CALL NO. 302

CONTRACT ID. 251031

CHRISTIAN COUNTY

FED/STATE PROJECT NUMBER FD04 024 0024-000-025

DESCRIPTION I-24

WORK TYPE UTILITY ADJUSTMENT

PRIMARY COMPLETION DATE 180 WORKING DAYS

LETTING DATE: October 23,2025

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

NO PLANS ASSOCIATED WITH THIS PROJECT.

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

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SCOPE OF WORK

ADMINISTRATIVE DISTRICT - 02

CONTRACT ID - 251031

FD04 024 0024-000-025

COUNTY - CHRISTIAN

PCN - DE02400242531
FD04 024 0024-000-025

I-24 (MP 92.0) RECONSTRUCT WATER LINE AND SANITARY SEWER LINE AT THE I-24 REST AREA IN CHRISTIAN COUNTY (MP 93.0) SYP NO. 02-00012.00.

GEOGRAPHIC COORDINATES LATITUDE 36:53:00.00 LONGITUDE 87:28:00.00

ADT

COMPLETION DATE(S):

180 WORKING Days	APPLIES TO ENTIRE CONTRACT

CONTRACT NOTES

INSURANCE

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

PROPOSAL ADDENDA

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

BID SUBMITTAL

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

JOINT VENTURE BIDDING

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

UNDERGROUND FACILITY DAMAGE PROTECTION

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

REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY

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

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

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

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

SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT

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

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

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

HARDWOOD REMOVAL RESTRICTIONS

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

INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES

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

ACCESS TO RECORDS

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

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

BOYCOTT PROVISIONS

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

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

LOBBYING PROHIBITIONS

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

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

SPECIAL NOTE – BUY AMERICA REQUIREMENTS AND BUILD AMERICA, BUY AMERICA (BABA) ACT 05/05/2025

1.0 BUY AMERICA REQUIREMENT.

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

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

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

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

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

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

Use foreign materials only under the following conditions:

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

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

2.0 – BUILD AMERICA, BUY AMERICA (BABA)

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

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

BABA permits FHWA participation in the Contract only if all "construction materials" as defined in the Act are made in the United States. The Buy America preference applies to the following construction materials incorporated into infrastructure projects: non-ferrous metals; plastic and polymer-based products (including polyvinylchloride, composite building materials, and polymers used in fiber optic cables); glass (including optic glass); Fiber optic cable; optical fiber; lumber; engineered wood; and drywall. Contractor will be

required to use construction materials produced in the United States on this Project. The Contractor shall submit a certification stating that all construction materials are certified to be BABA compliant.

3.0 FINAL RULE – FHWA'S BUY AMERICA REGULATION TO TERMINATE GENERAL APPLICABILITY WAIVER FOR MANUFACTURED PRODUCTS

- **March 17, 2025** (effective date): For all Federal-aid projects obligated on or after March 15, 2025, all iron or steel products, as defined in § 635.410(c)(1)(iii), must comply with FHWA's Buy America requirements for steel and iron in § 635.410(b). In addition, for all Federal-aid projects obligated on or after March 15, 2025, per § 635.410(c)(2), articles, materials, and supplies should be classified as an iron or steel product, a manufactured product, or another product as specified by law or in 2 CFR part 184 (such other products specified by law or in 2 CFR part 184 include "excluded materials" and "construction materials"); an article, material, or supply must not be considered to fall into multiple categories.
- **October 1, 2025:** The final assembly requirement will become effective for Federal-aid projects obligated on or after October 1, 2025. This means that, for manufactured product to be Buy America compliant, for Federal-aid projects obligated on or after October 1, 2025, final assembly of the manufactured product must occur in the United States.
- **October 1, 2026:** The 55 percent requirement will become effective for Federal-aid projects obligated on or after October 1, 2026. This means that, for manufactured product to be Buy America-compliant, for Federal-aid projects obligated on or after October 1, 2026, all manufactured products permanently incorporated into the project must both be manufactured in the United States (satisfy the final assembly requirement) and have the cost of the components of the manufactured product that are mined, produced, or manufactured in the United States be greater than 55 percent of the total cost of all components of the manufactured product (satisfy the 55 percent requirement).

4.0 – ADDITIONAL REQUIREMENTS

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

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

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

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

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

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

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

Date Submitted:_____

Contractor:_____

Signature:_____

Printed Name:_____

Title:_____

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

SPECIAL NOTE FOR RECIPROCAL PREFERENCE

RECIPROCAL PREFERENCE TO BE GIVEN BY PUBLIC AGENCIES TO RESIDENT BIDDERS

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

April 30, 2018

DGA BASE

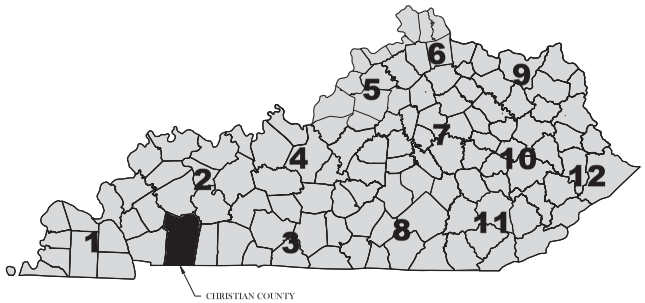
Unless otherwise noted, the Department estimates the rate of application for DGA Base to be 115 lbs/sy per inch of depth.

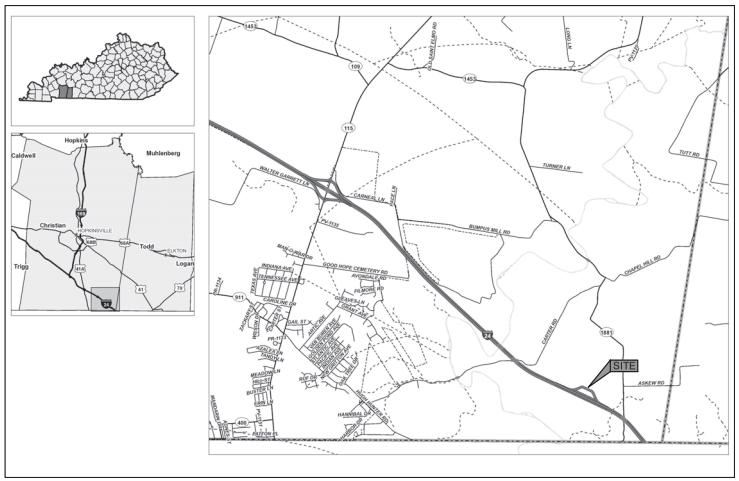
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

PLANS OF
PROPOSED PROJECT

CHRISTIAN COUNTY REST AREA
WATER AND SEWER RENOVATION
FD04 024 0024-092-093
(SYP No. 02-00012)

TEAM KENTUCKY
TRANSPORTATION CABINET





LOCATION MAP

DESIGN CRITERIA

CLASS OF HIGHWAY
TYPE OF TERRAIN
DESIGN SPEED
REQUIRED NPSD
REQUIRED PSD
LEVEL OF SERVICE
ADT PRESENT ( )
ADT FUTURE ( )
DHV
D %
T %

GEOGRAPHIC COORDINATES

LATITUDE 36 DEGREES 39 MINUTES 02 SECONDS NORTH
LONGITUDE 87 DEGREES 21 MINUTES 06 SECONDS WEST

DESIGNED

% RESTRICTED SD
LEVEL OF SERVICE
MAX. DISTANCE W/O PASSING

INDEX OF SHEETS

..	COVER SHEET
U2	GENERAL SUMMARY AND GENERAL NOTES
U3	GENERAL SUMMARY AND GENERAL NOTES
U4	LEGEND, SHEET KEY MAP AND UTILITY CONTACTS
U5	SANITARY SEWER PLAN & PROFILE STA. 69+90 TO 80+00
U6	SANITARY SEWER PLAN & PROFILE STA. 80+00 TO 90+00
U7	SANITARY SEWER PLAN & PROFILE STA. 90+00 TO 100+00
U8	SANITARY SEWER PLAN & PROFILE STA. 100+00 TO 110+00
U9	SANITARY SEWER PLAN & PROFILE STA. 110+00 TO 120+40
U10	WATER MAIN PLAN & PROFILE STA. 0+00 TO 10+00
U11	WATER MAIN PLAN & PROFILE STA. 10+00 TO 20+00
U12	WATER MAIN PLAN & PROFILE STA. 20+00 TO 30+00
U13	WATER MAIN PLAN & PROFILE STA. 30+00 TO 40+00
U14	WATER AND SANITARY SEWER DETAILS
U15	WATER AND SANITARY SEWER DETAILS
U16	WATER AND SANITARY SEWER DETAILS
U17	WATER AND SANITARY SEWER DETAILS
U18	WATER AND SANITARY SEWER DETAILS
U19	WATER AND SANITARY SEWER DETAILS
U20	WATER AND SANITARY SEWER DETAILS
U21	WATER AND SANITARY SEWER DETAILS
U22	SITE ELECTRICAL LEAD SHEET
U23	ELECTRICAL SITE PLAN
U24	SITE ELECTRICAL DETAILS
U25	SITE ELECTRICAL DETAILS
U26	SITE ELECTRICAL DETAILS

LENGTH ____ LIN. FT. ____ MILES	LENGTH ____ LIN. FT. ____ MILES	LENGTH ____ LIN. FT. ____ MILES	LENGTH ____ LIN. FT. ____ MILES
ADDED / DEDUCTED FOR EQUALITIES ____ LIN. FT.	ADDED / DEDUCTED FOR EQUALITIES ____ LIN. FT.	ADDED / DEDUCTED FOR EQUALITIES ____ LIN. FT.	ADDED / DEDUCTED FOR EQUALITIES ____ LIN. FT.
NOT INCLUDED	NOT INCLUDED	NOT INCLUDED	NOT INCLUDED
RAILROAD CROSSINGS NO. ____ LIN. FT.	RAILROAD CROSSINGS NO. ____ LIN. FT.	RAILROAD CROSSINGS NO. ____ LIN. FT.	RAILROAD CROSSINGS NO. ____ LIN. FT.
BRIDGES ____ LIN. FT.	BRIDGES ____ LIN. FT.	BRIDGES ____ LIN. FT.	BRIDGES ____ LIN. FT.

PROJECT NUMBER: FD04 024 0024-092-093
(SYP No. 02-00012)

PROJECT DESCRIPTION: REPLACE THE SANITARY SEWER LIFT STATION AND FORCE MAIN TO THE CONNECTION TO HOPKINSVILLE SYSTEM AT CARTER ROAD. REPLACE WATER MAIN AND CONNECT TO LOGAN TODD 16" WATER MAIN

RECOMMENDED BY: _____ PROJECT MANAGER DATE:

PLAN APPROVED BY: _____ STATE HIGHWAY ENGINEER DATE:

KENNETH D. MEADOWS — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

BFW
Paducah, KY Office
2301 McCracken Blvd, Paducah, KY 42001
270-443-1995 / BFWengineers.com
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LETTING DATE:

ITEM NO. 02-00012.00 COUNTY OF CHRISTIAN

SHEET NO. U1

GENERAL SUMMARY

ITEM CODE	ITEM	UNIT	QUANTITY
00001	DGA BASE (1)	TON	140
02275	FENCE - 8 FT CHAIN LINK (2)	LF	104
02287	DOUBLE VEHICULAR CHAIN LINK GATE (3)	EACH	1
02569	DEMOBILIZATION	LS	1
02650	MAINTAIN & CONTROL TRAFFIC	LS	1
02726	STAKING	LS	1
14001	W AIR RELEASE VALVE 3/4 INCH	EACH	6
14019	W FIRE HYDRANT ASSEMBLY	EACH	2
14022	W FLUSH HYDRANT ASSEMBLY	EACH	1
14026	W METER 1-1/2 INCH	EACH	1
14059	W PIPE PVC 06 INCH (4)	LF	3,438
14086	W SERVICE SPECIAL (6)	EACH	1
14087	W STRUCTURE ABANDONMENT (7)	EACH	1
14088	W STRUCTURE REMOVAL (8)	EACH	8
14090	W TAPPING SLEEVE AND VALVE SIZE 2	EACH	1
14104	W VALVE 04 INCH	EACH	1
14105	W VALVE 06 INCH	EACH	1
14144	W LINE MARKER	EACH	7
14168	W METER VAULT SIZE RANGE 1 (9)	EACH	1
15026	S FORCE MAIN AIR RLS/VAC VLV 02 INCH	EACH	8
15059	S FORCE MAIN PVC 04 INCH (4) (5)	LF	5,057
15073	S FORCE MAIN TIE-IN 04 INCH	EACH	1
15092	S MANHOLE	EACH	1
15095	S MANHOLE CASTING STANDARD	EACH	1
15099	S MANHOLE TAP EXISTING (10)	EACH	1
15112	S PIPE PVC 08 INCH (4)	LF	16
15119	S PUMP STATION (11)	EACH	1
15120	S SPECIAL ITEM (S FORCE MAIN CLEANOUT ASSEMBLY) (12)	EACH	1
15120	S SPECIAL ITEM (S GRINDER ASSEMBLY AND MANHOLE) (13)	EACH	1
15122	S STRUCTURE REMOVAL (14)	EACH	10
15123	S LINE MARKER	EACH	10

GENERAL SUMMARY NOTES:

THE ADDITIONS, EXCEPTIONS AND/OR CLARIFICATIONS PROVIDED BELOW ARE IN ADDITION TO ALL DESCRIPTIONS PROVIDED IN THE KYTC STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, KYTC STANDARD WATER BID ITEM DESCRIPTIONS AND KYTC STANDARD SANITARY SEWER BID ITEM DESCRIPTIONS. ITEMS SHOWN OR IMPLIED ON THE PLANS THAT ARE NOT SPECIFICALLY LISTED SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION AND SHALL BE INCLUDED IN THE OTHER ITEMS:

1. ITEM 00001 DGA BASE: SHALL INCLUDE GROUND PREPARATION, SHAPING, GRADING, PLACING AND COMPACTING OF A DGA SURFACE TO TIE INTO THE EXISTING DGA DRIVE.
2. ITEM 02275 FENCE - 8 FT CHAIN LINK: SHALL ALSO INCLUDE DEMOLITION AND DISPOSAL OF EXISTING FENCE AND TIE-IN OF NEW FENCE TO EXISTING FENCE.
3. ITEM 02287 DOUBLE VEHICULAR CHAIN LINK GATE: INCLUDES DEMOLITION AND DISPOSAL OF EXISTING VEHICULAR GATE AND A NEW 16-FEET TOTAL WIDTH x 8' TALL (DOUBLE 8' WIDE) SWINGING GATES.
4. ITEMS 14059 W PIPE PVC 06 INCH, 15059 S FORCE MAIN PVC 04 INCH AND 15112 S PIPE PVC 08 INCH: SHALL ALSO INCLUDE SAW-CUTTING OF EXISTING PAVEMENT WHERE REQUIRED FOR THE INSTALLATION; ALL BACKFILL, INCLUDING FLOWABLE FILL BACKFILL BENEATH IMPROVED SURFACES; ALL SURFACE RESTORATION INCLUDING PAVEMENT PATCHING, CURB & GUTTER RESTORATION, SEEDING, AGRICULTURAL LIMESTONE, FERTILIZER AND PROTECTION IN GRASS AREAS. THIS ITEM SHALL ALSO INCLUDE TREE REMOVAL AS NECESSARY FOR TRENCH EXCAVATION AND UTILITY INSTALLATION. THIS ITEM SHALL ALSO INCLUDE ALL MATERIALS AND LABOR FOR THE REMOVAL AND REINSTALLATION OF RIGHT-OF-WAY FENCE AS NECESSARY TO FACILITATE CONSTRUCTION. THIS ITEM SHALL ALSO INCLUDE THRUST BLOCKING AS REQUIRED ACCORDING TO THE DETAILS.
5. ITEM 15059 S FORCE MAIN PVC 04: SHALL ALSO INCLUDE THE REMOVAL AND DISPOSAL OF AN EXISTING SECTION OF 4" PVC WATER MAIN FROM AN EXISTING STEEL CASING BENEATH I-24 AND INSTALLATION OF 4" RESTRAINED JOINT PVC FORCE MAIN THROUGH THIS EXISTING CASING. THIS ITEM SHALL ALSO INCLUDE NEW CASING SPACERS AND NEW END SEALS PER PIPE MANUFACTURER RECOMMENDATIONS.
6. ITEM 14086 W SERVICE SPECIAL: SHALL INCLUDE A 1" TAP TO THE NEW 6" PVC WATER MAIN INCLUDING SERVICE SADDLE AND CORPORATION STOP, INSTALLING 350 LINEAR FEET OF 1" SCHEDULE 40 PVC WATER SERVICE (PARTIALLY THROUGH AN EXISTING 4" WATER MAIN TO BE ABANDONED WITH THIS PROJECT), CASING SPACERS, END SEALS, FREEZE-PROOF YARD HYDRANT, 1" SHUT-OFF-VALVE, 1" DOUBLE-CHECK BACKFLOW PREVENTER, CONCRETE RING, ALL EXCAVATION, ALL BACKFILL; AND PARTIAL REMOVAL OF THE EXISTING 4" WATER MAIN.
7. ITEM 14087 W STRUCTURE ABANDONMENT: SHALL INCLUDE THE CUTTING, CAPPING AND SEALING OF ALL WATER MAIN CONNECTIONS TO EXISTING MASTER METER VAULT NEAR CARTER ROAD, REMOVING THE MASTER METER AND RETURNING TO OAK GROVE WATER DEPARTMENT AND ABANDONMENT OF THE WATER METER VAULT.
8. ITEM 14088 W STRUCTURE REMOVAL: SHALL INCLUDE THE COMPLETE REMOVAL AND DISPOSAL OF (8) WATER AIR RELEASE VALVES AND VAULTS.
9. ITEM 14168 W METER VAULT SIZE RANGE 1: SHALL INCLUDE THE MASTER METER VAULT, METER ASSEMBLY, VALVES PIPING, FITTINGS, METER, HATCH, MARKING POSTS, AND ALL OTHER APPURTENANCES SHOWN ON THE PLANS.
10. ITEM 15099 S MANHOLE TAP EXISTING: SHALL INCLUDE THE TAPPING OF THE (1) EXISTING WET WELL FOR INCORPORATION TO THE NEW SYSTEM AS A MANHOLE AND ADDITIONAL STORAGE CAPACITY. THIS ITEM SHALL ALSO INCLUDE ALL CONCRETE AND LABOR NECESSARY TO MODIFY THE WET WELL BOTTOM ACCORDING TO DETAIL 7, SHEET U13.
11. ITEM 15119 S PUMP STATION: SHALL ALSO INCLUDE ALL LABOR, EQUIPMENT, APPURTENANCES AND FEES FOR PROVIDING AND INSTALLING A NEW DEDICATED ELECTRICAL SERVICE FOR THE NEW LIFT STATION AS SHOWN IN THE ELECTRICAL PLANS.
12. ITEM 15120 S SPECIAL ITEM (S FORCE MAIN CLEANOUT ASSEMBLY): SHALL INCLUDE THE COMPLETE SANITARY SEWER FORCE MAIN CLEANOUT ASSEMBLY SHOWN ON THE PLANS; INCLUDING THE MANHOLE/VAULT, HATCH, (3) PLUG VALVES, STAINLESS STEEL QUICK CONNECT FITTING AND CAP, TEE, MISC. FITTINGS, PIPING, EXCAVATION, BACKFILL, GROUND RESTORATION, AND ALL ADDITIONAL ITEMS NOT MENTIONED FOR A COMPLETE AND FUNCTIONAL ASSEMBLY.
13. ITEM 15120 S SPECIAL ITEM (S GRINDER ASSEMBLY AND MANHOLE): SHALL INCLUDE THE COMPLETE SANITARY SEWER GRINDER AND PREFABRICATED MANHOLE ASSEMBLY SHOWN ON THE PLANS; INCLUDING THE GRINDER, MANHOLE, HATCH, ALL INTERIOR COMPONENTS AS SHOWN IN THE DETAIL, CONTROL PANEL, CONTROLS ELECTRICAL, EXCAVATION, BACKFILL, GROUND RESTORATION, AND ALL ADDITIONAL ITEMS NOT MENTIONED FOR A COMPLETE AND FUNCTIONAL ASSEMBLY.
14. ITEM 15122 - S STRUCTURE REMOVAL: SHALL INCLUDE THE COMPLETE REMOVAL OF (8) SANITARY SEWER AIR RELEASE VALVES AND VAULTS AND (1) LIFT STATION VALVE VAULT INCLUDING ALL VALVES, AND CUTTING, CAPPING AND SEALING OF ALL SANITARY SEWER FORCE MAIN CONNECTIONS TO THESE STRUCTURES. ALL SANITARY SEWER AIR RELEASE/VACUUM VALVES SHALL BE RETURNED TO KYTC AT THE REST AREA FOR KYTC OWNERSHIP AND FUTURE USE. CONTRACTOR SHALL USE CARE IN REMOVAL AND TRANSPORT PROCESS SUCH THAT VALVES ARE NOT DAMAGED. THIS ITEM SHALL ALSO INCLUDE THE COMPLETE REMOVAL AND DISPOSAL OF ALL RAIL SYSTEMS, PIPING, VALVES, CONTROL PANELS, CONTROL PANEL PEDESTALS, AND OTHER INTERIOR APPURTENANCES OF (1) EXISTING LIFT STATION. THIS ITEM INCLUDES THE REMOVAL OF THE EXISTING PUMPS FROM THE LIFT STATION AND TURNING THEM OVER TO KYTC FOR THEIR RETENTION OF OWNERSHIP AND USE. THE LIFT STATION WET WELL SHALL BE LEFT IN-PLACE AND MODIFIED FOR USE UNDER ITEM 15099 S MANHOLE TAP EXISTING.



08/22/2025



08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: GENERAL SUMMARY

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U2

GENERAL UTILITY NOTES AND INSTRUCTIONS APPLICABLE TO ALL UTILITY WORK MADE A PART OF THE ROAD CONSTRUCTION CONTRACT:

The contractor should be aware the following utility notes and KYTC Utility Bid Item Descriptions shall supersede, replace and take precedence over any and all conflicting information that may be contained in utility owner supplied specifications contained in the contract, on plans supplied by the utility owner, or any utility owner specifications or information externally referenced in this contract.

Where information may have been omitted from these notes, bid item descriptions, utility owner supplied specifications or plans; the KYTC Standard Specifications for Road and Bridge Construction shall be referenced.

PROTECTION OF EXISTING UTILITIES
The existing utilities shown on the plans are shown as best known at the time the plans were developed and are to be used as a guide only by the Contractor. The Contractor shall use all means at his disposal to accurately locate all existing utilities, whether shown on the plans or not, prior to excavation. The contractor shall protect these utilities during construction. Any damage to existing utilities during construction that are shown or not shown on the plans shall be repaired at the Contractor's expense.

PREQUALIFIED UTILITY CONTRACTORS
Some utility owners may require contractors that perform relocation work on their respective facilities as a part of the road contract be prequalified or preapproved by the utility owner. Utility contractors may be added via addendum if KYTC is instructed to do so by the utility owner. Potential contractors must seek prequalification from the utility owner. Any revisions must be sent from the utility owner to KYTC a minimum of one week prior to bid opening. Those utility owners with a prequalification or preapproval requirement are as follows:

(The district utility agent shall list here utility owners requiring prequalified or preapproved contractors to perform work on their facilities. The utility agent shall place appropriate list(s) of prequalified or preapproved contractors at the end of these notes with each list identified with the utility owner name, utility type and appropriate heading at the top. If there are some utility owners that require prequalified or preapproved contractors and others that do not within this same contract, it may be prudent to list here each utility owner with utility work in the road contract and state if they require prequalified or preapproved contractors or not. If no utility owner prequalifies or preapproves contractors, the following statement shall be placed here: "No contractors are required to be prequalified or preapproved by the utility owner(s) to perform utility relocation work under this contract.")

The bidding contractor needs to review the above list and choose from the list of approved subcontractors at the end of these general notes as identified above before bidding. When the list of approved subcontractors is provided, only subcontractors shown on the following list(s) will be allowed to work on that utility as a part of this contract. In such instances, the utility subcontractor is not required to be prequalified with the KYTC Division of Construction Procurement.

IF A UTILITY SUPPLIED CONTRACTOR LIST IS NOT PROVIDED
When the above list of approved subcontractors for the utility work is not provided, the utility work can be completed by the prime contractor, or a prime contractor-chosen subcontractor. In such instances, the subcontractor shall be prequalified with the KYTC Division of Construction Procurement in the work type of "Utilities" (I33). Those who would like to become prequalified may contact the Division of Construction Procurement at (502) 564-3500. Please note: it could take up to 30 calendar days for prequalification to be approved. The prequalification does not have to be approved prior to the bid, but must be approved before the subcontract will be approved by KYTC and the work can be performed.

CONTRACT ADMINISTRATION RELATIVE TO UTILITY WORK
All utility work is being performed as a part of a contract administered by KYTC; there is not a direct contract between the utility contractor and utility owner. The KYTC Section Engineer is ultimately responsible for the administration of the road contract and any utility work included in the contract.

SUBMITTALS AND CORRESPONDENCE
All submittals and correspondence of any kind relative to utility work included in the road contract shall be directed to the KYTC Section Engineer, a copy of which may also be supplied to the utility owner by the contractor to expedite handling of items like material approvals and shop drawings. All approvals and correspondence generated by the utility owner shall be directed to the KYTC Section Engineer. The KYTC Section Engineer will relay any approvals or correspondence to the utility contractor as appropriate. At no time shall any direct communication between the utility owner and utility contractor without the communication flowing through the KYTC Section Engineer be considered official and binding under the contract.

ENGINEER
Where the word "Engineer" appears in any utility owner specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet (KYTC) Section Engineer or designated representative and the utility owner engineer or designated representative jointly. Both engineers must mutually agree upon all decisions made with regard to the utility construction. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

INSPECTOR OR RESIDENT PROJECT REPRESENTATIVE
Where the word "Inspector" or "Resident Project Representative" appears in the utility specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Inspector" or "Resident Project Representative" is the utility owner inspector and KYTC inspector jointly. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

NOTICE TO UTILITY OWNERS OF THE START OF WORK
One month before construction is to start on a utility, the utility contractor shall make notice to the KYTC Section Engineer and the utility owner of when work on a utility is anticipated to start. The utility contractor shall again make confirmation notice to the KYTC Section Engineer and the utility owner one week before utility work is to actually start.

UTILITY SHUTDOWNS
The Contractor shall not shut down any active and in-service mains, utility lines or services for any reason unless specifically given permission to do so by the utility owner. The opening and closing of valves and operating of other active utility facilities for main, utility line or utility service shut downs are to be performed by the utility owner unless specific permission is given to the contractor by the owner to make shutdowns. If and when the utility owner gives the contractor permission to shutdown mains, utility lines or utility services, the contractor shall do so following the rules, procedures and regulations of the utility owner. Any permission given by the utility owner to the contractor to shutdown active and in-service mains, utility lines or services shall be communicated to the KYTC Section Engineer by the utility owner that such permission has been given.

Notice to customers of utility shut downs is sometimes required to be performed by the utility contractor. The contractor may be required; but, is not limited to, making notice to utility customers in a certain minimum amount of time in advance of the shut down and by whatever means of communication specified by the utility owner. The means of communication to the customer may be; but is not limited to, a door hanger, notice by newspaper ad, telephone contact, or any combination of communication methods deemed necessary, customary and appropriate by the utility owner. The contractor should refer to the utility owner specifications for requirements on customer notice.

Any procedure the utility owner may require the contractor to perform by specification or plan note and any expense the contractor may incur to comply with the utility owner's shut down procedure and notice to customers shall be considered an incidental expense to the utility construction.

CUSTOMER SERVICE AND LATERAL ABANDONMENTS
When temporary or permanent abandonment of customer water, gas, or sewer services or laterals are necessary during relocation of utilities included in the contract, the utility contractor shall perform these abandonments as part of the contract as incidental work. No separate payment will be made for service line and lateral abandonments. The contractor shall provide all labor, equipment and materials to accomplish the temporary or permanent abandonment in accordance with the plans, specifications and/or as directed by the engineer. Abandonment may include, but is not limited to, digging down on a water or gas main at the tap to turn off the tap valve or corporation stop and/or capping or plugging the tap, digging down on a sewer tap at the main and plugging or capping the tap, digging down on a service line or lateral at a location shown on the plans or agreeable to the engineer and capping or plugging, or performing any other work necessary to abandon the service or lateral to satisfactorily accomplish the final utility relocation.

STATIONS AND DISTANCES
All stations and distances, when indicated for utility placement in utility relocation plans or specifications, are approximate; therefore, some minor adjustment may have to be made during construction to fit actual field conditions. Any changes in excess of 6 inches of plan location shall be reviewed and approved jointly by the KYTC Section Engineer or designated representative and utility owner engineer or designated representative. Changes in location without prior approval shall be remedied by the contractor at his own expense if the unauthorized change creates an unacceptable conflict or condition.

RESTORATION
Temporary and permanent restoration of paved or stone areas due to utility construction shall be considered incidental to the utility work. No separate payment will be made for this work. Temporary restoration shall be as directed by the KYTC Section Engineer. Permanent restoration shall be "in-kind" as existing.

Restoration of seed and sod areas will be measured and paid under the appropriate seeding and sodding bid items established in the contract for roadway work.

BELOW ARE NOTES FOR WHEN "INST" ITEMS ARE IN THE CONTRACT MEANING THE UTILITY COMPANY IS PROVIDING CERTAIN MATERIALS FOR UTILITY RELOCATION

MATERIAL
Contrary to Utility Bid Item Descriptions, those bid items that have the text "Inst" at the end of the bid item will have the major components of the bid item provided by the utility owner. No direct payment will be made for the major material component(s) supplied by the utility company. All remaining materials required to construct the bid item as detailed in utility bid item descriptions, in utility specifications and utility plans that are made a part of this contract will be supplied by the contractor. The contractor's bid price should reflect the difference in cost due to the provided materials.

The following utility owners have elected to provide the following materials for work under this contract:

(List here utility owner name(s) and specific materials that will be provided to the contractor. If there are some utility owners that will be supplying materials and others that will not, it may be prudent to also list each utility owner that will not be supplying materials for clarity of the contract. If no utility owner intends to supply materials, the following statement shall be placed here: "No materials are being supplied by the utility owner(s). All materials are to be supplied by the contractor per bid item descriptions, utility specifications and utility plans.")

SECURITY OF SUPPLIED MATERIALS
If any utility materials are to be supplied by the utility owner, it will be the responsibility of the utility contractor to secure all utility owner supplied materials after delivery to the project site. The utility contractor shall coordinate directly with the utility owner and their suppliers for delivery and security of the supplied materials. Any materials supplied by the utility owner and delivered to the construction site that are subsequently stolen, damaged or vandalized and deemed unusable shall be replaced with like materials at the contractor's expense.

GENERAL SITE UTILITY NOTES:

1. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL CONTACT KY 811. CONTRACTOR IS RESPONSIBLE FOR DIRECT CONTACT WITH UTILITY OWNERS THAT HAVE UTILITIES THAT ARE NOT MARKED BY KY 811.
2. ALL EXISTING UTILITIES ARE SHOWN IN THEIR GENERAL LOCATION ONLY. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING AND FIELD LOCATING ALL UTILITIES WITHIN THE PROJECT LIMITS SO THAT CONSTRUCTION WILL NOT DAMAGE OR INTERFERE WITH EXISTING UTILITY LINES. IF ANY UTILITY LINES ARE DAMAGED, IT IS THE CONTRACTOR'S RESPONSIBILITY TO REPAIR AND/OR REPLACE THE UTILITY LINES AT THE CONTRACTOR'S EXPENSE. FINISHED REPLACEMENT OR REPAIR SHALL MEET THE APPROVAL OF THE SPECIFIC UTILITY OWNER.
3. IF NECESSARY, CONTRACTOR SHALL POTHOLE EXISTING UTILITIES TO CONFIRM THE ABSENCE OF ANY CONFLICT WITH PROPOSED UTILITY INSTALLATIONS.
4. CONTRACTOR MUST FIELD VERIFY THE LOCATION AND DEPTHS OF ALL EXISTING UTILITES THAT ARE BEING CONNECTED TO IN THIS PROJECT. IF ADJUSTMENTS ARE NEEDED, CONTACT ENGINEER FOR COORDINATION OF ACTUAL LOCATIONS AND DEPTHS OF UTILITIES.
5. ALL CONSTRUCTION SHALL BE IN CONFORMANCE WITH FEDERAL, STATE & LOCAL CODES AND SPECIFICATIONS. CONDUCT ALL CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH ALL APPLICABLE O.S.H.A. STANDARDS AND REGULATIONS.
6. IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, THE CONTRACTOR WILL BE SOLELY AND COMPLETELY RESPONSIBLE FOR CONDITIONS OF THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT WILL APPLY CONTINUOUSLY AND WILL NOT BE LIMITED TO NORMAL WORKING HOURS.
7. CONTRACTOR SHALL INSTALL AND MAINTAIN ALL NECESSARY EROSION AND SEDIMENTATION CONTROLS ACCORDING TO THE STATE OF KENTUCKY STANDARD PROCEDURES AND THE SWPPP PREPARED FOR THIS PROJECT. ALL EROSION AND SEDIMENTATION CONTROL MATERIALS, LABOR AND MAINTENANCE SHALL BE INCIDENTAL TO THE PROJECT AND SHALL BE COMPLETED AT NO ADDITIONAL COST TO THE OWNER.
8. CONTRACTOR SHALL IMPLEMENT TRAFFIC CONTROL MEASURES IN ACCORDANCE WITH KYTC STANDARDS AND WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.U.T.C.D.) AS NECESSARY. UTILITY CONSTRUCTION SIGNS AND SHOULDER CLOSURE SIGNS ARE ANTICIPATED ALONG THE INTERSTATE WHEN WORK IS BEING CONDUCTED WITHIN THE RIGHTS-OF-WAY.
9. CONTRACTOR SHALL RETAIN A PROFESSIONAL LAND SURVEYOR TO REPLACE ALL SURVEY MONUMENTS, PROPERTY CORNERS, ETC. DISTURBED BY CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
10. ALL TRENCHES BENEATH EXISTING IMPROVED SURFACES (ASPHALT/CONCRETE), SHALL BE BACKFILLED WITH COMPACTED CRUSHED STONE. CONTRACTOR SHALL RESTORE EXISTING IMPROVED SURFACES WITH SAME TYPE AND THICKNESS.
11. THE CONTRACTOR SHALL FULLY RESTORE ALL AREAS (ASPHALT, CONCRETE, CURBS, SIDEWALKS, LANDSCAPING, & ETC.) DISTURBED DURING CONSTRUCTION AT NO ADDITIONAL COST TO THE OWNER.
12. CONTRACTOR SHALL NOTIFY UTILITY OWNERS PRIOR TO ANY CONNECTIONS OR WORK INVOLVING THEIR FACILITIES.
13. THE CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY TAP-ON FEES, METERS AND ETC. CONTRACTOR TO COORDINATE WITH UTILITY COMPANIES.
14. ALL UTILITY MATERIALS AND CONSTRUCTION SHALL COMPLY WITH THAT PARTICULAR UTILITY PROVIDER'S STANDARDS, METHODS AND PROCEDURES.
15. EXISTING WATER SUPPLY SHALL REMAIN IN SERVICE THROUGHOUT CONSTRUCTION. CONTRACTOR TO TRANSFER SERVICE FROM EXISTING TO NEW MAIN UPON COMPLETION OF NEW WATER INSTALLATION. ANY DOWN TIME FOR FINAL CONNECTIONS OF NEW SERVICE TO EXISTING FACILITIES MUST BE COORDINATED AHEAD OF TIME WITH KYTC, AND ANY "DOWN-TIMES" MUST BE LIMITED TO A FEW HOUR PERIOD DETERMINED UPON COORDINATION BETWEEN THE CONTRACTOR AND KYTC.
16. THE NEW WATER INSTALLATION MUST BE COMPLETED AND TRANSITIONED FROM THE EXISTING FIRST, PRIOR TO THE SANITARY SEWER.
17. EXISTING SANITARY SEWER MAIN SHALL REMAIN IN SERVICE THROUGHOUT CONSTRUCTION. CONTRACTOR MUST ENSURE THAT THE SERVICE IS OPERATING FOR THE REST AREA FACILITY TO REMAIN OPEN. IF AT ANY POINT THERE IS NEEDED A PUMP TRUCK AND PUMP SERVICE TO PUMP THE EXISTING WET WELL AND HAUL SANITARY SEWAGE TO THE TREATMENT PLANT, IT IS THE CONTRACTOR'S RESPONSIBILITY TO PERFORM THIS SERVICE OR RETAIN AND PAY FOR A SUBCONTRACTOR TO PERFORM THIS SERVICE. CONTRACTOR TO TRANSFER SERVICE FROM EXISTING MAIN TO NEW MAIN UPON COMPLETION OF ENTIRE MAIN INSTALLATION.
18. WATER MAINS AND SEWER MAINS MUST MAINTAIN A MINIMUM SEPARATION OF 10 FEET HORIZONTAL. WHERE WATER MAINS CROSS SEWER MAINS, THE WATER MAINS MUST BE MINIMUM 18" ABOVE THE SEWER MAINS MEASURED FROM OUTSIDE TO OUTSIDE OF PIPE.
19. WATER MAIN DISINFECTION, SAMPLING AND TESTING MUST BE CONDUCTED AND PASS PRIOR TO PLACING INTO SERVICE. CONDUCT ALL TESTING IN ACCORDANCE WITH THE SPECIFICATIONS AND KY DIVISION OF WATER STANDARDS.
20. SANITARY SEWER MAIN, FORCE MAIN AND MANHOLE TESTING MUST BE CONDUCTED AND PASS PRIOR TO PLACING INTO SERVICE. CONDUCT ALL TESTING IN ACCORDANCE WITH THE SPECIFICATIONS AND KY DIVISION OF WATER STANDARDS.
21. ALL WATER MAIN AND SANITARY SEWER FORCE MAIN SHALL BE INSTALLED WITH MINIMUM 42" COVER MEASURED FROM FINAL GROUND SURFACE TO THE OUTSIDE TOP OF PIPE. ALL PIPE JOINT DEFLECTIONS SHALL BE PER PIPE MANUFACTURER SPECIFICATIONS AT MAXIMUM. ADDITIONAL COVER MAY BE NECESSARY IN CERTAIN AREAS SUCH THAT MAXIMUM JOINT DEFLECTIONS ARE NOT EXCEEDED AND MINIMUM COVER IS MAINTAINED.
22. CONTRACTOR SHALL COMPLETE ALL NECESSARY MISCELLANEOUS DEMOLITION, DISPOSAL, AND RESTORATION AS PART OF THE PROJECT BID ITEMS WITH NO ADDITIONAL COST TO THE OWNER.

STATE OF KENTUCKY — KENNETH D. MASKOVIC — 19111 — LICENSED PROFESSIONAL ENGINEER
08/22/2025

STATE OF KENTUCKY — JOSEPH E. MATESEVAC — 20200 — LICENSED PROFESSIONAL ENGINEER
08/22/2025

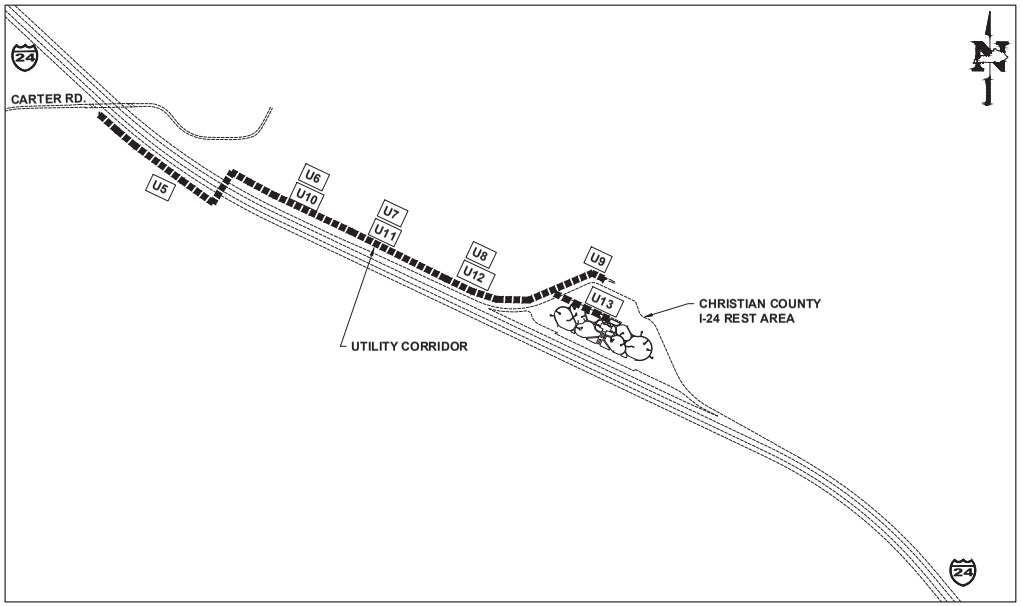
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: GENERAL NOTES

ITEM NO. 02-00012.00 | COUNTY OF CHRISTIAN
SHEET NO. U3

LEGEND

- PROPERTY LINE
- ADJOINING PROPERTY LINE
- EASEMENTS
- EXISTING BUILDING
- EXISTING CURB AND GUTTER
- EXISTING PAVEMENT
- EXISTING RIGHT-OF-WAY FENCE
- EXISTING STORM SEWER
- EXISTING FIBER OPTIC LINE
- EXISTING UNDERGROUND ELECTRIC
- EXISTING OVERHEAD ELECTRIC
- EXISTING OVERHEAD COMMUNICATIONS
- EXISTING UNDERGROUND ELECTRIC
- EXISTING UNDERGROUND COMMUNICATIONS
- EXISTING GAS LINE
- EXISTING WATER LINE
- EXISTING SANITARY SEWER
- EXISTING SANITARY FORCE MAIN
- GAS METER
- GAS VALVE
- GUY WIRE
- UTILITY POLE
- LIGHT POLE
- TELEPHONE PEDESTAL
- WATER METER
- EXISTING WATER VALVE
- EXISTING SANITARY SEWER MANHOLE
- EXISTING SANITARY SEWER OR WATER AIR RELEASE VALVE
- PROPOSED SANITARY FORCE MAIN
- PROPOSED SANITARY MAIN
- PROPOSED WATER MAIN
- PROPOSED SANITARY SEWER OR WATER AIR RELEASE VALVE
- PROPOSED SANITARY SEWER MANHOLE
- PROPOSED GATE VALVE
- PROPOSED FIRE HYDRANT
- EXISTING TREE



SHEET KEY MAP

BURIED UTILITIES NOTE

BURIED UTILITIES ARE SHOWN AT THEIR APPROXIMATE LOCATION BASED UPON INFORMATION OBTAINED FROM UTILITY COMPANIES AND FIELD EVIDENCE. OTHER BURIED UTILITIES MIGHT EXIST ON THE SUBJECT SITE WHICH ARE NOT SHOWN ON THIS DRAWING. USE EXTREME CAUTION DURING EXCAVATION PROCEDURES AND CONTACT KENTUCKY 811 @ 811 OR 1-800-752-6007 FOR EXACT LOCATION OF BURIED FACILITIES PRIOR TO EXCAVATION OPERATIONS.

Kentucky 811
Know what's below.
Call before you dig.

Call 811 or 800-752-6007
www.kentucky811.com
Two Business Days Before You Dig
IT'S THE LAW

SITE UTILITY CONTACTS:

WATER:	Logan Todd Regional Water Commission Kyle Kenner 270.483.6990 270.878.0377 kkenner@ltwrc.org
WATER:	Oak Grove Water Department Brandy Moore 270.439.4646 270.640.4232 Brandy.moore@oakgroveky.org
SANITARY SEWER:	Hopkinsville Water Environment Authority Trey Pollock 270.887.4246 Tpollock@hwea-ky.com
COMMUNICATIONS:	AT&T Distribution, Fiber & Telephone 800.288.2020
ELECTRICITY:	Pennyrile RECC 270.475.6633

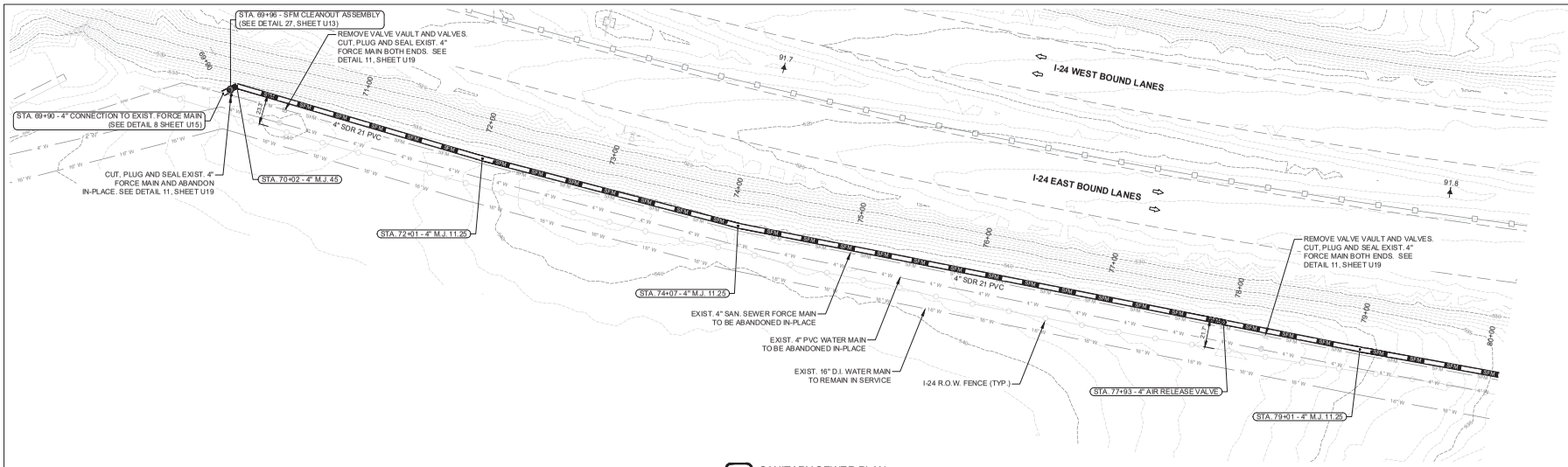
STATE OF KENTUCKY — KENNETH D. MASCHMEIER — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

STATE OF KENTUCKY — JOSEPH E. MATESEVAC — 20200 — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

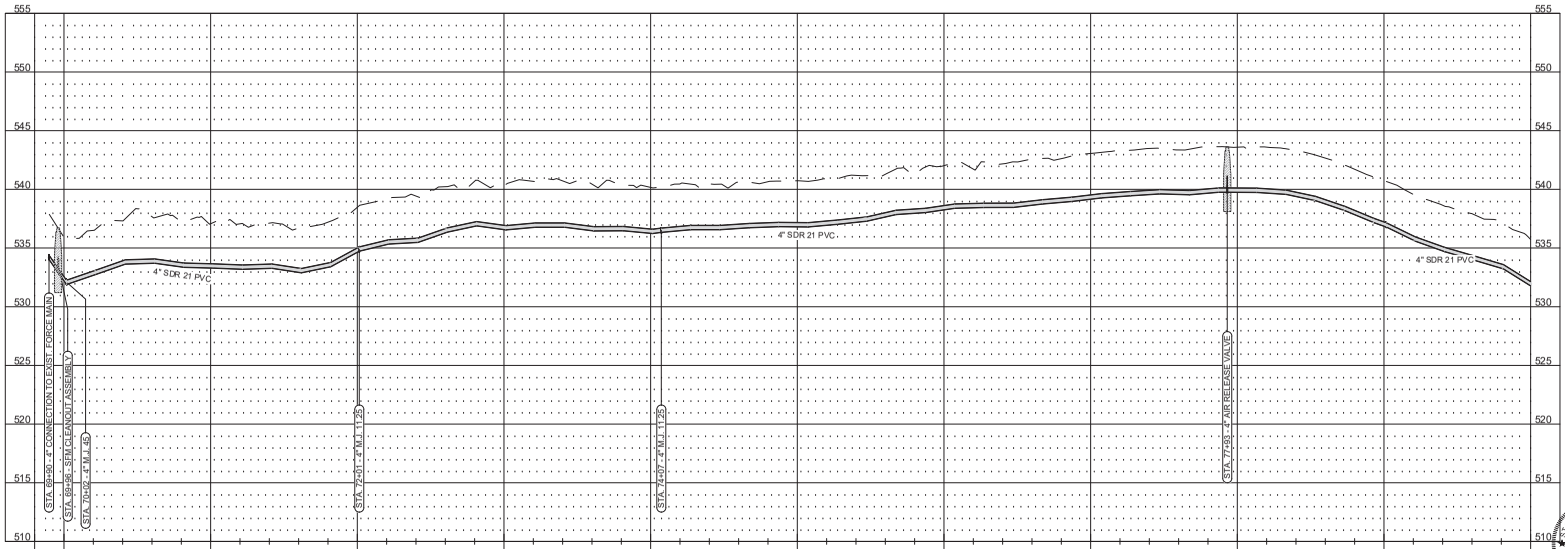
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: LEGEND, SHEET KEY MAP AND UTILITY CONTACTS

ITEM NO. 02-00012.00 | COUNTY OF CHRISTIAN
SHEET NO. U4



1 SANITARY SEWER PLAN
SCALE: 1" = 40'



2 SANITARY SEWER PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENTUCKY LICENSED PROFESSIONAL ENGINEER — KENNETH D. MASCHKE — 19111 — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

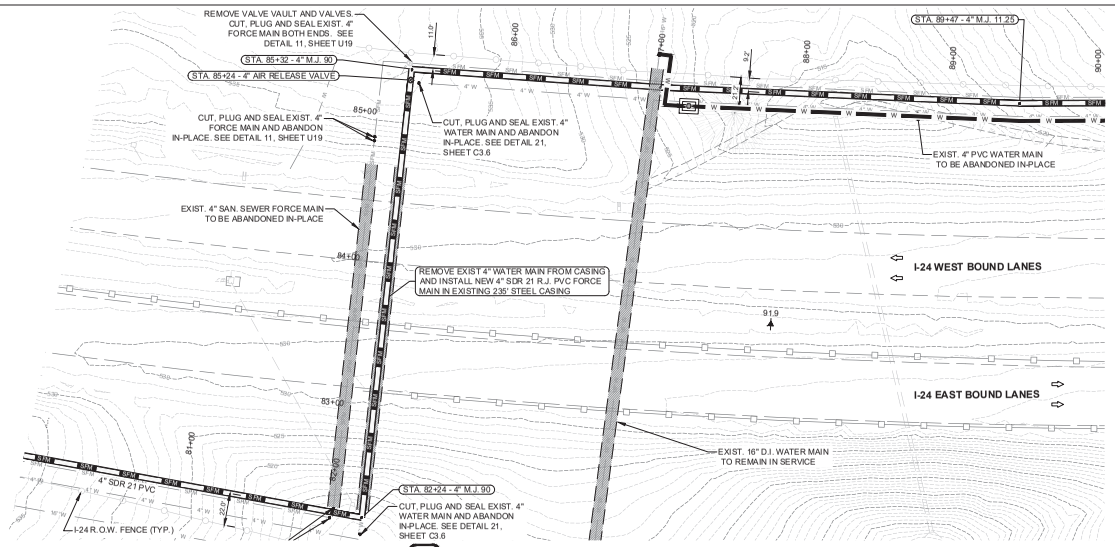
SANITARY SEWER PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

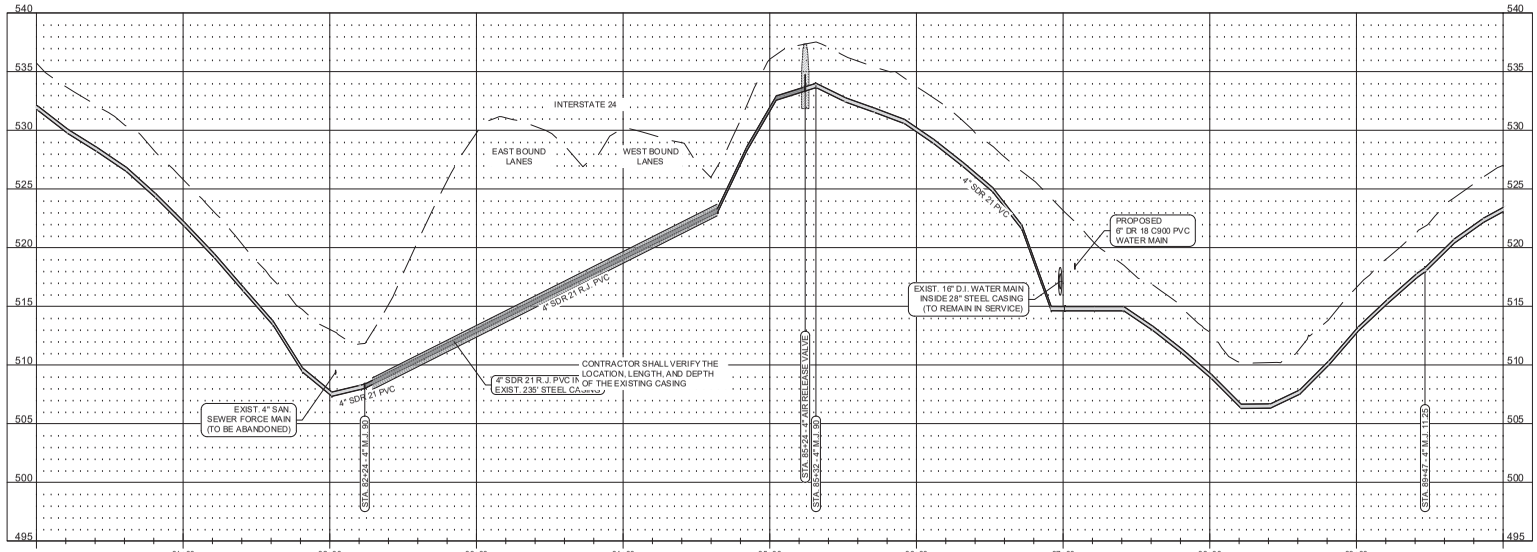
0' 40' 80' 160'
0' 5' 10' 20'

