



**TRANSPORTATION CABINET**

Frankfort, Kentucky 40622  
www.transportation.ky.gov/

**Steven L. Beshear**  
Governor

**Michael W. Hancock, P.E.**  
Acting Secretary

April 16, 2010

CALL NO. 103  
CONTRACT ID NO. 101018  
ADDENDUM # 2

Subject: Jefferson County, IM 0642 (173)  
Letting April 23, 2010

- (1) Revised - Plan Sheets - R2, R2A, R2B, R2C, R2F, R2G, R2J, R2K, R7, R8, R9, R10, R11, R12, R51, & R53
- (2) Revised - Table of Contents - Page 2 of 137
- (3) Added - ITS Notes - Pages 15(a)-15(x) of 137
- (4) Revised - Bid Items - Pages 131-137 of 137

Proposal revisions are available at <http://transportation.ky.gov/contract/>.  
Plan revisions are available at <http://www.lynnimaging.com/kytransportation/>.

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

Sincerely,

A handwritten signature in black ink that reads "Ryan Griffith".

Ryan Griffith, P.E.  
Director  
Division of Construction Procurement

Enclosures  
RG:ks



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COMMONWEALTH OF KENTUCKY  
**TRANSPORTATION CABINET**  
**DEPARTMENT OF HIGHWAYS**

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JEFFERSON COUNTY  
TRIMARC RELOCATION ON I-64

ITEM NUMBER: 5-159.10

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## PROJECT DESCRIPTION

### GENERAL

This project includes relocating various existing TRIMARC facilities associated with the widening of I-64 Westbound between Hurstbourne Parkway and I-264. See Roadway Plans for details of proposed work.

### SYSTEM COMPATIBILITY

The Contractor is responsible for coordinating with TRIMARC to insure equipment compatibility and to complete integration of equipment into the TRIMARC project.

### COMMUNICATIONS

Camera shall communicate with the control center over the new phone lines and/or DSL connection and fiber optic (coordinated with the TRIMARC). The Contractor shall be responsible for furnishing and installing all conduits, junction boxes and communication cables installed on Kentucky right-of-way as specified in the plans. The Contractor shall be responsible for the installation and correct operation of all communications systems located in the field cabinet to the field devices. Testing of the Contractor's work will be performed both locally at the cabinet and remotely at the TRIMARC Traffic Operations Center. TRIMARC personnel will assist with any troubleshooting necessary to resolve problems with the communication equipment.

### EQUIPMENT AND MATERIALS

All equipment and materials provided by the Contractor shall be new unless existing equipment is to be reused. All equipment shall be the latest model and shall contain the latest firmware unless it can be shown that an earlier version is required for compatibility with existing KYTC communication protocols.

### SPECIFICATIONS AND WORKMANSHIP

Unless otherwise specified, all work shall conform to the following:

- Kentucky Standard Specifications for Road and Bridge Construction, latest edition.
- FHWA, Manual on Uniform Traffic Control Devices, latest edition.
- National Electrical Code, latest edition.
- National Electric Safety Code, latest edition.
- KYTC Department of Highways Standard Drawings, current editions.
- KYTC Department of Highways Sepia Drawings, current editions.
- International Municipal Signal Association (IMSA) Specification No. 51-7, current edition.
- AASHTO, Roadside Design Guide, latest edition.
- AASHTO, Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, latest edition.
- Kentucky Transportation Cabinet, Department of Highways, Special Provisions: Special Provision 13 Crash Cushions

All work shall be performed in a neat and professional manner. The Contractor shall remove debris and trash from work areas during construction. The Contractor shall restore areas to original condition and clean up all debris after construction.

#### DAMAGE TO EXISTING FACILITIES

The Contractor shall be responsible for locating all underground utilities prior to excavation. The contractor shall repair damage caused to any public or private facilities at his expense. Utilities include but are not limited to telephone, power, water, gas, fiber optic cable, underground vaults, roadway lighting wiring, traffic signal wiring, and roadway drainage systems.

#### GROUNDING

Unless otherwise specified, the grounding system provided will be as shown in the details provided in the Plans. Minimum ground resistance reading needs to be 10 ohms or less as tested via the 3 point fall of potential test method.

If the installation of the preferred grounding system is not possible due to physical constraints of the location or other extenuating factors, the TRIMARC Systems Engineer may allow for a standard ground installation. The standard installation would be with ground wiring consisting of solid bare copper #4 AWG and securely connected inside enclosures with #4 AWG copper clamp connectors. Nuts and washers securing the wire are not acceptable. All grounding shall meet the National Electric Code. Ground wires shall be exothermically welded to the ground rods. Ground rod clamps are not acceptable. The following devices shall be grounded to an array of two or three, 10' X 1" copper coated steel ground rods:

- Model 336 Enclosures (two ground rods required)
- Camera Poles (three ground rods required)

All ground rods in arrays shall have a minimum of 6' separation.

The resistance to ground shall be less than 10 Ohms as measured with an AEMC clamp on ground resistance meter or equivalent.

Existing grounding systems shall be replaced if the resistance to ground greater than 10 Ohms.

The Contractor shall leave all exothermic welds exposed for inspection by the Engineer before backfilling.

#### EQUIPMENT LIST

The contractor shall provide an equipment list in Microsoft Excel format to the Engineer containing the following information:

- Type of equipment
- Field location
- Make

- Model
- Serial number
- Date of purchase
- Manufacturer contact information
- Equipment vendor contact information (if different)
- Date of Installation
- Date warranty expires

This list shall be provided to the Division of Traffic Operations and TRIMARC Systems Administrator prior to burn-in testing. See below for TRIMARC Info:

Mr. Todd Hood  
TRIMARC Systems Administrator  
901 W. Main St.  
Louisville, KY 40202  
Phone: 502-587-6624  
Fax: 502-587-6645  
Email: Todd.Hood@ngc.com

#### WARRANTY

The Contractor shall provide a copy of all equipment warranty information to the Division of Traffic Operations for new equipment only. The Contractor shall provide documentation from the manufacturer that ownership of the warranty is transferred to the following:

Kentucky Transportation Cabinet  
Division of Traffic Operations  
200 Mero Street  
Frankfort, KY 40622

#### TESTING

The contractor shall demonstrate proper functioning of all devices at the field communications demarcation point. The field communications demarcation point is the location where the communications equipment supplied by TRIMARC is installed. After each device can be successfully operated at the field communications demarcation point the devices will be integrated into the TRIMARC Traffic Operations Center.

The project will be accepted after all devices have completed their test successfully and are functioning in at least pre-construction levels, and acceptable as-built drawings and warranty information have been received.

#### SHOP DRAWINGS

All items that are used on this project shall have shop drawings sent to Traffic Operations for approval. All items shall be approved before purchase of said items.

#### AS-BUILT DRAWINGS

The Contractor, at the completion of the project, shall submit as-built drawings. As-built drawings shall be submitted in electronic format such as .pdf, .tiff, .dgn or other standard

image format acceptable to the Engineer. As-built drawings may be scanned from marked up field plans or drawn in MicroStation. As-built drawings shall be scanned at a resolution that will allow them to be clearly legible on a computer display. As-built drawings shall include the exact location of all above ground equipment, underground conduit, wire, sensors and other equipment. Drawings shall indicate any changes to the design including changes to the numbers of conductors, wire gage, splices, additional conduit, etc. Conduit locations shall be drawn to scale or shall be dimensioned and referenced to permanent roadway features. Turns in conduit shall be referenced so that the conduit paths may be derived from the as-built drawings. Existing underground utilities shall be indicated on the drawings. Two copies of the drawings shall be submitted. One copy of the drawings shall be submitted to the Engineer. One copy of the drawings shall be submitted to the KYTC Division of Traffic Operations Design Services Branch. The Contractor shall correct any drawings that are deemed unacceptable to the Engineer. As-built drawings shall be delivered prior to burn-in testing.

### **TRAFFIC CONTROL PLANS**

See the Maintenance of Traffic and Construction Phasing Plans.

## **POLE BASE**

### **DESCRIPTION**

Furnish and install Pole Base in accordance with the plans, specifications and Standard Drawings. Refer to grounding section of this document for additional requirements concerning grounding.

### **MATERIALS**

Pole Base includes concrete, anchor bolts, reinforcing steel, and conduit within base. The Contractor shall submit to material testing at the discretion of the Engineer.

### **INSTALLATION**

The Contractor shall stake all proposed pole base locations and obtain approval before excavation. TRIMARC Engineer will approve locations for all pole bases. The Contractor shall have utilities marked in the field prior to requesting approval. The Contractor shall allow two weeks to schedule the location approval with the TRIMARC Engineer. TRIMARC Engineer approval of field device location does not relieve the contractor from his responsibility to avoid utilities and repair any damage to buried infrastructure. The Contractor shall grade and re-seed all disturbed areas and restore the area to the satisfaction of the Engineer. Poles located behind guardrail shall have a minimum 5' spacing from edge of pole to face of guardrail. Otherwise, poles shall be located as according to the plans sheets or a minimum of 30' from all driving lanes. This item includes all excavation including any special equipment required to install the base in rock.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Pole Base will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## **CCTV CONTROL CABLE**

### **DESCRIPTION**

Furnish and install CCTV Control Cable in accordance with the plans, specifications and Standard Drawings.

### **MATERIALS**

CCTV Control Cable shall be compatible with CCTV Assembly. CCTV control cables shall be a composite cable consisting of one RG59 coax video cable and an appropriate number and size of copper conductors to meet the needs of the camera. Cable shall meet all applicable specifications of UL/NEC/CEC CATV or CM. Cable shall be flame resistant per UL 1581 Vertical Tray. All connectors, terminators, fittings, etc. are incidental to the cost of installing the CCTV control cable and no separate payment will be made.

### **INSTALLATION**

CCTV Control Cable shall be provided on spools of 1000 feet (nominal). The cable shall be of suitable length to allow installation between equipment without exceeding the minimum bend radius as specified by the manufacturer. Connectors shall be installed as necessary and shall match the connector interface requirements for the equipment being connected. Adapters are not acceptable. At the completion of the project, partial spools with a minimum of 50 feet of cable shall become the property of the KYTC.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

CCTV Control Cable will be measured for payment per unit each 1000 foot spool. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## **COMMUNICATIONS CABLE**

### **DESCRIPTION**

Furnish and install Communications Cable in accordance with the plans, specifications and Standard Drawings.

### **MATERIALS**

Communications cable shall be General Cable GenSpeed 5000 CAT 5e Outside Plant Cable 8 wire PN: 5136100 or approved equal. The cable shall meet or exceed the following specifications:

Performance:

- ANSI/TIA/EIA 568B (Category 5e)
- MIL-C-24640A Water Penetration
- Propagation Delay: 583 ns @ 100 MHz
- Return Loss @ 100 MHz: 20.1 DB
- Frequency Range: 1-350 MHz

Physical characteristics:

- Nominal Outside Diameter: 0.230 in
- Insulation Type: Polyolefin
- Maximum Pulling Tension: 25 lbs
- Maximum DC Resistance: 9.38 Ohms/100m
- Mutual Capacitance @ 1kHz: 17 pF/100m
- Operating Temperature: -45° C to 80° C

All connectors, terminators, fittings, etc. shall be incidental to the cost of installing the Communications Cable and no separate payment will be made.

## **INSTALLATION**

Communications Cable shall be furnished on spools of 1000 feet (nominal). The Contractor shall install all cable and wire splice-free from the controller/service location to each cabinet, VMS sign, or CCTV camera the cable or wire is feeding. The Contractor shall not use excessive force when pulling wire through duct. The Contractor shall replace all wire damaged during installation. The Contractor shall submit to material testing at the discretion of the Engineer. Upon completion of the project, partial spools with a minimum of 50 feet of cable shall become the property of the KYTC.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Communications Cable will be measured for payment per unit each 1000 foot spool. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## **CONDUIT**

### **DESCRIPTION**

Furnish and install Conduit in accordance with the plans, specifications and Standard Drawings.

### **MATERIALS**

Conduit shall be rigid steel, schedule 40 PVC, or flexible, non-metallic conduit as specified. This item includes fittings, connectors, clamps, caps and other materials necessary for proper installation. The Contractor shall submit to material testing at the discretion of the Engineer.

## **INSTALLATION**

All conduit installed above ground or below ground under pavement shall be rigid steel. All conduit installed below ground, not under pavement shall be PVC. Flexible, non-metallic conduit shall be used as required. Unused conduits shall be capped on both ends. Conduit containing wire or cable shall be sealed with duct seal putty. All conduits shall be accessible inside junction boxes.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Rigid Steel and PVC Conduit will be measured for payment per unit linear foot. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section. A direct measurement will not be made for flexible, non-metallic conduit. All flexible, non-metallic conduit shall be incidental to the project.

# **ELECTRICAL SERVICE**

## **DESCRIPTION**

Furnish and install Electrical Service in accordance with the plans, specifications and Standard Drawings.

## **MATERIALS**

The Contractor shall coordinate with the local power company to determine the exact materials for the service. The local power company has stated that all new services will be 3 wires and care should be taken to install the meter in a direction it can be easily read. Some locations will require an AWR meter. This includes but is not limited to conduit, meter base, stainless steel disconnect, fused cutout, ground rod, wire, connectors, fittings and all associated hardware required to construct the service. All connections shall be coated with Nalox to prevent corrosion.

## **INSTALLATION**

The Contractor shall coordinate with TRIMARC and the local power company for the exact location of the service. This item also includes all electrical inspection and other fees required to provide electrical service.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Electrical Service will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## FIBER OPTIC CABLE AND FIBER TERMINATION RACK

### DESCRIPTION

Furnish and install Fiber Optic Cable and Fiber Termination Rack in accordance with the plans, specifications and Standard Drawings.

### MATERIALS

The Contractor shall install specified fiber optic cable and distribution equipment using the stated installation procedures. The fiber termination rack shall include rack enclosure (Corning Fiber CCH01 or approved equal), panel modules 12 fiber (Corning Fiber CCHCP1259 or approved equal), and single mode patch cords (Corning Fiber VDX9YY53FIS or approved equal).

This shall include furnishing and installing all materials, mounting hardware, and cabling necessary to construct a complete and functional system. This shall also include all labor, tools, equipment, and incidentals necessary to complete the work, including but not limited to integrated fiber optic termination units, connector modules, jumper cables, testing, and documentation.

Fiber optic cable shall be Optical Cable Company BX12 125D SLS 900 OFNR or approved equal. Fiber optic cable, jumper cables, and distribution equipment shall be fabricated by a certified ISO 9001 manufacturer.

All fiber cable provided under this contract shall be from the same manufacturer utilizing identical specifications. Fiber cables shall be dielectric (constructed from non-metallic materials). Fiber cables shall contain single mode optical fibers, loose tube, filled with a water-blocking material, and shall be suitable for installation in underground conduit and field cabinets.

All optical fiber in the cable shall, at a minimum, comply with the following requirements:

- Min. Cladding diameter: 125+/- 1.0 $\mu$ m
- Core to cladding offset: 0.8 $\mu$ m maximum
- Maximum attenuation: 0.5 dB/km at 1310 nm  
0.5 dB/km at 1550 nm
- Maximum chromatic dispersion: 3.2 ps/(nm x km) from 1285 nm to 1330 nm  
18 ps/(nm x km) at 1550 nm
- Fiber polarization mode dispersion: 0.5 ps/(km), 2 maximum
- Coating diameter: 245  $\mu$ m +/- 10  $\mu$ m

The change in attenuation for single-mode from 0° F to -150° F shall not exceed 0.2 dB/km at 1550 nm, with 80 percent of the measured values no greater than 0.1 dB/km at 1550 nm.

The cable design shall have a life expectancy of 20 years when installed to manufacturer's specifications.

Optical fibers shall be contained inside a loose buffer tube. Each buffer tube shall contain 12 fibers. The buffer tubes shall allow free movement of the fibers without fiber damage during installation or normal operation, including expansion and contraction of the buffer tubes. The diameter of all buffer tubes in a cable shall match.

The cable shall have a central member designed to prevent buckling of the cable.

The cable core interstices shall be filled with a non-nutritive to fungus, electrically non-conductive, water-blocking material such as water-swellaable tape that is dry to the touch. The water blocking material shall be free from dirt and foreign matter.

The cable shall contain a least one ripcord under the sheath for easy sheath removal.

The cable shall have tensile strength members that minimize cable elongation due to installation forces and temperature. The cable shall withstand a 600 lb. tensile load applied per EIA-455-33. The change in attenuation shall not exceed 0.2 dB during loading and 0.1 dB after loading. The cable shall be rated for a minimum installed tensile service load of 200 lbs.

The cable shall be dielectric (with no armoring) and be either HDPE or MDPE. Jacketing material shall be applied directly over the tensile strength members and water-blocking material.

The markings on the fiber optic cable shall include cable length markings.

