



COMMONWEALTH OF KENTUCKY
TRANSPORTATION CABINET

www.transportation.ky.gov/

Andy Beshear
GOVERNOR

Jim Gray
SECRETARY

April 19, 2022

CALL NO. 100
CONTRACT ID NO. 221022
ADDENDUM # 2

Subject: Wolfe County, NHPP 0061(066)
Letting April 28, 2022

- (1) Revised - Special Note - Pages 17-19 of 371
- (2) Added - Special Notes - Pages 36(a)-36(c) of 371
- (3) Omit - Pages 73-77 of 371
- (4) Revised - Proposal Bid Items - Pages 200-211 of 371
- (5) Added - Special Note - Pages 1-11 of 11
- (6) Revised - Plan Sheets - R2G, R2J, R2L, R2M, and R323

Proposal revisions are available at <http://transportation.ky.gov/Construction-Procurement/>.

If you have any questions, please contact us at 502-564-3500.

Sincerely,

Rachel Mills,

A handwritten signature in black ink that reads "Rachel Mills".

Rachel Mills, P.E.
Director
Division of Construction Procurement

RM:mr
Enclosures

SPECIAL NOTE FOR EXCESS MATERIAL SITES

WOLFE COUNTY MOUNTAIN PARKWAY EXPANSION ITEM 10-168.00

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

PART A: PERMITTED SITES

The Kentucky Transportation Cabinet (KYTC) has identified ten (10) excess material sites, acquired temporary easements or fee simple deed for these sites through the right-of-way process, and has completed all environmental clearances for each. Environmental clearances include but are not limited to historic, archaeological, biological assessments for development of National Environmental Policy Act (NEPA) documentation and Section 404 & Section 401 permits from the U.S. Army Corps of Engineers and the Kentucky Division of Water, respectively. Mitigation efforts have been committed to obtain these clearances, including payment for mitigation of stream impacts, and payment for loss of endangered bat tree habitat. These sites were acquired and permitted for the contractor to use for this KYTC project 10-168.00. The Contractor shall notify KYTC prior to the use of any of these sites and follow all environmental commitments for these sites, as described in the permits.

The location and size of the excess material sites are illustrated in the construction plans and numbered in the Right-of-Way plans on sheets R103-R129.

PART B: NON-PERMITTED SITES

The KYTC will allow up to two (2) modifications to the existing Section 404 and 401 permits for additions or modifications to the excess material sites.

No additional contract time or payment will be allowed for this process, which includes approval from all regulatory agencies. All associated cost for modification to existing permits or sites, or addition of new sites, will be the responsibility of the contractor, including any mitigation fees for tree clearing or stream impacts determined to be necessary. The fees and the method of payment will be determined through the permitting process, and discussed through coordination between the Contractor, KYTC District-10, and KYTC Division of Environmental Analysis (DEA).

If the Contractor chooses to modify any of the ten (10) already-permitted sites, i.e., expand the areas of the sites, use additional sites, or use different sites, it is the Contractor's responsibility to obtain all environmental approvals for such modifications or additions, including any haul roads to access them. Such environmental approvals must be completed by KYTC-prequalified firms and shall include historic, archeological, biological assessments, Section 404 and 401 permits, and any commitments and mitigation the approvals by the regulatory agencies require, such as seasonal restriction(s), or payments for tree clearing or stream impacts. Regulatory agency approvals shall include but not be limited to the KY State Historic Preservation Officer (SHPO), U.S. Fish & Wildlife Service (USFWS), Kentucky Division of Water (KDOW), and U.S. Army Corps of Engineers (USACE). Prior to initiating this effort the Contractor shall coordinate with the KYTC DEA and District-10 to develop a scope of work and schedule.

In addition, the contractor is responsible for securing agreements in writing to place excess material at the site from the property owner(s), agreements from any other governmental agencies (County roads, etc.), compliance with any local ordinances, and coordination with any utility companies and the relocation of utilities aboveground or below. The KYTC is not responsible for damages or repairs to sites or accesses to sites located outside of state right-of-way or easements obtained for this project.

PART C: INFORMATION FOR ALL PERMITTED / UNPERMITTED SITES

At the pre-construction meeting the contractor shall notify the KYTC on the waste site(s) that will be used during construction. The contractor must notify the KYTC prior to tree clearing in the excess material sites. No tree clearing will be permitted between June 1 and July 31 for the road project or any excess material sites, permitted or unpermitted.

It is the contractor's responsibility to review the Sections 401 & 404 permits and maintain compliance with the 401 & 404 permits throughout the duration of the project. Prior to any disturbance, the Contractor shall contact the District Office if there are questions related to required environmental document(s), including the permits and impacts to "Waters of the United States."

Payment will be allowed for all erosion control and the temporary and permanent seeding and protection for both the permitted and any non-permitted excess material sites.

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

Any communication made by the contractor with regulatory agencies shall copy Dave Harmon dave.harmon@ky.gov and Aric Skaggs aric.skaggs@ky.gov.

SPECIAL NOTE FOR CULVERT PIPE REHABILITATION

WITH HDPE PIPE

1. Description. Perform all work in accordance with the Department's Standard Specifications, Supplemental Specifications, current edition, and any applicable Special Provisions, and applicable Standard and Septa Drawings, except as hereafter specified. Furnish all materials, labor, equipment, and incidentals for installing and grouting necessary to rehabilitate existing culvert pipe by slip lining an existing culvert pipe with high density polyethylene (HDPE) pipe. The pipes shall be sizes, types, design and dimensions shown on the summary and shall include all connections, joints and other appurtenances as required to complete the work. The slip lining process will require the contractor to completely grout the annular void between the host and liner pipe. The grout and grouting process shall be considered incidental to this item.

2. Materials. Unless otherwise specified on the plans or herein, culvert pipe renewal shall conform to the following:

A. Liner Material - High Density Polyethylene (HDPE) Pipe

1. High density polyethylene pipe and fittings shall meet the requirements in the AASHTO M326-08 and ASTM F894 Specifications. Contractors must furnish a certificate of compliance at bid time from the pipe manufacturer that the liner pipe to be installed has been tested by a certified 3rd party laboratory and meets all AASHTO M326 requirements. The certification must list the laboratory and contact person with phone number.

B. Designation of Type.

1. The HDPE pipes used for liners in gravity flow culverts shall be solid wall construction with mechanical end connectors, male and female.

C. Pipe joints shall comply with ASTM D3212 Standard Specification for Joint tightness.

D. Hydraulic flow characteristics for the liner pipe shall provide a Manning's coefficient of $n = 0.00914$.

E. Grouting Material. Contractor shall utilize material specifications for solidification of the annular void between host and the inserted liner with low density flowable fill or cellular grout. The grouting material shall have a density of not less than 40 lbs per cubic foot nor greater than 125 lbs per cubic foot.

3. Cleaning. The existing culvert pipe shall be cleaned by whatever means necessary to remove all obstructions which may be encountered that would prevent insertion of the pipe liner into the host pipe as approved by the engineer. This work will not be paid for directly, but shall be considered incidental to this item.

4. Construction.

A. Site Preparation. Be responsible for all site preparation. This item will include, but is not limited to, incidental excavation and backfilling; removal of all obstructions or any other items; disposal of materials; sweeping and removal of debris; shoulder preparation and restoration, temporary and permanent erosion and pollution control; and all incidentals. Site preparation will be only as approved or directed by the Engineer. Other than the bid items listed, no direct payment will be made for site preparation, but will be incidental to the other items of work.

B. Liner Pipe. Liner pipe shall be inserted and installed in accordance with manufacturer's recommendations. Slip liner pipe grade shall be maintained parallel to grade of host pipe.

C. Grouting. Upon completion or partial completion of the slip lining process grouting will be required to be placed in the annular void between the insertion pipe and the host pipe. Cellular grout with a density between 40 and 125 lbs per cubic foot shall be used.

A detailed plan on holding the liner pipe on the invert of the host pipe shall be submitted to the engineer for approval.

The annular void shall be completely grout filled without deflecting the insertion pipe greater than 1.5 percent.

The contractor shall provide bulkheads at the open points of each run of pipe to be grouted.

The annular void shall be grouted solid by injecting grout from one end of the pipe run and allowing it to flow toward the other end. Venting of the annular void shall be performed to assure uniform filling of the void space during the grouting process. An open ended, high point tap or equivalent vent must be provided and monitored at the bulkhead opposite to the point of grouting.

Pressure on the annular void shall not exceed 2 PSI to avoid damage to the liner pipe. Regardless of the pressure, the contractor shall be

solely responsible for any damage or distortion to the insertion pipe due to the grouting process.

D. Pipe Stockpiling and Handling. Pipe and fittings shall be stockpiled in a safe manner at each contractor staging area or pit location. The stockpiling shall be arranged to cause a minimum of interference to pedestrian and stored outside the safety clear zone of vehicular traffic. When handling slip lining pipe, the contractor shall take all precautions necessary to avoid damaging the pipe. No liner pipe shall be permitted to drag across the ground. All liner pipe must be fully supported or carried above the ground while being moved until inserted into the host culvert. Pipe with deep cuts, scratches, or gouges shall be rejected or replaced at the entire expense of the contractor. If pipe is found to have developed an irregular shape that will not allow pipe joining or insertion without the use of outside forces to bring pipe to round shape, it shall be rejected and replaced at the entire expense of the contractor. An irregularly shaped pipe that would necessitate the use of undue force that could cause damage to the pipe or the joints shall be rejected and replaced at the entire expense of the contractor.

5. Clean-up and Restoration. Upon acceptance of the installation work and testing, the contractor shall clean-up and restore the project area affected by operations as approved by the Engineer.

6. Measurement. This item shall be measured by the foot. Such measurement shall be made along the flow line of the liner pipe complete in place.

The accepted quantities of pipe liner will be paid for at the contract unit price per linear foot for the size of the existing pipe in which the liner is installed, complete in place.

7. Payment. The Department will pay for HDPE Pipe Liner at the linear foot price. Payment is full compensation for cleaning existing pipe; for furnishing, hauling, installing liner pipe and placing grout, all connections and for all labor, tools equipment, materials, clean-up and incidentals.

Code	Pay Item	Pay Unit
24683EC	HDPE PIPE LINER (XX INCH)	LF

SPECIAL NOTE FOR CONCRETE PATCHING REPAIR

These Notes or designated portions thereof, apply where so indicated on the plans, proposals or bidding instruction.

1. DESCRIPTION: Perform all work in accordance with the Department's 2012 Standard Specifications, and applicable Supplemental Specifications, the attached sketches, and these Notes. Section references are to the Standard Specifications.

This work consists of: (1) Furnish all labor, materials, tools, and equipment; (2) Remove existing spalled/delaminated concrete; (3) Prepare the existing surface for concrete patching; (4) Place hook fasteners and welded wire fabric over surfaces to be repaired (where applicable); (5) Apply concrete patching as specified by this note and as shown on the attached detail drawings; (6) Finish and cure the new Concrete Patches; (7) Maintain & control traffic; and, (8) Any other work specified as part of this contract.

2. MATERIALS.

- A. Class "M" Concrete. Use either "M1" or "M2". See Section 601.
- B. Steel Reinforcement. Use Grade 60. See Section 602
- C. Welded Steel Wire Fabric (WWF). Conform to Section 811
- D. Hook Fasteners. Use commercial grade galvanized hook fasteners. Minimum 3/16" diameter.

3. CONSTRUCTION.

- A. Concrete Removal and Preparation. The Contractor, as directed by the Engineer shall locate and remove all loose, spalled, deteriorated and delaminated concrete. Sounding shall be used to locate delaminated areas. Care shall be exercised not to damage areas of sound concrete or reinforcing steel during concrete removal operations. Concrete removal shall be in accordance with a sequence approved by the Engineer.