STA. 69+90 TO 80+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U5



1 SANITARY SEWER PLAN
SCALE: 1" = 40'



2 SANITARY SEWER PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENNETH D. MASKORN — LICENSED PROFESSIONAL ENGINEER — 08/22/2025
JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

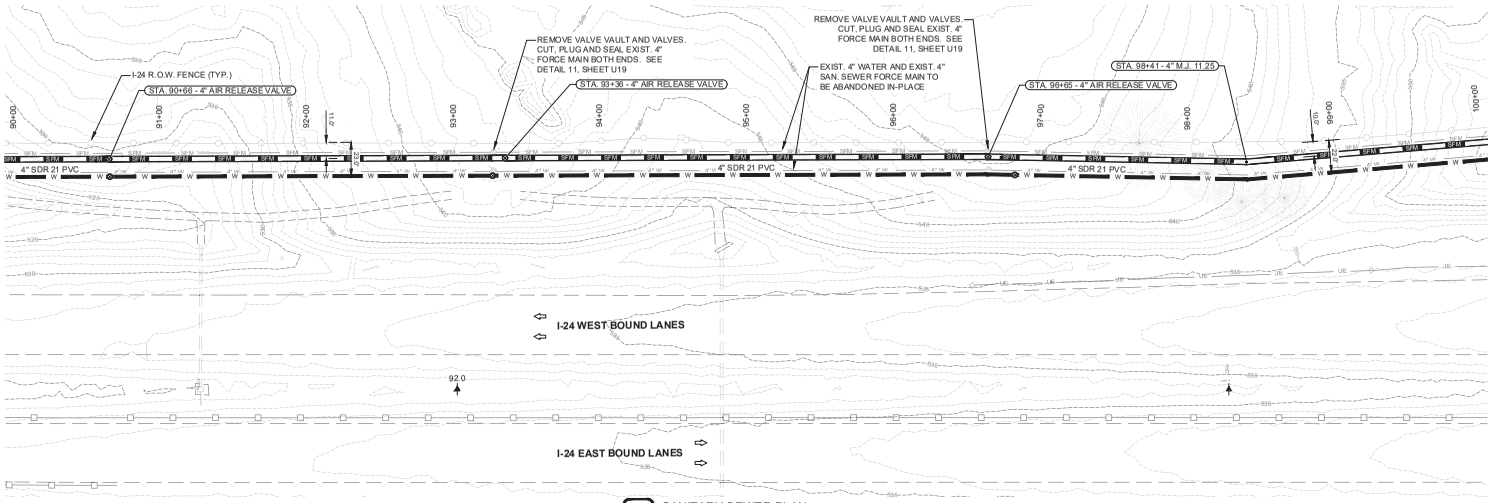
SANITARY SEWER PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

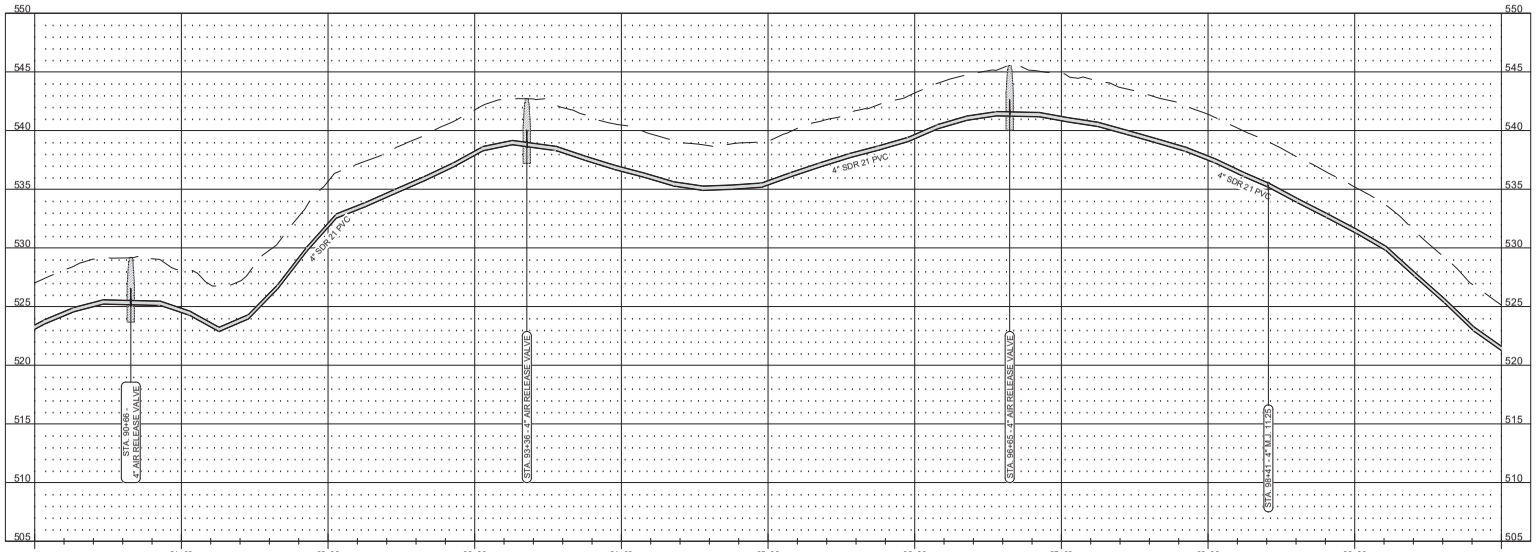
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STA. 80+00 TO 90+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U6



1 SANITARY SEWER PLAN
SCALE: 1" = 40'



2 SANITARY SEWER PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

SANITARY SEWER PLAN & PROFILE

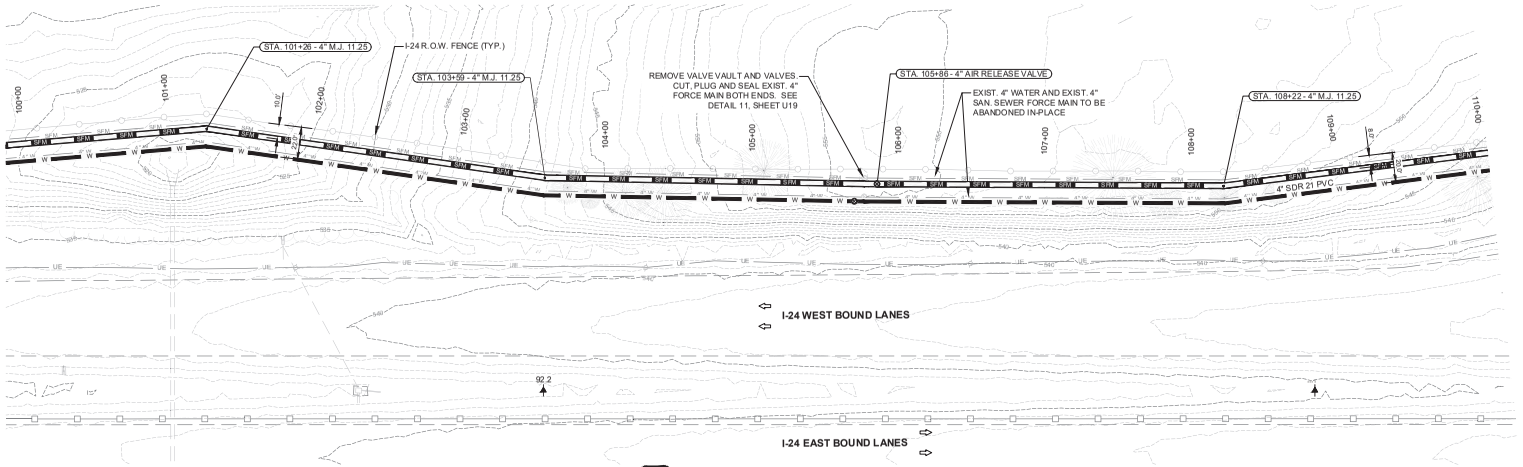
HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

0' 40' 80' 160'
0' 5' 10' 20'

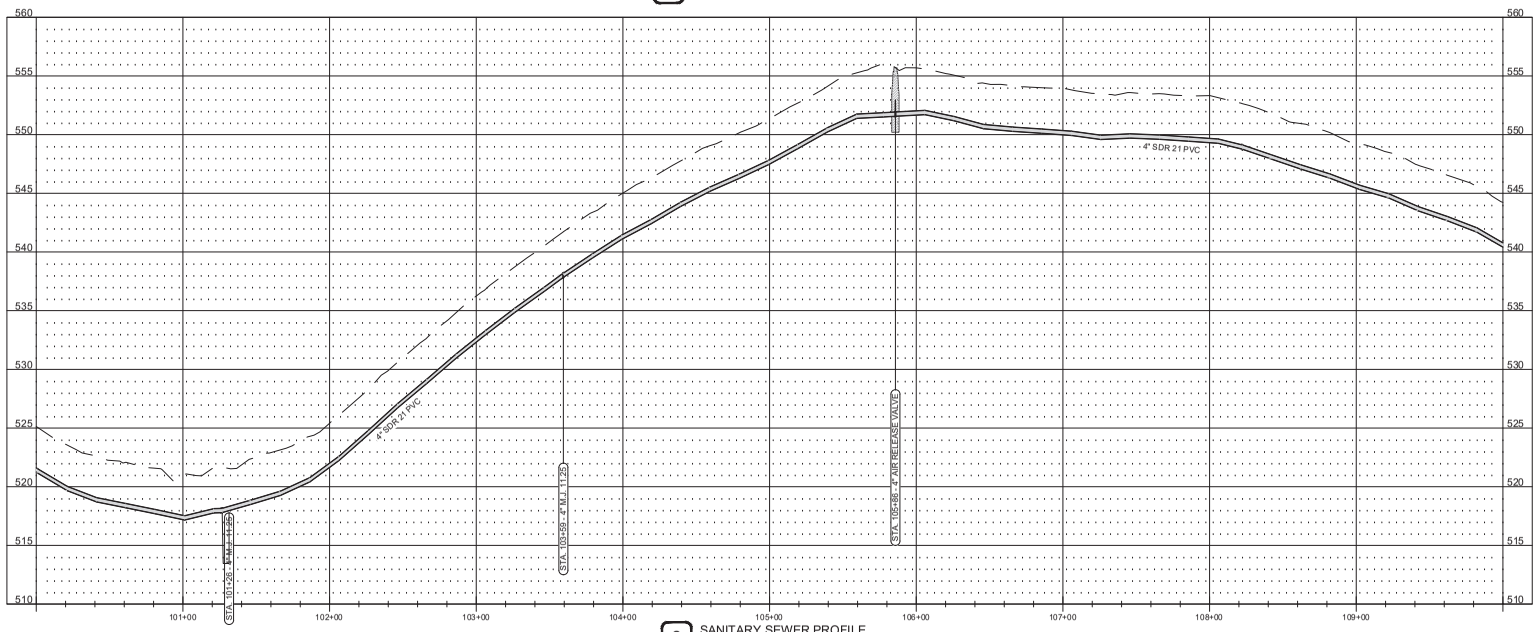
STA. 90+00 TO 100+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U7

KENNETH D. MASKORN — LICENSED PROFESSIONAL ENGINEER — 08/22/2025
JOSEPH E. MATISEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025



1 SANITARY SEWER PLAN
SCALE: 1" = 40'



2 SANITARY SEWER PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

08/22/2025 08/22/2025

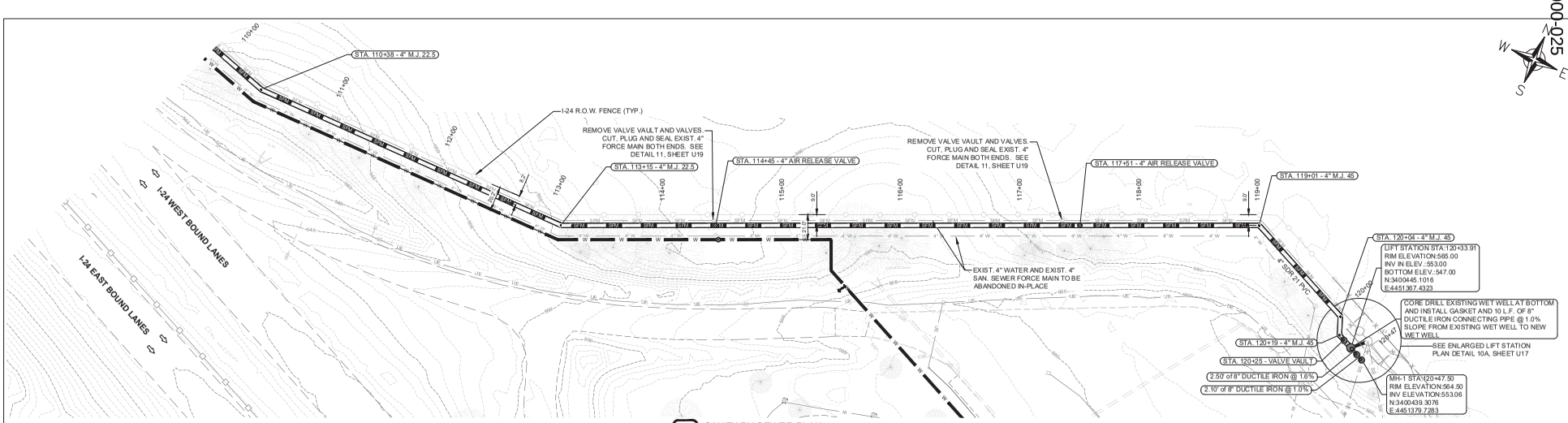
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

SANITARY SEWER PLAN & PROFILE

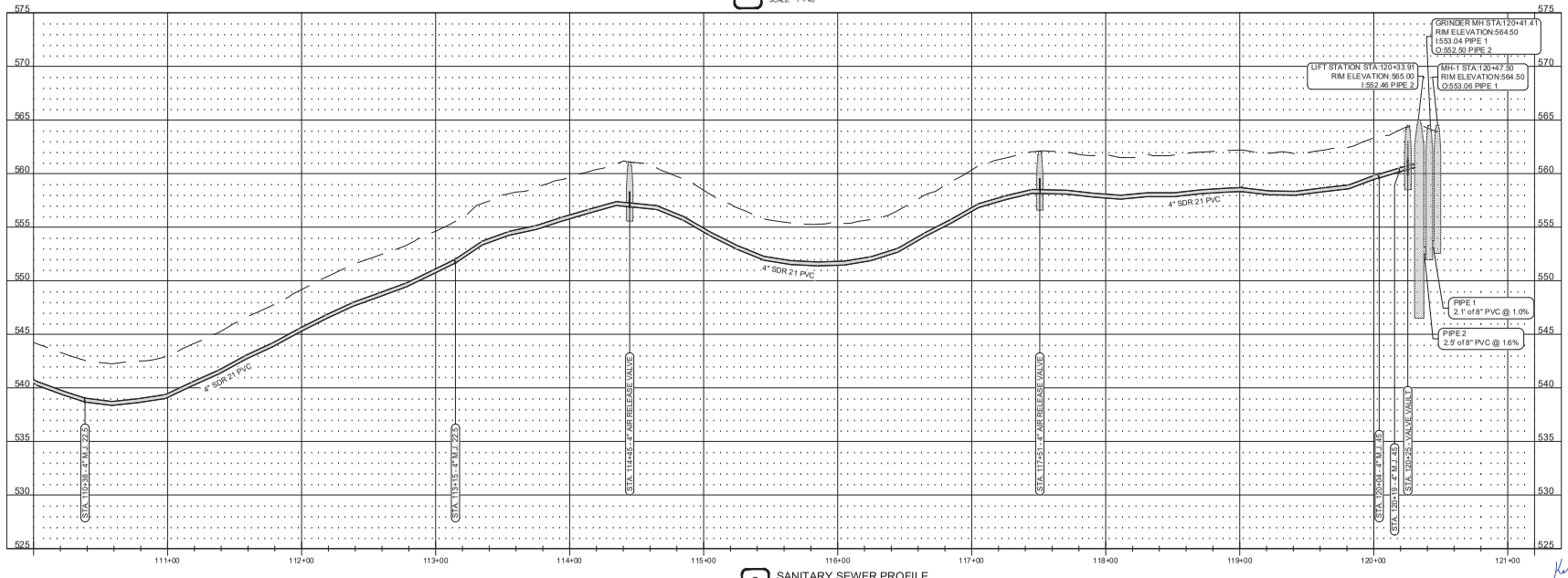
HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

STA. 100+00 TO 110+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U8



1 SANITARY SEWER PLAN
SCALE: 1" = 40'



2 SANITARY SEWER PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENTUCKY D. MASKOWN LICENSED PROFESSIONAL ENGINEER 08/22/2025

JOSEPH E. MATESEVAC 20200 LICENSED PROFESSIONAL ENGINEER 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

SANITARY SEWER PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'

VERTICAL SCALE
SCALE: 1" = 5'

0' 40' 80' 160'

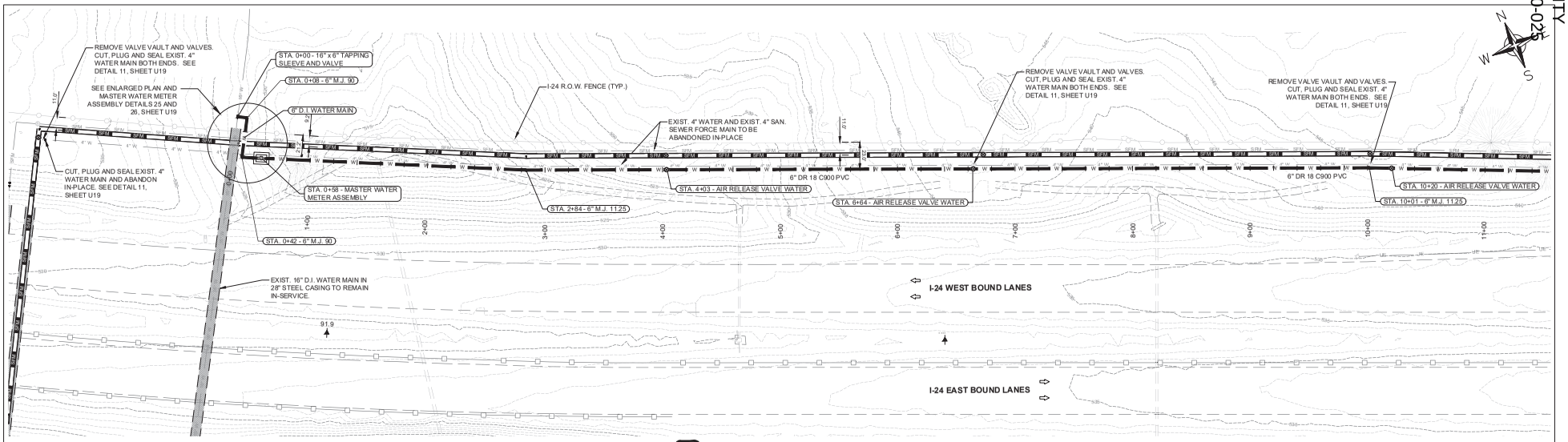
0' 5' 10' 20'

STA. 110+00 TO 121+00

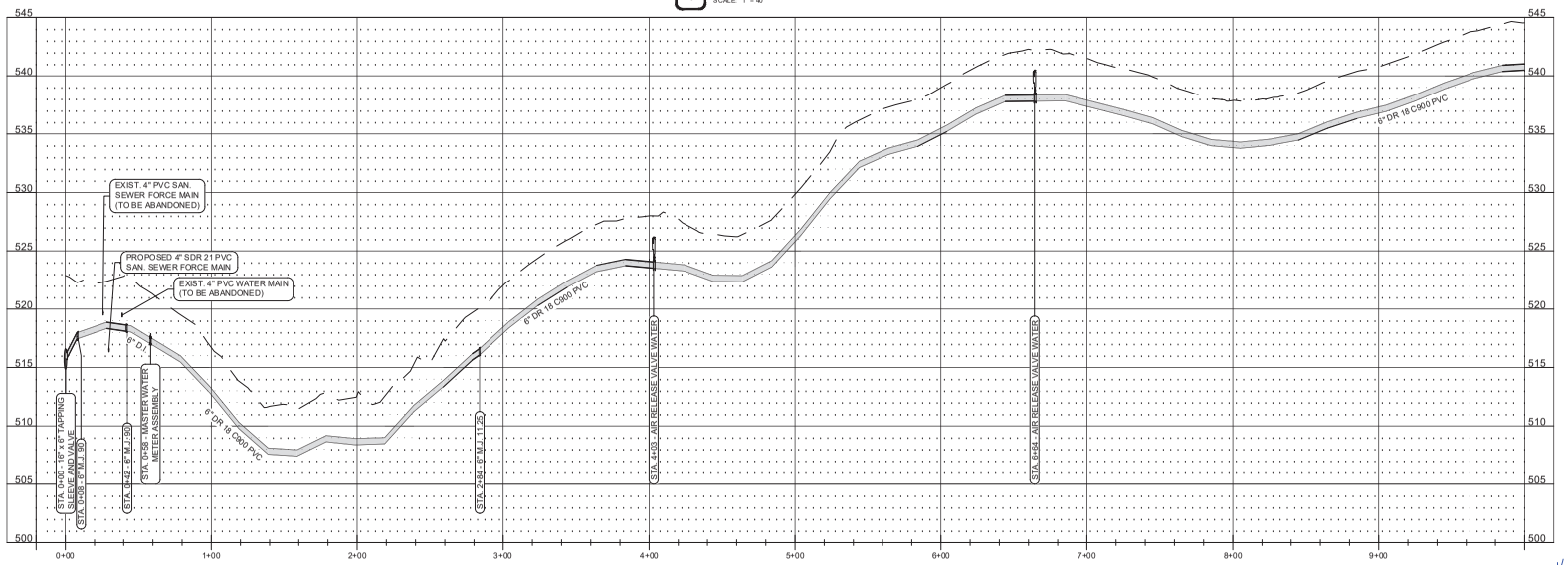
ITEM NO. 02-00012.00

COUNTY OF CHRISTIAN

SHEET NO. U9



1 WATER MAIN PLAN
SCALE: 1" = 40'



2 WATER MAIN PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENNETH D. MASKOWN — LICENSED PROFESSIONAL ENGINEER — STATE OF KENTUCKY — 08/22/2025

JOSEPH E. MATESEVAC — 20200 — LICENSED PROFESSIONAL ENGINEER — STATE OF KENTUCKY — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

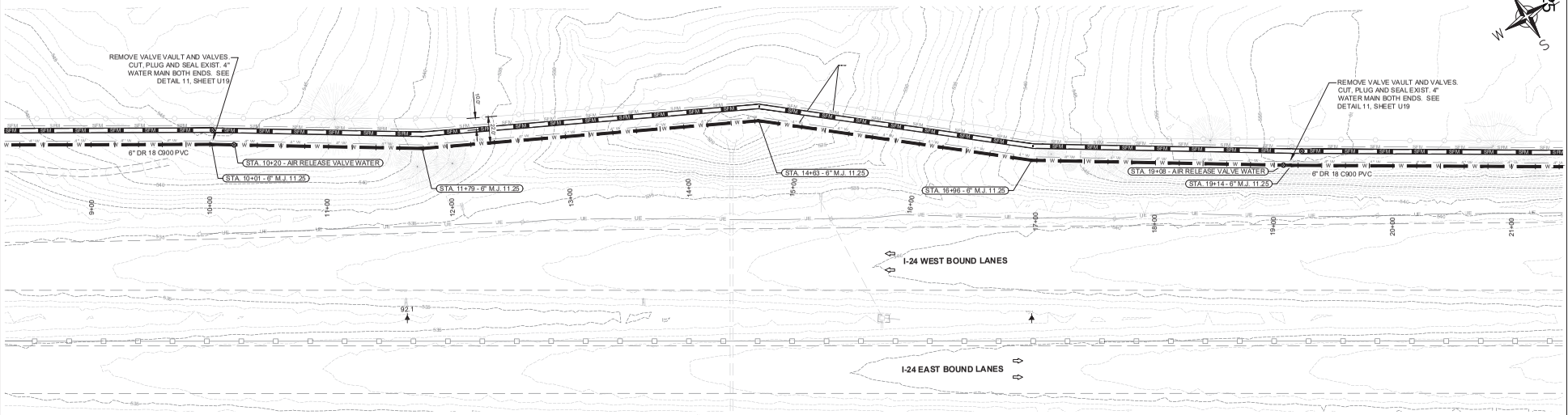
WATER MAIN PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

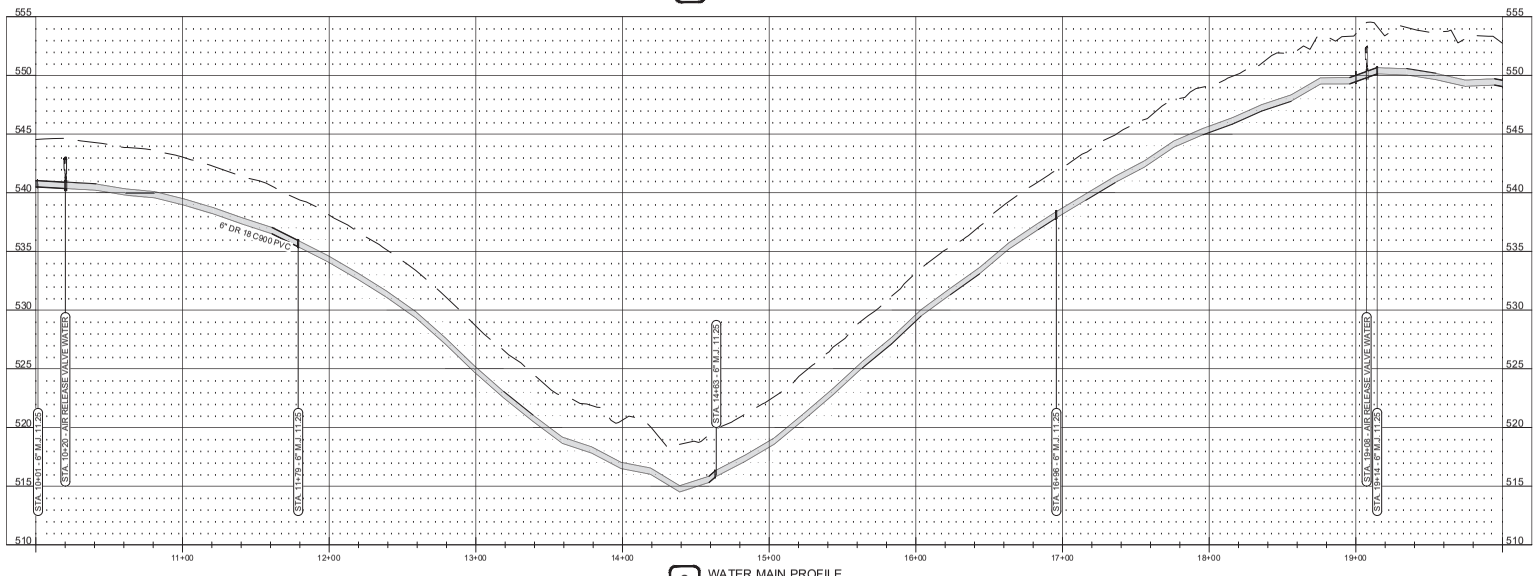
0' 40' 80' 160'
0' 5' 10' 20'

STA. 0+00 TO 10+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U10



1 WATER MAIN PLAN
SCALE: 1" = 40'



2 WATER MAIN PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENTUCKY LICENSED PROFESSIONAL ENGINEER — KENNETH D. MASKOVYAK — 19111 — 08/22/2025

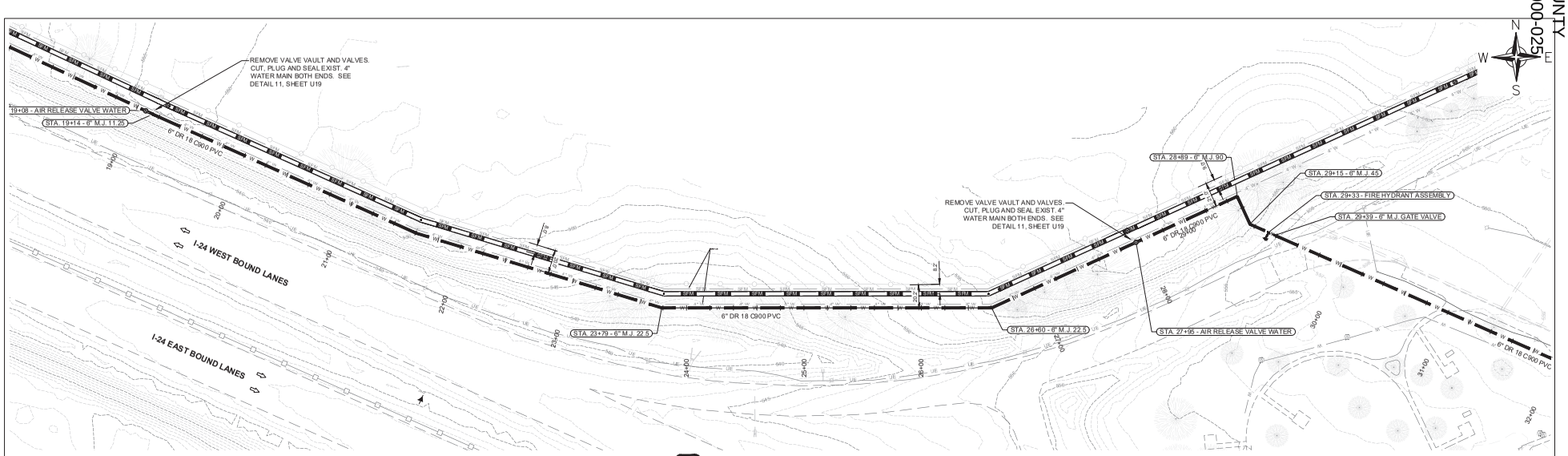
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

WATER MAIN PLAN & PROFILE

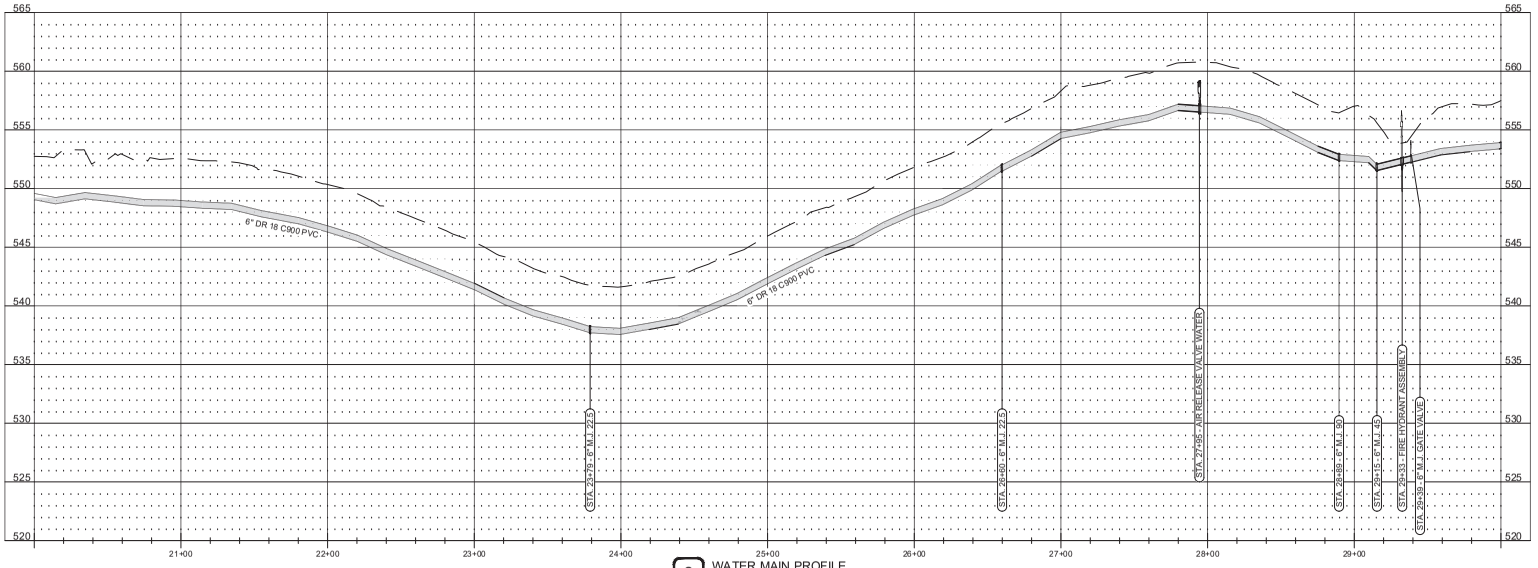
HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

STA. 10+00 TO 20+00

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U11



1 WATER MAIN PLAN
SCALE: 1" = 40'



2 WATER MAIN PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

WATER MAIN PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'

VERTICAL SCALE
SCALE: 1" = 5'

0' 40' 80' 160'

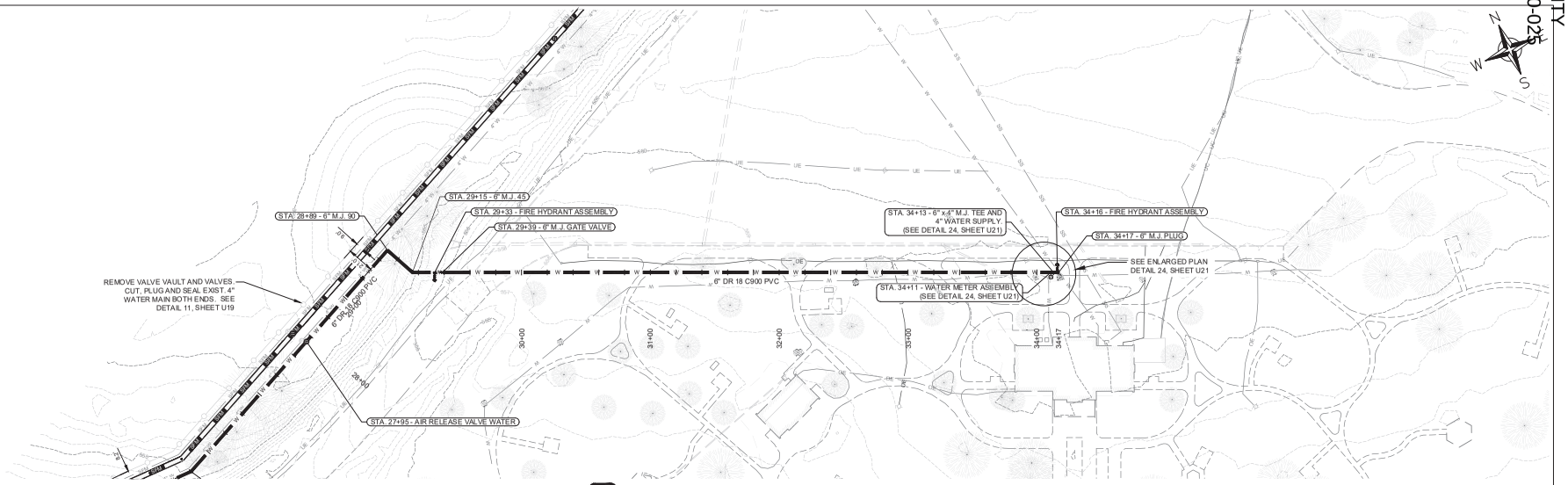
0' 5' 10' 20'

STA. 20+00 TO 30+00

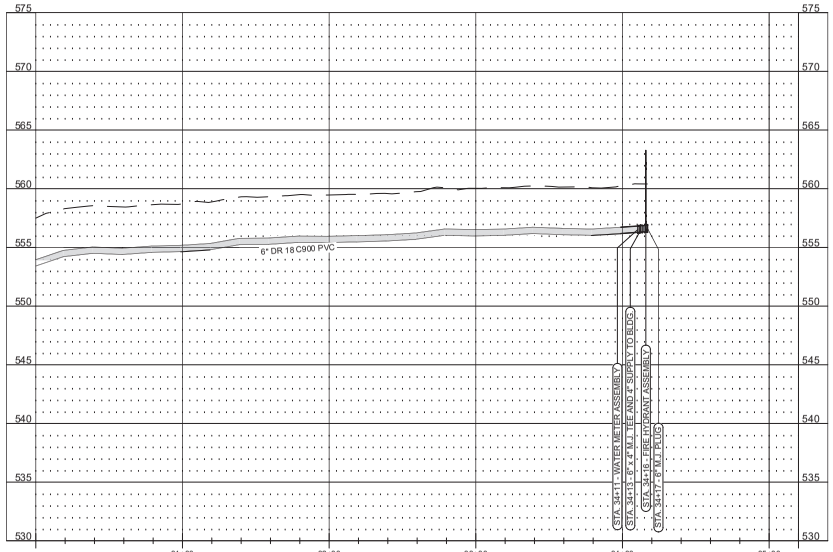
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U12

KENNETH D. MUSGRAVE — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025



1 WATER MAIN PLAN
SCALE: 1" = 40'



2 WATER MAIN PROFILE
SCALE: HORIZ - 1" = 40' VERT 1:5

KENTUCKY LICENSED PROFESSIONAL ENGINEER
KENNETH D. MASCHINOT
19111
08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

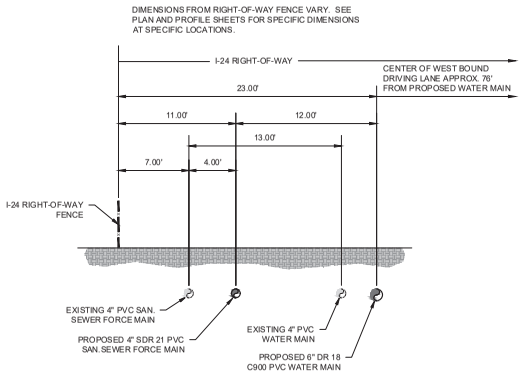
WATER MAIN PLAN & PROFILE

HORIZONTAL SCALE
SCALE: 1"=40'
VERTICAL SCALE
SCALE: 1" = 5'

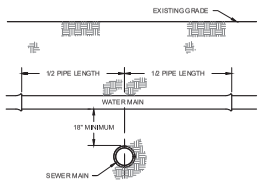
0' 40' 80' 160'
0' 5' 10' 20'

STA. 30+00 TO 40+00

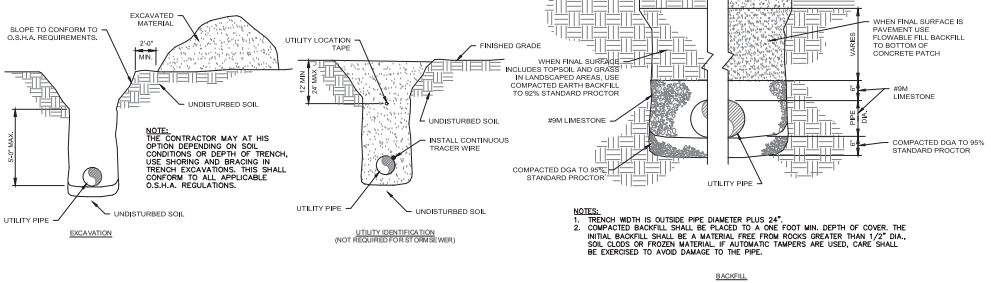
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U13



1 TYPICAL UTILITY INSTALLATION ON RIGHT-OF-WAY
SCALE: N.T.S.

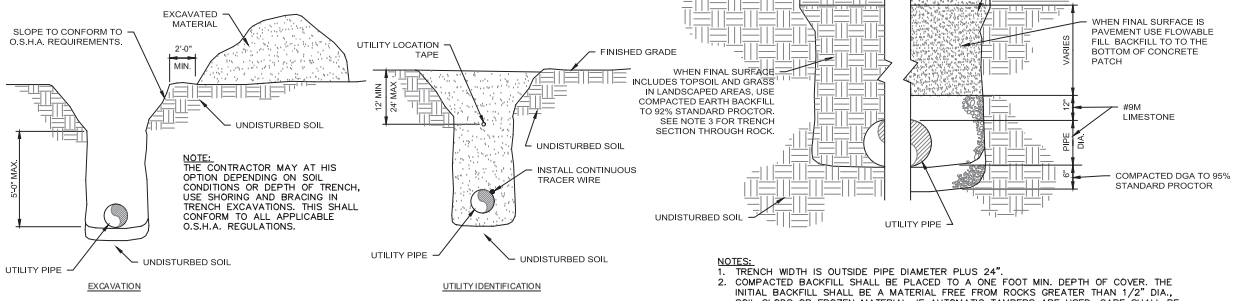


2 WATER MAIN CROSSING SEWER
SCALE: N.T.S.



NOTES:
1. TRENCH WIDTH IS OUTSIDE PIPE DIAMETER PLUS 24".
2. COMPACTED BACKFILL SHALL BE PLACED TO A ONE FOOT MIN. DEPTH OF COVER. THE INITIAL BACKFILL SHALL BE A MATERIAL FREE FROM ROCKS GREATER THAN 1/2" DIA., SOIL CLODS OR FROZEN MATERIAL. IF AUTOMATIC TAMPERS ARE USED, CARE SHALL BE EXERCISED TO AVOID DAMAGE TO THE PIPE.

3 UTILITY TRENCH DETAILS FOR GRAVITY SYSTEM
SCALE: N.T.S.



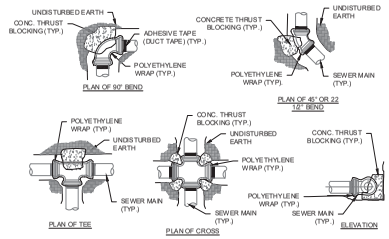
NOTES:
1. TRENCH WIDTH IS OUTSIDE PIPE DIAMETER PLUS 24".
2. COMPACTED BACKFILL SHALL BE PLACED TO A ONE FOOT MIN. DEPTH OF COVER. THE INITIAL BACKFILL SHALL BE A MATERIAL FREE FROM ROCKS GREATER THAN 1/2" DIA., SOIL CLODS OR FROZEN MATERIAL. IF AUTOMATIC TAMPERS ARE USED, CARE SHALL BE EXERCISED TO AVOID DAMAGE TO THE PIPE.
3. TRENCH SECTION CUT INTO ROCK OR IN GROUND WITH ROCKS LARGER THAN 1/2" SHALL HAVE 6" BEDDING OF COMPACTED DGA TO 95% STANDARD PROCTOR BELOW PIPE FOLLOWED BY #9M LIMESTONE BACKFILLED TO 12" ABOVE TOP OF PIPE.

4 UTILITY TRENCH DETAILS FOR FORCED SYSTEM
SCALE: N.T.S.

THRUST / LBS. OF PRESSURE

PIPE SIZE	DEAD END OR TEE	1/4° BEND	1/8° BEND	1/16° BEND
4"	20	40	27	20
6"	39	60	54	29
8"	68	100	56	31
10"	110	160	89	48
12"	155	220	120	62
16"	260	340	180	90

NOTES:
1. ALL DUCTILE IRON PIPE, FITTINGS AND VALVES SHALL BE WRAPPED WITH A POLYETHYLENE MATERIAL, 6MIL INSTALLED TO THE CURRENT ADDITION OF THE AWWA C-105.
2. BLOCKING SHALL BE POURED AFTER THE POLYETHYLENE WRAP IS IN PLACE.
3. BLOCKING SHALL BE INSPECTED BY THE DESIGN ENGINEER'S INSPECTOR PRIOR TO BACKFILLING.
4. THRUST BLOCKS TO BE PLACED AGAINST UNDISTURBED EARTH. USE ADDITIONAL CONCRETE AS REQUIRED FOR OVER EXCAVATION.
5. THRUST BLOCKS SHALL BE CONSTRUCTED WITH CLASS "B" PORTLAND CEMENT CONCRETE, 2500 PSI MINIMUM.



5 TYPICAL THRUST BLOCKING DETAIL (SEWER)
SCALE: N.T.S.

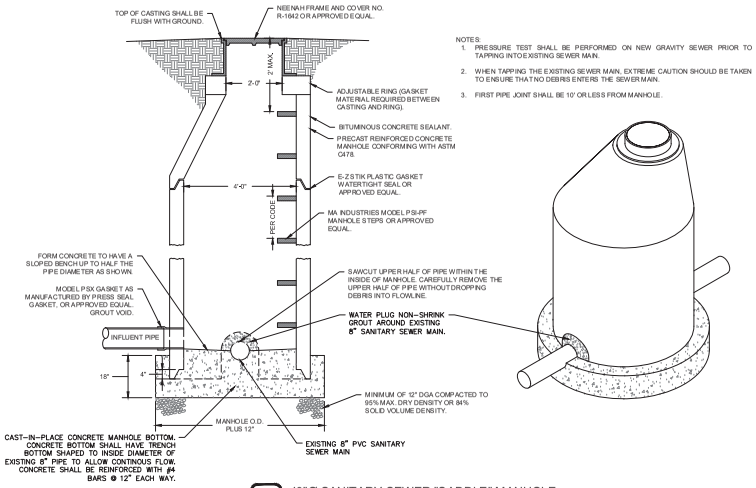
KENTUCKY LICENSED PROFESSIONAL ENGINEER — KENNETH D. MADDOX — 19111 — 08/22/2025

COMMONWEALTH OF KENTUCKY — JOSEPH E. MATESEVAC — 20200 — 08/22/2025

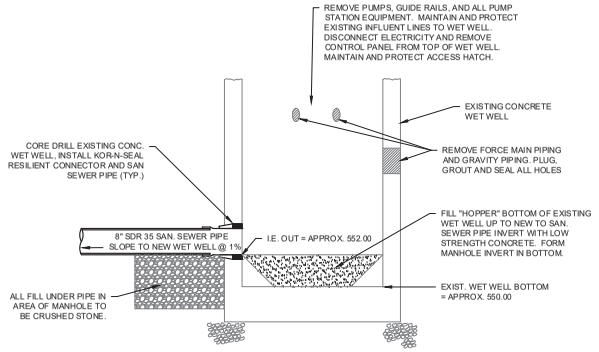
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

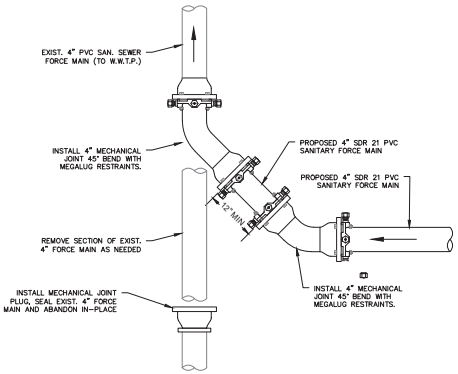
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U14



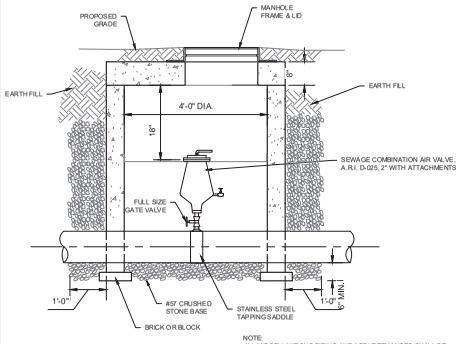
6 48"Ø SANITARY SEWER "SADDLE" MANHOLE
SCALE: N.T.S.



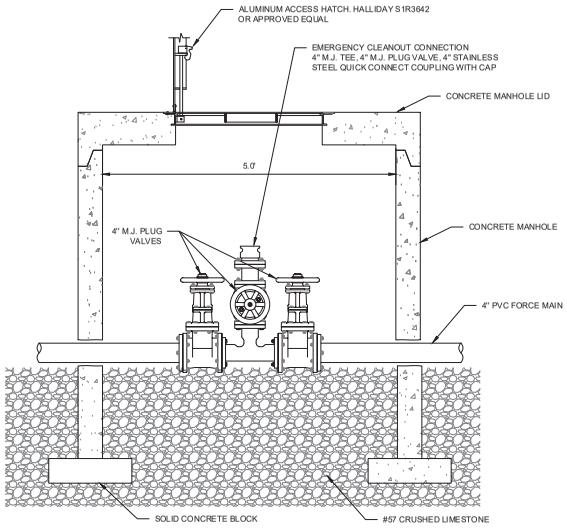
7 EXISTING, WET WELL CONNECTION TO NEW WET WELL
SCALE: N.T.S.



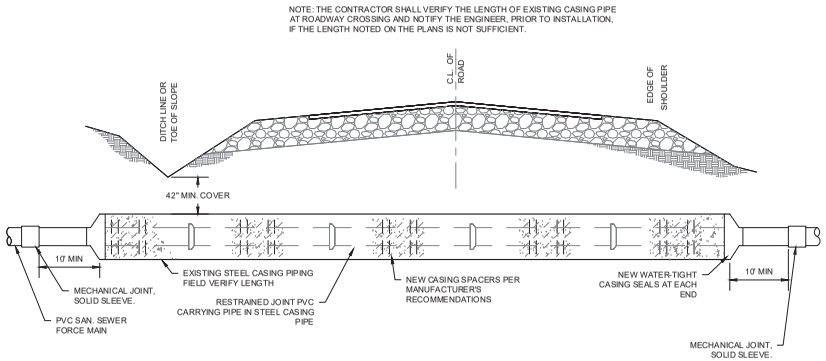
8 CONNECTION TO EXISTING SAN. SEWER FORCE MAIN
SCALE: N.T.S.



9 SAN. SEWER AIR RELEASE VALVE ASSEMBLY
SCALE: N.T.S.



26 SAN. SEWER FORCE MAIN CLEANOUT CONNECTION
SCALE: N.T.S.



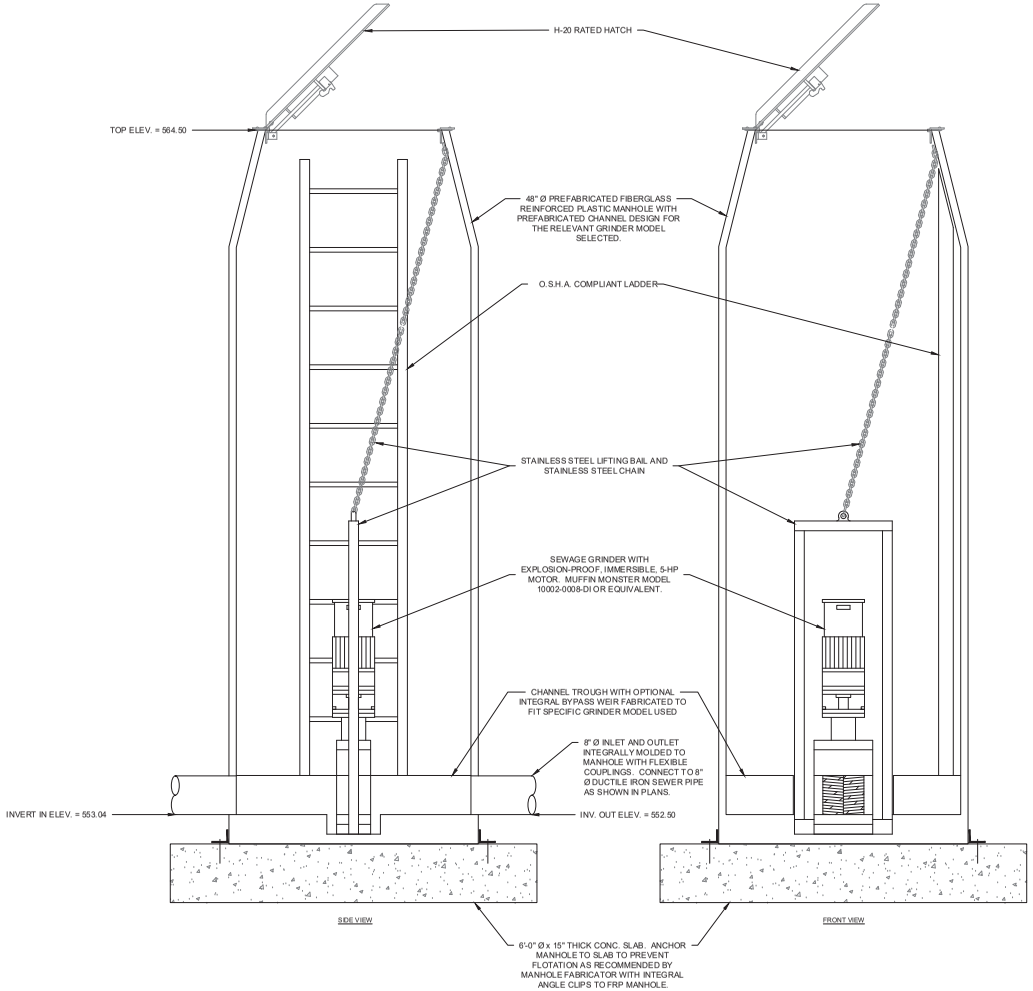
27 SAN. SEWER FORCE MAIN INSTALLATION THROUGH CASING
SCALE: N.T.S.

