



**CALL NO. 304**

**CONTRACT ID. 171048**

**HOPKINS COUNTY**

**FED/STATE PROJECT NUMBER FD04 SPP 054 041A 000-002**

**DESCRIPTION US-41A AT DIXON ROAD**

**WORK TYPE GRADE & DRAIN WITH ASPHALT SURFACE**

**PRIMARY COMPLETION DATE 10/1/2020**

**LETTING DATE: December 08,2017**

Sealed Bids will be received electronically through the Bid Express bidding service until 10:00 AM EASTERN STANDARD TIME December 08,2017. Bids will be publicly announced at 10:00 AM EASTERN STANDARD TIME.

**PLANS AVAILABLE FOR THIS PROJECT.**

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

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**PART I**  
**SCOPE OF WORK**

## ADMINISTRATIVE DISTRICT - 02

**CONTRACT ID - 171048**

**FD04 SPP 054 041A 000-002**

**COUNTY - HOPKINS**

**PCN - DE054041A1748**

**FD04 SPP 054 041A 000-002**

US-41A AT DIXON ROAD WIDEN US-41A FROM YORKWOOD PLACE TO US-41/KY-281., A DISTANCE OF 01.78  
MILES.GRADE & DRAIN WITH ASPHALT SURFACE SYP NO. 02-00137.20.  
GEOGRAPHIC COORDINATES LATITUDE 37:21:11.00 LONGITUDE 87:32:18.00

**COMPLETION DATE(S):**

COMPLETED BY 10/01/2020

APPLIES TO ENTIRE CONTRACT

## **CONTRACT NOTES**

### **PROPOSAL ADDENDA**

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

### **BID SUBMITTAL**

Bidder must use the Department's Expedite Bidding Program available on the Internet web site of the Department of Highways, Division of Construction Procurement. ([www.transportation.ky.gov/construction-procurement](http://www.transportation.ky.gov/construction-procurement))

The Bidder must download the bid file located on the Bid Express website ([www.bidx.com](http://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.

### **SPECIAL NOTE FOR COMPOSITE OFFSET BLOCKS**

Contrary to the Standard Drawings (2016 edition) the Cabinet will allow 6" composite offset blocks in lieu of wooden offset blocks, except as specified on proprietary end treatments and crash cushions. The composite blocks shall be selected from the Cabinet's List of Approved Materials.

### **REGISTRATION WITH THE SECRETARY OF STATE BY A FOREIGN ENTITY**

Pursuant to KRS 176.085(1)(b), an agency, department, office, or political subdivision of the Commonwealth of Kentucky shall not award a state contract to a person that is a foreign entity required by [KRS 14A.9-010](#) to obtain a certificate of authority to transact business in the Commonwealth (“certificate”) from the Secretary of State under [KRS 14A.9-030](#) unless the person produces the certificate within fourteen (14) days of the bid or proposal opening. If the foreign entity is not required to obtain a certificate as provided in [KRS 14A.9-010](#), the foreign entity should identify the applicable exception. Foreign entity is defined within [KRS 14A.1-070](#).

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

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

### **SPECIAL NOTE FOR PROJECT QUESTIONS DURING ADVERTISEMENT**

Questions about projects during the advertisement should be submitted in writing to the Division of Construction Procurement. This may be done by fax (502) 564-7299 or email to [kytc.projectquestions@ky.gov](mailto:kytc.projectquestions@ky.gov). The Department will attempt to answer all submitted questions. The Department reserves the right not to answer if the question is not pertinent or does not aid in clarifying the project intent.

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

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

### **HARDWOOD REMOVAL RESTRICTIONS**

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

### **INSTRUCTIONS FOR EXCESS MATERIAL SITES AND BORROW SITES**

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

### **ACCESS TO RECORDS**

The contractor, as defined in KRS 45A.030 (9) agrees that the contracting agency, the Finance and Administration Cabinet, the Auditor of Public Accounts, and the Legislative Research Commission, or their duly authorized representatives, shall have access to any books, documents, papers, records, or other evidence, which are directly pertinent to this contract for the purpose of financial audit or program review. Records and other prequalification information confidentially disclosed as part of the bid process shall not be deemed as directly pertinent to the contract and shall be exempt from disclosure as provided in KRS 61.878(1)(c). The contractor also recognizes that any books, documents, papers, records, or other evidence, received during a financial audit or program review shall be subject to the Kentucky Open Records Act, KRS 61.870 to 61.884.

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

06/01/16

**SPECIAL NOTE FOR RECIPROCAL PREFERENCE**

**Reciprocal preference to be given by public agencies to resident bidders**

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

03/01/2011



### **ASPHALT MIXTURE**

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

### **INCIDENTAL SURFACING**

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

### **FUEL AND ASPHALT PAY ADJUSTMENT**

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

### **ASPHALT PAVEMENT RIDE QUALITY CATEGORY A**

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

### **OPTION A**

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

# **SPECIAL NOTE**

## **WATER RELOCATION**

### **US41A (HOPKINS)**

### **ITEM NO. 2-137.01**

This Special Note will apply for all work related to furnishing, installing, testing and placing into service the newly relocated water main, services and appurtenances.

#### **1.0 SCOPE OF WORK**

The scope of work shall include the relocation of water distribution facilities owned by the City of Madisonville. The water line relocation work is shown on project drawings U1 through U71. The project includes the following major work items:

- Relocate existing watermain
- Installation of valves and hydrants
- New meters and services connections
- Boring and Jacking new watermain

#### **2.0 MAINTENANCE OF TRAFFIC AND EROSION CONTROL**

Any required maintenance of traffic and erosion control best management practices for the water line relocation work shall fall under the roadway project maintenance of traffic and erosion control and is not a separate pay item. See Traffic Control Sheets (R72-R92) and Erosion Control Sheets (R93-R100).

#### **3.0 PIPELINE MATERIALS, CONSTRUCTION, TESTING AND TIE-INS**

Unless otherwise indicated on the project drawings or modified by this special note, KYTC's specifications and the attached technical specifications shall apply to the water line relocation materials, installation, testing and tie-ins on this project.

#### **4.0 GENERAL UTILITY NOTES AND INSTRUCTIONS APPLICABLE TO WATER LINE RELOCATION WORK MADE A PART OF 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 technical 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, technical specifications or plans; the KYTC Standard Specifications for Road and Bridge Construction shall be referenced.

**4.1 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.

## 5.0 KYTC UTILITY BID ITEM DESCRIPTIONS

### 5.1 Standard Water Bid Item Descriptions

**W AIR RELEASE VALVE** This bid item description shall apply to all air release valve installations of every size except those defined as "Special". This item shall include the air release valve, main to valve connecting line or piping, manhole, vault, structure, access casting or doors, tapping the main, labor, equipment, excavation, proper backfill and restoration required to install the air release valve at the location shown on the plans or as directed in accordance with the specifications and standard drawings complete and ready for use. All air release valves on a project shall be paid under one bid item regardless of size. No separate pay items will be established for size variations. Only in the case of the uniqueness of a particular air release valve would a separate bid item be established. Please refer to the Technical Specifications. This item shall be paid EACH (EA) when complete.

**W CAP EXISTING MAIN** This item shall include the specified cap, concrete blocking and/or mechanical anchoring, labor, equipment, excavation, backfill, and restoration required to install the cap at the location shown on the plans or as directed in accordance with the specifications. This item is not to be paid on new main installations. This pay item is only to be paid to cap existing mains. Caps on new mains are incidental to the new main. Any and all caps on existing mains shall be paid under one bid item included in the contract regardless of size. No separate bid items will be established for size variations. Please refer to KYTC's Specifications and the attached technical specifications. This item shall be paid EACH (EA) when complete.

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

**W FIRE HYDRANT ASSEMBLY** Includes all labor, equipment, new fire hydrant, isolating valve and valve box, concrete pad around valve box (when specified in specifications or plans), piping, anchoring tee, anchoring couplings, fire hydrant extension, excavation, concrete blocking, granular drainage material, backfill, and restoration, to install a new fire hydrant assembly as indicated on plans and on standard drawings complete and ready for use. No additional payment will be made for rock excavation. Please refer to the attached technical and KYTC specifications. This item shall be paid EACH (EA) when complete.

**W FIRE HYDRANT REMOVE** This bid item includes removal of an abandoned fire hydrant, isolating valve, and valve box to the satisfaction of the engineer. The removed fire hydrant, isolating valve and valve box shall become the property of the contractor for his disposal as salvage or scrap. Please refer to KYTC's Specifications and the technical specifications. This item shall be paid EACH (EA) when complete.

**W METER** This item is for payment for installation of all standard water meters of all sizes 2 inches ID or less as specified on the plans. This item shall include all labor, equipment, meter, meter box, casting, yoke, and any other associated material needed for installation of a functioning water meter in accordance with the plans and specifications, complete and ready for use. This item shall include connections to the new or existing water service line. Please refer to the attached technical and KYTC's specifications. This item shall be paid EACH (EA) when complete.

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

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

**W TAPPING SLEEVE 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 KYTC's Specifications and the attached technical specifications. This item shall be paid EACH (EA) when complete.

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

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

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

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

Private or commercial entrances shall not be considered a public roadway in defining payment under this item. The contractor shall draw his own conclusions as to the length of piping that may be needed. This pay item does not include installation or relocation of meters. Meters will be paid separately. No additional payment will be made for rock excavation or for bedding required in rock excavation. Please refer to the KYTC’s Specifications and the attached technical specifications. This item shall be paid EACH (EA) when complete.

## **6.0 CONTRACT ADMINISTRATION RELATIVE TO WATER RELOCATION 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.

## **7.0 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 and/or utility owner engineer by the contractor to expedite handling of items like material approvals and shop drawings. All approvals and correspondence generated by the utility owner/engineer 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.

## **8.0 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.

## **9.0 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.

### **10.0 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.

### **11.0 WATER SHUTDOWNS**

Shutdowns for tie-ins to the main shall be approved by the utility owner. Shutdown times will be limited to off peak periods and allowable durations will be determined 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 utility 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, as shown on the project drawings and specified in the Specifications. 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.

### **12.0 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.

### **13.0 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.

# **SPECIAL NOTE**

## **SEWER RELOCATION**

### **US41A (HOPKINS)**

### **ITEM NO. 2-137.01**

This Special Note will apply for all work related to furnishing, installing, testing and placing into service the newly relocated sewer main, services and appurtenances.

#### **1.0 SCOPE OF WORK**

The scope of work shall include the relocation of sewer facilities owned by the City of Madisonville. The sewer line relocation work is shown on project drawings U1 through U71. The project includes the following major work items:

- Relocate existing sewer lines
- New manholes and services connections
- Boring and Jacking new sewer lines

#### **2.0 MAINTENANCE OF TRAFFIC AND EROSION CONTROL**

Any required maintenance of traffic and erosion control best management practices for the sewer line relocation work shall fall under the roadway project maintenance of traffic and erosion control and is not a separate pay item. See Traffic Control Sheets (R72-R92) and Erosion Control Sheets (R93-R100).

#### **3.0 PIPELINE MATERIALS, CONSTRUCTION, TESTING AND TIE-INS**

Unless otherwise indicated on the project drawings or modified by this special note, KYTC's specifications and the attached technical specifications shall apply to the sewer line relocation materials, installation, testing and tie-ins on this project.

#### **4.0 GENERAL UTILITY NOTES AND INSTRUCTIONS APPLICABLE TO SEWER LINE RELOCATION WORK MADE A PART OF 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 technical 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, technical specifications or plans; the KYTC Standard Specifications for Road and Bridge Construction shall be referenced.

**4.1 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.



## 5.0 KYTC UTILITY BID ITEM DESCRIPTIONS

### 5.1 Standard Sewer Bid Item Descriptions

**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 technical and KYTC Specifications. This item shall be paid LINEAR FEET (LF).

**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 technical and KYTC specifications. 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 technical and KYTC Specifications. . This item shall be paid LINEAR FEET (LF).

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

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

**S MANHOLE** Payment under this item is for the installation of new 4 foot interior diameter sanitary sewer manhole. Payment for manholes will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Manholes shall include concrete base, barrel sections, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup in accordance with the specifications and standard drawings. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the technical and KYTC Specifications. This item shall be paid EACH (EA) when complete.

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

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

**S MANHOLE WITH DROP** Payment under this item is for the installation of new 4 foot interior diameter sanitary sewer manhole with drop. Payment for drop manholes will be made at the contract unit price each in place complete and ready for use at the locations shown on plans in accordance with specifications and standard drawings. Drop manholes shall include concrete base, barrel sections, drop materials, cone section or slab top, steps, excavation, backfilling, air testing, restoration, and cleanup. Payment shall be made under this item regardless of whether the base is to be precast or cast-in-place (doghouse). All materials, except casting, shall be new and unused. An existing casting from an existing abandoned or removed manhole is to be reused and shall be considered incidental to this item. When a new casting is specified, or an existing casting is unavailable, it shall be paid as a separate bid item. Anchoring of casting, new or used, shall be considered incidental to this bid item. No additional compensation will be paid for manhole height variations. No additional payment will be made for rock excavation. Please refer to the technical and KYTC Specifications. This item shall be paid EACH (EA) when complete.

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

**S PUMP STATION** This item is for payment for installation of sanitary pump stations including above or below ground structure for housing of the pumps. This item shall include all pumps, piping, fittings, valves, electrical components, building materials, concrete, any other appurtenances, labor, equipment, excavation, and backfill, to complete the pump station installation as required by the plans, standard drawings, and specifications, complete and ready for use. Please refer to the technical and KYTC Specifications. This item shall be paid LUMP SUM (LS) for each when complete.

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

## **6.0 CONTRACT ADMINISTRATION RELATIVE TO SEWER RELOCATION 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.

## **7.0 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 and/or utility owner engineer by the contractor to expedite handling of items like material approvals and shop drawings. All approvals and correspondence generated by the utility owner/engineer 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.

## **8.0 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.

## **9.0 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.

## **10.0 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.

## **11.0 SEWER SHUTDOWNS**

Shutdowns for tie-ins to the main shall be approved by the utility owner. Shutdown times will be limited to off peak periods and allowable durations will be determined 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 utility 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, as shown on the project drawings and specified in the Specifications. 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.

#### **12.0 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.

#### **13.0 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.

**RECOMMENDATION FOR PICKUP OF ITEMS TO BE INSTALLED  
 ON TRAFFIC SIGNALS/LIGHTING**

Item Number: 2-137.20

County: HOPKINS

Description: US 41A @ US 41/ KY 281

Cabinets		
	Master code	
1	T-01-0010	Pole Mounted 336 Cabinet
1	T-01-0100	170 Controller
2	T-01-0510	Isolator, Model 242 (for ped detector and railroad)
8	T-01-0600	Loop Detector, Model 222
12	T-01-0700	Load Switches

Signals		
30	T-02-0009	Siemen 3 section, 12 inch signal
15	T-02-0032	Siemen 3 section backplate
8	T-02-0090	Pedestrian signal housing
14	T-02-0300	LED Module 12" red arrow
14	T-02-0310	LED Module 12" yellow arrow
14	T-02-0320	LED Module 12" green arrow
16	T-02-0330	LED Module 12" red ball
16	T-02-0340	LED Module 12" yellow ball
16	T-02-0350	LED Module 12" green ball
8	T-02-0365	LED Countdown Pedestrian Module

Special items		
4	T-02-0400	Video Detection System C# of left turns put here
1	T-02-0504	Router (this includes power supply/antenna/cabling)
1	T-02-0650	Pedstl.top mntg.bkt One-way
3	T-02-0660	Pedstl.top mntg.bkt Two-way
4	T-02-0670	Pedestal
8	T-06-0710	Ped Detector Pole Mount FSA Box
8	T-06-0730	Ped Button w/o Plunger
8	T-17-0015	9 X 15 Countdown Ped Sign DBL Sided

Poles		
1	T-04-0020	Steel Strain Pole 30 foot
1	T-04-0030	Steel Strain Pole 32 foot
2	T-04-0040	Steel Strain Pole 34 foot

Project Engineer \_\_\_\_\_ Contact number for Project Engineer \_\_\_\_\_

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

Signature of Project Engineer or Designee \_\_\_\_\_

## **SPECIAL NOTE FOR PIPELINE INSPECTION**

**1.0 DESCRIPTION.** The Department will perform visual inspections on all pipe on the project. A video inspection will be required on projects having more than 250 linear feet of storm sewer and/or culvert pipe and on routes with an ADT of greater than 1,000 vehicles. Conduct video inspections on all pipe located under the roadway and 50 percent of the remaining pipe not under the roadway. Storm sewer runs and outfall pipes not under the roadway take precedence over rural entrance pipes. Contractors performing this item of work must be prequalified with the Department in the work type J51 (Video Pipe Inspection and Cleaning). Deflection testing shall be completed using a mandrel in accordance with the procedure outlined below or by physical measurement for pipes greater than 36 inches in diameter. Mandrel testing for deflection must be completed prior to the video inspection testing. Unless otherwise noted, Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

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

### **2.1 INSPECTION FOR DEFECTS AND DISTRESSES**

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

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

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

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

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

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

**3.0 MANDREL TESTING.** Mandrel testing will be used for deflection testing. For use on Corrugated Metal Pipe, High Density Polyethylene Pipe, and Polyvinyl Chloride Pipe,

use a mandrel device with an odd number of legs (9 minimum) having a length not less than the outside diameter of the mandrel. The diameter of the mandrel at any point shall not be less than the diameter specified in Section 3.6. Mandrels can be a fixed size or a variable size.

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

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

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

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

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

**3.6 AASHTO Nominal Diameters and Maximum Deflection Limits.**

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



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

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

$$\% \text{ Deflection} = [(AASHTO \text{ Nominal Diameter} - D2) / AASHTO \text{ Nominal Diameter}] \times 100\%$$

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

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

**4.2** Record and submit all data.

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

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

<sup>(1)</sup> Provide Structural Analysis for HDPE and metal pipe. Based on the structural analysis, pipe may be allowed to remain in place at the reduced unit price. <sup>(2)</sup> The Department may allow the pipe to remain in place with no pay to the Contractor in instances where it is in the best interest to the public and where the structural analysis demonstrates that the pipe should function adequately.

<b>RIGID PIPE REMEDIATION TABLE PIPE</b>	
Crack Width (inches)	Payment
• 0.1	100% of the Unit Bid Price
Greater than 0.1	Remediate or Replace <sup>(1)</sup>

<sup>(1)</sup> Provide the Department in writing a method for repairing the observed cracking. Do not begin work until the method has been approved.

**6.0 PAYMENT.** The Department will measure the quantity in linear feet of pipe to inspect. The Department will make payment for the completed and accepted quantities under the following:

<u>Code</u>	<u>Pay Item</u>	<u>Pay Unit</u>
24814EC	Pipeline Inspection	Linear Foot
10065NS	Pipe Deflection Deduction	Dollars


***SPECIAL NOTE***

**For Tree Removal**

**Hopkins County  
WIDEN US-41A TO 5-LANES FROM US-41 WEST TO  
KINGDOM HALL ROAD IN MADISONVILLE.  
Item No. 2-137**

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

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

	KENTUCKY TRANSPORTATION CABINET Department of Highways DIVISION OF RIGHT OF WAY & UTILITIES	TC 62-226 Rev. 01/2016 Page 1 of 1
<b>RIGHT OF WAY CERTIFICATION</b>		

<input checked="" type="checkbox"/> Original	<input type="checkbox"/> Re-Certification	<b>RIGHT OF WAY CERTIFICATION</b>	
<b>ITEM #</b>	<b>COUNTY</b>	<b>PROJECT # (STATE)</b>	<b>PROJECT # (FEDERAL)</b>
2-137.20	Hopkins	FD04 C054 7334401R	N/A
<b>PROJECT DESCRIPTION</b>			

Widen US 41A to five lanes from US 41 to Kingdom Hall Road in Madisonville (Section 2).  
 **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	35	EXCEPTION (S) Parcel #	ANTICIPATED DATE OF POSSESSION WITH EXPLANATION
Number of Parcels That Have Been Acquired			
Signed Deed	34		
Condemnation	1		
Signed ROE			

Notes/ Comments (Use Additional Sheet if necessary)

<b>LPA RW Project Manager</b>		<b>Right of Way Supervisor</b>	
Printed Name		Printed Name	Jennifer K. Cox
Signature		Signature	
Date		Date	10/30/2017
<b>Right of Way Director</b>		<b>FHWA</b>	
Printed Name	Dan Loy	Printed Name	
Signature		Signature	
Date	30 OCT 17	Date	

## UTILITIES AND RAIL CERTIFICATION NOTE

**Hopkins County**  
**2-137.20**

### GENERAL PROJECT NOTE ON UTILITY PROTECTION

Water, Sewer, & Electric is included in the roadway contact.

**The Roadway contractor is required to use one of the following Electrical Contactors listed below for the City of Madisonville Electrical work.**

#### **Groves**

3135 Grapevine Road  
Madisonville, KY 42431

Toll Free [1-800-342-2656](tel:1-800-342-2656)

Phone [270-825-1437](tel:270-825-1437)

Fax [270-825-1485](tel:270-825-1485)

#### **5 Star electric**

170 Bean Cemetery Rd  
Madisonville, KY 42431-9677

[\(270\) 399-7262](tel:270-399-7262)

#### **T&D**

175 State Route 109 N  
Clay, KY 42404

Phone: [\(270\) 664-2349](tel:270-664-2349)

Fax: [\(270\) 664-2000](tel:270-664-2000)

## UTILITIES AND RAIL CERTIFICATION NOTE

**Hopkins County**  
**2-137.20**

**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**

**Mediacom Cable** Will Require 6 months to relocate after the electrical work that is included in the roadway contract is complete.

**AT&T** has completed most of the underground relocation. They have some underground work along Dodson lane along with having aerial work that will **begin** once the Cable TV work is complete. AT&T will complete their work within 12 Months once electrical work is complete.

**Atmos** will begin relocation work on the gas mains in February 2018. They plan to complete their work by **9/30/2018**.

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

The City of Madisonville has included the relocation of the Water, Sewer, and Electric facilities in the road way contact.

**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)

**See special notes for Rail Road protection in the proposal.**

## UTILITIES AND RAIL CERTIFICATION NOTE

**Hopkins County**  
**2-137.20**

### **SPECIAL CAUTION NOTE – PROTECTION OF UTILITIES**

The contractor will be responsible for contacting all utility facility owners on the subject project to coordinate his activities. The contractor will coordinate his activities to minimize and, where possible, avoid conflicts with utility facilities. Due to the nature of the work proposed, it is unlikely to conflict with the existing utilities beyond minor facility adjustments. Where conflicts with utility facilities are unavoidable, the contractor will coordinate any necessary relocation work with the facility owner and Resident Engineer. The Kentucky Transportation Cabinet maintains the right to remove or alter portions of this contract if a utility conflict occurs.

The utility facilities as noted in the previous section(s) have been determined using data garnered by varied means and with varying degrees of accuracy: from the facility owners, a result of S.U.E., field inspections, and/or reviews of record drawings. The facilities defined may not be inclusive of all utilities in the project scope and are not Level A quality, unless specified as such. It is the contractor's responsibility to verify all utilities and their respective locations before excavating.

### **BEFORE YOU DIG**

The contractor is instructed to call 1-800-752-6007 to reach KY 811, the one-call system for information on the location of existing underground utilities. The call is to be placed a minimum

## UTILITIES AND RAIL CERTIFICATION NOTE

**Hopkins County**  
**2-137.20**

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

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

### AREA UTILITIES CONTACT LIST

<u>Utility Company/Agency</u>	<u>Contact Name</u>	<u>Contact Information</u>
AT&T	Mike Wilson	270-825-7808
City Of Madisonville (Water/Sewer & Electric)	William Jackson	270-824-2187
Atmos Energy	Chase Downing	270-685-8128
MediaCom	Albert Gaboriault	270-339-6040



# **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 City Of Madisonville Electric requires one of the following contractors to perform the relocation work on their facilities.*

### **Groves**

3135 Grapevine Road  
Madisonville, KY 4243

[270-825-1437](tel:270-825-1437)

Fax [270-825-1485](tel:270-825-1485)

### **5 Star electric**

170 Bean Cemetery Rd

Madisonville, KY 42431-9677

[\(270\) 399-7262](tel:(270)399-7262)

### **T&D**

175 State Route 109 N

Clay, KY 42404

Phone: [\(270\) 664-2349](tel:(270)664-2349)

Fax: [\(270\) 664-2000](tel:(270)664-2000)

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.

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

### MATERIAL

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

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

***No materials are being supplied by the utility owner(s). All materials are to be supplied by the contractor per bid item descriptions, utility specifications and utility plans.***

### SECURITY OF SUPPLIED MATERIALS

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

# **Technical Specifications**

**For**

**US 41A (Hopkins)**

**Item No. 2-137.01**

**October, 2017**

**City of Madisonville, KY**

*Prepared by:*

**HDR Engineering, Inc.  
4645 Village Square Drive, Suite F  
Paducah, KY 42001**

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## **SECTION 02221 TRENCHING, BEDDING AND BACKFILLING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. Excavation of all materials encountered in trench excavation, including earth, rock or other materials, whether wet or dry.
- B. Provide necessary sheeting, shoring and bracing.
- C. Dewater excavation as required.
- D. Undercut unsuitable materials and replace as required.
- E. Prepare a stable, satisfactory trench bottom.
- F. Place and compact granular beds, check dams, and backfill as appropriate.
- G. Dispose of any unsuitable or excess materials.

#### **1.2 PRECAUTIONS**

- A. In accordance with the Kentucky State Law the Contractor shall properly notify underground utility owners prior to beginning excavation activities. Kentucky State Law requires notification to the statewide one-call center, Kentucky One-Call, at least two (2) working days prior to excavation, but not more than ten (10) working days in advance of beginning the work. Locate requests, including emergency locate requests, to Kentucky One-Call shall be processed in accordance with Kentucky State Law. Contact Kentucky One-Call at 811 to process a locate ticket. The City of Madisonville will not locate its water and sewer utilities without a locate ticket from Kentucky One-Call.
- B. Protect all structures, utilities, sidewalks, pavements, fences, vegetation and other features to remain.
- C. Protect all benchmarks, property pins, survey points and similar items. If disturbed or damaged by construction operations, the Contractor shall pay the cost of restoration by a registered surveyor.
- D. Follow all Federal, State, County, TVA, KYTC, and Railroad regulations when working in Rights-of-Way not owned by City or in utility easement.



- E. Establish all erosion prevention and sediment control devices.
- F. Precautions shall be taken to eliminate tracking of soil, mud, rock and gravel onto streets and roadways.

### **1.3 DUST CONTROL**

- A. When ordered by Engineer or his representative, furnish and distribute over traveled road surfaces which have not been fully restored, an application of regular flake calcium chloride having a minimum calcium chloride content of 77 percent, or a brine solution consisting of 1.5 pound of calcium chloride and one pound of sodium chloride per 100 gallons of water applied by a pressure distributor. Rate of application shall be 3 pounds/square yard for the flake calcium chloride, and 0.48 gallon/square yard for brine solution.
- B. Whenever dust control is necessary, it shall be considered an integral part of the work, and no separate payment shall be made for it.

### **1.4 MAINTENANCE OF TRAFFIC AND CLOSING OF STREETS**

- A. Carry on the work in a manner which will cause a minimum of interruption to traffic, and do not close to through travel more than two consecutive blocks, including the cross street intersected. Where traffic must cross open trenches, provide bridges at street intersections and driveways. Post signs indicating that a street is closed and necessary detour signs for the proper maintenance of traffic. Before closing any streets notify responsible municipal, state, county, emergency, transit and school system authorities.
- B. Place and maintain barricades, fences, construction signs, lights and flagmen as required during the progress of the construction work and until it is safe for traffic to use the roads and streets. The rules and regulations of OSHA, KYTC and other appropriate authorities respecting traffic safety provisions shall be observed.

## **PART 2 – PRODUCTS**

### **2.1 BEDDING AND BACKFILL MATERIALS**

- A. Crushed stone material, No. 9 aggregate and Dense Graded Aggregate (DGA) as shown on the project details.
- B. Class II Material: Coarse sands and gravels with a maximum particle dimension of 1-1/2 inch including variously graded sands and gravels containing small percentages of fines, generally granular and non-cohesive, either wet or dry.
- C. Class III Material: Fine sand and clayey gravels, including fine sands, sand-clay mixtures, and gravel-clay mixtures.
- D. Class IV Material: Silt, silty clays, and clays, including inorganic clays and silts of medium to high plasticity and liquid limits.
- E. In rock cuts, paved areas, roadways or other areas where free drainage bedding or backfill material is required, use crushed stone material.
- F. Flowable Fill: Per Kentucky Standard Specifications.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Pre-construction photographs and video shall be taken by the Contractor, with special attention to improved areas, to aid in restoring landscaping and other items to their initial condition.
- B. Protect all features to remain.
- C. Put in place all traffic and other safety provisions as required.

### 3.2 EXCAVATION

- A. Unless specifically shown otherwise on the Bid Form, all excavation is unclassified, and includes excavation to subgrade elevations regardless of the character of materials and obstructions encountered. It is to be understood that any reference to rock, earth or any other material on the drawings is not to be taken as an indication of classified excavation or the quantity of either rock, earth or any other material involved.
- B. The Bidder should make such investigations as deemed necessary to determine existing conditions and shall draw his own conclusions as to the conditions to be encountered. When rock borings, soundings or test pit data are provided, they are for information only and do not guarantee existing conditions.
- C. Align the trench as shown on the Contract Drawings. Deviations due to obstructions are discussed in Paragraph 3.8 of this Section.
- D. Perform excavation in such a manner as to form a suitable trench in which to place the pipe and so as to cause the least inconvenience to the public.
- E. The Contractor shall be responsible for stripping, storing and protecting topsoil that is to be removed prior to excavation. This topsoil is to be reused during the cleanup and restoration. The Contractor is responsible for obtaining and providing other topsoil as may be necessary to restore the excavated area to its original topsoil quantity and quality.
- F. Pavement cuts shall be made along neat, straight lines with either a pavement breaker or pavement saw prior to the excavation. Cut pavement to be a minimum of 1 foot outside of trench cut. Coordinate all street cuts with the State, County and City Street Departments as applicable.
- G. Trenches shall be excavated to the depths indicated on the Contract Drawings. Trench depth shall be sufficient to provide a minimum cover of 42 inches (Sewer) and 42 inches (Water) over the top of the pipe in non- traffic areas and 42 inches (Sewer) and 42 inches (Water) in areas subject to vehicular traffic. Depth of cover is measured from finished grade to top of the pipe. Where approved by the Owner, additional pipe protection such as use of ductile iron pipe or concrete encasement may be used where minimum cover is not possible. Increased depth may be required as noted on the Contract Drawings to avoid obstructions, avoid requiring an air release valve and other reasons.
- H. Excavated material shall be placed a minimum of two feet back from the edge of the trench.

- I. When unstable soil or other unsuitable material is encountered at the trench bottom, undercut these materials to a depth required to assure support of the pipeline or as directed by the Engineer and backfill to the proper grade with compacted crushed stone. The top six (6) inches shall be Class I angular material.
- J. Remove rock encountered in trench excavation to a minimum depth of four (4) inches below the bottom of the pipe barrel, backfill with Class I angular material, and compact to uniformly support the pipe. In no case shall solid rock exist within four inches of the finished pipeline.
- K. Maximum width at the crown of the pipe shall be two (2) feet plus the nominal diameter of the pipe, unless specifically approved otherwise by the Engineer due to unusual bracing and shoring requirements. Trenches constructed by mechanical trenching are allowed only with prior approval of Engineer. Over-excavation will be required at locations for fittings and valves and construction of concrete thrust blocks.
- L. Trenches four (4) feet or more in depth should be provided with a means of egress. Spacing between ladders or other means of egress must be such that a worker will not have to travel more than 25 feet laterally to the nearest means of egress.
- M. Open excavations shall be barricaded when the Contractor is not at the site. At a minimum, this shall consist of orange polyethylene barricade safety fence.

### **3.3 SHEETING, SHORING AND BRACING**

- A. Furnish, put in place, and maintain such sheeting, shoring and bracing, as may be required to support the sides of the excavation and to prevent movement as required by OSHA. Damages resulting from improper shoring or failure to shore shall be the sole responsibility of the Contractor.
- B. Comply with all OSHA standards in determining where and in what manner sheeting, shoring and bracing are to be accomplished. The sheeting, shoring and bracing system shall be designed by a professional engineer licensed in the State of Kentucky and shall be subject to approval by the Engineer. However, such approval does not relieve the Contractor of the sole responsibility for the safety of all employees, the effectiveness of the system, and any damages or injuries resulting from the lack or inadequacy of the sheeting, shoring and bracing.
- C. The Contractor may use a trench box, which is a prefabricated movable trench shield composed of steel plates welded to a heavy steel frame. The trench box shall be designed to provide protection equal to or greater than that of an appropriate shoring system.

- D. Do not leave sheeting, shoring or bracing materials in place unless called for in the Contract Drawings, ordered by the Engineer, or deemed necessary or advisable for the safety or protection of new or existing work or features. Remove these materials in such a manner that the new structure or any existing structure or property, whether public or private, will not be endangered or damaged and that cave-ins and slides are avoided.

### **3.4 DISPOSAL OF MATERIALS**

- A. Whenever practicable, all materials removed by excavation that are suitable for backfilling pipe trenches or for other purposes shown on the drawings or directed by the Engineer shall be used for those purposes.
- B. Any materials not so used shall be considered waste materials and disposed of by the Contractor. Waste materials may be deposited in spoil areas at locations approved of by the Engineer, or shall be properly disposed of off-site if there is no approved spoil area.

### **3.5 UNAUTHORIZED EXCAVATION**

- A. Unauthorized excavation is defined as all excavation outside or below the proposed lines and grades shown on the Contract Drawings or that which is directed by the Engineer.
- B. Backfill areas of unauthorized excavation with the type of material necessary to ensure the stability of the structure or construction involved.
- C. Unauthorized excavation and/or backfill to replace same shall not be a pay item.

### **3.6 DEWATERING**

- A. The Contractor shall furnish, install and operate all necessary equipment to keep excavated areas free of water while work is in progress. Dewatering equipment shall be of adequate size and quantity to assure maintaining proper conditions for installing pipe, concrete, bedding, backfill or other material or structure in the excavation. The Cost of Dewatering is incidental to the project cost.
- B. Well-pointing shall be performed if required.

- C. Take particular precautions to prevent the displacement of structures or pipelines as a result of accumulated water. Any pipe displaced due to accumulated water shall be replaced by the Contractor at his expense.
- D. Dewatering operations shall be performed in a manner so as not to cause injury to public or private property or nuisance to the public nor contribute to pollution to surface water.

### **3.7 OBSTRUCTIONS**

- A. Obstructions shown on the Contract Drawings are for information only and do not guarantee their exact locations nor that other obstructions are not present. The crossing of existing mains and services, which are approximately perpendicular to the proposed ditch line, is considered normal construction practice. The Contractor shall have the responsibility of making these crossings and repairing any damages to such crossings without additional reimbursement.
- B. Whenever unknown obstructions are encountered during the progress of the work that directly interfere with the vertical or horizontal alignment of the pipeline, the Engineer shall have the authority to order a deviation from the grade or alignment or for the removal, relocation or reconstruction of the obstructing utility or structure. Likewise, the Contractor may request to relocate the proposed line or request reimbursement for relocating the existing line or performing unusual shoring beyond what is normally required for trench stabilization.
- C. When utilities or obstructions are not shown on the Contract Drawings but are present off the roadway at the location of the proposed pipeline route, the Contractor may request to relocate the pipeline in the roadway if necessary to avoid disturbing the utility or obstructions. If the relocation is approved by the Engineer into a paved area, the Contractor shall receive compensation for additional granular backfill and pavement replacement as measured and paid for as set forth in Section 01026, Paragraph 3.2.
- D. Exercise due care in excavating adjacent to existing obstructions and do not disturb same unless absolutely necessary.
- E. In the event existing utilities are disturbed, repair or replace as quickly as possible to the condition existing prior to their disturbance at no cost to the Owner. If required by the Owner, pay for the repair or replacement work performed by the forces of the utility company or other appropriate party.
- F. If replacement or repair of disturbed obstructions is not performed after a reasonable period of time, the Owner may have the necessary work done and deduct the cost of same from payments to the Contractor.

### **3.8 BEDDING OF GRAVITY SEWER MAINS**

- A. Always maintain proper grade and alignment during the bedding and tamping process. Any pipe damaged or displaced during this process shall be replaced by the Contractor at his expense.
- B. Provide crushed stone for bedding of all gravity sanitary sewer pipe regardless of pipe material. Dig bell holes so that the barrel of the pipe will rest for its entire length upon the prepared bedding to assure uniform support of the pipe.
- C. Completely encapsulate each PVC sewer pipe section per the detail on the drawings.
- D. Where gravity sewer pipe, regardless of pipe material, is laid within a rock cut, completely encapsulate each pipe section with a minimum of 4 inches of crushed stone on the top, both sides and the bottom of the pipe.

### **3.9 BEDDING OF WATER MAINS AND SEWER FORCE MAINS**

- A. Water mains and sewer force mains may be laid on a stable earth bed in a trench cut in natural ground. Excavate the trench in such a manner as to form a suitable bed on which to place the pipe. Where unstable soil or other unsuitable material is encountered at the trench bottom, undercut and replace these materials as discussed in Paragraph 3.2 of this Section.
- B. Where water lines and sewer force mains are laid within a rock cut, completely encapsulate each pipe section with a minimum of four (4) inches of crushed stone on the top, and 4" minimum on both sides and the bottom of the pipe.
- C. Dig bell holes so that the barrel of the pipe will rest for its entire length upon the natural earth trench bed or prepared bedding to assure uniform support of the pipe.

### **3.10 INITIAL BACKFILLING OF WATER MAINS AND SEWER FORCE MAINS**

- A. Do not begin backfilling before the Engineer or his representative has inspected or approved the grade and alignment of the pipe, the bedding of the pipe, and the joints between the pipes. If backfill material is placed over the pipe before an inspection is made, the Engineer or his representative may require the Contractor to reopen the trench in order for an inspection to be made at no cost to the Owner. If construction allows, leave trench open at the joints until a pressure test is completed.

- B. Perform initial backfilling by hand or by carefully dumping small quantities of fill from a loader bucket, until fill has progressed to six (6) inches above the top of the pipe.

### **3.11 FINAL BACKFILLING OF WATER MAINS, SEWER FORCE MAINS AND GAS LINES**

- A. Final backfilling shall be performed as soon as practicable after inspection and initial backfilling is complete. Adequate precautions shall be taken to insure proper placement and compaction of backfill without disturbing or damaging pipe. Fill shall be properly compacted and suitable precautions shall be taken to insure permanent stability for pipe. Utilities shall be provided with adequate cover or additional protection as described in Paragraph 3.2 of this Section.
- B. Backfilling in unimproved areas:
  - 1. Dispose of all soft, yielding or organic material that is unsuitable for trench backfill and replace with suitable material. The maximum dimension of individual stones and broken rock within the backfill should not exceed six (6) inches.
  - 2. Deposit, spread and compact backfill in even layers no greater than 12 inches deep to the surface with suitable equipment in such a manner so as not to disturb the pipe. If earth material for backfill is, in the opinion of the Engineer or his representative, too dry to allow thorough compaction, the Contractor shall add enough water so that the backfill can be properly compacted.
  - 3. Neatly round sufficient surplus excavated material over the trench to compensate for settlement of the backfill.
  - 4. The top 12 inches of backfill material shall consist of fine loose earth free from large clods, vegetable matter, debris, stone and/or other objectionable materials.
  - 5. Properly dispose of all excess excavated material.
  - 6. Prior to final acceptance, finish grade, restore topsoil and reestablish landscaping as required.
- C. Backfilling beneath flexible and rigid pavements:
  - 1. Refer to trench details as shown on the drawings.
  - 2. Compact each layer thoroughly by rolling, ramming and tamping with tools suitable for that purpose in such a manner so as not to disturb the pipe.
- D. Backfilling of shoulders along streets and highways:
  - 1. Backfilling methods and materials for shoulders along streets and highways shall be in accordance with the requirements of governing State, County or City departments maintaining the particular roadway or highway.
  - 2. Replace with similar materials, all shoulders that may be damaged or destroyed as a result of pipe trenching.
  - 3. Backfilling of shoulders shall not be directly measured for payment.
  - 4. Where shoulders along state highways have sealed coat surfaces, replace with double bituminous seal in accordance with KYTC requirements.



5. Where KYTC or local authority requires trenches to be backfilled entirely with granular material in the shoulder of roads, granular material so placed shall not be a pay item, but included in the prices per linear foot of pipe unless provided for specifically on the Bid Form.
  6. Backfill in state highways may also be performed utilizing flowable fill.
- E. Crushed stone for pavement and shoulder replacement:
1. Where possible, salvage and reuse all base material that is removed during construction.
  2. Wet and thoroughly compact crushed stone and blade to tie into the existing surface prior to final acceptance.
  3. Base material placed as a portion of pavement replacing items will not be measured for payment.

### **3.12 CHECK DAMS**

- A. Check dams shall be installed in the bedding and backfill of new or replaced gravity sewer lines to limit the drainage area subject to the French drain effect of gravel bedding. Major rehabilitation projects should also include check dams in the design.
- B. Check dams shall consist of compacted clay bedding and backfill at least three (3) feet thick to the top of the trench and cut into the walls of the trench two (2) feet. Alternatively, concrete may be used, keyed into the trench walls.
- C. Check dam material within one foot of the sewer main shall be carefully hand placed and compacted. No gravel backfill or bedding shall be used in the check dam area.
- D. Check dams shall be installed upstream of each manhole.
- E. All stream crossings shall include concrete check dams on both sides of the crossing.

**END OF SECTION**

## **SECTION 02713 WATER DISTRIBUTION SYSTEM**

### **PART 1 – GENERAL**

#### **1.1 WORK INCLUDED**

Installation and testing of water lines and appurtenances.

#### **1.2 RELATED WORK**

A. Section 02221: Trenching, Bedding and Backfilling

### **PART 2 – MATERIALS, STORAGE AND HANDLING**

#### **2.1 MANUFACTURER’S RECOMMENDATION**

Care shall be exercised in the delivery, storage and handling of all materials prior to their incorporation into the work. Follow all manufacturers’ recommendations for delivery and storage (except where these specifications differ.) Acceptance of questionable material shall be based solely on the Engineer’s interpretation of fabrication, delivery, storage and installation practices of the material in question.

#### **2.2 STORED PIPE**

Contractor shall take special care to ensure that no foreign matter including, but not limited to soil, trash, trench water or other debris enters the pipe at any time. Upon arrival of pipe shipment, Contractor shall completely seal pipe openings in a manner acceptable to the Engineer.

#### **2.3 STORED FITTINGS**

Contractor shall take special care to ensure that no foreign matter including, but not limited to soil, trash, trench water or other debris enters pipe appurtenances at any time. Upon arrival of pipe shipment, Contractor shall completely seal pipe openings in a manner acceptable to the Engineer.

#### **2.4 INSTALLED PIPE**

The installed pipe in the trench shall be plugged at the close of work each day or during any prolonged break period, including anytime workers are absent from the job site (lunch breaks, etc.). The only acceptable method for plugging the installed pipe is with a watertight M.J. cap or M.J. plug.

## **2.5 FAILURE TO FOLLOW SPECIFICATIONS**

Failure to take such preventative measures mentioned in these specifications, or flooding or contamination of the main for any reason, shall require the Contractor to clean the line with a hydraulically propelled foam pig (or other suitable pigging device acceptable to the Engineer) and slug chlorinate the line as specified in Subpart 4.8 of this Section. The Contractor shall also be required to take whatever other measures required by the Engineer in accordance with these specifications or AWWA C-651 to remove the contamination. All such procedures shall be fully documented and submitted for approval by the Engineer.

## **PART 3 – PRODUCTS**

### **3.1 DUCTILE IRON PIPE AND FITTINGS**

#### **A. Pipe:**

1. Manufactured in accordance with ANSI A21.51 (AWWA C151).
2. A cement lining meeting the requirements of ASNI 21.4 (AWWA C104).
3. A minimum of 1 mil thick bituminous coating on the outside surface.
4. Clearly mark with manufacturer's name, D.I. or Ductile, weight, class or nominal thickness, and casting period.
5. Unless otherwise specified or shown on the plans, ductile iron pipe shall be pressure class 350 for sizes up through 12-inch.
6. All ductile iron pipe shall be furnished and installed with restrained joint locking gaskets, U.S. Pipe Field Lok 350 or approved equivalent.

#### **B. Fittings: All fittings and specials for pipe 3" in diameter and larger shall be cast or ductile iron.**

1. Fittings 3" – 24": Pressure rated at 350 psi meeting the requirements of ANSI 21- 53/AWWA C153 for compact fittings.
2. Joints meeting the requirements of ANSI 21.11/AWWA C111.
3. All mechanical joint ductile iron fittings shall be equipped with mechanical joint restraint devices as specified in Subpart 3.9.

### **3.2 POLYETHYLENE ENCASEMENT**

- #### **A. All ductile iron pipe shall be furnished and installed with polyethylene encasement in accordance with the ANSI/AWWA C105/A21.5 standard. Encasement shall be low-density film with minimum thickness of 8 mils. Installation shall be per the manufacturer's instructions.**

### 3.3 HIGH DENSITY POLYETHYLENE PIPE (HDPE) FOR HORIZONTAL DIRECTIONAL DRILLING

- A. HDPE pipe shall only be used for directional bores as approved by the Engineer.
- B. Pipe shall have a DR number 9 with a working pressure of 200 psi and be sized to provide inside diameter equal to or greater than the size shown on the plans.
- C. Materials: Polyethylene pipe and fittings shall be made from resin meeting the requirements of the Plastic Pipe Institute as PE 3408. The resin shall meet the requirements of ASTM D3350- 02 with a cell classification of 345464C. The requirements of this cell classification are:

<i>HDPE Resin Specifications</i>			
Property	Specification	Unit	Typical Value
Material Designation	PPI/ASTM		PE 3408
Material Approval	NSF #14		
Material Classification	ASTM D1248		III C5 P34
Cell Classification	ASTM D3350-02		345464C
o Density	ASTM D1505	g/cm <sup>3</sup>	0.955
o Melt Index	ASTM 1238	gm/10 min	0.11
o Flexural Modulus	ASTM D790	psi	135,000
o Tensile Strength	ASTM D638	psi	3,200
o Slow Crack Growth			
- ESCR	ASTM D1693	hours in 100% iqepal	>5,000
- PENT	ASTM F1473	hours	>100
- HDB @73 deq F	ASTM D1693	psi	1,600
- UV Stabilizer	ASTM D1603	%C	2.5%

- D. Butt Fusion Fittings: HDPE fittings shall be PE 3408, HDPE, Cell Classification of 346464C as determined by ASTM D3350-02, and approved for potable water use by the AWWA. Butt fusion fittings shall have a manufacturing standard of ASTM D3261. Molded and fabricated fittings shall have a pressure rating equal to the pipe unless otherwise specified in the plans. Fabricated fittings are to be manufactured using data loggers. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the Quality Control records. All fittings shall be suitable for use as pressure conduit, and per AWWA C906, have a nominal burst value of 3.5 times the working pressure rating of the fitting.
- E. Pipe Manufacturer's Quality Control: The pipe manufacturer shall have an ongoing Quality Control program for incoming and outgoing materials. HDPE resins for manufacturing of pipe shall be checked for density, melt flow rate, and contamination. The manufacturer of the HDPE resin shall certify the Cell Classification as indicated in Subpart 3.2 C above. These incoming resins shall be approved by plant Quality Control and verified as approved by NSF before being

converted to pipe. Pipe shall be checked for outside diameter, wall thickness, length, roundness and surface finish on the inside, outside and end cut.

- F. HDPE pipe shall be joined together at the transition points to other mechanical joint adapters. Mechanical joint adapters shall have a manufacturing standard of ASTM D3261. They shall have a pressure rating equal to the pipe.
- G. A minimum of 100 feet of restrained joint ductile iron pipe shall be provided on the pipe preceding and the pipe following the HDPE. Appropriate restraint methods include using restrained joints equivalent to American Flex Ring or U.S. Pipe T.R. Flex.

### 3.4 SERVICE PIPE

- A. Polyethylene Pipe:  
Crosslinked Polyethylene pipe (Rehau Municipex) is acceptable for service lines from the main to the meter, and between the meter and the building in accordance with the Standard Plumbing Code. Crosslinked Polyethylene (PEXa) pipe shall meet the following criteria:
  - 1. Manufactured using the high pressure peroxide method of crosslinking.
  - 2. Certified to AWWA C 904 *Cross-linked Polyethylene (PEX) Pressure Pipe, ½ in. through 3 in. for Water Service* by approved testing agency. Certified to standards ASTM F876, CSA B137.5, NSF 14 and NSF 61, by approved testing agencies, with a standard materials designation code of 3306.
  - 3. Demonstrates ability to satisfy the performance requirements of Section F.7 of Plastics Pipe Institute (PPI) Technical Report 3 (TR-3) for polyethylene materials in order to apply a 0.63 design factor resulting in a temperature/pressure rating of 200 psi @ 73.4°F (1380 kPa @ 23°C).
  - 4. Shall be rated for 160 psi @ 73.4°F (1103 kPa @ 23°C) and 100 psi @ 180°F (690 kPa @ 82°C) per PPI TR-4.
  - 5. Shall have co-extruded UV Shield made from UV-resistant high-density polyethylene, color Blue.
  - 6. Shall have minimum recommended UV exposure time of one (1) year when tested in accordance with ASTM F2657, or as per manufacturer's recommendations.
  - 7. Shall be compatible with cold-expansion compression-sleeve fittings certified to ASTM F2080 for installations as cold as -40°F.
  - 8. Shall be approved for use with AWWA C800 fittings when using manufacturer's recommended insert.
  - 9. Shall be approved by manufacturer for use with manual plastic pipe squeeze-off tools for temporary stoppage of flow.
  - 10. Shall be approved by manufacturer to be repaired using hot air, if kinked in the field.

11. Shall have minimum markings: PEXa 3306, CSA B137.5, ASTM F876, F2023 and F2080, NSF-pw-g.

B. Copper Pipe:

1. Seamless copper tubing meeting the requirements of ASTM B88, Type K for ¾" through 2". Copper tubing 1" and smaller shall be soft. Copper tubing larger than 1" may be hard or soft. All underground copper to copper connection is to be by compression coupling, no solder sweat joints.
2. Contain not less than 99.90% copper and not more than 0.04% phosphorous.
3. Suitable for use with a working water pressure of 160 psi.
4. ¾" nominal diameter unless otherwise specified or shown on the Plans.
5. Service pipe shall be used to connect the corporation stop with the meter yoke. Use the minimum length required to make a straight-line connection including a goose neck. The minimum length of service shall be 5 feet in order to facilitate the location of the services with metallic pipe locators.
6. No 3" copper service pipe shall be allowed. No 3" piping on Madisonville's side of the water meter shall be allowed.
7. All copper service piping shall be buried at a minimum depth of 24" below finished grade unless otherwise approved.

C. Ductile Iron Pipe:

For service lines 4-inches and larger, ductile iron pipe meeting the requirements set forth in Subpart 3.2 shall be used.

### 3.5 WATER SERVICE ASSEMBLIES

A. Water Meters (all water meters are issued by the City of Madisonville):

1. AWWA C700.
2. 5/8" x ¾" unless otherwise specified or shown on the Plans.
3. Frost proof with a cast bronze casing and a hinged cover.
4. Direct reading register, in gallons, unless otherwise specified.
5. Disc or piston operated with magnetic drive.
6. A suitable non-corrosive strainer located over the inlet to the measuring chamber.
7. The name of the manufacturer imprinted in the lid of the register box and the meter serial number imprinted thereon.
8. Meters shall be located in non-traffic areas.
9. Water services shall be located near the center of the lot in non-traffic areas so that they are not in driveways. Water meters shall be located in a landscaped area near the property line unless otherwise approved by the Engineer.

- B. Water Main Connections:
1. Tap water mains in the upper half of the pipe at a 45-degree angle.
  2. Do not exceed the pipe manufacturer's recommended maximum tap size.
  3. Use service saddles on all taps for PVC pipe. Water service tapping saddles for services 2" or less shall be of total brass or bronze construction with no ferrous materials. Saddles are to have double straps or extra wide single straps and shall employ a dual o-ring seal. Saddles shall be Ford or pre-approved equal.
  4. Service taps on line under construction that has not been tested and inspected by the City may be made by a qualified Contractor. Taps on existing City mains must be made by authorized City personnel unless specifically authorized by the Engineer's office.
  5. For all 2" taps on ductile iron lines, a ductile iron epoxy coated body saddle with double stainless steel straps shall be furnished. For ¾" to 1" connections, ductile iron mains shall be drilled and tapped with no need for a saddle.
- C. Corporation Stops/Service Valves: Corporation stops are required for all ¾" and 1" services. Services of 2" diameter shall use a 2" ball valve with a square operating nut. All corporation stops shall have a minimum rating of 200 psi. All service valves shall have a standard valve box installed and brought to grade. Corporation stops shall meet the following criteria:
1. AWWA C800
  2. Cast of certified waterworks red brass, composed of 85% copper and 5% each of tin, lead, and zinc.
  3. Water tight and individually tested for leaks.
  4. Waterway diameter approximately equal to the nominal size of the stop.
  5. Coat or cap all threads for protection prior to installation.
  6. Manufactured by Ford or pre-approved equal.
- D. Meter Yokes:
1. Copper tubing with an integral brace and meter stop.
  2. Minimum rise of 7".
  3. Provide with outlets designed for the use of polyethylene or copper service pipe.
  4. Manufactured by Ford. or pre-approved equal.
- E. Curb Valves: All water services less than 2" diameter must terminate with a curb ball valve immediately prior to the meter yoke location. Approved model is Ford or pre-approved equal. Curb ball valves that are buried prior to the installation of a yoke shall have a bolt or pin placed in the stop wing to prevent the ball valve from being accidentally opened during back fill.
- F. Meter Boxes:
1. Water meters shall be located in a landscaped area near the property line unless otherwise approved by the Engineer.
  2. The depth of the meter yoke inlet for 5/8" – 1" meters shall be 18" to 24".

3. The depth of the meter yoke inlet for 1 ½" – 6" meters shall be 24" to 36".
  4. Meter box to be of sufficient size to facilitate easy installation and removal of the water meter.
  5. Where the service assemblies include a pressure reducing valve, sufficiently size box for installation of the pressure reducing valve in the meter box.
- G. Pressure Reducing Valves for Service Assemblies: Pressure reducing valves are the responsibility of the customer and may be installed at any point downstream of the meter in accordance with the Standard Plumbing Code and the City's "Cross Connection Control Policy and Program". Pressure reducing valves are required where the static pressure is greater than 80 psi.
- H. Service Materials: No galvanized pipe, galvanized nipples, black iron, glued plastic or sweated fittings are to be used between the main and the meter yoke. Threaded brass, slip joints, mechanical joints, and bronze/brass compression fittings are allowed.