The fiber optic cable shall be capable of withstanding the following conditions without damage or decrease in function:

- Cable freezing per EIA/TIA-455-98
- Total immersion in water with natural mineral and salt contents
- Salt spray or salt water immersion for extended periods
- Wasp and hornet spray

Cable shall be furnished in one continuous length per reel and shall be free from optical splices. A minimum length of six feet on each end of the cable shall be accessible for testing.

Information either stenciled or lettered on the reel or provided on a weatherproof tag firmly attached to the reel shall include the following:

- Factory order number
- Job number
- Ship date
- Manufacturer's cable code
- Type of cable (single mode, outdoor, indoor)
- Beginning and ending length markings

- Measured length and attenuation

#### FIBER OPTIC DISTRIBUTION EQUIPMENT:

SC type Connectors shall used. The measured attenuation of the connector (inclusive of coupler and mated test connector) shall not exceed an average of 0.3 dB for all connectors provided. Any connector found in excess of 0.5 dB will be rejected. Reflectance shall be less than -40 dB, from 14° F to +140° F. The manufacturer shall have a program that periodically tests connectors to ensure that, after 1000 re-matings, the attenuation shall not change more than 0.2 dB.

The connector shall be able to withstand an axial pull of 25 lbs. with no physical damage to the connector and no permanent optical degradation more than 0.3 dB. Connectors shall be pre-wired by the manufacturer.

Fiber optic jumper cables shall, at a minimum, comply with the following requirements:

- Have less than 0.2 dB loss when subjected to EIA/TIA-455-1A, 300 cycles, 0.5 kg
- Have an Aramid yarn strength member
- Have a rugged PVC sheathing
- Have a minimum bend radius of 12.5 inches following installation, 25 inches during installation
- Have a minimum tensile strength of 100 lbs
- Have connectors with strain relief pre-wired by the manufacturer
- Comply with NEC requirements for indoor fiber optic cable

Jumper cables shall be either single or duplex. Duplex jumper cables shall have permanent markings to distinguish between the fibers or connectors.

Connector modules shall consist of a connector panel, couplers, and a protective housing. The measured attenuation of the connector module (inclusive of coupler, fiber, and mated ST test connector) shall not exceed an average of 0.3 dB for all connector modules provided. Any connector module found in excess of 0.5 dB will be rejected. Connector modules shall, at a minimum, comply with the following:

- Have 6 couplers for ST applications
- Have 12 couplers for SC applications
- Have a durable housing that provides physical protection and strain relief for the termination of multi-fiber cable to couplers
- Be easily installed and removed from the termination housing
- Be furnished with protective covers for couplers on the jumper cable side
- Comply with NEC requirements for indoor fiber optic cable

There shall be a fixed correlation between each buffered fiber color and coupler position for all connector modules. Fiber color shall meet the requirements for outdoor fiber optic cable.

Fiber optic termination units shall be properly sized for the required number of terminations subject to the minimum requirements stated for each configuration. The fiber optic termination units shall, at a minimum, comply with the following requirements:

- Be rack mounted
- Have front and rear doors or removable panels
- Have a top, bottom, and 4 sides that fully enclose the interior and protect its contents from physical damage
- Be manufactured using 16 gauge aluminum or equivalent and corrosion resistant
  
- Have provisions for neatly routing cables, buffer tubes and fan-out tubing
- Have cable management brackets or rings integral to the unit to secure and route cables from the connector modules to the vertical rack members while maintaining a minimum 1.5 inch cable radius

## **INSTALLATION**

Fiber optic cable shall be installed in conduit and cabinets. Fiber optic cable shall be installed in accordance with the manufacturer's installation techniques and procedures. The Contractor shall furnish and install all jumper cables and termination equipment necessary to connect fiber optic cable to the equipment.

The Contractor shall install fiber optic cable as a continuous run, without splices, between the cable ends identified. The Contractor shall label fiber optic cables at each end of the cable run, at the points where the cable enters and exits the cabinet for mid-cable access locations, and in all junction boxes. Labels for fiber optic cable shall identify the cable number and the string numbers of the fiber contained within the cable.

Installation of fiber optic cable and jumper cables shall meet the minimum requirements of local building codes and NEC Article 770. Cable shall not be pulled along the ground, over or around obstructions, over edges or corners, or through unnecessary curves or bends. Bend radius criteria of 10 times the cable diameter no stress and twenty times cable diameter under stress shall not be exceeded. Manufacturer-approved pulling grips, cable guides, feeders, shoes, and bushings shall be used to prevent damage to cable during installation.

When cable is removed from the reel prior to installation, it shall be placed in a "figure-eight" configuration to prevent kinking or twisting. Care shall be taken to relieve pressure on the cable by placing cardboard shims at each crossover, by creating additional "figure-eights", or by an approved equivalent method.

Prior to the installation of any fiber optic cable in conduit, the Contractor shall provide the cable manufacturer's recommended and maximum pulling tensions to the Engineer. Included with these pulling tensions shall be a list of the cable manufacturer's approved pulling lubricants. Lubricants shall be used in quantities and in accordance with the procedures recommended by the lubricant manufacturer.

Prior to the installation of any fiber optic cable in conduit, all cable pulling equipment shall be approved by the Engineer. The cable pulling equipment shall include a meter to display pulling tension and a mechanism to ensure that the maximum allowable pulling tension cannot be exceeded at any time during installation.

The Contractor shall furnish attachment hardware, installation guides, and other necessary equipment, not specifically listed herein, as required to install the fiber optic cable.

Fiber optic cable in junction boxes shall be properly looped and attached to the sidewall.

Slack fiber optic cable shall be coiled, labeled, and attached to cable guides.

All fibers, including spares, shall be installed from the connector modules, terminated at the appropriate fibers, and secured neatly within the termination rack.

Fiber terminations shall be neatly and permanently labeled on the connector modules to designate transmit or receive.

Blank connector panels shall be of the same finish and manufacture as the connector modules and shall be installed for all unused connector module spaces.

Prior to the installation of jumper cables, the Contractor shall provide and maintain protective covers over the optical connectors and terminations. Protective covers on unused terminations shall remain.

Jumper cables shall be installed from connector modules to end equipment, and from end equipment to end equipment in multiple cabinet configurations. Jumper cables shall be secured to provide strain relief at both the connector module and the end equipment. Manufacturer recommended installation and minimum bend radius requirements shall be adhered to. Jumper cables shall be labeled at both ends.

Any approved splices shall be made using the fusion splice technique and shall not induce more than 0.1 dB attenuation for each splice nor 0.07 dB average for all splices. Splices that exceed 0.1 dB attenuation shall be re-spliced by the Contractor at no additional cost.

#### TESTING

Fiber optic cables shall be tested by the manufacturer in conformance with the procedures of TIA/EIA-526-7A. Submittal of test data shall include a summary sheet that clearly illustrates measured loss versus budgeted loss. Each test result on the summary sheet shall be identified by cable number(s) and begin and end locations. The Contractor shall identify any unacceptable losses and perform corrective work at no additional cost. The maximum permissible loss for cables other than jumpers, terminations, and connector modules is 0.05 dB. Any cable not compliant shall be

replaced in its entirety and re-tested for compliance. A copy of the final, summarized, post-installation test results shall be placed in a protective sleeve approved by the Engineer and attached to the rack or door.

Bi-directional (OTDR) tests shall be conducted by the manufacturer for all string paths. The OTDR tests shall document the loss for each component (connector module, jumper cable, etc.). Short runs of fiber shall be tested using a 'lead-in' cable or an 'attenuator' to obtain proper readings from the OTDR. OTDR traces shall be submitted. Each test shall be clearly annotated with the measured loss identified on the OTDR trace. All tests over 0.05 dB shall be identified on the summary sheet.

#### **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Fiber Optic Cable will be measured for payment per unit linear foot. Termination Fiber Rack will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

### **JUNCTION BOX**

#### **DESCRIPTION**

Furnish and install Junction Box in accordance with the plans, specifications and Standard Drawings.

#### **MATERIALS**

Junction box shall meet or exceed ANSI/SCTE 77-2002, tier 15. Junction box covers shall be marked "Traffic." Covers shall be attached with a minimum of two 3/8" stainless steel hex bolts.

#### **INSTALLATION**

Where required, junction box shall be oriented such that the dimensions comply with the NEC. Junction boxes used as pull boxes along a conduit run shall be spaced at a maximum of 250'. Junction boxes shall not be placed in ditch lines or in areas where standing water may accumulate. Junction box covers shall be flush with the finished surface. All conduits shall be marked in the junction box to show the directions (to device or to service). The Contractor shall restore and reseed all disturbed areas to the satisfaction of the Engineer.

#### **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Junction Box will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## **TRANSCEIVERS**

### **DESCRIPTION**

Furnish single channel video over fiber transceiver and single channel data over fiber transceiver to be located in cabinets and trusses for protection of and/or communications to CCTV camera cabinets, VMS Signs, and high mast pole installations.

### **MATERIALS**

#### **SINGLE CHANNEL DATA OVER FIBER TRANSCEIVER**

Single Channel Data over Fiber Transceiver shall be IFS, DE7200-S or approved equal.

All fiber optic transceivers shall be supplied from a single manufacturer.

Fiber optic Ethernet media converters shall be provided. The system shall provide real-time 10/100 Base-T and 100 Base-FX performance. The transceiver shall be used as an Ethernet media converter supporting one Ethernet 100 Base-T electrical port and one Ethernet 100 Base-FX optical port. The transceiver shall have auto MDI/MDI-X operation that has the capability of being forced on. The transceiver shall be fully compatible with all standard IEEE 802.3, 802.3u, and 802.3x Ethernet protocols. The transceiver shall have an enhanced mode to provide the back-off algorithm changed from IEEE standard 802.3 binary exponential to aggressive mode, enable half-duplex back-pressure, disable excessive collision drop, and enable jumbo frame for streaming media applications. The transceiver requirements shall be two single mode optical fiber. The transceiver shall have a substantially wide dynamic range so as to never require optical or electrical adjustments. Optical attenuators shall never be required. The transceiver shall provide local diagnostic indicators. The transceiver shall support a remote network management option providing full interoperability with industry standard SNMP/IP protocols. All transceivers shall be available in both card mount and surface mount versions. All transceiver shall have automatic, resettable, polymer fuses on all power rails that shall provide for automatic reset, as well as, transient suppression on all data I/O connections. All card mount transceivers shall have an internal DC power supply. A short circuit in one module shall not affect the operation of other modules powered from the common power supply. All card mount transceivers shall have the ability to be inserted into and removed from the communication management chassis without interrupting power and with no risk of damage to other modules or the communications management chassis during replacement. The system shall have an ambient operating temperature of -40°C to +74°C, an ambient storage temperature of 40°C to +85°C, a relative humidity ability of 0% to 95% (non-condensing), have an option for conformal coating, and a MTBF of > 100,000 hours. The transceiver shall meet or exceed NEMA TS-1/TS-2 and Caltrans Traffic Signal Control Equipment Specifications for operating temperature, humidity, mechanical shock, vibration, and voltage transient protection. The transceiver radiated emissions shall be compliant with FCC Part 15, Class B, and EN55022 specifications. The transceiver shall use lasers that are compliant with FDA Performance Standard for Laser Products, Title 21, Code of Federal Regulations Subchapter J.

## SPECIFICATIONS

Data: One (1) channel, bi-directional

### DATA SPECIFICATIONS

- Data Protocol: Ethernet
- Operating Mode: Half or full-duplex
- Enhanced or standard IEEE 802.3
- Data Rate: 10/100 Mbps
- Ethernet Compliance: IEEE 802.3, 802.3u, 802.3x
- Ethernet Isolation: 1500 VRMS, One (1) minute

### OPTICAL SPECIFICATIONS

- Fiber Type: Single mode
- Wavelength: 1300/1550nm
- Number of Fibers: Two
- Optical Emitter Type: Laser
- Transmitter Output Power: 500 $\mu$ w (-3 dBm)
- Receiver Sensitivity: 5 $\mu$ w (-23 dBm)
- Optical Power Budget: 20 dB

### STATUS INDICATOR SPECIFICATIONS

- Power
- Data Rate
- Auto-Negotiate
- Operating Modes
- Optical Link Detect

### SINGLE CHANNEL VIDEO OVER FIBER TRANSCEIVER

Single Channel Video over Fiber Transceiver shall be IFS, VADT/VADR 14130WDM or approved equal.

All fiber optic modules shall be supplied from a single manufacturer.

Digital fiber optic video and data transmitters and receivers shall be provided as required. The transceiver shall transmit a one-way, single channel of high resolution, true broadcast quality, real-time NTSC or PAL color video. The transceiver shall employ 10-bit digital encoding for transmission of these signals. The transceiver shall meet the RS-250C short-haul standard for video transmission. The transceiver shall provide bi-directional data supporting RS-232, RS-422, or 2 or 4-wire RS-485 data interfaces. The transceiver shall be transparent to all major data protocols (i.e., Manchester Encoding, Bi-Phase, NRZ, NRZI, etc.). The transceiver requirements shall be one single mode optical fiber. The transceiver shall have a substantially wide dynamic range so as to never require optical or electrical adjustments. Optical attenuators shall never be required. The

transceiver shall provide local diagnostic indicators. The transceiver shall support a remote network management option providing full interoperability with industry standard SNMP/IP protocols. All transceivers shall be available in both card mount and surface mount versions. All transceivers shall have automatic, resettable, polymer fuses on all power rails that shall provide for automatic reset, as well as, transient suppression on all video and data I/O connections. All card mount transceivers shall have an internal DC power supply. A short circuit in one module shall not affect the operation of other modules powered from the common power supply. All card mount transceivers shall have the ability to be inserted into and removed from the communication management chassis without interrupting power and with no risk of damage to other modules or the communications management chassis during replacement. The transceiver shall have an ambient operating temperature of -40°C to +74°C, an ambient storage temperature of -40°C to +85°C, a relative humidity ability of 0% to 95% (non-condensing), have an option for conformal coating, and a MTBF of > 100,000 hours. The transceiver shall meet or exceed NEMA TS-1/TS-2 Equipment Specifications for operating temperature, humidity, mechanical shock, vibration, and voltage transient protection. The transceiver radiated emissions shall be compliant with FCC Part 15, Class B, and EN55022 specifications. The transceivers shall use lasers that are compliant with FDA Performance Standard for Laser Products, Title 21, and Code of Federal Regulations Subchapter J.

#### SPECIFICATIONS

Video: One (1) channel, one-way

Data: One (1) channel, bi-directional, RS-232, RS-422, or 2 or 4-wire RS-485

#### VIDEO SPECIFICATIONS

- I/O: 1 volt pk-pk (75 ohms)
- Bandwidth: 5Hz – 10 MHz
- Differential Gain: < 2%
- Differential Phase: < 0.7°
- Tilt: < 1%
- Signal-to-Noise Ratio (SNR): 67 dB @ maximum optical loss budget

#### DATA SPECIFICATIONS

- Data Interface: RS-232, RS-422, or 2 or 4-wire RS-485
- Data Format: NRZ, NRZI, Manchester, Bi-Phase
- Data Rate: DC – 230 kbps (NRZ)
- Bit Error Rate (BER): < 1 x 10<sup>-9</sup> @ maximum optical loss budget
- Operating Mode: Simplex or full-duplex

#### OPTICAL SPECIFICATIONS

- Fiber Type: Single Mode

- Wavelength: 1300/1550nm
- Number of Fibers: One
- Optical Emitter Type: Laser
- Transmitter Output Power: 600 $\mu$ w (-2 dBm)
- Receiver Sensitivity: 3 $\mu$ w (-25 dBm)
- Optical Power Budget: 23 dB

#### STATUS INDICATOR SPECIFICATIONS

- Power
- Video Sync
- Data Receive
- Data Transmit
- Optical Link Detect

This item includes cables, connectors, power supplies, and all incidentals required for operation.

#### INSTALLATION

The Contractor shall single channel data over fiber transceivers and single channel video over fiber transceivers in Model 334/336 enclosures, VMS signs, on poles, and on sign trusses as specified on layout sheets. The Contractor shall be responsible for the transceivers working properly with other equipment.

#### METHOD OF MEASUREMENT AND BASIS OF PAYMENT

Fiber Transceiver Sign (DATA) and Fiber Transceiver Camera (Video) will be measured for payment per unit each. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

### TRENCHING AND BACKFILLING

#### DESCRIPTION

Trenching and Backfilling shall be performed in accordance with the plans, specifications and Standard Drawings.

#### MATERIALS

All trenches shall be marked with underground utility warning tape.