Concrete removal shall be accomplished by chipping with hand picks, chisels or light duty pneumatic or electric chipping hammers (not to exceed 15 lbs.). Remove all deteriorated loose concrete to a minimum depth of 4". When reinforcing steel is exposed, concrete removal shall continue until there is a minimum 3/4 inch clearance around the exposed reinforcing bar. Care shall be taken to not damage bond to adjacent non-exposed reinforcing steel during concrete removal

processes. Unless specifically directed by the Engineer, depth of removal shall not exceed 6 inches.

The perimeter of all areas where concrete is removed shall be lapped at an approximately 45° angle, except that the outer edges of all chipped areas shall be saw cut to minimum depth of 1 inch to prevent feathering unless otherwise approved by the Engineer. After all deteriorated concrete has been removed, the repair surface to receive concrete patching shall be prepared by abrasive blast cleaning. Abrasive blast cleaning shall remove all fractured surface concrete and all traces of any unsound material or contaminants such as oil, grease, dirt, slurry, or any materials which could interfere with the bond of freshly placed concrete.

The Contractor shall dispose all removed material off State Right Of Way in an approved site.

- B. Steel Reinforcement. All corroded reinforcing steel exposed during concrete removal shall have corrosion products removed by abrasive grit blasting or wire brush whichever is more appropriate. Furnish for replacement, as directed by the Engineer, additional linear feet of steel reinforcing bars 1/2" diameter by 20-foot lengths. Place these bars in areas deemed by the Engineer to require additional reinforcement. Field cutting and bending is permitted. Deliver unused bars to the nearest County Maintenance Barn. Payment will be made in accordance with Section 602.

Reinforcing steel displaying deep pitting or loss of more than 20 percent of cross-sectional area shall be removed and replaced. Such bars shall be placed in accordance with the recommendations of ACI 506R, Sections 5.4 and 5.5. In particular, bars shall not be bundled in lapped splices, but shall be placed such that the minimum spacing around each bar is three times the maximum aggregate size to allow for proper encapsulation with concrete patching.

Intersecting reinforcing bars shall be lightly secured to each other using tie wire and adequately supported to minimize movement during concrete placement. Welded wire fabric (WWF) shall be provided when shown on the attached sketches and at each repair area larger than 1 square foot if the depth of the repair exceeds 3 inches from the original dimension of the repaired member. Sheets of adjoining WWF shall be lapped by at least one and one-half spaces at all intersections, in both directions, and be securely fastened. WWF fabric shall be supported no closer than 1/2 inch to the prepared concrete surface and shall have a minimum concrete cover of 1.5 inches.

WWF shall be fastened to preset anchors on a grid not more than 12 inches square. Large knots of tie wire which could result in sand pockets and voids during patching shall be avoided.

- C. Hook Fasteners. Hook fasteners shall be positioned at the spacing as stated above or as directed by the Engineer. Any given area shall have a minimum of four anchors. The WWF shall not move or deform excessively during concrete patching. Maximum hook fastener spacing shall not exceed 2 feet on a grid pattern over the entire repair area.

Hook fasteners shall be of commercial grade galvanized steel with a minimum diameter of 3/16". They may be mechanically set or grouted, as approved by the Engineer. The Department will randomly select hook fasteners to be tested to verify pullout force is sufficient. If any anchors fail to meet the minimum acceptable pullout value, corrective measures shall be taken by the Contractor and further testing will be conducted.

- D. Class M Concrete. Place and finish the new concrete for the patching area as shown on the attached detail drawings, or as directed by the Engineer. The Engineer shall approve the Contractor's method of placing and consolidating the concrete prior to the beginning of this operation.

- E. On completion of finishing operation, patching concrete shall immediately be prevented from drying out and cracking by fogging, wetting, and/or any appropriate method approved by the Engineer. See Section 501.03.15.

Each Contractor submitting a bid for this work shall make a thorough inspection of the site prior to submitting his bid and shall thoroughly familiarize himself with existing conditions so that the work can be expeditiously performed after a contract is awarded. Submission of a bid will be considered evidence of this inspection having been made. Any claims resulting from site conditions will not be honored by the Department. Quantities given are approximate. The quantity for "Concrete Patching Repair" shall be bid with the contingency that quantities may be increased, decreased, or eliminated by the Engineer. Dispose of all removed material entirely away from the job site as approved by the Engineer. This work is incidental to the contract unit price for "Concrete Patching Repair".

4. MEASUREMENT

- A. Concrete Patching Repair. The Department will measure the quantity per square feet of each area restored. Double payment will not be made on both faces of corner repairs.

- C. ASTM-D638: Tensile Strength and Tensile Modulus
- D. ASTM-D790: Flexural Strength and Flexural Modulus
- E. ASTM-D792: Specific Gravity
- F. ASTM-D256: IZOD Impact

Steam monitoring methods and forming period shall be recommended by the liner manufacturer.

After forming the liner shall be cooled using compressed air or a mixture of compressed air and water. Cooling shall be deemed complete when the temperature of the exhaust air or air water mixture has remained constantly below 110°F for a minimum of 20 minutes.

- 5. Pipe Liner Trimming. After installation the ends of the PVC liner shall be cut off and the ends folded over the host pipe or pressed flush against the headwall.
- 6. Connecting pipes. The exact number and location of pipe connections shall be determined from the pre-lining inspection. It shall be the Contractor's responsibility to accurately locate all existing pipe connections. The Contractor shall reconnect all pipe connections to the pipe liner.

All existing service connections shall be reinstated by remotely controlled robotic device or other methods approved by the Engineer.

Pipe reconections shall be smooth and circular in nature. The opening shall be smooth and conform to the inside shape and size of the original connection. Trial cuts should be repaired per the pipe liner manufacturer's recommendations not be at no cost to the Department.

- C. DEFECT REPAIR OR REPLACEMENT.
Any defects, which in the judgment of the Department and the pipe liner manufacturer that will affect the integrity or strength of the liner, shall be repaired or the pipe liner replaced at the Contractor's expense per the pipe liner manufacturers recommendations. All repairs or replacement of defective work shall be completed to the full satisfaction of the Department.

- D. PAYMENT.
Payment for the work included in this section will be paid by the linear foot of pipe lined. Work incidental to the lining process such as, by-pass pumping, traffic control, pipe preparation, and other activities necessary to line the pipe shall not be paid for directly but shall be considered incidental.

- C. ASTM-D638: Tensile Strength and Tensile Modulus
- D. ASTM-D790: Flexural Strength and Flexural Modulus
- E. ASTM-D792: Specific Gravity
- F. ASTM-D256: IZOD Impact

3. CONSTRUCTION

A. PRE-INSTALLATION Host Pipe Preparation.

The host pipe shall be inspected and cleaned prior to culvert lining. Any cleaning or clearing of pipes shall be included in the item "Ditching and Shouldering" or "Clean Pipe Structure". Prior to inserting the PVC liner, each pipe should be inspected to verify any connecting pipes and also to determine if additional work will be needed to prepare the host pipe for the PVC liner. Any work necessary to prepare the host pipe shall be incidental to PVC pipe liners.

B. LINER INSTALLATION.

1. Pre-Heating. Prior to insertion of the liner into the host pipe the Contractor shall pre-heat the liner in the manner prescribed by the manufacturer's installation instructions. The heated liner must be pliable enough to be pulled into the host pipe with as little resistance as possible.
2. Pipe Liner Insertion. The liner pipe shall be inserted into the culvert through existing catch basins or culvert inlet or outlets. Insertion of the liner into the host pipe will be accomplished by pulling the liner into the host pipe according to the manufacturer's recommendations.
3. Stress Relief. After the liner has been inserted into the host pipe, the Contractor shall relieve any stress imparted to the liner during the insertion in a manner prescribed in the manufacturer's installation instructions.
4. Processing. The Contractor shall supply suitable heat source equipment. The equipment shall be capable of delivering steam through the lining section to uniformly raise the temperature of the PVC material to effect forming of the liner pipe.

Suitable monitors shall be installed to gauge steam temperatures and temperatures at the input and exhaust ends of the liner.

- B. Steel Reinforcement. See Section 602.
- C. Welded Wire Fabric & Hook Fasteners. Welded Wire Fabric and Hook Fasteners will not be measured for payment, but shall be considered incidental to "Concrete Patching Repair".

5. PAYMENT

- A. Concrete Patching Repair. Payment at the contract unit price per square feet is full compensation for the following: (1) Furnish all labor, materials, tools, equipment; (2) preparation of specified areas including removing and disposing of specified existing materials; (3) place, finish, and cure new concrete patches; and (4) all incidentals necessary to complete the work as specified by this note and as shown on the attached detail drawings.

- B. Steel Reinforcement. See Section 602.

The Department will consider payment as full compensation for all work required by these notes and detail drawings.

SPECIAL NOTE FOR FOLD AND FORM PVC PIPE LINERS
PIPE REHABILITATION BY THERMOFORMED (FOLD AND FORM) PIPE METHOD

1. DESCRIPTION OF WORK. The work specified under this section provides for the rehabilitation of an existing culvert pipe using PVC Fold and Form trenchless technology. The process consists of installing a thermofomed PVC pipe liner inside an existing culvert (Host Pipe) from inlet to outlet as described in the following sections. When installed the liner will be a seamless, joint-less, solid wall PVC pipe liner that tightly conformed to the interior contours of the original host pipe. The liner shall be continuous from inlet to outlet with no seams or joints. In most cases required service connections will be reconnected using closed circuit television and remotely controlled cutters.

2. REFERENCED DOCUMENTS. This specification references ASTM standards and other related standards, which are made a part hereof by reference and shall be the latest edition thereof.

- A. ASTM-F1504
- B. ASTM-E831: Coefficient of Linear Thermal Expansion

PROPOSAL BID ITEMS

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Section: 0001 - PAVING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0010	00003		CRUSHED STONE BASE	236,332.00	TON		\$	
0020	00020		TRAFFIC BOUND BASE	180.00	TON		\$	
0030	00100		ASPHALT SEAL AGGREGATE	2,277.00	TON		\$	
0040	00103		ASPHALT SEAL COAT	273.00	TON		\$	
0050	00190		LEVELING & WEDGING PG64-22	22,941.00	TON		\$	
0060	00212		CL2 ASPH BASE 1.00D PG64-22	34,385.00	TON		\$	
0070	00214		CL3 ASPH BASE 1.00D PG64-22	128,804.00	TON		\$	
0080	00301		CL2 ASPH SURF 0.38D PG64-22	15,946.00	TON		\$	
0090	00356		ASPHALT MATERIAL FOR TACK	494.00	TON		\$	
0100	00388		CL3 ASPH SURF 0.38B PG64-22	28,173.00	TON		\$	
0110	02081		JPC PAVEMENT-8 IN SHLD	58.00	SQYD		\$	
0120	02602		FABRIC-GEOTEXTILE CLASS 1	643,357.00	SQYD		\$	
0130	02676		MOBILIZATION FOR MILL & TEXT	1.00	LS		\$	
0140	02677		ASPHALT PAVE MILLING & TEXTURING	16,909.00	TON		\$	
0150	20071EC		JOINT ADHESIVE	362,525.00	LF		\$	

