SECTION 700 – GENERAL

700.02 – SIGNAL CABINET AND FOUNDATION INSTALLATION

The Specifications are amended to include the following:

Install the proposed cabinet on existing foundations or poles where indicated on the Plans. Remove the existing cabinet and salvage all equipment and lead in cables with the exception of traffic signal controllers and Malfunction Management Units / conflict monitors. Traffic signal controllers and Malfunction Management Units / conflict monitors shall be relocated to proposed cabinet. The Contractor shall not cut any cables or conductors unless indicated on the Plans or instructed by the Engineer. The Contractor is responsible for salvaging all cabinets as identified on the Plans.

Route all cables into and out of the cabinet as indicated on the Plans. Install new conduits where necessary and reuse existing conduit stubouts whenever possible. Install cables using pull rope as provided.

Prior to installing the new cabinet, conduct an inspection of the existing foundation to find any surface cracks. Grout and seal all cracks with an approved epoxy or polyurethane material.

Where necessary, install new bolts into the foundation according to the manufacturer provided bolt pattern. Drill to a minimum depth of 4 inch and seal with an approved epoxy. Saw cut any unused existing bolts prior to cabinet installation. Secure base mount cabinets using manufacturer provided fasteners.

Where indicated on the Plans, install new conduits by drilling a hole in the foundation. Locate the hole as close to the center of the foundation as possible to reduce cracking. Where approved by the Engineer, install conduit entrances into existing foundations in accordance with the Plans and Specifications.

Silicone sealant must be installed around any conduit penetration to the cabinet. Grout and sealant material must be waterproof and anti-corrosive and be approved by the Engineer. Silicone sealant must be waterproof and be approved by the Engineer.

Modify existing foundations in accordance with the Plans and Specifications. At locations where sidewalk, brick pavers, surface treatments, or landscaping treatments are removed or damaged as part of the cabinet foundation modification, replace and restore to preconstruction condition using same material as approved by the Engineer. For repair of sidewalks and walkways, remove entire section of slab from joint to joint and replace.

Contractor shall place all equipment/items within a single section of slab whenever possible to limit concrete repair area.
700.04 (C) – CONCRETE FOUNDATIONS

The Specifications are amended to include the following:

Use a minimum of four ½ inch diameter expanding type anchor bolts to secure the cabinet to foundation.

Seal space between cabinet base and foundation with permanent, flexible, waterproof sealing material.

700.04 (H) – CONDUIT SYSTEMS

The Specifications are amended to include the following:

When obstructions are encountered during installation and fiber optic conduit cannot be economically located elsewhere, the obstruction shall be bypassed by deflecting the conduit at a rate of at least 10:1. Minimum 4’ radius, maximum 90° bends may be used to avoid obstructions at locations where 10:1 deflection is not possible, provided the least degree bend needed to clear the obstruction is used. Flexible bends may be utilized when needed to facilitate proper location of the fiber optic conduit, only at locations approved by the Engineer. Fiber optic conduit runs between any two junction boxes shall not employ more than 4 bends, or exceed an angular sum of 270°. The Contractor shall notify the Engineer immediately in the event of obstructions encountered within existing conduit system. If additional spare conduit is not available for the designated conduit path, the Contractor shall propose a value engineering alternate remediation (e.g. boring/sub-sleeving the obstructed conduit path between junction boxes, etc.) for approval by the Engineer.

Furnish non-detectable underground marker tape with the wording “WARNING – Fiber Optic Cable” in all trenches under both paved and unpaved areas.

Open ends of unused conduit shall be closed with watertight plugs or caps to seal against moisture. Open ends of conduits with conductors installed shall be sealed with an approved soft, pliable, and easily removable waterproof sealant. The sealant shall not have a deleterious effect on cable coverings.

Provide #12 AWG, THWN, stranded copper wire to serve as tracer wire. Install tracer wire in all new / proposed conduits and in all existing conduits where fiber optic cables are being installed. Tracer wire shall be grounded in accordance with the NEC for non-current carrying conductors. Pull tracer wire simultaneously in a continuous length with the fiber optic cable. Provide waterproof butt splices where tracer wire is spliced. Splicing is allowed only in cabinets, manholes, handholes, and junction boxes. Label all tracer wires entering equipment cabinets, manholes, handholes, and junction boxes.

In certain cases the Contractor may use an alternate material and method of installation based on
existing field conduits and preferences. Obtain written approval from the Engineer before proceeding.

General

Install HDPE or PVC conduit for all underground runs. Clean existing underground conduit to be incorporated into a new system. Install longitudinal runs of conduit a minimum of one (1) foot from back of curb or six (6) feet from edge of pavement in the absence of curb unless otherwise approved by the Engineer.

