves shall conform to AWWA C509.

D. VALVE BOXES All valves shall be provided with valve boxes. Valve boxes shall be of standard, adjustable, heavy duty cast iron extension type, two piece, 5 1/4 inch shaft, screw type, and of such length as necessary to extend from valve to finished grade, Tyler #562-S, Tyler #564-S or approved equal. Valve box cover shall be stamped "Water". Tops shall be set at final established grade.

E. BUTTERFLY VALVES. Unless otherwise specified valves 16 inches and larger shall be butterfly valves rated at 250 psi working pressure and conform to the applicable portions of AWWA Standard C504, latest edition.

1. Body - The valves shall be AWWA Class 250B designed for tight shut-off against a differential pressure of 250 psi. Valve bodies shall be constructed of ductile iron. Two trunnions for shaft bearing shall be integral with the valve body. The valves and appurtenances shall be suitable for buried service.

2. Ends - Valves shall have mechanical joint ends and shall be furnished with high strength COR-10 tee head with hex nuts, ductile iron glands, and rubber gaskets for each mechanical joint end.

3. Discs - Valve discs of cast steel, fabricated steel, or cast bronze are not acceptable.

4. Seats - Seats bonded on the discs are not acceptable.

5. Shaft Seals - If stuffing boxes are utilized for shaft seals they shall be constructed of cast iron, ASTM A126. Gland assemblies shall be of cast bronze, ASTM B132. The packing gland shall be housed in a solid walled cast iron, ASTM A48, Class 40 one piece structure or equal.

6. Operators - The valve operating mechanism shall be for counterclockwise opening. There shall be no external moving parts on valve or operator except the operator input shaft. Input shaft is to be operated by a 2 inch square operating nut. Maximum required input force on the operator shaft to open and close the valve shall be 40 pounds. The total number of turns applied to the operating nut required

to completely open the valve from a completely closed position shall not be less than twice the normal valve diameter. An extension stem shall be furnished to bring the operating nut within 3 1/2 feet of the finished grade. Extension stems shall be securely fastened to the valve stem.

E. VALVE BOXES All valves shall be provided with valve boxes. Valve boxes shall be of standard, adjustable, heavy duty cast iron extension type, two piece, 5 1/4 inch shaft, screw type, and of such length as necessary to extend from valve to finished grade, Tyler #562-S, Tyler #564-S or approved equal. Valve box cover shall be stamped "Water". Tops shall be set at final established grade.

F. AIR RELEASE AND VACUUM VALVES. Air release valves shall be constructed at high points in the water line as indicated on the plans. These valves shall permit the air in the pipeline to escape as the pipe line fills and allows the air to re-enter as the line empties. These valves shall be APCO Air Release Valves Model #200-A, 250 psi working pressure, 1", cast iron body and cover. 16" and larger water mains shall be a 2" air release valve and curb stop. Refer to Standard Drawing #106 for reference.

8. **STEEL CASING PIPE**

Casing pipe shall be steel pipe with a minimum yield strength of 35,000 psi with a minimum wall thickness as listed below:

Nominal Diameter Casing Pipe	Normal Wall Thickness	Nominal Diameter Casing Pipe	Normal Wall Thickness
Under 350 mm (14")	0.251"	650 mm (26")	0.438"
350 & 400 mm(14"&16")	0.282"	700 & 750 mm(28"&30")	0.469"
450 mm (18")	0.313"	800 mm (32")	0.501"
500 mm (20")	0.344"	850 & 900 mm(34"&36")	0.532"
550 mm (22")	0.375"	950 – 1050mm(38,40&42")	0.563"
600 mm (24")	0.407"	1200 mm (48")	0.626"

The inside diameter of the casing pipe shall be at least 100 mm (4") greater than the outside diameter of the carrier pipe joints. Steel casing sections shall be connected by welding, conforming to AWWA C206.

Adequate pipe spacers shall be installed to ensure that the carrier pipe is adequately supported in the center of the casing pipe throughout it's length, particularly at the ends. There shall not be any metallic contact between the casing and carrier pipe. Casing shall be backfilled with pea gravel or sand after the carrier pipe is installed to prevent pipe movement. Casings shall have both ends sealed up in such a way as to prevent the entrance of foreign material. See Standard Drawing #104 for installation details.

9. **MATERIAL APPROVAL** Material certification and test samples shall be provided by the Contractor, at the contractors expense, as required by Northern Kentucky Water District and the Kentucky Department of Highways. No material shall be used until approved. All rejected material be removed from the project and approved material acquired by the Contractor at the Contractor's expense.

10. **PAVING MATERIALS FOR REPLACEMENT IN KIND** All materials for replacement in kind of streets, sidewalks, curbs, walls etc. shall meet the requirements of the applicable sections of KYDOH Standard Specifications For Road And Bridge Construction.

11. **FLOWABLE FILL** This material shall meet the requirements of SPECIAL NOTE 7X of the Kentucky Department of Highways' Standard Specifications for Road and Bridge Construction.

Section IV
CONSTRUCTION

A. GENERAL Installation of water mains and appurtenances shall conform to the latest edition of AWWA Standard C600 for D.I.P.

Water main pipe and fittings shall be laid on a good level foundation with no gaps or humps under the pipe or fittings. Excavation shall be done by hand at joints to prevent the pipe and fittings from being supported by the mechanical joint or slip joint bell. Pipe shall be laid with the bell ends facing in the direction of laying.

The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations. ALL OPEN ENDS ARE TO BE CLOSED WITH CAPS OR PLUGS AT ALL TIMES WHEN PIPE LAYING OPERATIONS ARE NOT IN OPERATION AND AT THE END OF THE DAY. All caps or plugs shall be properly installed and blocked in advance of filling, flushing, and testing mains. All securing and blocking shall be inspected by the Engineer prior to backfilling of ditch.

B. HANDLING. Pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against other pipe. Pipe hooks that extend inside the ends of the pipe shall not be used for handling the pipe since they could damage the lining. Under no circumstances shall such materials be dropped. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign material at all times. When handling P.V.C. pipe care should be taken to avoid abrasion damage, gouging of the pipe, rocks, and any stressing of the bell joints or damage of the bevel ends.

C. TREE REMOVAL. Stumps of trees designated for removal 12" in diameter and smaller shall be physically removed. Any stump larger than 12" shall be ground down to 6" below final grade level.

D. DEWATERING. Should water be encountered, the Contractor shall furnish and operate suitable pumping equipment of such capacity adequate to dewater the trench. The trench shall be sufficiently dewatered so that the laying and joining of the pipe is made in the dry. The Contractor shall convey all trench water to a natural drainage channel or storm sewer without causing any property damage.

E. CONSTRUCTION EQUIPMENT. Where mains are located in or adjacent to pavements, all backfilling and material handling equipment shall have rubber tires. Crawler equipment shall be permitted when there is no danger of damaging pavement.

F. TRENCH SUPPORT. Supporting open cuts for mains shall be the responsibility of the Contractor where trenching may cause unnecessary damage to street pavement, trees, structures, poles, utilities, or other private or public property. During the progress of the work, whenever and wherever it is necessary, the Contractor shall, at his expense, support the sides of the excavation by adequate and suitable sheeting, shoring, bracing, or other approved means. Such trench support material and equipment shall remain in place until backfilling operations have progressed to the point where the supports may be withdrawn without endangering property.

G. NOISE DUST AND ODOR CONTROL. The Contractor's construction activities shall be conducted so as to eliminate all unnecessary noise, dust and odors.

H. DISINFECTION AND LEAKAGE TESTING. See Section "Disinfection and Leakage Testing."

I. TRENCH EXCAVATION AND BOTTOM PREPARATION.

1. General. The Contractor shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the drawings or as otherwise specified. During excavation material suitable for backfilling shall be piled in an orderly manner a sufficient distance form the banks of the trench to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or suitable for backfill shall be removed and wasted at a site acquired by the Contractor and approved by the Engineer. Topsoil shall be stripped from the excavation area before excavation begins.

   Such grading shall be done as may be required to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be removed by pumping or other approved methods. The trench shall be sufficiently dewatered so that the laying and joining of pipe is made in the dry. The Contractor shall take whatever action necessary to insure that water pumped from the trench will not damage private property. If necessary the Contractor shall haul trench water to another suitable location for disposal.

   Such sheeting and shoring shall be furnished and installed by the Contractor, at his own expense, as may be necessary for the protection of the work, protection of other utilities, protection of structures, the safety of the personnel, and the safety of the public. All shoring shall be removed when the work is completed unless directed otherwise by the Engineer. The Contractor shall also furnish whatever barricades or fencing necessary to provide for the safety of pedestrians in excavation areas and for traffic control as discussed in other sections. All open trenches shall be adequately covered, barricaded and/or backfilled during non-working hours in order to adequately protect vehicular and pedestrian traffic.

   The Contractor shall excavate whatever material encountered. Trenches shall be excavated to the widths shown in the table headed "Trench Width" or as otherwise indicated in the plans, and the banks shall be as nearly vertical as practicable. The bottom of the trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe or conduit on undisturbed soil at every point along its entire length, except for bell holes and for the proper sealing of the pipe joints. Bell holes and depressions in order that the pipe rest upon the prepared bottom for as nearly its full length as practicable, shall be only of such length, depth, and width as required for properly making the particular type of joint. Additional depth shall be excavated in rock as described elsewhere herein.

   Except in cases where the elevations of the water lines are indicated on the plans, trenches for water line shall be of a depth that will provide a minimum cover over the top of the pipe of 36 inches from the indicated finished grade, and avoid interference of the water lines with other existing or proposed utilities. Where the note occurs, "Slope to Drain", the Contractor shall manage to keep a positive slope in that direction in order that

air may travel to the air vent. Where paved surfaces are to be disturbed by an open cut, the Contractor shall provide suitable machinery to cut the edges of the pavement in a smooth straight line.

2. Rock The word "rock" wherever used as the name of an excavated material, shall mean boulders and solid masonry larger than 1/2 cubic yard in volume, or solid ledge rock and masonry which, in the opinion of the Engineer, requires for its removal, drilling and blasting, wedging, sledging, barring, or breaking up with a power operated hand tool. Any material which can be excavated using a hand pick and shovel, power operated excavator, power operated backhoe or power operated shovel shall not be defined as rock.

3. Blasting Rock. No blasting of rock shall be done within 40 feet of pipes or structures without specific permission from the Engineer. Blasts shall be properly covered and the pipe or structure properly protected. Warnings shall be given to all persons in the immediate vicinity. Blasting shall be at the risk of the Contractor who shall be liable for all damages to persons or property. Necessary permits shall be secured and paid for by the Contractor.

4. Trench Width. Widths of trenches shall be held to a minimum to accommodate the pipe and appurtenances. The trench width shall be measured at the top of the pipe barrel and shall conform to the following limits:

Earth

a. Minimum - outside diameter of the pipe barrel plus 8 inches, 4 inches each side of pipe.
Maximum - nominal pipe diameter plus 24 inches.

Rock

Minimum – 24" or less, nominal pipe size: outside diameter of pipe barrel plus 12", @ 6" each side.
Minimum - Larger than 24", nominal pipe size: outside diameter of pipe barrel plus 18", @ 9" each side.
Maximum - nominal pipe diameter plus 24".

b. Butterfly Valves. Trench width shall be over excavated 24" on the side that the operating mechanism is located on the butterfly valve when the surrounding area cannot be hand dug.

c. Structures. The minimum excavation limits for structures shall be as indicated. In rock, the excavation limits shall not exceed 12 inches from the outside wall and 6 inches below the footer.

5. Excessive Trench Width. If, for any reason the trench width exceeds the maximum trench width defined in paragraph "Trench Width", the Contractor, subject to approval of the Engineer, shall provide compacted stone bedding, additional strength pipe or concrete encasement, at the contractor expense.

6. Bottom Preparation The Contractor shall use excavation equipment that produces an even foundation. For the entire length of the trench, a compacted layer of sand or bankrun bedding material shall be installed below the pipe. Bell holes and depressions

for joints, valves, and fittings shall be dug after the trench bedding has been graded in order that the pipe rest upon the prepared bedding for as nearly its full length as practicable. Bell holes and depressions shall be only of such length, depth, and width as required for properly making the particular type of joint.

a. Earth. The trench shall be excavated to the depth required, so as to provide a uniform and continuous bearing and support for the pipe barrel. A minimum of 3" sand shall be installed on the solid and undisturbed ground. The finished trench bottom shall be accurately prepared by means of hand tools.

b. Rock. Where excavation is made in rock or boulder, the trench shall be excavated 6 inches below the pipe barrel for pipe 24 inches in diameter or less, and inches for pipe larger than 24 inches in diameter. All loose material shall be removed from the trench bottom. After preparation of the trench bottom, a pipe bed shall be prepared using sand and thoroughly compacted. The bedding material shall be spread the full width of the trench bottom.

7. Water Main Depth. Mains 12" and less in size shall be not less than 36" in depth and no more than 48" in depth, unless otherwise specified. Mains larger than 12" shall be installed as shown on the plans.

8. Excessive Trench Depth. If, for any reason, the trench depth exceeds the trench depth shown on the Plans, the Contractor is responsible for any and all additional cost incurred for the excessive depth.

9. Foundation. The mains are to be built on a good foundation. If, in the Engineer's opinion, the material forming the trench bottom is not suitable for a good foundation, a further depth shall be excavated and the same filled with suitable material. Unauthorized excavation below the trench bottom shall be filled with compacted crushed stone at the Contractor expense.

J. PIPE, VALVE AND HYDRANT INSTALLATION The provisions of AWWA C600 shall apply in addition to the following:

1. Pipe shall not be laid in water or when trench or weather conditions are unsuitable for the work except when permitted by the Engineer. Unless otherwise indicated in the plans or in Section I, Bid Item Explanations, the material shall be new and unused. The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved methods. Pipe shall be laid with bell ends facing in the direction of laying, unless otherwise directed by the Engineer. After placing a length of pipe in the trench, the spigot end shall be centered in the bell of the pipe and forced home. All pipe shall be laid with ends abutting and true to line and grade. Deflection of pipe joints in excess of the manufacturer's recommendations will not be permitted. A watertight pipe plug or bulkhead shall be provided and used to prevent the entrance of foreign material whenever pipe laying operations are not in progress. Any pipe that has the grade or joint disturbed after laying shall be taken up and relayed. Any section of pipe found to be defective before of after laying shall be removed and replaced at the Contractor's expense.

2. Pipe Cutting. The cutting of pipe for installing valves, fittings, or hydrants shall be done in a neat and workmanlike manner without damage to the pipe or lining. The end shall be

smooth and at right angles to the axis of the pipe. Flame cutting of metal pipe by means of an oxyacetylene torch shall not be permitted. All pipe cutting shall be at the Contractor's expense.

3. Push-On Joints. The surfaces with which the rubber gaskets comes in contact shall be thoroughly cleaned just prior to assembly. The gasket shall then be inserted into the groove in the bell. Before starting joint assembly, a liberal coating of special lubricant shall be applied to the spigot end. (Special lubricant shall be suitable for use in potable water) With the spigot end centered in the bell, the spigot end is pushed home.

4. Mechanical Joints. Mechanical joints require that the spigot be centrally located in the bell. The surfaces with which the rubber gasket comes in contact shall be thoroughly cleaned just prior to assembly. The clean surfaces shall be brushed with a special lubricant just prior to slipping the gasket over the spigot end and into the bell. (Special lubricant shall be suitable for use in potable water) The lubricant shall also be brushed over the gasket prior to installation to remove the loose dirt and lubricate the gasket as it is forced into its retaining space. P.V.C. pipe spigot ends shall be field cut smooth and at right angles to the axis of the pipe for installation in mechanical joint fittings.
   1. Bolt Torque The normal range of bolt torque to be applied to standard cast iron bolts in a joint are:

Size	Range of Torque in foot-pounds
5/8"	40 - 60
3/4"	60 - 90
1"	70 - 100
1-1/4"	90 - 120

5. Restrained Joints

   a. Ball and Socket. Ball and Socket joints shall be assembled and installed according to the manufacturers recommendations. The joint shall be thoroughly cleaned and lubricated. Check the retainer ring fastener. After installation, all slack shall be taken out of the pipe joint.

   b. Push-On. Assemble and install the push-on joint according to the manufacturer's recommendations. Restrained joint-type pipe and fittings shall only be used as approval by the Engineer. Retaining glands, field lock gaskets, or retaining flanges shall not be considered as providing a restrained joint. The joint shall be thoroughly cleaned and lubricated. Check the retainer ring fastener. After installation, all slack shall be taken out of the pipe joint.

6. Setting Valves. Valves shall be set on a firm solid concrete block foundation so that no load will be transferred to the connecting pipe. Valves in water mains shall, where possible, be located on the street property lines extended, unless otherwise shown on the plans. A valve box shall be provided for every valve. The valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the operating nut of the valve. The box cover shall be set flush with the surface of the finished pavement unless otherwise shown. All valves boxes with the exception of isolating valves for fire hydrants that are located in non-paved areas shall have a minimum of 2'x2'x4" concrete pad as shown in Standard Drawing No. 105.

7. Setting Hydrants. Hydrants shall be located as shown on the plans or as directed by the Engineer. The location shall provide complete accessibility and minimize the possibility of damage from vehicles or injury to pedestrians. All hydrants shall stand plumb with the pumper nozzle facing the curb. Hydrant shall be set to the established grade, with the traffic flange within 100 mm (4") above final grade in accordance to Standard Drawing No. 109. Each hydrant shall be controlled by an independent gate valve with valve box. All valves used for hydrant control shall be anchored to the branch tee.

8. Thrust Blocking. All bends over five (5) degrees, plugs, caps, and tees shall be securely blocked against movement with concrete thrust blocks placed against undisturbed earth in accordance with Standard Drawing No. 104. Thrust blocks shall be approved by the Engineer prior to backfilling. Water mains shall have concrete thrust block at all pipe intersections and changes of direction to resist forces acting on the pipeline. All concrete thrust blocks shall be poured in such a manner that the bolts can be replaced without disturbing the blocking.

   All caps or plugs used in mains to undergo hydrostatic test shall be properly installed and blocked in advance of testing mains. All caps or plug installations shall be approved by the Engineer's representative before the main is subjected to the pressure test.

   a. Concrete Blocking. Concrete blocking shall be K.D.O.T. Class A concrete as specified in Section "Concrete". Blocking shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing on the fitting and on the ground in each instance shall be that shown herein. The blocking shall, unless otherwise shown, be so placed that the pipe and fitting joints will be accessible for repair.

   b. Tie Rods. If shown or specified, movement shall be prevented by attaching suitable metal rods, clamps or restrained fittings. Steel tie rods or clamps, where permitted, shall be of adequate strength to prevent movement. Steel tie rods or clamps shall be painted with three coats of an approved bituminous paint or coal tar enamel. A minimum of 3/4" welded eye bolts @ a 90 degree bend and 3/4" threaded rods may only be used with the approval of the Engineer for temporary restraint only. Duc-Lucs are prohibited for use.

   c. Restrained Fittings. Restrained fittings, where permitted, shall be subject to the approval of the Engineer.

K. TRENCH BACKFILL

All trench backfill shall be free from cinders, refuse, organic material, boulders, rocks or other material which in the opinion of the Engineer is unsuitable. No backfill shall be made with frozen material.

1. BACKFILL

   a. Trench Bottom Preparation. The pipe shall be bedded on sand to achieve full pipe barrel support. In any event not less than 3" of sand bedding shall be used.

   b. Backfill to 12" Over Pipe Barrel. All trench excavations shall be backfilled immediately after pipe is laid with the exception of thrust blocks. Compacted sand shall be used to backfill the trench from the bottom of the pipe barrel to the 12" over the pipe barrel. No

flushing of backfill shall be permitted to achieve compaction. Clay bulkheads shall be installed as specified under Bulkheads Section.

c. Remaining Trench Backfill in Non-Roadway Pavement Areas. From 12" above the pipe barrel to the surface, excavated trench material or flowable fill may be used as backfill material. No material shall be used for backfill that contains frozen earth, vegetation or organic material, debris, rocks 8" or larger measured in any direction, or earth with an exceptionally high void content.

d. Compaction. All backfill shall be placed in uniform loose layers, not to exceed 12" layers, and each layer shall be compacted to a density not less than 95 percent of the standard Proctor maximum dry density (ASTM D698). The backfill shall be compacted in such a manner and with appropriate equipment so that there is no pipe damage, pipe misalignment or damage to joints. No flushing of backfill shall be permitted to achieve compaction.

e. Bulkheads. When a granular bedding is provided in rock or when granular backfill is used, the Contractor shall place bulkheads of clay soil across the trench at 100' intervals to resist the movement of groundwater through the granular material. Such bulkheads shall be carefully compacted and shall extend approximately 3 feet in a direction parallel to the pipe and shall extend from the bottom of the trench to a point 4" below final grade level.

f. Remaining Trench Backfill in Roadway Pavement Areas. From 12" above the pipe barrel to subgrade, flowable fill is required as backfill material. Flowable fill shall be per Ky. Department of Highways Standard Specifications for Road and Bridge Construction.

g. Surface Conditions. The trench surface shall be periodically attended to during the course of the contract. The trench surface shall be maintained in a safe condition and shall not interfere with natural drainage.

L. INSTALLATION OF PIPE BY BORING OR JACKING. At certain locations where designated on the plans, the Contractor will be required to install pipe under paved areas or other obstacles by boring a hole large enough to pull the pipe through without obstructing the designated area, or by jacking, whichever is the most feasible.

M. WATER METERS Water Meters shall be installed at locations shown on the plans. The meter shall be constructed per NKWD Standard Drawings.

N. CONNECTIONS (TIE-INS) TO EXISTING WATER LINES All connections to existing water lines shall be made at location shown on the plans. Care shall be taken in each case that none of the sterilizing water may enter the system during the sterilizing operation. Each connection shall be preceded with a one inch corporation stop and drain to allow bleeding of the water line of air and sterilizing water. This corporation stop shall be furnished and installed at the Contractor's expense. All sections of pipe and appurtenances to be used for tie-ins and not sterilized, shall be thoroughly cleaned by scrubbing with a chlorine solution prior to installation. All tie-ins of mains shall be done with transitional or straight solid sleeves. Mains shall be flushed of sterilizing water before tie-ins to existing mains are made.

O. INSTALLATION OF SERVICE LINES Service line shall be installed as shown on the plans or as directed. The Contractor shall excavate whatever material encountered. The service lines shall be installed using boring and jacking or open cut (as specified on the plans) at the depth required to clear existing and proposed sewers, but in no case shall the line be installed with less than 36" cover from final grade. The trench width shall be as excavated to a maximum of 2'. The line shall be laid on firm soil. In rock, sufficient extra depth shall be excavated and refilled with acceptable compacted soil or bedding sand to provide a cushion for the elimination of the possibility of crushing or perforating the pipe. Connections shall be made using normal practices for water line installation and in accordance with the standards in the plans or contained herein. Backfill shall meet the same requirements as that described in PIPE TRENCH BACKFILL.

P. TEMPORARY SERVICE CONNECTIONS Contractor shall furnish, install, make connections, and maintain all temporary lines and other appurtenances necessary to run temporary service connections as needed to permit construction. All temporary service pipes crossing streets, commercial driveways, and/or wheelchair ramps must be buried to prevent a traffic/pedestrian hazard.

The pipe, hoses and other materials furnished by the Contractor for use as temporary service pipe, shall be clean, water-tight and fully adequate to withstand existing pressures and all other conditions of use.. Care shall be exercised throughout the installation of all temporary pipe and service fittings to avoid any possible contamination of any mains or house services or contamination of the temporary pipe proper. Contractor must disinfect all temporary line. All temporary lines must be flushed before being hooked to service line.

The Contractor shall be responsible for the regularly testing and recording the chlorine level of the temporary lines. If low levels are encountered, the Contractor shall be responsible for flushing the line to get levels into standard. The Contractor shall perform all connecting and disconnecting of temporary bypass to consumers' services and all back clearing of service lines.

The Contractor shall maintain the temporary water service line in safe and operative condition at all times. Any temporary bypass lines or services crossing a sidewalk or driveway shall be temporarily covered with a rubber ramp provided by the Contractor or bituminous cold patch, compacted by a roller or a mechanical compaction device, provided by the Contractor. Ramping method must be approved by the District prior to use. The Contractor shall be responsible for the maintenance of the temporary ramping method and any damage as a result there-of.

Q. APPLICABLE SPECIFICATIONS & STANDARDS

The following specifications and standards form a part of these Specification:

A. **American Water Works Association** (AWWA) Standards
B. **Northern Kentucky Water District** Standards Drawing & Specifications – current edition
C. "Manual of Accident Prevention in Construction" published by the **Associated General contractors of America**
D. **Kentucky Occupational Safety and Health Administration's** "Kentucky Occupational Safety and Health Standards for General Industry" current edition.
E. **American National Standards Institute** (ANSI)
F. **American Society for Testing & Materials** (ASTM)

G. **Kentucky Division of Water Quality**
H. **"Recommended Standards for Water Works"** current edition

Section V
DISINFECTION AND LEAKAGE TEST

A. SCOPE. This section covers the disinfection of the new water mains, fittings, temporary services and associated appurtenances. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to test the mains for watertightness and disinfect the mains as directed by the District and as specified herein. Gauges for the test shall be furnished by the Contractor.

B. TEST SECTION. After the main has been installed and backfilled all newly installed pipe or any valved section thereof shall be considered a test section.

C. WITNESS. All tests performed for each test section shall be witnessed and approved by the District before acceptance. In the event the Contractor performs any test without witness by the District, the Contractor will be required to test the section again in conformance with this specification at no cost to the District.

D. GENERAL. All disinfection work shall conform to the requirements of the latest revision of ANSI/AWWA C651 and the requirements of the Kentucky Division of Water. If any State requirements conflict with the provisions of this section, the State requirements shall govern.

Water required for flushing and disinfection work will be provided as stipulated in the temporary facilities.

When it is necessary to interrupt service to water customers, each customer affected shall be notified in advance of the proposed service interruption and its probable duration in accordance with the project requirements.

E. DISINFECTION PROCEDURE. During construction or after the installation of the pipe and fittings is complete, an approved disinfection method, according to governing standards, shall be used. The disinfection solution shall be allowed to stand in the main and associated appurtenances for a period of at least twenty-four (24) hours.

During disinfection, all valves, hydrants, and service line connections shall be operated to ensure that all appurtenances are disinfected. Valves shall be manipulated in such a manner that the strong disinfection solution in the main from flowing back into the supply line. Check valves shall be used if required.

All non-disinfected fittings used for tie-ins or repairs shall be cleaned and swabbed with a liquid sodium hypochlorite disinfecting solution prior to installation.

F. FINAL FLUSHING. Upon completion of chlorination but before sampling and bacteriological testing, Contractor shall remove all heavily chlorinated water from the main and temporary services by flushing with potable water at the maximum velocity which can be developed under the direction and control of the District.

The Contractor shall properly neutralize and dispose of the chlorinated water and flushing water in accordance with all applicable regulations. Contractor shall obtain all special waste disposal permits necessary.

G. DISPOSAL OF HEAVILY CHLORINATED WATER. Contractor shall apply a de-chlorinating agent to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. (See the following table for neutralizing chemicals.) Federal, state, and local regulatory agencies should be contacted to determine special provisions for disposal of heavily chlorinated water.

Chlorine residual of water being disposed of shall be de-chlorinated by treating with one of the chemicals listed in the following table:

Pounds of Chemicals Required to De-chlorinate Various Residual Chlorine Concentrations in 100,000 Gallons of Water*

Residual Chlorine Concentration *mg/L*	Sulfur Dioxide (SO2)	Sodium Bisulfate (NaHSO3)	Sodium Sulfite (Na2SO3)	Sodium Thiosulfate (Na2S2O3@5H2O)
1	0.8	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
10	8.3	12.5	14.6	12.0
50	41.7	62.6	73.0	60.0

* Except for residual chlorine concentration, all amounts are in pounds.

The Contractor shall provide all necessary materials, equipment and labor for applying the de-chlorinating chemical in a manner such that proper mixing and contact time of the chemical and the heavily chlorinated water is obtained for complete removal of chlorine being flushed. The Contractor shall periodically test the flush water to verify that the chlorine residual is zero.

H. CHLORINE RESIDUAL TESTS. Upon completion of final flushing, the District will perform chlorine residual tests to ensure the chlorine residual in the main and temporary services is not higher than that generally prevailing in the remainder of the water distribution system and is acceptable to the District.

I. BACTERIOLOGICAL TESTS. Sampling and testing of water in the main and temporary services will be performed by the District after final flushing. A standard plate count will be made by the District for each sample.

J. REDISINFECTION. Should the bacteriological tests indicate the presence of coliform organisms at any sampling point, the main and temporary services shall be re-flushed, re-sampled, and re-tested. If check samples show the presence of coliform organisms, the main and temporary services shall be re-chlorinated at no additional cost to the District until results acceptable to the District are obtained.

Re-disinfection shall be completed by the continuous feed or by the slug method. Unless otherwise permitted, the chlorination agent shall be injected into the main and temporary services at the supply end through a corporation cock installed in the top of the pipe. All materials, equipment and labor necessary for the re-disinfection shall be

supplied by Contractor at no additional cost to the District.

K. HYDROSTATIC TESTING. Hydrostatic Testing will be in accordance with AWWA C600. The water main being tested shall have all air expelled by additional flushing or installation of taps on high points in the line. The pressure of the water main shall be gradually increased to obtain a minimum pressure of 100 psi over the design pressure 250 psi. at the lowest elevation point of the water main or as directed by the Engineer. The test will be for a two (2) hour duration and will not vary by more than 5 psi. All tests performed for each test section shall be witnessed and approved by a representative of the Engineer, in the event any test is performed without a representative of the Engineer, the Contractor shall be required to test the section again. Leakage is defined as the amount of water used to maintain the test pressure.

Section VI
VEHICULAR AND PEDESTRIAN TRAFFIC CONTROL

1. REFERENCE MATERIALS Traffic shall be maintained in accordance with the "Manual on Uniform Traffic Control" published by the Federal Highway Administration, current edition of Kentucky Department of Highways Standard Specifications for Road & Bridge Construction and current KYDOH Standard Drawings.

2. PEDESTRIAN TRAFFIC Should the Contractor be required to remove sidewalk or any other pavement used by pedestrians, the Contractor shall construct an approved, safe, alternate route with acceptable paving materials. Approval for alternate routes and temporary paving materials shall be acquired form the Engineer. The Contractor shall also construct temporary barricades and fences as required. No extra payment will be made for construction of temporary pedestrian walkways, fences or barricades required for water line construction, but shall be considered incidental to water line construction.

3. VEHICULAR TRAFFIC Vehicular traffic shall be maintained as required by the referenced materials listed above. The cost of all temporary paving materials for pavement restoration due to water line construction shall be considered incidental to the contract. The cost for all traffic control materials including signs, barricades, etc. shall be considered incidental to the contract. The Contractor shall be required to keep the construction area safe at all times and check that traffic control devices are in place. Should temporary paving materials used for water line construction fail to perform satisfactorily, the Contractor shall repair same at his own expense.

Section VII
TEMPORARY AND PERMANENT RESTORATION

1. TEMPORARY RESTORATION Any street, driveway, parking lot, sidewalk, stairs, walls, etc. disturbed by water line construction which is shown on roadway construction plans to be disturbed by roadway construction may be replaced with temporary materials. These temporary materials and their placement shall be approved by the Engineer prior to placement. The cost for temporary paving materials and their placement shall be considered incidental to the cost of water line construction.

2. PERMANENT RESTORATION Any street, driveway, parking lot, sidewalk, walls, shrubs, etc. disturbed by water line construction, which is shown on roadway construction plans to remain and not be disturbed by roadway construction, shall be replaced in kind. The concrete, asphalt, and stone removed shall be replaced with the same type material, the same thickness as that removed. All pavement shall be removed and replaced as detailed on drawings and in specifications contained elsewhere in the contract.

3. SEEDING AND SODDING This work shall be performed under bid items pertaining to same for roadway construction and in accordance with KDOH Standard Specifications for Road and Bridge Construction

Section VIII
METHOD OF MEASUREMENT AND BASIS OF PAYMENT

A. METHOD OF MEASUREMENT

1. Ductile Iron Water Line, each type and size, shall be measured by the linear feet laid in the trench, along the center line of the pipe, thru valves and fittings, to point of contact with existing lines, excluding any portion in concrete encasement or used in water main offsets.

2. Service Pipe, all sizes, shall be measured by the linear feet laid in the trench, excluding meter settings, from water main or existing service line to existing service line.

3. Water Line Undercut, when directed by the Engineer shall be measured along the subgrade for length and width and from pipe subgrade or bottom of fill, if in a fill placed for roadway as a pat of this same contract, to bottom of undercut. Water line undercut shall be measured and paid by the cubic feet.

4. Method of Measurement For All Other Items, shall be by each or lump sum as specified for that particular item in "SECTION I, BID ITEM EXPLANATIONS" contained herein.

B. BASIS OF PAYMENT

1. Excavation, for water lines from the surface to water line subgrade or to 6" below water line subgrade in rock, for structures, for service lines, or for any other water system item will not be a bid item but shall be considered incidental to the bid item to which it pertains. No additional payment will be made for rock excavation.

2. Water Line Undercut, when directed by the Engineer and/or NKWD, shall be paid by the cubic yard. The accepted quantities of water line undercut will be paid at the agreed unit price of $15.00 per cubic yard, which shall also include acquisition and placement of acceptable refill material. Should the Contractor be directed to perform water line undercut, the item "Water Line Undercut" at the agreed unit price of $15.00 per cubic yard shall be added to the contract by change order.

3. Water Main Fittings, shall be paid EACH, couplings in tie-ins and all fittings in offsets shall be considered incidental to those items.

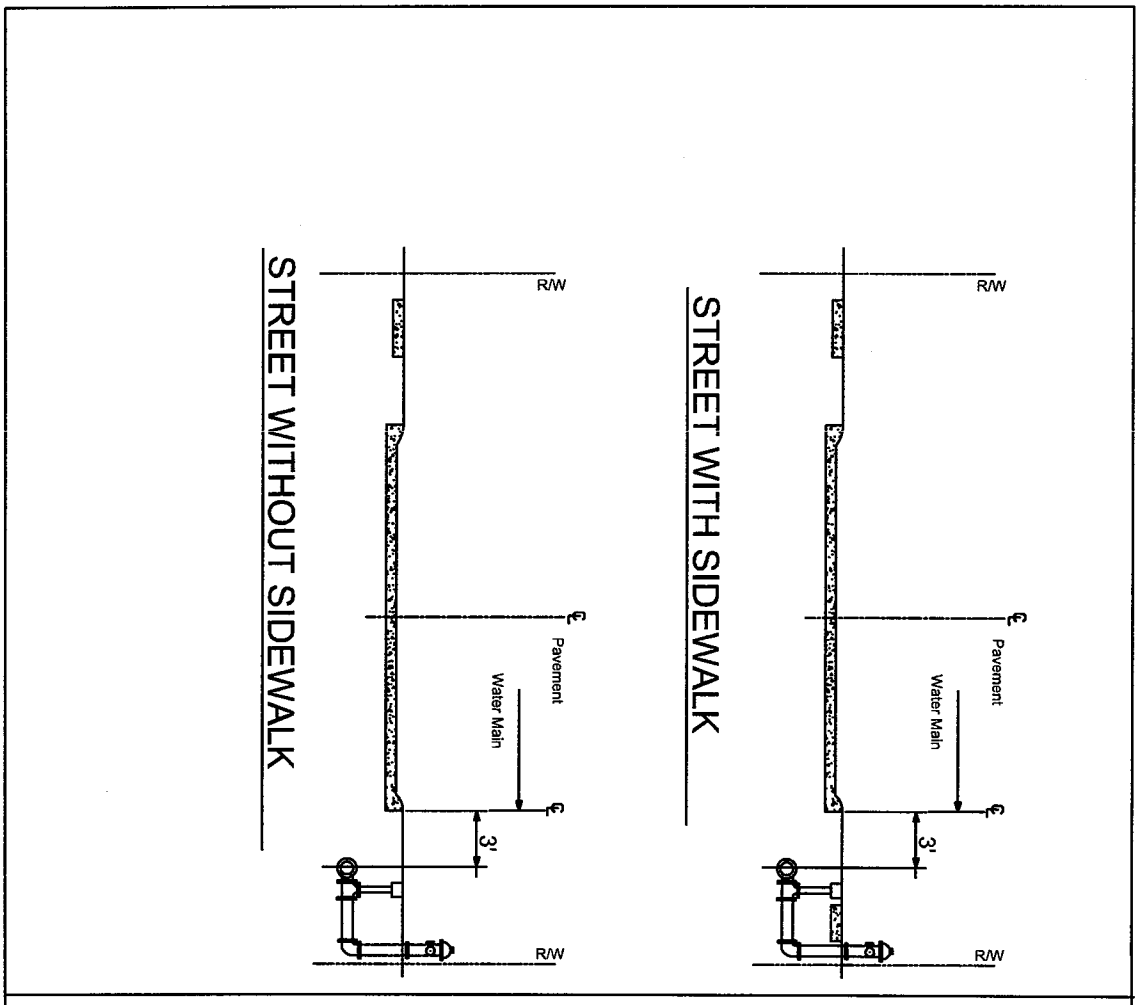
4. Backfill, for all phases of water line construction shall not be paid separately but shall be considered incidental to water line construction. Flowable fill under existing and proposed pavement shall be considered incidental to road construction.

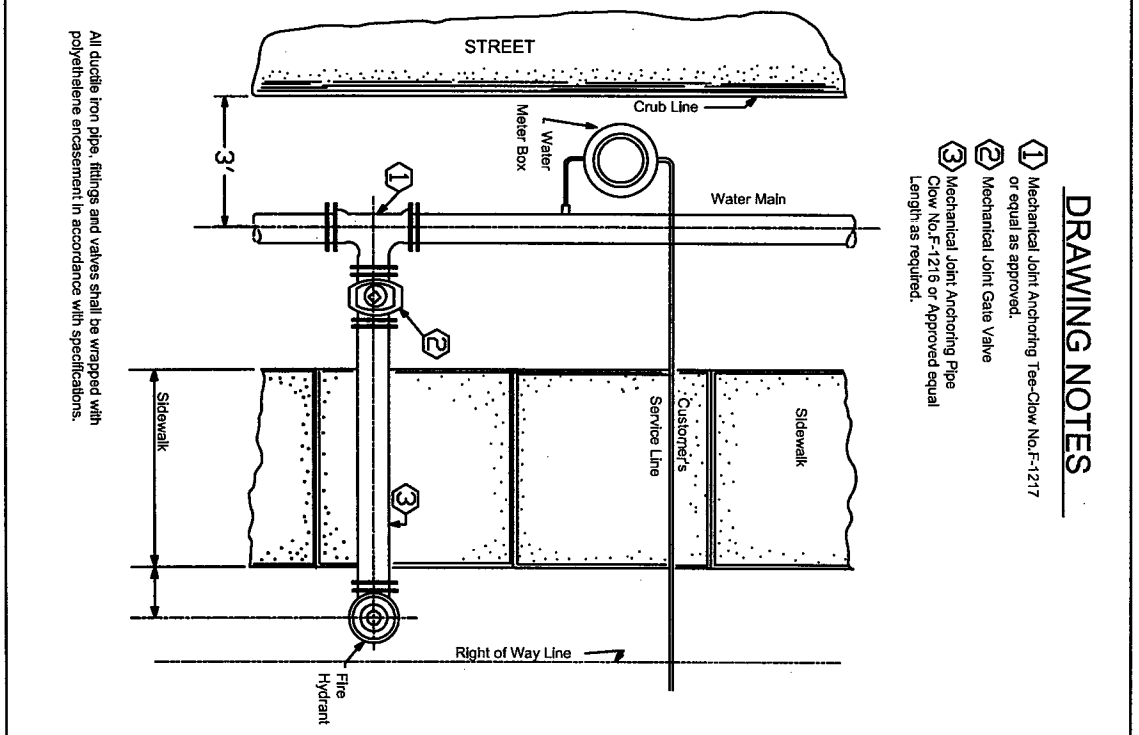
5. Temporary Restoration, of streets, roadways, sidewalks, steps, walls, trees, shrubs, etc. shall be considered incidental to water line construction when damaged by water line construction. The cost for this temporary restoration shall be considered incidental to the cost of the water line construction.

6. Traffic Control and Maintenance of Traffic, for a water line construction shall not be paid separately but shall be considered incidental to water line construction.

7. Permanent pavement restoration materials and their placement required for water main installation in areas outside of road construction shall be considered incidental to water main construction. No separate payment will be made for permanenet pavement replacement.

8. Basis of Payment for all Other Items, shall be by cubic feet, ton, linear feet, square feet, each, or lump sum as specified for that particular item.





DRAWING NOTES

1. Mechanical Joint Anchoring Tee-Clow No.F-1217 or equal as approved.
2. Mechanical Joint Gate Valve
3. Mechanical Joint Anchoring Pipe Clow No.F-1216 or Approved equal Length as required.

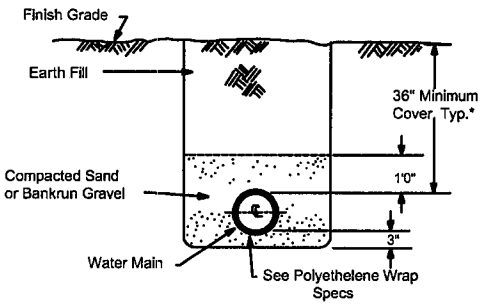
All ductile iron pipe, fittings and valves shall be wrapped with polyethelene encasement in accordance with specifications.

STANDARD DRAWING NO: 102	DATE: 2/02/11	APPROVED: RH	DRAWN BY: SAR

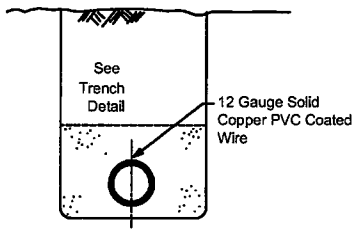
N. KY. WATER DISTRICT

WATER MAINS TERMINATIONS

REVISION	BY	DATE
1. The 30' under pvmt. not for intersect.	MPS	1/15/93
Detail temp. dead-end blocking.	MPS	9/22/93

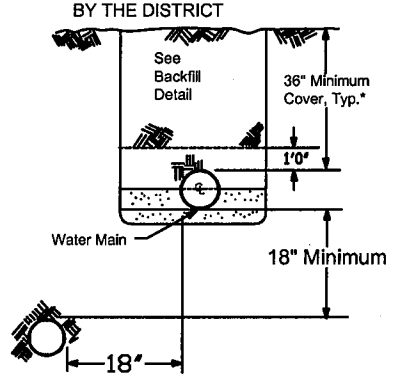


EARTH CUTS
TRENCH DETAIL



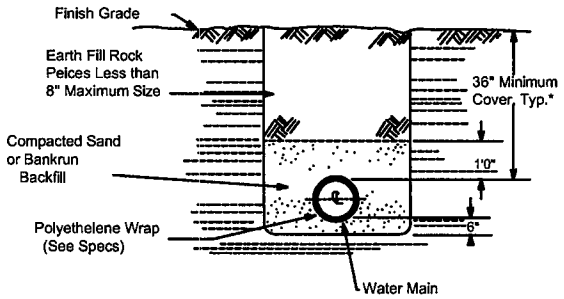
PVC PIPE

ALTERNATE TO BE USED ONLY ON APPROVAL
BY THE DISTRICT

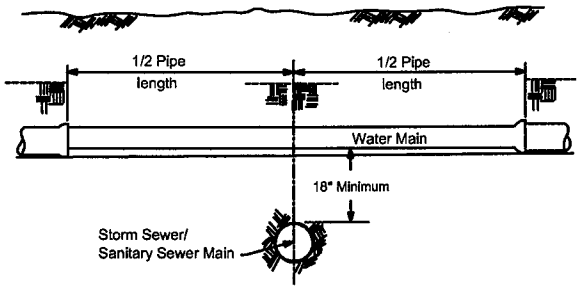


Water Main must be located a minimum of 10 feet lateral distance from anyexisting or future sewer lines or manholes, or as shown in the above alternate.

WATER MAIN PARALLELING
SEWER MAIN



ROCK CUTS
& UNSTABLE SUBGRADE
* 48" Maximum Cover
TRENCH DETAIL



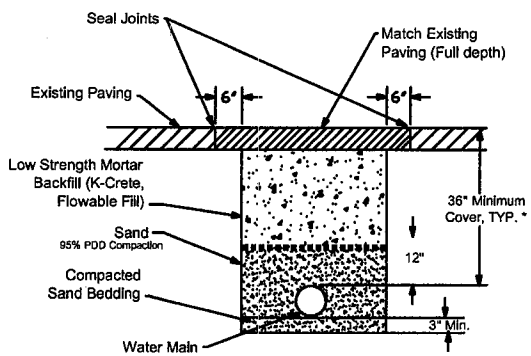
WATER MAIN CROSSING SEWER

SUBDIVISION CONSTRUCTION

REVISION	BY	DATE
1. 6" Min. Rock size	MPS	1/13/05

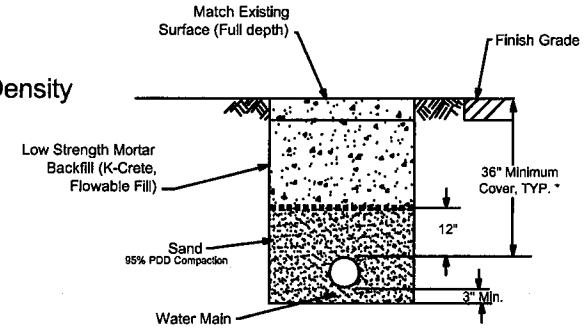
N. KY. WATER DISTRICT
TYPICAL PIPELINE TRENCH DETAIL

DRAWN BY: SAR
APPROVED: RH
DATE: 2/02/11
STANDARD DRAWING NO: 103

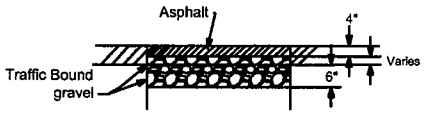


UNDER ASPHALT CONCRETE PAVEMENT

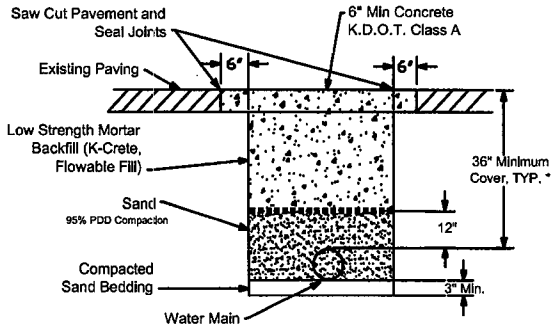
PDD= Standard Proctor Dry Density
-ASTM D698



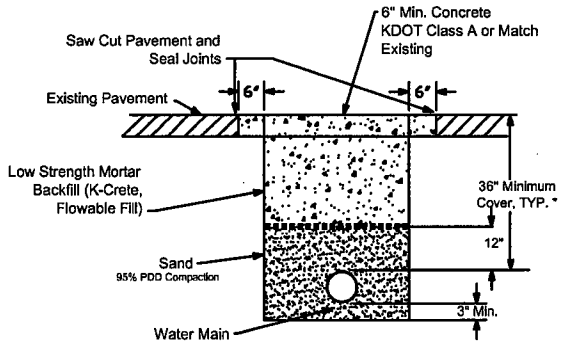
UNDER SHOULDER OF STATE MAINTAINED STREET



TEMPORARY STREET RESTORATION



UNDER CONCRETE PAVEMENT



UNDER STATE MAINTAINED STREET

* 48" Maximum Cover

ALL CONSTRUCTION

REVISION	BY	DATE
1. All streets low slight radius	MPA	10/09/09

N. KY. WATER DISTRICT

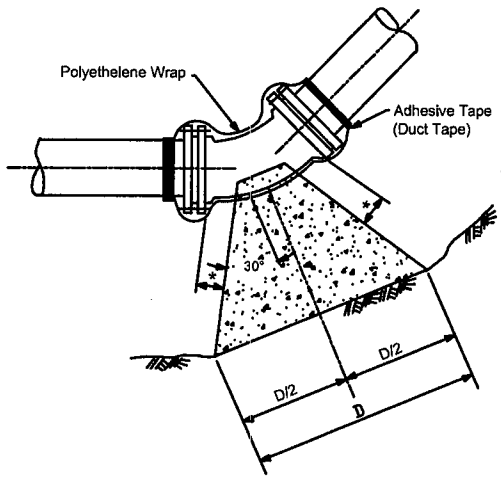
TYPICAL PIPELINE TRENCH DETAIL

DRAWN BY: SAR

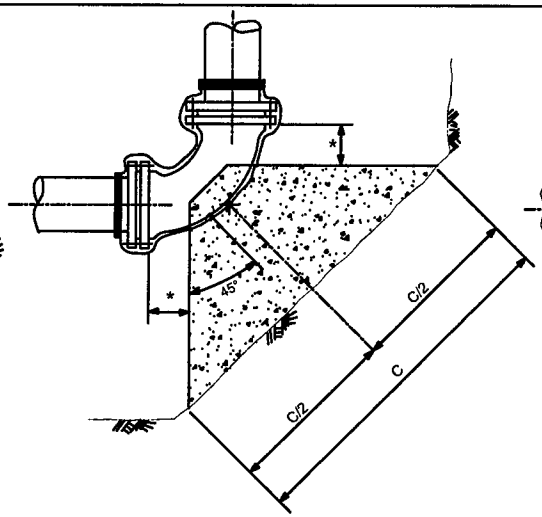
APPROVED: RH

DATE: 2/02/11

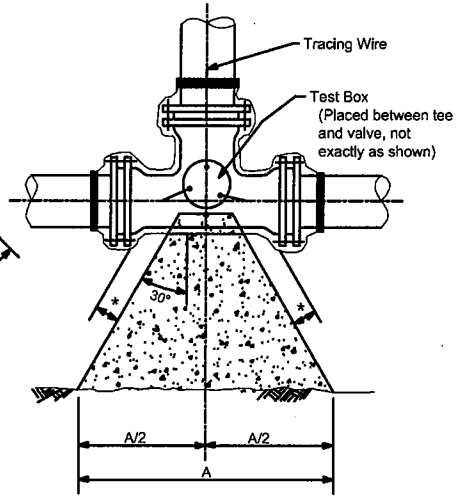
STANDARD DRAWING NO: 103A



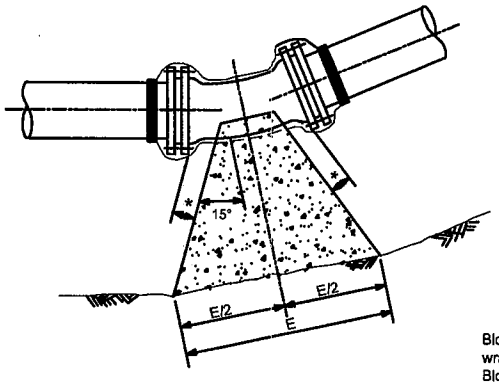
45° BEND



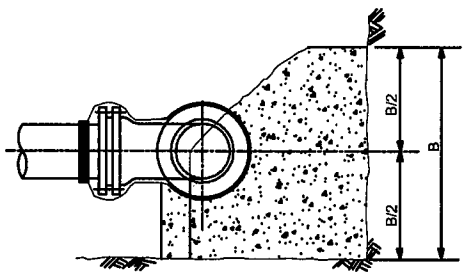
90° BEND



TEE (DEAD END OR FIRE HYDRANT SIMILAP



11 1/4° & 22 1/2° BEND



ELEVATION

Blocking shall be poured after blue polyethelene wrap is in place.
Blocking shall be inspected by the District prior to backfilling.