Section: 0002 - ROADWAY

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0160	00021		DRAINAGE BLANKET-EMBANKMENT	1,000.00	CUYD		\$	
0170	00078		CRUSHED AGGREGATE SIZE NO 2	95.00	TON		\$	
0180	01000		PERFORATED PIPE-4 IN	3,830.00	LF		\$	
0190	01002		PERFORATED PIPE-8 IN	2,584.00	LF		\$	
0200	01010		NON-PERFORATED PIPE-4 IN	2,764.00	LF		\$	
0210	01012		NON-PERFORATED PIPE-8 IN	296.00	LF		\$	
0220	01020		PERF PIPE HEADWALL TY 1-4 IN	9.00	EACH		\$	
0230	01022		PERF PIPE HEADWALL TY 1-8 IN	34.00	EACH		\$	
0240	01024		PERF PIPE HEADWALL TY 2-4 IN	4.00	EACH		\$	
0250	01028		PERF PIPE HEADWALL TY 3-4 IN	35.00	EACH		\$	
0260	01032		PERF PIPE HEADWALL TY 4-4 IN	10.00	EACH		\$	
0270	01034		PERF PIPE HEADWALL TY 4-8 IN	10.00	EACH		\$	
0280	01310		REMOVE PIPE	987.00	LF		\$	
0290	01314		PLUG PIPE	3.00	EACH		\$	
0300	01718		REMOVE INLET	11.00	EACH		\$	
0310	01740		CORED HOLE DRAINAGE BOX CON-4 IN	2.00	EACH		\$	
0320	01825		ISLAND CURB AND GUTTER	331.00	LF		\$	
0330	01891		ISLAND HEADER CURB TYPE 2	321.00	LF		\$	
0340	01982		DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL WHITE	813.00	EACH		\$	
0350	01983		DELINEATOR FOR GUARDRAIL MONO DIRECTIONAL YELLOW	75.00	EACH		\$	
0360	01986		DELINEATOR FOR BARRIER WALL-B/Y	2.00	EACH		\$	
0370	01987		DELINEATOR FOR GUARDRAIL BI DIRECTIONAL WHITE	48.00	EACH		\$	
0380	01990		DELINEATOR FOR BARRIER WALL-B/W	109.00	EACH		\$	
0390	02003		RELOCATE TEMP CONC BARRIER	8,500.00	LF		\$	
0400	02014		BARRICADE-TYPE III	14.00	EACH		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0410	02091		REMOVE PAVEMENT	4,570.00	SQYD		\$	
0420	02159		TEMP DITCH	36,186.00	LF		\$	
0430	02160		CLEAN TEMP DITCH	18,093.00	LF		\$	
0440	02165		REMOVE PAVED DITCH	72.00	SQYD		\$	
0450	02200		ROADWAY EXCAVATION	5,427,914.00	CUYD		\$	
0460	02223		GRANULAR EMBANKMENT	788.00	CUYD		\$	
0470	02242		WATER	500.00	MGAL		\$	
0480	02262		FENCE-WOVEN WIRE TYPE 1	116,326.00	LF		\$	
0490	02351		GUARDRAIL-STEEL W BEAM-S FACE	64,237.00	LF		\$	
0500	02352		GUARDRAIL-STEEL W BEAM-D FACE	1,375.00	LF		\$	
0510	02360		GUARDRAIL TERMINAL SECTION NO 1	18.00	EACH		\$	
0520	02363		GUARDRAIL CONNECTOR TO BRIDGE END TY A	25.00	EACH		\$	
0530	02365		CRASH CUSHION TYPE IX-A	10.00	EACH		\$	
0540	02367		GUARDRAIL END TREATMENT TYPE 1	29.00	EACH		\$	
0550	02369		GUARDRAIL END TREATMENT TYPE 2A	41.00	EACH		\$	
0560	02371		GUARDRAIL END TREATMENT TYPE 7	12.00	EACH		\$	
0570	02381		REMOVE GUARDRAIL	94,643.00	LF		\$	
0580	02387		GUARDRAIL CONNECTOR TO BRIDGE END TY A-1	20.00	EACH		\$	
0590	02391		GUARDRAIL END TREATMENT TYPE 4A	3.00	EACH		\$	
0600	02397		TEMP GUARDRAIL	1,981.00	LF		\$	
0610	02429		RIGHT-OF-WAY MONUMENT TYPE 1	266.00	EACH		\$	
0620	02432		WITNESS POST	9.00	EACH		\$	
0630	02475		PLUG WATER WELL	3.00	EACH		\$	
0640	02545		CLEARING AND GRUBBING 674.5 ACRES	1.00	LS		\$	
0650	02562		TEMPORARY SIGNS	4,862.00	SQFT		\$	
0660	02585		EDGE KEY	230.00	LF		\$	
0670	02607		FABRIC-GEOTEXTILE CLASS 2 FOR PIPE	11,935.00	SQYD	\$2.00	\$	\$23,870.00
0680	02625		REMOVE HEADWALL	123.00	EACH		\$	
0690	02650		MAINTAIN & CONTROL TRAFFIC DIVERSIONS (BY-PASS DETOURS)	1.00	LS		\$	
0700	02651		KY-1010	1.00	LS		\$	
0710	02651		DIVERSIONS (BY-PASS DETOURS) KY-2491	1.00	LS		\$	
0720	02671		PORTABLE CHANGEABLE MESSAGE SIGN	6.00	EACH		\$	
0730	02690		SAFELoading	315.00	CUYD		\$	
0740	02692		SETTLEMENT PLATFORM	10.00	EACH		\$	
0750	02701		TEMP SILT FENCE	36,186.00	LF		\$	
0760	02703		SILT TRAP TYPE A	675.00	EACH		\$	
0770	02704		SILT TRAP TYPE B	675.00	EACH		\$	
0780	02705		SILT TRAP TYPE C	675.00	EACH		\$	
0790	02706		CLEAN SILT TRAP TYPE A	675.00	EACH		\$	
0800	02707		CLEAN SILT TRAP TYPE B	675.00	EACH		\$	
0810	02708		CLEAN SILT TRAP TYPE C	675.00	EACH		\$	
0820	02726		STAKING	1.00	LS		\$	
0830	02731		REMOVE STRUCTURE KY 1010 STA. 50+00 - KY 1010 BRIDGE OVER KY 9009	1.00	LS		\$	
0840	02731		REMOVE STRUCTURE KY 3034 STA. 48+70 - REMOVE ARCH	1.00	LS		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
0850	02731		REMOVE STRUCTURE STA. 129+40.35 - KY 9009 BRIDGE OVER KY 191	1.00	LS		\$	
0860	02731		REMOVE STRUCTURE STA. 133+62.64 - DBL. 10' X 6' RCBC (PARTIAL)	1.00	LS		\$	
0870	02731		REMOVE STRUCTURE STA. 143+46 - REMOVE BARN	1.00	LS		\$	
0880	02731		REMOVE STRUCTURE STA. 159+02.55 - 4' X 4' RCBC(PARTIAL)	1.00	LS		\$	
0890	02731		REMOVE STRUCTURE STA. 223+32 - 5' X 5' RCBC(PARTIAL)	1.00	LS		\$	
0900	02731		REMOVE STRUCTURE STA. 223+32 - 5' X 5' RCBC(UNDER SERVICE ROAD)	1.00	LS		\$	
0910	02731		REMOVE STRUCTURE STA. 252+53 - KY 9009 OVER KY 2491	1.00	LS		\$	
0920	02731		REMOVE STRUCTURE STA. 305+23 - DBL. 14'X8' RCBC (PARTIAL)	1.00	LS		\$	
0930	02731		REMOVE STRUCTURE STA. 311+20 - KY 9009 OVER KY 1812	1.00	LS		\$	
0940	02731		REMOVE STRUCTURE STA. 361+79 - 8' X 8' RCBC(PARTIAL)	1.00	LS		\$	
0950	02731		REMOVE STRUCTURE STA. 382+31 - 5' X 4' RCBC(PARTIAL)	1.00	LS		\$	
0960	02731		REMOVE STRUCTURE STA. 385+36 - KY 9009 WAGON BOX OVER KY 3034	1.00	LS		\$	
0970	02731		REMOVE STRUCTURE STA. 400+90 - REMOVE BARN	1.00	LS		\$	
0980	02731		REMOVE STRUCTURE STA. 575+51 - 6' X 4' RCBC(PARTIAL)	1.00	LS		\$	
0990	02731		REMOVE STRUCTURE STA. 592+98 - 8' X 5' RCBC(PARTIAL)	1.00	LS		\$	
1000	02731		REMOVE STRUCTURE STA. 599+49 - DBL. 12' X 8' RCBC(PARTIAL)	1.00	LS		\$	
1010	02731		REMOVE STRUCTURE STA. 613+46 - KY 9009 BRIDGE OVER KY 1419	1.00	LS		\$	
1020	02731		REMOVE STRUCTURE STA. 620+41 - 5' X 4' RCBC(PARTIAL)	1.00	LS		\$	
1030	02775		ARROW PANEL	6.00	EACH		\$	
1040	02898		RELOCATE CRASH CUSHION	6.00	EACH		\$	
1050	02929		CRASH CUSHION TYPE IX	2.00	EACH		\$	
1060	03000		PRECAST CONC BOX SECT 7X4- KY-3034 STA. 48+70.04	36.00	LF		\$	
1070	03171		CONCRETE BARRIER WALL TYPE 9T	4,330.00	LF		\$	
1080	03340		STEEL PIPE-2 1/2 IN	132.00	LF		\$	
1090	03343		STEEL PIPE-4 IN	132.00	LF		\$	
1100	05950		EROSION CONTROL BLANKET	23,871.00	SQYD		\$	
1110	05952		TEMP MULCH	2,178,001.00	SQYD		\$	
1120	05953		TEMP SEEDING AND PROTECTION	1,633,500.00	SQYD		\$	
1130	05963		INITIAL FERTILIZER	101.00	TON		\$	
1140	05964		MAINTENANCE FERTILIZER	61.00	TON		\$	
1150	05985		SEEDING AND PROTECTION	1,879,585.00	SQYD		\$	
1160	05989		SPECIAL SEEDING CROWN VETCH	83,474.00	SQYD		\$	

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1170	05992		AGRICULTURAL LIMESTONE	1,217.00	TON		\$	
1180	06510		PAVE STRIPING-TEMP PAINT-4 IN	15,000.00	LF		\$	
1190	06511		PAVE STRIPING-TEMP PAINT-6 IN	255,216.00	LF		\$	
1200	06514		PAVE STRIPING-PERM PAINT-4 IN WHITE	6,861.00	LF		\$	
1210	06514		PAVE STRIPING-PERM PAINT-4 IN YELLOW	6,975.00	LF		\$	
1220	06516		PAVE STRIPING-PERM PAINT-8 IN WHITE	88.00	LF		\$	
1230	06542		PAVE STRIPING-THERMO-6 IN W WHITE	151,501.00	LF		\$	
1240	06543		PAVE STRIPING-THERMO-6 IN Y YELLOW	124,432.00	LF		\$	
1250	06546		PAVE STRIPING-THERMO-12 IN W	7,273.00	LF		\$	
1260	06568		PAVE MARKING-THERMO STOP BAR-24IN	453.00	LF		\$	
1270	06572		PAVE MARKING-DOTTED LANE EXTEN	1,299.00	LF		\$	
1280	06592		PAVEMENT MARKER TYPE V-B W/R	1,605.00	EACH		\$	
1290	06593		PAVEMENT MARKER TYPE V-B Y/R	81.00	EACH		\$	
1300	08100		CONCRETE-CLASS A (REVISED 4-19-22)	25.00	CUYD		\$	
1310	08150		STEEL REINFORCEMENT	588.00	LB		\$	
1320	08900		CRASH CUSHION TY VI CLASS B TL2	4.00	EACH		\$	
1330	08902		CRASH CUSHION TY VI CLASS B TL3	1.00	EACH		\$	
1340	10020NS		FUEL ADJUSTMENT	1,797,964.00	DOLL	\$1.00	\$	\$1,797,964.00
1350	10030NS		ASPHALT ADJUSTMENT	900,181.00	DOLL	\$1.00	\$	\$900,181.00
1360	20210EP69		COHESIVE PILE CORE	1,448.00	CUYD		\$	
1370	20362ES403		SHOULDER RUMBLE STRIPS-SAWED	241,433.00	LF		\$	
1380	20411ED		LAW ENFORCEMENT OFFICER	2,000.00	HOUR		\$	
1390	20432ES112		REMOVE CRASH CUSHION	1.00	EACH		\$	
1400	20545ND		TEMP MEDIAN CROSSOVER	7.00	EACH		\$	
1410	20550ND		SAWCUT PAVEMENT	55,179.00	LF		\$	
1420	20667ED		PNEUMATIC BACKSTOWING	300.00	TON		\$	
1430	20738NS112		TEMP CRASH CUSHION	2.00	EACH		\$	
1440	21587EN		REINFORCED SOIL SLOPE	109.00	SQFT		\$	
1450	23086EN		CONCRETE MEDIAN BARRIER TY 9C	154.00	LF		\$	
1460	24457EC		REMOVE CONCRETE MEDIAN BARRIER END	1.00	EACH		\$	
1470	24814EC		PIPELINE INSPECTION	13,844.00	LF		\$	
1480	24845EC		UTILITY COORDINATION	1.00	LS		\$	
1490	25075EC		QUEUE PROTECTION VEHICLE	480.00	HOUR		\$	
1500	25117EC		FURNISH QUEUE PROTECTION VEHICLES	24.00	MONT		\$	
1510	26136EC		PORTABLE QUEUE WARNING ALERT SYSTEM	24.00	MONT		\$	
1520	26137EC		QUEUE WARNING PCMS	192.00	MONT		\$	
1530	26138EC		QUEUE WARNING PORTABLE RADAR SENSORS	192.00	MONT		\$	