### **3.6 VALVES AND VALVE BOXES**

- A. Gate Valves
1. AWWA C509 or C515.
  2. Iron body, resilient seat, non-rising stem type.
  3. Stuffing boxes: O-ring seal type with two (2) rings in the stem located above the thrust collar.
  4. 2" square wrench nut for operation of the valve.
  5. Minimum design working water pressure of 200 psi for valves with diameters of 2" – 12" and 150 psi for valves with diameter of 14" – 54", unless otherwise specified or shown on the plans.
  6. Joints: ANSI A21.11 (AWWA C111).
  7. Bonnet or body markings: Manufacturer's name, year of casting, size, pressure rating, and open direction labeled with an arrow.
  8. Epoxy coat interior and exterior in accordance with AWWA C550.
  9. Shall be Mueller A-2360, M&H 7571, American Flow Control 2500 or pre-approved equal.
- B. Valve Boxes:
1. Cast iron, 2-piece or 3-piece, screw type with shaft diameter of not less than 5" (Tyler/Union 6850 or equal).
  2. Comply with AWWA M44.
  3. Heavy roadway type equipped with a cover containing the word "WATER" in raised letters on the top.



4. Base of such size as to permit its installation without allowing it to come in contact with either the valve or the pipe.
  5. In paved areas, the top of the box casting shall be made level with the adjacent pavement. In unpaved areas, the box shall be 1" above the adjacent ground and encircled with a concrete collar 4" thick and 2' in diameter. Pre-cast concrete valve collars may also be used around valve boxes.
- C. Tapping Valves and Sleeves:
1. Tapping valves shall meet all the requirements of Subpart 3.5 A above and shall be Mueller T2360-16, M&H 4751-01 or pre-approved equal.
  2. Tapping sleeves shall be Mueller H-304, Ford FTSS, JCM 452, Smith Blair 665, Dresser Style 630 or pre-approved equal.
  3. Tapping sleeves shall be two-piece fabricated stainless steel with adjusting/tightening bolts on each side. The fabricated sleeve must contain all stainless materials and be rated for the anticipated working pressure. Sleeves must have a stainless steel outlet flange. Sleeves with ductile iron or carbon steel flanges will not be accepted. Care must be used to assure that all bolts are equally tightened. The tapping valve is to be solidly supported with brick or block and carefully bedded to prevent shifting due to settling back fill.
  4. After valve is bolted to sleeve, and with valve closed, remove test plug from the tap on sleeve and air test sleeve to 100 psi prior to making tap.

### **3.7 FIRE HYDRANTS AND BLOW-OFF HYDRANTS**

- A. Fire Hydrants:
1. AWWA C502. Mueller Super Centurion, Kennedy Guardian K81-D, or Clow Medallion are the standard for Madisonville.
  2. Cast iron bodies, fully bronze mounted, designed for operation at a working water pressure of 150 psi.
  3. Furnish with two 2-½" thread brass hose nozzles and one threaded 4-½" brass pumper nozzle.
  4. Compression type main valve 5-¼" diameter faced with a suitable yielding such as rubber..
  5. So designed that, when it is installed, no excavation is required to remove the main valve or the movable parts of the drain valve.
  6. Inside diameter of barrel: at least 120 percent of the hydrant valve size.
  7. Inlet connection: minimum of 6" mechanical joint on all lines, unless otherwise specified or shown on the Plans.
  8. Equipped with safety flange located not more than 10" above ground and a two-piece shaft break-away assembly.
  9. Shop paint and mark in accordance with AWWA C502. Open left hydrants yellow.

10. Cast markings: manufacturer's name, size of the main valve, year of manufacture, and direction of opening.
11. Field touch-up, if the surface has been marred, with paint supplied by the manufacturer of the same color and type as that used during shop painting.
12. 4' bury hydrants are the standard. Where the line depth justifies additional depth, hydrant extensions shall be installed.
13. All hydrants shall be installed utilizing hydrant (swivel) tees. Unless otherwise shown on the plans, tees with all mechanical joint ends shall be used if field conditions require hydrant isolation valve to be placed away from the water main.
14. All hydrants shall be installed with a 6-inch isolation gate valve in valve box.
15. Fire hydrants shall not be installed on water lines less than 6-inch in diameter.
16. A fire hydrant shall not be located closer than five (5) feet from any driveway.

B. Blow-Off Hydrants:

1. Post type having cast iron bodies, fully bronze mounted and designed for operation at a working water pressure of 150 psi.
2. Furnish with either two 1-1/2" or 2-1/2" threaded brass hose nozzles.
3. Compression type main valve 2-1/8" minimum diameter faced with a suitable yielding material such as rubber, leather or balata.
4. So designed that, when it is installed, no excavation is required to remove the main valve or the movable part of the drain valve.
5. Inside diameter of the barrel: at least 3".
6. Inlet connection: 2" mechanical joint, unless otherwise specified or shown on the plans.
7. Equipped with a safety flange located not more than 2" above the ground.
8. Open on counter-clockwise operation, unless otherwise specified.
9. Cast markings: manufacturer's name, size of the main valve, year of manufacture, and direction of opening.
10. Field touch-up, if the surface has been marred, with paint supplied by the manufacturer of the same color type as that used during shop painting.
11. Type of post hydrant: Mueller A-411 or M & H (Style 33 or 233).

### 3.8 MECHANICAL JOINT RESTRAINT DEVICE

- A. Pipe restraint: It is the intention of these specifications that all mechanical joint fittings and valves be restrained at each opening with approved mechanical joint restraint devices. Restrained fittings **do not** eliminate or replace the requirement for sufficient concrete thrust blocking and/or restrained pipe joints.
- B. Ductile Iron Pipe Restraint Devices:
1. Restraint devices shall consist of multiple gripping wedges incorporated into a follower gland meeting the requirements of ANSI/AWWA C110/A21.10.

2. Devices shall have a working pressure rating of 350 psi for 3" to 16" and 250 psi for 18" and larger. Ratings are for water pressure and must include a minimum safety factor of 2:1.
  3. Restraint devices shall have torque bolts.
  4. Megalug Series 1100 produced by EBAA Iron or equal.
- C. Restraint Devices - General:
1. Gland body, wedges and wedge activating components shall be cast from grade 65-45- 12 ductile iron material in accordance with ASTM A536.
  2. Installation shall be performed using conventional tools and installation procedures as specified in AWWA C600 while retaining full mechanical joint deflection during assembly as well as allowing joint deflection after assembly.
  3. Proper activation of the gripping wedges shall be ensured with torque-limiting twist- off nuts.

### 3.9 CROSS CONNECTION

- A. All commercial properties must have backflow protection installed on incoming water lines (domestic, fire and irrigation). The type and location of commercial property backflow prevention devices shall be as follows:
1. Reduced Pressure Assemblies for domestic and irrigation.
  2. Double Check Assemblies (with fire meter) or Double Check Detector Assemblies (where approved by the Engineer without fire meter) for all fire systems unless the system contains chemicals or is connected to an alternate water source.
  3. Backflow prevention devices shall be installed downstream of the meter before the first branch off the main line serving the building(s). Outdoor installations require protective enclosures. Inside installations require adequate drains.
- B. **Except for fire systems**, all backflow prevention installations are required to have a strainer installed immediately upstream of the device.

## PART 4 - EXECUTION

### 4.1 PREPARATION

- A. Follow all material storage and handling requirements in accordance with Section 02713, Part 2.
- B. Prior to laying pipe, prepare a suitable bedding according to Section 02221.
- C. Before placing pipe in the trench, remove temporary pipe plug, field inspect for cracks or other defect; remove defective pipe from the construction site.

- D. Swab the interior of the pipe to remove all undesirable material.
- E. Prepare the bell end and remove undesirable material from the gasket and gasket recess.
- F. Locate water lines in relation to other piped utilities.

#### **4.2 INSTALLING WATER LINES**

- A. Install ductile iron pipe (DIP) in accordance with AWWA C600.
- B. Lay all pipe on a uniform grade and with deflections not exceeding the pipe manufacturer's recommendations.
- C. After applying gasket lubricant, take extreme care to keep the spigot end from contacting the ground.
- D. Hone the pipe with suitable tools or equipment to provide a smooth beveled edge on plain end sections or field cut sections.
- E. Closely follow the manufacturer's instruction in laying and joining pipe.
- F. Cut pipe for inserting valves, fittings, etc., in a neat and workmanlike manner without damaging the pipe so as to leave a smooth end at right angles to the axis of the pipe.
- G. Cover pipe with a watertight mechanical joint cap or plug during each installation of pipe segment and at conclusion of each day's construction activities.
- H. The location of all water mains installed under these specifications shall be marked by the use of a continuous blue tape, minimum three inches in width, made of minimum 5 mil thick polyethylene plastic with a 0.5 mil thick aluminum metallic core or backing. The tape shall be buried in the trench, above the pipe, no more than two feet below the surface. The tape shall be marked indelibly with the words "Water Main Below" or similar wording to warn unwary excavators.
- I. An insulated minimum 12-gauge solid copper-coated steel tracer wire shall also be installed in the ditch immediately along the water line, either attached to or periodically wrapped around the line. Wire shall have HDPE insulating jacket. Care shall be taken to ensure the buried wire is not broken. The wire shall be branched off at intervals of 500' ± to connect to hydrants, valve boxes, or services to allow convenient surface access to the wire for pipe locator connection. Wire shall be terminated (unconnected) with a wire nut and enough "loose" wire to extend 24

inches outside the valve box. Tracer wire shall be installed on all water mains including ductile iron water main.

- J. The Contractor shall stamp the concrete curb with a "W" where water services are located. The end of each service stub shall be marked with a 6-foot long 4x4 wooden post or metal fence post embedded 2 feet in the ground and be marked with blue paint.
- K. Installing Crosslinked polyethylene (PEXa) municipal water service pipe: Follow manufacturer's installation guide for handling pipe on the jobsite, preparing the trench, making connections, placing the pipe, and backfilling the trench. Install with tracer wire per Subpart 4.2 I of this specification.
- L. Installing HDPE Water Lines (directional drilling applications):
  - 1. HDPE pipe shall be assembled utilizing field-site butt fusion joints.
  - 2. Personnel performing butt fusion joining shall be certified by pipe manufacturer.
  - 3. Each piece of pipe must be held by a clamping device so it will not move.
  - 4. Pipe ends shall be faced to establish clean mating surfaces.
  - 5. Pipe profiles must be rounded and aligned with each other to prevent mismatch of pipe walls.
  - 6. Heat the ends of the pipe to the pipe manufacturer's recommended temperature, interface pressure, and time duration.
  - 7. Keep heater faces clean to prevent molten plastic from sticking to the heater faces.
  - 8. After heating, remove heater tool and bring molten pipe ends together with sufficient pressure to form a homogenous joint.
  - 9. Hold the molten joint immobile under pressure until cooling has occurred and joint achieves strength.
  - 10. Test line per the requirements of this Section.

#### **4.3 SEPARATION OF WATER AND SEWER LINES**

- A. Maintain a 10-foot horizontal separation, measured edge to edge, between any new or proposed water main and any existing or proposed sanitary sewer.
- B. Where conditions cause the required horizontal separation to be impractical, the water main may be laid closer provided it is laid in a separate trench and the elevation of the top of the sewer is at least 18 inches below the bottom of the water main.
- C. Where a sewer crosses under a water main, the top of the sewer shall be at least 18 inches below the bottom of the main.

- D. Where conditions cause the required vertical separation to be impractical, the water main shall be relocated to provide the required separation or else reconstructed with mechanical joint ductile iron pipe for a distance of 10 feet on each side of the sewer with a full joint of the water main centered over the sewer.
- E. Where sewers must be constructed over water mains or less than 18 inches below the water main, the sewer shall be designed and constructed equal to water main standards and pressure tested to assure water tightness.
- F. Additional protection such as concrete encasement shall be installed where directed by the Engineer.

#### **4.4 INSTALLING APPURTENANCES**

- A. Set all valves, fittings, hydrants, and other special fittings in a neat workmanlike manner. Tapping valves are to be supported with blocking and surrounding bedding carefully compacted to prevent settlement.
- B. Use thrust blocks, pipe anchors, or other approved means to prevent displacement of other fittings as shown on the Project Documents. Do not allow concrete to cover nuts and bolts on fittings. Gate valves on fire hydrant leads are to be restrained or blocked independently of the hydrant blocking so that the hydrant may be excavated and removed with the valve closed. Mechanical restraint is to be by the use of MegaLug devices or other similar devices. Underground use of galvanized all thread rod is not allowed except unless specifically approved by the Engineer. Fittings for taps made on the reverse side of the main must be restrained joints. All mechanical joints are to be restrained with mechanical joint restraining devices as set forth in Paragraph 3.09. These restraining devices do not eliminate the requirement for sufficient concrete thrust blocking and/or restrained joint pipe.
- C. Erect hydrants to stand plumb with the pumper nozzle facing the road. Nozzles shall be installed a minimum of 18 inches above bury line.
- D. Enhance drainage of hydrants by using 6 cubic feet of gravel around base of hydrant. Do not allow concrete thrust block to obstruct drain holes.
- E. Close dead end pipe with a mechanical joint solid sleeve and plug, and equip with blow-off assemblies, where shown on the drawings.

#### **4.5 CONNECTING NEW SYSTEM TO EXISTING SYSTEM**

- A. Initial filling of the new line shall be made at only one point and shall be via a metered backflow prevention assembly (large sizes may not be metered at option of City), installed by the Contractor, and then removed by the Contractor and returned to the City after acceptance of the line. The Contractor is responsible for providing all necessary sleeves, reducers, or other fittings to install and remove the backflow assembly from the main.
- B. All connection of new main extensions to existing systems shall be valved to prevent existing customers from being included in the new system area during testing and disinfection procedures.
- C. Connections of new mains to existing mains shall normally be made by the use of a tapping valve in order to avoid disrupting service to existing customers.
- D. Any wet connections involving the shutdown of existing system valves shall be specifically approved by and coordinated with the Engineer's Office. Such coordination shall include the responsibility of the Contractor in notifying affected customers and scheduling shutdowns to minimize customer inconvenience. An authorized shutdown shall not relieve the Contractor from liabilities resulting from shutdowns such as damaged water heaters, discolored water, etc. The turning of valves shall be scheduled with the City's representative.
- E. Manipulation of valves for filling or flushing lines shall be minimized to avoid accumulations of air and discolored water in the affected areas. No water valves shall be operated by anyone other than City of Madisonville personnel.
- F. Once new systems are fully activated, following disinfection, flushing and testing, the Contractor shall inspect each valve that has been installed or manipulated to ensure that all valves are in fully open position.
- G. The Contractor will be charged for the consumption volume of water by flushing, filling, leaks, etc. that exceeds twice the volume of the installed pipe.

#### **4.6 HIGHWAY AND RAILROAD CROSSINGS**

- A. Perform highway crossings by the open cut method, unless otherwise shown on the Drawings or required by the appropriate authorities.
- B. Boring and jacking, tunneling, or horizontal directional drilling of crossings, if necessary, will be performed in accordance with the appropriate specification sections.

#### 4.7 WATER LINE PRESSURE TEST

- A. All newly laid pipe or any valved section thereof shall be subjected to hydrostatic pressure testing. Conduct hydrostatic testing in accordance with AWWA C600 for ductile iron pipe or AWWA C605 for PVC pipe.
- B. Where practicable, pipelines shall be tested in lengths between line valves or plugs of no more than 3,000 feet.
- C. Hydrostatic testing shall be conducted only with potable water. Due to the inherent safety hazard potential associated with testing components and systems with compressed air or other compressed gases, pressure testing shall never be accomplished using compressed air.
- D. The Contractor shall furnish all gauges, recording devices, meters, pumps, pipe, connections and other equipment required to conduct the test and shall maintain said equipment in condition for accurate testing as determined by the Owner. Gauges used for pressure tests shall be oil-filled gauges.
- E. Hydrostatic test results shall be recorded on an appropriate chart recorder. The Contractor shall furnish a recording gauge and water meter for recording pressure charts and for measuring makeup water used during the hydrostatic testing. Recording pressure charts shall be submitted to the Owner at the conclusion of testing. The pressure recording device shall be suitable for outside service, with a range from 0–300 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Engineer. For Contractor's information only, such pressure recording devices may be available from Foxboro Company, Foxboro, Massachusetts; Bristol Division of ACCO, Waterbury, Connecticut; or Weksler Instruments Corporation, Freeport, New York.
- F. Prior to testing, the Contractor shall place sufficient backfill to prevent pipe movement. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surfacing. The Contractor shall ensure that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the pipeline.
- G. Cross Connection Control: When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check valve assembly between the test and supply main or by other means approved by the Engineer. Prior to pressure and leakage testing, the temporary



backflow protection should be removed and the main under test isolated from the supply main.

H. Test Pressure Requirements:

1. The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section, but not greater than 200 psi.
2. The test pressure shall not exceed the thrust restraint design pressure or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).
3. The test pressure shall not exceed the rated working pressure of the valves when the pressure boundary of the test section includes closed, resilient seated gate valves or butterfly valves.
4. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.

I. Test Procedure:

1. Each valved section of pipeline shall be slowly filled with potable water using a metered backflow-protected assembly. When venting air from pipelines, it is important to limit the pipeline fill rate to avoid excessive surge pressures when the water reaches the air venting opening(s).
2. Before applying the specified test pressure, air shall be expelled completely from the pipeline section under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at such points to expel air as the line is filled with water. After all the air has been expelled, close the corporation cocks and apply the test pressure. At the conclusion of the pressure test, remove the corporation cocks and plug or leave in place at the discretion of the Engineer.
3. The specified test pressure shall be applied using a suitable pump connected to the pipeline in a manner satisfactory to the Engineer. The specified test pressure shall be based on the elevation of the lowest point of the pipeline or section under test and corrected to the elevation of the test gauge, in accordance with test pressure requirements specified herein.
4. The pipeline shall be allowed to stabilize at the test pressure before conducting the hydrostatic test. This may require several cycles of pressurizing and bleeding trapped air prior to beginning the test. It is recommended that the line remain pressurized for a minimum of 24 hours before testing in order for joints to tighten and pockets of air to dissolve in the water.

5. The hydrostatic test shall be at least 2 hours in duration after reaching the specified test pressure where joints are exposed and at least 8 hours where joints are covered.
  6. The test pressure shall not vary by more than +/- 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline. The amount of makeup water added shall be accurately measured (in gallons per hour) by suitable methods and shall not exceed the applicable testing allowance as specified herein.
- J. Visual Inspection:  
Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the hydrostatic pressure test. Any damaged or defective materials that are discovered during or following the pressure test shall be repaired or replaced at the Contractor's expense, and the test shall be repeated until satisfactory results are obtained. Water main repair and replacement shall be in accordance with Subpart 4.7 L.
- K. Testing Allowance:
1. Testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within +/- 5 psi of the specified test pressure (after the pipeline has been filled with water and the air has been expelled).
  2. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:
$$L = \frac{S * D * (P)^{1/2}}{148,000}$$
Where:
    - L = testing allowance (makeup water), in gallons per hour
    - S = length of pipe tested, in feet
    - D = nominal diameter of the pipe, in inches
    - P = average test pressure during the hydrostatic test, in pounds per square inch (gauge pressure)
  3. This formula is based on a testing allowance of 10.5 gpd/mile/inch of nominal diameter at a pressure of 150 psi. Values of testing allowance at various pressures are shown in the following table. When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/hr/inch of nominal valve size shall be allowed. When hydrants are in the test section, the test shall be made against the main valve of the hydrant.

Hydrostatic Testing Allowance per 1,000 feet of pipeline (gallons per hour)*											
Average Test Pressure (psi)	Nominal Pipe Diameter (inches)										
	4	6	8	10	12	14	16	18	20	24	30
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03
75	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40	1.76
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43

*\*If the pipeline under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.*

- L. Acceptance of the installation shall be determined on the basis of testing allowance only. Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the allowance used for testing. Hydrostatic test results shall be recorded on an appropriate chart recorder as specified herein. A copy of the test chart shall be provided to the Engineer.
  
- M. To repair or replace damaged or defective water main pipe, the Contractor shall maintain positive pressure on the main (valves left partially open) while he excavates around and under (2' clearance) the pipe so that water can be pumped out of the excavation pit before it enters the newly constructed main during the repair process. Contractor shall have adequate pumping capacity to prevent any trench water or debris from entering the main during this process. The interior of all pipe and fittings shall be sprayed with a 1% hypochlorite solution before they are installed in the repair process. To produce this one percent hypochlorite solution, one gallon of 5% hypochlorite bleach can be diluted with four (4) gallons of water. Flooding or contamination of the main during this process shall invoke Paragraph 2.5 of Section 02713.

## STANDARD OPERATION PROCEDURES FOR WATER MAIN DISINFECTION

### 4.8 CLEANING AND DISINFECTING OF WATER LINES

- A. Disinfection Tests: Conduct disinfection tests in accordance with AWWA C-651.
  - 1. During construction, take precautions to protect pipe interiors, fittings, and valves against contamination. Follow all Material Storage and Handling Requirements in Section 02713 Part 2.
  - 2. All chlorine products shall be NSF approved chlorine. Pool chlorine products shall not be used.
  - 3. The Granular Method shall be used as the standard disinfection method on all newly installed pipelines unless prior approval for the continuous feed or slug method is obtained from the Engineer or his representative.
  - 4. Granular Method (Standard Method):
    - a) Chlorine product shall be OxyChem ACL 60 Disinfecting Granules (sodium dichloroisocyanurate) with approximately 62% available chlorine or approved equal.
    - b) Place granular chlorine in the pipe at the beginning of the line, beginning of each branch line, and at 500-foot intervals (every 25 pipe joints).
    - c) Place enough granular chlorine in the pipe to achieve a 25 ppm dosage in the pipeline. Contractor shall obtain granular chlorine in pre-measured bottles from the City of Madisonville to ensure proper dosage is achieved (see Table I).
    - d) Slowly fill the pipeline with water and eliminate all air pockets. Hold the disinfection solution in the pipeline for 24 hours.
    - e) Flush thoroughly to clear the strong chlorine solution from the pipelines before bacteriological sampling (see Item 8 of this section).

TABLE I - GRANULAR METHOD	
GRANULAR CHLORINE DOSE SIZE FOR 500 FT OF PIPE AT 25 PPM (MG/L)	
Pipe Diameter (in)	Dose Size (oz)
2	0.5
4	2
6	4
8	7
10	11
12	16
16	28
24	63
30	99
36	142

5. Continuous Feed Method (Special Approval Required):
  - a) Granular chlorine may be placed (optional) in the pipeline during construction (see Granular Method).
  - b) Thoroughly flush the pipeline to remove all sediments and air pockets.
  - c) Add a continuous dose of chlorine while flowing water slowly into the new main until a 25 ppm chlorine concentration is reached throughout the new pipelines. Contractor shall use Sodium Hypochlorite to obtain the 25 ppm dosage (see Table II for total amount of Sodium Hypochlorite to be fed to establish 25 ppm dosage for 500 feet of pipe). In the alternative, granular chlorine can be mixed to obtain the 25 ppm concentration (see Table I for total amount of granular chlorine to be fed to establish 25 ppm concentration for 500 feet of pipe). Measure the chlorine residual at various locations to confirm proper residual has been achieved.
  - d) Hold the disinfection solution in the lines for 24 hours and confirm that the chlorine residual is at least 10 ppm after 24 hours.
  - e) Flush thoroughly to clear the strong solution from the pipelines before bacteriological sampling (see Subpart 4.8 A.8.)

<b>TABLE II – CONTINUOUS FEED METHOD</b>			
<b>SODIUM HYPOCHLORITE DOSE SIZE FOR 500 FT OF PIPE AT 25 PPM (MG/L)</b>			
<b>Pipe Diameter (in)</b>	<b>Sodium Hypochlorite Volume (gal)</b>		
	<b>5.0%</b>	<b>6.15%</b>	<b>10.0%</b>
2	0.04	0.03	0.02
4	0.16	0.13	0.08
6	0.37	0.30	0.18
8	0.65	0.53	0.33
10	1.0	0.83	0.51
12	1.5	1.2	0.73
16	2.6	2.1	1.3
24	5.9	4.8	2.9
30	9.2	7.5	4.6
36	13.2	10.7	6.6

6. Slug Method (Special Approval Required):
  - a) Granular chlorine may be placed (optional) in the pipeline during construction (see Granular Method).
  - b) Thoroughly flush the line to remove all sediments and air pockets.
  - c) Admit water to the new main very slowly and dose with enough chlorine to produce a residual of at least 100 ppm. Contractor shall use Sodium Hypochlorite or granular chlorine according to Table III to obtain the 100 ppm concentration. The objective is to produce a column of 100 ppm chlorine solution which will move slowly as a slug through the new pipeline. The column or slug of highly chlorinated water must be long enough to contact all surfaces of the pipe interior for at least 3 hours. Measure chlorine residuals in the slug as it moves down the pipeline. The residual must be maintained over 50 ppm.
  - d) For emergency line repair situations only, to be performed only by, or in the presence of, authorized City personnel, and where no service connections exist, the standard 100 ppm concentration can be substituted for a 300 ppm solution and the contact time can be reduced from the standard 3 hours to 15 minutes. Table IV indicates the Sodium Hypochlorite and granular chlorine dose sizes to be used for this method. Refer to Paragraph 4.08B for appropriate situations and procedures.
  - e) Flush thoroughly to clear the strong chlorine solution from the pipelines before bacteriological sampling.

<b>TABLE III – SLUG METHOD</b>				
<b>CHLORINE DOSE SIZE FOR 500 FT OF PIPE AT 100 PPM (MG/L)</b>				
<b>Pipe Diameter (in)</b>	<b>Sodium Hypochlorite Volume (gal) (oz. of weight)</b>			<b>Granular Chlorine</b>
	<b>5.0%</b>	<b>6.15%</b>	<b>10.0%</b>	<b>62%</b>
2	0.2	0.1	0.1	2.1
4	0.7	0.5	0.3	7.1
6	1.5	1.2	0.7	16
8	2.6	2.1	1.3	28
10	4.1	3.3	2.0	44
12	5.9	4.8	2.9	63
16	10	8.5	5.2	112
24	23	19	12	253
30	37	30	18	395
36	53	43	26	569

<b>TABLE IV – SLUG METHOD</b>				
<b>CHLORINE DOSE SIZE FOR 500 FT OF PIPE AT 300 PPM (MG/L)</b>				
<b>Pipe Diameter (in)</b>	<b>Sodium Hypochlorite Volume (gal) (oz. of weight)</b>			<b>Granular Chlorine</b>
	<b>5.0%</b>	<b>6.15%</b>	<b>10.0%</b>	<b>62%</b>
2	0.5	0.4	0.2	6.3
4	2.0	1.6	1.0	21
6	4.4	3.6	2.2	48
8	7.8	6.4	3.9	84
10	12	10	6.1	132
12	18	14	8.8	190
16	31	25	16	336
24	70	57	35	758
30	110	90	55	1185
36	159	129	79	1706

7. While chlorine is being applied, do not manipulate valves so that the treatment dosage will not flow back into the line that is supplying the water. Continue application of chlorine until the entire line being treated is filled with the chlorine solution.
8. Final Flushing: Conduct final flushing in accordance with AWWA C651.
  - a) After applicable retention period, flush heavily chlorinated water from the line until chlorine concentration in water leaving the main is no higher than that generally prevailing in the system, or less than 2 mg/l. Unless special approval is obtained from Engineer, all water shall be flushed through de-chlorinating diffusers rated to remove the appropriate chlorine concentration (Arden Industries' Bazooka with Liquid Calcium Thiosulfate Feed or pre-approved equal). The City may, at its option, provide such devices to the

Contractor while the line is flushed. The Contractor must contact the Inspector prior to flushing any water from the newly constructed line. The Inspector shall provide de-chlorinating diffuser(s) to the Contractor before flushing. If no diffusers are available through the city, the Contractor shall be required to provide diffusers. The Inspector shall approve the flushing location. The Inspector shall also check the chlorine level in the main before final flushing. If the residual chlorine level is out of the effective range of the de-chlorinating diffuser, the Inspector shall require the Contractor to wait until the residual level has dropped to within the range of the de-chlorinating diffuser before flushing.

- b) In the alternative, but only with special approval from the Engineer, neutralizing chemicals may be applied externally as the water reaches the ground. Perform such flushing only at sites where Engineer has approved. If no approved point of discharge is available, neutralizing chemicals must be applied to the water in order to neutralize the chlorine residual. The amount of chemicals required to neutralize various residual chlorine concentrations in 100,000 gallons of water are shown in Table V.
- c) Flushing Velocity: The velocity of water used to flush the line shall be at least 2 fps. The flow rates required to produce this velocity varies depending on pipe diameter. To approximate this velocity; refer to Table VI to select the proper number of taps or 2-½" Fire Hydrant Nozzles to open at the end of the line.
- d) Minimum Flushing Time: At minimum, the line shall be flushed to remove two complete volumes of water through the newly constructed pipeline, approximately 7 minutes per 500 ft. The Disinfection, Flushing, and Pressure Testing Worksheet presents the minimum flushing time for various lengths of pipe.
- e) Additional Flushing: After flushing pipe for minimum time specified in Item d, check for trapped air at Air Release Valves, Blow-offs and services at high points. Verify that all mud, air cloudiness, or other discoloration is absent from flushing stream. If such problems exist, continue to flush line until the stream is clear.
- f) Once a line has been flushed, test to make certain that the residual chlorine in the water is within acceptable limits.
- g) It must be noted that flushing is no substitute for taking preventative measures before and during the laying of water lines. Certain contaminants – especially those in caked deposits – are difficult or even impossible to remove by flushing, no matter how high the velocity. Furthermore, in pipe with diameters of 16" or more, it can be difficult to achieve even the minimum recommended flushing velocity of 2.5 fps.



Residual Chlorine Concentration (mg/L)	Sulfur Dioxide (SO <sub>2</sub> ) lb	Sodium Bisulfite (NaHSO <sub>3</sub> ) lb	Sodium Sulfite (Na <sub>2</sub> SO <sub>3</sub> ) lb	Sodium Thiosulfate (Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> -5H <sub>2</sub> O) lb
1	0.08	1.2	1.4	1.2
2	1.7	2.5	2.9	2.4
3	8.3	12.5	14.6	12.0
4	41.7	62.6	73.0	60.0

Pipe Diameter (in)	Number of 1" Taps	Number of 2" Taps	Number of 2-1/2" FH Nozzles
2	1	---	---
4	1	1	1
6	---	1	1
8	---	1	1
10	---	2	1
12	---	2	2
16	---	4	2
24	---	-	4
30	---	---	6
36	---	---	8

9. Bacteriological Testing:  
**Contractor to coordinate with City's Water Personnel regarding the bacteriological testing and procedure.**

**Section B and C below are for Authorized City Personnel or Contractors working under direct supervision of Authorized City Personnel.**

- B. Positive Pressure Method:
  1. Contact 811 to have all other utilities located; notify Service Department and Water Treatment Plant of areas affected.
  2. All attempts will be made to repair line under "wet" conditions to avoid or eliminate possible contaminants from entering the system.
  3. Close nearest isolation valves on the downstream side of the leak. Reduce the flow from the upstream side of the leak by throttling back the remaining valve, leaving positive pressure on the line. **DO NOT OPEN ANY FIRE HYDRANTS TO REDUCE LINE PRESSURE PRIOR TO OPENING THE TRENCH TO A DEPTH OF AT LEAST 18-INCHES BELOW THE LINE.** This will prevent contaminants from entering the system. Complete the repair trench excavation.

4. After excavation of the repair trench is complete (to a depth of at least 18-inches below the line) close the remaining valve after removing the standing water to fully expose the pipe 360 degrees. Treat any standing water now remaining in the repair trench with ½ oz. of Granular Chlorine (62% purity) for every one hundred gallons of trench water to achieve a 25-ppm solution.
  5. To ensure a clean repair, inspect around the pipe in and near the damaged area and remove any debris, soil, or other material from the damaged area. Swab or spray the damaged area of the pipe and interior of all repair clamps or other appropriate devices with a 1% hypochlorite solution (5.2 fluid oz. of 6.15% bleach/quart of water) before installation. Complete the repair.
  6. Open the appropriate valve(s) and flush the water main toward the repair location from both directions if valve and hydrant locations permit. Continue flushing until all discolored water is eliminated and satisfactory chlorine residual is reached.
  7. Before the water main is returned to full service, collect a single water sample at a point nearest the repaired section. If direction of flow can be determined, the sample should be collected from downstream of the break repair. If direction of flow cannot be determined, samples should be collected from above and below the break repair. These samples should be coded "D". This sample is to be delivered as soon as possible to the Water Treatment Plant for bacteriological testing.
  8. Check all valves to insure they have been returned to the open position.
  9. If the test results are negative, the test results will serve as a record of compliance and no future work is required.
  10. Fill out all appropriate forms indicating disinfection procedures.
  11. If the test results are positive, then additional sampling should be undertaken immediately. A total of three (3) additional samples should be taken. The first additional sample should be taken from the original sampling location and the other two additional samples should be taken above and below the original sampling location. These three samples should be coded "R". If all three samples are negative, then no further work is required. If any of the additional samples is positive, then follow the normal repeat monitoring procedure.
- C. Dewatered Method: If it is not possible to maintain positive pressure as stated above and the pipe must be dewatered prior to opening and preparing the repair trench, then the entire section of pipe must be disinfected in accordance with Section 6 of this document (Slug Method), which is derived from Section 4.7.4 of AWWA C651-99.
1. Contact Kentucky One Call to have all other utilities located; notify the Service Department and Water Treatment Plant of areas affected.
  2. Close the nearest isolation valves on all sides of main break.
  3. If there are customers in the isolated area, turn off all services at the lock wing on the meter yokes. Remove the meters. This will prevent the disinfectant from entering the customer's premises.

4. In order to lessen the possibility of additional contaminates from entering the exposed line, after excavation of the repair trench is complete, pump the water down below the main line. Treat the standing water in the repair trench with ½ oz. of granular chlorine for every one hundred gallons of trench water to achieve a 25-ppm solution.
5. Clean the area around the pipe. Swab or spray the interior of all repair pipe and fittings with a 1 percent hypochlorite solution (5.2 fluid oz. of 6.15% bleach/quart of water) before installation.
6. The line should be properly disinfected by the slug method using a chlorine dosage of 100 mg/L and a contact time of at least 3 hours for areas where service connections are present.
7. In areas where no service connections exist the line can be properly disinfected by the slug method using a chlorine dosage of 300 mg/L and a contact time of at least 15 minutes.
8. After the disinfectant has been added to the line by using a sodium hypochlorite solution or calcium hypochlorite granules, an upstream valve should be opened slightly, along with an opened downstream hydrant, to allow air and highly discolored contaminated water to be removed. The slow flowing concentrated slug will gradually move through the pipe allowing all parts to be exposed to the disinfectant.
9. Once the highly discolored contaminated water has been flushed, the valve and flushing hydrant should be closed to allow for the prescribed disinfectant contact time.
10. After the prescribed contact time has been reached, prepare to treat (de-chlorinate) the highly chlorinated water to be flushed from the isolated line if there is a possibility that the discharge will cause any damage to the environment.
11. Open the upstream valve and the downstream hydrant and flush until all discolored water is eliminated, de-chlorinating the discharge if necessary. Test for highly chlorinated water remaining in the line and continue flushing if necessary until elimination is successful and the concentration is no higher than that in the prevailing water in the surrounding area.
12. Before the water main is returned to full service, collect a single water sample at a point nearest the repaired section. If direction of flow can be determined, the sample should be collected from downstream of the break repair. If direction of flow cannot be determined, samples should be collected from above and below the break repair. These samples should be coded "D". This sample is to be delivered as soon as possible to the Water Treatment Plant for bacteriological testing.
13. Open the customer's services at the lock wings and flush the service lines. Reinstall meters.
14. Open the remaining valves in the isolated area.
15. Flush the area again at the highest hydrant in the area to insure the elimination of any discolored water.

16. If the test results are negative, the test results will serve as a record of compliance and no future work is required.
17. Fill out all appropriate forms indicating disinfection procedures.
18. If the test results are positive, then additional sampling should be undertaken immediately. A total of three (3) additional samples should be taken. The first additional sample should be taken from the original sampling location and the other two additional samples should be taken above and below the original sampling location. These three samples should be coded "R". If all three samples are negative, then no further work is required. If any of the additional samples is positive, then follow the normal repeat monitoring procedure.

**END OF SECTION**

## **SECTION 02722 SANITARY SEWER SYSTEMS**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

The work included in this Section includes the installation and testing of sanitary sewerage systems. All sanitary sewerage systems shall conform to the design and construction standards promulgated by the Kentucky Division of Water (KDOW).

#### **1.2 RELATED WORK**

A. Section 02221: Trenching, Bedding and Backfilling

#### **1.3 DELIVERY, STORAGE AND HANDLING**

Care shall be exercised in the delivery, storage and handling of all materials prior to their incorporation into the work. Follow all manufacturers' recommendations for delivery and storage (except where these specifications differ). Acceptance of questionable material shall be based solely on the Engineer's interpretation of fabrication, delivery, storage and installation practices of the material in question.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL**

New sanitary sewer pipe may generally be constructed of PVC pipe as specified in Subparts 2.2 and 2.3 of this Section, with the following exceptions:

- A. Sanitary sewers shall be specially coated and lined ductile iron pipe where indicated on the Contract Drawings. All other locations shall be PVC.
- B. Open cut sanitary sewers crossing drainage ditches and swales, storm drain discharge, wet weather streams, USGS blue-line streams, and other erosive environments shall be specially coated and lined ductile iron pipe and will be provided with concrete encasement.
- C. Sanitary sewers with less than the required 42 inches of cover in non-traffic areas and 48 inches in areas subject to vehicular traffic shall be specially coated and lined ductile iron pipe.

- D. Where additional pipe protection is required due to loads, insufficient cover, erosive environments, crossing other utilities, etc., specially coated and lined ductile iron pipe, restrained joints, concrete encasement and other methods shall be required as directed by the Engineer.
- E. Sanitary sewer pipe installed by horizontal directional drilling shall be HDPE pipe unless otherwise approved by the Engineer. See Section 02727 for product specifications of HDPE pipe.

## **2.2 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE**

- A. Manufactured from virgin, National Sanitation Foundation (NSF) approved resin conforming to ASTM D1784, suitable for use as a gravity sewer conduit with provisions for contraction and expansion at each joint, with a rubber ring and standard lengths of 20-feet and 12.5-feet plus or minus one (1) inch.
- B. Joints shall meet the requirements of ASTM D3212. Joint design shall be tested and certified to result in no leakage under prescribed laboratory test conditions of joint alignment, load conditions, pressure and vacuum, and deflection. Pipe and fittings shall have integral bell with elastomeric seal joint. The gaskets used for joining PVC sewer pipe shall conform to ASTM F477.
- C. PVC gravity sewer main pipe 8 inches to 15 inches in diameter shall meet and/or exceed the requirements of ASTM D3034, SDR 35. PVC gravity sewer pipe installed at depths greater than 12 feet shall conform to SDR 26.
- D. Gravity sewer mains shall be at least 8 inches in diameter.
- E. All PVC gravity service line pipe and fittings from the sewer main to the sewer cleanout assembly shall conform to SDR 35 unless depth exceeds 12 feet, in which case service lines and fittings shall conform to SDR 26.
- F. Color of PVC gravity sewer pipe shall be green or white.
- G. All PVC gravity sewer pipe shall be clearly marked with the manufacturer's name, nominal diameter, SDR, ASTM designation, and NSF approval seal.

## **2.3 POLYVINYL CHLORIDE (PVC) PRESSURE SEWER PIPE AND FITTINGS**

- A. Manufactured from virgin National Sanitation Foundation (NSF) approved resin, PVC 1120 made from PVC compounds 12454-A or 12454-B as defined in ASTM D1784.
- B. PVC pressure sewer pipe 4 inches to 12 inches in diameter shall meet and/or exceed the requirements of ASTM D2241, SDR 21, Pressure Class 200 or AWWA C900, DR14, Pressure Class 200.

- C. PVC pressure sewer pipe shall have bell and spigot push-on joints manufactured in accordance with ASTM D3139. The bell shall consist of an integral wall section with a solid cross-section elastomeric gasket securely locked in place to prevent displacement during assembly. The gasket shall be reinforced with a steel band or other rigid material and shall conform to ASTM F477. The gasket and annular groove shall be designed and shaped so that when the joint is assembled, the gasket will be radially compressed to the pipe and locked in place against displacement, thus forming a positive seal.
- D. Color of PVC pressure sewer pipe shall be green or white.
- E. All PVC pressure sewer pipe shall be clearly marked with the manufacturer's name, nominal diameter, type of material, SDR or Class, ASTM or AWWA designation, and NSF approval seal.
- F. All fittings for PVC pressure sewer mains shall be ductile iron with mechanical joints as described in Subpart 2.4 of this section. The gaskets shall be duck-tipped transition gaskets for use with PVC pipe. All adaptors, fittings and transition gaskets necessary to connect ductile iron fittings to PVC shall be furnished.

## **2.4 DUCTILE IRON SEWER PIPE AND FITTINGS**

- A. Ductile iron pressure sewer pipe shall conform to the latest revisions of ANSI/AWWA C151/A21.51 and ANSI/AWWA C111/A21.11.
- B. Unless otherwise specified or shown on the Contract Drawings, ductile iron sewer pipe shall be Pressure Class 350 for sizes 12-inch and smaller.
- C. Unless otherwise specified or shown on the Contract Drawings, ductile iron sewer pipe shall be furnished with push-on joints, with mechanical joint fittings and valves. Exposed piping shall be flanged.
- D. Ductile iron sewer pipe shall be specially coated and lined as detailed in Subpart 2.5 of this Section.
- E. All pipe shall be new and shall have the manufacturer's name, AWWA or ASTM designation, weight, pressure class and nominal diameter stamped on the outside of each pipe.
- F. Standard and special fittings shall be mechanical joint ductile iron fittings meeting the requirements of ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53, as applicable. Fittings shall have a pressure rating of 350 psi for 24-inch and smaller piping. Fittings shall at a minimum have the same pressure rating as the connecting

pipe. Ductile iron fittings shall be specially coated and lined as detailed in Subpart 2.5 of this Section.

## **2.5 SPECIAL COATINGS AND LININGS FOR DUCTILE IRON PIPE AND FITTINGS**

- A. All ductile iron pipe and fittings shall be coated outside with a minimum 1 mil-thick bituminous coating per AWWA C151 for ductile iron pipe, AWWA C115 for flanged pipe and AWWA C110 and C153 for fittings.
- B. All ductile iron pipe and fittings shall be lined with 40 mils nominal dry film thickness of "Protecto 401 Ceramic Epoxy." The lining material shall be an amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment.
- C. Lining application shall be performed by an applicator approved by the coating manufacturer, in accordance with the manufacturer's instructions and under controlled conditions at the applicator's shop or the pipe manufacturer's plant.

All ductile iron pipe and fitting linings shall be inspected in accordance with the manufacturer's recommendations. The pipe or fitting manufacturer shall submit a certified affidavit of compliance with the manufacturer's instructions and requirements specified herein.

## **2.6 JOINT RESTRAINT DEVICES**

- A. Mechanical Joint Restraint Devices
  - 1. All mechanical joint fittings and valves shall be restrained at each opening with approved mechanical joint restraint devices. Restrained fittings **do not** eliminate or replace the requirement for sufficient concrete thrust blocking and/or restrained pipe joints.
  - 2. Restraint devices for joining plain end pipe to mechanical joint fittings, pipe and valves shall consist of multiple gripping wedges incorporated into a follower gland meeting the applicable requirements of ANSI/AWWA C111/A21.11 for PVC pipe or ANSI/AWWA C110/A21.10 for ductile iron pipe.
  - 3. Devices for PVC pipe shall have a working pressure rating equal to that of the pipe on which it is used. Ratings are for water pressure and must include a minimum safety factor of 2:1.
  - 4. Devices for ductile iron pipe shall have a working pressure rating of 350 psi for 3 to 16 inch and 250 psi for 18 inch and larger. Ratings are for water pressure and must include a minimum safety factor of 2:1.
  - 5. Gland body, wedges and wedge actuating components shall be cast from grade 65-45-12 ductile iron materials in accordance with ASTM A536.
  - 6. Mechanical joint restraint shall require conventional tools and installation procedures per AWWA C600, while retaining full mechanical joint deflection



during assembly as well as allowing joint deflection after assembly. Proper actuation of the gripping wedges shall be ensured with torque limiting twist off nuts.

7. Mechanical joint restraint shall be Megalug Series 2000PV or Megalug Series 1100 produced by EBAA Iron Inc. or approved equal.

**B. Bell Restraint Harness Devices**

1. Bell restraint harnesses for push-on joint PVC pipe shall be Series 1600, 2800, or 6500 as manufactured by EBAA Iron, Inc., Series 1350 or 1390 by Uni-Flange, or approved equal.
2. Bell restraint harnesses for push-on joint ductile iron pipe shall be Series 1700 by EBAA Iron, Inc., or approved equal.

## **2.7 COMPRESSION COUPLINGS**

- A. When joining together dissimilar types of pipe, such as PVC and vitrified clay pipe, for repairing and rejoining sections of gravity sewer, for joining new pipe to existing pipe and for connecting the first full joint of pipe to a short stub through a manhole wall, compression couplings complying with ASTM C425 shall be used.
- B. Compression couplings shall be resistant to corrosion by soil and sewage and shall provide a permanent watertight joint. The compression couplings shall be of synthetic rubber or rubber-like material and the bands for attaching the couplings shall be of stainless steel.

## **2.8 PRECAST CONCRETE MANHOLES**

- A. All precast concrete manholes shall conform to the requirements of AASHTO M-199 SR and ASTM C478, including steel reinforcement.
- B. All concrete used in connection with the construction of precast manholes shall be at minimum 4,000 psi concrete.
- C. The precast manufacturer shall use XYPEX additive. XYPEX ADMIX C-1000/dye shall be added to the concrete during batching at a rate of 2-3 percent by weight of Portland cement. The amount of cement shall remain the same and not be reduced. Precast concrete structures shall have a reddish tint to verify the XYPEX admix.
- D. Base, riser and top sections shall have tongue and groove joints.
- E. The Contractor may choose to order new precast base sections with monolithic bottoms and inverts already formed and manhole bases and risers with pipe openings and integrally cast resilient pipe connectors in place. Manhole steps may also be provided cast-in-place. It shall be the Contractor's responsibility to provide

- manholes with properly located and sized pipe openings and properly formed inverts. Manholes not constructed in accordance with the Contract Drawings are subject to rejection and replacement at no additional cost to the Owner.
- F. Unless otherwise specified, all manholes shall have an inside diameter of not less than 4 feet and a vertical wall height of not less than 30 inches. Drop manholes shall be a minimum of 5 feet in diameter and 6-foot diameter manholes shall be used on sewers 30 inches and larger.
  - G. Top sections shall be eccentric cones where cover over the pipe exceeds 4 feet. Top sections shall be flat top where cover over the pipe is 4 feet or less.
  - H. The clear opening in the manhole shall be not less than 24 inches. 30-inch diameter openings may be required at the Engineer's discretion in special circumstances such as shallow manholes less than 4 feet deep or manholes on large diameter trunk sewers.
  - I. All manholes with drop assemblies or force main entrances shall be epoxy coated or utilize an interior construction such as the A-Lok® system to prevent H<sub>2</sub>S deterioration of the manhole interior.

## **2.9 MANHOLE INVERTS**

Manhole inverts shall be constructed of concrete with a minimum 28-day compressive strength of 3,000 psi. Inverts shall be shaped so as to form a smooth, even U-shaped channel with curves formed with as large a radius as is permitted by the size of the manhole. The height of the channel shall be at least  $\frac{1}{2}$  the pipe diameter for pipes less than 15 inches in diameter and at least  $\frac{3}{4}$  the pipe diameter for pipes 15 inches in diameter and larger. The bench shall be sloped to drain to the channel, but no more steeply than a slope of 1 in 12.

## **2.10 JOINT SEALANT FOR PRECAST MANHOLES AND WET WELLS**

Joint sealant for precast manholes and wet wells shall provide permanently flexible, watertight joints, shall retain workability over a wide temperature range, shall form permanent bonds to concrete substrates and shall not shrink, harden or oxidize upon aging. Joint sealant material shall consist of pre-molded rubber or butyl rubber. Sealants shall meet the requirements of Federal Specification SS-S-210A and AASHTO M-198.

## **2.11 CASTINGS FOR FRAME AND COVERS**

- A. Castings shall be gray cast iron conforming to the requirements of ASTM A48, Class 30. Castings shall be made accurately to the required dimensions, shall be sound, smooth, clean, free from scale, lumps, blisters and other defects. Castings shall be machined to provide solid bearing so that covers rest securely in the frames with no rocking.

- B. Castings shall be thoroughly cleaned before rusting begins and coated with bituminous paint that will produce an acceptable finish that is not affected by exposure to hot or cold weather.
- C. Standard frames and covers shall be traffic duty weighing not less than 410 pounds and shall have a minimum 24-inch clear opening. The covers shall be the solid indented type with no holes except watertight pick notches, with the words "SANITARY SEWER" cast in raised letters thereon. Standard manhole frames and covers shall be Neenah Casting No. R-1726-A or approved equal.
- D. Watertight frames and covers shall be traffic duty weighing not less than 485 pounds and shall be the double cover type with rubber gaskets. The surface cover shall be the solid type with no holes except watertight pick notches, with the words "SANITARY SEWER" cast in raised letters thereon. The inner cover shall be of the solid type with no holes, shall have not less than two lifting handles and shall have a neoprene sealing gasket with at least 3/8-inch diameter cross section. The inner cover shall be mechanically sealed by means of a removable steel locking bar located over the inner cover with a centrally located stainless steel tightening bolt. This bolt shall be fitted for a tee-handle or bent-handle that shall be included with each cover. The bolt shall have ACME threads for durability. The inner cover shall have appropriate reinforcing ribs to prevent cracking or distortion when tightened. The inner cover shall have sufficient clearance to allow easy installation of the cover. Watertight manhole frames and covers shall be approved prior to construction.
- E. Covers shall include the City logo where directed by the Engineer.
- F. Covers shall be bolted to the frame where indicated on the drawings or as otherwise specified.
- G. Frame shall be bolted to the precast concrete section with four, 1/2-inch diameter expansion anchor bolts.
- H. Castings with 30-inch openings may be used in special circumstances such as shallow manholes less than 4 feet deep or manholes on large diameter trunk sewers. Refer to Engineer for these special applications.

## **2.12 MANHOLE STEPS**

- A. Manhole steps conforming to ASTM C478 shall be made of copolymer polypropylene plastic conforming to the latest revision of ASTM D-4101 and shall have a 1/2-inch diameter Grade 60 Steel reinforcing rod meeting the latest revision of ASTM A615 through its center.
- B. Each step shall be 12 inches in width and capable of supporting a load of 1,000 pounds in the center of the step when projected 6 inches from the wall. Each step shall be equipped with non-skid grooves. Rung spacing shall be 12 inches.

## 2.13 RESILIENT PIPE CONNECTIONS AT MANHOLES

- A. Resilient pipe connectors shall be manufactured in accordance with ASTM C923 and shall provide a positive watertight joint and minimum of 10 degrees deflection in any direction. There shall be no water leakage through the connector when pipe is in its maximum deflected position. Connectors shall be manufactured of durable rubber, which offers superior resistance to water, sewage, oils, acid, ozone, weathering and aging. Connectors shall be securely sealed to the cut out in the manhole wall by means of stainless steel expansion sleeves, bands or rings and to the pipe by means of stainless steel clamps or bands. Connectors shall be KOR-N-SEAL as manufactured by NPC, Inc., or approved equal.
- B. Compression-type connectors cast integrally into the manhole wall shall be A-Lok or equal.
- C. When making a main or service connection to an existing manhole or to any manhole for which a factory installed booted opening has not been provided, a hole shall be cored into the manhole with minimal damage to the structure and a resilient pipe connector such as KOR-N-SEAL installed.
- D. When setting a manhole over an existing sewer line, the exterior of the pipe shall be thoroughly cleaned and a double wrap of Ram Neck or equivalent bitumastic material placed around the pipe to form a gasket over which the concrete for the new manhole base is poured, in order to form a watertight connection.

## 2.14 MANHOLE FRAME SEALS

- A. Frame seals shall consist of a flexible internal rubber sleeve, interlocking extensions and stainless steel expansion bands as manufactured by Cretex Specialty Products or pre-approved equal. Frame seals shall be installed in areas designated by the Engineer.
- B. The seal shall remain flexible throughout a 25-year design life, allowing repeated vertical movement of the frame of not less than 2 inches and/or repeated horizontal movement of not less than ½ inch. The sleeve portion of the seal shall be double, triple, or quadruple pleated with a minimum unexpanded vertical height of 8 inches, 10 inches, or 13 inches respectively. The sleeve and extension shall have a minimum thickness of 3/16 inches and shall be made from a high quality rubber compound conforming to the applicable material requirements of ASTM C923, with a minimum 1500 psi tensile strength, a maximum 18% compression set and a hardness (durometer) of 48±5. The area of the seal that compresses against the manhole frame/casting and the chimney/cone shall have a series of sealing fins to facilitate a watertight seal. These sealing fins shall have teardrop holes or air pockets to allow the sealing area to conform to minor surface irregularities that may be encountered.
- C. The expansion bands used to compress the sleeve against the manhole shall be integrally formed from 16-gauge stainless steel conforming to the applicable portion of ASTM C-923, Type 304, with no welded attachments, and shall have a minimum

width of 1¾ inches.

- D. The bands shall have a minimum adjustment range of 2-½ diameter inches and the mechanism used to expand the band shall have the capacity to develop the pressures necessary to make a watertight seal. The band shall be permanently held in this expanded position by the positive locking mechanism located on the overlapping edge of the band.

## **PART 3 – EXECUTION**

### **3.1 WATER AND SEWER LINE SEPARATION**

- A. Maintain a 10-foot horizontal separation, measured edge to edge, between any new or proposed sanitary sewer and any existing or proposed water main.
- B. Where conditions cause the required horizontal separation to be impractical, the sewer may be laid closer provided it is laid in a separate trench and the elevation of the top of the sewer is at least 18 inches below the bottom of the water main.
- C. Where a sewer crosses under a water main, the top of the sewer shall be at least 18 inches below the bottom of the main.
- D. Where conditions cause the required vertical separation to be impractical, the water main shall be relocated to provide the required separation or else reconstructed with mechanical joint ductile iron pipe for a distance of 10 feet on each side of the sewer with a full joint of the water main centered over the sewer.
- E. Where sewers must be constructed over water mains or less than 18 inches below the water main, the sewer shall be designed and constructed equal to water main standards and pressure tested to assume water tightness.
- F. Additional protection such as concrete encasement shall be installed where directed by the Engineer.