150 PSI/250 PSI

PIPE SIZE	A	B	C	D	E
6"	2'0"/2'6"	1'6"/1'6"	3'0"/3'6"	1'6"/2'0"	1'0"/1'0"
8"	2'6"/3'6"	2'0"/2'0"	3'6"/4'6"	2'0"/2'6"	1'0"/1'6"
10"	3'6"/4'0"	2'6"/2'6"	4'6"/5'6"	2'6"/3'0"	1'6"/1'6"
12"	4'0"/5'0"	3'0"/3'0"	5'6"/6'6"	3'0"/3'6"	1'6"/2'0"
16"	5'0"/6'0"	3'0"/4'0"	7'0"/8'6"	4'0"/4'6"	3'0"/3'0"
20"	6'0"/7'6"	5'0"/5'0"	7'0"/10'6"	4'0"/6'0"	3'0"/3'0"

* Distance to be 1/2" longer than entire length of the bolt used.

NOTES

1 DIP Fittings shall be per specifications.
2 Concrete to be 3500 psi.
3 All fittings to be Mechanical Joint.
4 Thrust blocks to be placed against undisturbed earth - use additional concrete as required for over excavation.
5 Blocking to be placed in a manner so that bolts can be removed without distrubing the block.

REVISION	BY	DATE

N. KY. WATER DISTRICT

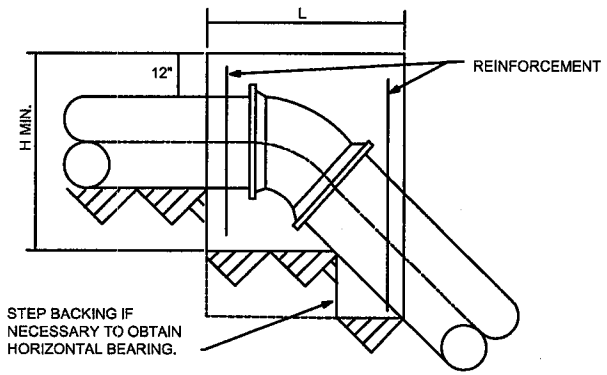
CONCRETE THRUST BLOCK DETAIL

DRAWN BY: SAR

APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 104



SECTION A-A

SIZE of PIPE	DEGREE OF BEND											
	11 1/4				22 1/2				45			
	L"	W"	H"	VOL.	L"	W"	H"	VOL.	L"	W"	H"	VOL.
4"	12	24	16	2.7	15	30	18	4.7	22	36	24	11.0
6"	12	43	18	5.4	16	48	34	15.1	30	55	24	22.9
8"	12	54	24	9.0	18	57	36	21.4	36	57	33	39.2
12"	20	63	36	26.3	37	62	37	49.2	48	62	51	88.0
16"	31	65	38	44.4	60	65	39	88.2	65	65	65	159.2
20"	45	70	40	73.0	56	70	60	136.4	72	76	78	247.5
24"	47	72	54	106.0	67	74	69	198.4	88	84	84	360.1

NOTE: VOLUMES GIVEN IN CUBIC FEET

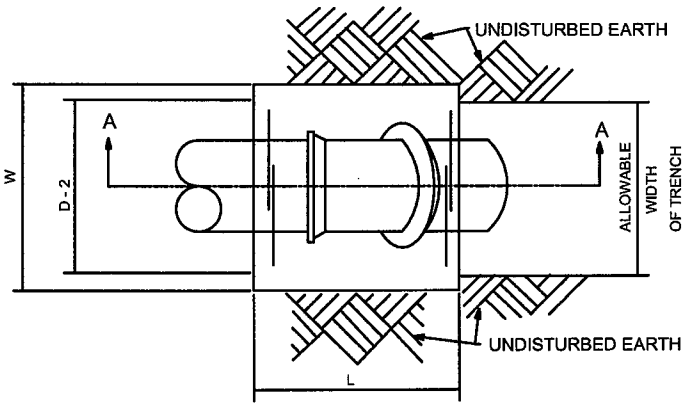
CONCRETE BACKING FOR VERTICAL BENDS

1. BACKING DESIGNED FOR 3000 POUNDS PER SQUARE FOOT SOIL BEARING AND 150 POUNDS PER SQUARE INCH INTERNAL PRESSURE.

2. PROVIDE MINIMUM CONCRETE REINFORCEMENT OF 2 PAIR OF TWO 5" "U" BARS @ 12" C.

3. CENTER BACKING ON BEND.

BLOCKING FOR SIZES NOT SHOWN SHALL USE THE NEXT LARGER SIZE.



PLAN

REVISION	BY	DATE

N. KY. WATER DISTRICT

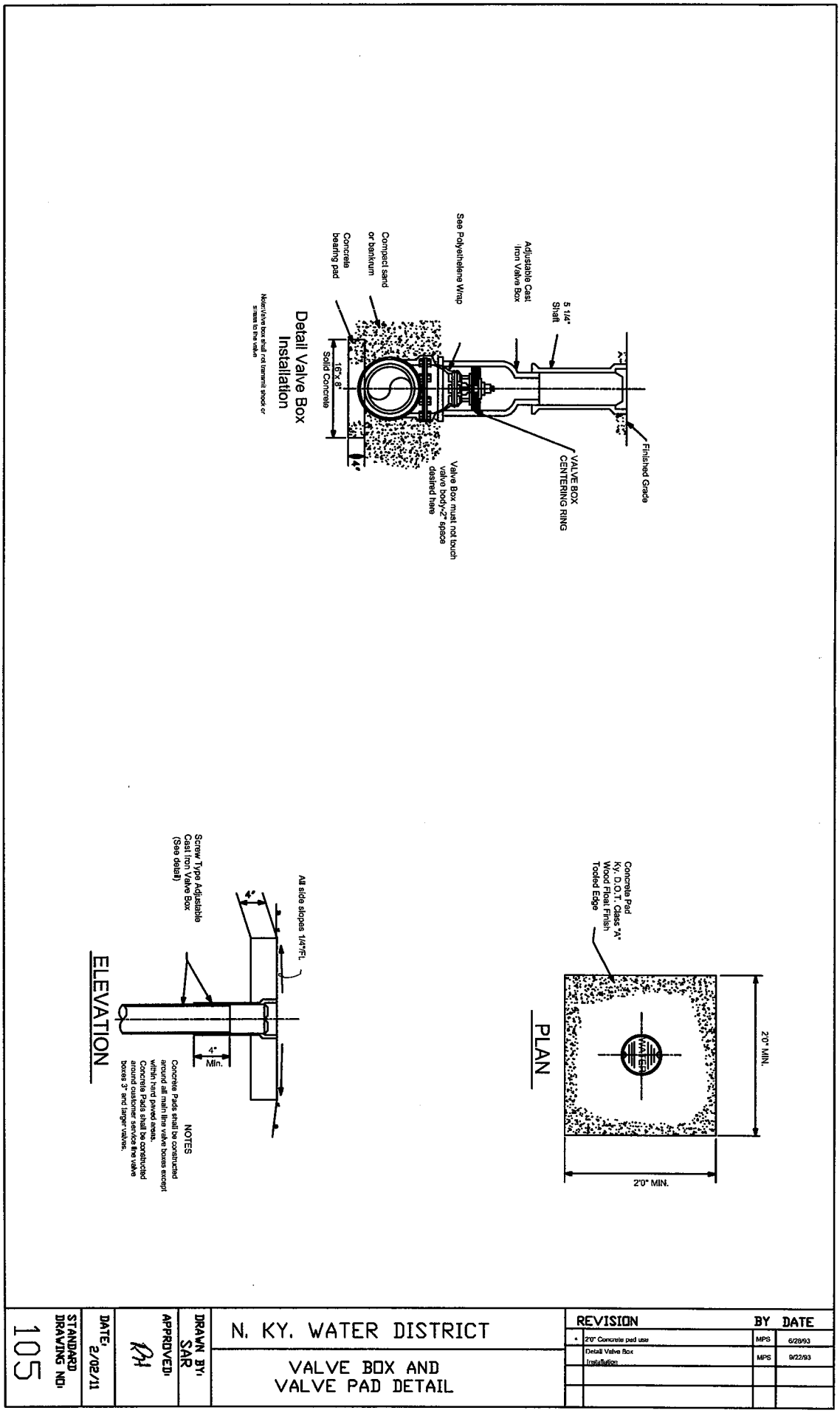
CONCRETE THRUST BLOCKING FOR VERTICAL BENDS

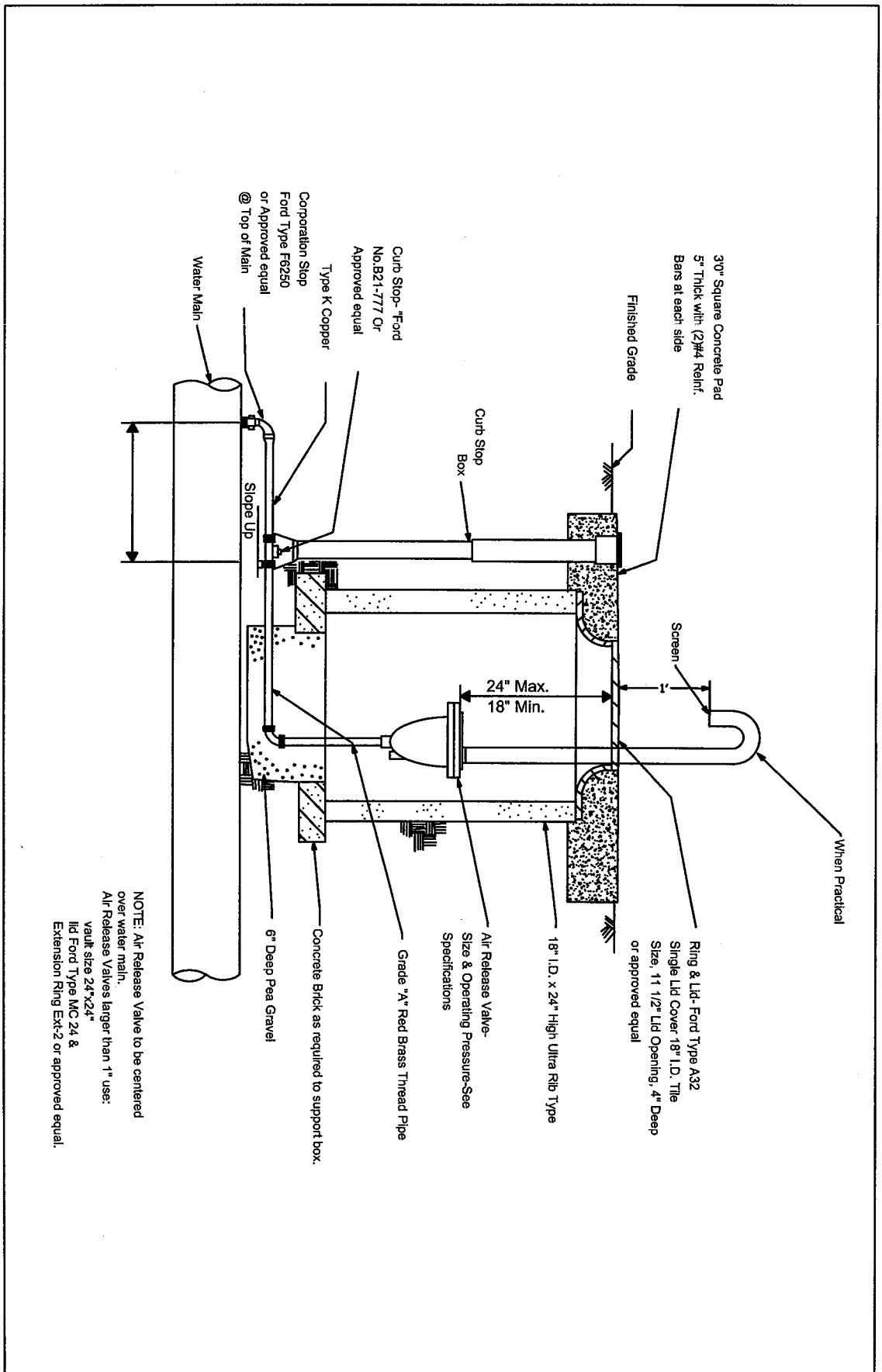
DRAWN BY: SAR

APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 104A

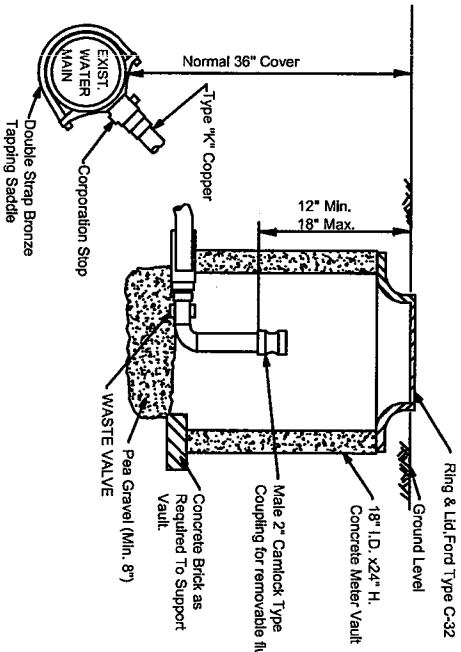

Detail Valve Box Installation
Note: Valve box shall not transmit shock or stress to the valve
Concrete bearing pad
Compact sand or bankrun
16"x 8" Solid Concrete
See Polyethelene Wrap
Adjustable Cast Iron Valve Box
5 1/4" Shaft
Valve Box must not touch valve body-2" space desired here
VALVE BOX CENTERING RING
Finished Grade
ELEVATION
Screw Type Adjustable Cast Iron Valve Box (See detail)
All side slopes 1/4"/FT.
4"
4" Min.
NOTES
Concrete Pads shall be constructed around all main line valve boxes except within hard paved areas.
Concrete Pads shall be constructed around customer service line valve boxes 3" and larger valves.
PLAN
Concrete Pad Ky. D.O.T. Class "A" Wood Float Finish Tooled Edge
WATER
2'0" MIN.
2'0" MIN.
N. KY. WATER DISTRICT
VALVE BOX AND VALVE PAD DETAIL
REVISION
BY
DATE
* 2'0" Concrete pad use
MPS
6/28/93
Detail Valve Box Installation
MPS
9/22/93
DRAWN BY: SAR
APPROVED: RH
DATE: 2/02/11
STANDARD DRAWING NO: 105



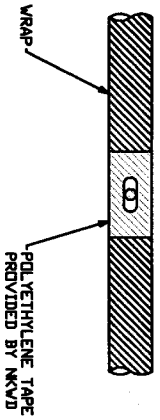
DRAWN BY: SAR	N. KY. WATER DISTRICT	REVISION	BY DATE
APPROVED: RH	N.KY WATER DISTRICT AIR RELEASE VALE		
DATE: 2/02/11			
STANDARD DRAWING NO: 106			

TYPICAL MANUAL AIR RELEASE VALVE INSTALLATION

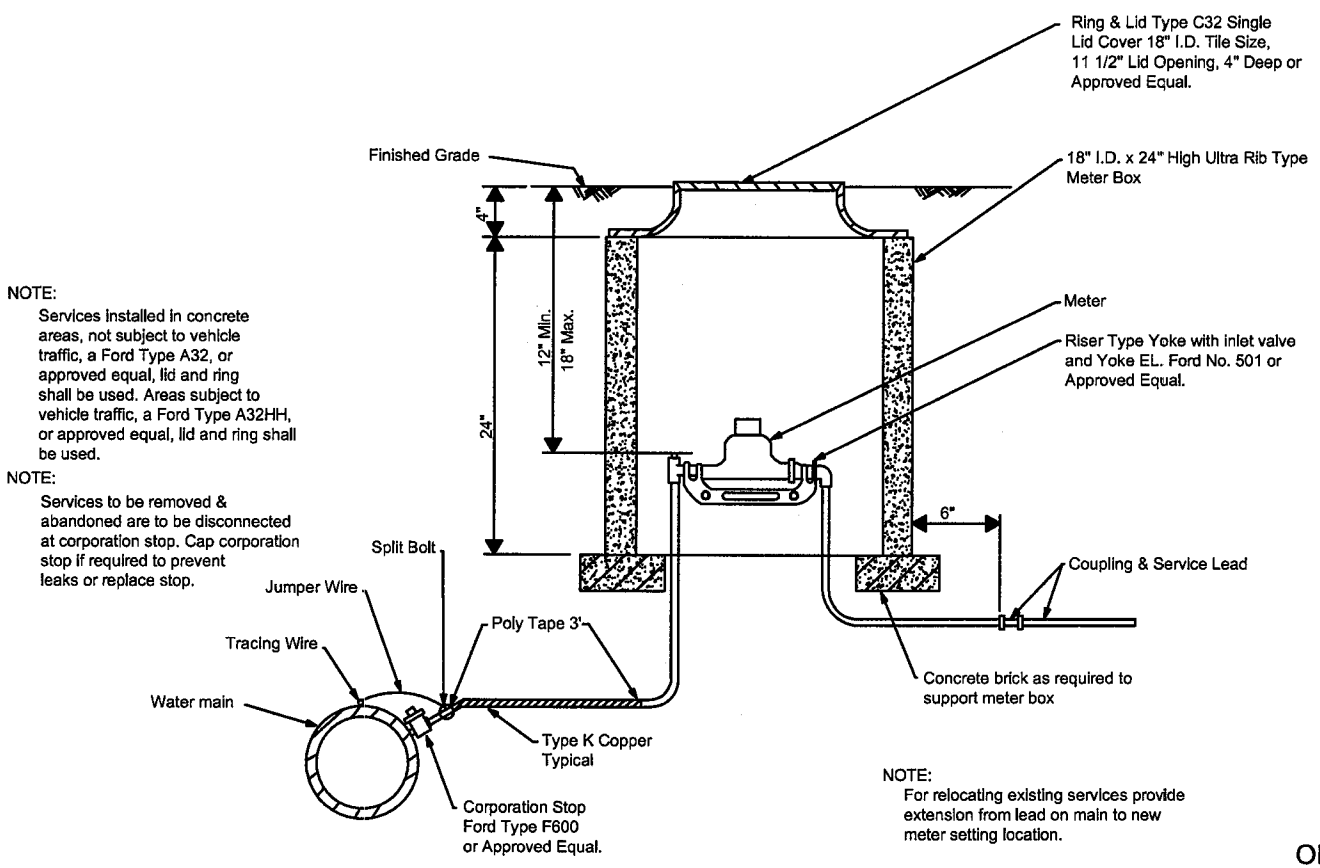
N.T.S.



ONLY FOR D.I. PIPE



N. KY. WATER DISTRICT	REVISION	BY	DATE
TYPICAL MANUAL AIR RELEASE VALVE INSTALLATION			
DRAWN BY: SAR	APPROVED: RH	DATE: 2/02/11	STANDARD DRAWING NO: 106A

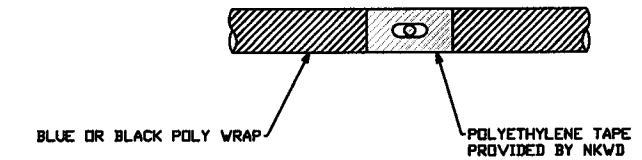


NOTE:
Services installed in concrete areas, not subject to vehicle traffic, a Ford Type A32, or approved equal, lid and ring shall be used. Areas subject to vehicle traffic, a Ford Type A32HH, or approved equal, lid and ring shall be used.

NOTE:
Services to be removed & abandoned are to be disconnected at corporation stop. Cap corporation stop if required to prevent leaks or replace stop.

NOTE:
For relocating existing services provide extension from lead on main to new meter setting location.

ONLY FOR D.I. PIPE



REVISION	BY	DATE

N. KY. WATER DISTRICT

5/8" & 1" METER SETTING

DRAWN BY: SAR

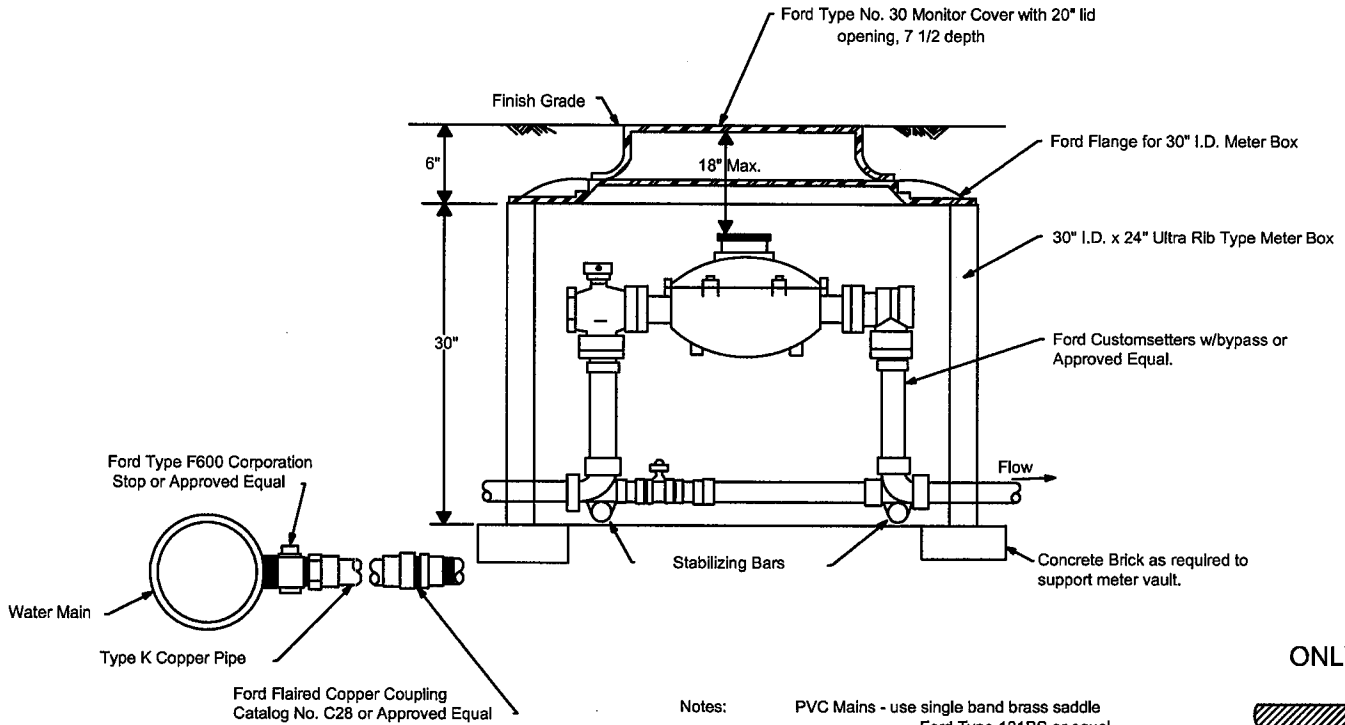
APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 107

Note: Services to be removed & abandoned are to be disconnected at corporation stop. Cap corporation stop if required to prevent leaks or replace stop.
For relocating existing services provide extension from lead on main to new meter setting location.

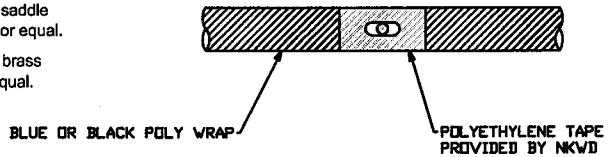
Note:If service is installed in sidewalk or pavement area,a heavy duty lid shall be installed.



Notes: PVC Mains - use single band brass saddle Ford Type 101BS or equal.

D.I.P. Mains 8" or smaller use a double strap brass tapping saddle Ford Type 202B or equal.

ONLY FOR D.I. PIPE



REVISION	BY	DATE

N. KY. WATER DISTRICT

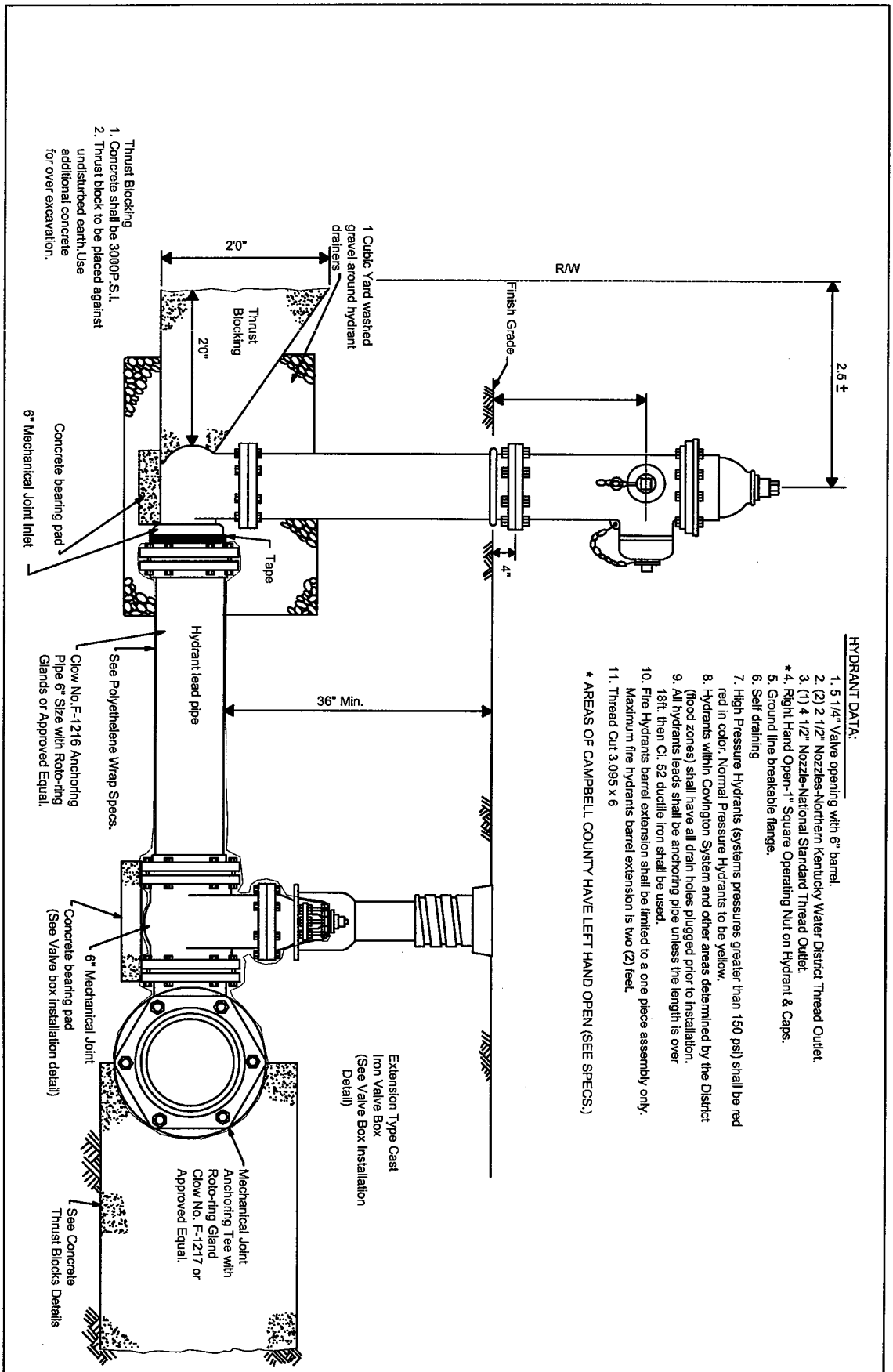
1-1/2" & 2" METER SETTING

DRAWN BY: SAR

APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 108

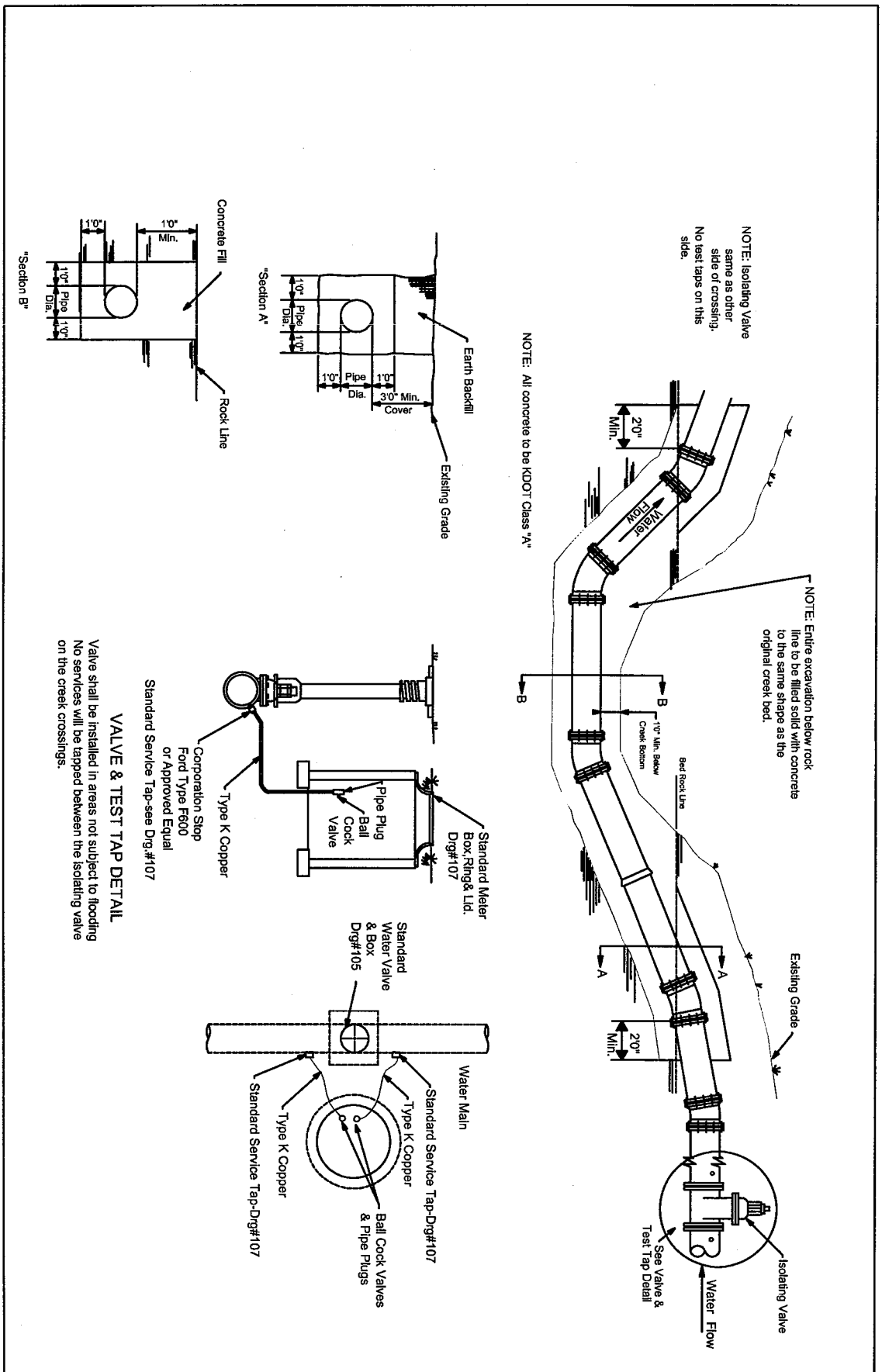


REVISION	BY	DATE
Blocking,conc.pads,polywrap	MPS	6/22/93
Extension to barrel	MPS	12/22/93
Blocking inside R/W	MPS	10/25/95

N. KY. WATER DISTRICT

HYDRANT ASSEMBLY

DRAWN BY: SAR
APPROVED: RH
DATE: 2/02/11
STANDARD DRAWING NO: 109

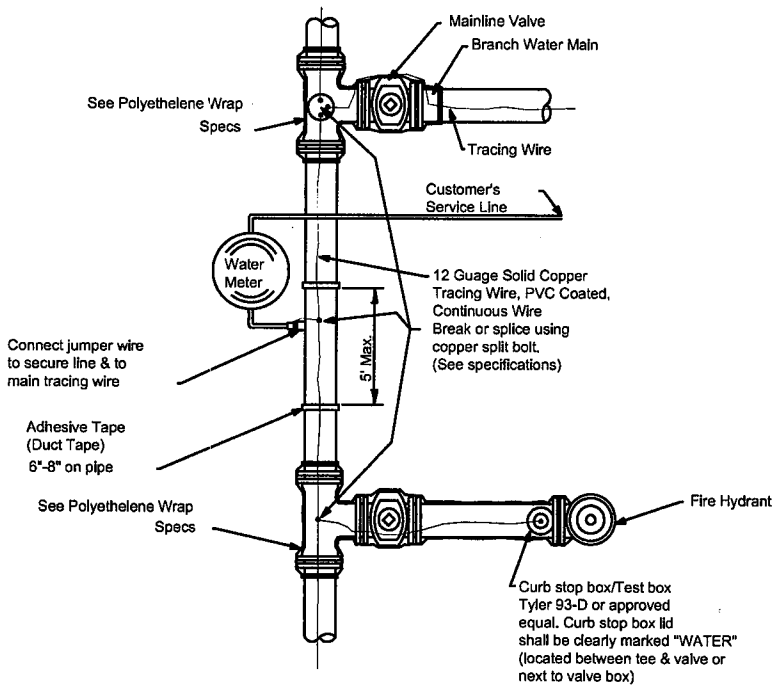


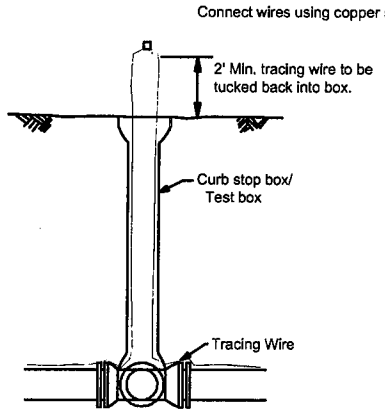
VALVE & TEST TAP DETAIL

Valve shall be installed in areas not subject to flooding
No services will be tapped between the isolating valve on the creek crossings.

Standard Service Tap-see Drg.#107

N. KY. WATER DISTRICT	REVISION	BY	DATE
CONCRETE ENCASEMENT AT CREEK CROSSING			
DRAWN BY: SAR			
APPROVED: RH			
DATE: 2/02/11			
STANDARD DRAWING NO: 110			





DUCTILE IRON AND PVC PIPE WITH DUCTILE IRON FITTINGS

Note: Curb stop box/test box shall not be installed in paved areas.

REVISION	BY	DATE

N. KY. WATER DISTRICT

TRACING WIRE INSTALLATION DETAIL

DRAWN BY: SAR

APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 111

Note: Meter lid shall be flush with the top of the concrete surface. The concrete surface shall be tapered to provide a smooth transition to the meter lid. A tooled joint shall be formed around the meter lid.

NOTE: SERVICES INSTALLED IN CONCRETE AREAS, NOT SUBJECT TO VEHICLE TRAFFIC, A FORD TYPE A32, OR APPROVED EQUAL, LID AND RING SHALL BE USED. AREAS SUBJECT TO VEHICLE TRAFFIC, A FORD TYPE A32HH, OR APPROVED EQUAL, LID AND RING SHALL BE USED.

PLASTIC (PVC) METER CROCKS shall be raised by use of an adapter with a section of plastic crock cut to achieve final grade.

At no time shall woodbe used to adjust the ring and lid to grade.

Meter ring and lids shall be reset solidly and shall have no broken edge to allow dirt to enter the crock.

If the meter box is damaged beyond repair it shall be replaced. See Standard Drawing 107.

RAISING CURB STOPS OR VALVE BOXES:

Curb stop boxes and valve boxes shall be raised by turning the upper section to meet grade. If the upper section cannot be raised in this manner it shall be carefully broken off and replaced.

New upper sections shall be supplied by NKWD

REVISION	BY	DATE

N. KY. WATER DISTRICT

ADJUDTING RING & LID TO GRADE

DRAWN BY: SAR

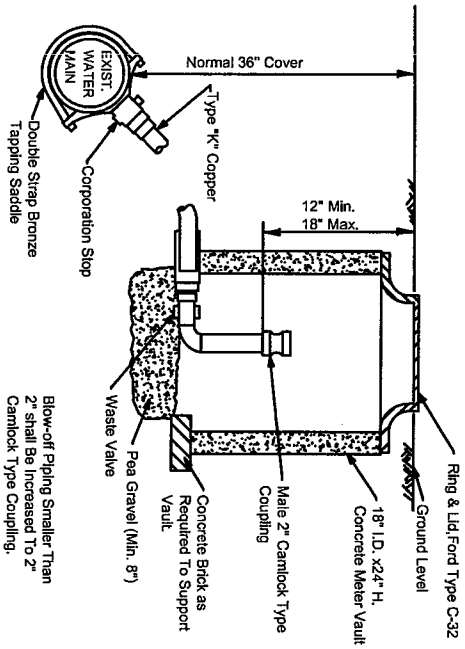
APPROVED:

DATE: 2/02/11

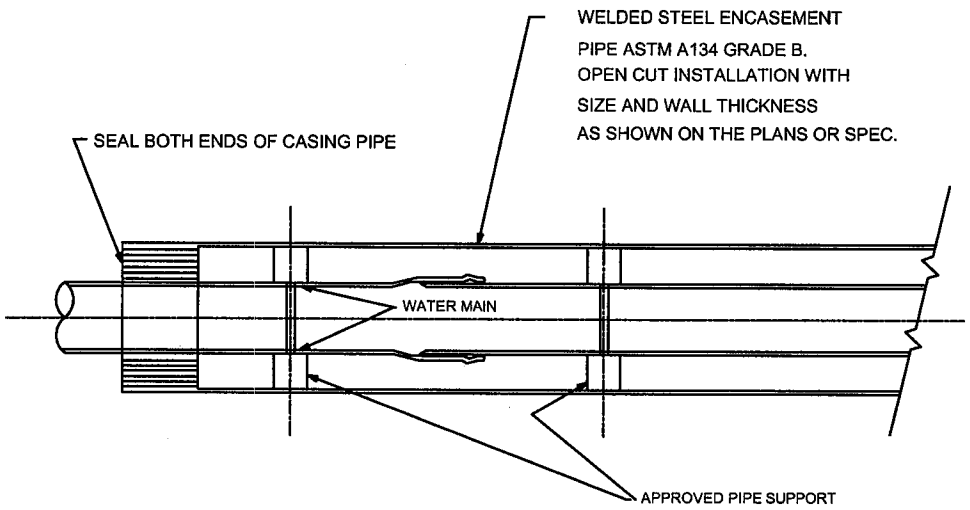
STANDARD DRAWING NO: 112

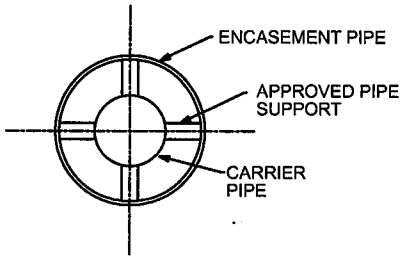
TYPICAL FLUSHING DEVICE INSTALLATION

N.T.S.



STANDARD DRAWING NO: 113	DATE: 2/02/11	APPROVED: RH	DRAWN BY: SAR	N. KY. WATER DISTRICT TYPICAL FLUSHING DEVICE INSTALLATION	REVISION / BY / DATE





1. All carrier pipe placed in steel casing pipe shall be minimum class 50 ductile iron pipe and conform to the latest edition of AWWA C151.
2. Carrier pipe gaskets shall develop a wedging action between pairs of high-strength stainless steel elements spaced around the gasket (FIELD LOK , FASTGRIP, or approved equal gaskets).

NOTE: CASING PIPE JOINTS SHALL BE SEAM WELDED SO THAT CASING IS WATER TIGHT FROM END TO END.

ENCASEMENT PIPE DETAIL

NO SCALE

REVISION	BY	DATE
1. Remove Grinder Fill	JS	2/1/00

N. KY. WATER DISTRICT

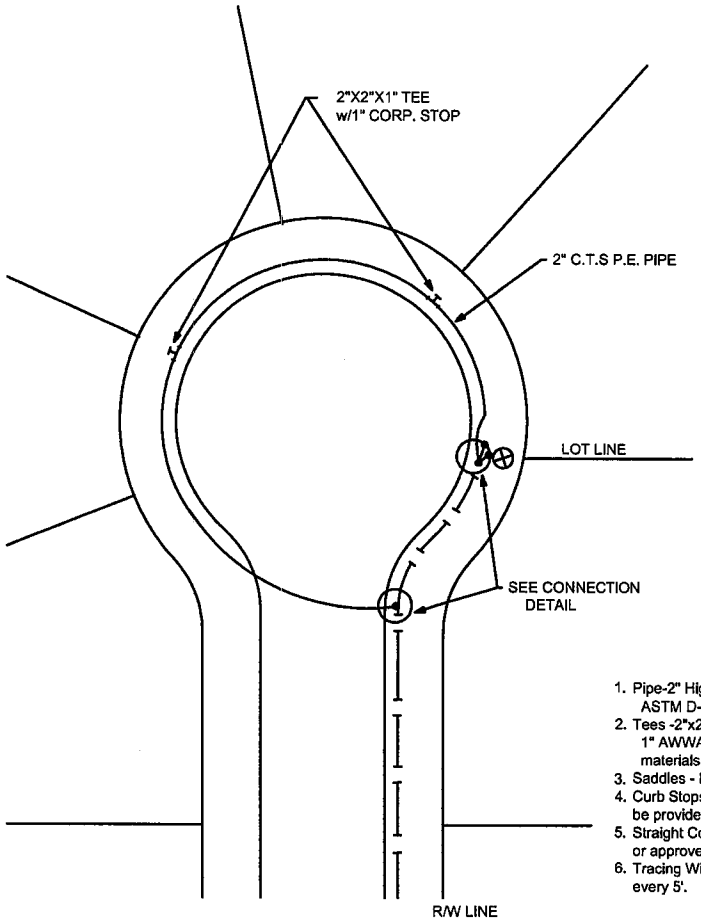
ENCASEMENT PIPE DETAIL

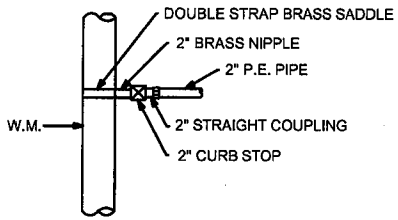
DRAWN BY: SAR

APPROVED: RH

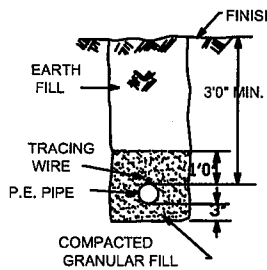
DATE: 2/02/11

STANDARD DRAWING NO: 114





CONNECTION DETAIL



TRENCH DETAIL

Materials

1. Pipe-2" High Density Polyethylene Water Service Pipe,Class 200 (SDR-9),CTS-OD,200psi, ASTM D-2737.
2. Tees -2"x2"x1" with Pack Joints both ends,side outlet tapped for corp stop. Ford T440-774 1" AWWA Taper Threads with Ford 1"-F600 Corporation Stop or approved equal. materials will be provided by the Water District.
3. Saddles - Ford 202B Double Strap Brass Saddles (IP Threads) or approved equal.
4. Curb Stops - Ford 2" B11-777 Ball Valves for Iron Pipe or approved equal. A curb stop box shall be provided.
5. Straight Couplings - Ford 2" C84-77 Male Iron Pipe Thread to Pack Joint type fittings for P.E. Pipe or approved equal.
6. Tracing Wire- 12 gauge solid copper (P.V.C. coated) tracing wire taped to the top of the pipe every 5'.

GENERAL INFORMATION

1. This detail is not designed to eliminate dead-end water mains. This is an alternate to installing 6" or 8" pipe around a cul-de-sac.
2. Tees for services need to be dropped off on the opposite lot lines of the electric and other utilities.
3. Tees for services will need to be properly installed with some type of above ground markers.
4. P.E. Pipe shall be installed after the curb are installed.
5. The only joints made in the P.E. pipe shall be made at the water service tees.
6. 1" copper tubing will need to be provided for one of the water service tees for flushing purposed.

REVISION	BY	DATE

N. KY. WATER DISTRICT

2" P.E. AROUND CUL-DE-SAC

DRAWN BY: SAR

APPROVED: RH

DATE: 2/02/11

STANDARD DRAWING NO: 115

Contract Documents and
Specifications for

Sanitary Sewer Relocation

Taylor Mill Road from Blackstone Ct. to I-275

Sanitation District No. 1
Fort Wright, Kentucky

SPECIFICATION EXPLANATION FOR SANITARY SEWER CONSTRUCTION

The following explanation is provided with the specifications and plans for the relocation of sanitary sewer facilities owned by Sanitation District No. 1 (SD1) and being installed as a part of the road contract. The contents of this document and the following technical specifications shall apply only to the sanitary sewer work and shall not extend to cover any other utility or roadway work. For the sanitary sewer work, this explanation, specifications and drawings shall apply and shall take precedence over the requirements of the KYTC Department of Highways Standard Specification for Road and Bridge Construction.

SPECIFICATION

TABLE OF CONTENTS

1. Sanitary Sewer "Complete" Defined

   Sanitary Sewer Work will be considered complete when Sanitation District No. 1 (SD1) has approved all materials used, all testing is completed and passed, the installation is final inspected and accepted by SD1, and the sanitary sewer facilities are considered ready for permanent and continuous use by the Cabinet and SD1.

2. SUBMITTALS AND CORRESPONDENCE

   All submittals and correspondence relative to sanitary sewer work being performed under the roadway contract shall be directed to the Owner (SD1) with one additional copy directed to the Section Engineer (KYTC). The Contractor shall allow a minimum of 21 days for processing of all material or shop drawing submittals that require review and response. See Specification Section 01340.