Clearance between HDPE or PVC conduit installations and existing utilities shall be in accordance with State Corporation Commission (SCC) requirements and the City of Richmond’s Right-of-way Excavation and Restoration Manual; whichever is more restrictive takes precedence.

Trench excavation shall conform to the 2007 VDOT Road and Bridge Specifications and the 2008 VDOT Road and Bridge Standards ECI-1 and ECI-2 with two exceptions: the minimum depth shall be 36 inches under all paved surfaces including driveways and 24 inches in all other locations, and marker tape shall be installed within all trenches whether under paved or unpaved areas. When trenching conduit, the minimum depth shall be measured from finished grade to the top of the installed conduit unless otherwise approved by the Engineer. Where transitioning to existing conduit systems at a different depth, the Contractor shall utilize 45 degree bends for a gradual transition in elevation/depth.

Extend the ends of the conduits such that upon completion of the installation the conduits will extend a minimum of 2 inches above concrete surfaces and 4 inches above crushed stone bases. The Contractor shall modify existing junction boxes, where called for on the plans, to accommodate new conduit entries.

Upon completion, restore surface to like-original condition within seven (7) calendar days of occurrence of damage. Remove all rock and debris from backfill material. Remove excess material from site and compact area. Backfill with excavated material and compact to 95% of original density. Backfill trench at locations along the trench path where non-movable objects, such as rocks and boulders, cannot be avoided. The purpose of the backfill is to provide a gradual change in elevation of the trench, so that excessive bending and stress will not be transferred to conduits once underground conduit system is installed. The Contractor shall be required to restore/reseed any private property damaged during construction.

After installation of conduits and upon completion of tamping and backfilling, perform a mandrel test on each conduit to ensure no conduit has been damaged. Furnish a non-metallic mandrel having a diameter of approximately 80% of the inside diameter of the conduit in which it is to be pulled through. If damage has occurred, replace the entire length of conduit between junction boxes, handholes,
manholes, or other access points. Ensure pull line is re-installed.

Along segments where more than one conduit will be installed (via trenching or directional drilling), install conduits of contrasting colors for identification. Maintain consistent colors throughout the conduit network including at junction boxes, handholes, or manhole junctions.

**Unpaved Trenching**

Install conduit in all unpaved areas. Rake smooth the top 1 1/2 inches seed with same type of grass as surrounding area. Finish unpaved areas flush with surrounding natural ground.

**Paved Trenching**

On concrete surfaces, replace the entire joint of concrete unless otherwise specified. Repair/finish paved areas with materials matching damaged areas and to the required extents (e.g. entire travel lane) in accordance with the City of Richmond’s *Right-of-Way Excavation and Restoration Manual*. For conduit installed under sidewalks and walkways, remove entire section of slab from joint to joint and replace.

Daily trench excavation within pavement sections shall not exceed 500 feet in length. Repair/finish paved areas with materials matching damaged areas in accordance with the City of Richmond’s *Right-of-Way Excavation and Restoration Manual*. Trench excavation within pavement sections shall be temporarily backfilled flush with the adjacent pavement surface with Type I, Size 21A or 21B aggregate until permanent pavement restoration. Place cold patch to temporarily maintain traffic where repairs cannot be performed immediately. Cold patch material should be applied in one lift, approximately 2 inches thick or greater and should be flush with adjacent pavement surface. Temporary patch material shall not remain in place for more than ten (10) calendar days unless the location is being continually worked.

Whenever existing pavement is permitted to be cut, not over one-half of the roadway width shall be disturbed at one time and the first open cut trench section shall be satisfactorily restored to allow for the passage of traffic prior to the second half of the roadway surface can be disturbed.

Daily trench excavation within pavement sections shall not exceed 500 feet in length and the trench shall be temporarily backfilled flush with the adjacent pavement surface with Type I, Size 21A or 21B aggregate until permanent pavement restoration. If the application of the bituminous courses is delayed due to adverse weather conditions, the Contractor shall backfill the trench with a bituminous asphalt base course (BM 25.0) that is acceptable to VDOT until such time as installation of the underground facility is completed and the appropriate pavement restoration can occur.

Trenched conduit under paved roadway surfaces and driveways shall be concrete encased.
**Conduit Repair**

At locations shown on the plans or as requested by the Engineer, excavate and repair existing conduit. The Contractor shall be responsible for excavating an area up to six feet by ten feet with a maximum depth of eight feet. The Contractor shall be responsible for any shoring or stabilizing equipment necessary to prevent the hole from collapsing during excavation and work on the conduit system.