### **3.2 GRAVITY SEWER INSTALLATION**

- A. Properly excavate trench to required lines and depths and install any necessary sheeting, shoring and bracing in accordance with Section 02221.
- B. Prepare a satisfactory trench bottom and install suitable bedding in accordance with Section 02221.

- C. Lay pipe true to the lines and grades from the grade and alignment stakes, or equally usable references.
- D. Carefully inspect all pipe and each fitting prior to its placement in the trench, and reject and remove any damaged or defective pipe or fitting from the job site.
- E. Dig bell holes large enough to allow ample room for the pipe joints to be properly made. Carefully grade the crushed stone bedding between bell holes such that each pipe barrel will rest for its entire length upon the prepared bedding to assure uniform support of the pipe.
- F. Lay pipe progressively up grade, with bell upstream in such a manner as to form close, concentric joints with smooth bottom inverts. Swab the interior of the pipe to remove all foreign material. Prepare the bell and remove undesirable material from the gasket and gasket recess. Joining of all pipe shall be in accordance with manufacturer's specifications.
- G. When cutting short lengths of PVC pipe, a pipe cutter will be used, and care shall be taken to make the cut at right angles to the centerline of the pipe. In the case of push-on pipe, the cut ends shall be tapered with a portable grinder or coarse file to match the manufactured taper.
- H. Compression couplings shall be used where indicated on the Contract Drawings or as specified in Paragraph 2.7 of this Section.
- I. Gravity sewer pipe shall be of the size and material indicated on the Contract Drawings and as specified in Part 2 of this Section. No sewer main shall be less than 8 inches in diameter.
- J. Gravity sewer pipe shall be installed at the grade indicated on the Contract Drawings. Sewer pipe shall be installed with slopes equal to or exceeding the minimum slopes provided in the following table.

Nominal Sewer Size	Minimum Slope in Feet Per 100 Feet
<u>8 inch</u>	0.40
10 inch	0.28
12 inch	0.22
14 inch	0.17
15 inch	0.15
16 inch	0.14
18 inch	0.12
21 inch	0.10
24 inch	0.08
27 inch	0.067
30 inch	0.058

- K. Additional pipe protection such as use of specially lined ductile iron pipe or concrete encasement shall be installed where indicated on the Contract Drawings or as directed by the Engineer. Pipe protection may be required for shallow sewers, areas subject to erosion, very heavy traffic, utility crossings, along property lines where future fence posts could be anticipated, etc.
- L. As the work progresses, thoroughly clean the interior of the pipe in place. After each joint of pipe has been laid, carefully inspect it and remove all foreign material from its interior. Upon completion of a section between any two manholes, it shall be possible to view a complete circle of light when looking through the pipe.
- M. Do not allow walking on complete pipelines until backfill has been placed to a depth of at least 6 inches above the crown of the pipe.
- N. When laying pipe ceases at the end of the workday or any other disruption, close the open ends of the pipe with a suitable watertight plug to prevent the entrance of foreign materials.
- O. Trench backfill and check dams shall be placed in accordance with Section 02221.
- P. Making connections to existing manholes by core drilling a hole in the wall of the existing structure, installing a resilient pipe connector such as Kor-N-Seal, and securing the sewer pipe in the connector in accordance with the manufacturer's recommendations. Shape or re-shape the invert of the manhole to accommodate the new flow channel.
- Q. Measurement of the depth to determine depth classification shall be the vertical distance between the original ground surface elevation and the invert of the pipe as shown on the Contract Drawings except where the profile has been revised and approved by the Owner.

### **3.3 PRECAST CONCRETE MANHOLE INSTALLATION**

- A. Manholes shall be installed at the end of each sewer main, at all changes in grade, size, or alignment, at all intersections, and at distances not greater than 400 feet for sewers 16 inches or less and 500 feet for sewers larger than 16 inches. Where a sewer main extension is expected in the foreseeable future, the manhole shall be installed with a stub at least to the property line shared by the current and future development.
- B. Provide a stable, satisfactory subgrade for the new manhole. Dewater the excavation as required. Any unstable or otherwise unsuitable material encountered at the subgrade shall be undercut and replaced with compacted Class I angular material.

- C. Provide a bedding of at least 6 inches of compacted DGA as crushed stone base material for the manhole.
- D. Manholes shall be installed such that they are fully and uniformly supported, set plumb in true alignment and at the proper grade in accordance with the Contract Drawings.
- E. Where concrete foundations are to be cast-in-place, the concrete shall have a compressive strength of at least 4,000 psi. The base section shall be carefully blocked above the prepared base stone so that it is plumb and in true alignment and the concrete foundation poured beneath it. The concrete foundation shall be at least 8 inches thick. Riser sections shall not be added until the concrete foundation has been allowed to set for at least 24 hours.
- F. Seal joints between sections with an approved joint sealant.
- G. Where pipe openings and integrally cast resilient pipe connectors have not been provided complete, the Contractor shall make connections to manholes by core drilling a hole in the wall of the structure, installing a resilient pipe connector such as Kor-N-Seal, and securing the sewer pipe in the connector in accordance with the manufacturer's recommendations. Shape the invert of the manhole to accommodate the flow channel as specified herein.
- H. Thoroughly wet and then completely fill all lift holes, any defects and all interior joints with non-shrink grout and smooth them to ensure watertightness.
- I. Where indicated on the Contract Drawings, the manhole encapsulation system shall be installed on the outside surface of all joints including the manhole casting to manhole connection. The manhole and casting shall be clean and dry prior to application of a primer as recommended by the manufacturer. Installation shall be in accordance with the manufacturer's recommendations.
- J. Trench check dams shall be installed upstream of each manhole as specified in Section 02221.
- K. Backfill manholes in accordance with the requirements for trenching and backfilling as specified in Section 02221.
- L. When completed, the manhole shall be free from channel obstructions and leakage.
- M. All manhole inverts shall be finished with mortar to provide a smooth transition from the manhole into the pipe entrances and exits.
- N. Measurement of the depth to determine depth classification shall be the vertical distance from the finished casting elevation to the invert of the outlet pipe as shown on the Contract Drawings unless the profile has been revised and approved by the Owner.



### **3.4 MANHOLE FRAME AND COVERS INSTALLATION**

- A. All castings shall be of the types, dimension, and weights as shown on the Contract Drawings and as specified in Paragraph 2.11 of this Section and shall be set at the required elevation. Bolted watertight manhole covers are required in areas subject to flooding. Bolted down covers are also to be installed in all unimproved areas such as wooded areas that are subject to unsupervised vandalism.
- B. The manhole sidewall shall be adjusted with either steel or concrete grade adjustment rings as required to bring the casting to the required grade. No more than 6 inches of grade adjustment rings will be permitted on newly constructed manholes.
- C. Where manholes are constructed in paved areas, the frame and cover shall be tilted so as to conform to the exact slope, crown and grade of the existing adjacent pavement.
- D. A full circle of an approved joint sealant shall be placed between the manhole ring frame and the masonry portion of the manhole to assure water tightness. The frame shall be further secured to the manhole by the use of mortar or grout placed from the outside edge of the masonry structure to a point approximately 1 inch below the top of the casting. Manhole frames shall be bolted to the manhole using four ½-inch diameter stainless steel expansion anchor bolts.
- E. Manhole frame seals shall be installed on sanitary manholes in accordance with the manufacturer's recommendations where indicated on the Contract Drawings or as directed by the Engineer.
- F. Existing manhole frames shall be adjusted utilizing John Bouchard & Sons, Inc. manhole adjusting riser rings.

### **3.6 DROP ASSEMBLY INSTALLATION**

- A. Drop assemblies are also required in pump station wet wells where the difference between the invert elevation of the inlet pipe and the level control cutoff point is greater than 24 inches. Down pipes shall be terminated approximately 3 inches above the level control cutoff point.
- B. Drop assemblies shall be internal to the manhole or wet well. External drops shall not be permitted unless specifically approved by the Owner.
- C. Drop assemblies shall be constructed of PVC. The down pipe shall be 12 inches in diameter. A cross fitting shall be provided at the pipe entrance to the manhole to provide access for cleaning blockages. Stainless steel straps and anchors spaced no greater than 6 feet apart shall be installed to support the assembly. A 90 degree sweeping elbow shall be installed at the bottom of the drop pipe and a suitable invert shall be formed.

- D. Drop manholes shall be a minimum of 5 feet in diameter. All manholes with drop assemblies shall be epoxy coated or utilize an interior construction such as the A-Lok® system to prevent H<sub>2</sub>S deterioration of the manhole interior.

### **3.7 SEWER FORCE MAIN INSTALLATION**

- A. Properly excavate trench to required lines and grades and install any necessary sheeting, shoring and bracing in accordance with Section 02221.
- B. Prepare a satisfactory trench bottom in accordance with Section 02221.
- C. Lay the force main true to the lines and grades indicated on the Contract Drawings. Particular care shall be taken to ensure the line is maintained on a positive or negative grade and that increased depth is provided where indicated on the Contract Drawings so that no undesired local high point is created. The Contractor shall relay any force main pipe with undesired high points at no additional expense to the Owner.
- D. Unless otherwise directed by the Engineer, lay pipe with the bell ends facing the direction of laying.
- E. Carefully inspect all pipe, valves and fittings prior to placement in the trench, and reject and remove any damaged or defective pipe from the job site.
- F. Dig bell holes large enough to allow ample room for the pipe joints to be properly made. Carefully grade the bottom of the trench between bell holes such that each pipe barrel will rest for its entire length upon the trench bottom to assure uniform support of the pipe.
- G. All pipe and fittings shall be carefully lowered into the trench to prevent damage to the materials and to any protective coatings and linings. Specially lined ductile iron pipe and fittings must be handled only from the outside. No forks, chains, hooks, timber, etc. shall be placed inside the pipe and fittings for lifting, positioning or laying.
- H. The interior of all pipe, valves and fittings shall be thoroughly cleaned to remove any accumulated mud, debris, etc. before being laid. The spigot end shall be cleaned and the bell cleaned and prepared. If the pipe cannot be laid without allowing earth and debris from entering the pipe, a suitable cover such as canvas or a plug shall be used to assure the pipe remains clean until it is joined to the next pipe. Joining of all pipe shall be in accordance with the manufacturer's recommendations.
- I. Cut pipe for inserting valves, fittings, etc. in a neat and workmanlike manner without damaging the pipe. Follow the manufacturer's recommendations concerning how to cut and machine the pipe in order to leave a smooth end at right angles to the axis of

- the pipe. Hone the pipe with suitable tools to provide a smooth beveled edge on field cut sections.
- J. When pipe laying ceases at the end of the workday or any other disruption, such as inclement weather, close the open ends of the pipe with a suitable watertight plug or wrap to prevent entrance of foreign materials.
  - K. Wherever pipe must be deflected from a straight line, the amount of deflection shall not exceed that necessary for the joint to be satisfactorily made. The deflection shall in no case exceed that recommended by the pipe manufacturer.
  - L. At high points on the line profile, where a change from a positive to a negative grade occurs, an air relief or combination air/vacuum relief valve shall be installed as specified in the Contract Drawings.
  - M. Force main valves shall be installed where indicated on the Contract Drawings. Valves and stems shall be installed plumb.
  - N. All valves and fittings are to be restrained with mechanical joint restraining devices. These restraining devices do not eliminate the requirement for sufficient concrete thrust blocking and/or restrained joint pipe. The distance from the fitting to the end of the restraint shall not be less than that indicated on the Contract Drawings.
  - O. Concrete thrust blocks shall be installed at all fittings in accordance with the Contract Drawings. The concrete shall be Class B concrete per KYTC specifications. The thrust block shall be constructed between the fitting and undisturbed soil with a bearing area at least the size indicated on the Contract Drawings, and shall be constructed such that the fittings, valves and joints are accessible for repairs. All pipe, fittings and valves that will be in contact with the concrete shall be wrapped with polysheet to prevent bonding with the thrust block.
  - P. Backfill shall be as specified in Section 02221.
  - Q. Carsonite markers shall be installed where indicated on the Contract Drawings.
  - R. Where the force main discharges into a gravity sewer manhole, the force main entrance to the receiving gravity manhole shall be within 6 inches of the lowest invert of the manhole. Deflector fittings or new inverts shall be installed if necessary to reduce the turbulence of the incoming flow. All manholes with force main discharges shall be epoxy coated or shall utilize an interior construction such as the A-Lok® system to prevent H<sub>2</sub>S deterioration of the manhole interior.
  - S. New force main connections to existing force mains shall be as shown on the Contract Drawings.

### 3.8 IDENTIFYING TAPE AND TRACER WIRE

- A. The location of all force mains, regardless of material type, installed under these specifications shall be marked by the use of a continuous tape, minimum three inches in width, made of 5 mil polyethylene plastic with a 0.5 mil thick aluminum metallic core or backing. The tape shall be buried in the trench, above the pipe, not more than two feet below the surface. The tape shall be marked indelibly with the words "Sewer Main Below" or similar wording to warn unwary excavators, and shall be green in color.
- B. An insulated minimum 12-gauge tracer wire shall also be installed in the trench immediately along sewer force mains, either attached to or periodically wrapped around the line. The wire shall be branched off to connect to valve boxes and air release valves to allow convenient surface access to the wire for pipe locator connection.

### 3.9 BYPASS PUMPING

- A. Where flow stoppage may be necessary and the flow is so great as to require pumping, the Contractor shall bypass the sewage around the section or sections of gravity sewer line that are out of service by plugging an existing upstream manhole and pumping sewage to a downstream manhole. The pump and bypass lines shall be of adequate capacity and size to handle the flow. Likewise, bypass pumping may be required at pump stations through pump-around ports, where available. Alternatively, situations may demand that pumping and hauling be performed. The Contractor shall perform whatever bypass operations are necessary to complete the required work and prevent overflow or spillage of raw sewage.
- B. **UNDER NO CIRCUMSTANCES WILL THE DUMPING OF RAW SEWAGE ON PRIVATE PROPERTY, OR INTO STREAMS, STORM SEWER OR CITY STREETS BE ALLOWED.**
- C. Except as may be approved by the Owner's Inspector, temporary connections shall be made at the end of each working day so that overnight pumping is not required. Bypassing of sewage shall be considered a subsidiary obligation of the Contract and no separate payment shall be made for this work unless specifically listed as a pay item on the Bid Form.

### 3.10 STREAM CROSSINGS

A Stream Crossing permit must be obtained from KDOW where utilities cross USGS-designated blue-line streams or where utility line construction otherwise disturbs these streams. Construction shall comply with the Contract Drawings and with the provisions of the permit and SWPPP. Upon completion of construction, the stream and its banks

shall be stabilized and/or returned as nearly as possible to their original condition. Cleanup, grading, seeding, planting or restoration of the work area shall be carried out as early as practical as the construction proceeds and in accordance with the Permit.

## **PART 4 – TESTING**

### **4.1 GENERAL**

- A. Testing and inspection of the completed work shall be accomplished by one or more of the following methods:
  - 1. Visual Inspection
  - 2. Closed Circuit Television (CCTV)/Video Inspection
  - 3. Leak Testing of Gravity Mains
    - 1. Low-Pressure Air Testing
    - 2. Infiltration Testing
    - 3. Exfiltration Testing
  - 4. Deflection Testing of Gravity Mains
  - 5. Vacuum Testing of Manholes
  - 6. Hydrostatic Testing of Force Mains
  - 7. Valve Testing
  
- B. Upon completion of construction, the Contractor shall remove all sand, dirt, rock and other foreign materials from the sewers and shall conduct his own inspection and testing to locate and repair any defects, and determine when sewers are ready for final inspection and testing by the Owner's Inspector. After all apparent defects have been corrected; the Contractor shall notify the Owner and request a final inspection.
  
- C. The Owner will not conduct a final inspection until receiving written notice from the contractor that the construction is completed in accordance with approved Contract Drawings and Specifications. This notification shall include a report of the results of the inspection and testing performed on the sanitary sewer system components.

### **4.2 VISUAL INSPECTION**

- A. Unscheduled visual inspection of the sewer and construction site by the Owner's Inspector shall occur during the course of the construction. The Inspector shall make visual inspection of pipe, fittings, valves and other materials to be incorporated into the work before they are installed. Items found to be defective or otherwise not in accordance with Contract Drawings and Specifications shall be immediately removed from the site.
  
- B. Visual inspection of grade and alignment, bedding, pipe jointing, manholes, etc. will proceed as work progresses. Acceptance of work at this stage in no way relieves the Contractor of responsibility and does not preclude additional testing at the discretion of the Owner. Any sags, humps, bends or other evidence of misalignment shall be

cause for rejection. Improper construction and work not in accordance with the Contract Drawings and Specifications shall also be cause for rejection.

- C. Upon completion of the work, all sewers and manholes shall be inspected for foreign matter such as sand or mud brought in by infiltration or inflow, and any such matter shall be removed before final acceptance. If visual inspection of lines, manholes or other items reveals leaks, structural failures or other defects, the Contractor shall repair such immediately.

#### **4.3 CCTV/VIDEO INSPECTION**

- A. The Contractor shall conduct an internal inspection and digital recording of the sewer system using a television instrument. As an alternate to the Contractor performing the television inspection, the Contractor may choose to use the services of the City's crews at a cost determined by the General Manager or his designated representative. The Contractor shall be responsible for correcting all deficiencies discovered by the CCTV inspection at no cost to the Owner.
- B. A remote controlled, adequately lit camera that will travel the length of each section of gravity sewer main from manhole to manhole shall be used to televise all newly installed sewers. The camera shall be of suitable design and manufactured for the express purpose of televising gravity sanitary sewer mains. The camera's path shall be recorded with an onscreen display of footage traveled. Auditory notations by the camera operator regarding locations of service connections, pipe defects, indications of faulty installation and all other important points of interest shall be recorded as permanent record. The view recorded by the camera shall also include an object of reference to assist the viewer in determining the scale of objects within the pipe.
- C. Video quality shall be such that the condition of all interior sections of the main and service laterals on that section of the main are easily discernible. The camera shall allow for articulation that enables a clear view of service laterals in a direction perpendicular to the direction of the main and at a variety of vertical angles to allow viewing of laterals at varying slopes. The image must be clear to the test cap or first bend of the service lateral.
- D. Audio quality shall be adequate to clearly understand remarks of the camera operator.
- E. Video inspection shall commence immediately after line cleaning so that any sag or changes in grade shall be revealed and evidenced by puddling in areas where positive slope is not maintained.
- F. The Contractor shall be responsible for correcting all deficiencies discovered by the CCTV inspection at no cost to the Owner.
- G. At the time of the request for final inspection, the Contractor shall submit to the Engineer's Office on CD-ROM or DVD media 2 copies of digital files that represent the videotaping of all sewer mains in a project or development. The video record of each section of gravity main between manholes shall be represented by a separate

MPEG or AVI format digital file. The disc and its jacket shall be clearly labeled with the name of the subdivision or project and its phase and/or section, as well as the installation date. All references to manholes and mains with regard to videotaping shall be by the same naming convention as that shown on construction plans approved by the City. An index file shall be provided with each disc that explains the meaning of each file name and identifies the CCTV company that produced it.

#### **4.4 LOW-PRESSURE AIR TESTING**

- A. Low-pressure air testing is the preferred method of leak testing of gravity sewer mains up through 24 inches in diameter when above groundwater. If the groundwater level is 2 feet or more above the top of the pipe at the upstream end, air testing shall not be used.
- B. Labor, equipment and supplies required for all tests shall be furnished by the Contractor. The test shall be observed by the Owner's Inspector.
- C. Low-pressure air tests shall be made with equipment specifically designed and manufactured for the purpose of testing pipelines using low-pressure air. The equipment shall be provided with an air regulator valve or air safety valve set such that the internal air pressure in the pipeline cannot exceed 8 psig (gauge pressure). Test equipment shall be top quality, in good condition and approved by the Inspector. Plugs shall have a sealing length equal to or greater than the diameter of the pipe being tested and external bracing of the plugs should not be required in order for the plug to hold against internal air pressure. The test equipment shall include accurate, oil-filled pressure gauges to monitor test pressure, safety relief valve(s) and quick-release air bleed valve(s).
- D. The procedure for low-pressure air testing shall be in accordance with ASTM F1417 unless modified herein.
  1. Clean the section of sewer line to be tested by flushing or other means prior to conducting the low-pressure air test.
  2. Isolate the section of sewer line to be tested by suitable test plugs and plug all sewer services to be included in the test to prevent air leakage. Such sewer service caps shall be readily removable, and their removal shall provide a socket suitable for making a lateral connection or extension. All plugs and caps shall be securely braced to prevent blow-out against internal pressures. One of the plugs or caps should have an inlet tap, or other provision for connecting a hose to a portable air control source. Allow no one in the manholes while pressurizing the line or during the test.
  3. Immediately following this check or cleaning, test the pipe installation with low-pressure air. Supply the air slowly to the plugged pipe installation until the internal air pressure reaches 4.0 psi more than the average backpressure of any groundwater that may submerge the pipe (an additional 0.43 psi should be added for each foot of groundwater above the pipe). Allow at least 2 minutes for temperature stabilization.
  4. After the stabilization period and with 3.5 psi minimum pressure (above the average backpressure) in the pipeline, air supply shall be disconnected and the time measured which results in a 1 psi pressure drop.

5. The time required in minutes for the pressure in the section under test to decrease from 3.5 psi to 2.5 psi shall not be less than that shown in the table below.

<b>Low-Pressure Air Test Requirements</b>							
<b>Pipe Dia. (inches)</b>	<b>Min. Time (min:sec)</b>	<b>Length for Min. Time (feet)</b>	<b>Time for Longer Length</b>	<b>Specified Time for Length Shown (min:sec)</b>			
				<b>100 ft</b>	<b>200 ft</b>	<b>300 ft</b>	<b>400 ft</b>
8	7:34	298	1.520*L	7:34	7:34	7:36	10:08
10	9:26	239	2.374*L	9:26	9:26	11:52	15:49
12	11:20	199	3.418*L	11:20	11:24	17:05	22:47
15	14:10	159	5.342*L	14:10	17:48	26:42	35:36
18	17:00	133	7.692*L	17:00	25:38	38:27	51:16
21	19:50	114	10.470*L	19:50	34:54	52:21	69:48
24	22:40	99	13.674*L	22:47	45:34	68:22	91:10

6. It is not necessary to hold the test for the entire period of time indicated in the above table when it is evident that the rate of air loss is zero or less than the allowable, and is authorized by the Inspector.
7. Upon completion of the test, open the bleeder valve and allow all air to escape. Plugs should not be removed until all air pressure in the test section has been reduced to atmospheric pressure.
8. Failure of any section of the pipeline to meet the requirements of this test shall cause the Contractor to determine, at his own expense, the source(s) of leakage. The Contractor shall excavate and repair or replace all defective materials or workmanship, and repeat all testing until results are satisfactory at no additional cost to the Owner.

#### 4.5 INFILTRATION TESTING

- A. Gravity sewers shall be leak tested by an infiltration test if the groundwater is more than 2 feet above the crown of the pipe for the full length of the section to be tested.
- B. Pipe shall be tested for infiltration after the backfill has been placed and the groundwater allowed to return to normal elevation. If an inspection of the completed pipeline or any part thereof shows pipes or joints that allow noticeable infiltration of water, the defective work or material shall be replaced or repaired as directed by the Owner. All visible leaks shall be repaired prior to testing.
- C. The length of line to be tested shall not be less than the length between adjacent manholes and not more than the total length of each size of pipe. The measured infiltration shall not exceed 2.0 gallons per inch of diameter per day per 100 feet of pipe in each section tested.



- D. Rates of infiltration shall be determined by means of V-notch weirs, pipe spigots, or by plugs in the end of the pipe installed in an approved manner and at such times and locations as may be directed by the Engineer.
- E. Failure of any section of the pipeline to meet the requirements of this test shall cause the Contractor to determine, at his own expense, the source(s) of leakage. The Contractor shall excavate and repair or replace all defective materials or workmanship, and repeat all testing until results are satisfactory at no additional cost to the Owner.

#### **4.6 EXFILTRATION TESTING**

- A. Where required by the Engineer, leakage testing by exfiltration shall be made by creating a head in the pipeline to be tested by filling the line and either manhole or temporary riser on one end of the line with water. The length of pipe to be tested shall be such that the head over the crown at the upstream end is not less than 2 feet and the head over the downstream crown is not more than 5 feet.
- B. The pipe shall be filled with water in such a manner that the air can be released from the pipe while it is being filled. Before any measurements are made, the pipe shall be kept full of water long enough to allow absorption and the escape of any trapped air to take place. Following this, a test period of at least one hour shall begin. Provisions shall be made for measuring the amount of water required to maintain the water at a constant level during the test period. If the quantity of water required to maintain a constant head in the pipe does not exceed 2.0 gallons per inch of diameter per day per 100 feet of pipe and if all the leakage is not confined to a few joints, workmanship shall be considered satisfactory.
- C. Failure of any section of the pipeline to meet the requirements of this test shall cause the Contractor to determine, at his own expense, the source(s) of leakage. The Contractor shall excavate and repair or replace all defective materials or workmanship, and repeat all testing until results are satisfactory at no additional cost to the Owner.

#### **4.7 DEFLECTION TESTING**

- A. Flexible PVC pipe shall pass a go/no-go Mandrel sized to 95% of the actual pipe diameter with the pipe in place and properly backfilled. No testing shall be performed until the pipe has been laid and backfilled for 30 days and any necessary line cleaning is complete.
- B. The Mandrel size shall be based upon the maximum possible inside diameter for the type of pipe being tested, taking into account the manufacturing tolerances of the pipe.
- C. The Mandrel shall have an odd number of legs, or vanes, with a quantity of such equal to or greater than nine. The legs of the Mandrel shall be permanently attached to the Mandrel.

- D. The Mandrel shall be constructed of steel, aluminum, or other material approved by the Engineer or his representative, and shall have sufficient rigidity so the legs of the Mandrel will not deform when pulling through a pipe.
- E. A Mandrel with variable sizes shall not be allowed. The Mandrel dimensions shall be checked by the Engineer or his representative before use by the Contractor.
- F. Failure of any section of the pipeline to meet the requirements of this test shall cause the Contractor to determine, at his own expense, the source(s) of deformity. The Contractor shall excavate and repair or replace all defective materials or workmanship, and repeat all testing until results are satisfactory at no additional cost to the Owner.

#### 4.8 VACUUM TESTING OF SEWER MANHOLES

- A. All new manholes are to be vacuum tested as soon as is practicable after assembly is completed. No standing water shall be allowed in the manhole excavation that may affect the accuracy of the test. Leakage testing on newly rehabilitated manholes shall be accomplished in accordance with ASTM C1244-05A rather than as specified in this Paragraph.
- B. All lifting holes and exterior joints shall be filled and pointed with non-shrink grout for concrete manholes or sealed with compatible sealant for other materials.
- C. All pipes and other entrances into the manhole should be suitably plugged and blocked in such a manner as to prevent displacement of the plugs while the vacuum is being pulled.
- D. Installation and operation of the vacuum equipment and indicating devices shall be in accordance with equipment specifications and instructions provided by the manufacturer. Gauges used for manhole testing shall be oil-filled gauges.
- E. The casting opening shall be sealed with an appropriate testing/sealing device and a vacuum of 10.0 inches of mercury (5 PSIG) pulled on the manhole (DO NOT PUT A POSITIVE PRESSURE ON THE MANHOLE). The time for the vacuum to drop to 9.0 inches of mercury shall be recorded.
- F. Acceptance manholes shall be defined as when the time to drop from 10.0 inches to 9.0 inches of mercury meets or exceeds the following:

<b>Minimum Time (seconds) to Drop From 10.0 Inches to 9.0 Inches of Mercury</b>			
<b>Manhole Diameter</b>	<b>Manhole Depth</b>		
	<b>4 feet to 10 feet</b>	<b>10 feet to 15 feet</b>	<b>15 feet to 25 feet</b>
4 feet	75	90	105
5 feet	90	105	120
6 feet	105	120	135

- G. If the manhole fails the test, necessary repairs shall be made at the Contractor's expense and the vacuum test repeated until the manhole passes the test. A significant number of leaks on a single manhole may be considered as a basis for rejection and replacement at the Contractor's expense.
- H. If the manhole joint mastic or gasket is displaced during the vacuum test, the manhole shall be disassembled and the seal replaced.

#### **4.9 HYDROSTATIC TESTING OF SEWER FORCE MAINS**

- A. All newly laid pipe or any valved section thereof shall be subjected to hydrostatic pressure testing. Conduct hydrostatic testing in accordance with AWWA C600 for ductile iron pipe or AWWA C605 for PVC pipe.
- B. Where practicable, pipelines shall be tested in lengths between line valves or plugs of no more than 3,000 feet.
- C. Hydrostatic testing shall be conducted only with potable water. Due to the inherent safety hazard potential associated with testing components and systems with compressed air or other compressed gases, pressure testing shall never be accomplished using compressed air.
- D. The Contractor shall furnish all gauges, recording devices, meters, pumps, pipe, connections and other equipment required to conduct the test and shall maintain said equipment in condition for accurate testing as determined by the Owner. Gauges used for pressure tests shall be oil-filled gauges.
- E. Hydrostatic test results shall be recorded on an appropriate chart recorder. The Contractor shall furnish a recording gauge and water meter for recording pressure charts and for measuring makeup water used during the hydrostatic testing. Recording pressure charts shall be submitted to the Owner at the conclusion of testing. The pressure recording device shall be suitable for outside service, with a range from 0–200 psig, 24-hour spring wound clock, designed for 9-inch charts, and shall be approved by the Owner. Such pressure recording devices may be available from Foxboro Company, Foxboro, Massachusetts; Bristol Division of ACCO, Waterbury, Connecticut; or Weksler Instruments Corporation, Freeport, New York.
- F. Prior to testing, the Contractor shall place sufficient backfill to prevent pipe movement. When local conditions require that the trenches be backfilled immediately after the pipe has been laid, the testing may be carried out after backfilling has been completed but before placement of permanent surfacing. The Contractor shall ensure that thrust blocking or other types of restraining systems will provide adequate restraint prior to pressurizing the pipeline.

- G. Cross Connection Control: When existing water mains are used to supply test water, they should be protected from backflow contamination by temporarily installing a double check valve assembly between the test and supply main or by other means approved by the Owner. Prior to pressure and leakage testing, the temporary backflow protection should be removed and the main under test isolated from the supply main.
- H. Test Pressure Requirements:
1. The test pressure shall not be less than 1.25 times the stated working pressure of the pipeline measured at the highest elevation along the test section and not less than 1.5 times the stated working pressure at the lowest elevation of the test section.
  2. The test pressure shall not exceed the thrust restraint design pressure or 1.5 times the pressure rating of the pipe or joint, whichever is less (as specified by the manufacturer).
  3. The test pressure shall not exceed the rated working pressure of the valves when the pressure boundary of the test section includes closed, resilient seated gate valves or butterfly valves.
  4. Valves shall not be operated in either direction at a differential pressure exceeding the rated valve working pressure. A test pressure greater than the rated valve working pressure can result in trapped test pressure between the gates of a double-disc gate valve. For tests exceeding the rated valve working pressure, the test setup should include a provision, independent of the valve, to reduce the line pressure to the rated valve working pressure on completion of the test. The valve can then be opened enough to equalize the trapped pressure with the line pressure, or the valve can be fully opened if desired.
- I. Test Procedure:
1. Each valved section of pipeline shall be slowly filled with potable water using a metered backflow-protected assembly provided by the Owner. When venting air from pipelines, it is important to limit the pipeline fill rate to avoid excessive surge pressures when the water reaches the air venting opening(s).
  2. Before applying the specified test pressure, air shall be expelled completely from the pipeline section under test. If permanent air vents are not located at all high points, corporation cocks shall be installed at such points to expel air as the line is filled with water. After all the air has been expelled, close the corporation cocks and apply the test pressure. At the conclusion of the pressure test, remove the corporation cocks and plug or leave in place at the discretion of the Owner.
  3. The specified test pressure shall be applied using a suitable pump connected to the pipeline in a manner satisfactory to the Owner. The specified test pressure shall be based on the elevation of the lowest point of the pipeline or section under test and corrected to the elevation of the test gauge, in accordance with test pressure requirements specified herein.

4. The pipeline shall be allowed to stabilize at the test pressure before conducting the hydrostatic test. This may require several cycles of pressurizing and bleeding trapped air prior to beginning the test. It is recommended that the line remain pressurized for a minimum of 24 hours before testing in order for joints to tighten and pockets of air to dissolve in the water.
  5. The hydrostatic test shall be at least 2 hours in duration after reaching the specified test pressure where joints are exposed and at least 8 hours where joints are covered.
  6. The test pressure shall not vary by more than +/- 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline. The amount of makeup water added shall be accurately measured (in gallons per hour) by suitable methods and shall not exceed the applicable testing allowance as specified herein.
- J. Visual Inspection: Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the hydrostatic pressure test. Any damaged or defective materials that are discovered during or following the pressure test shall be repaired or replaced at the Contractor's expense, and the test shall be repeated until satisfactory results are obtained.

K. Testing Allowance:

1. Testing allowance shall be defined as the maximum quantity of makeup water that is added into a pipeline undergoing hydrostatic pressure testing, or any valved section thereof, in order to maintain pressure within +/- 5 psi of the specified test pressure (after the pipeline has been filled with water and the air has been expelled).
2. No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

$$L = \frac{S * D * (P)^{1/2}}{148,000}$$

Where:

L = testing allowance (makeup water), in gallons per hour  
S = length of pipe tested, in feet

D = nominal diameter of the pipe, in inches

P = average test pressure during the hydrostatic test, in pounds per square inch (gauge pressure)

3. This formula is based on a testing allowance of 10.5 gpd/mile/inch of nominal diameter at a pressure of 150 psi. Values of testing allowance at various pressures are shown in the following table. When testing against closed metal-seated valves, an additional testing allowance per closed valve of 0.0078 gal/hr/inch of nominal valve size shall be allowed.

Hydrostatic Testing Allowance per 1,000 feet of pipeline (gallons per hour)*											
Average Test Pressure	Nominal Pipe Diameter (inches)										
	4	6	8	10	12	14	16	18	20	24	30
250	0.43	0.64	0.85	1.07	1.28	1.50	1.71	1.92	2.14	2.56	3.21
225	0.41	0.61	0.81	1.01	1.22	1.42	1.62	1.82	2.03	2.43	3.04
200	0.38	0.57	0.76	0.96	1.15	1.34	1.53	1.72	1.91	2.29	2.87
175	0.36	0.54	0.72	0.89	1.07	1.25	1.43	1.61	1.79	2.15	2.68
150	0.33	0.50	0.66	0.83	0.99	1.16	1.32	1.49	1.66	1.99	2.48
125	0.30	0.45	0.60	0.76	0.91	1.06	1.21	1.36	1.51	1.81	2.27
100	0.27	0.41	0.54	0.68	0.81	0.95	1.08	1.22	1.35	1.62	2.03
75	0.23	0.35	0.47	0.59	0.70	0.82	0.94	1.05	1.17	1.40	1.76
50	0.19	0.29	0.38	0.48	0.57	0.67	0.76	0.86	0.96	1.15	1.43

- L. Acceptance of the installation shall be determined on the basis of testing allowance. Should any test of pipe laid disclose leakage greater than that specified, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance. All visible leaks are to be repaired regardless of the allowance used for testing. Hydrostatic test results shall be recorded on an appropriate chart recorder as specified herein. A copy of the test chart shall be provided to the Owner.

**4.10 VALVE TESTING**

Upon completion of the work, the Contractor shall operate all buried valves in the presence of the Owner’s Inspector to verify proper operation of each valve.

**END OF SECTION**

## **SECTION 02725 BORING AND JACKING**

### **PART 1 - GENERAL**

#### **1.1 WORK INCLUDED**

- A. All water and sewer mains installed in a bore under streets, highways and railroads must be cased as specified herein.
- B. Copper water services 2" in diameter or smaller and schedule 40 PVC, HDPE or ductile iron sewer services may be installed without casing. The bore for any such uncased service shall not be greater than 2 inches larger than the maximum OD of the carrier pipe. Services encroaching KYTC right-of-way may be required to be cased at the discretion of KYTC.

#### **1.2 RELATED WORK**

- A. Section 02713: Water Distribution Systems
- B. Section 02722: Sanitary Sewer Systems

#### **1.3 REGULATIONS AND PERMITS**

- A. Permits for crossing highways or railroads will be obtained by the Owner. The Contractor shall verify that such permits have been obtained before construction commences.
- B. For highway crossings, the Contractor shall satisfy KYTC to the extent of the Owner's posted Surety Bonds.

### **PART 2 - PRODUCTS**

#### **2.1 STEEL CASING PIPE**

- A. Encasement pipe shall be smooth wall welded steel with minimum yield strength of 35,000 psi. A protective bituminous coating shall be applied to the outside of the pipe.
- B. Steel casing pipe shall be of sufficient strength to meet the loading conditions of H-20 loading for highway crossings and Cooper E-80 loading for railroad crossings, and shall have the minimum pipe diameter and wall thickness shown in the following table. Where mechanical joint pipe requires a larger diameter casing pipe than push-

on joint pipe, a separate line item for MJ pipe has been provided in the following table. Where bell restraint harnesses have been specified for the carrier pipe, an appropriately sized casing pipe shall be specified to accommodate the restraints and required casing spacers.

Carrier Pipe Nominal Diameter (inches)	Minimum Steel Casing Pipe Diameter (inches)	Minimum Wall Thickness (inches)	
		Highway Crossing	Railroad Crossing
4	12	0.188	0.188
6	14	0.250	0.250
8	16	0.250	0.250
8 MJ	18	0.250	0.250
10	18	0.250	0.250
10 MJ	20	0.250	0.281
12	20	0.250	0.281
12 MJ	24	0.250	0.312
14 - 16	24	0.250	0.312
16 MJ	30	0.312	0.406
18 - 21	30	0.312	0.406
24 - 27	36	0.375	0.469
30	42	0.500	0.562
36	48	0.500	0.594
36 MJ	54	0.500	0.719

## 2.2 CARRIER PIPE

Carrier pipe installed in the casing pipe shall be as indicated on the Contract Drawings.

## 2.3 CASING SPACERS

- A. Casing spacers shall be provided so that the carrier pipe is in a centered/restrained position. The casing spacers shall be constructed of circular stainless steel bands that bolt together to form a shell around the carrier pipe and shall be lined with PVC or EPDM to protect the carrier pipe and prevent slippage. The spacer shall be designed with risers and runners to support the carrier pipe within the casing.
- B. The shell shall be minimum 14-gauge T-304 stainless steel and shall be manufactured in minimum widths of 8 inches and 12 inches. The riser shall be constructed of minimum 10- gauge T-304 stainless steel and shall be sized to support all loads and shall support the carrier pipe within the casing in the centered/restrained position. The runners shall be a minimum width of 2 inches and be constructed of glass-reinforced polymer with beveled ends.



- C. The spacers shall at a minimum be positioned at 1 to 2 feet on either side of the joint and at the midpoint. Additional spacers may be required where recommended by the manufacturer and/or Engineer.
- D. Casing spacers shall be Models CSS8 and CSS12 by CCI Pipeline Systems or S8G-2 and S12G-2 by Pipeline Seal and Insulator, Inc.

## **2.4 END SEALS**

A wrap-around self-curing rubber end seal shall be applied to each end of the casing pipe. End seals shall be Model ESW by CCI Pipeline Systems or Model "W" by PSI, Inc.

## **PART 3 – EXECUTION**

### **3.1 GENERAL REQUIREMENTS**

- A. Perform all crossings according to the requirements of the governing highway department.
- B. Notify the appropriate authorities involved and request their supervisory services during construction.
- C. Provide necessary safeguards to protect the crossing.
- D. Where bored highway installations are not shown on the Contract Drawings, open cut the crossing and provide a casing pipe only if required by the governing highway department or Engineer.
- E. All uncased roadway punches shall be approved by the City Engineer prior to construction.
- F. Excavation shall be unclassified and no distinction shall be made between rock and other materials excavated.
- G. No extra payment will be provided for tunneling through rock. The contractor shall provide whatever means necessary to complete road bores even if rock is encountered. All line items referencing road bores shall include boring or tunneling as required. No change orders shall be issued if rock is encountered during road boring.

### **3.2 INSTALLATION**

- A. Perform all crossings in the manner shown on the drawings, except as otherwise directed by the governing highway department or railroad company.
- B. Dry bore an opening under the crossing.
- C. Jack the casing pipe, of the type and size specified, into the bored opening.
- D. Install the appropriate carrier pipe into the casing pipe.
- E. Test the carrier pipe according to the appropriate Utility Sections (02713 or 02722).
- F. Alignment and grade shall be installed and maintained per the Contract Drawings.
- G. Bores which are not on horizontal or vertical alignment shall be re-bored.  
Abandoned bore holes shall be filled with flowable fill.
- H. Install carrier pipe with casing spacers to maintain alignment inside casing pipe.  
Casing spacers shall be installed one (1) foot from each end of the pipe joint and at the midpoint.
- I. Install casing end seals and casing vents upon completion of installation of carrier pipe.

**END OF SECTION**



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**U.S. 41A – Section 2 Utility Relocation  
Madisonville Municipal Utilities**

Contract No: \_\_\_\_\_-C1  
Date: \_\_\_\_\_  
Rev.: \_\_\_\_\_00

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# **U.S. 41A – SECTION 2 UTILITY RELOCATION PROJECT**

## **CONTRACT NO.**

**MADISONVILLE MUNICIPAL UTILITIES  
Madisonville, Kentucky**

**OCTOBER 2017**

**P. Anthony Hanson  
KY PE License #17402**



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**U.S. 41A – Section 2 Utility Relocation  
Madisonville Municipal Utilities**

Contract No: \_\_\_\_\_-C1  
Date: \_\_\_\_\_  
Rev.: \_\_\_\_\_00

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**SECTION 00 01 07  
SEALS PAGE**

DESIGN PROFESSIONALS OF RECORD

Electrical Engineer:

1. P. Anthony Hanson
2. KY PE License #17402

END OF SECTION 00 01 07



**U.S. 41A – Section 2 Utility Relocation  
 Madisonville Municipal Utilities**

Contract No: \_\_\_\_\_-C1  
 Date: \_\_\_\_\_  
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**REVISION HISTORY**

Revision No.	Date	Description
00	04/11/2016	Issued for review

END OF SECTION 00 01 10



**U.S. 41A – Section 2 Utility Relocation  
Madisonville Municipal Utilities**

Contract No: \_\_\_\_\_-C1  
Date: \_\_\_\_\_  
Rev.: \_\_\_\_\_00

**SECTION 00 01 15  
LIST OF EXHIBITS AND DRAWINGS**

<b>EXHIBIT</b>	<b>DESCRIPTION</b>
EXHIBIT A	Install Unit Sheets
EXHIBIT B	Remove Unit Sheets

<b>CONTRACT DRAWINGS</b>		
<b>DRAWING NO.</b>	<b>REV.</b>	<b>DESCRIPTION</b>
2-1079.00	R4-01	Utility Plan Sheet
2-1079.00	R4-02	Framing Units
2-1079.00	R4-03	Utility Framing

END OF SECTION 00 01 15



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**SECTION 00 41 13  
BID FORM**

**1.01 SUMMARY OF BID (from Unit Price Bid Sheet below)**

BID ITEM A: New Construction	
BID ITEM B: Retire Construction	
BID ITEM C: Transfer Construction	
TOTAL BID	

Note: Contractor must submit with this bid a bill of material with catalog numbers of all material provided.



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**1.02 UNIT PRICE BID SHEET**

Assembly Name	Status	Description	Qty	Labor Unit Price	Material Unit Price	Extended Labor and Material Price
<b>BID ITEM A (NEW)</b>						
	Construction		2			
	Construction		1			
	Construction		2			
	Construction		1			
	Construction		2			
	Construction		9			
	Construction		2			
	Construction		2			
	Construction		1			
	Construction		1			
	Construction		2			
	Construction		1			
	Construction		7			
	Construction		13			
	Construction		13			
	Construction		1			
	Construction		5			
	Construction		1			
	Construction		3			

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BID FORM





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Assembly Name	Status	Description	Qty	Labor Unit Price	Material Unit Price	Extended Labor and Material Price
	Construction		1			
	Construction		1			
	Construction		7			
	Construction		4			
	Construction		1			
	Construction		2766			
	Construction		922			
	Construction		525			
	Construction		3			
	Construction		2			
	Construction		2			
	Construction		2			
	Construction		1			
<b>SUBTOTAL PRICE FOR BID ITEM A (NEW)</b>						
<hr/>						
<b>BID ITEM B (RETIRE)</b>						
	Retire		5			
	Retire		1			
	Retire		5			



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Assembly Name	Status	Description	Qty	Labor Unit Price	Material Unit Price	Extended Labor and Material Price
	Retire		1			
	Retire		1			
	Retire		2			
	Retire		1			
	Retire		2			
	Retire		1			
	Retire		2700			
	Retire		900			
	Retire		2			
	Retire					
<b>SUBTOTAL PRICE FOR BID ITEM B (RETIRE)</b>						
<b>BID ITEM C (TRANSFER)</b>						
	Transfer	Primary	300			
	Transfer	Neutral	92			
<b>SUBTOTAL PRICE FOR BID ITEM C (TRANSFER)</b>						



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**SECTION 01 10 00  
SUMMARY OF WORK**

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**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Description
- B. General Work Requirements
- C. Work Site Location
- D. Owner and Contractor-furnished Materials
- E. Work By Others
- F. Site Visits

**1.02 PROJECT DESCRIPTION**

- A. The Contractor shall be responsible for providing material, labor and equipment for the project including the various labor units to transfer, remove and install according to the Contract Drawings. The project will include the following:
  - 1. Contractor shall be responsible for ROW clearing for new overhead alignment.
  - 2. 12kv Construction Removal: Remove structures, guying, hookstick switch and XXX ACSR primary and XXX neutral located in construction zone identified on Contract Drawings. Removal shown in green on Plan View drawings.
  - 3. 12KV Construction Install: Install new deadends, tangent structures, guying, anchors, gang operated switch and re-conductor using new neutral. Installation shown in red on Plan View drawings.
  - 4. 12KV Transfer:

**1.03 GENERAL WORK REQUIREMENTS**

- A. The scope of Work includes the installation of a complete and functional system for serving distribution customers. The general scope of tasks are described as follows:
  - 1. Contractor responsible for layout and surveying of the proposed modifications. Owner shall provide survey locations of structures and anchors.
  - 2. Contractor shall submit a complete material list, with supplier, catalog information and catalog cut detail to Owner for review and approval.
  - 3. Contractor is responsible for providing supervisor(s) and personnel qualified to perform the Work as specified.
  - 4. The methods of framing and construction practices must conform to the latest and best current practice for the type of construction required for the application. The system shall be complete with all necessary accessories for proper operation.



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5. If any departure from the Contract or Contract Drawings is deemed necessary by the Contractor, details of such departure and the reasons therefor shall be submitted as soon as practicable to Engineer and Owner for approval. No such departures shall be made without prior written approval of Owner.
6. Contractor is advised that existing distribution line outages shall be held to an absolute minimum, may be prohibited at times, and at all times shall not remove any substation from service. The duration of outages may be restricted to maintain a satisfactory operating condition. In general, Contractor shall maintain the system in such condition that, in the event of any emergency, service can be restored with minimum effort and lost time. Contractor shall, whenever possible, lean the existing lines out of the way of the new construction during the construction phase of the Work, and take such steps consistent with the safe and reliable operating and construction procedures. If outage is required Contractor shall work with Owner to assure three phase loads are coordinated to limited outage and assure service is maintained.
7. Contractor shall coordinate material checkouts, detailed material counts, and locations where materials are used.
8. Contractor is responsible for providing for proper handling, storing and protection of materials.
9. Contractor is responsible for demolition, removing and disposing of existing wood poles and equipment as specified.
10. Contractor shall disassemble, store, protect and return removed materials to Owner's warehouse.
11. Contractor is responsible for transferring existing facilities, removing old facilities, and installing new facilities, as identified on the Contract Drawings. Additional holes and sagging of conductors shall be included in assembly price.
12. All pole top assembly units includes installation, and proper requirements for sagging of primary and neutral conductors.
13. All pole change-outs includes the transferring, dead-ending and reattachment of conductors.
14. Contractor is responsible for landscape and concrete repair due to construction activities including restoring, planting, seeding new areas and areas disturbed during construction.
15. Contractor is responsible for cleaning-up and disposing of debris and waste as project progresses.
16. Contractor is advised that construction will involve performing work adjacent to and on energized electrical power facilities owned by the Owner and others.
17. Contractor is responsible for coordinating construction activities with the Owner, other agencies and utilities as required by these specifications and associated permits.
18. Actual construction shall be based on the Contract Drawings. Any change to the Contract Drawings must be approved by Owner. Within 10 days after return of approved prints, copies shall be furnished to Owner for retention as a matter of record. Prior to completion of the Work, the originals, available from Owner, shall be revised to show all changes subsequent to original plans and submitted for retention as a matter of record.



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19. Contractor shall attend progress and scheduling meetings in person or by teleconference as allowed by the Owner.
20. Contractor is responsible for notifying Owner sufficiently in advance if a materials shortage is detected to avoid a project delay or shut-down.
21. Contractor responsible for providing barricading and traffic control during construction activities. Contractor shall abide by all Federal, State, local and Transportation Cabinet regulations. Use Proper D.O.T. traffic control procedures.
22. Contractor shall attend kickoff, progress and closeout meeting scheduled by Owner.
23. Owner will perform walkthrough inspection after completion; Contractor shall remedy identified issues before closeout.
24. Owner reserves the right to make ground inspections. The Contractor shall make any corrections required to bring project into compliance with original specifications at no cost to Owner.
25. Construction is not complete until Contractor has energized lines at operating voltage in accordance with RUS specifications and after Owners inspection.
26. It is the responsibility of the Contractor to verify the location of any and all underground utilities including water, gas, telephone, and sewage either privately or publicly owned. Contractor assumes sole responsibility for damages to facilities in or near work area if damage occurs. Contractor shall abide by state and utility notifications "One Call Law".
27. Temporary work necessary in the normal course of construction should be identified prior to bidding. No additional payment will be made.

**1.04 WORK SITE LOCATION**

- A. Within and outside the service territory of the City of Madisonville.

**1.05 OWNER - CONTRACTOR-FURNISHED ITEMS**

- A. All materials are Contractor-furnished.
- B. Contractor shall be responsible for maintaining a continuing inventory.
- C. Contractor is responsible for inventorying all units, construction drawings, and construction documents for material quantity requirements. All units are to be complete, functional and meet applicable safety standards.

**1.06 WORK BY OTHERS**

- A. The Owner will coordinate necessary outages and notifications of affected customers.

**1.07 SITE VISITS**

- A. The Contract Work stated and specified herein involves construction adjacent to energized overhead electric lines. The Engineer has attempted to depict construction conditions as accurately as possible; however, the Contractor is strongly advised to undertake the following:
  1. It is the responsibility of Contractor to review all construction documents and visit the proposed location of construction. The Contractor should visit the location for types of soil and terrain construction might encounter.



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2. Pay special attention to scheduling Work activities to permit expeditious accomplishment of the requirements.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION – NOT USED**

END OF SECTION 01 11 00



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**SECTION 02 41 00  
DEMOLITION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Existing Conditions
- B. Continuity of Electrical Service
- C. Coordination
- D. Preparation for Demolition
- E. Execution of Demolition

**1.02 EXISTING CONDITIONS**

- A. Conduct demolition to minimize interference with adjacent structures.
- B. Provide, erect, and maintain temporary barriers and security devices.

**1.03 CONTINUITY OF ELECTRICAL SERVICE**

- A. Maintain electrical service to customers during construction, wherever feasible.
- B. Coordinate customer outages with designated utility personnel and customers.

**1.04 COORDINATION**

Arrange for required power outages with Owner, customers, and other utilities as appropriate.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.01 PREPARATION FOR DEMOLITION**

- A. Locate and protect existing utilities.
- B. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- C. Protect existing landscaping, materials, appurtenances, and structures that are not to be demolished.

**3.02 EXECUTION FOR DEMOLITION**

- A. Demolish indicated structures and appurtenances in an orderly and careful manner. Take all precautions necessary for working near exposed, energized electrical equipment.
- B. Cease operations and notify Owner immediately if adjacent structures appear to be endangered. Do not resume operations until corrective measures have been taken.
- C. Remove demolished materials from site as Work progresses. Leave site in clean condition.



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- D. Demoeed materials become the property of the Contractor and are to be disposed of in accordance with applicable codes, with the exception of the following materials of which Owner will retain ownership: Transformers, switches, capacitors, lights and other materials specified by the Owner.
- E. Remove materials to be reinstalled or retained in manner to prevent damage.
- F. Remove and promptly dispose of contaminated, vermin infested, special or dangerous materials encountered.
- G. Do not burn or bury materials onsite.
- H. Resurface areas disturbed by demolition activities with surfacing equal to the existing surfacing.
- I. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- J. Backfill excavated areas, open pits, and holes caused as a result of demolition.
- K. Do not use explosives.
- L. Immediately notify Owner of damage to materials specified for reinstallation or return to stores.
- M. Damaged materials shall not be reinstalled.
- N. Materials returned to stores in damaged condition without notification to Owner will not be credited.

END OF SECTION 02 41 00





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**SECTION 32 90 05  
ROW VEGETATION CLEARING**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Work

**1.02 QUALITY ASSURANCE**

ROW vegetation clearing shall be done in the accordance with Kentucky Department of Highways.

**PART 2 - PRODUCTS**

**2.01 DESCRIPTION OF WORK**

ROW for new alignment and guying shall be cleared for new overhead construction. All structures and guying are out of construction zone with the exception of structure being replaced on south side of W. Center St. All structures and guying are within ROW.

**PART 3 – EXECUTION**

**3.01 GENERAL**

- A. All excess earth, rock, debris, underbrush, clearing debris and other useless material shall be removed from project area by the Contractor from the site as work progresses.
- B. Contractor shall not begin removal of trees or clearing of ROW without written notification from Transportation Cabinet. Contractor shall notify ROW authorities if adjacent landowners object to tree felling or trimming of any trees on land in connection with this project. Written consent shall be obtained before proceeding in any case.

END OF SECTION 32 90 05



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**SECTION 33 71 17  
WOOD POLE CROSSARMS**

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**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood Poles
- B. Wood Pole Structure Erection
- C. Wood Pole Handling

**1.02 QUALITY ASSURANCE**

Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. All work shall conform to REA/RUS specifications, the 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) and National Electric Code shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.