3. DEFINITIONS

   1. Engineer

   Where the word "Engineer" appears in the specifications or plans, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet, Department of Highways Section Engineer, the Utility Owner, Utility Owner Engineer or their designated representatives jointly. All decisions made during construction shall be agreeable to all parties. The Section Engineer and Utility Owner Engineer or their designated representatives shall work cooperatively to inspect and accomplish the work. It shall be understood that the Kentucky Transportation Cabinet, through its Section Engineer, has ultimate authority in all decisions.

   2. Owner

   Owner is Sanitation District No. 1 represented by the Utility Owner Engineer or other designated representative(s).

   3. Utility Owner Engineer

   Utility Owner Engineer is James W. Berling Engineering, P.L.L.C.

4. Section Engineer
Section Engineer is the engineer or representative designated by KYTC to supervise construction, administer, and insure compliance with the contract in the field.

5. Resident Project Representative
Resident Project Representative is the Utility Owner's Representative to supervise construction, administer, and insure compliance with the Sanitary Sewer construction documents in the field.

4. BID ITEMS

A. General

The Contractor shall furnish all necessary labor, materials and equipment to perform all work and testing as indicated on the plans and/or in the specifications at the unit prices bid complete and ready to use. All temporary restoration of paved and unpaved areas shall be considered incidental to sewer construction unless otherwise noted. Permanent restoration shall be paid under roadway bid items.

B. Bid Item and Payment Descriptions

1. Sewer Pipe, all types, sizes 200mm (8 inches) and larger
Payment will be made at the contract unit price, and shall include clearing, grubbing, all excavation including rock removal, pipe material, bedding, laying pipe, backfilling, labor and material for the Sanitary Sewers including testing, CCTV, and cleanup as required as required per SD1 Specification Section 02610, Section 2651 and Standard Drawing127 Drawing page 1 &2. All materials shall be new and unused. All bedding and backfill material, including flowable fill where the sewer pipe is installed under existing and/or proposed roadway surfaces and in other areas where designated on the plans, shall be incidental to the sewer pipe contract unit prices.

Method of measurement of sanitary sewer pipe, all types and all sizes, shall be by linear feet laid in the trench measured along the center-line of the pipe shall be paid by LINEAR FEET (LF).

2. Fill and Cap Existing Manhole shall be performed in accordance with KYTC Standard Specifications for Road and Bridge Construction.

3. Safeloading Existing Sanitary Sewer Pipe shall be performed in accordance with KYTC Standard Specifications for Road and Bridge Construction.

4. Reconstruct Sanitary Manhole shall be performed in accordance with SD1 specifications. Payment shall be made under this bid item regardless of the amount of adjustment necessary to a sanitary sewer manhole. The total height of adjusting rings and butyl rubber sealant may not exceed 10 inches. Any adjustment in excess of 10 inches may require the installation, removal, or replacement of manhole barrel sections. Any addition, removal, or replacement of barrel sections shall be considered incidental to this item. Paid EACH (EA) when complete.

5. Manholes (All Kinds, All Sizes)
Payment for Manholes will be made at the contract unit price each in place complete and ready for use at depth shown on plans, which shall include anti-flotation concrete base with minimum 8" projection, cone section, steps, casting frame and watertight lid, excavation, backfilling, testing, restoration and cleanup in accordance with the SD1 Standard Drawings 113 and specification 02606. Final adjustments may be made using adjusting rings set in a

bed of butyl rubber sealant and the joint shall be pointed with cement mortar to a smooth finish unless a second row of sealant is installed. The total height of adjusting rings and butyl rubber sealant may not exceed 10 inches. All materials used for manhole construction shall be new and unused. Paid EACH (EA) when complete.

6. Concrete Anchor

Payment for concrete anchors will be made at the contract unit price each in place complete and ready for use. Concrete anchors shall be constructed in accordance with Sanitation District No. 1 Standard Drawings 123. Paid EACH (EA) when complete.

7. Concrete Encasement

Payment for concrete encasement will be made at the contract unit price in place complete and ready for use. Concrete anchors shall be constructed in accordance with Sanitation District No. 1 Standard Drawing 118. Paid by LINEAR FEET (LF).

5. BACKFILLING

A. Pipe Bedding (Refer to SD1 Specification 02220)
Pipe bedding shall meet the requirements of SD1 Specification Section 02220, SD1 Drawing 127 page 1 &2 and KYTC Department of Highways, Standard Specifications for Road and Bridge Construction.

B. Flowable Fill
Flowable fill shall meet the requirements of the KYTC Department of Highways, Standard Specifications for Road and Bridge Construction.

C. Surface Restoration Materials (Temporary and Permanent)
All restoration materials shall meet the requirements of the appropriate sections of KYTC Department of Highways, Standard Specifications for Road and Bridge Construction.

D. Concrete (Refer to SD1 Specification 03300)

6. RESTORATION

1. Temporary Restoration
Any temporary restoration necessary to maintain traffic and insure public safety shall be performed to the satisfaction of the Engineer. All temporary restoration materials and their placement shall be approved by the Engineer. The Contractor will be responsible for maintenance of temporary restoration until permanent restoration is accomplished. Payment for temporary restoration shall be incidental to the contract.

2. Permanent Restoration
All areas and items that are disturbed during utility construction which are outside of road construction limits shall be replaced in-kind. All permanent restoration materials and their placement shall be approved by the Engineer. All permanent restoration materials and their placement shall meet the requirements of the appropriate sections of Kentucky Department of Highways, Standard Specifications for Road and Bridge Construction. Payment for permanent restoration shall be incidental to the contract.

7. TESTING (Refer to SD1 Specification 02610)

8. BASIS OF PAYMENT

1. Temporary and Permanent Restoration
   No separate payment will be made for the furnishing and placement of temporary or permanent restoration materials. This work shall be considered incidental to utility construction.

2. Maintenance of Traffic
   No separate payment will be made for maintaining and controlling traffic. This work shall be considered incidental to utility construction.

3. Flowable Fill
   No separate payment will be made for flowable fill. Flowable fill is required to be used under existing and proposed pavement areas and in other areas designated on the plans, and shall be considered incidental. No separate payment will be made for flowable fill when the material is being used at the contractor's convenience.

   Payment for flowable fill will be made separately only when the Engineer directs its use contrary to this addendum, the plans and specifications. If the Engineer directs the use of flowable fill, the Engineer will arrange payment to the contractor.

4. Bedding Material
   No separate payment will be made for bedding material. The furnishing and placement of bedding material by the contractor shall be considered incidental to utility construction.

5. Excavation and Backfill
   No separate payment will be made for excavation and backfill for sanitary sewer construction. All excavation and backfill shall be unclassified. No separate payment will be made for rock excavation.

End of Specification Explanation

SECTION 01340

SHOP DRAWING PROCEDURES

1.1 GENERAL

A. Shop Drawing procedures shall conform to requirements of General Conditions and as described in this Section.

B. Shop drawings shall be submitted for each type of equipment, piping, construction operation, facility or system specified on the drawings or in the specifications.

C. A schedule of values, site specific safety plan, submittal schedule, construction schedule, construction photos, testing results, record documents and other items requested by the OWNER or ENGINEER during the course of the project shall also be submitted

1.2 PROCEDURE

A. Submit Shop Drawings to: Sanitation District No. 1, 1045 Eaton Drive, Fort Wright, Kentucky 41017. Submit additional copy to the Resident Project Representative at address provided by ENGINEER.

B. A letter of transmittal shall accompany each submittal. If data for more than one Section of the Specifications is submitted, a separate transmittal letter shall accompany the data submitted for each Section.

C. At the beginning of each letter of transmittal provide a reference heading indicating the following:

1. OWNER'S Name Sanitation District No. 1
2. Project Name_____
3. Contract Name/No._____
4. Transmittal No._____
5. Section No._____

D. If a Shop Drawing deviates from the requirements of the Contract Documents, CONTRACTOR shall specifically note each variation in his letter of transmittal.

E. All Shop Drawings submitted for approval shall have a title block with complete identifying information satisfactory to ENGINEER.

F. All Shop Drawings submitted shall bear the stamp of approval and signature of CONTRACTOR as evidence that they have been reviewed by CONTRACTOR. Submittals without this stamp of approval will not be reviewed by ENGINEER and will be returned to CONTRACTOR.

CONTRACTOR'S stamp shall contain the following minimum information:

Project Name:_____

CONTRACTOR'S NAME:_____

Date:_____
Item:_____

Specifications:

Section:_____

Page No.:_____

Para. No.:_____

Drawing No.:_____ of _____

Location:_____

Submittal No.:_____ Review Cycle No.:_____

Shop Drawing/Document Reference No.:_____

Company Name of Source:_____

Approved By:_____

G. Shop Drawing Submittal Numbering and Identification:

1. In order to identify and track all Shop Drawing submittals as separate and unique items, the CONTRACTOR shall utilize a two number Shop Drawing submittal identification numbering system as follows:
   a. The first number shall be the Submittal Number. The Submittal Number shall be a separate and unique Shop Drawing. No two Shop Drawings shall be submitted with or under the same Submittal Number, regardless of whether or not they are submitted together, at the same time, under the same Section Number and/or with the same transmittal letter. A Submittal Number shall be assigned to each unique and separate submittal that needs to be tracked as a separate and unique item. The Submittal Number shall be a two part, eight character,

number assigned by CONTRACTOR in the following manner:

1) The first part of the Submittal Number shall consist of five characters that pertain to the applicable Section Number. For example:

Section Number	Submittal Number, First Part
2220	02220
11336	11336
13620	13620

2) The second part of the Submittal Number shall consist of three digits (the numbers 001 to 999) to number each separate and unique item, document, or drawing submitted under each Section Number.
3) A dash shall separate the two parts of the Submittal Number.
4) A typical Submittal Number would be as follows:
   11336-003;
   11336 = Section for Secondary Clarifier Collector Mechanism;
   and
   003 = the third submittal under this section.

b. The second number shall be the Review Cycle. The Review Cycle shall be a three-digit number indicating the initial submission or resubmission or resubmission of the same Shop Drawing submittal. For example:
   001 = Initial submission.
   002 = First resubmission.
   003 = Second resubmission, etc.

c. Some examples of typical Shop Drawing submittal identification numbers are:

Submittal Number	Review Cycle
11336-003	001

11336 = Section for Secondary Clarifier Collector Mechanism;
003 = the third submittal under this section; and,
001 = the initial submission of this submittal.

Submittal Number	Review Cycle
08331-001	001

08331 = Section for Overhead Coiling Doors;
001 = the first submittal under this section; and,
001 = initial submission for this submittal.

Submittal Number	Review Cycle
08331-001	002

08331 = Section for Overhead Coiling Doors;
001 = the first submittal under this section; and,
002 – first resubmission of this submittal.

H. CONTRACTOR shall initially submit to ENGINEER a minimum of 7 copies of all submittals. The Resident Project Representative shall receive one copy only of each submittals which will be stamped "Preliminary – Not For Construction."

I. After ENGINEER completes his review, Shop Drawings will be marked with one of the following notations:
1. Approved.
2. Approved as Corrected.
3. Revise and Resubmit.
4. Not approved.

J. If a submittal is acceptable, it will be marked "Approved" or "Approved as Corrected". Four prints or copies of the submittal will be returned to CONTRACTOR.

K. Upon return of a submittal marked "Approved" or "Approved as Corrected", CONTRACTOR may order, ship or fabricate the materials included on the submittal, provided it is in accordance with the corrections indicated.

L. If a Shop Drawing marked "Approved as Corrected" has extensive corrections or corrections affecting other drawings or Work, ENGINEER may require that CONTRACTOR make the corrections indicated thereon and resubmit the Shop Drawings for record purposes. Such drawings will have the notation, "Approved as Corrected – Resubmit."

M. If a submittal is unacceptable, 2 copies will be returned to CONTRACTOR with one of the following notations:
1. "Revise and Resubmit."
2. "Not Approved."

N. Upon return of a submittal marked "Revise and Resubmit", CONTRACTOR shall make the corrections indicated and repeat the initial approval procedure. The "Not Approved" notation is used to indicate material or equipment that is not acceptable. Upon return of a submittal so marked, CONTRACTOR shall repeat the initial approval procedure utilizing acceptable material or equipment.

O. Any related Work performed or equipment installed without an "Approved" or "Approved as Corrected" Shop Drawing will be at the sole responsibility of the CONTRACTOR.

P. Shop Drawings shall be submitted well in advance of the need for the material or equipment for construction and with ample allowance for the time required to make delivery of material or equipment after data covering such is approved. CONTRACTOR shall assume the risk for all materials or equipment which are fabricated or delivered prior to the approval of Shop Drawings. Materials or equipment will not be included in periodic progress payments until approval thereof has been obtained in the specified manner.

Q. ENGINEER will review and process all submittals promptly, but a first submission review period, not including mailing time, of 21 days shall be allotted by the CONTRACTOR when scheduling the Work. Shop Drawings being revised and resubmitted for review shall also have the same time allotted for ENGINEER's review.

R. It is CONTRACTOR'S responsibility to review submittals made by his suppliers and Subcontractors before transmitting them to ENGINEER to assure proper coordination of the Work and to determine that each submittal is in accordance with his desires and that there is sufficient information about materials and equipment for ENGINEER to determine compliance with the Contract Documents. Incomplete or inadequate submittals will be returned for revision without review.

S. CONTRACTOR shall furnish required submittals with complete information and accuracy in order to achieve required approval of an item within three submittals. All costs to ENGINEER involved with subsequent submittals of Shop Drawings, Samples or other items requiring approval, will be backcharged to CONTRACTOR, at the rate of 3.0 times direct technical labor cost by deducting such costs from payments due CONTRACTOR for Work completed. In the event that CONTRACTOR requests a substitution for a previously approved item, all of ENGINEER'S costs in the reviewing and approval of the substitution will be backcharged to CONTRACTOR unless the need for such substitution is beyond the control of CONTRACTOR.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECTION (Not Used)

++ END OF SECTION ++

SECTION 02050

DEMOLITIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required for demolitions, removal and disposal Work.
   2. Included, but not limited to, are demolition and removals of existing materials, equipment, or work necessary to install the new Work as shown and specified and to connect same with existing work in an approved manner. Demolition includes structural concrete, foundations, walls, doors, windows, structural steel, metals, roofs, masonry, attachments, appurtenances, piping, electrical and mechanical equipment, paving, curbs, walks, fencing, gates, and similar existing facilities.
   3. Demolitions and removals which may be specified under other Sections shall conform to requirements of this Section.
   4. OWNER reserves the right of ownership of any and all materials.

B. Related Sections:
   1. Section 01010, Summary of Work.
   2. Section 02220, Excavation and Backfill.

1.2 SUBMITTALS

A. Schedule: Submit for approval proposed methods, equipment, and operating sequences. Include coordination for shut-off, capping, temporary services, continuation of utility services, and other applicable items to ensure no interruption of OWNER'S operations.

1.3 JOB CONDITIONS

A. Protection:
   1. Perform all demolition and removal Work to prevent damage or injury to structures, occupants thereof and adjacent features which might result from falling debris or other causes, and so as not to interfere with the use, and free and safe passage to and from adjacent structures.
   2. Closing or obstructing of roadways, sidewalks, and passageways adjacent to the Work by the placement or storage of materials will not be permitted, and all operations shall be conducted with a minimum interference to traffic on these ways.
   3. Erect and maintain barriers, lights, sidewalk sheds, and other necessary protective devices.

4. Repair damage to facilities to remain, or to any property belonging to the OWNER or occupants of the facilities.

B. Scheduling:
   1. Carry out operations so as to avoid interference with OWNER'S operations and work in the existing facilities.

C. Notification:
   1. At least 48 hours prior to commencement of a demolition or removal, notify ENGINEER in writing of proposed schedule therefor. OWNER will inspect the existing equipment and mark for identification those items which are to remain the property of the OWNER. Do not start removals without the permission of the ENGINEER.

D. Explosives:
   1. Do not bring explosives on site nor use explosives for any demolition.

PART 2 – PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

A. All materials and equipment removed from existing work shall become the property of CONTRACTOR, except for those which OWNER has identified and marked for his use. All materials and equipment as indicated in Section 01010 or on the Contract Drawings shall be carefully removed by the CONTRACTOR, so as not to be damaged, and shall be cleaned and transported to the Lakeview Pump Station, 1045 Eaton Drive, Fort Wright, Kentucky 41017 or Dry Creek Waste Water Treatment Plant, 2999 Amsterdam Road, Villa Hills, Kentucky 41017 or as directed by the OWNER.

B. CONTRACTOR shall dispose of all demolition materials, equipment, debris, and all other items, except for equipment or materials which are to remain the property of the OWNER, off the site and in conformance with all existing applicable laws and regulations.

C. Surfaces of walls, floors, ceilings, or other areas which are exposed by any of the removals specified herein, and which will remain as architecturally finished surfaces shall be repaired and re-finished by the CONTRACTOR with the same or matching materials as the existing adjacent surface or as may be otherwise approved by the ENGINEER.

D. CONTRACTOR shall work closely with OWNER during completion of the Project to avoid disruptions to pump station operations.

E. Pollution Controls: Use water sprinkling, temporary enclosures, and other suitable methods to limit the amount of dust and dirt rising and scattering in the air to the lowest practical level. Comply with governing regulations pertaining to environmental protection.
   1. Do not use water when it may create hazardous or objectionable conditions such as ice, flooding, and pollution.
   2. Clean adjacent structures, facilities, and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to conditions existing prior to the start of the Work.

F. Building Demolition:
   1. Unless otherwise approved by ENGINEER, proceed with demolition from the top of the structure to the ground. Complete demolition work above each floor or tier before disturbing supporting members of lower levels.
   2. Demolish concrete and masonry in small sections.
   3. Remove structural framing members and lower to ground by means of hoists, derricks, or other suitable methods.
   4. Break up and remove foundations and slabs-on-grade, unless otherwise shown to remain.
   5. Locate equipment used for demolition work, and remove demolished materials, so as to not impose excessive loads on supporting walls, floors or framing.

3.2 STRUCTURAL REMOVALS

A. Remove structures to the lines and grades shown unless otherwise directed by the ENGINEER. Where no limits are shown, the limits shall be 4 inches outside the item to be installed. The removal of masonry beyond these limits shall be at the CONTRACTOR'S expense and these excess removals shall be reconstructed to the satisfaction of the ENGINEER with no additional compensation to the CONTRACTOR.

B. All concrete, brick, tile, concrete block, roofing materials, reinforcement, structural or miscellaneous metals, plaster, wire mesh and other items contained in or upon the structure shall be removed and taken from the site, unless otherwise approved by the ENGINEER. Demolished items shall not be used in backfill adjacent to structures or in pipe line trenches.

C. After removal of parts or all of masonry walls, slabs and like work which tie into new Work or existing work, the point of junction shall be neatly repaired so as to leave only finished edges and surface exposed.

D. The jambs, sills and heads of any new windows, passageways, doors, or other openings cut into new Work or existing work, shall be dressed with new masonry, concrete or metal to provide a smooth, finished appearance.

E. Where new anchoring materials including bolts, nuts, hangers, welds and reinforcing steel, are required to attach new Work to the existing work they shall be included under this Section, except where specified elsewhere.

3.3 MECHANICAL REMOVALS

A. Mechanical removals shall consist of dismantling and removing of existing piping, pumps, motors, equipment and other appurtenances as specified, shown, or required for the completion of the Work. It shall include cutting, capping, and plugging as required, except that the cutting of existing piping for the purpose of making connections thereto will be included under Division 15.

B. Existing process, water, chemical, gas, fuel oil and other piping not required for the new Work shall be removed where shown or where it will interfere with new Work. Piping not indicated to be removed or which does not interfere with new Work shall be removed to the nearest solid support, capped and left in place. Chemical and fuel lines and tanks shall be purged and made safe prior to removal or capping. Where piping that is to be removed passes through existing walls, it shall be cut off and properly capped on each side of the wall.

C. When underground piping is to be altered or removed, the remaining piping shall be properly capped. Abandoned underground piping may be left in place unless it interferes with new Work or is shown or specified to be removed.

D. Waste and vent piping shall be removed to points shown. Pipe shall be plugged with cleanouts and plugs. Where vent stacks pass through an existing roof that is to remain, they shall be removed and the hole in the roof properly patched and made watertight.

E. Any changes to potable water piping and other plumbing and heating system work shall be made in conformance with all applicable codes and under the same requirements as other underground piping. All portions of the potable water system that have been altered or opened shall be pressure tested and disinfected in accordance with Section 15051 and local codes. Other plumbing piping and heating piping shall be pressure tested only.

3.4 ELECTRICAL REMOVALS

A. CONTRACTOR shall be responsible for disconnecting wiring at equipment to be removed. CONTRACTOR shall be responsible for removing the disconnected conduit, disconnect switches, wiring, lighting fixtures, receptacles, and all other appurtenant electrical removals unless otherwise noted on the Drawings.

B. Electrical removals shall consist of the removal of existing transformers, distribution switchboards, control panels, motors, conduits and wires, poles and overhead wiring,

panelboards, lighting fixtures, and miscellaneous electrical equipment all as shown, specified, or required to perform the Work.

C. All existing electrical equipment and fixtures to be removed shall be removed with such care as may be required to prevent unnecessary damage, to keep existing systems in operation and to keep the integrity of the grounding systems.

D. Distribution switchboards shall be removed or modified as shown. Switchboards to be removed shall be disconnected and dismantled, and all components shall be disposed of off the site. Circuit breakers and other control equipment on modified switchboards that will no longer be used shall be removed unless otherwise shown or specified. All new openings cut into the modified switchboard panels shall be cut square and dressed smooth to the dimensions required for the installation of the new equipment.

E. Motors shall be disconnected and removed where shown or specified. Motors not designated by the OWNER to be salvaged shall be removed from the site. Motors or other electrical gear designated for reuse shall be stored in enclosed, heated storage.

F. Conduits and wires shall be abandoned or removed where shown. All wires in abandoned conduits shall be removed, salvaged, and stored. Abandoned conduits concealed in floor or ceiling slabs, or in walls, shall be cut flush with the slab or wall at the point of entrance. The conduits shall be suitably plugged and the area repaired in a flush, smooth, approved manner. Exposed conduits and their supports shall be disassembled and removed from the site. Repair all areas of work to prevent rust spots on exposed surfaces.

G. Where shown or otherwise required, wiring in the underground duct system shall be removed. All such wiring shall be salvaged and stored as specified. CONTRACTOR shall verify the function of all wiring before disconnecting and removing it. Ducts which are not to be reused shall be plugged where they enter buildings and made watertight.

H. Where shown, direct-burial cable shall be abandoned. Such cable shall be disconnected at both ends of the run. Where it enters a building or structure, the cable shall be cut back to the point of entrance. All openings in buildings for entrance of abandoned direct-burial cable shall be patched and made watertight.

I. Poles and overhead wiring shall be abandoned as shown and specified. Existing substation and poles owned by the power company will be removed by the power company. Poles not owned by the power company shall be completely removed from the site by the CONTRACTOR. The overhead wires shall be salvaged and stored as specified in Section 02050, Paragraph 3.1.A. CONTRACTOR shall perform this work after the new service has been completed and energized, and in accordance with the approved schedule. CONTRACTOR also shall make all the necessary arrangements with the power company for the removal of their

transformers and metering equipment after the new electrical system has been installed and energized.

J. Panelboards where shown shall be removed and disposed of off the site. Where shown or specified, they shall be replaced with new panelboards at the same or adjacent locations. All cutting and patching necessary for the removal and replacement of panelboards shall be performed.

K. Lighting fixtures shall be removed or relocated as shown. Fixtures not relocated shall be removed from the site. Relocated fixtures shall be carefully removed from their present location and rehung where shown.

L. Wall switches, receptacles, starters and other miscellaneous electrical equipment, shall be removed and disposed of off the site as required. Care shall be taken in removing all equipment so as to minimize damage to architectural and structural members. Any damage incurred shall be repaired.

3.5 ALTERATIONS AND CLOSURES

A. Alterations shall conform with all applicable Specifications, the Drawings, and the directions and approvals of the ENGINEER.

B. Where alterations require cutting or drilling into existing floors, walls, and roofs, the holes shall be repaired in an approved manner. CONTRACTOR shall repair such openings with the same or matching materials as the existing floor, wall, or roof or as otherwise approved by the ENGINEER. All repairs shall be smoothly finished unless otherwise approved by the ENGINEER.

C. Openings in existing concrete slabs, ceilings, masonry walls, floors and partitions shall be closed and sealed as shown or otherwise directed by the ENGINEER. New Work shall be keyed into the existing Work in an acceptable manner. New reinforcing steel shall be welded to the existing reinforcing. Welding shall conform to AWS D12.1, Reinforcing Steel Welding Code. In general, use the same or matching materials as the existing adjacent surface. The finished closure shall be a smooth, tight, sealed, permanent closure acceptable to the ENGINEER.

3.6 CLEAN-UP

A. CONTRACTOR shall remove from the site all debris resulting from the demolition operations as it accumulates. Upon completion of the Work, all materials, equipment, waste, and debris of every sort shall be removed and premises shall be left, clean, neat and orderly.

++ END OF SECTION ++

SECTION 02220

EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
1. CONTRACTOR shall provide all labor, materials, equipment and incidentals required to perform all excavating, backfilling, filling and grading, and disposing of earth materials as shown, specified, and required for construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work in every respect.
2. All necessary preparation of subgrade for slabs and pavements is included.
3. All temporary means needed to prevent discharge of sediment to water courses from dewatering systems or erosion are included.
4. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof.

B. Related Sections:
1. Section 02050, Demolitions.
2. Section 02512, Bituminous Paving.
3. Section 02900, Landscaping.
4. Section 15051, Buried Piping Installation.

1.2 QUALITY ASSURANCE

A. Tests:
1. Engage the services of a qualified testing laboratory to make tests and determine acceptability of the fill or material as listed below. Laboratory shall be acceptable to ENGINEER.
2. Field quality control testing will be performed by OWNER's testing service. CONTRACTOR shall give full cooperation to OWNER's testing personnel so that the required tests can be taken in an efficient and timely manner.
3. Required Tests:
   a. Select Fill Samples: Gradation, ASTM D 422.
   b. General Fill Samples: Gradation, ASTM D 422; Atterberg Limits, ASTM D4318
   c. Compacted General Fill: Compaction, ASTM D 1556 and ASTM D 698, ASTM D 2922.

d. Compacted Select Fill, Drainage Fill, Subbase Material and Pipe Bedding: Compaction, ASTM D 1556 and ASTM D 698, ASTM D 2922, ASTM D4253, ASTM D4254.

B. Permits and Regulations:
1. OWNER will obtain all necessary permits for work in roads, rights-of-way, railroads, etc.
2. CONTRACTOR shall obtain permits as required by local, state and federal agencies for discharging water from excavations.
3. CONTRACTOR shall perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

C. Reference Standards: Comply with applicable provisions and recommendations of the following except as otherwise shown or specified.
1. ASTM A 36, Specification for Structural Steel.
2. ASTM A 328, Specification for Steel Sheet Piling.
3. ASTM D 422, Method for Particle-Size Analysis of Soils.
4. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft – lbf/cu ft) (600 KN-m/cum).
5. ASTM D 1556, Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
6. ASTM D 2321, Practice for Underground Installation of Thermoplastic Pipe for Sewer and other Gravity – Flow Applications
7. ASTM D 2922, In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
8. ASTM D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
9. ASTM D4254, Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
10. AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.
11. Kentucky Department of Highways (KDOH), Standard Specifications for Road and Bridge Construction, 2000 Edition.
12. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650 (Subpart P - Excavations).

1.3 SUBMITTALS

A. Excavation Plan: Prior to start of excavation operations, submit written plan to demonstrate compliance with OSHA Standard 29 CFR Part 1926.650. As a minimum, excavation plan shall include:
1. Name of competent person.
2. Excavation method(s) or protective system(s) to be used.

3. Copies of "manufacturer's data" or other tabulated data if protective system(s) are designed on the basis of such data.

B. Shop Drawings: Submit for approval the following:
1. Sheeting and bracing, or other protective system(s).
2. Dewatering system.
3. Cofferdams.
4. Anticipated Protection Methods.
5. Underpinning.

Shop Drawings shall be prepared by a licensed professional engineer recognized as expert in the specialty involved. Also submit for approval, calculations and all other pertinent information. CONTRACTOR, however, will be responsible for designing, installing, operating and maintaining the system(s) as required to satisfactorily accomplish all necessary sheeting, bracing, protection, underpinning and dewatering.

C. Submit gradation and compaction test reports of all specified soil materials.

1.4 JOB CONDITIONS

A. Subsurface Information: Refer to Supplementary Conditions for Data on subsurface conditions. Data is not intended as a representation or warranty of continuity of conditions between soil borings nor of groundwater levels at dates and times other than date and time when measured. OWNER will not be responsible for interpretations or conclusions drawn therefrom by CONTRACTOR. Data are solely made available for the convenience of CONTRACTOR.
1. Additional test borings and other exploratory operations may be made by CONTRACTOR at no cost to OWNER.

B. Existing Structures: The Drawings show certain surface and underground structures adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of CONTRACTOR. CONTRACTOR shall explore ahead of the required excavation to determine the exact location of all structures. They shall be supported and protected from damage by CONTRACTOR. If they are broken or damaged, they shall be restored immediately by CONTRACTOR at his expense.

C. Existing Utilities: Locate existing underground utilities in the areas of Work. If utilities are to remain in place, provide adequate means of protection during all operations.
1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult piping or utility owner and ENGINEER immediately for directions as to procedure. Cooperate with OWNER and utility owner in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

2. In general, service lines to individual houses and businesses are not shown; however, CONTRACTOR shall assume that a service exists for each utility to each house or business.
3. Do not interrupt existing utilities serving facilities occupied and used by OWNER or others, except when permitted in writing by ENGINEER and then only after acceptable temporary utility services have been provided.
4. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

D. Protection of Persons and Property: Barricade open excavations occurring as part of the Work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.
1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

E. Dust Control: Conduct all operations and maintain areas of activity, including sweeping and sprinkling of roadways, to minimize creation and dispersion of dust. Calcium chloride may be used to control serious or prolonged dust problems, subject to approval of ENGINEER.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Select Fill:
1. Place select fill where shown or specified below and around structures, pipelines, roads, tanks, walks, and other work.
2. Use well graded sand and gravel, free from organic matter. A well-graded select fill shall have a uniformity coefficient greater than 6 for sand and greater than 4 for gravel and have a coefficient of gradation between 1 and 3 for sand and gravel. Not more than 70 percent by weight shall pass through a No. 40 sieve; not more than 10 percent by weight shall pass through a No. 200 sieve; and 100 percent shall pass through a 3-inch square sieve.
3. Advise ENGINEER in writing of source and, if required, submit a sample of the material for approval.

B. Subbase Material:
1. Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand, approved by ENGINEER.
2. Comply with the gradation conforming to Crushed Stone Base in Section 805 of the KDOH Standard Specifications for Road and Bridge Construction, 2000 Edition.

C. Drainage Fill: Gradation shall conform to the requirements for Free Draining Bedding and Backfill in Section 805 of the KDOH Standard Specifications for Road and Bridge Construction, 2000 Edition.

D. General Backfill and Fill Materials: Provide approved soil materials for backfill and fill, free of rock thicker than 6 inches or larger than 24 inches maximum in any dimension, debris, waste, frozen materials, vegetable and other organic matter and other deleterious materials. Previously excavated materials meeting these requirements may be used for backfill. All rock shall be excluded from fill within 24 inches of the pipe.

E. Riprap: Provide rock, broken concrete, or stone of sizes such that at least 85% of the total material by weight is larger than a 6-inch but less than an 18-inch square opening. At least 50% of the total material by weight shall be larger than a 12-inch square opening. The material smaller than a 6-inch square opening shall consist predominantly of rock and shall be free of soil.

F. Pipe Bedding Material:
1. Place around pipe and compact for pipe bedding material.
2. Fill shall be clean natural or washed sand and gravel, crushed gravel or crushed stone, free from cementitious substances and flat or flaky particles in an amount to cause caking, packing, yielding or uneven support for the pipe. Lime sand shall not be acceptable. All material shall be of such sizes that one-hundred percent (100%) passes the one and one half (1 ½) inch screen, 40% or less passes the No. 40 sieve, and ten (10) percent or less passes the No. 200 sieve.
3. Fill shall not consist of any organic soil or stone larger than 1½-inch in any dimension.

G. Control Density Fill:
1. Use for trench backfill where shown on the Drawings.
2. Description:
   a. Flowable fill shall consist of a mixture of cement, sand, fly ash, water and other materials approved by SD1.
3. Materials and Mixing Proportioning:
   a. Cement: 30 lbs.
   b. Fly Ash, Class F: 300 lbs. Do not allow the loss or ignition for Class F fly ash to exceed twelve (12) percent.
   c. Natural Sand (S.S.D): 3,000 lbs.
   d. Water (Maximum): 550 lbs. Water used for the mixture shall be potable and free of oil, salts, acid and other impurities that would have an adverse effect on the quality of the backfill material.
4. Properties:
   a. Average Compressive Strength:

1) 28 days: 50 to 100 psi

b. For applications that require early opening to traffic or placement of pavement as soon as possible, provide a mixture with the following properties:

1) Mixture bleeds freely within 10 minutes
2) Mixture shall support a 150-pound person within three (3) hours.

H. Flash Fill:

1. Use for trench backfill where shown on the Drawings.
2. Description:
   a. Be readily flowable to form around pipes, cables and other embedments in trenches.
   b. Achieve a quick initial set to permit paving within 4 hours of placement.
   c. Achieve an initial strength capable of bearing traffic within 4 hours of placement.
   d. Achieve an ultimate strength of no more than 100 psi so that material can be re-excavated if necessary.
3. Materials:
   a. Cement: None.
   b. Fly ash shall meet ASTM C-618, Class C or Class F, except that requirement for moisture and pozzolanic activity are waived for Class F fly ash.
   c. Sand shall be natural, recycled, or manufactured. Other filler materials may be used as a substitute with approval.
   d. Water used for the mixture shall be potable and free of oil, salts, acid and other impurities that would have an adverse effect on the quality of the backfill material.
4. Properties:
   a. Resistance to Penetration (avg. at 4 hours): 400 psi.
   b. Coefficient of Permeability: $2.6x10^{-5}$ cm/sec.
   c. Unconfined Compressive Strength:
      1) 3 Hours: 20 psi (1.44 tsf).
      2) 28 Days: 70 psi (5.0 tsf).
      3) 91 Days: 100 psi (7.2 tsf).
   d. Atterberg Limits: Non plastic.
   e. pH (at one month): 11.16.
   f. Thermal Resistivity: 45 C-cm/w.
   g. Color: Tan.
5. Mixing Proportioning:
   a. ASTM C-618 Fly Ash: 400 lbs.
   b. Sand: 2930 lbs.
   c. Water: 430 lbs.
   d. Unit Weight (Fresh Weight): 135 lbs/cu. ft.
6. Product Name:
   a. Flashfill by Roth Ready Mix Concrete Co.
   b. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. CONTRACTOR shall examine installation site, verify elevations, and observe conditions under which work is to be performed and notify ENGINEER of unsatisfactory conditions. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

B. Provide ENGINEER with sufficient notice and with means to examine the areas and conditions under which excavating, filling, and grading are to be performed. ENGINEER will notify CONTRACTOR if conditions are found that may be detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE PREPARATION

A. Clear all areas to be occupied by permanent construction or embankments of all trees, brush, roots, stumps, logs, wood and other materials and debris. Clean and strip subgrades for fills and embankments of vegetation, sod, topsoil and organic matter. All waste materials shall be removed from site and properly disposed of by CONTRACTOR. Burning will not be permitted.

3.3 TEST PITS

A. Where shown or ordered by ENGINEER, excavate and backfill, in advance of construction, test pits to determine conditions or location of existing facilities. Perform all work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

B. Payment for test pits ordered by ENGINEER will be paid for under a change order per Article 10 of the General Conditions.

C. No separate payment will be made for test pits made by CONTRACTOR for his own use.

3.4 EXCAVATION

A. Perform all excavation required to complete the Work as shown, specified and required. Excavations shall include earth, sand, clay, gravel, hardpan, boulders, bedrock, pavements, rubbish and all other materials within the excavation limits.

B. Refer to Section 02222 for Rock Removal.

C. Excavations for structures and pipelines shall be open excavations. Provide excavation protection system(s) required by ordinances, codes, law and regulations to prevent injury to workmen and to prevent damage to new and existing structures or pipelines. Unless shown or specified otherwise, protection system(s) shall be utilized under the following conditions.
   1. Excavation Less Than 5 Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
   2. Excavations More Than 5 Feet Deep: Excavations in stable rock may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded or shored and braced.
   3. Excavation protection system(s) shall be installed and maintained in accordance with drawings submitted under Article 1.3 above.

D. Where the structure or pipeline is to be placed below the ground water table, well points, cofferdams or other acceptable methods shall be used to permit construction of said structure or pipeline under dry conditions. Dry conditions shall prevail until concrete has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested and backfilled. In addition, protect excavation from flooding until all walls and floor framing up to and including grade level floors are in place and backfilling has begun. Water level shall be maintained below top of backfill at all times.

E. Pumping of water from excavations shall be done in such a manner to prevent the carrying away of unsolidified concrete materials, and to prevent damage to the existing subgrade. See also additional requirements in section 15051 BURIED PIPING INSTALLATION.

F. The elevation of the bottom of footings shown shall be considered as approximate only and ENGINEER may order such changes in dimensions and elevations as may be required to secure a satisfactory footing. All structure excavations shall be hand-trimmed to permit the placing of full widths, and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

G. When excavations are made below the required grades, without the written order of ENGINEER, they shall be backfilled with compacted gravel or concrete, as directed by ENGINEER, at the expense of CONTRACTOR.

H. Excavations shall be extended sufficiently on each side of structures, footings, etc., to permit setting of forms, installation of shoring or bracing or the safe sloping of banks.

I. Subgrades:
   1. General Requirements: The backfill shall be maintained at ±3% from optimum moisture content. The compacted fill shall remain firm and intact under all construction operations. Mud, muck, and other soft or unsuitable materials shall be removed.
   2. Subgrade Requirements for Roadways: Compact to the degree specified in Section 207 of the KDOH Standard Specifications for Road and Bridge Construction, 2000 Edition.
   3. Subgrade Requirements for Pipeline Trench Bottoms, Floor Slabs and Concrete Pads: Compact to at least 95% of the maximum Standard Proctor dry unit weight as determined by ASTM D 698.
   4. Subgrade Requirements for Footing Foundations: Compact to at least 98% of the maximum Standard Proctor dry unit weight as determined by ASTM D 698.
   5. Soft Subgrades: For subgrades which are otherwise solid, but which become soft or unsuitable on top due to construction operations, remove the soft and unsuitable material and replace with suitable backfill and recompact to the specified density.
   6. Finished Elevation of Stabilized Subgrades: Do not place above subgrade elevations shown.

J. Stability of Excavations:
   1. Sides of Excavations: Slope to comply with codes and ordinances of agencies having jurisdiction.
   2. Shoring and Bracing: Provide shoring and bracing where sloping is not possible either because of space restrictions or stability of material excavated.
   3. Safety: Maintain sides and slopes of excavations in a safe condition until completion of backfilling.
   4. Caving: If caving occurs outside the excavation area, backfill the resulting hole in accordance with the requirements of this section after removing loose material.

K. Pipe Trench Preparation: Trench construction shall be per SD1 pipe bedding and trench condition details as follows
   1. No more than 200 feet of trench may be opened in advance of pipe laying.
   2. Trench width shall be minimized to greatest extent practical but shall conform to SD1's standard trench details and the following:
      a. Flexible Pipe: Sufficient to provide room for installing, jointing and inspecting piping, but a minimum of pipe barrel OD plus two feet for 36" and less diameter pipe. For pipe that is greater than 36" in diameter, the trench width shall be the OD of the pipe plus four feet.
      b. Rigid Pipe: Sufficient to provide room for installing, jointing and inspecting piping, but a minimum of pipe barrel OD plus two feet for 36" and less diameter pipe. For pipe that is greater than 36" in diameter, the trench width shall be: **OD + 2*(OD/6).**

c. Enlargements at pipe joints may be made if required and approved by ENGINEER.
d. Sufficient for shoring and bracing, or shielding and dewatering.
e. Sufficient to allow thorough compaction of bedding material adjacent to bottom half of pipe.
f. Do not use excavating or compaction equipment, which requires the trench to be excavated to excessive width.

3. Depth of trench shall be as shown. If required and approved by ENGINEER, depths may be revised.
4. Bedding material shall be carefully placed over the full trench width before the pipe is laid to a depth of at least 6-inches and compacted in maximum of 6-inch lifts over the full trench width. Where pipe is laid in rock excavation, depth of pipe bedding below the pipe shall be at least 6-inches for pipe 24-in. and smaller and 9-inches for pipe 30-in. and larger. After laying pipe, the balance of the bedding material and backfill shall be placed as described herein.

L. Material Storage: Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.
1. Locate and retain soil materials away from edge of excavations.
2. Dispose of excess soil material and waste materials as specified hereinafter.

M. Where ENGINEER considers the existing material beneath the bedding material unsuitable, CONTRACTOR shall remove same and replace it with compacted select fill or compacted pipe bedding material.

3.5 UNAUTHORIZED EXCAVATION

A. All excavation outside the lines and grades shown, and which is not approved by ENGINEER, together with the removal and disposal of the associated material shall be at CONTRACTOR'S expense. Unauthorized excavations shall be filled and compacted with select backfill by CONTRACTOR at his expense.

3.6 AUTHORIZED UNDERCUTS

A. Subgrades for concrete structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud and muck; and shall be sufficiently stable to remain firm and intact under the feet of the workers.

B. If in the course of excavation as determined by the ENGINEER, unstable soil is encountered at the point of the bottom of the required excavation, the CONTRACTOR shall be authorized to undercut sufficiently to remove all the unstable soil to the limits specified by the ENGINEER.

C. The CONTRACTOR shall refill the undercuts with select backfill or pipe bedding material and compact same to the requirements set forth in paragraph 3.4.I, unless

other means of refill are specified or ordered by the ENGINEER.

D. The cost of removing and disposing of the unstable material and providing refill material shall be reimbursable to the CONTRACTOR at the contract unit price bid or at a mutually agreeable negotiated unit price between the CONTRACTOR and OWNER.

3.7 DRAINAGE AND DEWATERING

A. General:
1. Prevent surface and subsurface water from flowing into excavations and from flooding adjacent areas.
2. Remove water from excavation as fast as it collects.
3. Maintain the ground water level below the bottom of the excavation to provide a stable surface for construction operations, a stable subgrade for the permanent work, and to prevent damage to the Work during all stages of construction.
4. Provide and maintain pumps, sumps, suction and discharge lines and other dewatering system components necessary to convey water away from excavations.
5. Obtain ENGINEER'S approval before shutting down dewatering system for any reason.

B. Standby Requirements for Dewatering: Provide standby equipment to ensure continuity of dewatering operations.

C. Disposal of Water Removed by Dewatering System:
1. All dewatering flows are to be settled in siltation basins or directed through filtering devices before discharge to stabilized sites, such as streams or sewers; not onto exposed soils, stream banks, or any other site where the flow could cause erosion.
2. Silt from construction operations shall not be permitted to enter the storm sewer system. When construction occurs near storm sewer inlets, erosion control measures such as inlet filters and hay bales shall be used to prevent silt from entering storm sewers.
3. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the Work under construction or completed.
4. Dispose of water in such a manner as to cause no inconvenience to OWNER, ENGINEER, or others involved in work about the site.
5. Convey water from the construction site in a closed conduit. Do not use trench excavations as temporary drainage ditches.
6. CONTRACTOR shall be responsible for complying with all regulatory agency rules pertaining to dewatering and obtaining permits, if required.
7. See also additional requirements in section 15051 BURIED PIPING INSTALLATION.

3.8 SHEETING, SHORING AND BRACING

A. General:

1. Used material shall be in good condition, not damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary work.
2. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade with a bending strength not less than 1500 psi or Southern Pine No. 2 Dense.
3. All steel work for sheeting, shoring, bracing, cofferdams etc., shall be designed in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the AISC except that field welding will be permitted.
4. Steel sheet piling shall be manufactured from steel conforming to ASTM A 328. Steel for soldier piles, wales and braces shall be new or used and shall conform to ASTM A 36.
5. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
6. Unless otherwise shown, specified, or ordered, all materials used for temporary construction shall be removed when work is completed. Such removal shall be made in a manner not injurious to the structure or its appearance or to adjacent Work.
7. 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. Cutoff tops as required and leave permanently in place.
8. The clearances and types of the temporary structures, insofar as they affect the character of the finished Work, and the design of sheeting to be left in place, will be subject to the approval of ENGINEER; but CONTRACTOR shall be responsible for the adequacy of all sheeting, shoring, bracing, coffer-damming, etc.
9. Safe and satisfactory sheeting, shoring and bracing shall be the entire responsibility of CONTRACTOR.

B. Sheeting Left in Place:

1. Steel sheet piling shown to be left in place shall consist of rolled sections of the continuous interlocking type unless otherwise approved. The type and design of the sheeting and bracing shall conform to the above specifications for all steel work for sheeting and bracing. Steel sheeting designated to be left in place shall be new.
2. Steel sheet piling to be left in place shall be driven straight to the lines and grades as shown or directed. The CONTRACTOR shall determine the grade to

which the sheet piling shall be driven. The piles shall penetrate into firm materials with secure interlocking throughout the entire length of the pile. Damaged piling having faulty alignment shall be pulled and replaced by new piling.

3. The type of guide structure used and method of driving for steel sheet piling to be left in place shall be subject to the approval of ENGINEER. Jetting will not be permitted.
4. Cut off piling left in place to the grades shown or ordered by ENGINEER and remove the cut offs from the site.
5. Clean wales, braces and all other items to be embedded in the permanent structure, and ensure that the concrete surrounding the embedded element is sound and free from air pockets or harmful inclusions. Provisions shall include the cutting of holes in the webs and flanges of wale and bracing members, and the welding of steel diaphragm waterstops perpendicular to the centerline of brace ends which are to be embedded.
6. Subsequent to removal of the inside face forms, and when removal of bracing is permitted, cut back steel at least 2 inches inside the wall face and patch opening with cement mortar. Concrete shall be thoroughly worked beneath wales and braces, around stiffeners and in any other place where voids may be formed.
7. Portions of sheeting or soldier piles and breast boards which are in contact with the foundation concrete shall be left in place, together with wales and bracing members which are cast into foundation or superstructure concrete.

C. Removal of Sheeting and Bracing:
   1. Remove sheeting and bracing from excavations unless otherwise ordered in writing by ENGINEER. Removal shall be done so as to not cause injury to the Work. Removal shall be equal on both sides of excavation to ensure no unequal loads on pipe or structure.
   2. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete, until the following conditions are satisfied:
      a. Concrete has cured a minimum of 7 days.
      b. Wall and floor framing up to and including grade level floors are in place.

3.9 TRENCH SHIELDS

A. Excavation of earth material below the bottom of a shield shall not exceed the limits established by ordinances, codes, laws and regulations.

B. When using a shield for pipe installation:
   1. Any portion of the shield that extends below the mid-diameter of an installed rigid pipe (i.e. RCCP) shall be raised above this point prior to moving the shield ahead for the installation of the next length of pipe.
   2. The bottom of the shield shall not extend below the mid-diameter of installed flexible pipe (i.e. Steel, DI, PVC, etc.) at any time and shall be raised above this

point prior to moving the shield ahead for the installation of the next length of pipe.

C. When using a shield for the installation of structures, the bottom of the shield shall not extend below the top of the bedding for the structures.

D. When a shield is removed or moved ahead, extreme care shall be taken to prevent the movement of pipe or structures or the disturbance of the compacted bedding for pipe or structures. Pipe or structures that are disturbed shall be removed and reinstalled as specified.

3.10 GENERAL REQUIREMENTS FOR BEDDING, BACKFILL, FILL AND COMPACTION

A. Furnish, place and compact all fill and backfill required for structures and trenches and to provide the finished grades shown and specified, including but not limited to restoration of access roads, construction benches, etc. Unless otherwise specified, backfill and fill may be obtained from on-site sources. Additional materials, if required, shall be furnished from off-site sources at no additional cost to OWNER.

B. Backfill excavations as promptly as Work permits, but not until completion of the following:
1. Acceptance by ENGINEER of construction below finish grade including dampproofing, waterproofing, perimeter insulation, trench construction, and pipe and bedding installation.
2. Inspection, testing, approval, and recording of locations of underground utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
7. Placement of settlement plates.

C. Keep excavations dry during backfilling operations. Bring backfill around structures and piping up evenly on all sides.

D. Do not allow levels of backfill against concrete walls to differ by more than 2 feet on either side of walls unless walls are adequately braced or all floor framing is in place up to and including grade level slabs.

E. Place select backfill material above pipe encasements and as bedding material for pipelines that pass under structures, concrete pavements, or other pipelines. General backfill material may be used above pipe bedding material in other areas. Method of bedding pipe shall be as specified in Section 02610 and as shown on the Drawings.