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U15

KENNETH D. MADDOX — LICENSED PROFESSIONAL ENGINEER — 08/22/2025
JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025



28 SAN. SEWER GRINDER MANHOLE
SCALE: N.T.S.

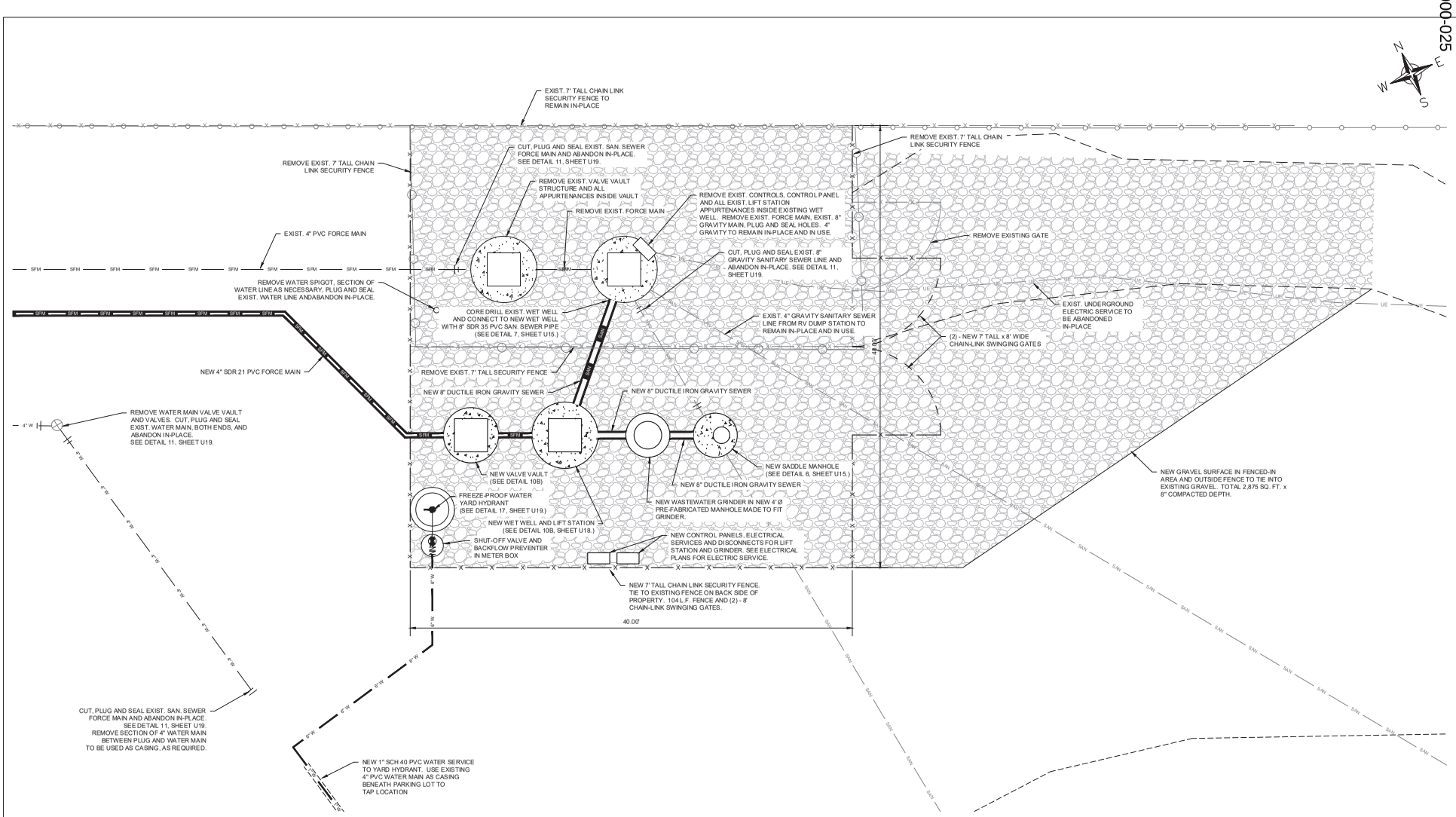
KENNETH D. MASKORN — STATE OF KENTUCKY — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

JOSEPH E. MATESEVAC — 20200 — STATE OF KENTUCKY — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U16



10A LIFT STATION PLAN
SCALE: 1/4" = 1'

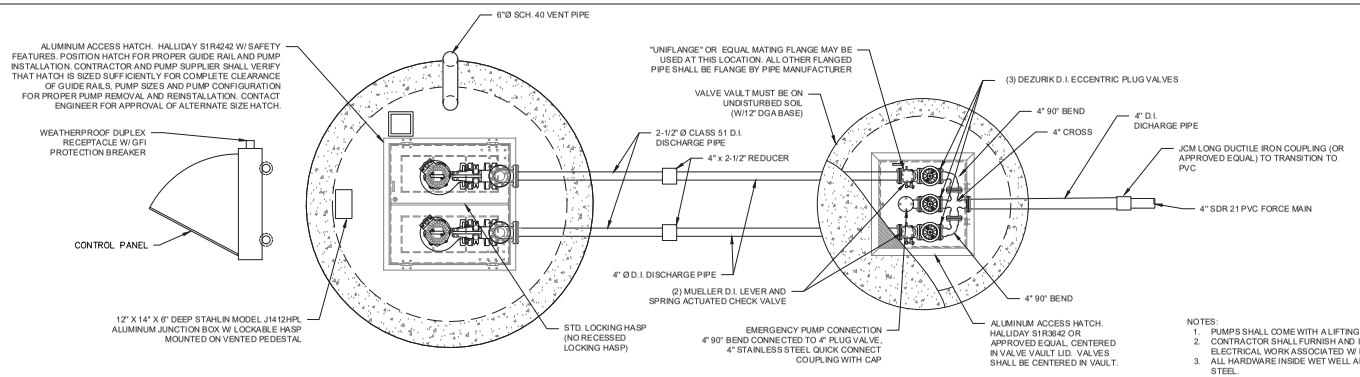
KENNETH D. MASKORN — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

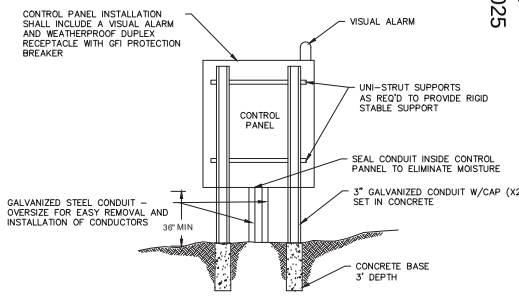
JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

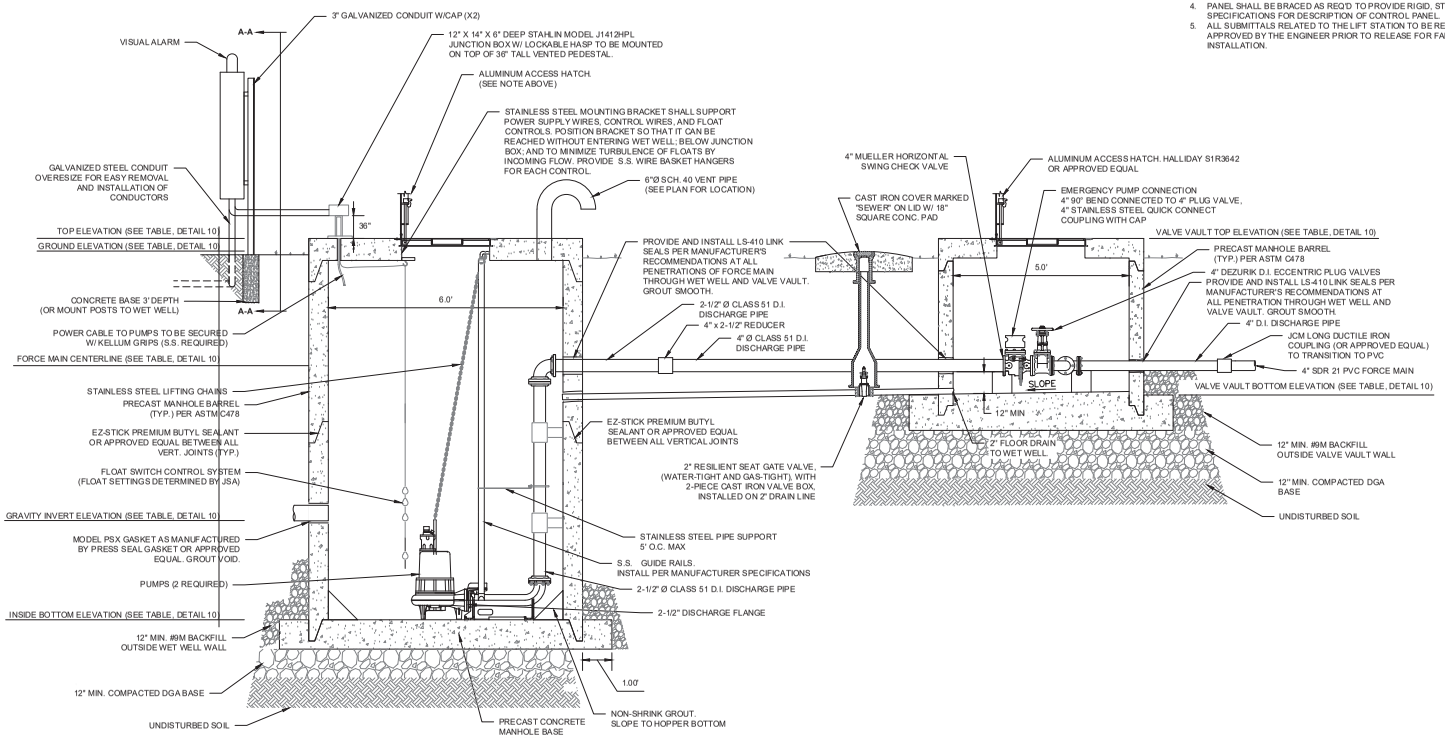
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U17





SECTION A-A

NOTES:
1. PUMPS SHALL COME WITH A LIFTING BAIL.
2. CONTRACTOR SHALL FURNISH AND INSTALL CONTROL PANEL AND ALL ELECTRICAL WORK ASSOCIATED W/ PROJECT.
3. ALL HARDWARE INSIDE WET WELL AND VALVE VAULT SHALL BE STAINLESS STEEL.
4. PANEL SHALL BE BRACED AS REQ'D TO PROVIDE RIGID, STABLE SUPPORT. SEE SPECIFICATIONS FOR DESCRIPTION OF CONTROL PANEL.
5. ALL SUBMITTALS RELATED TO THE LIFT STATION TO BE REVIEWED AND APPROVED BY THE ENGINEER PRIOR TO RELEASE FOR FABRICATION AND OR INSTALLATION.



10B LIFT STATION DETAIL
SCALE: N.T.S.

DETAIL DIMENSIONS AND DESIGN

WETWELL

INSIDE DIAMETER	6 ft
INSIDE BOTTOM ELEVATION	547.00
PUMP OFF ELEVATION	549.00
LEAD PUMP ON ELEVATION	549.60
LAG PUMP ON ELEVATION	550.60
HIGH LEVEL ALARM ELEVATION	551.60
GRAVITY INVERT ELEVATION	553.00
FORCE MAIN CENTERLINE	560.50
GROUND ELEVATION	564.50±
TOP ELEVATION	565.00
NO. OF PUMPS	2 + 1 Extra = 3

PUMP #1		PUMP #2	
FLOW	100 GPM	FLOW	100 GPM
HEAD CONDITIONS	48 FT	HEAD CONDITIONS	48 FT
MOTOR SIZE	5 HP	MOTOR SIZE	5 HP
SPEED	3450 rpm	SPEED	3450 rpm
PUMP DISCHARGE SIZE	2.5 In	PUMP DISCHARGE SIZE	2.5 In
IMPELLER SIZE	4.5 In	IMPELLER SIZE	4.5 In

VALVE PIT		PIPING	
INSIDE DIAMETER	5 ft	INFLUENT GRAVITY MAIN	8 In PVC
TOP ELEVATION	565.00	FORCE MAIN	4 In PVC
INSIDE BOTTOM ELEV.	559.00		

ELECTRICAL			
AVAILABLE VOLTAGE	208	TYPE OF PUMP	Myers
TYPE OF CONNECTION	3 Phase	SOLIDS HANDLING	Grinder
TYPE OF SERVICE	UNDERGROUND	PUMP MODEL	VS50
NAME OF SUPPLIER	Straeffer Pump		

BASIS OF DESIGN

BASED ON WATER USAGE RECORDS, AVERAGE FLOW IN PEAK SEASON HAS BEEN APPROX. 6,000 GPD. DESIGN AVERAGE FLOW BASED ON 6,000 x 1.5 = 9,000 GPD.
PUMP SELECTION AS GIVEN ABOVE SHALL BE "OR APPROVED EQUAL"; ALL EQUIVALENTS MUST BE SUBMITTED AND APPROVED BY THE ENGINEER. MINIMUM PUMP RATE SHALL BE 80 GPM TO MAINTAIN MINIMUM FORCE MAIN VELOCITY.

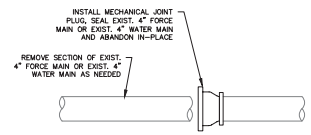
* CONTRACTOR SHALL SUPPLY THREE IDENTICAL PUMPS, TWO FOR LIFT STATION INSTALLATION AND ONE TO BE DELIVERED TO KYTC AT THE REST AREA FOR STORAGE

10C LIFT STATION DATA
SCALE: N.T.S.

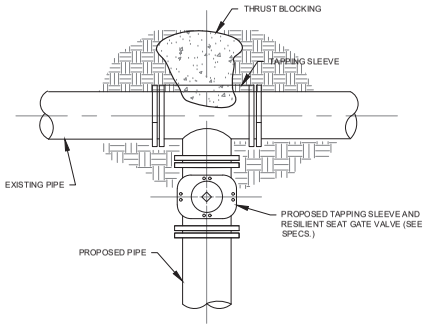
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

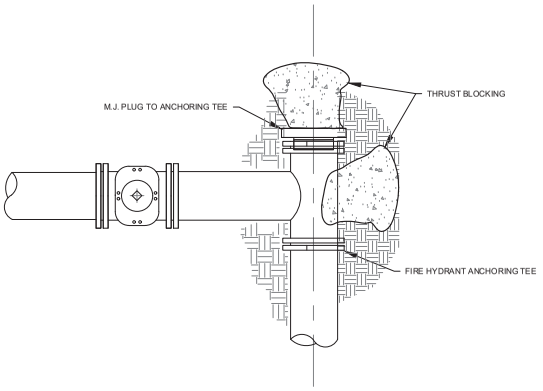
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U18



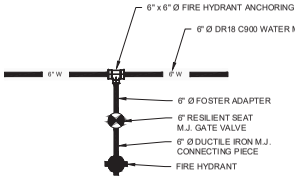
11 DETAIL OF ABANDONING EXISTING WATER MAIN OR FORCE MAIN
SCALE: N.T.S.



12 TYPICAL TAPPING VALVE INSTALLATION DETAIL
SCALE: N.T.S.

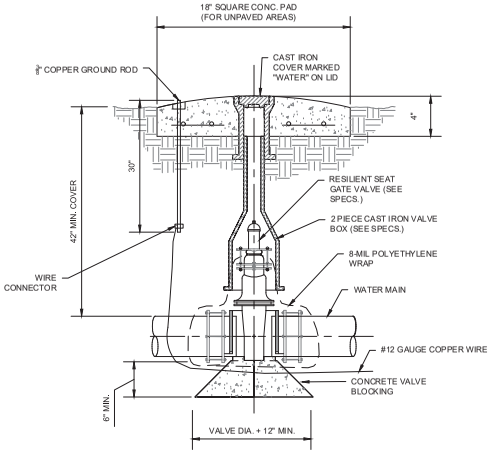


13 WATER MAIN TERMINATION
SCALE: N.T.S.



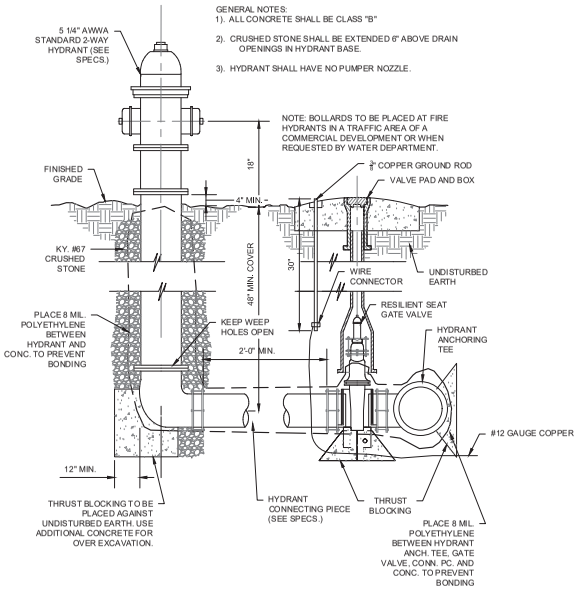
14 TYPICAL FIRE HYDRANT ASSEMBLY
SCALE: N.T.S.

NOTE:
1. CONCRETE PADS SHALL BE CONSTRUCTED AROUND ALL MAIN LINE.
2. CONCRETE PADS SHALL BE CLASS "A" TYPE PORTLAND CEMENT CONCRETE WITH A WOOD FLOAT FINISH TOOLED EDGE.
3. THE VALVE BOX SHALL NOT TRANSMIT SHOCK OR STRESS TO THE VALVE.

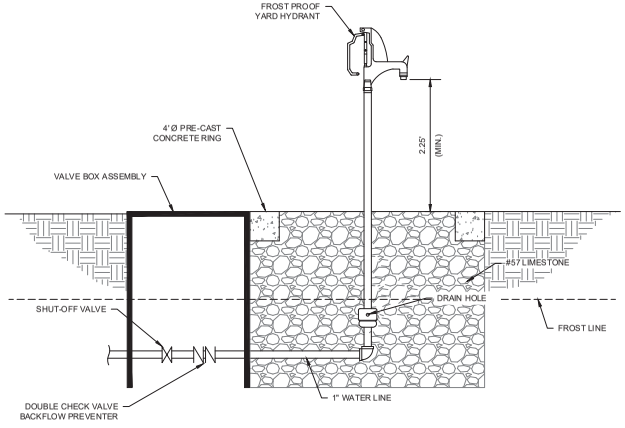


15 TYPICAL GATE VALVE AND BOX COLLAR
SCALE: N.T.S.

GENERAL NOTES:
1). ALL CONCRETE SHALL BE CLASS "B"
2). CRUSHED STONE SHALL BE EXTENDED 6" ABOVE DRAIN OPENINGS IN HYDRANT BASE.
3). HYDRANT SHALL HAVE NO PUMPER NOZZLE.



16 WATER HYDRANT PLACEMENT DETAILS
SCALE: N.T.S.



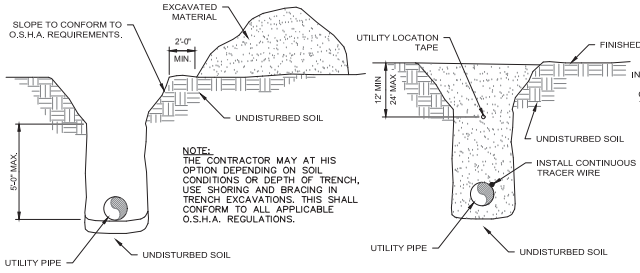
17 WATER YARD HYDRANT
SCALE: 1"=1'

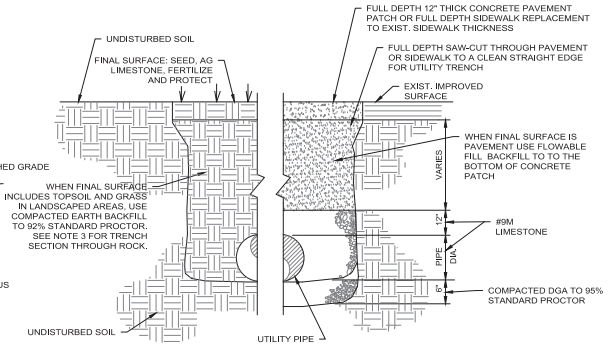
KENNETH D. MASKWELL — LICENSED PROFESSIONAL ENGINEER — 08/22/2025
JOSEPH E. MATESEVAC — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

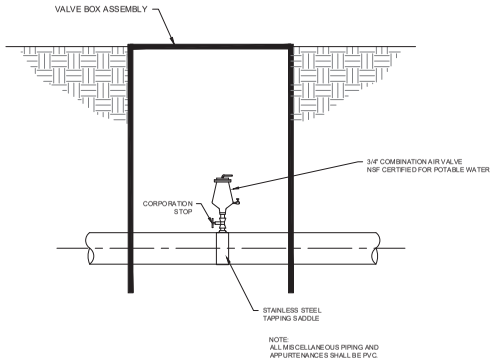
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U19





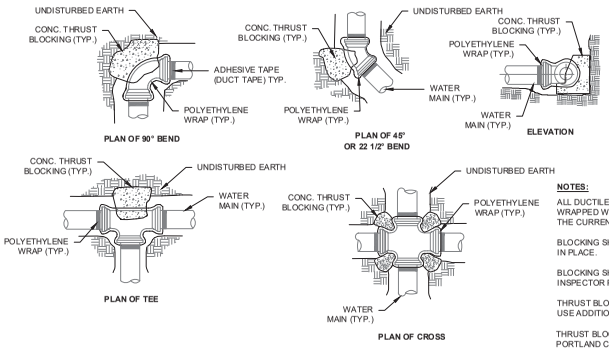
NOTES:
1. TRENCH WIDTH IS OUTSIDE PIPE DIAMETER PLUS 24".
2. COMPACTED BACKFILL SHALL BE PLACED TO A ONE FOOT MIN. DEPTH OF COVER. THE INITIAL BACKFILL SHALL BE A MATERIAL FREE FROM ROCKS GREATER THAN 1/2" DIA., SOIL CLODS OR FROZEN MATERIAL. IF AUTOMATIC TAMPERS ARE USED, CARE SHALL BE EXERCISED TO AVOID DAMAGE TO THE PIPE.
3. TRENCH SECTION CUT INTO ROCK OR IN GROUND WITH ROCKS LARGER THAN 1/2" SHALL HAVE 6" BEDDING OF COMPACTED DGA TO 95% STANDARD PROCTOR BELOW PIPE FOLLOWED BY #9M LIMESTONE BACKFILLED TO 12" ABOVE TOP OF PIPE.

18 UTILITY TRENCH DETAILS FOR FORCED SYSTEM
SCALE: N.T.S.



20 AIR RELEASE VALVE ASSEMBLY - WATER
SCALE: N.T.S.

TYPICAL THRUST BLOCKING DETAILS



THRUST / LBS. OF PRESSURE

PIPE SIZE	DEAD END OR TEE	1/4" BEND	1/8" BEND	1/16" BEND
4"	20	40	27	20
6"	39	60	54	29
8"	68	100	56	31
10"	110	160	89	48
12"	155	220	120	62
16"	260	340	180	90

NOTES:
ALL DUCTILE IRON PIPE, FITTINGS AND VALVES SHALL BE WRAPPED WITH A POLYETHYLENE MATERIAL, 8-MIL. INSTALLED TO THE CURRENT ADDITION OF THE AWWA C-105.

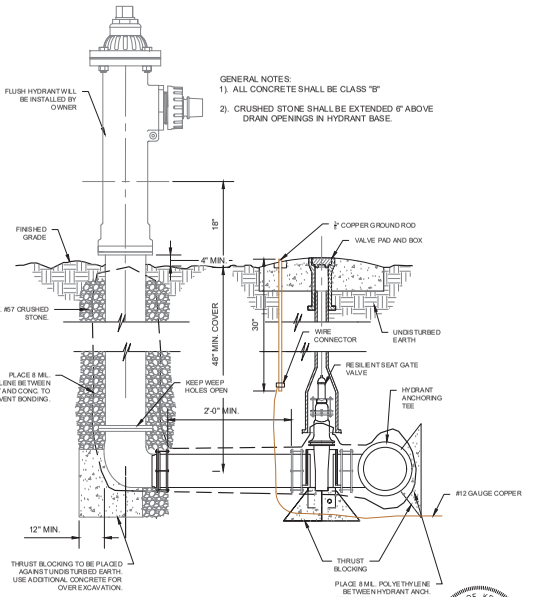
BLOCKING SHALL BE POURED AFTER THE POLYETHYLENE WRAP IS IN PLACE.

BLOCKING SHALL BE INSPECTED BY THE DESIGN ENGINEER'S INSPECTOR PRIOR TO BACKFILLING.

THRUST BLOCKS TO BE PLACED AGAINST UNDISTURBED EARTH. USE ADDITIONAL CONCRETE AS REQUIRED FOR OVER EXCAVATION.

THRUST BLOCKS SHALL BE CONSTRUCTED WITH CLASS "B" PORTLAND CEMENT CONCRETE, 2500 PSI, MINIMUM.

19 TYPICAL THRUST BLOCKING DETAILS (WATER)
SCALE: N.T.S.

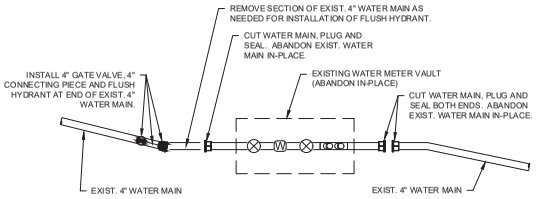


21 POST-TYPE FLUSH HYDRANT
SCALE: N.T.S.

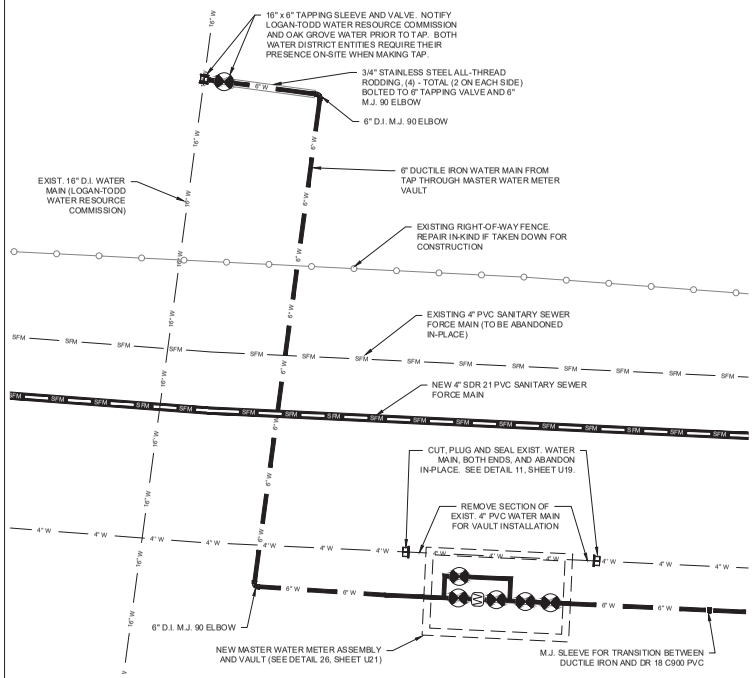
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U20



22 DETAIL OF ABANDONING EXISTING WATER METER VAULT
SCALE: N.T.S.



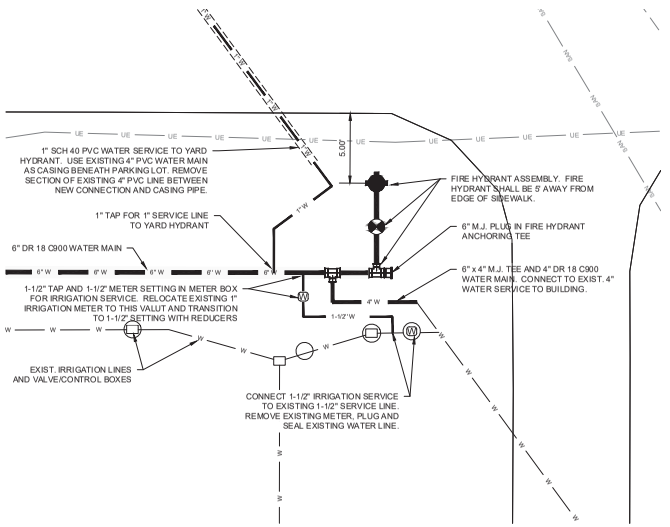
25 ENLARGED PLAN - TAP AND MASTER WATER METER ASSEMBLY
SCALE: 1/4" = 1'

KEY NOTES:

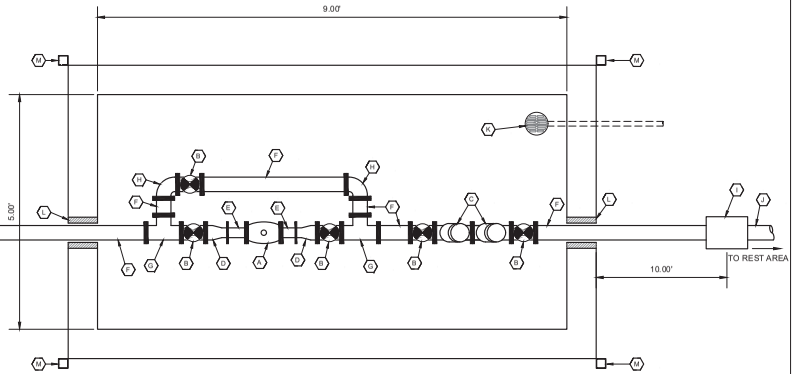
- (A) 4" BADGER COMPOUND METER. SEE NOTE #9 BELOW.
- (B) RESILIENT SEAT 6" FLANGED GATE VALVE.
- (C) DOUBLE CHECK VALVE BACKFLOW PREVENTION ASSEMBLY.
- (D) 6" x 4" FLANGED REDUCER
- (E) STRAIGHT LENGTH OF DUCTILE IRON PIPE PER METER MANUFACTURER SPECIFICATIONS
- (F) 6" Ø FLANGED DUCTILE IRON PIPE.
- (G) 6" DUCTILE IRON TEE
- (H) 6" DUCTILE IRON ELBOW
- (I) 6" M.J. SLEEVE FOR TRANSITION FROM DUCTILE IRON TO PVC.
- (J) 6" Ø DR 18 C900 PVC PIPE.
- (K) CAST IRON FLOOR DRAIN WITH 2" PIPE DISCHARGE. EXTEND DISCHARGE PIPE @ 1% SLOPE TO DAYLIGHT.
- (L) WATER-TIGHT LINK SEALS OR APPROVED EQUAL.
- (M) 2" x 12' TELESCOPING STEEL SIGN POSTS, (4) REQUIRED AS SHOWN. INSTALL 4' DEEP AND 8' EXPOSED ABOVE GRADE FOR MARKING VAULT.

NOTES:

1. OWNERSHIP AND MAINTENANCE OF THE VAULT, METER ASSEMBLY AND METER IS OAK GROVE WATER DEPARTMENT.
2. VAULT SHALL BE PRE-CAST OR POURED IN-PLACE CONCRETE, 4,000 PSI CONCRETE MINIMUM REQUIRED.
3. VAULT SHALL HAVE A DUAL HATCH HYDRAULIC CYLINDER ASSISTED OPENING ALUMINUM HATCH, FULL VAULT OPENING DIMENSION
4. ALL FITTINGS SHALL BE DUCTILE IRON.
5. ALL PIPE SHALL BE DUCTILE IRON WITH FLANGED FITTINGS. TRANSITION TO DR18 C900 PVC WITH M.J. SLEEVE OUTSIDE OF VAULT.
6. INCLUDE ALL NECESSARY DUCTILE IRON FLANGED FITTINGS NOT SPECIFICALLY LABELED FOR THIS ASSEMBLY. THAT INCLUDES BUT IS NOT LIMITED TO COUPLINGS, TEE'S, ELBOWS, FOSTER ADAPTERS, ETC.
7. ALL SHALL MEET LOCAL FIRE CODE AND AWWA REQUIREMENTS.
8. VAULT SHALL HAVE A FLOOR DRAIN AND BE DRAINED BY GRAVITY. MINIMUM 12" INCHES OF #57'S OR #9M STONE IS REQUIRED FOR VAULT BEDDING.
9. STRAIGHT PIPE SECTIONS OF SUFFICIENT LENGTH SHALL BE PLACED ON EACH SIDE OF WATER METERS AS REQUIRED BY WATER METER MANUFACTURER FOR PROPER OPERATION AND ACCURACY.
10. MASTER METER SETTING AND VAULT SHALL BE A PREFABRICATED ASSEMBLY PROVIDED BY G & C SUPPLY COMPANY, INC., ATWOOD, TN TO MEET OAK GROVE WATER DEPARTMENT STANDARDS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION, CONNECTIONS AND PAYMENT OF THE ASSEMBLY.



24 ENGLARGED SERVICE CONNECTION PLAN
SCALE: 1/4" = 1'



26 MASTER WATER METER ASSEMBLY DETAIL
SCALE: N.T.S.

STATE OF KENTUCKY — KENNETH DEAN MADDOX — LICENSED PROFESSIONAL ENGINEER — 08/22/2025
STATE OF KENTUCKY — JOSEPH E. MATESEVAC — 20200 — LICENSED PROFESSIONAL ENGINEER — 08/22/2025

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

DRAWING TITLE: WATER AND SANITARY SEWER DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U21

LIGHTING FIXTURE SCHEDULE

TYPE	MANUFACTURER	CATALOG NO.	LAMP	VOLTAGE	INPUT WATTS	MOUNTING	FINISH	REMARKS	NOTES
AA	LITHONIA OR EQUAL	DSX0 LED P1 50K 80CRI T4M 120 RPA PER ___	LED	120	34.0	POLE	OWNER TO SELECT	D-SERIES SIZE 0 AREA LUMINAIRE	A,B,C

GENERAL NOTES:

1 ALL LAMPS SHALL BE 5000K, 80 CRI UNLESS NOTED OTHERWISE.

2 PRIOR APPROVAL REQUIRED A MINIMUM OF 10 DAYS PRIOR TO BID - EQUALS TO BE LISTED BY ADDENDA.

3 OTHER LIGHT FIXTURES MANUFACTURERS THAT ARE CONSIDERED AS EQUALS FOR GENERAL LIGHTING REQUIREMENTS ARE:
A. COOPER LIGHTING AND SUB-PRODUCT LINES AS SUPPLIED BY JAW LIGHTING.
B. ACUITY BRAND AND SUB-PRODUCT LINES AS SUPPLIED BY LHI LIGHTING SALES.
C. HUBBELL LIGHTING AND SUB-PRODUCT LINES AS SUPPLIED BY LUMENATION.
D. WILLIAMS LIGHTING AND SUB-PRODUCT LINES AS SUPPLIED BY SESCO LIGHTING.
ALL LIGHT FIXTURES SHALL BE SUBJECT TO SHOP DRAWING REVIEW BY THE ENGINEER FOR ACCEPTANCE AS TO ENERGY EFFICIENCY, APPEARANCE, STYLE, PERFORMANCE, AND OVER ALL SERVICEABILITY.

SPECIAL NOTES:

A LIGHT FIXTURE SHALL BE FURNISHED WITH POLE EQUAL TO LITHONIA RSS 20'. THE POLE COLOR SHALL MATCH THE FIXTURE COLOR.

B LIGHT FIXTURE SHALL BE FURNISHED WITH PHOTOCELL EQUAL TO LITHONIA DLL127F 1.5 JU.

C FINISH TO BE SELECTED BY THE OWNER DURING SHOP DRAWINGS PROCESS. FURNISH COLOR BROCHURE FOR SELECTIONS, AS APPLICABLE.

ELECTRICAL NOTES AND TAGS	
#/A#	ELECTRICAL DETAIL NUMBER ELECTRICAL DETAIL TAG DRAWING WHERE DETAIL IS ILLUSTRATED
#	ELECTRICAL CONSTRUCTION NOTE
#	ELECTRICAL DEMOLITION NOTE
WIRING HOME RUNS	
	WIRING AND RACEWAY HOME RUN BACK TO POWER SOURCE ABOVE SLAB. (SEE PLAN VIEW FOR CIRCUIT TAG)

ABBREVIATIONS	
AFF	ABOVE FINISHED FLOOR
BTM	BOTTOM
EC	ELECTRICAL CONTRACTOR
GFI	GROUND FAULT INTERRUPTING DEVICE
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUGS ONLY
NFDS	NON-FUSED DISCONNECT SWITCH
UG	UNDERGROUND
UON	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF DEVICE - WEATHER RESISTANT RATED

GENERAL SITE DEMOLITION NOTES

1 THESE PLANS ARE SCHEMATIC IN NATURE AND INDICATE THE APPROXIMATE AND GENERAL LOCATION OF THE WORK. CONTRACTOR SHALL PERFORM WORK THROUGH COORDINATION WITH OTHER TRADES AND TO SUIT FIELD CONDITIONS. WHILE EVERY EFFORT HAS BEEN MADE TO IDENTIFY ALL MAJOR EQUIPMENT, UTILITY SERVICES, AND ASSOCIATED APPURTENANCES, IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE, DE-ENERGIZE, AND/OR PROPERLY TERMINATE EQUIPMENT, UTILITY SERVICES, AND ASSOCIATED APPURTENANCES WITHIN THIS SCOPE OF WORK WHETHER SPECIFICALLY INDICATED OR NOT. IT IS THE INTENT OF THIS SCOPE OF WORK TO PROVIDE A COMPLETE AND THOROUGH REMOVAL OF ALL EQUIPMENT, UTILITY SERVICES, AND ASSOCIATED APPURTENANCES THAT ARE RENDERED UNUSED OR OBSOLETE BY NEW WORK.

2 USE EXTREME CAUTION WHEN EXCAVATING. UNDERGROUND UTILITIES ILLUSTRATED ARE APPROXIMATE AND ARE SHOWN TO ALERT CONTRACTOR TO THEIR PRESENCE. CONTRACTOR MUST LOCATE/VERIFY UTILITIES BY HAND EXCAVATION.

3 ALL DEMOLITION SHALL COMPLY WITH OSHA AND OTHER APPROPRIATE SAFETY STANDARDS.

4 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION AND BACKFILL REQUIRED FOR COMPLETE DEMOLITION OF ALL WORK AS SPECIFIED. PROVIDE BARRICADES, SHORING, BRACING, DE-WATERING EQUIPMENT AND ETC. AS REQUIRED. CONDUCT EXCAVATION SO THAT WALLS, FOOTINGS AND ADJOINING PROPERTY ARE NOT DISTURBED OR INJURED. PROPERLY DISPOSE OF SPOILS OFF-SITE UNLESS OTHERWISE NOTED.

5 THE INTENT OF THE DEMOLITION SCOPE OF WORK IS TO REMOVE ALL UNNECESSARY/OBSOLETE INSTALLATIONS FROM THE LIMITS OF CONSTRUCTION AFTER THE NEW INSTALLATION HAS BEEN COMPLETED. THE PURPOSE OF ILLUSTRATING PORTIONS OF THE SYSTEM(S) IS TO CONVEY THE MAGNITUDE OF THE SCOPE OF WORK AND SHOULD NOT BE THE BASIS OF PROPOSAL. ALL INSTALLATIONS RENDERED OBSOLETE OR IN CONFLICT WITH PROPOSED NEW WORK SHALL BE REMOVED/RELOCATED WHETHER EXPLICITLY DEPICTED OR NOT. ADDITIONAL SELECTIVE DEMOLITION MAY ALSO BE REQUIRED FOR EXISTING EQUIPMENT, UTILITY SERVICES, AND ASSOCIATED APPURTENANCES WHICH IMPEDE OR OTHERWISE CONFLICT WITH NEW WORK THAT IS NOT SPECIFICALLY INDICATED. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO REMOVE, DE-ENERGIZE, AND/OR PROPERLY TERMINATE EQUIPMENT, UTILITY SERVICES, AND ASSOCIATED APPURTENANCES WITHIN THIS SCOPE OF WORK WHETHER SPECIFICALLY INDICATED OR NOT.

6 DEMOLITION DRAWINGS ARE INTENDED TO GENERALLY SHOW THE DEMOLITION/RELOCATION NECESSARY TO COMPLETE THE PROPOSED NEW WORK. COORDINATE ALL OUTAGES WITH THE APPLICABLE UTILITY COMPANY.

7 EXISTING INSTALLATIONS WITHIN THE BOUNDS OF THE PROPOSED NEW WORK ARE INDICATED ON THE DRAWINGS ONLY TO THE EXTENT THAT SUCH INFORMATION HAS BEEN MADE AVAILABLE TO OR DISCOVERED BY THE ENGINEER IN PREPARING THE DRAWINGS. THERE IS NO GUARANTEE AS TO THE ACCURACY OR COMPLETENESS OF SUCH INFORMATION, AND ALL RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS THEREOF IS EXPRESSLY DISCLAIMED.

8 EXISTING UTILITIES SHALL BE MODIFIED AS NECESSARY DURING CONSTRUCTION TO PROVIDE UNINTERRUPTED SERVICE. CONTRACTOR SHALL VERIFY ALL LOCATIONS (HORIZONTAL AND VERTICAL) PRIOR TO CONSTRUCTION ACTIVITIES. PROTECT ELECTRICAL SERVICES AND UTILITIES WHERE REMOVAL/MODIFICATION OF EXISTING UTILITIES IS INDICATED.

9 PROVIDE NECESSARY PRECAUTIONS TO AVOID DAMAGE TO EXISTING UTILITIES/STRUCTURES THAT REMAIN IN PLACE TO BE REUSED OR TO REMAIN THE PROPERTY OF THE OWNER. ANY DAMAGED ITEMS SHALL BE REPAIRED OR REPLACED AT NO ADDITIONAL COST.

10 ALL MATERIALS AND EQUIPMENT REMOVED AND NOT REUSED SHALL BE REMOVED FROM THE PROPERTY AND PROPERLY DISPOSED OF. PROPERLY STORE MATERIALS AND EQUIPMENT TO BE REUSED OR RELOCATED TO PREVENT DAMAGE AND REINSTALL AS THE WORK PROGRESSES.

11 AREAS OUTSIDE THE DEMOLITION LIMITS HAVE OCCUPIED STRUCTURES. ALL NECESSARY CARE SHALL BE TAKEN BY THE CONTRACTOR TO ENSURE THE SAFETY OF RESIDENTS AND ADJACENT PROPERTY.

12 ALL EXCESS DEMOLITION DEBRIS SHALL BE REMOVED FROM THE SITE AND DISPOSED OF LEGALLY IN A LANDFILL APPROVED BY THE AUTHORITY HAVING JURISDICTION.

13 RE-LABEL AS "SPARE" ALL EXISTING DEVICES OR EQUIPMENT THAT HAVE BEEN DISCONNECTED.

GENERAL ELECTRICAL NOTES

GENERAL

1 THE ELECTRICAL DRAWINGS ARE SCHEMATIC IN NATURE AND SHOW THE GENERAL ARRANGEMENT OF EQUIPMENT. THE DRAWINGS SHALL NOT BE SCALED FROM.

2 ALL WORK IS TO BE COORDINATED WITH ALL OTHER TRADES ON THIS PROJECT AND ELECTRICAL WORK SHALL BE INSTALLED IN A NEAT AND ORDERLY FASHION.

3 ALL NEW ELECTRICAL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE AND ALL OTHER LOCAL, STATE, AND NATIONAL CODES WHICH APPLY AS INTERPRETED BY THE AHJ (AUTHORITY HAVING JURISDICTION).

4 THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL THE CONTRACT DOCUMENTS AND VISITING THE PROJECT SITE TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS PRIOR TO BIDDING. ANY DISCREPANCIES OR QUESTIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER NINE (9) DAYS PRIOR TO THE BID DATE.

5 CONTRACTOR SHALL CUT AND PATCH AS REQUIRED DURING THE COURSE OF INSTALLATION OR AS SPECIFIED ON THE DRAWINGS. THE GENERAL CONTRACTOR SHALL BE RETAINED TO PERFORM PATCHING AND THE COSTS BORNE BY THE CONTRACTOR REQUIRING THE PATCH.

6 RACEWAY FILL WHEN RACEWAY SIZE IS NOT SPECIFICALLY INDICATED, SHALL BE BASED ON APPLICABLE ARTICLES OF THE NEC.

7 CONTRACTOR SHALL REFERENCE THE PROJECT SITE PLANS ALL UTILITIES. COORDINATE ALL REQUIRED WORK WITH ASSOCIATED UTILITIES BEFORE BIDDING AND INCLUDE ALL MATERIAL AND LABOR REQUIRED BY THE RESPECTIVE UTILITY AND DEEMED "THE OWNERS RESPONSIBILITY" BY THAT UTILITY COMPANY. IN CASE OF DISCREPANCIES BETWEEN THE CONSTRUCTION DOCUMENTS AND UTILITY COMPANY REQUIREMENTS, THE REQUIREMENTS OF THE UTILITY COMPANY SHALL BE FOLLOWED AND THE COST THEREOF SHALL BE INCLUDED IN THE BID.

CONDUCTORS - CIRCUITING

1 ALL CONDUCTORS OF THE ELECTRICAL SYSTEM SHALL BE COPPER, 600V, THW/THWN AND SIZED AS REQUIRED FOR LOADING AND PER CODE.

2 ALL UNDERGROUND CONDUCTORS AND SPLICES MUST BE LISTED AS SUITABLE FOR WET LOCATIONS.

3 IDENTIFICATION OF CONDUCTORS SHALL BE IN COMPLIANCE WITH NEC 210.5.

4 NEUTRAL CONDUCTORS SHALL NOT BE SHARED FOR BETWEEN MULTIPLE SINGLE PHASE CIRCUITS OF A 3-PHASE, 4-WIRE HOME RUN - NEUTRALS SHALL BE DEDICATED PER CIRCUIT - REFER TO NEC ARTICLE 200.4. (FOR 3 PHASE SYSTEMS ONLY)

5 CIRCUIT ROUTING, IN GENERAL, IS NOT SPECIFIED. CONTRACTOR SHALL COORDINATE ROUTING LENGTH WITH CONNECTED LOAD AND ADJUST CONDUCTOR SIZE FOR A VOLTAGE DROP LESS THAN 3%.

CONDUIT

1 ALL CONDUIT SHALL BE RMC AND LFMC WHEN INSTALLED OUTDOORS (UNLESS SPECIFICALLY OTHERWISE INDICATED).

2 WHEN INSTALLED IN CONCRETE OR BELOW GRADE, ALL CONDUIT MAY BE RNC-40.

EQUIPMENT CONNECTIONS

1 CONTRACTOR SHALL COORDINATE THE LOCATION OF ALL EQUIPMENT TO MAINTAIN ACCESS REQUIRED BY THE NEC AND EQUIPMENT MANUFACTURERS.

2 CONTRACTOR SHALL PROVIDE ALL LABOR AND MATERIAL TO CONNECT EQUIPMENT SPECIFIED AS PART OF THIS PROJECT AND SHALL REVIEW ALL PARTS OF THE CONSTRUCTION DOCUMENTS FOR LOCATION AND QUANTITIES.

3 CONTRACTOR SHALL BE REQUIRED TO FABRICATE AND INSTALL ANY NECESSARY STANCHION MOUNTS FOR ALL ELECTRICAL EQUIPMENT THAT IS NECESSARY TO COMPLETE THEIR WORK.

4 SERVICE VOLTAGE AND ELECTRICAL REQUIREMENTS OF ALL EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ELECTRICAL ROUGH-IN. DISCREPANCIES BETWEEN THE ELECTRICAL DRAWINGS AND EQUIPMENT REQUIREMENTS SHALL BE REPORTED TO THE ENGINEER BEFORE ANY ASSOCIATED WORK IS INSTALLED.

5 FINAL CONNECTIONS TO ALL EQUIPMENT WHICH PRODUCE VIBRATION SHALL BE WITH FLEXIBLE METAL CONDUIT SUITABLE FOR THE SURROUNDING ENVIRONMENT. CONDUIT TURNING UP FROM BELOW GRADE OR FROM WITHIN CONCRETE SHALL BE RMC.

LABELING

1 THE CONTRACTOR SHALL FURNISH AND INSTALL LABELING ON ELECTRICAL DISTRIBUTION EQUIPMENT TO INDICATE MAXIMUM AVAILABLE FAULT CURRENT AS REQUIRED BY NEC 110.24.

2 EACH WIRING DEVICE SHALL BE LABELED AT THE FACEPLATE. EACH LABEL SHALL CONSIST OF THE PANEL NAME AND CIRCUIT NUMBER. THE CHARACTERS SHALL BE A MINIMUM OF 3/16" HIGH

3 INDEXES OF ELECTRICAL PANELS SHALL BE COMPLETED FOR EACH CIRCUIT. ARC-FLASH WARNING LABELS SHALL BE APPLIED ON ALL EQUIPMENT PER NEC 110.24. LABELS AND TAGS AS DETAILED SHALL BE PLACED ON ALL PANELS, STARTERS, DISCONNECTS, AND ETC.

RECEPTACLES

1 ALL GFCI RECEPTACLES SHALL BE INSTALLED IN READILY ACCESSIBLE LOCATIONS. RECEPTACLES INSTALLED AT EXTERIOR BUILDING LOCATIONS SHALL BE WEATHER-RESISTANT RATED PER REQUIREMENTS OF NEC ARTICLE 406.9 AND SHALL HAVE A CAST ALUMINUM WEATHER-RESISTANT "WHILE-IN-USE PROTECTIVE COVER.

2 ALL RECEPTACLES SHALL BE TAMPER RESISTANT TYPE. THE INTENT IS TO EXCEED THE MINIMUM CODE REQUIRED BY NEC 406.12 IN ORDER TO PROVIDE ADDITIONAL SAFETY.

Electrical DP1 Schedule

VOLTS/PHASE/WIRE:		PANEL SIZE:		MAIN TYPE & SIZE:			CABINET:		MIN SCC:	FED FROM:	
120/208/34		200 A		200 A MCB ---			SURFACE		22000	--	
CIRCUIT NO.	AREA SERVED	TRIP AMPS	NO. POLES	PHASE LOAD VA A	PHASE LOAD VA B	PHASE LOAD VA C	NO. POLES	TRIP AMPS	AREA SERVED	CIRCUIT NO.
1,3,5	LIFT STATION PUMPS	50	3	4729	4729	4729				
				2627	2627	2627	3	35	GRINDER PUMP	2,4,6
7,9	SPARE	20	2	0	0	0				
				0	0	0	2	20	SPARE	8,10
11	FREE STANDING RACK RECEPTACLE	20	1	0	0	180				
				0	0	34	1	20	SITE LIGHTING	12
13	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	14
15	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	16
17	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	18
19	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	20
21	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	22
23	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	24
25	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	26
27	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	28
29	SPARE	20	1	0	0	0				
				0	0	0	1	20	SPARE	30
		CONNECTED LOAD		7356	7356	7570	22.3 KVA			

LOAD CATEGORY	CONN. LOAD	DEMAND FACTOR	EST. LOAD
Lighting - Exterior	0.0	1.25	0.0
Motors	14.2	1.00	14.2
Motors (Largest)	7.9	1.25	9.9
Receptacles (0 - 10 KVA)	0.2	1.00	0.2
TOTAL	22.3		24.3

GENERAL SITE UTILITY NOTES

1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR REVIEWING ALL THE CONTRACT DOCUMENTS AND VISITING THE PROJECT SITE TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS PRIOR TO BIDDING. ANY DISCREPANCIES OR QUESTIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER NINE (9) DAYS PRIOR TO THE BID DATE.

2 ALL WORK SHALL BE IN ACCORDANCE WITH THE STATE BUILDING CODE, NATIONAL ELECTRICAL CODE, OSHA SAFETY REGULATIONS, UTILITY COMPANY STANDARDS/REQUIREMENTS, AND OTHER LOCAL/STATE/NATIONAL CODES OR STANDARDS THAT APPLY.

3 THE CONTRACTOR SHALL ACQUIRE ALL NECESSARY PERMIT(S) AND COORDINATE ALL INSPECTIONS.

4 THESE PLANS ARE SCHEMATIC IN NATURE AND INDICATE THE APPROXIMATE AND GENERAL LOCATION OF EXISTING. COORDINATE INSTALLATION OF WORK WITH OTHER DRAWINGS AND TRADES. FURNISH AND INSTALL COMPLETE AND FUNCTIONAL SYSTEMS REGARDLESS OF WHETHER OR NOT ALL ELEMENTS ARE SPECIFICALLY CALLED OUT.

5 BE AWARE THAT UTILITIES MAY BE LOCATED IN THE GROUND BELOW THE PROJECT CONSTRUCTION LIMITS. EXERCISE CAUTION WHEN EXCAVATING. UTILIZE HAND TOOLS TO LOCATE EXISTING UTILITIES PRIOR TO MACHINE EXCAVATION.

6 VERIFY ALL DIMENSIONS BEFORE FABRICATION.

7 THE CONTRACTOR SHALL PATCH AND REPAIR ALL WALKS, DRIVES, LAWNS, PAVEMENTS, GRADES, ETC. THAT ARE ALTERED OR DAMAGED BECAUSE OF WORK REQUIRED. THE REPAIRS SHALL MATCH EXISTING ITEMS IN THE AREA.

8 THE CONTRACTOR SHALL FIELD VERIFY THE EXISTING MATERIALS OF CONSTRUCTION, ELEVATIONS, AND LOCATIONS OF ALL TIE-IN POINTS BEFORE ORDERING MATERIALS AND INSTALLING ANY UNDERGROUND PIPING OR CONDUITS.