#### INSTALLATION

The Contractor shall be responsible for locating all underground utilities prior to excavation. The Contractor shall excavate the trench, place warning tape above the conduit, backfill the trench, reseed, and restore all disturbed areas to the satisfaction of the Engineer. Backfill material shall be placed and compacted in lifts of 9 inches or less. Incidental to this item is any Bore and jack under existing roadway.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Trenching and Backfilling will be measured for payment per unit linear foot. The Department will make payment for complete, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## **WIRE AND CABLE**

### **DESCRIPTION**

Furnish and install Wire and Cable in accordance with the plans, specifications and Standard Drawings.

### **MATERIALS**

Unless otherwise specified, wire shall be stranded copper type USE. This item shall include all connectors, splicing and insulating hardware, ties, tape, labels and incidentals required for electrical connections. All connections shall be coated with Nolox to prevent corrosion. The Contractor shall submit to material testing at the discretion of the Engineer.

### **INSTALLATION**

The Contractor shall install all cable or wire runs splice-free from the controller/service location to each cabinet, VMS sign, or CCTV camera the cable or wire is feeding. All wire shall be labeled inside cabinets and junction boxes. The contractor shall not use excessive force when pulling wire through duct. The contractor shall replace all wire damaged during installation. The Engineer may require testing of wiring for damaged insulation. Wire that does not pass an insulation resistance test of a minimum of 100 hundred megohms to ground shall be replaced by the Contractor at his cost.

## **METHOD OF MEASUREMENT AND BASIS OF PAYMENT**

Wire and cable will be measured for payment per unit linear foot. The Department will make payment for complete, functioning, inspected, and accepted quantities. The Department will consider payment as full compensation for all work required under this section.

## GLOSSARY

The following acronyms, abbreviations, and definitions shall govern this specification:

- AASHTO – American Association of State Highway and Transportation Officials
- ABS - Acrylonitrile Butadiene Styrene
- AC – Alternating Current
- AlInGaP – Aluminum Indium Gallium Phosphide (refers to the chemical composition of an LED).
- ANSI – American National Standards Institute
- ASCII – American Standard Code for Information Interchange
- ASN.1 – Abstract Syntax Notation 1
- ASTM – American Society for Testing and Materials
- AWG - American Wire Gauge
- AWS – American Welding Society
- BCD – Binary Coded Decimal
- B frames – Bi-directional Predicted Frames
- BGP – Border Gateway Protocol
- Bin – Group of LEDs categorized and sorted by intensity or color. Each bin has upper and lower intensity or color specifications and contains only LEDs that are measured to be within that range. LED manufacturers sort LEDs into bins to ensure consistent intensity and color properties.
- BOOTP – Bootstrap Protocol
- CALTRANS – California Department of Transportation
- CAN – Control Area Network
- CCTV – Closed Circuit Television
- CDPD – Cellular Digital Packet Data
- CLI – Command Line Interface
- CNC – Computer Network Control
- Control Computer – A desktop or laptop computer used in conjunction with VMS control software to communicate with VMS sign controllers. The control computer can instruct a VMS sign controller to program and control the VMS, monitor VMS status, and run VMS diagnostic tests. A control computer can be used for remote control of one of more VMS, as well as for local control of a single VMS
- DC – Direct Current
- DHCP – Dynamic Host Configuration Protocol
- DMS – Dynamic Message Sign. An industry term that applies to various types of changeable sign technology
- DVI-D – Digital Visual Interface - Digital
- EIA – Electronic Industries Association
- ELFEXT – Equal Level Far End Crosstalk
- EPA – Effective Projected Area
- FCC – Federal Communications Commission
- FDA – Food and Drug Administration
- Font – The style and shape of alphanumeric characters that are displayed on the

- VMS matrix to create messages viewed by motorists and travelers
- Frame – see *Page*
  - FSORS – Full, Standardized Object Range Support – an NTCIP term. See the NTCIP standards for additional information.
  - GUI – Graphical User Interface
  - HDPE – High Density Polyethylene
  - HHR – Half Horizontal Resolution
  - HTTP – Hypertext Transfer Protocol
  - IEEE – Institute of Electrical and Electronic Engineers
  - I frames – Intra-frames
  - IC – Integrated Circuit
  - IGMP
  - InGaAlP – Indium Gallium Aluminum Phosphide
  - I/O – Input/Output
  - IP – Internet Protocol – in transceivers
  - IRE – Institute of Radio Engineers
  - ISO – International Organization for Standardization
  - ITE – Institute of Transportation Engineers
  - ITS – Intelligent Transportation System
  - Kbps – Kilobits per second
  - KYTC – Kentucky Transportation Cabinet
  - LAN – Local Area Network
  - LCD – Liquid Crystal Display
  - LED – Light Emitting Diode
  - MDPE – Medium Density Polyethylene
  - Message – Information displayed on the VMS for the purpose of visually communicating with motorists. A VMS message can consist of one or more pages of data that are displayed consecutively
  - MIB – Management Information Base
  - Module – Assembly consisting of a two-dimensional LED pixel array, pixel drive circuitry, and mounting hardware. Modules are installed in the display adjacent to each other to form the display matrix.
  - MTBF – Mean Time Between Failures
  - MPEG – Moving Picture Experts Group
  - NEC – National Electrical Code
  - NEMA – National Electrical Manufacturers Association
  - NESC – National Electrical Safety Code
  - NEXT – Near End Crosstalk
  - NCHRP – National Cooperative Highway Research Program
  - NRZ – Non Return to Zero
  - NRZI – Non Return to Zero Inverted
  - NTCIP – National Transportation Communications for ITS Protocol
  - NTSC - National Transmission Standards Committee

- Object – An NTCIP term referring to an element of data in an NTCIP-compatible device that can be manipulated to control or monitor the device.
- OER – Octet Encoding Rules
- OSHA – Occupational Safety and Health Administration
- OTDR – Optical Time Domain Reflectometer
- Page – An NTCIP term referring to the data that is displayed on the VMS display matrix at a given moment in time. Also referred to as a frame.
- P frames – Forward Predicted Frames
- PCB – Printed Circuit Board
- Pixel – Picture element. The smallest changeable (programmable) portion of a VMS display matrix
- PMPP – Point to Multi-Point Protocol
- PPP – Point to Point Protocol
- PSELFEXT – Power Sum Equal Level Far End Cross Talk
- PSNEXT – Power Sum Near End Crosstalk
- PTZ – Pan/Tilt/Zoom
- PVC – Polyvinyl Chloride
- PWM – Pulse Width Modulation
- QSIF – Quarter Source Input Format
- RAM – Random Access Memory
- RARP – Reverse Address Resolution Protocol
- RGB – Red-Green-Blue
- Schedule – A set of data that determines the time and date when a VMS sign controller will cause a stored message to be displayed on the VMS
- SDRAM – Synchronous Dynamic Random Access Memory
- SIF – Source Input Format
- SNMP – Simple Network Management Protocol
- STMP – Simple Transportation Management Framework
- Stroke – Refers to the vertical and horizontal width of the lines and curves of a display font. Single stroke denotes character segments that are one pixel wide. Double stroke denotes character segments that are two pixels wide.
- TFTP – Trivial File Transfer Protocol
- TIA - Telecommunications Industry Association
- TMA – Truck Mounted Attenuator
- TOC – Traffic Operations Center
- UL – Underwriters Laboratories
- UPS – Uninterruptible Power Supply
- USB – Universal Serial Bus
- VLAN – Virtual Local Area Network
- VMS – Variable Message Sign. A type of VMS that is fully programmable such that the content of its messages are fully changeable remotely and electronically.
- VMS Controller – A stand-alone computer that is located at a VMS site, which controls a single VMS. A sign controller receives commands from and sends information to a control computer

- WAN – Wide Area Network
- WYSIWYG – What You See Is What You Get. More specifically, what you see on the VMS control computer monitor is a scaled representation of how a message will appear when it is being displayed on the VMS. Similarly, after a pixel diagnostic test routine has been run, what you see on the control computer monitor is a scaled representation of the functional status of each pixel in the VMS display matrix.

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT PRICE	AMOUNT
SECTION 0001 ROADWAY						
0010	00001	DGA BASE	16,004.000	TON		
0020	00018	DRAINAGE BLANKET-TYPE II-ASPH	4,266.000	TON		
0030	00022	JPC PAVEMENT DRAINAGE BLANKET	1,693.000	TON		
0040	00078	CRUSHED AGGREGATE SIZE NO 2	28.000	TON		
0050	00100	ASPHALT SEAL AGGREGATE	86.000	TON		
0060	00214	CL3 ASPH BASE 1.00D PG64-22	3,862.000	TON		
0070	00217	CL4 ASPH BASE 1.00D PG64-22	2,726.000	TON		
0080	00219	CL4 ASPH BASE 1.00D PG76-22	1,392.000	TON		
0090	00291	EMULSIFIED ASPHALT RS-2	10.000	TON		
0100	00339	CL3 ASPH SURF 0.38D PG64-22	565.000	TON		
0110	00342	CL4 ASPH SURF 0.38A PG76-22	636.000	TON		
0120	00461	CULVERT PIPE-15 IN	16.000	LF		
0130	00462	CULVERT PIPE-18 IN	89.000	LF		
0140	00464	CULVERT PIPE-24 IN	46.000	LF		
0150	01000	PERFORATED PIPE-4 IN	9,134.000	LF		
0160	01010	NON-PERFORATED PIPE-4 IN (REVISED: 4-16-10)	401.000	LF		
0170	01015	INSPECT & CERTIFY EDGE DRAIN SYSTEM	( 1.00)	LS		
0180	01020	PERF PIPE HEADWALL TY 1-4 IN	10.000	EACH		
0190	01028	PERF PIPE HEADWALL TY 3-4 IN (REVISED: 4-16-10)	7.000	EACH		
0200	01032	PERF PIPE HEADWALL TY 4-4 IN (REVISED: 4-16-10)	6.000	EACH		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT PRICE	AMOUNT
0210	01432	SLOPED BOX OUTLET TYPE 1-15 IN	1.000	EACH		
0220	01433	SLOPED BOX OUTLET TYPE 1-18 IN	1.000	EACH		
0230	01450	S & F BOX INLET-OUTLET-18 IN	3.000	EACH		
0240	01480	CURB BOX INLET TYPE B	2.000	EACH		
0250	01511	DROP BOX INLET TYPE 5D	1.000	EACH		
0260	01642	JUNCTION BOX-18 IN	1.000	EACH		
0270	01718	REMOVE INLET	4.000	EACH		
0280	01740	CORED HOLE DRAINAGE BOX CON-4 IN	4.000	EACH		
0290	01915	STANDARD BARRIER MEDIAN TYPE 1	282.000	SQYD		
0300	01984	DELINEATOR FOR BARRIER-WHITE	223.000	EACH		
0310	01985	DELINEATOR FOR BARRIER-YELLOW	228.000	EACH		
0320	02003	RELOCATE TEMP CONC BARRIER	8,832.000	LF		
0330	02006	REMOVE CONCRETE MEDIAN	537.000	LF		
0340	02022	JPC PAVEMENT-8 IN/24	640.000	SQYD		
0350	02060	PCC PAVEMENT DIAMOND GRINDING	6,140.000	SQYD		
0360	02071	JPC PAVEMENT-11 IN	3,625.000	SQYD		
0370	02072	JPC PAVEMENT-11 IN SHLD	3,671.000	SQYD		
0380	02159	TEMP DITCH	4,000.000	LF		
0390	02200	ROADWAY EXCAVATION (REVISED: 4-16-10)	29,879.000	CUYD		
0400	02223	GRANULAR EMBANKMENT (REVISED: 4-16-10)	7,034.000	CUYD		
0410	02242	WATER	300.000	MGAL		

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0420	02351	GUARDRAIL-STEEL W BEAM-S FACE	4,277.000	LF		
0430	02360	GUARDRAIL TERMINAL SECTION NO 1	2.000	EACH		
0440	02381	REMOVE GUARDRAIL	1,100.000	LF		
0450	02382	GUARDRAIL CONNECT-SHLD BRIDGE PIER TY A	1.000	EACH		
0460	02391	GUARDRAIL END TREATMENT TYPE 4A	4.000	EACH		
0470	02483	CHANNEL LINING CLASS II	3,564.000	TON		
0480	02484	CHANNEL LINING CLASS III	95.000	TON		
0490	02545	CLEARING AND GRUBBING 5 ACRES	( 1.00)	LS		
0500	02562	SIGNS (REVISED: 4-12-10)	483.000	SQFT		
0510	02585	EDGE KEY	5,867.000	LF		
0520	02598	FABRIC-GEOTEXTILE TYPE III (REVISED: 4-16-10)	44,120.000	SQYD		
0530	02599	FABRIC-GEOTEXTILE TYPE IV	6,090.000	SQYD		
0540	02600	FABRIC GEOTEXTILE TY IV FOR PIPE	772.000	SQYD	2.00	1,544.00
0550	02625	REMOVE HEADWALL	16.000	EACH		
0560	02650	MAINTAIN & CONTROL TRAFFIC	( 1.00)	LS		
0570	02653	LANE CLOSURE	1.000	EACH		
0580	02671	PORTABLE CHANGEABLE MESSAGE SIGN	2.000	EACH		
0590	02676	MOBILIZATION FOR MILL & TEXT	( 1.00)	LS		
0600	02677	ASPHALT PAVE MILLING & TEXTURING	267.000	TON		
0610	02695	RUMBLE STRIPS TYPE 3	2,778.000	LF		
0620	02701	TEMP SILT FENCE	2,600.000	LF		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT PRICE	AMOUNT
0630	02703	SILT TRAP TYPE A	10.000	EACH		
0640	02704	SILT TRAP TYPE B	10.000	EACH		
0650	02705	SILT TRAP TYPE C	10.000	EACH		
0660	02706	CLEAN SILT TRAP TYPE A	20.000	EACH		
0670	02707	CLEAN SILT TRAP TYPE B	20.000	EACH		
0680	02708	CLEAN SILT TRAP TYPE C	20.000	EACH		
0690	02709	CLEAN TEMP SILT FENCE	2,600.000	LF		
0700	02726	STAKING	( 1.00)	LS		
0710	02775	ARROW PANEL	2.000	EACH		
0720	02898	RELOCATE CRASH CUSHION	1.000	EACH		
0730	03171	CONCRETE BARRIER WALL TYPE 9T (REVISED: 4-12-10)	8,912.000	LF		
0740	04795	CONDUIT-2 IN	7,202.000	LF		
0750	04820	TRENCHING AND BACKFILLING	2,024.000	LF		
0760	04829	PIEZOELECTRIC SENSOR	8.000	EACH		
0770	04830	LOOP WIRE	1,644.000	LF		
0780	04835	WIRE-NO. 4	12,330.000	LF		
0790	04895	LOOP SAW SLOT AND FILL	414.000	LF		
0800	05950	EROSION CONTROL BLANKET	1,184.000	SQYD		
0810	05952	TEMP MULCH	50,000.000	SQYD		
0820	05953	TEMP SEEDING AND PROTECTION	50,000.000	SQYD		
0830	05966	TOPDRESSING FERTILIZER	2.000	TON		

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LINE NO	ITEM	DESCRIPTION	APPROXIMATE QUANTITY	UNIT	UNIT PRICE	AMOUNT
0840	05985	SEEDING AND PROTECTION	30,000.000	SQYD		
0850	05989	SPECIAL SEEDING CROWN VETCH	5,000.000	SQYD		
0860	06550	PAVE STRIPING-TEMP REM TAPE-W	23,862.000	LF		
0870	06551	PAVE STRIPING-TEMP REM TAPE-Y	20,625.000	LF		
0880	08100	CONCRETE-CLASS A	16.620	CUYD		
0890	08150	STEEL REINFORCEMENT	24.000	LB		
0900	08901	CRASH CUSHION TY VI CLASS BT TL2	1.000	EACH		
0910	10020NS	FUEL ADJUSTMENT	23,626.000	DOLL	1.00	23,626.00
0920	10030NS	ASPHALT ADJUSTMENT	19,321.000	DOLL	1.00	19,321.00
0930	20391NS835	JUNCTION BOX TYPE A	2.000	EACH		
0940	20392NS835	JUNCTION BOX TYPE C	8.000	EACH		
0950	20411ED	LAW ENFORCEMENT OFFICER	900.000	HOUR		
0960	21062ND	CCTV CONTROL CABLE	1.000	EACH		
0970	21076ND	FIBER TERMINATION RACK (ADDED: 4-16-10)	2.000	EACH		
0980	21077ED	FIBER OPTIC CABLE	1,994.000	LF		
0990	21419ND	COMMUNICATION CABLE	1.000	EACH		
1000	21458ND	FIBER TRANSCEIVER SIGN (ADDED: 4-16-10)	4.000	EACH		
1010	23131ER701	PIPELINE VIDEO INSPECTION	76.000	LF		
1020	23828NC	REMOVE AND RELOCATE CCTV POLE	1.000	EACH		
SECTION 0002 SIGNING						
1030	06227	REMOVE SIGN BR ATTACH BRACKETS	1.000	EACH		