**PART 2 – PRODUCTS**

**2.01 WOOD POLES**

- A. Wood poles shall be Contractor-furnished Southern Pine.
- B. The Owner reserves the right to inspect materials at storage area.
- C. Poles shall be warranted to this specification. Any pole found no in conformance, within 1 year of delivery date, shall be replaced as promptly as possible by manufacturer.
- D. Southern Pine shall have a wood fiber strength of 8000 psi.
- E. Wood poles shall be marked with manufactures information. Items on the marking should include:
  - 1. Manufactures code or trademark.
  - 2. QA mark.
  - 3. Manufacture location and treatment year.
  - 4. Code letters for species, preservative (SP for Southern Pine).
  - 5. Length/class of pole.

**PART 3 - EXECUTION**

**3.01 WOOD POLE STRUCTURE ERECTION**

- A. Contractor is responsible for compacting excavated areas to minimize settlement of roads and ground. If settlement occurs, the Contractor is responsible for repair for a warranty period of one year.
- B. The depth of setting wood poles shall be 10% plus 2' in earth and 10% in rock.
- C. Poles shall be set no deeper than 3" than the values in the table above. No pole will be set



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less than "earth" depth without Engineer's approval.

- D. Poles set in holes partly in earth and partly in rock shall be set to the depths shown for "earth". Holes may be shortened only upon the Engineer's approval.
- E. Excavation is unclassified. No additional pay for rock excavation shall be provided.
- F. Unless directed by the Owner, it will not be permissible to cut off the top of any pole. It will not be permissible to cut off the bottom of any pole.
- G. All holes shall be dug in the correct locations and shall be large enough to provide space for use of power tamping bars all around poles to the full depth of the holes. The poles shall be carefully placed in the holes so that the structure grounding materials will not be damaged or displaced.
- H. Holes will be hand dug where requested by Underground Protective Services markings or Engineer.
- I. Structure Setting Tolerances
  - 1. Owner will inspect staked pole locations before construction setting activities. 48 hour notice shall be given for approval inspection.
  - 2. Poles shall be set according to the Drawings and Construction Schedule. No pole will be moved without Engineer's approval.
  - 3. Each structure shall be set within 2" of the centerline specified.
  - 4. Contractor will install a permanent identifiable mark 15' above pole butt as a check of setting depth.
  - 5. Angle poles will be raked not less than 1" for each 10' above ground.
  - 6. Poles shall be set so that the crossarm gains face in opposite directions on every other pole. However at line deadends, the last two poles shall be set so that the pole gains face the deadend.
- J. Backfill of Wood Pole Structures
  - 1. Poles shall be properly aligned before backfilling. Tangent poles to be set plumb in both directions. Angle poles raked as required.
  - 2. Loose dirt shall be removed from all holes and bottom tamped with hydraulic tamp. All backfill shall be done with a hydraulic tamp from bottom of hole to grade.
  - 3. Backfill shall contain enough natural or added moisture to be approximately equal to density of surrounding soils. Backfill shall be material excavated from hole unless directed by the Engineer. All backfill shall be placed in 6" layers and each layer power tamped to a density, after completion, equal to surrounding soils. Where rocks, gravel, sand, swampy or murky type soils are encountered in hole digging, this shall not be used as backfill. Do not use sod or grassy soil or place foreign objects in the backfill.
  - 4. Holes excavated for aggregate backfill shall be a minimum 4" greater in diameter than the pole butt or bearing plate if used.
  - 5. Holes, over excavated, shall be backfilled with crushed rock until hole depth is that of



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appropriate setting depth of specified wood pole at no cost to Owner. Holes with excessive moisture shall be over excavated by 1'-0 and backfilled with crushed rock in over excavation.

- K. Excavation shall not be left open for more than two days.
- L. Additional pole holes shall not be tolerated. Should unnecessary or improperly bored holes compromise the strength, the pole shall be replaced by the Contractor at Contractor's expense.

**3.02 WOOD POLE HANDLING**

- A. Poles shall be handled with care so as not to damage the wood or the preservative treatment. Pole tongs or Cant hooks shall be handled so as to avoid excessive tearing of the wood. The Contractor shall not use tongs or cant hooks on any portion of the pole required to go underground. Poles shall not be dragged along the ground. Poles stored after delivery shall be arranged with care and shall be placed so that no pole will come in contact with standing water or the ground.
- B. Poles shall be set plumb and in alignment if not raked.

END OF SECTION 33 71 17



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**SECTION 33 71 23  
INSULATORS, LINE HARDWARE, CROSSARMS AND ANCHORS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Materials
- B. Insulators
- C. Hardware
- D. Crossarms
- E. Guys
- F. Anchors

**1.02 QUALITY ASSURANCE**

- A. Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. All work shall conform to REA/RUS specifications, the 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) and National Electric Code shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.
- B. All materials supplied by Contractor must be REA/RUS approved and manufactured in the United States.
- C. Contractor is responsible for inventorying all units, construction drawings, and construction documents for material quantity requirements. All units are to be complete, functional and meet applicable safety standards.
- D. All insulator ties, connectors, and guy grips are considered part of the units and will be supplied by the Contractor at no additional cost.

**PART 2 – PRODUCTS**

**2.01 INSULATORS**

- A. Suspension Insulators
  - 1. 12kV Application
    - a. 60 Hz, Dry Flashover 60 kV
    - b. 60 Hz, Wet Flashover 30 kV
    - c. Critical Impulse, Positive 100 kV
    - d. Leakage Distance 6-3/4" min inches
    - e. Specified Mechanical Load (SML) 10,000 lbs.
    - f. Routine Test Load (RTL) 5,000 lbs.
    - g. ANSI Classification ANSI class 52-9 or equivalent



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- h. Insulation Test Standard                      ANSI C29.2
  - i. Approved Manufacturers:                      Victor, Gamma Insulator, Locke
- B. Vertical Post Insulators Application and Specifications
- 1. 12kV Application – Pin type
    - a. 60 Hz, Dry Flashover                      xx kV
    - b. 60 Hz, Wet Flashover                      xx kV
    - c. Critical Impulse, Positive                      xx kV
    - d. Leakage Distance                      xx inches
    - e. Maximum Design Cantilever Load (MDCL) 1875 lbs.
    - f. Base End Fittings                      1.0" Stud
    - g. ANSI Classification                      ANSI class 55-x or equivalent
    - h. Insulation Test Standard                      ANSI C29.1
    - i. Approved Manufacturers                      Victor, Gamma Insulators, PPC
- C. Neutral Insulator and Clevis
- 1. ANSI Class
  - 2. Cantilever Strength                      lbs.
  - 3. Color                      Gray/Skyline
  - 4. Glaze                      Standard
  - 5. Approved Manufacturers                      Joslyn, Hubbell, Hughes Brothers
- D. Fiberglass Crossarms
- 1. Tangent
    - a. Length: 8 foot, 10 foot
    - b. Color: Gray
    - c. Mount: Center
    - d. Manufacturer: Pupi or equivalent
    - e. Catalog Numbers
      - 1) 8 foot:
      - 2) 10 foot:
  - 2. Deadend
    - a. Length: 8 foot, 10 foot



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- b. Color: Gray
  - c. Mount: Center
  - d. Manufacturer: Pupi or equivalent
  - e. Catalog Numbers
    - 1) 8 foot:
    - 2) 10 foot:
- E. Fiberglass Guy Strain Insulators
- 1. Ultimate Strength: 16,000 lbs.
  - 2. Length: 12 inch, 78 inch and 120 inches or as specified by Contract Drawings
  - 3. End fitting hardware shall meet all applicable ASTM standards
  - 4. End fitting hardware types: Clevis-Clevis, with one or two rollers as specified on Contract Drawings.
  - 5. Color: Gray
  - 6. Rod: Fiberglass with ultra-violet protective coating
  - 7. Manufacturer: Chance or equivalent

**2.02 LINE HARDWARE**

- A. Materials for use with ACSR conductors shall be forged steel or ductile iron, hot-dip galvanized in accordance with ASTM A153, or aluminum in accordance with ASTM 4-356-76.
- B. Dead-end Clamps: Straight-line type, spring-loaded, side opening for 12kV applications.
  - 1. Approved Manufacturers: Maclean, Hubbell, Burndy
- C. Cotter Pins: Stainless steel, Type 302 or 304
- D. Bolts
  - 1. Manufactured in accordance with ANSI C135.1
  - 2. Galvanized in accordance with ASTM A153-73
  - 3. Each bolt shall be furnished with one standard square nut.
  - 4. Size and type shall be furnished as specified in the Contract Drawings.
  - 5. Locknuts shall be used to back-up all threaded bolt nuts, unless a washer is included.
- E. Washers
  - 1. Galvanized in accordance with ASTM A153-73
  - 2. Size and type shall be furnished as specified in the Contract Drawings.
- F. Attachment hardware such as anchor shackles, links, and clevises shall be galvanized in accordance with ASTM A153 and supplied in sizes and types as specified in the Contract Drawings.



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**2.03 GUY RODS, ANCHORS AND ACCESSORIES**

- A. Contractor must have the capability to install all types of anchors.
- B. Anchors shall be power-installed, screw type with triple 8-inch, 10-inch, and 12- inch Helix; or quad 10-inch, 12-inch, 14-inch, and 14-inch Helix.
- C. Anchor rods shall be 8 feet in length by 3/4 inch square shaft, with double-eye adapter for triple Helix anchors.
- D. Rod extensions shall be 3-1/2 or 7 feet in length.
- E. Anchors shall have a minimum 10,000lb holding power in Class 5 soil.
- F. Triple helix anchors shall provide a minimum 26,000 pounds tension capacity for installation.
- G. Guy grips for use with steel guy stranding:
  - 1. 3/8-inch EHS 7 strand: Preformed Line Products
- H. Guy grips for use with steel guy stranding:
  - 1. Guy guards: yellow, plastic, full round, 8 feet with bolted connections, 75- mil thickness.
- I. Guying attachments shall be ductile iron, hot-dip galvanized in accordance with ASTM A-536, ASTM A153, respectively, and compatible with the ultimate guy strand(s) strength as specified in the Contract Drawings.

**PART 3 – EXECUTION**

**3.01 INSULATORS**

- A. Handle insulators with care. Protect fiberglass continuously with packaging until installed.
- B. Insulators shall be thoroughly cleaned of all foreign material before installation. Cotter pins must be fully inserted in insulator caps. If suspension insulators are raised separately from the pole structure, they shall be lifted from one (1) end of the assembly only. Bending of insulator strings, resulting in deformation of fittings or hardware, including cotter pins, shall result in rejection of the string, in which case Contractor shall re-fabricate the string at no cost to Owner. The movements of insulator strings for construction purposes shall be accomplished by pulling the string from the bottom. All movement of insulator string away from or back to vertical shall be controlled movement. All post insulators shall be handled in a manner to prevent damage. Damaged, chipped or cracked insulators shall be replaced by Contractor.
- C. Do not transport insulators and fiberglass units in any manner that will scratch, mar, or deface coating.

**3.02 HARDWARE**

- A. Before installation, inspect hardware for missing parts, visual defects, and damage to galvanizing. Clean hardware by removing dirt, corrosion, and foreign matter. Repair damage to galvanizing to Engineer's satisfaction.
- B. Tighten all hardware firmly, using properly-installed lock washers, lock nuts and spring washers.
- C. Provide a washer at each point where a bolt head or nut bears on the surface of a pole or crossarm. Provide a locknut with each nut, eye nut, or other fastener on all bolts or threaded hardware.





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- D. Bore or drill all bolt holes such that the attached hardware and bolt is on the same horizontal or vertical plane. If required, bore bolt holes so they are in a level plane and in-line with deadend pulls, or at right angles to the line in tangent construction.
- E. Bolt exposure shall be restricted to 2" maximum exposure. Contractor shall use correct size and length. Do not cut bolts to achieve this tolerance.
- F. Tighten nuts firmly with properly installed lock washers, lock nuts, spring washers, and cotter pins. Orient nuts and cotter pins toward pole or downward, as applicable. Spread and bend back straight cotter pins in hardware bolts so as to be shielded by the outer face of the unit to prevent corona. Do not use wrenches. Do not flake or damage galvanizing.
- G. Hardware and other attachments to the pole shall be tightened to the point where sufficient compression is obtained to offset the effects of future pole shrinkage. Each item of hardware shall be thoroughly tightened and shall be set with locknuts and where necessary or suitable to the application with spring-type lock washers. Suitable flat, curved or reinforced washers shall be used to provide adequate bearing on wood surfaces.
- H. Anchor shackles shall be installed, as required by REA/RUS specifications.

**3.03 GUYS**

- A. Guys shall be provided where and as required by the Contract Drawings, and at other locations where required by changes in proposed line routing. Guys shall be of the strength, size and types specified herein. Where necessary, additional extension lengths shall be provided to screw anchors to ensure its placement into firm soil and shall be included as Work of this Contract. Guys shall be installed sufficiently tight to snug hardware, to prevent radio noise, and to set the anchor. The ground line at the top anchor rod shall be marked prior to loading. Creepage in excess of 1.5" shall be considered excessive, requiring anchors to be re-set as Work of this Contract. All hardware fittings and connections shall be tight. All down guys shall be equipped with approved guy guards.
- B. Install all guy strands prior to conductor stringing operations. Guys shall be evenly pre-tensioned such that structure loads remain balanced during stringing.
- C. Place all guys before conductors are transferred or installed. Attach guys to poles as specified in the Drawings. Ensure proper adjustment of guys when transferring and tensioning conductors so that loading on structures is balanced.
- D. All guys shall be installed prior to loading the structures. If, after loading the structures, Owner determines that final adjustments to the guys are necessary, Contractor shall make such adjustments to the satisfaction of the Owner.
- E. Guy insulators shall be installed as specified in the Contract Drawings.
- F. Install guy anchors in-line with slope of guy strand. Install double-guy anchors on a slope equal to the average slope of guy strands.
- G. Guys must be of size and types shown on the Contract Drawings. Test anchors at the time of installation for 100 percent of manufacturer- specified holding capacity using the sheer pin/torque method or other methods recommended by the anchor manufacturer and approved by the Engineer. The Contractor shall submit written documentation of anchor tests, before conductor installation, indicating pole number, type of anchor, and proof of holding capacity.

**3.04 ANCHORS**



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- A. Anchors must be of size and types shown on the Drawings.
- B. Install anchors according to the manufacturer's written instructions. Install anchors and verify the holding capacity of all new anchors before conductors are transferred or installed.
- C. All anchors and rods shall be in line on the bi-sector of multiple strain anchors. Each anchor rod shall be aligned with its connected guys and shall extend not less than 3", not more than 9" above the ground surface after the connected structure has been loaded.
- D. The backfill of all anchor holes must be thoroughly tamped the full depth.
- E. Excavation shall not be left open for more than two days.
- F. The Contractor shall have all equipment required to install the screw anchors according to manufacturer's instructions. Torque capacity of the driving rig shall be at least 120 percent of the installation torque specified by the anchor manufacturer. The driving rig must be capable of applying an axial downward force on the anchor, as recommended by the manufacturer. This axial force shall be applied consistently throughout anchor installation to insure the anchor advances the proper depth for each revolution, as specified by the anchor manufacturer.
- G. Drive all anchors, adding extension shafts and couplings, as required, until the manufacturer's recommended installation torque is achieved. The anchor must then be advanced for the distance specified by the manufacturer while maintaining torque. If the torque decreases, continue driving until the specified torque is reached again, and maintain torque for the specified distance.
- H. Immediately notify the Engineer if difficulties are experienced during installation. The Engineer will instruct the Contractor whether to proceed with installation or to remove the screw anchor and install an alternate anchor.
- I. All anchor assemblies requiring abandonment in soil shall be cut off 12 inches below grade. All anchor assemblies requiring abandonment in rock shall be cut off at grade.
- J. Unless an alternate location is specifically approved by the Engineer, all anchors shall be installed within 6 inches of the location specified on the Contract Drawings.

END OF SECTION 33 71 23



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**SECTION 33 71 25  
CONDUCTOR, GUY WIRE AND GROUNDING WIRE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Conductor and Accessories
- B. Wire Sagging and Clipping
- C. Splices, Deadends, and Connections
- D. Grounding
- E. Inspection and Testing

**1.02 SUBMITTALS**

- A. Provide stringing plans and setup locations.
- B. Owner will provide sag charts for installation.

**1.03 QUALITY ASSURANCE**

Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. The 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.

**PART 2 – PRODUCTS**

**2.01 CONDUCTOR AND ACCESSORIES**

- A. All materials are Contractor-furnished.
- B. 12kV Primary conductor shall be
- C. Neutral conductor shall be:

**2.02 GROUNDING MATERIALS**

- A. All grounding materials will be Contractor-furnished.
- B. Ground rods for overhead distribution: Copper-clad or copper-bonded, 5/8-inch minimum diameter by 8 feet in length.
- C. Grounds and Accessories: Ground clamps for 5/8-inch rod, safety set screw, Joslyn J8492.
- D. Use #1/0 stranded copper, soft-drawn for pole down leads.

**PART 3 – EXECUTION**

**3.01 WIRE SAGGING AND CLIPPING**

- A. Follow practice recommended in the latest edition of IEEE No. 524 "IEEE Guide to the Installation of Overhead Transmission Line Conductors".
- B. Installation shall provide necessary clearances between conductors and ground, between conductors, or between conductors and other surfaces. All necessary precautions shall be taken



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to ensure that the conductors, poles, insulators, or other facilities are not damaged. Particular care must be taken to ensure that the conductors are not damaged in any manner. Conductors must not be drawn across the ground and shall not be drawn over crossarms without proper protection. Conductor installation shall be accomplished, using approved sheaves and other equipment. All sections of conductor damaged by application of gripping attachments shall be repaired or replaced prior to completion of Work

- C. Initial or Final Sag tables, as applicable, shall be provided by the Engineer. Sagging of the conductor by the controlled tension method is acceptable.
- D. Tighten all guys before the conductors are transferred to new structures.
- E. The Contractor's sagging procedure must be approved by the Engineer. Regardless of the procedure used, the resulting final sags must be within a tolerance of  $\pm 3$ " of the specified sags.
- F. Determine sag temperature by using an accurate thermometer placed in the open at a height approximately equal to the sagged height of the wire.
- G. After sagging the wire, record, in a format approved by the Engineer, all pertinent sagging information including but not limited to temperature, span length, time, and sag. Provide such information to the Engineer in writing.
- H. Make up jumper loops such that they present a smooth, uniformly curving appearance. Form the jumper such that the completed jumper meets clearance requirements from live parts to ground as given in the NESC current at the time of bid opening.

**3.02 SPLICES, DEADENDS, AND CONNECTIONS**

- A. Make full-tension splices, if required, in the presence of the Owner's representative.
- B. Do not install splices in road, highway or powerline crossing spans.
- C. Thoroughly clean conductor surfaces of all foreign matter at the fitting location. Remove conductor sections damaged by the application of gripping attachments before the conductors are spliced with the permanent compression splices.
- D. Remove all wrapping, binding, and excess grease and compound at the completion of pressing operations. The strands of the conductors or wire must be snugly seated when the splice is completed. Remove slight bends in the fitting using a method that protects the fitting from damage.
- E. Remove all burrs and die marks from splices, deadend fittings, and jumper terminals.
- F. Install the compression splices in accordance with manufacturer instructions. Use manufacturer-recommended filler compound. Select the correct die by matching the index numbers stamped on both the fitting and die set. Do not allow the weight of the conductor or wire to be applied to the dies.
- G. Install compression deadend assemblies in accordance with manufacturer recommendations.

**3.03 GROUND RODS - OVERHEAD LINES**

- A. Driven grounds shall consist of a system of 5/8 inch by 8 foot sectional ground rods, complete with coupling sleeves and driving studs, connected vertically and driven a minimum of 2 rods deep. Locate ground rods so that the top is at least 2 feet below grade. The ground rods shall be bonded to each other and to the pole down-leads with #6 C.W. bare conductor. If refusal is encountered before full depth is reached and relocation of rod is impractical, remove rod and



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drill a 2"-diameter vertical hole to full depth, place ground rod, and fill remaining space with bentonite clay. Used only as approved by Owner.

- B. Install ground rods along center line of line.
- C. Placing ground rods in "pole embedment hole" is not acceptable.
- E. All guy wires shall be bonded to the pole ground and neutral in accordance with NESC and RUS requirements. Guy markers shall be installed on all guys.

**3.04 GROUNDING CONNECTIONS**

- A. Clean electrical contact surfaces with solvent or abrasion, as recommended by connector manufacturer, to provide a clean contact. Apply a liberal coat of oxidation inhibiting compound to all buried and bimetallic connections. Remove excess compound after installation. Torque connection bolts as recommended by the manufacturer.

**3.05 INSPECTION AND TESTING**

Before energizing any circuit, inspect the complete section of line circuit that will be energized to verify that the circuit segment is complete and free from all extraneous connections and unsafe conditions. Test each section of line that will be energized for absence of shorts and grounds, as well as for conductor continuity and correct phasing. Notify Owner not less than 48 hours in advance of scheduled times for energizing line circuits.

END OF SECTION 33 71 25



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**SECTION 33 71 26.05  
DISTRIBUTION LINE SWITCHES**

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**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Distribution Switches

**1.02 SUBMITTALS**

- A. Shop Drawings

- 1. Erection details including bill of material, for installation of wood pole(s).

- B. Ratings

- 1. Electrical ratings including nominal and maximum continuous operating voltage, rated withstand voltage, continuous and momentary asymmetrical current and maximum load interrupting capability
  - 2. Mechanical strength rating of frame for balanced and unbalanced conductor tension loading

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Distribution switches shall be shipped with all three switch poles and interphase operating mechanism preassembled to the switch mounting crossarm. Each three-pole switch assembly shall be crated in a manner suitable for stacking. Operating pipes shall be shipped unassembled and banded together, one set per switch, properly identified and protected against damage. All loose parts and operating mechanism hardware shall be shipped in a common container properly identified.
- B. Shipping Requirements:
  - 1. Switches shall be assembled, with insulators, and fully adjusted before shipment.

**PART 2 – PRODUCTS**

**2.01 GENERAL**

- A. Test: Successfully passed ice tests on a prototype model as outlined on ANSI "Test Code for High Voltage Air Switches."
- B. After fabrication, hot-dip galvanize bases, operating mechanisms and other steel parts in accordance with ASTM A 123. Do not drill, cut or alter after galvanizing.
- C. Switch terminal pads: NEMA 2-hole tinned.

**2.02 DISTRIBUTION SWITCHES**

- A. Three-phase gang-operated switches supplied for distribution applications shall be horizontal side-break, upright mounting, with three switch assemblies rigidly attached to a common, steel, pole-mounted crossarm.
- B. Approved manufacturer: S&C



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C. Supplied switches shall meet the following electrical requirements:

- 1. Nominal Operating Voltage, kV: 12.47
- 2. Maximum Operating Voltage, kV: 15.5
- 3. Basic Impulse Level, kV: 95
- 4. Continuous Rating, Amps: 600
- 5. Momentary Asymmetrical Rating, kA 25
- 6. Minimum Load Interrupting Rating, Amps: 600

**2.03 ACCESSORIES**

- A. Grounding strap and clamps for attachment to the vertical operating shaft. Strap to be braided copper wire, tinned, at least 18 inches long with two 9/16 inch holes at one end for attachment to the pole grounding.
- B. Switch blade position indicator located near operator.
- C. Provision for padlocking in either OPEN or CLOSED position.
- D. Operator: As specified on Contract Drawings

**PART 3 – EXECUTION**

**3.01 GENERAL**

- A. Follow manufacturer-provided instructions and recommendations for the following:
  - 1. Receiving and storage
  - 2. Assembly and adjustment of switch components
  - 3. Inspection of complete switch assembly
  - 4. Switches shall be made with compression type connectors. Drilling and hole boring and other miscellaneous items shall be considered part of unit or pole assembly and included in bid cost.

END OF SECTION 33 71 26.05



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**SECTION 33 71 75  
OVERHEAD ELECTRICAL SYSTEM CONSTRUCTION**

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**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Units
- B. Construction

**1.02 QUALITY ASSURANCE**

- A. Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. The 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.
- B. If any materials, equipment or workmanship shall be deemed defective after delivery or installation before final acceptance of project. The replacement or remedy of shall be at the expense of the Contractor.
- C. In the event the Owner determines the construction contains numerous defects, it shall be the duty of the Contractor to have inspection, if any, made by an engineer approved by the Owner.

**PART 2 - PRODUCTS**

**2.01 DESCRIPTION OF UNITS**

- A. Special units and descriptions are included in Contract. Remainder of unit descriptions will be found in REA/RUS Bulletin 50-3 Standard D-804: Specifications and Drawings for 7.2/12.5 kV Line Construction.
- B. Fiberglass braceless crossarms and manufacturer provided material will be used in place of wood crossarms and braces. Crossarms to be installed at same location of RUS and construction drawings provided in this contract. It is the Contractor responsibility to verify what material is supplied from manufacturer.
- C. Maintain careful and accurate records of all materials removed or reused as specified.
- D. The construction assemblies are on a unit basis so that the Owner may authorize any combination, addition or deletion, of construction units desired. The descriptions apply to those assemblies on the Contract Drawings on the Assembly Guide Drawings and includes all necessary labor and Owner-furnished material required to make the assemblies complete, including testing and submitting report forms where required, as follows:
  - 1. Installation (Add) Units
    - a. Specified by designation of the assembly unit to be installed, e.g. "ADD: C1-1" signifies the installation of a C1-1 assembly unit as identified on the Assembly drawings.
    - b. Maintain careful and accurate records of all materials removed or reused as specified.
  - 2. Pole Installation
    - a. Consists of one pole in place. The first digits indicate length: the following shows





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classification. Thus, "45-3" signifies a 45-foot class 3 wood-equivalent pole. Similar designations may be used for varying pole manufacturers.

- b. Site restoration at pole and along access to pole is a part of unit requirements.
  - c. Includes the "covering" up of existing conductors and/or the transfer of conductors to "Hot Arms" for work clearance/code requirements.
3. Overhead Conductor Installation
- a. Consists of 922' (K ft) of 3-phase conductor primary and is the measured horizontal distance between conductor supports. The unit includes tie wires, clamping, sleeves for splicing, connectors, and armor rods; jumpers and connections at deadends, junctions and taps. Includes report form submittal.
  - b. Unit will include the spreading of existing conductors onto hot arms as required.
4. Pole Top Assembly Installation
- a. Consists of the hardware, crossarms and their appurtenances, insulators, connectors, hot-line clamps, and stirrups, etc., except tie wire required to support the conductors. Unit does not include the pole ground downlead wire.
  - b. Includes the "covering" up of existing conductors and/or the transfer of conductors to "Hot Arms" for work clearance/code requirements.
5. Gang-Operated Switch
- a. Specified by the term "GOAB". Consists of insulators, switch, crossarms, terminal pads, switch base, controls. Refer to manufacturer specifications for installation instructions.
6. Ground Installation
- a. Consists of the ground wire, staples, ground molding where required, ground rod, all connectors, clamps and associated hardware as indicated on the various guide drawings. Includes testing and report form submittal.
7. Guy Installation
- a. Consists of the necessary length, both overhead and down guys, of guy wire, all bolts and fasteners, lag screws, guy bonding bolt, deadend hardware, grounding jumpers and connectors. Guy markers are part of this assembly.
8. Anchor Installation
- a. Consists of the anchor with rod complete with applicable bonding clamp and ready for attaching the guy wire, including testing, and report form submittal. Anchor rod extensions required to meet the holding capacity will be additional units.
9. Transfer Assembly
- a. Specified by the prefix "TR" and followed by the designation of existing assembly unit to be transferred.
  - b. Transfer unit will be used when a unit may be removed and installed from one set up of truck as determined by Owner.
  - c. Consists of furnishing of all labor for removing and reinstalling the unit specified from one



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location to another on the same or new pole, as required. Material in the transfer unit such as brackets, braces and etc. may be reused if in satisfactory condition and only when approved by Owner.

- d. Includes the removal and reattachment of any or all conductors associated with the unit, any sagging or re-sagging, tying, untying and re-tying, armor rodding or re-armor rodding, all splices, connectors, etc., and any other labor required to make a complete assembly.
- e. Transfer of guy wire requires installation of new preformed deadend grips.
- f. Splicing of guy wire is not acceptable.

**10. Removal Units**

- a. All assembly units specified by the "REMOVE" and followed by the assembly unit designation of existing assembly unit to be removed.
- b. Includes the furnishing of all labor for removal of existing units of construction from existing lines, disassembling into material items, and all labor and transportation for the returning of all materials in groups of like items to the warehouse of the Owner in an orderly manner, or transporting elsewhere to the site of the Project or for reuse in the prosecution of this Contract as specified.
- c. Do not place removed materials or equipment where it will be damaged by or cause damage to vehicular traffic, livestock, persons and property. Immediately remove from the job site.
- d. Includes, in addition to the removal of the assembly itself, any necessary transferring, holding and handling, re-sagging, splicing, re-armor rodding, and retying and all connectors and reconnecting of all conductors, jumpers and leads in those cases where an existing assembly will be removed and replaced by a new assembly and where any existing conductor is to be reused.

**11. Pole Removal**

- a. Includes all poles of the same height, regardless of pole class, and designated by the same unit.
- b. Includes pulling and salvage of all poles designated as removals. Poles are not to be cut off unless specified.
- c. Includes immediate backfill of holes with solidly tamped earth in 6" maximum thickness layers and refill to the ground line of any settlement that occurs during the contract period.
- d. When backfilling holes at pole removal locations, do not dig holes in the landscape to obtain backfill. Obtain backfill dirt by scooping or scraping within the designated right-of-way or by fill dirt obtained locally. Do not dig seeded areas within highway or public rights-of-way. Do not place foreign objects in backfill.
- e. Includes the replacement of the surrounding surface where concrete, asphalt, or other man-made surfaces are encountered.
- f. Poles that are designated to be "removed" shall not have the tops cut off unless the existing pole conflicts with the safe operation and construction of the new facilities.
- g. Joint Use Poles designated for "removal" shall not be topped without providing prior



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notification to the Owner. Before topping any Joint Use pole designated for "removal", the Contractor shall be responsible for contacting the occupying Joint Use Utility and request that said Utility vacate the subject pole. The Contractor shall provide Owner verification of contact if requested. If the Joint Use Utility cannot or will not vacate the pole, the Contractor may top the pole, if such pole conflicts with the safe operation and construction of the new facilities. This function is considered "means and methods", and no additional compensation will be made for topping poles designated for removal or for coordinating work with the Joint

- h. Use Utility unless prior approval has been received from the Owner. The Contractor, for the duration of the construction contract, shall be responsible for the removal of all "topped" poles previously designated for "removal" and upon removal will be compensated the "removal" unit bid price.

**12. Pole-Top Assembly Removal**

- a. Includes, in addition to the removal of the assembly itself, any necessary holding and handling, resagging, splicing, re-armor rodding, and retying and all connectors and reconnecting of all conductors, jumpers and leads in those cases where an existing assembly will be removed and replaced by a new assembly and where any existing conductor is to be reused.
- b. Includes any holding or handling of mainline or tap conductors at tap lines, angles, and deadends where such is involved, and reinstalling of any conductor as required by the assembly. The new unit of construction will be specified separately.

**13. Conductor Removal**

- a. Includes the removal unit for each size of conductor or cable shown by the "Remove" followed by the conductor or cable type.
- b. Includes removal in the longest practical length, preferably between deadends, without unnecessary kinking or nicking. It also includes coiling or reeling of all conductors, and removing and retaining possession of all tie wire, armor rods, jumpers, and miscellaneous connectors.

**14. Guy Removal**

- a. Includes all guys, attachments, hardware, grounds, and insulation regardless of length, type of attachment, size of guy strand or accessories. Thus, REMOVE: "E" signifies removal of any down guy or span guy assembly including attachment, hardware, grounds, and insulation.
- b. Includes removal and coiling of guy strand in the longest practical length and the dismantling of all three-bolt clamps, guy attachments, bonding bolts and guy guards.

**15. Anchor Removal**

- a. Includes only anchor rod removal in the anchor removal units. The anchors will be left in the ground. Rods unable to be removed will be cut off 18" below grade.



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**PART 3 - EXECUTION**

**3.01 CONSTRUCTION**

- A. Removing and Replacing Fences, Sod, etc. shall be completed as follows:
  - 1. The Contractor shall carefully remove and store all interfering fences, mailboxes, culverts, shrubs, flowers, other planting, etc. After installation of work and backfilling, reinstalling these items and restoring to at least the conditions which existed prior to commencement of work using materials and workmanship to match those of original construction and installation.
- B. Coordination shall be provided as follows:
  - 1. The Contractor and all Subcontractors for the various branches of work employed on the Project shall cooperate fully with each other to facilitate the progress of the work, and to avoid all interferences between the various parts of the work.
  - 2. The Contractor shall cooperate fully with any other contractor that is engaged in work on the Project for the Owner or any other contractor working in the Project area.
- C. Poles shall be installed per Section 33 71 16.43 - Wood Poles Construction.
- D. Pole Top Assemblies shall be installed as follows:
  - 1. Pole top assemblies shall be framed in accordance with drawings.
  - 2. Switches shall be installed in accordance with manufacture specifications.
- E. Insulators shall be installed per Section 33 71 23 – Insulators, Hardware and Anchors.
- F. Practices relative to right-of-way shall be observed by the Contractor during construction as follows:
  - 1. The ROW shall consist of an area as determined by the state highway markers on both sides of the center line of the route of the Project lines.
  - 2. Limit the movement of crews and equipment so as to cause as little damage as possible to cultivated land, pastures, bridges, crops, orchards, or other property, and endeavor to avoid marring the lands. Replace all fences which are necessarily opened or moved during the construction of the Project, in as good condition as they were found and take precautions to prevent the escape of livestock. The Contractor shall be responsible for all damage and loss, outside right-of-way, as specified herein, caused by the construction of the Project.
  - 3. All rights-of-way and easements across private or public property required for performance of the work herein will be obtained by the Owner. Access to the Project area outside the rights-of-way limits specified shall be the responsibility of the Contractor. The Owner shall be informed of all arrangements made for such access. Promptly restore to at least the conditions which existed prior to the commencement of work any ruts or damage made by equipment whether on or off the right-of-way.

END OF SECTION 33 71 75



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# Exhibit A

# Install Unit Sheets



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# Exhibit B

# Remove Unit Sheets



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# Contract Drawings

KyTC BMP Plan for Project PCN ## - #####



**Kentucky Transportation Cabinet**

**Highway District 2 (1)**

**And**

\_\_\_\_\_ **(2), Construction**

**Kentucky Pollutant Discharge Elimination System  
Permit KYR10  
Best Management Practices (BMP) plan**

**Groundwater protection plan**

**For Highway Construction Activities**

**For**

**RE-CONSTRUCTION AND WIDENING OF  
US41A FROM KY 1178 TO US41**

**Project: PCN ## - #####**



## KyTC BMP Plan for Project PCN ## - ####

### Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – Kentucky Transportation Cabinet, District 2
2. Resident Engineer: (2)
3. Contractor name: (2)  
Address: (2)  
  
Phone number: (2)  
Contact: (2)  
Contractors agent responsible for compliance with the KPDES permit requirements (3):
4. Project Control Number (2)
5. Route (Address) : US 41A
6. Latitude/Longitude (project mid-point) dd/mm/ss, dd/mm/ss:  
  
Lat: 37/20/47, Long: 87/30/16
7. County (project mid-point): HOPKINS
8. Project start date (date work will begin): (2)
9. Projected completion date: (2)

## KyTC BMP Plan for Project PCN ## - ####

### A. Site description:

1. Nature of Construction Activity (from letting project description): Re-construction and widening of US 41A from KY 1178 to US 41
2. Order of major soil disturbing activities (2) and (3)
3. Projected volume of material to be moved : 105,688 C. Y.(1)
4. Estimate of total project area (acres) : 52.1 acres(1)
5. Estimate of area to be disturbed (acres) : 40.7 acres(1)
6. Post construction runoff coefficient will be included in the project drainage folder. Persons needing information pertaining to the runoff coefficient will contact the resident engineer to request this information.
7. Data describing existing soil condition: See Geotech report if available. See Roadway Plans(1) & (2)
8. Data describing existing discharge water quality (if any): (1) & (2)
9. Receiving water name: (1)
10. TMDLs and Pollutants of Concern in Receiving Waters: N/A(1 DEA)
11. Site map – Project layout sheet plus the erosion control sheets in the project plans that depict Disturbed Drainage Areas (DDAs) and related information. These sheets depict the existing project conditions with areas delineated by DDA (drainage area bounded by watershed breaks and right of way limits), the storm water discharge locations (either as a point discharge or as overland flow) and the areas that drain to each discharge point. These plans define the limits of areas to be disturbed and the location of control measures. Controls will be either site specific as designated by the designer or will be annotated by the contractor and resident engineer before disturbance commences. The project layout sheet shows the surface waters ,wetlands, organic enrichment, nutrient and dissolved oxygen.
12. Potential sources of pollutants:

The primary source of pollutants is solids that are mobilized during storm events. Other sources of pollutants include oil/fuel/grease from servicing

## KyTC BMP Plan for Project PCN ## - #####

and operating construction equipment, concrete washout water, sanitary wastes and trash/debris. (3)

### **B. Sediment and Erosion Control Measures:**

1. Plans for highway construction projects will include erosion control sheets that depict Disturbed Drainage Areas (DDAs) and related information. These plan sheets will show the existing project conditions with areas delineated by DDA within the right of way limits, the discharge points and the areas that drain to each discharge point. Project managers and designers will analyze the DDAs and identify Best Management Practices (BMPs) that are site specific. The balance of the BMPs for the project will be listed in the bid documents for selection and use by the contractor on the project with approval by the resident engineer.

Projects that do not have DDAs annotated on the erosion control sheets will employ the same concepts for development and managing BMP plans.

2. Following award of the contract, the contractor and resident engineer will annotate the erosion control sheets showing location and type of BMPs for each of the DDAs that will be disturbed at the outset of the project. This annotation will be accompanied by an order of work that reflects the order or sequence of major soil moving activities. The remaining DDAs are to be designated as "Do Not Disturb" until the contractor and resident engineer prepare the plan for BMPs to be employed. The initial BMP's shall be for the first phase (generally Clearing and Grubbing) and shall be modified as needed as the project changes phases. The BMP Plan will be modified to reflect disturbance in additional DDA's as the work progresses. All DDA's will have adequate BMP's in place before being disturbed.
3. As DDAs are prepared for construction, the following will be addressed for the project as a whole or for each DDA as appropriate:
  - Construction Access – This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary mulch and/or vegetation.
  - At the beginning of the project, all DDAs for the project will be inspected for areas that are a source of storm water pollutants. Areas that are a source of pollutants will receive appropriate cover or BMPs to arrest the introduction of pollutants into storm water. Areas that have not been opened by the contractor will be

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- inspected periodically (once per month) to determine if there is a need to employ BMPs to keep pollutants from entering storm water.
- Clearing and Grubbing – The following BMP's will be considered and used where appropriate.
    - Leaving areas undisturbed when possible.
    - Silt basins to provide silt volume for large areas.
    - Silt Traps Type A for small areas.
    - Silt Traps Type C in front of existing and drop inlets which are to be saved
    - Diversion ditches to catch sheet runoff and carry it to basins or traps or to divert it around areas to be disturbed.
    - Brush and/or other barriers to slow and/or divert runoff.
    - Silt fences to catch sheet runoff on short slopes. For longer slopes, multiple rows of silt fence may be considered.
    - Temporary Mulch for areas which are not feasible for the fore mentioned types of protections.
    - Non-standard or innovative methods.
  - Cut & Fill and placement of drainage structures - The BMP Plan will be modified to show additional BMP's such as:
    - Silt Traps Type B in ditches and/or drainways as they are completed
    - Silt Traps Type C in front of pipes after they are placed
    - Channel Lining
    - Erosion Control Blanket
    - Temporary mulch and/or seeding for areas where construction activities will be ceased for 21 days or more.
    - Non-standard or innovative methods
  - Profile and X-Section in place – The BMP Plan will be modified to show elimination of BMP's which had to be removed and the addition of new BMP's as the roadway was shaped. Probably changes include:
    - Silt Trap Type A, Brush and/or other barriers, Temporary Mulch, and any other BMP which had to be removed for final grading to take place.
    - Additional Silt Traps Type B and Type C to be placed as final drainage patterns are put in place.
    - Additional Channel Lining and/or Erosion Control Blanket.
    - Temporary Mulch for areas where Permanent Seeding and Protection cannot be done within 21 days.
    - Special BMP's such as Karst Policy
  - Finish Work (Paving, Seeding, Protect, etc.) – A final BMP Plan will result from modifications during this phase of construction. Probably changes include:
    - Removal of Silt Traps Type B from ditches and drainways if they are protected with other BMP's which are sufficient to

## KyTC BMP Plan for Project PCN ## - #####

control erosion, i.e. Erosion Control Blanket or Permanent Seeding and Protection on moderate grades.

- Permanent Seeding and Protection
  - Placing Sod
  - Planting trees and/or shrubs where they are included in the project
- BMP's including Storm Water Management Devices such as velocity dissipation devices and Karst policy BMP's to be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed are : Seeding and Protection, Erosion Control Blanket, Grassed Waterways (1)

### **C. Other Control Measures**

1. No solid materials, including building materials, shall be discharged to waters of the commonwealth, except as authorized by a Section 404 permit.
2. Waste Materials

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease containers, liquids of any kind, soluble materials, etc.) will be collected and stored in appropriate covered waste containers. Waste containers shall be removed from the project site on a sufficiently frequent basis as to not allow wastes to become a source of pollution. All personnel will be instructed regarding the correct procedure for waste disposal. Wastes will be disposed in accordance with appropriate regulations. Notices stating these practices will be posted in the office.

3. Hazardous Waste

All hazardous waste materials will be managed and disposed of in the manner specified by local or state regulation. The contractor shall notify the Resident Engineer if there any hazardous wastes being generated at the project site and how these wastes are being managed. Site personnel will be instructed with regard to proper storage and handling of hazardous wastes when required. The Transportation Cabinet will file for generator, registration when appropriate, with the Division of Waste Management and advise the contractor regarding waste management requirements.

4. Spill Prevention

The following material management practices will be used to reduce the risk of spills or other exposure of materials and substances to the weather and/or runoff.

## KyTC BMP Plan for Project PCN ## - #####

### ➤ **Good Housekeeping:**

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite

### ➤ **Hazardous Products:**

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- Contractor will follow procedures recommended by the manufacturer when handling hazardous materials
- If surplus product must be disposed of, manufacturers' or state/local recommended methods for proper disposal will be followed

**The following product-specific practices will be followed onsite:**

### ➤ **Petroleum Products:**

Vehicles and equipment that are fueled and maintained on site will be monitored for leaks, and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products onsite will be stored in tightly sealed containers, which are clearly labeled and will be protected from exposure to weather.

The contractor shall prepare an Oil Pollution Spill Prevention Control and Countermeasure plan when the project that involves the storage of petroleum

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products in 55 gallon or larger containers with a total combined storage capacity of 1,320 gallons. This is a requirement of 40 CFR 112.

This project (will / will not) (3) have over 1,320 gallons of petroleum products with a total capacity, sum of all containers 55 gallon capacity and larger.

### ➤ **Fertilizers:**

Fertilizers will be applied at rates prescribed by the contract, standard specifications or as directed by the resident engineer. Once applied, fertilizer will be covered with mulch or blankets or worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

### ➤ **Paints:**

All containers will be tightly sealed and stored indoors or under roof when not being used. Excess paint or paint wash water will not be discharged to the drainage or storm sewer system but will be properly disposed of according to manufacturers' instructions or state and local regulations.

### ➤ **Concrete Truck Washout:**

Concrete truck mixers and chutes will not be washed on pavement, near storm drain inlets, or within 75 feet of any ditch, stream, wetland, lake, or sinkhole. Where possible, excess concrete and wash water will be discharged to areas prepared for pouring new concrete, flat areas to be paved that are away from ditches or drainage system features, or other locations that will not drain off site. Where this approach is not possible, a shallow earthen wash basin will be excavated away from ditches to receive the wash water

### ➤ **Spill Control Practices**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted. All personnel will be made aware of procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area. Equipment and materials will include as appropriate, brooms, dust pans, mops, rags, gloves, oil absorbents, sand, sawdust, and plastic and metal trash containers.
- All spills will be cleaned up immediately after discovery.

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- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state/local agency as required by KRS 224 and applicable federal law.
- The spill prevention plan will be adjusted as needed to prevent spills from reoccurring and improve spill response and cleanup.
- Spills of products will be cleaned up promptly. Wastes from spill clean up will be disposed in accordance with appropriate regulations.

### **D. Other State and Local Plans**

This BMP plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials. Upon submittal of the NOI, other requirements for surface water protection are incorporated by reference into and are enforceable under this permit (even if they are not specifically included in this BMP plan). This provision does not apply to master or comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit issued for the construction site by state or local officials. (1)

### **E. Maintenance**

1. The BMP plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.
- Maintenance of BMPs during construction shall be a result of weekly and post rain event inspections with action being taken by the contractor to correct deficiencies.
  - Post Construction maintenance will be a function of normal highway maintenance operations. Following final project acceptance by the cabinet, district highway crews will be responsible for identification and correction of deficiencies regarding ground cover and cleaning of storm water BMPs. The project manager shall identify any BMPs that will be for the purpose of post construction storm water management with specific guidance for any non-routine maintenance. (1)



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### **F. Inspections**

Inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- Inspections will be conducted by individuals that have successfully completed the KEPSC-RI course as required by Section 213.02.02 of the Standard Specifications for Road and Bridge Construction, current edition.
- Inspection reports will be written, signed, dated, and kept on file.
- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 70 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

### **G. Non – Storm Water discharges**

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

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- Water from water line flushings.
- Water from cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

### **H. Groundwater Protection Plan (3)**

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

\_\_\_\_\_ 2. (e) land treatment or land disposal of a pollutant;

\_\_\_\_\_ 2. (f) Storing, ..., or related handling of hazardous waste, solid waste or special waste, ..., in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

\_\_\_\_\_ 2. (g) .... Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

\_\_\_\_\_ 2. (j) Storing or related handling of road oils, dust suppressants, ....., at a central location;

\_\_\_\_\_ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

\_\_\_\_\_ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

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Or, check the following only if there are no qualifying activities

\_\_\_\_\_ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

The contractor is responsible for the preparation of a plan that addresses the

401 KAR 5:037 Section 3. (3) Elements of site specific groundwater protection plan:

- (a) General information about this project is covered in the Project information;
- (b) Activities that require a groundwater protection plan have been identified above;
- (c) Practices that will protect groundwater from pollution are addressed in section C. Other control measures.
- (d) Implementation schedule – all practices required to prevent pollution of groundwater are to be in place prior to conducting the activity;
- (e) Training is required as a part of the ground water protection plan. All employees of the contractor, sub-contractor and resident engineer personnel will be trained to understand the nature and requirements of this plan as they pertain to their job function(s). Training will be accomplished within one week of employment and annually thereafter. A record of training will be maintained by the contractor with a copy provide to the resident engineer.
- (f) Areas of the project and groundwater plan activities will be inspected as part of the weekly sediment and erosion control inspections
- (g) Certification (see signature page.)

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Contractor and Resident Engineer Plan certification

The contractor that is responsible for implementing this BMP plan is identified in the Project Information section of this plan.

The following certification applies to all parties that are signatory to this BMP plan:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Further, this plan complies with the requirements of 401 KAR 5:037. By this certification, the undersigned state that the individuals signing the plan have reviewed the terms of the plan and will implement its provisions as they pertain to ground water protection.

Resident Engineer and Contractor Certification:

(2) Resident Engineer signature

Signed \_\_\_\_\_ title \_\_\_\_\_, \_\_\_\_\_ signature  
                    Typed or printed name<sup>2</sup>

(3) Signed \_\_\_\_\_ title \_\_\_\_\_, \_\_\_\_\_ signature  
                    Typed or printed name<sup>1</sup>

1. Contractors Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

2. KyTC note: to be signed by the Chief District Engineer or a person designated to have the authority to sign reports by such a person (usually the resident engineer) in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601 Reference the Project Control Number (PCN) and KPDES number when one has been issued.

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### Sub-Contractor Certification

The following sub-contractor shall be made aware of the BMP plan and responsible for implementation of BMPs identified in this plan as follows:

Subcontractor

Name:  
Address:  
Address:

Phone:

The part of BMP plan this subcontractor is responsible to implement is:

I certify under penalty of law that I understand the terms and conditions of the general Kentucky Pollutant Discharge Elimination System permit that authorizes the storm water discharges, the BMP plan that has been developed to manage the quality of water to be discharged as a result of storm events associated with the construction site activity and management of non-storm water pollutant sources identified as part of this certification.

Signed \_\_\_\_\_ title \_\_\_\_\_, \_\_\_\_\_  
Typed or printed name<sup>1</sup> signature

1. Sub Contractor Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

## ***SPECIAL NOTE***

### **Filing of eNOI for KPDES Construction Stormwater Permit**

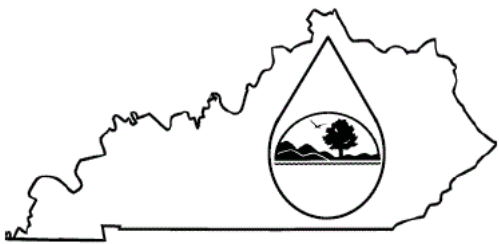
**County: Hopkins**  
**Item No.: 2-137.20**

**Route: US41A**  
**KDOWSubmittalID: 819cd9f0-3eec-4549-926d-7c37dc9491b8**

**Project Description:** WIDEN US-41A FROM YORKWOOD PLACE TO US 41 / KY 281. (SECTION 2) (2012BOP)(16CCR)

**A Notice of Intent for obtaining coverage under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Stormwater Discharges Associated with Construction Activities (KYR10) has been drafted, copy of which is attached. Upon award, the Contractor will be identified in Section III of the form as the “Building Contractor” and it will be submitted for approval to the Kentucky Division of Water. The Contractor shall be responsible for advancing the work in a manner that is compliant with all applicable and appropriate KYTC specifications for sediment and erosion control as well as meeting the requirements of the KYR10 permit and the KDOW.**

**If there are any questions regarding this note, please contact David Waldner, Director, Division of Environmental Analysis, TCOB, 200 Mero Street, Frankfort, KY 40622, Phone: (502) 564-7250.**

	<h2 style="margin:0;">KENTUCKY POLLUTION DISCHARGE</h2> <h3 style="margin:0;">ELIMINATION SYSTEM (KPDES)</h3> <p style="margin:0;">Notice of Intent (NOI) for coverage of Storm Water Discharge Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000</p> <p style="margin:0;"><a href="#">Click here for Instructions (Controls/KPDES_FormKYR10_Instructions.htm)</a></p> <p style="margin:0;"><a href="http://dep.ky.gov/formslibrary/Documents/KYR10PermitPage.pdf">Click here to obtain information and a copy of the KPDES General Permit. (http://dep.ky.gov/formslibrary/Documents/KYR10PermitPage.pdf)</a></p> <p style="margin:0;">(*) indicates a required field; (✓) indicates a field may be required based on user input or is an optionally required field</p>
---	---

Reason for Submittal:(*) <input type="text" value="Application for New Permit Coverage"/>	Agency Interest ID: <input type="text" value="Agency Interest ID"/>	Permit Number:(✓) <input type="text" value="KPDES Permit Number"/>
--	--	---

If change to existing permit coverage is requested, describe the changes for which modification of coverage is being sought:(✓)

**ELIGIBILITY:**  
Stormwater discharges associated with construction activities disturbing individually one (1) acre or more, including, in the case of a common plan of development, contiguous construction activities that cumulatively equal one (1) acre or more of disturbance.

**EXCLUSIONS:**  
The following are excluded from coverage under this general permit:  
 1) Are conducted at or on properties that have obtained an individual KPDES permit for the discharge of other wastewaters which requires the development and implementation of a Best Management Practices (BMP) plan;  
 2) Any operation that the DOW determines an individual permit would better address the discharges from that operation;  
 3) Any project that discharges to an Impaired Water listed in the most recent Integrated Report, §305(b) as impaired for sediment and for which an approved TMDL has been developed.

**SECTION I -- FACILITY OPERATOR INFORMATION (PERMITTEE)**

Company Name:(✓) <input type="text" value="Kentucky Transportation Cabinet - District 2"/>	First Name:(✓) <input type="text" value="Wade"/>	M.I.: <input type="text" value="MI"/>	Last Name:(✓) <input type="text" value="Clements"/>
Mailing Address:(*) <input type="text" value="1840 N Main Street"/>	City:(*) <input type="text" value="Madisonville"/>	State:(*) <input type="text" value="Kentucky"/>	Zip:(*) <input type="text" value="42431"/>
eMail Address:(*) <input type="text" value="wade.clements@ky.gov"/>	Business Phone:(*) <input type="text" value="270-824-7080"/>	Alternate Phone: <input type="text" value="Phone"/>	

**SECTION II -- GENERAL SITE LOCATION INFORMATION**

Project Name:(*) <input type="text" value="US41A Widening from KY 1178 to US41"/>	Status of Owner/Operator(*) <input type="text" value="State Government"/>	SIC Code(*) <input type="text" value="1611 Highway and Street Const"/>
Company Name:(✓) <input type="text" value="Kentucky Transportation Cabinet - District 2"/>	First Name:(✓) <input type="text" value="Wade"/>	M.I.: <input type="text" value="MI"/>
Last Name:(✓) <input type="text" value="Clements"/>		
Site Physical Address:(*) <input type="text" value="US41A Widening from KY 1178 to US41"/>		
City:(*) <input type="text" value="Madisonville"/>	State:(*) <input type="text" value="Kentucky"/>	Zip:(*) <input type="text" value="42431"/>
County:(*) <input type="text" value="Hopkins"/>	Latitude(decimal degrees)(*)DMS to DD Converter (https://www.fcc.gov/media/radio/dms-decimal) <input type="text" value="37.346388"/>	Longitude(decimal degrees)(*) <input type="text" value="-87.50444"/>

**SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION**

Project Description:(\*)

a. For single projects provide the following information

Total Number of Acres in Project:(√) 52.1	Total Number of Acres Disturbed:(√) 40.7
Anticipated Start Date:(√) 3/1/2018	Anticipated Completion Date:(√)

b. For common plans of development provide the following information

Total Number of Acres in Project:(√) # Acre(s)	Total Number of Acres Disturbed:(√) # Acre(s)
Number of individual lots in development, if applicable:(√) # lot(s)	Number of lots in development:(√) # lot(s)
Total acreage of lots intended to be developed:(√) Project Acres	Number of acres intended to be disturbed at any one time:(√) Disturbed Acres
Anticipated Start Date:(√)	Anticipated Completion Date:(√)

List Building Contractor(s) at the time of Application:(\*)

Company Name
+  

SECTION IV -- IF THE PERMITTED SITE DISCHARGES TO A WATER BODY THE FOLLOWING INFORMATION IS REQUIRED ?