9 THE CONTRACTOR SHALL INSTALL WARNING TAPE ABOVE ALL BURIED UTILITY SERVICE LINES. TAPE SHALL BE SPECIFICALLY LABELED FOR SERVICE. ALL NON-METALLIC PIPES SHALL BE INSTALLED WITH TRACER WIRE IN CONTACT WITH THE PIPING.

10 THE CONTRACTOR SHALL COORDINATE THE ELEVATIONS OF THE DIFFERENT UNDERGROUND PIPING AND CONDUIT SYSTEMS TO ENSURE THAT THE ELEVATIONS OF PIPE AND / OR CONDUITS WILL NOT CONFLICT.

11 THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXCAVATION AND BACKFILL REQUIRED FOR THE INSTALLATION OF THE WORK. PROVIDE STREET PLATES, BARRICADES, WARNING LIGHTS, SHORING, BRACING, DE-WATERING EQUIPMENT, ETC. AS REQUIRED. CONDUCT EXCAVATION SO THAT WALLS, FOOTINGS AND ADJOINING PROPERTY ARE NOT DISTURBED OR DAMAGED. PROPERLY DISPOSE OF SPOILS OFF-SITE UNLESS OTHERWISE NOTED.

12 THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING ALL WATER RUN-OFF GENERATED AS A RESULT OF THEIR ACTIVITY OR STORM WATER. CONTRACTOR SHALL CONSULT WITH ALL APPLICABLE WATER CONTROL GUIDELINES AS DIRECTED BY THE CONTRACT DOCUMENTS AND/OR AUTHORITIES HAVING JURISDICTION.

UTILITY CONTACT

ELECTRIC: PENNYRILE ELECTRIC
2441 MAIN STREET
CADIZ, KY 42211
ATTN: JORDAN PERRY

PH: 270.886.2555

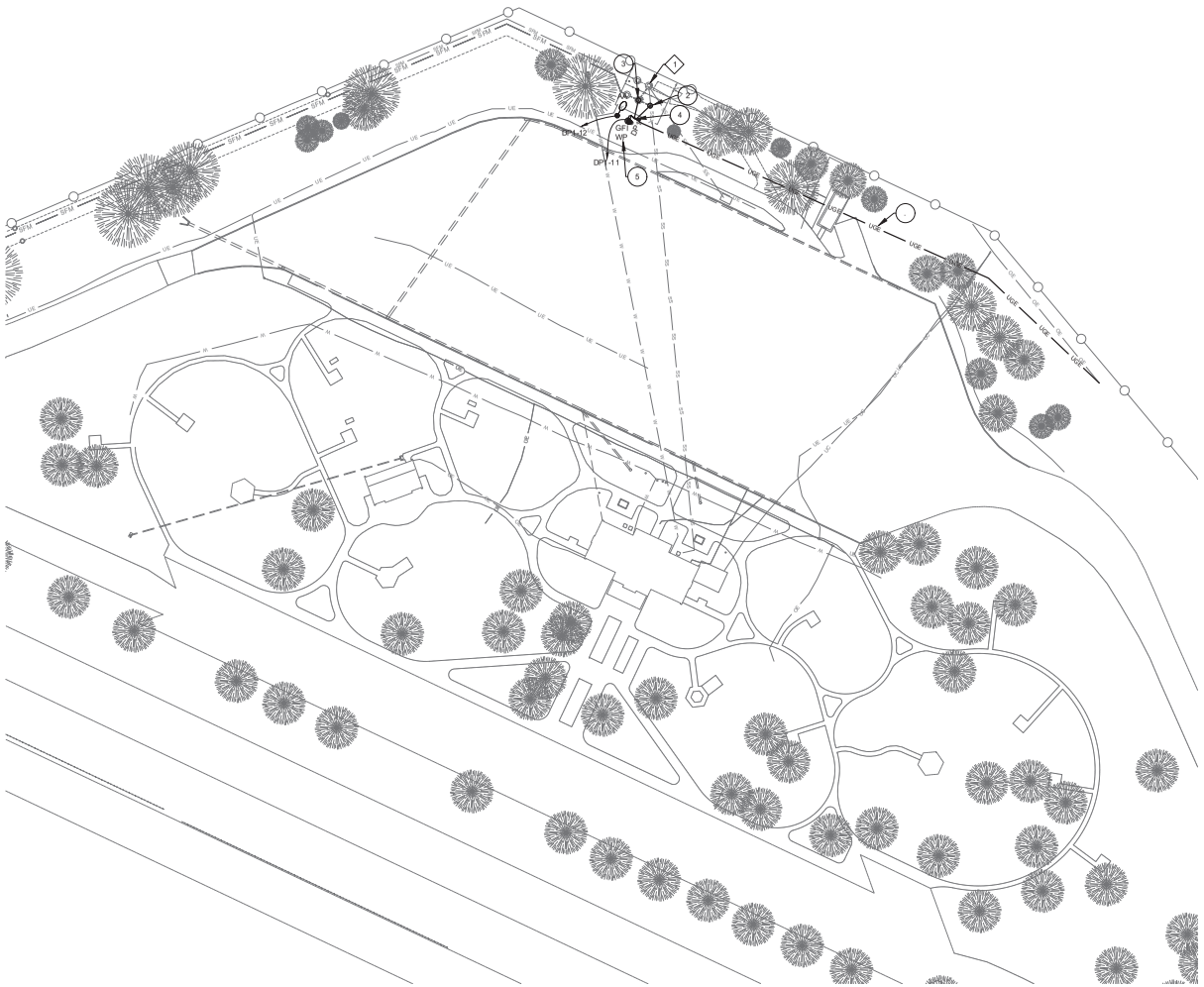
STATE OF KENTUCKY — MATTHEW MORGAN No. 37688 — LICENSED PROFESSIONAL ENGINEER
08/20/2025

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2301 McCracken Blvd, Paducah, KY 42001
270-444-9274 / marcumengineers.com

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

SITE ELECTRICAL LEAD SHEET

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U22



PROJECT NORTH

SITE PLAN

SCALE: 1" = 50' - 0"

ELECTRICAL DEMOLITION TAG NOTES

(APPLIES TO THIS DRAWING ONLY)

#	
1	UPON COMPLETION OF INSTALLATION OF LIFT STATION, THE POWER CONNECTION TO THE EXISTING LIFT STATION SHALL BE REMOVED IN ITS ENTIRETY. ALL ACCESSIBLE CONDUIT, WIRE, BOXES, ETC. SHALL BE REMOVED BACK TO THE SOURCE. ALL UNDERGROUND CONDUIT SHALL BE CAPPED AND ABANDONED BELOW GRADE.

ELECTRICAL CONSTRUCTION TAG NOTES

(APPLIES TO THIS DRAWING ONLY)

#	
1	DIRECTIONAL BORE CONDUIT UNDERGROUND FROM EXISTING UTILITY POLE LOCATED ON SITE TO METER BASE TO BE INSTALLED ON FREE-STANDING RACK. CONDUIT SHALL BE INSTALLED ACCORDING TO UTILITY COMPANY STANDARDS. REFER TO RISER DIAGRAM FOR CONDUIT REQUIREMENTS.
2	INSTALL POWER CONNECTION TO LIFT STATION PUMP MOTORS AS REQUIRED BY THE MANUFACTURER. ALL CIRCUITRY SHALL BE ROUTED BACK TO LIFT STATION CONTROL PANEL TO BE INSTALLED ON FREE STANDING RACK ADJACENT TO THE ELECTRICAL PANEL.
3	INSTALL POWER CONNECTION TO LIFT STATION GRINDER PUMP AS REQUIRED BY THE MANUFACTURER. ALL CIRCUITRY SHALL BE ROUTED BACK TO GRINDER PUMP CONTROL PANEL TO BE INSTALLED ON FREE STANDING RACK ADJACENT TO THE ELECTRICAL PANEL.
4	CONTRACTOR SHALL RECEIVE LIFT STATION AND GRINDER CONTROL PANELS FROM THE RESPECTIVE CONTRACTOR AND INSTALL ON FREE-STANDING RACK ADJACENT TO THE ELECTRICAL PANEL. REFER TO PANEL SCHEDULE FOR ALL CIRCUITRY REQUIRED TO BE ROUTED BETWEEN ELECTRICAL PANEL AND THE CONTROL PANEL.
5	RECEPTACLE SHALL BE INSTALLED SURFACE MOUNTED IN CAST JUNCTION BOX ON FREE-STANDING RACK BELOW PANEL. COORDINATE PLACEMENT OF DEVICE WITH ALL CONDUITS BEING ROUTED TO AVOID CONFLICT.

BURIED UTILITIES NOTE

BURIED UTILITIES ARE SHOWN AT THEIR APPROXIMATE LOCATION BASED UPON INFORMATION OBTAINED FROM UTILITY COMPANIES AND FIELD EVIDENCE. OTHER BURIED UTILITIES MIGHT EXIST ON THE SUBJECT SITE WHICH ARE NOT SHOWN ON THIS DRAWING. USE EXTREME CAUTION DURING EXCAVATION PROCEDURES AND CONTACT KENTUCKY 811 @ 811 OR 1-800-752-6007 FOR EXACT LOCATION OF BURIED UTILITIES PRIOR TO EXCAVATION OPERATIONS.

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MATTHEW MORGAN
No. 37686
LICENSED PROFESSIONAL ENGINEER
08/26/2025

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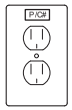
COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

ELECTRICAL SITE PLAN

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U23

TYPICAL WIRING DEVICES - LABEL THE FACEPLATE INDICATING PANEL NAME AND CIRCUIT NUMBER (P/C#). THE CHARACTERS SHALL BE A MINIMUM OF 3/16" HIGH.

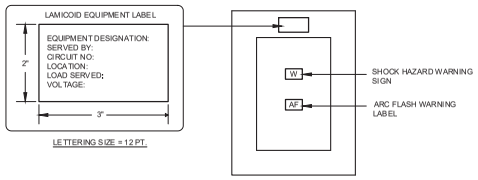
REFER TO ELECTRICAL SPECIFICATIONS FOR WIRING DEVICE AND COVERPLATE COLOR/TYPE SELECTIONS.



RECEPTACLE

ELECTRICAL WIRING DEVICE IDENTIFICATION

NO SCALE



LETTERING SIZE = 12 PT.

ELECTRICAL EQUIPMENT LABEL/IDENTIFICATION

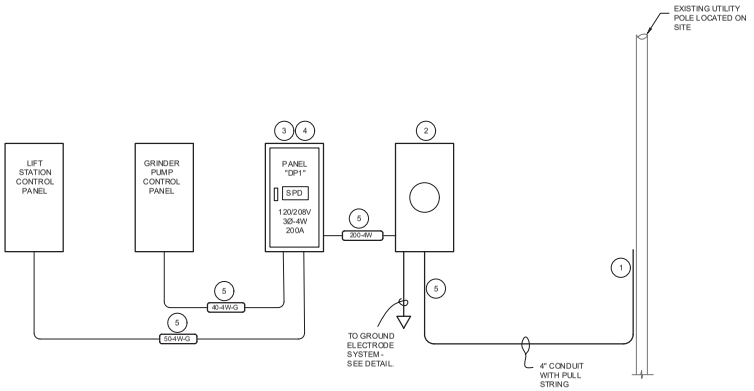
NO SCALE

ELECTRICAL FEEDER SCHEDULE (CU)

FEEDER CODE	CONDUIT/WIRE DESCRIPTION	TEMP RATING	FEEDER CODE	CONDUIT/WIRE DESCRIPTION	TEMP RATING	FEEDER CODE	CONDUIT/WIRE DESCRIPTION	TEMP RATING
*50-2W-G	3/4"C-3#12	*60°C	200-3W	2-1/2"C-3#3/0	75°C	800-4W	(2) SETS EA OF 4"C-4#600MCM	75°C
*20-3W-G	3/4"C-4#12		200-4W	2-1/2"C-4#3/0		800-3W-G	(2) SETS EA OF 4"C-3#600MCM, #1/0 GND	
*50-2W-G	3/4"C-3#10		200-3W-G	2-1/2"C-3#3/0, #6 GND		800-4W-G	(2) SETS EA OF 4"C-4#600MCM, #1/0 GND	
*50-3W-G	3/4"C-4#10		200-4W-G	2-1/2"C-4#3/0, #6 GND		1000-4W	(3) SETS EA OF 3"C-4#410MCM	
*50-4W-G	3/4"C-4#10, #10 GND		225-3W	2-1/2"C-3#4/0,		1000-3W-G	(3) SETS EA OF 3"C-3#410MCM, #2/0 GND	
*60-2W-G	3/4"C-2#8, #10 GND		225-4W	2-1/2"C-4#4/0,		1000-4W-G	(3) SETS EA OF 3"C-4#410MCM, #2/0 GND	
*60-3W-G	3/4"C-3#8, #10 GND		225-3W-G	2-1/2"C-3#4/0, #4 GND		1200-4W	(3) SETS EA OF 4"C-4#600MCM	
*60-4W-G	3/4"C-4#8, #10 GND		225-4W-G	2-1/2"C-4#4/0, #4 GND		1200-3W-G	(3) SETS EA OF 4"C-3#600MCM, #3/0 GND	
*60-2W-G	3/4"C-2#6, #10 GND		250-4W	3"C-4#250MCM		1200-4W-G	(3) SETS EA OF 4"C-4#600MCM, #3/0 GND	
*60-3W-G	3/4"C-3#6, #10 GND		250-3W-G	3"C-3#250MCM, #4 GND		1600-4W	(4) SETS EA OF 4"C-4#600MCM	
*60-4W-G	3/4"C-4#6, #10 GND		250-4W-G	3"C-4#250MCM, #4 GND		1600-3W-G	(4) SETS EA OF 4"C-3#600MCM, #4/0 GND	
*60-2W-G	3/4"C-2#4, #10 GND		300-3W-G	3"C-3#350MCM, #4 GND		1600-4W-G	(4) SETS EA OF 4"C-4#600MCM, #4/0 GND	
*60-3W-G	3/4"C-3#4, #10 GND		300-4W-G	3"C-4#350MCM, #4 GND		2000-4W	(5) SETS EA OF 4"C-4#600MCM	
*60-4W-G	1"C-4#4, #10 GND		400-3W	4"C-3#600MCM		2000-3W-G	(5) SETS EA OF 4"C-3#600MCM, #250 MCM GND	
*60-2W-G	1"C-2#3, #8 GND		400-3W-G	4"C-3#600MCM, #3 GND		2000-4W-G	(5) SETS EA OF 4"C-4#600MCM, #250 MCM GND	
*60-3W-G	1-1/4"C-3#3, #8 GND		400-4W	4"C-4#600MCM		2300-4W	(6) SETS EA OF 4"C-4#600MCM	
*60-4W-G	1-1/4"C-4#3, #8 GND		400-4W-G	4"C-4#600MCM, #3 GND		2300-3W-G	(6) SETS EA OF 4"C-3#600MCM, #350 MCM GND	
*100-3W	1-1/2"C-3#1		500-3W-G	(2) SETS EA OF 3"C-3#250MCM, #2 GND		2300-4W-G	(6) SETS EA OF 4"C-4#600MCM, #350 MCM GND	
*100-4W	1-1/2"C-4#1		500-4W	(2) SETS EA OF 3"C-4#250MCM		3000-4W	(8) SETS EA OF 4"C-4#600MCM	
*100-3W-G	1-1/2"C-3#1, #6 GND		500-4W-G	(2) SETS EA OF 3"C-4#250MCM, #2 GND		3000-3W-G	(8) SETS EA OF 4"C-3#600MCM, #400 MCM GND	
*100-4W-G	1-1/2"C-4#1, #6 GND		600-3W-G	(2) SETS EA OF 3-1/2"C-3#350MCM, #1 GND		3000-4W-G	(8) SETS EA OF 4"C-4#600MCM, #400 MCM GND	
125-3W-G	1-1/2"C-3#1, #6 GND	75°C	600-4W	(2) SETS EA OF 3-1/2"C-4#350MCM		4000-4W	(10) SETS EA OF 4"C-4#600MCM	
125-4W-G	1-1/2"C-4#1, #6 GND		600-4W-G	(2) SETS EA OF 3-1/2"C-4#350MCM, #1 GND		4000-3W-G	(10) SETS EA OF 4"C-3#600MCM, #500 MCM GND	
150-3W-G	1-1/2"C-3#1/0, #6 GND		700-4W	(2) SETS EA OF 4"C-4#500MCM		4000-4W-G	(10) SETS EA OF 4"C-4#600MCM, #500 MCM GND	
150-4W-G	1-1/2"C-4#1/0, #6 GND		700-3W-G	(2) SETS EA OF 4"C-3#500MCM, #1 GND				
175-3W-G	2"C-3#2/0, #6 GND		700-4W-G	(2) SETS EA OF 4"C-4#500MCM, #1 GND				
175-4W-G	2"C-4#2/0, #6 GND		800-3W	(2) SETS EA OF 4"C-3#600MCM				

* EQUIPMENT PROVISIONS FOR ELECTRICAL CONNECTIONS - TEMPERATURE LIMITIONS SHALL COMPLY WITH NEC ARTICLE 110.14 FOR CIRCUITS RATED 100A OR LESS. WIRE SIZES ARE BASED ON TYPE "THHN" COPPER CONDUCTORS, WITH NOT MORE THAN THREE CURRENT CARRYING CONDUCTORS IN RACEWAY - DERATE PER TABLE 310.15.AS APPLICABLE. CONTRACTOR SHALL DERATE WIRING AS REQUIRED WHEN MORE THAN FOUR (4) CURRENT CARRYING CONDUCTORS ARE INSTALLED IN SINGLE RACEWAY PER NEC TABLE 310.15(B)(3)(a).

UTILITY NOTE:
THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL UTILITY COMPANY FEES AND/OR CHARGES, ASSOCIATED WITH ESTABLISHING ELECTRICAL SERVICE TO THE SITE THIS SHALL INCLUDE ALL COSTS AND MATERIAL ASSOCIATED WITH PRIMARY CONDUIT, CABLING, POLES, METERING EQUIPMENT, TAP CABINETS, TERMINATION CABINETS, TRANSFORMERS, DISTRIBUTION EQUIPMENT, ETC. CONTRACTOR SHALL COORDINATE ALL MAIN SERVICE REQUIREMENTS AND LOCATIONS WITH UTILITY COMPANY, PRIOR TO BIDDING. ALL ROUGH-INS SHALL COMPLY WITH UTILITY COMPANY STANDARDS.



RISER DIAGRAM

NO SCALE

ELECTRICAL CONSTRUCTION TAG NOTES

(APPLIES TO THIS DRAWING ONLY)

#	
1	CONDUIT SHALL BE TURNED UP AT EXISTING UTILITY POLE LOCATED ON SITE ACCORDING TO UTILITY COMPANY STANDARDS.
2	FURNISH AND INSTALL 200 AMP METER BASE EQUAL TO MILBANK U2569-O OR OTHER APPROVED BY THE LOCAL UTILITY.
3	PANEL WITH INTERNAL SURGE PROTECTIVE DEVICE CONNECTED DIRECTLY TO BUSBAR ASSEMBLY. RATINGS SHALL BE PER SPECIFICATIONS. EXTERNAL ADD ON UNITS ARE NOT ACCEPTABLE.
4	REFER TO PANEL SCHEDULES FOR ALL BREAKER REQUIREMENTS WITHIN PANELS.
5	ALL CONDUIT ROUTED ABOVE GRADE AT FREE-STANDING RACK SHALL BE RIGID METALLIC CONDUIT.

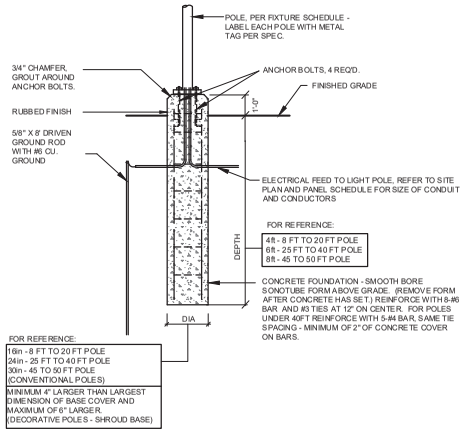


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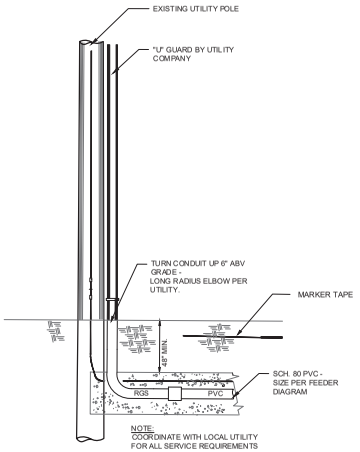
SITE ELECTRICAL DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U24



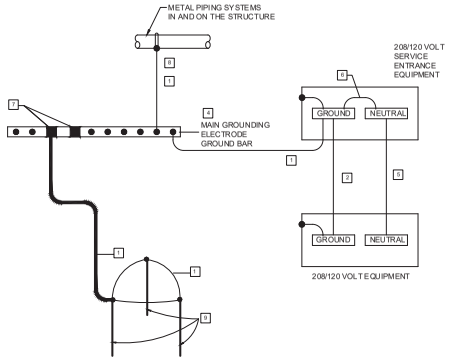
LIGHT POLE BASE DETAIL

NO SCALE



TYPICAL ELECTRICAL RISER DETAIL @ UTILITY POLE

NO SCALE



KEYED NOTES

1. INSTALL GROUNDING ELECTRODE CONDUCTOR, SIZED BASED ON NEC TABLE 250-66 USE NO. 3/0.
2. INSTALL EQUIPMENT GROUNDING CONDUCTOR SIZED BASED ON NEC TABLE 250-122 USING THE FEEDER OVERCURRENT DEVICE SIZE. SEE RISER DIAGRAM FOR SIZES.
3. NOT USED.
4. INSTALL A "MAIN GROUND ELECTRODE GROUND BAR" FOR SINGLE POINT GROUNDING. LOCATE AT AN ACCESSIBLE POINT NEAR THE SERVICE ENTRANCE EQUIPMENT. MAKE CONNECTIONS TO THE GROUND ELECTRODE CONDUCTOR USING IRREVERSIBLE CONNECTORS OR EXOTHERMIC WELDS. MAKE OTHER CONNECTIONS TO THE GROUND BAR USING TWO-HOLE COMPRESSION SPADE LUGS THAT MEET IEEE 837 REQUIREMENTS. LABEL EACH CONNECTION TO THE GROUND BAR.
5. INSTALL NEUTRAL CONDUCTOR THAT IS NOT LESS THAN THE PHASE CONDUCTOR AMPACITY. SEE RISER DIAGRAM.
6. INSTALL BONDING JUMPER WIRE THAT IS SIZED BASED ON NEC TABLE 250-66 USING THE SERVICE OR SEPARATELY-DERIVED SYSTEM PHASE CONDUCTOR SIZE.
7. INSTALL IRREVERSIBLE COMPRESSION CONNECTOR WITH TAMPER-PROOF HARDWARE OR INSTALL EXOTHERMIC WELD.
8. BOND TO METAL PIPING SYSTEMS IN THE AREA.
9. 5/8"dia. X 10' Cu CLAD GRD. RODS SPACED @ 10'-0" APART.

GENERAL NOTES

1). CONDUCTOR SIZES SHOWN ARE MINIMUM AND MAY BE LARGER THAN THE MINIMUM SIZES REQUIRED BY NEC.

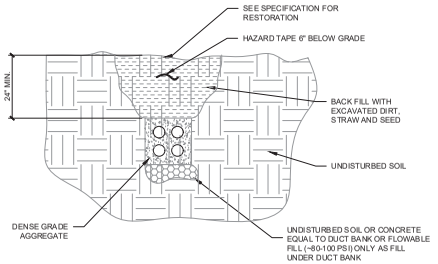
2). INSTALL GROUNDING CONNECTIONS TO BUILDING STRUCTURE AND GAS LINES AT LOCATIONS THAT ARE VISIBLE AND ACCESSIBLE FOR INSPECTION, MAINTENANCE, AND TESTING.

3). INSTALL AN INSULATED THROAT GROUNDING BUSHING ON EACH METALLIC SERVICE ENTRANCE CONDUIT. BOND TO GROUND BUS USING CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250-66 USING THE SERVICE PHASE CONDUCTOR SIZE.

4). INSTALL AN INSULATED THROAT GROUNDING BUSHING ON EACH METALLIC FEEDER CONDUIT. BOND TO GROUND BUS USING CONDUCTOR THAT IS SIZED BASED ON NEC TABLE 250-122 USING THE FEEDER CIRCUIT OVERCURRENT DEVICE SIZE OR THE SEPARATELY DERIVED SYSTEM OVERCURRENT DEVICE SIZE.

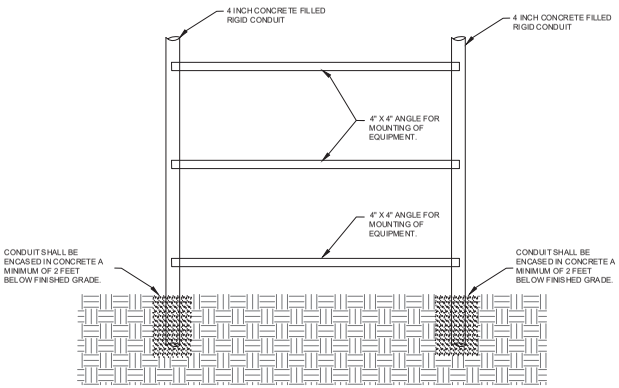
GROUNDING SYSTEM DIAGRAM

NO SCALE



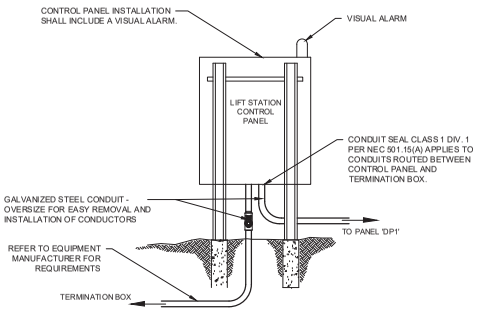
TRENCH SECTION DETAIL (UNDER GRASS OR SOD AREA)

NO SCALE



FREE-STANDING RACK DETAIL

NO SCALE



LIFT STATION CONTROL PANEL MOUNTING

NO SCALE

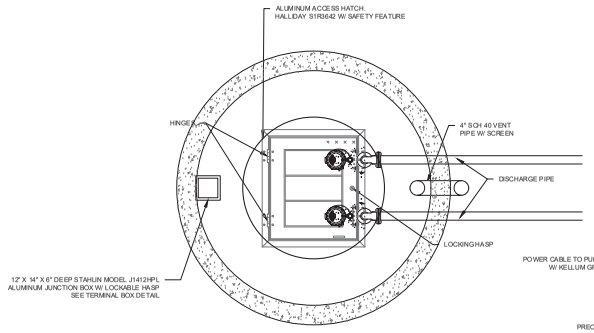
STATE OF KENTUCKY
MATTHEW MORGAN
No. 37688
LICENSED PROFESSIONAL ENGINEER
08/26/2025

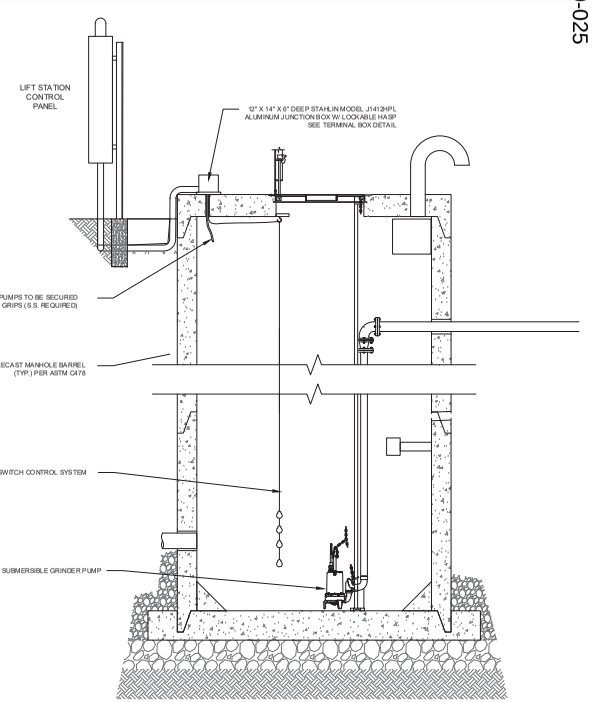
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DEPARTMENT OF HIGHWAYS

SITE ELECTRICAL DETAILS

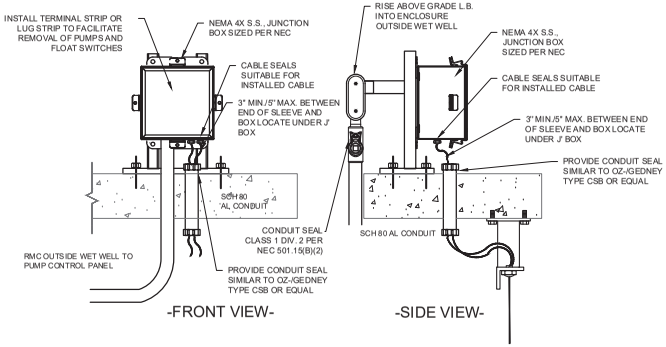
ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U25





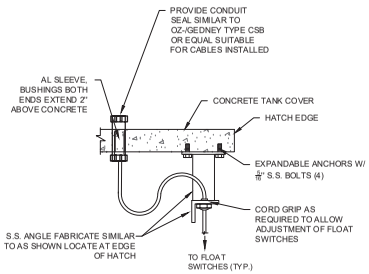
WET WELL SECTION

NO SCALE



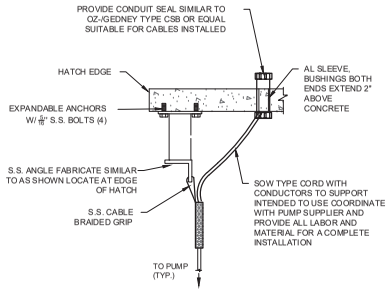
TERMINAL BOX DETAILS

NO SCALE



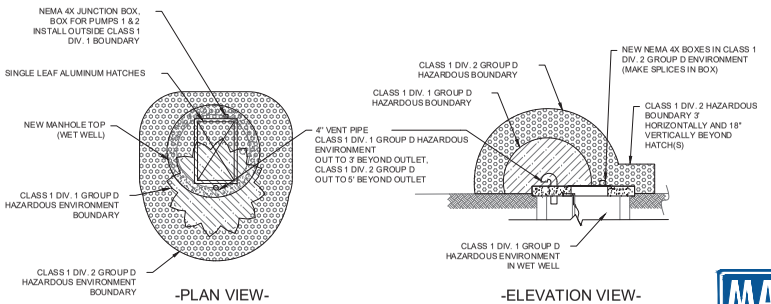
FLOAT SWITCH SUPPORT DETAIL

NO SCALE



PUMP LEAD SUPPORT DETAIL

NO SCALE



HAZARDOUS CLASSIFIED AREA

NO SCALE

STATE OF KENTUCKY
MATTHEW MORGAN
No. 37688
LICENSED PROFESSIONAL ENGINEER
08/26/2025

MARCUM
Paducah, KY Office
2301 McCracken Blvd, Paducah, KY 42001
270-444-9274 / marcumengineers.com

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF HIGHWAYS

SITE ELECTRICAL DETAILS

ITEM NO. 02-00012.00
COUNTY OF CHRISTIAN
SHEET NO. U26

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

August 29, 2025

Christopher Smith
1219 Wilkinson Blvd
Frankfort, KY 40601

Re: Christian County Rest Area Water & Sewer Renovation
Christian County, Kentucky
Oak Grove WWTP
Activity ID #: 780, APE20250003
Receiving Treatment Plant KPDES #: KY00940056

Dear Mr. Smith:

We have reviewed the plans and specifications for the above referenced project. The plans include the construction of approximately 5025 linear feet of 4-inch PVC sanitary force main and duplex grinder pumps capable of 100gpm at 48ft of head. This is to advise that plans and specifications for the above referenced project are APPROVED with respect to sanitary features of design, as of this date with the requirements contained in the attached construction permit.

If we can be of any further assistance or should you wish to discuss this correspondence, please do not hesitate to contact Serena Male at 502-782-1558.

Sincerely,

Ken Melton, P.E.
Supervisor, Clean Water Engineering Section
Signed by: Ken Melton
Water Infrastructure Branch
Division of Water

KM / SM
Enclosures
c: Christian County Health Department
Bacon Farmer Workman (BFW) Engineering & Testing Inc
Division of Plumbing
Oak Grove

Sewer Line Construction
Oak Grove WWTP
Facility Requirements

Activity ID No.:APE20250003

GACT0000000021 (Christian County Rest Area sewer relocation) 5025 linear feet of 4-inch PVC sanitary force main and duplex grinder pumps capable of 100gpm at 48ft of head:

Submittal/Action Requirements:

Condition No.	Condition
S-1	When this project is completed, the applicant shall: submit written certification: Due 30 calendar days after Completion of Construction to the Division of Water that the facilities have been constructed and tested in accordance with the approved plans and specifications and the approval conditions. Such certification shall be signed by a registered professional engineer. Failure to certify may result in penalty assessment and/or future approvals being withheld. [401 KAR 5:005 Section 24(2)]

Narrative Requirements:

Condition No.	Condition
T-1	The plans and specifications submitted for the project are approved by the Department of Environmental Protection as to sanitary features, subject to the requirements contained within the permit. [401 KAR 5:005 Section 24(3)]
T-2	Authority to construct these sewers is hereby granted. This approval is issued under the provisions of KRS Chapter 224.10-100 (19) regulations promulgated pursuant thereto. Issuance of this permit does not relieve the permittee from the responsibility of obtaining any permits or licenses required by this cabinet and other state, federal, and local agencies. [401 KAR 5:005 Section 24(3)(c)2]
T-3	A permit to construct a facility shall be effective and valid for twenty-four (24) months upon issuance unless otherwise conditioned. If construction has not commenced within twenty-four (24) months following a permit's issuance, a new permit shall be obtained before construction may begin. [401 KAR 5:005 Section 24(1)]
T-4	The permit is issued to the applicant, and the permittee shall remain the responsible party for compliance with all applicable statutes and administrative regulations until a notarized applicable change in ownership certification is submitted and the transfer of ownership is acknowledged by the cabinet. [401 KAR 5:005 Section 28(1)]
T-5	The issuance of a permit by the cabinet does not convey any property rights of any kind or any exclusive privilege. [401 KAR 5:005 Section 24(5)]
T-6	There shall be no deviations from the plans and specifications submitted with the application or the conditions specified, unless authorized in writing by the cabinet. [401 KAR 5:005 Section 24(3)(b)1]

Sewer Line Construction
Oak Grove WWTP
Facility Requirements

Activity ID No.:APE20250003

GACT0000000021 (Christian County Rest Area sewer relocation) 5025 linear feet of 4-inch PVC sanitary force main and duplex grinder pumps capable of 100gpm at 48ft of head:

Narrative Requirements:

Condition No.	Condition
T-7	For subfluvial pipe crossings, a floodplain construction permit will not be required pursuant to KRS 151.250, if the following requirements of 401 KAR 4:050 Section 2 are met: 1) During the construction of the crossing, no material may be placed in the stream or in the flood plain of the stream to form construction pads, coffer dams, access roads, etc., unless prior approval has been obtained from the cabinet. 2) The trench shall be backfilled as closely as possible to the original contour. All excess material from construction of the trench shall be disposed of outside of the flood plain, unless the applicant has received prior approval from the cabinet to fill within the flood plain. 3) For subfluvial crossings of erodible channels, there shall be at least thirty (30) inches of clear cover above the top of the pipe or conduit at all points. 4) For subfluvial crossings of nonerodible channels, there shall be at least six (6) inches of clear cover above the top of the pipe or conduit at all points, and the pipe or conduit shall be encased on all sides by at least six (6) inches of concrete. 5) The weight of a pipe and its contents during normal operating conditions at all points must exceed that of an equal volume of water, or the applicant must provide the division with sufficient information to show that the pipe and joints have sufficient strength. Contact the Floodplain Management Section of the Surface Water Permits Branch at (502) 564-3410 with any question on these requirements. [KRS 151.250 & 401 KAR 4:060]
T-8	If any portion of the sewer project will be constructed in or along a stream or wetland, contact the Water Quality Certification Section, located within the Water Quality Branch, at 502-564-3410, to determine if a 401 certification will be required. [KRS 224.16-050]
T-9	Facilities shall be designed and constructed in accordance with the "Recommended Standards for Wastewater Facilities" of the Great Lakes-Upper Mississippi River Board of State Public Health and Environmental Managers, commonly referred to as "Ten States' Standards", 2014 edition. [401 KAR 5:005 Section 7(1)(a)]
T-10	Gravity sewer lines and force mains shall be designed and constructed to give mean velocities, when flowing full, of not less than two (2) feet per second. Velocity calculations shall incorporate roughness coefficients pursuant to 401 KAR 5:005 Section 8(8). [401 KAR 5:005 Section 8(8)]
T-11	Sewer line pipe material, joints, fittings, and installation shall conform to the latest ASTM specifications. [Ten States (WW) 33.7-33.9]
T-12	Gravity sewer lines and force mains shall have a minimum of thirty (30) inches of cover or provide comparable protection. [401 KAR 5:005 Section 8(9)]

Sewer Line Construction
Oak Grove WWTP
Facility Requirements

Activity ID No.:APE20250003

GACT0000000021 (Christian County Rest Area sewer relocation) 5025 linear feet of 4-inch PVC sanitary force main and duplex grinder pumps capable of 100gpm at 48ft of head:

Narrative Requirements:

Condition No.	Condition
T-13	Sewer lines crossing water mains shall be laid to provide a vertical distance of eighteen (18) inches between the outside of the water main and the outside of the sewer line. This shall be the case where the water main is either above or below the sewer line. The crossing shall be arranged so that the sewer line joints are equidistant and as far as possible from the water main joints. Where a water main crosses under a sewer, adequate structural support shall be provided for the sewer line to prevent damage to the water main. [Ten States (WW) 38.32]
T-14	Sewer lines shall be laid at least ten (10) feet horizontally from any existing or proposed water main. The distance shall be measured from edge to edge. [Ten States (WW) 38.31]
T-15	If gravity sewer lines and force mains are to be constructed in fill areas, the fill areas shall be compacted to ninety-five (95) percent density as determined by the Standard Proctor Density test or to a minimum of ninety (90) percent density as determined by the Modified Proctor Density test prior to the installation of the sewer lines. [401 KAR 5:005 Section 8(10)]
T-16	An audible and visible alarm shall be provided at any proposed wastewater pump station. [Ten States (WW) 46]
T-17	All proposed pump station wetwells shall be sized such that, based on the average flow, the time to fill the wetwell from the pump-off elevation to the pump-on elevation shall not exceed thirty (30) minutes. [401 KAR 5:005 Section 8(16)]
T-18	All pump stations shall provide a minimum of two (2) hours of detention time, based on the average design flow, above the high level alarm elevation or provide an alternate source of power with wetwell storage providing sufficient time for the alternate power source to be activated. [401 KAR 5:005 Section 8(18)]

Sewer Line Construction
Oak Grove WWTP
Facility Requirements

Activity ID No.:APE20250003

PORT0000000037 (Christian County Rest Area sewer relocation) duplex grinder pumps capable of 100gpm at 48ft of head:

Narrative Requirements:

Condition No.	Condition
T-1	Pumps and force mains handling raw wastewater shall be capable of passing spheres of at least three (3) inches in diameter. Pump suction and discharge openings, as well as sewer force main pipe, shall be a minimum of four (4) inches in diameter. The above requirements do not apply to grinder pump stations or force mains directly connected to grinder pump stations. [Ten States (WW) 42.33, 49.1]

Sewer Line Construction
Oak Grove WWTP
Facility Requirements

Activity ID No.:APE20250003

PORT0000000038 (Christian County Rest Area sewer relocation) 5025 linear feet of 4-inch PVC sanitary force main:

Narrative Requirements:

Condition No.	Condition
T-1	The integrity of any proposed force main shall be verified by leakage tests. The specifications shall include testing methods and leakage limits. [401 KAR 5:005 Section 8(6)(b)]
T-2	Each high point in the sewer force main shall have an automatic air release valve. [401 KAR 5:005 Section 8(19)]
T-3	Adequate thrust blocks shall be provided at all significant bends in any proposed sewer force main, in order to prevent movement of the main. [Ten States (WW) 49.4]

Distribution-Water Line Extension
Logan Todd Regional Water Commission
Facility Requirements

Activity ID No.:APE20250002

GACT0000000013 (Christian County Rest Area Water Renovation) 3438 linear feet of 6-inch PVC water line:

Narrative Requirements:

Condition No.	Condition
T-1	Construction of this project shall not result in the water system's inability to supply consistent water service in compliance with 401 KAR 8:010 through 8:600. [401 KAR 8:100 Section 5]
T-2	The public water system shall not implement a change to the approved plans without the prior written approval of the cabinet. [401 KAR 8:100 Section 4(3)]
T-3	A proposed change to the approved plans affecting sanitary features of design shall be submitted to the cabinet for approval in accordance with Section 2 of this administrative regulation. [401 KAR 8:100 Section 4(2)]
T-4	During construction, a set of approved plans and specifications shall be available at the job site. Construction shall be performed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 3(1)]
T-5	Unless construction begins within two (2) years from the date of approval of the final plans and specifications, the approval shall expire. [401 KAR 8:100 Section 3(3)]
T-6	Upon completion of construction, a professional engineer shall certify in writing that the project has been completed in accordance with the approved plans and specifications. [401 KAR 8:100 Section 4(1)]
T-7	The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. [Recommended Standards for Water Works 8.2.1, Drinking Water General Design Criteria IV.1.a]
T-8	Water lines should be hydraulically capable of a flow velocity of 2.5 ft/s while maintaining a pressure of at least 20 psi. [Drinking Water General Design Criteria IV.1.b]
T-9	The normal working pressure in the distribution system at the service connection shall not be less than 30 psi under peak demand flow conditions. Peak demand is defined as the maximum customer water usage rate, expressed in gallons per minute (gpm), in the pressure zone of interest during a 24 hour (diurnal) time period. [Drinking Water General Design Criteria IV.1.d]
T-10	When static pressure exceeds 150 psi, pressure reducing devices shall be provided on mains or as part of the meter setting on individual service lines in the distribution system. [Drinking Water General Design Criteria IV.1.c]
T-11	The minimum size of water main in the distribution system where fire protection is not to be provided should be a minimum of three (3) inch diameter. Any departure from minimum requirements shall be justified by hydraulic analysis and future water use, and can be considered only in special circumstances. [Recommended Standards for Water Works 8.2.2, Drinking Water General Design Criteria IV.2.b]

Distribution-Water Line Extension
Logan Todd Regional Water Commission
Facility Requirements

Activity ID No.:APE20250002

GACT0000000013 (Christian County Rest Area Water Renovation) 3438 linear feet of 6-inch PVC water line:

Narrative Requirements:

Condition No.	Condition
T-12	Water mains not designed to carry fire-flows shall not have fire hydrants connected to them. [Recommended Standards for Water Works 8.4.1.b]
T-13	Flushing devices should be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-14	No flushing device shall be directly connected to any sewer. [Recommended Standards for Water Works 8.2.4.b, Recommended Standards for Water Works 8.4.1.b]
T-15	Pipe shall be constructed to a depth providing a minimum cover of 30 inches to top of pipe. [Drinking Water General Design Criteria IV.3.a]
T-16	Water mains shall be covered with sufficient earth or other insulation to prevent freezing. [Recommended Standards for Water Works 8.7]
T-17	A continuous and uniform bedding shall be provided in the trench for all buried pipe. Backfill material shall be tamped in layers around the pipe and to a sufficient height above the pipe to adequately support and protect the pipe. Stones found in the trench shall be removed for a depth of at least six inches below the bottom of the pipe. [Recommended Standards for Water Works 8.7]
T-18	Water line installation shall incorporate the provisions of the AWWA standards and/or manufacturer's recommended installation procedures. [Recommended Standards for Water Works 8.7]
T-19	All materials used for the rehabilitation of water mains shall meet ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-20	Packing and jointing materials used in the joints of pipe shall meet the standards of AWWA and the reviewing authority. [Recommended Standards for Water Works 8.1]
T-21	All tees, bends, plugs and hydrants shall be provided with reaction blocking, tie rods or joints designed to prevent movement. [Recommended Standards for Water Works 8.7]
T-22	All materials including pipe, fittings, valves and fire hydrants shall conform to the latest standards issued by the ASTM, AWWA and ANSI/NSF, where such standards exist, and be acceptable to the Division of Water. [Recommended Standards for Water Works 8.1]
T-23	Water mains which have been used previously for conveying potable water may be reused provided they meet the above standards and have been restored practically to their original condition. [Recommended Standards for Water Works 8.1]

Distribution-Water Line Extension
Logan Todd Regional Water Commission
Facility Requirements

Activity ID No.:APE20250002

GACT0000000013 (Christian County Rest Area Water Renovation) 3438 linear feet of 6-inch PVC water line:

Narrative Requirements:

Condition No.	Condition
T-24	Manufacturer approved transition joints shall be used between dissimilar piping materials. [Recommended Standards for Water Works 8.1]
T-25	The minimum size of water main which provides for fire protection and serving fire hydrants shall be six?inch diameter. [Recommended Standards for Water Works 8.2, Drinking Water General Design Criteria IV.2.a]
T-26	Pipes and pipe fittings containing more than 8% lead shall not be used. All products shall comply with ANSI/NSF standards. [Recommended Standards for Water Works 8.1]
T-27	Gaskets containing lead shall not be used. Repairs to lead?joint pipe shall be made using alternative methods. [Recommended Standards for Water Works 8.1]
T-28	Pipe materials shall be selected to protect against both internal and external pipe corrosion. [Recommended Standards for Water Works 8.1]
T-29	Dead end mains shall be equipped with a means to provide adequate flushing. [Recommended Standards for Water Works 8.2]
T-30	The hydrant lead shall be a minimum of six inches in diameter. Auxiliary valves shall be installed on all hydrant leads. [Recommended Standards for Water Works 8.4.3]
T-31	A sufficient number of valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. [Recommended Standards for Water Works 8.3]
T-32	Wherever possible, chambers, pits or manholes containing valves, blow?offs, meters, or other such appurtenances to a distribution system, shall not be located in areas subject to flooding or in areas of high groundwater. Such chambers or pits should drain to the ground surface, or to absorption pits underground. The chambers, pits and manholes shall not connect directly to any storm drain or sanitary sewer. Blow?offs shall not connect directly to any storm drain or sanitary sewer. [Recommended Standards for Water Works 8.6]
T-33	At high points in water mains where air can accumulate provisions shall be made to remove the air by means of air relief valves. [Recommended Standards for Water Works 8.5.1]
T-34	Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur. [Recommended Standards for Water Works 8.5.1]
T-35	The open end of an air relief pipe from automatic valves shall be extended to at least one foot above grade and provided with a screened, downward?facing elbow. [Recommended Standards for Water Works 8.5.2.c]

Distribution-Water Line Extension
Logan Todd Regional Water Commission
Facility Requirements

Activity ID No.:APE20250002

GACT0000000013 (Christian County Rest Area Water Renovation) 3438 linear feet of 6-inch PVC water line:

Narrative Requirements:

Condition No.	Condition
T-36	Discharge piping from air relief valves shall not connect directly to any storm drain, storm sewer, or sanitary sewer. [Recommended Standards for Water Works 8.5.2.d]
T-37	Water pipe shall be constructed with a lateral separation of 10 feet or more from any gravity sanitary or combined sewer measured edge to edge where practical. If not practical a variance may be requested to allow the water pipe to be installed closer to the gravity sanitary or combined sewer provided the water pipe is laid in a separate trench or undisturbed shelf located on one side of the sewer with the bottom of the pipe at least 18 inches above the top of the gravity sanitary or combined sewer pipe. [Drinking Water General Design Criteria IV.3.b]
T-38	Water lines crossing sanitary, combined or storm sewers shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and the outside of the sanitary, combined or storm sewer with preference to the water main located above the sanitary, combined or storm sewer. [Drinking Water General Design Criteria IV.3.c]
T-39	At crossings, one full length of water pipe shall be located so both joints will be as far from the sewer as possible. [Recommended Standards for Water Works 8.8.3.b]
T-40	There shall be no connection between the distribution system and any pipes, pumps, hydrants, or tanks whereby unsafe water or other contaminating materials may be discharged or drawn into the system. [Recommended Standards for Water Works 8.10.1]
T-41	Water utilities shall have a cross connection program conforming to 401 KAR 8. [Recommended Standards for Water Works 8.10.1]
T-42	Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate AWWA Standards. [Recommended Standards for Water Works 8.7.6]
T-43	New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. In an emergency or unusual situation, the disinfection procedure shall be discussed with the Division of Water. [Recommended Standards for Water Works 8.7.7]
T-44	A minimum cover of five feet shall be provided over pipe crossing underwater. [Recommended Standards for Water Works 8.9.2]
T-45	Valves shall be provided at both ends of water crossings so that the section can be isolated for testing or repair; the valves shall be easily accessible, and not subject to flooding for pipes crossing underwater. [Recommended Standards for Water Works 8.9.2.b]
T-46	Permanent taps or other provisions to allow insertion of a small meter to determine leakage and obtain water samples on each side of the valve closest to the supply source for pipes crossing. [Recommended Standards for Water Works 8.9.2.c]

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

September 16, 2025

Kyle Kenner
Logan Todd Regional Water Commission
PO Box 400
Guthrie, KY 42234

RE: Christian County Rest Area Water & Sewer Renovation
Todd County, KY
Logan Todd Regional Water Commission
AI #: 6029, APE20250002
PWSID #: 1101005-25-002

Dear Kyle Kenner:

We have reviewed the plans and specifications for the above referenced project. The plans include the construction of approximately 3,438 linear feet of 6-inch PVC water line. This is to advise that plans and specifications for the above referenced project are APPROVED with respect to sanitary features of design, as of this date with the requirements contained in the attached construction permit.

If you have any questions concerning this project, please contact Serena Male at 502-782-1558.

Sincerely,

Terry Humphries, P.E.
Supervisor, Engineering Section
Water Infrastructure Branch
Division of Water

TH:SM
Enclosures
c: McGhee Engineering Inc
Todd County Health Department
Division of Plumbing

KENTUCKY TRANSPORTATION CABINET
Department of Highways
DIVISION OF RIGHT OF WAY & UTILITIES

TC 62-226
Rev. 01/2016
Page 1 of 1

RIGHT OF WAY CERTIFICATION

☒ Original	☐ Re-Certification	RIGHT OF WAY CERTIFICATION	
ITEM #	**COUNTY**	**PROJECT # (STATE)**	**PROJECT # (FEDERAL)**
2-12	Christian	FD04 024 0024 092-093	N/A
PROJECT DESCRIPTION			

RECONSTRUCT WATER LINE AND SANITARY SEWER LINE AT THE I-24 REST AREA IN CHRISTIAN COUNTY.

☒ **No Additional Right of Way Required**

Construction will be within the limits of the existing right of way. The right of way was acquired in accordance to FHWA regulations under the Uniform Relocation Assistance and Real Property Acquisitions Policy Act of 1970, as amended. No additional right of way or relocation assistance were required for this project.

☐ **Condition # 1 (Additional Right of Way Required and Cleared)**

All necessary right of way, including control of access rights when applicable, have been acquired including legal and physical possession. Trial or appeal of cases may be pending in court but legal possession has been obtained. There may be some improvements remaining on the right-of-way, but all occupants have vacated the lands and improvements, and KYTC has physical possession and the rights to remove, salvage, or demolish all improvements and enter on all land. Just Compensation has been paid or deposited with the court. All relocations have been relocated to decent, safe, and sanitary housing or that KYTC has made available to displaced persons adequate replacement housing in accordance with the provisions of the current FHWA directive.

☐ **Condition # 2 (Additional Right of Way Required with Exception)**

The right of way has not been fully acquired, the right to occupy and to use all rights-of-way required for the proper execution of the project has been acquired. Some parcels may be pending in court and on other parcels full legal possession has not been obtained, but right of entry has been obtained, the occupants of all lands and improvements have vacated, and KYTC has physical possession and right to remove, salvage, or demolish all improvements. Just Compensation has been paid or deposited with the court for most parcels. Just Compensation for all pending parcels will be paid or deposited with the court prior to AWARD of construction contract

☐ **Condition # 3 (Additional Right of Way Required with Exception)**

The acquisition or right of occupancy and use of a few remaining parcels are not complete and/or some parcels still have occupants. All remaining occupants have had replacement housing made available to them in accordance with 49 CFR 24.204. KYTC is hereby requesting authorization to advertise this project for bids and to proceed with bid letting even though the necessary right of way will not be fully acquired, and/or some occupants will not be relocated, and/or the just compensation will not be paid or deposited with the court for some parcels until after bid letting. KYTC will fully meet all the requirements outlined in 23 CFR 635.309(c)(3) and 49 CFR 24.102(j) and will expedite completion of all acquisitions, relocations, and full payments after bid letting and prior to AWARD of the construction contract or force account construction.