F. Place all bedding in pipe trenches in horizontal layers not exceeding 6 inches in depth up to a point 12-inches or more above the top of the pipe and thoroughly compact each layer along the full trench width before the next layer is placed.

G. Prior to the installation of pipes which are to be installed in fill sections, place the fill as described herein, until a minimum height of 2 feet above the pipe is reached, unless otherwise required in other Sections. The fill for the trench width shall then be excavated and the pipe installed, bedded, and backfilled. The remainder of the fill shall then be placed.

H. Control the water content of backfill and fill material during placement within the range necessary to obtain the compaction specified. In general, the moisture content of the fill shall be within 3 percent of the optimum moisture content for compaction as determined by laboratory tests. Perform all necessary work to adjust the water content of the material to within the range necessary to permit the compaction specified. Do not place backfill or fill material when free water is standing on the surface of the area where the backfill or fill is to be placed. No compaction of backfill or fill will be permitted with free water on any portion of the material to be compacted.

I. Do not place or compact backfill or fill in a frozen condition or on top of frozen material. Remove backfill or fill containing organic materials or other unacceptable material and replace with approved backfill material.

J. Perform Compaction of bedding, backfill and fill with equipment suitable for the type of material placed and which is capable of providing the densities required. CONTRACTOR shall select compaction equipment and submit it and his proposed procedure to ENGINEER for approval.

K. Compacted bedding, backfill, and fill shall be compacted by at least two coverages of all portions of the surface of each lift by compaction equipment. One coverage is defined as the condition obtained when all portions of the surface of the material have been subjected to the direct contact of the compactor.

L. Test the effectiveness of the equipment selected by CONTRACTOR at the commencement of compaction by construction of a small section of trench, backfill or fill within the area where material is to be placed. If tests on this section show that the specified compaction is not obtained, CONTRACTOR shall increase the number of coverages, decrease the lift thicknesses or obtain a different type of compactor. No additional cost to OWNER shall be incurred.

M. Perform backfill around structures using the specified procedures, except that within 10 feet of foundations and underground structures, light compaction equipment shall be used, with the gross weight of the equipment not exceeding 7,000 pounds.

Provide equipment that is capable of the required compaction within restricted areas next to structures and around piping.

3.11 PIPE BEDDING

A. Bedding Pipe: Bed pipe as specified below. Piping refers to the main line pipe as well as any service laterals or connections to the mainline pipe.
   1. Trench excavation, backfill, bedding materials and compaction shall conform to the requirements of this section 02220.
   2. Excavate trenches below the pipe bottom by the amount specified below.
   3. Remove all loose and unsuitable material from the trench bottom in accordance with 3.6, Authorized Undercuts.
   4. Use pipe bedding material as specified in 2.1.F .
   5. Where pipe is installed in a trench excavation, pipe bedding shall be carefully placed and compacted over the full trench width before the pipe is laid. Depth of pipe bedding below the pipe shall be at least 6 inches for pipe 24-in. and smaller and 9 inches for pipe 30-in. and larger. After laying pipe, the balance of the bedding shall be placed as described herein.
   6. Carefully and thoroughly compact all pipe bedding with equipment that achieves the degree of compaction specified in 3.14, Compaction Specifications.
   7. Excavate for bell holes in bedding carefully so as not to disturb the surrounding compacted material and lay pipe so that the bell bears uniformly on the compacted trench bedding material beneath the pipe.
   8. Do not lay pipe until the ENGINEER approves the bedding condition. If a conflict exists obtain clarification from ENGINEER before proceeding.
   9. Continue placement of bedding material around pipe. Place all bedding and backfilling in pipe trenches in horizontal layers not exceeding 6 inches in depth and thoroughly compact each layer before the next layer is placed. Bedding material shall be sliced or worked-in along the length of the pipeline during each 6-inch layer lift and then compacted.
   10. No pipe shall be brought into position until the preceding length has been bedded and secured in its final position.
   11. Bedding and initial backfill continues to 12 inches above the top of the pipe.
   12. See Sewer Trench Compaction Detail that follows this section.

3.11.1 Normal Backfill

A. After the pipe sections have been embedded up to a point 12-inches or more above

the top of the pipe, the pipe sections have been encased in concrete, or the structures or appurtenances have been constructed, as specified on the drawings, the remainder of the trench or excavated area shall be backfilled using trench or structure excavated material if it meets the requirements set forth under 2.1.D. General Backfill and Fill Materials. If the material does not meet these requirements, the trench or structure excavated material shall be wasted and suitable imported material shall be used for backfill.

B. Backfill shall be placed in horizontal loose lifts not exceeding 8 inches in thickness and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Backfill shall then be compacted as specified under 3.11 Compaction Specifications up to existing ground level or finished grade level if same has been established.

3.11.2 Rock Backfill

A. Where the trench is located in areas from which rock had to be excavated in a quantity other than isolated stones, the excavated rock may be used as part of the backfill above a point 2 feet or more above the top of the pipe, or above a point 1 foot above pipe encasement, but shall not be used under pavement areas, unless specifically authorized by the ENGINEER.

B. The rock fragments used in the backfill shall not exceed rock thicker than 6 inches or larger than 24 inches maximum in any dimension, shall not be dropped into the trench directly over the pipe centerline and shall be used with sufficient smaller dimensioned material so that voids between larger fragments shall be filled. Compaction shall meet the requirements specified under 3.11 Compaction Specifications up to existing ground level or finished grade level if same has been established.

C. Rock shall not be used in the top 12-inches of the backfill, except across creeks, gullies, ravines or areas designated by the ENGINEER, where the rock may be used to the existing ground level as specified on the drawings.

3.12 COMPACTION SPECIFICATIONS

A. Requirements based on material types are as follows:

1. Select Fill, Drainage Fill and Pipe Bedding: For fill and bedding beneath structures and foundations, compact granular materials that exhibit a well-defined moisture density curve to at least 98 percent of the standard proctor maximum dry density (ASTM D698). For all other fill and bedding, compact granular materials that exhibit a well-defined moisture–density curve to at least 95 percent (ASTM D698). Moisture-condition fill materials to within a range of two (2) percent below to three (3) percent above optimum moisture content

(ASTM D698). Compact granular materials that do not exhibit a well-defined moisture-density curve to at least 85 percent relative density (ASTM D4253 and D4254) beneath structures and foundations, and to at least 75 percent relative density (ASTM D4253 and D4254) for all other areas.

2. Subbase Material: Compact granular materials that exhibit a well-defined moisture-density curve to at least 100 percent (ASTM D698). Moisture-condition subbase material to within one (1) percent of optimum moisture contents (ASTM D698). Compact granular materials that do not exhibit a well-defined moisture density curve to at least 85 percent relative density (ASTM D4253 and D4254).

3. General Fill and Backfill: Compact materials that exhibit a well-defined moisture density curve to at least 98 percent of the standard proctor maximum dry density (ASTM D698) beneath structures, foundations and the top one (1) foot below pavements, and at least 95 percent (ASTM D698) in all other areas. Moisture-condition fill materials to within a range of two (2) percent below to three(3) percent above optimum moisture content (ASTM D698). Compact granular or rock materials that do not exhibit a well-defined moisture-density curve to at least 85 percent relative density (ASTM D4253 and D4254) beneath structures and foundations, and to at least 75 percent relative density (ASTM D4253 and D4254) for all other areas.

B. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, or because of soil moisture content, the CONTRACTOR shall perform whatever work is required to provide the required densities. This work shall include complete removal of unacceptable bedding, backfill or fill areas, and replacement and recompaction until acceptable densities are provided.

C. CONTRACTOR shall repair, at his own expense, any Settlement that occurs within the construction area. He shall make all repairs and replacements necessary within 30 days after notice from ENGINEER or OWNER.

3.13 EMBANKMENTS

A. To the maximum extent available, use excess earth obtained from structure bench and trench excavations for construction of embankments. Obtain additional material from borrow pits as necessary. After preparation of the embankment area, level and roll the subgrade so that surface materials of the subgrade will be compact and well bonded with the first layer of the embankment. All material deposited in embankments shall be free from rocks or stones, more than 6 inches thick or larger than 24 inches in maximum dimension, brush, stumps, logs, roots, debris, and organic or other objectionable materials. Construct embankments in horizontal layers not exceeding 8 inches in uncompacted thickness. Spread and level material

deposited by excavating and hauling equipment prior to compaction. Thoroughly compact each layer by rolling or other method acceptable to the ENGINEER to at least 98 percent of the maximum density within two (2) to three (3) percent of optimum moisture content as determined by ASTM D 698 beneath structures and foundations, and 95 percent (ASTM D698) in all other areas. If the material fails to meet the density specified, compaction methods shall be altered. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 24 inches above the top of the pipe before the trench is excavated.

3.14 STRUCTURE FILL

A. Provide structure fill in the following locations:
   1. Support for structure foundations where CONTRACTOR excavates below design subgrade shall be provided at CONTRACTOR'S expense.
   2. Support below and around piping and foundations as directed by ENGINEER.
   4. Subgrade for roads and pavements.
   5. Restoration of construction benches and access roads.
   6. Where shown or directed by ENGINEER.

B. Subgrade surface shall be level, dry, firm and subject to ENGINEER'S approval. Do not place fill if any water is on the surface of area to receive fill. Do not place or compact fill in a frozen condition or on top of frozen material.

C. Place fill in horizontal loose lifts of 8 inches maximum thickness. It shall be mixed and spread in a manner to assure uniform lift thickness after placing.

D. Compact each layer of fill before placement of the next lift.

E. Do not use fill containing topsoil, rubble, debris, wood or other organic matter. Fill containing unacceptable material shall be removed and disposed of.

F. The water content of the fill being compacted shall be within the range of two (2) percent below to three (3) percent above the optimum moisture content of the material. CONTRACTOR shall wet or dry the fill materials during placement to achieve water contents needed for effective compaction.

G. Perform compaction of fill with equipment suitable for the type of fill material being placed. Select equipment, which is capable of providing the densities, required and submit selection of the equipment to ENGINEER for approval.

H. Compact each layer of fill material by at least two complete coverages of all portions of the surface of each lift using approved compaction equipment. One coverage is defined as the condition reached when all portions of the fill lift have been subjected to the direct contact of the compacting surface of the compactor.

I. The minimum density to be obtained in compacting the structural fill shall be 98 percent of the standard Proctor maximum dry density (ASTM D698) beneath structures and foundations, and 95 percent (ASTM D698) in all other areas. If the field and laboratory tests indicate unsatisfactory compaction, CONTRACTOR shall provide the additional compaction necessary to obtain the specified degree of compaction. All additional compaction work shall be performed by CONTRACTOR at no additional cost to OWNER until the specified compaction is obtained.

J. Structure fill necessary to replace subgrade materials disturbed and softened as a result of CONTRACTOR'S operations or to backfill unauthorized excavation shall be provided, placed and compacted at CONTRACTOR'S expense.

3.15 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth subgrade surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:
   1. Turfed Areas or Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover to within not more than 1 inch above or below the required subgrade elevations.
   2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1 inch above or below the required subgrade elevation.
   3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2 inch above or below the required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2 inch when tested with a 10 foot straightedge.

D. Compaction:
   1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.16 PAVEMENT SUBBASE COURSE

A. General: Place subbase material, in layers of specified thickness, over ground surface to support pavement base course.
   1. See other Sections of Division 2 for paving specifications.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

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

D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.
   1. When a compacted subbase course is shown to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in thickness when compacted.

3.17 DISPOSAL OF EXCAVATED MATERIALS

A. Material removed from the excavations which does not conform to the requirements for fill or is in excess of that required for backfill shall be hauled away from the project site by the CONTRACTOR and disposed of in compliance with ordinances, codes, laws and regulations at no additional cost to the OWNER.

3.18 RESTORING AND RESURFACING EXISTING ROADWAYS AND FACILITIES

A. Place 1-1/2 inches of temporary bituminous pavement immediately after backfilling trenches in paved roadways, which are to be retained for permanent use. Maintain the surface of the paved area over the trench in good and safe condition during progress of the entire Work, and promptly fill all depressions over and adjacent to the trench caused by settlement of backfilling. The permanent replacement pavement shall be equal to that of the existing roadways unless otherwise specified.

B. Pavement, gutters, curbs, sidewalks or roadways disturbed or damaged by the CONTRACTOR'S operations shall be restored by him at his own expense to as good condition as they were previous to the commencement of the Work and in accordance with applicable local and state highway specifications.

3.19 TEMPORARY FENCING

A. Furnish and install a temporary fence surrounding excavations and work area. Fence shall have openings only at vehicular, equipment and worker access points.

B. The fence shall be a snowfence type enclosure, 48 inches high. Fence shall be constructed of vertical hardwood slats measuring 1-1/2 by 1/4-inch interwoven with strands of horizontal wire, or shall be of equivalent plastic construction. Posts shall be of steel, either U, Y, T or channel section, and shall have corrugations, knobs, notches or studs placed and constructed to engage a substantial number of fence line wire in the proper position. Posts shall have tapered anchors weighing 0.67 pounds or more, each firmly attached by means of welding, riveting or clamping. Posts shall have a nominal weight of 1/3 pound per linear foot exclusive of the anchor. Each post shall be furnished with a sufficient number of galvanized wire fasteners or clamps, of not less than 0.120-inch in diameter for attaching fence wire to the post.

3.20 ENVIRONMENTAL PROTECTION AND RESTORATION

A. CONTRACTOR shall be responsible for complying with all regulatory requirements pertaining to environmental protection and restoration. CONTRACTOR shall follow all erosion control design provisions shown in the Erosion Prevention and Sediment Control Plan, drawings, and specifications. CONTRACTOR shall provide, install, and maintain additional erosion and sediment control measures as necessary to retain disturbed sediments on-site.

B. All disturbed areas of the site shall be stabilized. Stabilization shall begin within 7 days on areas of the site where construction activities have permanently or temporarily (for 30 days or more) ceased. When snow cover causes delays, stabilization shall begin as soon as possible. Stabilization practices include seeding, mulching, placing sod, planting trees or shrubs, and using geotextile fabrics and other appropriate measures.

3.21 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: The OWNER's testing service must inspect and approve subgrades and fill layers before construction work is performed thereon. Tests of subgrades and fill layers shall be taken as follows:
   1. Footing Subgrade: 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 subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to ENGINEER.
   2. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 square feet of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test

for every 2000 square feet of overlaying building slab or paved area, but in no case less than 3 tests.

3. Compacted bedding material beneath and around pipe in trenches: Make at least one field density test of compacted bedding at the start of the project to ensure CONTRACTOR's method of compacting the bedding is meeting the compaction requirements. OWNER shall periodically call for tests of bedding compaction as the Work progresses and if the CONTRACTOR's pipe placement operations differ from proper procedures.

B. If testing service reports or inspections show subgrade, fills, or bedding compaction are below specified density, CONTRACTOR shall remove any unacceptable materials as necessary and replace with specified materials and provide additional compaction at the CONTRACTOR's sole expense until subgrades, bedding, and backfill are acceptable as specified herein. The costs for the retesting of these subgrade, fills, or bedding materials that did not originally meet the specified density shall be paid by the CONTRACTOR.

++ END OF SECTION ++

SECTION 02222

ROCK REMOVAL

PART 1 – GENERAL

1.01 WORK INCLUDED

A. The CONTRACTOR shall excavate rock, if encountered, as required to perform the required work, and shall dispose of the excavated material, and shall furnish acceptable material for backfill in place of the excavated rock.

B. CONTRACTOR shall utilize blasting if required and specified otherwise rock shall be removed by a suitable mechanical method.

C. In general, rock in pipe trenches shall be excavated so as to be not more than 6 inches below the invert of the pipe after it has been laid.

D. No additional payment will be made for rock excavation.

1.02 References

A. NFPA 495 – Explosive Materials Code

B. Commonwealth of Kentucky Department of Mines and Minerals, Laws and Regulations Governing Explosives and Blasting.

1.03 REGULATORY REQUIREMENTS

A. Comply with Federal, State, and Local Regulations and National Codes on the purchase, transportation, storage, and use of explosive material. Federal Regulations and National Codes include but are not limited to the following:

1. Storage, security, and accountability: Bureau of Alcohol, Tobacco, and Firearms (BATF): 27 CFR Part 181.
2. Shipment: DOT, 49 CFR Parts 171-179, 390-397.
3. Safety and Health: OSHA 29 CFR Part 1926, Subpart U.
4. Transportation and Storage: NFPA 495, Chapters 3 through 6.
5. Kentucky Department of Mines and Minerals code for explosive disintegration of rock.

B. Obtain permits from local authorities having jurisdiction before explosives are brought to site or drilling is started.

1.04 DEFINITIONS

A. Rock: A naturally occurring hard inorganic material that is in-situ. Rock may be either of sedimentary, igneous, or metamorphic origin, and is solid, bedded, jointed or fractured, and cannot be removed without ram hammering or systematic drilling and blasting; and boulders, masonry or concrete, except pavement, exceeding 1 cubic yard volume.

B. Blaster in Charge (BIC): One competent, experienced person shall be specifically designated as Blaster-in-Charge (BIC); the BIC shall be in charge of explosives and blasting operations.

C. Explosives and Initiating Devices: Explosives and initiating devices include, but are not limited to, dynamite and other explosives, slurries, water gels, emulsions, blasting agents, initiating explosives, detonators, and detonating cord.

D. Shot: Explosive charge designed to fracture rock when detonated.

1.05 QUALITY ASSURANCE

A. Prepare blasting plan in accordance with applicable regulatory requirements. Obtain written approval before bringing any explosives and initiating devices to the jobsite and beginning blasting. The blasting plan is for quality control and record keeping purposes. The review of the blasting plan does not relieve the Contractor of the responsibility for using existing drilling and blasting technology and for obtaining the required results in a safe manner. The blasting plan shall include, but not be limited to the following minimum requirements:

1. Part 1: Include a complete summary of proposed transportation, handling, storage, safety precautions, and use of explosives and initiating devices, and include the name of the Blaster in Charge (BIC), who will supervise and be responsible for blasting operations, written evidence of past experience and competency, and a minimum of three references for that person.

2. Part 2: Shall contain the general concept for the blasting, including the following minimum requirements:

   a. Typical plan and section view of the drill pattern for controlled blast holes, and production blast holes as necessary. Indicate stations or coordinates for the areas to be shot and number of holes. Show the free face, burden, hole diameters, depths, spacings, inclinations, and depth of subdrilling if any.

b. Individual blast hole loading pattern diagram for each type of shot anticipated showing:
   (1) Location of each hole.
   (2) Maximum dimensions for width, length, depth of shot.
   (3) Amount of each type of explosive in each hole including primer and initiators.
   (4) Location, type, and depth of stemming.

c. Initiation and delay methods, delay times and overall power factor.

d. Manufacturer's data sheets for all explosives and initiating devices.

e. Controls of noise, dust, fly rock, airblast and vibrations.

f. Data necessary to support the adequacy of the Contractor's proposed efforts regarding the safety of structures and slopes.

g. Information on test blasts (planned by the Contractor or) required by the regulatory authorities.

B Videotape preblast conditions with audible descriptions of observed conditions. Provide and install vibration monitors and sensors at designated locations in accordance with blasting plan.

C. Blasting and liability insurance in accordance with Kentucky Department of Highway (KDOH) and Sanitation District No. 1 (Owner) requirements.

D. Comply with local and state safety codes in effect at the time of the work, observe the recommendations set forth in Employers Mutual, Factory Mutual or Associated General Contractors safety manuals and shall be completely responsible for all blasting operations.

E. Blasting shall only be done by a Kentucky certified blaster and will be referred to herein as the BIC. The BIC shall maintain documentation of current license at the site for review by regulatory authorities and OWNER.

F. Explosives and caps shall be kept in separate locked metal boxes, painted a bright color and stenciled with approved warning signs. When not in use, explosives and caps shall be stored in separate magazines. Whenever a blast is made, signals warning persons of danger shall be given in ample time. Suitable timber or steel blasting mats shall be used over blast area to confine all material lifted by blasting.

G. Excessive blasting or overshooting will not be permitted. Any material outside the authorized excavation limits which is shattered or loosened by blasting shall be removed at the CONTRACTOR'S expense. The OWNER shall have the authority, with notice, to order blasting stopped if the method or amount is causing overshooting or is dangerous to life or destructive to property.

H. Preparation: Provide security, notification of adjacent owners, warning signs, guards, clearances, and other protective measures and procedures necessary to this project.

I. Protection: Protect existing features and facilities from damage, movement or gas-induced pressures. Make proper use of blasting mats and other protective devices, adopting additional precautions necessary to prevent damage to trees, shrubs, and other landscape features, buildings, utilities, monuments, and other structures. Should damage occur, make restoration as required by the OWNER at no additional cost to the OWNER.

1.06 SCHEDULING

Requirements: Schedule blasting between the hours of ( ) and ( ), and only on ( ) days.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Explosives: Type recommended by explosives firm and required by authorities having jurisdiction.

B. Delay devices: Type recommended by explosives firm and conforming to state regulations.

C. Blasting mat materials: Type recommended by explosives firm and conforming to state regulations.

PART 3 – EXECUTION

3.01 PREBLAST STRUCTURE SURVEY

A. Perform a preblast survey to determine and document with pictures the condition of adjacent structures, utilities, wells, buried cables, and other features within a minimum of 400 ft. of the blast area unless otherwise required by applicable regulatory authorities. Determine safe distances to structures or other facilities according to NFPA 495, Appendix B. Where facilities are closer than these distances, and natural barriers are not present, or when the amount of explosive cannot be reduced economically, blasting mats shall be used. Provide mats to protect environmentally sensitive areas, trees within 20 feet from the blasting area, streams, and rock formations from throw rock.

B. Purpose of survey is to document existing condition of structures prior to blasting, and is intended to be used as evidence in ascertaining whether and to what extent damage may have occurred as result of blasting.

C. Conduct survey prior to start blasting.

D. Record information for each structure surveyed:

1. Age and type of construction.
2. Location and character of cracks.
3. Evidence of settlement and leakage.
4. Other pertinent information.

E. Record preblast survey information on forms prepared specifically for preblast surveys.

F. Supplement written records with photographs or videotape recordings.

G. Submit copies of written records and photographs or videotapes to respective property owner, as well as, OWNER and ENGINEER, prior to start of blasting.

3.02 BLAST DESIGN

A. Design each blast to avoid damage to existing facilities, adjacent property, and completed Work. Consider effects of blast-induced vibrations and air blast, and fly rock potential in design of each blast.

B. Whenever peak particle velocity exceeds vibration limits, change design of subsequent blasts, as necessary to reduce peak particle velocity to within limits established by BIC.

C. Whenever air blast exceeds limits, change design of subsequent blasts or provide controls necessary to reduce air blast to within specified limits.

3.03 VIBRATION LIMITS

General: Establish appropriate maximum limit for air blast for each structure or facility that is adjacent to or near blast sites. Base maximum limits on expected sensitivity of each structure or facility to air blast, and federal, state, or local regulatory requirements, but not to exceed 0.015 psi peak overpressure (133 decibels).

3.04 AIR-BLAST LIMITS

Establish appropriate maximum limit for air blast for each structure or facility that is adjacent to or near blast sites. Base maximum limits on expected sensitivity of each structure or facility to air blast, and federal, state, or local regulatory requirements, but not to exceed 0.015 psi peak overpressure (133 decibels).

3.05 FLY ROCK CONTAINMENT

Where fly rock may damage existing facilities, adjacent property, or completed Work, cover area to be blasted with blasting mats or provide other means that will contain and prevent scattering of blast debris.

3.06 VIBRATION AND AIR-BLAST MONITORING

A. Monitor and record blast-induced vibrations and air blast using suitable sensors and recording equipment for each blast.

B. Seismograph Requirements:
   1. Designed for monitoring blast-induced vibrations and air blast.
   2. Capable of recording particle velocity in three mutually perpendicular directions in range from 0 to 6 inches per second.
   3. Flat vibration frequency response between 4- and 200-Hz.
   4. Capable of recording air-blast overpressure up to 140 decibels.
   5. Flat air-blast frequency response between 2- and 500-Hz.

C. Monitor on, or at, structures or other facilities that are closest to point of blasting. Monitoring more distant facilities that are expected to be sensitive to blast-induced vibrations and air blast.

D. BIC shall supervise establishment of monitoring programs and initial operation of equipment; review interpretation of records and recommend revisions of blast designs.

E. Include following information in blasting plan.
   1. Vibration and air-blast limits as recommended by BIC.
   2. Name of qualified BIC who will be responsible for monitoring program and interpretation of records.
   3. Types and models of equipment proposed for monitoring.
   4. Numbers and locations of proposed monitoring stations.
   5. Procedures to be used for coordinating recording of each blast.
   6. Steps to be taken if blasting vibrations or air blast exceed limits.

3.07 EXPLOSIVES

The CONTRACTOR shall keep explosives on the site only in such quantity as may be needed for the Work under way and only during such time as they are being used. Notify the OWNER, in advance, of provisions to store and use explosives.

3.08 BLASTING PRECAUTIONS

A. Permission for any deviation from the blasting plan and other specified restrictions shall be secured from the OWNER and applicable authorities, in writing; however, permission for any such deviations shall not relieve the CONTRACTOR from any responsibility in the event of damage to buildings, structures or utilities.

B. All operations involving explosives shall be conducted with all possible care to avoid injury to persons and property. Blasting shall be done only with such quantities and strengths of explosives and in such a manner as will break the rock approximately to the intended lines and grades and yet will leave the rock not to be excavated in an unshattered condition. Care shall be taken to avoid excessive cracking of the rock upon or against which any structure will be built, and to prevent injury to existing pipes or other structures and property above or below ground. Rock shall be well covered with logs or mats, or both, where required. Sufficient warning shall be given to all persons in the vicinity of the Work before a charge is exploded.

C. The CONTRACTOR shall be solely responsible for his blasting operations. The CONTRACTOR shall not hold the OWNER and/or the ENGINEER liable for any damages resulting from his blasting operations on this project.

3.09 BLASTING RECORDS

A. For each blast, document the following:

1. Location of blast in relation to Project stationing or state plane coordinate system and elevation.
2. Date and times of loading and detonation of blast.
3. Name of person in responsible charge of loading and firing.
4. Details of blast design, as previously specified.
5. Vibration records including location and distance of seismograph geophones to blast and to nearest structure, and measured peak particle velocity. Report peak particle velocity in units of inches per second.
6. Air-blast records. Report peak air blast values in units of pounds per square inch overpressure above atmospheric or in decibels at linear response.
7. Comments by BIC regarding damage to existing facilities, adjacent property, or completed Work, misfires, fly rock occurrences, unusual results, or unusual effects as required.

3.10 SUSPENSION OF BLASTING

A. In event damage to existing facilities, adjacent property, or completed Work occurs due to blasting, immediately suspend blasting and report damage to ENGINEER and OWNER. CONTRACTOR shall be responsible for all costs of repairs or replacement due to damage from blasting.

B. Before resuming blasting operations, adjust design of subsequent blasts, or take other appropriate measures to control effects of blasting, and submit complete description of proposed changes for reducing potential for future damage.

C. Do not resume blasting until authorized by OWNER and applicable regulatory authorities.

3.11 ROCK REMOVAL – MECHANICAL METHOD

A. Excavate and remove rock by the mechanical method. Drill holes and utilize mechanical impact to fracture rock.

B. In utility trenches, excavate 6 inches below invert elevation of pipe and 24 inches wider than pipe diameter.

C. Stockpile excavated materials and reuse select materials for site landscaping. Remove and dispose of excess materials offsite at approved location.

D. Correct unauthorized rock removal in accordance with backfilling and compacting requirements of Section 02220.

3.12 PAYMENT

Rock excavation shall be bid incidental to the Work and will not be paid for separately.

++ END SECTION ++

SECTION 02606

MANHOLES & AIR/VACUUM RELEASE VALVE VAULTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope: CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown on the Design Drawings, specified herein and required to furnish and install all precast and cast-in-place manholes, air release manholes and bypass pumping vaults.

B. General:
1. Manholes shall conform in shape, size, dimensions, material, and other respects to the details shown or as ordered by ENGINEER.
2. Cast-iron frames, grates and covers shall be as shown on the drawings.
3. Concrete for cast-in-place manholes and for inverts in precast manholes shall conform to the requirements of Section 03300.

1.2 QUALITY ASSURANCE

A. Reference Standards:
1. ASTM C 33, Standard Specification for Concrete Aggregate.
2. ASTM C 76, Class III Reinforced Concrete Pipes.
3. ASTM C 443, Specifications for Joints for Circular Concrete Sewer and Culvert Pipe, using Rubber Gaskets.
4. ASTM C 478, Specification for Precast Reinforced Concrete Manhole Sections.
5. ASTM C 579, Standard test method for compressive strength of chemical resistant mortars, grouts, monolithic surfacing and polymer concretes.
6. ASTM C 857, Standard Practice for Minimum Structural Design Loading for underground Precast Concrete Utility Structures.
7. ASTM C 923, Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes, and Laterals.
8. ASTM D 695, Standard Test Method for Compressive Properties of Rigid Plastics.
9. ASTM D 790, Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
10. ASTM C 990, Standard Specification for Joints for Concrete Pipe, Manholes, Precast Box Sections Using Preformed Flexible Joint Sealants.

11. ASTM C 1244, Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill.
12. ASTM D 4161, Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.
13. ASTM D 6783, Standard Specification for Polymer Concrete Pipe.
14. ASTM F 477, Specification for Elastomeric Seals (gaskets) for Joining Plastic Pipe.
15. AWWA C 110, Ductile-Iron and Gray-Iron Fittings, 3 in. through 48 in., for Water and Other Liquids.
16. AWWA C 111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.AWWA C 115, Flanged Ductile-Iron Pipe with Threaded Flanges.
17. AWWA C 151, Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.
18. AWWA C 302, Reinforced Concrete Pressure Pipe, Noncylinder Type, for Water and Other Liquids.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
   1. Design Drawings showing design and construction details of all precast concrete and cast-in-place manholes including details of joints between the manhole bases and riser sections and stubs or openings for the connection of sewers. Design Drawings shall also show invert elevations of all pipe connections entering and leaving the manhole along with flowline slope across the base.
   2. Manufacturer's name for all precast structures.

B. Submit a laying schedule of each manhole showing elevations and manhole components to be used from base to casting.

C. For manhole interior linings, if required, submit calculations for the round manhole lining that demonstrate hoop strength under maximum hydrostatic conditions. The calculation shall assume zero liner adhesion to the existing structure, but assume lateral support from the existing wall. The calculated hoop stress shall be less than 11% of the compressive strength as determined by appropriate ASTM test method.

PART 2 - PRODUCTS

2.1 PRECAST CONCRETE MANHOLES, AIR RELEASE MANHOLES, AND BYPASS PUMPING VAULTS

A. General:

1. Precast manholes shall conform to the details shown on the Standard Details.
2. Concrete shall be minimum 4000 psi compressive strength.
3. Except where otherwise specified precast manhole components shall consist of reinforced concrete pipe sections especially designed for manhole construction and manufactured in accordance with ASTM C 478 except as modified herein.
   a. Standard Manholes shall be six (6) feet or more in depth, measured from the base of the cover frame to the invert of the outlet and shall be concentric cone-type, top construction as shown on the Design Drawings.
   b. Shallow Manholes shall be less than six (6) feet in depth, measured from the base of the cover frame to the invert of the outlet and shall be of flat-top construction as shown on the Design Drawings.
4. Precast, reinforced concrete manhole bases, riser sections, flat slabs and other components shall be manufactured by wet cast methods only, using forms which will provide smooth surfaces free from irregularities, honeycombing or other imperfections.
5. All precast manhole components shall be of approved design and of sufficient strength to withstand the loads imposed upon them. They shall be designed for a minimum earth cover loading of 130 pounds per cubic foot, an H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact.
6. Precast concrete manhole sections (including eccentric and concentric cones, risers and grade rings) shall conform to ASTM C 478 except sections deeper than 12 feet shall have reinforcing equal to that of ASTM C76 Class III reinforced concrete pipes, unless otherwise noted on the Design Drawings.
7. Lifting holes, if used in manhole components, shall be tapered, and no more than two shall be cast in each section. Tapered, solid rubber plugs shall be furnished to seal the lifting holes. The lifting holes shall be made to be sealed by plugs driven from the outside face of the section only.
8. Mark date of manufacture, manhole number as shown on the Design Drawings, and name or trademark of manufacturer on inside of barrel.

B. Manhole Bases Sections:

1. Precast concrete manhole base sections shall be "monolithic", consisting of base slab and base riser (barrel) section.
   a. Precast base sections shall be furnished with an integral anti-

flotation footing, thickness as specified hereinafter, extending trench bank-to-bank as shown in the Standard Details (minimum 8" projection).

b. Precast concrete manhole base slab thickness shall comply with the following schedule:

0.0' – 15.0'	Vertical Height	- 8" Slab
15.1' – 20.0'	Vertical Height	- 10" Slab
20.1' – 25.0'	Vertical Height	- 12" Slab
25.1' – 30.0'	Vertical Height	- 14" Slab

d. Manholes over 30 feet shall be designed by a Professional Engineer registered in the State of Kentucky. Submittals shall be provided to the District for review & approval.

c. Manhole bases shall have two cages of reinforcing steel in their walls, each of the area equal to that required in the riser sections. Wall thickness shall not be less than 5 inches.

d. There should be a minimum of twelve (12") inches between the outside diameters of all pipe penetrations in the base section.

e. Base riser shall extend a minimum twelve (12) inches above the top of the highest pipe in the base.

2. Flow channel (invert) and apron (bench) shall be poured separately at the point of manufacture to the dimensions shown on the Design Drawings.

b. The flow channel through manholes should be made to conform in shape and slope to that of the sewers.

c. Invert shall be smooth and semi-circular in cross-section of the same diameter of the pipe leaving the manhole.

d. Changes of direction of flow or sewer centerline within the manhole shall be made by forming the flow channel along a smooth curve with as long radius as the inside of the manhole will allow.

e. Bench shall slope toward invert at not less than one (1) inch per foot.

3. All precast base sections with pipe openings shall be furnished with ASTM C 923 pipe-to-manhole connector gaskets as specified hereinafter.

C. Manhole Barrel Sections:

1. Manhole barrel sections shall have reinforcing steel in their walls, Wall thickness shall not be less than 5 inches.

2. The barrel of the manhole shall be constructed of various lengths of riser pipe manufactured in increments of one foot to provide the correct height with the fewest joints. Openings in the barrel of the manholes for sewers or drop connections will not be permitted closer than one foot from the nearest joint. Special manhole base or riser sections shall be furnished as necessary to meet this requirement.

3. The barrel sections shall be of the height required, but not less than

one (1) foot in height. No opening shall be cut into a barrel section, the maximum dimension of which exceeds one-half (1/2) the section height.

4. Joints between manhole components shall be the tongue and groove. The circumferential and longitudinal steel reinforcement shall extend into the tongue and groove ends of the joint without breaking the continuity of the steel. Joints between the base sections, riser sections and top slabs of manholes 72 inches in diameter and less shall be rubber and concrete joints. Joints for manhole components greater than 72 inches in diameter shall be provided with steel bell and spigot rings.
5. Precast manhole section joints shall be joined with one of the following products:
   a. ASTM C 443, a single, continuous rubber O-ring gasket and shall conform to AWWA C302.
   b. ASTM C-990, flexible butyl resin sealant such as Conseal CS-102, CS-202 as manufactured by Concrete Sealants, Inc.
   c. Hamilton-Kent "Kent-Seal No. 2"
   d. K.T. Snyder Co. "Rub'r-Nek"
   e. Press Seal Gasket "E-Z Stik"
6. All precast barrel sections with pipe openings shall be furnished with ASTM C 923 pipe-to-manhole connector gaskets as specified hereinafter.

D. Cone Sections and Top Slab:
1. A precast concentric cone or precast top slab shall be provided at the top of the manhole barrel to receive the cast iron frame and cover or floor access hatch cover as shown on the Design Drawings. Eccentric cones will be evaluated on a case by case basis.
2. Cone sections and top slabs shall be designed for an H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact.
3. Cone sections for standard manholes shall have a minimum 8" thick upper walls and shall not exceed 3'-0" in height.
4. Concrete top slabs shall not be less than 8 inches thick.

E. Drop Manhole:
1. Drop Manholes shall conform to all provisions specified herein, with the additional requirements for the drop pipe as shown on the Design Drawings.
2. The drop pipe shall be of the same material and diameter as the inlet sewer pipe used.
3. Drop pipe shall be totally enclosed in concrete, formed, with a minimum covering dimension of six (6) inches.
4. No drop pipes shall be allowed inside of the manholes, unless otherwise approved by the Owner.
5. Base shall be cast to support drop connection.

6. If the slope of the influent sewer is greater than or equal to five (5) percent, a detailed drop connection drawing needs to be submitted. All other influent sewer slopes and drop connections will be evaluated on a case by case basis.
7. If the total height of the drop is greater than sixteen (16) feet, a Vortex Assembly must be used. See section 2.8

F. Acceptable Manufacturers
1. Aerocrete
2. Sherman Dixie
3. KOI
4. Hanson
5. or equal

2.2 MISCELLANEOUS METALS

A. Metal frames, covers, floor access hatch covers, steps, toe pockets and similar required items shall be provided as shown on the Design Drawings.

2.3 FLEXIBLE PIPE JOINT SEAL

A. A flexible pipe joint seal shall be provided in the connection of pipe to manholes and other miscellaneous structures. The rubber seal shall meet the requirements given in ASTM C 923. The seal shall be of a size specifically designed for the pipe size and material.

B. All connecting elements of the seal shall be Type 304 stainless steel.

C. Flexible pipe joint seal shall allow for pipe alignment of up to fifteen (15) degrees deflection.

D. Pipes entering manholes that do not have existing flows and have slopes greater than twenty–six (26) percent shall have fittings (22.5 or 11.25 degree bends) installed immediately outside the manhole.

E. If a flexible pipe joint seal is provided at each manhole wall penetration and the pipe is not rigidly locked into the manhole wall through grouting or other methods, then the 12" maximum pipe stub shown in the SD1 Standard Drawing No. 113 is not required.

F. Acceptable Products:
1. Kor-N-Seal by NPC, Inc.
2. A-Lok by A-LOK Products, Inc.
3. Dura-Seal III by Dura-Tech
4. Or equal.

2.4 MANHOLE STEPS

A. Plastic manhole steps shall be PS1-PF (Press Fit polypropylene plastic) as manufactured by MA Industries, or equal. Steps shall be driven into specially sized holes cast into the manhole section. Holes shall be formed in the manhole section using an insert plug that is removed upon curing.

B. Steps shall be aligned vertically above the downstream pipe, in line with the direction of flow. Step spacing shall be 12" as shown the Standard Detail Drawing.

2.5 MANHOLE RISERS

A. Manhole risers (adjusting rings) 6" to 10" height shall be concrete.

B. Manhole risers 2" to 4" height shall be high density polyethylene as manufactured by Ladtech, Inc.

2.6 EXTERNAL SLEEVE FOR STRUCTURE

A. Provide external sleeve around all manhole joints and the chimney as designated on the plans. Any manholes located within fifty (50) feet or less of a creek/ stream or within a floodplain shall have an external sleeve. External sleeve shall be a wraparound heat shrinkable sleeve that creates a barrier to water infiltration and protects support of the structure and frame from ground moisture prevents corrosion and freeze-thaw damage. The system shall be compatible with and bond to concrete, metal, and fiberglass using an adhesive type primer. The sleeve shall have the following physical properties:

Softening Point	212 degrees Fahrenheit	ASTM E-28
Lap Shear Strength	12 PSI	DIN 30 672
Tensile Strength	2900 PSI	ASTM D-638
Elongation	600%	ASTM D-638
Hardness	46 Shore D	ASTM D-2240
Abrasion Resistance	45 mg	ASTM D-1044
Peel Strength	9PLI	ASTM D-1000
Water Absorption	0.05%	ASTM D-570
Low Temperature	-40 degrees Fahrenheit	ASTMD-2671D
Minimum Width	12 inches	

B. System shall accommodate ground movement and resists soil stress.

C. Acceptable Products:
1. WrapidSeal – Manhole Encapsulation System by Canusa –CPS.
2. Link- Seal Riser- Wrap Heat Shrink System.
3. Or Equal.

PART 3 - EXECUTION

3.1 MANHOLE BASES

A. General

1. Manholes shall be constructed at the locations shown on the Design Drawings.
2. The dimensions shall be as shown on the detail sheets and the depths shall be as indicated by either finished top elevation given or depth dimension given on the plans.
3. Perform Sitework as per the requirements of Specifications Sections 02220 and 02222.
4. Excavation for manholes and other underground structures shall be of sufficient size to adequately accommodate installation and proper centering.
5. The bases shall be placed directly on an 8-inch to 12-inch deep pad (compacted thickness) of pipe bedding material as specified in section 02220, placed to proper elevation and leveled, unless a deeper excavation is required to remove any loose sandy soils or soft to medium stiff, clayey soils down to a soil stratum suitable for support of the manhole and base.
   a. The excavated soils shall be replaced with an appropriate Structural Backfill material or with controlled, low-strength material (CLSM), lean concrete, or an extra thickness of manhole base concrete.
6. The excavation shall be kept free of water while the manhole is being constructed and manhole shall not be backfilled until inspected by the ENGINEER.
7. CONTRACTOR will be required to compact bedding material around the entire circumference of the manhole and manhole excavation area to at least 12-inches above the highest incoming or outgoing pipe.
8. Compacted backfill as specified on the Design Drawings or section 02220 shall then be placed above the compacted bedding material up to finished grade.

B. Pre-Cast Bases

1. The Engineer reserves the right to inspect precast manhole base sections at the construction site and to reject the use of such sections if the Engineer determines the products unsuitable for the OWNER'S installation.

C. Cast-in-Place Bases

1. Cast-in-Place Bases shall be used when installing a doghouse manhole over an existing sewer or as approved by the ENGINEER.
   b. Cast-in-place bases shall be placed on suitable foundations after the pipes are laid as specified in 3.1.A.5.

2. The base shall be cast monolithically to an elevation at least 12 inches above the top of the highest pipe entering the manhole, except where a drop connection is to be installed.
   b. Base thickness shall be as per 2.1.B.1.
   c. Base, walls and bottom shall be at least of the thickness shown and reinforced to withstand the loads to be expected.
   d. Connections for sewer pipes shall conform to the details shown.
   e. The base of the bell or groove end at joints between components shall be buttered with 1:2 cement-sand mortar to provide a uniform bearing between components.
   f. All joints shall be sealed with cement mortar inside and out and troweled smooth to the contour of the wall surface.
   g. Raised or rough joint finishes will not be accepted.

3.2 PRECAST MANHOLE SECTIONS

A. Set sections vertical with steps and sections in true alignment.

B. Install sections, joints and gaskets in accordance with manufacturer's recommendations.

C. Lifting holes shall be sealed tight with a solid rubber plug driven into the hole from the outside of the barrel and the remaining void filled with 1 to 2 cement-sand mortar.

3.3 MANHOLE CHANNELS (NOT USED)

3.4 GRADING RINGS

A. Grading rings shall be used for all precast and masonry manholes to adjust height of manhole frame casting where required.
   1. Grade rings shall be a maximum of 10 inches in height, constructed on the roof slab or cone section on which the manhole frame and cover shall be placed.
   2. The height of the grade ring shall be such as is necessary to bring the manhole frame to the proper grade.
   3. One piece precast concrete rings shall be used for grade adjustment greater than six (6) inches and up to ten (10) inches in height. Rings shall be set concentrically on top of the cone section or top slab if used.
   4. High density polyethylene risers shall be used for grade adjustment from two (2) inches to a maximum of six (6) inches in height. Rings shall be set concentrically on top of the cone section or top slab if used.
   5. The rings shall be set in a bed of butyl rubber sealant and this joint

shall be pointed with cement mortar to a smooth finish unless a second row of sealant is installed.

6. Polyethylene grade rings shall be sealed using two rows of butyl rubber sealant.

B. The casting frame shall be installed on the riser as previously described with four (4) five-eights (5/8) inch diameter stainless steel bolts extending through the riser and into the cone section or top slab.

1. The riser and cone may also be drilled with four (4) equally spaced five-eights (5/8) inch diameter holes and four (4) No. 5 steel reinforcement bars installed and left flush with the riser top to prevent lateral movement and the casting frame bolted to the riser as previously described.

C. High Density Polyethylene Manhole Adjusting Rings shall be used to adjust up to a maximum of six (6) inches. Casting must be bolted through the adjusting rings to the cone section with four (4) equally spaced five-eights (5/8) inch diameter threaded stainless steel rods with cinch anchors.

3.5 CONNECTIONS TO EXISTING MANHOLES (NOT USED)

3.6 STUBS FOR FUTURE CONNECTIONS (NOT USED)

3.7 GRADING AT MANHOLES

A. Manholes shall be installed to conform to the following convention unless otherwise called for on the plans. The ground surface shall be graded to drain away from the manhole. Final dimensions shall be determined after grading has taken place.

1. Manholes in roads, parking lots, paved areas and lawns shall be installed flush with the surrounding area.
2. Manholes in wooded or other inaccessible areas shall be installed twelve (12) inches above the final grade.
3. Manholes in cultivated fields, hay fields and pastures shall be installed with the cone section flush with the final grade. After installation of the casting, a slope fill 1:5 (1 vertical to 5 horizontal) shall be installed to provide surface drainage away from the manhole.

B. Manholes in paved areas shall be constructed to meet the final surface grade. In paved areas on State Highways, all manholes shall be 1/2 inch below final wearing surfaces. Manholes shall not project above finished roadway pavements to prevent damage from snowplows.

C. CONTRACTOR shall be solely responsible for the proper height of all manholes necessary to reach the final grade at all locations. CONTRACTOR is cautioned that ENGINEER'S review of Shop drawings for manhole components will be general in nature and CONTRACTOR shall provide an adequate supply of random length precast manhole riser sections to adjust any manhole to meet field conditions for final grading.

3.8 MANHOLE WATERTIGHTNESS

A. All manholes shall be free of visible leakage. Each manhole shall be tested for leaks and inspected. If the manhole fails testing, the District will consider the manhole defective and the Contractor shall replace the manhole and make any necessary reconnections to the new or existing pipelines at no additional cost to the Owner. No leak repairs shall be performed without the ENGINEER'S approval.

B. Vacuum test manholes to ASTM C 1244. Testing to be witnessed by OWNER. Manholes not subject to vacuum testing must be in writing from OWNER. This specification shall govern the negative air pressure (vacuum) testing of sanitary sewer manholes and structures and shall be used as a method of determining acceptability by the OWNER, in accepting maintenance of a sanitary sewer manhole or structure on behalf of the public. Other forms of testing of some manholes may be required, as deemed necessary by the Owner.

C. Manholes shall be tested after installation with all connections in place along with the following completed prior to testing:
   1. Lift holes, if any, shall be plugged with an approved, non-shrinkable grout prior to testing.
   2. Drop connections shall be installed prior to testing.
   3. The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings.
   4. The manholes shall be backfilled and finished to design grade prior to test.
   5. Test pressure requirements of ASTM C-923 shall be met.

D. Test Procedure:
   1. Temporarily plug, with the plugs being braced to prevent the plugs or pipes from being drawn into the manhole, all pipes entering the manhole at least eight inches into the sewer pipe(s). The plug must be inflated at a location past the manhole/pipe gasket.
   2. The test head shall be placed inside the frame at the top of the manhole and inflated, in accordance with the manufacturer's recommendations.
   3. A vacuum of 10" of mercury shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and disconnect the vacuum line.

4. The pressure gauge shall be liquid filled, having a 3.5 inch diameter face with a reading from zero to thirty inches of mercury.
5. The manhole shall be considered to pass the vacuum test if it holds at least 9 inches of mercury for the following time durations:

	Time (Minutes)		
Manhole Depth	4' Diameter	5' Diameter	6' Diameter
20 Feet or Less	1	2	3
20.1 to 30 Feet	2	3	4

Note: Consult SD1 on manhole diameters larger then six (6) foot

6. If a manhole fails the vacuum test, The District will consider the manhole defective and the CONTRACTOR shall replace the manhole and/ or defective components and make any necessary reconnections to the new or existing pipelines at no additional cost to the Owner. No repairs shall be made to the manhole unless approved by the ENGINEER.
7. All temporary plugs and braces shall be removed after each test.
8. Manholes will be accepted as having passed the vacuum test requirements if they meet the criteria stated above.

+ + END OF SECTION + +

SECTION 02610

PIPE AND FITTINGS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. CONTRACTOR shall provide all labor, materials, equipment, incidentals, and services as shown, specified, and required for furnishing, installing, and testing all buried piping, fittings, and specials specified herein. Piping herein specified includes force main & gravity sewer. Refer to the pipe material schedule shown below to determine which pipe materials are acceptable for each application. Remove and replace all existing piping that interferes with installation of new pipe or structures or that is damaged by new installations in a manner approved by the ENGINEER.