Discharge Point(s):

	Unnamed Tributary?	Latitude	Longitude	Receiving Water Name	Delete
1	Yes	37.342250	-87.519953	Fork of Greasy Creek	Delete
2	Yes	37.342992	-87.518702	Fork of Greasy Creek	Delete
3	Yes	37.343287	-87.516125	Fork of Greasy Creek	Delete
4	Yes	37.343376	-87.515598	Fork of Greasy Creek	Delete
5	Yes	37.344178	-87.510972	fork of Greasy Creek	Delete
6	Yes	37.344540	-87.507146	Fork of Greasy Creek	Delete
7	Yes	37.344641	-87.509392	Fork of Greasy Creek	Delete
8	Yes	37.345450	-87.507146	Fork of Greasy Creek	Delete
9	Yes	37.345944	-87.504991	Fork of Greasy Creek	Delete
10	Yes	37.345989	-87.502177	Fork of Greasy Creek	Delete

SECTION V -- IF THE PERMITTED SITE DISCHARGES TO A MS4 THE FOLLOWING INFORMATION IS REQUIRED ?

Name of MS4:

City of Madisonville-MADISONVILLE

Date of application/notification to the MS4 for construction site permit coverage:

12/1/2017

Discharge Point(s):(\*)

	Latitude	Longitude
+  		

SECTION VI -- WILL THE PROJECT REQUIRE CONSTRUCTION ACTIVITIES IN A WATER BODY OR THE RIPARIAN ZONE?

Will the project require construction activities in a water body or the riparian zone?: (\*)

No

If Yes, describe scope of activity: (√)

describe 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:(*) Charlotte	M.I.: M	Last Name:(*) Cotton	Company Name:(*) Kentucky Transportation Cabinet - District 2
Mailing Address:(*) 1840 N Main Street	City:(*) Madisonville	State:(*) Kentucky	Zip:(*) 42431
eMail Address:(*) charlotte.cotton@ky.gov	Business Phone:(*) 270-824-7080	Alternate Phone: Phone	

SECTION VIII -- ATTACHMENTS	
Facility Location Map:(*)	<input type="button" value="Upload file"/>
Supplemental Information:	<input type="button" value="Upload file"/>

SECTION IX -- CERTIFICATION			
<p>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.</p>			
Signature:(*) Wade Clements PE CDE		Title:(*) Chief District Engineer	
First Name:(*) Wade	M.I.: MI	Last Name:(*) Clements	
eMail Address:(*) wade.clements@ky.gov	Business Phone:(*) 270-824-7080	Alternate Phone: Phone	Signature Date:(*) Date

<input type="button" value="Click to Save Values for Future Retrieval"/> <input type="button" value="Click to Submit to DEP"/>
--

KyTC BMP Plan for Project PCN ## - #####



**Kentucky Transportation Cabinet**

**Highway District 2 (1)**

**And**

\_\_\_\_\_ **(2), Construction**

**Kentucky Pollutant Discharge Elimination System**

**Permit KYR10**

**Best Management Practices (BMP) plan**

**Groundwater protection plan**

**For Highway Construction Activities**

**For**

**RE-CONSTRUCTION AND WIDENING OF**

**US41A FROM KY 1178 TO US41**

**Project: PCN ## - #####**

## KyTC BMP Plan for Project PCN ## - ####

### Project information

Note – (1) = Design (2) = Construction (3) = Contractor

1. Owner – Kentucky Transportation Cabinet, District 2
2. Resident Engineer: (2)
3. Contractor name: (2)  
Address: (2)  
  
Phone number: (2)  
Contact: (2)  
Contractors agent responsible for compliance with the KPDES permit requirements (3):
4. Project Control Number (2)
5. Route (Address) : US 41A
6. Latitude/Longitude (project mid-point) dd/mm/ss, dd/mm/ss:  
  
Lat: 37/20/47, Long: 87/30/16
7. County (project mid-point): HOPKINS
8. Project start date (date work will begin): (2)
9. Projected completion date: (2)

## KyTC BMP Plan for Project PCN ## - ####

### A. Site description:

1. Nature of Construction Activity (from letting project description): Re-construction and widening of US 41A from KY 1178 to US 41
2. Order of major soil disturbing activities (2) and (3)
3. Projected volume of material to be moved : 105,688 C. Y.(1)
4. Estimate of total project area (acres) : 52.1 acres(1)
5. Estimate of area to be disturbed (acres) : 40.7 acres(1)
6. Post construction runoff coefficient will be included in the project drainage folder. Persons needing information pertaining to the runoff coefficient will contact the resident engineer to request this information.
7. Data describing existing soil condition: See Geotech report if available. See Roadway Plans(1) & (2)
8. Data describing existing discharge water quality (if any): (1) & (2)
9. Receiving water name: (1)
10. TMDLs and Pollutants of Concern in Receiving Waters: N/A(1 DEA)
11. Site map – Project layout sheet plus the erosion control sheets in the project plans that depict Disturbed Drainage Areas (DDAs) and related information. These sheets depict the existing project conditions with areas delineated by DDA (drainage area bounded by watershed breaks and right of way limits), the storm water discharge locations (either as a point discharge or as overland flow) and the areas that drain to each discharge point. These plans define the limits of areas to be disturbed and the location of control measures. Controls will be either site specific as designated by the designer or will be annotated by the contractor and resident engineer before disturbance commences. The project layout sheet shows the surface waters ,wetlands, organic enrichment, nutrient and dissolved oxygen.
12. Potential sources of pollutants:

The primary source of pollutants is solids that are mobilized during storm events. Other sources of pollutants include oil/fuel/grease from servicing

## KyTC BMP Plan for Project PCN ## - #####

and operating construction equipment, concrete washout water, sanitary wastes and trash/debris. (3)

### **B. Sediment and Erosion Control Measures:**

1. Plans for highway construction projects will include erosion control sheets that depict Disturbed Drainage Areas (DDAs) and related information. These plan sheets will show the existing project conditions with areas delineated by DDA within the right of way limits, the discharge points and the areas that drain to each discharge point. Project managers and designers will analyze the DDAs and identify Best Management Practices (BMPs) that are site specific. The balance of the BMPs for the project will be listed in the bid documents for selection and use by the contractor on the project with approval by the resident engineer.

Projects that do not have DDAs annotated on the erosion control sheets will employ the same concepts for development and managing BMP plans.

2. Following award of the contract, the contractor and resident engineer will annotate the erosion control sheets showing location and type of BMPs for each of the DDAs that will be disturbed at the outset of the project. This annotation will be accompanied by an order of work that reflects the order or sequence of major soil moving activities. The remaining DDAs are to be designated as "Do Not Disturb" until the contractor and resident engineer prepare the plan for BMPs to be employed. The initial BMP's shall be for the first phase (generally Clearing and Grubbing) and shall be modified as needed as the project changes phases. The BMP Plan will be modified to reflect disturbance in additional DDA's as the work progresses. All DDA's will have adequate BMP's in place before being disturbed.
3. As DDAs are prepared for construction, the following will be addressed for the project as a whole or for each DDA as appropriate:
  - Construction Access – This is the first land-disturbing activity. As soon as construction begins, bare areas will be stabilized with gravel and temporary mulch and/or vegetation.
  - At the beginning of the project, all DDAs for the project will be inspected for areas that are a source of storm water pollutants. Areas that are a source of pollutants will receive appropriate cover or BMPs to arrest the introduction of pollutants into storm water. Areas that have not been opened by the contractor will be

## KyTC BMP Plan for Project PCN ## - #####

inspected periodically (once per month) to determine if there is a need to employ BMPs to keep pollutants from entering storm water.

- Clearing and Grubbing – The following BMP's will be considered and used where appropriate.
  - Leaving areas undisturbed when possible.
  - Silt basins to provide silt volume for large areas.
  - Silt Traps Type A for small areas.
  - Silt Traps Type C in front of existing and drop inlets which are to be saved
  - Diversion ditches to catch sheet runoff and carry it to basins or traps or to divert it around areas to be disturbed.
  - Brush and/or other barriers to slow and/or divert runoff.
  - Silt fences to catch sheet runoff on short slopes. For longer slopes, multiple rows of silt fence may be considered.
  - Temporary Mulch for areas which are not feasible for the fore mentioned types of protections.
  - Non-standard or innovative methods.
- Cut & Fill and placement of drainage structures - The BMP Plan will be modified to show additional BMP's such as:
  - Silt Traps Type B in ditches and/or drainways as they are completed
  - Silt Traps Type C in front of pipes after they are placed
  - Channel Lining
  - Erosion Control Blanket
  - Temporary mulch and/or seeding for areas where construction activities will be ceased for 21 days or more.
  - Non-standard or innovative methods
- Profile and X-Section in place – The BMP Plan will be modified to show elimination of BMP's which had to be removed and the addition of new BMP's as the roadway was shaped. Probably changes include:
  - Silt Trap Type A, Brush and/or other barriers, Temporary Mulch, and any other BMP which had to be removed for final grading to take place.
  - Additional Silt Traps Type B and Type C to be placed as final drainage patterns are put in place.
  - Additional Channel Lining and/or Erosion Control Blanket.
  - Temporary Mulch for areas where Permanent Seeding and Protection cannot be done within 21 days.
  - Special BMP's such as Karst Policy
- Finish Work (Paving, Seeding, Protect, etc.) – A final BMP Plan will result from modifications during this phase of construction. Probably changes include:
  - Removal of Silt Traps Type B from ditches and drainways if they are protected with other BMP's which are sufficient to

## KyTC BMP Plan for Project PCN ## - #####

control erosion, i.e. Erosion Control Blanket or Permanent Seeding and Protection on moderate grades.

- Permanent Seeding and Protection
  - Placing Sod
  - Planting trees and/or shrubs where they are included in the project
- BMP's including Storm Water Management Devices such as velocity dissipation devices and Karst policy BMP's to be installed during construction to control the pollutants in storm water discharges that will occur after construction has been completed are : Seeding and Protection, Erosion Control Blanket, Grassed Waterways (1)

### **C. Other Control Measures**

1. No solid materials, including building materials, shall be discharged to waters of the commonwealth, except as authorized by a Section 404 permit.
2. Waste Materials

All waste materials that may leach pollutants (paint and paint containers, caulk tubes, oil/grease containers, liquids of any kind, soluble materials, etc.) will be collected and stored in appropriate covered waste containers. Waste containers shall be removed from the project site on a sufficiently frequent basis as to not allow wastes to become a source of pollution. All personnel will be instructed regarding the correct procedure for waste disposal. Wastes will be disposed in accordance with appropriate regulations. Notices stating these practices will be posted in the office.

3. Hazardous Waste

All hazardous waste materials will be managed and disposed of in the manner specified by local or state regulation. The contractor shall notify the Resident Engineer if there any hazardous wastes being generated at the project site and how these wastes are being managed. Site personnel will be instructed with regard to proper storage and handling of hazardous wastes when required. The Transportation Cabinet will file for generator, registration when appropriate, with the Division of Waste Management and advise the contractor regarding waste management requirements.

4. Spill Prevention

The following material management practices will be used to reduce the risk of spills or other exposure of materials and substances to the weather and/or runoff.

## KyTC BMP Plan for Project PCN ## - #####

### ➤ **Good Housekeeping:**

The following good housekeeping practices will be followed onsite during the construction project.

- An effort will be made to store only enough product required to do the job
- All materials stored onsite will be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure
- Products will be kept in their original containers with the original manufacturer's label
- Substances will not be mixed with one another unless recommended by the manufacturer
- Whenever possible, all of the product will be used up before disposing of the container
- Manufacturers' recommendations for proper use and disposal will be followed
- The site contractor will inspect daily to ensure proper use and disposal of materials onsite

### ➤ **Hazardous Products:**

These practices will be used to reduce the risks associated with any and all hazardous materials.

- Products will be kept in original containers unless they are not resealable
- Original labels and material safety data sheets (MSDS) will be reviewed and retained
- Contractor will follow procedures recommended by the manufacturer when handling hazardous materials
- If surplus product must be disposed of, manufacturers' or state/local recommended methods for proper disposal will be followed

**The following product-specific practices will be followed onsite:**

### ➤ **Petroleum Products:**

Vehicles and equipment that are fueled and maintained on site will be monitored for leaks, and receive regular preventative maintenance to reduce the chance of leakage. Petroleum products onsite will be stored in tightly sealed containers, which are clearly labeled and will be protected from exposure to weather.

The contractor shall prepare an Oil Pollution Spill Prevention Control and Countermeasure plan when the project that involves the storage of petroleum



## KyTC BMP Plan for Project PCN ## - #####

products in 55 gallon or larger containers with a total combined storage capacity of 1,320 gallons. This is a requirement of 40 CFR 112.

This project (will / will not) (3) have over 1,320 gallons of petroleum products with a total capacity, sum of all containers 55 gallon capacity and larger.

### ➤ **Fertilizers:**

Fertilizers will be applied at rates prescribed by the contract, standard specifications or as directed by the resident engineer. Once applied, fertilizer will be covered with mulch or blankets or worked into the soil to limit exposure to storm water. Storage will be in a covered shed. The contents of any partially used bags of fertilizer will be transferred to a sealable plastic bin to avoid spills.

### ➤ **Paints:**

All containers will be tightly sealed and stored indoors or under roof when not being used. Excess paint or paint wash water will not be discharged to the drainage or storm sewer system but will be properly disposed of according to manufacturers' instructions or state and local regulations.

### ➤ **Concrete Truck Washout:**

Concrete truck mixers and chutes will not be washed on pavement, near storm drain inlets, or within 75 feet of any ditch, stream, wetland, lake, or sinkhole. Where possible, excess concrete and wash water will be discharged to areas prepared for pouring new concrete, flat areas to be paved that are away from ditches or drainage system features, or other locations that will not drain off site. Where this approach is not possible, a shallow earthen wash basin will be excavated away from ditches to receive the wash water

### ➤ **Spill Control Practices**

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be followed for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted. All personnel will be made aware of procedures and the location of the information and cleanup supplies.
- Materials and equipment necessary for spill cleanup will be kept in the material storage area. Equipment and materials will include as appropriate, brooms, dust pans, mops, rags, gloves, oil absorbents, sand, sawdust, and plastic and metal trash containers.
- All spills will be cleaned up immediately after discovery.

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- The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.
- Spills of toxic or hazardous material will be reported to the appropriate state/local agency as required by KRS 224 and applicable federal law.
- The spill prevention plan will be adjusted as needed to prevent spills from reoccurring and improve spill response and cleanup.
- Spills of products will be cleaned up promptly. Wastes from spill clean up will be disposed in accordance with appropriate regulations.

### **D. Other State and Local Plans**

This BMP plan shall include any requirements specified in sediment and erosion control plans, storm water management plans or permits that have been approved by other state or local officials. Upon submittal of the NOI, other requirements for surface water protection are incorporated by reference into and are enforceable under this permit (even if they are not specifically included in this BMP plan). This provision does not apply to master or comprehensive plans, non-enforceable guidelines or technical guidance documents that are not identified in a specific plan or permit issued for the construction site by state or local officials. (1)

### **E. Maintenance**

1. The BMP plan shall include a clear description of the maintenance procedures necessary to keep the control measures in good and effective operating condition.
- Maintenance of BMPs during construction shall be a result of weekly and post rain event inspections with action being taken by the contractor to correct deficiencies.
  - Post Construction maintenance will be a function of normal highway maintenance operations. Following final project acceptance by the cabinet, district highway crews will be responsible for identification and correction of deficiencies regarding ground cover and cleaning of storm water BMPs. The project manager shall identify any BMPs that will be for the purpose of post construction storm water management with specific guidance for any non-routine maintenance. (1)

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### **F. Inspections**

Inspection and maintenance practices that will be used to maintain erosion and sediment controls:

- All erosion prevention and sediment control measures will be inspected at least once each week and following any rain of one-half inch or more.
- Inspections will be conducted by individuals that have successfully completed the KEPSC-RI course as required by Section 213.02.02 of the Standard Specifications for Road and Bridge Construction, current edition.
- Inspection reports will be written, signed, dated, and kept on file.
- Areas at final grade will be seeded and mulched within 14 days.
- Areas that are not at final grade where construction has ceased for a period of 21 days or longer and soil stock piles shall receive temporary mulch no later than 14 days from the last construction activity in that area.
- All measures will be maintained in good working order; if a repair is necessary, it will be initiated within 24 hours of being reported.
- Built-up sediment will be removed from behind the silt fence before it has reached halfway up the height of the fence.
- Silt fences will be inspected for bypassing, overtopping, undercutting, depth of sediment, tears, and to ensure attachment to secure posts.
- Sediment basins will be inspected for depth of sediment, and built-up sediment will be removed when it reaches 70 percent of the design capacity and at the end of the job.
- Diversion dikes and berms will be inspected and any breaches promptly repaired. Areas that are eroding or scouring will be repaired and re-seeded / mulched as needed.
- Temporary and permanent seeding and mulching will be inspected for bare spots, washouts, and healthy growth. Bare or eroded areas will be repaired as needed.
- All material storage and equipment servicing areas that involve the management of bulk liquids, fuels, and bulk solids will be inspected weekly for conditions that represent a release or possible release of pollutants to the environment.

### **G. Non – Storm Water discharges**

It is expected that non-storm water discharges may occur from the site during the construction period. Examples of non-storm water discharges include:

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- Water from water line flushings.
- Water from cleaning concrete trucks and equipment.
- Pavement wash waters (where no spills or leaks of toxic or hazardous materials have occurred).
- Uncontaminated groundwater and rain water (from dewatering during excavation).

All non-storm water discharges will be directed to the sediment basin or to a filter fence enclosure in a flat vegetated infiltration area or be filtered via another approved commercial product.

### **H. Groundwater Protection Plan (3)**

This plan serves as the groundwater protection plan as required by 401 KAR 5:037.

- Contractors statement: (3)

The following activities, as enumerated by 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan, will or may be may be conducted as part of this construction project:

\_\_\_\_\_ 2. (e) land treatment or land disposal of a pollutant;

\_\_\_\_\_ 2. (f) Storing, ..., or related handling of hazardous waste, solid waste or special waste, ..., in tanks, drums, or other containers, or in piles, (This does not include wastes managed in a container placed for collection and removal of municipal solid waste for disposal off site);

\_\_\_\_\_ 2. (g) .... Handling of materials in bulk quantities (equal or greater than 55 gallons or 100 pounds net dry weight transported held in an individual container) that, if released to the environment, would be a pollutant;

\_\_\_\_\_ 2. (j) Storing or related handling of road oils, dust suppressants, ....., at a central location;

\_\_\_\_\_ 2. (k) Application or related handling of road oils, dust suppressants or deicing materials, (does not include use of chloride-based deicing materials applied to roads or parking lots);

\_\_\_\_\_ 2. (m) Installation, construction, operation, or abandonment of wells, bore holes, or core holes, (this does not include bore holes for the purpose of explosive demolition);

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Or, check the following only if there are no qualifying activities

\_\_\_\_\_ There are no activities for this project as listed in 401 KAR 5:037 Section 2 that require the preparation and implementation of a groundwater protection plan.

The contractor is responsible for the preparation of a plan that addresses the

401 KAR 5:037 Section 3. (3) Elements of site specific groundwater protection plan:

- (a) General information about this project is covered in the Project information;
- (b) Activities that require a groundwater protection plan have been identified above;
- (c) Practices that will protect groundwater from pollution are addressed in section C. Other control measures.
- (d) Implementation schedule – all practices required to prevent pollution of groundwater are to be in place prior to conducting the activity;
- (e) Training is required as a part of the ground water protection plan. All employees of the contractor, sub-contractor and resident engineer personnel will be trained to understand the nature and requirements of this plan as they pertain to their job function(s). Training will be accomplished within one week of employment and annually thereafter. A record of training will be maintained by the contractor with a copy provide to the resident engineer.
- (f) Areas of the project and groundwater plan activities will be inspected as part of the weekly sediment and erosion control inspections
- (g) Certification (see signature page.)

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Contractor and Resident Engineer Plan certification

The contractor that is responsible for implementing this BMP plan is identified in the Project Information section of this plan.

The following certification applies to all parties that are signatory to this BMP plan:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. Further, this plan complies with the requirements of 401 KAR 5:037. By this certification, the undersigned state that the individuals signing the plan have reviewed the terms of the plan and will implement its provisions as they pertain to ground water protection.

Resident Engineer and Contractor Certification:

(2) Resident Engineer signature

Signed \_\_\_\_\_, \_\_\_\_\_  
Typed or printed name<sup>2</sup> signature

(3) Signed \_\_\_\_\_, \_\_\_\_\_  
Typed or printed name<sup>1</sup> signature

1. Contractors Note: to be signed by a person who is the owner, a responsible corporate officer, a general partner or the proprietor or a person designated to have the authority to sign reports by such a person in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601. Reference the Project Control Number (PCN) and KPDES number when one has been issued.

2. KyTC note: to be signed by the Chief District Engineer or a person designated to have the authority to sign reports by such a person (usually the resident engineer) in accordance with 401 KAR 5:060 Section 9. This delegation shall be in writing to: Manager, KPDES Branch, Division of Water, 14 Reilly Road, Frankfort Kentucky 40601 Reference the Project Control Number (PCN) and KPDES number when one has been issued.



## ***SPECIAL NOTE***

### **Filing of eNOI for KPDES Construction Stormwater Permit**

**County: Hopkins**  
**Item No.: 2-137.20**

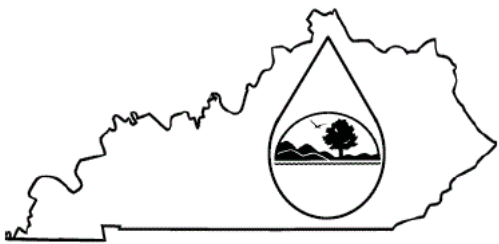
**Route: US41A**  
**KDOWSubmittalID: 819cd9f0-3eec-4549-926d-7c37dc9491b8**

**Project Description:** WIDEN US-41A FROM YORKWOOD PLACE TO US 41 / KY 281. (SECTION 2) (2012BOP)(16CCR)

**A Notice of Intent for obtaining coverage under the Kentucky Pollutant Discharge Elimination System (KPDES) General Permit for Stormwater Discharges Associated with Construction Activities (KYR10) has been drafted, copy of which is attached. Upon award, the Contractor will be identified in Section III of the form as the “Building Contractor” and it will be submitted for approval to the Kentucky Division of Water. The Contractor shall be responsible for advancing the work in a manner that is compliant with all applicable and appropriate KYTC specifications for sediment and erosion control as well as meeting the requirements of the KYR10 permit and the KDOW.**

**If there are any questions regarding this note, please contact David Waldner, Director, Division of Environmental Analysis, TCOB, 200 Mero Street, Frankfort, KY 40622, Phone: (502) 564-7250.**



	<h2 style="margin: 0;">KENTUCKY POLLUTION DISCHARGE ELIMINATION SYSTEM (KPDES)</h2> <p style="margin: 5px 0;">Notice of Intent (NOI) for coverage of Storm Water Discharge Associated with Construction Activities Under the KPDES Storm Water General Permit KYR100000</p> <p style="margin: 5px 0;"><a href="#">Click here for Instructions (Controls/KPDES_FormKYR10_Instructions.htm)</a></p> <p style="margin: 5px 0; font-size: small;">Click here to obtain information and a copy of the KPDES General Permit. (<a href="http://dep.ky.gov/formslibrary/Documents/KYR10PermitPage.pdf">http://dep.ky.gov/formslibrary/Documents/KYR10PermitPage.pdf</a>)</p> <p style="margin: 5px 0; font-size: x-small;">(*) indicates a required field; (✓) indicates a field may be required based on user input or is an optionally required field</p>
---	---

Reason for Submittal:(*) <input type="text" value="Application for New Permit Coverage"/>	Agency Interest ID: <input type="text" value="Agency Interest ID"/>	Permit Number:(✓) <input type="text" value="KPDES Permit Number"/>
--	--	---

If change to existing permit coverage is requested, describe the changes for which modification of coverage is being sought:(✓)

**ELIGIBILITY:**  
 Stormwater discharges associated with construction activities disturbing individually one (1) acre or more, including, in the case of a common plan of development, contiguous construction activities that cumulatively equal one (1) acre or more of disturbance.

**EXCLUSIONS:**  
 The following are excluded from coverage under this general permit:  
 1) Are conducted at or on properties that have obtained an individual KPDES permit for the discharge of other wastewaters which requires the development and implementation of a Best Management Practices (BMP) plan;  
 2) Any operation that the DOW determines an individual permit would better address the discharges from that operation;  
 3) Any project that discharges to an Impaired Water listed in the most recent Integrated Report, §305(b) as impaired for sediment and for which an approved TMDL has been developed.

**SECTION I -- FACILITY OPERATOR INFORMATION (PERMITTEE)**

Company Name:(✓) <input type="text" value="Kentucky Transportation Cabinet - District 2"/>	First Name:(✓) <input type="text" value="Wade"/>	M.I.: <input type="text" value="MI"/>	Last Name:(✓) <input type="text" value="Clements"/>
Mailing Address:(*) <input type="text" value="1840 N Main Street"/>	City:(*) <input type="text" value="Madisonville"/>	State:(*) <input type="text" value="Kentucky"/>	Zip:(*) <input type="text" value="42431"/>
eMail Address:(*) <input type="text" value="wade.clements@ky.gov"/>	Business Phone:(*) <input type="text" value="270-824-7080"/>	Alternate Phone: <input type="text" value="Phone"/>	

**SECTION II -- GENERAL SITE LOCATION INFORMATION**

Project Name:(*) <input type="text" value="US41A Widening from KY 1178 to US41"/>	Status of Owner/Operator(*) <input type="text" value="State Government"/>	SIC Code(*) <input type="text" value="1611 Highway and Street Const"/>	
Company Name:(✓) <input type="text" value="Kentucky Transportation Cabinet - District 2"/>	First Name:(✓) <input type="text" value="Wade"/>	M.I.: <input type="text" value="MI"/>	Last Name:(✓) <input type="text" value="Clements"/>
Site Physical Address:(*) <input type="text" value="US41A Widening from KY 1178 to US41"/>			
City:(*) <input type="text" value="Madisonville"/>	State:(*) <input type="text" value="Kentucky"/>	Zip:(*) <input type="text" value="42431"/>	
County:(*) <input type="text" value="Hopkins"/>	Latitude(decimal degrees)(*)DMS to DD Converter <small>(<a href="https://www.fcc.gov/media/radio/dms-decimal">https://www.fcc.gov/media/radio/dms-decimal</a>)</small> <input type="text" value="37.346388"/>	Longitude(decimal degrees)(*) <input type="text" value="-87.50444"/>	

**SECTION III -- SPECIFIC SITE ACTIVITY INFORMATION**

Project Description:(\*)

a. For single projects provide the following information

Total Number of Acres in Project:(√) 52.1	Total Number of Acres Disturbed:(√) 40.7
Anticipated Start Date:(√) 3/1/2018	Anticipated Completion Date:(√)

b. For common plans of development provide the following information

Total Number of Acres in Project:(√) # Acre(s)	Total Number of Acres Disturbed:(√) # Acre(s)
Number of individual lots in development, if applicable:(√) # lot(s)	Number of lots in development:(√) # lot(s)
Total acreage of lots intended to be developed:(√) Project Acres	Number of acres intended to be disturbed at any one time:(√) Disturbed Acres
Anticipated Start Date:(√)	Anticipated Completion Date:(√)

List Building Contractor(s) at the time of Application:(\*)

Company Name
+  

SECTION IV -- IF THE PERMITTED SITE DISCHARGES TO A WATER BODY THE FOLLOWING INFORMATION IS REQUIRED ?

Discharge Point(s):

	Unnamed Tributary?	Latitude	Longitude	Receiving Water Name	Delete
1	Yes	37.342250	-87.519953	Fork of Greasy Creek	Delete
2	Yes	37.342992	-87.518702	Fork of Greasy Creek	Delete
3	Yes	37.343287	-87.516125	Fork of Greasy Creek	Delete
4	Yes	37.343376	-87.515598	Fork of Greasy Creek	Delete
5	Yes	37.344178	-87.510972	fork of Greasy Creek	Delete
6	Yes	37.344540	-87.507146	Fork of Greasy Creek	Delete
7	Yes	37.344641	-87.509392	Fork of Greasy Creek	Delete
8	Yes	37.345450	-87.507146	Fork of Greasy Creek	Delete
9	Yes	37.345944	-87.504991	Fork of Greasy Creek	Delete
10	Yes	37.345989	-87.502177	Fork of Greasy Creek	Delete

SECTION V -- IF THE PERMITTED SITE DISCHARGES TO A MS4 THE FOLLOWING INFORMATION IS REQUIRED ?

Name of MS4:

City of Madisonville-MADISONVILLE

Date of application/notification to the MS4 for construction site permit coverage:

12/1/2017

Discharge Point(s):(\*)

	Latitude	Longitude
+  		

SECTION VI -- WILL THE PROJECT REQUIRE CONSTRUCTION ACTIVITIES IN A WATER BODY OR THE RIPARIAN ZONE?

Will the project require construction activities in a water body or the riparian zone?: (\*)

No

If Yes, describe scope of activity: (√)

describe scope of activity

Is a Clean Water Act 404 permit required?:(\*)

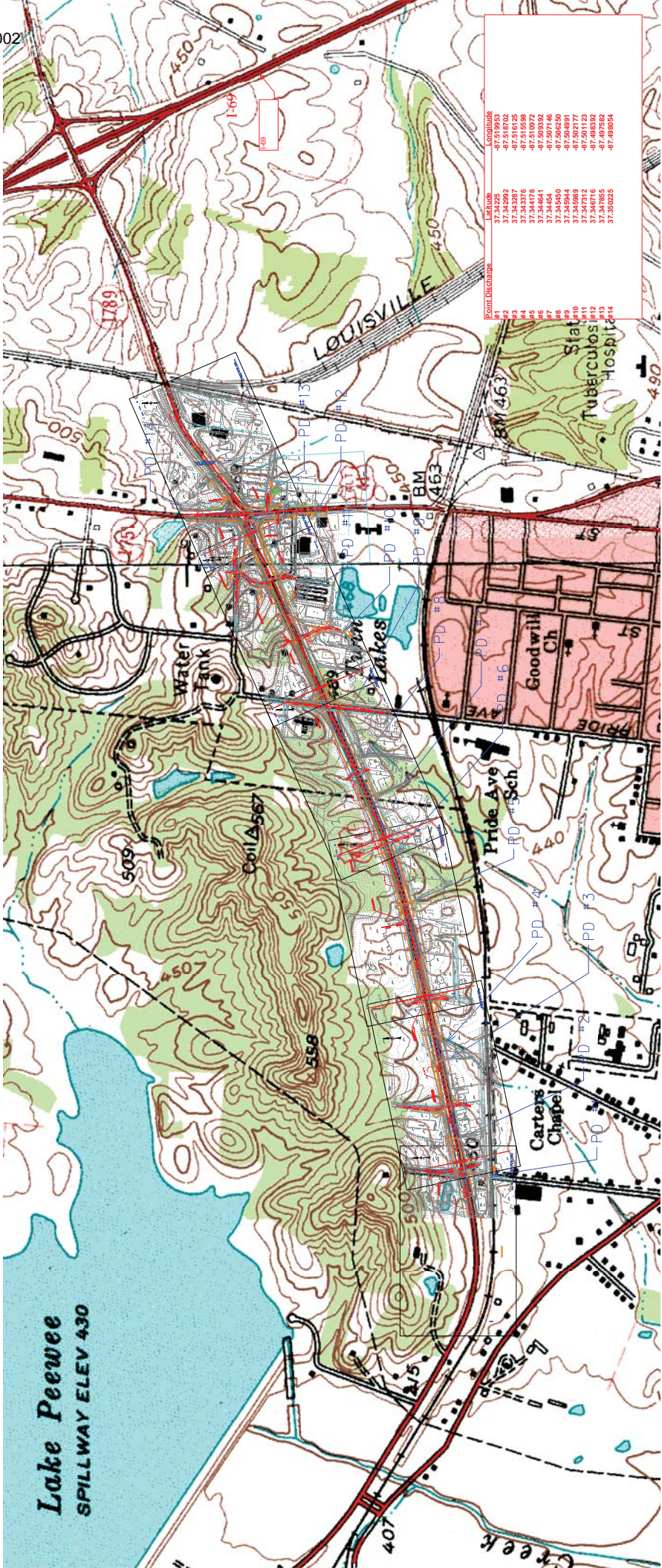
No

Is a Clean Water Act 401 Water Quality Certification required?:(*)	No
--	----

SECTION VII -- NOI PREPARER INFORMATION			
First Name:(*) Charlotte	M.I.: M	Last Name:(*) Cotton	Company Name:(*) Kentucky Transportation Cabinet - District 2
Mailing Address:(*) 1840 N Main Street	City:(*) Madisonville	State:(*) Kentucky	Zip:(*) 42431
eMail Address:(*) charlotte.cotton@ky.gov	Business Phone:(*) 270-824-7080	Alternate Phone: Phone	

SECTION VIII -- ATTACHMENTS	
Facility Location Map:(*)	<input type="button" value="Upload file"/>
Supplemental Information:	<input type="button" value="Upload file"/>

SECTION IX -- CERTIFICATION			
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.			
Signature:(*) Wade Clements PE CDE		Title:(*) Chief District Engineer	
First Name:(*) Wade	M.I.: MI	Last Name:(*) Clements	
eMail Address:(*) wade.clements@ky.gov	Business Phone:(*) 270-824-7080	Alternate Phone: Phone	Signature Date:(*) Date



Madisonville East Quadrangle

TO Madisonville

Madisonville West Quadrangle

2-137.20 US 41A Widening from just past Yorkwood Place to US 41 (North Main Street)  
Madisonville, Kentucky

Lake Pewee  
SPILLWAY ELEV 430

LOUISVILLE

Goodwill Ch

Carters Chapel

Pride Ave Sch

Tuberculosis Hospital

Water Tank

Coil

Wagon Lakes

Coil

Coil

Coil

Creek

## KENTUCKY TRANSPORTATION CABINET COMMUNICATION ALL PROMISES (CAP)

**Item Number**  
02-0137.20

**County**  
HOPKINS

**Route**  
US 41

**Project Manager**  
KYTC\JOHN.RUDD

CAP #	Date of Promise	Requestor	Location of Promise:	CAP Description
1	2/5/16	J Rudd	Parcel 52	Property owner retains ownership of both signs 1 &3.
2	1/12/16	J Rudd	Parcel 53	It is understood by both parties that the sign will be retained by the Owner for a \$0 salvage value with the understanding that the sign is to be removed from the proposed impacted area by June 1, 2016. If the sign is in place after this date it becomes the property of the KYTC. It is also understood that the Contractor shall not disturb the shrubs and sidewalk in front of the building.
3	4/2/15	J Rudd	Parcel 55	Mr. Chandler requested a Utility Casing be placed under the proposed Mainline to allow for future development. KYTC agreed and is working with the City of Madisonville to include the construction of the casing. Mr. Chandler further requested a change to his entrance and ditch located at STA. 656+66 Left of Mainline centerline. Requested changes were approved and have been included in R/W Rev. No. 4, plan sheet R11. Mr. Chandler was provided a copy of the revised plans.
4	2/18/16	J Rudd	Parcel 69	Any required relocation of the existing lift station owned by John A. Roy and Cynthia S. Roy, husband and wife (25%); Randy T. Travis and Donna S. Travis, husband and wife (25%); and James A. Wells and Connie Sue Wells, husband and wife (50%) will be handled during the utility relocation by KYTC and/or its contractors.
5	6/8/15	J Rudd	Parcel 74	The KYTC has agreed to complete a plan change providing a commercial entrance right of Approach Center Line approximately Sta. 48+50. Entrance will not be a right in/right out. Plans will be provided to Mr. and Mrs. Lewis upon completion of design. It is understood by both parties that the Owner is conveying additional permanent and temporary easement for the purpose of constructing an entrance at the Owner's request for no additional compensation.
6	7/27/15	J Rudd	Parcel 80	Owner retaining the sign for \$0 salvage value and it must be removed by June 2016.
7	10/16/17	J Rudd	Parcel 72	The configuration of the Property Owner's driveway shall be shown on the attached (MOU on file at District Office) Right of Way Plans for: County of Hopkins, Item 2-137.01, Sheet No. R23, and Parcel No. 072, and the width of said driveway, at its intersection with KY Highway 41A, is now shown as extended from 12 feet to 20 feet. Said Right of Way Plans (consisting of one page) being marked as Attachment "A" and incorporated herein by reference. - Change made to Final Roadway Plans

## KENTUCKY TRANSPORTATION CABINET COMMUNICATION ALL PROMISES (CAP)

CAP #	Date of Promise	Requestor	Location of Promise:	CAP Description
8	10/5/17	J Rudd	Parcel 85	<p>KYTC receives title to acquired signs. MOU conditions with tenant: The Kentucky Transportation Cabinet ("KYTC") acknowledges that RTM Operating Company, LLC operates an Arby's Restaurant ("Arby's") on the tract of land (the "Property") upon which the temporary easement area ("TE") is located, and by accepting the temporary easement and commencing the work described herein, the KYTC hereby covenants and agrees as follows: The KYTC and its contractors will use all reasonable efforts to prevent any interference with Arby's business operations, provided that the parties acknowledge that some interference will occur. No construction vehicles shall be parked on Arby's parking lot (except within the TE) without Arby's express permission. The KYTC will use reasonable efforts to coordinate installation, construction, and maintenance activity within the TE with Arby's, provided that the parties acknowledge that the KYTC shall prevail on any dispute as to work to be done and when said work will be done. The KYTC will determine if underground utilities are located within the TE before any work begins and use all reasonable efforts to prevent any interruption of utility service to Arby's business operations. If any utility interruption is unavoidable, the KYTC will use all reasonable efforts to contact the Arby's manager and schedule the interruption, coordinating the interruption time with the Arby's manager. The parties acknowledge that the KYTC shall prevail on any dispute as to work to be done and when said work will be done. The parties acknowledge that the foregoing terms and conditions shall be binding on and inure to the benefit of any future tenant on the Property and/or successor in interest to Arby's.</p>
9	3/7/16	J Rudd	Parcel 90	<p>It is understood by both parties that the Contractor will perform all work in such a manner so as to not unduly disrupt the operation of the McDonald's restaurant on grantor's property. Grantee will "cone off" no more than the one parking stall in the very southwest corner of Grantor's remaining property, and will not "cone off" or block in any manner any access drive at any time. Additionally the Contractor will not park on or store any construction vehicles, equipment, or materials within the easement area or on Grantor's other property. The foregoing notwithstanding, the Cabinet may utilize the parking space in the very southwest corner of Grantor's remaining property during construction.</p>

**PART II**  
**SPECIFICATIONS AND STANDARD DRAWINGS**

### **SPECIFICATIONS REFERENCE**

Any reference in the plans or proposal to previous editions of the *Standard Specifications for Road and Bridge Construction* and *Standard Drawings* are superseded by *Standard Specifications for Road and Bridge Construction, Edition of 2012* and *Standard Drawings, Edition of 2016*.



## **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>

## **SPECIAL NOTE FOR TURF REINFORCING MAT**

**1.0 DESCRIPTION.** Install turf reinforcement mat at locations specified in the Contract or as the Engineer directs. Section references herein are to the Department's 2012 Standard Specifications for Road and Bridge Construction.

### **2.0 MATERIALS.**

**2.1 Turf Reinforcement Mat (TRM).** Use a Turf Reinforcement Mat defined as permanent rolled erosion control product composed of non-degradable synthetic fibers, filaments, nets, wire mesh and/or other elements, processed into a three-dimensional matrix of sufficient thickness and from the Department's List of Approved Materials. Mats must be 100% UV stabilized materials. For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting exclusively. Ensure product labels clearly show the manufacturer or supplier name, style name, and roll number. Ensure labeling, shipment and storage follows ASTM D-4873. The Department will require manufacturer to provide TRMs that are machine constructed web of mechanically or melt bonded nondegradable fibers entangled to form a three dimensional matrix. The Department will require all long term performance property values in table below to be based on non degradable portion of the matting alone. Approved methods include polymer welding, thermal or polymer fusion, or placement of fibers between two high strength biaxially oriented nets mechanically bound by parallel stitching with polyolefin thread. Ensure that mats designated in the plans as Type 4 mats, are not to be manufactured from discontinuous or loosely held together by stitching or glued netting or composites. Type 4 mats shall be composed of geosynthetic matrix that exhibits a very high interlock and reinforcement capacities with both soil and root systems and with high tensile modulus. The Department will require manufacturer to use materials chemically and biologically inert to the natural soil environments conditions. Ensure the blanket is smolder resistant without the use of chemical additives. When stored, maintain the protective wrapping and elevate the mats off the ground to protect them from damage. The Department will not specify these materials for use in heavily acidic coal seam areas or other areas with soil problems that would severally limit vegetation growth.

- A) Dimensions. Ensure TRMs are furnished in strips with a minimum width of 4 feet and length of 50 feet.
- B) Weight. Ensure that all mat types have a minimum mass per unit area of 7 ounces per square yard according to ASTM D 6566.
- C) Performance Testing: The Department will require AASHTO's NTPEP index testing. The Department will also require the manufacturer to perform internal MARV testing at a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory for tensile strength, tensile elongation, mass per unit area, and thickness once every 24,000 yds of production or whatever rate is required to ensure 97.7% confidence under ASTM D4439& 4354. The Department will require Full scale testing for slope and channel applications shear stress shall be done under ASTM D 6459, ASTM D 6460-07 procedures.

### **2.2 Classifications**

The basis for selection of the type of mat required will be based on the long term shear stress level of the mat of the channel in question or the degree of slope to protect and will be designated in the contract. The Type 4 mats are to be used at structural backfills protecting critical

structures, utility cuts, areas where vehicles may be expected to traverse the mat, channels with large heavy drift, and where higher factors of safety, very steep slopes and/or durability concerns are needed as determined by project team and designer and will be specified in the plans by designer.

Turf Reinforcement Matting					
Properties <sup>1</sup>	Type 1	Type 2	Type 3	Type 4	Test Method
Minimum tensile Strength lbs/ft	125	150	175	3000 by 1500	ASTM D6818 <sup>2</sup>
UV stability (minimum % tensile retention)	80	80	80	90	ASTM D4355 <sup>3</sup> (1000-hr exposure)
Minimum thickness (inches)	0.25	0.25	0.25	0.40	ASTM D6525
Slopes applications	2H:1V or flatter	1.5H:1V or flatter	1H:1V or flatter	1 H: 1V or greater	
Shear stress lbs/ft <sup>2</sup> Channel applications	6.0 <sup>4</sup>	8.0 <sup>4</sup>	10.0 <sup>4</sup>	12.0 <sup>4</sup>	ASTM D6459 ASTM D6460-07

<sup>1</sup> For TRMs containing degradable components, all physical property values must be obtained on the non-degradable portion of the matting alone.

<sup>2</sup>Minimum Average Roll Values for tensile strength of sample material machine direction.

<sup>3</sup>Tensile Strength percentage retained after stated 1000 hr duration of exposure under ASTM D4355 testing. Based on nondegradable components exclusively.

<sup>4</sup>Maximum permissible shear design values based on short-term (0.5 hr) vegetated data obtained by full scale flume testing ASTM D6459, D6460-07. Based on nondegradable components exclusively. Testing will be done at Independent Hydraulics Facility such as Colorado State University hydraulics laboratory, Utah State University hydraulics laboratory, Texas Transportation Institute (TTI) hydraulics and erosion control laboratory.

### 2.3 Quality Assurance Sampling, Testing, and Acceptance

- A) Provide TRM listed on the Department’s List of Approved Materials. Prior to inclusion on the LAM, the manufacturer of TRM must meet the physical and performance criteria as outlined in the specification and submit a Letter Certifying compliance of the product under the above ASTM testing procedures and including a copy of report from Full Scale Independent Hydraulics Facility that Fully Vegetated Shear Stress meets shear stress requirements tested under D6459 and D6460-07.
- B) Contractors will provide a Letter of Certification from Manufacturer stating the product name, manufacturer, and that the product MARV product unit testing results meets Department criteria. Provide Letters once per project and for each product.
- C) Acceptance shall be in accordance with ASTM D-4759 based on testing performed by a Geosynthetic Accreditation Institute – Laboratory Accreditation Program (GAI-LAP) accredited laboratory using Procedure A of ASTM D-4354.

Current mats meeting the above criteria are shown on the Department's List of Approved Materials.

**2.4 Fasteners.** When the mat manufacturer does not specify a specific fastener, use steel wire U-shaped staples with a minimum diameter of 0.09 inches (11 gauge), a minimum width of one inch and a minimum length of 12 inches. Use a heavier gauge when working in rocky or clay soils and longer lengths in sandy soils as directed by Engineer or Manufacturer's Representative. Provide staples with colored tops when requested by the Engineer.

**3.0 CONSTRUCTION.** When requested by the Engineer, provide a Manufacturer's Representative on-site to oversee and approve the initial installation of the mat. When requested by the Engineer, provide a letter from the Manufacturer approving the installation. When there is a conflict between the Department's criteria and the Manufacturer's criteria, construct using the more restrictive. The Engineer and Manufacturer's Representative must approve all alternate installation methods prior to execution. Construct according to the Manufacturer's recommendations and the following as minimum installation technique:

**3.1 Site Preparation.** Grade areas to be treated with matting and compact. Remove large rocks, soil clods, vegetation, roots, and other sharp objects that could keep the mat from intimate contact with subgrade. Prepare seedbed by loosening the top 2 to 3 inch of soil.

**3.2 Installation.** Install mats according to Standard Drawing Sepias "Turf Mat Channel Installation" and "Turf Mat Slope Installation." Install mats at the specified elevation and alignment. Anchor the mats with staples with a minimum length of 12 inches. Use longer anchors for installations in sandy, loose, or wet soils as directed by the Engineer or Manufacturer's Representative. The mat should be in direct contact with the soil surface.

**4.0 MEASUREMENT.** The Department will measure the quantity of Turf Reinforcement Mat by the square yard of surface covered. The Department will not measure preparation of the bed, providing a Manufacturer's Representative, topsoil, or seeding for payment and will consider them incidental to the Turf Reinforcement Mat. The Department will not measure any reworking of slopes or channels for payment as it is considered corrective work and incidental to the Turf Reinforcement Mat. Seeding and protection will be an incidental item.

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

<u>Code</u>	<u>Pay Item</u>	<u>Pay Unit</u>
23274EN11F	Turf Reinforcement Mat 1	Square Yard
23275EN11F	Turf Reinforcement Mat 2	Square Yard
23276EN11F	Turf Reinforcement Mat 3	Square Yard
23277EN11F	Turf Reinforcement Mat 4	Square Yard

June 15, 2012

**PART III**

**EMPLOYMENT, WAGE AND RECORD REQUIREMENTS**

**TRANSPORTATION CABINET  
DEPARTMENT OF HIGHWAYS**

**LABOR AND WAGE REQUIREMENTS  
APPLICABLE TO OTHER THAN FEDERAL-AID SYSTEM PROJECTS**

- I. Application
- 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.

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

**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.

## EXECUTIVE BRANCH CODE OF ETHICS

In the 1992 regular legislative session, the General Assembly passed and Governor Brereton Jones signed Senate Bill 63 (codified as KRS 11A), the Executive Branch Code of Ethics, which states, in part:

KRS 11A.040 (7) provides:

No present or former public servant shall, within six (6) months following termination of his office or employment, accept employment, compensation, or other economic benefit from any person or business that contracts or does business with, or is regulated by, the state in matters in which he was directly involved during the last thirty-six (36) months of his tenure. This provision shall not prohibit an individual from returning to the same business, firm, occupation, or profession in which he was involved prior to taking office or beginning his term of employment, or for which he received, prior to his state employment, a professional degree or license, provided that, for a period of six (6) months, he personally refrains from working on any matter in which he was directly involved during the last thirty-six (36) months of his tenure in state government. This subsection shall not prohibit the performance of ministerial functions, including but not limited to filing tax returns, filing applications for permits or licenses, or filing incorporation papers, nor shall it prohibit the former officer or public servant from receiving public funds disbursed through entitlement programs.

KRS 11A.040 (9) states:

A former public servant shall not represent a person or business before a state agency in a matter in which the former public servant was directly involved during the last thirty-six (36) months of his tenure, for a period of one (1) year after the latter of:

- a) The date of leaving office or termination of employment; or
- b) The date the term of office expires to which the public servant was elected.

This law is intended to promote public confidence in the integrity of state government and to declare as public policy the idea that state employees should view their work as a public trust and not as a way to obtain private benefits.

If you have worked for the executive branch of state government within the past six months, you may be subject to the law's prohibitions. The law's applicability may be different if you hold elected office or are contemplating representation of another before a state agency.

Also, if you are affiliated with a firm which does business with the state and which employs former state executive-branch employees, you should be aware that the law may apply to them.

In case of doubt, the law permits you to request an advisory opinion from the Executive Branch Ethics Commission, 3 Fountain Place, Frankfort, Kentucky 40601; telephone (502) 564-7954.

Revised: January 27, 2017

### **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](mailto: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.

Contract ID: 171048  
Page 193 of 201

### 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



# WWW.WAGEHOUR.DOL.GOV

U.S. Department of Labor | Wage and Hour Division

**PART IV**  
**INSURANCE**

## INSURANCE

The Contractor shall procure and maintain the following insurance in addition to the insurance required by law:

- 1) Commercial General Liability-Occurrence form – not less than \$2,000,000 General aggregate, \$2,000,000 Products & Completed Aggregate, \$1,000,000 Personal & Advertising, \$1,000,000 each occurrence.
- 2) Automobile Liability- \$1,000,000 per accident
- 3) Employers Liability:
  - a) \$100,000 Each Accident Bodily Injury
  - b) \$500,000 Policy limit Bodily Injury by Disease
  - c) \$100,000 Each Employee Bodily Injury by Disease
- 4) The insurance required above must be evidenced by a Certificate of Insurance and this Certificate of Insurance must contain one of the following statements:
  - a) "policy contains no deductible clauses."
  - b) "policy contains \_\_\_\_\_ (amount) deductible property damage clause but company will pay claim and collect the deductible from the insured."
- 5) KENTUCKY WORKMEN'S COMPENSATION INSURANCE. The contractor shall furnish evidence of coverage of all his employees or give evidence of self-insurance by submitting a copy of a certificate issued by the Workmen's Compensation Board.

The cost of insurance is incidental to all contract items. All subcontractors must meet the same minimum insurance requirements.