Total Number of Parcels on Project	0	**EXCEPTION (S) Parcel #**	**ANTICIPATED DATE OF POSSESSION WITH EXPLANATION**
Number of Parcels That Have Been Acquired			
Signed Deed			
Condemnation			
Signed ROE			

Notes/ Comments (Use Additional Sheet if necessary)

LPA RW Project Manager		Right of Way Supervisor	
Printed Name		Printed Name	
Signature		Signature	Digitally signed by Jennifer K. Cox Date: 2025.09.04 10:30:06 -05'00'
Date		Date	

Right of Way Director		FHWA	
Printed Name		Printed Name	
Signature	Digitally signed by Kelly Divine Date: 2025.09.05 14:18:12 -05'00'	Signature	
Date		Date	

UTILITIES AND RAIL CERTIFICATION NOTE

2-12.00
Christian County
I 24
FD04 024 0024 092-093

GENERAL PROJECT NOTE ON UTILITY PROTECTION

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

N/A

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

N/A

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

N/A

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

Oak Grove Water and HWEA (Sewer)

THE FOLLOWING RAIL COMPANIES HAVE FACILITIES IN CONJUNCTION WITH THIS PROJECT AS NOTED

☒ **No Rail Involved** ☐ **Minimal Rail Involved (See Below)** ☐ **Rail Involved (See Below)**

UTILITIES AND RAIL CERTIFICATION NOTE

2-12.00
Christian County
I 24
FD04 024 0024 092-093

UNDERGROUND FACILITY DAMAGE PROTECTION – BEFORE YOU DIG

The contractor shall make every effort to protect underground facilities from damage as prescribed in the Underground Facility Damage Protection Act of 1994, Kentucky Revised Statute KRS 367.4901 to 367.4917. It is the contractor's responsibility to determine and take steps necessary to be in compliance with federal and state damage prevention directives. The contractor is instructed to contact KY 811 for the location of existing underground utilities. Contact shall be made a minimum of two (2) and no more than ten (10) business days prior to excavation.

The contractor shall submit Excavation Locate Requests to the Kentucky Contact Center (KY 811) via web ticket entry. The submission of this request does not relieve the contractor from the responsibility of contacting non-member facility owners, whom are to be contacted through their individual Protection Notification Center. It may be necessary for the contractor to contact the County Court Clerk to determine what utility companies have facilities in the area. Non-compliance with these directives can result in the enforcement of penalties.

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.

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

UTILITIES AND RAIL CERTIFICATION NOTE

2-12.00
Christian County
I 24
FD04 024 0024 092-093

AREA UTILITIES CONTACT LIST

NOTE: The Utilities Contact List is provided as informational only, and may not be a complete list of all Utility Companies with facilities in the project area.

Pennyrile RECC	Jordan Perry	joperry@precc.com/270-498-6802
AT&T	Michael Forrest	michael.forrest@att.com/270-519-5862
HWEA	Trey Pollock	tpollock@hwea-ky.com/ 270-887-4726
Oak Grove Water	Brandy Moore	brandy.moore@oakgroveky.org/ 270-439-4646 / 270-640-4232
Logan Todd Regional Water Commission	Kyle Kenner	kkenner@ltwrc.org/ 270-483-6990/270-878-0377

GENERAL UTILITY NOTES AND INSTRUCTIONS APPLICABLE TO ALL UTILITY WORK MADE A PART OF THE ROAD CONSTRUCTION CONTRACT

The contractor should be aware the following utility notes and KYTC Utility Bid Item Descriptions shall supersede, replace and take precedence over any and all conflicting information that may be contained in utility owner supplied specifications contained in the contract, on plans supplied by the utility owner, or any utility owner specifications or information externally referenced in this contract.

Where information may have been omitted from these notes, bid item descriptions, utility owner supplied specifications or plans; the KYTC Standard Specifications for Road and Bridge Construction shall be referenced.

PROTECTION OF EXISTING UTILITIES

The existing utilities shown on the plans are shown as best known at the time the plans were developed and are to be used as a guide only by the Contractor. The Contractor shall use all means at his disposal to accurately locate all existing utilities, whether shown on the plans or not, prior to excavation. The contractor shall protect these utilities during construction. Any damage to existing utilities during construction that are shown or not shown on the plans shall be repaired at the Contractor's expense.

PREQUALIFIED UTILITY CONTRACTORS

Some utility owners may require contractors that perform relocation work on their respective facilities as a part of the road contract be prequalified or preapproved by the utility owner. Those utility owners with a prequalification or preapproval requirement are as follows:

*(The district utility agent shall list here utility owners requiring prequalified or preapproved contractors to perform work on their facilities. The utility agent shall place appropriate list(s) of prequalified or preapproved contractors at the end of these notes with each list identified with the utility owner name, utility type and appropriate heading at the top. If there are some utility owners that require prequalified or preapproved contractors and others that do not within this same contract, it may be prudent to list here each utility owner with utility work in the road contract and state if they require prequalified or preapproved contractors or not. If no utility owner prequalifies or preapproves contractors, the following statement shall be placed here: "**No contractors***

are required to be prequalified or preapproved by the utility owner(s) to perform utility relocation work under this contract.")

The bidding contractor needs to review the above list and choose from the list of approved subcontractors at the end of these general notes as identified above before bidding. When the list of approved subcontractors is provided, only subcontractors shown on the following list(s) will be allowed to work on that utility as a part of this contract.

When the list of approved subcontractors for the utility work is not provided in these general notes, the utility work must be completed by either the prime contractor or a subcontractor that is prequalified with the KYTC Division of Construction Procurement in the work type of "Utilities" (I33). Those who would like to become prequalified may contact the Division of Construction Procurement at (502) 564-3500. Please note: it could take up to 30 calendar days for prequalification to be approved. The prequalification does not have to be approved prior to the bid, but must be approved before the subcontract will be approved by KYTC and the work can be performed.

CONTRACT ADMINISTRATION RELATIVE TO UTILITY WORK

All utility work is being performed as a part of a contract administered by KYTC; there is not a direct contract between the utility contractor and utility owner. The KYTC Section Engineer is ultimately responsible for the administration of the road contract and any utility work included in the contract.

SUBMITTALS AND CORRESPONDENCE

All submittals and correspondence of any kind relative to utility work included in the road contract shall be directed to the KYTC Section Engineer, a copy of which may also be supplied to the utility owner by the contractor to expedite handling of items like material approvals and shop drawings. All approvals and correspondence generated by the utility owner shall be directed to the KYTC Section Engineer. The KYTC Section Engineer will relay any approvals or correspondence to the utility contractor as appropriate. At no time shall any direct communication between the utility owner and utility contractor without the communication flowing through the KYTC Section Engineer be considered official and binding under the contract.

ENGINEER

Where the word "Engineer" appears in any utility owner specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Engineer" is the Kentucky Transportation Cabinet (KYTC) Section Engineer or designated representative and the utility owner engineer or designated representative jointly. Both engineers must mutually agree upon all decisions made with regard to the utility construction. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

INSPECTOR OR RESIDENT PROJECT REPRESENTATIVE

Where the word "Inspector" or "Resident Project Representative" appears in the utility specifications included in this proposal, utility owner specifications included as a part of this contract by reference or on the utility relocation plans, it shall be understood the "Inspector" or "Resident Project Representative" is the utility owner inspector and KYTC inspector jointly. The Transportation Cabinet, Section Engineer shall make all final decisions in all disputes.

NOTICE TO UTILITY OWNERS OF THE START OF WORK

One month before construction is to start on a utility, the utility contractor shall make notice to the KYTC Section Engineer and the utility owner of when work on a utility is anticipated to start. The utility contractor shall again make confirmation notice to the KYTC Section Engineer and the utility owner one week before utility work is to actually start.

UTILITY SHUTDOWNS

The Contractor shall not shut down any active and in-service mains, utility lines or services for any reason unless specifically given permission to do so by the utility owner. The opening and closing of valves and operating of other active utility facilities for main, utility line or utility service shut downs are to be performed by the utility owner unless specific permission is given to the contractor by the owner to make shutdowns . If and when the utility owner gives the contractor permission to shutdown mains, utility lines or utility services, the contractor shall do so following the rules, procedures and regulations of the utility owner. Any permission given by the utility owner to the contractor to shutdown active and in-service mains, utility lines or services shall be communicated to the KYTC Section Engineer by the utility owner that such permission has been given.

Notice to customers of utility shut downs is sometimes required to be performed by the utility contractor. The contractor may be required; but, is not limited to, making notice to utility customers in a certain minimum amount of time in advance of the shut down and by whatever means of communication specified by the utility owner. The means of communication to the customer may be; but is not limited to, a door hanger, notice by newspaper ad, telephone contact or any combination of communication methods deemed necessary, customary and appropriate by the utility owner. The contractor should refer to the utility owner specifications for requirements on customer notice.

Any procedure the utility owner may require the contractor to perform by specification or plan note and any expense the contractor may incur to comply with the utility owner's shut down procedure and notice to customers shall be considered an incidental expense to the utility construction.

STATIONS AND DISTANCES

All stations and distances, when indicated for utility placement in utility relocation plans or specifications, are approximate; therefore, some minor adjustment may have to be made during construction to fit actual field conditions. Any changes in excess of 6 inches of plan location shall be reviewed and approved jointly by the KYTC Section Engineer or designated representative and utility owner engineer or

designated representative. Changes in location without prior approval shall be remedied by the contractor at his own expense if the unauthorized change creates an unacceptable conflict or condition.

RESTORATION

Temporary and permanent restoration of paved or stone areas due to utility construction shall be considered incidental to the utility work. No separate payment will be made for this work. Temporary restoration shall be as directed by the KYTC Section Engineer. Permanent restoration shall be "in-kind" as existing.

Restoration of seed and sod areas will be measured and paid under the appropriate seeding and sodding bid items established in the contract for roadway work.

BELOW ARE NOTES FOR WHEN "INST" ITEMS ARE IN THE CONTRACT MEANING THE UTILITY COMPANY IS PROVIDING CERTAIN MATERIALS FOR UTILITY RELOCATION

MATERIAL

Contrary to Utility Bid Item Descriptions, those bid items that have the text **"Inst"** at the end of the bid item will have the major components of the bid item provided by the utility owner. No direct payment will be made for the major material component(s) supplied by the utility company. All remaining materials required to construct the bid item as detailed in utility bid item descriptions, in utility specifications and utility plans that are made a part of this contract will be supplied by the contractor. The contractor's bid price should reflect the difference in cost due to the provided materials.

The following utility owners have elected to provide the following materials for work under this contract:

*(List here utility owner name(s) and specific materials that will be provided to the contractor. If there are some utility owners that will be supplying materials and others that will not, it may be prudent to also list each utility owner that will not be supplying materials for clarity of the contract. If no utility owner intends to supply materials, the following statement shall be placed here: "**No materials are being supplied by the utility owner(s). All materials are to be supplied by the contractor per bid item descriptions, utility specifications and utility plans**.")*

SECURITY OF SUPPLIED MATERIALS

If any utility materials are to be supplied by the utility owner, it will be the responsibility of the utility contractor to secure all utility owner supplied materials after delivery to the project site. The utility contractor shall coordinate directly with the utility owner and their suppliers for delivery and security of the supplied materials. Any materials supplied by the utility owner and delivered to the construction site that are subsequently stolen, damaged or vandalized and deemed unusable shall be replaced with like materials at the contractor's expense.

Standard Water Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

W AIR RELEASE VALVE This bid item description shall apply to all air release valve installations of every size except those defined as "Special". This item shall include the air release valve, main to valve connecting line or piping, manhole, vault, structure, access casting or doors, tapping the main, labor, equipment, excavation, proper backfill, and restoration required to install the air release valve at the location shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

W CAP EXISTING MAIN This item shall include the specified cap, concrete blocking and/or mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the cap on an existing main to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to cap new main installations or mains that are to be abandoned. This pay item is only to be paid to cap existing mains to be left in service. Caps on new mains are to be considered incidental to the new main, as are other fittings, and are not to be paid under this item. All caps on existing mains shall be paid under this one bid item included in the contract, regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W CATHODIC PROTECTION This item is for providing and installing all cathodic protection materials to iron pipe and fittings, as specified in plans and specifications, complete and ready-for-use. Materials to be supplied and installed by the contractor shall include, but are not limited to, anodes, wire, fusion kits, test stations, and/or marker posts. All cathodic protection required for the entire project shall be paid under this one item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LUMP SUM (LS) when complete.

W DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized to minimize the impact of open-cut for the installation of water main under streets, creeks, etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore, whether used as a carrier pipe or an encasement of a separate carrier pipe. This item shall also include pipe anchors at

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

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

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

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

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

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

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

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

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

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

W FIRE HYDRANT RELOCATE This item includes all labor and equipment to remove the existing fire hydrant from its existing location and to reinstall at a new location. This item shall include a new isolating valve and valve box, concrete pad around valve box (when required in specifications or plans), new piping, new anchoring tee, anchoring couplings, fire hydrant extensions, concrete blocking, restoration, granular drainage material, excavation, and backfill as indicated on plans, specifications, and standard drawings, compete and ready-for-use. This item shall also include allowing for utility owner inspector to inspect the existing fire hydrant prior to reuse, contractor returning unusable fire hydrants to the utility owner warehouse and picking up a replacement hydrant for use if the existing fire hydrant is determined unfit for reuse. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

W LINE STOP SIZE 1 OR 2 This item shall include the line stop saddle/sleeve, valve, completion plug and any other material, labor, and equipment necessary to complete the line stop as indicated in the plans and/or specifications. This installation shall allow the waterline system to operate as usual without any interruption of service. The size shall be the measured internal diameter of the live pipe to be tapped. The line stop size to be paid under sizes 1 or 2 shall be as follows:
Size 1 = All live tapped main sizes up to and including 8 inches
Size 2 = All live tapped main sizes greater than 8 inches
Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

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

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

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

W METER WITH PRESSURE REDUCING VALVE (PRV) This item is for payment for installation of all standard water meters with pressure reducing valves (PRV) of all sizes 2 inches in diameter or less,

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

W PIPE This item shall apply to all pipe of every size and type material to be used as water main, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing wire with test boxes (if required by specifications), polyethylene wrap (when specified), labor, equipment, excavation, bedding, backfill, restoration, testing, sanitizing, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. No additional payment will be made for rock excavation. This bid item includes material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. This item shall include all temporary and permanent materials, as well as equipment required to pressure test and sanitize mains including, but not limited to, pressurization pumps, hoses, tubing, gauges, main taps, saddles, temporary main end caps or plugs and blocking, main end taps for flushing, chlorine liquids or tablets for sanitizing, water for testing/sanitizing and flushing (when not supplied by the utility), chlorine neutralization equipment and materials, and any other items needed to accomplish pressure testing and sanitizing the main installation. This item shall also include pipe anchors at each end of polyethylene pipe runs, when specified to prevent the creep or contraction of the pipe. When owner specifications require, this bid item shall include contractor preparation of as-built drawings to be provided to the engineer and/or utility owner at the end of construction. Measurement of quantities under this item shall be through fittings, encasements, and directional bores (only when a separate carrier pipe is specified within the directional bore pipe). Measurements shall be further defined to be to the center of tie-in where new pipe contacts existing pipe at the center of connecting fittings, to the outside face of vault or structure walls, or to the point of main termination at dead ends. No separate payment will be made under pipe items when the directional bore pipe is the carrier pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W PRESSURE REDUCING VALVE This item shall apply to all pressure reducing valves (PRV) of every size required in the plans and specifications, except those bid items defined as "Special". Payment under this description is to be for PRVs being installed with new main. This item includes the PRV as specified in the plans and specifications, polyethylene wrap (if required by specification), labor, equipment, excavation, anchoring (if any), pit or vault, backfill, restoration, testing, disinfection, etc., required to install the specified PRV at the location shown on the plans, in accordance with the specifications and standard

drawings, complete and ready-for-use. If required on the plans and/or proposed adjoining DIP is restrained, PRVs shall be restrained. PRV restraint shall be considered incidental to the PRV and adjoining pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

W SERVICE SHORT SIDE This item shall apply to all service line installations of every size up to and including 2-inch internal diameter, except those service bid items defined as "Special". This item includes installation of the specified piping material of the size specified on plans, encasement of 2 inches or less internal diameter (if required by plans or specifications), main tap, tapping saddle (if required), corporation stop, coupling for connecting the new piping to the surviving existing piping, labor, equipment, excavation, backfill, testing, disinfection, and restoration at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. This bid item is to pay for service installations where both ends of the service connection are on the same side of the public roadway, or when an existing service crossing a public roadway will remain and is being extended, reconnected, or relocated, with all work on one side of the public roadway centerline as shown on the plans. The length of

the service line is not to be specified and shall not be restricted to any minimum or maximum length. Placement of a service lateral across a private residential or commercial entrance alone shall not be reason to make payment under this item. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. This pay item does not include installation or relocation of meters. Meters will be paid separately. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

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

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

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

W VALVE BOX REMOVE This item is in payment for all labor, equipment, restoration materials, disposal, and any other effort for removal of a valve box, leaving the valve in place. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE CUT-IN This item is for new cut-in valve installations of all sizes, where installation is accomplished by cutting out a section of existing main. This item shall include cutting the existing pipe, supplying the specified valve, couplings or sleeves, valve box, concrete pad around valve box (when required in specifications or plans), labor, equipment, and materials to install the valve at the locations

shown on the plans, or as directed by the engineer, complete and ready-for-use. Any pipe required for installation shall be cut from that pipe removed or supplied new by the contractor. No separate payment will be made for pipe required for cut-in valve installation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE REMOVE This item is in payment for all labor, equipment, and restoration materials for cutting of existing pipe and any other effort necessary for total removal of an existing valve and valve box. This bid item shall include disposal of the valve and box, unless plans or specifications state the valve and box are to be salvaged and delivered to the utility owner for reuse. No separate pay items are to be established for size variations. All valve removals, regardless of size, shall be paid under this one pay item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.
If plugging of existing abandoned mains is needed after valve removal, the work shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

Standard Sanitary Sewer Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

S BYPASS PUMPING This item shall include all labor, equipment, and materials needed to complete a bypass pumping and/or hauling operation for diversion of sewage during sanitary sewer construction. Examples of such operations when bypass pumping and/or hauling may be necessary during force main tie-ins, manhole invert reconstruction, insertion of new manholes into existing mains, or other similar construction. There may be more than one bypass pumping/hauling operation on a project. This item shall be paid for each separate bypass pumping/hauling operation occurrence as called out on the plans or directed by the engineer and actually performed. There will be no separate bid items defined for length, duration, or volume of sewage pumped or hauled in each occurrence. If a bypass pumping/hauling operation is called out on the plans, but conditions are such that the bypass pumping/hauling operation is not needed or utilized, no payment will be made under this item. The contractor shall draw his own conclusions as to what labor, equipment, and materials may be needed for each bypass pumping/hauling occurrence. The contractor should be prepared to handle the maximum volume of the sewer being bypassed, even during a storm event. This item shall not be paid separately, but shall be considered incidental, when bypass pumping and/or hauling is needed during cast-in-place-pipe (CIPP) and/or point repair operations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA).

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

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

S CIPP LINER This item is to pay for rehabilitation of existing sanitary sewers using the Cured-In-Place-Pipe method. This bid item description applies to all CIPP sizes included in the contract. All CIPP Liner items, of all varying sizes, shall include all labor, materials, customer notification, testing, necessary permits,

ingress and egress procedures, bypass pumping, pre-construction video, sediment and root removal, dewatering, traffic control, erosion and sediment control, excavation pits, removal and replacement of manhole frames and covers as necessary to facilitate the lining work, sealing at manholes and service connections, clearing and grubbing, pipeline cleaning, re-cleaning, video inspection as many times as necessary, debris collection and disposal, root removal, pre- and post-construction video inspection, all digital inspection footage, final report preparation and approval, the cost of potable water from the Owner, required compliance tests, site restoration, site cleanup, sealing of liner at manholes, acceptance testing, and all other rehabilitation work and incidentals not included under other pay items, necessary to complete the rehabilitation per the plans and specifications. There will be no separate payment for acceptance testing of the lined pipe but shall be considered incidental to this item. Pay under this item shall be by each size bid in the contract. Pay measurement shall be from center of manhole to center of manhole. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

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

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

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

S ENCASEMENT CONCRETE This item includes all labor, equipment, excavation, concrete, reinforcing steel, backfill, restoration, etc. to construct the concrete encasement of the sewer or force main, as shown on the plans and in accordance with the specifications and standard drawings. Payment under this item shall be in addition to the carrier pipe, as paid under separate bid items. Carrier pipe is not included in this bid item. Any and all concrete encasements shall be paid under one bid item, included in the contract, regardless of the size of the carrier pipe or the volume of concrete or steel reinforcement as specified in the plans and specifications. No separate bid items will be established for size variations. Measurement of

pay quantity shall be from end of concrete to end of concrete. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

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

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

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

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

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

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

S FORCE MAIN This item description shall apply to all PVC, ductile iron, and polyethylene/plastic pipe bid items of every size and type, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing wire with test stations (if required by specifications), polyethylene wrap (when specified), labor, equipment, excavation, bedding, restoration, testing, backfill, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. No additional payment will be made for rock excavation. This bid item includes material and placement of flowable fill under existing and

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

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

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

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

basis, but shall be paid EACH (EA) at each location when complete and placed in service. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.

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

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

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

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

S LAMPHOLE Payment under this item is for the installation of a lamphole along or at the end of a gravity sewer pipe for inspection and cleaning of a sewer pipe. Lampholes shall include, but are not limited

to bends, tees, vertical pipe, casting, any other materials specified, excavation, backfilling, air testing, restoration, and cleanup in accordance with the plans, specifications, and standard drawings, complete and ready-for-use. Payment shall be made under this bid item regardless of lamphole size. No separate pay items will be established for size variations. All materials shall be new and unused. No additional compensation will be paid for lamphole height variations. All vertical pipe required to construct the lamphole, regardless of height, shall be considered incidental to this item. No additional payment will be made for rock excavation. Cleanouts on pipes 6 inches or less are not considered lampholes and are not to be paid under this item. Only lampholes on pipes 8 inches or larger are to be paid under this item. Cleanouts on pipes 6 inches or less are to be paid under pay item S LATERAL CLEANOUT. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LATERAL CLEANOUT This item shall be for payment for installation of a cleanout in a service lateral line. This item shall include furnishing and installation of a tee, vertical pipe of whatever length required, and threaded cap. The cleanout shall extend from the lateral to final grade elevation. The size of the cleanout shall be equivalent to the size of the lateral. The cleanout materials shall meet the same specification as those for the lateral. The cleanout shall be installed at the locations shown on the plans or as directed by the engineer. Only one pay item shall be established for cleanout installation. No separate pay items shall be established for size or height variations. Payment under this item is for cleanouts on pipe of 6 inches or less. Cleanouts on pipes of 8 inches or greater are considered lampholes and shall be paid under the S LAMPHOLE bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

S MANHOLE Payment under this item is for the installation of new 4-foot interior diameter sanitary sewer manhole. Payment for manholes will be at the contract unit price, in-place, complete and ready-for-use at the locations shown on plans, in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup, in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting shall be paid as a separate bid item. Anchoring of a casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE ABANDON/REMOVE Payment under this item is for the full or partial removal, disposal, and/or filling of any sanitary sewer manhole, regardless of size or depth, that no longer serves any purpose. All manholes partially removed shall be removed to a point at least 12 inches below final grade, 12 inches below roadway subgrade, or 12 inches clear of any other underground infrastructure, whichever is lowest. If partial removal of an abandoned manhole is elected, the remaining manhole structure shall be filled with flowable fill. Flowable fill shall be considered incidental to this bid item. Plugging of pipes entering and exiting within an abandoned manhole that is left in place partially or in whole shall be considered incidental to this item. All sanitary sewer castings shall be salvaged and securely stockpiled for reuse on new sanitary sewer manholes. Salvage of manhole castings for reuse on the project shall be considered incidental to this

bid item. Any casting that is not needed for reuse, is not reusable, or is directed by the engineer not to be reused shall be disposed of by the contractor. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Plugging or safeloading of pipes required at locations outside of manholes when manholes are removed in total shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

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

S MANHOLE OVERSIZED Payment under this item is for the installation of a new manhole greater than the standard 4-foot interior diameter. Payment for oversized manholes will be made at the contract unit price in-place, complete and ready-for-use at the locations shown on plans, in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup, in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE RECONSTRUCT INVERT This item is to pay for all labor, equipment, and material for

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

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

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

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

S MANHOLE WITH LINING Payment under this item is for the installation of a new 4-foot interior

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

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

S PIPE This item description shall apply to all gravity and force-main sewer pipe bid items, of every size and type of material 8 inches internal diameter and larger, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, tap tees and couplings for joining to existing similar or dissimilar pipes), polyethylene wrap (if required by specification), labor, equipment, excavation, bedding, backfill, restoration, pressure or vacuum testing, temporary testing materials, video inspection, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. This bid item shall include material and placement of flowable fill under existing and proposed pavement, and wherever specified on the plans or in the specifications. No additional payment will be made for rock excavation. Measurement of quantities under this item shall be through fittings and encasements to a point at the outside face of manhole barrels, or to the point of main termination at dead ends or lampholes. Carrier pipe placed within an encasement shall be paid under this item and shall include casing spacers and end seals. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

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

This bid item shall include bypass pumping when required. Measurement shall be from contact point to contact point of old and new pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

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

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

Manhole abandonment shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

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

Manhole removal shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

Christian County I-24 Rest Area
Item No. 02-00012.00

Kentucky Transportation Cabinet

CHRISTIAN COUNTY REST AREA
WATER AND SEWER RENOVATION

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Standard Water Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

W AIR RELEASE VALVE This bid item description shall apply to all air release valve installations of every size except those defined as "Special". This item shall include the air release valve, main to valve connecting line or piping, manhole, vault, structure, access casting or doors, tapping the main, labor, equipment, excavation, proper backfill, and restoration required to install the air release valve at the location shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

W CAP EXISTING MAIN This item shall include the specified cap, concrete blocking and/or mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the cap on an existing main to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to cap new main installations or mains that are to be abandoned. This pay item is only to be paid to cap existing mains to be left in service. Caps on new mains are to be considered incidental to the new main, as are other fittings, and are not to be paid under this item. All caps on existing mains shall be paid under this one bid item included in the contract, regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W CATHODIC PROTECTION This item is for providing and installing all cathodic protection materials to iron pipe and fittings, as specified in plans and specifications, complete and ready-for-use. Materials to be supplied and installed by the contractor shall include, but are not limited to, anodes, wire, fusion kits, test stations, and/or marker posts. All cathodic protection required for the entire project shall be paid under this one item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LUMP SUM (LS) when complete.

W DIRECTIONAL BORE Payment under this item is made whenever the plans or specifications specifically show directional boring is to be utilized to minimize the impact of open-cut for the installation of water main under streets, creeks, etc. Payment under this item shall include the specified bore pipe, labor, and equipment. No separate payment shall be made for bore pipe installed in the bore, whether used as a carrier pipe or an encasement of a separate carrier pipe. This item shall also include pipe anchors at

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

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

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

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

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

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

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

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

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

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

W FIRE HYDRANT RELOCATE This item includes all labor and equipment to remove the existing fire hydrant from its existing location and to reinstall at a new location. This item shall include a new isolating valve and valve box, concrete pad around valve box (when required in specifications or plans), new piping, new anchoring tee, anchoring couplings, fire hydrant extensions, concrete blocking, restoration, granular drainage material, excavation, and backfill as indicated on plans, specifications, and standard drawings, compete and ready-for-use. This item shall also include allowing for utility owner inspector to inspect the existing fire hydrant prior to reuse, contractor returning unusable fire hydrants to the utility owner warehouse and picking up a replacement hydrant for use if the existing fire hydrant is determined unfit for reuse. No additional payment will be made for rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

W LINE STOP SIZE 1 OR 2 This item shall include the line stop saddle/sleeve, valve, completion plug and any other material, labor, and equipment necessary to complete the line stop as indicated in the plans and/or specifications. This installation shall allow the waterline system to operate as usual without any interruption of service. The size shall be the measured internal diameter of the live pipe to be tapped. The line stop size to be paid under sizes 1 or 2 shall be as follows:
Size 1 = All live tapped main sizes up to and including 8 inches
Size 2 = All live tapped main sizes greater than 8 inches
Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

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

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

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

W METER WITH PRESSURE REDUCING VALVE (PRV) This item is for payment for installation of all standard water meters with pressure reducing valves (PRV) of all sizes 2 inches in diameter or less,

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

W PIPE This item shall apply to all pipe of every size and type material to be used as water main, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, bends, tees, reducers, plugs, and caps), tracing wire with test boxes (if required by specifications), polyethylene wrap (when specified), labor, equipment, excavation, bedding, backfill, restoration, testing, sanitizing, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. No additional payment will be made for rock excavation. This bid item includes material and placement of flowable fill under existing and proposed pavement, and wherever else specified on the plans or in the specifications. This item shall include all temporary and permanent materials, as well as equipment required to pressure test and sanitize mains including, but not limited to, pressurization pumps, hoses, tubing, gauges, main taps, saddles, temporary main end caps or plugs and blocking, main end taps for flushing, chlorine liquids or tablets for sanitizing, water for testing/sanitizing and flushing (when not supplied by the utility), chlorine neutralization equipment and materials, and any other items needed to accomplish pressure testing and sanitizing the main installation. This item shall also include pipe anchors at each end of polyethylene pipe runs, when specified to prevent the creep or contraction of the pipe. When owner specifications require, this bid item shall include contractor preparation of as-built drawings to be provided to the engineer and/or utility owner at the end of construction. Measurement of quantities under this item shall be through fittings, encasements, and directional bores (only when a separate carrier pipe is specified within the directional bore pipe). Measurements shall be further defined to be to the center of tie-in where new pipe contacts existing pipe at the center of connecting fittings, to the outside face of vault or structure walls, or to the point of main termination at dead ends. No separate payment will be made under pipe items when the directional bore pipe is the carrier pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF) when complete.

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

W PRESSURE REDUCING VALVE This item shall apply to all pressure reducing valves (PRV) of every size required in the plans and specifications, except those bid items defined as "Special". Payment under this description is to be for PRVs being installed with new main. This item includes the PRV as specified in the plans and specifications, polyethylene wrap (if required by specification), labor, equipment, excavation, anchoring (if any), pit or vault, backfill, restoration, testing, disinfection, etc., required to install the specified PRV at the location shown on the plans, in accordance with the specifications and standard

drawings, complete and ready-for-use. If required on the plans and/or proposed adjoining DIP is restrained, PRVs shall be restrained. PRV restraint shall be considered incidental to the PRV and adjoining pipe. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

W SERVICE SHORT SIDE This item shall apply to all service line installations of every size up to and including 2-inch internal diameter, except those service bid items defined as "Special". This item includes installation of the specified piping material of the size specified on plans, encasement of 2 inches or less internal diameter (if required by plans or specifications), main tap, tapping saddle (if required), corporation stop, coupling for connecting the new piping to the surviving existing piping, labor, equipment, excavation, backfill, testing, disinfection, and restoration at the locations shown on the plans or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. This bid item is to pay for service installations where both ends of the service connection are on the same side of the public roadway, or when an existing service crossing a public roadway will remain and is being extended, reconnected, or relocated, with all work on one side of the public roadway centerline as shown on the plans. The length of

the service line is not to be specified and shall not be restricted to any minimum or maximum length. Placement of a service lateral across a private residential or commercial entrance alone shall not be reason to make payment under this item. Private or commercial entrances shall not be considered a public roadway in defining payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. This pay item does not include installation or relocation of meters. Meters will be paid separately. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

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

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

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

W VALVE BOX REMOVE This item is in payment for all labor, equipment, restoration materials, disposal, and any other effort for removal of a valve box, leaving the valve in place. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE CUT-IN This item is for new cut-in valve installations of all sizes, where installation is accomplished by cutting out a section of existing main. This item shall include cutting the existing pipe, supplying the specified valve, couplings or sleeves, valve box, concrete pad around valve box (when required in specifications or plans), labor, equipment, and materials to install the valve at the locations

shown on the plans, or as directed by the engineer, complete and ready-for-use. Any pipe required for installation shall be cut from that pipe removed or supplied new by the contractor. No separate payment will be made for pipe required for cut-in valve installation. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

W VALVE REMOVE This item is in payment for all labor, equipment, and restoration materials for cutting of existing pipe and any other effort necessary for total removal of an existing valve and valve box. This bid item shall include disposal of the valve and box, unless plans or specifications state the valve and box are to be salvaged and delivered to the utility owner for reuse. No separate pay items are to be established for size variations. All valve removals, regardless of size, shall be paid under this one pay item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.
If plugging of existing abandoned mains is needed after valve removal, the work shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

Standard Sanitary Sewer Bid Item Descriptions

THESE BID ITEM DESCRIPTIONS SHALL SUPERCEDE ANY BID ITEM DESCRIPTIONS CONTAINED IN UTILITY OWNER SUPPLIED SPECIFICATIONS PROVIDED ELSEWHERE IN THIS PROPOSAL.

S BYPASS PUMPING This item shall include all labor, equipment, and materials needed to complete a bypass pumping and/or hauling operation for diversion of sewage during sanitary sewer construction. Examples of such operations when bypass pumping and/or hauling may be necessary during force main tie-ins, manhole invert reconstruction, insertion of new manholes into existing mains, or other similar construction. There may be more than one bypass pumping/hauling operation on a project. This item shall be paid for each separate bypass pumping/hauling operation occurrence as called out on the plans or directed by the engineer and actually performed. There will be no separate bid items defined for length, duration, or volume of sewage pumped or hauled in each occurrence. If a bypass pumping/hauling operation is called out on the plans, but conditions are such that the bypass pumping/hauling operation is not needed or utilized, no payment will be made under this item. The contractor shall draw his own conclusions as to what labor, equipment, and materials may be needed for each bypass pumping/hauling occurrence. The contractor should be prepared to handle the maximum volume of the sewer being bypassed, even during a storm event. This item shall not be paid separately, but shall be considered incidental, when bypass pumping and/or hauling is needed during cast-in-place-pipe (CIPP) and/or point repair operations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA).

S CAP EXISTING MAIN This item shall include the specified cap, concrete blocking and/or mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the cap on an existing gravity sewer or force main to be left in service at the location shown on the plans or as directed, in accordance with the specifications. This item is not to be paid to cap new main installations or mains that are to be abandoned. This pay item is only to be paid to cap existing mains to be left in service. Caps on new mains are to be considered incidental to the new main, as are other fittings, and are not to be paid under this item. All caps on existing mains shall be paid under this one bid item included in the contract, regardless of size. No separate bid items will be established for size variations. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced.
"Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe."
This item shall be paid EACH (EA) when complete.

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

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

S CIPP LINER This item is to pay for rehabilitation of existing sanitary sewers using the Cured-In-Place-Pipe method. This bid item description applies to all CIPP sizes included in the contract. All CIPP Liner items, of all varying sizes, shall include all labor, materials, customer notification, testing, necessary permits, ingress and egress procedures, bypass pumping, pre-construction video, sediment and root removal, dewatering, traffic control, erosion and sediment control, excavation pits, removal and replacement of manhole frames and covers as necessary to facilitate the lining work, sealing at manholes and service connections, clearing and grubbing, pipeline cleaning, re-cleaning, video inspection as many times as necessary, debris collection and disposal, root removal, pre- and post-construction video inspection, all digital inspection footage, final report preparation and approval, the cost of potable water from the Owner, required compliance tests, site restoration, site cleanup, sealing of liner at manholes, acceptance testing, and all other rehabilitation work and incidentals not included under other pay items, necessary to complete the rehabilitation per the plans and specifications. There will be no separate payment for acceptance testing of the lined pipe but shall be considered incidental to this item. Pay under this item shall be by each size bid in the contract. Pay measurement shall be from center of manhole to center of manhole. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Plugging of existing abandoned mains shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

S LAMPHOLE Payment under this item is for the installation of a lamphole along or at the end of a gravity sewer pipe for inspection and cleaning of a sewer pipe. Lampholes shall include, but are not limited to bends, tees, vertical pipe, casting, any other materials specified, excavation, backfilling, air testing, restoration, and cleanup in accordance with the plans, specifications, and standard drawings, complete and ready-for-use. Payment shall be made under this bid item regardless of lamphole size. No separate pay items will be established for size variations. All materials shall be new and unused. No additional compensation will be paid for lamphole height variations. All vertical pipe required to construct the lamphole, regardless of height, shall be considered incidental to this item. No additional payment will be made for rock excavation. Cleanouts on pipes 6 inches or less are not considered lampholes and are not to be paid under this item. Only lampholes on pipes 8 inches or larger are to be paid under this item. Cleanouts on pipes 6 inches or less are to be paid under pay item S LATERAL CLEANOUT. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S LATERAL CLEANOUT This item shall be for payment for installation of a cleanout in a service lateral line. This item shall include furnishing and installation of a tee, vertical pipe of whatever length required, and threaded cap. The cleanout shall extend from the lateral to final grade elevation. The size of the cleanout shall be equivalent to the size of the lateral. The cleanout materials shall meet the same specification as those for the lateral. The cleanout shall be installed at the locations shown on the plans or as directed by the engineer. Only one pay item shall be established for cleanout installation. No separate pay items shall be established for size or height variations. Payment under this item is for cleanouts on pipe of 6 inches or less. Cleanouts on pipes of 8 inches or greater are considered lampholes and shall be paid under the S LAMPHOLE bid item. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

S MANHOLE Payment under this item is for the installation of new 4-foot interior diameter sanitary sewer manhole. Payment for manholes will be at the contract unit price, in-place, complete and ready-for-use at the locations shown on plans, in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup, in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting shall be paid as a separate bid item. Anchoring of a casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

S MANHOLE ABANDON/REMOVE Payment under this item is for the full or partial removal, disposal, and/or filling of any sanitary sewer manhole, regardless of size or depth, that no longer serves any purpose. All manholes partially removed shall be removed to a point at least 12 inches below final grade, 12 inches below roadway subgrade, or 12 inches clear of any other underground infrastructure, whichever is lowest. If partial removal of an abandoned manhole is elected, the remaining manhole structure shall be filled with flowable fill. Flowable fill shall be considered incidental to this bid item. Plugging of pipes entering and exiting within an abandoned manhole that is left in place partially or in whole shall be considered incidental to this item. All sanitary sewer castings shall be salvaged and securely stockpiled for reuse on new sanitary sewer manholes. Salvage of manhole castings for reuse on the project shall be considered incidental to this bid item. Any casting that is not needed for reuse, is not reusable, or is directed by the engineer not to be reused shall be disposed of by the contractor. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

Plugging or safeloading of pipes required at locations outside of manholes when manholes are removed in total shall be performed and paid in accordance with Section 708.03.05 of KYTC Standard Specifications for Road and Bridge Construction, using Bid code 01314, Plug Pipe.

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

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

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

S MANHOLE OVERSIZED Payment under this item is for the installation of a new manhole greater than the standard 4-foot interior diameter. Payment for oversized manholes will be made at the contract unit price in-place, complete and ready-for-use at the locations shown on plans, in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup, in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused when available and shall be considered incidental to this item. When an existing casting is unavailable or a new casting is specified on plans or elsewhere in the contract, a new casting shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. In cases where a manhole is to be located within a grade-sensitive area such as roadway pavement, sidewalks, shared-use-paths, etc., the final casting grade given on plans shall be considered approximate. Any readjustment of a manhole casting to meet field conditions shall be incidental to this item. No additional payment shall be made for casting adjustments on new manholes. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid EACH (EA) when complete.

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

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

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

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

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

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

S PIPE This item description shall apply to all gravity and force-main sewer pipe bid items, of every size and type of material 8 inches internal diameter and larger, except those bid items defined as "Special". This item includes the pipe specified by the plans and specifications, all fittings (including, but not limited to, tap tees and couplings for joining to existing similar or dissimilar pipes), polyethylene wrap (if required by specification), labor, equipment, excavation, bedding, backfill, restoration, pressure or vacuum testing, temporary testing materials, video inspection, etc., required to install the specified new pipe and new fittings at the locations shown on the plans, or as directed, in accordance with the specifications and standard drawings, complete and ready-for-use. This bid item shall include material and placement of flowable fill under existing and proposed pavement, and wherever specified on the plans or in the specifications. No additional payment will be made for rock excavation. Measurement of quantities under this item shall be through fittings and encasements to a point at the outside face of manhole barrels, or to the point of main termination at dead ends or lampholes. Carrier pipe placed within an encasement shall be paid under this item and shall include casing spacers and end seals. Please refer to the Utility Company's Specifications. If the Company does not have specifications, KYTC's Specifications shall be referenced. This item shall be paid LINEAR FEET (LF).

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

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

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

Manhole abandonment shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

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

Manhole removal shall not be paid under this item but shall be paid under the bid item S MANHOLE ABANDON/REMOVE.

SECTION 221330 – SPECIALTY EQUIPMENT – ELECTRIC GRINDERS

1. GENERAL

1.1 WORK INCLUDES

A. Base Bid General Contractor Provide: The equipment shall be installed as shown on the plans, as recommended by the supplier, and in compliance with all OSHA, local, state and federal codes and regulations.

a. Sewer grinder(s), motor(s), controls, control panel(s).
b. The grinder shall be capable of processing 100 GPM with a maximum headloss of 2 inches at a downstream water level of 4 inches.
c. Stainless Steel Grinder support/lifting frame(s) with stainless steel chain(s).
d. Prefabricated manhole with prefabricated channel designed to fit the specific model of sewer grinder specified, O.S.H.A. compliant ladder, H-20 rated hatch. Prefabricated channel shall have integral bypass.

B. References

a. Grinder(s) shall, as applicable, meet the requirements of the following industry standards:

1) American Society for Testing and Materials (ASTM) A36: Standard Specification for Carbon Steel Plate

2) American Society for Testing and Materials (ASTM) A536-84: Standard Specification for Ferritic Ductile Iron Castings
a) American Iron and Steel Institute (AISI) 303 Stainless Steel
b) American Iron and Steel Institute (AISI) 304 Stainless Steel
c) American Iron and Steel Institute (AISI) 4130 Heat Treated Alloy Steel
d) American Iron and Steel Institute (AISI) 4140 Heat Treated Hexagon Steel
e) Rockwell C

3) Motor controllers shall, as applicable, meet the requirements of the following Regulatory Agencies.

a) National Electrical Manufacturer's Association (NEMA) Standards
b) National Electrical Code (NEC)
c) Underwriters Laboratory (UL and cUL)

1.2 RELATED WORK

A. 221313 Facility Sanitary Sewers

B. See Division 26 Section 260000 “General Provisions for Electrical.”

1.3 SUBMITTALS

A. Product Data: For each type and size of grinder specified. Include certified performance curves with operating points plotted on curves; and rated capacities of selected models, furnished specialties, and accessories.

B. Shop Drawings: Diagram power, signal, and control wiring.

C. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Qualified suppliers shall have a minimum 25 years experience at manufacturing, support systems, two (2)-shafted grinding equipment and motor controls with a minimum of 5,000 installations with similar equipment. Supplier shall provide a list of names and dates of installations for verification by the Engineer or Owner's Representative.

B. Supplier shall provide the services of a factory-trained representative to check the installation and to start-up each grinder and controller. The factory representative shall have complete knowledge of proper installation, operation, and maintenance of equipment supplied. Representative shall inspect the final installation and supervise a start-up test of the equipment.

C. Each grinder and controller shall be factory tested to ensure satisfactory operation.

2. PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 Sewage Grinder – Comminutor

A. Grinder(s) and motor controller(s) shall be in compliance with these specifications and plans and shall be supplied by one of the following manufacturers:

1. JWC Environmental®: Muffin Monster® model No. 30005-008-DI

2. The manufacturer must certify that the unit can be returned for maintenance to the factory or a local repair facility. The certification shall include a statement that there will be no charge for repair labor.

B. SUPPORT SYSTEM(S): The support frame and additional supports shall be of welded square tube, angle, and plate construction. The construction material shall be 304 stainless steel.

C. GENERAL

1. Each grinder shall include cutters, spacers, shafts, bearings and seals, side rails, end housings, covers, reducer, and motor.
2. The grinder shall be of two (2)-shaft design and be capable of continuous operation, processing wet or dry. Bar screens or single-shaft devices utilizing a single rotating cutter bar with stationary cutters shall not be acceptable. Grinders designed with cutter and spacer cartridges rather than individual cutters and spacers, shall not be acceptable.

   Two (2)-shaft design shall consist of two (2) parallel shafts alternately stacked with individual intermeshing cutters and spacers positioned on the shaft to form a helical pattern. The two (2) shafts shall counter-rotate with the driven shaft operating at approximately two-thirds (2/3) the speed of the drive shaft. Cutter diameters on the drive and driven shafts shall be of equal diameter.

D. COMPONENTS

1. Individual Cutters and Spacers
   a. The cutting chamber shall be a nominal height of 8 inches.
   b. Individual cutters and spacers shall be 4130 heat treated alloy steel, surface ground for uniformity and through-hardened to a minimum 45-50 Rockwell C.
   c. The inside configuration of both the individual cutters and the individual spacers shall be hexagonal so as to fit the shafts with a total clearance not to exceed 0.015 inch (0.38 mm) across the flats to assure positive drive, minimize wear on the cutters.
   d. Cutter configuration shall consist of individual 11 tooth cam cutters on both shafts. To maintain particle size, the height of the tooth shall not exceed 1/2 inch above the root diameter. Cutter to cutter root diameter overlap shall be not less than 1/16 inch or greater than 1/4 inch to maintain the best possible cutting efficiency while incurring the least amount of frictional losses. Clearance between overlapping cutters of opposing shafts shall be no greater than 0.011 inches.
   e. The cutters shall exert a minimum force at the tooth tip of 2,051 lbs./hp during momentary load peaks.

2. Shafts
   a. Grinder drive and driven shafts shall be made of 4140 heat treated hexagon steel with a tensile strength rating of not less than 149,000 psi.

b. Each hexagonal shaft shall measure a nominal 2 inches across parallel surfaces.

3. Intermediate Shaft Support
   a. An intermediate shaft support shall be provided in the center of the cutter stack for all grinders with 40 inch (1,016 mm) cutter stacks. Grinders with 50 inch (1,270 mm) or 60 inch (1,524 mm) cutter stacks shall have two (2) intermediate shaft supports.
   b. The intermediate shaft support shall provide additional support for heavier than normal influent grinder demand loads and protection for the seal assemblies.
   c. The intermediate shaft support shall be made of a cast 303 stainless steel collar and two (2) bushings. The bushings shall act as bearings to allow the free rotation of the shafts.

4. Shaft Bearings and Seals
   a. The radial and axial loads of the cutter shafts shall be borne by sealed, oversized, deep-groove ball bearings at each end.
   b. The bearings shall be protected by a combination of a replaceable and independent tortuous path device and mechanical seals.
   c. Face materials shall be tungsten carbide to tungsten carbide.
   d. O-rings shall be made of Buna-N elastomers.
   e. Products requiring continuous or occasional lubrication or flushing shall not be accepted.
   f. The mechanical seal shall be rated at 90 psi continuous duty by the seal supplier.
   g. The bearings shall be housed in a replaceable cartridge that supports and aligns the bearings and seals, as well as protects the shafts and end housings. The seal elements shall be independent of the stack height; therefore cutter stack tightness shall not affect seal performance. The seal elements shall maintain their factory set preload independent of the cutter stack tightness.
   h. Seals shall meet required pressure rating regardless of cutter stack fit. The seal cartridge shall provide seal protection against axial loading on shafts and bearings during shaft deflection.
   i. Each seal element shall be positively locked to its corresponding rotating or static cartridge element. This positive lock on the seal elements is critical to long seal life in applications where grit or other abrasive materials are present.

5. Side Rails
   a. The inside profile of the cutter side rails shall be concave to follow the radial arc of the cutters.
   b. Clearance between the major diameter of the cutters and the concave arc of the side rails shall not exceed 5/16 inch (7.9 mm).
   c. The side rails shall have evenly-spaced slots that increase flow and decrease head loss. The slots shall only be built into the influent side of the side rail and the effluent side of the side rail shall be void of slots to allow for maximum flow of the processed effluent.
   d. The side rails shall be cast of A536-84 ductile iron.

6. End Housings and Covers
   a. Grinder end housings shall be of cast A536-84 ductile iron with a cast-in-place flow deflector, designed to protect the bushings while guiding particles directly into the cutting chamber.
   b. Top covers shall be A536-84 ductile iron and bottom covers shall be A36 hot rolled plates.

7. Reducer
   a. The speed reducer shall be a grease-filled planetary-type of reducer with a 500% shock load capacity. The reduction ratio shall be 29:1.
   b. The input shaft of the reducer shall be directly coupled to the motor using a three (3)-piece coupling, and the output shaft of the reducer shall be directly coupled with the grinder using a two (2)-piece coupling.

8. Motor
   a. The motor shall be 5 hp, 1,770 rpm, 230volt, three-phase, 60 Hz.
   b. Motor service factor shall be 1.15, the efficiency factor not less than 85% at full load and the power factor not less than 80% at full load.
   c. Motor shall be explosion-proof classification
   d. Motor shall be capable of operating in air continuously and shall be capable of operating up to 40 feet of continuous submergence for a period of 40-days.

9. Required Running Torque per Horsepower (kW):
   a. At Momentary Load Peaks: 4,756 in-lbs/hp

E. MOTOR CONTROLLER(S)

1. GENERAL
   a. The controller shall provide independent control of the grinder.
   b. Controller shall be the supplier's standard UL/cUL listed Model PC2200.
   c. The controller shall be rated for 5 hp, 230 volts, single phase, 60Hz.

2. OPERATION
   a. The controller shall be equipped with a GRINDER ON-OFF/RESET-REMOTE three (3) position selector switch.
      1) In the OFF/RESET position the grinder shall not run.
      2) In the ON position the grinder shall run continuously.
      3) In the REMOTE mode the grinder shall start and stop as controlled by a remotely-located dry contact.
      4) The grinder shall only be reset by switching the GRINDER ON-OFF/RESET-REMOTE switch to the OFF/RESET position.

3. COMPONENTS
   a. Enclosure
      1) Enclosures shall be NEMA 4X, stainless steel, and shall be suitable for wall mounting. Doors shall have hinges and corrosion-resistant lockable latches.

2) Enclosure shall house the control devices, relays, terminal blocks and reversing motor starters.

b. Control Devices
   1) Pilot devices shall be mounted on the enclosure front panel door.
   2) The controller shall have indicator lights for POWER ON, RUN, and FAIL.
   3) Indicator lights shall be LED type pilot lights. Lights and the selector switches shall be heavy duty NEMA 4X type.
   4) Control transformer shall be protected by two (2) primary fuses and one (1) secondary fuse. The 120 volt secondary shall have one (1) leg grounded.
   5) Relay contacts shall be included for GRINDER run and FAIL signal outputs. The contacts shall be rated two (2) ampere, 240 VAC, resistive load.

c. Motor Starter
   1) Starter shall be a full-voltage reversing type with 120 volt operating coils.
   2) Forward and reverse contactors on the starters shall have both mechanical and electrical interlocks.
   3) Overload relays (OL) shall be adjustable so that the range selected includes the FLA (full load amperes) rating and service factor.

4. SAFETY FEATURES
   a. When a grinder jam condition occurs in the grinder ON or REMOTE mode the controller shall stop the grinder, and reverse grinder rotation to clear the obstruction. If the jam is cleared, the controller shall return the grinder to normal operation. Up to two (2) additional reversing cycles (3 times total) may occur within 30 seconds before the controller de-energizes the grinder motor and activates the grinder fail indicator and relay.
   b. If a power failure occurs while a grinder is running, operation will resume when power is restored.
   c. If a power failure occurs while the grinder is in a fail condition the fail indicator shall reactivate when power is restored.
   d. The controller shall provide overload protection for the motor through an overload relay mounted directly on the grinder starter.
   e. Short-circuit protection requires that a properly-sized circuit breaker or fuses be installed by others.
   f. Controller reset shall be from the local panel controls only.

3. EXECUTION

3.1 INSTALLATION

Grinder(s) and motor controller(s) shall be installed in accordance with the supplier's installation instructions, and in compliance with all OSHA, local, state, and federal codes and regulations.

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Preparing subgrades for pavements, turf and grasses.
2. Excavating and backfilling for structures.
3. Subbase course for pavements and stuctures.
4. Excavating and backfilling for utility trenches.

1.2 DEFINITIONS

A. Backfill: Soil material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.

C. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

D. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

E. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

F. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

1. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Architect. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
2. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by Architect. Unauthorized excavation, as well as remedial work directed by Architect, shall be without additional compensation.

G. Fill: Soil materials used to raise existing grades.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.3 QUALITY ASSURANCE

A. Pre-excavation Conference: Conduct conference at Project site.

1.4 PROJECT CONDITIONS

A. Utility Locator Service: Notify utility locator service for area where Project is located before beginning earth moving operations.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GC, SC, CL, ML, GW, GP, GM, SW, SP, and SM according to ASTM D 2487, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
   1. Plasticity Index: 30 (beneath Structures and Pavements.
   2. Minimum Unit Weight: 100 lbs/cubic foot

C. Unsatisfactory Soils: Soil Classification Groups OL, CH, MH, OH, and PT according to ASTM D 2487, or a combination of these groups.

   1. Unsatisfactory soils also include satisfactory soils not maintained within 3 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.

H. Drainage Course: Narrowly graded mixture of washed crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.2 ACCESSORIES

A. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility; colored to comply with local practice or requirements of authorities having jurisdiction.

B. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored to comply with local practice or requirements of authorities having jurisdiction.

PART 3 - EXECUTION

3.1 PREPARATION

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

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.3 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.5 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 8 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

D. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
3. Cut and protect roots according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.6 SUBGRADE INSPECTION

A. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired dump truck to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Architect, without additional compensation.

3.7 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used when approved by Architect.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Architect.

3.8 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.9 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings.

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course.

E. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

F. Place and compact final backfill of satisfactory soil to final subgrade elevation.

G. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.10 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use satisfactory soil material or engineered fill.
4. Under building slabs, use satisfactory soil material or engineered fill.
5. Under footings and foundations, use engineered fill.