Type	Size	Depth	Acceptable Materials
Gravity	8 Inch	Less than 20'	PVC SDR 35; Fiberglass Polymer Mortar Pipe SN 46
Gravity	8 Inch	20.1' to 30'	PVC SDR 26; Fiberglass Polymer Mortar Pipe SN 72
Gravity	8 Inch	30.1 and Greater or her shown on plans	Ductile Iron Class 350 with Protecto 401 lining

Note: Pipe selected shall be designed for the cover and loading requirements to each project. Design calculations for pipe wall thickness and structural design shall be provided by the ENGINEER, as requested by SD1. Restrained joint calculations for force mains shall be provided for all projects.

Depth is based on maximum cover between structures or manhole runs. Pipe shall be the same thickness between structures or manholes.

B. The Work includes, but is not limited to, the following:
1. Piping beneath structures.
2. Supports and restraints,.
3. Pipe encasements.
4. Work on or affecting existing piping.
5. Testing.
6. Cleaning and disinfecting.

7. Installation of all jointing and gasketing materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, and all other Work required to complete the buried piping installation.
8. Incorporation of valves, meters and special items shown or specified into the piping systems as required and as specified in the Section 15100.
9. Unless otherwise specifically shown, specified, or included under other Sections, all buried piping work required, beginning at the outside face of structures or structure foundations and extending away from structure.

C. Review installation procedures under other Sections and other contracts and coordinate with the work that is related to this Section.

1.2 RELATED WORK

1. Section 02606 - Manholes.
2. Section 02220, Excavation and Backfill.
3. Section 02710, Drainage Structures.
4. Section 03300, Cast-In-Place Concrete.
5. Section 09900, Painting.
6. Division 15, Sections on Piping, Valves and Appurtenances.
7. Section 15052, Exposed Piping Installation.
8. Section 15100, Valves and Appurtenances.
9. Section 15121, Wall Pipes, Floor Pipes and Pipe Sleeves.
10. Section 15122, Piping Specialties.
11. Section 15140, Pipe Hangers and Supports.

1.3 LIMITATIONS

All existing piping as shown on the Design Drawings is based on the best information available, but SD1 and ENGINEER makes no guarantees as to the accuracy of the locations or type of piping depicted. All new piping which ties into existing lines must be made compatible with that piping. So that piping conflicts may be avoided, CONTRACTOR shall open up his trench well ahead of the pipe laying operation to confirm exact locations and sizes of existing piping before installing any new piping. CONTRACTOR shall provide all fittings and adapters necessary to complete all connections to existing piping as approved by SD1. All costs associated with alignment adjustments on new piping to tie into existing piping shall be borne by CONTRACTOR. No additional costs will be paid by SD1.

1.4 QUALITY ASSURANCE

Requirements of Regulatory Agencies:

A. Comply with requirements of UL, FM and other jurisdictional authorities, where applicable.

B. Refer to the General and Supplementary Conditions regarding permit requirements for this Project.

1.5 REFERENCES

Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified:

A. AWWA C104, Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

B. AWWA C105, Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids

C. AWWA C110, Standard for Ductile-Iron and Gray-Iron Fittings, 3 In.-48 In. (76 mm-1,219 mm), for Water.

D. AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings

E. AWWA C115, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.

F. AWWA C150, Standard for Thickness Design of Ductile-Iron Pipe.

G. AWWA C151, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.

H. AWWA C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.

I. AWWA C606, Grooved and Shouldered Joints.

J. AWWA C800, Underground Service Line Valves and Fittings.

K. AWWA C900, Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 In.-12 In. (100 mm-300 mm), for Water Dist.

L. AWWA M23, PVC—Design and Installation

M. ASTM A 27, Standard Specification for Steel Castings, Carbon, for General Application.

N. ASTM A 82, Standard Specification for Steel Wire, Plain for Concrete Reinforcement.

O. ASTM A 185, Welded Steel Wire Fabric for Concrete Reinforcement.

P. ASTM A 496, Deformed Steel Wire for Concrete Reinforcement.

Q. ASTM A 497, Steel Welded Wire Fabric, Deformed for Concrete Reinforcement.

R. ASTM A 1011, Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

S. ASTM A 615, Standard Specification for Deformed and Plain Billet Steel Bars for Concrete Reinforcement.

T. ASTM C 14, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe.

U. ASTM C 76, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe.

V. ASTM C 118, Concrete Pipe for Irrigation or Drainage.

W. ASTM C 150, Standard Specification for Portland Cement

X. ASTM C 361, Standard Specification for Reinforced Concrete Low-Head Pressure Pipe.

Y. ASTM C 443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.

Z. ASTM C 478, Standard Specification for Precast Reinforced Concrete Manhole Sections.

AA. ASTM D 1238, Measuring Flow Rates of Thermoplastics by Extrusion Plastometer.

BB. ASTM D 1598, Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.

CC. ASTM D 1599, Short Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings.

DD. ASTM D 1784, Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

EE. ASTM D 1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

FF. ASTM D 2122, Determining Dimensions of Thermoplastic Pipe and Fittings

GG. ASTM D 2412, Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.

HH. ASTM D 2464, Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

II. ASTM D 2467, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

JJ. ASTM D 2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

KK. ASTM D 2774, Practice for Underground Installation of Thermoplastic Pressure Piping.

LL. ASTM D 3034, Bell and Spigot-Type Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings.

MM. ASTM D 3212, Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals

NN. ASTM D 3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.

OO. ASTM D 3262, Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe.

PP. ASTM D 3350, Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

QQ. ASTM D 3754, "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Sewer and Industrial Pressure Pipe.

RR. ASTM D 4161 Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals.

SS. ASTM D 5685, "Fiberglass" (Glass-Fiber-Reinforced-Thermosetting-Resin) Pressure Pipe Fittings.

TT. ASTM F 437, Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

UU. ASTM F 439, Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.

VV. ASTM F 441, Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

WW. ASTM F 493, Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings.

XX. ASTM F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

YY. ASCE MOP No. 37, Design and Construction of Sanitary and Storm Sewers

1.6 SUBMITTALS

A. In addition to the requirements of Section 01300, provide the following:
   1. Size, class and other details of pipe to be used.
   2. Full details of piping, specials, joints, harnessing, and connections to existing piping, structures, equipment and appurtenances.
   3. Laying schedules and detailed drawings in plan and profile for piping.
   4. Jacking and boring operation details, including size of jacking and receiving pits, method of shoring and dewatering, jacking machine information, casing pipe, spacers and end seals.
   5. Method to monitor vibration, movement, settlement, cracking of nearby structures from jacking and boring operation.

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Prepare and submit report for each test.

C. Certificates: Submit certificates of compliance with referenced standards.

D. As requested by SD1, all pipe manufacturers that supply pipe for the project shall provide a detailed structural design taking in account the depth of burial, highway loads, bedding and backfill requirements, water elevation, soil conditions and installation procedures. All designs submitted shall have a Professional ENGINEER's stamp from Kentucky. Such design shall be received, reviewed, and approved prior to manufacture.

E. As requested by SD1, pipe manufacturer for each pipe type used shall be present and instruct CONTRACTOR on proper installation technique per shop drawings and manufacturer's recommended procedures. As requested by SD1, pipe manufacturer's representative shall visit job site to monitor progress of pipe

installation and shall notify in writing the CONTRACTOR and SD1 of any discrepancy, changes, or incorrect procedures that would prevent the pipe from performing as designed.

F. Record Drawings: Submit record drawings in accordance with Section 01720 and Section 01721.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Refer to applicable Sections for material specifications.

B. General:
1. Marking Piping:
   a. Clearly mark each piece of pipe or fitting with a designation conforming to those shown on the laying schedule.
   b. Cast or paint material, type and pressure designation on each piece of pipe or fitting 4 inches in diameter and larger.
   c. Pipe and fittings smaller than 4 inches in diameter shall be clearly marked by manufacturer as to material, type and rating.

2.2 DUCTILE IRON PIPE AND FITTINGS

A. Piping furnished hereunder shall be complete with all joint gaskets, bolts, and nuts required for installation of valves and equipment furnished by others for installation under this contract.

B. Pipe Manufacturer's Experience and Field Services.
1. All ductile iron pipe, fittings, and specials shall be fabricated, lined and coated by the pipe manufacturer. Minimum required experience shall include manufacture of a similar pipeline in length to this contract, of equal or larger diameter than the pipe to be provided with joints, lining, and coating suitable for the same or greater pressure rating specified herein, which has performed satisfactorily for the past 5 years.
2. An experienced, competent, and authorized field service representative shall be provided by the pipe manufacturer to perform all pipe manufacturer's field services specified herein. The field service representative's minimum required experience qualifications shall include 5 years of practical knowledge and experience installing ductile iron pipe with joints, lining, and coating of the pipe to be provided.
3. All ductile iron pipe shall be installed in accordance with the pipe

manufacturer's recommendations. The pipe manufacturer's field service representative shall visit the site and inspect, check, instruct, guide, and direct CONTRACTOR's procedures for pipe handling and installation at the start of the pipe installation. The pipe manufacturer's field service representative shall coordinate his services with CONTRACTOR.

4. Each joint, including all restrained joints, shall be checked by CONTRACTOR as instructed by the pipe manufacturer's field service representative to determine that the joint and the restraints are installed properly.
5. The pipe manufacturer's field service representative shall furnish to SD1, through ENGINEER, a written report certifying that CONTRACTOR's installation personnel have been properly instructed and have demonstrated the proper pipe handling and installation procedures. The pipe manufacturer's field service representative shall also furnish to SD1, through ENGINEER, a written report of each site visit. The pipe manufacturer's field service representative shall revisit the site as often as necessary until all trouble is corrected and the pipeline installation and operation are satisfactory in the opinion of the ENGINEER.
6. All costs for these services shall be included in the Contract Price.

C. Materials

1. Where ductile iron pipe is required, it shall conform to ANSI/AWWA C151/A21.51, Table 1 or Table 3. Pressure class 350 shall be used for all piping, unless otherwise shown on the drawings or specified. Fittings shall conform to ANSI/AWWA C110/A21.10 , or ANSI/AWWA C153/A21.53, with a minimum working pressure rating of 350 psi. All fittings shall be suitable for a test pressure as specified herein without leakage or damage.
2. All buried pressure piping shall be push-on joint or mechanical joint. Restrained joint pipe shall be installed at the station locations shown on the Contract Drawings. All above ground piping or piping in vaults shall be flanged.
3. All gravity sewer piping shall be push-on joint or mechanical joint.
4. Push-on joints and mechanical joints shall be in accordance with ANSI/AWWA C111/A21.11.
5. Restrained joint pipe shall be fabricated to the lengths required as determined by the laying schedule to be submitted as specified herein. If deviations from the approved laying schedule are required in the field as approved by SD1 and ENGINEER and field-cuts are required, CONTRACTOR shall provide restraint on the field-cut piping using, EBAA Iron "Megalug" restrained joints as specified below.
6. Field cuts shall be minimized and will be limited to only locations approved by SD1 and ENGINEER, when no other alternative to using factory provided

joint restraint exists. Use of field-lock, fast-grip, field flex-ring, TR-flex gripper ring, etc. gaskets for field-cut pipe shall not be allowed.

D. Joints

1. Certification of joint design shall be provided in accordance with ANSI/AWWA C111/A21.11-90, Section 4.5, Performance Requirements, as modified herein.
2. The joint test pressure for each type of joint used on this project shall be not less than 2 times the working pressure or 1-1/2 times the test pressure of the pipeline, whichever is higher. The same certification and testing shall also be provided for restrained joints. For restrained joints, the piping shall not be blocked to prevent separation and the joint shall not leak or show evidence of failure.
3. It is not necessary that such tests be made on pipe manufactured specifically for this project. Certified reports covering tests made on other pipe of the same size and design as specified herein and on the drawings and manufactured from materials of equivalent type and quality may be accepted as adequate proof of design.
4. Nuts, bolts, and tie -rods used on buried pressure pipe and fittings shall be low alloy steel T- bolts with Zinc anode caps for all T-bolts and rods. The entire installation shall be wrapped in two layers of polyethylene encasement. Nuts, bolts and stiffener plates which will be in contact with sewage shall be stainless steel Type 316.

E. Material Schedule

Push-on Joints and Mechanical Joints	ANSI/AWWA C111/A21.11
Restrained Push-on Joints Positive locking segments and/or rings (4 inch through 64 inch)	American "Flex-Ring", or "Lok-Ring"; U.S. Pipe "TR Flex"; Clow Corp., "Super-Lock", without exception
Restrained Push-on Joints, (field-cut spigot) locking wedge type	EBAA Iron "Megalug" Series 1700, without exception. Shall only be used in locations approved by the ENGINEER.
Restrained Mechanical Joints (Factory prepared spigot) (4 inch through 48 inch)	American "MJ coupled Joints"

Restrained Mechanical Joints (field cut spigot)	EBAA Iron "Megalug" Series 1100, without exception. Shall only be used in locations approved by the ENGINEER.
Fittings	ANSI/AWWA C110/A21.1, or ANSI/AWWA C153/A21.53, all with minimum working pressure of 350 psi, and suitable for the test pressure based on the project design without leakage or damage.
Flanged Joints & Fittings	Ductile Iron, ANSI/AWWA C115/A21.5 suitable for the test pressure based on the project design without leakage or damage. Faced and drilled, ANSI B16.1 125-pound flat face. Threaded conforming to AWWA C115/A21.15.
Bolting	125-pound flat–faced flange: ASTM A 307, Grade A carbon steel hex head bolts and ASTM A563 Grade A carbon steel hex head nuts
Gaskets	Restrained Push-on and Mechanical Joints: Synthetic rubber conforming to AWWA C111/A21.11. Natural rubber is not acceptable. Flanged: 1/8 inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F., conforming to ANSI B16.21, AWWA C207, and ASTM D1330, Grades 1 and 2. Full face for 125-pound flat-faced flanges, or specially designed gaskets with required properties per ANSI/AWWA C111/A21.11 to meet the test pressure rating. Blind flanges shall be gasketed covering the entire inside face with the gasket cemented to the blind flange.

	Gasket pressure rating to equal or exceed the system hydrostatic test pressure.
Joint Lubricant	Manufacturer's standard
Tapping Sleeves	316 SS, with 316 SS body and bolting, and rubber sealing gasket, suitable for the test pressure specified herein. JCM Industries, Model JCM 452 or approved equal.
Polyethylene Encasement	Seamless, ANSI/AWWA C105/A21.5; LLD-8 mil or HDCL-4 mil

F. Lining and Coating Ductile Iron Pipe and Fittings

1. All buried ductile iron pipe and fittings shall have manufacturers outside standard asphaltic coating and ceramic epoxy lining inside, factory applied. Ceramic epoxy lining shall be Protecto 401 as manufactured by Vulcan Painters, Inc. of Birmingham, AL, or NovoCoat SP-2000W as manufactured by NovoCoat Protective Coatings, of Addison, Texas and as specified herein. Flange faces shall be coated externally with a suitable manufacturer's standard rust-preventative compound.
2. Application of Lining
   The interior of the pipe exposed to liquids and gases shall be blasted and cleaned to remove all loose oxides and rust. After cleaning, the lining material shall be applied to yield 40 mils for the complete system using a centrifugal lance applicator. No lining shall take place over grease, oil, etc., that would be detrimental to the adhesion of the compound to the substrate. The compound shall not be applied when the substrate temperature is below 40 degrees F., or in adverse atmospheric conditions which will cause detrimental blistering, pinholing or porosity of the film.
3. Lining material
   The material shall be a two component epoxy with the following minimum Requirements:
   a. A permeability rating of 0.0 perms when measured by ASTM E96-66, Procedure A. Duration of test - 6 weeks.
   b. A direct impact resistance of 125 inches-pounds with no cracking when measured by ASTM-D-2794.
   c. The ability to build at least 50 mils dry in one coat.

d. The material shall be recoatable with itself for at least seven days with no additional surface preparation when exposed to direct summer sun and a temperature of 90 degrees F.
e. The material shall contain at least 20% by volume of ceramic quartz pigment.
f. A test and service history demonstrating the ability of the material to withstand the service expected.

4. Inspection
   a. All pipe shall be checked for thickness using a magnetic film thickness gauge.
   b. All pipe shall be pinhole detected with a non-destructive 2,500 volt test.
   c. Each pipe joint shall be marked with the date application of the lining system and with its numerical sequence of application of that date.
   d. Each requirement of 3. above must be certified by the material supplier.

5. Field Cuts
   a. All manufacturer's procedures and recommendations shall be followed when making field cuts. Note proper field preparations and curing time of the coating.

G. All items used for jointing pipe shall be furnished with the pipe and tested before shipment. The joints shall be made with tools and lubricant in strict conformity with the manufacturer's instructions. If requested, three (3) copies of such instructions shall be delivered to the ENGINEER at start of construction.

H. Encasement
   1. Polyethylene encasement shall be provided for all buried ductile iron pipe, including all straight pipe, bends, tees, wyes, adapters, closure pieces, field restraint devices, valves and other fittings or specials, in accordance with ANSI/AWWA C105/A21.5, Method A. Preparation of the pipe shall include, but not be limited to: removing lumps of clay, mud, cinders, etc., prior to installation.
   2. Where ductile iron pipe is also embedded or encased in concrete or within a casing pipe, the polyethylene encasement shall be installed over the ductile iron pipe prior to concrete placement and in conjunction with installation in the casing pipe.
   3. The pipe shall be wrapped with 8-mil thickness polyethylene tube wrap, using the recommended minimum flat tube widths for the specified pipe

sizes. The polyethylene tube wrap shall be of virgin polyethylene as produced from DuPont Alathan resin or equal.

4. The polyethylene tube seams and overlaps shall be wrapped and held in place by means of 2-inch wide plastic backed adhesive tape. The tape shall be Polyken Number 900, Scotchrap Number 50, or equal. The tape shall be such that the adhesive shall bond securely to both metal surfaces and polyethylene film.
5. The polyethylene film supplied shall be clearly marked at a minimum of 2-ft along its length, containing the following information:
   a. Manufacturer's name or trademark
   b. Year of Manufacture
   c. ANSI/AWWA C105/A21.5
   d. Minimum film thickness and material type (LLDPE or HDCLPE)
   e. Applicable range of nominal pipe diameter size(s)
   f. Warning--Corrosion Protection--Repair any Damage

2.3 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS (GRAVITY LINES)

A. Polyvinyl Chloride (PVC) and Chlorinated Polyvinyl Chloride (CPVC) Piping – Schedule Rated Pipe:

1. Pipe and Fitting Material:
   a. Standard: ASTM D 1784.
   b. Type: Type I, Grade 1, rigid (12454-B).
2. Pipe:
   a. PVC:
      1) Standard: ASTM D 1785.
      2) Designation: PVC 1120.
   b. CPVC:
      1) Standard: ASTM F 441.
3. Joints:
   a. General: Connect pipe by solvent cementing except where flanged or threaded fittings are required at expansion joints, valves, flow meters, equipment connections or otherwise shown or directed.
   b. Flanged Joints:
      1) Use flanges joined to pipe by solvent cementing.
      2) Flange Drilling and Dimensions: Comply with ANSI B16.1.
      3) Flange Gaskets: Viton full face.
      4) Bolts, Nuts and Washers: Type 316 stainless steel.
      5) Provide washers on each face of the bolted connection.
   c. Threaded Joints:
      1) Taper Pipe Threads: ANSI B2.1.
      2) Joint Preparation: Teflon tape.
      3) Use PVC dies for taper pipe threads.
   d. Primer and Solvent Cement:
      1) Standard:

a) PVC: ASTM D 2564.
b) CPVC: ASTM F 493.

4. Fittings:
a. Socket-Type:
1) PVC:
a) Standard: ASTM D 2467.
b) Designation: PVC I.
2) CPVC:
a) Standard: ASTM F 439.
b. Threaded Type:
1) PVC:
a) Standard: ASTM D 2464.
b) Designation: PVC I.
2) CPVC:
a) Standard: ASTM F 437.

B. Polyvinyl Chloride (PVC) Piping – Gravity Sewer Pipe and Fittings:
1. Pipe and Fitting Material:
a. Standard: ASTM D 1784.
2. Pipe and Fittings:
a. Standard:
1) 4-inch through 15-inch diameter: ASTM D 3034.
2) 18-inch through 27-inch diameter: ASTM F 679.
b. Thickness Class: As shown in item 1.1 this section.
3. Joints:
a. Push On Joints: Connect pipe with integral wall bell and spigot joints. The bell shall consist of an integral wall section with a solid cross section rubber gasket, factory assembled, securely locked in place to prevent displacement during assembly. Joints shall be assembled in accordance with the pipe manufacturer's recommendations and ASTM D 3212.
b. Gaskets: Rubber gaskets shall be in compliance with ASTM F 477 and shall be suitable for the service specified.

2.4 POLYVINYL CHLORIDE (PVC) PIPE – C900 Piping (FORCE MAINS)

1. This pipe shall meet the requirements of AWWA C900-75 for Polyvinyl Chloride (PVC) Pressure Pipe. The pipe shall be PVC 1120 pipe with cast iron pipe equivalent ODs. See Table 1 below for pipe material depth and pressure limitations.

2. Provisions must be made for expansion and contraction at each joint with a rubber ring. The bell shall consist of an integral wall section with a solid cross-section rubber ring which meets the laboratory

performance of ASTM D3139. The bell section shall be designed to be at least as strong as the pipe wall.

3. Standard laying lengths shall be 20 feet ± for all sizes. At least 85 percent of the total footage of pipe of any class and size shall be furnished in standard lengths, the remaining 15% in random lengths. Random lengths shall not be less than 10 feet long. Each standard and random length of pipe shall be tested to four times the class pressure of the pipe for a minimum of 5 seconds. The integral bell shall be tested with the pipe.

4. Fittings for all lines 4 inches in diameter or larger shall be restrained ductile iron and in accordance with AWWA C153 and have a body thickness and radii of curvature conforming to ANSI A21.10 or ANSI A21.53 for compact fittings.

5. Fittings for all lines less than 4 inches in diameter shall be PVC gasketed push on type or socket glue-type manufactured specifically for the pipe class being utilized. All socket-glue type connections shall be joined with PVC solvent cement conforming to ASTM D2564. Product and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility. Solvent cement joints shall be made up in accordance with the requirements of ASTM D2855.

6. Appropriate restraint shall be provided for all fittings. Fittings shall be restrained with EBAA Iron Mega-Lugs, without exception. Pipe joints on either side of the fittings shall also be restrained to the distance required by the restrained joint calculations with the appropriate EBAA Iron Mega- Lug. The appropriate restraints are listed below:

- Series 2000SV: MEGALUG Restraint for existing C900 PVC Pipe at DIP fitting
- Series 2500: MEGALUG Restraint for C900 at PVC fitting
- Series 2800: MEGALUG Restraint Harness for C900
- Series 2200: MEGALUG Restraint for C900 at DIP Mechanical Joint fitting

TABLE -1 Pipe Material Depth and Pressure Limitations

Pipe Material	Minimum Depth of Bury[1, 2]	Maximum Depth of Bury[1, 2]	Pressure Class / Rating	Maximum Surge Pressure Capacity
Pressure Class 350 – DIP	3 ft.	30 ft.	350 psi	450 psi
DR 25 – C900 PVC	3 ft.	10 ft.	165 psi.[3]	264 psi[5]
DR 18 – C900 PVC	3 ft.	20 ft.	235 psi.[3]	376 psi[5]
DR 14 – C900 PVC	3 ft.	30 ft.	305 psi.[3]	488 psi[5]

1. Depth of bury limitations are provided as a general rule. At the discretion of SD1, greater depths may be allowed provided special pipe bedding is provided. Under some combinations of pipe material, soil type and bedding conditions, maximum acceptable depths may be reduced. For all applications where depth of bury is greater than or equal to thirty (30) feet, DIP shall be used.

2. Design ENGINEER shall consult appropriate references to ensure selected pipe material is suitable for each application. Such references may include the DIPRA *Design of Ductile Iron Pipe* brochure, *Uni-Bell Handbook of PVC Pipe Design and Construction*, PWEagle Technical Bulletins TB-D5 and TB-D8 (for PVC pipe), or Performance Pipe Bulletin PP 503 and PP 508 (for HDPE pipe) or other appropriate sources.

3. Total System Pressure (i.e. maximum working pressure plus any routine pressure surge) shall be less than the Pressure Class, as defined by AWWA C900-07 (values given in the above table are at 73.4°F). "Maximum working pressure" is the maximum steady-state, sustained operating pressure applied to the pipe exclusive of transient pressures.

4. Maximum working pressure shall be less than the Pressure Class, and Total System Pressure (i.e. maximum working pressure plus any routine pressure surge) shall be less than 1.5 times the Pressure Class, as defined by AWWA C906-07 (values given in the above table are at 73.4°F). "Maximum working pressure" is the maximum steady-state, sustained operating pressure applied to the pipe exclusive of transient pressures.

5. For C900 PVC pipe, maximum working pressure plus occasional or "emergency" surges shall not be greater than the Maximum Surge Pressure Capacity (1.6 times the Pressure Class of the pipe) as defined by AWWA C900(2007).

6. For C906 HDPE pipe, maximum working pressure plus occasional or "emergency" surges shall not be greater than the Maximum Surge Pressure Capacity (2.0 times the Pressure Class of the pipe) as defined by AWWA C906(2007).

2.5 HIGH DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

A. Quality Assurance

1. Qualification of Manufacturers: Qualified manufacturers shall be firms regularly engaged in the manufacture of HDPE pipe and pipe fittings of the same size, type, and joint configuration specified, and whose products have been in satisfactory use for not less than five (5) years.
2. Heat Fusion Training/Certification: The CONTRACTOR shall ensure and certify that persons making heat fusion joints have received training in the manufacturer's recommended procedure not more than 12 months prior to commencing construction.

a. An experienced, competent, and authorized field service representative shall be provided by the pipe manufacturer to perform all pipe manufacturer's field services specified herein. The field service representative's minimum required experience qualifications shall include 5 years of practical knowledge and experience in making heat fusion joints and installing HDPE pipe.

b. All HDPE pipe shall be installed in accordance with the pipe manufacturer's recommendations. The pipe manufacturer's field service representative shall visit the site and inspect, check, instruct, guide, and direct CONTRACTOR's procedures for pipe handling and installation at the start of the pipe installation. The fusion pipe manufacturer's field service representative shall coordinate his services with CONTRACTOR.

c. Each joint shall be checked by CONTRACTOR as instructed by the pipe manufacturer's field service representative to determine that the pipe is properly fused.

d. The pipe manufacturer's field service representative shall furnish to SD1, through ENGINEER, a written report certifying that CONTRACTOR's installation personnel have been properly instructed and have demonstrated the proper pipe handling, fusion, and installation procedures. The pipe manufacturer's field service representative shall also furnish to SD1, through ENGINEER, a written report of each site visit. The pipe manufacturer's field service representative shall revisit the site as often as necessary until all trouble is corrected and the pipeline installation and operation are satisfactory in the opinion of the ENGINEER.

e. All costs for these services shall be included in the Contract Price.

3. Interchangeability of Pipe and Fittings: Within Contract limits, pipe and fittings from different approved manufacturers shall not be interchanged.

4 HDPE shall be manufactured in accordance with ASTM F 714, Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter, and shall be so marked. Each production lot of pipe shall be tested for (from material or pipe) melt index, density, percent carbon, (from pipe) dimensions and ring tensile strength.

5. Materials used for the manufacture of HDPE pipe and fittings shall be PE3408 HDPE, meeting cell classification 345434C or 345434E per ASTM D 3350 and meeting Type III, Class B or Class C, Category 5, Grade P34 per ASTM D 1248; and shall be listed in the name of the pipe and fitting manufacturer in Plastics Pipe Institute (PPI) TR-4, Recommended Hydrostatic Strengths and Design Stresses for Thermoplastic Pipe and Fittings Compounds, with a standard grade rating of 1,600 psi at 73° F. The manufacturer shall certify that the materials used to manufacture pipe and fittings meet those requirements.

6. Fabricated fittings shall be made by heat fusion joining specially machined shapes cut from pipe, polyethylene sheet stock, or molded fittings. Fabricated fittings shall be rated for internal pressure service at least equal to

the full service pressure rating of the mating pipe. Directional fittings 16-inch IPS and larger such as elbows, tee, etc., shall have a plain end inlet for butt fusion and flanged directional outlets.

7. Molded fittings shall be manufactured in accordance with ASTM D 3261, Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing, and shall be so marked. Each production lot of molded fittings shall be subjected to the test required under ASTM D 3261.
8 Flange adapters shall be made with sufficient through-bore length to be clamped in a butt fusion joining machine without the use of a stub-end holder. The sealing surface of the flange adapter shall be machined with a series of small V-shaped grooves to provide gasketless sealing, or to restrain the gasket against blow-out.
9. Flange adapters shall be fitted with back-up rings pressure rated equal to or greater than the mating pipe. The back-up ring bore shall be chamfered or radiused to provide clearance to the flange adapter radius. Flange bolts and nuts shall be Grade 2 or higher.
10. Joints between HDPE pipes and between HDPE fittings and pipes shall be fusion bonded as described in Section 3.5.
11. The exterior of the HDPE pipe shall be color coded and striped in a way to identify the difference in pipe service, size and application.
12. HDPE pipe shall be black.
13. All piping used for horizontal directional drilling shall be permanently striped.
14. Internal 316 stainless steel stiffeners as manufactured by JCM Industries, Inc., or approved equal shall be used at all locations where external connectors or restraint clamps are installed. MJ adapters as manufactured by Central Plastics Company or equal, with creation of positive restraint to the pipe from heat fusion of the adapter to the pipe, and creation of positive restraint at the connection through bolting of the backup ring to the MJ valve or fitting, can be used in lieu of the JCM internal stainless steel stiffeners and external restraint clamps.
15. Except as noted in item 14 above, all mechanical connections shall be stiffened and restrained. Restraints shall be as manufactured by JCM Industries, Inc., or approved equal.
16. External restraint clamps utilized for transition from ductile iron pipe to polyethylene pipe shall be as manufactured by JCM Industries, Inc., or approved equal. Restraints must be compatible with stiffeners and pipe. JCM restraints shall not be used with HDPE pipe in locations where test pressures will exceed 150 psi. In locations where HDPE pipe will have test pressures exceeding 150 psi, provide an MJ adapter as described in item 14 above.
17. The Dimension Ratios (DR's) are shown on the table below:

Pipe Material Depth and Pressure Limitations

Pipe Material	Minimum Depth of Bury[1, 2]	Maximum Depth of Bury[1, 2]	Pressure Class / Rating	Maximum Surge Pressure Capacity
DR 17 – HDPE	3 ft.	10 ft.	100 psi[4]	200 psi[6]
DR 13.5 – HDPE	3 ft.	15 ft.	128 psi[4]	256 psi[6]
DR 11 – HDPE	3 ft.	20 ft.	160 psi[4]	320 psi[6]
DR 9 – HDPE	3 ft.	25 ft.	200 psi[4]	400 psi[6]
DR 7.3 – HDPE	3 ft.	25 ft.	254 psi[4]	508 psi[6]

1. Depth of bury limitations are provided as a general rule. At the discretion of SD1, greater depths may be allowed provided special pipe bedding is provided. Under some combinations of pipe material, soil type and bedding conditions, maximum acceptable depths may be reduced. For all applications where depth of bury is greater than or equal to thirty (30) feet, DIP shall be used.

2. Design ENGINEER shall consult appropriate references to ensure selected pipe material is suitable for each application. Such references may include the DIPRA *Design of Ductile Iron Pipe* brochure, *Uni-Bell Handbook of PVC Pipe Design and Construction*, PWEagle Technical Bulletins TB-D5 and TB-D8 (for PVC pipe), or Performance Pipe Bulletin PP 503 and PP 508 (for HDPE pipe) or other appropriate sources.

3. Total System Pressure (i.e. maximum working pressure plus any routine pressure surge) shall be less than the Pressure Class, as defined by AWWA C900-07 (values given in the above table are at 73.4°F). "Maximum working pressure" is the maximum steady-state, sustained operating pressure applied to the pipe exclusive of transient pressures.

4. Maximum working pressure shall be less than the Pressure Class, and Total System Pressure (i.e. maximum working pressure plus any routine pressure surge) shall be less than 1.5 times the Pressure Class, as defined by AWWA C906-07 (values given in the above table are at 73.4°F). "Maximum working pressure" is the maximum steady-state, sustained operating pressure applied to the pipe exclusive of transient pressures.

5. For C900 PVC pipe, maximum working pressure plus occasional or "emergency" surges shall not be greater than the Maximum Surge Pressure Capacity (1.6 times the Pressure Class of the pipe) as defined by AWWA C900(2007).

6. For C906 HDPE pipe, maximum working pressure plus occasional or "emergency" surges shall not be greater than the Maximum Surge Pressure Capacity (2.0 times the Pressure Class of the pipe) as defined by AWWA C906(2007).

The DR's shall be verified by the Design ENGINEER and the manufacturer for the laying and pressure conditions shown on the drawings, including full consideration of vacuum, with calculations submitted to SD1 for review. NOTE: Manufacturers who do not comply with this requirement will not be considered an equal. The CONTRACTOR shall be liable if the pipe fails or pulls apart. The minimum DR shown above shall be used unless a thicker wall DR is recommended by the manufacturer during his verification. For horizontal directional drilling (HDD), pipe installed at depths from 0'-15' deep shall have a minimum DR 9 rating or

manufacturer's minimum recommended DR, whichever is more conservative. HDD pipe installed at depths greater than 15' shall also have a minimum DR 9 rating or manufacturer's minimum recommended DR, whichever is more conservative. **CONTRACTOR shall note that depending on the wall thickness of the pipe to be furnished, an increase in pipe size may be required to provide comparable internal diameter to ductile iron pipe.**

18. Mechanical joint ductile iron fittings for DIP sized HDPE pipe meeting all requirements of ANSI A211.11 (AWWA C111) may be used in lieu of HDPE pipe fittings. Restraints shall be Sur-Grip as manufactured by JCM Industries, Inc., or approved equal.
19. Nuts, bolts, and tie -rods used on buried pressure pipe and fittings shall be low alloy steel T- bolts with Zinc anode caps for all T-bolts and rods. The entire installation shall be wrapped in two layers of polyethylene encasement. Nuts, bolts and stiffener plates which will be in contact with sewage shall be stainless steel Type 316.
20. HDPE pipe shall have OD of ductile iron pipe.
21. HDPE pipe shall be as manufactured by CP Performance Pipe, or equal.

2.6 FIBERGLASS REINFORCED POLYMER MORTAR (FIBERGLASS) PIPE AND FITTINGS (GRAVITY LINES)

A. Fiberglass reinforced polymer mortar (fiberglass) pipe and fittings for gravity sewers shall conform to the requirements of ASTM D-3262, current approval, "Standard Specification for 'Fiberglass' (Glass-Fiber-Reinforced Thermosetting Resin) Sewer Pipe."

B. Materials

1. Resin Systems: The manufacturer shall use only polyester resin systems with a proven history of performance in this particular application. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product.
2. Glass Reinforcements: Chopped glass reinforcement fibers used to manufacture the components shall be of highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins. Continuous circumferential glass reinforcement fibers, where utilized, shall be of grade ECR-glass with binder and sizing compatible with impregnating resins.
3. Silica Sand: Sand shall be a minimum of 98% silica with a maximum moisture content of 0.2%.
4. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally affect the performance of the product.
5. Elastomeric Gaskets: Gaskets shall be supplied by qualified gasket manufacturers and be suitable for the service intended.

C. Manufacture and Construction

1. Pipes: Manufacture pipe by a process that will result in a dense, non-porous, corrosion-resistant, consistent composite structure.
2. Joints: Unless otherwise specified, the pipe shall be field connected with fiberglass couplings that utilize elastomeric EPDM or REKA sealing gaskets as the sole means to maintain joint watertightness. The joints shall meet the performance requirements of ASTM D4161. Additionally, the joints shall be rated to a pressure of 80% of -14.7 psi as installed. Joints at tie-ins, when needed may utilize fiberglass, gasket-sealed closure couplings.
3. Fittings: Flanges, elbows, reducers, tees, wyes, laterals and other fittings shall be capable of withstanding all operating conditions when installed. They may be contact molded or manufactured from mitered sections of pipe joined by glass-fiber-reinforced overlays. All fittings and couplings shall be pressure rated for a minimum of 50 psi.
4. End Coating: Protective spigot end resin coating shall be applied at the time of manufacture. CONTRACTOR shall similarly coat the ends of all field cut pipes if the wall of the pipe is completely de-aerated during the production process and glass and sand are not impregnated with 100% pure resin to form a wall that cannot be penetrated by water.
5. Fiberglass pipe shall be as manufactured by: Hobas Pipe USA, Inc., or approved equal.
6. For bury depths greater than 20 feet, CONTRACTOR shall comply with special trench construction requirements recommended by the manufacturer.

D. Dimensions

1. Diameters: The actual outside diameter of the pipe barrel shall be in accordance with ASTM D3262. The internal diameters of all pipes shall be as specified on the Contract Drawings for each pipe diameter.
2. Lengths: Pipe shall be supplied in nominal lengths of 20 feet. Actual laying length shall be nominal +1, -4 inches. At least 90% of the total footage of each size and class of pipe, excluding special order lengths, shall be furnished in nominal length sections.
3. Wall Thickness: The minimum wall thickness shall be the required design thickness for the laying conditions. Manufacturer shall provide information in writing to SD1 per the submittal requirements.
4. End Squareness: Pipe ends shall be square to the pipe axis with a maximum tolerance of 1/4".

E. Testing

1. Pipes: Pipes shall be manufactured and tested in accordance with ASTM D3262.
2. Joints: Joints shall meet the requirements of ASTM D4161.
3. Stiffness: As tested in accordance with ASTM D2412. Any fiberglass pipe run that exceeds 20 feet ,but less than 30 feet, in depth to invert anywhere along the run length from one manhole or structure to a second manhole or structure shall be a minimum stiffness of 72 psi for the entire run.

F. Customer Inspection
   1. SD1 or other designated representative shall be entitled to inspect pipes at the factory or witness the pipe manufacturing.
   2. Manufacturers Notification to Customer: Should SD1 request to see specific pipes during any phase of the manufacturing process, the manufacture must provide SD1 with adequate advance notice of when and where the production of those pipes will take place.

G. Packaging, Handling, and Shipping shall be done in accordance with the manufacturer's instructions.

2.7 TRACER WIRE

A. All pressure pipe shall have marking tape 6" wide. Marking tape for the force main shall be green with the words "Sanitary Sewer" installed approximately twelve (12) inches above the pipe and shall continue for the length of the pipe installation.

B. All pipe for sanitary force mains shall be installed with a twelve (12) gauge solid copper (PVC coated) tracing wire taped to the top of the pipe every five (5) feet. No tracing wire length shall exceed fifteen hundred (1500) feet between air release valves and/or discharge manhole, where system becomes gravity, without terminating in a curb stop box marked with "Sewer". Tracing wire must run continuously through air release valves and made accessible from ground level. Sanitary force mains that end in a discharge manhole, at which point system becomes gravity, shall terminate tracing wire in a curb stop box next to the discharge manhole. Curb stop boxes shall not be located in pavement areas. Splices in the tracing wire shall be kept to a minimum and approved by SD1. If splices are required, they shall be made with copper split bolt (Ilsco #1K-8 or approved equal) and taped with electrical tape. Tracer wire shall be tested to confirm it is functioning properly after installation.

2.8 PIPE COUPLINGS

The pipe couplings shall be of a gasketed, sleeve-type with diameter to properly fit the pipe. Each coupling shall consist of one (1) stainless steel middle ring, of thickness and length specified, two (2) stainless steel followers, two (2) rubber-compounded wedge section gaskets and sufficient track-head steel bolts to properly compress the gaskets. The couplings shall be assembled on the job in a manner to insure permanently tight joints under all reasonable conditions of expansion, contraction, shifting and settlement, unavoidable variations in trench gradient, etc. The coupling shall be Dresser, Style 38, as manufactured by Dresser Manufacturing Division, Bradford, PA, or equal.

2.9 WYE BRANCH FITTINGS AND LATERALS FOR NEW CONSTRUCTION

A. Tee or wye branch fittings shall be used for household or service connection lines to the sewer collector line. The fittings shall meet the requirements of the mainline pipe materials as specified herein. The wyes and tees shall be located as shown on the Contract Drawings or as directed by the ENGINEER. The wyes and tees shall be positioned as to require the least number of fittings per lateral connection. Regular wye connections shall be in accordance with Standard Drawing No. 120. Stack wye connections shall include vertical piping, elbows, wye, and concrete encasement in accordance with Standard Drawing No. 108. If a single sweep tee connection is used, the sweep must be in the direction of sanitary sewer main

B. Inserta Tee pipe fittings are permitted as an alternate lateral tap connection in lieu of wye fittings on a case by case basis for new construction. Inserta Tee type shall be compatible for the pipe type be tapped. Contractor shall be responsible for supplying the proper Tee. Install Inserta Tees using procedures and equipment as referenced in the manufacturer's written installation instructions and in accordance with standard drawing 102.

C. Tapping saddles shall only be used with the explicit approval of SD1 on a case by case basis.

D. Lateral extensions shall be installed from the end of the regular or stack wye connection to the limit of easement or public right-of-way in accordance with Standard Drawing No. 120.

2.10 CONNECTIONS TO EXISTING SEWERS

A. Connections to existing public sewers shall be made at the nearest wye or tee available on the public sewer. Connections to existing sewers where wyes or tees are not available shall be made by one of the following methods:
   1. Install a wye or tee branch fitting per the manufacturer's recommendations or an approved method by SD1.
   2. Inserta Tee Pipe Fittings: Install Inserta Tees using procedures and equipment as referenced in the manufacturer's written installation instructions and in accordance with standard drawings 102.
   3. Tapping Saddles: Tapping saddles shall only be used with the explicit approval of SD1 on a case by case basis.

2.11 JOINT RESTRAINERS AND APPURTENANCES

A. General: Where new pipe is connected to the existing piping, consult SD1 for appropriate pipe connections.

PART 3 - EXECUTION

3.1 GENERAL

A. After being delivered alongside the trench, the pipe, fittings, and specials shall be carefully examined for cracks, soundness, or damage, or other defects while suspended above the trench before installation. No piece of pipe or fitting which is known to be defective shall be laid or placed in the lines. If any defective pipe or fitting shall be discovered after the pipe is laid, it shall be removed and replaced with a satisfactory pipe or fitting without additional charge. Before each piece of pipe is lowered into the trench, it shall be thoroughly cleaned out. Each piece of pipe shall be lowered safely and separately in the trench. In case a length of pipe is cut to fit in a line, it shall be so cut as to leave a smooth end at right angles to the longitudinal axis of the pipe.

B. The bell and spigot of the joint shall be thoroughly wire brushed and cleaned of dirt and foreign matter immediately prior to jointing. The contact surfaces shall be coated with the lubricant, primer or adhesive recommended by the manufacturer, and then the pipe shall be pushed together until the joint snaps distinctly in place. The pushing together of the pipe may be done by hand or by the use of a bar.

C. Place pipe to the grades and alignment indicated, with a tolerance of one in 100 vertical and one in 500 horizontal, unless otherwise directed by the ENGINEER. Remove and relay pipes that are not laid correctly. Slope piping uniformly between elevations shown.

D. Trenches shall be kept dry during pipe laying. Before pipe laying is started, all water that may have collected in the trench shall be removed. Ensure that ground water level in trench is at least 12 inches below bottom of pipe before laying piping. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete and protect and keep clean water pipe interiors, fittings and valves.

E. All pipe shall be laid starting at the lowest point and proceed towards the higher elevations, unless otherwise approved by ENGINEER. Place bell and spigot pipe so that bells face the direction of laying, unless otherwise approved by ENGINEER.

F. When laying of the pipe is stopped, the end of the pipe shall be securely plugged or capped. Plugging shall prevent the entry of animals, liquids, or persons into the pipe or the entrance or insertion of deleterious material.
   1. Install standard plugs into all bells at dead ends, tees or crosses. Cap all spigot ends.
   2. Fully secure and block all plugs and caps installed for pressure testing to withstand the specified test pressure.
   3. Where plugging is required for phasing of the Work or for subsequent connection of piping, install watertight, permanent type plugs.

G. Pipe manufacturer for each pipe type used shall be present and instruct CONTRACTOR on proper installation technique per shop drawings and manufacturer's recommended procedures prior to the start of the Work.

H. Install piping as shown, specified and as recommended by the manufacturer. If there is a conflict between manufacturer's recommendations and the Drawings or Specifications, request instructions from SD1 before proceeding.

I. Deflections at joints shall not exceed 75 percent of the amount allowed by the pipe manufacturer.

J. Field cut pipe, where required, with a machine specially designed for cutting piping. Make cuts carefully, without damage to pipe or lining, and with a smooth end at right angles to the axis of pipe. Cut ends on push-on joint shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.

K. Touch up protective coatings in a satisfactory manner prior to backfilling. See pipe material section for specific requirements.

L. Place concrete pipe containing elliptical reinforcement with the minor axis of the reinforcement in a vertical position.

M. Laying Pipe and Service Laterals

1. Conform to manufacturer's instructions and requirements of the standards listed below, where applicable:
   a. Ductile Iron Pipe: AWWA C600, AWWA C105.
   b. Concrete Pipe: AWWA M9, Concrete Pipe Handbook.
   c. Thermoplastic Pipe: ASTM D 2774.
   d. ASCE Manual of Practice No. 37.

3.2 PIPING INSTALLATION- GENERAL

A. Excavation for Pipeline Trenches: Refer to Section 02220. Trenches in which pipes are to be laid shall be excavated to the depths shown on the Drawings or as specified by the ENGINEER. Minimum cover for all pipelines shall be 36 inches under non-traffic areas and 60 inches under traffic areas unless otherwise shown on the Drawings or approved by the ENGINEER. All trench excavations shall be inspected by ENGINEER prior to laying pipe. Notify ENGINEER in advance of excavating, bedding and pipe laying operations.

B. Jointing: The types of joints described herein shall be made in accordance with the manufacturer's recommendations.

C. Separation of Sewers and Potable Water Pipe Lines:

1. Horizontal and Vertical Separation:
   a. Wherever possible, existing and proposed potable water mains and service lines, and sanitary and storm sewers and service lines shall be separated horizontally by a clear distance of not less than 10 feet.
   b. If local conditions preclude a clear horizontal separation of not less 10 feet, the installation will be permitted provided the potable water main is in a separate trench or on an undistributed earth shelf located on one side of the sewer and at an elevation so the bottom of the potable water main is at least 18 inches above the top of the sewer.
   c. Exception:
      1) Where it is not possible to provide the minimum horizontal and vertical separation described above, the potable water main must be constructed of cement lined ductile iron slip-on or mechanical joint pipe complying with the public water supply design standards of the governing agency. Sewer must be constructed of epoxy lined ductile iron slip-on or mechanical joint pipe complying with SD1's requirements. Both pipes shall be pressure tested in accordance with the requirements of the buried piping schedule, but in no case less than 150 psi, to assure watertightness before backfilling.
2. Crossings:
   a. Provide a minimum vertical distance of 18 inches between the outsides of pipes.
   b. Center one full length section of potable water main over the sewer so that the sewer joints will be equidistant from the potable water main joints.
   c. Provide adequate structural support where a potable water main crosses under a sewer to maintain line and grade.
   d. Exceptions:
      1) See requirements in paragraph 3.2.C.1.c.(1) above.
      2) Encase either potable water main or sewer in a watertight carrier pipe that extends 10 feet on both sides of the crossing, measured perpendicular to the potable water main.

D. Piping in close proximity to cathodic protection:

   1. Where new metal piping is in close proximity to or crosses existing steel or Ductile Iron pipe confirmation if the existing piping has cathodic protection shall be performed. If existing piping is catholically protected, SD1 shall be consulted for direction.

E. On steep slopes, take measures acceptable to ENGINEER to prevent movement of the pipe during installation. Permanent slope anchors shall be installed on all pipe with slopes over twenty (20) percent. See the SD1's standard detail for Concrete Anchor Block. Consult with SD1 on spacing of the anchors.

F. Where force mains parallel gravity sewers, fittings shall be provided to maintain 12-inches of separation between all pipes and manholes.

G. Reaction Anchorage (Pressure Pipe Only):

1. All tees, Y-branches, bends deflecting 11-1/4 degrees or more, and plugs which are installed in buried piping shall be provided with proprietary restrained joint systems for preventing movement of the pipe and joints caused by the internal test pressure.

H. Thrust Restraint

1. Provide thrust restraint on pressure piping systems where shown and specified.
2. Thrust restraint for DIP shall be accomplished by means of restrained pipe joints.
3. Thrust restraints shall be designed for the axial thrust exerted by the system design pressures as specified by the Design ENGINEER.

I Dewatering and Ground Water

1. Discharging of sediment laden groundwater or rainwater from excavations directly to watercourses or storm sewers is prohibited. Failure of the CONTRACTOR to comply with the requirements of this specification may result in SD1 issuing a stop work order or non-approval of pay estimates until the CONTRACTOR puts measures in place to comply with this specification. All costs associated with the stop work or non-approval of pay estimates shall be at the CONTRACTOR's sole expense.