Section: 0003 - DRAINAGE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1540	00441		ENTRANCE PIPE-18 IN	40.00	LF		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
1550	00443		ENTRANCE PIPE-24 IN	63.00	LF		\$	
1560	00462		CULVERT PIPE-18 IN	2,626.50	LF		\$	
1570	00464		CULVERT PIPE-24 IN	805.80	LF		\$	
1580	00466		CULVERT PIPE-30 IN	288.10	LF		\$	
1590	00468		CULVERT PIPE-36 IN	1,388.50	LF		\$	
1600	00469		CULVERT PIPE-42 IN	308.10	LF		\$	
1610	00470		CULVERT PIPE-48 IN	511.30	LF		\$	
1620	00471		CULVERT PIPE-54 IN	319.00	LF		\$	
1630	00472		CULVERT PIPE-60 IN	326.10	LF		\$	
1640	00522		STORM SEWER PIPE-18 IN	3,384.30	LF		\$	
1650	00524		STORM SEWER PIPE-24 IN	290.50	LF		\$	
1660	00526		STORM SEWER PIPE-30 IN	9.80	LF		\$	
1670	00530		STORM SEWER PIPE-48 IN	2,137.50	LF		\$	
1680	00531		STORM SEWER PIPE-54 IN	567.00	LF		\$	
1690	00532		STORM SEWER PIPE-60 IN	123.00	LF		\$	
1700	01204		PIPE CULVERT HEADWALL-18 IN	47.00	EACH		\$	
1710	01208		PIPE CULVERT HEADWALL-24 IN	14.00	EACH		\$	
1720	01210		PIPE CULVERT HEADWALL-30 IN	4.00	EACH		\$	
1730	01212		PIPE CULVERT HEADWALL-36 IN	18.00	EACH		\$	
1740	01214		PIPE CULVERT HEADWALL-42 IN	4.00	EACH		\$	
1750	01216		PIPE CULVERT HEADWALL-48 IN	7.00	EACH		\$	
1760	01220		PIPE CULVERT HEADWALL-60 IN	8.00	EACH		\$	
1770	01450		S & F BOX INLET-OUTLET-18 IN	8.00	EACH		\$	
1780	01451		S & F BOX INLET-OUTLET-24 IN	2.00	EACH		\$	
1790	01480		CURB BOX INLET TYPE B	26.00	EACH		\$	
1800	01505		DROP BOX INLET TYPE 5B	24.00	EACH		\$	
1810	01511		DROP BOX INLET TYPE 5D	1.00	EACH		\$	
1820	01517		DROP BOX INLET TYPE 5F	22.00	EACH		\$	
1830	01538		DROP BOX INLET TYPE 7	5.00	EACH		\$	
1840	01642		JUNCTION BOX-18 IN	2.00	EACH		\$	
1850	01653		JUNCTION BOX-SPECIAL (REVISED 4-19-22)	24.00	EACH		\$	
1860	01767		MANHOLE TYPE C	1.00	EACH		\$	
1870	02483		CHANNEL LINING CLASS II	79.00	TON		\$	
1880	02488		CHANNEL LINING CLASS IV	19,292.00	CUYD		\$	
1890	03262		CLEAN PIPE STRUCTURE	28.00	EACH		\$	
1900	05950		EROSION CONTROL BLANKET	23,871.00	SQYD		\$	
1910	20911ED		HIGH SLUMP 3000 PSI GROUT	87.00	CUYD		\$	
1920	22146EN		CONCRETE PATCHING REPAIR	1,463.00	SQFT		\$	
1930	23744EC		EPOXY INJECTION CRACK REPAIR	32.00	LF		\$	
1940	23864EC		CHANNEL LINING CLASS III-MOD	265.00	TON		\$	
1950	23911EC		GROUT	8.00	CUYD		\$	
1960	24026EC		PIPE CULVERT HEADWALL-54 IN	6.00	EACH		\$	
1970	24583EC		HDPE PIPE LINER 18 INCH	347.20	LF		\$	
1980	24583EC		HDPE PIPE LINER 24 INCH	796.50	LF		\$	
1990	24583EC		HDPE PIPE LINER 30 INCH	131.50	LF		\$	
2000	24583EC		HDPE PIPE LINER 36 INCH	676.60	LF		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2010	24862EC		PVC FOLD AND FORM PIPE LINER-18 IN	110.80	LF		\$	
2020	24864EC		PVC FOLD AND FORM PIPE LINER-30 IN	177.00	LF		\$	
2030	24865EC		PVC FOLD AND FORM PIPE LINER-36 IN	237.00	LF		\$	
2040	25073EC		CULVERT REPAIRS	1.00	LS		\$	

Section: 0004 - BRIDGE - 28291 - AT KY 191

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2050	02231		STRUCTURE GRANULAR BACKFILL	1,304.00	CUYD		\$	
2060	02604		FABRIC-GEOTEXTILE CLASS 1A	2,885.00	SQYD		\$	
2070	02998		MASONRY COATING	2,191.00	SQYD		\$	
2080	03299		ARMORED EDGE FOR CONCRETE	219.00	LF		\$	
2090	08001		STRUCTURE EXCAVATION-COMMON	428.00	CUYD		\$	
2100	08020		CRUSHED AGGREGATE SLOPE PROT	794.00	TON		\$	
2110	08033		TEST PILES	200.00	LF		\$	
2120	08039		PRE-DRILLING FOR PILES	202.00	LF		\$	
2130	08046		PILES-STEEL HP12X53	2,258.00	LF		\$	
2140	08094		PILE POINTS-12 IN	128.00	EACH		\$	
2150	08100		CONCRETE-CLASS A	410.00	CUYD		\$	
2160	08104		CONCRETE-CLASS AA	592.00	CUYD		\$	
2170	08150		STEEL REINFORCEMENT	87,006.00	LB		\$	
2180	08151		STEEL REINFORCEMENT-EPOXY COATED	147,852.00	LB		\$	
2190	08633		PRECAST PC I BEAM TYPE 3	1,769.00	LF		\$	
2200	24595EN		ELASTICIZED EPS 28291	200.00	SQYD		\$	
2210	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	725.00	LF		\$	

Section: 0005 - BRIDGE - 28292 - AT KY 2491

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2220	02231		STRUCTURE GRANULAR BACKFILL	552.00	CUYD		\$	
2230	02604		FABRIC-GEOTEXTILE CLASS 1A	1,936.00	SQYD		\$	
2240	03299		ARMORED EDGE FOR CONCRETE	160.00	LF		\$	
2250	08001		STRUCTURE EXCAVATION-COMMON	1,114.00	CUYD		\$	
2260	08002		STRUCTURE EXCAV-SOLID ROCK	12.00	CUYD		\$	
2270	08019		CYCLOPEAN STONE RIP RAP	2,060.00	TON		\$	
2280	08020		CRUSHED AGGREGATE SLOPE PROT	350.00	TON		\$	
2290	08033		TEST PILES	165.00	LF		\$	
2300	08046		PILES-STEEL HP12X53	875.00	LF		\$	
2310	08094		PILE POINTS-12 IN	32.00	EACH		\$	
2320	08100		CONCRETE-CLASS A	259.20	CUYD		\$	
2330	08104		CONCRETE-CLASS AA	535.20	CUYD		\$	
2340	08150		STEEL REINFORCEMENT	55,420.00	LB		\$	
2350	08151		STEEL REINFORCEMENT-EPOXY COATED	147,230.00	LB		\$	
2360	20745ED		ROCK SOUNDINGS	120.00	LF		\$	
2370	20746ED		ROCK CORINGS	222.00	LF		\$	
2380	22417EN		DRILLED SHAFT-54 IN-COMMON	133.00	LF		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2390	23000EX		DRILLED SHAFT-66 IN (ROCK)	110.00	LF		\$	
2400	23378EC		CONCRETE SEALING	33,289.00	SQFT		\$	
2410	23963EC		PPC I-BEAM TYPE HN 36-49	1,822.00	LF		\$	
2420	24595EN		ELASTICIZED EPS 28292	110.00	SQYD		\$	
2430	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	740.00	LF		\$	

Section: 0006 - BRIDGE - 28293 - AT KY 1812

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2440	02231		STRUCTURE GRANULAR BACKFILL	1,179.00	CUYD		\$	
2450	02604		FABRIC-GEOTEXTILE CLASS 1A	2,559.00	SQYD		\$	
2460	02998		MASONRY COATING	2,134.00	SQYD		\$	
2470	03299		ARMORED EDGE FOR CONCRETE	228.00	LF		\$	
2480	08001		STRUCTURE EXCAVATION-COMMON	559.00	CUYD		\$	
2490	08020		CRUSHED AGGREGATE SLOPE PROT	1,021.00	TON		\$	
2500	08033		TEST PILES	179.00	LF		\$	
2510	08039		PRE-DRILLING FOR PILES	464.00	LF		\$	
2520	08046		PILES-STEEL HP12X53	2,114.00	LF		\$	
2530	08094		PILE POINTS-12 IN	140.00	EACH		\$	
2540	08100		CONCRETE-CLASS A	416.00	CUYD		\$	
2550	08104		CONCRETE-CLASS AA	602.00	CUYD		\$	
2560	08150		STEEL REINFORCEMENT	74,171.00	LB		\$	
2570	08151		STEEL REINFORCEMENT-EPOXY COATED	166,165.00	LB		\$	
2580	08632		PRECAST PC I BEAM TYPE 2	2,374.00	LF		\$	
2590	24595EN		ELASTICIZED EPS 28293	177.00	SQYD		\$	
2600	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	809.00	LF		\$	