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1040	06405	SBM ALUMINUM PANEL SIGNS	1,659.000	SQFT		
1050	06445	OSS ALUMINUM 90 FT TRUSS	4.000	EACH		
1060	06449	REM OVERHEAD SIGN SUPPORT STR	5.000	EACH		
1070	06450	REM OVERHEAD STRUC CONC BASE	5.000	EACH		
1080	06490	CLASS A CONCRETE FOR SIGNS	101.600	CUYD		
1090	06491	STEEL REINFORCEMENT FOR SIGNS	9,196.000	LB		
1100	06514	PAVE STRIPING-PERM PAINT-4 IN	1,991.000	LF		
1110	06572	PAVE MARKING-DOTTED LANE EXTEN	1,625.000	LF		
1120	06574	PAVE MARKING-THERMO CURV ARROW	2.000	EACH		
1130	06592	PAVEMENT MARKER TYPE V-B W/R	164.000	EACH		
1140	06593	PAVEMENT MARKER TYPE V-B Y/R	32.000	EACH		
1150	20418ED	REMOVE & RELOCATE SIGNS	9.000	EACH		
1160	21373ND	REMOVE SIGN	9.000	EACH		
1170	22854EN	PAVE STRIPE PERM-6 IN HD21-WHITE	11,310.000	LF		
1180	22855EN	PAVE STRIPE PERM-6 IN HD21-YELLOW	1,220.000	LF		
1190	22856EN	PAVE STRIPE PERM-12 IN HD21-WHITE	1,045.000	LF		
SECTION 0003 LIGHTING						
1200	04740	POLE BASE	33.000	EACH		
1210	04780	FUSED CONNECTOR KIT	66.000	EACH		
1220	04793	CONDUIT-1 1/4 IN	8,360.000	LF		
1230	04811	JUNCTION BOX TYPE B	2.000	EACH		

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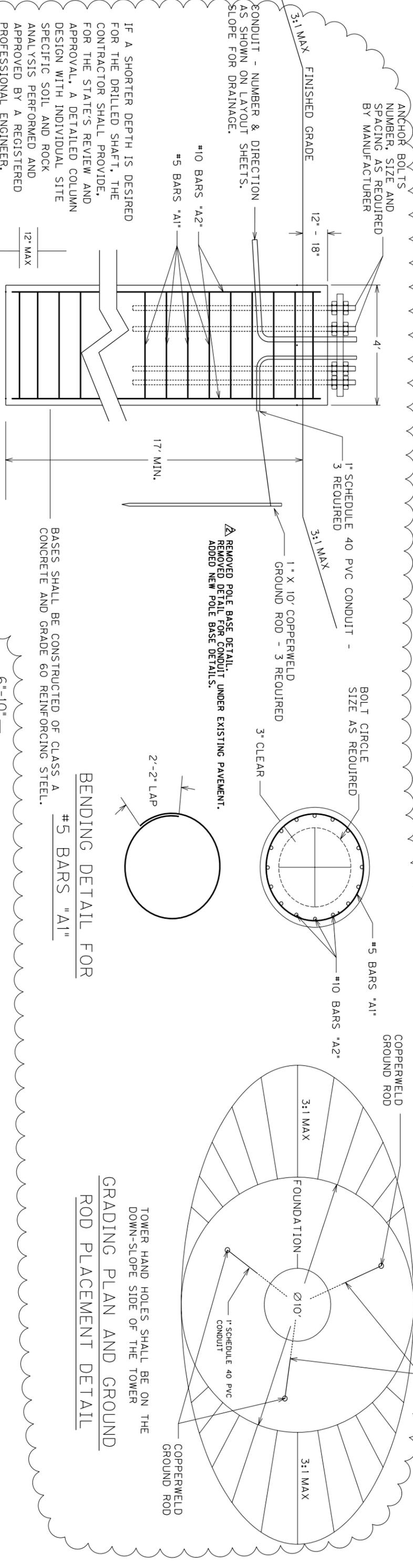
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1240	04820	TRENCHING AND BACKFILLING	8,360.000	LF		
1250	04833	WIRE-NO. 8	10,250.000	LF		
1260	04835	WIRE-NO. 4	8,360.000	LF		
1270	04836	WIRE-NO. 2	6,470.000	LF		
1280	04941	REMOVE POLE BASE	33.000	EACH		
1290	04942	REMOVE STORE & REINSTALL POLE	33.000	EACH		
SECTION 0004 MOB AND DEMOB						
1300	02568	MOBILIZATION (NO MORE THAN 5%)		LUMP		
1310	02569	DEMOBILIZATION (AT LEAST 1.5%)		LUMP		
		TOTAL BID				

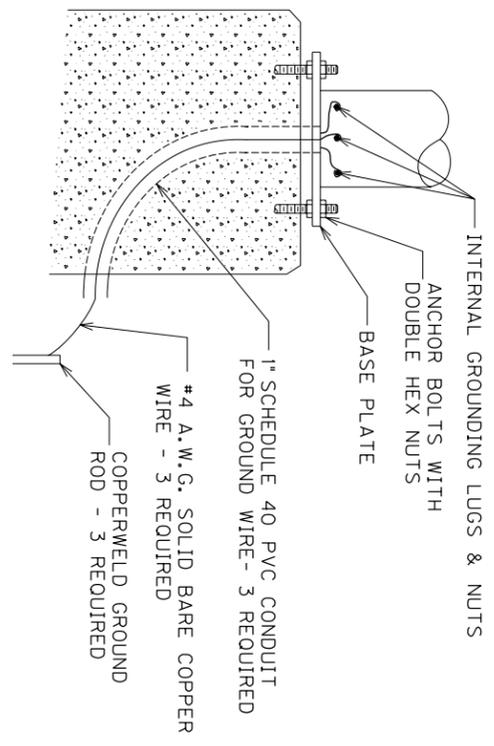
# BASE DESIGN FOR UP TO 80' HIGH MAST POLES (TO SUPPORT CAMERA LOWERING DEVICE AND CCTV CAMERA)

REVISED 4-13-2010

COUNTY OF	ITEM NO.	SHEET NO.
JEFFERSON	5-159.10	R51



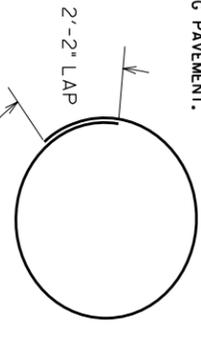
## BASE DETAIL



GROUNDING NOTE: TOWERS SHALL BE GROUNDED BY MEANS OF THREE NO. 4 A.W.G. SOLID BARE COPPER WIRES ATTACHED TO THE INTERNAL GROUNDING LUGS WITHIN THE TOWER. GROUND WIRES SHALL BE EXOTHERMICALLY WELDED TO THREE GROUND RODS.

## GROUNDING AND CONDUIT ENTRANCE DETAIL

## BENDING DETAIL FOR #5 BARS "A1"

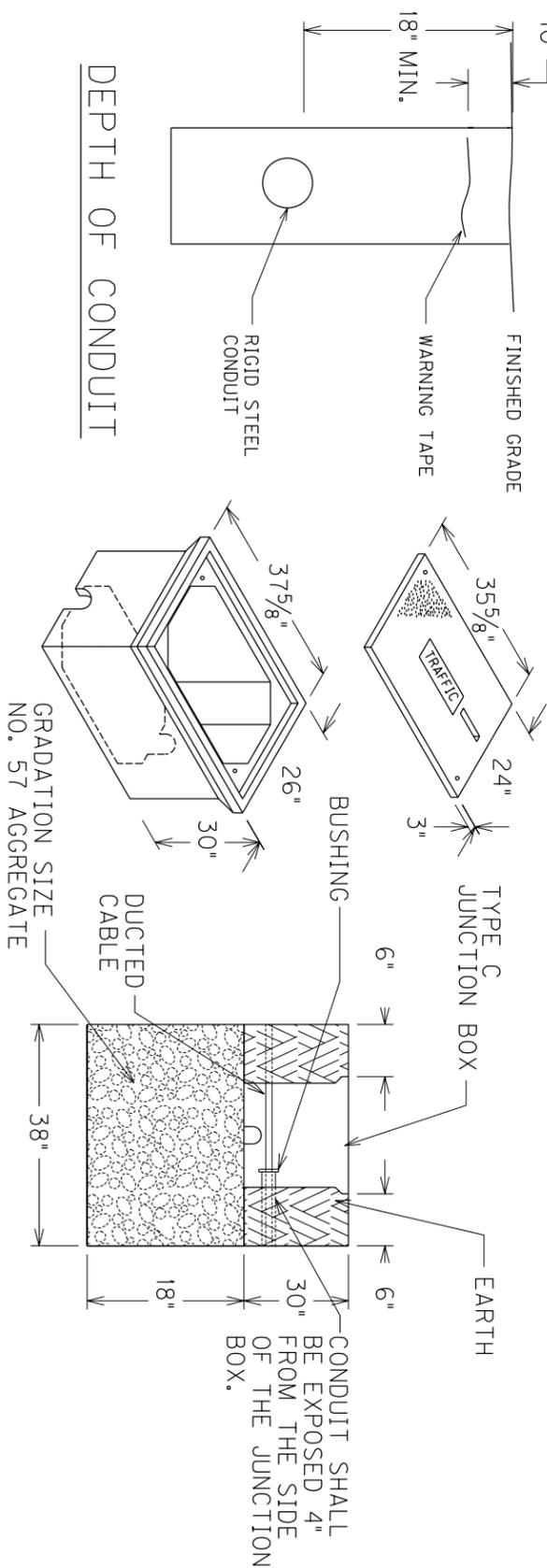


## UNDERGROUND UTILITY WARNING TAPE

CONTRACTOR SHALL INSTALL UNDERGROUND UTILITY WARNING TAPE IMMEDIATELY ABOVE THE CIRCUIT CABLES AS SHOWN. THE TAPE SHALL CONFORM WITH THE APWA-ULCC NATIONAL COLOR CODE WITH BLACK LETTERING ON RED. THE TAPE SHALL CONTINUOUSLY READ "CAUTION: ELECTRIC LINE BURIED BELOW" ALTERNATING WITH A NO DIGGING SYMBOL. IT SHALL BE DURABLE AND COLORFAST TO WITHSTAND YEARS OF UNDERGROUND BURIAL AND EASILY DIRECT BURIED.

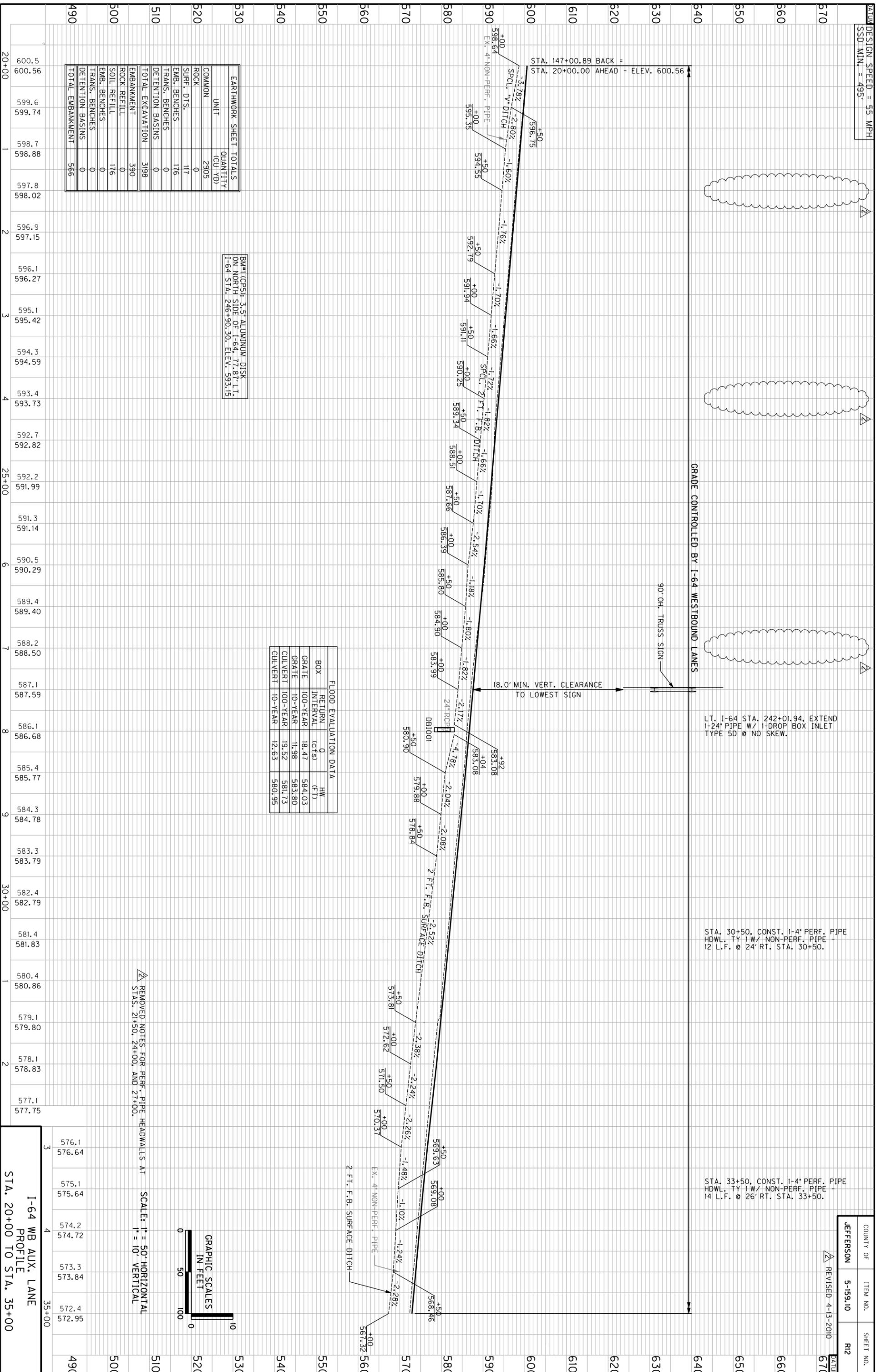
THE TAPE SHALL BE 6 INCHES WIDE AND 7.0 MILS (NOMINAL) THICK. IT SHALL HAVE A MINIMUM TENSILE STRENGTH OF 600# PER 6 INCH WIDTH. IT SHALL BE COLOR CODE IMPREGNATED WITH ALKALI AND ACID STABLE, LEAD-FREE, ORGANIC PIGMENTS SUITABLE FOR DIRECT BURIAL. IT SHALL BE ULTRAVIOLET COLORFAST ALSO. THE TAPE SHALL BE NONDISTORTING WITH NO ELONGATION.

## DEPTH OF CONDUIT



## JUNCTION BOX TYPE C

JUNCTION BOXES SHALL BE CONSTRUCTED OF A FIBERGLASS REINFORCED POLYMER CONCRETE, QUAZITE PC STYLE OR APPROVED EQUAL. COVERS SHALL BE MARKED "TRAFFIC" AND BE ATTACHED WITH 3/8" STAINLESS HEX BOLTS. JUNCTION BOXES SHALL BE INSTALLED FLUSH WITH FINISHED GRADE.



GRADE CONTROLLED BY I-64 WESTBOUND LANES

90' OH. TRUSS SIGN

18.0' MIN. VERT. CLEARANCE TO LOWEST SIGN

LT. I-64 STA. 242+01.94, EXTEND I-24" PIPE W/ 1-DROP BOX INLET TYPE 5D @ NO SKEW.

STA. 30+50, CONST. 1-4" PERF. PIPE HDWL. TY 1 W/ NON-PERF. PIPE 12 L.F. @ 24' RT. STA. 30+50.

STA. 33+50, CONST. 1-4" PERF. PIPE HDWL. TY 1 W/ NON-PERF. PIPE 14 L.F. @ 26' RT. STA. 33+50.

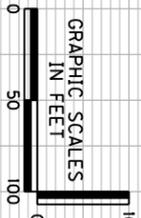
BM#1 (CP5): 3.5" ALUMINUM DISK ON NORTH SIDE OF I-64, 77.87' LT. I-64 STA. 246+90.30. ELEV. 593.15

BOX RETURN INTERVAL	0 (cfs)	HW (FT)
GRATE 100-YEAR	18.47	584.03
GRATE 10-YEAR	11.98	583.80
CULVERT 100-YEAR	19.52	581.73
CULVERT 10-YEAR	12.63	580.95

UNIT	QUANTITY (CU YD)
COMMON	2905
ROCK	0
SURF. DTS.	117
EMB. BENCHES	176
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EXCAVATION	3198
EMBANKMENT	390
ROCK REFILL	0
SOIL REFILL	176
EMB. BENCHES	0
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EMBANKMENT	566

REMOVED NOTES FOR PERF. PIPE HEADWALLS AT STAS. 21+50, 24+00, AND 27+00.