2. Pipe trenches and excavations for appurtenances shall be kept free from water during trench bottom preparation, pipe laying and jointing, pipe embedment and building of appurtenances in an adequate and acceptable manner.

3. Where the trench or excavation bottom is mucky or otherwise unstable because of ground water, or where the ground water elevation is above the bottom of the trench or excavation, the ground water shall be lowered by means acceptable to the ENGINEER to the extent necessary to keep the trench or excavation free from water while the trench or excavation is in progress. The discharge of ground water from the trench or excavation area shall be by the methods specified below to natural drainage channels, gutters, drains, or storm sewers which will conduct the water away from the trench or excavation area. Means of diverting any surface water away from the trench or excavation area shall be taken and surface water prevented from entering the trench or excavation area.

4. Dewatering equipment shall be provided to remove and dispose of all surface water and groundwater entering excavations, trenches, or other

parts of the work. Each excavation shall be kept dry during sub grade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

5. All excavations for concrete structures or trenches which extend down to or below groundwater shall be dewatered by lowering and keeping the groundwater level beneath such excavations a minimum of 6 inches or more below the bottom of the excavation.

6. Surface water shall be diverted or otherwise prevented from entering excavations or trenches to the greatest extent possible without causing damage to adjacent property.

7. Groundwater and rainwater removed during dewatering shall be discharged onto undisturbed ground where vegetative cover exists or through sediment and erosion controls and allowed to flow overland to filter out any sediments before discharging to any drain, storm sewer, or watercourse specified above. No such flows are permitted onto exposed soils, stream banks, or other areas subject to erosion.

8. Where overland flow on existing undisturbed ground is not sufficient to adequately remove all sediment from dewatering operations prior to discharge to any drain, storm sewer, or watercourse, straw bale check dams, sediment capturing bags, or other means acceptable to SD1 or ENGINEER shall be used to remove the sediment from the water prior to discharge. The method of discharging ground water or rain water from the trench or excavation area shall be such as to not create any erosion of existing ground.

9. All discharge locations shall be approved prior to construction by the ENGINEER and OWNER.

10. CONTRACTOR shall take measures to prevent damage to properties, structures, sewers, and other utility installations and other work.

11. CONTRACTOR shall repair all damage, disruption, or interference resulting directly or indirectly from groundwater control system operations at no additional cost to SD1.

12. The CONTRACTOR shall maintain the components of the dewatering system and surface water erosion and sediment controls within the project site. Deficiencies identified during visual inspection by SD1, SD1 's representatives, or the governing regulatory authority shall be remedied by the CONTRACTOR at no additional cost to SD1.

13. Dewatering system components shall be located where they will not interfere with construction activities adjacent to the work area.

14. The CONTRACTOR shall be responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipe or conduit shall be left clean and free of sediment.

J GROUND WATER BARRIERS

Where specified, continuity of bedding material shall be interrupted by low permeability groundwater barriers to impede passage of water through the bedding. Groundwater barriers for all pipelines shall be soil plugs of 3 feet in thickness, extending the full depth and width of the pipe bedding material in the trench, and spaced not more than 400 feet apart. The soil plugs shall be constructed from soil meeting ASTM D2487 classification GC, SC, CL, or ML, and compacted to 95 percent of maximum density at or near the optimum moisture content (ASTM D698).

K PIPE ENCASEMENTS

1. Concrete Encasement
   a. Wherever pipe encasement is called for on the plans or ordered in by SD1, the CONTRACTOR shall construct the encasement as shown on the drawings or in accordance with SD1's standard drawings.
   b. Support the pipe sections on oak blocks or other compressible blocks, being sure to keep the pipe sections on line and grade and then pour concrete, completely under each section, along each side and up to a point at least twelve (12) inches above the top of each section, making sure that all voids are filled. In lieu of blocks, the CONTRACTOR may use a bed of concrete, to initially support the pipe sections.
   c. The minimum dimension of concrete under the pipe sections shall be six (6) inches and on each side of the sections shall be twelve (12) inches. This encasement shall be reinforced around the top and sides of the pipe as shown on the Contract Drawings for creek crossings and other locations. If the trench walls are nearly vertical from the bottom of the trench up to a point to which the encasement is to be poured, forms for forming the encasement may be omitted and the concrete poured to and against the trench walls. Where trench walls are not nearly vertical, proper forms shall be set for forming the encasement, unless otherwise called for by SD1. The space between the trench walls and any formed encasement shall be filled and compacted with approved pipe bedding or backfilling material.
   d. Care shall be taken to assure that the pipe sections remain on line and grade during the placing of concrete and that the joints are not disturbed. Backfill shall not be placed for a minimum of six (6) hours after encasement is completed, unless otherwise approved by SD1.

e. Exercise care to avoid flotation when installing pipe in cast-in-place concrete.

2. Casing Pipe

a. Whenever casing pipe is called for on the plans, the CONTRACTOR shall install a casing pipe of the size and of the material called for on the plans by means of jacking, boring, or trenching.

b. When the casing pipe is to be installed under a highway or railroad, and at other locations specifically designated on the Drawings, the method of installation shall be jacking or boring as specified in Section 02400, unless trenching is specifically allowed.

1.For force mains inside casing pipe all pipe joints shall be restrained joint connections. Casing spacers or wood blocking shall be used to center the pipe in the casing. The annular space between the force main and casing pipe shall be completely filled with 500 psi or higher compressive strength grout.

2.For gravity pipe inside casing pipe, casing spacers shall be used to center the pipe within the casing. The annular space does not have to be filled.

c. Casing Spacers- Include in casing pipe. Centered/Restrained Casing spacers shall be installed to position the carrier pipe within the center of the casing pipe. The required spacing and installation shall be per the manufacturer's recommendation, except that for PVC carrier pipe, a minimum of 3 spacers shall be installed on each length of pipe with a maximum 6 feet spacing between spacers. All spacers shall be 316 stainless steel as manufactured by Cascade Waterworks MFG Co., Advance Products and Systems (APS) or other approved equal. Casing spacers shall also be provided with height field-adjustment capability for installation of gravity sewer on a constant slope.

d. Casing pipe end seals shall be installed at each end of the casing pipe and shall consist of a proper sized rubber seal and attached to the carrier and casing pipe with stainless steel bands per the manufacturers recommendation. Casing pipe end seals shall be manufactured by Cascade Waterworks MFG Co., Advanced Products and Systems (APS) or other approved equal.

L Work Affecting Existing Piping

1. Location of Existing Piping:

a. Locations of existing piping shown should be considered approximate.

b. CONTRACTOR shall determine the true location of existing piping to which connections are to be made, and location of other facilities

which could be disturbed during earthwork operations, or which may be affected by CONTRACTOR'S Work in any way.

c. Conform to applicable requirements of Division 1 pertaining to cutting and patching, and connections to existing facilities.

2. Taking Existing Pipelines Out of Service:
   a. Do not take pipelines out of service unless specifically noted on the Drawings, or approved by SD1.
3. Work on Existing Pipelines:
   a. Cut or tap pipes as shown or required with machines specifically designed for this work.
   b. Install temporary plugs to prevent entry of mud, dirt, water and debris.
   c. Provide all necessary adapters, fittings, pipe and appurtenances required to complete the Work.

M. Install service laterals per SD1's standard details and per the requirements specified in this specification,.

N. Bedding and backfilling of pipeline trenches shall be in accordance with the requirements set forth in Section 02220 and as shown on SD1's trench compaction detail.

O. Before final acceptance, the CONTRACTOR will be required to level all trenches or to bring the trench up to grade. The CONTRACTOR shall also remove from roadways, rights-of-way and/or private property all excess earth or other materials resulting from construction.

3.3 DUCTILE IRON PIPE INSTALLATION REQUIREMENTS

A. Jointing Pipe:
   1. Ductile Iron Mechanical Joint Pipe:
      a. Wipe clean the socket, plain end and adjacent areas immediately before making joint. Make certain that cut ends are tapered and sharp edges are filed off smooth.
      b. Lubricate the plain ends and gasket with soapy water or an approved pipe lubricant, in accordance with AWWA C111, just prior to slipping the gasket onto the plain end of the joint assembly.
      c. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end.
      d. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
      e. Push gland toward socket and center it around pipe with the gland lip against the gasket.
      f. Insert bolts and hand tighten nuts.

g. Make deflection after joint assembly, if required, but prior to tightening bolts. Alternately tighten bolts 180 degrees apart to seat the gasket evenly. The bolt torque shall be as follows:

Pipe Size (inches)	Bolt Size (inches)	Range of Torque (ft-lbs)
3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1-1/4	120-150

2. Ductile Iron Push-On Joint Pipe:
   a. Prior to assembling the joints, the last 8 inches of the exterior surface of the spigot and the interior surface of the bell shall be thoroughly cleaned and all mud, debris, etc. removed and joint recesses wiped clean.
   b. Rubber gaskets shall be wiped clean and flexed until resilient. Refer to manufacturer's instructions for procedures to ensure gasket resiliency when assembling joints in cold weather.
   c. Insert gasket into joint recess and smooth out the entire circumference of the gasket to remove bulges and to prevent interference with the proper entry of the spigot of the entering pipe.
   d. Immediately prior to joint assembly, apply a thin film of approved lubricant to the surface of the gasket which will come in contact with the entering spigot end of pipe. CONTRACTOR may, at his option, apply a thin film of lubricant to the outside of the spigot of the entering pipe.
   e. For assembly, center spigot in the pipe bell and push pipe forward until it just makes contact with the rubber gasket. After gasket is compressed and before pipe is pushed or pulled all the way home, carefully check the gasket for proper position around the full circumference of the joint. Final assembly shall be made by forcing the spigot end of the entering pipe past the rubber gasket until it makes contact with the base of the bell. When more than a reasonable amount of force is required to assemble the joint, the spigot end of the pipe shall be removed to verify the proper positioning of the rubber gasket. Gaskets which have been scoured or otherwise damaged shall not be used.
   f. Maintain an adequate supply of gaskets and joint lubricant at the site at all times when pipe jointing operations are in progress.
3. Proprietary Joints:
   a. Pipe which utilizes proprietary joints such as Fastite, by American Cast Iron Pipe Company, Tyton by U.S. Pipe Incorporated, restrained joints, or other such joints shall be installed in strict accordance with the manufacturer's instructions.

B. Polyethylene Tube Wrap Installation

The polyethylene tube wrap shall be installed on ductile iron pipe in accordance with AWWA C105 and the following:

1. Pick up the pipe by a crane at the side of the trench using either a sling or pipe tongs, and raise the pipe about three feet off the ground. Slip a section of the polyethylene tubing over the spigot send of the pipe and bunch up, accordion fashion, between the end of the pipe and the sling. The tubing should be cut to a length approximately 4 feet longer than the length of the pipe.
2. Lower the pipe into the trench, seat the spigot end in the bell of the adjacent installed pipe and then lower the pipe to the trench bottom. A shallow bell hole shall be provided in the trench bottom to facilitate the wrapping of the joint.
3. Make up the pipe joint in the normal fashion.
4. Remove the sling from the center of the pipe and hook into the bell cavity and raise the bell end 3 or 4 inches to permit the polyethylene tubing to be slipped along the full length of the barrel. Enough of the tubing should be left bunched up, accordion fashion, at each end of the pipe to overlap the adjoining pipe approximately 2 feet.
5. To make the overlap joint, pull the tubing over the bell of the pipe, fold around the adjacent spigot and wrap with approximately three (3) circumferential turns of the 2-inch wide plastic adhesive tape to seal the tubing to the pipe.
6. The tubing on the adjacent pipe shall then be pulled over the first wrap on the pipe bell and sealed in place behind the bell using approximately three circumferential turns of the 2-inch plastic adhesive tape.
7. The resulting wrap on the barrel of the pipe will be loose, and it should be pulled snugly around the barrel of the pipe and the excess material folded over at the top, and held in place by means of 6-inch strips of the 2-inch wide plastic adhesive tape at intervals of approximately 3 feet along the pipe barrel.
8. Fittings, valves, hydrants, etc., shall be hand wrapped, using polyethylene film that is held in place with the plastic adhesive tape.
    a. Bends, reducers, and offsets can be wrapped with the polyethylene tubing in the same manner as pipe.
    b. Valves can be wrapped by bringing the tube wrap on the adjacent pipe over the bells or flanges of the valve and sealing with a flat sheet of the polyethylene passed under the valve bottom and brought up around the body to the stem and fastened in place with the adhesive tape.
    c. Hydrants can be wrapped with polyethylene tubing slipped over the hydrant to encase the hydrant from the lead-in valve to the ground level of the hydrant. To provide drainage of the hydrant, it is necessary to cut a small hole in the film and insert a short pipe nipple to drain the water to the soil outside the film wrap.
    d. All fittings that require concrete backing should be completely wrapped prior to pouring the concrete backing block.

3.4 HDPE INSTALLATION REQUIREMENTS

A. Pipe Joining

1. Joints between plain end pipes and fittings shall be made by butt fusion, and joints between the main and saddle branch fittings shall be made using saddle fusion using only procedures that are recommended by the pipe and fittings manufacturer.
2. Butt fusion shall be performed between pipe ends, or pipe ends and fitting outlets, of like outside diameter and wall thickness (SDR or DR). Butt fusion jointing between like diameters, but unlike wall thickness, shall not be permitted. Transitions between unlike wall thicknesses shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means.
3. Heat-joining of HDPE pipe shall conform to applicable portions of AWWA C-906.
4. HDPE pipe and fittings shall be joined together or to other materials by means of flanged connections (flange adapters and back-up rings) or mechanical couplings designed for joining HDPE pipe or for joining HDPE pipe to another material. Mechanical couplings shall be fully pressure-rated and fully thrust restrained such that when installed in accordance with manufacturer's recommendations, a longitudinal load applied to the mechanical coupling will cause the pipe to yield before the mechanical coupling disjoins. External joint restraints shall be used in lieu of fully restrained mechanical couplings.

B. Installation

1. On every day that butt fusions are to be made, the first fusion of the day shall be a trial fusion. The trial fusion shall be allowed to cool completely, then fusion straps shall be cut out. The test strap shall be 12-inch (minimum) or 30 times the wall thickness in length with the fusion in the center, and 1-inch (minimum) or 1.5 times the wall thickness in width. Bend the test strap until the ends of the strap touch. If the fusion fails at the joint, a new trial fusion shall be made, cooled completely and tested. Butt fusion of pipe to be installed shall not commence until a trial fusion has passed the bent strap test.
2. Installation shall be in accordance with ASTM D 2321, manufacturer's recommendations, and this specification. All necessary precautions shall be taken to ensure a safe working environment in accordance with all applicable safety codes and standards.
3. Mechanical joints and flange connections shall be installed in accordance with the manufacturer's recommended procedure. Flange faces shall be centered and aligned to each other before assembling and tightening bolts. In no case shall the flanged bolts be used to draw the flanges into alignment. Bolt threads shall be lubricated and flat washers shall be fitted under the

flange nuts. Bolts shall be evenly tightened according to the tightening pattern and torque step recommendations of the manufacturer. At least one (1) hour after initial assembly, flange connections shall be re-tightened following the tightening pattern and torque step recommendations of the manufacturer. The final tightening torque shall be 100 ft.-lbs. or as recommended by the manufacturer.

4. Pipe shall be laid on grade and on a stable foundation in accordance with Section 02220.
5. When lifting with slings, only wide fabric choker slings shall be used to lift, move, or lower pipe and fittings. Wire rope or chain shall not be used.
6. CONTRACTOR shall be liable to correct any pipe installed off line or grade (whether by horizontal directional drilling or other means).

3.5 POLYVINYL CHLORIDE (PVC) GRAVITY PIPE INSTALLATION REQUIREMENTS

A. Push-on Joints

1. Bevel all field-cut pipe, remove all burrs and provide a reference mark the correct distance from the pipe end.
2. Clean the pipe end and the bell thoroughly before making the joint. Insert the O-ring gasket, making certain it is properly oriented. Lubricate the spigot well with an approved lubricant; do not lubricate the bell or O-ring. Insert the spigot end of the pipe carefully into the bell until the reference mark on the spigot is flush with the bell.

3.6 FIBERGLASS PIPE INSTALLATION REQUIREMENTS

A. Pipe Handling: Use textile slings, other suitable materials or a forklift. Use of chains or cables is not permitted.

B. Jointing:

1. Clean ends of pipe and coupling components.
2. Apply joint lubricant to pipe ends and elastomeric seals of coupling. Use only lubricants approved by the pipe manufacturer.
3. Use suitable equipment and end protection to push or pull the pipes together.
4. Do not exceed forces recommended by the manufacturer for coupling pipe.
5. Join pipes in straight alignment then deflect to required angle. Do not allow the deflection angle to exceed the deflection permitted by the manufacturer.

3.7 GENERAL TESTING REQUIREMENTS

A. General:

1. Test all piping.
2. All piping shall be tested prior to post-construction CCTV operations.
3. Notify SD1 at least 48 hours in advance of testing.
4. Conduct all tests in the presence of SD1.
5. Remove or protect any pipeline-mounted devices which may be damaged by the test pressure.

6. Provide all apparatus and services required for testing, including but not limited to, the following:
   a. Test pumps, bypass pumps, hoses, calibrated gauges, meters, test containers, valves and fittings.
   b. Temporary bulkheads, bracing, blocking and thrust restraints.
7. Provide air if an air test is required and power if pumping is required.
8. CONTRACTOR shall provide fluid required for testing.

B. Force Mains Test Schedule:
1. The required hydrostatic test pressures shall be as specified by the Design ENGINEER and approved by SD1.

2. Unless otherwise specified, the required hydrostatic test pressures are at the lowest elevation of the pipeline.

C. Pressure Test Procedure for Force Mains:
1. Complete backfill and compaction of entire pipe before testing, unless otherwise required or approved by ENGINEER
2. Fill section to be tested slowly with water and expel all air. Install corporation cocks, if necessary, to remove all air.
3. Apply specified test pressure for two hours and observe pressure gage. Check carefully for leaks while test pressure is being maintained.
4. A successful test shall be defined as zero drop in the specified test pressure during the two hour testing period.

D. Displacement of Pipe

1. The sewer pipe sections may be checked by SD1 to determine if any displacement of the pipe sections from alignment and grade have occurred as each portion of the sewer is completed between manhole locations. When the test is required by SD1, it shall be as follows:
   a. Flashing a light beam by means of a strong flashlight or reflecting sunlight through the portion of the sewer between manhole locations or by utilizing a laser beam.
   b. When viewed from the opposite end of the portion of the sewer from the light location, the light beam should be full throughout the sections, but not less than two-thirds full under any circumstances. There shall be no "dips" in the grade of the pipe invert.
   c. If the pipe sections show any misalignment, displacement or any other defects in the sections or joints, the CONTRACTOR shall remedy the defect to the satisfaction of SD1.
   d. This test may be done after the pipe sections have been laid, the joints completed and the bedding completed to twelve (12) inches above the pipe sections, or after completion of the sewer and all backfilling has been undertaken or both.

E. Deflection of Pipe

1. A deflection test shall be performed on all gravity sanitary sewers using flexible pipe. The test shall be conducted after the final backfill has been in place at least thirty (30) days. No pipe shall exceed a deflection of five percent (5%). The deflection test is to be run by using a rigid mandrel, or equal means approved by SD1, and shall have a diameter equal to ninety-five percent (95%) of the inside diameter of the pipe, including the pipe manufacturer's tolerances. The test shall be performed without mechanical pulling devices. All tests must be witnessed and approved by a representative of SD1.

2. A deflection test shall be performed on all ductile iron gravity sanitary sewers exceeding twelve (12) feet in depth. The test shall be conducted after the final backfill has been in place at least thirty (30) days. No pipe shall exceed a deflection of five percent (5%). The deflection test is to be run by using a rigid fin style mandrel fitted with rubber inline skate wheels, rubber padding on the fins, or equal means to prevent damage to the internal lining of the pipe. If a wheeled mandrel is used each fin shall have 2 wheels made of polyurethane with a Shore Scale durometer value of between 78A and 82A. Any damages to the lining from the mandrel testing shall be repaired to the satisfaction of SD1 at the sole expense of the CONTRACTOR. Final diameter of the protected mandrel shall be equal to ninety-five percent (95%) of the inside diameter of the pipe, including the pipe manufacturers' tolerances. The test shall be performed without mechanical pulling devices. All tests must be witnessed and approved by a representative of SD1.

F. Air Test for Gravity Sewers 42" and Smaller

1. The CONTRACTOR shall test the tightness of the pipe sections, joints and appurtenances of all gravity sewers by means of the low pressure air test.
2. No tests shall be made until the backfill is consolidated over the pipe and all service lines in the section to be tested have been connected and plugged.
3. The low pressure air test shall be conducted in accordance with procedures outlined in UNIBELL Specification UNI B-6. If the section of sewer being tested is below the elevation of ground water in the trench, the test pressure shall be 0.433 psi for each foot of ground water above the invert of the pipe.
4. All tests must be witnessed and approved by a representative of SD1.
5. Any leaks determined from the air test shall be replaced by the CONTRACTOR to the satisfaction of SD1.
6. The minimum air test pressure for all gravity sewers shall be 7 psi.

G. Individual Pipe Joint Testing for Gravity Sewers 48" and Greater.

1. The CONTRACTOR shall test each individual joint of the gravity sewers using the following procedure:
   a. The test pressure shall be 22 psig for 10 minutes using the

individual joint apparatus, based in the ASTM 4161 joint test standards. The pressure gage used shall read in one (1) psi increments.

b. Center the joint tester over the joint. Inflate the outer element to the manufacturer's specified pressure over the desired test pressure.

c. Fill the center of the joint tester cavity with water or air, dependent upon test used, until it flows evenly from the bleed off valve, which removes air from the outer cavity. The bleed off valve shall be located at the top of the joint tester assembly. Close the bleed –off valve and pressurize the cavity to the test pressure. Allow pressure to stabilize (10 to 15 seconds).

d. The test time period is 10 minutes. If the pressure in the cavity drops below 22 psig, the joint is defective and fails the test.

e. When the joint test is completed, all pressure must be exhausted from the center cavity and from the end element to 0 psig. The joint tester can then be transported and positioned on the next joint to be tested.

H. Repair of Failed Pipe Sections:

1. Contact SD1 24 hours prior to making any repairs to failed pipe sections. SD1 shall be present during the entire duration of time repairs are being made to failed sections of pipe.
2. The CONTRACTOR shall remove and replace, at no extra cost to SD1 all sections of pipe which fail any of the tests specified in this section in accordance with the following procedures:
   a. Excavate failed sections of pipe in accordance with Section 02220.
   b. Cut out and/or remove failed sections and relay new pipe beginning at nearest joint.
   c. Close pipe with pipe coupling per manufacturer's recommendation and approval of SD1.
3. The CONTRACTOR shall provide all material, labor, and equipment necessary to remove and replace the failed pipe section.
4. Retest the replaced sewer sections to meet the requirements listed in this section.

3.8 CLEANING AND DISINFECTION

A. Cleaning:

1. Thoroughly clean all piping and flush in a manner approved by ENGINEER, prior to placing in service.

2. Piping 24 inches in diameter and larger shall be inspected from inside and all debris, dirt and foreign matter removed.
3. If piping which requires disinfection has not been kept clean during storage or installation, CONTRACTOR shall swab each section individually before installation with a five percent hypochlorite solution, to ensure clean piping.

B. Disinfection:
1. Disinfect all potable and finished water piping.
2. A suggested procedure for accomplishing complete and satisfactory disinfection is specified below. Other procedures will be considered for approval by the ENGINEER.
   a. Thoroughly flush piping prior to disinfection with water. For pipelines 24 inches in diameter and larger, pipelines shall be manually cleaned, carefully removing all sweepings, dirt and debris prior to disinfection.
   b. Conform to procedures described in AWWA C651. Continuous feed method of disinfecting shall be used unless alternative method is acceptable to ENGINEER.
3. CONTRACTOR shall supply water for initial flushing, testing and chlorination. CONTRACTOR shall provide all temporary piping, hose, valves, appurtenances and services required. Cost of water required for re-disinfection will be paid by CONTRACTOR.
4. Chlorine will be supplied by CONTRACTOR.
5. Bacteriologic tests will be performed by SD1. A certified test laboratory report will be made available to CONTRACTOR, if requested.
6. After the required retention period, the heavily chlorinated water shall be flushed to wet well at a rate acceptable to SD1.

3.9 CLEAN-UP

Upon completion of the installation of the piping and appurtenances, the CONTRACTOR shall remove all debris and surplus construction materials resulting from the work. The CONTRACTOR shall grade the ground along each side of pipe trenches in a uniform and neat manner leaving the construction area in a shape as near as possible to the original ground line. Refer to Section 02900, Landscaping, for restoration.

- END OF SECTION -

SECTION 02651

TELEVISION INSPECTION

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, tools, equipment and incidentals as shown, specified, and required to perform Post- Installation television (TV) inspection of all sanitary and storm sewers, as specified herein.

1.2 DEFINITIONS

A. Post-Installation TV Inspection: Video inspection to determine that rehabilitation of an existing sewer or construction of new sanitary and/or storm sewers have been completed according to Specifications.

1.3 PERFORMANCE REQUIREMENTS

A. Inspection shall be done one sewer line section (i.e. manhole to manhole) at a time.

B. Quality of inspection recording shall be acceptable to SD1 when viewed on a 19" monitor.

C. Inspection shall be performed by a SCREAM™ or NASSCO *Pipeline Assessment Certification Program* (PACP) certified operator and shall meet the coding and reporting standards and guidelines as set by SCREAM™ or PACP. All report annotations, pipe conditions and pipe defects shall be identified properly using SCREAM™ or PACP codes as defined by SCREAM™ or NASSCO.

1.4 SUBMITTALS

A. Submit one copy of Electronic Inspection Reports and TV videos on portable hard drive, CD, DVD, or other digital media.

1.5 REFERENCE STANDARDS

A. NASSCO prepared *Pipeline Assessment and Certification Program* (PACP), Current Edition Reference Manual. This manual includes a standard TV inspection form and sewer condition codes.

PART 2 – PRODUCTS

2.1 TELEVISION EQUIPMENT

A. Closed Circuit TV Equipment: Select and use closed-circuit television equipment that will produce a color digital recording.

B. Pipe Inspection Camera: Produce a video using a pan-and-tilt, radial viewing, pipe inspection camera or a hand-held video camera that pans ± 275 degrees and rotates 360 degrees. Use an accurate footage counter to measure the exact distance of the camera from the centerline of the starting point. Use a camera with camera height adjustment so that the camera lens is always centered at one-half the inside diameter, or higher, in the pipe being televised. Provide a lighting system that allows the features and condition of the pipe to be clearly seen. A reflector in front of the camera may be required to enhance lighting in humidity conditions. The camera shall be operative in 100 percent humidity conditions. The camera, television monitor and other components of the video system shall be capable of producing a minimum 500-line resolution colored video picture. Picture quality and definition shall be to the satisfaction of the ENGINEER. If unsatisfactory, equipment shall be removed and no payment made for an unsatisfactory inspection.

C. Television Inspection Logs: Prepare printed location records to clearly identify the location of each source of infiltration or defect discovered using a standard stationing system. Other data of significance includes:

1. Estimation of extraneous flows observed from holes, joints, cracks, and from the annular space between rehabilitated sliplined pipe.
2. Unusual conditions.
3. Roots.
4. Cracked or collapsed sections.
5. Sags or low spots in the pipe.
6. Presence of scale and corrosion.
7. Structural deficiencies.
8. Signs of previous leakage.
9. Sewer line sections that the camera failed to pass through and reasons for the failure.
10. Other discernible features.

D. For off-road work, CONTRACTOR shall provide the appropriate vehicle(s) for the terrain in order to access the sewers and allow for proper inspection of the sewers and manholes.

E. Data shall be recorded digitally and a copy of the television inspection logs shall be supplied to the OWNER or ENGINEER in the form of a bound report. A table listing acronyms and their meaning shall be

included in the report. CONTRACTOR shall also supply the OWNER a copy of the television inspection logs on an electronic file that is Microsoft Excel compatible.

F. Video Capture - Full time live color video files shall be captured for each pipe segment inspected. The files shall be stored in industry standard MPEG format viewable from an external hard drive on an external personal computer that utilizes a standard digital media player to view the recording. The MPEG video shall be ISO-MPEG Level 1 (MPEG-1) coding with a resolution of at least 352 pixels (x) by 240 pixels (y) and an encoded frame rate of 29.97 frames per second. System shall perform an automatic disk image/file naming structure to allow saved video/data sections to be saved to a portable hard drive. The video recording shall be free of electrical interference and shall produce a clear and stable image. The digital recordings and inspection data shall be cross-referenced to allow instant access to any point of interest within the digital recording.

PART 3 – EXECUTION

3.1 POST INSTALLATION TELEVISION INSPECTION

ALL NEWLY CONSTRUCTED SEWERS SHALL BE CLEANED AND FREE FROM DEBRIS PRIOR TO PERFORMING THE POST INSTALLATION TELEVISION INSPECTION. THIS COST SHALL BE CONSIDERED INCEDENTAL TO THE POST INSTALLATION TELEVISION INSPECTION.

A. Televise each sewer line to document the structural and maintenance conditions of the line. The sewer inspections shall be compatible with the SCREAM™ defect coding system for sewers and manholes, which is SD1's standard defect coding system. The CONTRACTOR shall either use the SCREAM™ sewer defect coding system or SD1 will allow the CONTRACTOR to use an industry standard defect coding system, such as NASSCO PACP in lieu of using the SCREAM™ sewer defect codes, to conduct the sewer inspections.

The following data for the defect observations shall be recorded:

- Observation Data
- Observation#, unique per defect
- Footage
- Clock position (1 – 12)
- Defect/Description (use code)
- Comments

B. In addition to recording the defects for the sewers and manholes, CONTRACTOR shall also record the following attribute data as "fields" in their inspections:

- Upstream MH#

- Downstream MH#
- Date of inspection
- Direction of inspection
  - 1 = upstream to downstream
  - 2 = downstream to upstream
- Length of pipe (as noted by last observation footage)
- Diameter/height (inches)
- Shape (use shape code or text)
- Material (use pipe material code or text)
- Pipe width, non-circular (inches)
- Crew
- Video (name as USMH_DSMH_Direction_date.mpg)
- Comments

A. Immediately after cleaning, televise the sewer line to document its condition and to locate existing points of infiltration or other defects. Notify the OWNER and ENGINEER 24 hours in advance of any TV inspection so that the OWNER and ENGINEER may observe inspection operations.

B. Perform TV inspection of the sewer as follows:

1. A NEW inspection shall be started where a manhole, junction, or diversion chamber is located. This includes new manholes, junctions, or diversion chambers identified in the field, but not previously identified in SD1 mapping. Therefore, no manholes, junctions, or diversion chambers shall be at a midpoint of an inspection log, only at the beginning and the end of each inspection. Inspection runs shall begin and end at manholes or junctions unless an obstruction is encountered. Lateral connections from inlets/catch basins, material changes or breaks in grade are not approved locations to begin/end an inspection. Said features shall be logged on the recording. If CONTRACTOR uses a lateral connection from inlets/catch basins, material changes or breaks in grade as a begin/end point for televising, SD1 will reject said segment and the sewer data shall be reorganized to match the data requirements at no additional cost to SD1.

2. Perform Survey TV Inspection immediately after cleaning.
   a. Move the camera through the line in either direction at a uniform rate not exceeding 30 feet per minute, stopping when necessary to ensure proper documentation of the sewer's condition. The intent is to perform the inspection per the NASSCO and SCREAM™ standards. It may be

necessary for a lower rate of speed depending on the defects encountered.

b. Use manual winches, power winches, TV cable and powered rewinds or other devices that do not obstruct the camera view or interfere with proper documentation of the sewer conditions to move the camera through the sewer line.

c. Quantify visible leakage of extraneous flow into the sewer or other sags or defects in the sewer and record on electronic log and audio videotape. The video recording may be paused during observation. Record results of the flow observed on videotape and inspection logs.

3. Perform Post-Installation TV Inspection to confirm completion of rehabilitation work or proper installation of new sewers. Verify that the rehabilitation work or new sewer construction conforms to the requirements of the Specifications. Provide a color, digital recording ~~videotape~~ showing the completed Work. Prepare and submit a log providing location of any discrepancies.

4. Camera shall pan beginning and ending manholes to demonstrate that all debris has been removed. Camera operator shall slowly pan clamped joints, and when pipe material transitions from one material to another. A log shall be completed for every segment that is submitted to the OWNER.

5. Inspections shall be from center of the starting manhole to the center of the ending manhole. Distances along the pipe should be measured from the center of the upstream manhole. Measurement meters shall be accurate to the nearest foot per 100 feet of sewer being televised within the particular section of pipe (section of pipe being defined as the length of pipe between the upstream and downstream MHs). Prior to recording the location of defects and service connections, slack in the cable of the television inspection camera shall be taken up to assure metering device is designating proper footage. Accuracy of the measurement meters shall be checked daily by use of a walking meter, roll-a-tape, or other suitable device.

6. Center the camera in the middle of the pipe.

7. Stop at every defective joint for a time long enough to properly assess and code the defective joint. Pan and tilt to observe and document areas of apparent deteriorated pipe surface.

8. Stop at every lateral connection. Center the camera so that the lighting and the pan and tilt view can be used to inspect as far into the lateral connection as possible. Record all defects found in the service connection. Observe top, bottom and sides of lateral

connections. Where lateral flow is observed, observe flows from service connections for a length of time long enough to ascertain if the flow is sanitary or extraneous flow. The video recording may be paused during observation. Record results of the flow observed on the inspection. The inspection of the service lateral itself is not to be performed as part of the sewer mainline inspection.

9. TV inspection recordings shall be continuous for each pipe segment.

10. CONTRACTOR is responsible for adjusting light levels, cleaning fouled or fogged lenses, and allowing vapor to dissipate from camera lights in order to produce acceptable recordings.

11. Sewer inspections not meeting the requirements set forth in this specification as determined by SD1 shall be re-performed at no additional cost to SD1 until the inspection meets to SD1's satisfaction.

12. CONTRACTOR shall complete the post-installation CCTV within 30 days after the acceptance of the Mandrel test.

3.2 FLOW CONTROL

A. No flow will be allowed in the line while performing Post-Installation TV Inspection.

3.3 ACCEPTANCE OF WORK

A. Rehabilitation or completion of new sewer installation work shall only be accepted if no defects are found in the line upon TV inspection as determined by the OWNER.

B. Contractor shall repair all defects to the piping in a manner acceptable to the OWNER at no additional cost to the OWNER.

3.4 INSPECTION DELIVERABLES

Pipe inspection logs shall be submitted as specified in section 2.1

A. The CCTV videos shall be provided as specified in Section 2.1.

B. All videos shall be divided into separate files for each manhole to manhole segment.

C. Digital Inspection Recordings

1. Provide digital inspection recordings. Inspection recordings must be viewable on a standard 19" computer monitor.

2. Recording shall be of a quality sufficient for the ENGINEER to evaluate the condition of the sewer and manholes, locate the sewer service connections, and verify cleaning. If SD1 determines that the quality is not sufficient, CONTRACTOR shall re-televise the sewer segment and/or re-inspect the manhole and provide a new recording and report at no additional compensation. Camera distortions, inadequate lighting, dirty lens, or blurred/hazy picture will be cause for rejection.

3. Multiple project areas may be included on a given submittal, but the files must be organized in individual project folders. Each pipe segment must be its own electronic file. Electronic recording file must allow snap scrolling to allow easy and quick access of the entire recording.

4. Each submittal must have a file index whose name contains the pipe segment reference number.

5. Label each submittal with the following information:
   a. Pipe Segments
   b. CONTRACTOR's Name
   c. Project Name
   d. Contract Number
   e. Inspection Type:
   f. Date Televised

++ END OF SECTION ++

SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install cast-in-place concrete, reinforcement and related materials.

B. Coordination:
   1. Review installation procedures under other Sections and coordinate the installation of items that must be installed in the concrete.

1.2 QUALITY ASSURANCE

A. Source Quality Control:
   1. Concrete Testing Service:
      a. OWNER shall employ acceptable testing laboratory to perform materials evaluation, testing and design of concrete mixes.

B. Reference Standards: Comply with the applicable provisions and recommendations of the following, except as otherwise shown or specified.
   1. ACI 301, Specifications for Structural Concrete for Buildings (includes ASTM Standards referred to herein except ASTM A 36).
   2. ACI 304, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
   3. ACI 305, Hot Weather Concreting.
   4. ACI 306, Cold Weather Concreting.
   5. ACI 315, Manual of Engineering and Placing Drawings for Reinforced Concrete Structures.
   6. ACI 318, Building Code Requirements for Reinforced Concrete.
   7. ACI 347, Guide to Formwork for Concrete.
   8. ACI 350, Environmental Engineering Concrete Structures.
   9. ASTM A 36, Specification for Structural Steel.
   10. Concrete Reinforcing Steel Institute, Manual of Standard Practice, includes ASTM Standards referred to herein.

1.3 SUBMITTALS

A. Samples: Submit samples of materials as specified and may be requested by ENGINEER, including names, sources and descriptions.

B. Shop Drawings: Submit for approval the following:
   1. Copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, and concrete related materials.
   2. Drawings for fabrication, bending, and placement of concrete reinforcement, and reinforcement accessories. Comply with ACI 315, Chapters 1 through 7.
   3. Concrete Mix Design Report:
      a. All concrete mix design report shall be submitted to ENGINEER at least 15 days prior to start of Work. Do not begin concrete production until mixes have been reviewed and are acceptable to ENGINEER. Mix designs may be adjusted when material characteristics, job conditions, weather, test results or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by ENGINEER.
      b. Concrete mix design proportions.
      c. Mill test reports covering chemical and physical properties of cement included in concrete design mix.
      d. Sieve analysis report of fine and coarse aggregates to show compliance with specified requirements.
      e. Manufacturer's literature on all admixtures used in the mix design.
         1) All admixtures must be included and tested in the concrete design mix to predetermine satisfactory results.

C. Laboratory Batch Trial Test Reports: ENGINEER'S review will be for general information only. Production of concrete to comply with specified requirements is the responsibility of CONTRACTOR.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver concrete reinforcement materials to the site bundled, tagged and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. All materials used for concrete must be kept clean and free from all foreign matter during transportation and handling and kept separate until measured and placed in the mixer. Bins or platforms having hard clean surfaces shall be provided for storage. Suitable means shall be taken during hauling, piling and handling to insure that segregation of the coarse and fine aggregate particles does not occur and the grading is not affected.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II.

B. Aggregates: ASTM C 33.
   1. Fine Aggregate: Clean, sharp, natural sand free from loam, clay, lumps or other deleterious substances. Dune sand, bank run sand and manufactured sand are not acceptable.
   2. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:
      a. Crushed stone, processed from natural rock or stone.
      b. Washed gravel, either natural or crushed. Use of slag and pit or bank run gravel is not permitted.

C. Coarse Aggregate Size: Size to be ASTM C 33, Nos. 57 or 67, unless permitted otherwise by ENGINEER.

D. Water: Clean, drinkable.

E. Air-Entraining Admixture: ASTM C 260.

F. Water-Reducing Admixture: ASTM C 494, Type A. Only use admixtures which have been tested and accepted in mix designs. Only to be added onsite by a certified admixture representative of the concrete supplier.

G. Water-Reducing High Range Admixture: ASTM C 494, Type F/G. Only use admixtures which have been tested and accepted in mix designs. Only to be added onsite by a certified admixture representative of the concrete supplier.

2.2 CONCRETE

A. Proportioning and Design Mix
   1. Minimum compressive strength at 28 days: 4000 psi.
   2. Maximum water cement ratio by weight: 0.44.
   3. Minimum cement content: 564 pounds per cubic yard.
   4. Normal weight: 145 pounds per cubic foot.
   5. Use air-entraining admixture in all concrete: provide not less than 4 percent nor more than 8 percent entrained air for all concrete.
   6. Slump Limits:
      a. Proportion and design mixes to result in concrete slump at the point of placement of not less than 1 inch and not more than 4 inches. If Water-Reducing Admixtures or Superplasticizers are used slump after addition of the admixture shall not exceed 8 inches.

7. Calcium Chloride: Do not use calcium chloride in concrete, unless otherwise authorized in writing by ENGINEER. Do not use admixtures containing calcium chloride.

2.3 FORM MATERIALS

A. Provide form materials with sufficient stability to withstand pressure of placed concrete without bow or deflection.

B. Exposed Concrete Surfaces: Acceptable panel-type to provide continuous, straight, smooth, as-cast surfaces. Use largest practical sizes to minimize form joints.

C. Unexposed Concrete Surfaces: Suitable material to suit project conditions.

D. Provide 3/4-inch chamfer at all exposed corners.

E. Form Ties:
1. Provide factory-fabricated, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling of concrete surfaces upon removal. Materials used for tying forms will be subject to approval of ENGINEER.
2. Unless otherwise, shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least 1-inch from the outer concrete surface. Unless otherwise shown, provide form ties that will leave a hole no larger than 1-inch diameter in the concrete surface.
3. Ties for exterior walls and walls subject to hydrostatic pressure shall have waterstops.
4. Provide wood or plastic cones for ties, where concrete is exposed in the finish structure and in the interior of tanks.
5. Wire ties are not acceptable.

2.4 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615, Grade 60.

B. Welded Wire Fabric: ASTM A 185.

C. Steel Wire: ASTM A 82.

D. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcement in place.
1. Use wire bar type supports complying with CRSI recommendations, except as specified below. Do not use wood, brick, or other unacceptable materials.
2. For slabs on grade, use supports with sand plates or horizontal runners where base materials will not support chair legs.

3. For all concrete surfaces, where legs of supports are in contact with forms, provide supports complying with CRSI, Manual of Standard Practice as follows:
   a. Either hot-dip galvanized, plastic protected or stainless steel legs.

E. Adhesive Dowels:
   1. Where adhesive dowels are shown or required to be installed into concrete, adhesive material shall be used for the installation of all reinforcing bars.
   2. Adhesive Material:
      a. Capsule or injectable adhesive material shall be a two-component system which includes a hardener and a resin.
      b. Product and Manufacturer: Provide adhesive material by one of the following:
         1) HY 150 or HVA capsule by Hilti Fastening Systems, Inc.
         2) Power-Fast or Needle-Capsule by Powers Fastening, Inc.
         3) Or equal.
   3. Dowel:
      a. Dowel reinforcing bars shall meet the ASTM standards for Grade 60, A615 steel.

F. Form Savers: Form savers may be used as a mechanical connection in applications where drilling holes in form material is not desired. This connection shall be a full mechanical connection that shall develop in tension or compression, as required, at least 125 percent of specified yield strength (f_y) of the bar in accordance with ACI 318 Section 12.14.3.
   1. Product and Manufacturer: Provide on of the following:
      a. Form Saver by Lenton Rebar Splicing Division of Erico Products, Inc.
      b. Or equal.

2.5 RELATED MATERIALS

A. Construction Joint Waterstops
   1. Polyvinylchloride (PVC) Waterstops:
      a. Provide PVC waterstops complying with Corps of Engineers CRD-C572.
      b. Provide serrated type with a minimum thickness of 3/8 inch by a minimum width of 6 inches may be provided in specific applications as approved by the ENGINEER.
      c. Product and Manufacturer: Provide PVC waterstops as manufactured by one of the following:
         1) Style No. 783 or No. 724, Greenstreak Plastic Products company.
         2) Style No. R6-38T or No. RSB6-38, Vinylex Corporation.
         3) Or equal.
   2. Adhesive Waterstop:
      a. Provide preformed adhesive waterstop in construction joint locations where shown, or as alternative to PVC waterstop where appropriate.

b. The preformed waterstop shall meet or exceed all requirements of Federal Specifications SS-S-210A, "Sealing Compounds for Expansion Joints".
c. Product and Manufacturer: Provide waterstops as manufactured by one of the following:
1) Synko-Flex Waterstop by Synko-Flex Products, Division of Henry Products, Inc.
2) Or equal.

3. Hydrophilic Waterstops:
a. Hydrophilic waterstop may be used as an alternate to the adhesive waterstop.
b. Product and Manufacturer: Provide waterstops as manufactured by one of the following:
1) Hydrotite CJ-0725-3K and Leakmaster LV-1, Greenstreak Plastic Products Company.
2) Adeka MC201OM and P201 by Adeka, Inc.
3) Or equal.

B. Membrane-Forming Curing compound: ASTM C 309, Type I-D.
1. Provide without fugitive dye when requested by ENGINEER.

C. Epoxy Bonding Agent:
1. Two-component epoxy resin bonding agent.
a. Product and Manufacturer: Provide one of the following:
1) Sikadur 32, Hi-Mod LPL, as manufactured by Sika Chemical Corporation.
2) Epoxtite Binder (Code No. 2390), as manufactured by A.C. Horn, Incorporated.
3) Or equal.

D. Latex Bonding Adhesive:
1. Provide a latex bonding adhesive formulated for use in both interior and exterior locations. The bonding adhesive shall be stable in submerged locations and shall not be affected by chlorine. Adhesive shall be capable of being applied to damp or dry surfaces. The latex bonding adhesive shall comply with ASTM C1059, Type II, where specified.
2. Product and Manufacturer: Provide one of the following:
a. Weld-Crete by Larsen Products Corp.
b. Or equal.

2.6 GROUT

A. Nonshrink Grout:
1. Prepackaged nonstaining cementitious grout requiring only the addition of water at the job site.
2. Product and Manufacturer: Provide one of the following:
a. Euco N-S, as manufactured by the Euclid Chemical Company.
b. Masterflo 713, as manufactured by Master Builders Company.

c. Or equal.

B. Grout Fill:
1. Except where otherwise specified use 1 part cement to 3 parts sand complying with the following:
a. Cement: ASTM C 150, Type II.
b. Fine and Coarse Aggregate (No. 7) meeting ASTM C 33.
c. Specified 28-day Compressive Strength: 3,000 psi.
d. Maximum Water-Cement Ratio by Weight: 0.50.
e. Air Content Percentage 7±1%.
f. Minimum Cement Content in Pounds per Cubic Yard: 611.

PART 3 - EXECUTION

3.1 INSPECTION

A. CONTRACTOR and his installer shall examine the substrate and the conditions under which Work is to be performed and notify ENGINEER in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to ENGINEER.

3.2 FORMWORK

A. Construct the concrete members and structures to correct size, shape, alignment, elevation and position, complying with ACI 347.

B. Provide openings in formwork to accommodate Work of other trades. Accurately place and securely support items built into forms.

C. Clean and adjust forms prior to concrete placement. Apply form release agents or wet forms, as required. Retighten forms during and after concrete placement if required to eliminate mortar leaks.

3.3 REINFORCEMENT MATERIALS

A. Comply with the applicable recommendations of specified codes and standards, and CRSI, Manual of Engineering and Placing Drawings, for details and methods of reinforcement placement and supports.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete.

C. Position, support, and secure reinforcement against displacement during formwork construction or concrete placemen,t, including sidewalks. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required.
1. Place reinforcement to obtain the minimum concrete coverages as shown and as specified in ACI 318. Arrange, space, and securely tie bars and bar

supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set with ties so that twisted ends are directed away from exposed concrete surfaces.

2. Reinforcing steel shall not be secured to forms with wire, nails or other ferrous metal. Metal supports subject to corrosion shall not touch formed or exposed concrete surfaces.

D. Provide sufficient numbers of supports of strength required to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment and similar construction loads.

E. Splices:
   1. Provide standard reinforcement splices by lapping ends, placing bars in contact, and tying tightly with wire. Comply with requirements shown for minimum lap of spliced bars in accordance with ACI 318.

F. Install welded wire fabric in as long lengths as practical, lapping at least one mesh. Locate and support fabric by metal chairs, runners, bolsters, spacers and hangers, as required for proper placement of the concrete.

G. Installation of Embedded Items: Set and build into the Work anchorage devices and embedded items required for other Work that is attached to, or supported by cast-in-place concrete. Use setting diagrams, templates and instructions provided under other Sections and other contracts for locating and setting. Refer also to Paragraph 1.1.B., Coordination.

H. Adhesive Dowels:
   1. Drilling equipment used and installation of adhesive dowel shall be in accordance with manufacturer's instructions.
   2. Assure that embedded items are protected from damage and are not filled in with concrete.
   3. Unless otherwise shown or approved by ENGINEER conform to following for adhesive dowels:

Bar Size	Embedment Depth
#3	3 ¾"
#4	5 ½"
#5	7"
#6	8 ½"
#7	10"
#8	11 ¾"
#9	12 ¾"

(If an alternate adhesive material is submitted, CONTRACTOR must submit embedment depths per manufacture's recommendation. Embedment depths

shall be based on a compressive strength of 2000 psi when embedded into existing concrete.)