Section: 0007 - BRIDGE - 28294 - AT KY 3034

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2610	02231		STRUCTURE GRANULAR BACKFILL	807.00	CUYD		\$	
2620	02604		FABRIC-GEOTEXTILE CLASS 1A	1,638.00	SQYD		\$	
2630	02998		MASONRY COATING	1,268.00	SQYD		\$	
2640	03299		ARMORED EDGE FOR CONCRETE	164.00	LF		\$	
2650	08001		STRUCTURE EXCAVATION-COMMON	376.00	CUYD		\$	
2660	08020		CRUSHED AGGREGATE SLOPE PROT	602.00	TON		\$	
2670	08033		TEST PILES	154.00	LF		\$	
2680	08039		PRE-DRILLING FOR PILES	560.00	LF		\$	
2690	08046		PILES-STEEL HP12X53	1,407.00	LF		\$	
2700	08094		PILE POINTS-12 IN	104.00	EACH		\$	
2710	08100		CONCRETE-CLASS A	345.00	CUYD		\$	
2720	08104		CONCRETE-CLASS AA	332.00	CUYD		\$	
2730	08150		STEEL REINFORCEMENT	60,687.00	LB		\$	
2740	08151		STEEL REINFORCEMENT-EPOXY COATED	95,430.00	LB		\$	
2750	08668		PRECAST PC BOX BEAM SB17	1,402.00	LF		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2760	24595EN		ELASTICIZED EPS 28294	119.00	SQYD		\$	
2770	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	480.00	LF		\$	

Section: 0008 - BRIDGE - 28295 - AT KY 1010

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2780	02231		STRUCTURE GRANULAR BACKFILL	654.00	CUYD		\$	
2790	02604		FABRIC-GEOTEXTILE CLASS 1A	1,604.00	SQYD		\$	
2800	02998		MASONRY COATING	1,880.00	SQYD		\$	
2810	03299		ARMORED EDGE FOR CONCRETE	95.00	LF		\$	
2820	08001		STRUCTURE EXCAVATION-COMMON	138.00	CUYD		\$	
2830	08002		STRUCTURE EXCAV-SOLID ROCK	313.00	CUYD		\$	
2840	08020		CRUSHED AGGREGATE SLOPE PROT	169.00	TON		\$	
2850	08033		TEST PILES	74.00	LF		\$	
2860	08039		PRE-DRILLING FOR PILES	265.00	LF		\$	
2870	08046		PILES-STEEL HP12X53	818.00	LF		\$	
2880	08094		PILE POINTS-12 IN	51.00	EACH		\$	
2890	08100		CONCRETE-CLASS A	314.00	CUYD		\$	
2900	08104		CONCRETE-CLASS AA	422.00	CUYD		\$	
2910	08150		STEEL REINFORCEMENT	69,828.00	LB		\$	
2920	08151		STEEL REINFORCEMENT-EPOXY COATED	119,808.00	LB		\$	
2930	08634		PRECAST PC I BEAM TYPE 4	1,208.00	LF		\$	
2940	24595EN		ELASTICIZED EPS 28295	101.00	SQYD		\$	
2950	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	615.00	LF		\$	

Section: 0009 - BRIDGE - 28296 - AT KY 1419

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
2960	02231		STRUCTURE GRANULAR BACKFILL	1,230.00	CUYD		\$	
2970	02604		FABRIC-GEOTEXTILE CLASS 1A	2,608.00	SQYD		\$	
2980	02998		MASONRY COATING	1,996.00	SQYD		\$	
2990	03299		ARMORED EDGE FOR CONCRETE	228.00	LF		\$	
3000	08001		STRUCTURE EXCAVATION-COMMON	448.00	CUYD		\$	
3010	08020		CRUSHED AGGREGATE SLOPE PROT	720.00	TON		\$	
3020	08033		TEST PILES	189.00	LF		\$	
3030	08039		PRE-DRILLING FOR PILES	131.00	LF		\$	
3040	08046		PILES-STEEL HP12X53	2,344.00	LF		\$	
3050	08094		PILE POINTS-12 IN	132.00	EACH		\$	
3060	08100		CONCRETE-CLASS A	407.00	CUYD		\$	
3070	08104		CONCRETE-CLASS AA	525.00	CUYD		\$	
3080	08150		STEEL REINFORCEMENT	81,252.00	LB		\$	
3090	08151		STEEL REINFORCEMENT-EPOXY COATED	149,271.00	LB		\$	
3100	08632		PRECAST PC I BEAM TYPE 2	1,599.00	LF		\$	
3110	24595EN		ELASTICIZED EPS 28296	187.00	SQYD		\$	
3120	25028ED		RAIL SYSTEM SINGLE SLOPE - 40 IN	657.00	LF		\$	

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Section: 0010 - BRIDGE- CULVERT - 28297 - DBL 10X6

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3130	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3140	08100		CONCRETE-CLASS A	407.30	CUYD		\$	
3150	08150		STEEL REINFORCEMENT	52,545.00	LB		\$	
3160	08410		LOW FLOW DIVERSION CURB	1.00	LS		\$	

Section: 0011 - BRIDGE- CULVERT - 28298 - DBL 10X6

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3170	08002		STRUCTURE EXCAV-SOLID ROCK	149.00	CUYD		\$	
3180	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3190	08100		CONCRETE-CLASS A	451.30	CUYD		\$	
3200	08150		STEEL REINFORCEMENT	59,271.00	LB		\$	
3210	08410		LOW FLOW DIVERSION CURB	1.00	LS		\$	

Section: 0012 - BRIDGE- CULVERT - 28299 - 4X4

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3220	08002		STRUCTURE EXCAV-SOLID ROCK	75.00	CUYD		\$	
3230	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3240	08100		CONCRETE-CLASS A	64.80	CUYD		\$	
3250	08150		STEEL REINFORCEMENT	4,351.00	LB		\$	

Section: 0013 - BRIDGE- CULVERT - 28300 - 5X5

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3260	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3270	08100		CONCRETE-CLASS A	65.60	CUYD		\$	
3280	08150		STEEL REINFORCEMENT	4,484.00	LB		\$	

Section: 0014 - BRIDGE- CULVERT - 28301 - DBL 14X8

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3290	08002		STRUCTURE EXCAV-SOLID ROCK	274.00	CUYD		\$	
3300	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3310	08100		CONCRETE-CLASS A	743.30	CUYD		\$	
3320	08150		STEEL REINFORCEMENT	137,928.00	LB		\$	
3330	08410		LOW FLOW DIVERSION CURB	1.00	LS		\$	

Section: 0015 - BRIDGE- CULVERT - 28303 - 5X4

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3340	08002		STRUCTURE EXCAV-SOLID ROCK	15.00	CUYD		\$	
3350	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3360	08100		CONCRETE-CLASS A	154.50	CUYD		\$	
3370	08150		STEEL REINFORCEMENT	16,034.00	LB		\$	

Section: 0016 - BRIDGE- CULVERT - 28302 - 8X8

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3380	08002		STRUCTURE EXCAV-SOLID ROCK	65.00	CUYD		\$	
3390	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3400	08100		CONCRETE-CLASS A	113.40	CUYD		\$	
3410	08150		STEEL REINFORCEMENT	8,752.00	LB		\$	

Section: 0017 - BRIDGE-CULVERT - 28305 - DBL 12X8

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3420	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3430	08100		CONCRETE-CLASS A	381.20	CUYD		\$	
3440	08150		STEEL REINFORCEMENT	44,727.00	LB		\$	
3450	08410		LOW FLOW DIVERSION CURB	1.00	LS		\$	

Section: 0018 - BRIDGE-CULVERT - 28306 - 8X5

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3460	08002		STRUCTURE EXCAV-SOLID ROCK	3.00	CUYD		\$	
3470	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3480	08100		CONCRETE-CLASS A	103.10	CUYD		\$	
3490	08150		STEEL REINFORCEMENT	7,548.00	LB		\$	

Section: 0019 - BRIDGE- CULVERT - 28307 - DBL 12X8

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3500	08002		STRUCTURE EXCAV-SOLID ROCK	1.00	CUYD		\$	
3510	08003		FOUNDATION PREPARATION	1.00	LS		\$	
3520	08100		CONCRETE-CLASS A	403.50	CUYD		\$	
3530	08150		STEEL REINFORCEMENT	48,960.00	LB		\$	
3540	08410		LOW FLOW DIVERSION CURB	1.00	LS		\$	

Section: 0020 - BRIDGE-RETAINING WALL - STA 387+50

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3550	01000		PERFORATED PIPE-4 IN	247.00	LF		\$	
3560	02220		FLOWABLE FILL	87.00	CUYD		\$	
3570	02555		CONCRETE-CLASS B	20.00	CUYD		\$	

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LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3580	08039		PRE-DRILLING FOR PILES ROCK	465.00	LF		\$	
3590	08039		PRE-DRILLING FOR PILES SOIL	670.00	LF		\$	
3600	08051		PILES-STEEL HP14X89	345.00	LF		\$	
3610	08100		CONCRETE-CLASS A	294.00	CUYD		\$	
3620	08150		STEEL REINFORCEMENT	20,628.00	LB		\$	
3630	08170		SHEAR CONNECTORS	1.00	LS		\$	
3640	20172ED		CONCRETE BARRIER	287.00	LF		\$	
3650	20745ED		ROCK SOUNDINGS	670.00	LF		\$	
3660	20746ED		ROCK CORINGS	620.00	LF		\$	
3670	23378EC		CONCRETE SEALING	4,399.00	SQFT		\$	
3680	24132EC		TIMBER LAGGING	2,487.00	SQFT		\$	
3690	24461ED		DRAINAGE GEOCOMPOSITE	234.00	SQYD		\$	
3700	25084ED		PILES-STEEL W18X158	814.00	LF		\$	

Section: 0021 - SIGNING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3710	06400		GMSS GALV STEEL TYPE A	13,332.00	LB		\$	
3720	06401		FLEXIBLE DELINEATOR POST-M/W	769.00	EACH		\$	
3730	06404		FLEXIBLE DELINEATOR POST-M/Y	91.00	EACH		\$	
3740	06405		SBM ALUMINUM PANEL SIGNS	582.00	SQFT		\$	
3750	06406		SBM ALUM SHEET SIGNS .080 IN	405.00	SQFT		\$	
3760	06407		SBM ALUM SHEET SIGNS .125 IN	1,055.00	SQFT		\$	
3770	06410		STEEL POST TYPE 1	2,607.00	LF		\$	
3780	06412		STEEL POST MILE MARKERS	24.00	EACH		\$	
3790	06441		GMSS GALV STEEL TYPE C	7,560.00	LB		\$	
3800	06451		REMOVE SIGN SUPPORT BEAM	23.00	EACH		\$	
3810	06490		CLASS A CONCRETE FOR SIGNS	78.50	CUYD		\$	
3820	06491		STEEL REINFORCEMENT FOR SIGNS	1,702.00	LB		\$	
3830	20418ED		REMOVE & RELOCATE SIGNS	13.00	EACH		\$	
3840	20419ND		ROADWAY CROSS SECTION	18.00	EACH		\$	
3850	21596ND		GMSS TYPE D	49.00	EACH		\$	
3860	24631EC		BARCODE SIGN INVENTORY	158.00	EACH		\$	

Section: 0022 - LIGHTING

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3870	04714		POLE 120 FT MTG HT HIGH MAST	2.00	EACH		\$	
3880	04761		LIGHTING CONTROL EQUIPMENT	1.00	EACH		\$	
3890	04797		CONDUIT-3 IN	150.00	LF		\$	
3900	04800		MARKER	2.00	EACH		\$	
3910	04820		TRENCHING AND BACKFILLING	780.00	LF		\$	
3920	20392NS835		ELECTRICAL JUNCTION BOX TYPE C	4.00	EACH		\$	
3930	23161EN		POLE BASE-HIGH MAST	20.00	CUYD		\$	
3940	24749EC		HIGH MAST LED LUMINAIRE	8.00	EACH		\$	
3950	24851EC		CABLE-NO. 10/3C DUCTED	1,040.00	LF		\$	