**PART V**  
**BID ITEMS**

## PROPOSAL BID ITEMS

171048

Page 1 of 5

Report Date 12/4/17

### Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	17,351.00	TON		\$	
0020	00020		TRAFFIC BOUND BASE	209.00	TON		\$	
0030	00078		CRUSHED AGGREGATE SIZE NO 2	21,844.00	TON		\$	
0040	00190		LEVELING & WEDGING PG64-22	1,478.00	TON		\$	
0050	00205		CL3 ASPH BASE 1.50D PG64-22	9,062.00	TON		\$	
0060	00214		CL3 ASPH BASE 1.00D PG64-22	17,842.00	TON		\$	
0070	00324		CL3 ASPH SURF 0.50B PG64-22	6,815.00	TON		\$	
0080	02101		CEM CONC ENT PAVEMENT-8 IN (REVISED: 12-4-17)	1,384.00	SQYD		\$	
0090	02599		FABRIC-GEOTEXTILE TYPE IV	78,684.00	SQYD		\$	
0100	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		\$	
0110	02677		ASPHALT PAVE MILLING & TEXTURING	3,771.00	TON		\$	
0120	06401		FLEXIBLE DELINEATOR POST-M/W	9.00	EACH		\$	
0130	06510		PAVE STRIPING-TEMP PAINT-4 IN	76,887.00	LF		\$	
0140	06514		PAVE STRIPING-PERM PAINT-4 IN	46,099.00	LF		\$	
0150	06566		PAVE MARKING-THERMO X-WALK-12 IN	919.00	LF		\$	
0160	06568		PAVE MARKING-THERMO STOP BAR-24IN	210.00	LF		\$	
0170	06570		PAVE MARKING-PAINT CROSS-HATCH	6,608.00	SQFT		\$	
0180	06572		PAVE MARKING-DOTTED LANE EXTEN	651.00	LF		\$	
0190	06574		PAVE MARKING-THERMO CURV ARROW	42.00	EACH		\$	
0200	06578		PAVE MARKING-THERMO MERGE ARROW	8.00	EACH		\$	
0210	22520EN		PAVE MARKING-THERMO YIELD BAR-36 IN	58.00	LF		\$	
0220	24489EC		INLAID PAVEMENT MARKER	815.00	EACH		\$	

### Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0230	01310		REMOVE PIPE	1,558.00	LF		\$	
0240	01314		PLUG PIPE	1.00	EACH		\$	
0250	01585		REMOVE DROP BOX INLET	5.00	EACH		\$	
0260	01718		REMOVE INLET	4.00	EACH		\$	
0270	01810		STANDARD CURB AND GUTTER	18,525.00	LF		\$	
0280	01811		STANDARD CURB AND GUTTER MOD	35.50	LF		\$	
0290	01923		STANDARD BARRIER MEDIAN TYPE 5	255.00	SQYD		\$	
0300	02091		REMOVE PAVEMENT	1,446.00	SQYD		\$	
0310	02159		TEMP DITCH	3,817.00	LF		\$	
0320	02160		CLEAN TEMP DITCH	1,909.00	LF		\$	
0330	02200		ROADWAY EXCAVATION	60,571.00	CUYD		\$	
0340	02203		STRUCTURE EXCAV-UNCLASSIFIED	274.00	CUYD		\$	
0350	02223		GRANULAR EMBANKMENT	129.00	CUYD		\$	
0360	02242		WATER FOR DUST CONTROL	200.00	MGAL		\$	
0370	02262		FENCE-WOVEN WIRE TYPE 1	546.00	LF		\$	
0380	02429		RIGHT-OF-WAY MONUMENT TYPE 1	141.00	EACH		\$	
0390	02430		RIGHT-OF-WAY MONUMENT TYPE 1A	4.00	EACH		\$	
0400	02432		WITNESS POST	3.00	EACH		\$	

**PROPOSAL BID ITEMS**

171048

Page 2 of 5

Report Date 12/4/17

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0410	02545		CLEARING AND GRUBBING APPROX 49 ACRES	1.00	LS		\$	
0420	02555		CONCRETE-CLASS B	266.00	CUYD		\$	
0430	02562		TEMPORARY SIGNS	320.00	SQFT		\$	
0440	02585		EDGE KEY	445.00	LF		\$	
0450	02611		HANDRAIL-TYPE A-1	160.00	LF		\$	
0460	02625		REMOVE HEADWALL	7.00	EACH		\$	
0470	02650		MAINTAIN & CONTROL TRAFFIC	1.00	LS		\$	
0480	02690		SAFELOADING	73.00	CUYD		\$	
0490	02701		TEMP SILT FENCE	3,817.00	LF		\$	
0500	02703		SILT TRAP TYPE A	27.00	EACH		\$	
0510	02704		SILT TRAP TYPE B	27.00	EACH		\$	
0520	02705		SILT TRAP TYPE C	27.00	EACH		\$	
0530	02706		CLEAN SILT TRAP TYPE A	27.00	EACH		\$	
0540	02707		CLEAN SILT TRAP TYPE B	27.00	EACH		\$	
0550	02708		CLEAN SILT TRAP TYPE C	27.00	EACH		\$	
0560	02720		SIDEWALK-4 IN CONCRETE	6,814.29	SQYD		\$	
0570	02726		STAKING	1.00	LS		\$	
0580	02998		MASONRY COATING	313.00	SQYD		\$	
0590	05950		EROSION CONTROL BLANKET	9,978.00	SQYD		\$	
0600	05952		TEMP MULCH	86,245.00	SQYD		\$	
0610	05953		TEMP SEEDING AND PROTECTION	64,684.00	SQYD		\$	
0620	05963		INITIAL FERTILIZER	9.00	TON		\$	
0630	05964		20-10-10 FERTILIZER	4.50	TON		\$	
0640	05985		SEEDING AND PROTECTION	86,587.00	SQYD		\$	
0650	05990		SODDING	6,825.00	SQYD		\$	
0660	05992		AGRICULTURAL LIMESTONE	54.00	TON		\$	
0670	10020NS		FUEL ADJUSTMENT	41,961.00	DOLL	\$1.00	\$	\$41,961.00
0680	10030NS		ASPHALT ADJUSTMENT	63,211.00	DOLL	\$1.00	\$	\$63,211.00
0690	20418ED		REMOVE & RELOCATE SIGNS	8.00	EACH		\$	
0700	20550ND		SAWCUT PAVEMENT	1,347.00	LF		\$	
0710	21289ED		LONGITUDINAL EDGE KEY	17,351.00	LF		\$	
0720	23158ES505		DETECTABLE WARNINGS	523.00	SQFT		\$	
0730	23276EN11F		TURF REINFORCEMENT MAT 3	1,932.00	SQYD		\$	
0740	23839EC		REMOVE CONCRETE MEDIAN	698.00	SQYD		\$	
0750	24651ED		CONCRETE ISLAND	858.00	SQYD		\$	

**Section: 0003 - DRAINAGE**

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0760	00440		ENTRANCE PIPE-15 IN	188.00	LF		\$	
0770	00521		STORM SEWER PIPE-15 IN	3,710.00	LF		\$	
0780	00522		STORM SEWER PIPE-18 IN	3,704.00	LF		\$	
0790	00524		STORM SEWER PIPE-24 IN	2,375.00	LF		\$	
0800	00525		STORM SEWER PIPE-27 IN	68.00	LF		\$	
0810	00526		STORM SEWER PIPE-30 IN	600.00	LF		\$	
0820	00528		STORM SEWER PIPE-36 IN	412.00	LF		\$	
0830	00529		STORM SEWER PIPE-42 IN	260.00	LF		\$	
0840	00980		SLOTTED DRAIN PIPE-12 IN	50.00	LF		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0850	01000		PERFORATED PIPE-4 IN	1,952.00	LF		\$	
0860	01005		PERFORATED PIPE EDGE DRAIN-4 IN	14,992.00	LF		\$	
0870	01010		NON-PERFORATED PIPE-4 IN	451.00	LF		\$	
0880	01015		INSPECT & CERTIFY EDGE DRAIN SYSTEM	1.00	LS		\$	
0890	01020		PERF PIPE HEADWALL TY 1-4 IN	1.00	EACH		\$	
0900	01024		PERF PIPE HEADWALL TY 2-4 IN	6.00	EACH		\$	
0910	01028		PERF PIPE HEADWALL TY 3-4 IN	4.00	EACH		\$	
0920	01202		PIPE CULVERT HEADWALL-15 IN	3.00	EACH		\$	
0930	01204		PIPE CULVERT HEADWALL-18 IN	2.00	EACH		\$	
0940	01208		PIPE CULVERT HEADWALL-24 IN	4.00	EACH		\$	
0950	01210		PIPE CULVERT HEADWALL-30 IN	2.00	EACH		\$	
0960	01212		PIPE CULVERT HEADWALL-36 IN	3.00	EACH		\$	
0970	01214		PIPE CULVERT HEADWALL-42 IN	3.00	EACH		\$	
0980	01432		SLOPED BOX OUTLET TYPE 1-15 IN	1.00	EACH		\$	
0990	01450		S & F BOX INLET-OUTLET-18 IN	2.00	EACH		\$	
1000	01451		S & F BOX INLET-OUTLET-24 IN	2.00	EACH		\$	
1010	01452		S & F BOX INLET-OUTLET-30 IN	4.00	EACH		\$	
1020	01453		S & F BOX INLET-OUTLET-36 IN	2.00	EACH		\$	
1030	01456		CURB BOX INLET TYPE A	83.00	EACH		\$	
1040	01490		DROP BOX INLET TYPE 1	9.00	EACH		\$	
1050	01499		DROP BOX INLET TYPE 4	4.00	EACH		\$	
1060	01538		DROP BOX INLET TYPE 7	2.00	EACH		\$	
1070	01559		DROP BOX INLET TYPE 13G	7.00	EACH		\$	
1080	01577		DROP BOX INLET TYPE 14	1.00	EACH		\$	
1090	01580		DROP BOX INLET TYPE 15	1.00	EACH		\$	
1100	01581		DROP BOX INLET TYPE 16G	5.00	EACH		\$	
1110	01756		MANHOLE TYPE A	12.00	EACH		\$	
1120	01761		MANHOLE TYPE B	2.00	EACH		\$	
1130	01767		MANHOLE TYPE C	5.00	EACH		\$	
1140	01770		MANHOLE TYPE C SPECIAL	2.00	EACH		\$	
1150	02484		CHANNEL LINING CLASS III	151.00	TON		\$	
1160	02600		FABRIC GEOTEXTILE TY IV FOR PIPE	22,472.00	SQYD	\$2.00	\$	\$44,944.00
1170	03385		PVC PIPE-6 IN	11.00	LF		\$	
1180	20904ED		RECONSTRUCT CURB BOX INLET	2.00	EACH		\$	
1190	23952EC		DRAINAGE JUNCTION BOX TY B	2.00	EACH		\$	
1200	24814EC		PIPELINE INSPECTION	10,885.00	LF		\$	

**Section: 0004 - BRIDGE-BOX CULVERT**

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1210	02403		REMOVE CONCRETE MASONRY	4.00	CUYD		\$	
1220	03000		PRECAST CONC BOX SECT 30 IN X 30 IN	14.00	LF		\$	
1230	08103		CONCRETE-CLASS D MOD	1.00	CUYD		\$	

**Section: 0005 - UTILITY-ELECTRICAL**

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
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## PROPOSAL BID ITEMS

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1240	24725EC		UTILITY RELOCATION	1.00	LS		\$	

### Section: 0006 - SEWER

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1250	15011		S DIRECTIONAL BORE	80.00	LF		\$	
1260	15017		S ENCASMENT STEEL BORED RANGE 4	410.00	LF		\$	
1270	15023		S ENCASMENT STEEL OPEN CUT RANGE 4	50.00	LF		\$	
1280	15059		S FORCE MAIN PVC 04 INCH	90.00	LF		\$	
1290	15073		S FORCE MAIN TIE-IN 04 INCH	1.00	EACH		\$	
1300	15092		S MANHOLE	10.00	EACH		\$	
1310	15093		S MANHOLE ABANDON/REMOVE	4.00	EACH		\$	
1320	15099		S MANHOLE TAP EXISTING	1.00	EACH		\$	
1330	15101		S MANHOLE WITH DROP	1.00	EACH		\$	
1340	15104		S PIPE DUCTILE IRON 08 INCH	254.00	LF		\$	
1350	15112		S PIPE PVC 08 INCH	668.00	LF		\$	
1360	15119		S PUMP STATION	1.00	EACH		\$	
1370	15121		S STRUCTURE ABANDON	1.00	EACH		\$	

### Section: 0007 - SIGNALIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1380	04792		CONDUIT-1 IN	25.00	LF		\$	
1390	04795		CONDUIT-2 IN	35.00	LF		\$	
1400	04820		TRENCHING AND BACKFILLING	400.00	LF		\$	
1410	04830		LOOP WIRE	4,650.00	LF		\$	
1420	04844		CABLE-NO. 14/5C (REVISED: 12-4-17)	7,050.00	LF		\$	
1430	04850		CABLE-NO. 14/1 PAIR	4,350.00	LF		\$	
1439	04884		ANCHOR (ADDED: 12-4-17)	4.00	EACH		\$	
1440	04885		MESSENGER-10800 LB (REVISED: 12-4-17)	815.00	LF		\$	
1450	04895		LOOP SAW SLOT AND FILL	1,760.00	LF		\$	
1460	04931		INSTALL CONTROLLER TYPE 170	1.00	EACH		\$	
1461	04932		INSTALL STEEL STRAIN POLE (ADDED: 12-4-17)	4.00	EACH		\$	
1470	20093NS835		INSTALL PEDESTRIAN HEAD-LED	8.00	EACH		\$	
1480	20094ES835		TEMP RELOCATION OF SIGNAL HEAD (REVISED: 12-4-17)	75.00	EACH		\$	
1490	20188NS835		INSTALL LED SIGNAL-3 SECTION (REVISED: 12-4-17)	30.00	EACH		\$	
1495	20275EC		VIDEO DETECTION-INSTALL (ADDED: 12-4-17)	4.00	EACH		\$	
1500	20390NS835		INSTALL COORDINATING UNIT	1.00	EACH		\$	
1510	20391NS835		ELECTRICAL JUNCTION BOX TYPE A	4.00	EACH		\$	
1520	21543EN		BORE AND JACK CONDUIT	35.00	LF		\$	
1530	21743NN		INSTALL PEDESTRIAN DETECTOR	8.00	EACH		\$	
1540	23157EN		TRAFFIC SIGNAL POLE BASE (REVISED: 12-4-17)	20.20	CUYD		\$	



**PROPOSAL BID ITEMS**

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1550	23222EC		INSTALL SIGNAL PEDESTAL	3.00	EACH		\$	
1560	24900EC		PVC CONDUIT-1 1/4 IN-SCHEDULE 80	20.00	LF		\$	
1570	24901EC		PVC CONDUIT-2 IN-SCHEDULE 80	320.00	LF		\$	
1580	24955ED		REMOVE SIGNAL EQUIPMENT (REVISED: 12-4-17)	2.00	EACH		\$	

**Section: 0008 - WATERLINE**

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1590	14001		W AIR RELEASE VALVE 3/4 INCH	6.00	EACH		\$	
1600	14003		W CAP EXISTING MAIN	11.00	EACH		\$	
1610	14004		W DIRECTIONAL BORE	125.00	LF		\$	
1620	14008		W ENCASEMENT STEEL BORED RANGE 3	490.00	LF		\$	
1630	14009		W ENCASEMENT STEEL BORED RANGE 4	650.00	LF		\$	
1640	14011		W ENCASEMENT STEEL BORED RANGE 6	150.00	LF		\$	
1650	14019		W FIRE HYDRANT ASSEMBLY	4.00	EACH		\$	
1660	14021		W FIRE HYDRANT REMOVE	4.00	EACH		\$	
1670	14028		W METER 3/4 INCH	7.00	EACH		\$	
1680	14036		W PIPE DUCTILE IRON 06 INCH	1,456.00	LF		\$	
1690	14037		W PIPE DUCTILE IRON 08 INCH	3,899.00	LF		\$	
1700	14040		W PIPE DUCTILE IRON 16 INCH	230.00	LF		\$	
1710	14059		W PIPE PVC 06 INCH	1,614.00	LF		\$	
1720	14060		W PIPE PVC 08 INCH	2,317.00	LF		\$	
1730	14063		W PIPE PVC 16 INCH	274.00	LF		\$	
1740	14081		W SERVICE RELOCATE	3.00	EACH		\$	
1750	14089		W TAPPING SLEEVE AND VALVE SIZE 1 6 INCH	8.00	EACH		\$	
1760	14089		W TAPPING SLEEVE AND VALVE SIZE 1 8 INCH	3.00	EACH		\$	
1770	14090		W TAPPING SLEEVE AND VALVE SIZE 2	2.00	EACH		\$	
1780	14094		W TIE-IN 06 INCH	1.00	EACH		\$	
1790	14105		W VALVE 06 INCH	10.00	EACH		\$	
1800	14106		W VALVE 08 INCH	6.00	EACH		\$	
1810	14109		W VALVE 16 INCH	2.00	EACH		\$	
1820	14148		W SERV COPPER LONG SIDE 3/4 IN	1.00	EACH		\$	
1830	14152		W SERV COPPER SHORT SIDE 3/4 IN	9.00	EACH		\$	
1840	14156		W METER REMOVE	7.00	EACH		\$	

**Section: 0009 - DEMOBILIZATION &/OR MOBILIZATION**

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1850	02568		MOBILIZATION	1.00	LS		\$	
1860	02569		DEMOBILIZATION	1.00	LS		\$	



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**U.S. 41A – Section 1 Utility Relocation  
Madisonville Municipal Utilities  
KY Transportation Cabinet**

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Contract No: 6531-C1  
Date: Nov. 30, 2017  
Rev.: 00

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# **U.S. 41A – SECTION 1 UTILITY RELOCATION PROJECT**

## **CONTRACT NO. 6531-C1**

### **MADISONVILLE MUNICIPAL UTILITIES Madisonville, Kentucky**

**November 2017**

**P. Anthony Hanson  
KY PE License #17402**



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**U.S. 41A – Section 1 Utility Relocation  
Madisonville Municipal Utilities  
KY Transportation Cabinet**

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**SECTION 00 01 07  
SEALS PAGE**

DESIGN PROFESSIONALS OF RECORD

Electrical Engineer:

1. P. Anthony Hanson
2. KY PE License #17402

END OF SECTION 00 01 07



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00 41 13	Bid Form
<b>DIVISION 01</b>	<b>GENERAL REQUIREMENTS</b>
01 11 00	Summary of Work
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<b>DIVISION 33</b>	<b>UTILITIES</b>
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**REVISION HISTORY**

Revision No.	Date	Description
00	11/30/2017	Issued for review

END OF SECTION 00 01 10



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**SECTION 00 01 15**  
**LIST OF EXHIBITS AND DRAWINGS**

<b>EXHIBIT</b>	<b>DESCRIPTION</b>
EXHIBIT A	Install / Remove / Transfer Unit Quantities

<b>CONTRACT DRAWINGS</b>
Utility Plan Sheets (U72-U96)
Detailed Drawings (KYMMU41A203 to KYMMU41A225, plus KYMMU41A401)
Steel Pole Drawings (KYMMU41A101 to KYMMU41A116)

END OF SECTION 00 01 15



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**SECTION 00 41 13**  
**BID FORM**

**1.01 LUMP SUM BID**

BID ITEM A: INSTALLS New Construction	
BID ITEM B: REMOVALS Retire Construction	
BID ITEM C: TRANSFERS Transfer Construction	
TOTAL BID	

Note: Contractor must submit with this bid a bill of material with catalog numbers of all material provided.



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**SECTION 01 10 00  
SUMMARY OF WORK**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Project Description
- B. Description of Work
- C. General Work Requirements
- D. Work Site Location
- E. Owner and Contractor-furnished Materials
- F. Work By Others
- G. Site Visits

**1.02 PROJECT DESCRIPTION**

- A. The Kentucky Transportation Cabinet (KTC) is improving Hwy 41A and Hwy 41 (Main Street) in Madisonville, KY. With the improvements for the highway project, sections of the existing overhead and underground 12kV electric facilities will have to be relocated outside road construction limits where possible. Construction will consist of installing, removing and transferring facilities, as well as installing overhead equipment, services, and street lighting.

**1.03 DESCRIPTION OF WORK**

The Work is divided into two sections. Contractor shall perform the tasks as outlined below.

- A. The first section is along Hwy 41A to Main St. The length of this section is 6800'.
  - 1. 12kV Removal: Remove 2000' of double circuit framing on steel poles, guying, gang-operated switch, riser, street lights, secondary, transformers and other equipment. Remove single circuit and single-phase wood poles, framing, conductor as indicated on construction drawings in various locations along the length of this route. Remove existing double circuit three-phase conductor 795ACSR and 397ACSR Neutral. Removals are indicated on Plan View drawings shown in green.
  - 2. 12kV Install: Install 2050' of double circuit framing on steel poles framing, guying, anchors, gang-operated switch, single-phase riser, street lights, secondary, transformers, equipment and new conductor. New steel poles will be installed with rock backfill. Install single-phase riser, 2-2" ductbank 10' to existing pad-mounted transformer. Along this route, install single circuit and single-phase wood poles, framing, conductor and equipment. Installs are indicated on Plan View drawings shown in red.
  - 3. 12kV Transfer: Transfer and splice existing taps were indicated on the Plan View drawings shown in orange.



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- B. The second section is along Hwy 41 (Main St) totaling 1700'.
  - 1. 12kV Removal: Remove 1700' of single circuit framing on wood poles, guying, stubs, span guys, gang-operated switch, three-phase riser, street lights, secondary, transformers and other equipment. Remove existing three-phase conductor 795ACSR and 397ACSR Neutral. Removals are indicated on Plan View drawings shown in green.
  - 2. 12kV Install: Install 1700' of single circuit 795ACSR primary and 397ACSR neutral conductor and framing on steel poles. Where indicated on drawings, install single phase taps, guying, span guys, steel stub poles, anchors, gang-operated switch, three-phase riser, street lights, secondary, transformers, equipment. New steel poles will be installed with rock backfill or concrete. Install three-phase riser, 1168' of 6-2" ductbank and termination elbows to existing pad-mounted transformer. One self-supporting structure with a pier drilled foundation will also be required. Installs are indicated on Plan View drawings shown in red.
  - 3. 12kV Transfer: Transfer and splice existing single and three phase taps were indicated on the Plan View drawings shown in orange.

**1.04 GENERAL WORK REQUIREMENTS**

- A. The scope of Work includes the installation of a complete and functional system for serving distribution customers. The general scope of tasks is described as follows:
  - 1. Contractor shall furnish all material per contract drawings.
  - 2. Contractor shall be responsible for layout and surveying of the proposed modifications. Engineer shall provide survey locations of structures and anchors.
  - 3. Contractor shall submit a complete material list, with supplier, catalog information and catalog cut detail to Engineer for review and approval.
  - 4. Contractor shall be responsible for providing supervisor(s) and personnel qualified to perform the Work as specified.
  - 5. The methods of framing and construction practices must conform to the latest and best current practice for the type of construction required for the application. The system shall be complete with all necessary accessories for proper operation.
  - 6. If any departure from the Contract or Contract Drawings is deemed necessary by Contractor, details of such departure and the reasons therefor shall be submitted as soon as practicable to Engineer and Owner for approval. No such departures shall be made without prior written approval of Owner.
  - 7. Contractor is advised that existing distribution line outages shall be held to an absolute minimum, may be prohibited at times, and at all times shall not remove any substation from service. The duration of outages may be restricted to maintain a satisfactory operating condition. In general, Contractor shall maintain the system in such condition that, in the event of any emergency, service can be restored with minimum effort and lost time. All outages must be approved in advance by Owner and Engineer.
  - 8. Contractor shall coordinate with other pole-mounted utilities.
  - 9. Contractor shall be responsible for providing for proper handling, storing and protection of materials.





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10. Contractor shall be responsible for demolition, removing and disposing of existing wood poles and equipment as specified.
11. Contractor shall disassemble, store, protect and return removed materials to Owner's warehouse.
12. Contractor shall be responsible for transferring existing facilities, removing old facilities, and installing new facilities, as identified on the Contract Drawings.
13. All pole top assembly units include installation, proper requirements for sagging of primary and neutral conductors.
14. All pole change-outs includes the transferring, dead-ending and reattachment of conductors.
15. Contractor shall be responsible for landscape and concrete repair (due to construction activities including restoring, planting, seeding new areas and areas disturbed during construction) per KTC specification.
16. Contractor shall be responsible for cleaning-up and disposing of debris and waste as project progresses.
17. Contractor is advised that construction will involve performing work adjacent to and on energized electrical power facilities owned by Owner and others.
18. Contractor shall be responsible for coordinating construction activities with Owner, other agencies and utilities as required by these specifications and associated permits.
19. Actual construction shall be based on the Contract Drawings. Any change to the Contract Drawings must be approved by Owner. Within 10 days after return of approved prints, copies shall be furnished to Owner for retention as a matter of record. Prior to completion of the Work, the originals, available from Owner, shall be revised to show all changes subsequent to original plans and submitted for retention as a matter of record.
20. Contractor shall attend progress and scheduling meetings in person or by teleconference as allowed by Owner.
21. Contractor shall be responsible for providing barricading and traffic control during construction activities. Contractor shall abide by all Federal, State, local and Transportation Cabinet regulations. Use Proper Transportation Cabinet traffic control procedures.
22. Contractor shall attend kickoff, progress and closeout meeting scheduled by Owner.
23. Owner will perform walkthrough inspection after completion; Contractor shall remedy identified issues before closeout.
24. Owner and Engineer reserves the right to make ground inspections. Contractor shall make any corrections required to bring project into compliance with original specifications at no cost to Owner.
25. Construction is not complete until Contractor has energized lines at operating voltage after Owner's inspection.
26. It is the responsibility of Contractor to verify the location of any and all underground utilities including water, gas, telephone, and sewage either privately or publicly owned. Contractor assumes sole responsibility for damages to facilities in or near work area if damage occurs. Contractor shall abide by state and utility notifications "One Call Law".



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27. Temporary work necessary in the normal course of construction should be identified prior to bidding. No additional payment will be made.

**1.05 WORK SITE LOCATION**

- A. Within and outside the service territory of the City of Madisonville, Kentucky on Hwy 41A and Hwy 41 (Main St).

**1.06 CONTRACTOR-FURNISHED ITEMS**

- A. All materials are Contractor-furnished.
- B. Contractor shall be responsible for inventorying all units, construction drawings, and construction documents for material quantity requirements. All units are to be complete, functional and meet applicable safety standards.

**1.07 WORK BY OTHERS**

- A. Owner will coordinate necessary outages and notifications of affected customers.
- B. Owner will provide a switch/hot line tag selection upon Contractor's request.
- C. Owner will provide pole-mounted transformer.

**1.08 SITE VISITS**

- A. The Work stated and specified herein involves construction adjacent to energized overhead electric lines. Engineer has attempted to depict construction conditions as accurately as possible; however, Contractor is strongly advised to undertake the following:
  - 1. Review all construction documents and visit the proposed location of construction. Contractor should visit the location for types of soil and terrain construction might encounter.
  - 2. Pay special attention to scheduling Work activities to permit expeditious accomplishment of the requirements.

**PART 2 - PRODUCTS – NOT USED**

**PART 3 - EXECUTION – NOT USED**

END OF SECTION 01 11 00



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**SECTION 02 41 00  
DEMOLITION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Existing Conditions
- B. Continuity of Electrical Service
- C. Coordination
- D. Preparation for Demolition
- E. Execution of Demolition

**1.02 EXISTING CONDITIONS**

- A. Conduct demolition to minimize interference with adjacent structures.
- B. Provide, erect, and maintain temporary barriers and security devices.

**1.03 CONTINUITY OF ELECTRICAL SERVICE**

- A. Maintain electrical service to customers during construction, wherever feasible.
- B. Coordinate customer outages with designated utility personnel and customers.

**1.04 COORDINATION**

Arrange for required power outages with Owner, customers, and other utilities as appropriate.

**PART 2 - PRODUCTS - NOT USED**

**PART 3 - EXECUTION**

**3.01 PREPARATION FOR DEMOLITION**

- A. Locate and protect existing utilities.
- B. Prevent movement or settlement of adjacent structures. Provide bracing and shoring.
- C. Protect existing landscaping, materials, appurtenances, and structures that are not to be demolished.

**3.02 EXECUTION FOR DEMOLITION**

- A. Demolish indicated structures and appurtenances in an orderly and careful manner. Take all precautions necessary for working near exposed, energized electrical equipment.
- B. Cease operations and notify Engineer immediately if adjacent structures appear to be endangered. Do not resume operations until corrective measures have been taken.
- C. Remove demolished materials from site as Work progresses. Leave site in clean condition.



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- D. Demoeed materials become the property of Contractor and are to be disposed of in accordance with applicable codes, with the exception of the following materials of which Owner will retain ownership: Transformers, switches, capacitors, lights and other materials specified by Owner.
- E. Remove materials to be reinstalled or retained in manner to prevent damage.
- F. Remove and promptly dispose of contaminated, vermin infested, special or dangerous materials encountered.
- G. Do not burn or bury materials onsite.
- H. Resurface areas disturbed by demolition activities with surfacing equal to the existing surfacing.
- I. Rough grade and compact areas affected by demolition to maintain site grades and contours.
- J. Backfill excavated areas, open pits, and holes caused as a result of demolition.
- K. Do not use explosives.
- L. Immediately notify Owner of damage to materials specified for reinstallation or return to stores.
- M. Damaged materials shall not be reinstalled.
- N. Materials returned to stores in damaged condition without notification to Owner will not be credited.

END OF SECTION 02 41 00



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**SECTION 33 71 16.23  
GALVANIZED STEEL POLE STRUCTURES**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Steel Structure Design
- B. Materials
- C. Steel Structure Fabrication

**1.02 REFERENCES**

- A. The latest published edition of a reference shall be applicable to this Project unless identified by a specific edition date.
- B. All reference amendments adopted prior to the effective date of this Contract shall be applicable to this Project.
- C. All materials and workmanship shall comply with the applicable requirements and standards addressed within, but not limited to, the following references:
  - 1. ASCE / SEI 48, Design of Steel Transmission Pole Structures
  - 2. ASME Section 1X, Part QB, Brazing
  - 3. ASTM A36, Standard Specification for Carbon Structural Steel
  - 4. ASTM A123, Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 5. ASTM A143, Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement
  - 6. ASTM A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 7. ASTM A194, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both
  - 8. ASTM A304, Standard Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements
  - 9. ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength
  - 10. ASTM A354, Standard Specification for Quenched and Tempered Alloy Steel Bolts, Studs, and Other Externally Threaded Fasteners
  - 11. ASTM A370, Standard Test Methods and Definitions for Mechanical Testing of Steel Products
  - 12. ASTM A384, Standard Practice for Safeguarding Against Warpage and Distortion During Hot-Dip Galvanizing of Steel Assemblies



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13. ASTM A572, Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
14. ASTM A615, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
15. ASTM B773, Standard Guide for Ultrasonic C-Scan Bond Evaluation of Brazed or Welded Electrical Contact Assemblies
16. ASTM E23, Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
17. AWS D1.1, Structural Welding Code – Steel
18. NACE No. 2 / SSPC-SP 10, Joint Surface Preparation Standard: Near-White Metal Blast Cleaning
19. NACE No. 3 / SSPC-SP 6, Commercial Blast Cleaning

**1.03 SUBMITTALS**

- A. General: Submit in accordance with Division 0 – Bidding Requirements and Section 01 33 00 – Submittal Procedures.
- B. Included with Bid – Final design calculations for self-supporting steel poles, sealed by a Professional Engineer registered in the State of Kentucky, including:
  1. The total actual moments, moments of inertia, and stresses at 5-foot intervals along the structure as well as at points of load application for all load cases
  2. Computation of stresses in connections, attachments, and baseplates
  3. Maximum deflection at all load points and at top or ends of structure for all load cases
  4. Calculated weight of members and attachments
  5. Description of members, including thickness, length, diameter, cross-sectional geometry, and method of fastening each component
  6. Foundation loads for pier foundation poles
- C. Following Contract Award – Shop Drawings for each structure type, illustrating the following:
  1. Steel structure, attachment, crossarm and bracing fabrication details
  2. Details of proposed climbing assemblies
  3. Erection details for each structure type including match markings to be used, actual calculated scale weights of members, and structure orientation with the Transverse (X) – Vertical (Y) – Longitudinal (Z) axis shown on the Drawings
  4. Details of anchor bolt assemblies
  5. Details of steel pole grounding provisions
  6. When requested by Engineer, copies of each pre-qualified welding procedure, and each welder and welding operator’s qualifications proposed for use on the Work



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7. Plans and specifications for structure erection
8. Do not start fabrication until design computations and shop drawings have been approved by Engineer
9. Certified copies of Charpy test data and copies of mill test reports for all structural steel indicating compliance with the chemical and mechanical property requirements of the Contract Documents to Engineer before payment shall be made.

**1.04 QUALITY ASSURANCE**

- A. Determine the chemical compositions and appropriate mechanical properties of structural steel used, either by obtaining manufacturer's certificates of compliance or by laboratory testing.
- B. Upon request, furnish sample coupons of steel used for independent testing by a laboratory selected by Engineer.
- C. Perform ultrasonic inspection on all full penetration welds and visual inspection on all welds in accordance with the requirements of AWS D1.1. Design ultrasonic examination methods to ensure weld quality conformance.
- D. Ultrasonically test all plates over 1-1/2 inches thick to determine whether defects are present which could cause laminar tearing.
- E. Maintain a "Traveler" on all major structure components. List on the Traveler material identification: welder identity, inspection results and inspector identity.
- F. Upon request, make provisions for inspection of structure fabrication by Engineer. Engineer shall provide one week advance notice of any inspection. Owner shall be responsible for expenses of inspector or Owner's representatives. Inspection by Engineer at the point of manufacture shall not constitute acceptance of the Work as specified.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. General
  1. Segregate bolts, nuts and small pieces according to size and pack in separate waterproof wooden boxes or kegs marked by structure identification. Bundle other pieces.
  2. Properly block all materials to prevent damage and distortion of members during transit.
- B. Prepare and load equipment in such a manner as to provide protection from damage in transit. Use moisture proof packaging, packing or wrapping to preclude moisture damage in transit and during storage at the Project site before installation. Where necessary, mount heavy parts on skids or crate, and box or wire in bundle parts that might otherwise be lost. Plainly mark for identification. Load equipment so that it shall not shift or become damaged during transport. Prepare equipment exceeding 200 pounds in gross weight for shipment so that slings or handling by crane may readily be attached without damage to equipment.
- C. Mark all parts for ease of field assembly.
- D. Accompany each shipment with a packing list of articles included in the shipment.
- E. Seller shall provide at least 48 hours' notice of delivery date.
- F. Owner shall be responsible for unloading.



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**PART 2 - PRODUCTS**

**2.01 STEEL STRUCTURE DESIGN**

- A. Except as otherwise specified in the Contract Documents, design Steel Structures in accordance with the requirements of ASCE / SEI 48.
- B. Steel Structure Design: Meet the load requirements shown on the Drawings. Do not exceed the specified yield strength of the steel used for the unit stress under full design load, including safety factors and secondary bending stresses.
- C. Design all deadend structures such that the resultant horizontal loads for any and all load cases may be applied in any direction in the Transverse-Longitudinal (X-Z) plane.
- D. Design the structures for maximum deflection limits based on the total pole height above the point of assumed fixity under design loads, as shown on the Contract Drawings.
- E. Use a maximum value of 3,500 psi for the 28-day compressive strength of the concrete.
- F. The maximum outside diameter of anchor bolt assemblies shall be as shown on the Contract Drawings.
- G. Design mounting brackets and crossarms to the loading and dimensional requirements shown on the Drawings.
- H. Taper poles continuously for their entire length.
- I. Bolted flange-type joints in the pole shaft are not acceptable. Multiple section poles shall be designated with slip joints providing an accuracy of fit that will prevent misalignment of structures during erection. The length of overlap shall be not less than 1.5 times the largest axis dimension of the structure at the joint. Design slip joints to withstand torsion without slippage or rotation under design loads.
- J. Design shall consider ease of assembly and erection. Design and furnish construction attachments including vangs, nuts, or bails as desired to facilitate steel pole erection, wire installation, and other construction activities. Design construction attachments so as not to impair the function of any other component, reduce electrical clearances, pose a safety risk, or impart overloads on the structure or its parts.

**2.02 MATERIALS**

- A. General
  - 1. Structural Steel: Made by the open hearth, basic oxygen, or electric furnace process and in accordance with the latest revision of ASTM under which the steel is produced. Alloying elements, if present, shall not be in quantities that produce steel that is not readily weldable by the arc welding processes used for plain carbon structural steels.
  - 2. Structural Steel: Minimum impact property of 15 foot-pounds at -20°F in the longitudinal direction as measured by the Charpy "V" notch test in accordance with ASTM A370 and E23.
  - 3. Identify steel as to yield strength.
  - 4. Use 3/16 inch minimum thickness for steel, regardless of yield strength.
  - 5. Weld Material: Compatible with the parent material, as defined by AWS D1.1.





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**B. Steel Poles, Arms, Arm Attachment Plates, Braces and Conductor Brackets**

1. Galvanized Steel: Fabricate tubular steel poles, mounting brackets, pole caps, bearing plates, arm attachment plates, arms and braces and conductor brackets from material conforming to the requirements of ASTM A36 or A572 modified to limit silicon content to 0.06 percent. Select grade for A572 as required.

**C. Anchor Bolts and Nuts**

1. Fabricate anchor bolts from steel conforming to ASTM A615, Grade 60 or 75.
2. Normalize steel by holding at temperature for a sufficient time to ensure uniform heat distribution throughout its mass and uniformly cool in still air.
3. Nuts for Anchor Bolts: Conform to A563, Grade DH, galvanized. Tap nuts after galvanizing to produce a finger-free fit without shake on the galvanized bolts.

**D. Structure Assembly Hardware**

1. Use 5/8 inch minimum diameter bolts and nuts with locknuts or lockwashers for bolted connections.
2. Provide bolt lengths such that bolt will project at least 1/4 inch, but not more than 3/4 inch beyond the nut when assembled.
3. Furnish bolts, nuts and locking devices at 105 percent of the actual quantity required for field connections.
4. Connection Bolts for Galvanized Steel Structures: ASTM A325 or A354, Grade BC, hot-dip galvanized.
5. Connection Nuts: A563, Grade DH, galvanized. Tap nuts after galvanizing to provide finger-free fit without shake on the bolt.

**E. Grounding Tabs: ASTM A304, stainless steel.**

**F. Climbing and Working Ladder Attachments for Galvanized Steel Structures: ASTM A325 or A572.**

**G. Removable Climbing Steps: ASTM A36, A572 or A325, galvanized.**

**H. Touch-up Paint for Damaged Galvanized Structures: Single package 95% zinc rich.**

**PART 3 – EXECUTION**

**3.01 STEEL STRUCTURE FABRICATION**

**A. General**

1. Do not start fabrication until design computations and shop drawings have been accepted by Engineer.
2. Fabricate in accordance with ASCE / SEI 48 except as otherwise specified in the Contract Documents. Provide symmetrical pole cross-sections. Design and fabricate structures so that field welding is not required.



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3. Fabrication tolerances:

Description	Tolerance
Length	-0 inch / +5 inches
Cross-section of poles:	
36 inches or less diameter	-1/8 inch / +1/4 inch
Greater than 36 inches diameter	-1/4 inch / +1/2 inch
Circumference of all poles	-0 inch
Spacing between vertical connections	±3/4 inch
Location of hardware with respect to top of pole	±2 inches
Straightness of pole	±1/2 inches from centerline
Location of a drilled hole in a piece	±1/8 inch
Spacing between holes of same connection	±1/16 inch (non-accumulative)
Angles shown	±2 degrees
Anchor Bolts:	
Length	-0 inch / +3 inches
Thread length	-0 inch / +2 inches
Length of galvanizing on anchor bolts	-0 inch / +12 inches
Distance between anchor bolts in cluster	±1/8 inch (non-accumulative)

B. Anchor Bolts

1. Furnish three heavy hex nuts with each anchor bolt, one of these provided as a “keeper”.
2. Do not perform any welding on the anchor bolts within the bolt stress development area.
3. Fabricate anchor bolts into a rigid pre-positioned assembly and ship from the factory as a unit ready to be placed in the foundation.

C. Welding / Brazing

1. Perform welding in accordance with the requirements of American Welding Society Structural Welding Code, AWS D1.1, as supplemented herein.
2. For primary joints, use welding electrodes with, as a minimum, an impact value of 15 foot-pounds at -20°F as measured by the standard Charpy-V-Notch test, and physical properties of the base metal being welded when tested with the applicable AWS D1.1 specification for welding electrodes.
3. Perform welding by the shielded metal-arc, gas shielded fluxcore, gas metal-arc, or submerged-arc processes. Perform shielded metal-arc welding with appropriate strength low hydrogen electrodes which have been conditioned in accordance with the requirements of AWS D1.1. Limit gas metal-arc process, using solid bare filler wire, to root bead or tack welding only.
4. Preheat in accordance with the steel producer’s minimum recommendation, or as verified by testing for suitability for structural application in accordance with AWS D1.1.
5. Make longitudinal welds with 80 percent minimum weld joint penetration. Make base plate and circumferential seam welds with complete penetration welds.



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6. Brazing in accordance with applicable sections of ASME Section 1X, Part QB, Brazing. Test factory brazing in accordance with ASTM B773.

D. Grounding Provisions

1. Weld stainless steel plates or grounding nuts on each pole in accordance with the details shown on the Drawings.

E. Climbing Provisions

1. Furnish galvanized structures with welded clips designed to accept removable Winola industrial ladders. Ladders shall be furnished by others.

F. Finish and Protective Coatings

1. Fabrication shall be complete before galvanizing.
2. Preparation
  - a. Clean all foreign matter, slag and weld spatter from structural steel members after fabrication is complete.
  - b. Blast clean all steel after fabrication in accordance with:
    - 1) SSPC-SP 6 commercial finish.
3. Galvanized Steel Structures
  - a. Structures shall be galvanized by the hot dip process in accordance with ASTM A123 with a minimum thickness of 2.5 mils.
  - b. Precautions shall be taken against embrittlement, warpage and distortion in accordance with ASTM A143 and ASTM A384.
  - c. Galvanized coating shall be continuous, adherent, smooth and evenly distributed. The coating shall be a matte finish.
4. Coatings for the Embedded Portion of the Pole A minimum 16 mil DFT of two component hydrocarbon extended polyurethane coating that is resistant to ultraviolet light shall be applied on the exposed surface of the embedded portion of the pole. The coating shall extend 16" inches above groundline or proposed future groundline. Other coatings shall be approved by Owner prior to their use. One-quart container of touch up shall be provided with each five poles.
5. Galvanize nuts, bearing plates and the threaded area plus 6 inches of anchor bolts in accordance with ASTM A123 or A153, as applicable.
6. Structures or structure components shall not be shipped until finish coats are completely dry.



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7. Marking and Identification

- a. Mark each pole of each structure on one face 5 feet above the ground line and on the bottom of the bearing plate with the structure type, and pole length. Make markings  $\frac{1}{4}$  inch weld to be easily readable at 5 feet. Place information on a face that will not be obstructed by equipment.
- b. Where slip joints are used, mark the top of the male section and the bottom of the female section with  $\frac{1}{4}$  inch weld alignment marks which, when the joint is fully installed, shall be no more than 18 inch apart. Install additional marks on the male section to guide initial installation.
- c. Identify anchor bolt assemblies by structure type and pole length. Identify and mark baseplate and anchor bolt assemblies on the Transverse-Longitudinal (X-Z) axis as shown on the Drawings.
- d. Distinctly mark each separate part of a structure with structure type and position of the piece in the structure.

END OF SECTION 33 71 16.23



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**SECTION 33 71 16.43  
POLE CONSTRUCTION, INSTALLATION, AND REMOVAL**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Poles
- B. Installation Notes
- C. Pole Handling
- D. Pole Structure Erection
- E. Pole Installation
- F. Pole Removal

**1.02 QUALITY ASSURANCE**

Installation and removal work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. The 2012 (or latest edition) of the National Electric Safety Code (ANSI-C2) shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.

**PART 2 – PRODUCTS**

**2.01 POLES**

- A. Poles shall be Owner-furnished.

**PART 3 - EXECUTION**

**3.01 INSTALLATION NOTES**

- A. Coordination shall be provided as follows:
  - 1. Contractor and all Subcontractors for the various branches of work employed on the Project shall cooperate fully with each other to facilitate the progress of the work, and to avoid all interferences between the various parts of the work.
  - 2. Contractor shall cooperate fully with any other contractor that is engaged in work on the Project for Owner or any other contractor working in the Project area.
- B. Practices relative to right-of-way shall be observed by Contractor during construction as follows:
  - 1. The right-of-way shall consist of an area as determined by Owner extending on both sides of the center line of the route of the Project lines.
  - 2. All rights-of-way and easements across private or public property required for performance of the work herein will be obtained by Owner. Access to the Project area outside the rights-of-way limits specified shall be the responsibility of Contractor. Owner shall be informed of all arrangements made for such access. Promptly restore to at least the conditions which existed prior to the commencement of work any ruts or damage made by equipment whether on or off the right-of-way.



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**3.02 POLE HANDLING**

Poles shall be handled with care so as not to damage the pole. Poles shall not be dragged along the ground. Poles stored after delivery shall be arranged with care and shall be placed so that no pole will come in contact with standing water or the ground.

**3.03 POLE STRUCTURE ERECTION**

- A. The depth of setting shall be as follows unless otherwise specified on the construction drawings:

POLE HEIGHT (Per Ft.)	SETTING DEPTH	
	In Earth (Ft.)	In Rock (Ft.)
35	5.5	3.5
40	6.0	4.0
45	6.5	4.5
50	7.0	5.0
55	7.5	5.5
60	8.0	6.0
70	9.0	7.0
75	9.5	7.5
80	10.0	8.0
85	10.5	8.5
90	11.0	9.0

- B. Poles shall be set plumb and in alignment if not raked.
- C. Poles shall be set no deeper than 3” than the values in the table above. No pole will be set less than “earth” depth without Engineer’s approval.
- D. Poles set in holes partly in earth and partly in rock shall be set to the depths shown for “earth”. Holes may be shortened only upon Engineer’s approval.
- E. Excavation is unclassified. No additional pay for rock excavation shall be provided.
- F. All holes shall be dug in the correct locations and shall be large enough to provide space for use of power tamping bars all around poles to the full depth of the holes. The poles shall be carefully placed in the holes so that the structure grounding materials will not be damaged or displaced.
- G. Holes will be hand dug where requested by Underground Protective Services markings or Engineer.
- H. Structure Setting Tolerances
  1. Owner will stake new pole locations.
  2. Poles shall be set according to the Drawings and Construction Schedule. No pole will be moved without Engineer’s approval.
  3. Each structure shall be set within 1.5" of the centerline specified.
  4. Contractor will install a permanent identifiable mark 15' above pole butt as a check of setting depth. This mark may be a tack or other mark as approved by Engineer. Tolerance of  $\pm 1"$ .



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5. Angle poles will be raked at 1/2" for each 10' above ground.

I. Backfill of Pole Structures

1. Poles shall be properly aligned before backfilling. Tangent poles to be set plumb in both directions. Angle poles raked as required.
2. Backfill shall contain enough natural or added moisture to be approximately equal to density of surrounding soils. Backfill shall be material excavated from hole unless directed by Engineer. All backfill shall be placed in 6" layers and each layer power tamped to a density, after completion, equal to surrounding soils. Where rocks, gravel, sand, swampy or murky type soils are encountered in hole digging, this shall not be used as backfill. Do not use sod or grassy soil or place foreign objects in the backfill.
3. Holes excavated for aggregate backfill shall be a minimum 4" greater in diameter than the pole butt or bearing plate if used.
4. Holes, over excavated, shall be backfilled with crushed rock until hole depth is that of appropriate setting depth of specified pole at no cost to Owner. Holes with excessive moisture shall be over excavated by 1'-0 and backfilled with crushed rock in over excavation.

J. Excavation shall not be left open for more than two days.

**3.04 POLE INSTALLATION**

- A. Consists of one pole in place. The first digits indicate length: the following shows classification. Thus, "70/H3" signifies a 70-foot class H3 wood-equivalent pole. Similar designations may be used for varying pole manufacturers.
- B. Site restoration at pole and along access to pole is a part of unit requirements.
- C. Pole Top Assemblies shall be installed as follows:
  1. Transmission assemblies shall be framed in accordance with drawings.

**3.05 POLE REMOVAL**

- A. Includes all poles of the same height, regardless of pole class, and designated by the same unit.
- B. Includes pulling and salvage of all poles designated as removals.
- C. Includes immediate backfill of holes with solidly tamped earth in 6" maximum thickness layers and refill to the ground line of any settlement that occurs during the contract period.
- D. When backfilling holes at pole removal locations, do not dig holes in the landscape to obtain backfill. Obtain backfill dirt by scooping or scraping within the designated right-of-way or by fill dirt obtained locally. Do not dig seeded areas within highway or public rights-of-way. Do not place foreign objects in backfill.
- E. Includes the replacement of the surrounding surface where concrete, asphalt, or other man-made surfaces are encountered.
- F. Contractor must coordinate the removal of foreign utilities before removing pole. Contractor is responsible for pole removal after foreign utilities have been relocated.

END OF SECTION 33 71 16.43



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**SECTION 33 71 17  
WOOD POLE AND CROSSARMS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood Poles
- B. Wood Pole Structure Erection
- C. Wood Pole Handling

**1.02 QUALITY ASSURANCE**

Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. All work shall conform to REA/RUS specifications, the 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) and National Electric Code shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.

**PART 2 – PRODUCTS**

**2.01 WOOD POLES**

- A. Wood poles shall be Contractor-furnished Southern Pine.
- B. Owner reserves the right to inspect materials at storage area.
- C. Poles shall be warranted to this specification. Any pole found no in conformance, within 1 year of delivery date, shall be replaced as promptly as possible by manufacturer.
- D. Southern Pine shall have a wood fiber strength of 8000 psi.
- E. Wood poles shall be marked with manufactures information. Items on the marking should include:
  - 1. Manufactures code or trademark.
  - 2. QA mark.
  - 3. Manufacture location and treatment year.
  - 4. Code letters for species, preservative (SP for Southern Pine).
  - 5. Length/class of pole.

**PART 3 - EXECUTION**

**3.01 WOOD POLE STRUCTURE ERECTION**

- A. Contractor is responsible for compacting excavated areas to minimize settlement of roads and ground. If settlement occurs, Contractor is responsible for repair for a warranty period of one year.
- B. The depth of setting wood poles shall be 10% plus 2' in earth and 10% in rock or where depth is indicated on construction drawings.
- C. Poles shall be set no deeper than 3" than the values in the table above. No pole will be set less than "earth" depth without Engineer's approval.





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- D. Poles set in holes partly in earth and partly in rock shall be set to the depths shown for "earth". Holes may be shortened only upon Engineer's approval.
- E. Excavation is unclassified. No additional pay for rock excavation shall be provided.
- F. Unless directed by Owner, it will not be permissible to cut off the top of any pole. It will not be permissible to cut off the bottom of any pole.
- G. All holes shall be dug in the correct locations and shall be large enough to provide space for use of power tamping bars all around poles to the full depth of the holes. The poles shall be carefully placed in the holes so that the structure grounding materials will not be damaged or displaced.
- H. Holes will be hand dug where requested by Underground Protective Services markings or Engineer.
- I. Structure Setting Tolerances
  - 1. Owner will inspect staked pole locations before construction setting activities. 48 hour notice shall be given for approval inspection.
  - 2. Poles shall be set according to the Drawings and Construction Schedule. No pole will be moved without Engineer's approval.
  - 3. Each structure shall be set within 2" of the centerline specified.
  - 4. Contractor will install a permanent identifiable mark 15' above pole butt as a check of setting depth.
  - 5. Angle poles will be raked not less than 1" for each 10' above ground.
  - 6. Poles shall be set so that the crossarm gains face in opposite directions on every other pole. However at line deadends, the last two poles shall be set so that the pole gains face the deadend.
- J. Backfill of Wood Pole Structures
  - 1. Poles shall be properly aligned before backfilling. Tangent poles to be set plumb in both directions. Angle poles raked as required.
  - 2. Loose dirt shall be removed from all holes and bottom tamped with hydraulic tamp. All backfill shall be done with a hydraulic tamp from bottom of hole to grade.
  - 3. Backfill shall contain enough natural or added moisture to be approximately equal to density of surrounding soils. Backfill shall be material excavated from hole unless directed by Engineer. All backfill shall be placed in 6" layers and each layer power tamped to a density, after completion, equal to surrounding soils. Where rocks, gravel, sand, swampy or murky type soils are encountered in hole digging, this shall not be used as backfill. Do not use sod or grassy soil or place foreign objects in the backfill.
  - 4. Holes excavated for aggregate backfill shall be a minimum 4" greater in diameter than the pole butt or bearing plate if used.
  - 5. Holes, over excavated, shall be backfilled with crushed rock until hole depth is that of appropriate setting depth of specified wood pole at no cost to Owner. Holes with excessive moisture shall be over excavated by 1'-0" and backfilled with crushed rock in over excavation.



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- K. Excavation shall not be left open for more than two days.
  
- L. Additional pole holes shall not be tolerated. Should unnecessary or improperly bored holes compromise the strength, the pole shall be replaced by Contractor at Contractor's expense.

**3.02 WOOD POLE HANDLING**

- A. Poles shall be handled with care so as not to damage the wood or the preservative treatment. Pole tongs or Cant hooks shall be handled so as to avoid excessive tearing of the wood. Contractor shall not use tongs or cant hooks on any portion of the pole required to go underground. Poles shall not be dragged along the ground. Poles stored after delivery shall be arranged with care and shall be placed so that no pole will come in contact with standing water or the ground.
  
- B. Poles shall be set plumb and in alignment if not raked.

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**SECTION 33 71 19  
ELECTRICAL UNDERGROUND DUCTBANK**

**PART 1 – GENERAL**

**1.01 SUMMARY**

- A. Ductbank
- B. Conduit
- C. Encasement Slurry
- D. Spacing Blocks
- E. Fittings
- F. Ball Marker
- G. Execution

**1.02 REFERENCES**

- A. ASTM (American Society for Testing and Materials)
- B. NFPA 70 (National Fire Protection Association) – National Electric Code
- C. NEMA TC2 and TC3 (National Electrical Manufacturers Association)

**1.03 SUBMITTALS**

- A. Record Documents
  - 1. Show dimensioned locations of underground ductbank from nearest permanent structure or survey control points.
  - 2. Show as built ductbank elevations and cover.

**1.04 QUALITY ASSURANCE**

- A. Listing and Labeling: Provide products that are listed and labeled as defined in NFPA 70, article 100, and marked for intended use for the location and environment in which they are installed.
- B. ANSI C2 “National Electric Safety Code” for components and installation.
- C. Testing and Inspection for Contractor Quality Control: Contractor shall perform inspection and tests described below, and, based upon the results of those inspections and tests, shall take action required and submit specified reports to Owner.
  - 1. Sampling and Testing Materials: Certificates of Compliance for encasement slurry.

**1.05 FIELD CONDITIONS**

If the field conditions warrant change in the routing or configuration of ductbanks and/or location, shape and size of manholes, obtain Engineer's approval for such field changes. Such changes shall be done at no additional cost to Owner and the Contract Price is deemed to be inclusive of such changes.

**PART 2 – PRODUCTS**

**2.01 DUCTBANK**

The duct system shall consist of conduits as shown on the Contract Drawings.



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**2.02 CONDUIT**

- A. Conduit for underground ductbanks shall be PVC Schedule 80 suitable for slurry encasement. The conduit size shall be as shown on the Contract Drawings.
- B. All duct shall be tightly jointed and sealed with a PVC rating sealer to be approved by Engineer.
- C. Conduit shall be straight and true and shall be furnished in lengths of 20 feet. A cross section taken at any point perpendicular to duct shall not vary more than 1/8 inch from a true circle.
- D. Conduits shall be complete with all couplings, adaptors, bends and supports as required or shown on the Contract Drawings. All couplings and fittings shall be the products of conduit manufacturer and shall be secured to the conduit with an adhesive in strict accordance with the manufacturer's recommendations. End bells are required to provide smooth and rounded surfaces at the edge of the duct to prevent injury to the cable during normal movement.
- E. Changes in directions in duct runs exceeding a total of 10 degrees, either vertical or horizontal, shall be accomplished by long sweep bends having a minimum radius of curvature of 2 feet. At the end of the conduit run, manufactured elbows having a minimum radius of 60 inches may be used. Standard radius bends, elbows or other fittings shall not be used.
- F. All above grade conduit shall be rigid steel (RGS) for three cables per conduit. Single-phase cable in conduits shall be aluminum.

**2.03 ENCASEMENT SLURRY**

- A. A maximum of 1,000 psi slurry shall be used for encasement under pavement; direct-embedded otherwise.
- B. Permanent red dye shall be sprinkled on top of ductbank freshly poured to indicate "power."

**2.04 SPACING BLOCKS**

Spacing blocks shall be made of PVC or other suitable non-metallic, non-decaying material, with spacing as indicated on Contract Drawings

**2.05 FITTINGS**

PVC conduit and tube fittings: NEMA TC2 and TC3

**PART 3 – EXECUTION**

**3.01 DUCTBANK**

- A. A minimum of 3" of encasement slurry shall be installed below, above and on both sides of bank.
- B. Duct shall be tied in place by means of tie wire or spacers around the outside of duct and fastened to the bottom spacer to prevent movement during placement of concrete. Ductbank shall also be anchored to ground to prevent floating of conduits. In no case shall complete wire loop be installed around ductbank.

**3.02 CONDUIT**

- A. The conduits shall be a minimum of 48" deep, unless otherwise indicated.
- B. The joints shall be staggered 6 - 8" with spacers approximately 5' apart.



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- C. Conduit shall be installed in not less than 20 foot lengths, except at the ends of runs or at bends. Conduit shall be free of cracks and chipped ends. Have available at the job site a sufficient quantity of conduit so that cracked pieces or those with chipped ends may be discarded.
- D. All field cuts of PVC conduit shall be made with a hack saw. Cuts shall be smooth and square to conduit axis. The cut end of conduit shall be reamed smooth. Field-cut conduits shall be joined with double-ended couplings designed for the purpose.
- E. Repairs to conduits shall not be permitted. All individual lengths of broken, cracked, chipped or impaired conduit shall be removed and replaced with new conduit.
- F. When changes in the formation of a bank of conduits within a duct run are necessary, the transition shall be accomplished in as straight an alignment as possible, maintaining continuous earth support under the conduits.
- G. After the conduits and reinforcements are in place with proper spacing and joints made tight, the entire assembly is raised from the bottom of the trench on concrete or plastic blocks placed at intervals, so that concrete bed of specified depth is formed below the conduit assembly. The entire conduit envelope assembly shall be firmly anchored in position to prevent "floating" when concrete is placed.
- H. After the installation is complete, a flexible duct rodding device shall be passed through each completed conduit to check for continuity and cleanliness.
- I. Following the duct rodding device, a mandrel not less than ¼-inch smaller than the inside diameter of the conduit preceded by a wire brush tied to the same string shall be pulled through the conduit once in each direction. When the conduit is partially or fully obstructed with mud, dirt, or gravel, the duct shall be flushed clean by use of water from a long flushing nozzle attached to a water hose which shall be pushed into the conduit and applied until the conduit is clear. After cleaning, the procedure outlined above for rodding and wire brushing shall be followed. Any damaged conduit shall be replaced with a new conduit.
- J. After all obstructions have been removed and the conduits wire-brushed clean, a nylon cord of suitable strength shall be threaded in each conduit of ductbank and tied to the nearest pulling eye with a six foot length left at each end. Immediately upon completion of threading the conduit with a nylon cord, both ends of the conduit shall be plugged to prevent entry of foreign matter before the cables are pulled.