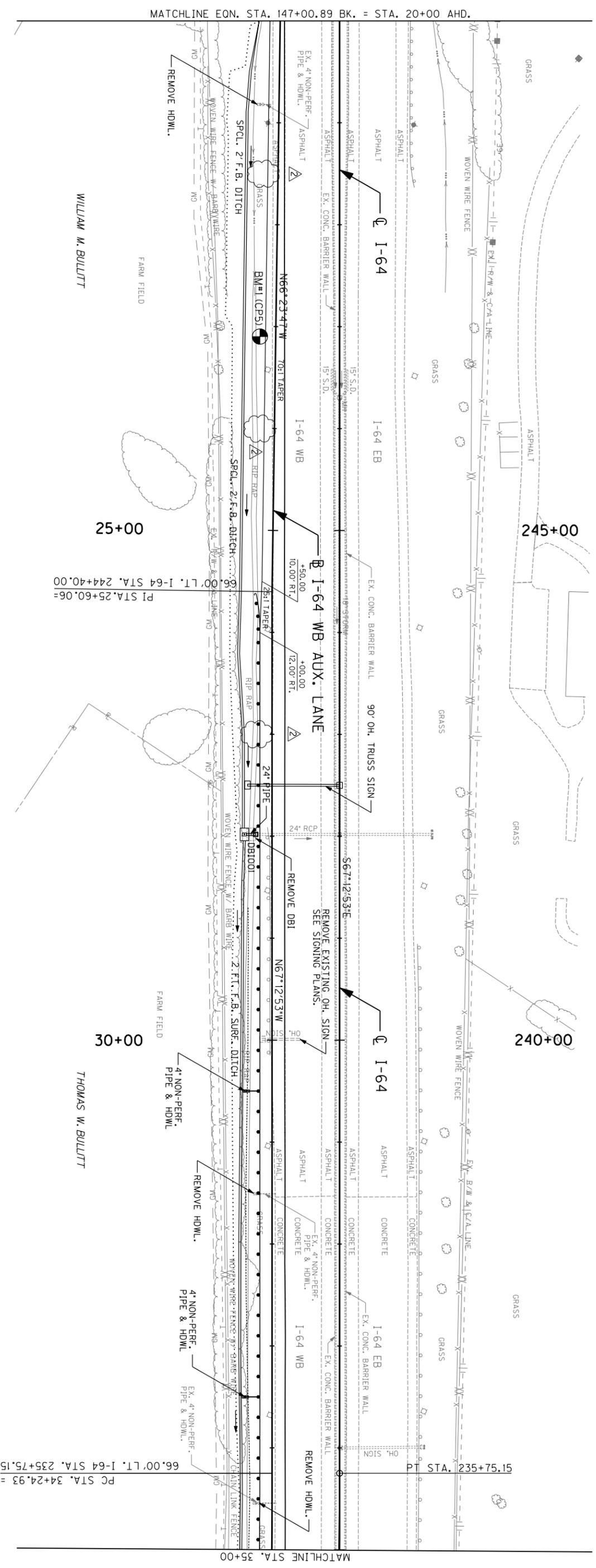
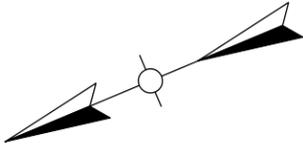
SCALE: 1" = 50' HORIZONTAL  
1" = 10' VERTICAL



I-64 WB AUX. LANE  
PROFILE  
STA. 20+00 TO STA. 35+00

600.5  
600.56  
599.6  
599.74  
598.7  
598.88  
597.8  
598.02  
596.9  
597.15  
596.1  
596.27  
595.1  
595.42  
594.3  
594.59  
593.4  
593.73  
592.7  
592.82  
592.2  
591.99  
591.3  
591.14  
590.5  
590.29  
589.4  
589.40  
588.2  
588.50  
587.1  
587.59  
586.1  
586.68  
585.4  
585.77  
584.3  
584.78  
583.3  
583.79  
582.4  
582.79  
581.4  
581.83  
580.4  
580.86  
579.1  
579.80  
578.1  
578.83  
577.1  
577.75  
576.1  
576.64  
575.1  
575.64  
574.2  
574.72  
573.3  
573.84  
572.4  
572.95

490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670



DITCH CONSTRUCTION - RIGHT			
STATION	SIZE-SHAPE TYPE	TYPE	LINING
20+00 TO 27+92	SPCL. 2' F.B.	CLASS II	T12 TONS
28+04 TO 35+00	2' F.B. SURF.	CLASS II	313 TONS

- RT. STA. 20+81, REMOVE 1;
- RT. STA. 31+50, REMOVE 1;
- RT. STA. 34+53, REMOVE 1;
- REMOVE HEADWALL
- RT. STA. 27+98, REMOVE 1.
- REMOVE INLET
- STEEL W/ BEAM GUARDRAIL
- RT. STA. 23+00.00 TO RT. STA. 35+00.00, CONST. 1200 L.F. W/ 1-END TREATMENT TYPE 4A.
- REMOVE GUARDRAIL
- RT. STA. 27+91.00 TO RT. STA. 30+15.00, REMOVE 225 L.F.
- REMOVE HEADWALLS AT STAS. 21+50, 24+00, AND 27+00.



SCALE: 1"=50'

GRADE, DRAIN, AND SURFACING PLANS  
I-64 WB AUX. LANE  
STA. 20+00 TO STA. 35+00

DATUM  
SSD MIN. = 495'

COUNTY OF ITEM NO. SHEET NO.  
JEFFERSON 5-159.10 R10  
DATE

REVISED 4-13-2010

DATUM

STA. 136+50, CONST. 1-4" PERF. PIPE  
HDWL. TY 4 W/NON-PERF. PIPE-25 L.F.  
@ 37' RT. STA. 136+50.

STA. 139+00, CONST. 1-4" PERF. PIPE  
HDWL. TY 4 W/NON-PERF. PIPE-25 L.F.  
@ 37' RT. STA. 139+00.

LT. I-64 STA. 254+05.43, EXTEND  
1-18" PIPE W/ 1-18" S & F BOX I-O  
@ 2'26'35" SKEW LT.

GRADE CONTROLLED BY I-64 WESTBOUND LANES

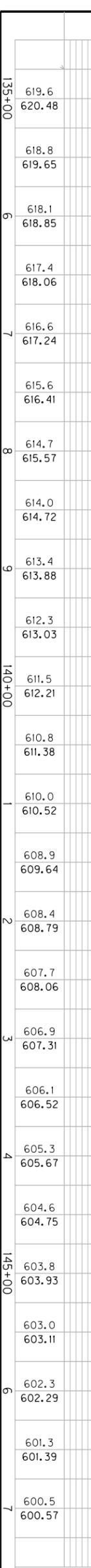
OXMOOR FARM ROAD

INSIDE SHOULDER - 15.9' MIN. V.C.  
TRAFFIC LANES - 6.2' MIN. V.C.  
OUTSIDE SHOULDER - 14.0' MIN. V.C.

STA. 147+00.89 BACK =  
STA. 20+00.00 AHEAD - ELEV. 600.56

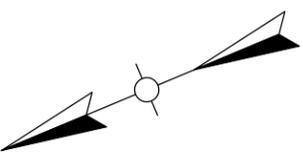
REMOVED NOTE FOR PERF. PIPE HEADWALL AT STA. 141+50.

EARTHWORK SHEET TOTALS	
UNIT	QUANTITY (CU YD)
COMMON	6404
ROCK	0
SURF. DTS.	0
EMB. BENCHES	0
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EXCAVATION	6404
EMBANKMENT	51
ROCK REFILL	0
SOIL REFILL	0
EMB. BENCHES	0
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EMBANKMENT	51

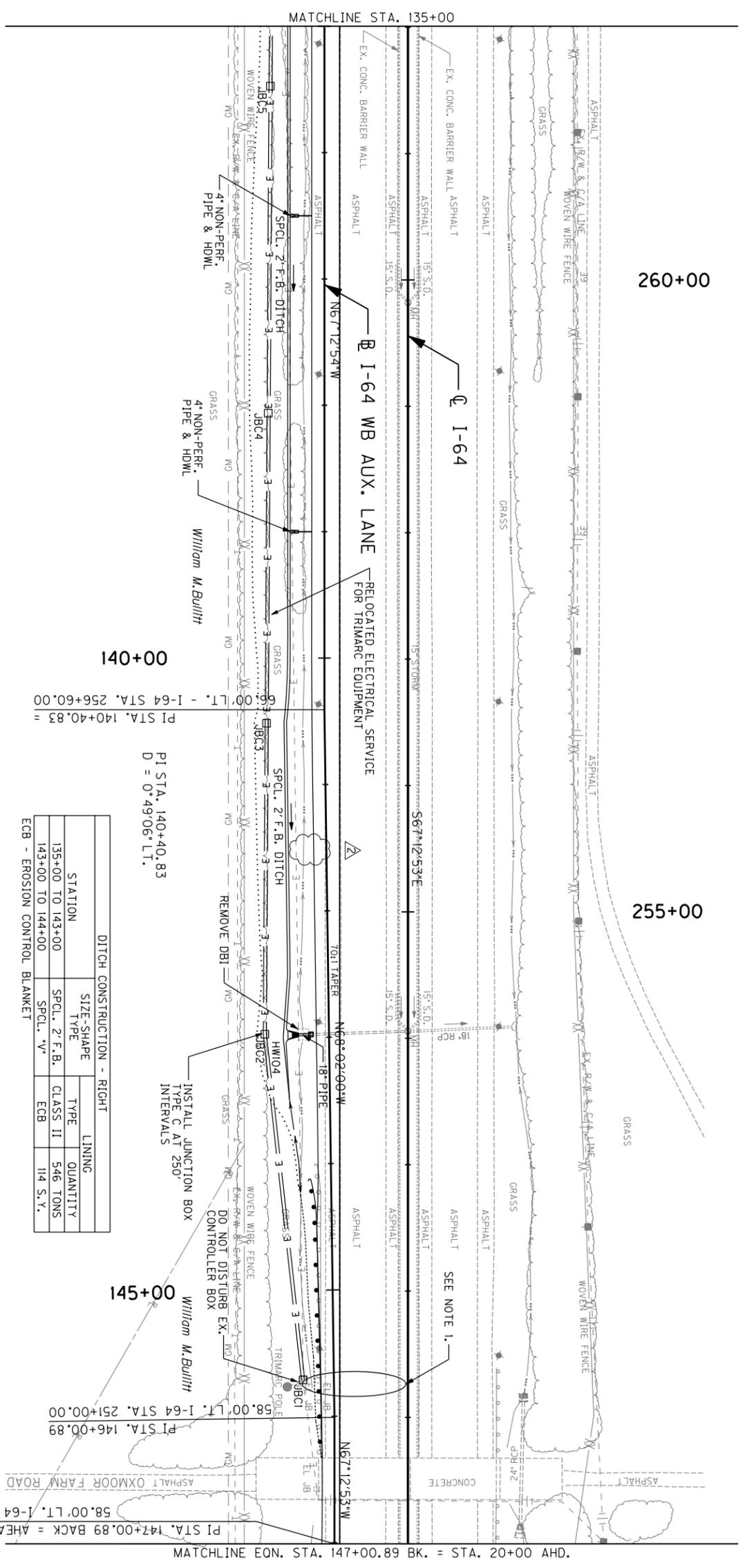


SCALE: 1" = 50' HORIZONTAL  
1" = 10' VERTICAL

I-64 WB AUX. LANE  
PROFILE  
STA. 135+00 TO STA. 147+00.89



NOTES:  
 1. A TRAFFIC DATA COLLECTION STATION EXISTS AT THIS LOCATION. SEE PROPOSAL AND BID DOCUMENTS FOR DETAILS OF RECONSTRUCTION REQUIRED.



FOR RELOCATED ELECTRICAL SERVICE

FROM	TO	CONDUIT REQUIRED	WIRE REQUIRED
JBC1	JBC8	2" SCHEDULE 40 PVC	3-#4 AWG WIRES
JBC8	JBC8	2" SCHEDULE 40 PVC	3-#4 AWG WIRES
JBC1	JBC8	2" SCHEDULE 40 PVC	FIBER OPTIC CABLE
JBC8	JBC8	2" SCHEDULE 40 PVC	FIBER OPTIC CABLE
EX. CAMERA CONTROLLER BOX	EX. CAMERA CONTROLLER BOX	2" SCHEDULE 40 PVC	CONTROL CABLE
EX. CAMERA CONTROLLER BOX	EX. CAMERA CONTROLLER BOX	SPARE 2" SCHEDULE 40 PVC	NONE
RELOCATED CAMERA POLE	RELOCATED CAMERA POLE	SPARE 2" SCHEDULE 40 PVC	NONE
EX. CAMERA CONTROLLER BOX	EX. CAMERA CONTROLLER BOX	SPARE 2" SCHEDULE 40 PVC	NONE
JBC1	JBC7	2" SCHEDULE 40 PVC	4-#4 AWG WIRES
JBC1	JBC7	2" SCHEDULE 40 PVC	CAT 5 CABLE
JBC7	JBC7	2" SCHEDULE 40 PVC	4-#4 AWG WIRES
JBC7	JBC7	2" SCHEDULE 40 PVC	CAT 5 CABLE

DITCH CONSTRUCTION - RIGHT

STATION	SIZE-SHAPE TYPE	CLASS	QUANTITY
135+00 TO 143+00	SPCL. 2' F.B.	CLASS II	546 TONS
143+00 TO 144+00	SPCL. 'V'	ECB	114 S.Y.

EGB - EROSION CONTROL BLANKET

REMOVE GUARDRAIL  
 RT. STA. 144+50.00 TO RT. STA. 146+32.91  
 CONST. 183 L.F. W/ I-END TREATMENT TYPE 4A.  
 AND 1 GUARDRAIL CONN. TO BR. END TY A.

REMOVE INLET  
 RT. STA. 144+05.00 TO RT. STA. 146+32.91.  
 REMOVE 232 L.F.

REMOVE INLET  
 RT. STA. 142+97, REMOVE 1.

P1 STA. 146+00.89  
 D = 0°49'06" RT.

P1 STA. 147+00.89  
 D = 0°49'06" RT.

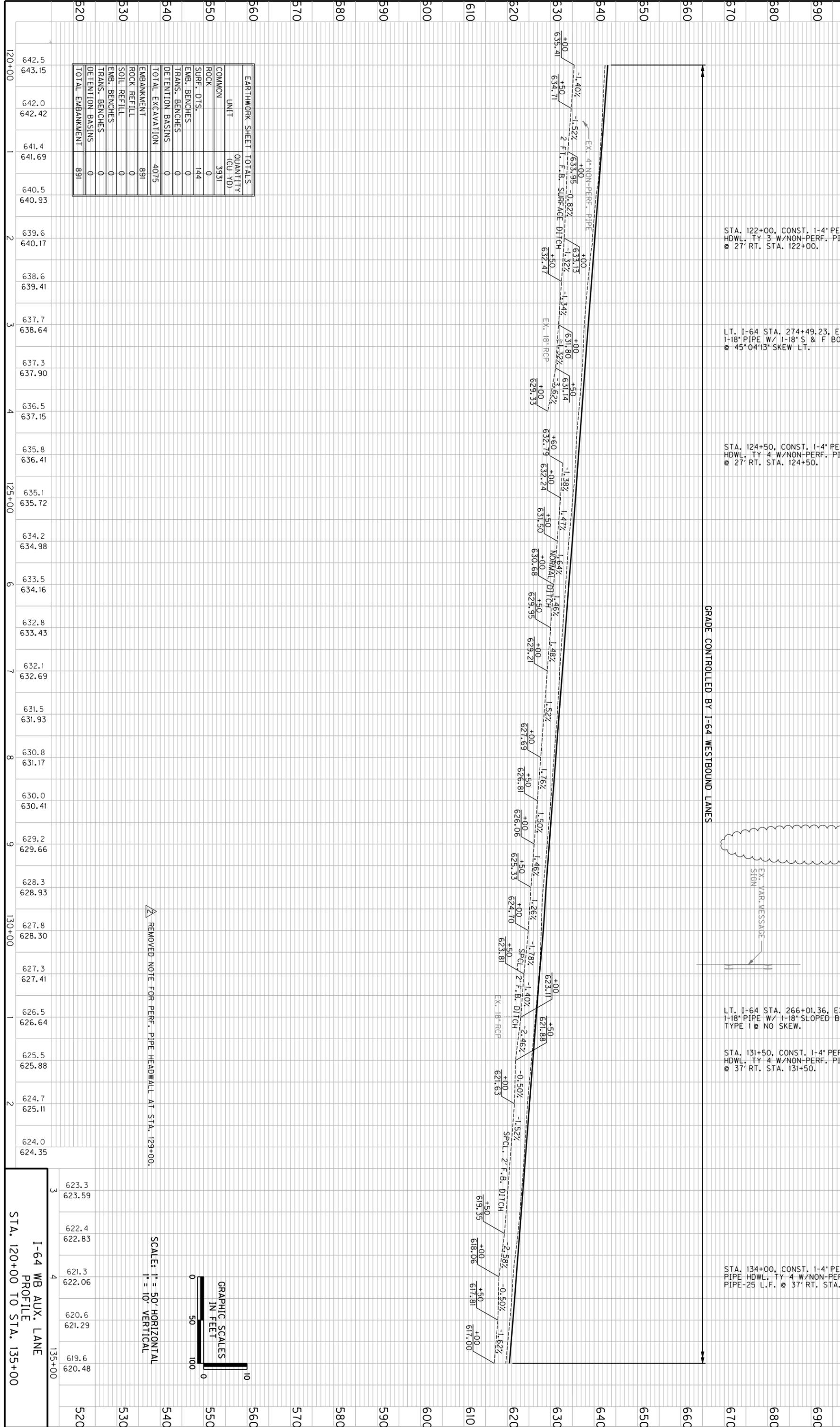


SCALE: 1"=50'