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Section: 0023 - WATERLINE

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
3960	14003		W CAP EXISTING MAIN	4.00	EACH		\$	
3970	14007		W ENCASEMENT STEEL BORED RANGE 2	417.00	LF		\$	
3980	14008		W ENCASEMENT STEEL BORED RANGE 3	315.00	LF		\$	
3990	14013		W ENCASEMENT STEEL OPEN CUT RANGE 2	220.00	LF		\$	
4000	14014		W ENCASEMENT STEEL OPEN CUT RANGE 3	535.00	LF		\$	
4010	14022		W FLUSH HYDRANT ASSEMBLY	7.00	EACH		\$	
4020	14034		W PIPE DUCTILE IRON 03 INCH	907.00	LF		\$	
4030	14036		W PIPE DUCTILE IRON 06 INCH	1,333.00	LF		\$	
4040	14057		W PIPE PVC 03 INCH	2,102.00	LF		\$	
4050	14058		W PIPE PVC 04 INCH	2,166.00	LF		\$	
4060	14059		W PIPE PVC 06 INCH	2,020.00	LF		\$	
4070	14085		W SERV PE/PLST SHORT SIDE 3/4 IN	3.00	EACH		\$	
4080	14089		W TAPPING SLEEVE AND VALVE SIZE 1	5.00	EACH		\$	
4090	14092		W TIE-IN 03 INCH	5.00	EACH		\$	
4100	14093		W TIE-IN 04 INCH	1.00	EACH		\$	
4110	14094		W TIE-IN 06 INCH	5.00	EACH		\$	
4120	14103		W VALVE 03 INCH	14.00	EACH		\$	
4130	14104		W VALVE 04 INCH	2.00	EACH		\$	
4140	14105		W VALVE 06 INCH	5.00	EACH		\$	
4150	14144		W LINE MARKER	58.00	EACH		\$	

Section: 0024 - DEMOBILIZATION & MOBILIZATION

LINE	BID CODE	ALT	DESCRIPTION	QUANTITY	UNIT	UNIT PRIC	FP	AMOUNT
4160	02568		MOBILIZATION	1.00	LS		\$	
4170	02569		DEMOBILIZATION	1.00	LS		\$	

**SPECIAL NOTE FOR
REINFORCED SOIL SLOPES**

1) REFERENCES:

All references to the Standard Specifications are to the Kentucky Department of Highways Standard Specifications for Road and Bridge Construction, Current Edition with all Supplemental Specifications.

All references to AASHTO are to the AASHTO LRFD Bridge Design Specifications, Current Edition with applicable Interim Revisions. All references for FHWA GEC No. 11 are to the Federal Highway Administration's Geotechnical Engineering Circular (GEC) No. 11: Design & Construction of Mechanically Stabilized Earth Walls and Reinforced Soil Slopes, Volumes I and II.

The requirements in the Standard Specifications or AASHTO shall be used for information not provided. Where there are conflicts between the Standard Specifications and AASHTO, the Standard Specifications shall govern.

The Contractor shall provide the Reinforced Soil Slope (RSS) Designer with a complete set of project plans and specifications and shall ensure that the RSS design is compatible with all other project features that can impact the design and construction of the slope. Various terms of interest for this special note are defined below.

1.1 Definitions:

Structural Geogrid - A structural geogrid is formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and functions primarily as reinforcement.

Department/Engineer - Refers to the Kentucky Transportation Cabinet representative and/or a designated consultant acting on behalf of KYTC.

Supplier - The entity contractually retained by the Contractor to provide approved Structural Geogrid.

Designer - The entity that provides specific design of an accepted RSS system as described in the special note. The "Supplier" and "Designer" may be the same entity or separate entities retained by the Contractor.

Manufacturer - The entity that oversees and facilitates production of the geogrid from its component materials.

Working Drawings - A detailed plan set for the RSS, providing all information required to complete RSS construction.

2) SCOPE OF WORK:

Furnishing and testing materials, and the design and construction of a Reinforced Soil Slope retention system. Work consists of:

1. Furnishing structural geogrid reinforcement, drainage composite, and erosion control vegetative facing system (or other facing alternate) as shown on the construction drawings.

2. Storing, cutting, and placing structural geogrid reinforcement, drainage composite, and erosion control system as specified herein and as shown on the construction drawings.
3. Furnishing sealed design calculations and construction drawings for the RSS.
4. Providing Supplier and Designer representatives for on-site pre-construction meeting with Contractor and Engineer and as-needed during construction. The Representatives shall be onsite for a minimum of the first five (5) days of RSS construction.
5. Excavation, placement, and compaction of reinforced fill and backfill material as specified herein and as shown on the construction drawings.

Acceptance of the Contractor's design calculations and construction plans does not constitute endorsement or approval of the work submitted. The acceptance is an acknowledgment of the work performed and authorization for the Contractor to proceed with the project.

3) DESIGNER QUALIFICATIONS:

The RSS Designer will need to meet the following minimum qualifications:

1. The selected geogrid reinforcement has been previously reviewed and approved for use by the Department District Materials personnel, Division of Materials, and Division of Structural Design, Geotechnical Branch.
2. The Designer has the operational capacity and necessary experience to provide expert support to the Contractor on a timely basis.
3. At least 3 years of experience in the design of Reinforced Soil Slopes.
4. Past documented experience in the design of at least 3 projects of a similar magnitude to the proposed RSS, that have been constructed successfully.
5. All calculations and RSS construction plans shall be dated, sealed, and signed by a registered professional engineer licensed to practice in Kentucky.

4) CALCULATIONS AND PLANS:

A materials list, draft working drawings, and design calculations clearly showing conformance with the Standard Specifications, AASHTO, and contract plans shall be submitted for review. The format for the construction plans shall be in accordance with the Division of Structural Design's Guidance Manual. The first sheet shall be a title sheet.

All review submittals shall be submitted electronically in .PDF format through the Contractor to the Engineer. Half-sized prints are preferred. The Engineer may request full size (22" X 36") PDF sheets if necessary. The Engineer shall forward the submissions to the Geotechnical Branch.

The Contractor shall allow 30 calendar days for the Department to review each submission. While this process does not require submission of paper copies, the Department reserves the right to require such copies on a case-by-case basis. The thirty-day period begins when submissions are received in the Geotechnical Branch. Revisions may be required by the Department. The revised package shall be resubmitted to the Engineer for review. The Engineer shall have 15 calendar days to complete review of the revised package. This review process shall be repeated until the entire submittal is accepted by the Engineer. Additional time required by the Department to review resubmissions shall not be cause for increasing the number of contract working days. The additional work required by the Contractor to provide resubmissions shall be at no cost to the

Department and with no extension of contract time. The Working Drawings shall include the following items:

- A. A plan view showing the RSS disturbed limits
- B. Cross-sections showing RSS extents and slope steepness
- C. All design parameters and assumptions, including design life
- D. Clear and detailed descriptions of selected geosynthetic reduction factors for design, including test results that verify the chosen reduction factors. This also includes backfill properties, where applicable.
- E. Accommodations for roadway drainage systems, subgrades, etc.
- F. Show utilities impacted by slope
- G. Primary and secondary reinforcement lengths and spacing
- H. Selected facing system and justification, with specific construction methods
- I. Overlap / seam requirements; include detailed overlap requirements for horizontal curves
- J. Special design considerations, if applicable
(May include but not limited to guardrail/sign post installation, reinforcement placement around deep foundations or other obstructions, drainage systems, foundation modifications, scour protection, etc.)

Working drawings shall not be produced until after the Department has approved all submittals. Final design calculations and construction plans shall be dated, sealed, and signed by a registered professional engineer licensed to practice in Kentucky. The Designer shall submit reviewed and approved shop drawings. The Designer shall provide the Department with a statement of assurance that the Working Drawings are accurate and satisfy project requirements. Each sheet of the drawings shall be dated, sealed, and signed by the RSS design engineer providing the design.

A Certificate of Analysis for the Internal RSS Fill Material (See Sections 5.02 and 5.3 herein) may be required prior to final acceptance of the RSS design.

The Department assumes no responsibility for errors or omissions in the working drawings. Acceptance of the final working drawings submitted by the Contractor shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work. Construction of the RSS shall not commence until the Contractor receives a written Notification to Begin RSS Construction from the Engineer, which will be issued once the complete package (drawings, calculations and construction procedures) is accepted. Fabrication of any RSS components before the written Notification to Begin RSS Construction shall be at the sole risk of the Contractor.

5) **DESIGN:**

The RSS design shall be in general accordance FHWA GEC No. 11 and AASHTO. Exceptions to these requirements are listed in this note or shown elsewhere in the contract documents.

- Earth reinforcement elements in Reinforced Slope Systems shall be designed to have a corrosion resistance/durability to ensure a minimum design life of 75 years, or 100 years for bridge abutments or when supporting utilities. Requirements may vary on a project-specific basis, and if so will be provided in the geotechnical notes.
- The length of primary reinforcement shall be the same throughout the RSS Structure.

- Construction and Traffic loading shall be considered equivalent to an additional two feet of earth surcharge. The internal RSS fill material shall extend 1 foot, minimum, beyond the ends of the reinforcement. The internal RSS fill should be separated from the non-reinforced embankment (where present) with Geotextile Fabric meeting requirements of current Standard Specifications Section 843 for Slope Protection, Channel Lining and Stabilization. Fabric placement shall be in accordance with current Standard Specifications Section 214.
- The following minimum factors of safety will be used for slope design.
 - Grid Pullout 2.0
 - Internal Stability 1.3
 - Global Stability 1.4
 - Sliding 1.4
- Minimum geogrid anchorage length = 3 ft.

6) MATERIALS:

6.1 Internal RSS Volume:

Provide internally reinforced fill material consisting of either A) Quarry-processed limestone or sandstone from a Department-approved quarry or B) Durable Limestone/Sandstone from Roadway Excavation meeting all applicable general requirements of Section 805 of the Standard Specifications, current edition, and requirements herein. Approval of the material source by the Department is required prior to beginning RSS construction. The required gradation of internal RSS fill is below. (If optional product-specific construction damage testing is successfully performed, the gradation may be adjusted to that used for the testing. See Section 6.2.2.)

Table 1: Gradation of Internal RSS Fill	
Sieve Size	Percent Passing
1"	100
3/4 "	80-100
3/8 "	20-80
No. 4	0-30
No. 8	0-10
Sizes No. 67, 68, 710, and 78 in the Department’s Standard Specifications fall within these gradation limits. Sizes No. 57 and 610 may fall with these limits, depending on the specific gradation used.	

Gradations for the RSS volume should be attained and verified twice per week in order to meet the above requirements. Material having an internal friction angle greater than or equal to 34 degrees shall be used. Project-specific shear strength testing is not required if a design value of 34 degrees is used. (See Section 6.0). Uniform fine sands are not permitted in the RSS Volume. The Designer is responsible for establishing and maintaining a quality control program to ensure compliance with this section.

6.2 Geogrid:

Use only geogrid products placed on the Department’s Kentucky Product Evaluation List (KYPEL) and accepted for use on a project basis. Geogrid Manufacturers are required to

participate in the National Transportation Product Evaluation Program (NTPEP) for Geosynthetic Reinforcement Products and the product must have current test data posted in NTPEP DataMine.

Use a polymer geogrid consisting of High Density Polyethylene (HDPE) or high tenacity Polyester (PET) formed into a uniform regular network of integrally connected elements with apertures greater than one-fourth (1/4) inch (6.35 mm) to allow interlocking with surrounding soil, rock, earth, or other specified materials to function primarily as reinforcement. Use a geogrid that is generally inert to biological degradation and commonly encountered chemicals and is free of defects or flaws significantly affecting its physical properties.

Ensure the geogrid has a minimum width of four (4) feet (1.22 meter) and that each roll is labeled with the manufacturers' name, product type, lot number, roll number, manufactured date, and roll dimension.

6.2.1 Packaging:

Protect the reinforcement from direct sunlight, ultraviolet rays, temperatures greater than 48°C, mud, dirt, dust, and debris during all periods of shipment and storage. Keep geogrids dry until installation, and do not store directly on the ground.