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**SECTION 33 71 23  
INSULATORS, LINE HARDWARE, CROSSARMS AND ANCHORS**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Materials
- B. Insulators
- C. Hardware
- D. Crossarms
- E. Guys
- F. Anchors
- G. Street Lights

**1.02 QUALITY ASSURANCE**

- A. Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. All work shall conform to REA/RUS specifications, the 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) and National Electric Code shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.
- B. All materials supplied by Contractor must be REA/RUS approved and manufactured in the United States.
- C. Contractor is responsible for inventorying all units, construction drawings, and construction documents for material quantity requirements. All units are to be complete, functional and meet applicable safety standards.
- D. All insulator ties, connectors, and guy grips are considered part of the units and will be supplied by Contractor at no additional cost.

**PART 2 – PRODUCTS**

**2.01 INSULATORS**

**A. Suspension Insulators**

**1. 12kV Application**

- |                                    |                                |
|------------------------------------|--------------------------------|
| a. 60 Hz, Dry Flashover            | 80 kV                          |
| b. 60 Hz, Wet Flashover            | 50 kV                          |
| c. Critical Impulse, Positive      | 125 kV                         |
| d. Leakage Distance                | 11 1/2" min inches             |
| e. Specified Mechanical Load (SML) | 20,000 lbs.                    |
| f. Routine Test Load (RTL)         | 10,000 lbs.                    |
| g. ANSI Classification             | ANSI class 52-4 or equivalent  |
| h. Insulation Test Standard        | ANSI C29.2                     |
| i. Approved Manufacturers:         | Victor, Gamma Insulator, Locke |



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**B. Vertical Post Insulators Application and Specifications**

- 1. 12kV Application – Pin type
  - a. 60 Hz, Dry Flashover 65 kV
  - b. 60 Hz, Wet Flashover 35 kV
  - c. Critical Impulse, Positive 105 kV
  - d. Leakage Distance 9 inches
  - e. Maximum Design Cantilever Load (MDCL) 3000 lbs.
  - f. Base End Fittings 1.0" Stud
  - g. ANSI Classification ANSI class 55-4 or equivalent
  - h. Insulation Test Standard ANSI C29.1
  - i. Approved Manufacturers Victor, Gamma Insulators, PPC
- 2. 12kV Application – Porcelain post type
  - a. 60 Hz, Dry Flashover 80 kV
  - b. 60 Hz, Wet Flashover 60 kV
  - c. Critical Impulse, Positive 130 kV
  - d. Leakage Distance 14 inches
  - e. Maximum Design Cantilever Load (MDCL) 2800 lbs.
  - f. Base End Fittings 3/4" Stud
  - g. ANSI Classification ANSI class 57-11 or equivalent
  - h. Insulation Test Standard ANSI C29.1
  - Approved Manufacturers Victor, Gamma Insulators, PPC

**C. Neutral Insulator and Clevis**

- 1. ANSI Class 53-2
- 2. Cantilever Strength 3000lbs.
- 3. Color Gray/Skyline
- 4. Glaze Standard
- 5. Approved Manufacturers Joslyn, Hubbell, Hughes Brothers



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D. Fiberglass Crossarms

1. Tangent
  - a. Length: 10 foot
  - b. Color: Gray
  - c. Mount: Center
  - d. Manufacturer: Pupi
  - e. Catalog Numbers
    - 1) 10 foot: TB25001205X2 3/4" BOLT

2. Deadend
  - a. Length: 10 foot
  - b. Color: Gray
  - c. Mount: Center
  - d. Manufacturer: Pupi
  - e. Catalog Numbers
    - 1) 10 foot: DA3000120E2B9X2

E. Fiberglass Guy Strain Insulators

1. Ultimate Strength: 16,000 lbs.
2. Length: 78 inch as specified by Contract Drawings
3. End fitting hardware shall meet all applicable ASTM standards
4. End fitting hardware types: Clevis-Clevis, with one roller as specified on Contract Drawings.
5. Color: Gray
6. Rod: Fiberglass with ultra-violet protective coating
7. Manufacturer: Chance or equivalent

F. Street Lights and Masts

1. American Electric Lighting
  - a. 400 WATT - 32540SCAMT1R3DG
  - b. Mast Arm- 14'

**2.02 LINE HARDWARE**

- A. Materials for use with ACSR conductors shall be forged steel or ductile iron, hot-dip galvanized in accordance with ASTM A153, or aluminum in accordance with ASTM 4-356-76.
- B. Dead-end Clamps: Quadrant strain for 12kV applications.





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- 1. Approved Manufacturers: Anderson or equivalent
- C. Cotter Pins: Stainless steel, Type 302 or 304
- D. Bolts
  - 1. Manufactured in accordance with ANSI C135.1
  - 2. Galvanized in accordance with ASTM A153-73
  - 3. Each bolt shall be furnished with one standard square nut.
  - 4. Size and type shall be furnished as specified in the Contract Drawings.
  - 5. Locknuts shall be used to back-up all threaded bolt nuts, unless a washer is included.
- E. Washers
  - 1. Galvanized in accordance with ASTM A153-73
  - 2. Size and type shall be furnished as specified in the Contract Drawings.
- F. Attachment hardware such as anchor shackles, links, and clevises shall be galvanized in accordance with ASTM A153 and supplied in sizes and types as specified in the Contract Drawings.

**2.03 GUY RODS, ANCHORS AND ACCESSORIES**

- A. Contractor must have the capability to install all types of anchors in all types of soils.
- B. Anchors shall be power-installed, screw type quad 8-inch, 10-inch Helix.
- C. Anchor rods shall be 8 feet in length by 3/4 inch square shaft, with triple-eye adapter for double Helix anchors.
- D. Rod extensions shall be 3-1/2 or 7 feet in length.
- E. Anchors shall have a minimum 27,000lb holding power in Class 5 soil.
- F. Guy grips for use with steel guy stranding:
  - 1. 7/16-inch EHS 7 strand: Preformed Line Products GDE-1108
- G. Guy guards:
  - 1. Guy guards: yellow, plastic, full round, 8 feet with bolted connections, 75- mil thickness.
- H. Guying attachments shall be ductile iron, hot-dip galvanized in accordance with ASTM A-536, ASTM A153, respectively, and compatible with the ultimate guy strand(s) strength as specified in the Contract Drawings.

**PART 3 – EXECUTION**

**3.01 INSULATORS**

- A. Handle insulators with care. Protect fiberglass continuously with packaging until installed.
- B. Insulators shall be thoroughly cleaned of all foreign material before installation. Cotter pins must be fully inserted in insulator caps. If suspension insulators are raised separately from the pole structure, they shall be lifted from one (1) end of the assembly only. Bending of insulator strings, resulting in deformation of fittings or hardware, including cotter pins, shall result in rejection of the string, in which case Contractor shall re-fabricate the string at no cost to Owner. The movements of insulator strings for construction purposes shall be accomplished by pulling the string from the



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bottom. All movement of insulator string away from or back to vertical shall be controlled movement. All post insulators shall be handled in a manner to prevent damage. Damaged, chipped or cracked insulators shall be replaced by Contractor.

- C. Do not transport insulators and fiberglass units in any manner that will scratch, mar, or deface coating.

**3.02 HARDWARE**

- A. Before installation, inspect hardware for missing parts, visual defects, and damage to galvanizing. Clean hardware by removing dirt, corrosion, and foreign matter. Repair damage to galvanizing to Engineer's satisfaction.
- B. Tighten all hardware firmly, using properly-installed lock washers, lock nuts and spring washers.
- C. Provide a washer at each point where a bolt head or nut bears on the surface of a pole or crossarm. Provide a locknut with each nut, eye nut, or other fastener on all bolts or threaded hardware.
- D. Bore or drill all bolt holes such that the attached hardware and bolt is on the same horizontal or vertical plane. If required, bore bolt holes so they are in a level plane and in-line with deadend pulls, or at right angles to the line in tangent construction.
- E. Bolt exposure shall be restricted to 2" maximum exposure. Contractor shall use correct size and length. Do not cut bolts to achieve this tolerance.
- F. Tighten nuts firmly with properly installed lock washers, lock nuts, spring washers, and cotter pins. Orient nuts and cotter pins toward pole or downward, as applicable. Spread and bend back straight cotter pins in hardware bolts so as to be shielded by the outer face of the unit to prevent corona. Do not use wrenches. Do not flake or damage galvanizing.
- G. Hardware and other attachments to the pole shall be tightened to the point where sufficient compression is obtained to offset the effects of future pole shrinkage. Each item of hardware shall be thoroughly tightened and shall be set with locknuts and where necessary or suitable to the application with spring-type lock washers. Suitable flat, curved or reinforced washers shall be used to provide adequate bearing on wood surfaces.
- H. Anchor shackles shall be installed, as required by Contract Drawings.

**3.03 GUYS**

- A. Guys shall be provided where and as required by the Contract Drawings, and at other locations where required by changes in proposed line routing. Guys shall be of the strength, size and types specified herein. Where necessary, additional extension lengths shall be provided to screw anchors to ensure its placement into firm soil and shall be included as Work of this Contract. Guys shall be installed sufficiently tight to snug hardware, to prevent radio noise, and to set the anchor. The ground line at the top anchor rod shall be marked prior to loading. Creepage in excess of 1.5" shall be considered excessive, requiring anchors to be re-set as Work of this Contract. All hardware fittings and connections shall be tight. All down guys shall be equipped with approved guy guards.
- B. Install all guy strands prior to conductor stringing operations. Guys shall be evenly pre-tensioned such that structure loads remain balanced during stringing.
- C. Place all guys before conductors are transferred or installed. Attach guys to poles as specified in the Drawings. Ensure proper adjustment of guys when transferring and tensioning conductors so that loading on structures is balanced.



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- D. All guys shall be installed prior to loading the structures. If, after loading the structures, Owner determines that final adjustments to the guys are necessary, Contractor shall make such adjustments to the satisfaction of Owner.
- E. Guy insulators shall be installed as specified in the Contract Drawings.
- F. Install guy anchors in-line with slope of guy strand. Install double-guy anchors on a slope equal to the average slope of guy strands.
- G. Guys must be of size and types shown on the Contract Drawings. Test anchors at the time of installation for 100 percent of manufacturer- specified holding capacity using the sheer pin/torque method or other methods recommended by the anchor manufacturer and approved by Engineer. Contractor shall submit written documentation of anchor tests, before conductor installation, indicating pole number, type of anchor, and proof of holding capacity.
- H. Field drill holes for guy attachments as indicated on construction drawings in wood and steel poles. Field drilling on steel poles will require a zinc-rich touchup paint to prevent exposure to bare steel.

**3.04 ANCHORS**

- A. Anchors must be of size and types shown on the Drawings.
- B. Install anchors according to the manufacturer's written instructions. Install anchors and verify the holding capacity of all new anchors before conductors are transferred or installed.
- C. All anchors and rods shall be in line on the bi-sector of multiple strain anchors. Each anchor rod shall be aligned with its connected guys and shall extend not less than 3", not more than 9" above the ground surface after the connected structure has been loaded.
- D. The backfill of all anchor holes must be thoroughly tamped the full depth.
- E. Excavation shall not be left open for more than two days.
- F. Contractor shall have all equipment required to install the screw anchors according to manufacturer's instructions. Torque capacity of the driving rig shall be at least 120 percent of the installation torque specified by the anchor manufacturer. The driving rig must be capable of applying an axial downward force on the anchor, as recommended by the manufacturer. This axial force shall be applied consistently throughout anchor installation to insure the anchor advances the proper depth for each revolution, as specified by the anchor manufacturer.
- G. Drive all anchors, adding extension shafts and couplings, as required, until the manufacturer's recommended installation torque is achieved. The anchor must then be advanced for the distance specified by the manufacturer while maintaining torque. If the torque decreases, continue driving until the specified torque is reached again, and maintain torque for the specified distance.
- H. Immediately notify Engineer if difficulties are experienced during installation. Engineer will instruct Contractor whether to proceed with installation or to remove the screw anchor and install an alternate anchor.
- I. All anchor assemblies requiring abandonment in soil shall be cut off 18 inches below grade. All anchor assemblies requiring abandonment in rock shall be cut off at grade.
- J. Unless an alternate location is specifically approved by Engineer, all anchors shall be installed within 6 inches of the location specified on the Contract Drawings.



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**SECTION 33 71 25  
CONDUCTOR, GUY WIRE AND GROUNDING WIRE**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Conductor and Accessories
- B. Wire Sagging and Clipping
- C. Splices, Deadends, and Connections
- D. Grounding
- E. Inspection and Testing

**1.02 SUBMITTALS**

- A. Provide stringing plans and setup locations.
- B. Engineer will provide sag charts for installation.
- C. Test results of ground resistance.

**1.03 QUALITY ASSURANCE**

Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. The 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.

**PART 2 – PRODUCTS**

**2.01 CONDUCTOR AND ACCESSORIES**

- A. All materials are Contractor-furnished.
- B. 12kV Primary conductor shall be:
  - 1. 795 ACSR 26/7 “Drake”
  - 2. 397 ACSR 18/1 “Chickadee”
- C. Neutral conductor shall be:
  - 1. 4/0 ACSR 6/1 “Penguin”
  - 2. 397 ACSR 18/1 “Chickadee”
  - 3.

**2.02 GROUNDING MATERIALS**

- A. All grounding materials will be Contractor-furnished.
- B. Ground rods for overhead distribution: Copper-clad or copper-bonded, 5/8-inch minimum diameter by 8 feet in length.
- C. Grounds and Accessories: Ground clamps for 5/8-inch rod, safety set screw, Joslyn J8492.
- D. Use #6 solid copper, soft-drawn for pole down leads.



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- E. Pole Ground Nut: Ground Vise, Anderson GC-207

**PART 3 – EXECUTION**

**3.01 WIRE SAGGING AND CLIPPING**

- A. Follow practice recommended in the latest edition of IEEE No. 524 “IEEE Guide to the Installation of Overhead Transmission Line Conductors”.
- B. Installation shall provide necessary clearances between conductors and ground, between conductors, or between conductors and other surfaces. All necessary precautions shall be taken to ensure that the conductors, poles, insulators, or other facilities are not damaged. Particular care must be taken to ensure that the conductors are not damaged in any manner. Conductors must not be drawn across the ground and shall not be drawn over crossarms without proper protection. Conductor installation shall be accomplished, using approved sheaves and other equipment. All sections of conductor damaged by application of gripping attachments shall be repaired or replaced prior to completion of Work
- C. Initial or Final Sag tables, as applicable, shall be provided by Engineer. Sagging of the conductor by the controlled tension method is acceptable.
- D. Tighten all guys before the conductors are transferred to new structures.
- E. Contractor’s sagging procedure must be approved by Engineer. Regardless of the procedure used, the resulting final sags must be within a tolerance of  $\pm 3$ ” of the specified sags.
- F. Determine sag temperature by using an accurate thermometer placed in the open at a height approximately equal to the sagged height of the wire.
- G. After sagging the wire, record, in a format approved by Engineer, all pertinent sagging information including but not limited to temperature, span length, time, and sag. Provide such information to Engineer in writing.
- H. Make up jumper loops such that they present a smooth, uniformly curving appearance. Form the jumper such that the completed jumper meets clearance requirements from live parts to ground as given in the NESC current at the time of bid opening.

**3.02 SPLICES, DEADENDS, AND CONNECTIONS**

- A. Make full-tension splices, if required, in the presence of Owner’s representative.
- B. Thoroughly clean conductor surfaces of all foreign matter at the fitting location. Remove conductor sections damaged by the application of gripping attachments before the conductors are spliced with the permanent compression splices.
- C. Remove all wrapping, binding, and excess grease and compound at the completion of pressing operations. The strands of the conductors or wire must be snugly seated when the splice is completed. Remove slight bends in the fitting using a method that protects the fitting from damage.
- D. Remove all burrs and die marks from splices, deadend fittings, and jumper terminals.
- E. Install the compression splices in accordance with manufacturer instructions. Use manufacturer-recommended filler compound. Select the correct die by matching the index numbers stamped on both the fitting and die set. Do not allow the weight of the conductor or wire to be applied to the dies.
- F. Install compression deadend assemblies in accordance with manufacturer recommendations.



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**3.03 GROUND RODS - OVERHEAD LINES**

- A. Driven grounds shall consist of a system of 5/8 inch by 8 foot sectional ground rods, complete with coupling sleeves and driving studs, connected vertically and driven a minimum of 2 rods deep. Locate ground rods so that the top is at least 2 feet below grade. The ground rods shall be bonded to each other and to the pole down-leads with #6 C.W. bare conductor. If refusal is encountered before full depth is reached and relocation of rod is impractical, remove rod and drill a 2"-diameter vertical hole to full depth, place ground rod, and fill remaining space with bentonite clay. Used only as approved by Owner.
- B. Install ground rods along center line of line.
- C. Placing ground rods in "pole embedment hole" is not acceptable.
- D. All guy wires shall be bonded to the pole ground and neutral in accordance with NESC and RUS requirements. Guy markers shall be installed on all guys.

**3.04 GROUNDING CONNECTIONS**

Clean electrical contact surfaces with solvent or abrasion, as recommended by connector manufacturer, to provide a clean contact. Apply a liberal coat of oxidation inhibiting compound to all buried and bimetallic connections. Remove excess compound after installation. Torque connection bolts as recommended by the manufacturer.

**3.05 INSPECTION AND TESTING**

Before energizing any circuit, inspect the complete section of line circuit that will be energized to verify that the circuit segment is complete and free from all extraneous connections and unsafe conditions. Test each section of line that will be energized for absence of shorts and grounds, as well as for conductor continuity and correct phasing. Notify Owner not less than 48 hours in advance of scheduled times for energizing line circuits.

END OF SECTION 33 71 25



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**SECTION 33 71 26.05  
DISTRIBUTION LINE SWITCHES**

**PART 1 – GENERAL**

**1.01 SECTION INCLUDES**

- A. Distribution Switches

**1.02 SUBMITTALS**

- A. Shop Drawings
  - 1. Erection details including bill of material, for installation on steel pole(s).
- B. Ratings
  - 1. Electrical ratings including nominal and maximum continuous operating voltage, rated withstand voltage, continuous and momentary asymmetrical current and maximum load interrupting capability
  - 2. Mechanical strength rating of frame for balanced and unbalanced conductor tension loading

**1.03 DELIVERY, STORAGE, AND HANDLING**

- A. Distribution switches shall be shipped with all three switch poles and interphase operating mechanism preassembled to the switch mounting crossarm. Each three-pole switch assembly shall be crated in a manner suitable for stacking. Operating pipes shall be shipped unassembled and banded together, one set per switch, properly identified and protected against damage. All loose parts and operating mechanism hardware shall be shipped in a common container properly identified.
- B. Shipping Requirements:
  - 1. Switches shall be assembled, with insulators, and fully adjusted before shipment.

**PART 2 – PRODUCTS**

**2.01 GENERAL**

- A. Test: Successfully passed ice tests on a prototype model as outlined on ANSI "Test Code for High Voltage Air Switches."
- B. After fabrication, hot-dip galvanize bases, operating mechanisms and other steel parts in accordance with ASTM A 123. Do not drill, cut or alter after galvanizing.
- C. Switch terminal pads: NEMA 2-hole tinned.

**2.02 DISTRIBUTION SWITCHES**

- A. Three-phase gang-operated switches supplied for distribution applications shall be horizontal side-break, upright mounting, with three switch assemblies rigidly attached to a common, steel, pole-mounted crossarm.
- B. Approved manufacturer: S&C Omni-Rupter- No substitutions





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C. Supplied switches shall meet the following electrical requirements:

- 1. Nominal Operating Voltage, kV: 14.4
- 2. Maximum Operating Voltage, kV: 17
- 3. Basic Impulse Level, kV: 110
- 4. Continuous Rating, Amps: 900
- 5. Momentary Asymmetrical Rating, kA 25
- 6. Minimum Load Interrupting Rating, Amps: 900

**2.03 ACCESSORIES**

- A. Grounding strap and clamps for attachment to the vertical operating shaft. Strap to be braided copper wire, tinned, at least 24 inches long with two 9/16 inch holes at one end for attachment to the pole grounding.
- B. Switch blade position indicator located near operator.
- C. Provision for padlocking in either OPEN or CLOSED position.
- D. Operator: As specified on Contract Drawings

**PART 3 – EXECUTION**

**3.01 GENERAL**

- A. Follow manufacturer-provided instructions and recommendations for the following:
  - 1. Receiving and storage
  - 2. Assembly and adjustment of switch components
  - 3. Inspection of complete switch assembly
  - 4. Switches shall be made with compression type connectors. Drilling and hole boring and other miscellaneous items shall be considered part of unit or pole assembly and included in bid cost.

END OF SECTION 33 71 26.05



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**SECTION 33 71 50  
MEDIUM VOLTAGE POWER CABLE AND ACCESSORIES**

**PART 1 - GENERAL**

**1.01 SUMMARY**

- A. Section Includes
  - 1. Installation of 15kV, 1/0 aluminum cable
  - 2. Cable fittings and accessories

**1.02 REFERENCES**

- A. Reference Standards
  - 1. ANSI/IEEE C2, National Electrical Safety Code
  - 2. ASTM B33, B189, B3, B8, B172, B173, B174, B230, B231, B496, Copper and Aluminum Conductor Specifications
  - 3. AEIC CS8, Cross-linked Polyethylene (XLPE) Shielded Power Cables Rated 5 through 46kV
  - 4. IEEE-48, Test Procedures and Requirements for High Voltage Alternating Current Cable Terminations
  - 5. IEEE-404, Standard for Power Cable Joints
  - 6. NEMA WC74, 5–46kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy
  - 7. ICEA/IEEE 400, Guide for Making High-Direct-Voltage Tests on Power Cable Systems in the Field.
  - 8. UL 1072, Medium Voltage Power Cables
  - 9. ICEA 5-66-524, Specification for Cross-Linked Thermosetting Polyethylene Insulated Wire and Cable for the Transmission and Distribution of Electric Power
  - 10. NETA Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems, 2003

**1.03 SUBMITTALS**

- A. Shop Drawings:
  - 1. Pulling lubricants
  - 2. Cable terminations
- B. Cable test results
- C. Cable Splices Qualifications: Provide proof of certification, training, names of personnel, years of experience performed with selected accessories.

**1.04 QUALITY ASSURANCE**

- A. Installer: Specializing in installation of medium voltage cable and accessories with minimum of three years' experience.



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**PART 2 - PRODUCTS**

**2.01 MEDIUM VOLTAGE POWER CABLE**

A. Conductor shall be rated as follows:

1. 15kV Power Cable – Phase Conductor, three single cross-linked polyethylene compacted copper conductors per Phase, 15kV, 1/0 Al, 133% insulation level, 220 Mil XLPE insulated, with 1/3 concentric neutral, and PVC outer jacket

**2.02 POWER CABLE TERMINATORS**

A. Riser pole terminators

1. Single conductor terminators capable of indoor/outdoor cable terminations as required.
2. 15kV, 1/3 concentric neutral power cables terminating in distribution vaults and power transformers.
  - a. Ratings and characteristics:
    - 1) Rated voltage: 13.2kV line to line
    - 2) Conductor:
      - i) 1/0 Al. per Contract Drawings
    - 3) Skirts: Used on outdoor installations
    - 4) Voltage withstand: ac, 1 min., 50kV; dc, 15 min., 75kV.
    - 5) Impulse withstand 1.2 × 50 microseconds, crest: 110kV.
    - 6) Two bolt termination.
  3. Manufacturer: Raychem Corporation. (Catalog no. to be determined by cable specifications of selected manufacturer) Raychem HVT
  4. Accessories: ground braids and clamps.

**2.03 CABLE PULLING LUBRICANT**

- A. Lubricity: Coefficient of dynamic friction less than or equal to 0.15 on PVC-jacketed cable and PVC conduit with 200 lbs./ft. of normal pressure.
- B. Temperature range: 20°F – 110°F
- C. Compatible with PVC-jacketed cable
- D. Non-toxic, non-flammable, water-based gel
- E. Manufacturer: American Polywater, Stillwater, MN, Type Polywater® J. or Polywater® Plus Silicone™
- F. Listing: UL



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**2.04 CABLE IDENTIFICATION TAGS**

- A. Type: Horizontal-reading, strapped to cables with mylar, self-locking tabs at each end of holder.
- B. Tags: Polyethylene, with black 1-inch high characters on a yellow background, integrally molded with locking grid, injection molded.
- C. Holders: Black polyethylene.
- D. Marking as follows: Feeder or circuit number and phase, e.g. "201A."
- E. Furnish blank yellow characters to fully fill the holder, as required.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

- A. Install cables in accordance with ANSI and IEEE C2.
  - 1. Do not exceed cable pulling tensions and bending radius recommended by manufacturer.
  - 2. Pull cable using specified lubricants and cable pulling equipment. Locate reels conveniently for feeding cable into the conduit without causing excessive bending or possible injury to cable by abrasion and place on reel stands.
  - 3. Pull all cables together where several cables are to occupy one conduit.
  - 4. Seal cable ends when pulling into conduit. Do not leave cable ends exposed to moisture unless splicing is to be done immediately.
  - 5. Station sufficient personnel along the cable route at all conduit entrances and exits to direct the passage of cable as required.
  - 6. Protect the cable from chafing on the ground, conduit edges or other sharp surfaces during pulling. Provide timbers and flexible cable pulling tubes to guide and protect the cable.
  - 7. Apply identification tags to cables at terminal points, conduit entrances and manholes. Refer to Contract Drawings for the numbering sequence for the cables.
  - 8. Permanently support cable ends prior to terminating. Support vertical cable runs having a total vertical drop in excess of 15 feet at the top and as specified in NEC Article 300-19 with cable grips or other approved devices, with provision for cable expansion and contraction.
  - 9. Clamp or snub each cable and tie for proper support at each terminal connection and splice so that strain on the cable is not transmitted to the terminal connection or splice.

**3.02 CABLE IDENTIFICATION**

- A. Mark all cables with cable circuit and phase identification tags specified in PART 2 above.
- B. Securely fasten cable identification tags to cables at each end of tag holder with self-locking nylon ties, in visible locations at each termination and at intermediate pull boxes, manholes, trenches or other points of access.

**3.03 CABLE TERMINATIONS**

- A. Perform cable phase identification and phasing tests before initiation of terminating activities.



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- B. Perform “megger” insulation resistance test on each cable to ground prior to terminating. Record temperature, humidity, duration of test and voltage for each test and submit to Engineer. Use 2500 volt motor-operated megger.
- C. Minimum acceptable megger reading is 10 megohms.
- D. Make further tests to isolate problem if specified test values are not met.
- E. Replace cable installation with new cable if required insulation resistance cannot be obtained.
- F. Complete termination in accordance with manufacturer’s instructions.
- G. Ground all cable shields to grounding conductor.

**3.04 TESTING CABLES**

- A. New Cables
  - 1. Test all sections of cables.
  - 2. Conduct a high potential (HI POT) dc test at NETA specified values for 15 consecutive minutes. Record leakage current with time.

**3.05 FIELD QUALITY CONTROL**

- A. Coordinate installation and final testing with Engineer. Notify Engineer at least 48 hours in advance of testing. Provide Engineer the opportunity to witness any and all tests. Submit all test results to Engineer within 36 hours of the test.
- B. Except where noted otherwise, the following tests may be performed by Contractor or by an independent testing firm regularly employed in the testing of medium-voltage cables.
  - 1. DC high-potential (Hi-Pot) testing shall be performed by an independent testing firm.
- C. Tests shall be performed for all medium-voltage cable installed by this project.
- D. Tests shall be performed after making up splices and terminations, but before landing cable run at either source or load, and before electrical circuitry has been energized except as noted below:
  - 1. If desired, cables may be tested prior to making up splices and termination. However, such tests shall not replace the need to fully test the cable assembly after termination. Test voltages used prior to termination shall not exceed the cable manufacturer’s recommended limits.
- E. Perform inspections and tests in accordance with NETA ATS 2003 7.3.3.
- F. Perform Visual and Mechanical Inspection per NETA ATS 7.3.3.1 and the following:
  - 1. Perform Visual and Mechanical Inspection at each end of cable and at any exposed transitional area.

END OF SECTION 33 71 50



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**SECTION 33 71 75  
OVERHEAD ELECTRICAL SYSTEM CONSTRUCTION**

**PART 1 - GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Units
- B. Construction

**1.02 QUALITY ASSURANCE**

- A. Installation work shall be done in a thorough and workmanlike manner, in accordance with the Contract. Work shall comply with applicable ordinances and codes. The 2017 (or latest edition) of the National Electric Safety Code (ANSI-C2) shall be followed, except where local regulations or these Specifications are more stringent, in which case the most stringent qualifications shall be met.
- B. If any materials, equipment or workmanship shall be deemed defective after delivery or installation before final acceptance of project. The replacement or remedy of shall be at the expense of Contractor.
- C. In the event Owner determines the construction contains numerous defects, it shall be the duty of Contractor to have inspection, if any, made by an engineer approved by Owner.

**PART 2 - PRODUCTS**

**2.01 DESCRIPTION OF UNITS**

- A. Special units and descriptions are included in Contract. Remainder of unit descriptions will be found in REA/RUS Bulletin 50-3 Standard D-804: Specifications and Drawings for 7.2/12.5 kV Line Construction.
- B. Fiberglass braceless crossarms and manufacturer provided material will be used in place of wood crossarms and braces on steel poles. Crossarms to be installed as shown on construction drawings provided in this contract. It is Contractor's responsibility to verify what material is supplied from manufacturer.
- C. Maintain careful and accurate records of all materials removed or reused as specified.
- D. The construction assemblies are on a unit basis so that Owner may authorize any combination, addition or deletion, of construction units desired. The descriptions apply to those assemblies on the Contract Drawings on the Assembly Guide Drawings and includes all necessary labor and Owner-furnished material required to make the assemblies complete, including testing and submitting report forms where required, as follows:
  - 1. Installation (Add) Units
    - a. Specified by designation of the assembly unit to be installed, e.g. "ADD: C1.1" signifies the installation of a C1.1 assembly unit as identified on the Assembly drawings.
    - b. Maintain careful and accurate records of all materials removed or reused as specified.
  - 2. Pole Installation
    - a. Consists of one pole in place. The first digits indicate length: the following shows classification. Thus, "45-3" signifies a 45-foot class 3 wood or steel wood-equivalent



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- poles. Similar designations may be used for varying pole manufacturers. If "S" is indicated steel pole is to be installed.
- b. Site restoration at pole and along access to pole is a part of unit requirements.
  - c. Includes the "covering" up of existing conductors and/or the transfer of conductors to "Hot Arms" for work clearance/code requirements.
3. Overhead Conductor Installation
- a. Conductor is measured horizontal distance between conductor supports. The unit includes tie wires, clamping, sleeves for splicing, connectors, and armor rods; jumpers and connections at deadends, junctions and taps. Includes report form submittal.
  - b. Unit will include the spreading of existing conductors onto hot arms as required.
4. Pole Top Assembly Installation
- a. Consists of the hardware, crossarms and their appurtenances, insulators, connectors, hot-line clamps, and stirrups, etc., except tie wire required to support the conductors. Unit does not include the pole ground downlead wire.
  - b. Includes the "covering" up of existing conductors and/or the transfer of conductors to "Hot Arms" for work clearance/code requirements.
5. Gang-Operated Switch
- a. Specified by the term "GOAB". Consists of insulators, switch, crossarms, terminal pads, switch base, controls. Refer to manufacturer specifications for installation instructions.
6. Ground Installation
- a. Consists of the ground wire, staples, ground molding where required, ground rod, all connectors, clamps and associated hardware as indicated on the various guide drawings. Includes testing and report form submittal.
7. Guy Installation
- a. Consists of the necessary length, both overhead and down guys, of guy wire, all bolts and fasteners, lag screws, guy bonding bolt, deadend hardware, grounding jumpers and connectors. Guy markers are part of this assembly.
8. Anchor Installation
- a. Consists of the anchor with rod complete with applicable bonding clamp and ready for attaching the guy wire, including testing, and report form submittal. Anchor rod extensions required to meet the holding capacity will be additional units.
9. Transfer Assembly
- a. Specified by the prefix "TR" and followed by the designation of existing assembly unit to be transferred.
  - b. Transfer unit will be used when a unit may be removed and installed from one set up of truck as determined by Owner.
  - c. Consists of furnishing of all labor for removing and reinstalling the unit specified from one location to another on the same or new pole, as required. Material in the transfer unit such as brackets, braces and etc. may be reused if in satisfactory condition and only



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when approved by Owner.

- d. Includes the removal and reattachment of any or all conductors associated with the unit, any sagging or re-sagging, tying, untying and re-tying, armor rodding or re-armor rodding, all splices, connectors, etc., and any other labor required to make a complete assembly.
- e. Transfer of guy wire requires installation of new preformed deadend grips.
- f. Splicing of guy wire is not acceptable.

**10. Removal Units**

- a. All assembly units specified by the "REMOVE" shown as green and followed by the assembly unit designation of existing assembly unit to be removed.
- b. Includes the furnishing of all labor for removal of existing units of construction from existing lines, disassembling into material items, and all labor and transportation for the returning of all materials in groups of like items to the warehouse of the Owner in an orderly manner, or transporting elsewhere to the site of the Project or for reuse in the prosecution of this Contract as specified.
- c. Do not place removed materials or equipment where it will be damaged by or cause damage to vehicular traffic, livestock, persons and property. Immediately remove from the job site.
- d. Includes, in addition to the removal of the assembly itself, any necessary transferring, holding and handling, re-sagging, splicing, re-armor rodding, and retying and all connectors and reconnecting of all conductors, jumpers and leads in those cases where an existing assembly will be removed and replaced by a new assembly and where any existing conductor is to be reused.

**11. Pole Removal**

- a. Includes all poles of the same height, regardless of pole class, and designated by the same unit.
- b. Includes pulling and salvage of all poles designated as removals. Poles are not to be cut off unless specified.
- c. Includes immediate backfill of holes with solidly tamped earth in 6" maximum thickness layers and refill to the ground line of any settlement that occurs during the contract period.
- d. When backfilling holes at pole removal locations, do not dig holes in the landscape to obtain backfill. Obtain backfill dirt by scooping or scraping within the designated right-of-way or by fill dirt obtained locally. Do not dig seeded areas within highway or public rights-of-way. Do not place foreign objects in backfill.
- e. Includes the replacement of the surrounding surface where concrete, asphalt, or other man-made surfaces are encountered.
- f. Poles that are designated to be "removed" shall not have the tops cut off unless the existing pole conflicts with the safe operation and construction of the new facilities.
- g. Joint Use Poles designated for "removal" shall not be topped without providing prior notification to Owner. Before topping any Joint Use pole designated for "removal", Contractor shall be responsible for contacting the occupying Joint Use Utility and request that said Utility vacate the subject pole. Contractor shall provide Owner verification of contact if requested. If the Joint Use Utility cannot or will not vacate the pole, Contractor





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may top the pole, if such pole conflicts with the safe operation and construction of the new facilities. This function is considered “means and methods”, and no additional compensation will be made for topping poles designated for removal or for coordinating work with the Joint

- h. Use Utility unless prior approval has been received from Owner. Contractor, for the duration of the construction contract, shall be responsible for the removal of all “topped” poles previously designated for “removal” and upon removal will be compensated the “removal” unit bid price.

**12. Pole-Top Assembly Removal**

- a. Includes, in addition to the removal of the assembly itself, any necessary holding and handling, resagging, splicing, re-armor rodding, and retying and all connectors and reconnecting of all conductors, jumpers and leads in those cases where an existing assembly will be removed and replaced by a new assembly and where any existing conductor is to be reused.
- b. Includes any holding or handling of mainline or tap conductors at tap lines, angles, and deadends where such is involved, and reinstalling of any conductor as required by the assembly. The new unit of construction will be specified separately.

**13. Conductor Removal**

- a. Includes the removal unit for each size of conductor or cable shown by the "Remove" followed by the conductor or cable type.
- b. Includes removal in the longest practical length, preferably between deadends, without unnecessary kinking or nicking. It also includes coiling or reeling of all conductors, and removing and retaining possession of all tie wire, armor rods, jumpers, and miscellaneous connectors.

**14. Guy Removal**

- a. Includes all guys, attachments, hardware, grounds, and insulation regardless of length, type of attachment, size of guy strand or accessories. Thus, REMOVE: "E" signifies removal of any down guy or span guy assembly including attachment, hardware, grounds, and insulation.
- b. Includes removal and coiling of guy strand in the longest practical length and the dismantling of all three-bolt clamps, guy attachments, bonding bolts and guy guards.

**15. Anchor Removal**

- a. Includes only anchor rod removal in the anchor removal units. The anchors will be left in the ground. Rods unable to be removed will be cut off 18” below grade.

**PART 3 - EXECUTION**

**3.01 CONSTRUCTION**

- A. Removing and Replacing Fences, Sod, etc. shall be completed as follows:
- B. Contractor shall carefully remove and store all interfering fences, mailboxes, culverts, shrubs, flowers, other planting, etc. After installation of work and backfilling, reinstalling these items and restoring to at least the conditions which existed prior to commencement of work using materials and workmanship to match those of original construction and installation.



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- C. Coordination shall be provided as follows:
  - 1. Contractor and all Subcontractors for the various branches of work employed on the Project shall cooperate fully with each other to facilitate the progress of the work, and to avoid all interferences between the various parts of the work.
  - 2. Contractor shall cooperate fully with any other contractor that is engaged in work on the Project for Owner or any other contractor working in the Project area.
- D. Poles shall be installed per Section 33 71 16.43 - Pole Construction, Installation, and Removal.
- E. Pole Top Assemblies shall be installed as follows:
  - 1. Pole top assemblies shall be framed in accordance with drawings.
  - 2. Switches shall be installed in accordance with manufacture specifications.
- F. Insulators shall be installed per Section 33 71 23 – Insulators, Hardware and Anchors.
- G. Practices relative to right-of-way shall be observed by Contractor during construction as follows:
  - 1. The ROW shall consist of an area as determined by the state highway markers on both sides of the center line of the route of the Project lines.
  - 2. Limit the movement of crews and equipment so as to cause as little damage as possible to cultivated land, pastures, bridges, crops, orchards, or other property, and endeavor to avoid marring the lands. Replace all fences which are necessarily opened or moved during the construction of the Project, in as good condition as they were found and take precautions to prevent the escape of livestock. Contractor shall be responsible for all damage and loss, outside right-of-way, as specified herein, caused by the construction of the Project.
  - 3. All rights-of-way and easements across private or public property required for performance of the work herein will be obtained by Owner. Access to the Project area outside the rights-of-way limits specified shall be the responsibility of Contractor. Owner shall be informed of all arrangements made for such access. Promptly restore to at least the conditions which existed prior to the commencement of work any ruts or damage made by equipment whether on or off the right-of-way.

END OF SECTION 33 71 75



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# Exhibit A

## Install / Remove / Transfer Unit Quantities

**SECTION 1  
INSTALL QUANTITIES**

<b>DESC.</b>	<b>QTY</b>
1/0 ACSR	1,220
1/0 DPX	153
1/0 TPX	329
15KV ELBOW	4
2 ACSR	3,482
2/0 QPX	318
2C2-2CL	6
2C8C	1
2C7C2-BA	-
2C7C-BA	4
35-4	4
397.5 18/1 ACSR	3,882
4 DPX	1,319
1/0 15KV URD	820
400W STREETLIGHT & MAST	5
40-3	2
45 STEEL POLE	2
45-3	3
50 STEEL POLE	1
50-1S	1
50-2	1
50-3	1
50-H2	-
50-H3S	1
55-H1S	1
55-H2S	3
55-H3S	5
60-H2S	1
60-H3S	3
60-H4S	1
60-H5S	1
60-LD12S	1
65-H4S	4
70-H5S	1
795 26/7 ACSR	17,526
A1.011	2
A4.2	2
A5-2	6

**SECTION 1  
INSTALL QUANTITIES**

<b>DESC.</b>	<b>QTY</b>
A6.1	2
ADD DEPTH	12
ANCHOR BOLT FDN	1
C2.24	1
C2.52	2
C2-2CL	8
C7C	4
C8C	9
CONCRETE BACKFILL	5
CRUSHED ROCK BACKFILL	3
E1-3	13
E1-3F	40
E1-3FD	11
E2-3T	10
FP-2	55
G1.4	3
G1.6	1
G2.1	1
G3.3	1
H1.1	3
H4.1	1
J2.1	6
J2.2	8
J2.2V	24
J3.1	1
JUMPER	5
K11	1
L2.3	1
M2-11RO	24
M26-5	4
M5-10	2
M5-10C	7
M5-9	3
P1.3	4
S2.32	2
TRENCH	168
UA1	1
UC	1

**SECTION 1  
REMOVAL QUANTITIES**

<b>DESC.</b>	<b>QTY</b>
35	2
40	7
45	11
50	3
1/0 ACSR	1,396
1/0 TPX	64
15KV UG CABLE	770
2 ACSR	3,200
2/0 QPX	20
2C2-2CLX	6
2C8C-BA	4
397.5 18/1 ACSR	7,104
50 SP	2
55 SP	5
60 SP	3
65S	1
A1	2
A2.3	1
A4	2
A5	2
A5-2	5
C1.3	5
C2.52	5
C2-1	1
C2-2	1
C2-2CL	1
C5.21	3
C6.21	3
C7C	1
C9-1X	1
DUPLEX	1,126
E	49
E2	4
E3-10	29
F	38
F2	1
G1	1
G2	1
G3	1

**SECTION 1  
REMOVAL QUANTITIES**

<b>DESC.</b>	<b>QTY</b>
H1.1	16
J2.1	1
J2.2	1
K11	4
M2-11RO	7
M26-5	12
M3-15	1
M5-10	1
M5-6	3
M5-9	4
NEUTRAL	2,838
PRIMARY	12,237
S1.01	6
S2.01	3
S2.32	1
TRIPLEX	329
UA1	1
UC	1

**SECTION 1**  
**TRANSFER QUANTITIES**

<b>DESC.</b>	<b>QTY</b>
397.5 18/1 ACSR	180
795 26/7 ACSR	1,080
A5	1
C7	1
UM5	1
G3.1	1
2 ACSR	568





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**U.S. 41A – Section 1 Utility Relocation**  
**Madisonville Municipal Utilities**  
**KY Transportation Cabinet**

---

Contract No: 6531-C1  
Date: Nov. 30, 2017  
Rev.: 00

---

# Contract Drawings

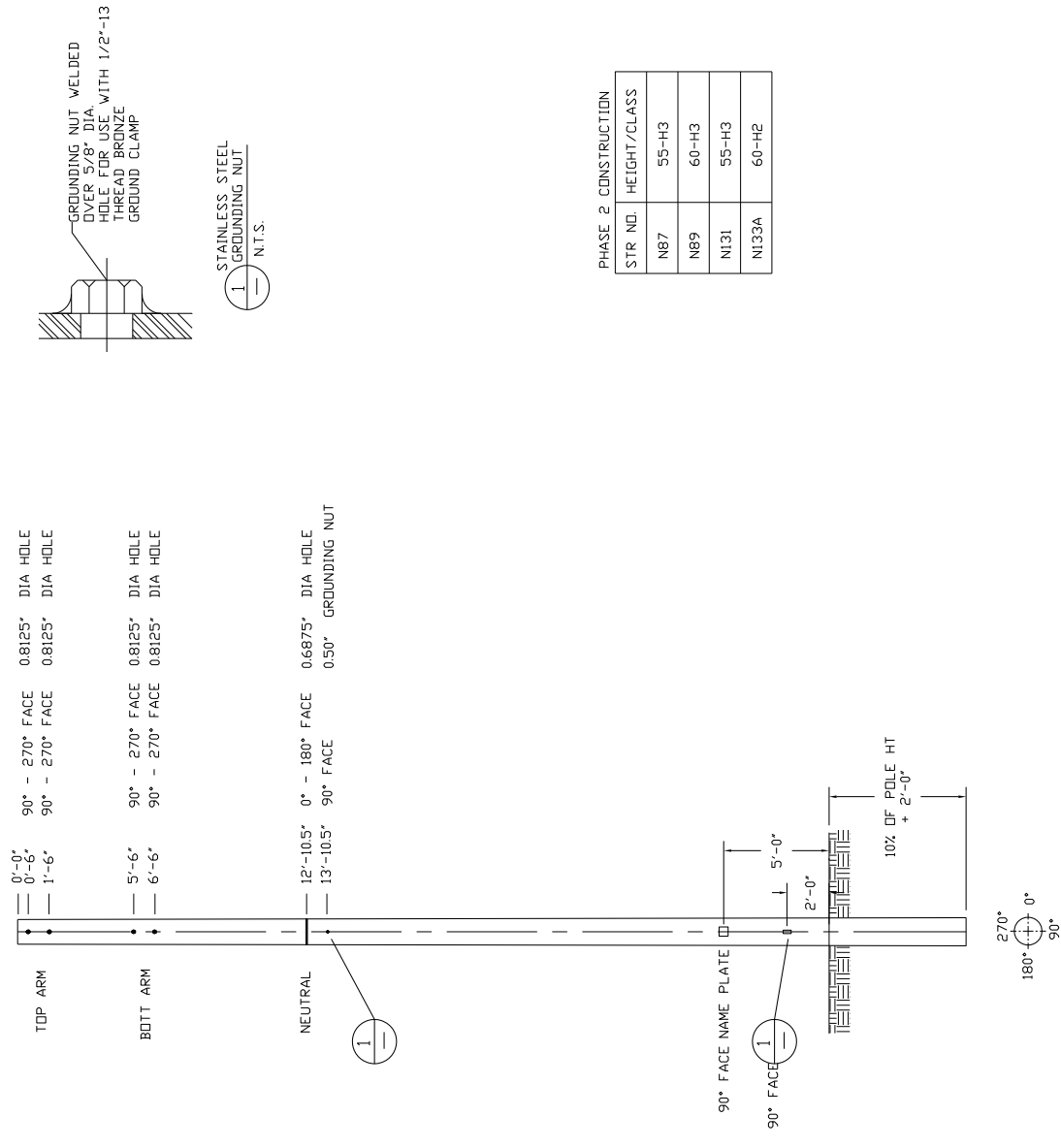
DATE	REVISION	BY	NO.
11-30-17			0

MADISONVILLE MUNICIPAL UTILITIES  
MADISONVILLE, KENTUCKY  
STEEL POLE FRAMING  
WOOD POLE EQUIVALENT  
2C2-2C1



DATE  
SCALE  
DRAWING NO.  
KMMU171A101


FOR BIDDING ONLY



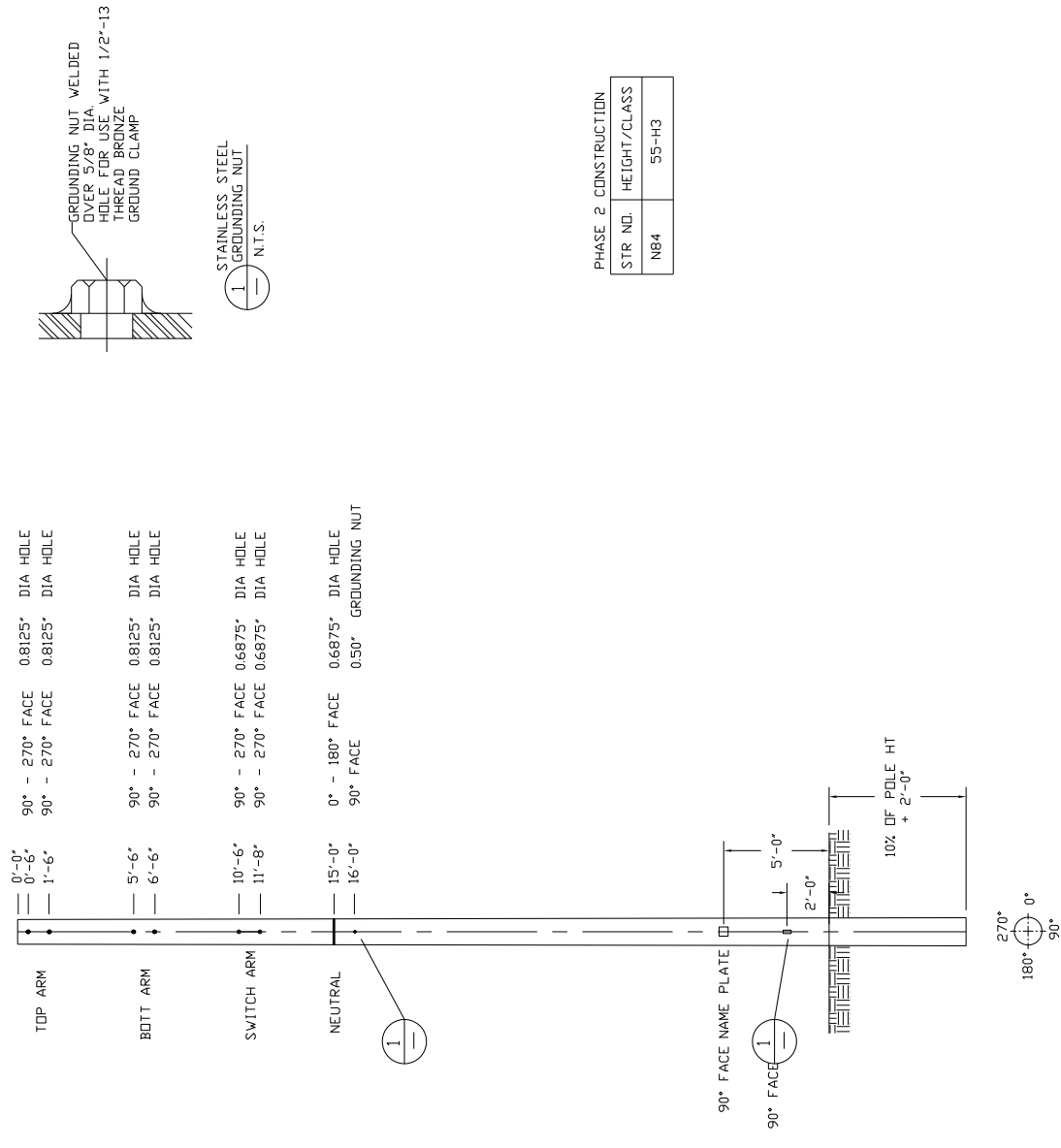
PHASE 2 CONSTRUCTION

STR NO.	HEIGHT/CLASS
N87	55-H3
N89	60-H3
N131	55-H3
N133A	60-H2



Drawn By: _____ Checked By: _____ Date: 11-20-17	<b>MADISONVILLE MUNICIPAL UTILITIES</b> MADISONVILLE, KENTUCKY <b>STEEL POLE FRAMING</b> <b>WOOD POLE EQUIVALENT</b> <b>G2-2CL/ C8C/GANG OPERATED SWITCH</b>	 Patterson & Dewar ENGINEERS 800 CENTER WAY, NORCROSS, GEORGIA 30071 (770) 453-1410   pdengineers.com	DATE: _____ SCALE: _____ DRAWING NO: <b>KMMU141A102</b>
--	--	---	---

FOR BIDDING ONLY



PHASE 2 CONSTRUCTION	
STR. NO.	HEIGHT/CLASS
N84	55-H3









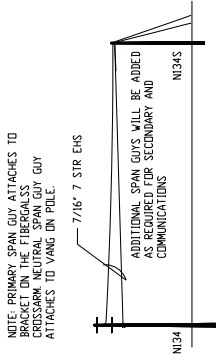




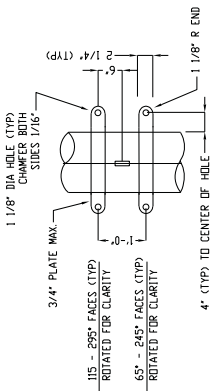
MADISONVILLE MUNICIPAL UTILITIES  
STEEL POLE PROJECT  
N134  
60 FT LD12 EQUIPMENT

NO.	DATE	REVISION
0	11-26-17	ISSUED FOR BIDS

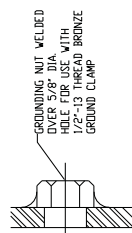
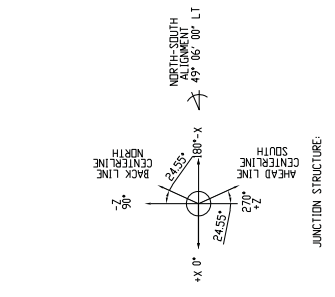
NOTE: NOTE:  
1. POLE CAP APPLIED SLEEVE AND BEARING PLATE SET  
2. GALVANIZED SAEEL  
3. CORROSION PROTECTED



NOTE: SPAN GUY BACKS UP DEADEND FROM WEST. DOES NOT SUPPORT LINE ANGLE.