GRADE, DRAIN, AND SURFACING PLANS  
 I-64 WB AUX. LANE  
 STA. 135+00 TO STA. 147+00.89

DESIGN SPEED = 55 MPH  
 S&D MINI = 495'  
 GP9: REBAR W/CAP  
 ON NORTH SIDE OF I-64, 89.05' L.T.,  
 I-64 STA. 272+26.54, ELEV. 633.54  
 BM#5 (GP9): 3.5' ALUMINUM DISK  
 ON NORTH SIDE OF I-64, 72.98' L.T.,  
 I-64 STA. 262+43.27, ELEV. 619.78

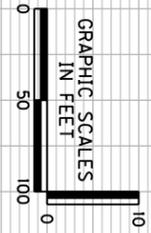
COUNTY OF JEFFERSON  
 ITEM NO. 5-159.10  
 SHEET NO. R8  
 DATE 700  
 REVISED 4-13-2010



EARTHWORK SHEET TOTALS	
UNIT	QUANTITY (CU YD)
COMMON	3931
ROCK	0
SURF. DTS.	144
EMB. BENCHES	0
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EXCAVATION	4075
EMBANKMENT	891
ROCK REFILL	0
SOIL REFILL	0
EMB. BENCHES	0
TRANS. BENCHES	0
DETENTION BASINS	0
TOTAL EMBANKMENT	891

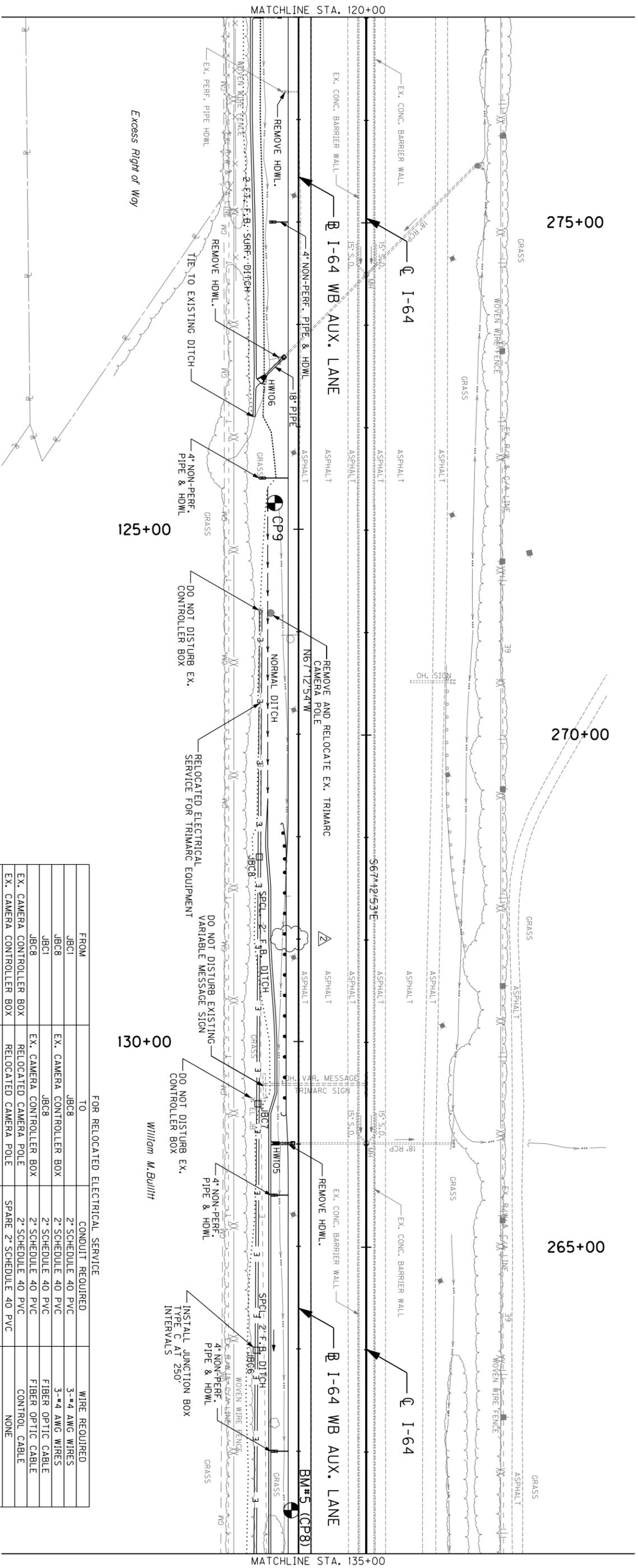
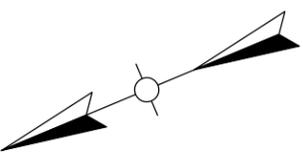
REMOVED NOTE FOR PERF. PIPE HEADWALL AT STA. 129+00.

SCALE: 1" = 50' HORIZONTAL  
 1" = 10' VERTICAL



120+00 1 2 3 4 125+00 6 7 8 9 130+00 1 2 3 4 135+00

I-64 WB AUX. LANE  
 PROFILE  
 STA. 120+00 TO STA. 135+00



275+00

270+00

265+00

MATCHLINE STA. 120+00

MATCHLINE STA. 135+00

Excess Right of Way

125+00

130+00

DITCH CONSTRUCTION - RIGHT

STATION	SIZE-SHAPE TYPE	TYPE	QUANTITY
120+00 TO 124+00	2' F.B. SURF.	CLASS II	181 TONS
124+60 TO 128+00	NORMAL	ECB	386 S.Y.
128+00 TO 135+00	SPCL. 2' F.B.	CLASS II	453 TONS

STEEL "W" BEAM GUARDRAIL  
 RT. STA. 128+25.00 TO RT. STA. 130+70.00,  
 CONST. 245 L.F. W/ 1-END TREATMENT  
 AND 1-TERMINAL SECTION NO. 1.

REMOVE HEADWALL

REMOVE HEADWALL

STATION	SIZE-SHAPE TYPE	TYPE	QUANTITY
RT. STA. 120+72. REMOVE 1,			
RT. STA. 123+55. REMOVE 1,			
RT. STA. 131+00. REMOVE 1,			

FOR RELOCATED ELECTRICAL SERVICE

FROM	TO	CONDUIT REQUIRED	WIRE REQUIRED
JBCI	JBC8	2" SCHEDULE 40 PVC	3-#4 AWG WIRES
JBC8	JBCI	2" SCHEDULE 40 PVC	3-#4 AWG WIRES
JBCI	JBC8	2" SCHEDULE 40 PVC	FIBER OPTIC CABLE
JBC8	JBCI	2" SCHEDULE 40 PVC	FIBER OPTIC CABLE
JBCI	JBC7	2" SCHEDULE 40 PVC	NONE
JBC7	JBCI	2" SCHEDULE 40 PVC	NONE
JBC7	JBCI	2" SCHEDULE 40 PVC	4-#4 AWG WIRES
JBCI	JBC7	2" SCHEDULE 40 PVC	CAT 5 CABLE
JBC7	JBCI	2" SCHEDULE 40 PVC	4-#4 AWG WIRES
JBCI	JBC7	2" SCHEDULE 40 PVC	CAT 5 CABLE

REMOVED PERF. PIPE HEADWALL AT STA. 129+00.



GRAPHIC SCALE IN FEET

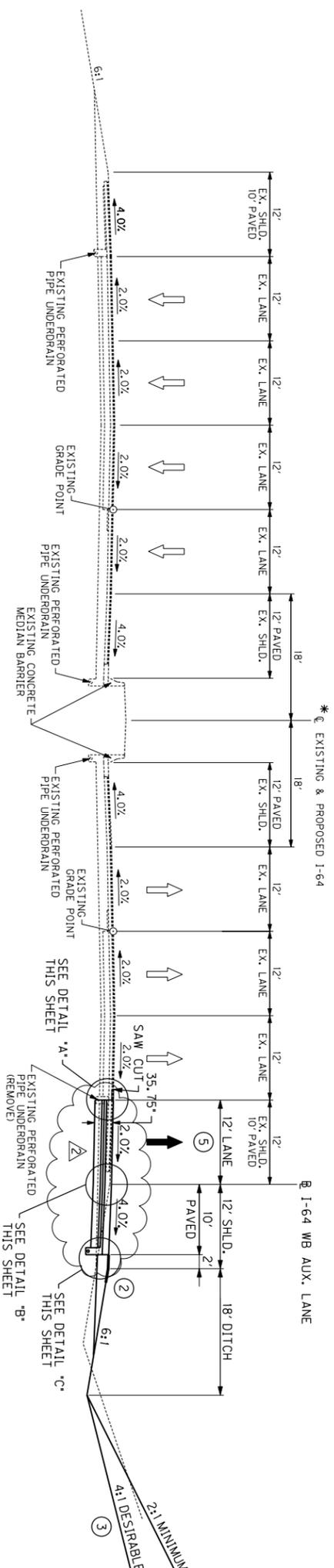
SCALE: 1"=50'

GRADE, DRAIN, AND SURFACING PLANS  
 STA. 120+00 TO STA. 135+00

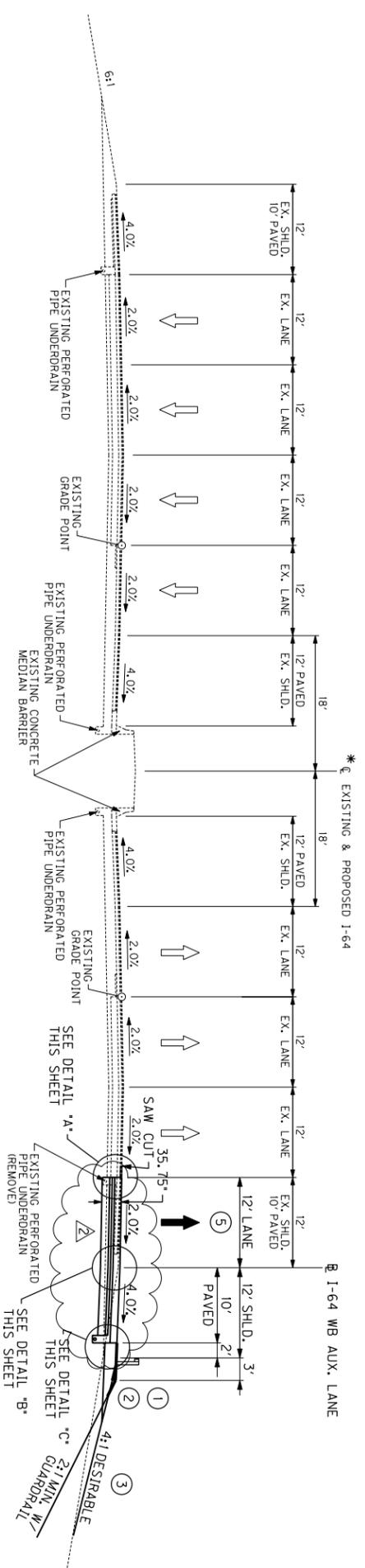
# TYPICAL SECTIONS

COUNTY OF	ITEM NO.	SHEET NO.
JEFFERSON	5-159.10	R2

REVISED 4-13-2010



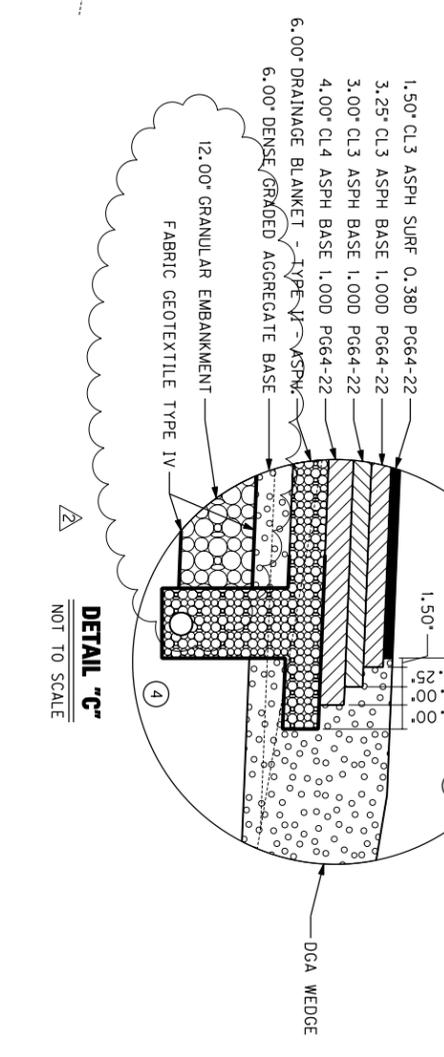
NORMAL CUT SECTION



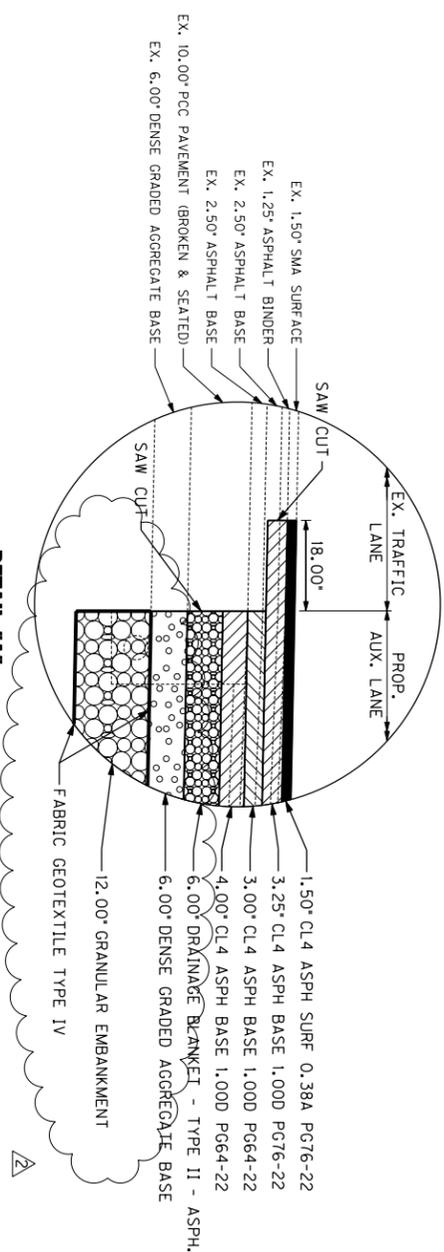
NORMAL FILL SECTION

**I-64 WIDENING FOR AUXILIARY LANES**  
**STA. 100 + 00 TO STA. 140 + 40.83**  
**STA. 25 + 60.06 TO STA. 31 + 50.11**  
**\* STA. 256 + 60 TO STA. 297 + 00.83**  
**STA. 238 + 50 TO STA. 244 + 40**

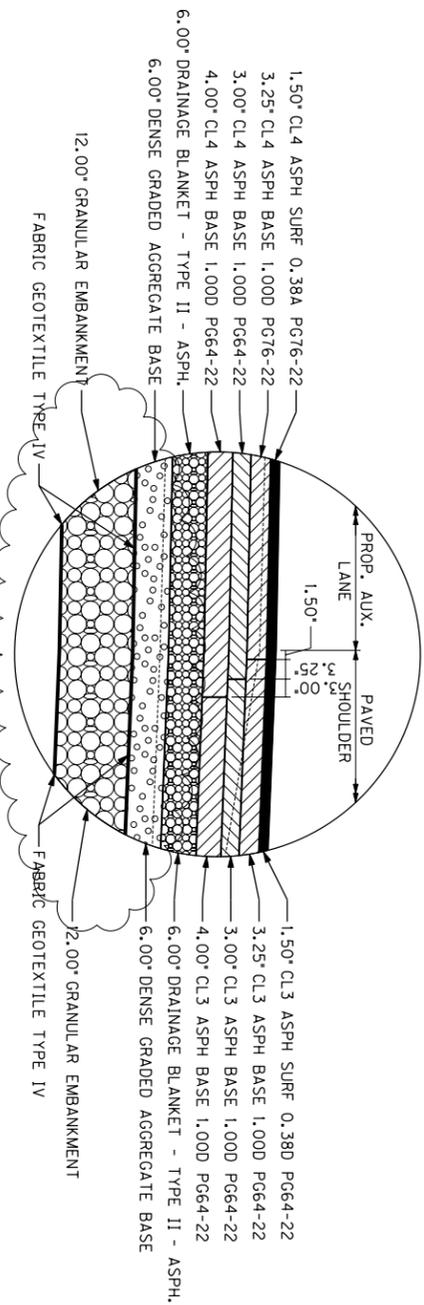
- NOTES**
- SHOULDERS SHALL BE WIDENED 3 FEET WHERE GUARDRAIL IS TO BE INSTALLED AND PAVED SHOULDER SHALL BE WIDENED 2 FEET TO FACE OF GUARDRAIL.
  - ASPHALT SEAL REQUIRED FROM OUTSIDE EDGE OF PAVED SHOULDER TO A POINT 2 FEET DOWN THE DITCH OR FILL SLOPE. TWO APPLICATIONS OF THE FOLLOWING:  
 EMULSIFIED ASPHALT RS-2 @ 2.40 LBS. / SQ. YD.  
 ASPHALT SEAL AGGREGATE @ 20 LBS. / SQ. YD.
  - SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDERS.
  - PERFORATED PIPE UNDERDRAIN (SEE SHEET R2E).
  - SEE PLANS AND CROSS SECTIONS FOR PAVEMENT WIDTHS AND CROSS SLOPES OF RAMP LANES AND TAPERS ADJACENT TO I-64.