6.2.2 Physical Requirements:

Furnish geogrid suitable to the final design. The minimum weight should be 8 oz/yd² to minimize construction damage.

Determine Long Term Design Tensile Strength based on the following:

$$TD = TULT \div RF$$

Where:

TD = Long Term Design Strength

TULT = Ultimate Tensile Strength determined in primary strength direction in accordance with ASTM D 6637 conducted at a strain rate of 10 % per minute. Tensile strength shall be reported without artificially deforming, manipulating, or massaging the test specimen under load before measuring such resistance or employing an artificial secant or offset tangent.

RF = Total Reduction Factor = RFCR x RFCD x RFDU
Minimum RF with product specific testing: 3.15 for HDPE and 2.0 for PET
Minimum RF without test data: 10

RFCR = Reduction Factor for Creep Deformation for 100-year Design Life calculated in accordance with *GRI-GG4 using ASTM D 5262 for Long Term Strength.
Minimum RFCR with product specific testing: 2.60 for HDPE and 1.60 for PET
Minimum RFCR without test data: 5.0 for HDPE and 3.0 for PET
*Either GRI-GG4 (a) or GRI-GG4 (b), depending on Flexural Rigidity value from ASTM D 1388.

RFCD = Reduction Factor for Construction Damage calculated in accordance with ASTM D 5818.

Minimum RFCD with product-specific testing with appropriate backfill:

PET: 1.1
HDPE: 1.2

Minimum RFCD without test data:

PET: 1.7
HDPE: 2.0

Note 1: Product-specific testing may allow adjustment of the gradation in Table 1, to that used in the construction damage testing, provided all other internal fill requirements are met.

Note 2: When product-specific testing is conducted, if $RFCD > 1.7$, the particular combination of geogrid, internal RSS fill, gradation, and placement method shall not be used.

RFDU = Reduction Factor for Durability based on index properties in Table 2.

If index properties satisfied and $RFCD \leq 1.7$, RFDU = 1.3 (Default)

Minimum RFDU with product specific durability testing: 1.10

Minimum RFDU without durability or index test data: 2.0

Table 2: Required Values for Use of Default Durability Reduction Factor			
Type	Index Test	Method	Value
HDPE	UV	ASTM D 4355	Min. 70% strength after 500 hours
PET	UV	ASTM D 4355	Min. 50% strength after 500 hours*
HDPE	Thermo-oxidation Resistance	ENV ISO 13438:1999, Method B	Min 50% strength after 56 days
PET	Hydrolysis Resistance	Inherent Viscosity Method (ASTM D 4603, GRI-GG8)	Min. Number (Mn) Molecular Weight of 25,000
PET	Hydrolysis Resistance	GRI GG7	Max. Carboxyl End Group Number of 30
HDPE & PET	Survivability	Weight per Unit Area (ASTM D 5261)	Min. 8 oz/yd ²
HDPE & PET	% Post-Consumer Recycled Material (by weight)	Certification	Max. 0%

* If buried in one week. If not, must meet minimum 70% strength after 500 hours.

6.3 Sampling & Testing:

6.3.1 Internal RSS Fill:

To obtain source approval, the Contractor shall furnish the Engineer with an 80-pound representative sample of the internal RSS fill material and a Certificate of Analysis containing results of all tests referenced in Table 3 at least four weeks prior to beginning construction of the Reinforced Soil Slope.

During construction, the internal RSS fill material shall be sampled by the Engineer for acceptance and quality control testing, performed by the Department and/or an independent approved, third party laboratory. A new sample and Certificate of Analysis shall be provided any time the material and/or source changes.

The RSS Designer will review all fill material tests and certify compliance with the design parameters. RSS Designer shall evaluate any failed material placed in the RSS and will provide a signed, stamped recommendation for modification and/or repair of the RSS system to adjust for the failed material.

Table 3: Sampling Frequency for Internal RSS Fill

Function	Tests	Frequency
Source Approval: (Testing by Contractor and/or its Consultant)	Soundness (AASHTO T 104)*	At least four (4) weeks prior to beginning RSS construction and once per material change and/or change in source.
	Gradation (AASHTO T 27)*	One test is valid for up to 10,000 ft ² of RSS area if there is no material change or change in source. **
Acceptance and Quality Control (Testing by Department)	Gradation (AASHTO T 27)*	One per 2,000 cubic yards at job site. (A change of more than +/- 5.0 percent passing any sieve size <u>may</u> require additional Gradation testing by the Contractor.)
	Any other applicable requirements of Section 805 of the current Standard Specifications	As required by the current Materials Field Sampling and Testing Manual, Standard Specifications, and/or other Department policy.
<p>* The laboratory performing these tests must be accredited by the AASHTO Materials Reference Laboratory (AMRL) for the tests they perform. The Contractor may consult the Geotechnical Branch to ensure that a lab is accredited or certified.</p> <p>** e.g. 1 to 10,000 ft² of RSS requires 1 test, 10,001 to 20,000 ft² requires 2 tests, etc.</p>		

6.3.2 Geogrid:

No project-specific geogrid testing will be required during construction, however the Department reserves the right to require such testing of geogrid at any time.

7) GEOTECHNICAL DESIGN PARAMETERS:

Granular Embankment (if required) - See Subsection 805 of the Standard Specifications

$$\gamma = 115 \text{ lb/ft}^3$$

$$\phi = 38^\circ$$

$$C = 0 \text{ psf}$$

Internal RSS Fill -

$$\gamma = 120 \text{ lb/ft}^3$$

$$*\phi = 34^\circ$$

$$C = 0 \text{ psf}$$

In-Situ Soil – See Geotechnical Notes & Drawings

The coefficient of friction for sliding resistance for cohesionless soils shall be no greater than tangent phi of the weaker material. The coefficient of friction for sliding resistance for cohesive soils shall be no greater than the adhesion value for the in-situ soil.

In no case shall the geotechnical strength parameters used for design exceed the values allowed by the AASHTO Specifications.

*If a design friction angle of greater than 34 degrees is used, the value must be substantiated by Direct Shear Test (AASHTO T236) or CU Triaxial Test (AASHTO T 297) on project specific material. The design friction angle may be increased up to a maximum of 40 degrees based on laboratory testing. Generally, only one Direct Shear or CU Triaxial Test is required unless there is a change in material, source, or gradation.

8) GENERAL:

8.1 General requirements:

Comply with all dimensions shown on the contract plans and accommodate all other project features as shown on the contract plans.

Section 107 of the current specifications shall apply to the use of patented devices, materials, slope systems, and processes.

Geogrid shall be installed at the proper elevation and orientation as shown on the construction drawings or as directed by the Engineer. Correct orientation (roll direction) of the geogrid shall be verified by the Contractor. Geogrid may be temporarily secured in place with staples, pins, sand bags, or backfill as required by fill properties, fill placement procedures, or weather conditions, or as directed by the Engineer. All connections shall be in accordance with the Designer's recommendations and drawings.

When wrapped-face slopes are required (see below), a minimum overlap of 6 inches is recommended along edges perpendicular to slope. Alternatively, the edges of the grid may be clipped or tied together. When wrapped-face slopes are not necessary, no overlap is required and edges may be butted.

The non-reinforced embankment material (where present) shall be built concurrently with the Reinforced Soil Slope. The core cannot be constructed prior to the RSS.

Tracked construction equipment shall not be operated directly on the geogrid. A minimum fill thickness of 6 inches is required prior to operation of rubber-tired and tracked vehicles over the geogrid. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geogrid.

Any geogrid damaged during installation shall be replaced by the Contractor at no additional cost.

8.2 Slope Facing Requirements:

Treatment of slope faces shall be in accordance with Table 4 below, based on specific project conditions.

Table 4: RSS slope facing options (after Collin, 1996)

Slope Face Angle and Soil Type	Type of Facing			
	When Geosynthetic is not Wrapped at Face		When Geosynthetic is Wrapped at Face	
	Vegetated Face ¹	Hard Facing ²	Vegetated Face ¹	Hard Facing ²
> 50° (> ~0.9H:1V) All Soil Types	Not Recommended	Gabions	Sod, Permanent Erosion Blanket w/ seed	Wire Baskets, ³ Stone, Shotcrete
35° to 50° (~ 1.4H:1V to 0.9H:1V) Clean Sands (SP) ⁴ Rounded Gravel (GP)	Not Recommended	Gabions, Soil-Cement	Sod, Permanent Erosion Blanket w/ seed	Wire Baskets, ³ Stone, Shotcrete
35° to 50° (~ 1.4H:1V to 0.9H:1V) Silts (ML) Sandy Silts (ML)	Soil Bio reinforcement, Drainage Composites ⁵	Gabions, Soil-Cement, Stone Veneer	Sod, Permanent Erosion Blanket w/ seed	Wire Baskets, ³ Stone, Shotcrete
35° to 50° (~ 1.4H:1V to 0.9H:1V) Silty Sands (SM) Clayey Sands (SC) Well graded sands and gravels (SW & GW)	Temporary Erosion Blanket w/ Seed or Sod, Permanent Erosion Mat w/ Seed or Sod	Hard Facing, Not Needed	Geosynthetic Wrap Not Needed	Geosynthetic Wrap Not Needed
25° to 35° (~ 2H:1V to 1.4H:1V) All Soil Types	Temporary Erosion Blanket w/ Seed or Sod, Permanent Erosion Mat w/ Seed or Sod	Hard Facing Not Needed	Geosynthetic Wrap Not Needed	Geosynthetic Wrap Not Needed

Notes: 1. Vertical spacing of reinforcement (primary/secondary) shall be no greater than 16 in. (400 mm) with primary reinforcements spaced no greater than 32 in. (800 mm) when secondary reinforcement is used.
 2. Vertical spacing of primary reinforcement shall be no greater than 32 in. (800 mm).
 3. 18 in. (450 mm) high wire baskets are recommended.
 4. Unified Soil Classification
 5. Geosynthetic or natural horizontal drainage layers to intercept and drain the saturated soil at the face of the slope.

(Table from FHWA GEC 011 – Volume II)

8.3 Compaction Requirements:

Backfill material shall be placed in lifts and compacted according to Section 206 of the current Specifications, unless thinner lift thicknesses are required by the Designer. Backfill shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the geogrid. In addition, the Department shall monitor density with Plate Compaction Testing in accordance with the procedure outlined below in Section 8.3.1.

8.3.1 Plate Compaction Test Procedure:

Trial fill sections shall be constructed with Department personnel present to determine appropriate criteria to achieve adequate compaction. The trial fill sections shall be performed as follows:

- One trial fill section is valid for up to 10,000 ft² of RSS area (e.g. 1 to 10,000 ft² requires 1 trial fill section, 10,001 to 20,000 ft² requires 2, etc.) and for no more than one individual RSS.
- The minimum dimensions of the test pad shall be 15 ft. wide by 50 ft. long.
- The lift thickness shall not exceed one (1) foot.
- Compaction shall be determined by using a level to measure the settlement of the trial section at a number of locations after each pass (e.g., a minimum of 5 locations measured at the center of a 1 ft. square metal plates or other methods approved by the Engineer).
- After constructing a total thickness of approximately 3 feet, the third lift shall be used to determine the appropriate number of passes for production, which will maximize compaction without excessively crushing the rock at the surface.
- The number of passes to achieve at least 80 percent of the maximum settlement will be required for production work.
- Only those methods and equipment used to establish compaction compliance in the trial fill section shall be used for production work.
- A material change, change in source, a difference of more than +/- 5.0 percent passing any sieve size, and/or change in the approved equipment shall require the Contractor to conduct a new trial fill section and obtain re-approval by the Engineer of the minimum number of passes and rolling pattern.
- The Department reserves the right to use other test methods to evaluate the adequacy of the compaction criteria.
- The trial fill sections are incidental to the bid price for Reinforced Soil Slope.