4. The CONTRACTOR shall comply with the adhesive material manufacturer's installation instructions on the hole diameter. The CONTRACTOR shall properly clean out the hole utilizing a synthetic brush and compressed air to remove all loose material from the hole, prior to installing adhesive capsules or material. Proper mixing of the two-component system shall be done to the manufacturer's recommendations.
5. Adhesive material manufacturer's representative shall observe and demonstrate the proper installation procedures for the adhesive dowels and adhesive material at no additional expense to the OWNER. Each installer shall be certified in writing by the manufacturer to be qualified to install the adhesive dowels.

3.4 CONSTRUCTION JOINTS

A. Comply with ACI 301, Chapter 6, and as specified below.

B. Locate and install construction joints as shown. Additional construction joints shall be located as follows:
   1. In walls locate joints at a spacing of 50 feet maximum.
   2. Provide other additional construction joints as required to satisfactorily complete all work.

C. Horizontal Joints:
   1. Roughen the surface in an acceptable manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, or damaged concrete at the surface.
   2. Remove laitance, waste mortar or other substance which may prevent complete adhesion.
   3. For concrete over 45 days old, apply concrete epoxy bonding adhesive prior to placing new concrete.

D. Vertical Joints:
   1. Roughen the surface in an acceptable manner that exposes the aggregate uniformly and does not leave laitance, loosened particles of aggregate, or damaged concrete at the surface.
   2. Remove laitance, waste mortar or other substance which may prevent complete adhesion.
   3. For concrete over 45 days old, apply concrete epoxy bonding adhesive prior to placing new concrete.

3.5 BONDING TO HARDENED CONCRETE

A. The surface of hardened concrete upon which fresh concrete is to be palced shall be rough, clean, sound, and damp. Before placement of new plastic concrete, the hardened surface shall be cleaned of all laitance and foreign substances (including curing compound), washed with clean water and wetted thoroughly.

B. For bonding to hardened concrete less than 30 days old, coarse aggregate shall be omitted from the first batch or batches of concrete placed against hardened concrete. The mortar puddle shall cover the hardened concrete with at leats 2 inches at every point.

C. Use epoxy bonding agent for the following:
   1. Bonding of fresh concrete to concrete cured greater than 30 days or to existing concrete.
   2. Handle and store epoxy adhesive in compliance with the manufacturer's printed instructions, including safety precautions.
   3. Mix the epoxy adhesive in complete accordance with the instructions of the manufacturer.
   4. Before placing fresh concrete, thoroughly roughen and clean hardened concrete surfaces and coat with epoxy grout not less than 1/16-inch thick. Place fresh concrete while the epoxy material is still tacky, without removing the in-place grout coat, and as directed by the epoxy manufacturer.

3.6 LATEX BONDING ADHESIVE

A. Use latex bonding adhesive as an alternative to epoxy bonding agent in specific applications as approved by the ENGINEER.

B. Handle and store latex bonding adhesive in compliance with the manufacturer's printed instructions, including safety precautions.

C. Mix the latex bonding adhesive in complete accordance with the instructions of the manufacturer.

D. Before applying latex bonding adhesive, thoroughly roughen and clean hardened concrete surfaces.

E. Latex bonding adhesive shall not be exposed to water from the time it is placed up to a period of at least 7 days after the concrete has been placed.

3.7 CONCRETE PLACEMENT

A. CONTRACTOR is solely responsible for the means and methods used to properly transport concrete onsite from the unloading point to the point of placement. The mechanism and equipment used to properly transport concrete shall be closely considered when the CONTRACTOR is planning his Work. Pumping of concrete is not required, however, if the CONTRACTOR fails to place the concrete to the satisfaction of the OWNER and ENGINEER by means other than pumping, the concrete shall be pumped by the CONTRACTOR at no additional cost to the OWNER.

B. Concrete shall not be placed until all reinforcement materials are inspected and permission for placing concrete is granted by ENGINEER. All concrete placed in violation of this provision will be rejected.

C. Inspection: Notify OWNER and ENGINEER at least 1 full working day in advance before starting to place concrete.

D. Manufacturing and delivery shall be in accordance with ASTM C 94.

E. Discharge Time:
   1. As determined by set time, do not exceed 1-1/2 hours after adding cement to water unless special approved time delay admixtures are used. Coordinate time delay admixture information with manufacturer and ENGINEER prior to placing concrete.
   2. Maintain required slump throughout time of concrete placement and consolidation. Discontinue use of high range water reducing admixture (superplasticizers) and provide new mix design if it fails to maintain slump between 4 to 6 inches and produce good consolidation for the length of time required. Redesign mix adjusting set control admixtures to maintain setting time in range required.

F. Job-Site Mixing: Not permitted for this project.

G. All concrete for liquid retaining structures, and all concrete in contact with earth, water, or exposed directly to the elements shall be watertight.

H. Concrete Placement: Comply with ACI 304, placing concrete in a continuous operation within planned joints or sections. Do not begin placement until work of other trades affecting concrete is completed.

I. Provide sufficient illumination in the interior of forms so concrete deposition is visible, permitting confirmation of consolidation quality.

J. Make all concrete solid, compact and smooth, and free of laitance, cracks and cold joints.

K. Pumping of Concrete:
   1. Provide standby pump, conveyor system, crane and concrete bucket, or other system onsite during pumping, for adequate redundancy to assure completion of concrete placement without cold joints in case of primary placing equipment breakdown.
   2. Minimum Pump Hose (Conduit) Diameter: 4 inches.
   3. Replace pumping equipment and hoses (conduits) that are not functioning properly.

L. Consolidate placed concrete using mechanical vibrating equipment with hand rodding and tamping, so that concrete is worked around reinforcement and other embedded items and into all parts of forms.
   1. Consolidate concrete with internal vibrators with minimum frequency of 8,000 cycles per minute and amplitude as required to consolidate concrete in section being placed.
   2. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete.

3. Consolidation Equipment and Methods: ACI 309R.
4. During concrete placement, vibration consolidation shall not exceed distance of 3 feet from point of top of concrete being placed.
5. Vibrate concrete in vicinity of joints to obtain impervious concrete.

M. Protect concrete from physical damage or reduced strength due to weather extremes during mixing, placement, and curing.
1. In hot weather comply with ACI 305.
2. In cold weather comply with ACI 306.

3.8 CURING

A. Curing: Begin initial curing as soon as free water has disappeared from exposed surfaces. Where possible, keep continuously moist for not less than 72 hours or apply curing compound immediately after final floating and finish. Continue curing through use of moisture-retaining cover or membrane-forming curing compound. Cure formed surfaces by moist curing until forms are removed. Provide protection as required to prevent damage to exposed concrete surfaces.

3.9 FINISHES

A. Slab Finish:
1. After placing concrete slabs, do not work the surface further until ready for floating. Begin floating when the surface water has disappeared or when the concrete has stiffened sufficiently. Use a wood float only. Check and level the surface plane to a tolerance not exceeding 1/4-inch in 10 feet when tested with a 10 foot straightedge placed on the surface at not less than 2 different angles. Cut down high spots and fill all low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat the surface to a uniform, smooth, granular texture.
2. After floating, begin the first trowel finish operation using a power-driven trowel. Begin final troweling when the surface produces a ringing sound as the trowel is moved over the surface.
3. Consolidate the concrete surface by the final hand troweling operation. Finish shall be free of trowel marks, uniform in texture and appearance, and with a surface plane tolerance not exceeding 1/8-inch in 10 feet when tested with a 10-foot straight edge. Grind smooth surface defects which would telegraph through applied floor covering system.
4. Use trowel finish for the following:
   a. Interior exposed slabs unless otherwise shown or specified.
5. Apply non-slip broom finish to exterior concrete slab and elsewhere as shown on the Drawings.

B. Formed Surfaces:
1. Rough Form Finish:
   a. Standard rough form finish shall be the concrete surface having the texture imparted by the form material used, with tie holes and defective areas repaired and patched with mortar of 1 part cement to 1 1/2 parts

sand and all fins and other projections exceeding 1/4-inch in height rubbed down or chipped off.

b. Use rough form finish for the following:
   1) Exterior vertical surfaces up to 1 foot below grade.
   2) Interior exposed vertical surfaces of liquid containers up to 1 foot below liquid level.
   3) Interior and exterior exposed beams and undersides of slabs.
   4) Other areas shown.

2. Smooth Form Finish:
   a. Produce smooth form finish by selecting form materials which will impart a smooth, hard, uniform texture. Arrange panels in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas as above with all fins or other projections completely removed and smoothed.
   b. Use smooth form finish for surfaces that are to be covered with a coating material. The material may be applied directly to the concrete or may be a covering bonded to the concrete such as waterproofing, dampproofing, painting or other similar system.
3. Smooth Rubbed Finish:
   a. Provide smooth rubbed finish to concrete surfaces which have received smooth form finish as follows:
      1) Rubbing of concrete surfaces not later than the day after form removal.
      2) Moistening of concrete surfaces and rubbing with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.
   b. Except where surfaces have been previously covered as specified above, use smooth rubbed finish for the following:
      1) Interior exposed walls and other vertical surfaces.
      2) Exterior exposed walls and other vertical surfaces down to 1 foot below grade.
      3) Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.
      4) Interior exposed vertical surfaces of liquid containers down to 1 foot below liquid level.
      5) Other areas shown.
4. Grout Cleaned Finish:
   a. Provide grout cleaned finish to concrete surfaces which have received smooth form finish as follows:
      1) Combine 1 part portland cement to 1-1/2 parts fine sand by volume, and mix with water to the consistency of thick paint. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that the final color of dry grout will closely match adjacent concrete surfaces.
      2) Thoroughly wet the concrete surface and apply grout uniformly by brushing or spraying immediately to the wetted surfaces.

Scrub surface with cork float or stone to coat surface and fill surface holes. Remove excess grout by scraping, followed by rubbing with clean burlap to remove any visible grout film. Keep grout damp during the setting period by means of fog spray at least 36 hours after final rubbing. Complete any area in the same day it is started, with the limits of any area being natural breaks in the finished surface.

b. Except where surfaces have been previously covered as specified above, use grout cleaned finish for the following:
   1) Interior exposed walls and other vertical surfaces.
   2) Exterior exposed walls and other vertical surfaces down to 1 foot below grade.
   3) Interior and exterior horizontal surfaces, except exterior exposed slabs and steps.
   4) Interior exposed vertical surfaces of liquid containers down to 1 foot below liquid level.
   5) Other areas shown.

5. Related Unformed Surfaces:
   a. At tops of walls, horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, strike off smooth and finish with a texture matching the adjacent formed surfaces. Continue the final surface treatment of formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown.

3.10 GROUT PLACEMENT

A. Nonshrink:
   1. Place nonshrink grout as shown and in accordance with manufacturer's instructions. If manufacturer's instructions conflict with the Specifications do not proceed until ENGINEER provides clarification.
   2. Drypacking of nonshrink grout will not be permitted.
   3. Placing grout shall conform to the temperature and weather limitations described in Article 3.4 above.

B. Grout Fill:
   1. Grout Fill shall be placed, cured, and finished as described in Article 3.7, 3.8 and 3.9.

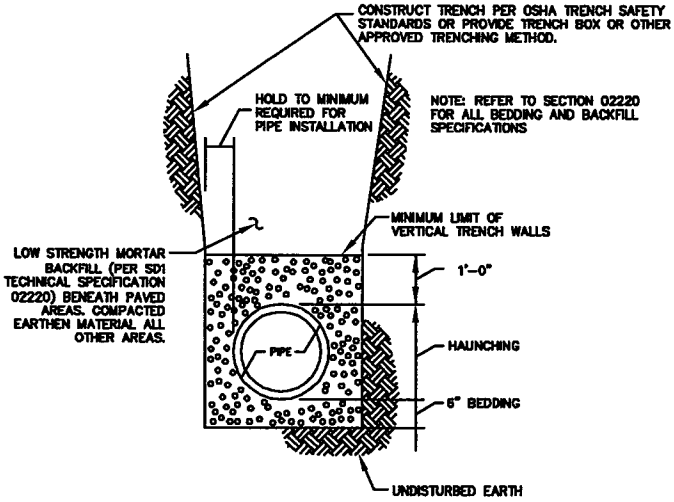
3.11 FIELD QUALITY CONTROL

A. Reinforcement Materials
   1. The CONTRACTOR shall correct improper workmanship, remove and replace, or correct as instructed, found unacceptable or deficient.
   2. Adhesive Dowels:
      a. OWNER will retain an independent testing laboratory to perform field quality testing of installed adhesive dowels. A minimum of ten percent of the adhesive dowels shall be tested to fifty percent of the yield capacity of the reinforcing bar.

b. CONTRACTOR shall provide access for the testing agency to places where work is being produced so that required inspection and testing can be accomplished.
c. If failure of any of the adhesive dowels occur, the CONTRACTOR will be required to pay for the costs involved in testing the remaining ninety percent of the adhesive dowels.
d. The CONTRACTOR shall pay for all corrections and subsequent tests required to confirm the integrity of the dowels.
e. The independent testing and inspection agency shall complete a report on each area. The report should summarize the observations made by the inspector and be submitted to the ENGINEER.

B. Concrete Work
1. Quality Control: OWNER'S testing laboratory will perform sampling and testing during concrete placement, as follows:
   a. Sampling: ASTM C 172.
   b. Slump: ASTM C 143, one test for each load at point of discharge.
   c. Air Content: ASTM C 31, one for each set of compressive strength specimens.
   d. Compressive Strength: ASTM C 39, one set of 4 cylinders for each 50 cubic yards or fraction thereof of each class of concrete as directed by OWNER or ENGINEER; 1 specimen tested at 7 days, 2 specimens tested at 28 days, 1 specimen tested at 56 days.
   e. Report test results in writing to ENGINEER on same day tests are made.
2. Cut out and properly replace to the extent ordered by ENGINEER, or repair to the satisfaction of ENGINEER, surfaces which contain cracks or voids, are unduly rough, or are in any way defective. Patches or plastering will not be acceptable.
3. Repair, removal, and replacement of defective concrete as ordered by ENGINEER shall be at no additional cost to OWNER.

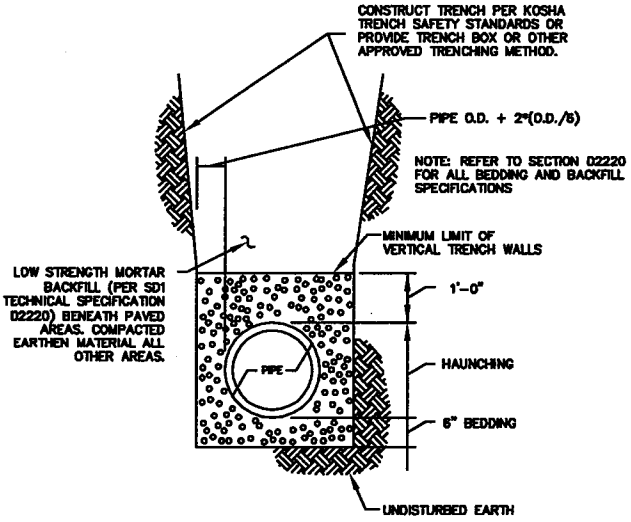
++ END OF SECTION ++



FLEXIBLE PIPE	MIN TRENCH WIDTH
PIPE LESS OR EQUAL TO 36" DIA	PIPE O.D. + 24"
PIPE GREATER THAN 36" DIA	PIPE O.D. + 48"

PIPE BEDDING – FLEXIBLE PIPE

N.T.S.



RIGID PIPE	MIN TRENCH WIDTH
PIPE LESS OR EQUAL TO 36" DIA	PIPE O.D. + 24"
PIPE GREATER THAN 36" DIA	PIPE O.D. + 2*(O.D./6)

PIPE BEDDING – RIGID PIPE

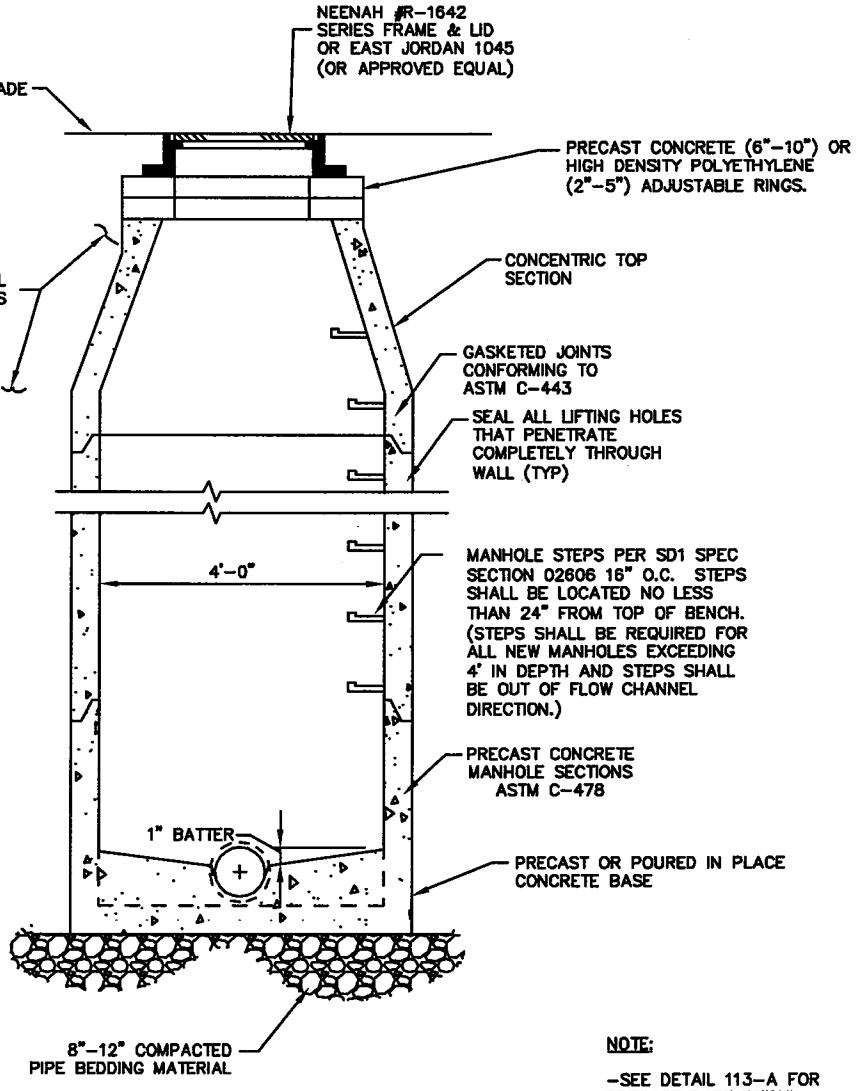
N.T.S.

REVISION	BY	DATE

SANITATION DISTRICT NO. 1
1045 Eaton Drive
FT. Wright, Kentucky 41017
Ph: (859) 578–7460
Fax: (859) 331–2436

DATE: MARCH 2010

STANDARD DRAWING NO: 110



NOTES:

1. IF THE SLOPE OF THE INCOMING SEWER EXCEEDS 26% FROM THE HORIZONTAL, A FITTING SHALL BE USED OUTSIDE THE MANHOLE WALL TO FACILITATE A MORE PERPENDICULAR CONNECTION TO THE MANHOLE WALL. THE USE OF THIS FITTING IS TO BE EVALUATED ON A CASE BY CASE BASIS BY SD1 ENGINEERS.

2. PRECAST MANHOLES SHALL BE INSTALLED PER SECTION 02606.

3. BENCHING SHALL BE SHAPED TO MAINTAIN A SMOOTH TRANSITION OF FLOW FOR PIPE ANGLES BETWEEN 90 AND 180 DEGREES, AS REFERENCED TO THE DOWNSTREAM FLOWLINE. NO ANGLES LESS THAN 90 DEGREES WILL BE ALLOWED BETWEEN INCOMING AND OUTGOING PIPES IN MHS.

NOTE:

-SEE DETAIL 113-A FOR PRECAST BASE DETAIL

-ANTI-FLOTATION FLANGES MAY BE REQUIRED IN AREAS WHERE THE MANHOLE IS SUBJECT TO GROUND WATER PER SD1 SPEC 02606.

STANDARD MANHOLE

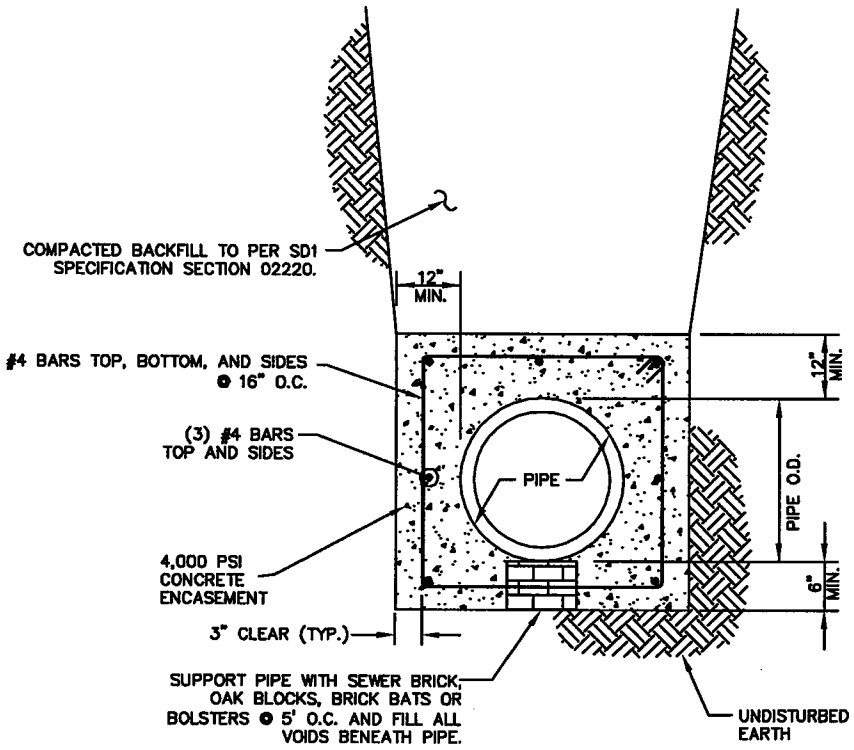
N.T.S.

REVISION	BY	DATE

SANITATION DISTRICT NO. 1
1045 Eaton Drive
FT. Wright, Kentucky 41017
Ph: (859) 578-7460
Fax: (859) 331-2436

DATE: APRIL 2010

STANDARD DRAWING NO: 113



CONCRETE PIPE ENCASEMENT

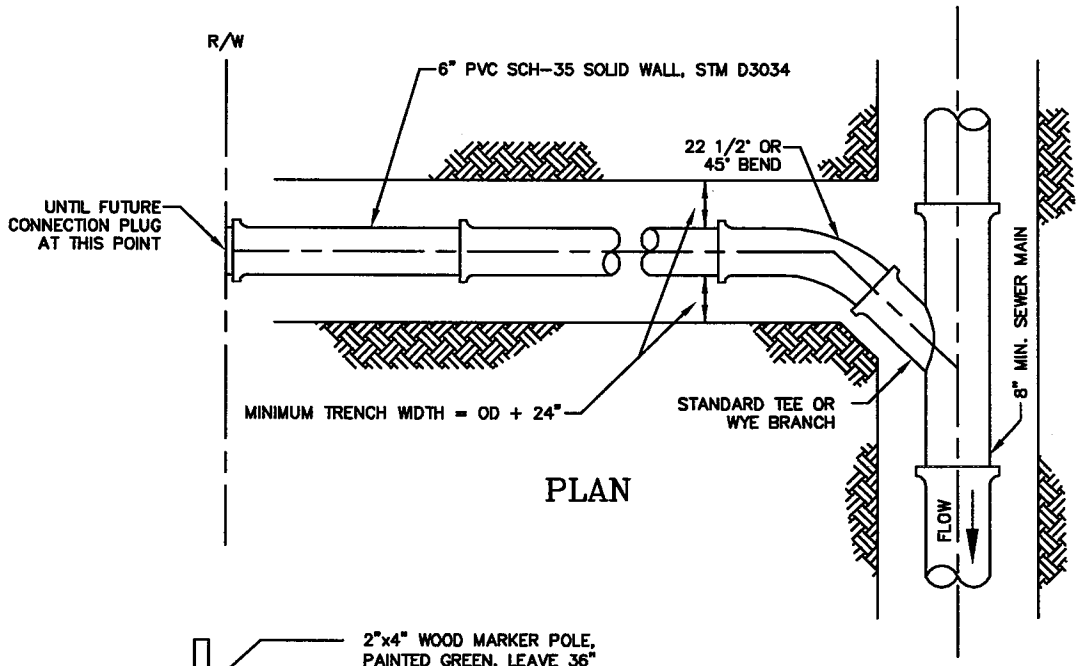
(FOR UTILITY CROSSINGS)
N.T.S.

REVISION	BY	DATE

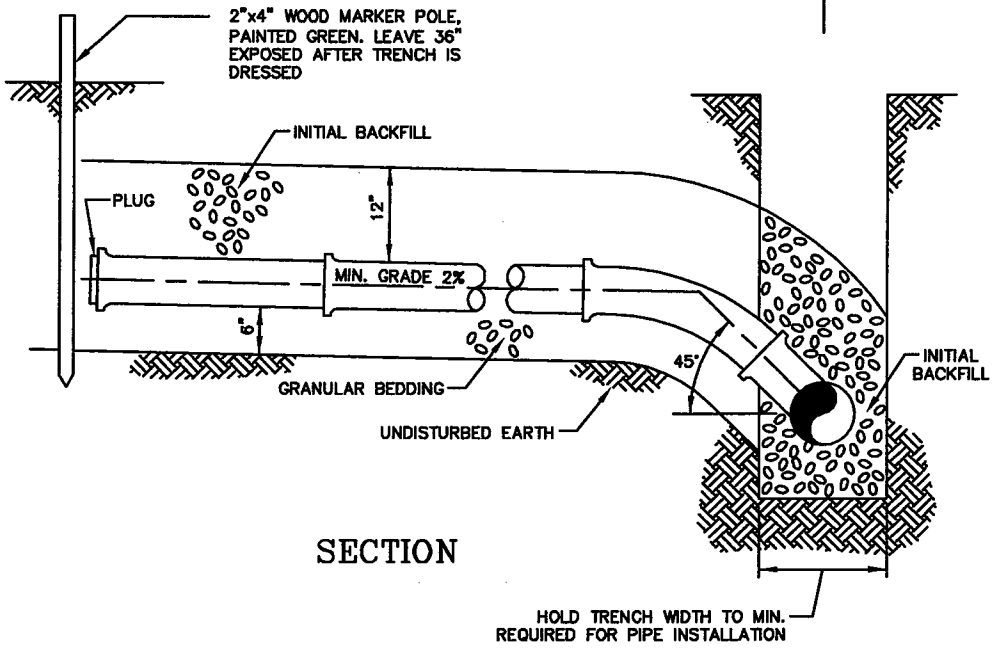
SANITATION DISTRICT NO. 1
1045 Eaton Drive
FT. Wright, Kentucky 41017
Ph: (859) 578-7460
Fax: (859) 331-2436

DATE: APRIL 2010

STANDARD DRAWING NO: 118



PLAN



SECTION

NOTE:

1. SEWER SERVICE CONNECTION TO SEWER LATERAL SHALL BE BY MEANS OF FLEXIBLE PIPE CONNECTORS (COUPLING OR DONUT TYPE) WHEN JOINING PIPES OF DIFFERENT MATERIAL. DETAIL ALSO APPLIES FOR ALL 4" SEWER SERVICE LATERALS IF SHOWN ON DRAWINGS.
2. ALL LATERAL CONNECTIONS SHALL BE MADE BETWEEN THE 10 AND 11 O'CLOCK AND THE 1 AND 2 O'CLOCK POSITIONS TO THE SEWER MAIN.
3. FOR ALL SEWER LATERAL CONSTRUCTION BEYOND PUBLIC R/W, REFER TO STD. DWG. 113.
4. LATERAL INSTALLATIONS SHALL FOLLOW ALL BEDDING AND BACKFILL REQUIREMENTS IN SD1 STANDARD SPECIFICATIONS, SECTION 02220.

SEWER LATERAL INSTALLATION

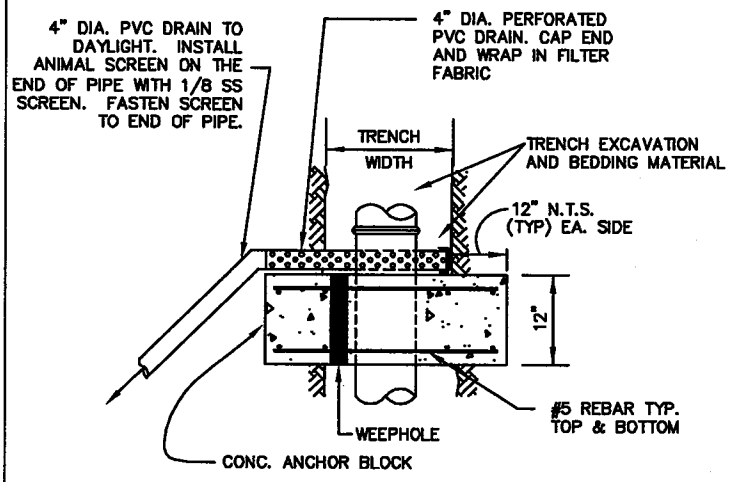
N.T.S.

REVISION	BY	DATE

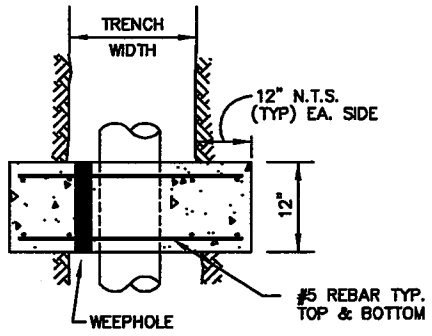
SANITATION DISTRICT NO. 1
1045 Eaton Drive
FT. Wright, Kentucky 41017
Ph: (859) 578-7460
Fax: (859) 331-2436

DATE: APRIL 2010

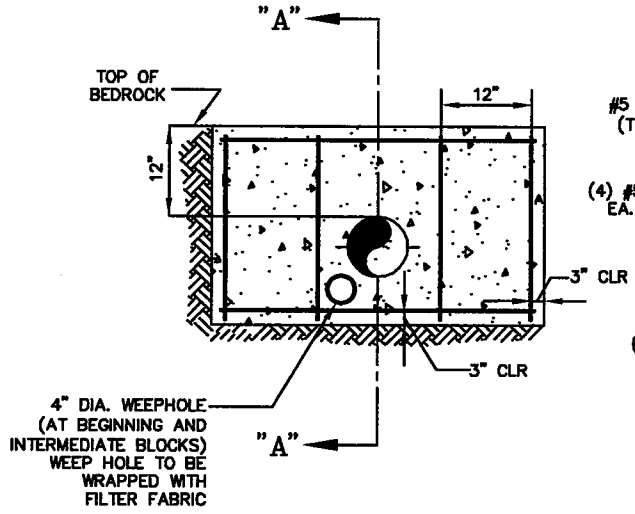
STANDARD DRAWING NO: 120



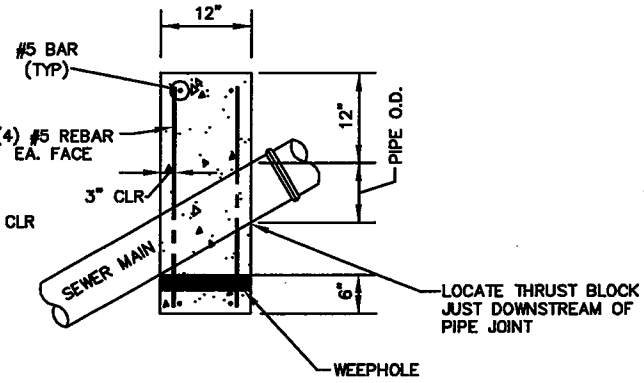
TOP VIEW
(AT BOTTOM OF SLOPE)



TOP VIEW
(BEGINNING AND INTERMEDIATE BLOCKS)



ELEVATION



SECTION "A"

CONCRETE ANCHOR BLOCK

(IN BEDROCK)
N.T.S.

REVISION	BY	DATE

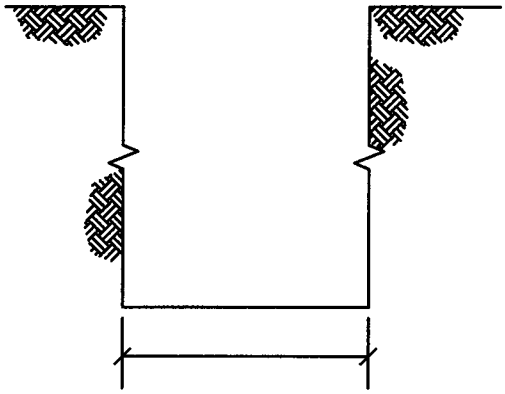
SANITATION DISTRICT NO. 1
1045 Eaton Drive
FT. Wright, Kentucky 41017
Ph: (859) 578-7460
Fax: (859) 331-2436

DATE: APRIL 2010

STANDARD DRAWING NO: 123

NKSD1 Requirements for Sewer Trench Compaction

STEP 1



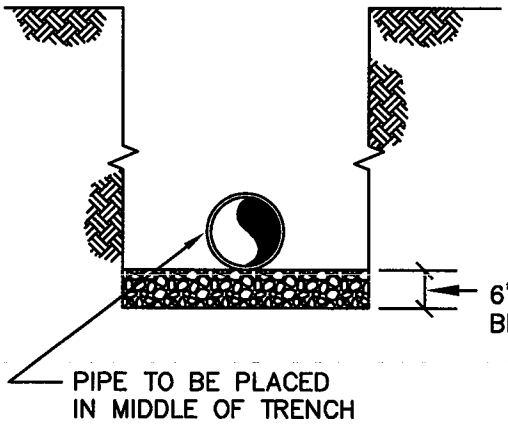
MINIMUM TRENCH WIDTH
SEE NOTES BELOW

- EXCAVATED TRENCH
- PIPE NOT INSTALLED YET
- EXAMINE TRENCH BOTTOM:
  - → IF FIRM & SOLID, PROCEED TO NEXT STEP
  - → IF UNSUITABLE SUBGRADE IS ENCOUNTERED, CONTRACTOR SHALL OVER EXCAVATE BOTTOM TO REMOVE UNSUITABLE MATERIAL & REPLACE WITH SUITABLE BACKFILL

FLEXIBLE PIPE	MIN TRENCH WIDTH
PIPE LESS OR EQUAL TO 36" DIA	PIPE O.D. + 24"
PIPE GREATER THAN 36" DIA	PIPE O.D. + 48"

RIGID PIPE	MIN TRENCH WIDTH
PIPE LESS OR EQUAL TO 36" DIA	PIPE O.D. + 24"
PIPE GREATER THAN 36" DIA	PIPE O.D. + 2*(O.D./6)

STEP 2

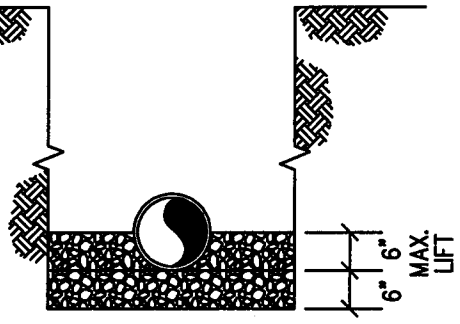


- PLACE 6" EMBEDMENT MAT'L IN TRENCH
- COMPACT GRANULAR & SAND DENSITY (ASTM D 4253 AND D 4254).
- PLACE PIPE ON TOP OF COMPACTED MATERIALS TO AT LEAST 75% RELATIVE MATERIAL.

NOTES

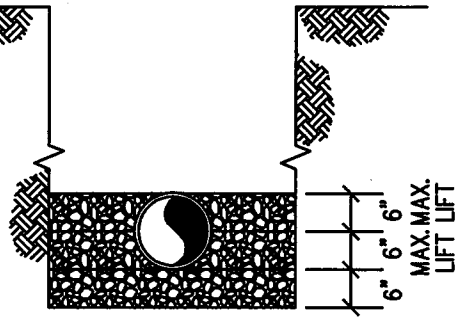
* APPLIES TO ALL AREAS, EXCEPT BENEATH STRUCTURES, FOUNDATIONS, AND ROADWAYS WHERE COMPACTION TO AT LEAST 85% RELATIVE DENSITY IS REQUIRED.

STEP 3



- PLACE EMBEDMENT MATERIAL IN A 6" LIFT MAXIMUM ALONG SIDES OF PIPE.
- HAVE CONTRACTOR SLICE MAT'L UNDER HAUNCHES OF PIPE WITH SHOVEL OR OTHER DEVICE TO FILL IN ALL VOID AREAS.
- COMPACT GRANULAR AND SAND MATERIALS TO AT LEAST 75% RELATIVE DENSITY. SEE STEP 2.

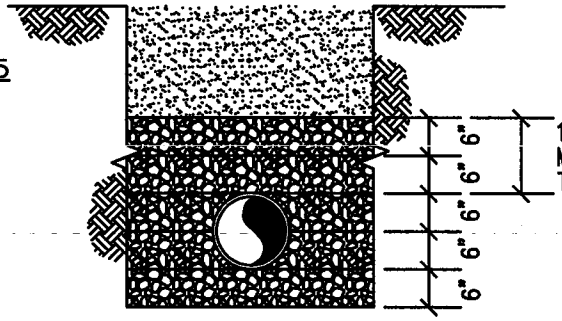
STEP 4



- PLACE NEXT 6" MAXIMUM LIFT OF EMBEDMENT MATERIAL ABOVE PREVIOUS LIFT.
- COMPACT EMBEDMENT MAT'L TO AT LEAST 75% RELATIVE DENSITY IN ACCORDANCE WITH STEP 2.
- CONTINUE PLACING EMBEDMENT MAT'L IN 6" LIFTS AND COMPACTING UNTIL REACH TOP OF PIPE.

STEP 5

- CONTINUE PLACING EMBEDMENT MATERIAL IN 6" MAXIMUM LIFTS AND COMPACT SAME AS ABOVE, UNTIL THERE IS 12" EMBEDMENT MATERIAL ABOVE THE TOP OF THE PIPE.
- THEN PROCEED WITH SOIL BACKFILL IN 8" COMPACTED LIFTS ABOVE EMBEDMENT MATERIAL.



- IN NON-ROADWAY AREAS, SUITABLE BACKFILL TO BE COMPACTED TO 95% OF MAXIMUM STANDARD PROCTOR DRY UNIT WEIGHT AS DETERMINED BY ASTM D 698. FOR COMPACTION OF BACKFILL IN OTHER AREAS, SEE SECTION 02220.

Kentucky Transportation Cabinet

Highway District 6

And

_____(2), Construction

Kentucky Pollutant Discharge Elimination System
Permit KYR10
Best Management Practices (BMP) plan

Groundwater protection plan

For Highway Construction Activities

For

KY 16 Kenton County

Project: PCN ## -
Item 06-344.30

KyTC BMP Plan for Project PCN ## -

Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – Kentucky Transportation Cabinet, District 6

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 16 in Kenton County

6. Latitude/Longitude (project mid-point) dd/mm/ss, dd/mm/ss 38^59’15.25” north, 84^30’14.87” west

7. County (project mid-point) Kenton County

8. Project start date (date work will begin): (2)

9. Projected completion date: (2)

KyTC BMP Plan for Project PCN ## - ####

A. Site description:

1. Nature of Construction Activity (from letting project description) Complete Reconstruction

2. Order of major soil disturbing activities (2) and (3)

3. Projected volume of material to be moved 388,774 Cubic Yards

4. Estimate of total project area (acres) 70 Acres

5. Estimate of area to be disturbed (acres) 70 Acres

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. 0.5

7. Data describing existing soil condition (2)

8. Data describing existing discharge water quality (if any) (2)

9. Receiving water name, Decoursy Creek, Holds Branch, Wayman Branch

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 : N/A

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.

2. Waste Materials

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.

3. 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.

4. 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.

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.

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 received KyTC Grade Level II training or other qualification as prescribed by the cabinet that includes instruction concerning sediment and erosion control.
- Inspection reports will be written, signed, dated, and kept on file.
- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 70 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

G. Non – Storm Water discharges

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

- Water from water line flushings.
- Water form cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).

- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

H. Groundwater Protection Plan (3)

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

_____ 2. (e) land treatment or land disposal of a pollutant;

_____ 2. (f) Storing, …, or related handling of hazardous waste, solid waste or special waste, …, in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

_____ 2. (g) …. Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

_____ 2. (j) Storing or related handling of road oils, dust suppressants, …., at a central location;

_____ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

_____ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

Or, check the following only if there are no qualifying activities

_____ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

KyTC BMP Plan for Project PCN ## - ####

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.

DEP Department For Environmental Protection

Welcome to the Department for Environmental Protection eForms Application.

Your eForm has been saved to our database and may be recalled in the future using the following eForm ID: "b4206842-b0a1-4132-aac7-30981708490e" (minus the double quotes). Please note, since you selected to save your values, this does NOT constitute as submittal to the Kentucky Department of Environmental Protection (DEP). Please note that some eForms require you to submit supporting upload file(s) or attachments. Upload files/attachments are not saved to our system until a final submission; we only save the file path using this save and retrieval feature. To retrieve this saved eForm, the eForms application will require you to enter your eForm ID in the appropriate field. The url for the retrieval is https://dep.gateway.ky.gov/eForms/default.aspx.

You have selected the following electronic form (eForm): KPDES FORM NOI-SW (Construction): (KPDES Notice of Intent (NOI) for Stormwater Discharges Associated with Construction Activity Under the KPDES General Permit). You may continue with a blank eForm by clicking on the "Continue with Blank eForm" button below or retrieve a previously saved version by entering your eForm Transaction ID in the field provided below.

Option A: Select this option to fill out a blank eForm.	Continue with Blank eForm
Option B: Select this option to retrieve a previously saved or submitted eForm. The check box allows you to use previously saved/submitted eForms as a "template". The system will generate a new eForm Transaction ID allow you to submit the new form to DEP.	Enter your eForm Transaction ID to retreive the latest version of your form: b4206842-b0a1-4132-aac7-30981708490e ☐ I want a NEW eForm with the values from the previously saved/submitted ID. Proceed

User Interface issues: 1. For Security reasons, the website only supports 45 minutes to complete data entry at any given time and will 'timeout', preventing the ability to save or submit your data. Please keep this in mind when filling out an eForm. 2. Please note that the Internet Explorer Browser uses the Backspace key as a Hot-Key for the Back button (Previous Page). When selecting values from a Dropdown List, using the backspace key will take you to the previous page and you will need to reenter your information.

Item No. 6 - 344.11 **Project Mgr.** MIKE BEZOLD

County KENTON **Route** KY-16

CAP #	Date of Promise	Promise made to:	Location of Promise
1	05-FEB-09	James Sebree	Parcels 525 and 588

CAP Description

THE PROPERTY OWNERS HAVE REQUESTED AND THE DEPARTMENT HAS AGREED THAT THE CONTRACOTOR SHALL CONSTRUCT A DRIEWAY APPROXIMATELY 20 FEET IN WIDTH AT EHT RIGHT OF APPROXIMATE STATION 134+79 WHERE THE EXISTING ENTRANCE TO PARCEL 525 IS LOCATED. THIS DRIVEWAY WOULD SERVICE BOTH PARCELS 525 AND 588 AND THE ADDITIONAL WIDTH WOULD ONLY EXTEND AS FAR AS THE EXISTING DRIVEWAY FOR PARCEL 525 IS PROPOSED TO BE REPLACED. THE EXISTING PARKING PAD ON PARCEL 525 WILL BE REPLACED IF DISTURBED AND THE OTHER ENTRANCE FOR PARCLE 588 SHALL BE CONSTRUCTED AS CURRENTLY ON THE PLANS.

2	05-FEB-09	James Sebree	Parcels 525 and 588

CAP Description

THE PROPERTY OWNERS HAVE REQUESTED AND THE DEPARTMENT HAS AGREED THAT THE DEPARTMENT SHALL RECONNECT PARCEL 525 (5366 OLD TAYLOR MILL ROAD) TO THE SANITARY SEWER MAIN WITH A 6" PIPE INSTEAD OF A 4" PIPE FROM THE MAIN TO THE EDGE OF THE PROPOSED RIGHT OF WAY.

3	12-JUN-09	Byron Lile	Parcel 144

CAP Description

THE PROPERTY OWNER IS CONSTRUCTING AN ENTRANCE TO OLD KY 16 CONNECTOR AT APPROXIMATELY STATION 160+00. THE CONTRACTOR WILL BE RESPONICIBLE TO TIE IN THIS ENTRANCE, REPARE ANY DAMAGES, AND SURFACE WITH A MATERIAL TO MATCH WHAT IS FOUND IN THE FIELD.

4	01-JUL-09	Kirby G. Rothenburger	Parcel 241

CAP Description

A FLAG POLE HAS BEEN CONSTRUCTED ON THE PARCEL NEAR THE TEMPORARY EASEMENT. THIS FLAG POLE IS NOT TO BE REMOVED BY THE CONTRACTOR.

5	15-DEC-12	George and Lois Spenlau	Parcel 405

CAP Description

KYTC AGREES TO COORDINATE THE CONSTRUCTION OF THE ROADWAY WITH THE CONSTRUCTION OF A RETAINING WALL BY BRIAN O'CONNER FROM STATION 161+78 LT TO STATION 164+30 LT. THIS WALL IS TO BE CONSTRUCTED BY, AND PAID FOR, BY MR. O'CONNER. THE CONTRACTOR SELECTED BY KYTC IS TO COORDINATE CONSTRUCITON WITH THE O'CONNER CONTRACTOR IN ORDER TO COORDINATE LAND EXCAVATION, CREATE EFFICIENTCIES IN THE RETAINING WALL CONSTRUCTION AND MINIMIZE DISRUPTION OF THE ROAD CONSTRUCITON ITSELF.

Item No. 6 - 344.3 **Project Mgr.** MIKE BEZOLD

County KENTON **Route** KY-16

CAP #	Date of Promise	Promise made to:	Location of Promise
1	05-FEB-09	James Sebree	Parcels 525 and 588

CAP Description

THE CONTRACTOR SHALL CONSTRUCT A DRIVEWAY APPROXIMATELY 20 FEET WIDE AT THE RIGHT OF APPROXIMATE STATION 134+79 WHERE THE EXISTING ENTRANCE OT PARCEL 525 IS LOCATED. THIS DRIVEWAY WOLD SERVICE BOTHPARCELS 525 AND 588 AND THE ADDITIONAL WITH WOULD ONLY EXTEND AS FAR AS THE EXISTING DRIVEWAY FOR PARCEL 525 IS PROPOSED TO BE REPLACED. THE EXISTING PAD ON PARCEL 525 WILL BE REPLACED IF DISTRUBED AND THE OTHER ENTRANCE FOR PARCEL 588 SHALL BE CONSTRUCTED AS CURRENTLY ON THE PLANS.

2	05-FEB-09	James Sebree	Parcels 523 and 588

CAP Description

THE SEWER CONNECTION TO PARCEL 525 (5366 OLD TAYLOR MILL ROAD) SHALL BE MADE WITH A 6" PIPE INSTEAD OF A 4" PIPE FROM THE MAIN TO THE EDGE OF THE PROPOSED RIGHT OF WAY.

3	12-JUN-09	Byron Lile	Parcel 144

CAP Description

THE PROPERTY OWNER IS CONSTRUCTING AN ENTRANCE TO OLD KY 16 CONNECTOR AT APPROXIMATELY STATION 160+00. THE CONTRACTOR WILL BE RESPONCIBLE TO TIE IN THIS ENTRANCE, REPARE ANY DAMAGES, AND SURFACE WITH MATERIAL TO MATH WHAT IS FOUND IN THE FIELD.

PART II

SPECIFICATIONS AND STANDARD DRAWINGS

SPECIFICATIONS REFERENCE

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 2012* and *Standard Drawings, Edition of 2012 with the 2012 Revision.*

Supplemental Specifications to the Standard Specifications for Road and Bridge Construction, 2012 Edition

(Effective with the August 17, 2012 Letting)

Subsection:	402.03.02 Contractor Quality Control and Department Acceptance.
Part:	D) Testing Responsibilites.
Number:	4) Density.
Revision:	Replace the second sentence of the Option A paragraph with the following: Perform coring by the end of the following work day.
Subsection:	606.03.17 Special Requirements for Latex Concrete Overlays.
Part:	A) Existing Bridges and New Structures.
Number:	1) Prewetting and Grout-Bond Coat.
Revision:	Add the following sentence to the last paragraph: Do not apply a grout-bond coat on bridge decks prepared by hydrodemolition.
Subsection:	609.03 Construction.
Revision:	Replace Subsection 609.03.01 with the following: 609.03.01 A) Swinging the Spans. Before placing concrete slabs on steel spans or precast concrete release the temporary erection supports under the bridge and swing the span free on its supports. 609.03.01 B) Lift Loops. Cut all lift loops flush with the top of the precast beam once the beam is placed in the final location and prior to placing steel reinforcement. At locations where lift loops are cut, paint the top of the beam with galvanized or epoxy paint.