DETAIL "C"  
NOT TO SCALE



DETAIL "A"  
NOT TO SCALE



DETAIL "B"  
NOT TO SCALE



SCALE: 1"=10'

TYPICAL SECTIONS  
 I-64 WIDENING - ASPHALT PAVEMENT

MODIFIED TYPICAL SECTION PAVEMENT DESIGN TO INCLUDE GRANULAR EMBANKMENT





# GENERAL SUMMARY

ITEM	DESCRIPTION	UNIT	I-64 WB AUX. LANE	KY 1932 (BRECKENRIDGE LANE)	TOTAL PROJECT
08901	CRASH CUSHION TY VI CLASS BT TL2	EACH	1	-	1
10020NS	FUEL ADJUSTMENT	DOLL	-	-	23626
10030NS	ASPHALT ADJUSTMENT	DOLL	-	-	19321
2039NS835	JUNCTION BOX TYPE A	EACH	2	-	2
20392NS835	JUNCTION BOX TYPE C	EACH	8	-	8
2041ED	LAW ENFORCEMENT OFFICER	HOURL	-	-	900
21062ND	CCTV CONTROL CABLE	EACH	2	-	2
21076ND	FIBER TERMINATION RACK	EACH	2	-	2
2107ED	FIBER OPTIC CABLE	LF	1594	-	1594
2149ND	COMMUNICATION CABLE	EACH	4	-	4
2149ND	FIBER TRANSCIEVER STON	EACH	4	-	4
2315E701	PIPELINE VIDEO INSPECTION	LF	62	14	76
23828NC	REMOVE & RELOCATE CCTV POLE	EACH	1	-	1

## NOTES:

TOTAL PROJECT EARTHWORK

### EXCAVATION

24833 CU. YD. COMMON  
20 CU. YD. SURF. CUTS, BASINS  
478 CU. YD. EMBANKMENTS  
19321 CU. YD. TRANS. BENCHES

### EMBANKMENT

5043 CU. YD. EMBANKMENT  
7034 CU. YD. ROCK REFILL  
429 CU. YD. SOL. REFILL  
0 CU. YD. DEBR. BENCHES  
8 CU. YD. TRANS. BENCHES

29879 CU. YD. EXCAVATION

16203 CU. YD. EMBANKMENT

NOTE: ROCK OUTCROPPINGS HAVE BEEN OBSERVED ALONG I-64 WESTBOUND FROM APPROXIMATE STATION 135+00 TO APPROXIMATE STATION 146+00. GEOTECHNICAL EXPLORATION HAS NOT AND WILL NOT BE COMPLETED FOR THIS AREA. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE QUANTITY OF ROCK THAT WILL NEED TO BE REMOVED. ANY ROCK REMOVAL REQUIRED THROUGHOUT THE PROJECT AREA SHALL BE PAID FOR AS "ROADWAY EXCAVATION" AT THE PRICE BID PER CUBIC YARD.

NOTE: CROSS SECTIONS DO NOT INDICATE THE PLACEMENT OF THE ONE FOOT (1') GRANULAR EMBANKMENT FOR THE WIDENING OF I-64. HOWEVER, EARTHWORK QUANTITIES ASSOCIATED WITH THE ADDITIONAL ONE FOOT (1') OF EXCAVATION ARE INCLUDED IN THE BID ITEM "ROADWAY EXCAVATION". THE BOTTOM OF THE FINAL EXCAVATION SHALL BE TO THE DEPTH AND WIDTH SPECIFIED BY THE TYPICAL SECTIONS.

② CLEARING AND GRUBBING AREA DOES NOT INCLUDE EXISTING PAVEMENT AND IS ESTIMATED AT 5 ACRES.

③ FOR CONTROLLING DUST CAUSED BY MAINTAINING TRAFFIC ONLY.

④ INCLUDES 6 TONS FROM PIPE DRAINAGE SUMMARY.

⑤ INCLUDES 8 TONS FROM PIPE DRAINAGE SUMMARY.

⑥ FOR CONSTRUCTION AND MAINTENANCE OF TRAFFIC ONLY.

⑦ EROSION CONTROL QUANTITIES ARE BASED ON THE PROBABLE AMOUNT OF EROSION CONTROL FEATURES AS ESTIMATED BY THE ENGINEER.

⑧ FOR WORKING PLATFORM.

⑨ INCLUDES 9,134 LF FROM PIPE UNDERDRAIN SUMMARY.

⑩ INCLUDES 480 LF FROM PIPE UNDERDRAIN SUMMARY.

⑪ INCLUDES 10 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑫ INCLUDES 10 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑬ INCLUDES 8 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑭ INCLUDES 4 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑮ INCLUDES 50 LF FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

⑯ SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT SITE TO A SITE PROVIDED BY THE CONTRACTOR.

⑰ INCLUDES REMOVAL OF PIPE REQUIRED AT EACH LOCATION.

⑱ INCLUDES REMOVAL OF END TREATMENTS.

⑲ INCLUDES 7152 LF FOR RECONSTRUCTION OF TRIMARC ELECTRICAL SUPPLY.

⑳ INCLUDES 30 LF FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

㉑ INCLUDES 1994 LF FOR RECONSTRUCTION OF TRIMARC ELECTRICAL SUPPLY.

㉒ FOR RECONSTRUCTION OF TRIMARC SERVICE.

㉓ FOR WRAPPING PIPE TRENCH BACKFILL.

㉔ FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

㉕ INCLUDES ALL WORK, LABOR, AND MATERIALS NECESSARY TO RELOCATE POLE AND APPURTENANCES INCLUDING BUT NOT LIMITED TO POLE BASE, ELECTRICAL SERVICE, COMMUNICATIONS, GROUNDING, ETC. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH TRIMARC BY CALLING MR. TODD HOOD AT 502-887-6624 PRIOR TO BEGINNING ANY WORK ON THE TRIMARC FACILITIES. THE CONTRACTOR SHALL VERIFY WITH TRIMARC THAT ALL EXISTING EQUIPMENT IS FUNCTIONAL PRIOR TO REMOVAL. TRIMARC EQUIPMENT SHALL BE STORED BY THE CONTRACTOR SUCH THAT THE EQUIPMENT SHALL NOT BE DAMAGED. UPON RE-INSTALLATION, ALL EQUIPMENT SHALL BE IN GOOD WORKING ORDER IN AT LEAST THE SAME CONDITION AS IT WAS PRIOR TO CONSTRUCTION. ANY EQUIPMENT DAMAGED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE DEPARTMENT OR TRIMARC.

CHANGED QUANTITIES ASSOCIATED WITH PAVEMENT DESIGN CHANGE.  
INCLUDED ADDITIONAL BID ITEMS AND MODIFIED DETAILS AND NOTES FOR  
RELOCATION OF TRIMARC FACILITIES.

COUNTY OF ITEM NO. SHEET NO.

JEFFERSON 5-159.10 R2G

REVISED 4-13-2010

GENERAL SUMMARY

# GENERAL SUMMARY

ITEM	DESCRIPTION	UNIT	I-64 WB AUX. LANE	KY 1932 (BRECKENRIDGE LANE)	TOTAL PROJECT
00078	CRUSHED AGGREGATE SIZE NO 2	TON	28	-	28
01000	PERFORATED PIPE-4 IN (9)	LF	9620	506	10126
01010	NON-PERFORATED PIPE-4 IN (10)	LF	401	-	401
01015	INSPECT & CERTIFY EDGE DRAIN SYSTEM	LS	-	-	-
01020	PERF PIPE HEADWALL TY 1-4 IN (11)	EACH	10	-	10
01028	PERF PIPE HEADWALL TY 3-4 IN (12)	EACH	7	-	7
01032	PERF PIPE HEADWALL TY 4-4 IN (13)	EACH	6	-	6
01718	REMOVE INLET (16)	EACH	2	2	4
01740	CORED HOLE DRAINAGE BOX CON-4 IN (14)	EACH	2	2	4
01915	STANDARD BARRIER MEDIAN TYPE 1	SOYD	-	282	282
01984	DELINEATOR FOR BARRIER-WHITE	EACH	223	-	223
01985	DELINEATOR FOR BARRIER-YELLOW	EACH	228	-	228
02003	RELOCATE TEMP CONC BARRIER	LF	8832	-	8832
02006	REMOVE CONCRETE MEDIAN	LF	-	537	537
02060	PCC PAVEMENT DIAMOND GRINDING	SOYD	5500	640	6140
02159	TEMP DITCH (7)	LF	4000	-	4000
02200	ROADWAY EXCAVATION (1)	CUYD	29120	159	29279
02223	GRANULAR EMBANKMENT (8)	CUYD	7034	-	7034
02242	WATER (3)	MGAL	300	-	300
02351	GUARDRAIL-STEEL W BEAM-S FACE	LF	4277	-	4277
02360	GUARDRAIL TERMINAL SECTION NO 1	EACH	2	-	2
02381	REMOVE GUARDRAIL (18)	LF	1100	-	1100
02382	GUARDRAIL CONNECT-SHLD BRIDGE PIER TY A	EACH	1	-	1
02391	GUARDRAIL END TREATMENT TYPE 4A	EACH	4	-	4
02483	CHANNEL LINING CLASS II (4)	TON	3564	-	3564
02484	CHANNEL LINING CLASS III (5)	TON	95	-	95
02545	CLEARING AND GRUBBING (2)	LS	-	-	-
02562	SIGNS (6)	SOFT	297	186	483
02568	MOBILIZATION	LS	-	-	-
02569	DEMOLITION	LS	-	-	-
02571	INCENTIVE/DISINCENTIVE	DOLL	-	-	-
02585	EDGE KEY	LF	586	-	586
02598	FABRIC-GEOTEXTILE TYPE III (8)	SOYD	4420	-	4420
02599	FABRIC-GEOTEXTILE TYPE IV	SOYD	5752	338	6190
02600	FABRIC GEOTEXTILE TY IV FOR PIPE (23)	SOYD	640	132	772
02625	REMOVE HEADWALL (16)	EACH	16	-	16
02650	MAINTAIN & CONTROL TRAFFIC	LS	-	-	-
02653	LANE CLOSURE	EACH	1	-	1
02671	PORTABLE CHANGEABLE MESSAGE SIGN	EACH	2	-	2
02676	MOBILIZATION FOR MILL & TEXT	LS	-	-	-
02677	ASPH PAVE MILLING & TEXTURING	TON	267	-	267
02695	RUMBLE STRIPS TYPE 3	LF	2778	-	2778
02701	TEMP SILT FENCE (7)	LF	2600	-	2600
02703	SILT TRAP TYPE A (7)	EACH	10	-	10
02704	SILT TRAP TYPE B (7)	EACH	10	-	10
02705	SILT TRAP TYPE C (7)	EACH	10	-	10
02706	CLEAN SILT TRAP TYPE A (7)	EACH	20	-	20
02707	CLEAN SILT TRAP TYPE B (7)	EACH	20	-	20
02708	CLEAN SILT TRAP TYPE C (7)	EACH	20	-	20
02709	CLEAN TEMP SILT FENCE (7)	LF	2600	-	2600
02726	STAKING	LS	-	-	-
02775	ARROW PANEL	EACH	2	-	2
02898	RELOCATE CRASH CUSHION	EACH	-	-	-
03171	CONCRETE BARRIER WALL TYPE 9T (16)	LF	8912	-	8912
04795	CONDUIT 2 INCH (15) (19)	LF	7202	-	7202
04820	TRENCHING AND BACKFILLING (20) (21)	LF	2024	-	2024
04829	PIEZOELECTRIC SENSOR (24)	EACH	8	-	8
04830	LOOP WIRE (29)	LF	1644	-	1644
04835	WIRE-NO. 4 (22)	LF	12330	-	12330
04895	LOOP SAW SLOT AND FILL (29)	LF	414	-	414
05950	EROSION CONTROL BLANKET	SOYD	1184	-	1184
05952	TEMP MULCH (7)	SOYD	50000	-	50000
05953	TEMP SEEDING AND PROTECTION (7)	SOYD	50000	-	50000
05966	TOPDRESSING FERTILIZER (7)	TON	2	-	2
05985	SEEDING AND PROTECTION (7)	SOYD	30000	-	30000
05989	SPECIAL SEEDING CROWN VETCH (7)	SOYD	5000	-	5000
06550	PAVE STRIPING-TEMP REM TAPE-W	LF	21742	2120	23862
06551	PAVE STRIPING-TEMP REM TAPE-Y	LF	18100	2525	20625

**NOTES:**

① TOTAL PROJECT EARTHWORK

② EXCAVATION

EMBANKMENT

24833 CU. YD. COMMON ROCK (SEE NOTE)  
 7034 CU. YD. SURF DTS  
 0 CU. YD. DEFINITION BASINS  
 4126 CU. YD. EMB. BENCHES  
 0 CU. YD. TRANS. BENCHES

7034 CU. YD. ROCK REFILL  
 4126 CU. YD. SOIL REFILL  
 0 CU. YD. DEFINITION BASINS  
 0 CU. YD. EMB. BENCHES  
 0 CU. YD. TRANS. BENCHES

29879 CU. YD. EXCAVATION  
 16203 CU. YD. EMBANKMENT

NOTE: ROCK OUTCROPPINGS HAVE BEEN OBSERVED ALONG I-64 WESTBOUND FROM APPROXIMATE STATION 135+00 TO APPROXIMATE STATION 146+00. GEOTECHNICAL EXPLORATION HAS NOT AND WILL NOT BE COMPLETED FOR THIS AREA. THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING THE QUANTITY OF ROCK THAT WILL NEED TO BE REMOVED. ANY ROCK REMOVAL REQUIRED THROUGHOUT THE PROJECT AREA SHALL BE PAID FOR AS 'ROADWAY EXCAVATION' AT THE PRICE BID PER CUBIC YARD.

NOTE: CROSS SECTIONS DO NOT INDICATE THE PLACEMENT OF THE ONE FOOT (1') GRANULAR EMBANKMENT FOR THE WIDENING OF I-64. HOWEVER, EARTHWORK QUANTITIES ASSOCIATED WITH THE ADDITIONAL ONE FOOT (1') OF EXCAVATION ARE INCLUDED IN THE BID ITEM 'ROADWAY EXCAVATION'. THE BOTTOM OF THE FINAL EXCAVATION SHALL BE TO THE DEPTH AND WIDTH SPECIFIED BY THE TYPICAL SECTIONS.

③ CLEARING AND GRUBBING AREA DOES NOT INCLUDE EXISTING PAVEMENT AND IS ESTIMATED AT 5 ACRES.

④ FOR CONTROLLING DUST CAUSED BY MAINTAINING TRAFFIC ONLY.

⑤ INCLUDES 6 TONS FROM PIPE DRAINAGE SUMMARY.

⑥ INCLUDES 8 TONS FROM PIPE DRAINAGE SUMMARY.

⑦ FOR CONSTRUCTION AND MAINTENANCE OF TRAFFIC ONLY.