4\"/>

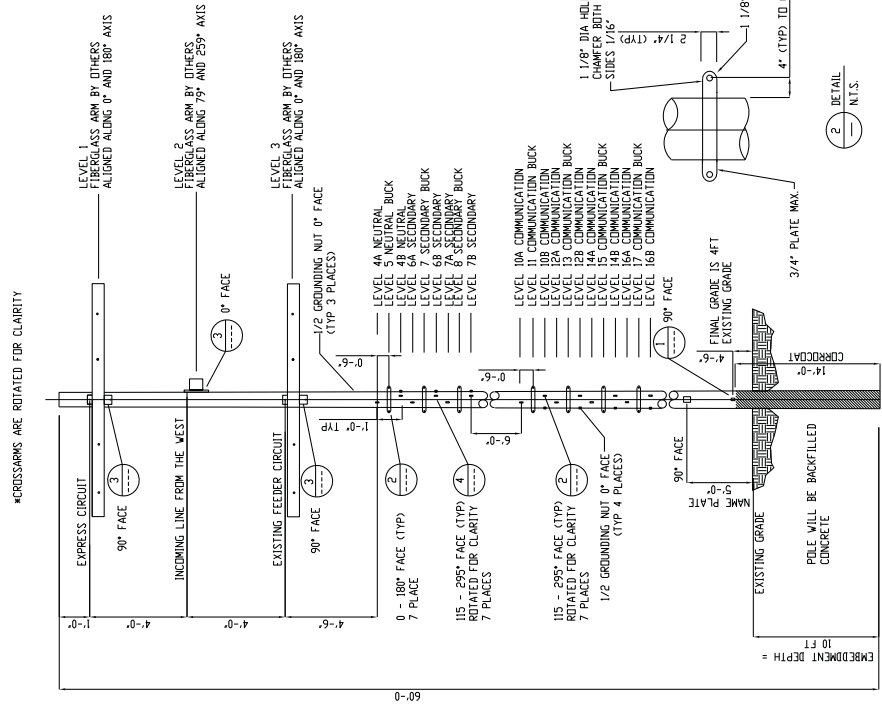


1  
STAINLESS STEEL GROUNDING NUT  
N.T.S.

LEVEL	APPLICATION	CONDUCTOR
LEVEL 1	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 2	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 3	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 4A-B	DISTRIBUTION CONDUCTOR, NEUTRAL CONDUCTOR	4/0 6/1 ACSR
LEVEL 5	DISTRIBUTION CONDUCTOR, NEUTRAL CONDUCTOR	4/0 6/1 ACSR
LEVEL 6A-B	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 7	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 8A-B	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 9	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 10A-B	COMMUNICATIONS	-----
LEVEL 11	COMMUNICATIONS	-----
LEVEL 12A-B	COMMUNICATIONS	-----
LEVEL 13	COMMUNICATIONS	-----
LEVEL 14A-B	COMMUNICATIONS	-----
LEVEL 15	COMMUNICATIONS	-----
LEVEL 16A-B	COMMUNICATIONS	-----
LEVEL 17	COMMUNICATIONS	-----

LEVEL	APPLICATION	CONDUCTOR
LEVEL 1	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 2	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 3	DISTRIBUTION CONDUCTOR, 3-PHASE	397.5 18/1 ACSR
LEVEL 4A-B	DISTRIBUTION CONDUCTOR, NEUTRAL CONDUCTOR	4/0 6/1 ACSR
LEVEL 5	DISTRIBUTION CONDUCTOR, NEUTRAL CONDUCTOR	4/0 6/1 ACSR
LEVEL 6A-B	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 7	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 8A-B	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 9	DISTRIBUTION SECONDARY	1/0 TRIPLEX
LEVEL 10A-B	COMMUNICATIONS	-----
LEVEL 11	COMMUNICATIONS	-----
LEVEL 12A-B	COMMUNICATIONS	-----
LEVEL 13	COMMUNICATIONS	-----
LEVEL 14A-B	COMMUNICATIONS	-----
LEVEL 15	COMMUNICATIONS	-----
LEVEL 16A-B	COMMUNICATIONS	-----
LEVEL 17	COMMUNICATIONS	-----

125 KV STRUCTURE TYPE SCHEDULE  
MIN ACCEPTABLE CLIM\*\*  
AT 100' OF POLE HT  
STR NO MIN STRUCTURE HT & WOOD CLASS EQUIV.  
N134 65' LOD2 DR EQUAL 652 FT-KIPS



\*CROSSARMS ARE ROTATED FOR CLARITY

3 CROSSARM MOUNTING BRACKET  
N.T.S.

2  
DETAIL  
N.T.S.

FOR BIDDING ONLY





















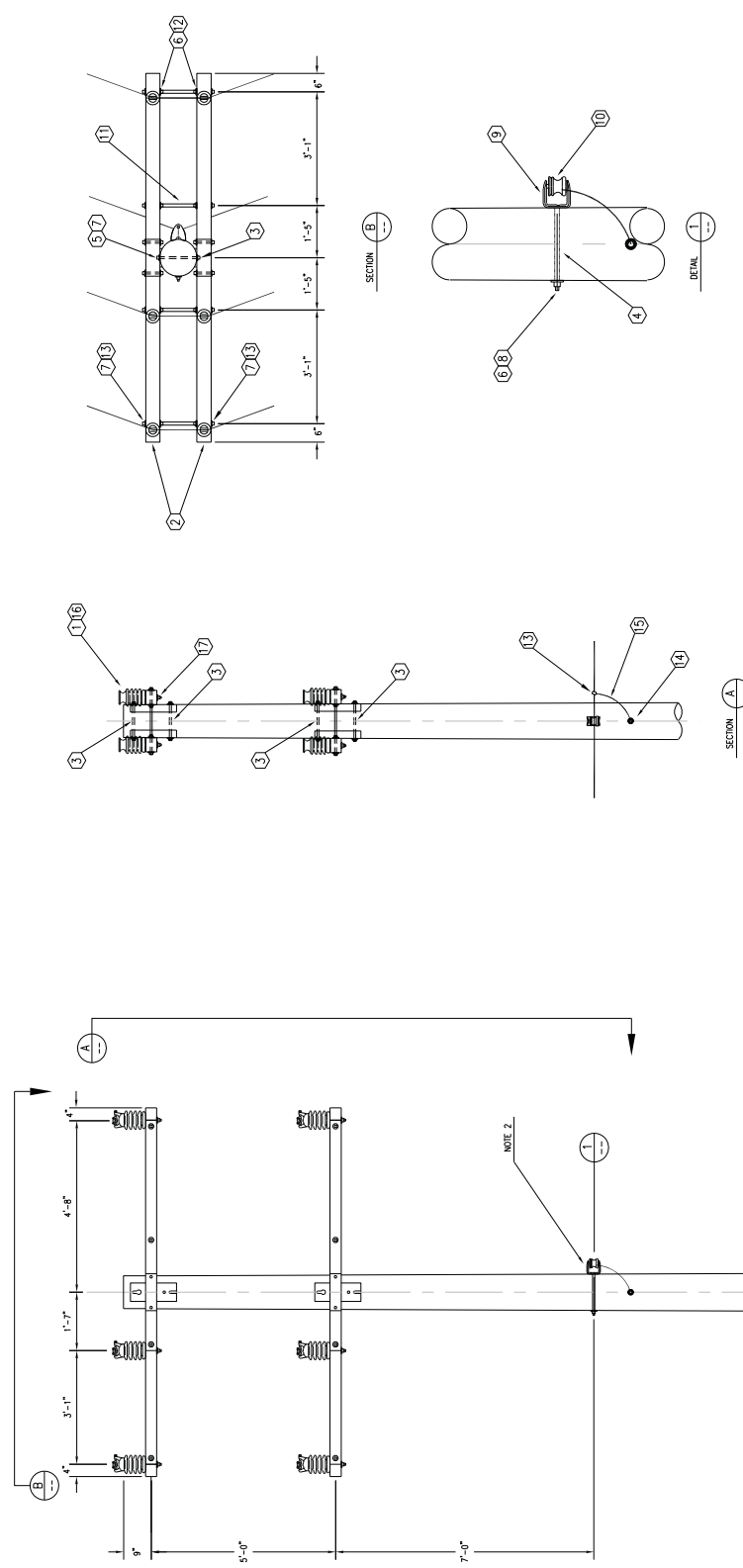
DATE	NO.	BY
11-30-17	0	REYSON
ISSUED FOR BIDS		
Drawn By:		
Designed By:		

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
STRUCTURE DETAIL  
2C2-2CL



DATE  
SCALE  
DRAWING NO.  
KYM110412040

FOR BIDDING ONLY



MATERIAL LIST FOR STRUCTURE TYPE 2C2-2CL

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		12	INSULATOR, POST TYPE, CLAMP TOP		GAMMA 4225-70
2		4	GROSSARM, 10" X 3/8" X 4 5/8" FIBERGLASS		PULP, TB250012005X2, 3/4" BOLT
3		4	BOLT, MACHINE 3/4" X REQ'D LENGTH		JOSLYN, J8914
4		1	BOLT, MACHINE 5/8" X REQ'D LENGTH		JOSLYN, J8814
5		4	NUT, MF-TYPE 3/4"		JOSLYN, J8584
6		33	NUT, MF-TYPE 5/8"		JOSLYN, J8583
7		4	WASHER, 2" ROUND FOR 3/4" BOLT		JOSLYN, J1089
8		4	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSLYN, J1075
9		1	CLEVIS, SPOOL INSULATOR		JOSLYN, J1300
10		1	INSULATOR, SPOOL		JOSLYN, J101
11		8	BOLTS, DOUBLE ARMING 5/8" X REQ'D LENGTH		JOSLYN, J88--
12		32	WASHER, 1 3/4" ROUND FOR 5/8" BOLT		JOSLYN, J1088
13		1	CONNECTOR, GENERAL USE PARALLEL GROOVE		ANDERSON, LC-83-A-XB
14		1	CONNECTOR, ROUNDING WISE TYPE BRONZE		ANDERSON, GC-207
15		3 FT.	WIRE, CU #6 SOLID		
16		12	CLAMP TOP CLAMP		MACLEAN ACTIS-150-SL1
17		12	MOUNTING STUD		GAMMA 11612A

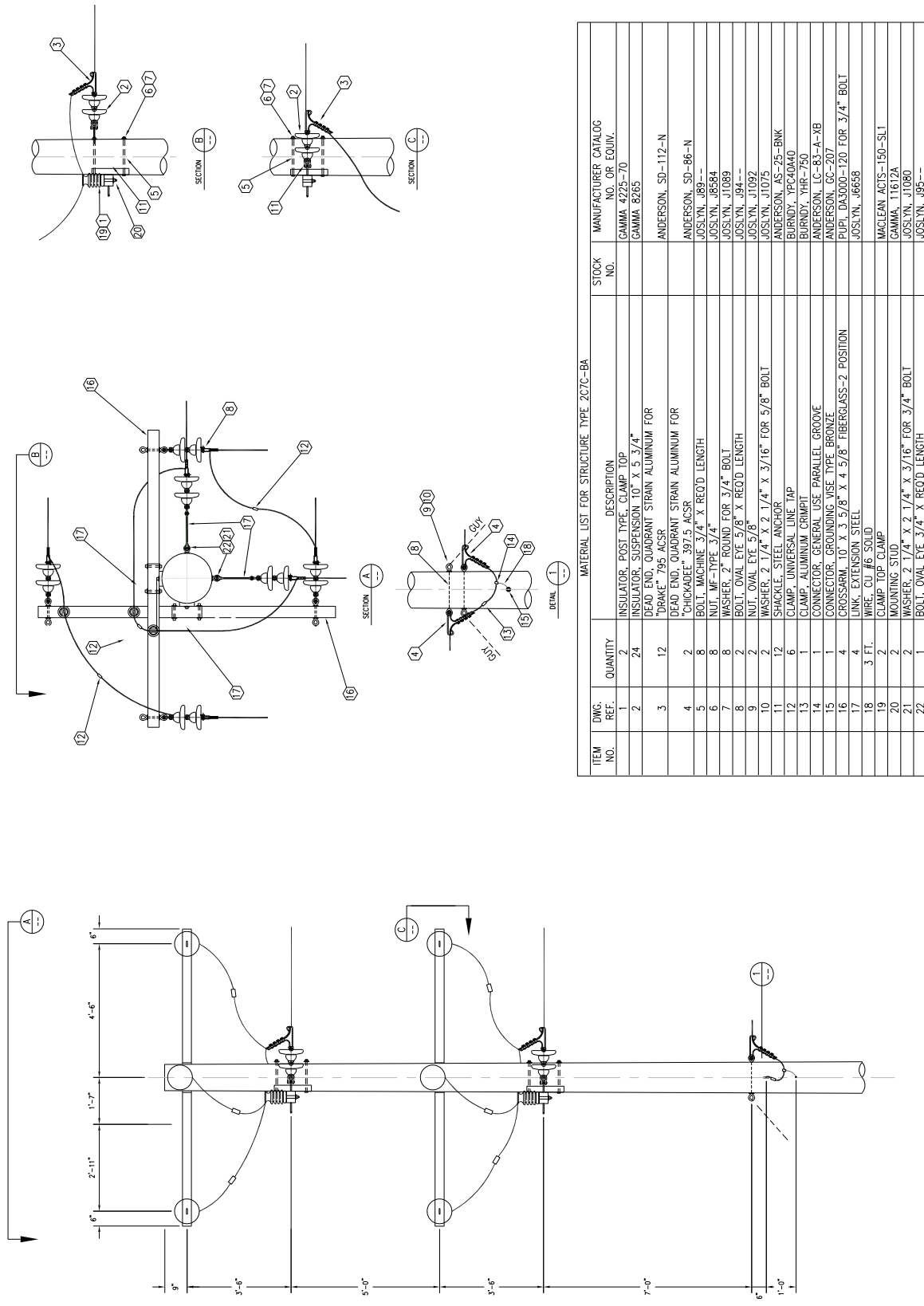


DESIGNED BY	DATE
DRAWN BY	
CHECKED BY	
ISSUED FOR BIDS	

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
STRUCTURE DETAILS  
2C7C-BA



DATE  
SCALE  
DRAWING NO. KYMMU41A206



MATERIAL LIST FOR STRUCTURE TYPE 2C7C-BA

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		2	INSULATOR, POST TYPE, CLAMP TOP		GAMMA 4223-70
2		24	INSULATOR, SUSPENSION 10" X 5/8"		GAMMA 8265
3		12	DEAD END, QUADRANT STRAIN ALUMINUM FOR DRAKE 795 ACSR		ANDERSON, SD-112-N
4		2	DEAD END, QUADRANT STRAIN ALUMINUM FOR CHICKADEE 397.5 ACSR		ANDERSON, SD-86-N
5		8	BOLT, MACHINE 3/4" X REQ'D LENGTH		JOSLYN, J89---
6		8	NUT, WF-TYPE 3/4"		JOSLYN, J8584
7		8	WASHER, 2" ROUND FOR 3/4" BOLT		JOSLYN, J1089
8		2	BOLT, OVAL EYE 5/8" X REQ'D LENGTH		JOSLYN, J84---
9		2	NUT, OVAL EYE 5/8"		JOSLYN, J1092
10		2	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		ANDERSON, AS-25-BNK
11		12	SHACKLE, STEEL ANCHOR		BURNDY, YFC40440
12		6	CLAMP, UNIVERSAL LINE TAP		ANDERSON, AS-25-BNK
13		1	CLAMP, ALUMINUM CRIMPIT		BURNDY, YFC40440
14		1	CONNECTOR, GENERAL USE PARALLEL GROOVE		ANDERSON, LC-85-A-XB
15		4	CONNECTOR, GROUNDING VISE TYPE BRONZE		ANDERSON, GC-207
16		4	CROSSARM, 10" X 3 5/8" X 4 5/8" FIBERGLASS-2 POSITION		PUPI, DA3000-120 FOR 3/4" BOLT
17		4	LINK, EXTENSION STEEL		JOSLYN, J6658
18		3 FT.	WIRE, CU #6 SOLID		MACLEAN ACTS-150-SLT
19		2	CLAMP TOP CLAMP		GAMMA 11612A
20		2	MOUNTING STUD		JOSLYN, J1080
21		2	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 3/4" BOLT		JOSLYN, J85---
22		1	BOLT, OVAL EYE 3/4" X REQ'D LENGTH		JOSLYN, J85---

FOR BIDDING ONLY



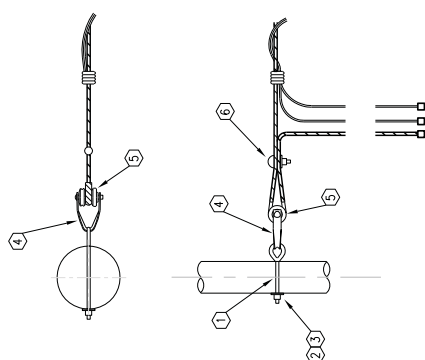
DATE	11-30-17	DESIGNED BY	DRWING NO.
ISSUED FOR	REVISION		

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
MADISONVILLE, KENTUCKY  
DETAILS  
A5-2, K6, M5-10C



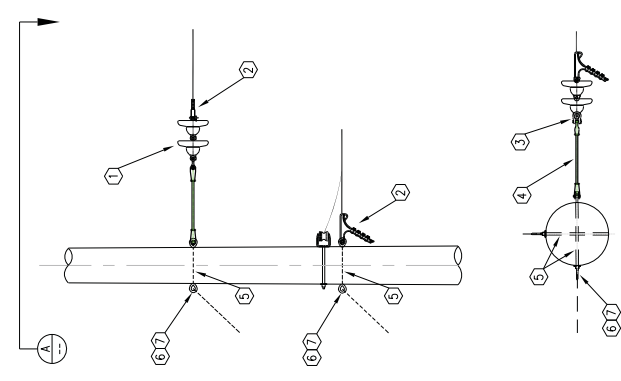
DATE	
SCALE	
DRAWING NO.	KYMMU41A208

FOR BIDDING ONLY



SERVICE DROP K6

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		1	BOLT, OVAL EYE 5/8" X REQ'D LENGTH		JOSELYN, J94--
2		1	NUT, OVAL EYE 5/8"		JOSELYN, J109Z
3		1	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSELYN, J1075
4		1	CLEVIS, SWINGING INSULATOR		JOSELYN, J1300
5		1	INSULATOR, SPOOL		JOSELYN, J101
6		1	CLAMP, LOOP, DEADEND		BURNDY, UW25R



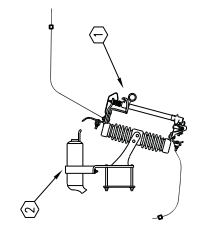
SECTION A

TYPE A5-2

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		2	INSULATOR, SUSPENSION 10" X 5 3/4"		GAMMA 8265
2		2	DEAD END, QUADRANT STRAIN ALUMINUM, #6-3/0-8k		ANDERSON, DE-46-N
3		1	SHACKLE, STEEL ANCHOR, 25k		ANDERSON, AS-25-BNK
4		1	LINE, EXTENSION 14" ALUMINUM		JOSELYN, J6658
5		2	BOLT, OVAL EYE 5/8" BY REQ'D LENGTH		JOSELYN, J94--
6		2	NUT, OVAL EYE 5/8"		JOSELYN, J109Z
7		2	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSELYN, J1075

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
2		1	CUTOUT, 100A		CHANGE, C710-1E4FA
		1	ARRESTOR, 10KV		JOSELYN, ZH010-0C00100

CUTOUT ARRESTOR COMBINATION M5-10C







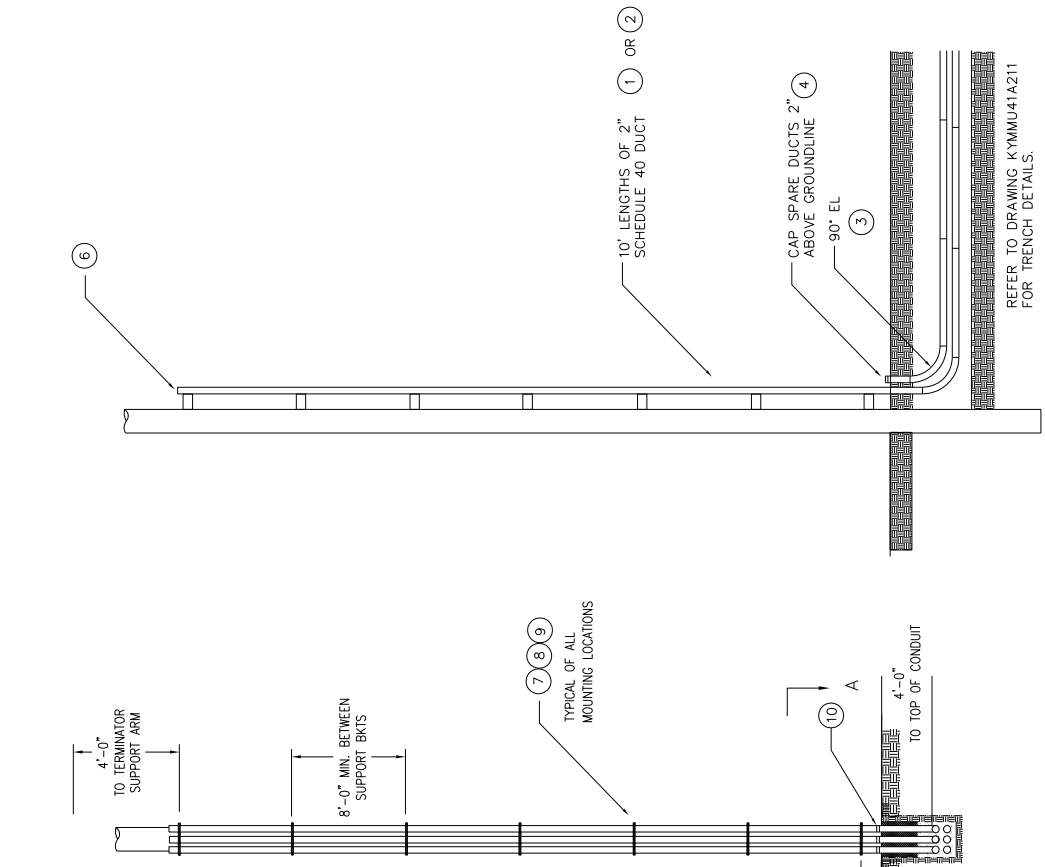
200-000-002

DESIGNED BY	DATE
DRAWN BY	DATE
CHECKED BY	DATE
ISSUED FOR	
NO.	DATE
BY	

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
3-PHASE RISER CONDUIT DETAIL



DATE  
SCALE  
DRAWING NO. KYMMU41A210



MATERIAL LIST FOR 3-PHASE RISER DUCT ASSEMBLY D3

ITEM NO.	DWG REF.	QUANTITY	DESCRIPTION	MANUFACTURER, CATALOG NO. OR EQUIV.
1	AS REQ'D	1	2" SCHEDULE 40 GALVANIZED DUCT, 10 FOOT LENGTHS	ALLIED
2	AS REQ'D	2	2" SCHEDULE 40 GALVANIZED DUCT, 20 FOOT LENGTHS	ALLIED
3	AS REQ'D	3	2" SCHEDULE 40 GALVANIZED DUCT, 90° EL., .36" RAD	ALLIED
4	3	2" PULCS WITH PULL TAB	CARLON WAEPGS	
5	AS REQ'D	3	2" COUPLINGS	ALLIED
6	3	2" BELL END	CARLON E907J-CAR	
7	AS REQ'D	1	CONDUIT STANDOFF BRACKET, 9 INCH	ALUMAFORM 9-CSO-24
8	AS REQ'D	1	CONDUIT STANDOFF BRACKET, STRAP KIT	ALUMAFORM STK-2
9	AS REQ'D	1	BANDING ASSEMBLY	ALUMAFORM BBS872
10	AS REQ'D	1	2" CONDUIT GROUND CLAMP	ALUMAFORM BBS872

SECTION 2

POLE NO.	
N134	

FOR BIDDING ONLY

REFER TO DRAWING KYMMU41A211 FOR TRENCH DETAILS.

DESIGNED BY	DATE
11-30-17	
DRAWN BY	
SSSFD FOR RKS	
PROJECT NO.	
DATE	
BY	

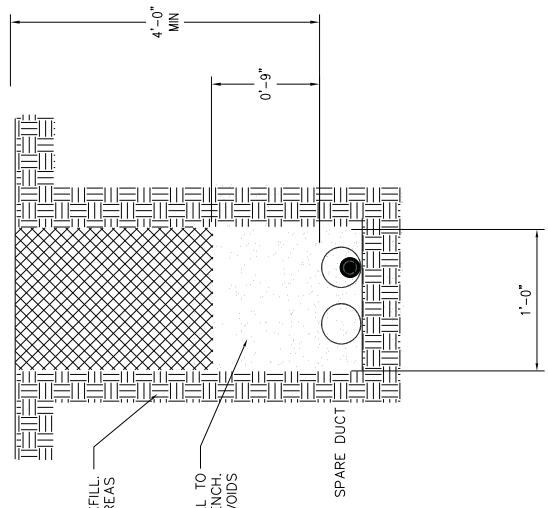
MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
TRENCHING DETAIL



DATE	
SCALE	
DRAWING NO.	KYMMU041A2110
REV	

FOR BIDDING ONLY

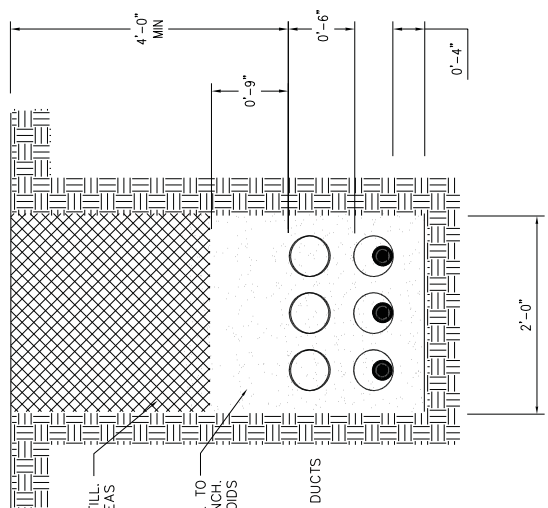
WARNING: TAPE TO BE INSTALLED ABOVE  
COMMUNICATION DUCTS AND POWER DUCTS



TYPICAL 1-PHASE TRENCH DETAIL

TRENCH TYPE 1: 12"  
ELECTRIC: (2) 2" POWER DUCTS.

WARNING: TAPE TO BE INSTALLED ABOVE  
COMMUNICATION DUCTS AND POWER DUCTS



TYPICAL 3-PHASE TRENCH DETAIL

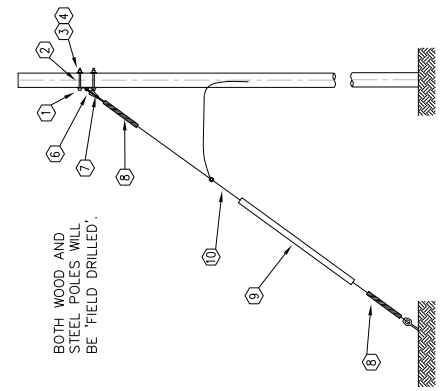
TRENCH TYPE 1: 24"  
ELECTRIC: (6) 2" POWER DUCTS.

DATE	11-09-17
DESIGNED BY	RSN
DRAWN BY	RSN
CHECKED BY	RSN
ISSUED FOR	RSN

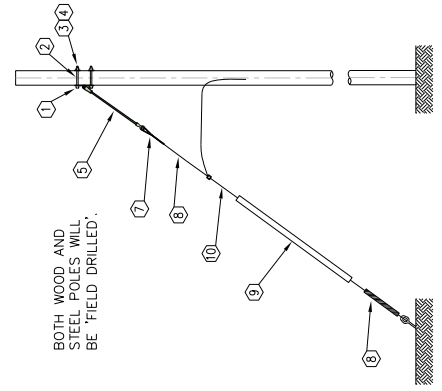
MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
MADISONVILLE, KENTUCKY  
GUY, ANCHOR AND GROUNDING UNITS



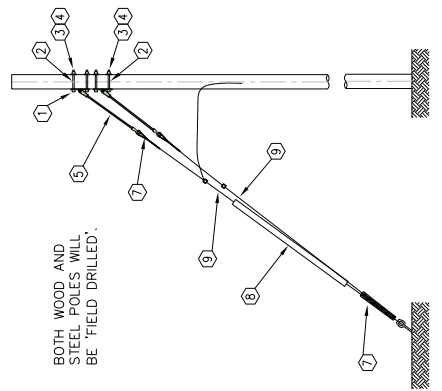
NOTE:  
1. ALL GUYS ARE TO 'PRE-TENSIONED' BEFORE CONDUCTOR INSTALLATION.  
2. INSTALL GUYING ON CROSSARM PLATES FOR IN LINE DEADENDING.  
3. WHEN INSTALLING GUY ATTACHMENTS, FIELD DRILL HOLES STARTING 6" BELOW THE CROSSARMS LOWEST HOLES.



SINGLE DOWN GUY E1-3



SINGLE DOWN GUY E1-3F



DOUBLE DOWN GUY E1-3FD

MATERIAL LIST FOR SINGLE DOWN GUY E1-3F

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		1	GUY ATTACHMENT, UNIVERSAL		MACLEAN, UGA-65-3
2		2	BOLT, MACHINE 5/8" X REQ'D LENGTH		JOSLYN, J88--
3		2	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSLYN, J1075
4		2	NUT, MF-TYPE 5/8"		JOSLYN, J8583
5		1	LINK, INSULATED EXTENSION, 78"		CHANCE, GS16078CC1
6		1	SHACKLE, ANCHOR		ANDERSON, AS-25-BNK
7		1	CLEVIS, THIMBLE		CHANCE, TC1
8		2	GUY GRIP, DEADEND GALVANIZED STEEL		PREFORMED, GDE-1108
9		1	GUY MARKER, ECONOMY FULL ROUND		CHANCE, 96-FRPE
10		AS REQ'D	GUY WIRE, 7/16" EXTRA HIGH STRENGTH STEEL		OPEN MARKET

MATERIAL LIST FOR DOUBLE DOWN GUY E1-3FD

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		2	GUY ATTACHMENT, UNIVERSAL, 15x 7/16" MAX		MACLEAN, UGA-65-3
2		4	BOLT, MACHINE 5/8" X REQ'D LENGTH		JOSLYN, J88--
3		4	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSLYN, J1075
4		4	NUT, MF-TYPE 5/8"		JOSLYN, J8583
5		2	LINK, INSULATED EXTENSION, 78"		CHANCE, GS16078CC1
6		1	SHACKLE, ANCHOR, 25x		ANDERSON, AS-25-BNK
7		4	GUY GRIP, DEADEND GALVANIZED STEEL		PREFORMED, GDE-1108
8		1	GUY MARKER, ECONOMY FULL ROUND		CHANCE, 96-FRPE
9		AS REQ'D	GUY WIRE, 7/16" EXTRA HIGH STRENGTH STEEL		OPEN MARKET

\*\*SINGLE DOWN GUY E1-3 ELIMINATES FIBERGLASS STRAIN INSULATOR

FOR BIDDING ONLY

DATE	11-05-17	DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.
DATE		DESIGNED BY	DRWING NO.

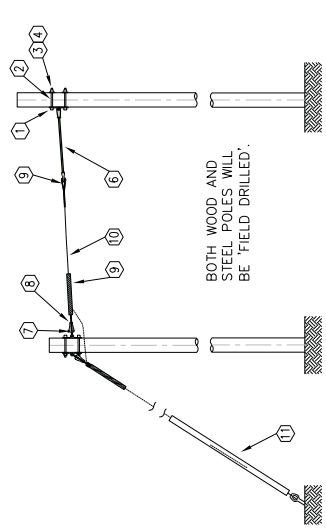
MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
GUY, ANCHOR AND GROUNDING UNITS



DATE  
SCALE  
DRAWING NO. KYMMU41A212

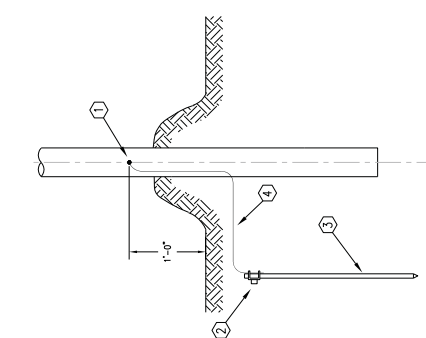
- NOTE:
- ANCHORS ARE SPECIFIED FOR CLASS 5 SOIL CONDITIONS AS DESCRIBED BELOW:  
 \*MEDIUM DENSE COURSE SANDS AND SILTS;  
 \*MEDIUM DENSE CLAYS;  
 \*MEDIUM DENSE CLAYEY SILTS AND CLAYS;  
 \*TYPICAL BLOW COUNT WOULD BE 14 TO 25.  
 PER CHANGE ANCHOR CATALOG THE ANCHOR IS 27,000# IS CLASS 5 CATEGORY SOILS.  
 WHEN SOILS ARE ENCOUNTERED THAT DO NOT FIT THE DESCRIPTIONS ABOVE, CONTACT THE ENGINEER FOR INSTRUCTIONS.  
 GROUND RESISTANCE MAY BE MEASURED USING THE 3-POINT METHOD OR RESISTANCE METER. RESULTS MUST BE RECORDED.
  - WHEN INSTALLING GUY ATTACHMENTS FIELD DRILL HOLES STARTING 12" BELOW THE CROSSARMS LOWEST HOLES.

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		1	GUY ATTACHMENT, UNIVERSAL		
2		2	BOLT, MACHINE, 5/8" X REQ'D LENGTH		MACLEAN, UCA-65-3
3		3	WASHER, 2 1/4" X 2 1/4" X 3/16" FOR 5/8" BOLT		JOSLYN, J88--
4		3	NUT, MF-TYPE 5/8"		JOSLYN, J1075
5		1	BOLT, OVAL EYE 5/8" X REQ'D LENGTH		JOSLYN, J8583
6		1	LINK, INSULATED EXTENSION, 78"		JOSLYN, J84--
7		1	SHACKLE, ANCHOR		ANDERSON, AS-25-BMK
8		1	CLEVIS, THIMBLE		CHANCE, G516078CC1
9		2	GUY GRIP, DEADEND GALVANIZED STEEL		CHANCE, TCI
10		FT.	GUY WIRE, 7/16" EXTRA HIGH STRENGTH STEEL		OPEN MARKET
11		1	GUY MARKER, ECONOMY FULL ROUND		CHANCE, 96-FRPE

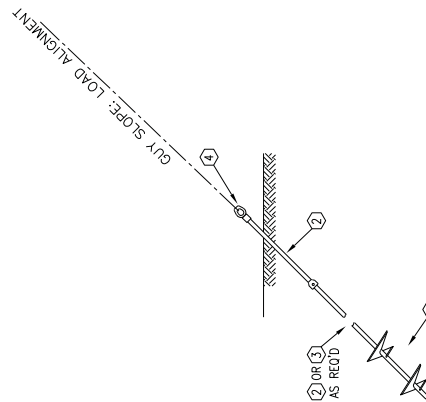


SEE DWG KYMMU41A212 FOR DOWN GUY MATERIAL OVERHEAD SPAN GUY E2-3T

BOTH WOOD AND STEEL POLES WILL BE 'FIELD DRILLED'.



STEEL POLE GROUNDING UNIT M2-11R0  
NOTE: SEE DRAWING KYMMU41A214 FOR FURTHER GROUNDING DETAILS.



SCREW ANCHOR FP-2

NOTE: ANCHORS TO BE INSTALLED TO FULL CAPACITY AS PER MANUFACTURER'S INSTRUCTIONS. ANCHORS MUST BE INSTALLED TO WITHIN 5% OF ALIGNMENT OF GUY TO MEET SPECIFIED CAPACITIES.

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		1	DOUBLE HELIX, 8"/10", 3 FT LENGTH		HUBBELL, 126542AE
2		AS REQ'D	SHAFT EXTENSION, 42"		HUBBELL, 12655
3		AS REQ'D	SHAFT EXTENSION, 84"		HUBBELL, 12657
4		1	TRIPLE EYE ADAPTOR, 18" W/PULLING EYE		HUBBELL, C102-0025

ITEM NO.	DWG. REF.	QUANTITY	DESCRIPTION	STOCK NO.	MANUFACTURER CATALOG NO. OR EQUIV.
1		1	CONNECTOR, GROUNDING WISE TYPE BRONZE		ANDERSON, GC-207
2		1	CLAMP, GROUND ROD		JOSLYN, J8392
3		1	ROD, GROUND, 5/8" X 8' COPPERCLAD		
4		REC'D FT.	WIRE, CU #6 SOLID		

NOTE: TEST AND RECORD GROUND RESISTANCE AFTER EACH GROUNDING SYSTEM MODIFICATION AT A STRUCTURE. BASED ON GROUND RESISTANCE MEASUREMENTS, THE ENGINEER OR OWNER MAY SPECIFY ADDITIONAL GROUNDING. THE TARGET GROUND RESISTANCE DISTRIBUTION IS 25 OHMS PER OHM OF GROUNDING WHERE MEASURED RESISTANCE IS GREATER THAN 25 OHMS.  
 GROUND ROD MUST BE INSTALLED OUTSIDE THE DISTURBED AREA AS SHOWN ON DRAWING KYMMU41A214.  
 GROUND ROD MUST BE INSTALLED MIN 2' MINIMUM FROM POLE FACE AND 1' DEEP IN UNDISTURBED SOIL.

FOR BIDDING ONLY





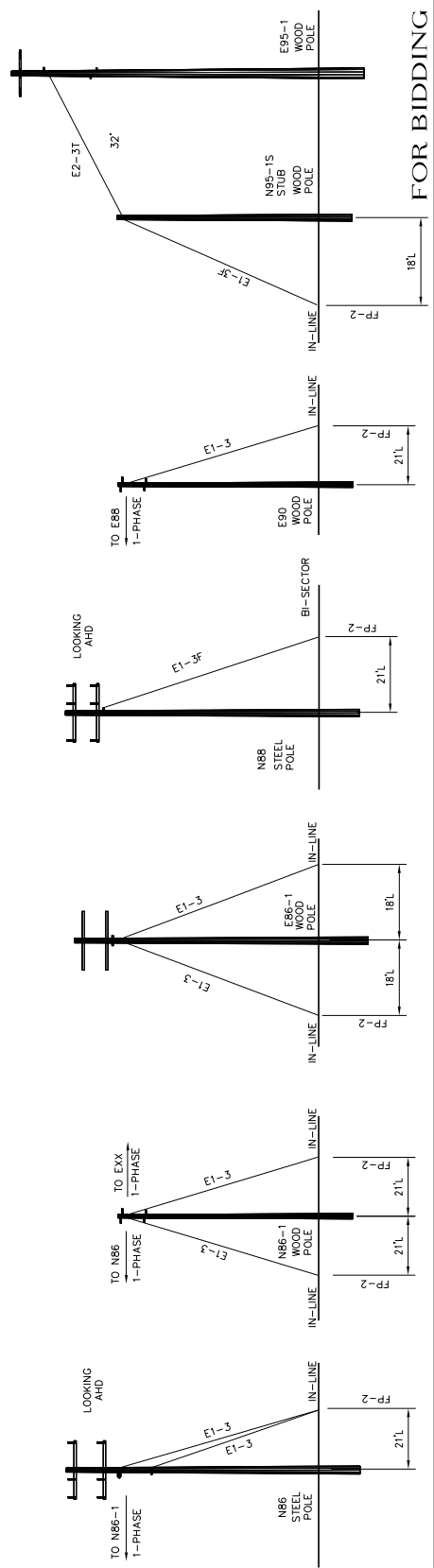
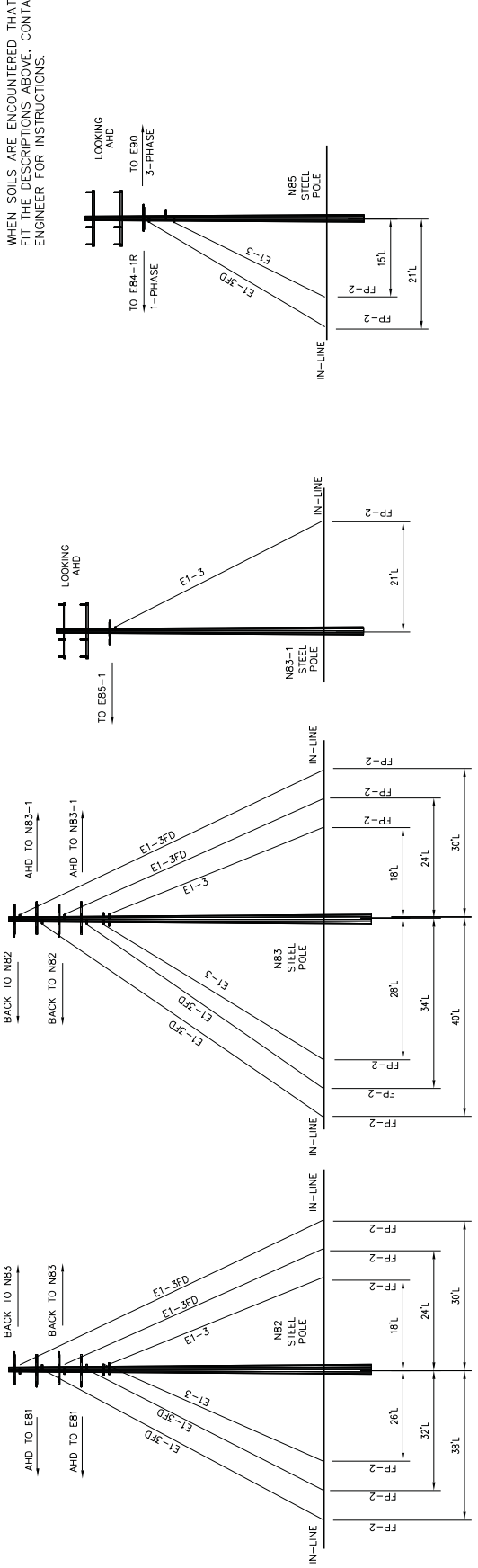
NO.	DATE	DESCRIPTION
0	11-30-17	ISSUED FOR BIDS
1		DESIGN
2		REVISION

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
SECTION 2  
GUY DETAILS



DATE: \_\_\_\_\_  
SCALE: \_\_\_\_\_  
DRAWING NO: KYMMU41A2101

NOTE:  
1. ANCHORS ARE SPECIFIED FOR CLASS 5 SOIL CONDITIONS AS DESCRIBED BELOW:  
"MEDIUM DENSE COARSE SANDS AND SANDY GRAVELS; STIFF TO VERY STIFF SILTS AND CLAY. TYPICAL BLOW COUNT WOULD BE 14 TO 25. PER CHANCE ANCHOR CATALOG THE HOLDING CAPACITY OF THE SPECIFIED ANCHOR IS 27,000# IS CLASS 5 CATEGORY SOILS.  
WHEN SOILS ARE ENCOUNTERED THAT DO NOT FIT THE DESCRIPTIONS ABOVE, CONTACT THE ENGINEER FOR INSTRUCTIONS.



FOR BIDDING ONLY





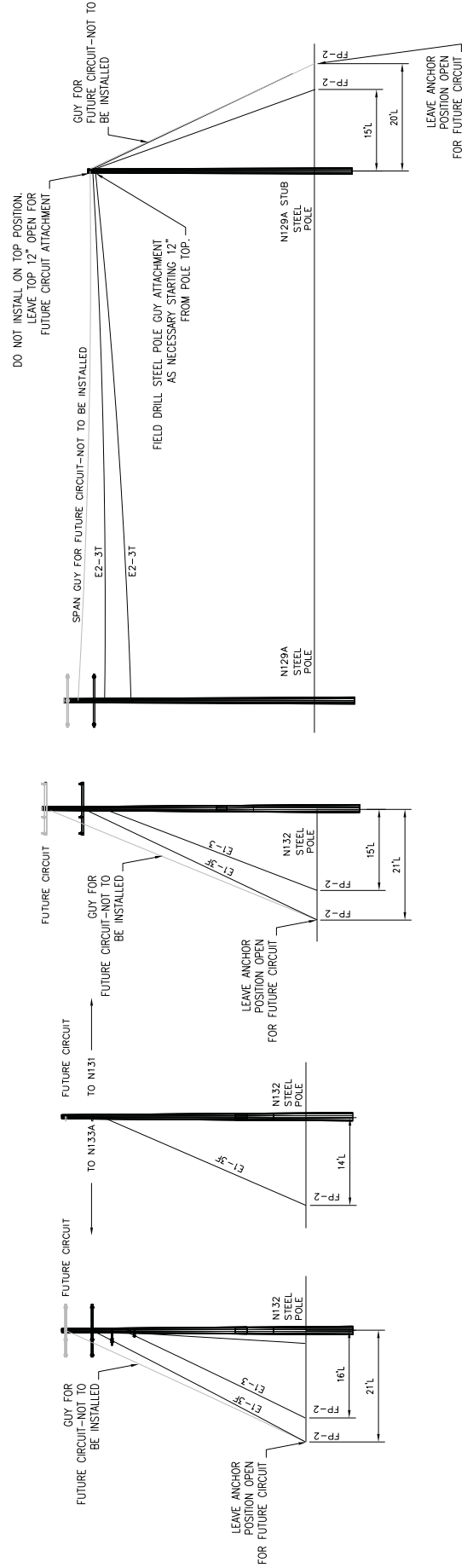
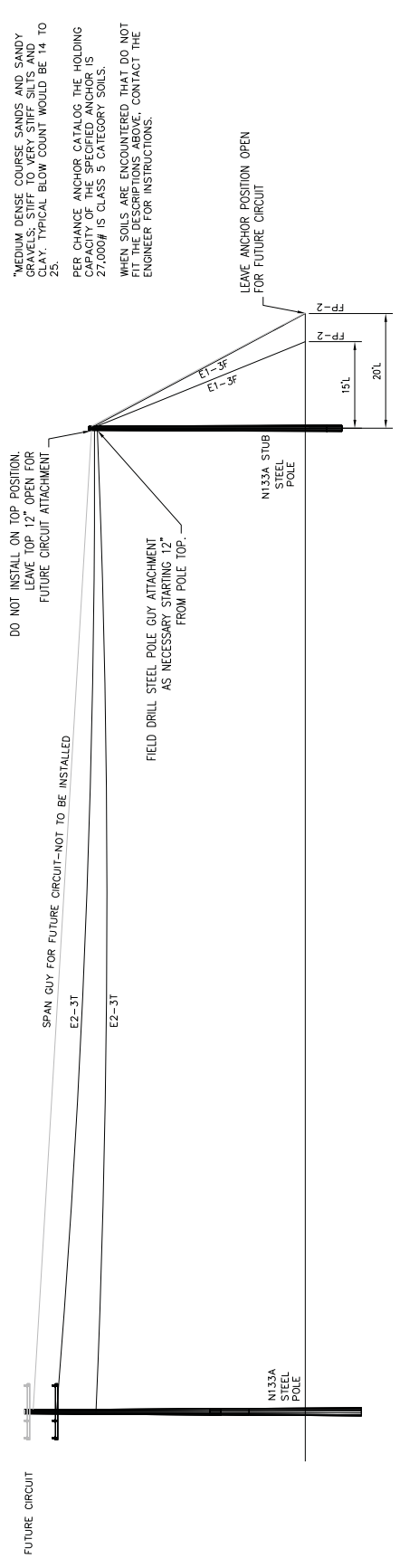


DATE	SCALE	DRAWING NO.	REV.
		KYMMU41A222	

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
SECTION 2  
GUY DETAILS



NOTE:  
1. ANCHORS ARE SPECIFIED FOR CLASS 5 SOIL CONDITIONS AS DESCRIBED BELOW:  
"MEDIUM DENSE COURSE SANDS AND SANDY GRAVELS; STIFF TO VERY STIFF SILTS AND CLAY. TYPICAL BLOW COUNT WOULD BE 14 TO 25."  
PER CHANCE ANCHOR CATALOG THE HOLDING CAPACITY OF THE SPECIFIED ANCHOR IS 27,000# IS CLASS 5 CATEGORY SOILS.  
WHEN SOILS ARE ENCOUNTERED THAT DO NOT FIT THE DESCRIPTIONS ABOVE, CONTACT THE ENGINEER FOR INSTRUCTIONS.



FOR BIDDING ONLY

200-000-002

DATE	11-30-17
DESIGNED BY	
DRAWN BY	
ISSUED FOR	REVISION

MADISONVILLE MUNICIPAL UTILITIES  
SR 41A PROJECT  
SECTION 2  
STEEL POLE FRAMING



DATE  
SCALE  
DRAWING NO.  
KYMIMU41A2270

SECTION 2			COMMENTS
STRUCTURE NO.	POLE HT/CL	FRAMING	
N82	70-H5	2C7C-BA	
N83	65-H5	2C7C-BA	
N83-1	55-H2	2C2-2CL	A5-2
N84	55-H3	C2-2CL/C8C	GOAB
N85	55-H2	2C2-2CL	C7C/A5-2
N86	55-H2	2C2-2CL	A5-2
N87	55-H3	2C2-2CL	
N88	55-H3	2C2-2CL	
N89	60-H3	2C2-2CL	C2-2CL FOR CROSSING LINE
N90	NOT USED	NOT USED	
N91	65-H4	2C7C-BA	
N92	65-H4	2C7C-BA	
N93	50-H2	2C8C	
N129A	55-H1	C8C	BOTTOM CIRCUIT, SPAN GUY
N129	60-H3	C2-2CL	BOTTOM CIRCUIT, STUB POLE
N130	65-H4	C2-2CL	BOTTOM CIRCUIT, 7' SPACING, (2)A5-2
N131	55-H3	C2-2CL	BOTTOM CIRCUIT, 7' SPACING
N132	55-H3	C8C	BOTTOM CIRCUIT
N133A	60-H2	C2-2CL	BOTTOM CIRCUIT, A5-2, RISER
N133A-S	45-H1	C2-2CL	BOTTOM CIRCUIT, SPAN GUYS
N133	60-H3	C2-2CL	BOTTOM CIRCUIT, STUB POLE
N134	60-H11	C8C	BOTTOM CIRCUIT
N135	50AB	C8C	BOTTOM CIRCUIT, C7C, SPAN GUY
N136	60-H5	C8C	BOTTOM CIRCUIT, ANCHOR BOLT FOUNDATION
N136-1	60-H4	C2-2CL	BOTTOM CIRCUIT, GOAB
N137	60-H11	C8C	BOTTOM CIRCUIT, C7C

FOR BIDDING ONLY

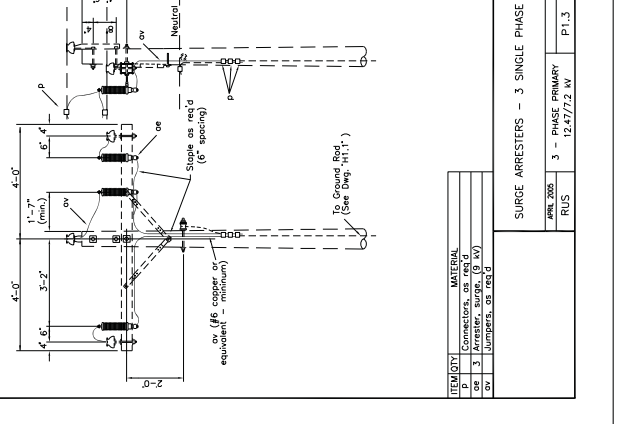
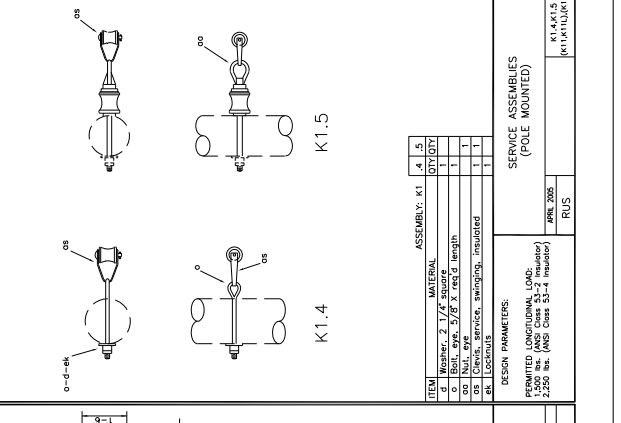
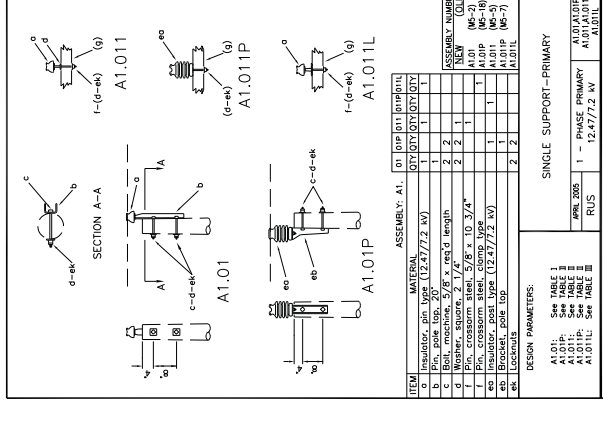
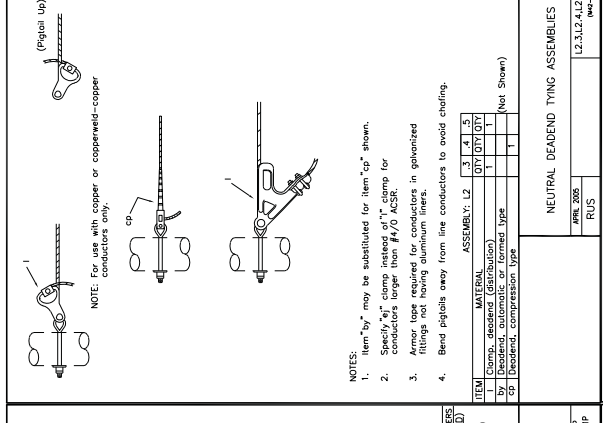
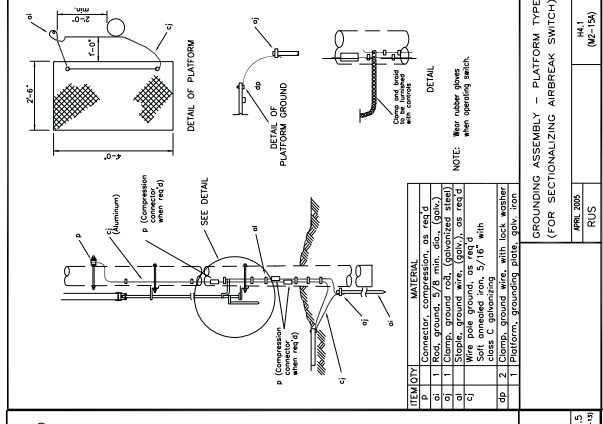
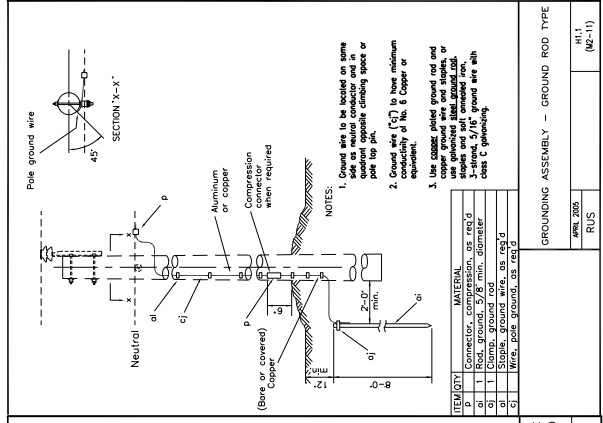
ISSUED FOR BIDS  
Drawn By: \_\_\_\_\_  
Checked By: \_\_\_\_\_  
Designed By: \_\_\_\_\_  
11-30-17

REVISION  
DATE  
BY

MADISONVILLE MUNICIPAL UTILITIES  
MADISONVILLE, KENTUCKY  
SR 41A PROJECT  
SINGLE PHASE AND EQUIPMENT  
WOOD POLE AND MISC ASSEMBLIES

paterson & dewar  
ENGINEERS  
850 CENTER WAY, INDIANOS, GEORGIA 30077  
(770) 453-1410 | pd@pdengineers.com

DATE  
SCALE  
DRAWING NO.  
KYM10412240



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