3.11 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 3 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 3 percent and is too wet to compact to specified dry unit weight.

3.12 COMPACTION OF SOIL BACKFILLS AND FILLS

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

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 5 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 92 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 92 percent.

3.13 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

C. Grading inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.14 SUBBASE AND BASE COURSES UNDER PAVEMENTS BUILDING SLABS AND WALKS

A. Place subbase course on subgrades free of mud, frost, snow, or ice.

3.15 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified geotechnical engineering testing agency to perform tests and inspections.

B. Allow testing agency to inspect and test subgrades and each fill or backfill layer. Proceed with subsequent earth moving only after test results for previously completed work comply with requirements.

C. Footing Subgrade: At footing subgrades, at least one test of each soil stratum will be performed to verify design bearing capacities. Subsequent verification and approval of other footing subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by Architect.

D. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

E. Density testing shall be performed at a rate of at least one test per 10,000 square feet per lift and with a minimum of 3 tests per lift.

3.16 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.17 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 331113- FACILITY WATER DISTRIBUTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes water-distribution piping and related components for water distribution piping to be turned over to municipal water district or company for public water supply.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.

C. Field quality-control test reports.

D. Operation and maintenance data.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
2. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
3. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.

B. Piping materials shall bear label, stamp, or other markings of specified testing agency.

C. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.

D. NSF Compliance:
1. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

1.4 PROJECT CONDITIONS

A. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:

1. Notify Engineer, Owner and Distribution Owner no fewer than two days in advance of proposed interruption of service.
2. Do not proceed with interruption of water-distribution service without Engineer, Owner and Distribution Owner written permission.

1.5 COORDINATION

Coordinate connection to water main with utility company Provide fees for main line taps, distribution system owner shall make all taps to existing mains.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

A. Ductile Iron Pipe Class 51 and Pressure Class 350

All ductile iron pipe shall be designed in accordance with AWWA/ANSI C151/A21.51. Ductile iron pipe class 51 shall be manufactured with thickness, diameter, and weight in accordance with AWWA C151, Table 3 and Table 4. All ductile iron pipe shall have a rating of not less than 300 psi. Ductile iron pipe exterior surface shall have an asphaltic coating, minimum thickness of 1 mil., in accordance with AWWA C151. Ductile iron pipe shall be cement lined in accordance with AWWA/ANSI C104/A21.4. Cement lining shall be standard thickness with a thickness tolerance of plus 1.8 inch. The pressure rating, metal thickness class, net weight of pipe without lining of pipe, and name of manufacturer shall be clearly marked on each length of pipe. Joints shall be Fastite, Bell-Tite, or Tyton as specified. Where restrained joint is specified, it shall be Tyton joint pipe with Tyton-Loc gasket by U.S. Pipe & Foundry Company, Inc., or approved equal. All joints, 4 inch through 12 inch, shall be adaptable for locking gaskets. All ductile iron pipe shall be manufactured in the United States unless otherwise approved by PW.

B. POLYVINYL CHLORIDE (PVC) PIPE Pipe shall be DR 18 (pressure class 235 psi) and manufactured in accordance with AWWA C900. Pipe color shall be blue. Gasket material shall be SBR. Provide pipe manufactured by NAPCO Pipe and Fittings or approved equal. POLYVINYL CHLORIDE (PVC) PIPE – RESTRAINED-JOINT Pipe shall be DR 18 (pressure class 235 psi) and manufactured in accordance with AWWA C900. Pipe shall have integral bells with a non-corrosive joint restraint mechanism that

is specifically designed and constructed to restrain the bell/spigot pipe joint when subjected to either tensile or compressive forces. Restrained-joint pipe shall be designed and manufactured specifically for use by horizontal directional drilling (HDD) installation method. Provide 20 foot joint lengths unless otherwise specified. Provide Certa-LOK® C900 RJIB pipe with Fluid Tite® gasket as manufactured by NAPCO Pipe and Fittings or approved equal.

D. Fittings

1. Fittings for PVC and ductile iron water mains shall be ductile iron fittings in accordance with AWWA C11O-77 (ANSI A21.10) and shall conform to the details and dimensions shown therein. Fittings shall have mechanical joints meeting the requirements of AWWA CIll-80 (ANSI A21.11). Fittings shall have interior cement-mortar lining as specified for the pipe.

2. Plugs, where required, shall be ductile iron mechanical joint dished or flat plugs in accordance with AWWA C110-77. Joints for plugs shall be restrained with the use of ductile iron mechanical joint retainer glands.

.2.2 VALVES

A. Gate Valves

1. All gate valves shall be of the resilient seat type, iron body, non-rising stem, fully bronze mounted and suitable for water working pressures of 150 psi. Valves shall be of standard manufacturer and of the highest quality both as to materials and workmanship.

2. All gate valves shall be furnished with mechanical joint and connections, unless otherwise shown on the Drawings or specified hereinafter.

3. All gate valves shall have the name or monogram of the manufacturer, the year the valve casting was made, the size of the valve, and the working water pressure cast on the body of the valve.

4. Each gate valve shall be installed in a vertical position with a valve box. Gate valves set with valve boxes shall be provided with a 2-inch square operating nut and shall be opened by turning to the left (counter-clockwise).

5. All valves shall conform with the latest revision of "AWWA Standard for Gate Valves - 3 inch through 48 inch - For Water and Other Liquids", AWWA C509. Valves shall be as manufactured by Mueller, M & H, American Valve and Hydrant, U.S. Pipe, Kennedy or equal.

B. Tapping Valves

Tapping valves shall be iron body and iron rubber encapsulated, with an iron gate. They shall be AWWA resilient seated gate valves, conforming to AWWA Standard C509 and be UL listed - FM approved. They shall have a non-rising bronze stem with two (2) inch square wrench nut and "O" ring packing. The inside and outside of the body and bonnet shall be coated with an epoxy coating to meet the AWWA C550 Standard. The internal design shall provide for the passing of full size cutters and tapping machine bits. The valve connection shall be Class 125, flanged for tapping sleeve, opening left. They shall have a mechanical joint for branch pipe connection, complete with bolts, nuts, and gaskets. Tapping valves shall be Mueller valve, or approved equal.

C. Stainless Steel Tapping Sleeves

This specification covers tapping sleeves of all stainless steel construction. All metal parts of the tapping sleeve shall be of 304 stainless steel, and the gaskets shall be of virgin SBR rubber compound for water service. The gasket shall have a full circumferential seal. The shell and neck of the sleeve shall be of 304 stainless steel. The neck shall be mig welded to the shell to form a strong permanent fusion with the shell. The welded areas then shall be fully passivated. Passification shall mean the weld areas of the sleeve shall be chemically treated and the residue removed so as to return the welded stainless steel to its original state and produce a highly corrosion resistant coating. The sleeve shall have heavy hex nuts, and the bolts shall be rolled national course thread of 304 stainless steel and shall be Teflon coated. It shall have a plastic lubricating washer. The armors shall be heavy gauge 304 stainless steel with a lip curve to hold position while tightening. The flange shall be 304 stainless steel with standard square head for pressure testing before tapping pipe. The tapping sleeve shall be of the SST style as manufactured by Romac Industries, Inc., or approved equal.

D. Valve Boxes

Valve boxes shall be constructed of cast iron in two-piece sections with heavy duty lids. Valve boxes shall be of the screw type, adjustable, and with a five and one-quarter (5 ¼) inch shaft. The lengths of the boxes shall be specified in the Bidder's Proposal. Valve boxes shall be as manufactured by the Tyler/Union Corporation, or approved equal.

2.3 HYDRANTS

A. Fire Hydrants

1. The Contractor shall furnish and install fire hydrants where shown on the Drawings. Hydrants shall conform in all respects to the requirements of AWWA C502-80. Hydrant barrel shall have safety breakage feature above the ground line. All hydrants shall have 6-inch mechanical joint shoe connection, two (2) 2-

1/2-inch discharge nozzles and one (1) 5-1/4 inch pumper nozzle with caps fitted with cap chains. Connection threads shall conform to local standards. Main valve shall have 5-1/4-inch full opening and be of the compression type opening against water pressure so that valve remains should barrel be broken off.

2. Hydrants shall be fully bronze mounted. Main valve shall have a threaded bronze seat ring assembly of such design that it is easily removable by unscrewing from a threaded bronze drain ring. Bronze drain ring shall have multiple ports providing positive automatic drainage as the main valve is opened or closed. Drainage waterways shall be completely bronze to prevent rust and corrosion.

3. Operating stem shall be equipped with anti-friction thrust bearing to reduce operating torque and assure easy opening. Stop shall be provided to limit stem travel. Stem threads shall be enclosed in a permanently sealed lubricant reservoir protected from weather and the waterway with O-ring seals.

4. Hydrants shall be designed for 250 psi working pressure and shop tested to 300 psi pressure with main valve both opened and closed. Under test the valve shall not leak, the automatic drain shall function and there shall be no leakage into the bonnet.

5. Hydrants shall be set plumb with not less than two (2) cubic feet of crushed stone and backed with at least one (1) cubic foot of Class "C" concrete or equivalent. Set hydrants so that centerline of pumper nozzle is minimum 18 inches above finished grade. An operating wrench and traffic damage repair kit shall be provided with every 15 hydrants. Provide one (1) set where quantity of hydrants is less than 15.

6. Hydrants shall be Mueller Co. Super Centurion 250 Model 423 with 3.5' minimum bury length, open left or approved equal.

B. Flush Hydrants

1. The Contractor shall furnish and install fire hydrants where shown on the Drawings. Hydrants shall conform in all respects to the requirements of AWWA C502-80. Hydrant barrel shall have safety breakage feature above the ground line. All hydrants shall have 4-inch mechanical joint shoe connection, one (1) 2-1/2-inch discharge nozzles with cap fitted with cap chains. Connection threads shall conform to local standards. Main valve shall have 2-1/8-inch full opening and be of the compression type opening against water pressure so that valve remains should barrel be broken off.

2. Hydrants shall be fully bronze mounted. Main valve shall have a threaded bronze seat ring assembly of such design that it is easily removable by unscrewing from a threaded bronze drain ring. Bronze drain ring shall have multiple ports providing positive automatic drainage as the main valve is opened or closed. Drainage waterways shall be completely bronze to prevent rust and corrosion.

3. Operating stem shall be equipped with anti-friction thrust bearing to reduce operating torque and assure easy opening. Stop shall be provided to limit stem travel. Stem threads shall be enclosed in a permanently sealed lubricant reservoir protected from weather and the waterway with O-ring seals.

4. Hydrants shall be designed for 200 psi working pressure and shop tested to 300 psi pressure with main valve both opened and closed. Under test the valve shall not leak, the automatic drain shall function and there shall be no leakage into the bonnet.

5. Hydrants shall be set plumb with not less than two (2) cubic feet of crushed stone and backed with at least one (1) cubic foot of Class "C" concrete or equivalent. Set hydrants. An operating wrench and traffic damage repair kit shall be provided with every 15 hydrants. Provide one (1) set where quantity of hydrants is less than 15.

6. Hydrants shall be Mueller Co. 2-1/8” Post Type Hydrant (A-411) with 3.5' minimum bury length, open left or approved equal.

2.4 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
    g. Approved equal.

4. Standard: ASSE 1013.
5. Operation: Continuous-pressure applications.
6. Pressure Loss: 12 psig maximum, through middle 1/3 of flow range.
7. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.

8. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories:

    a. Valves: Ball type with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate type with flanged ends on inlet and outlet of NPS 2-1/2 and larger.
    b. Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.

B. Double-Check, Backflow-Prevention Assemblies:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

    a. Ames Fire & Waterworks; a division of Watts Regulator Co.
    b. Conbraco Industries, Inc.
    c. FEBCO; SPX Valves & Controls.
    d. Flomatic Corporation.
    e. Watts Water Technologies, Inc.
    f. Zurn Plumbing Products Group; Wilkins Water Control Products Div.
    g. Approved equal.

4. Standard: ASSE 1015.
5. Operation: Continuous-pressure applications, unless otherwise indicated.
6. Pressure Loss: 5 psig maximum, through middle 1/3 of flow range.
7. Body: Bronze for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and larger.
8. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and larger.
9. Configuration: Designed for horizontal, straight through flow.
10. Accessories: Ball valves with threaded ends on inlet and outlet of NPS 2 and smaller; OS&Y gate valves with flanged ends on inlet and outlet of NPS 2-1/2 and larger.

2.5 WATER METER BOXES

A. Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.

1. Option: Base section may be cast-iron, PVC, clay, or other pipe.

B. Description: Cast-iron body and double cover for disc-type water meter, with lettering "WATER METER" in top cover; and with separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.

C. Description: Polymer-concrete body and cover for disc-type water meter, with lettering "WATER" in cover; and with slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of 15,000 lb minimum over 10 by 10 inches square.

2.6 CONCRETE VAULTS

A. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.

1. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
2. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.

3. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron traffic frame and cover.

4. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

2.4 LINE MARKERS

A. Buried Water Main Location Signs

The buried water main sign shall be a type single curve flexible marker blue in color with a height of six (6) feet and width of 3.75 inches. It shall be as manufactured by Formtech Enterprise, Inc., phone number 1-800-438-4733. The logo shall have a height of 15 inches and width of 3.5 inches. It shall read: CAUTION WATER MAIN BELOW, CALL BUD BEFORE DIGGING 1-800-752-6007.

PART 3 EXECUTION

A. EARTHWORK
1. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. PIPING APPLICATIONS

1. Piping is arbitrarily limited to NPS 6 (DN 150) for water service, NPS 8 (DN 200) for fire-service mains, and NPS 10 (DN 250) for combined water service and fire-service mains.
2. Select piping applications from this Article. Coordinate with materials specified in Part 2.
3. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
4. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
5. Do not use flanges or unions for underground piping.
6. Flanges, unions, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
7. Retain "any of" option in first paragraph below to allow Contractor to select piping materials from those retained.
8. Retain one or more of three subparagraphs below.
9. Retain "any of" option in first paragraph below to allow Contractor to select piping materials from those retained.

C. VALVE APPLICATIONS

1. General Application: Use mechanical-joint-end valves underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts.
2. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
   a. underground Valves, NPS 3 (DN 80) and Larger: AWWA, cast-iron, nonrising-stem, resilient-seated gate valves with valve box.
   b. Use the following for valves in vaults and aboveground:
   c. Gate Valves, NPS 3 (DN 80) and Larger: AWWA, cast iron, OS&Y rising stem, resilient seated.

D. PIPING INSTALLATION

1. Water-Main Connection: Contractor verify for tap of size and in location indicated in water main.
2. Water-Main Connection: Tap water main according to requirements of water utility company and of size and in location indicated.
3. Make connections larger than NPS 2 with tapping machine according to the following:
4. Install tapping sleeve and tapping valve according to MSS SP-60.
5. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
6. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
7. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
8. Install ductile-iron, water-service piping according to AWWA C600, AWWA M41 and Paducah Water Works Standards.
9. Bury piping with depth of cover over top at least 42 inches, with top at least 12 inches below level of maximum frost penetration.

10. Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.

E. JOINT CONSTRUCTION
1. Make pipe joints according to the following:
2. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
3. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
4. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
5. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Paducah Water Works "Standard Specifications and Procedures" for joining piping of dissimilar metals.

F. ANCHORAGE INSTALLATION
1. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
   a. Concrete thrust blocks.
   b. Locking mechanical joints.
   c. Set-screw mechanical retainer glands.
   d. Bolted flanged joints.
   e. Pipe clamps and tie rods.
2. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
   a. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
   b. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.

G. VALVE INSTALLATION
1. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.

H. FIRE HYDRANT INSTALLATION
1. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.
2. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
3. AWWA Fire Hydrants: Comply with AWWA M17.

I. CONNECTIONS
1. Connect water-distribution piping to existing water main. Use tapping sleeve and tapping valve.

J. FIELD QUALITY CONTROL
1. No pressure testing shall begin after 1:30 p.m. or on Friday.
2. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
3. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
   a. Increase pressure in 50-psig increments to a minimum of 150 psig Hold at test pressure for not less than 2 hours.
   b. Contractors shall pressure test all new mains prior to chlorination sampling.
   c. Prepare reports of testing activities.

K. IDENTIFICATION
1. Install continuous underground Tracer Wire during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping.

L. CLEANING
1. Clean and disinfect water-distribution piping as follows:
   a. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
   b. Retain subparagraph below for fire-protection-water piping not connected to potable-water supply.
   c. Use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.

   d. Use purging and disinfecting procedure prescribed by Union County Water District or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
      1) Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours.
      2) Retain last subparagraph above or first subparagraph below.
      3) Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours.
      4) After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
      5) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
   e. Prepare reports of purging and disinfecting activities.

END OF SECTION 331113

SECTION 331313 - GRAVITY SANITARY SEWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Pipe and fittings.
2. Nonpressure and pressure couplings.
3. Cleanouts.
4. Manholes.

1.2 ACTION SUBMITTALS

A. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show pipe sizes, locations, and elevations. Retain first paragraph below for product certificates from manufacturers.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 PVC PIPE AND FITTINGS

A. PVC Type PSM Sewer Piping:

1. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.

2. Fittings: ASTM D 3034, PVC with bell ends.
3. Gaskets: ASTM F 477, elastomeric seals.

2.3 NONPRESSURE-TYPE TRANSITION COUPLINGS

A. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.

B. Sleeve Materials:

1. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
2. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.

C. Unshielded, Flexible Couplings:

1. Description: Elastomeric sleeve with stainless-steel shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.

a. Manufacturers:

1) Fernco, Inc.
2) Approved equal.

D. Ring-Type, Flexible Couplings: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.

1. Manufacturers:

a. Fernco, Inc.
b. Approved equal.

2.4 CLEANOUTS

A. Cast-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Available Manufacturers:

a. Josam Company.
b. MIFAB Manufacturing Inc.
c. Smith, Jay R. Mfg. Co.
d. Wade Div.; Tyler Pipe.
e. Watts Industries, Inc.

f. Watts Industries, Inc.; Enpoco, Inc. Div.
g. Zurn Specification Drainage Operation; Zurn Plumbing Products Group.
h. Approved equal.

2. Top-Loading Classification(s): Medium Duty and Heavy Duty.
3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

2.5 MANHOLES

A. Standard Precast Concrete Manholes:

1. Description: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
2. Diameter: 48 inches minimum unless otherwise indicated.
3. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
4. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
5. Riser Sections: 4-inch minimum thickness, of length to provide depth indicated.
6. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
7. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
8. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.
9. Steps: Individual FRP steps or FRP ladder; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of manhole to finished grade is less than 48 inches.
10. Adjusting Rings: Interlocking rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
11. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.

B. Manhole Frames and Covers:

1. Description: Ferrous; 24-inch ID by 7- to 9-inch riser, with 4-inch-minimum-width flange and 26-inch-diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
2. Material: ASTM A 536, Grade 60-40-18 ductile iron unless otherwise indicated.

2.6 CONCRETE

A. General: Cast-in-place concrete complying with ACI 318, ACI 350/350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

C. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.

1. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.

a. Invert Slope: 2 percent through manhole.

2. Benches: Concrete, sloped to drain into channel.

a. Slope: 8 percent.

D. Ballast and Pipe Supports: Portland cement design mix, 3000 psi minimum, with 0.58 maximum water/cementitious materials ratio.

1. Reinforcing Fabric: ASTM A 185/A 185M, steel, welded wire fabric, plain.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.2 PIPING APPLICATIONS

A. Pipe couplings and fittings with pressure ratings at least equal to piping rating may be used in applications below, unless otherwise indicated.

1. Use pressure-type Ductile Iron mechanical joint solid sleeve type joints where required to join gravity-flow, nonpressure sewer piping, unless otherwise indicated.

B. Gravity-Flow, Nonpressure Sewer Piping: Use the following pipe materials for each size range:
   1. NPS 3 and NPS 4: NPS 6 ductile-iron, gravity sewer pipe; ductile-iron standard fittings; gaskets; and gasketed joints.
   2. NPS 3 and NPS 4: NPS 4 PVC sewer pipe and fittings, gaskets, and gasketed joints.
   3. NPS 5 and NPS 6: NPS 6 ductile-iron, gravity sewer pipe; ductile-iron standard fittings; gaskets; and gasketed joints.
   4. NPS 5 and NPS 6: NPS 6 PVC sewer pipe and fittings, gaskets, and gasketed joints.
   5. NPS 8 and NPS 10: Ductile-iron, gravity sewer pipe; ductile-iron standard fittings; gaskets; and gasketed joints.
   6. NPS 8 and NPS 10: PVC sewer pipe and fittings, gaskets, and gasketed joints.
   7. NPS 12 to NPS 16: Ductile-iron, gravity sewer pipe; ductile-iron standard fittings; gaskets; and gasketed joints.
   8. NPS 12 and NPS 15: PVC sewer pipe and fittings, gaskets, and gasketed joints.

3.3 PIPING INSTALLATION

A. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.

B. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.

C. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.

D. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

E. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.

F. Install gravity-flow, nonpressure, drainage piping according to the following:

1. Install piping pitched down in direction of flow, at minimum slope of 1% for pipe under 8” in diameter 0.4% for 8 in pipe, 0.28% for 10 inch pipe and 0.22% for 12” pipe, unless otherwise indicated.
2. Install piping NPS 6 and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
3. Install piping with 42-inch minimum cover.
4. Install piping below frost line.
5. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
6. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.

G. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

3.4 PIPE JOINT CONSTRUCTION

A. Basic piping joint construction is specified in Division 2 Section "Piped Utilities - Basic Materials and Methods." Where specific joint construction is not indicated, follow piping manufacturer's written instructions.

B. Join gravity-flow, nonpressure, drainage piping according to the following:
1. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
2. Join dissimilar pipe materials with nonpressure-type, flexible couplings.

C. Pipe couplings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

1. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.

a. Unshielded flexible couplings for pipes of same or slightly different OD.
b. Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
c. Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.

3.5 MANHOLE INSTALLATION

A. General: Install manholes complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections with sealants according to ASTM C 891.

C. Form continuous concrete channels and benches between inlets and outlet.

D. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere unless otherwise indicated.

3.6 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318.

3.7 CLEANOUT INSTALLATION

A. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.

1. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
2. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
3. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
4. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.

B. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

3.8 CONNECTIONS

A. Make connections to existing piping and underground manholes.

1. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus 6-inch overlap with not less than 6 inches of concrete with 28-day compressive strength of 3000 psi.

3.9 IDENTIFICATION

A. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

1. Use warning tape or detectable warning tape over ferrous piping.
2. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

3.10 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate report for each system inspection.
2. Defects requiring correction include the following:

    a. Alignment: Less than full diameter of inside of pipe is visible between structures.
    b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
    c. Damage: Crushed, broken, cracked, or otherwise damaged piping.
    d. Infiltration: Water leakage into piping.
    e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
4. Reinspect and repeat procedure until results are satisfactory.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.
2. Test completed piping systems according to requirements of authorities having jurisdiction.
3. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
4. Submit separate report for each test.
5. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:

    a. Fill sewer piping with water. Allowable leakage is maximum of 30 gal/inch of nominal pipe size per mile of pipe, during 24-hour period.
    b. Close openings in system and fill with water.
    c. Purge air and refill with water.
    d. Disconnect water supply.
    e. Test and inspect joints for leaks.

6. Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

    a. Option: Test plastic gravity sewer piping according to ASTM F 1417.
    b. Option: Test concrete gravity sewer piping according to ASTM C 924.

7. Deflection Tests: Perform the deflection test at segment locations specified by the Architect/Engineer. The maximum allowable deflection shall be limited to five (5) percent of the base inside diameter of the sewer pipe.

a. The test shall be performed by pulling an approved deflection gauge through the segment of sewer pipe being tested.
b. Segments that have deflected more than the allowed five (5) percent shall be removed and re-laid in accordance with the installation specifications.
c. Following reconstruction, the segment shall be retested for deflection.

8. Manholes: Perform hydraulic test according to ASTM C 969.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.11 CLEANING

A. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 331313

SECTION 333219 – SANITARY SEWER LIFT STATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wastewater pumping station(s).

1.2 UNIT PRICES

A. S PUMP STATION:

1. Basis of Measurement: By LUMP SUM.

2. Basis of Payment: This item is for payment for installation of sanitary pump stations, including above or below ground structures for housing of the pumps. This item shall include wet well with hatch, vent, all pumps, rail assemblies, piping, fittings, valves, valve vault with hatch, electrical components, electric service, electric panels, building materials, concrete, any other appurtenances, labor, equipment, excavation, and backfill, to complete the pump station installation as required by the plans, standard drawings, and specifications, complete and ready-for-use. Also includes startup tests, and all appurtenant items for the full operation of the pumping station(s).

1.3 SUBMITTALS

A. General: Submit three (3) copies each of the manufacturer's data sheets and operation and maintenance information as described herein to the Engineer.

B. Manufacturer's Data Sheets: Submit manufacturer’s data sheets for each of the products specified herein to the Architect/Engineer for approval. Highlight or otherwise distinguish the data that applies specifically to the products subject to approval. Provide certification on each submittal stating that the product information has been reviewed and that the product that will be used in the Work will comply with the requirements of the specifications. Provide and date and signature with each certification statement.

C. Manufacturer's Operation and Maintenance Manual: Upon completion of the project, supply manufacturer's operation and maintenance manuals for the pump station, controls, telemetry (if specified) and related accessories to the Owner for future

reference. As a minimum, the manufacturer's operation and maintenance manual should include the following information:

1. Data sheets for the pumps, pump mounting hardware, pump discharge piping, valves, pump controls, telemetry equipment (if specified) and entry hatch to the pump wet well. Material data sheets should include manufacturer's name and address, equipment model no., serial no., date manufactured, date installed, name and address of equipment installer, equipment operation specifications (H.P., RPM, Voltage, Phase, Amps, Temp. ranges, etc.), materials of construction and other information important for the proper identification of the equipment and related components.

2. Pump operating curves with the specified operating point clearly labeled as well as information concerning the impeller size, operating speed, voltage, phase, horsepower and theoretical efficiency.

3. Installation drawings illustrating the as-built elevations of the bottom of the wet well, elevations of incoming pipes, elevation of force mains leaving the wet well, elevations of the float controls. The installation drawings shall include an itemized breakdown identifying each of the components that make up the system. Include descriptive information for each of the components including size, type of material, etc.

4. Electrical diagrams and specifications for the pumps, pump controls, and telemetry system (if specified). Identify each electrical component and its pertinent specifications. Include specifications and dimensional information for the enclosures to be included as part of the installation.

5. Operating procedures for the pumps, controls and telemetry system (if specified).

6. Preventative and routine maintenance procedures and related recommended maintenance task frequencies for mechanical and electrical equipment.

7. Warranty for covered equipment.

8. Names and addresses for repair centers and part suppliers.

1.4 PRODUCT HANDLING

A. Delivery and Storage: Materials shall be handled in a manner complying with the recommendations of the manufacturer. Materials shall be stored in an organized manner at a location that will not interfere with the work. Mechanical and electrical equipment shall be stored in an area protected from the elements in order to exclude moisture.

B. Protection: Take appropriate measures to protect stored materials from the potential of damage from ongoing activities adjacent to the storage area.

C. Replacement: Replace materials damaged during shipment, handling, or storage prior to installation. Such replacements shall be made at no additional cost to the Owner.

1.5 WARRANTY

A. General: All Work associated with this section shall be covered by the standard one year contract warranty in accordance with requirements of General Conditions.

B. Equipment and Structures: All mechanical and electrical equipment as well as structures installed as part of the Work shall be covered by a full manufacturer's warranty for a minimum period of one (1) year after the acceptance of the installation by the Architect/Engineer.

PART 2 - PRODUCTS

2.1 STRUCTURES

A. Wet Well:

1. Provide pre-cast concrete manhole sections complying with ASTM C478 as approved by the owner. Manhole sections shall be Bituminous Coated. Construct top and bottom slabs to the dimensions shown on the Drawings. Use reinforcement for slabs as specified on drawings. Reinforcement for wall sections shall be in accordance with the provisions outlined in ASTM C478. Comply with minimum section thickness requirements of ASTM C478 for walls and slabs unless dimensioned otherwise on the Drawings.

B. Wet Well Hatch:

1. Provide duplex aluminum hatch and frames as shown on the plans. The exterior surface of the hatches shall be raised tread plate to provide a skid resistant surface. Hinges and hardware shall be 300 series stainless steel. The hatch will be designed for a 300 psf live and dead load. Each hatch shall be provided with a safety latch to hold the door in an open position. Each hatch door shall be provided with a locking hasp. A fall protection system shall also be provided. The access hatch fall protection system shall be as manufactured by Halliday Products, Inc., Orlando. Fl, or approved equal.

C. Valve Vault:

a. Provide pre-cast concrete manhole section complying with ASTM C478 as approved by the owner. Construct wall sections, top slabs and bottom slabs to meet the requirements outlined above for the precast wet well. Valve vault hatch shall meet the requirements as shown on the plans. Valve Vault shall be Bituminous Coated.

D. Pumps And Rail Assembly:

1. Pumps:

a. Operating Conditions:

1) Each pump shall be rated as shown on the plans. The pump shall be non-overloading throughout the entire range of operation without employing service factor. The pump shall reserve a minimum service factor of 1.20. The performance curve submitted for approval shall state in addition to head and capacity performance, the pump efficiency, solid handling capacity and reflect motor service factor.

b. Construction:

1) The pump shall be a submersible grinder pump type designed for use with wastewater. The pump volute, motor and seal housing shall be high quality gray cast iron, ASTM A-48, Class 30. All external mating parts shall be machined and Buna N Rubber O-ring sealed on a beveled edge. Gaskets shall not be acceptable. All fasteners exposed to the pumped liquids shall be 300 series stainless steel.

2. Electrical Power Cord:

a. The power cord shall be in compliance with prevailing electric codes for the design load and service conditions. The cord entry into the motor connection area shall be protected with a redundant system to exclude the entrance of moisture into the area. The power cable entry into the cord cap assembly shall be made initially with a rubber bushing compression coupling. Additionally, the cavity of the motor connection area shall be filled with an epoxy compound potting. Connection of the power cable to the motor leads shall be made utilizing heavy-duty connectors with brass inserts. Cord shall be sufficient length to reach panel; no splices are allowed.

3. Motor:

a. The stator, rotor and bearings shall be mounted in a sealed submersible cast iron housing. The stator windings shall have Class F insulation rated for a minimum 155ºC. The winding housing shall be filled with clean high dielectric oil. Air filled motors will not be acceptable. The pump and motor

assembly shall be designed so that they may be operated partially or completely submerged in the liquid being pumped. Dependence on the use of water jackets shall not be acceptable. The stator shall be held securely in place to the motor housing either by heat shrinking or through the use of mechanical fasteners. The pump shall be equipped with heat sensors. The heat sensor shall be mounted directly on the stator windings and sized to open at 120ºC and automatically reset at 30-35ºC differential. The sensor shall be connected in series with the motor starter coil.

4. Bearings and Shaft:

   a. The pump shaft shall be supported by an upper radial bearing and a lower thrust bearing. The upper radial bearing shall have a minimum B-10 life at the specified condition of 50,000 hours and the lower thrust bearing shall have a minimum B-10 life at the specified condition of 50,000 hours. Bearings shall be of a standard type, which would typically be available locally. The shaft shall be machined from a solid 303 stainless steel forging and be a design which is of large diameter with minimum overhang to reduce shaft deflection and prolong bearing life.

5. Seals:

   a. A tandem mechanical shaft seal system running in an oil bath shall be provided. Pumps larger than 3 horsepower shall be provided with:

      1) Upper seal shall be of carbon/tungsten carbide and lower seal shall be tungsten carbide/tungsten carbide or,

      2) Upper stationary seal shall be made of carbon and the rotating seal face shall be made of tool steel. Lower stationary seal face and rotating seal face shall be made of silicone carbide.

   b. Pumps of 3 horsepower and smaller may have seals which shall contain one stationary tungsten carbide ring and one positively driven rotating carbon ring and function as an independent secondary barrier between the pumped liquid and the stator housing. Each interface shall be held in contact by its own spring system.

   c. Conventional mechanical seals that require a constant pressure differential to affect sealing will not be allowed.

   d. Seals shall be industry standard and universally available.

   e. Each pump shall be equipped with a seal leak detection probe and warning system. This shall be designed to alert maintenance personnel of lower seal failure without having to take the unit out of service for inspection or requiring access for checking seal chamber oil level and consistency. An

electric probe or seal failure sensor shall be installed in the seal chamber between the two tandem mechanical seals to sense the entrance of moisture or contaminants. Upon failure of the lower seal, a signal will be sent to the specified alarm mechanism at the control panel. Opposed mechanical seals shall not be acceptable.

6. Impeller:

   a. The impeller shall be constructed of 316 stainless steel and be designed for rough duty service. It shall be a eight-vane, semi-open design with two wash out vanes on the rear shroud. The impeller shall be a non-overloading design. Impellers shall be statically, dynamically, and hydraulically balanced in accordance with standard industry procedures. Impellers shall be securely keyed to the shaft with a locking arrangement whereby the impeller cannot be loosened by torque from either forward or reverse direction. A stainless steel washer and bolt shall be utilized for attachment of the impeller to the shaft.

7. Grinder Mechanism

   a. The stationary cutter shall be circular in design and contain evenly spaced cutting slots that extend outwards from the inlet of the pump. The slots are tapered inward toward the inlet to help direct slurry through the cutting slots into the pump. The slots are to be angled, or undercut, to help maintain a sharp axial cutting edge, even as the axial face wears during use. The stationary cutter shall be provided with tapped back-off holes so that screws can be used to remove the cutter from the volute. The rotating cutter shall contact three axial cutting arms extending from the hub, perpendicular to the pump shaft, that are sharpened to aid in the rejection of suspended debris that has not been sufficiently reduced in size by the axial cutting action. The curved leading edge of the cutting arms shall create a scissor action with the cutting slots of the stationary cutter plate to minimize the required torque. This will allow the cutter to macerate tough objects and prolong cutter life. Serrations on the hub of the cutter add additional cuts that prevent debris from becoming entangled within the rotating cutter. The rotating cutter shall thread onto the end of the pump shaft and be secured by a 300 series stainless steel washer in conjunction with a 300 series stainless steel flat head cap screw threaded into the end of the shaft. Both stationary and rotating cutters shall be made of 440C stainless steel, hardened to Rockwell 57-60C and ground close to tolerance. The grinder shall be capable of grinding normal domestic sewage into a fine slurry.

8. Casing:

   a. Pump casing shall be constructed of ASTM A-48, Class 30 cast iron. The casing shall be of the end suction and centerline discharge type equipped

with an automatic pipe coupling arrangement for ease of installation and piping alignment. The design shall be such that the pumps will be automatically connected to the discharge piping when lowered into position with the guide rails. The casing shall be accurately machined and bored for register fits with the suction and casing covers. A volute case wearing ring shall be provided to minimize impeller wear. The wear ring shall be brass and held by stainless steel fasteners. The wear ring shall be easily replaceable in the field. Wear rings of other materials shall not be acceptable.

b. Mating surfaces where watertight seals are required shall be machined and fitted with nitrile rubber O-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between mating surfaces, resulting in proper compression of the O-rings without the requirement of specific torque limits.

9. Paint:

a. The pump shall be painted after assembly but before testing, with zinc chromate base enamel. The paint shall be applied to a minimum dry mil thickness of 6 mils. The paint shall be air dried prior to testing.

10. Testing:

a. Commercial testing shall be required and performed by the manufacturer. All testing shall be performed at no extra cost to the Owner. The tests required shall include the following:

1) Visual test to verify specified HP, voltage, phase and hertz.

2) Motor and seal housing shall be meggerred for infinity to test for moisture content or insulation defects.

3) The stator windings shall be checked for imbalance during operation. Check amperage readings at each leg. If a significant difference is noted among the readings, check stator windings with a bridge to determine if unbalanced resistance exists. If unbalanced resistance exists, replace stator.

4) Following submerged operation, megger motor and seal housing to verify that no moisture has entered.

b. A report summarizing the test results shall be prepared and submitted with the manufacturers operation and maintenance manual.

E. Rail System And Related Accessories:

1. General:

   a. Provide 300 series stainless steel dual pipe rail system, discharge elbow with guide arms, hydraulic sealing flange assembly with sealing diaphragm, guide rail connector, lifting chain, access frame and hatch cover, float mounting bracket, control equipment and discharge piping. All hardware inside the wet well shall be 300 series stainless steel, unless otherwise noted.

2. Discharge Elbow with Guide Arms:

   a. Provide cast or ductile iron discharge elbows designed to mount directly on sump floor. Elbows shall have a 125-lb. flange faced and drilled on the outlet side, with a machined mating inlet connection. The design of the elbow will be such as the discharge connection is made without the need for any nuts, bolts or gaskets. The base elbow shall also anchor and align the pump rail or rails. Accessory bolts, washers, nuts, anchors etc. shall be 300 series stainless steel.

3. Hydraulic Sealing Flange:

   a. Provide cast iron hydraulic sealing flanges, complete with Buna N rubber diaphragm type gaskets for each pump discharge. The rubber diaphragm shall be held in place with a clamp ring with stainless steel fasteners. Contractor to provide two (2) spare pairs of sealing flanges per pump.

4. Lifting Chain:

   a. Each pumping unit shall be provided with a stainless steel lifting chain and be of sufficient length to extend from the pump to the top of the wet well plus five additional feet. The access frame shall provide a hook to attach the chain when not in use. The lifting chain shall be sized according to the pump weight.

5. Float Mounting Bracket:

   a. A float-mounting bracket shall be provided with 300 series stainless strain reliefs that support and hold the level control cords. Continuous cords are to run from pumps and level controls to a junction box as shown on plans. No splices shall be made in the wiring. The bracket shall be fabricated from stainless steel and attached to the access frame with 300 series stainless steel fasteners. A dielectric spacer should be installed when bolting to the aluminum access frame.

6. Guide Rail-(Dual Rail Guide):

a. Provide dual rail system comprised of 2" stainless steel pipe. Bolt directly to base elbow and an upper guide rail bracket, which is bolted directly to access frame hatch.

7. Piping:

a. Pipe and Fittings for lift station shall be flanged 250-pressure class ductile iron in accordance with the provisions of Section 333400 Sanitary Utility Sewerage Force Mains section of these specifications. Accessory bolts, washers, nuts, anchors, etc. shall be 300 series stainless steel.

8. Check Valves:

a. Provide Mueller swing check valves with outside lever and spring.

9. Plug Valves:

a. Provide Dezurik cam operated plug valves with wing nut.

F. THREE-PHASE (3 PH) Duplex Control Panel

1. A duplex pump control panel shall be furnished with each station to be installed as shown on the plans.

2. All electrical components shall be mounted in a NEMA 4X stainless steel enclosure. The enclosure shall have a hasp for padlocking (padlock not included) and include a three-point latch.

3. A separate hinged dead-front inner door shall be provided in the enclosure. All control switches, lights, and overload resets shall be mounted through the inner door. The pump circuit breaker and control circuit breaker shall be mounted with operating handles through the inner door, and shall have locking tabs that prevent the inner door from being opened with the breakers in the ON position.

4. The panel shall include a pump circuit breaker, control circuit breaker, alarm circuit fuse, control circuit fuse, voltage monitor, across the line starters (as detailed below), pump hand-off-auto switch (momentary in the hand position), alarm test switch, pump run lights, seal leak lights, alternator relay (solid state), override relay, terminal blocks, ground lugs, condensation heater and all necessary wiring and brackets.

5. The control panel shall be fitted with a red lexan (polycarbonate) alarm light. The light shall be approximately 3" high by 3-1/2" in diameter. The globe shall be mounted on top of the enclosure with a neoprene gasket. The lens cannot be removed from the exterior of the enclosure. The lens may be removed by entering the interior of the enclosure and removing four (4) #8 screws. The bulb shall be 40-watt minimum high intensity-medium base type. The bulb shall be

easily replaced by removing a thumb screw from the support bracket on the interior of the panel.

6. The alarm shall have a bright glow and flash during high water conditions. The alarm light will go out when the water level drops.

7. All internal wiring shall be neat and color-coded. Each wire shall be a different color or stripe (except for ground), and all incoming wires shall terminate into a box clap type terminal block. All control wires shall be 14 GA. Type TEW rated for 105°C (221°F).

8. A schematic diagram (showing wire color) shall be permanently fastened to the inside of the enclosure. An Installation and Service Manual shall also be included with each control panel.

9. The control panel shall be U.L. listed as an assembly.

10. An alarm circuit (visual and audio) shall be provided to indicate an alarm condition. The horn shall be energized by either the alarm float switch or the alarm test switch and operate in conjunction with the alarm light. The horn shall be weatherproof and be rated for 103 dB at 10 feet. There shall be an exterior acknowledge switch that will silence the horn but allow the light to remain flashing during an alarm condition.

11. An E.T.M. shall be provided for each pump to record the actual running time of the motor. The E.T.M. shall be energized by an auxiliary contact from the motor starter or contactor and be wired in parallel with the pump run light. The E.T.M. shall have a maximum reading of 99,999.99 hours. The E.T.M. shall be non-resettable.

12. All 115-volt, 15-amp duplex ground fault-interrupting receptacle shall be mounted in the control panel. The receptacle shall be protected by a 15-amp circuit breaker. The receptacle shall have a NEMA 5-15R configuration and be powered from the control circuit transformer.

13. A lightning arrester (3 ph) shall be supplied in the control panel. The arrester shall protect the equipment from over-voltages caused by lightning discharges. The arrester shall be rated at 650 volts RMS L-G.

14. Motor starters shall be IEC rated with ambient compensated overloads. The control panel shall include all necessary start/run capacitors for pump operation.

15. 4The control panel shall be mounted on top of the wet well cover via an expanded metal, 6” x 6” x 24” pedestal.

16. BASIC OPERATION: The pumps shall be operated automatically or manually as a pump down, lead/lag, common off system. Each pump shall be controlled

primarily through a “Hand-off-auto” three position maintained illuminated selector switch. Control function requirements are further defined in this section.

a. POSITION COMMANDS

1) OFF – In this position the applicable pump will not run under any circumstance.

2) HAND – In this position the applicable pump shall run without regard for the level sensing commands and will rely on operator discipline to run and stop.

3) AUTO – In this position both pumps shall be controlled by float switches. These switches will sense the appropriate level in the wet well and initiate start and stop commands to the pumps. All floats shall be interposed with intrinsically safe UL listed relays installed per NEC Article 504, ANSI/ISA-RP12.6 and all other applicable codes.

b. PUMP SEQUENCE

1) LEVEL 4 – High Level Alarm

2) LEVEL 3 – Start Lag Pump; both pumps running

3) LEVEL 2 – Start Lead Pump; shall alternate pumps on each call

4) LEVEL 1 – Off; all pumps stop

5) LOW LEVEL ALARM and redundant off.

c. UTILITY POWER: Utility Power to the panel shall be 460 Volts, three-phase, 60 Hz.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify that inlet and discharge piping connections are size, location, and elevation as indicated.

3.2 INSTALLATION

A. Excavation:

1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch regardless of the character of surface and subsurface conditions encountered. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

2. If groundwater is encountered, prevent accumulation of water in excavations; place structure in dry trench.

3. Where possibility exists of watertight structure becoming buoyant in flooded excavation, anchor structure to avoid flotation, as approved by Architect/Engineer.

B. Basin:

1. Lift precast components at lifting points designated by manufacturer.

2. When lowering structures into excavations and joining pipe to units, take precautions to ensure that interior of pipeline and structure remains clean.

3. Set precast structures, bearing firmly and fully on compacted crushed stone bedding or on other support system as indicated.

4. Assembly:

   a. Assemble multi-section structures by lowering each section into excavation.

   b. Install rubber gasket joints between precast sections according to manufacturer's recommendations.

   c. Lower, set level, and firmly position base section before placing additional sections.

5. Remove foreign materials from joint surfaces and verify sealing materials are placed properly.

6. Maintain alignment between sections by using guide devices affixed to lower section.

7. Joint sealing materials may be installed on Site or at manufacturer's plant.

8. Verify that installed structures meet required alignment and grade.

9. Remove knockouts or cut structure to receive piping without creating openings larger than required to receive pipe; fill annular spaces with mortar.

10. Cut pipe flush with interior of structure.

11. Shape inverts through structures as indicated.

12. Bitumastic Concrete Sealant:

    a. General:

        1) The outside surface of all concrete manholes (inside and outside of structure) shall be covered with a bitumastic sealant upon or before installation and prior to vacuum testing. The sealant shall conform in all respects to ASTM D 4479 and be Pure Asphalt Fibrated Dampproofing as manufactured by Pure Asphalt Company, Inc. or approved other.

    b. Surface Preparation:

        1) The concrete surface shall be thoroughly cleaned of all dust, grease, oil, or other foreign particles and dried prior to dampproofing. If the surface cannot be satisfactorily cleaned, the use of Pure Asphalt Primer shall be used to insure proper adhesion.

    c. Application:

        1) Bitumastic sealant shall be applied with a wide fiber brush or by light airless spray at a rate of 4 to 6 gallons per 100 square feet.

3.3 FIELD QUALITY CONTROL

A. Pre-operational Checks:

1. Check pump and motor alignment.

2. Check for proper motor rotation.

3. Check pump and drive units for proper lubrication.

B. Start-up and Performance Testing:

1. Notify Architect/Engineer, 2 days prior to flow rate testing.

2. Startup and Initial Testing: Coordinate and operate pumps in conjunction with other construction of gravity interceptor.

3. Hydraulically test station to performance requirements by a pump drawdown test to determine output of each pump running individually and together.

4. Confirm general sequencing of pump and float operations at basin and control panel are according to performance requirements.

5. Document and certify startup results in startup report.

C. Equipment Acceptance: Adjust, repair, modify, or replace system components failing to perform as specified and rerun tests.

D. Document and certify startup and testing results in written report.

E. The results of the field tests must be submitted to the Architect/Engineer prior to final acceptance of installation.

F. Three copies of the Operation and Maintenance Manual must be supplied to Engineer upon completion.

3.4 ADJUSTING

A. Adjust basin, pump, and control panel systems such that station operates to performance requirements and according to Specifications.

3.5 DEMONSTRATION

A. Demonstrate equipment startup, shutdown, routine maintenance, and emergency repair procedures to Owner's personnel.

END OF SECTION 333219

A.

SECTION 333400 - SANITARY SEWER FORCE MAINS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Force mains.
2. Bedding and cover materials.
3. Buried Gate Valves.
4. Air Release Valves.

1.2 UNIT PRICES

A. Pipe and Fittings:

1. Basis of Measurement: By linear foot.
2. Basis of Payment: Includes hand trimming, excavation, backfill, bedding, thrust restraints, pipe, and fittings, pipe identification, and all appurtenances for complete installation.

B. Buried Isolation Valves.

1. Basis of Measurement: By each.
2. Basis of Payment: Includes support blocking, hand trimming, excavation, backfilling, thrust restraints, valve and valve box, valve box collar ring, and all appurtenances for complete installation.

C. Air-Vacuum Release Valves:

1. Basis of Measurement: By each.
2. Basis of Payment: Includes support blocking, hand trimming, excavation, backfilling, thrust restraints, valve and valve vault, valve vault frame and cover, and all appurtenances for complete installation.

1.3 SUBMITTALS

A. Product Data: Manufacturer information indicating pipe material used, pipe accessories, valves, restrained joint details and materials, and dimensional information for all products provided.

B. Shop Drawings:

1. Piping.

a. Piping piece numbers and locations.
b. Restrained joint locations.

2. Air-Vacuum Release Valves.

a. Detailed dimensional drawing of valve vault and valve installation.

C. Manufacturer's Certificate: Products meet or exceed specified requirements.

D. Manufacturer Instructions: Indicate special procedures required to install specified products.

E. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

F. Qualifications Statements:

1. Qualifications for manufacturer, installer, and licensed professional.
2. Manufacturer's approval of installer.

1.4 CLOSEOUT SUBMITTALS

A. Project Record Documents:

1. Record invert elevations and actual location of pipe runs and connections.
2. Record changes from bid documents due to Supplemental Field Instructions, unforeseen conditions, act of God, variations from existing conditions provided in the bid documents, or any other deviation which occurs in construction from the bid documents.

1.5 QUALITY ASSURANCE

A. Perform Work according to AWWA and/or ASTM standards as applicable.

B. Manufacturer: Company specializing in manufacturing products specified in this Section with three years' documented experience.

C. Installer: Company specializing in performing Work of this Section with three years' documented experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Storage:

1. Store materials on-site within project limits or designated areas as approved by the Owner, Architect/Engineer and property owner.
2. Store materials according to manufacturer instructions.

3. Do not place materials on private property without written permission of property owner.
4. Do not stack pipe higher than recommended by pipe manufacturer.

B. Protection:

1. Protect materials from moisture and dust by storing in clean, dry location remote from construction operations areas.
2. Store gaskets for mechanical and push-on joints in cool and dry location, out of direct sunlight, and not in contact with petroleum products.
3. Provide additional protection according to manufacturer instructions.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 FORCE MAIN

A. Ductile-Iron Pipe:

1. Comply with AWWA C151 and AWWA C104.
2. Standard cement-mortar lining and outside coated.
3. Pressure Classes:

   a. Sizes 3 to 12 Inches: 350 psig.
   b. Sizes 14 to 18 Inches: 250 psig.

4. Ductile-Iron Fittings:

   a. Comply with AWWA C110.
   b. Pressure Rating: 350 psig.
   c. Cement mortar lined and outside coated as for ductile-iron pipe.

5. Joints:

   a. Comply with AWWA C111.
   b. Type: Pipe - Mechanical or push on.
   c. Type: Fittings - Mechanical.

6. Rubber Gaskets, Lubricants, Glands, Bolts, and Nuts: Comply with AWWA C111.

B. PVC PIPE

1. PVC Pressure Sewer Pipe and Fittings, 2 1/2-Inch Nominal Size and Smaller:

    a. Comply with ASTM D1785.
    b. Schedule 40.
    c. Fittings: Comply with ASTM D2466.
    d. Joints:

        1) Piping shall be push on or solvent weld.
        2) Fittings shall be solvent weld.

    e. Directional Drilled:

        1) Yelomine Restrained Joint.

2. PVC Pressure Sewer Pipe and Fittings, 3-Inch Nominal Size and Larger:

    a. Comply with ASTM D2241.
    b. SDR 21.
    c. Fittings shall be Ductile Iron.

C. HDPE PIPE

1. High Density Polyethylene Pipe (HDPE) and Fittings, 4-Inch Nominal Size and Smaller:

    a. Comply with ASTM D1248 and ASTM D3350.
    b. DR 9
    c. Fittings shall be molded or fabricated from sections of pipe with outlet ends machined to match the system piping.
    d. Joints: Thermally Butt-Fusion Welded.

2.2 BEDDING AND COVER:

A. Bedding: Naturally or artificially graded mixture or natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve.
B. Haunching: Naturally or artificially graded mixture or natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve or excavated earth where approved by Architect/Engineer.
C. Backfill from top of Haunching to Finish Grade:

1. Improved Surfaces: Backfill under improved surfaces shall be consolidated #57 stone to a depth of 24” below finished grade. Compacted Dense Grade Aggregate to 95% standard proctor shall be used from top of #57 stone to subgrade.

2. Unimproved Surfaces: Backfill under unimproved surfaces shall be naturally or artificially graded mixture or natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve or excavated earth where approved by Architect/Engineer.

D. Subsoil: No rocks more than 3 inches in diameter, frozen earth, or foreign matter.

2.3 BURIED GATE VALVES:

A. AWWA, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. American AVK Co.; Valves & Fittings Div.
b. American Cast Iron Pipe Co.; American Flow Control Div.
c. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
d. Crane Co.; Crane Valve Group; Stockham Div.
e. East Jordan Iron Works, Inc.
f. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
g. McWane, Inc.; Kennedy Valve Div.
h. McWane, Inc.; M & H Valve Company Div.
i. McWane, Inc.; Tyler Pipe Div.; Utilities Div.
j. Mueller Co.; Water Products Div.
k. NIBCO INC.
l. U.S. Pipe and Foundry Company.
m. Approved equal.

4. Nonrising-Stem, Metal-Seated Gate Valves:

a. Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.

1) Standard: AWWA C500.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Mechanical joint.
4) Interior Coating: Complying with AWWA C550.

5. Nonrising-Stem, Resilient-Seated Gate Valves:

a. Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Mechanical joint.
4) Interior Coating: Complying with AWWA C550.

6. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:

a. Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 250 psig.
3) End Connections: Push on or mechanical joint.
4) Interior Coating: Complying with AWWA C550.

7. OS&Y, Rising-Stem, Metal-Seated Gate Valves:

a. Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.

1) Standard: AWWA C500.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Flanged.

8. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:

a. Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.

1) Standard: AWWA C509.
2) Minimum Pressure Rating: 200 psig.
3) End Connections: Flanged.

B. UL/FMG, Cast-Iron Gate Valves:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
3. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

a. American Cast Iron Pipe Co.; American Flow Control Div.
b. American Cast Iron Pipe Co.; Waterous Co. Subsidiary.
c. Crane Co.; Crane Valve Group; Stockham Div.
d. McWane, Inc.; Clow Valve Co. Div. (Oskaloosa).
e. McWane, Inc.; Kennedy Valve Div.
f. McWane, Inc.; M & H Valve Company Div.

g. Mueller Co.; Water Products Div.
h. NIBCO INC.
i. U.S. Pipe and Foundry Company.
j. Or Approved Equal.

4. UL/FMG, Nonrising-Stem Gate Valves:

a. Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig.
3) End Connections: Flanged.