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 2008 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.

A) Dimensions. Ensure TRMs are furnished in strips with a minimum width of 4 feet and length of 50 feet.
B) Weight. Ensure that all mat types have a minimum mass per unit area of 7 ounces per square yard according to ASTM D 6566.
C) 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.

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, 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.

Turf Reinforcement Matting					
Properties[1]	Type 1	Type 2	Type 3	Type 4	Test Method
Minimum tensile Strength lbs/ft	125	150	175	3000 by 1500	ASTM D6818[2]
UV stability (minimum % tensile retention)	80	80	80	90	ASTM D4355[3] (1000-hr exposure)
Minimum thickness (inches)	0.25	0.25	0.25	0.40	ASTM D6525
Slopes applications	2H:1V or flatter	1.5H:1V or flatter	1H:1V or flatter	1 H: 1V or greater	
Shear stress lbs/ft^2 Channel applications	6.0[4]	8.0[4]	10.0[4]	12.0[4]	ASTM D6459 ASTM D6460-07

[1] For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting alone.
[2]Minimum Average Roll Values for tensile strength of sample material machine direction.
[3]Tensile Strength percentage retained after stated 1000 hr duration of exposure under ASTM D4355 testing. Based on nondegradable components exclusively.
[4]Maximum permissible shear design values based on short-term (0.5 hr) vegetated data obtained by full scale flume testing ASTM D6459, D6460-07. Based on nondegradable components exclusively. Testing will be done at Independent Hydraulics Facility such as Colorado State University hydraulics laboratory, Utah State University hydraulics laboratory, Texas Transportation Institute (TTI) hydraulics and erosion control laboratory.

2.3 Quality Assurance Sampling, Testing, and Acceptance

A) 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.

B) 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.

C) 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.

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. When requested by the Engineer, 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. 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.

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

SPECIAL PROVISION FOR EMBANKMENT AT BRIDGE END BENT STRUCTURES

This Special Provision will apply when indicated on the plans or in the proposal. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

1.0 DESCRIPTION. Construct a soil, granular, or rock embankment with granular or cohesive pile core and place structure granular backfill, as the Plans require. Construct the embankment according to the requirements of this Special Provision, the Plans, Standard Drawing RGX 100 and 105, and the 2012 Standard Specifications.

2.0 MATERIALS.

2.1 Granular Embankment. Conform to Subsection 805.10. When Granular Embankment materials are erodible or unstable according to Subsection 805.03.04, use the Special Construction Methods found in 3.2 of the Special Provision.

2.2 Rock Embankment. Provide durable rock from roadway excavation that consists principally of Unweathered Limestone, Durable Shale (SDI equal to or greater than 95 according to KM 64-513), or Durable Sandstone.

2.3 Granular Pile Core. Select a gradation of durable rock to facilitate pile driving that conforms to Subsection 805.11. If granular pile core material hinders pile driving operations, take appropriate means necessary to reach the required pile tip elevation, at no expense to the Department.

2.4 Cohesive Pile Core. Conform to Section 206 of the Standard Specifications and use soil with at least 50 percent passing a No. 4 sieve having a minimum Plasticity Index (PI) of 10. In addition, keep the cohesive pile core free of boulders, larger than 6 inches in any dimension, or any other obstructions, which would interfere with drilling operations. If cohesive pile core material interferes with drilling operations, take appropriate means necessary to maintain excavation stability, at no expense to the Department.

2.5 Structure Granular Backfill. Conform to Subsection 805.11

2.6 Geotextile Fabric. Conform to Type I or Type IV in Section 214 and 843 as required in the plans.

3.0 CONSTRUCTION.

3.1 General. Construct roadway embankments at end bents according to Section 206 and in accordance with the Special Provision, the Plans, and Standard Drawings for the full embankment section. In some instances, granular or rock embankment will be required for embankment construction for stability purposes, but this special provision does not prevent the use of soil when appropriate. Refer to the plans for specific details regarding material requirements for embankment construction.

Place and compact granular or cohesive pile core, soil, granular or rock embankment, and structure granular backfill according to the applicable density requirements for the project. When constructing granular or rock embankments, use granular pile core for driven pile foundations and use cohesive pile core for pre-drilled pile or drilled shaft foundations. Place geotextile fabric, Type IV between cohesive pile core and structure

granular backfill and granular or rock embankment.

When granular or rock embankment is required for embankment construction, conform to the general requirements of Subsection 206.03.02 B). In addition, place the material in no greater than 2-foot lifts and compact with a vibrating smooth wheel roller capable of producing a minimum centrifugal force of 15 tons. Apply these requirements to the full width of the embankment for a distance of half the embankment height or 50 feet, whichever is greater, as shown on Standard Drawing RGX-105.

When using granular pile core, install 8-inch perforated underdrain pipe at or near the elevation of the original ground in the approximate locations depicted on the standard drawing, and as the Engineer directs, to ensure positive drainage of the embankment. Wrap the perforated pipe with a fabric of a type recommended by the pipe manufacturer.

After constructing the embankment, excavate for the end bent cap, drive piling or install shafts, place the mortar bed, construct the end bent, and complete the embankment to finish grade according to the construction sequence shown on the Plans or Standard Drawings and as specified hereinafter.

Certain projects may require widening of existing embankments and the removal of substructures. Construct embankment according to the plans. Substructure removal shall be completed according to the plans and Section 203. Excavation may be required at the existing embankment in order to place the structure granular backfill as shown in the Standard Drawings.

After piles are driven or shafts installed (see design drawings), slope the bottom of the excavation towards the ends of the trench as noted on the plans for drainage. Using a separate pour, place concrete mortar, or any class concrete, to provide a base for forming and placing the cap. Place side forms for the end bent after the mortar has set sufficiently to support workmen and forms without being disturbed.

Install 4-inch perforated pipe in accordance with the plans and Standard Drawings. In the event slope protection extends above the elevation of the perforated pipe, extend the pipe through the slope protection.

After placing the end bent cap and removing adjacent forms, fill the excavation with structure granular backfill material to the level of the berm prior to placing beams for the bridge. For soil embankments, place Type IV geotextile fabric between embankment material and structure granular backfill. After completing the end bent backwall, or after completing the span end wall, place the structure granular backfill to subgrade elevation. If the original excavation is enlarged, fill the entire volume with compacted structure granular backfill at no expense to the Department. Do not place backfill before removing adjacent form work. Place structure granular backfill material in trench ditches at the ends of the excavation. Place Geotextile Fabric, Type IV over the surface of structure granular backfill prior to placing aggregate base course.

Tamp the backfill with hand tampers, pneumatic tampers, or other means the Engineer approves. Thoroughly compact the backfill under the overhanging portions of the structure to ensure that the backfill is in intimate contact with the sides of the structure.

Do not apply seeding, sodding, or other vegetation to the exposed granular embankment.

3.2 Special Construction Methods. Erodible or unstable materials may erode even when protected by riprap or channel lining; use the special construction method described below when using these materials.

Use fine aggregates or friable sandstone granular embankment at “dry land” structures only. Do not use them at stream crossings or locations subject to flood waters.

For erodible or unstable materials having 50 percent or more passing the No. 4 sieve, protect with geotextile fabric. Extend the fabric from the original ground to the top of slope over the entire area of the embankment slopes on each side of, and in front of, the

end bent. Cover the fabric with at least 12 inches of non-erodible material.

For erodible or unstable materials having less than 50 percent passing a No. 4 sieve, cover with at least 12 inches of non-erodible material.

Where erodible or unstable granular embankment will be protected by riprap or channel lining, place geotextile fabric between the embankment and the specified slope protection.

4.0 MEASUREMENT.

4.1 Granular Embankment. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure for payment any Granular Embankment that is not called for in the plans.

The Department will not measure for payment any special construction caused by using erodible or unstable materials and will consider it incidental to the Granular Embankment regardless of whether the erodible or unstable material was specified or permitted.

4.2 Rock Embankment. The Department will not measure for payment any rock embankment and will consider it incidental to roadway excavation or embankment in place, as applicable. Rock embankments will be constructed using granular embankment on projects where there is no available rock present within the excavation limits of the project.

4.3 Granular Pile Core. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure for payment furnishing and placing 8-inch perforated underdrain pipe and will consider it incidental to the Granular pile core. The Department will not measure for payment any granular pile core that is necessary because the contractor elects to use granular or rock embankment when it is not specified in the plans.

4.4 Cohesive Pile Core. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204.

4.5 Structure Granular Backfill. The Department will measure the quantity in cubic yards using the plan quantity, increased or decreased by authorized adjustments as specified in Section 204. The Department will not measure any additional material required for backfill outside the limits shown on the Plans and Standard Drawings for payment and will consider it incidental to the work.

The Department will not measure structure excavation at the end bent or an existing embankment for payment and will consider it incidental to Structure Granular Backfill.

The Department will not measure for payment the 4-inch perforated underdrain pipe and will consider it incidental to the Structure Granular Backfill.

4.6 Geotextile Fabric. The Department will measure the quantities as specified in Section 214. The Department will not measure the quantity of fabric used for separating granular or rock embankment and cohesive pile core and will consider it incidental to cohesive pile core.

4.7 End Bent. The Department will measure the quantities according to the

Contract. The Department will not measure furnishing and placing the 2-inch mortar or concrete bed for payment and will consider it incidental to the end bent construction.

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

Code	Pay Item	Pay Unit
02223	Granular Embankment	Cubic Yards
20209EP69	Granular Pile Core	Cubic Yards
20210EP69	Cohesive Pile Core	Cubic Yards
02231	Structure Granular Backfill	Cubic Yards
02596, 02599	Geotextile Fabric, Type	See Section 214

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

June 15, 2012

PART III

EMPLOYMENT, WAGE AND RECORD REQUIREMENTS

TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS

LABOR AND WAGE REQUIREMENTS
APPLICABLE TO OTHER THAN FEDERAL-AID SYSTEM PROJECTS

I. APPLICATION

1. These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work or by subcontract. The contractor's organization shall be construed to include only workmen employed and paid directly by the contractor and equipment owned or rented by him, with or without operators.

2. The contractor shall insert in each of his subcontracts all of the stipulations contained in these Required Provisions and such other stipulations as may be required.

3. A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

II. NONDISCRIMINATION OF EMPLOYEES

AN ACT OF THE KENTUCKY
GENERAL ASSEMBLY TO PREVENT
DISCRIMINATION IN EMPLOYMENT
KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (between forty and seventy); 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 (between forty and seventy). 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, disability or age (between forty and seventy), except that such notice or advertisement may indicate a preference, limitation, or specification based on religion, or national origin when religion, or national origin 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 (between forty and seventy), 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.

III. PAYMENT OF PREDETERMINED MINIMUM WAGES

1. These special provisions are supplemented elsewhere in the contract by special provisions which set forth certain predetermined minimum wage rates. The contractor shall pay not less than those rates.

2. The minimum wage determination schedule shall be posted by the contractor, in a manner prescribed by the Department of Highways, at the site of the work in prominent places where it can be easily seen by the workers.

IV. STATEMENTS AND PAYROLLS

1. All contractors and subcontractors affected by the terms of KRS 337.505 to 337.550 shall keep full and accurate payroll records covering all disbursements of wages to their employees to whom they are required to pay not less than the prevailing rate of wages. Payrolls and basic records relating thereto will be maintained during the course of the work and preserved for a period of one (1) year from the date of completion of this contract.

2. The payroll records shall contain the name, address and social security number of each employee, his correct classification, rate of pay, daily and weekly number of hours worked, itemized deductions made and actual wages paid.

3. The contractor shall make his daily records available at the project site for inspection by the State Department of Highways contracting office or his authorized representative.

Periodic investigations shall be conducted as required to assure compliance with the labor provisions of the contract. Interrogation of employees and officials of the contractor shall be permitted during working hours.

Aggrieved workers, Highway Managers, Assistant District Engineers, Resident Engineers and Project Engineers shall report all complaints and violations to the Division of Contract Procurement.

The contractor shall be notified in writing of apparent violations. The contractor may correct the reported violations and notify the Department of Highways of the action taken or may request an informal hearing. The request for hearing shall be in writing within ten (10) days after receipt of the notice of the reported violation. The contractor may submit

records and information which will aid in determining the true facts relating to the reported violations.

Any person or organization aggrieved by the action taken or the findings established as a result of an informal hearing by the Division of Contract Procurement may request a formal hearing.

4. The wages of labor shall be paid in legal tender of the United States, except that this condition will be considered satisfied if payment is made by a negotiable check, on a solvent bank, which may be cashed readily by the employee in the local community for the full amount, without discount or collection charges of any kind. Where checks are used for payments, the contractor shall make all necessary arrangements for them to be cashed and shall give information regarding such arrangements.

5. No fee of any kind shall be asked or accepted by the contractor or any of his agents from any person as a condition of employment on the project.

6. No laborers shall be charged for any tools used in performing their respective duties except for reasonably avoidable loss or damage thereto.

7. Every employee on the work covered by this contract shall be permitted to lodge, board, and trade where and with whom he elects and neither the contractor nor his agents, nor his employees shall directly or indirectly require as a condition of employment that an employee shall lodge, board or trade at a particular place or with a particular person.

8. Every employee on the project covered by this contract shall be an employee of either the prime contractor or an approved subcontractor.

9. No charge shall be made for any transportation furnished by the contractor or his agents to any person employed on the work.

10. No individual shall be employed as a laborer or mechanic on this contract except on a wage basis, but this shall not be construed to prohibit the rental of teams, trucks or other equipment from individuals.

No Covered employee may be employed on the work except in accordance with the classification set forth in the schedule mentioned above; provided, however, that in the event additional classifications are required, application shall be made by the contractor to the Department of Highways and (1) the Department shall request appropriate classifications and rates from the proper agency, or (2) if there is urgent need for additional classification to avoid undue delay in the work, the contractor may employ such workmen at rates deemed comparable to rates established for similar classifications provided he has made written application through the Department of Highways, addressed to the proper agency, for the supplemental rates. The contractor shall retroactively adjust, upon receipt of the supplemental rates schedule, the wages of any employee paid less than the established rate and may adjust the wages of any employee overpaid.

11. 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 laborer or mechanic in any work-week in which he is employed on such work, to work in excess of eight hours in any calendar day or in excess of forty hours in such work-week unless such laborer or mechanic receives compensation at a rate not less than one and one half times his basic rate of pay for all hours worked in excess of eight hours in any calendar day or in excess of forty hours in such work-week. A laborer, workman or mechanic and an employer may enter into a written agreement or a collective bargaining agreement to work more than eight (8) hours a calendar day but not more than ten (10) hours a calendar day for the straight time hourly rate. This agreement shall be in writing and shall be executed prior to the employee working in excess of eight (8) hours, but not more than ten (10) hours, in any one (1) calendar day.

12. Payments to the contractor may be suspended or withheld due to failure of the contractor to pay any laborer or mechanic employed or working on the site of the work, all or part of the wages required under the terms of the contract. The Department may suspend or withhold payments only after the contractor has been given written notice of the alleged violation and the contractor has failed to comply with the wage determination of the Department of Highways.

13. Contractors and subcontractors shall comply with the sections of Kentucky Revised Statutes, Chapter 337 relating to contracts for Public Works.

Revised 2-16-95

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 (6) provides:
>
> No present or former public servant shall, within six (6) months of 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 the state in matters in which he was directly involved during 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, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved 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.
>
> KRS 11A.040 (8) states:
>
> A former public servant shall not represent a person in a matter before a state agency in which the former public servant was directly involved, 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, Room 136, Capitol Building, 700 Capitol Avenue, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Kentucky Equal Employment Opportunity Act of 1978

The requirements of the Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) shall apply to this Contract. The apparent low Bidder will be required to submit EEO forms to the Division of Construction Procurement, which will then forward to the Finance and Administration Cabinet for review and approval. No award will become effective until all forms are submitted and EEO/CC has certified compliance. The required EEO forms are as follows:

- EEO-1: Employer Information Report
- Affidavit of Intent to Comply
- Employee Data Sheet
- Subcontractor Report

These forms are available on the Finance and Administration's web page under ***Vendor Information, Standard Attachments and General Terms*** at the following address: **https://www.eProcurement.ky.gov**.

Bidders currently certified as being in compliance by the Finance and Administration Cabinet may submit a copy of their approval letter in lieu of the referenced EEO forms.

For questions or assistance please contact the Finance and Administration Cabinet by email at **finance.contractcompliance@ky.gov** or by phone at 502-564-2874.

General Decision Number: KY120126 08/17/2012 KY126

Superseded General Decision Number: KY20100212

State: Kentucky

Construction Type: Highway

Counties: Boone, Campbell, Kenton and Pendleton Counties in Kentucky.

HIGHWAY CONSTRUCTION PROJECTS (excluding tunnels, building structures in rest area projects & railroad construction; bascule, suspension & spandrel arch bridges designed for commercial navigation, bridges involving marine construction; and other major bridges).

Modification Number	Publication Date
0	01/06/2012
1	03/02/2012
2	04/06/2012
3	04/13/2012
4	06/01/2012
5	06/22/2012
6	07/13/2012
7	07/20/2012
8	08/03/2012
9	08/17/2012

BRKY0002-005 06/01/2009

	Rates	Fringes
BRICKLAYER	$ 26.12	9.73

BROH0001-005 06/01/2008

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER	$ 25.75	8.60

CARP0698-001 05/01/2009

BOONE, CAMPBELL, KENTON & PENDLETON COUNTIES:

	Rates	Fringes
Carpenter & Piledrivermen	$ 27.05	9.69
Diver	$ 40.58	9.69

* ELEC0212-007 05/28/2012

	Rates	Fringes
ELECTRICIAN	$ 26.11	15.42

ELEC0212-013 06/27/2011

	Rates	Fringes
Sound & Communication Technician	$ 21.55	8.46

ENGI0018-013 05/01/2009

	Rates	Fringes
OPERATOR: Power Equipment		
GROUP 1	$ 29.49	12.25
GROUP 2	$ 29.37	12.25
GROUP 3	$ 28.33	12.25
GROUP 4	$ 27.15	12.25
GROUP 5	$ 21.69	12.25
GROUP 6	$ 29.74	12.25
GROUP 7	$ 30.00	12.25

OPERATING ENGINEER CLASSIFICATIONS

GROUP 1 - Air Compressor on Steel Erection; Barrier Moving Machine; Boiler Operator on Compressor or Generator when mounted on a Rig; Cableway; Combination Concrete Mixer & Tower; Concrete Plant (over 4 yd. Capacity); Concrete Pump; Crane (All Types, Including Boom Truck, Cherry Picker); Crane-Compact, Track or Rubber over 4,000 lbs. capacity; Cranes-Self Erecting, Stationary, Track or Truck (All Configurations); Derrick; Dragline; Dredge (Dipper, Clam or Suction); Elevating Grader or Euclid Loader; Floating Equipment (All Types); Gradall; Helicopter Crew (Operator-Hoist or Winch); Hoe (all types); Hoisting Engine on Shaft or Tunnel Work; Hydraulic Gantry (Lifting System); Industrial-Type Tractor; Jet Engine Dryer (D8 or D9) Diesel Tractor; Locomotive (Standard Gauge); Maintenance Operator Class A; Mixer, Paving (Single or Double Drum); Mucking Machine; Multiple Scraper; Piledriving Machine (All Types); Power Shovel; Prentice Loader; Quad 9 (Double Pusher); Rail Tamper (with auto lifting & aligning device); Refrigerating Machine (Freezer Operation); Rotary Drill, on Caisson work; Rough Terrain Fork Lift with Winch/Hoist; Side-Boom; Slip-Form Paver; Tower Derrick; Tree Shredder; Trench Machine (Over 24" wide); Truck Mounted Concrete Pump; Tug Boat; Tunnel Machine and/or Mining Machine; & Wheel Excavator

GROUP 2 - Asphalt Paver; Automatic Subgrader Machine, Self-Propelled (CMI Type); Bobcat Type and/or Skid Steer Loader with Hoe Attachment Greater than 7,000 lbs.; Boring Machine More than 48"; Bulldozer; Endloader; Hydro Milling Machine; Horizontal Directional Drill (over 500,000 ft. lbs. thrust); Kolman-type Loader (production type-Dirt); Lead Greaseman; Lighting & Traffic Signal Installation Equipment (includes all groups or classifications); Material Transfer Equipment (Shuttle Buggy) Asphalt; Pettibone-Rail Equipment; Power Grader; Power Scraper; Push Cat; Rotomill (all), Grinders & Planers of All types; Trench Machine (24" wide & under); & Vermeer type Concrete Saw

GROUP 3 - A-Frame; Air Compressor on Tunnel Work (low

pressure); Asphalt Plant Engineer; Bobcat-type and/or Skid Steer Loader with or without Attachments; Highway Drills (all types); Locomotive (narrow gauge); Material Hoist/Elevator; Mixer, Concrete (more than one bag capacity); Mixer, one bag capacity (Side Loader); Power Boiler (Over 15 lbs. Pressure) Pump Operator installing & operating Well Points; Pump (4" & over discharge); Roller, Asphalt; Rotovator (lime soil stabilizer); Switch & Tie Tampers (without lifting & aligning device); Utility Operator (Small equipment); & Welding Machines

GROUP 4 - Backfiller; Ballast Re-locator; Bars, Joint & Mesh Installing Machine; Batch Plant; Boring Machine Operator (48" or less); Bull Floats; Burlap & Curing Machine; Concrete Plant (capacity 4 yd. & under); Concrete Saw (Multiple); Conveyor (Highway); Crusher; Deckhand; Farm-type Tractor with attachments (highway) except Masonry); Finishing Machine; Fireperson, Floating Equipment (all types); Fork Lift (highway); Form Trencher; Hydro Hammer; Hydro Seeder; Pavement Breaker; Plant Mixer; Post Driver; Post Hole Digger (Power Auger); Power Brush Burner; Power Form Handling Equipment; Road Widening Trencher; Roller (Brick, Grade & Macadam); Self-Propelled Power Spreader; Self-Propelled Power Subgrader; Steam Fireperson; Tractor (Pulling Sheepfoot, Roller or Grader); & Vibratory Compactor with Integral Power

GROUP 5 - Compressor (Portable, Sewer, Heavy & Highway); Drum Fireperson (Asphalt); Generator; Masonry Fork Lift; Inboard-Outboard Motor Boat Launch; Masonry Fork Lift; Oil Heater (asphalt plant); Oiler; Power Driven Heater; Power Sweeper & Scrubber; Pump (under 4" discharge); Signalperson; Tire Repairperson; & VAC/ALLS

GROUP 6 - Master Mechanic & Boom from 150 to 180

GROUP 7 - Boom from 180 and over

IRON0044-008 06/01/2012

	Rates	Fringes
Ironworkers:		
Fence Erector	$ 22.50	18.10
Structural	$ 24.80	18.10

IRON0372-004 06/01/2012

	Rates	Fringes
IRONWORKER, REINFORCING		
Beyond 30-mile radius of Hamilton County, Ohio Courthouse	$ 26.59	18.58
Up to & including 30-mile radius of Hamilton County, Ohio Courthouse	$ 26.34	18.58

LABO0189-004 07/01/2012

PENDLETON COUNTY:

	Rates	Fringes
LABORER		
GROUP 1	$ 21.15	11.41
GROUP 2	$ 21.40	11.41
GROUP 3	$ 21.45	11.41
GROUP 4	$ 22.05	11.41

LABORERS CLASSIFICATIONS

GROUP 1 - Aging & Curing of Concrete; Asbestos Abatement Worker; Asphalt Plant; Asphalt; Batch Truck Dump; Carpenter Tender; Cement Mason Tender; Cleaning of Machines; Concrete; Demolition; Dredging; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level D; Flagperson; Grade Checker; Hand Digging & Hand Back Filling; Highway Marker Placer; Landscaping, Mesh Handler & Placer; Puddler; Railroad; Rip-rap & Grouter; Right-of-Way; Sign, Guard Rail & Fence Installer; Signal Person; Sound Barrier Installer; Storm & Sanitary Sewer; Swamper; Truck Spotter & Dumper; Wrecking of Concrete Forms; General Cleanup

GROUP 2 - Batter Board Man (Sanitary & Storm Sewer); Brickmason Tender; Mortar Mixer Operator; Scaffold Builder; Burner & Welder; Bushammer; Chain Saw Operator; Concrete Saw Operator; Deckhand Scow Man; Dry Cement Handler; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Level C; Forklift Operator for Masonary; Form Setter; Green Concrete Cutting; Hand Operated Grouter & Grinder Machine Operator; Jackhammer; Pavement Breaker; Paving Joint Machine; Pipelayer; Plastic Pipe Fusion; Power Driven Georgia Buggy & Wheel Barrow; Power Post Hole Digger; Precast Manhole Setter; Walk-Behind Tamper; Walk-Behind Trencher; Sand Blaster; Concrete Chipper; Surface Grinder; Vibrator Operator; Wagon Driller

GROUP 3 - Asphalt Luteman & Raker; Gunnite Nozzleman; Gunnite Operator & Mixer; Grout Pump Operator; Side Rail Setter; Rail Paved Ditches; Screw Operator; Tunnel (Free Air); Water Blaster

GROUP 4 - Caisson Worker (Free Air); Cement Finisher; Environmental - Nuclear, Radiation, Toxic & Hazardous Waste - Levels A & B; Miner & Driller (Free Air); Tunnel Blaster; & Tunnel Mucker (Free Air); Directional & Horizontal Boring; Air Track Driller (All Types); Powderman & Blaster; Troxler & Concrete Tester if Laborer is Utilized

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LABO0265-009 05/01/2011

BOONE, CAMPBELL & KENTON COUNTIES:

	Rates	Fringes
LABORER		
GROUP 1	$ 25.82	8.75
GROUP 2	$ 25.99	8.75
GROUP 3	$ 26.32	8.75

GROUP 4.....$ 26.77 8.75

LABORER CLASSIFICATIONS

GROUP 1 - Asphalt Laborer; Carpenter Tender; Concrete Curing Applicator; Dump Man (Batch Truck); Guardrail and Fence Installer; Joint Setter; Laborer (Construction); Landscape Laborer; Highway Lighting Worker; Signalization Worker; Mesh Handlers & Placer; Right-of-way Laborer; Riprap Laborer & Grouter; Scaffold Erector; Seal Coating; Surface Treatment or Road Mix Laborer; Sign Installer; Slurry Seal; Utility Man; Bridge Man; Handyman; Waterproofing Laborer; Flagperson; Hazardous Waste (level D); Diver Tender; Zone Person & Traffic Control

GROUP 2 - Skid Steer; Asphalt Raker; Concrete Puddler; Kettle Man (Pipeline); Machine Driven Tools (Gas, Electric, Air); Mason Tender; Brick Paver; Mortar Mixer; Power Buggy or Power Wheelbarrow; Sheeting & Shoring Man; Surface Grinder Man; Plastic Fusing Machine Operator; Pug Mill Operator; & Vacuum Devices (wet or dry); Rodding Machine Operator; Diver; Screwman or Paver; Screed Person; Water Blast, Hand Held Wand; Pumps 4" & Under (Gas, Air or Electric) & Hazardous Waste (level C); Air Track and Wagon Drill; Bottom Person; Cofferdam (below 25 ft. deep); Concrete Saw Person; Cutting with Burning Torch; Form Setter; Hand Spiker (Railroad); Pipelayer; Tunnel Laborer (without air) & Caisson; Underground Person (working in Sewer and Waterline, Cleaning, Repairing & Reconditioning); Sandblaster Nozzle Person; & Hazardous Waste (level B)

GROUP 3 - Blaster; Mucker; Powder Person; Top Lander; Wrencher (Mechanical Joints & Utility Pipeline); Yarner; Hazardous Waste (level A); Concrete Specialist; Concrete Crew in Tunnels (With Air-pressurized - $1.00 premium); Curb Setter & Cutter; Grade Checker; Utility Pipeline Tapper; Waterline; and Caulker

GROUP 4 - Miner; & Gunite Nozzle Person

TUNNEL LABORER WITH AIR-PRESSURIZED ADD $1.00 TO BASE RATE

SIGNAL PERSON WILL RECEIVE THE RATE EQUAL TO THE RATE PAID THE LABORER CLASSIFICATION FOR WHICH HE OR SHE IS SIGNALING.

PAIN0012-016 05/01/2012

	Rates	Fringes
Painters:		
Bridge	$ 24.10	8.33
Bridge Equipment Tender and Containment Builder	$ 20.49	8.33
Brush & Roller	$ 23.10	8.33
Sandblasting & Water Blasting	$ 23.85	8.33
Spray	$ 23.60	8.33

PLUM0392-008 06/01/2012

	Rates	Fringes
PLUMBER	$ 29.30	16.59

SUKY2010-161 02/05/1996

	Rates	Fringes
Truck drivers:		
GROUP 1	$ 15.85	4.60
GROUP 2	$ 16.29	4.60

TRUCK DRIVER CLASSIFICATIONS

GROUP 1 - Driver

GROUP 2 - Euclid Wagon; End Dump; Lowboy; Heavy Duty Equipment; Tractor-Trailer Combination; & Drag

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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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) (ii)).

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 union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows 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. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any

changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

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 Regional Office for the area in which the survey was conducted because those Regional Offices have 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.

These rates are listed pursuant to the Kentucky Determination No. CR-III-IV-HWY dated September 5, 2012.

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 after an employee works eight (8) hours a day or forty (40) hours a week, whichever gives the employee the greater wages. At least time and one-half the base rate is required for all overtime. A laborer, workman or mechanic and an employer may enter into a written agreement or a collective bargaining agreement to work more than eight (8) hours a calendar day but not more than ten (10) hours a calendar day for the straight time hourly rate. Wage violations or questions should be directed to the designated Engineer or the undersigned.

Ryan Griffith, Director
Division of Construction Procurement
Frankfort, Kentucky 40622

PART IV

INSURANCE

INSURANCE

The Contractor shall procure and maintain the following insurance in addition to the insurance required by law:

1) Commercial General Liability-Occurrence form – not less than $2,000,000 General aggregate, $2,000,000 Products & Completed Aggregate, $1,000,000 Personal & Advertising, $1,000,000 each occurrence.

2) Automobile Liability- $1,000,000 per accident

3) Employers Liability:

   a) $100,000 Each Accident Bodily Injury
   b) $500,000 Policy limit Bodily Injury by Disease
   c) $100,000 Each Employee Bodily Injury by Disease

4) The insurance required above must be evidenced by a Certificate of Insurance and this Certificate of Insurance must contain one of the following statements:
   a) "policy contains no deductible clauses."
   b) "policy contains _____ (amount) deductible property damage clause but company will pay claim and collect the deductible from the insured."

5) KENTUCKY WORKMEN'S COMPENSATION INSURANCE. The contractor shall furnish evidence of coverage of all his employees or give evidence of self-insurance by submitting a copy of a certificate issued by the Workmen's Compensation Board.

The cost of insurance is incidental to all contract items. All subcontractors must meet the same minimum insurance requirements.

PART V

BID ITEMS

KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
FRANKFORT, KY 40622

CONTRACT ID: 121043 PAGE: 1
COUNTY: KENTON LETTING: 10/19/12
PROPOSAL: FD04 SPP 059 0016-NEWLOC CALL NO: 309

LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
	SECTION 0001	ROADWAY			
0010	00003	CRUSHED STONE BASE	31,827.000 TON		
0020	00013	LIME STABILIZED ROADBED	65,961.000 SQYD		
0030	00014	LIME	1,200.000 TON		
0040	00020	TRAFFIC BOUND BASE	2,000.000 TON		
0050	00021	DRAINAGE BLANKET-EMBANKMENT	8,737.000 CUYD		
0060	00071	CRUSHED AGGREGATE SIZE NO 57	18.000 TON		
0070	00078	CRUSHED AGGREGATE SIZE NO 2	6,614.000 TON		
0080	00100	ASPHALT SEAL AGGREGATE	5.420 TON		
0090	00103	ASPHALT SEAL COAT	0.650 TON		
0100	00212	CL2 ASPH BASE 1.00D PG64-22	36,888.000 TON		
0110	00221	CL2 ASPH BASE 0.75D PG64-22	7,645.000 TON		
0120	00301	CL2 ASPH SURF 0.38D PG64-22	1,443.000 TON		
0130	00307	CL2 ASPH SURF 0.38B PG64-22	5,395.000 TON		
0140	00440	ENTRANCE PIPE-15 IN	208.000 LF		
0150	00441	ENTRANCE PIPE-18 IN	82.000 LF		
0160	00461	CULVERT PIPE-15 IN	319.000 LF		
0170	00462	CULVERT PIPE-18 IN	112.000 LF		
0180	00464	CULVERT PIPE-24 IN	31.920 LF		
0190	00521	STORM SEWER PIPE-15 IN	476.000 LF		
0200	00522	STORM SEWER PIPE-18 IN	8,395.000 LF		

KENTUCKY TRANSPORTATION CABINET
DEPARTMENT OF HIGHWAYS
FRANKFORT, KY 40622

CONTRACT ID: 121043 PAGE: 2
COUNTY: KENTON LETTING: 10/19/12
PROPOSAL: FD04 SPP 059 0016-NEWLOC CALL NO: 309

LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
0210	00524	STORM SEWER PIPE-24 IN	2,760.000 LF		
0220	00526	STORM SEWER PIPE-30 IN	922.000 LF		
0230	00528	STORM SEWER PIPE-36 IN	1,159.000 LF		
0240	00530	STORM SEWER PIPE-48 IN	8.000 LF		
0250	01000	PERFORATED PIPE-4 IN	196.000 LF		
0260	01002	PERFORATED PIPE-8 IN	767.000 LF		
0270	01010	NON-PERFORATED PIPE-4 IN	76.000 LF		
0280	01011	NON-PERFORATED PIPE-6 IN	9.000 LF		
0290	01012	NON-PERFORATED PIPE-8 IN	447.000 LF		
0300	01026	PERF PIPE HEADWALL TY 2-8 IN	6.000 EACH		
0310	01433	SLOPED BOX OUTLET TYPE 1-18 IN	1.000 EACH		
0320	01450	S & F BOX INLET-OUTLET-18 IN	1.000 EACH		
0330	01452	S & F BOX INLET-OUTLET-30 IN	1.000 EACH		
0340	01456	CURB BOX INLET TYPE A	104.000 EACH		
0350	01496	DROP BOX INLET TYPE 3	11.000 EACH		
0360	01538	DROP BOX INLET TYPE 7	8.000 EACH		
0370	01544	DROP BOX INLET TYPE 11	1.000 EACH		
0380	01559	DROP BOX INLET TYPE 13G	2.000 EACH		
0390	01580	DROP BOX INLET TYPE 15	5.000 EACH		
0400	01642	JUNCTION BOX-18 IN	1.000 EACH		
0410	01644	JUNCTION BOX-30 IN	2.000 EACH		

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0420	01645	JUNCTION BOX-36 IN	1.000 EACH		
0430	01756	MANHOLE TYPE A	3.000 EACH		
0440	01767	MANHOLE TYPE C	4.000 EACH		
0450	01810	STANDARD CURB AND GUTTER	27,956.470 LF		
0460	01820	LIP CURB AND GUTTER	125.650 LF		
0470	01891	ISLAND HEADER CURB TYPE 2	173.130 LF		
0480	01917	STANDARD BARRIER MEDIAN TYPE 2	926.000 SQYD		
0490	02001	CURB TO BARRIER WALL TRANS	4.000 EACH		
0500	02014	BARRICADE-TYPE III	16.000 EACH		
0510	02084	JPC PAVEMENT-8 IN	2,238.000 SQYD		
0520	02091	REMOVE PAVEMENT	4,287.000 SQYD		
0530	02101	CEM CONC ENT PAVEMENT-8 IN	1,293.500 SQYD		
0540	02159	TEMP DITCH	7,425.000 LF		
0550	02160	CLEAN TEMP DITCH	14,850.000 LF		
0560	02200	ROADWAY EXCAVATION	415,768.000 CUYD		
0570	02223	GRANULAR EMBANKMENT	10,924.000 CUYD		
0580	02242	WATER	3,000.000 MGAL		
0590	02261	FENCE-WOVEN WIRE	86.000 LF		
0600	02351	GUARDRAIL-STEEL W BEAM-S FACE	50.000 LF		
0610	02360	GUARDRAIL TERMINAL SECTION NO 1	4.000 EACH		
0620	02367	GUARDRAIL END TREATMENT TYPE 1	2.000 EACH		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
0630	02397	TEMP GUARDRAIL	725.000 LF		
0640	02429	RIGHT-OF-WAY MONUMENT TYPE 1	75.000 EACH		
0650	02432	WITNESS POST	1.000 EACH		
0660	02545	CLEARING AND GRUBBING 75 ACRES	(1.00) LS		
0670	02562	SIGNS	1,059.800 SQFT		
0680	02585	EDGE KEY	334.850 LF		
0690	02599	FABRIC-GEOTEXTILE TYPE IV	90,378.000 SQYD		
0700	02600	FABRIC GEOTEXTILE TY IV FOR PIPE	38,859.000 SQYD	2.00	77,718.00
0710	02650	MAINTAIN & CONTROL TRAFFIC	(1.00) LS		
0720	02651	DIVERSIONS (BY-PASS DETOURS) #1	(1.00) LS		
0730	02651	DIVERSIONS (BY-PASS DETOURS) #2	(1.00) LS		
0740	02651	DIVERSIONS (BY-PASS DETOURS) #3	(1.00) LS		
0750	02653	LANE CLOSURE	12.000 EACH		
0760	02701	TEMP SILT FENCE	9,675.000 LF		
0770	02703	SILT TRAP TYPE A	150.000 EACH		
0780	02704	SILT TRAP TYPE B	150.000 EACH		
0790	02705	SILT TRAP TYPE C	225.000 EACH		
0800	02706	CLEAN SILT TRAP TYPE A	450.000 EACH		
0810	02707	CLEAN SILT TRAP TYPE B	450.000 EACH		
0820	02708	CLEAN SILT TRAP TYPE C	675.000 EACH		
0830	02709	CLEAN TEMP SILT FENCE	29,025.000 LF		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
0840	02720	SIDEWALK-4 IN CONCRETE	14,374.700 SQYD		
0850	02726	STAKING	(1.00) LS		
0860	02775	ARROW PANEL	4.000 EACH		
0870	05950	EROSION CONTROL BLANKET	4,137.000 SQYD		
0880	05952	TEMP MULCH	357,490.000 SQYD		
0890	05953	TEMP SEEDING AND PROTECTION	23,890.000 SQYD		
0900	05966	TOPDRESSING FERTILIZER	12.550 TON		
0910	05985	SEEDING AND PROTECTION	241,572.000 SQYD		
0920	05989	SPECIAL SEEDING CROWN VETCH	63,109.000 SQYD		
0930	05997	TOPSOIL FURNISHED AND PLACED	3,231.000 CUYD		
0940	06510	PAVE STRIPING-TEMP PAINT-4 IN	45,576.000 LF		
0950	06514	PAVE STRIPING-PERM PAINT-4 IN	49,738.000 LF		
0960	06565	PAVE MARKING-THERMO X-WALK-6 IN	1,580.000 LF		
0970	06568	PAVE MARKING-THERMO STOP BAR-24IN	352.000 LF		
0980	06570	PAVE MARKING-PAINT CROSS-HATCH	1,017.000 SQFT		
0990	06574	PAVE MARKING-THERMO CURV ARROW	42.000 EACH		
1000	06575	PAVE MARKING-THERMO COMB ARROW	1.000 EACH		
1010	06588	PAVEMENT MARKER TY IVA-BY TEMP	285.000 EACH		
1020	06589	PAVEMENT MARKER TYPE V-MW	302.000 EACH		
1030	06591	PAVEMENT MARKER TYPE V-BY	156.000 EACH		
1040	08100	CONCRETE-CLASS A	15.220 CUYD		

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1050	08150	STEEL REINFORCEMENT	829.500 LB		
1060	10020NS	FUEL ADJUSTMENT	137,995.000 DOLL	1.00	137,995.00
1070	10030NS	ASPHALT ADJUSTMENT	121,722.000 DOLL	1.00	121,722.00
1080	20782NS714	PAVE MARKING THERMO-BIKE	23.000 EACH		
1090	21117ND	VARIABLE MESSAGE SIGN-DYNAMIC	6.000 EACH		
1100	23131ER701	PIPELINE VIDEO INSPECTION	7,164.000 LF		
1110	23158ES505	DETECTABLE WARNINGS	686.000 SQFT		
1120	23274EN11F	TURF REINFORCEMENT MAT 1	6,933.000 SQYD		
1130	23275EN11F	TURF REINFORCEMENT MAT 2	301.000 SQYD		
1140	23276EN11F	TURF REINFORCEMENT MAT 3	306.000 SQYD		
1150	23277EN11F	TURF REINFORCEMENT MAT 4	32.000 SQYD		
	SECTION 0002	BRIDGE			
1160	02231	STRUCTURE GRANULAR BACKFILL	389.000 CUYD		
1170	02599	FABRIC-GEOTEXTILE TYPE IV	541.000 SQYD		
1180	02998	MASONRY COATING	5,363.000 SQYD		
1190	03299	ARMORED EDGE FOR CONCRETE	191.250 LF		
1200	08001	STRUCTURE EXCAVATION-COMMON	2,839.000 CUYD		
1210	08002	STRUCTURE EXCAV-SOLID ROCK	10,397.000 CUYD		
1220	08020	CRUSHED AGGREGATE SLOPE PROT	2,850.000 TON		
1230	08033	TEST PILES	121.000 LF		
1240	08050	PILES-STEEL HP14X73	890.000 LF		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
1250	08095	PILE POINTS-14 IN	24.000 EACH		
1260	08100	CONCRETE-CLASS A	8,221.900 CUYD		
1270	08104	CONCRETE-CLASS AA	68.900 CUYD		
1280	08105	CONCRETE-CLASS AAA	3,315.300 CUYD		
1290	08150	STEEL REINFORCEMENT	1,484,340.000 LB		
1300	08151	STEEL REINFORCEMENT-EPOXY COATED	1,237,934.000 LB		
1310	08160	STRUCTURAL STEEL 3976 LBS.	(1.00) LS		
1320	08472	EXPANSION DAM-4 IN NEOPRENE	105.250 LF		
1330	08637	PRECAST PC I BEAM TYPE 7	8,716.000 LF		
1340	08711	BRIDGE CHAIN LINK FENCE-6 FT	1,830.000 LF		
1350	21532ED	RAIL SYSTEM TYPE III	1,762.000 LF		
	SECTION 0003	UTILITY-GAS LINE			
1360	20721ND	HYDROSTATIC TEST 8 IN MAIN	1.000 EACH		
1370	20811ND	INSTALL M-C LONG-SIDE SERVICE PIPING-1IN	7.000 EACH		
1380	20812ND	INSTALL M-C SHORT-SIDE SERVICE PIPE-1 IN	3.000 EACH		
1390	23467EC	GAS MAIN-4 IN SWPC	890.000 LF		
1400	23468EC	GAS MAIN-4 IN PL	5,553.000 LF		
1410	23472EC	GAS MAIN-8 IN SWPC	2,185.000 LF		
1420	23737EC	VALVE ASSEMBLY-4 IN ST	1.000 EACH		
1430	24058EC	VALVE ASSEMBLY-4 IN PL	3.000 EACH		
	SECTION 0004	SEWER			

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
1440	01095	DUCTILE IRON PIPE-8 IN	810.000 LF		
1450	01786	FILL AND CAP MANHOLE	9.000 EACH		
1460	01789	RECONSTRUCT MANHOLE	1.000 EACH		
1470	01799	SANITARY SEWER MANHOLE	22.000 EACH		
1480	02690	SAFELOADING	91.000 CUYD		
1490	03387	PVC PIPE-8 IN	1,871.000 LF		
1500	20057ES601	CONCRETE ENCASEMENT	20.000 LF		
1510	24076EC	CONCRETE ANCHOR	3.000 EACH		
	SECTION 0005	SIGNING			
1520	06406	SBM ALUM SHEET SIGNS .080 IN	1,131.530 SQFT		
1530	06407	SBM ALUM SHEET SIGNS .125 IN	43.120 SQFT		
1540	06410	STEEL POST TYPE 1	1,899.000 LF		
	SECTION 0006	WATERLINE			
1550	01095	DUCTILE IRON PIPE-8 IN	3,495.000 LF		
1560	01097	DUCTILE IRON PIPE-10 IN	10.000 LF		
1570	01099	DUCTILE IRON PIPE-12 IN	285.000 LF		
1580	01103	DUCTILE IRON PIPE-16 IN	6,477.000 LF		
1590	01103	DUCTILE IRON PIPE-16 IN RESTRAINED	40.000 LF		
1600	03360	COPPER PIPE-3/4 IN	852.000 LF		
1610	03361	COPPER PIPE-1 IN	45.000 LF		
1620	03362	COPPER PIPE-1 1/2 IN	120.000 LF		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
1630	03363	COPPER PIPE-2 IN	160.000 LF		
1640	03426	ADJUST FIRE HYDRANT	2.000 EACH		
1650	03427	ADJUST WATER METER	11.000 EACH		
1660	03431	RELOCATE WATER METER	21.000 EACH		
1670	03433	RELOCATE FIRE HYDRANT	14.000 EACH		
1680	03437	RECONNECT SERVICE	32.000 EACH		
1690	03438	RECONNECT TO MAIN	22.000 EACH		
1700	03442	DUCTILE IRON FITTINGS 16 X 8 IN CROSS	1.000 LB		
1710	03495	AIR RELEASE VALVE	1.000 EACH		
1720	03530	GATE VALVE-10 IN RESILIENT SEATED	1.000 EACH		
1730	03536	GATE VALVE-16 IN RESILIENT SEATED	19.000 EACH		
1740	03543	BEND 11.25 DEG 16 IN RESTRAINED	3.000 EACH		
1750	03552	BEND 22.50 DEG 16 IN RESTRAINED	3.000 EACH		
1760	03558	BEND 45 DEG 16 IN RESTRAINED	1.000 EACH		
1770	20056NN	REDUCER 16 X 6 IN	1.000 EACH		
1780	20156EC	FIRE HYDRANT ASSEMBLY	5.000 EACH		
1790	20552NC	TEE AND BLOCK 8 IN X 8 IN X 8 IN	3.000 EACH		
1800	20554NC	BEND AND BLOCK-6 IN	4.000 EACH		
1810	20555NC	BEND AND BLOCK-8 IN	41.000 EACH		
1820	20559NC	CONNECT TO 6 IN	4.000 EACH		
1830	20784ND	ANCHOR TEE AND BLOCK 8IN X 8IN X 6 IN	5.000 EACH		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
1840	20785ND	ANCHOR TEE AND BLOCK 16 IN X 16 IN X 6IN	11.000 EACH		
1850	20786ND	TEE AND BLOCK 16IN X 16 IN X 8 IN	7.000 EACH		
1860	20788ND	BEND AND BLOCK-12 IN	2.000 EACH		
1870	20789ND	BEND AND BLOCK-16 IN	10.000 EACH		
1880	20791ND	CONNECT TO 16 IN	1.000 EACH		
1890	20792ND	ADJUST WATER VALVE BOXES	10.000 EACH		
1900	20793ND	PLUG AND BLOCK-16 IN	3.000 EACH		
1910	20794ND	REDUCER 8 IN X 6 IN	6.000 EACH		
1920	21094ND	TEE 12 IN X 8 IN	1.000 EACH		
1930	22169NN	CONNECT TO 10 IN	2.000 EACH		
1940	22445NN	RESTRAINED JOINT BEND-8 IN	3.000 EACH		
1950	22447NN	CONNECT TO 8 IN	6.000 EACH		
1960	22603NN	BEND AND BLOCK-10 IN	2.000 EACH		
1970	22819NN	TEE AND BLOCK-16 X 16 X 12 IN	2.000 EACH		
1980	22866NN	WATER METER 2 IN -TEMP	1.000 EACH		
1990	22874NN	RESILIENT SEAT GATE VALVE-12 IN	2.000 EACH		
2000	23201EC	TEE-16 IN X 16 IN	3.000 EACH		
2010	23442EC	RESILIENT SEATED GATE VALVE-6 IN	21.000 EACH		
2020	23443EC	RESILIENT SEATED GATE VALVE-8 IN	18.000 EACH		
2030	23572EC	RESTRAINED JOINT DIP-CL50 W/POLYWRAP-8IN	260.000 LF		
2040	23735EC	REDUCER-12 X 10 IN	2.000 EACH		

SECTION 0007 MOB AND DEMOB

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE UNIT QUANTITY	UNIT PRICE	AMOUNT
2050	02568	MOBILIZATION (NO MORE THAN 5%)	LUMP		
2060	02569	DEMOBILIZATION (AT LEAST 1.5%)	LUMP		
		TOTAL BID			