⑧ EROSION CONTROL QUANTITIES ARE BASED ON THE PROBABLE AMOUNT OF EROSION CONTROL FEATURES AS ESTIMATED BY THE ENGINEER.

⑨ FOR WORKING PLATFORM.

⑩ INCLUDES 9,134 LF FROM PIPE UNDERDRAIN SUMMARY.

⑪ INCLUDES 480 LF FROM PIPE UNDERDRAIN SUMMARY.

⑫ INCLUDES 10 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑬ INCLUDES 10 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑭ INCLUDES 8 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑮ INCLUDES 4 EACH FROM PIPE UNDERDRAIN SUMMARY.

⑯ INCLUDES 50 LF FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

⑰ SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PROJECT SITE TO A SITE PROVIDED BY THE CONTRACTOR.

⑱ INCLUDES REMOVAL OF PIPE REQUIRED AT EACH LOCATION.

⑲ INCLUDES REMOVAL OF END TREATMENTS.

⑳ INCLUDES 7152 LF FOR RECONSTRUCTION OF TRIMARC ELECTRICAL SUPPLY.

㉑ INCLUDES 30 LF FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

㉒ INCLUDES 1994 LF FOR RECONSTRUCTION OF TRIMARC ELECTRICAL SUPPLY.

㉓ FOR RECONSTRUCTION OF TRIMARC SERVICE.

㉔ FOR WRAPPING PIPE TRENCH BACKFILL.

㉕ FOR RECONSTRUCTION OF LOOPS FOR TRAFFIC DATA COLLECTION STATION.

㉖ INCLUDES ALL WORK, LABOR, AND MATERIALS NECESSARY TO RELOCATE POLE AND APPURTENANCES INCLUDING BUT NOT LIMITED TO POLE BASE, ELECTRICAL SERVICE, COMMUNICATIONS, GROUNDING, ETC. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH TRIMARC BY CALLING MR. TODD HOOD AT 502-887-6624 PRIOR TO BEGINNING ANY WORK ON THE TRIMARC FACILITIES. THE CONTRACTOR SHALL VERIFY WITH TRIMARC THAT ALL EXISTING EQUIPMENT IS FUNCTIONAL PRIOR TO REMOVAL. TRIMARC EQUIPMENT SHALL BE STORED BY THE CONTRACTOR SUCH THAT THE EQUIPMENT SHALL NOT BE DAMAGED. UPON RE-INSTALLATION, ALL EQUIPMENT SHALL BE IN GOOD WORKING ORDER IN AT LEAST THE SAME CONDITION AS IT WAS PRIOR TO CONSTRUCTION. ANY EQUIPMENT DAMAGED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND SHALL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE DEPARTMENT OR TRIMARC.

△ CHANGE TO THE MAINLINE QUANTITY

△ CHANGED QUANTITIES ASSOCIATED WITH PAVEMENT DESIGN CHANGE. INCLUDED ADDITIONAL BID ITEMS AND MODIFIED DETAILS AND NOTES FOR RELOCATION OF TRIMARC FACILITIES.





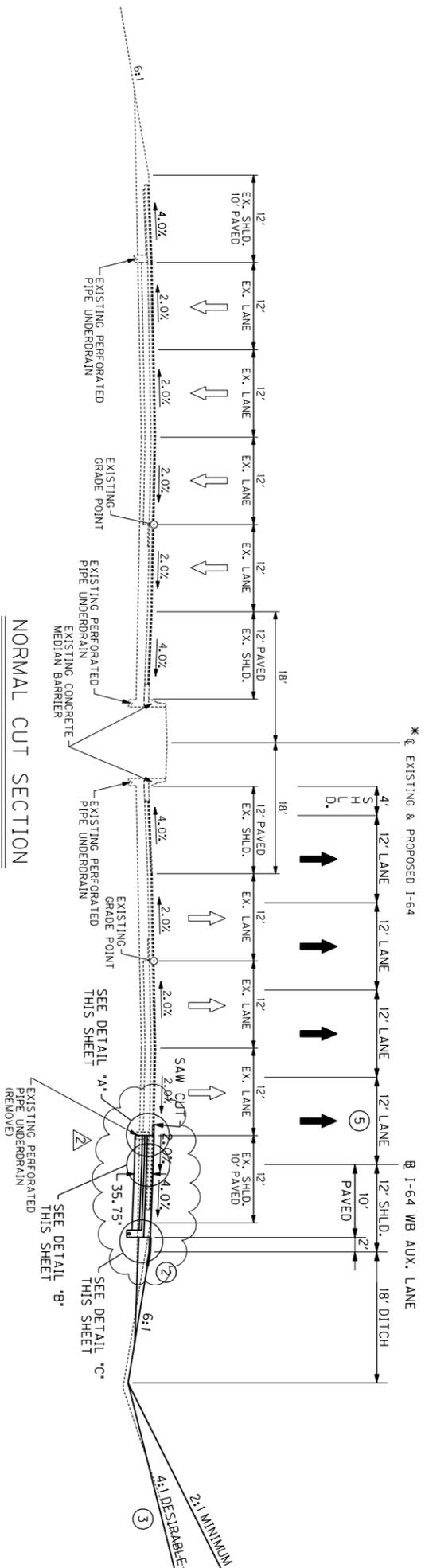
# TYPICAL SECTIONS

COUNTY OF	ITEM NO.	SHEET NO.
JEFFERSON	5-159.10	R2A

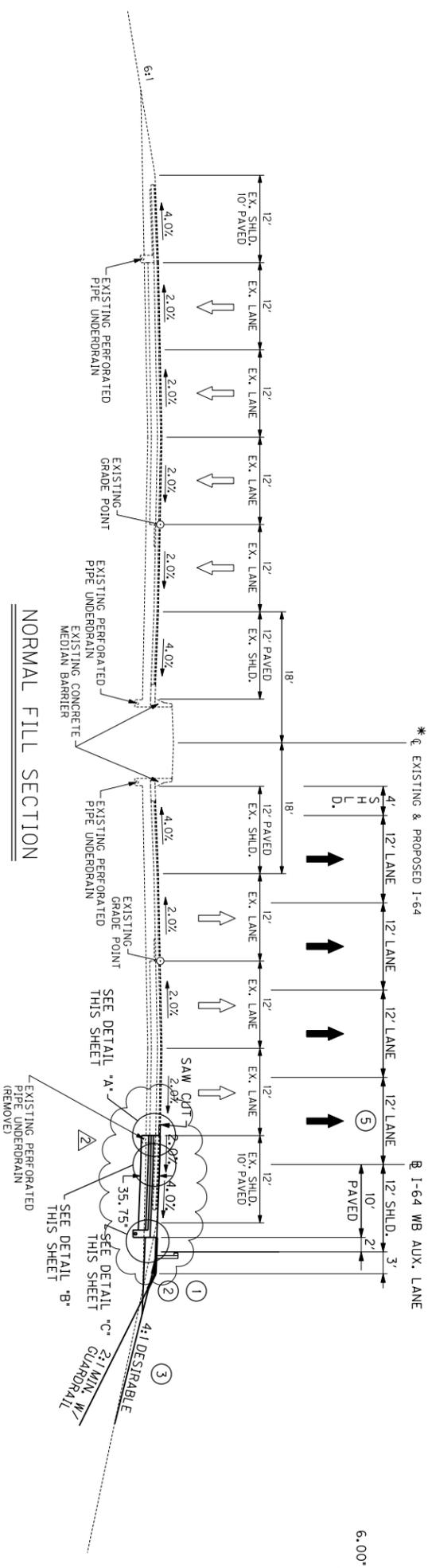
REVISED 4-13-2010

**NOTES**

- ① SHOULDERS SHALL BE WIDENED 3 FEET WHERE GUARDRAIL IS TO BE INSTALLED AND PAVED SHOULDERS SHALL BE WIDENED 2 FEET TO FACE OF GUARDRAIL.
- ② ASPHALT SEAL REQUIRED FROM OUTSIDE EDGE OF PAVED SHOULDER TO A POINT 2 FEET DOWN THE DITCH OR FILL SLOPE. TWO APPLICATIONS OF THE FOLLOWING:  
EMULSIFIED ASPHALT RS-2 @ 2.40 LBS. / SQ. YD.  
ASPHALT SEAL AGGREGATE @ 20 LBS. / SQ. YD.
- ③ SEE CROSS SECTIONS FOR SLOPES OUTSIDE THE LIMITS OF THE SHOULDERS.
- ④ PERFORATED PIPE UNDERDRAIN (SEE SHEET R2E).
- ⑤ SEE PLANS AND CROSS SECTIONS FOR PAVEMENT WIDTHS AND CROSS SLOPES OF RAMP LANES AND TAPERS ADJACENT TO I-64.

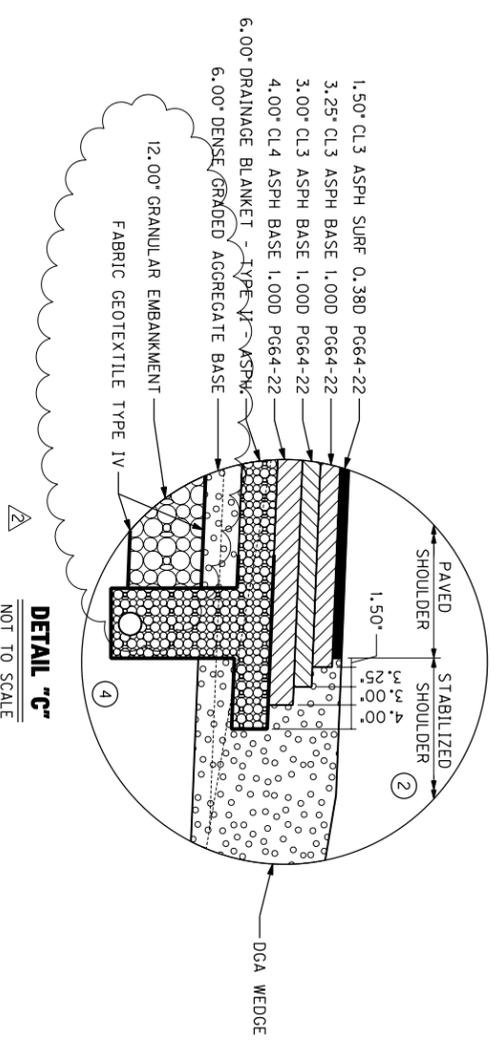


**NORMAL CUT SECTION**



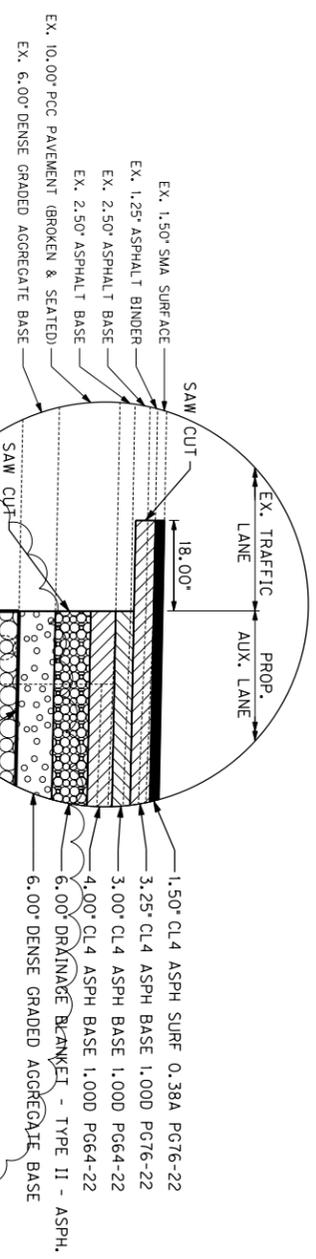
**I-64 WIDENING FOR AUXILIARY LANES  
STA. 140 + 40.83 TO STA. 25 + 60.06**

\* STA. 244 + 40 TO STA. 256 + 60



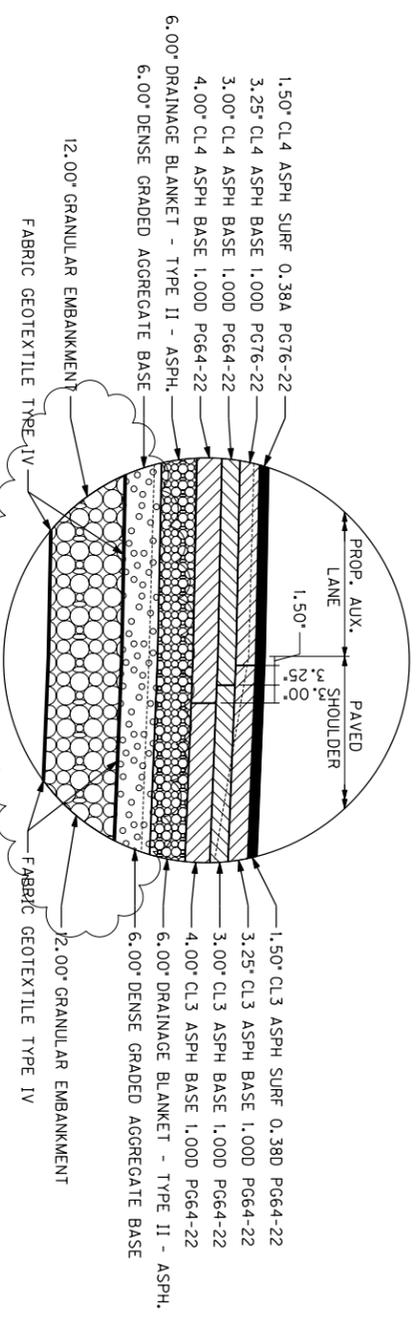
**DETAIL "C"**

NOT TO SCALE



**DETAIL "A"**

NOT TO SCALE



**DETAIL "B"**

NOT TO SCALE



GRAPHIC SCALE IN FEET

SCALE: 1"=10'

TYPICAL SECTIONS  
I-64 WIDENING - ASPHALT PAVEMENT

MODIFIED TYPICAL SECTION PAVEMENT DESIGN TO INCLUDE GRANULAR EMBANKMENT

# GEOTECHNICAL NOTES

COUNTY OF	ITEM NO.	SHEET NO.
JEFFERSON	5-159.10	R53

REVISED 4-13-2010

1.) In accordance with Section 206 of the current Standard Specifications, the moisture content of embankment material shall not vary from the optimum moisture content as determined by KM 64-511 by more than +2 percent or less than -2 percent. This moisture content requirement shall have equal weight with the density requirement when determining the acceptability of embankment construction. Refer to the Family of Curves for moisture/density correlation.

2.) All soils, whether from roadway or borrow, may require manipulation to obtain proper moisture content prior to compaction. Direct payment shall not be permitted for rehandling, hauling, stockpiling, and/or manipulating soils.

3.) Excavation of surface ditches and channel changes adjacent to embankment areas shall be performed prior to the placement of the adjacent embankments. The material excavated for the channel changes and surface ditches is suitable for embankment construction if dried to proper moisture content in accordance with Section 206 of the current Standard Specifications.

4.) The contractor is responsible for conducting any operations necessary to excavate the cut areas to the required typical section. These operations shall be incidental to the unit bid price for roadway excavation or embankment-in-place.

5.) Foundation embankment benches shall be placed in accordance with Standard Drawing RGX-010 at the locations listed below and/or as directed by the Engineer.

I-64 WB to I-264 WB Ramp

Stations 31+75 to 33+25  
Stations 36+75 to 54+75

6.) Some of the soil horizons and slopes on the project are subject to erosion. Necessary procedures in accordance with Sections 212 and 213 of the current Standard Specifications shall be followed during construction.

7.) A minimum 1.0-foot granular subgrade shall be constructed over the entire project. The subgrade shall be constructed using Granular Embankment (excluding pea gravel) in accordance with the current edition of Section 805 of the Standard Specifications for Road and Bridge Construction, and the material shall be classified as non-erodible. The Granular Embankment material shall be wrapped with Geotextile Fabric, Type IV in accordance with Sections 214 & 843 of the current Standard Specifications for Road and Bridge Construction. The actual elevation and thickness may need to be adjusted so that it also serves as a working platform. These adjustments will be determined by the Engineer during construction and may depend on seasonal fluctuations in the water table.

8.) Borrow material, if required beneath the granular subgrade, shall meet the minimum CBR value of 2.0.

9.) If sinkholes are encountered during construction, please contact this office for mitigation procedures.

REVISED NOTE 7 TO MODIFY REQUIRED USE OF  
KENTUCKY COARSE AGGREGATE #2'S TO  
GRANULAR EMBANKMENT.

**Commonwealth of Kentucky**  
**DEPARTMENT OF HIGHWAYS**  
COUNTY OF  
**JEFFERSON**

PROJECT \_\_\_\_\_ IM 0642 (173)  
NUMBERS: \_\_\_\_\_ FD52 056 0064 000-001

GEOTECHNICAL NOTE SHEET