Within three (3) feet of the slope face, compaction criteria shall be determined using test pad sections with Department personnel present to determine appropriate criteria to achieve adequate compaction. The test pad sections shall be performed as follows:

- The minimum dimensions of the test pad shall be 5 ft. wide by 15 ft. long.
- The lift thickness shall not exceed one (1) foot.
- Compaction shall be determined by using a level to measure the settlement of the test pad section at a number of locations after each pass (e.g., a minimum of 3 locations measured at the center of 1-foot square plates or other methods approved by the Engineer).
- After constructing a total thickness of approximately 3 feet, the third lift shall be used to determine the appropriate number of passes for production, which will maximize compaction without excessively crushing the rock at the surface.
- The number of passes to achieve at least 80 percent of the maximum settlement will be required for production work.
- Only those methods and equipment used to establish compaction compliance in the trial fill section shall be used for production work.
- A material change, change in source, a difference of more than +/- 5.0 percent passing any sieve size, and/or change in the approved equipment shall require the Contractor to conduct a new test pad section.
- The test pad sections are incidental to the bid price for Reinforced Soil Slope.

8.4 Project Plans Changes:

Design data is based on subsurface conditions and original project parameters. If project plans are changed subsequently, an additional subsurface investigation may be needed to verify the design parameters of the in-situ soils and embankment materials. The Engineer should notify the Division of Structural Design, Geotechnical Branch, of any plan changes as soon as possible. It is estimated that it will take approximately three (3) months for the Geotechnical Branch to complete its investigation and make any necessary geotechnical recommendations that may affect design prior to any construction. The Contractor will be responsible for providing access for drilling equipment to this area.

In the event the Contractor or Designer requires additional geotechnical investigation, those costs are incidental to the RSS bid item and no additional time will be allowed.

9) METHOD OF MEASUREMENT AND BASIS OF PAYMENT:

All work associated with providing the design, details and construction for the facing shall be incidental to the unit price bid for Reinforced Soil Slope.

GENERAL SUMMARY (SHEET 2 OF 3)

COUNTY OF	ITEM NO.	SHEET NO.
WOLFE	10-168.00	R2G

ITEM	DESCRIPTION	NOTES	UNIT	KY 9009	KY 9009 RAMP	CROSSROADS	ENTRANCES	TEMPORARY PAVEMENT	TOTALS
02607	FABRIC-GEOTEXTILE CLASS 2 FOR PIPE	5	SOYD	10,798	209	863	65		11,935
02625	REMOVE HEADWALL		EACH	117	1	5			123
02650	MAINTAIN & CONTROL TRAFFIC		LS	1					1
02651	DIVERSIONS (BY-PASS DETOURS) (KY 1010)		LS			1			1
02652	DIVERSIONS (BY-PASS DETOURS) (KY 2491)		LS			1			1
02671	PORTABLE CHANGEABLE MESSAGE SIGN	6	EACH	2	2	2			6
02676	MOBILIZATION FOR MILL & TEXT		LS						1
02690	SAFELOADING		CUYD	315					315
02692	SETTLEMENT PLATFORM	19	EACH	10					10
02701	TEMP SILT FENCE	8	LF	28,405	4,009	3,772			36,186
02703	SILT TRAP TYPE A	8	EACH	675					675
02704	SILT TRAP TYPE B	8	EACH	675					675
02705	SILT TRAP TYPE C	8	EACH	675					675
02706	CLEAN SILT TRAP TYPE A	8	EACH	675					675
02707	CLEAN SILT TRAP TYPE B	8	EACH	675					675
02708	CLEAN SILT TRAP TYPE C	8	EACH	675					675
02726	STAKING		LS						1
02731	REMOVE STRUCTURE STA. 129+40.35 - KY 9009 BRIDGE OVER KY 191		LS	1					1
02731	REMOVE STRUCTURE STA. 133+62.64 - DBL. 10' x 6' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 143+46 - REMOVE BARN		LS	1					1
02731	REMOVE STRUCTURE STA. 159+02.55 - 4' x 4' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 223+32 - 5' x 5' RCBC (SERVICE ROAD)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 223+32 - 5' x 5' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 252+53 - KY 9009 OVER KY 2491		LS	1					1
02731	REMOVE STRUCTURE STA. 305+23 - DBL. 14' x 8' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 311+20 - KY 9009 OVER KY 1812		LS	1					1
02731	REMOVE STRUCTURE STA. 361+79 - 8' x 8' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 382+31 - 5' x 4' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 385+36 - KY 9009 WAGON BOX OVER KY 3034		LS	1					1
02731	REMOVE STRUCTURE KY 3034 STA. 48+70 - REMOVE ARCH		LS	1					1
02731	REMOVE STRUCTURE STA. 400+90 - REMOVE BARN		LS	1					1
02731	REMOVE STRUCTURE STA. 575+51 - 6' x 4' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 592+98 - 8' x 5' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 599+49 - DBL. 12' x 8' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE STA. 613+46 - KY 9009 BRIDGE OVER KY 1419		LS	1					1
02731	REMOVE STRUCTURE STA. 620+41 - 5' x 4' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE KY 1010 STA. 50+00-KY 1010 OVER KY 9009		LS	1					1
02775	ARROW PANEL	6	EACH	4	2				6
02898	RELOCATE CRASH CUSHION		EACH	6					6
02929	CRASH CUSHION TYPE IX		EACH	2					2
03171	CONCRETE BARRIER WALL TYPE 9T	24	LF	4,330					4,330
03340	STEEL PIPE-2 1/2 IN	20	LF	132					132
03343	STEEL PIPE-4 IN	20	LF	132					132
05950	EROSION CONTROL BLANKET		SOYD	15,978	3,229	4,664			23,871
05952	TEMP MULCH	8,9	SOYD	2,178,001					2,178,001
05953	TEMP SEEDING AND PROTECTION	8,9	SOYD	1,633,500					1,633,500
05963	INITIAL FERTILIZER	8,9	TON	101					101
05964	MAINTENANCE FERTILIZER	8,9	TON	61					61
05985	SEEDING AND PROTECTION	8,9	SOYD	1,879,585					1,879,585
05989	SPECIAL SEEDING CROWN VETCH	8,9	SOYD	83,474					83,474
05992	AGRICULTURAL LIMESTONE	8,9	TON	1,217					1,217
06510	PAVE STRIPING-TEMP PAINT-4 IN		LF			15,000			15,000
06511	PAVE STRIPING-TEMP PAINT-6 IN		LF	249,451	5,765				255,216
08100	CONCRETE-CLASS A	26	CUYD	25					25
08150	STEEL REINFORCEMENT		LB	588					588

NOTES:

- ① SEE EARTHWORK QUANTITIES AND SUMMARY SHEET.
- ② FROM PERFORATED PIPE DRAINAGE SUMMARY.
- ③ FOR CONTROLLING DUST CAUSED BY MAINTENANCE OF TRAFFIC ONLY.
- ④ INCLUDES END TREATMENTS.
- ⑤ FOR WRAPPING PIPE TRENCH BACKFILL.
- ⑥ INCLUDES INITIAL PLACEMENT ONLY. RELOCATION SHALL BE CONSIDERED INCIDENTAL TO MAINTENANCE OF TRAFFIC.
- ⑦ APPROXIMATELY 674.5 ACRES (INCLUDES 125.7 ACRES FOR EXCESS EXCAVATION AREA).
- ⑧ FOR EROSION CONTROL.
- ⑨ INCLUDES EXCESS EXCAVATION AREA.
- ⑩ KENTUCKY STATE POLICE OFFICER. SEE MAINTENANCE OF TRAFFIC PLANS.
- ⑪ SEE TRAFFIC SHEETS FOR PERMANENT STRIPING QUANTITIES.
- ⑫ FOR TEMPORARY BARRIER WALL.
- ⑬ SEE STRUCTURE PLANS FOR PARTIAL REMOVAL QUANTITIES.
- ⑭ SEE GEOTECHNICAL NOTES 14 AND 18.
- ⑮ INCLUDES 2 FOR TEMPORARY GUARDRAIL FOR MOT.
- ⑯ INCLUDES 1 FOR TEMPORARY GUARDRAIL FOR MOT.
- ⑰ SEE GEOTECHNICAL NOTE 26.
- ⑱ INCLUDES 15,606 CUYD FROM DITCH CONSTRUCTION SUMMARY, AND 3,686 CUYD FROM PIPE DRAINAGE SUMMARY.
- ⑲ SEE STRUCTURES PLANS FOR LOCATION OF SETTLEMENT PLATFORMS.
- ⑳ FOR SETTLEMENT PLATFORMS.
- ㉑ SEE GEOTECHNICAL NOTE 16.
- ㉒ SEE GEOTECHNICAL NOTE 24.
- ㉓ INCLUDES 11,853 LF FOR ALL PROPOSED CULVERT AND STORM SEWER PIPES LESS THAN 54", AND 1,991 LF FOR EXISTING PIPES TO BE INSPECTED.
- ㉔ INCLUDES 8,500 LF OF RELOCATE TEMPORARY BARRIER WALL AND, 4,250 LF OF CONCRETE BARRIER WALL TYPE 9T, FOR MAINTENANCE OF TRAFFIC TO KEEP DEBRIS FROM ROCK CUTS FROM SPILLING OUT ONTO TEMPORARY TRAFFIC LANES. AS DIRECTED BY THE ENGINEER.
- ㉕ FOR REPAIR OF BOX CULVERT 305+23 AS DIRECTED BY THE ENGINEER.
- ㉖ INCLUDES 9.5 CUYD FROM PIPE DRAINAGE SUMMARY.

FILE NAME: J:\187405 - MOUNTAIN PARKWAY - WOLFE\SUBMITTALS\4-14-2022\R020205U.DGN

DATE PLOTTED: April 14, 2022
 USER: perkinsom

E-SHEET NAME:

GENERAL SUMMARY (SHEET 2 OF 3)

COUNTY OF	ITEM NO.	SHEET NO.
WOLFE	10-168.00	R2G

REVISED 4-14-22

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02651	DIVERSIONS (BY-PASS DETOURS) (KY 1010)		LS			1			1
02652	DIVERSIONS (BY-PASS DETOURS) (KY 2491)		LS			1			1
02671	PORTABLE CHANGEABLE MESSAGE SIGN	6	EACH	2	2	2			6
02676	MOBILIZATION FOR MILL & TEXT		LS						1
02690	SAFELOADING		CUYD	315					315
02692	SETTLEMENT PLATFORM	19	EACH	10					10
02701	TEMP SILT FENCE	8	LF	28,405	4,009	3,772			36,186
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02708	CLEAN SILT TRAP TYPE C	8	EACH	675					675
02726	STAKING		LS						1
02731	REMOVE STRUCTURE STA. 129+40.35 - KY 9009 BRIDGE OVER KY 191		LS	1					1
02731	REMOVE STRUCTURE STA. 133+62.64 - DBL. 10' x 6' RCBC (PARTIAL)	13	LS	1					1
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02731	REMOVE STRUCTURE KY 3034 STA. 48+70 - REMOVE ARCH		LS	1					1
02731	REMOVE STRUCTURE STA. 400+90 - REMOVE BARN		LS	1					1
02731	REMOVE STRUCTURE STA. 575+51 - 6' x 4' RCBC (PARTIAL)	13	LS	1					1
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02731	REMOVE STRUCTURE STA. 613+46 - KY 9009 BRIDGE OVER KY 1419		LS	1					1
02731	REMOVE STRUCTURE STA. 620+41 - 5' x 4' RCBC (PARTIAL)	13	LS	1					1
02731	REMOVE STRUCTURE KY 1010 STA. 50+00-KY 1010 OVER KY 9009		LS	1					1
02775	ARROW PANEL	6	EACH	4	2				6
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