5. OS&Y, Rising-Stem Gate Valves:

a. Description: Iron body and bonnet and bronze seating material.

1) Standards: UL 262 and FMG approved.
2) Minimum Pressure Rating: 175 psig.
3) End Connections: Flanged.

2.4 AIR RELEASE VALVES

A. Manufacturers:
1. APCO Model 445C or approved equal.
2. Comply with ANSI-AWWA C512.

B. Body and Cover: Cast iron.

C. Stem and Float: Stainless steel.

D. Trim: Stainless steel.

E. Orifice Seats: Buna-N.

F. Long bodies and float stems such that operating mechanisms and orifice openings are kept free from contact with sewage during purging of air.

G. Backflushing and Cleaning Accessories:

1. Shutoff valve at bottom inlet.
2. Blowoff valve near bottom of valve body.
3. Clear water inlet valve with quick-disconnect coupling.
4. Air inlet with quick-disconnect in valve cover.
5. Hose with quick-disconnect couplings.

PART 3 - EXECUTION

3.1 PREPARATION

A. Correct over-excavation with fine aggregate.

3.2 INSTALLATION

A. Excavation for trenches:

1. Excavate pipe trench to indicated gradients, lines, depths, and elevations.
2. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.

    a. Clearance: As indicated on Construction Drawings.

3. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

    a. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material, 4 inches deeper elsewhere, to allow for bedding course.

B. Bedding:

1. Install bedding at sides and over top of pipe to minimum compacted thickness of 8 inches.
2. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
3. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Piping:

1. Pipe shall be handled without dropping or bumping in a manner to insure installation in a sound, undamaged condition. Pipe shall be lifted with slings or as recommended by the manufacturer. Hooks in contact with joint surfaces shall not be used. Equipment used for handling shall be capable of the required work with an adequate safety factor against overturning or overloading.
2. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and convenient prosecution of the work. All pipe fittings and valves shall be carefully lowered into the trench piece by piece by means of

a derrick, ropes of other suitable tools or equipment, in such a manner as to prevent damage to force main materials.

3. All pipe shall be laid and maintained to the required lines and grades shown on the drawings, and as required to prevent undue deflections and breakages after flow has been placed in the lines to the operating pressures. Fittings and valves shall be set at the required locations, spigots centered in valves and all valve stems set plumb.
4. All pipe shall be laid to a minimum depth of cover over the top of the pipe of forty-two inches (42”) in all areas.
5. No pipe shall be laid, until factory representative of the company supplying the pipe visits the site and instructs the Contractor in the manner, ways and procedures of installing the pipe for this particular project. Then length of the initial visit shall be of sufficient time to thoroughly acquaint the Contractor with acceptable methods of laying, blocking and backfilling in and around the pipe, and shall not be less than two (2) days. All pipe laying shall be in strict accordance with the manufacturer’s recommendations and installation manual unless otherwise specified herein.
6. No pipe shall be laid in water, or when the trench conditions of the weather is unsuitable for the work to be done. When pipe laying is not in progress, the open ends of the pipe shall be closed to exclude trench water, dirt, and small animals from the pipe. Whenever trench water is excluded from the interior of the pipe, adequate backfill shall be deposited upon the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and relayed as directed.
7. After placing a length of pipe in the trench, the spigot end shall be centered in the bell and the pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the joints. Precautions shall be taken to prevent dirt from entering the joint space.
8. At times that pipe laying is not in progress, the open ends of pipe shall be closed by a watertight plug. Joints of pipe in the trench which cannot be completed shall be caulked with packing to make watertight as possible.
9. No pipe shall be laid on frozen ground, in water, or when trench conditions are unsuitable.
10. The grade of the force main shall be gradually changed to lower the line where necessary to get under existing utilities.
11. Whenever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstruction or plumb stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that required for satisfactory making of the joint and push-on joint ductile iron pipe shall not exceed those tabulated in Table I and Table II of AWWA Specification C600. Where pipe is laid in long radius curves, the contractor is to ensure that the pipe be positioned firmly against the outside of the trench to prevent shifting under pressure.
12. The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe. If the cut end of the pipe is to be inserted into the bell end with gasket, the outside edge of the filed cut plain end pipe shall be conditioned for use by filing or grinding a small taper at an angle of about thirty degrees.

13. Connect to municipal sewer system.

D. Thrust Restraints:

1. Provide pressure pipeline with restrained joints or concrete thrust blocking at bends, tees, and changes in direction.
2. Construct concrete thrust blocking as indicated.

E. Cradles and Encasements:

1. Provide concrete cradles and encasements for pipelines where indicated on Drawings.

F. Haunching:

1. Backfill from top of Bedding to Finish Grade:

a. Improved Surfaces: Backfill under improved surfaces shall be consolidated #57 stone to a depth of 24” below finished grade. Compacted Dense Grade Aggregate to 95% standard proctor shall be used from top of #57 stone to subgrade.
b. Unimproved Surfaces: Backfill under unimproved surfaces shall be naturally or artificially graded mixture or natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D2940; except with 100 percent passing a 1-inch sieve and not more than 8 percent passing a No. 200 sieve or excavated earth where approved by Architect/Engineer.

3.3 IDENTIFICATION

A. RIBBON TAPE

1. Materials and their installation are specified in Section 312000 "Earth Moving." Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.

a. Place buried metallic locator tape 18”-24” above top of pipe and a minimum of 12” below finished grade.. Tape must continuously read: “Caution: Sewer Force Main Below.”

B. TRACER WIRE

1. Description:

a. Magnetically detectable, #12 copper wire with THW insulation or approved equal.
b. All splices shall be soldered or mechanically bound (compression fittings) and shall be wrapped with waterproof wrapping to insure continuity and

insulation of the copper wire from the soil and securely connected at flange bolts to all valves and fittings to provide a suitable electrical connection.

c. The electrical continuity of tracer wire between valves shall be certified and defects found shall be corrected prior to acceptance by the Owner.

d. Tracer wire shall be taped or suitably held over the top center of the pipe.

3.4 FIELD QUALITY CONTROL

A. Inspections: Request inspection by Architect/Engineer 48 hours prior to and immediately after placing bedding.

B. Testing:

1. If tests indicate that Work does not meet specified requirements, remove Work, replace, and retest.
2. Pressure test:

a. After the trench has been backfilled as specified, all newly laid pipe, or any valved section thereof, shall be subjected to 150 psi pressure test under the supervision of the Architect/Engineer and the Owner.

b. The duration of each pressure test shall be at least three hours, after reaching the 150 psi.

c. Each valve section of the pipe shall be slowly filled with water and the specified test pressure applied by means of a pump connected to the pipe in a manner satisfactory to the Owner. The pump, pipe, connections, gauges and all necessary apparatus shall be furnished by the Contractor. The test connection shall be made at the highest point in the test section or provisions made for pressure differentials due to elevations. The test pressure may not vary plus or minus 5 psi for the duration of the test.

d. Before applying the test pressure, all air shall be expelled from the pipe. If hydrants with blow off valves are not available at high places, the Contractor shall make the necessary taps (requires service clamp and corporation stop) at points of highest elevation before the test is made with the approval of the Owner. These taps shall be left in place and the location marked.

e. Any cracked or defective pipes, fittings, valves or hydrants discovered in consequence of this pressure test shall be removed and replaced by the Contractor with new material in the manner specified and the test shall be repeated until satisfactory to the Owner.

3. Leakage test:

a. A leakage test shall be conducted concurrently with the pressure test. The duration of each leakage test shall be three hours and during the test, the main shall be subject to 150 psi pressure.

b. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof, necessary to maintain the specified

leakage test pressure after the pipe has been filled with water and the air expelled. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as determined by the following schedule:

1) Pipe Size: 10”

   a) Maximum Loss: 0.92 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

2) Pipe Size: 8”

   a) Maximum Loss: 0.74 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

3) Pipe Size: 6”

   a) Maximum Loss: 0.55 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

4) Pipe Size: 4”

   a) Maximum Loss: 0.37 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

5) Pipe Size: 3”

   a) Maximum Loss: 0.28 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

6) Pipe Size: 2 1/2”

   a) Maximum Loss: 0.23 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

7) Pipe Size: 2”

   a) Maximum Loss: 0.18 gal/hr
   b) Test Pressure: 150 psi
   c) Test Period: 3 hrs

c. Each end of the main shall be capped. The main shall then be filled slowly with water by means of a pump connected to the low end of the main. The pump shall be connected to the main in a manner satisfactory to the

Owner. Provisions shall be made at the high end of the main to expel all air from the line. After all air has been expelled from the main, the water pressure in the main shall then be increased gradually to 150 psi. After the pressure has stabilized to 150 psi the test shall begin. Water required to maintain 150 psi shall be withdrawn from a calibrated container. The outlet end of any pressure regulating device shall discharge into the calibrated container in order to accurately determine the actual amount of water required to maintain the required 150 psi water pressure within the test section. The duration of the test shall be three hours. Should any test of the pipe disclose leakage greater than that specified, the Contractor shall, at his own expense, repair the defective joints or sections until the leakage is within the specified allowance.

d. No pipe installation will be accepted until the leakage is less than the number of gallons per hour as specified in above table for the size pipe being tested.

END OF SECTION 333400

SECTION 260000 – GENERAL PROVISIONS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SCOPE

A. Special Conditions section and General Requirements section are made part of this Division.

B. This Division includes the sections, but not necessarily limited to, listed in the Division Table of Contents.

1.2 GENERAL

A. The work included in this division consists of furnishing all labor, equipment, transportation, excavation, backfill, supplies, material, appurtenances and services necessary for the satisfactory installation of the complete and operating Electrical System(s) indicated or specified in the Contract Documents.

B. Any materials, labor, equipment or services not mentioned specifically herein which may be necessary to complete or perfect any part of the Electrical Systems in a substantial manner, in compliance with the requirements stated, implied or intended in the drawings and/or specifications, shall be included as part of this Contract.

C. It is the intent of this Contract to deliver to the Owner's a "like new" project once work is complete. Although plans and specifications are complete to the extent possible, it shall be the responsibility of the Contractors involved to remove and/or relocate or re-attach any existing items which interfere with the new work required for the complete installation without additional cost to the Owner.

1.3 INTENT

A. It is the intention of the Contract Documents to call for finished work, tested and ready for operation.

B. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

1.4 EXAMINATION OF SITE AND CONDITIONS

A. Each Proposer shall inform himself of all conditions under which the work is to be performed, the site of the work, the structure of the ground, above and below grade, the obstacles that may be encountered, the availability and location of necessary facilities and all relevant matters concerning the work. Each Proposer shall also fully acquaint himself with all existing conditions as to ingress and egress, distance of haul

from supply points, routes for transportation of materials, facilities and services, availability of utilities, etc. His proposal shall cover all expenses or disbursements in connection with such matters and conditions. No allowance will be made for lack of knowledge concerning such conditions after bids are accepted.

1.5 DRAWINGS AND SPECIFICATIONS

A. The drawings are diagrammatic only and indicate the general arrangement of the work to be followed. If deviations from the layouts are necessitated by field conditions, detailed layouts of the proposed departures shall be submitted to the Engineer for approval before proceeding with the work. The drawings are not intended to show every item, which may be necessary to complete the systems. All Proposers shall anticipate that additional items may be required and submit their bid accordingly.

B. The drawings and specifications are intended to supplement each other. No Proposer shall take advantage of conflict between them, or between parties of either. Should this condition exist, the Proposer shall request a clarification not less than twelve days prior to the submission of the proposal so that the condition may be clarified by Addendum. In the event that such a condition arises after work is started, the interpretation of the Engineer shall be final.

C. The drawings and specifications shall be considered to be cooperative and anything appearing in the specifications, which may not be indicated on the drawings or conversely, shall be considered as part of the Contract and must be executed the same as though indicated by both.

D. The Contractor shall make all his own measurements in the field and shall be responsible for correct fitting. He shall coordinate this work with all other branches of work in such a manner as to cause a minimum of conflict or delay.

E. The Engineer shall reserve the right to make adjustments in location of piping, ductwork, equipment, etc. where such adjustments are in the interest of improving the project.

F. Should conflict or overlap (duplication) of work between the various trades become evident, this shall be called to the attention of the Engineer. In such event neither trade shall assume that he is to be relieved of the work which is specified under his branch until instructions in writing are received from the Engineer.

G. Unless dimensioned, the drawings only indicate approximate locations. Dimensions given in figures on the drawings shall take precedence over scaled dimensions and all dimensions, whether given in figures or scaled, shall be verified in the field to insure no conflict with other work.

H. Where on the Drawings a portion of the work is drawn out and the remainder is indicated in outline, or not indicated at all, the parts drawn out shall apply to all other like portions of the work. Where ornamentation or other detail is indicated by starting only, such detail shall be continued throughout the courses or parts in which it occurs and shall also apply to all other similar parts of the work, unless otherwise indicated.

I. Details not usually shown or specified, but necessary for the proper installation and operation of systems, equipment, materials, etc., shall be included in the work, the same as if herein specified or indicated.

J. Where on the Contract Documents the word typical is used, it shall mean that the work method or means indicated as typical shall be repeated in and each time it occurs whether indicated or not.

1.6 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

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

B. Before ordering material or performing any work, the Contractor shall verify all measurements at the work site. Any difference between dimensions on the Drawings and actual measurements shall be brought to the Engineer's attention for his consideration before the work may proceed. No extra compensation will be allowed because of difference between actual measurements and dimensions indicated on the Drawings. The Contractor shall assume full responsibility for accuracy of measurements obtained at the Work Site.

C. Dimensions, which are lacking, shall be obtained from the Architect. In no case shall Drawings be scaled.

D. All subcontractors shall familiarize themselves with all of the conditions relating to this Contract since the terms set forth in the General Conditions binds all subcontractors to the Contract.

1.7 WORK LAYOUT

A. This contractor shall layout his work from construction lines and levels established by the General Contractor and shall be responsible for the proper location and placement of his work.

B. Maintain all benchmarks, monuments, and other reference points; replace as directed if disturbed or destroyed.

1.8 PROTECTION OF STORED EQUIPMENT

A. Provide suitable storage for, and completely protect all materials and equipment prior to installation. Storage shall be dry, clean and safe. Any materials or equipment damaged, deteriorated, rusted or defaced due to improper storage shall be fully repaired, refinished or replaced, as directed by the Engineer and any materials or equipment lost through theft or mishandling shall be replaced, all without additional cost to the Owner.

1.9 COORDINATION BETWEEN TRADES

A. Each Proposer shall review all drawings and specifications including Architectural, Mechanical, Electrical, Fire Protection, Landscaping, Structural, Surveys, etc., to ensure that the work he intends to provide does not encroach a conflict with or affect the work of others in any way. Where such effect does occur, it shall be the Proposer's responsibility to satisfactorily eliminate any such encroachment conflict or effect prior to the submission of his proposal. Each Proposer shall in particular ensure that there is adequate space to install his equipment and materials. Failure to do so shall result in the correction of such encroachment conflict or effect of any work awarded to the Proposer and shall be accomplished fully without expense to others and that they are reasonably accessible for maintenance. Check closely all mechanical and electrical closets, chases, ceiling voids, wall voids, crawl spaces, etc., to insure adequate spaces.

B. It shall be the responsibility of this contractor to leave the necessary room for other trades. No extra compensation will be allowed to cover the cost of relocating conduit, boxes, etc., or equipment found encroaching on space required by others.

1.10 EQUIPMENT CONNECTIONS AND WIRING

A. This contractor shall make all electrical connections, etc., to existing equipment to be reused and all equipment furnished by others whenever such equipment is shown on any part of the drawings or mentioned in any section of the specifications, unless otherwise specified. For bidding, if circuits are not specifically indicated, new code compliant circuit shall extend to the nearest suitable electrical panel with capacity and terminated on contractor furnish circuit breakers.

B. Supervision, to assure proper functioning and operation shall be provided by the trade furnishing the equipment or apparatus so connected.

C. Unless otherwise specifically noted on the drawings or elsewhere in these specifications, all wiring shall be done by this contractor, including connections, etc., to all equipment requiring electrical services furnished under other sections of this specification. This contractor shall furnish and install all disconnects, overload protection, motor control apparatus, etc., for all equipment unless otherwise specifically noted elsewhere as being provided with, or as a part of, the equipment.

1.11 SUBSTITUTION OF MATERIALS AND EQUIPMENT

A. When this contractor requests approval of substitute materials and/or equipment, except when under formal alternate proposal, it shall be understood and agreed that such substitution, if approved, will be made without cost to the Owner or Engineer, regardless of changes in connections, spacing, electrical services, etc. In all cases where substitutions affect other trades, the contractor offering such substitutions shall reimburse all affected contractors for all necessary changes in their work.

1.12 CODES AND STANDARDS

A. Pertinent Federal, State and Local requirements and regulations are hereby made part of this contract. In case of conflict between Contract Documents and above listed requirements, the latter shall govern. Requirements of authority having local jurisdiction shall supersede all other requirements. Use of the term "code" in sections of the specification refers to applicable requirements and regulations of above agencies.

B. All electrical installation shall be made in accordance with the latest edition of the National Electrical Code and supplements in force at the time of bid opening, all materials employed shall bear Underwriters' official labels where such labeling is customary. In the event that local codes are more rigid than the National Electrical Code, both codes shall be considered as jointly governing and the requirements of either and/or both then prevail.

C. Following is a list of abbreviations for codes and standards, which are referred to in the specifications. Where such reference is made, the code or standard becomes a part of the specification as if the code or standard were included herein. Reference is always to the latest edition of the code or standard unless otherwise specifically noted.

1. Industry and Agency Standards, Codes and Specifications

ANSI - American National Standards Institution

ASTM - American Society of Testing and Materials

NBFU - National Board of Fire Underwriters'

NBS - National Bureau of Standards

NEMA - National Electrical Manufacturers Association

UL - Underwriters' Laboratories

NEC - National Electrical Code

NESC - National Electrical Safety Code

IPCEA - Insulated Power Cable Engineers Association

IEEE - Institute of Electrical and Electronics Engineers

D. Compliance with the Occupational Safety and Health Act shall be the responsibility of the contractor and under no circumstances shall the Engineer/Architect be an authority or be held responsible for any acts concerning this regulation.

1.13 MATERIALS AND EQUIPMENT

A. General. Material and equipment shall be furnished as specified in this section and in each individual electrical section of these specifications and shall be in strict accordance with the required ANSI, ASTM, NEMA, IPCEA, UL, NEC, or other recognized standards, codes and specifications listed. Applicable codes, standards and manufacturers' products referred to in these specifications shall establish minimum requirements for material, equipment and installation furnished.

B. Bolting shall be carbon steel conforming to ASTM A-307 with heavy hexagonal nut.

C. Angles, Channels, Beams, Bars and Rods shall be steel conforming to ASTM A-36.

1.14 INSTALLATION

A. Installation of all electrical equipment for the project as specified in these specifications and indicated on the drawings shall be in accordance with the general requirements of this section. Additional installation requirements applicable to individual systems are specified in the specific system section.

B. All equipment shall be installed at locations indicated on the drawings and as specified herein.

C. Assembly and installation of equipment shall be in strict accordance with manufacturer's installation instructions.

D. Equipment shall be securely anchored in place. Care shall be exercised to correctly orient equipment before securing in place.

E. All equipment and material shall meet the minimum requirements of seismic bracing as governed by the authority having jurisdiction.

1.15 OBSOLETE OR REMOVED EQUIPMENT AND MATERIALS

A. The Electrical Contractor shall remove all existing materials and equipment made obsolete by, and interfering with the additions, alterations, or razing as shown on the plans and specified. Maintain such existing equipment and materials intact and in existing condition insofar as possible.

B. Unless otherwise specifically stated in the specifications or shown on the drawings, all such removed material and equipment, not to be reused, shall be removed from the site and disposed of in a proper manner.

1.16 CONTINUOUS OPERATION AND CUT-OVER

A. The present services, facilities, or equipment shall be left intact until such time that the new permanent installation is completed, or temporary means provided for continuous operation.

B. All new services, equipment, etc., for the new installation shall be installed complete to a point of connection before attempting to make new connections.

C. To facilitate the continuous operation of the system and building, the cut-over work shall be done at off-peak periods. Such periods to be arranged by conference between the Contractor, Owner and the Engineer. All contractors shall rigidly adhere to the program so determined.

D. All material installed shall meet the minimum requirements of the Local Code for seismic bracing and be installed in such a manner suitable for the seismic zone which applies.

1.17 TESTS

A. Following the completion of all wiring installation, test the individual systems and eliminate any existing grounding of potential conductors, short circuits, other faults, etc.

1.18 PERMITS, FEES AND CERTIFICATES

A. Each respective contractor shall obtain and pay all permits and licenses required by Federal, State and Local Ordinances for his type work. All fees in connection with inspections, permits, licenses and approvals shall be paid by the contractor whose work is affected.

1.19 ELECTRICAL INSPECTION FOR CONTRACT COMPLIANCE

A. The contractor shall be responsible for obtaining and coordination of required electrical inspections. Inspections shall be made by an Electrical Inspector Certified by the authority having jurisdiction and any fees and charges associated with the inspections will be paid for by the contractor. The contractor shall furnish the Engineer and Owner a copy of the Electrical Certificate of approval before final payment will be made.

1.20 PROJECT CLEAN-UP

A. The Contractor shall export off site, all debris resulting from work under this Division. Burning of debris at the project site is not permitted.

B. Each contractor shall maintain his portion of this project in a neat and orderly fashion, disposing of debris, cartons, crates and boxes as the contents are installed in the project. This clean-up shall be accomplished each day in order not to create hardships on the other trades.

1.21 GUARANTEES AND WARRANTIES

A. This Contractor shall guarantee all equipment, apparatus, materials and workmanship entering into this contract to be the best of its respective kind, and shall replace all parts at his own expense, which have been proven defective, within one year from final acceptance of the work by the Owner. Items of equipment, which may have longer guarantees, shall have warranties and guarantees completed, in order, and in effect at the time of final acceptance of the work by the Architect. This contractor shall furnish all such warranties and guarantees at the time of final acceptance of the work.

1.22 SHOP DRAWINGS AND OTHER RELATED SUBMITTALS

A. The type of submittal information required for each item of equipment is scheduled at the end of this section. Unless noted otherwise, submittals shall be furnished in electronic format. The Contractor shall furnish a single pdf file for each submittal. Submittals shall be clearly labeled as to what is contained within and shall note the related Specification Section. The Contractor shall be responsible for providing a numbering convention for submittals to allow easy tracking of submittals.

B. Submittals for color selections shall not be electronically submitted. Provide hard copies of the colors. Printed color selections are not acceptable.

C. Unless otherwise specified, materials and equipment must be a standard product of manufacturers regularly engaged in production of such items.

1. The contractor shall secure right to use any patented article, method or apparatus used in work.
2. When substitute item of equipment has been submitted for approval, the mechanical contractor shall submit layout drawings indicating the changes necessary to adapt the substitute item of equipment to the design, when requested by the Engineer. All cost of the requested drawings shall be the responsibility of the contractor offering the substitutions.
3. Under no circumstances will materials be considered for substitution, which are not a product of a manufacturer regularly engaged in production of such material or which is a product of one who merely assembles products of other manufacturers into fabricated units. Material submitted for substitution shall be subject to express and implied warranties of one manufacturer only.

D. If substitution of material results in incidental extra costs on part of any trade under contract, such costs shall be borne by contractor desiring substitution.

1. Submittal data shall include specification data, such as metal gauges, finishes, optional accessories, etc., even though such equipment and materials may be detailed on the drawings or specified. In addition, the submittal data shall include performance (certification) data, wiring diagrams where applicable, accurate dimensional data and a recommended spare parts list. Outline or dimensional drawings alone are not acceptable.
2. No roughing-in connections, etc., shall be done until approved equipment submittals are in the hands of the contractors. It shall be the contractor's

responsibility to obtain approved drawings and to make all connections, etc., in the neatest and most workmanlike manner possible. Each contractor shall coordinate with all other contractors having any connections, roughing-in, etc., to the equipment.

3. In general, normal catalog information (with the particular items underlined or otherwise denoted as being the submitted item) will be acceptable as submittal data. Installation, operating and maintenance instructions must be that information, specifically applicable to the item furnished, ordinarily supplied with the equipment to the owner with any modifications indicated. Wiring diagrams must be correct for the application. Generalized wiring diagrams, showing alternate methods of connection, will not be acceptable unless all unrelated sections are marked out.
4. Submittal data sheets, which indicate several different model numbers, figure numbers, optional accessories, installation arrangements, etc., shall be clearly marked to indicate the specific items of equipment to be furnished. Samples and certificates shall be furnished as requested. Submittal data must be complete for each piece of equipment; piecemeal data will not be processed.
5. It shall be noted that approval of shop drawings by the Engineer applies only to general design, arrangement, type, capacity and quality. Such approval doesn't apply to quantities, dimensions, connection locations and the like. In all cases, the contractor alone shall be responsible for furnishing the proper quantity of equipment and/or materials required, that all equipment fits the available space in a satisfactory manner, and that all connections are suitably located.
6. Before the project is accepted, all submittal data (shop drawings, etc.) must be complete and approved.
7. In addition to shop drawings described above, the following information is required of the contractor to be furnished to the Engineer.

1.23 ELECTRICAL DOCUMENT REQUIREMENTS

ITEM OR DESCRIPTION OF EQUIPMENT REQUIRING SHOP DRAWINGS	PARTS LIST	OPERATING MANUAL	WIRING DIAGRAM	CERTIFICATION	SAMPLES
Lighting Fixtures	X	X	X	X	
Panelboards	X	X	X	X	
Wiring Devices	X	X			
Transient-Voltage Suppression Devices (SPD's)	X	X	X		

1.24 OPERATION AND MAINTENANCE DATA

A. The Contractor shall submit a single copy of the Operation and Maintenance Manuals prior to final completion.

A. Operation and Maintenance Manuals (O&M's) shall be submitted in electronic format. Provide one pdf file per Specification Division.

B. Prepare pdf files with the title for each file to include the Specification Division Number and brief description of contents (example: "Division 23 – HVAC Equipment").

C. The first page of pdf file shall be a coversheet titled "Operation and Maintenance Manual". Include table of contents with page numbers. Provide bookmarks within the pdf file labeled for each section contained within the file.

D. Include the following within O&M's

1. Part I: Directory, listing names, addresses, and telephone numbers of Architect/Engineer. Contractor, Subcontractors, and major equipment suppliers.
2. Part 2: Operation and maintenance instructions, arranged by system and subdivided. For each category, identify names, addresses, and telephone numbers of subcontractors and suppliers. Identify the following:

    a. Significant design criteria.
    b. List of equipment
    c. Parts list for each component.
    d. Operating instructions.
    e. Maintenance instructions for equipment and systems.
    f. Maintenance instructions for special finishes, including recommended cleaning methods and materials and special precautions identifying detrimental agents.

3. Part 3: Project documents and certificates, including the following:

    a. Shop drawings and product data.
    b. Power quality test results (including any required grounding tests).
    c. Certificates.
    d. Photocopies of warranties and bonds.

E. Submit one copy of completed pdf's in final form on DVD or solid-state media fifteen (15) days prior to final inspection. This copy will be returned after final inspection with Owner's comments. Revise content of documents as required prior to final submittal.

F. Submit final pdf's revised within ten (10) days after final inspection. Provide at minimum three (3) DVD or solid-state copies.

1.25 TRAINING/INSTRUCTION

A. General Operating/Maintenance Instruction: Arrange for each installer of work requiring continuing maintenance or operation, to meet with the Owner's personnel, at project site, to provide basic instructions needed for proper operation and maintenance of entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentations, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning and similar procedures and facilities. For operational equipment, demonstrate start-up, shutdown, emergency operations, noise and vibration adjustments, safety, economy/efficiency adjustments, energy effectiveness, and similar operations. Review maintenance and operations in relation with applicable Warranties, Agreements to Maintain, Bonds, and similar continuing commitments.

B. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 260000

SECTION 260500 - COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Sleeves for raceways and cables.
2. Sleeve seals.
3. Grout.
4. Common electrical installation requirements.

PART 2 - PRODUCTS

2.1 SLEEVES FOR RACEWAYS AND CABLES

A. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.

B. Sleeves for Rectangular Openings: Galvanized sheet steel.

1. Minimum Metal Thickness:

a. For sleeve cross-section rectangle perimeter less than 50 inches and no side more than 16 inches, thickness shall be 0.052 inch.
b. For sleeve cross-section rectangle perimeter equal to, or more than, 50 inches and 1 or more sides equal to, or more than, 16 inches, thickness shall be 0.138 inch.

2.2 GROUT

A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, non-staining, mixed with water to consistency suitable for application and a 30-minute working time.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Comply with NECA 1.

B. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.

C. Comply with all requirements of N.E.C. article 110 and others, which apply.

D. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.

E. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.

F. Right of Way: Give to piping systems installed at a required slope.

3.2 SLEEVE INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.

B. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.

C. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.

D. Cut sleeves to length for mounting flush with both surfaces of walls.

E. Extend sleeves installed in floors 2 inches above finished floor level.

F. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable, unless indicated otherwise.

G. Seal space outside of sleeves with grout for penetrations of concrete and masonry

1. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.

END OF SECTION 260500

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Connectors, splices, and terminations rated 600 V and less.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

C. Conductors: Copper, complying with ASTM B3 for bare annealed copper and with ASTM B8 for stranded conductors.

D. Conductor Insulation:

1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

2.2 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. 3M Electrical Products.
2. AFC Cable Systems; Atkore International.
3. Hubbell Power Systems, Inc.
4. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.
5. Tyco Electronics Corp.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders:

1. Copper; stranded.

B. Branch Circuits:

1. Copper, stranded.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THHN/THWN-2, single conductors in raceway.

B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.

C. Feeders Underground: Type THHN/THWN-2, single conductors in raceway.

D. Branch Circuits Underground: Type THHN/THWN-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.

B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inch of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes grounding and bonding systems and equipment.

B. Section includes grounding and bonding systems and equipment, plus the following special applications:

1. Underground distribution grounding.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2.3 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Mechanical-Type Bus-Bar Connectors: Cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Compression-Type Bus-Bar Connectors: Copper or copper alloy, with two wire terminals.

E. Conduit Hubs: Mechanical type, terminal with threaded hub.

F. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.

G. Service Post Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.

H. Straps: Solid copper, rated for 600 A.

2.4 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad steel; 5/8 inch by 10 ft.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install stranded conductors unless otherwise indicated.

B. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Welded connectors except at test wells and as otherwise indicated.
3. Connections to Ground Rods at Test Wells: Bolted connectors.

3.2 GROUNDING AT THE SERVICE

A. Equipment grounding conductors and grounding electrode conductors must be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Receptacle circuits.
3. Single-phase motor and appliance branch circuits.
4. Three-phase motor and appliance branch circuits.
5. Flexible raceway runs.
6. Armored and metal-clad cable runs.

C. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Ground Rods: Drive rods until tops are 12 inch below finished floor or final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.

B. Grounding and Bonding for Piping:

1. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
2. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
3. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Steel slotted support systems.
2. Conduit and cable support devices.
3. Support for conductors in vertical conduit.
4. Structural steel for fabricated supports and restraints.
5. Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
6. Fabricated metal equipment support assemblies.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified structural professional engineer to design hanger and support system.

B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame Rating: Class 1.
2. Self-extinguishing according to ASTM D635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32 inch diameter holes at a maximum of 8 inch on center in at least one surface.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Allied Tube & Conduit; Atkore International.
b. Cooper B-line; brand of Eaton, Electrical Sector.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Atkore International.
g. Wesanco, Inc.

2. Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
3. Material for Channel, Fittings, and Accessories: Galvanized steel.
4. Channel Width: Selected for applicable load criteria.
5. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
6. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
7. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
8. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs must have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body must be made of malleable iron.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

        1) Hilti, Inc.
        2) ITW Ramset/Red Head; Illinois Tool Works, Inc.
        3) MKT Fastening, LLC.
        4) Simpson Strong-Tie Co., Inc.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

    a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

        1) Cooper B-line; brand of Eaton, Electrical Sector.

2) Empire Tool and Manufacturing Co., Inc.
3) Hilti, Inc.
4) ITW Ramset/Red Head; Illinois Tool Works, Inc.
5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM F3125/F3125M, Grade A325.
6. Toggle Bolts: All steel springhead type.
7. Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 SELECTION

A. Comply with the following standards for selection and installation of hangers and supports, except where requirements on Drawings or in this Section are stricter:

1. NECA NEIS 101

B. Comply with requirements for raceways and boxes specified in Section 260533 "Raceway and Boxes for Electrical Systems."

C. Provide vibration and seismic controls with hangers and supports in accordance with requirements specified in "Section 260548 "Vibration and Seismic Controls for Electrical Systems."

D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and ERMC as required by NFPA 70. Minimum rod size must be 1/4 inch in diameter.

E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel.

3.2 INSTALLATION OF SUPPORTS

A. Comply with NECA NEIS 101 for installation requirements except as specified in this article.

B. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination must be weight of supported components plus 200 lb.

C. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inch thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inch thick.
6. To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that comply with seismic-restraint strength and anchorage requirements.

D. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

C. Field Welding: Comply with AWS D1.1/D1.1M. Submit welding certificates.

END OF SECTION 260529

SECTION 260533 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Type ERMC-S raceways, elbows, couplings, and nipples.
2. Type LFMC raceways.
3. Type PVC raceways and fittings.
4. Fittings for conduit, tubing, and cable.
5. Threaded metal joint compound.
6. Solvent cements.
7. Surface metal raceways and fittings.
8. Wireways and auxiliary gutters.
9. Termination boxes.
10. Junction boxes and pull boxes.
11. Hoods for outlet boxes.

PART 2 - PRODUCTS

2.1 TYPE ERMC-S RACEWAYS, ELBOWS, COUPLINGS, AND NIPPLES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 6 and UL Category Control Number DYIX.

B. Galvanized-Steel Electrical Rigid Metal Conduit (ERMC-S-G), Elbows, Couplings, and Nipples:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Thomas & Betts Corporation.
   b. Walker Systems, Inc; Wiremold Company (The).
   c. Wiremold Company (The); Electrical Sales Division.

2. Exterior Coating: Zinc.
3. Options:

   a. Interior Coating: Zinc.
   b. Minimum Trade Size: 3/4”.

2.2 TYPE LFMC RACEWAYS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 360 and UL Category Control Number DXHR.

B. Steel Liquidtight Flexible Metal Conduit (LFMC-S):

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Thomas & Betts Corporation.
    b. Walker Systems, Inc; Wiremold Company (The).
    c. Wiremold Company (The); Electrical Sales Division.

2. Material: Steel.
3. Options:

    a. Minimum Trade Size: 3/4”.
    b. Colors: As indicated on Drawings.

2.3 TYPE PVC RACEWAYS AND FITTINGS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 651 and UL Category Control Number DZYR.

B. Schedule 40 Rigid PVC Conduit (PVC-40) and Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

    a. Panduit Corporation.
    b. Lamson & Sessions; Carlon Electrical Products.
    c. Hubbell Incorporated; Wiring Device-Kellems Division.
    d. Enduro Systems, Inc.; Composite Products Division.
    e. Butler Manufacturing Company; Walker Division.
    f. Wiremold Company (The); Electrical Sales Division.
    g. Walker Systems, Inc; Wiremold Company (The).

2. Dimensional Specifications: Schedule 40.
3. Options:

    a. Minimum Trade Size: 3/4”.
    b. Markings: For use with maximum 90 deg C wire.

C. Schedule 80 Rigid PVC Conduit (PVC-80) and Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Panduit Corporation.
   b. Lamson & Sessions; Carlon Electrical Products.
   c. Hubbell Incorporated; Wiring Device-Kellems Division.
   d. Enduro Systems, Inc.; Composite Products Division.
   e. Butler Manufacturing Company; Walker Division.
   f. Wiremold Company (The); Electrical Sales Division.
   g. Walker Systems, Inc; Wiremold Company (The).

2. Dimensional Specifications: Schedule 80.
3. Options:

   a. Minimum Trade Size: 3/4”.
   b. Markings: For use with maximum 90 deg C wire**.**

2.4 FITTINGS FOR CONDUIT, TUBING, AND CABLE

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.

B. Fittings for Type LFMC Raceways:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. Wiremold Company (The); Electrical Sales Division.
   b. Walker Systems, Inc; Wiremold Company (The).
   c. Thomas & Betts Corporation.

2. General Characteristics: UL 514B and UL Category Control Number DXAS.

2.5 WIREWAYS AND AUXILIARY GUTTERS

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 870 and UL Category Control Number ZOYX.

B. Metal Wireways and Auxiliary Gutters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper B-line; brand of Eaton, Electrical Sector.
b. Hoffman; brand of nVent Electrical plc.
c. Square D; Schneider Electric USA.

2. Additional Characteristics:

a. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
b. Finish: Manufacturer's standard enamel finish.

3. Options:

a. Degree of Protection: Type 1 or Type 3R unless otherwise indicated.
b. Wireway Covers: Hinged type unless otherwise indicated.

2.6 TERMINATION BOXES

A. Description: Enclosure for termination base consisting of lengths of bus bars, terminal strips, or terminal blocks with provision for wire connectors to accommodate incoming or outgoing conductors or both.

B. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics: UL 1773 and UL Category Control Number XCKT.

C. Termination Boxes and Termination Bases for Installation on Line Side of Service Equipment:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
b. Hoffman; brand of nVent Electrical plc.
c. Milbank Manufacturing Co.

2. Additional Characteristics: Listed and labeled for installation on line side of service equipment.

2.7 JUNCTION BOXES AND PULL BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

    a. Non-Environmental Characteristics: UL 50.
    b. Environmental Characteristics: UL 50E.

B. Outdoor Cast-Metal Junction and Pull Boxes:

1. Description: Box with a blank cover that serves the purpose of joining different runs of raceway or cable.

2. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Adalet.
    b. Crouse-Hinds; brand of Eaton, Electrical Sector.
    c. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    d. O-Z/Gedney; brand of Emerson Electric Co., Automation Solutions, Appleton Group.

3. Additional Characteristics: UL Category Control Number BGUZ.
4. Options:

    a. Degree of Protection: Type 3R.

2.8 HOODS FOR OUTLET BOXES

A. Performance Criteria:

1. Regulatory Requirements: Listed and labeled in accordance with NFPA 70 and marked for intended location and use.
2. General Characteristics:

    a. Reference Standards:

        1) UL 514D and UL Category Control Numbers QCIT and QCMZ.
        2) Receptacle, hood, cover plate, gaskets, and seals comply with UL 498 Supplement SA when mated with box or enclosure complying with UL 514A, UL 514C, or UL 50E.

3. Mounts to box using fasteners different from wiring device.

B. Extra-Duty, While-in-Use Hoods for Outlet Boxes:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
    b. EGS; Emerson Electric Co., Automation Solutions, Appleton Group.
    c. Leviton Manufacturing Co., Inc.

d. Raco Taymac Bell; brand of Hubbell Electrical Solutions; Hubbell Incorporated.

2. Additional Characteristics: Marked "Extra-Duty" in accordance with UL 514D.
3. Options:

a. Provides clear, weatherproof, "while-in-use" cover.
b. Manufacturer may combine nonmetallic device box with hood as extra-duty rated assembly.

PART 3 - EXECUTION

3.1 SELECTION OF RACEWAYS

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of raceways. Consult Architect for resolution of conflicting requirements.

B. Outdoors:

1. Exposed and Subject to Physical Damage: ERMC.
2. Direct Buried: PVC-40.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.

C. Raceway Fittings: Select fittings in accordance with NEMA FB 2.10 guidelines.

1. ERMC and IMC: Provide threaded type fittings unless otherwise indicated.

3.2 SELECTION OF BOXES AND ENCLOSURES

A. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for selection of boxes and enclosures. Consult Architect for resolution of conflicting requirements.

B. Degree of Protection:

1. Outdoors:

a. Type 3R unless otherwise indicated.

C. Exposed Boxes Installed Less Than 2.5 m Above Floor:

1. Provide cast-metal boxes. Boxes with knockouts or unprotected openings are prohibited.
2. Provide exposed cover. Flat covers with angled mounting slots or knockouts are prohibited.

3.3 INSTALLATION OF RACEWAYS

A. Installation Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' written instructions, comply with NFPA 70 for installation of raceways. Consult Architect for resolution of conflicting requirements.
2. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
3. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
4. Comply with NECA NEIS 101 for installation of steel raceways.
5. Install raceways square to the enclosure and terminate at enclosures without hubs with locknuts on both sides of enclosure wall. Install locknuts hand tight, plus one-quarter turn more.
6. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to metric designator 35 (trade size 1-1/4) and insulated throat metal bushings on metric designator 41 (trade size 1-1/2) and larger conduits terminated with locknuts.
7. Raceway Terminations at Locations Subject to Moisture or Vibration:

    a. Provide insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.

B. General Requirements for Installation of Raceways:

1. Complete raceway installation before starting conductor installation.
2. Provide stub-ups through floors with coupling threaded inside for plugs, set flush with finished floor. Plug coupling until conduit is extended above floor to final destination or a minimum of 2 ft above finished floor.
3. Make bends in raceway using large-radius preformed ells except for parallel bends. Field bending must be in accordance with NFPA 70 minimum radii requirements. Provide only equipment specifically designed for material and size involved.
4. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
5. Support conduit within 12 inch of enclosures to which attached.
6. Install raceway sealing fittings at accessible locations in accordance with NFPA 70 and fill them with listed sealing compound. For concealed raceways, install fitting in flush steel box with blank cover plate having finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings in accordance with NFPA 70.
7. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal interior of raceways at the following points:

    a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
    b. Where an underground service raceway enters a building or structure.
    c. Conduit extending from interior to exterior of building.
    d. Conduit extending into pressurized duct and equipment.

e. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
f. Where otherwise required by NFPA 70.

8. Do not install raceways or electrical items on "explosion-relief" walls or rotating equipment.
9. Do not install conduits within 2 inch of the bottom side of a metal deck roof.
10. Keep raceways at least 6 inch away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
11. Cut conduit perpendicular to the length. For conduits metric designator 53 (trade size 2) and larger, use roll cutter or a guide to make cut straight and perpendicular to the length. Ream inside of conduit to remove burrs.
12. Install pull wires in empty raceways. Provide polypropylene or monofilament plastic line with not less than 200 lb tensile strength. Leave at least 12 inch of slack at both ends of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

C. Requirements for Installation of Specific Raceway Types:

1. Types ERMC and IMC:

a. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound that maintains electrical conductivity to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

2. Types FMC and LFMC:

a. Comply with NEMA RV 3. Provide a maximum of 72 inch of flexible conduit for recessed and semirecessed luminaires, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.

3. Type PVC:

a. Do not install Type PVC conduit where ambient temperature exceeds 122 deg F. Conductor ratings must be limited to 75 deg C except where installed in a trench outside buildings with concrete encasement, where 90 deg C conductors are permitted.
b. Comply with manufacturer's written instructions for solvent welding and fittings.

D. Raceway Fittings: Install fittings in accordance with NEMA FB 2.10 guidelines.

1. Flexible Conduit: Provide only fittings listed for use with flexible conduit type. Comply with NEMA FB 2.20.

E. Expansion-Joint Fittings:

1. Install in runs of aboveground PVC that are located where environmental temperature change may exceed 30 deg F and that have straight-run length that exceeds 25 ft. Install in runs of aboveground ERMC and EMT conduit that are

located where environmental temperature change may exceed 100 deg F and that have straight-run length that exceeds 100 ft.

2. Install type and quantity of fittings that accommodate temperature change listed for the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.
    c. Indoor Spaces Connected with Outdoors without Physical Separation: 125 deg F temperature change.
    d. Attics: 135 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at locations where conduits cross building or structure expansion joints.
5. Install expansion-joint fitting with position, mounting, and piston setting selected in accordance with manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

3.4 INSTALLATION OF BOXES AND ENCLOSURES

A. Provide boxes in wiring and raceway systems wherever required for pulling of wires, making connections, and mounting of devices or fixtures.

B. Fasten junction and pull boxes to, or support from, building structure. Do not support boxes by conduits.

C. Do not install aluminum boxes, enclosures, or fittings in contact with concrete or earth.

D. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to ensure a continuous ground path.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

3.6 CLEANING

A. Boxes: Remove construction dust and debris from device boxes, outlet boxes, and floor-mounted enclosures before installing wallplates, covers, and hoods.

END OF SECTION 260533

SECTION 260548 - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Isolation pads.
2. Spring isolators.
3. Restrained spring isolators.
4. Channel support systems.
5. Restraint cables.
6. Hanger rod stiffeners.
7. Anchorage bushings and washers.

1.2 PERFORMANCE REQUIREMENTS

A. Seismic-Restraint Loading:

1. Building Occupancy Category as Defined in ASCE 7: II
2. Site Class as Defined in IBC: D
3. Seismic Design Category as Defined in IBC: C.
4. Design Spectral Response Acceleration at Short Periods (0.2 Second): 1.185
5. Design Spectral Response Acceleration at 1-Second Period: 0.93

1.3 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.

    a. Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an agency acceptable to authorities having jurisdiction.
    b. Annotate to indicate application of each product submitted and compliance with requirements.

3. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.

B. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation. The professional engineer must be licensed/registered for the state that the project is located.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.

    a. Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Sections for equipment mounted outdoors.

2. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
3. Field-fabricated supports.
4. Seismic-Restraint Details:

    a. Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
    b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.
    c. Preapproval and Evaluation Documentation: By an agency acceptable to authorities having jurisdiction, showing maximum ratings of restraint items and the basis for approval (tests or calculations).

C. Welding certificates.

D. Field quality-control test reports.

E. Qualification Data: For professional engineer. The professional engineer must be licensed/registered for the state that the project is located.

1.4 QUALITY ASSURANCE

A. Comply with seismic-restraint requirements in the 2018 International Building Code and ASCE Standard 7, unless requirements in this Section are more stringent.

B. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

C. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer. The professional engineer must be licensed/registered for the state that the project is located.

D. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amber/Booth Company, Inc.
2. Kinetics Noise Control.
3. Mason Industries.
4. Approved equal.

B. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene, rubber, or hermetically sealed compressed fiberglass.

C. Spring Isolators: Freestanding, laterally stable, open-spring isolators.

1. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
2. Minimum Additional Travel: 50 percent of the required deflection at rated load.
3. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
4. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
5. Baseplates: Factory drilled for bolting to structure and bonded to 1/4-inch- thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to 500 psig.
6. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.

D. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.

1. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
2. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
3. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
4. Minimum Additional Travel: 50 percent of the required deflection at rated load.
5. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
6. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

2.2 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amber/Booth Company, Inc.
2. Cooper B-Line, Inc.; a division of Cooper Industries.
3. Hilti Inc.
4. Mason Industries.
5. Unistrut; Tyco International, Ltd.
6. Approved equal.

B. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an agency acceptable to authorities having jurisdiction.

1. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.

C. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

D. Restraint Cables: ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

E. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections to hanger rod. Do not weld stiffeners to rods.

F. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchors and studs.

G. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices.

H. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

I. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

J. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior

applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an agency acceptable to authorities having jurisdiction.

B. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.

C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.2 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment and Hanger Restraints:

1. Install restrained isolators on electrical equipment.
2. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch.
3. Install seismic-restraint devices using methods approved by an agency acceptable to authorities having jurisdiction providing required submittals for component.

B. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.

C. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.

D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.

4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
5. Set anchors to manufacturer's recommended torque, using a torque wrench.
6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.3 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

3.4 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Obtain Engineer’s approval before transmitting test loads to structure. Provide temporary load-spreading members.
2. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
3. Test to 90 percent of rated proof load of device.
4. Measure isolator restraint clearance.
5. Measure isolator deflection.
6. Verify snubber minimum clearances.
7. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

B. Remove and replace malfunctioning units and retest as specified above.

C. Prepare test and inspection reports.

3.5 ADJUSTING

A. Adjust isolators after isolated equipment is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.6 VIBRATION-CONTROL AND SEISMIC-RESTRAINT DEVICE SCHEDULE

EQUIPMENT/ SYSTEM TYPE	ISOLATOR TYPE	BASE TYPE	COMPONENT IMPORTANCE FACTOR (I_p)	COMPONENT AMPLIFICATION FACTOR	COMPONENT RESPONSE MODIFICATION FACTOR	SEISMIC RESTRAINT SYSTEM REQUIRED (Y/N)
Switchgear and Panelboards	NR	NA	1.0	2.5	6.0	Y. See Exemptions
Communicatio n Equipment	NR	NA	1.0	1.0	2.5	Y. See Exemptions
Lighting Fixtures	NR	NA	1.0	1.0	1.5	Y. See Exemptions
Life-Safety Distribution Systems	NR	NA	1.5	1.0	2.5	Y
Conduit and Bus Ducts	NR	NA	1.0	1.0	2.5	Y. See Exemptions
Suspended Cable Trays	NR	NA	1.0	2.5	6.0	Y. See Exemptions
Other Electrical Components	NR	NA	1.0	1.0	1.5	Y. See Exemptions

LEGEND: NA = Not Applicable
NR = Not Required
Y = Yes
N = No

A. Electrical Seismic-Restraint Exemptions:

1. Electrical components in Seismic Design Category B.
2. Electrical components in Seismic Design Category C provided that $I_p = 1.0$.
3. Electrical components in Seismic Design Categories D, E, and F where $I_p = 1.0$ and either:

    a. Flexible connections between the components and associated conduit are provided.
    b. Components are mounted at 4 ft or less above a floor level and weigh 400 lb or less.

4. Electrical components in Seismic Design Categories D, E, and F where I_p = 1.0 and:

    a. Flexible connections between the components and associated conduit are provided.
    b. The components weigh 20 lb or less or, for distribution systems, weighing 5 lb/ft or less.

5. Electrical conduit in any Seismic Design Category where I_p = 1.5 and:

    a. Conduit is 2 ½ inch trade size or less.

6. Electrical trapeze assemblies (supporting conduit, bus duct, or cable tray) in any Seismic Design Category where I_p = 1.5 and:

    a. Total weight of trapeze assembly weighs 10 lb/ft or less.

END OF SECTION 260548

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Tapes and stencils.
2. Signs.
3. Miscellaneous identification products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with ASME A13.1.

B. Comply with 29 CFR 1910.144 for color identification of hazards; 29 CFR 1910.145 for danger, caution, warning, and safety instruction signs and tags; and the following:

C. Signs, labels, and tags required for personnel safety must comply with the following standards:

1. Safety Colors: NEMA Z535.1.
2. Facility Safety Signs: NEMA Z535.2.
3. Safety Symbols: NEMA Z535.3.
4. Product Safety Signs and Labels: NEMA Z535.4.
5. Safety Tags and Barricade Tapes for Temporary Hazards: NEMA Z535.5.

D. Comply with NFPA 70E and Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, must comply with UL 969.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Raceways and Cables Carrying Circuits at 1000 V or Less:

1. Black letters on orange field.

2. Legend: Indicate voltage.

B. Color-Coding for Phase- and Voltage-Level Identification, 1000 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.

1. Color must be factory applied.
2. Colors for 208Y/120 V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Color for Neutral: White.
4. Color for Equipment Grounds: Green.

C. Warning Label Colors:

1. Identify system voltage with black letters on orange background.

D. Equipment Identification Labels:

1. Black letters on white field.

2. Equipment to Be Labeled:

a. Panelboards, electrical cabinets, and enclosures.
b. Disconnect switches.
c. Motor starters.
d. Push-button stations.

2.3 TAPES AND STENCILS

A. Underground-Line Warning Tape:

1. Tape:

a. Recommended by manufacturer for method of installation and suitable to identify and locate underground electrical and communications utility lines.
b. Printing on tape must be permanent and may not be damaged by burial operations.
c. Tape material and ink must be chemically inert and not be subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.

2. Color and Printing:

a. Comply with APWA Uniform Color Code using NEMA Z535.1 safety colors.
b. Inscriptions for Red Tapes: "CAUTION BURIED ELECTRIC LINE BELOW".

B. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height must be 1 inch.

2.4 SIGNS

A. Baked-Enamel Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.
3. Nominal Size: 7 by 10 inch.

B. Metal-Backed Butyrate Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs, with 0.0396 inch galvanized-steel backing, punched and drilled for fasteners, and with colors, legend, and size required for application.
2. 1/4 inch grommets in corners for mounting.
3. Nominal Size: 10 by 14 inch.

2.5 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless steel screws or stainless steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 1000 V: Identification must completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from floor.

J. Vinyl Wraparound Labels:

1. Secure tight to surface of raceway or cable at location with high visibility and accessibility.
2. Attach labels that are not self-adhesive type with clear vinyl tape, with adhesive appropriate to location and substrate.

K. Heat-Shrink, Preprinted Tubes: Secure tight to surface at location with high visibility and accessibility.

L. Underground Line Warning Tape:

1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inch below finished grade. Use multiple tapes where width of multiple lines installed in common trench or concrete envelope exceeds 16 inch overall.
2. Limit use of underground-line warning tape to direct-buried cables.
3. Install underground-line warning tape for direct-buried cables and cables in raceways.

M. Baked-Enamel Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on minimum 1-1/2 inch high sign; where two lines of text are required, use signs minimum 2 inch high.

N. Metal-Backed Butyrate Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.

O. Laminated Acrylic or Melamine Plastic Signs:

1. Attach signs that are not self-adhesive type with mechanical fasteners appropriate to location and substrate.
2. Unless otherwise indicated, provide single line of text with 1/2 inch high letters on 1-1/2 inch high sign; where two lines of text are required, use labels 2 inch high.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 1000 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels or vinyl tape applied in bands.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

D. Power-Circuit Conductor Identification, 1000 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use vinyl wraparound labels, self-adhesive wraparound labels, or self-adhesive vinyl tape to identify phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50 ft maximum intervals in straight runs, and at 25 ft maximum intervals in congested areas.

E. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with conductor or cable designation, origin, and destination.

F. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive labels with conductor designation.

G. Conductors to Be Extended in Future: Attach write-on tags, marker tape to conductors, and list source.

H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

I. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.

J. Instructional Signs: Self-adhesive labels, including color code for grounded and ungrounded conductors.

K. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive labels, Baked-enamel warning signs, or Metal-backed, butyrate warning signs.

1. Apply to exterior of door, cover, or other access.
2. For equipment with multiple power or control sources, apply to door or cover of equipment, including, but not limited to, the following:

a. Power-transfer switches.
b. Controls with external control power connections.

L. Arc Flash Warning Labeling: Self-adhesive labels.

M. Operating Instruction Signs: Self-adhesive labels, Baked-enamel warning signs, Metal-backed, butyrate warning signs, or Laminated acrylic or melamine plastic signs.

N. Equipment Identification Labels:

1. Indoor Equipment: Self-adhesive label, Baked-enamel signs, Metal-backed butyrate signs, Laminated acrylic, or melamine plastic sign.
2. Outdoor Equipment: Laminated acrylic or melamine sign.

END OF SECTION 260553

SECTION 260611 - UTILITY HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation for approach trenches and pits.
2. Horizontal directional drilling.
3. Pipe.
4. Drilling fluid system.

1.2 SUBMITTALS

A. Shop Drawings:

1. Technical data for equipment, method of installation, and proposed sequence of construction.
2. Information pertaining to pits, dewatering, method of spoils removal, and equipment size, capacity, and capabilities, including installing pipe on radius, type of drill bit, drilling fluid, method of monitoring line and grade, detection of surface movement, name plate data for drilling equipment, and mobile spoils removal unit.

B. Manufacturer's Certificate: Products meet or exceed specified requirements.

C. Field Quality-Control Submittals: Indicate results of Contractor-furnished tests and inspections.

D. Qualifications Statement:

1. Submit qualifications for driller.

1.3 CLOSEOUT SUBMITTALS

A. Project Record Documents: Record actual locations of pipe and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

C. Record actual depth of pipe at 25-foot intervals.

D. Record actual horizontal location of installed pipe.

E. Show depth and location of abandoned bores.

F. Record depth and location of drill bits and drill stems not removed from bore.

1.4 QUALITY ASSURANCE

A. Perform Work according to following:

1. NUCA HDD Good Practices Guidelines.
2. ASTM F1962.
3. PPI TR-46.

B. Driller: Company specializing in performing Work of this Section with 5 years' experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store field joint materials in original shipping containers in dry area indoors.

B. Handling:

1. Use shipping braces between layers of stacked pipe.
2. Stack piping lengths no more than three layers high.
3. Support pipes with nylon slings during handling.

1.6 AMBIENT CONDITIONS

A. Maintain storage temperature of manufacturer’s recommendations.

1.7 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 HORIZONTAL DIRECTIONAL DRILLING

A. Performance and Design Criteria:

1. Drilling Steering System: Remote with continuous electronic monitoring of boring depth and location.

2. Drilling pull back and torque capable of pulling a pipe cluster of 4 (two) – 2 (two) inch conduits through sands, silts or clayey soils a distance of 600 feet.
3. Directional Change Capability: 90 degrees with 150-foot radius curve.

4. Minimum distance for single bores and between boring pits:
   a. Pipe cluster of 4 (four) - 2 (two) inch conduits, 600 feet.

5. Ratio of Reaming Diameter to Pipe Outside Diameter:

   a. Nominal Diameter of cluster of 6" Inches and Smaller: Maximum of 1.5.
   b. Nominal Pipe Diameter Larger than 6 Inches or outside diameter of bundled conduits: Submit recommended ratio and reaming procedures for review, suggested minimum of 1.75.

2.2 WATER SOURCE

A. Water: Potable, obtained from plant utility source.

2.3 UNDERGROUND PIPE MARKERS

A. Trace Wire: Electronic detection materials for nonconductive piping products.

   1. Unshielded 16 gage THWN-insulated copper wire continuous with each conduit

2.4 MATERIALS

A. Drilling Fluid:

   1. Liquid bentonite clay slurry; totally inert with no environmental risk.

B. Polyethylene (PE) Piping:

   1. Pipe: Comply with ASTM D2239, SDR 11.,
   2. Fittings:

      a. Type: Molded.
      b. Comply with ASTM D3261, butt welded.

   3. Joints: Butt fusion.
   4. Materials: Comply with ASTM D3350, minimum cell classification.

C. Subsoil Fill: Type as specified in Section 312000 - Earthmoving; excavated and reused soil with no rocks over 3 inches in diameter, frozen earth, or foreign matter.

2.5 MIXES

A. Grout: As specified in Section 036000 - Grouting.

B. Flowable Fill: KYTC Road and Bridge Specifications .

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that connections, sizes, locations, and invert elevations are as indicated.

3.2 PREPARATION

A. Obtain a plant Excavation/penetration permit prior to performing work. Allow a minimum of one week to obtain the permit.

B. Maintain access to existing facilities and services and indicated to remain.

C. Locate and identify utilities indicated to remain and protect from damage.

D. Identify required lines, levels, contours, and data locations.

E. Protect plant life, lawns, and other features remaining as portion of final landscaping.

F. Protect benchmarks such as existing structures fences sidewalks paving curbs and survey control points from excavating equipment and vehicular traffic.

G. Establish pipe elevations with not less than 4 feet of cover and more than 7 feet in depth installed by directional drilling methods.

3.3 INSTALLATION

A. Dewatering:

1. Intercept and divert surface drainage, precipitation, and groundwater away from excavation using dikes, curb walls, ditches, pipes, sumps, or other approved means.
2. Develop and maintain substantially dry subgrade during drilling and pipe installation.
3. Comply with Plant - Best Management Practices (BMP) requirements for discharging water to watercourse, preventing stream degradation, and controlling erosion and sediment.

B. Excavation:

1. Excavate subsoil as specified.
2. Excavate approach trenches and pits according to SST Activity Hazard Assessment and as Site conditions require; minimize number of access pits.
3. Provide sump areas to contain drilling fluids.
4. Restore areas after completion of drilling and carrier pipe installation.

C. Drilling:

1. Drill pilot bore with vertical and horizontal alignment as indicated on Drawings.

2. Survey entire drill path and mark entry and exit locations with stakes. If a magnetic guidance system is used, survey drill path for surface geomagnetic variations or anomalies.
3. Guide drill remotely from ground surface to maintain alignment by monitoring signals transmitted from drill bit.

    a. Monitor depth, pitch, and position.
    b. Adjust drill head orientation to maintain correct alignment.

4. Inject drilling fluid into bore to stabilize hole, remove cuttings, and lubricate drill bit and pipe.
5. Continuously monitor drilling fluid pumping rate, pressure, viscosity, and density while drilling pilot bore, back reaming, and installing pipe to ensure adequate removal of soil cuttings and stabilization of bore.

    a. Provide relief holes when required to relieve excess pressure.
    b. Minimize heaving during pullback.

6. Verification of Accuracy:

    a. Calibrate and verify electronic monitor accuracy during first 100 feet of bore in presence of Architect/Engineer before proceeding with other drilling.
    b. Excavate minimum of four test pits spaced along first 100 feet of bore to verify required accuracy.
    c. If required accuracy is not met, adjust equipment or provide new equipment capable of meeting required accuracy.

7. After completing pilot bore, remove drill bit.

D. Drilling Obstructions:

1. If obstructions are encountered during drilling, notify Architect/Engineer immediately. Do not proceed around obstruction without Architect/Engineer's approval.
2. For conditions requiring more than 5 feet of deviation in horizontal alignment, submit revised Shop Drawings to Architect/Engineer for approval before resuming Work.
3. Maintain adjusted bore alignment within easement or right-of-way.

E. Pipe:

1. Install reamer and pipe pulling head; select reamer with minimum bore diameter required for pipe installation.
2. Attach pipe to pipe pulling head and pull reamer and pipe to entry pit along pilot bore.
3. Inject drilling fluid through reamer to stabilize bore and lubricate pipe.
4. Install piping with horizontal and vertical alignment as shown on Drawings.
5. Protect and support pipe being pulled into bore such that pipe moves freely and is not damaged during installation.
6. Do not exceed pipe manufacturer's recommended pullback forces.
7. Trace Wire:

a. Install trace wire continuous with each conduit.
b. Splice trace wire only at intermediate bore pits.
c. Tape or insulate trace wire to prevent corrosion and maintain integrity of pipe detection.
d. Terminate trace wire for each pipe run at structures along pipe system.
e. Provide extra length of trace wire at each structure such that trace wire can be pulled 5 feet out top of structure for connection to detection equipment.
f. Test trace wire for continuity for each bore before acceptance.

8. Provide sufficient length of pipe to extend past termination point to allow connection to other pipe sections.
9. Allow minimum of 24 hours for stabilization after installing pipe before making connections to pipe.
10. Mark location and depth of bore with spray paint on paved surfaces and on wooden stakes on non-paved surfaces at 10-foot intervals.

F. Slurry Removal and Disposal:

1. Contain excess drilling fluids at entry and exit points until recycled or removed from Site; provide recovery system to remove drilling spoils from access pits.
2. Drilling Spoils:

a. Remove, transport, and legally dispose of drilling spoils.
b. Do not discharge drilling spoils in sanitary sewers, storm sewers, or other drainage systems.
c. When drilling in suspected contaminated soil, test drilling fluid for contamination before disposal.

3. If drilling fluid leaks to surface, immediately contain leak and barricade area from vehicular and pedestrian travel before resuming drilling operations.
4. Complete cleanup of drilling fluid at end of each working day.

G. Backfilling:

1. As specified.
2. Backfill approach trenches and pits with subsoil fill to contours and elevations of surrounding existing grade.
3. Compact subsoil fill as specified.

3.4 TOLERANCES

A. Maximum Variation:

1. From Horizontal Position: 12 inches.
2. From Vertical Elevation: 8 inches.

B. Minimum Horizontal and Vertical Clearance from Other Utilities: 12 inches.

C. Deviation:

1. If pipe installation deviates beyond specified tolerances, abandon bore, remove installed pipe, rebore, and reinstall pipe in correct alignment.
2. Fill abandoned bores greater than 12 inches in diameter with grout or flowable fill material.

3.5 FIELD QUALITY CONTROL

A. Compaction Testing: As specified.

B. If tests indicate Work does not meet specified requirements, remove Work, replace, and retest.

C. Frequency of Compaction Testing: Two for each lift.

3.6 CLEANING

A. Upon completion of drilling and pipe installation, remove drilling spoils, debris, and unacceptable material from approach trenches and pits. Clean up excess slurry from ground.

B. Restore approach trenches and pits to original condition.

END OF SECTION 260611

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lighting and appliance branch-circuit panelboards.

1.2 DEFINITIONS

A. MCCB: Molded-case circuit breaker.

B. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of panelboard.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
3. Detail bus configuration, current, and voltage ratings.
4. Short-circuit current rating of panelboards and overcurrent protective devices.
5. Include evidence of NRTL listing for series rating of installed devices.
6. Include evidence of NRTL listing for SPD as installed in panelboard.
7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
8. Include wiring diagrams for power, signal, and control wiring.
9. Key interlock scheme drawing and sequence of operations.
10. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards.

1.4 INFORMATIONAL SUBMITTALS

A. Panelboard schedules for installation in panelboards.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.6 FIELD CONDITIONS

A. Service Conditions: NEMA PB 1, usual service conditions, as follows:

1. Ambient temperatures within limits specified.
2. Altitude not exceeding 6600 feet.

1.7 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.

1. Panelboard Warranty Period: 12 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

A. Fabricate and test panelboards according to IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA PB 1.

D. Comply with NFPA 70.

E. Enclosures: Surface-mounted, dead-front cabinets.

1. Rated for environmental conditions at installed location.

a. Outdoor Locations: NEMA 250, Type 3R.

2. Height: 84 inches maximum.
3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.

F. Incoming Mains Location: Top and Bottom.

G. Phase, Neutral, and Ground Buses: Tin-plated aluminum.

H. Conductor Connectors: Suitable for use with conductor material and sizes.

1. Material: Tin-plated aluminum.
2. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

I. NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards shall have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.

J. Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

K. Panelboard Short-Circuit Current Rating: Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by an NRTL. Include label or manual with size and type of allowable upstream and branch devices listed and labeled by an NRTL for series-connected short-circuit rating.

L. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Panelboards shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

B. Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 2.

2.3 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.

C. Mains: Circuit breaker or lugs only as indicated.

D. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

E. Doors: Concealed hinges; secured with flush latch with tumbler lock; keyed alike.

2.4 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. General Electric Company; GE Consumer & Industrial - Electrical Distribution.
2. Eaton.
3. Siemens Industry, Inc., Energy Management Division.
4. Square D; Schneider Electric USA.

B. MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.

1. Thermal-Magnetic Circuit Breakers:

a. Inverse time-current element for low-level overloads.
b. Instantaneous magnetic trip element for short circuits.
c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. MCCB Features and Accessories:

a. Standard frame sizes, trip ratings, and number of poles.
b. Breaker handle indicates tripped status.
c. UL listed for reverse connection without restrictive line or load ratings.
d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.

2.5 IDENTIFICATION

A. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.

B. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.

C. Circuit Directory: Directory card inside panelboard door, mounted in transparent card holder or metal frame with transparent protective cover. Use a computer or typewriter to create directory; handwritten directories are not acceptable.

2.6 ACCESSORY COMPONENTS AND FEATURES

A. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1.

B. Install panelboards and accessories according to NEMA PB 1.1.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Mount top of trim 90 inches above finished floor unless otherwise indicated.

E. Mount panelboard cabinet plumb and rigid without distortion of box.

F. Install overcurrent protective devices and controllers not already factory installed.

1. Set field-adjustable, circuit-breaker trip ranges.

G. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.

H. Install filler plates in unused spaces.

I. Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."

B. Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

C. Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

D. Device Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

E. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers stated in NETA ATS. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

D. Panelboards will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports, including a certified report that identifies panelboards included and that describes scanning results, with comparisons of the two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Receptacles with ground-fault protective devices.

1.2 ACTION SUBMITTALS

A. Product Data:

1. Receptacles with GFCI device.

PART 2 - PRODUCTS

2.1 RECEPTACLES WITH GROUND-FAULT PROTECTIVE DEVICES

A. General-Grade, Weather-Resistant, Tamper-Resistant Duplex Straight-Blade Receptacle with GFCI Device:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. Cooper Wiring Devices; a division of Cooper Industries, Inc.
b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
c. Leviton Manufacturing Co., Inc.
d. Pass & Seymour; Legrand North America, LLC.

2. Regulatory Requirements:

a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

3. General Characteristics:

a. Reference Standards: UL CCN KCXS, UL 498, and UL 943.

4. Options:

a. Device Color: White.

b. Configuration: Heavy-duty, NEMA 5-20R.

5. Accessories:

a. Cover Plate: 0.060 inch thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receptacles:

1. Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

3.2 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES

A. Comply with manufacturer's instructions.

B. Reference Standards:

1. Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
2. Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
3. Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacle to match configuration diagram in NEMA WD 6.

C. Identification:

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."

a. Mark cover or cover plate using hot, stamped, or engraved machine printing with white-filled lettering, and provide durable wire markers or tags inside device box or outlet box.
b. Healthcare Facilities: Distinctively identify covers or cover plates of device boxes and outlet boxes that are supplied from life safety and critical branch power supplies following facility's standard practice.

D. Interfaces with Other Work:

1. Do not install Type 3 SPD, including surge-protected relocatable taps and power strips, on branch circuit downstream of GFCI device.

3.3 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES

A. Field tests and inspections must be witnessed by authorities having jurisdiction and Construction Administrator.

B. Tests and Inspections:

1. Insert and remove test plug to verify that device is securely mounted.
2. Verify polarity of hot and neutral pins.
3. Measure line voltage.
4. Measure percent voltage drop.
5. Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
6. Healthcare Facilities: Test straight-blade receptacles in patient care spaces with receptacle pin tension test instrument in accordance with NFPA 99. Retention force of ground pin must be not less than 115 g (4 oz).
7. Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.

C. Nonconforming Work:

1. Device will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

D. Assemble and submit test and inspection reports.

3.4 PROTECTION

A. Devices:

1. Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
2. After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 262726

SECTION 264313 - SURGE PROTECTIVE DEVICES FOR LOW-VOLTAGE ELECTRICAL POWER CIRCUITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Type 2 surge protective devices.
2. Enclosures.

1.2 DEFINITIONS

A. I_n: Nominal discharge current.

B. Voltage Protection Rating (VPR): A rating selected from UL 1449 list of preferred values assigned to each mode of protection.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.

a. Include electrical characteristics, specialties, and accessories for SPDs.
b. Certification of compliance with UL 1449 by qualified electrical testing laboratory recognized by authorities having jurisdiction including the following information:

1) Tested values for VPRs.
2) I_n ratings.
3) MCOV, type designations.
4) OCPD requirements.
5) Manufacturer's model number.
6) System voltage.
7) Modes of protection.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 TYPE 2 SURGE PROTECTIVE DEVICES (SPDs)

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Zero Surge Inc.
2. United Power Corporation.
3. Tycor.
4. Transtector Systems, Inc.
5. Sutton Designs Inc.
6. Northern Technologies, Inc.
7. LEA International.
8. Innovative Technology, Inc.
9. General Electric Company.
10. Entrelec International.
11. Current Technology, Inc.
12. Atlantic Scientific.
13. Advanced Protection Technologies Inc. (APT).
14. Eaton.
15. Intermatic, Inc.
16. Leviton Manufacturing Co., Inc.
17. Liebert; Vertiv Holdings Co.
18. Schneider Electric USA, Inc.
19. Siemens Industry, Inc., Energy Management Division.
20. SSI, an ILSCO Company.

B. Source Limitations: Obtain devices from single source from single manufacturer.

C. General Characteristics:

1. Reference Standards: UL 1449, Type 2; UL 1283.
2. MCOV: Not less than 125 percent of nominal system voltage for 208Y/120 V and 120/240 V power systems, and not less than 115 percent of nominal system voltage for 480Y/277 V power systems.
3. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase must not be less than 240 kA. Peak surge current rating must be arithmetic sum of the ratings of individual MOVs in a given mode.
4. Protection modes and UL 1449 VPR for grounded wye circuits with 208Y/120 V, three-phase, four-wire circuits must not exceed the following:

    a. Line to Neutral: 700 V for 208Y/120 V.
    b. Line to Ground: 700 V for 208Y/120 V.
    c. Neutral to Ground: 700 V for 208Y/120 V.
    d. Line to Line: 1200 V for 208Y/120 V.

5. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits must not exceed the following:

a. Line to Neutral: 700 V.
b. Line to Ground: 700 V.
c. Neutral to Ground: 700 V.
d. Line to Line: 1200 V.

6. SCCR: Equal or exceed 100 kA.
7. I_n Rating: 10 kA.

D. Options:

1. Include LED indicator lights for power and protection status.
2. Include internal thermal protection that disconnects the SPD before damaging internal suppressor components.
3. Include NEMA ICS 5, dry Form C contacts rated at 2 A and 24 V(ac) for remote monitoring of protection status.
4. Include surge counter.

2.2 TYPE 3, TYPE 4, AND TYPE 5 SURGE PROTECTIVE DEVICES (SPDs)

A. Type 3, Type 4, and Type 5 SPDs are not approved for field installation.

2.3 ENCLOSURES

A. Outdoor Enclosures: Type 3R.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide OCPD and disconnect for installation of SPD in accordance with UL 1449 and manufacturer's instructions.

3.2 FIELD QUALITY CONTROL

A. Field tests and inspections must be witnessed by authorities having jurisdiction.

B. Tests and Inspections:

1. Compare equipment nameplate data for compliance with Drawings and the Specifications.
2. Inspect anchorage, alignment, grounding, and clearances.
3. Verify that electrical wiring installation complies with manufacturer's installation requirements.

C. Nonconforming Work:

1. SPDs that do not pass tests and inspections will be considered defective.

2. Remove and replace defective units and retest.

D. Prepare test and inspection reports.

3.3 STARTUP SERVICE

A. Complete startup checks in accordance with manufacturer's instructions.

B. Do not perform insulation-resistance tests of the distribution wiring equipment with SPDs installed. Disconnect SPDs before conducting insulation-resistance tests; reconnect them immediately after the testing is over.

C. Energize SPDs after power system has been energized, stabilized, and tested.

END OF SECTION 264313

SECTION 265619 - LED EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior solid-state luminaires that are designed for and exclusively use LED lamp technology.
2. Luminaire supports.
3. Luminaire-mounted photoelectric relays.

1.2 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color rendering index.

C. Fixture: See "Luminaire."

D. IP: International Protection or Ingress Protection Rating.

E. Lumen: Measured output of lamp and luminaire, or both.

F. Luminaire: Complete lighting unit, including lamp, reflector, and housing.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of luminaire.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale and coordinated.

B. Seismic Qualification Data: For luminaires, accessories, and components, from manufacturer.

C. Product Certificates: For each type of the following:

1. Luminaire.
2. Photoelectric relay.

D. Sample warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1. Provide a list of all lamp types used on Project. Use ANSI and manufacturers' codes.
2. Provide a list of all photoelectric relay types used on Project; use manufacturers' codes.

1.6 FIELD CONDITIONS

A. Mark locations of exterior luminaires for approval by Architect prior to the start of luminaire installation.

1.7 WARRANTY

A. Warranty: Manufacturer and Installer agree to repair or replace components of luminaires that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 2 year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Luminaires shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

B. Seismic Performance: Luminaires and lamps shall be labeled vibration and shock resistant.

1. The term "withstand" means "the luminaire will remain in place without separation of any parts when subjected to the seismic forces specified and the luminaire will be fully operational during and after the seismic event."

2.2 LUMINAIRE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. NRTL Compliance: Luminaires shall be listed and labeled for indicated class and division of hazard by an NRTL.

C. FM Global Compliance: Luminaires for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.

D. UL Compliance: Comply with UL 1598 and listed for wet location.

E. Lamp Rating: Lamp marked for outdoor use.

F. Source Limitations:

1. Obtain luminaires from single source from a single manufacturer.
2. For luminaires, obtain each color, grade, finish, type, and variety of luminaire from single source with resources to provide products of consistent quality in appearance and physical properties.

2.3 LUMINAIRE TYPES

A. Area and Site: See Schedule on Drawings.

2.4 MATERIALS

A. Metal Parts: Free of burrs and sharp corners and edges.

B. Sheet Metal Components: Corrosion-resistant aluminum. Form and support to prevent warping and sagging.

C. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses.

D. Diffusers and Globes:

1. Acrylic Diffusers: 100 percent virgin acrylic plastic, with high resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
2. Glass: Annealed crystal glass unless otherwise indicated.
3. Lens Thickness: At least 0.125 inch minimum unless otherwise indicated.

E. Lens and Refractor Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

F. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

G. Housings:

1. Rigidly formed, weather- and light-tight enclosure that will not warp, sag, or deform in use.
2. Provide filter/breather for enclosed luminaires.

2.5 FINISHES

A. Variations in Finishes: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

B. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

C. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20 requirements; and seal aluminum surfaces with clear, hard-coat wax.
3. Class I, Clear-Anodic Finish: AA-M32C22A41 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
4. Class I, Color-Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: Medium satin; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker), complying with AAMA 611.

    a. Color: Selected by Architect.

D. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1 or SSPC-SP 8.
2. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.

    a. Color: As selected by Architect from manufacturer's full range.

2.6 LUMINAIRE SUPPORT COMPONENTS

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for channel and angle iron supports and nonmetallic channel and angle supports.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS

A. Comply with NECA 1.

B. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

C. Install lamps in each luminaire.

D. Fasten luminaire to structural support.

E. Supports:

1. Sized and rated for luminaire weight.
2. Able to maintain luminaire position after cleaning and relamping.
3. Support luminaires without causing deflection of finished surface.
4. Luminaire-mounting devices shall be capable of supporting a horizontal force of 100 percent of luminaire weight and a vertical force of 400 percent of luminaire weight.

F. Wiring Method: Install cables in raceways. Conceal raceways and cables.

G. Install luminaires level, plumb, and square with finished grade unless otherwise indicated. Install luminaires at height and aiming angle as indicated on Drawings.

H. Coordinate layout and installation of luminaires with other construction.

I. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

J. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260533 "Raceways and Boxes for Electrical Systems" for wiring connections and wiring methods.

3.2 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch-thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.3 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.4 FIELD QUALITY CONTROL

A. Inspect each installed luminaire for damage. Replace damaged luminaires and components.

B. Perform the following tests and inspections:

1. Operational Test: After installing luminaires, switches, and accessories, and after electrical circuitry has been energized, test units to confirm proper operation.
2. Verify operation of photoelectric controls.

C. Luminaire will be considered defective if it does not pass tests and inspections.

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

3.5 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain luminaires and photocell relays.

END OF SECTION 265619

Andy Beshear
GOVERNOR

ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
300 Sower Boulevard
Frankfort, Kentucky 40601
Phone: (502) 564-2150
Fax: 502-564-4245

Rebecca W. Goodman
SECRETARY

Anthony R. Hatton
COMMISSIONER

September 12, 2025

Christopher Smith
KYTC Facilities Management
1219 Wilkinson Blvd
Frankfort, KY 40601

Re: KYR10 Coverage Acknowledgment
KPDES No.: KYR10T876
Christian County Rest Area Water and Sewer Renovat
Permit Type: Construction Stormwater
AI ID: 117430
Christian County, Kentucky

Dear Christopher Smith :

The discharges associated with the Notice of Intent you submitted have been approved for coverage under the "Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Storm Water Discharges Associated with Construction Activities (KYR100000)" master general permit. Your coverage becomes effective on the date of this letter. This coverage automatically terminates two years from the effective date of your coverage unless an extension is requested prior to the termination date, or the Division of Water revokes coverage, whichever comes first. During this period of coverage all discharges shall comply with the conditions of the KYR100000 master general permit. This permit and links to the eNOI (and permit coverage extension) and eNOT forms can be found on our website:
https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Documents/KYR10PermitPage.pdf.

Any person aggrieved by the issuance of a permit final decision may demand a hearing pursuant to KRS 224.10-420(2) within thirty (30) days from the date of the issuance of this letter. Any demand for a hearing on the permit shall be filed in accordance with the procedures specified in KRS 224.10-420, 224.10-440, 224.10-470, and the regulations promulgated thereto. The request for hearing should be submitted in writing to the Energy and Environment Cabinet, Office of Administrative Hearings, 211 Sower Boulevard, Frankfort, Kentucky 40601 and the Commonwealth of Kentucky, Energy and Environment Cabinet, Division of Water, 300 Sower Boulevard, Frankfort, Kentucky 40601. For your record keeping purposes, it is recommended that these requests be sent by certified mail. The written request must conform to the appropriate statutes referenced above.

Any questions concerning the general permit and its requirements should be directed to me at 502-782-7076 or email me at Robin.Snider@ky.gov

Construction Site GPS Coordinates: 36.652894, -87.36674
Receiving Water: West Fork Red River

Sincerely,

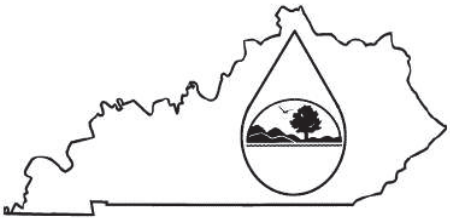
Robin M. Snider

Robin Snider
Surface Water Permits Branch
Division of Water

cc: Leigh Ann Liddell , eNOI Preparer
Lindsey Bibbee, Madisonville Regional Office

Thank you for submitting your information via the Kentucky Department for Environmental Protection eForms website. Please save a copy of this submittal for your records. We recommend saving a copy as a .mht, .html, or .htm file.
The Submittal ID for this transaction is 527778 and was submitted by Leigh Ann Liddell on September 05, 2025 10:04 AM Eastern Time

. If you need to contact EEC regarding your submission, please reference your Submittal ID. The eForm Submittal ID allows you to use the data from this submittal as a template and/or download a copy of your submittal.



KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)

Notice of Intent (NOI) for coverage of Storm Water Discharge Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000

Click here for Instructions (Controls/KYR10%20Instructions.pdf)

Click here to obtain information and a copy of the KPDES General Permit. (https://eec.ky.gov/Environmental-Protection/Water/PermitCert/KPDES/Documents/KYR10PermitPage.pdf)

(*) indicates a required field; (✓) indicates a field may be required based on user input or is an optionally required field

Reason for Submittal:(*)	Agency Interest ID:	Permit Number:(✓)
Application for New Permit Coverage	Agency Interest ID	KPDES Permit Number

If change to existing permit coverage is requested, describe the changes for which modification of coverage is being sought:(✓)

ELIGIBILITY:
Stormwater discharges associated with construction activities disturbing individually one (1) acre or more, including, in the case of a common plan of development, contiguous construction activities that cumulatively equal one (1) acre or more of disturbance.

COVERAGE:
Applicants shall complete and submit the eNOI-SWCA a minimum of seven (7) days before the proposed date for commencement of construction activities. Applicants shall receive written notification from the Division of Water before being authorized to discharge under the terms of the KYR10 General Permit.

EXCLUSIONS:
The following are excluded from coverage under this general permit:
1) Are conducted at or on properties that have obtained an individual KPDES permit for the discharge of other wastewaters which requires the development and implementation of a Best Management Practices (BMP) plan;
2) Any operation that the DOW determines an individual permit would better address the discharges from that operation;
3) Any project that discharges to an Impaired Water listed in the most recent Integrated Report, §305(b) as impaired for sediment and for which an approved TMDL has been developed.

SECTION I -- FACILITY OPERATOR INFORMATION (PERMITTEE)

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
Kentucky Transportation Cabinet	Christopher	T	Smith

Mailing Address:(*)	City:(*)	State:(*)	Zip:(*)
1219 Wilkinson Blvd	Frankfort	Kentucky	40601

eMail Address:(*)	Business Phone:(*)	Alternate Phone:
christophert.smith@ky.gov	502-564-3733	502-226-0559

Additional Facility Operator information(Co-Permittee) required ?(*)
No

SECTION II -- GENERAL SITE LOCATION INFORMATION

Project Name:(*)	Status of Owner/Operator(*)	SIC Code(*)
Christian County Rest Area Water and Sewer Renovation	State Government	1623 Water, Sewer, Pipeline, and Cor

Company Name:(✓)	First Name:(✓)	M.I.:	Last Name:(✓)
Kentucky Transportation Cabinet	Christopher	T	Smith

Site Physical Address:(*)
Along the Interstate 24 corridor between Carter Road and the Christian County Welcome Center

City:(*)	State:(*)	Zip:(*)
Oak Grove (nearest city)	Kentucky	42262

County:(*)	Latitude(decimal degrees)(*)	Longitude(decimal degrees)(*)
Christian	DMS to DD Converter (https://www.fcc.gov/media/radio/dms-decimal) 36.652894 5 or 6 decimal places	-87.366740 5 or 6 decimal places

SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION

Section III requires part A or part B to be completed.

Project Description:(*)

Replace sanitary sewer lift station and force main to connect to Hopkinsville system at Carter Rd; replace water main and connect to Logan Todd Reg. Water Comm. water main.

Was the pre-development land used for agriculture ?(*)	Will there be demolition of any structure built or renovated before January 1, 1980 ?(*)
No	No

Select the type of construction site (check all that apply)(*)

- [ ] Single-Family Residential
- [ ] Multi-Family Residential
- [ ] Commercial
- [ ] Industrial
- [ ] Institutional
- [ ] Highway or Road
- [x] Utility
- [ ] Other

a. For single projects provide the following information

Total Number of Acres in Project:(✓)	Total Number of Acres Disturbed:(✓)
6	5.6
Anticipated Start Date:(✓)	**Anticipated Completion Date:(✓)**
9/15/2025	9/15/2026

b. For common plans of development provide the following information

Total Number of Acres in Project:(✓)	Total Number of Acres Disturbed:(✓)
# Acre(s)	# Acre(s)
Number of individual lots in development, if applicable:(✓)	**Number of lots in development:(✓)**
# lot(s)	# lot(s)
Total acreage of lots intended to be developed:(✓)	**Number of acres intended to be disturbed at any one time:(✓)**
Project Acres	Disturbed Acres
Anticipated Start Date:(✓)	**Anticipated Completion Date:(✓)**

List Building Contractor(s) at the time of Application:(✓)

Company Name
To be determined

SECTION IV -- INFORMATION IS ALWAYS REQUIRED FOR ONSITE POINT OF DISCHARGE AND RECEIVING WATER

Complete the following table if the permitted site discharges to a water body. Please note that if you enter a row in hte below table, all columns are required to be filled out.
Unnamed Tributary?: Does discharge enter an unnamed tributary prior to entering a named receiving water?
Latitude in decimal degrees: Format must be between 36.490000 and 39.150000, with a minimum of 5 decimal points of accuracy.
Longitude in decimal degrees: Format must be between -89.580000 and -81.960000, with a minimum of 5 decimal points of accuracy.
Receiving Water Name: Receiving water name must be from the following list of possible receiving waters.(click here for a list (Controls/ReceivingStream.htm)). If the discharge flows into an unnamed tributary, please enter the first "named" receiving water for which the unnamed tributary(ies) eventually flows into.

Discharge Point(s):(*)

Unnamed Tributary?	Longitude	Receiving Water Name	
Yes	36.654077	-87.365876	West Fork Red River
Yes	36.652367	-87.363137	West Fork Red River
Yes	36.652286	-87.360745	West Fork Red River
Yes	36.641899	-87.359646	West Fork Red River
Yes	36.651426	-87.358163	West Fork Red River
Yes	36.641031	-87.357230	West Fork Red River
Yes	36.650251	-87.355061	West Fork Red River
Yes	36.650219	-87.353706	West Fork Red River
Yes	36.650801	-87.352109	West Fork Red River

This grid can be edited either directly on this page or by editing the information in an excel sheet.
If you would like to edit this information in an excel sheet, first use the right button (export) to download the sheet.

After adding your data, save the sheet, and use the left button (import) to import the same file to this grid.

SECTION V -- Section V MUST BE COMPLETED IF WITHIN A MS4 AREA

Name of MS4:

SECTION VI -- WILL THE PROJECT REQUIRE CONSTRUCTION ACTIVITIES IN A WATER BODY, FLOODPLAIN OR THE RIPARIAN ZONE?

Will the project require construction activities in a water body or the riparian zone?:(*)	No
If Yes, describe scope of activity:(✓)	Describe the scope of activity
Is a Clean Water Act 404 permit required?:(*)	No
Is a Clean Water Act 401 Water Quality Certification required?:(*)	No

SECTION VII -- NOI PREPARER INFORMATION

First Name:(*)	M.I.:	Last Name:(*)	Company Name:(*)
Leigh Ann	MI	Liddell	BFW Engineering and Testing

Mailing Address:(*)	City:(*)	State:(*)	Zip:(*)
2301 McCracken Boulevard	Paducah	Kentucky	42001

eMail Address:(*)	Business Phone:(*)	Alternate Phone:
lliddell1@bfwengineers.com	843-802-9177	270-443-1995

SECTION VIII -- ATTACHMENTS

Facility Location Map:(*)	Upload file Figure 1_ Site Topographic Map.pdf
Supplemental Information:	Upload file Figure 2_ Site Aerial Imagery.pdf

SECTION IX -- CERTIFICATION

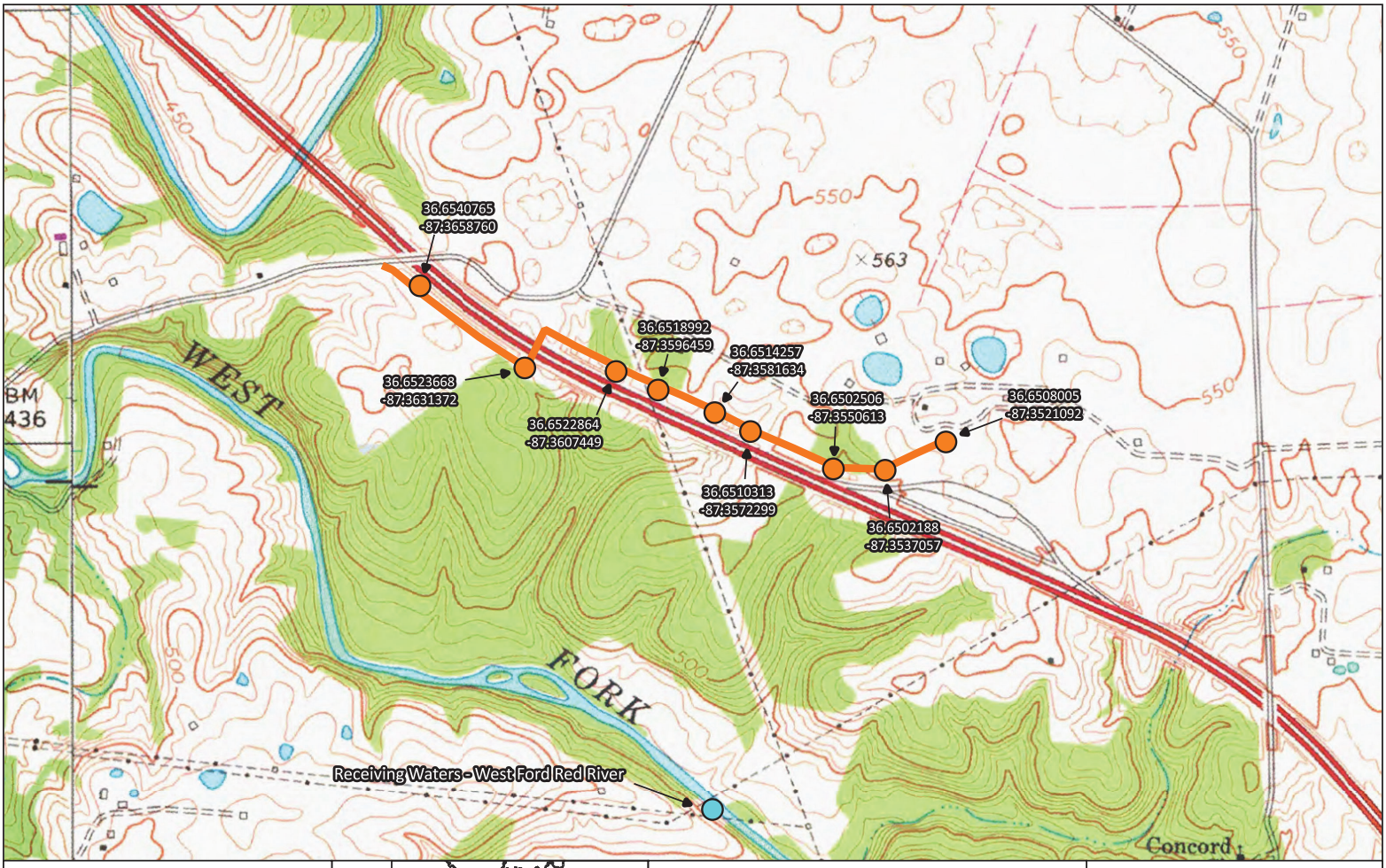
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature:(*)	Title:(*)
Christopher T. Smith	Construction Branch Manager

First Name:(*)	M.I.:	Last Name:(*)
Christopher	T	Smith

eMail Address:(*)	Business Phone:(*)	Alternate Phone:	Signature Date:(*)
christophert.smith@ky.gov	502-564-3733	502-226-0559	9/5/2025

Click to Save Values for Future Retrieval | Click to Submit to EEC



LEGEND

Project Data

- Discharge Points
- Receiving Waters
- Site Boundary



0 1,000 2,000 ft

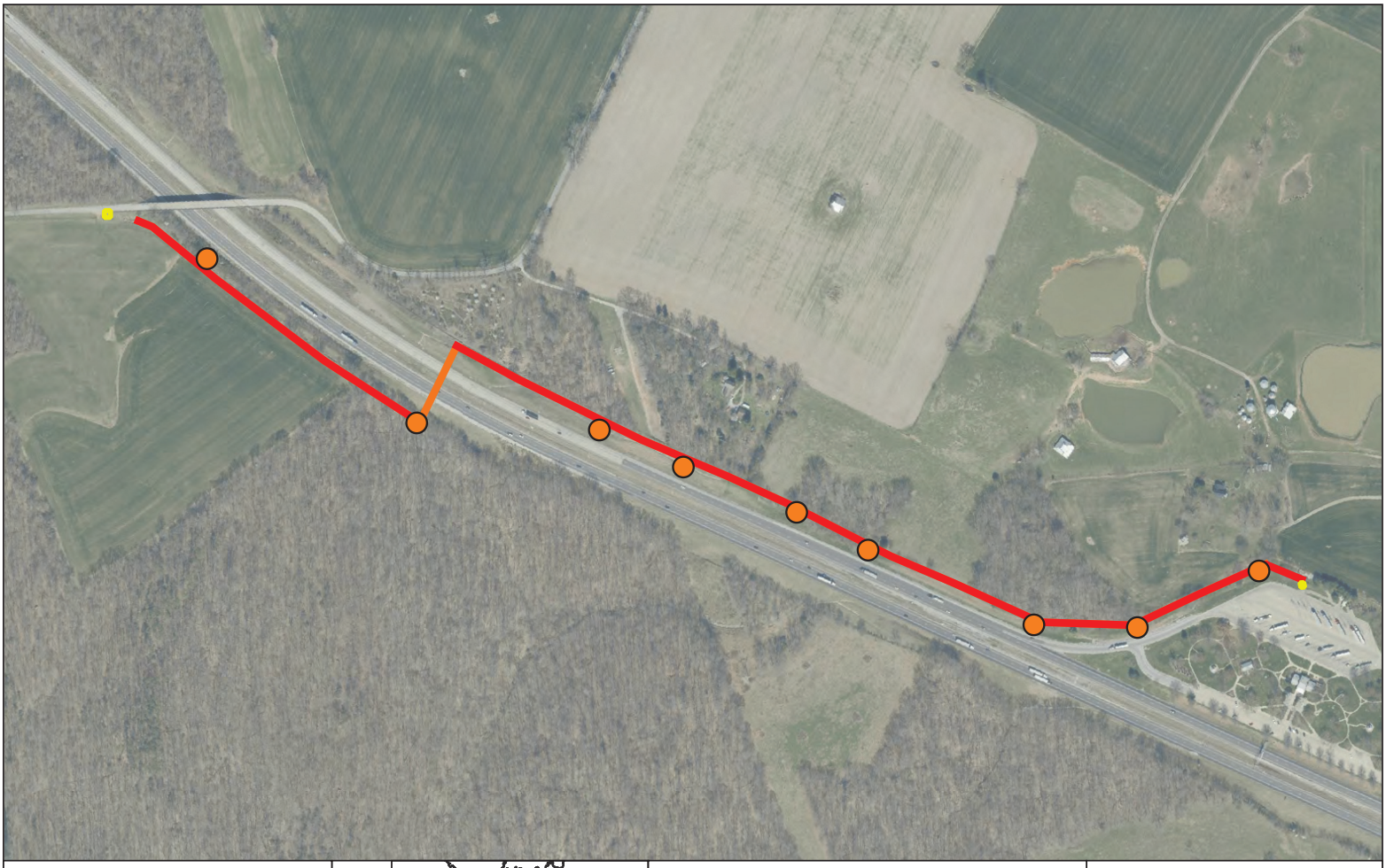
1 inch : 1000 feet

Figure 1: Site Topographic Map

Kentucky Transportation Cabinet
Water and Sewer Renovation
I-24 Rest Area | Christian County, KY

Project Number:	Drafted/Checked:	Date:
24596	HK/LL	2025-08-26

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LEGEND

Project Data

- Discharge Points
- Site Boundary
- Limits of Disturbance/Site Boundary
- Construction Entrance



0 500 1,000 ft

1 inch : 500 feet

Figure 2: Site Aerial Imagery

Kentucky Transportation Cabinet
Water and Sewer Renovation
I-24 Rest Area | Christian County, KY

Project Number:	Drafted/Checked:	Date:
24596	HK/LL	2025-08-26

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PART II

SPECIFICATIONS AND STANDARD DRAWINGS

STANDARD SPECIFICATIONS

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2019* and *Standard Drawings, Edition of 2020.*

SUPPLEMENTAL SPECIFICATIONS

The contractor shall use the Supplemental Specifications that are effective at the time of letting. The Supplemental Specifications can be found at the following link:
http://transportation.ky.gov/Construction/Pages/Kentucky-Standard-Specifications.aspx

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
II. Nondiscrimination of Employees (KRS 344)

I. APPLICATION

1. These contract provisions shall apply to all work performed on the contract by the contractor with his own organization and with the assistance of workmen under his immediate superintendence and to all work performed on the contract by piecework, station work or by subcontract. The contractor's organization shall be construed to include only workmen employed and paid directly by the contractor and equipment owned or rented by him, with or without operators.

2. The contractor shall insert in each of his subcontracts all of the stipulations contained in these Required Provisions and such other stipulations as may be required.

3. A breach of any of the stipulations contained in these Required Provisions may be grounds for termination of the contract.

II. NONDISCRIMINATION OF EMPLOYEES

AN ACT OF THE KENTUCKY
GENERAL ASSEMBLY TO PREVENT
DISCRIMINATION IN EMPLOYMENT
KRS CHAPTER 344
EFFECTIVE JUNE 16, 1972

The contract on this project, in accordance with KRS Chapter 344, provides that during the performance of this contract, the contractor agrees as follows:

1. The contractor shall not fail or refuse to hire, or shall not discharge any individual, or otherwise discriminate against an individual with respect to his compensation, terms, conditions, or privileges of employment, because of such individual's race, color, religion, national origin, sex, disability or age (forty and above); or limit, segregate, or classify his employees in any way which would deprive or tend to deprive an individual of employment opportunities or otherwise adversely affect his status as an employee, because of such individual's race, color, religion, national origin, sex, disability or age forty (40) and over. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

2. The contractor shall not print or publish or cause to be printed or published a notice or advertisement relating to employment by such an employer or membership in or any classification or referral for employment by the employment agency, indicating any preference, limitation, specification, or discrimination, based on race, color, religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, except that such a notice or advertisement may indicate a preference, limitation, or specification based on religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, when religion, national origin, sex, or age forty (40) and over, or because the person is a qualified individual with a disability, is a bona fide occupational qualification for employment.

3. If the contractor is in control of apprenticeship or other training or retraining, including on-the-job training programs, he shall not discriminate against an individual because of his race, color, religion, national origin, sex, disability or age forty (40) and over, in admission to, or employment in any program established to provide apprenticeship or other training.

4. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment. The contractor will take such action with respect to any subcontract or purchase order as the administrating agency may direct as a means of enforcing such provisions, including sanctions for non-compliance.

Revised: January 25, 2017

EXECUTIVE BRANCH CODE OF ETHICS

The Executive Branch Code of Ethics created by Kentucky Revised Statutes (KRS) Chapter 11A, effective July 14, 1992, establishes the ethical standards that govern the conduct of all executive branch employees. The Executive Branch Code of Ethics, which states, in part:

> KRS 11A.040 (7) provides:
>
> A present or former public servant listed in KRS 11A.010(9)(a) to (g) shall not, within one (1) year following termination of his or her office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of one (1) year, he or she personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his or her tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.
>
> KRS 11A.040 (9) states:
>
> A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:
>
> a) The date of leaving office or termination of employment; or
> b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not to obtain private benefits.

If you have worked for the executive branch of state government within the past year, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 1025 Capital Center Drive, Suite 105, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: March 11, 2025

Kentucky Equal Employment Opportunity Act of 1978

The requirements of the Kentucky Equal Employment Opportunity Act of 1978 (KRS 45.560-45.640) shall apply to this Contract. The apparent low Bidder will be required to submit EEO forms to the Division of Construction Procurement, which will then forward to the Finance and Administration Cabinet for review and approval. No award will become effective until all forms are submitted and EEO/CC has certified compliance. The required EEO forms are as follows:

- EEO-1: Employer Information Report
- Affidavit of Intent to Comply
- Employee Data Sheet
- Subcontractor Report

These forms are available on the Finance and Administration's web page under ***Vendor Information, Standard Attachments and General Terms*** at the following address: **https://www.eProcurement.ky.gov**.

Bidders currently certified as being in compliance by the Finance and Administration Cabinet may submit a copy of their approval letter in lieu of the referenced EEO forms.

For questions or assistance please contact the Finance and Administration Cabinet by email at **finance.contractcompliance@ky.gov** or by phone at 502-564-2874.

EMPLOYEE RIGHTS
UNDER THE FAIR LABOR STANDARDS ACT

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

FEDERAL MINIMUM WAGE
$7.25 PER HOUR
BEGINNING JULY 24, 2009

OVERTIME PAY

At least 1½ times your regular rate of pay for all hours worked over 40 in a workweek.

CHILD LABOR

An employee must be at least **16** years old to work in most non-farm jobs and at least **18** to work in non-farm jobs declared hazardous by the Secretary of Labor.

Youths **14** and **15** years old may work outside school hours in various non-manufacturing, non-mining, non-hazardous jobs under the following conditions:

No more than

- **3** hours on a school day or **18** hours in a school week;
- **8** hours on a non-school day or **40** hours in a non-school week.

Also, work may not begin before **7 a.m.** or end after **7 p.m.**, except from June 1 through Labor Day, when evening hours are extended to **9 p.m.** Different rules apply in agricultural employment.

TIP CREDIT

Employers of "tipped employees" must pay a cash wage of at least $2.13 per hour if they claim a tip credit against their minimum wage obligation. If an employee's tips combined with the employer's cash wage of at least $2.13 per hour do not equal the minimum hourly wage, the employer must make up the difference. Certain other conditions must also be met.

ENFORCEMENT

The Department of Labor may recover back wages either administratively or through court action, for the employees that have been underpaid in violation of the law. Violations may result in civil or criminal action.

Employers may be assessed civil money penalties of up to $1,100 for each willful or repeated violation of the minimum wage or overtime pay provisions of the law and up to $11,000 for each employee who is the subject of a violation of the Act's child labor provisions. In addition, a civil money penalty of up to $50,000 may be assessed for each child labor violation that causes the death or serious injury of any minor employee, and such assessments may be doubled, up to $100,000, when the violations are determined to be willful or repeated. The law also prohibits discriminating against or discharging workers who file a complaint or participate in any proceeding under the Act.

ADDITIONAL INFORMATION

- Certain occupations and establishments are exempt from the minimum wage and/or overtime pay provisions.
- Special provisions apply to workers in American Samoa and the Commonwealth of the Northern Mariana Islands.
- Some state laws provide greater employee protections; employers must comply with both.
- The law requires employers to display this poster where employees can readily see it.
- Employees under 20 years of age may be paid $4.25 per hour during their first 90 consecutive calendar days of employment with an employer.
- Certain full-time students, student learners, apprentices, and workers with disabilities may be paid less than the minimum wage under special certificates issued by the Department of Labor.

For additional information:

1-866-4-USWAGE

(1-866-487-9243) TTY: 1-877-889-5627

WHD U.S. Wage and Hour Division

WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Wage and Hour Division

WHD Publication 1088 (Revised July 2009)

PART IV

BID ITEMS

251031

PROPOSAL BID ITEMS

Page 1 of 1

Report Date 9/18/25

251031

Section: 0001 - UTILITY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00001		DGA BASE	140.00	TON		$	
0020	02275		FENCE-8 FT CHAIN LINK	104.00	LF		$	
0030	02287		DOUBLE VEHICULAR CHAIN LINK GATE	1.00	EACH		$	
0040	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		$	
0050	02726		STAKING	1.00	LS		$	
0060	14001		W AIR RELEASE VALVE 3/4 INCH	6.00	EACH		$	
0070	14019		W FIRE HYDRANT ASSEMBLY	2.00	EACH		$	
0080	14022		W FLUSH HYDRANT ASSEMBLY	1.00	EACH		$	
0090	14026		W METER 1-1/2 INCH	1.00	EACH		$	
0100	14059		W PIPE PVC 06 INCH	3,438.00	LF		$	
0110	14086		W SERVICE SPECIAL	1.00	EACH		$	
0120	14087		W STRUCTURE ABANDONMENT	1.00	EACH		$	
0130	14088		W STRUCTURE REMOVAL	8.00	EACH		$	
0140	14090		W TAPPING SLEEVE AND VALVE SIZE 2	1.00	EACH		$	
0150	14104		W VALVE 04 INCH	1.00	EACH		$	
0160	14105		W VALVE 06 INCH	1.00	EACH		$	
0170	14144		W LINE MARKER	7.00	EACH		$	
0180	14168		W METER VAULT SIZE RANGE 1	1.00	EACH		$	
0190	15026		S FORCE MAIN AIR RLS/VAC VLV 02 IN	8.00	EACH		$	
0200	15059		S FORCE MAIN PVC 04 INCH	5,057.00	LF		$	
0210	15073		S FORCE MAIN TIE-IN 04 INCH	1.00	EACH		$	
0220	15092		S MANHOLE	1.00	EACH		$	
0230	15095		S MANHOLE CASTING STANDARD	1.00	EACH		$	
0240	15099		S MANHOLE TAP EXISTING	1.00	EACH		$	
0250	15112		S PIPE PVC 08 INCH	16.00	LF		$	
0260	15119		S PUMP STATION	1.00	EACH		$	
0270	15120		S SPECIAL ITEM	2.00	EACH		$	
0280	15122		S STRUCTURE REMOVAL	10.00	EACH		$	
0290	15123		S LINE MARKER	10.00	EACH		$	

Section: 0002 - DEMOBILIZATION &/OR MOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0300	02569		DEMOBILIZATION	1.00	LS		$	