Expose the existing conduits and identify the blocked/damaged conduit. Cut and remove the damaged(blocked) portion of existing conduit and install new conduit, elbows, fittings, couplers, etc. necessary reconnect the severed conduit and repair the blockage. Ensure conduit joints are sealed using either a sealant or mechanical coupler that is compatible with conduit size and type being repaired. Replacement couplers and conduit segments shall be the same nominal size as the existing conduit being repaired. The Contractor shall be responsible for removing/replacing up to ten continuous linear feet of conduit under this pay item.

Upon completion, restore surface to like-original condition within seven (7) calendar days of occurrence of damage. Remove all rock and debris from backfill material. Remove excess material from site and compact area. Backfill with excavated material and compact to 95% of original density. Restoration of concrete surfaces shall be measured and paid for separately in accordance with Section 504 of the 2007 VDOT Road and Bridge Specifications.

Ensure that no other conduits are damaged or destroyed during excavation and repair of the damaged conduit or during restoration of the surface to like-original conditions. Any damage to other conduits or cabling present within the conduit system shall be repaired at the Contractor’s expense and will not be paid for under this contract.

Repair/finish paved areas with materials matching damaged areas in accordance with the City of Richmond’s Right-of-Way Excavation and Restoration Manual. For conduit installed under sidewalks and walkways, remove entire section of slab from joint to joint and replace. Place cold patch to temporarily maintain traffic where repairs cannot be performed immediately. Temporary patch material shall not remain in place for more than ten (10) calendar days unless the location is being continually worked.

Should the Contractor encounter any areas of damaged conduit not indicated on the plans, the Contractor shall notify the Engineer prior to proceeding with repair efforts.

**700.04 (I) – JUNCTION BOX COVERS**

The Specifications are amended to include the following:

Provide junction box covers with standard TRAFFIC logos, pull slots, and stainless steel pins.
Install the junction boxes flush with finished grade. Do not install sealant compound between junction boxes and covers. Install junction boxes where shown on the Plans and at locations where underground splicing of lead-in cable is necessary.

At certain locations shown on the Plans, reuse existing junction boxes and handholes. Precaution shall be taken to prevent damage to the existing conduit or cables. At locations where a new junction box or new conduit is to be connected to an existing junction box or handhole, use method to enter existing junction box or handhole as approved by the Engineer. Do not damage existing junction box or handhole or existing junction box or handhole contents. Junction boxes, handholes, or cable damaged shall be replaced at the Contractor’s expense.

700.05 – MEASUREMENT AND PAYMENT

The Specifications are amended to include the following:

**Modify Existing Cabinet Foundation**

No separate measurement will be made for cabinet foundation modifications and all work shall be considered incidental to the Install City Standard TS-2 Cabinet (Base Mounted).

Payment will be made under:

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<thead>
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<th>Pay Item</th>
<th>Pay Unit</th>
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<tr>
<td>Modified ECI-1</td>
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<tr>
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<td>Linear Foot</td>
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<td>Directional Drill (2) (3”)</td>
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<tr>
<td>Directional Drill (1) (4”)</td>
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</tr>
<tr>
<td>Conduit Repair</td>
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SECTION 703 – TRAFFIC SIGNALS

703.01 – DESCRIPTION

The Specifications are amended to include the following:

All proposed cabinets, controllers, detector racks, and Malfunction Management Units will be furnished by the City.

703.02 – EQUIPMENT

The Specifications are amended to include the following:

All proposed cabinets, controllers, detector racks, and Malfunction Management Units will be furnished by the City.

703.03 – PROCEDURES

The Specifications are amended to include the following:

The Contractor shall coordinate with the City’s standard signal system equipment provider (Econolite) to configure each signal controller with the site-specific IP addressing. No separate measurement or payment will be made for configuration of controller IP addresses. This work shall be considered incidental to the installation and configuration of Field Ethernet Switches (all types).

Traffic on existing roadways must be maintained at all times during construction. In order for an intersection to be online it must be integrated, tested, and accepted at the central system, and approved by the Engineer.

The Contractor shall install a City Standard MMU in all new signal cabinets as identified on the Plans. The Contractor shall remove and salvage the existing conflict monitor. The City will furnish all City Standard MMUs upon request from the Contractor. The Contractor shall provide a minimum two (2) week notice prior to the anticipated installation date for delivery of an MMU. The IP-based MMU shall be configured to operate on the same VLAN as the signal controller.

Where installing a new cabinet, the Contractor is to remove and salvage the existing cabinet. The City will furnish all new City Standard TS-2 cabinets upon request from the Contractor. The Contractor shall provide a minimum four (4) week notice prior to the anticipated installation date for delivery of a cabinet.

All salvaged equipment shall be returned to the Transportation Engineering Division Shop between the hours of 8:00 AM and 3:30 PM Monday through Friday, or at a time/place mutually agreed to by the Contractor, Engineer, and Signal Technician. The Contractor shall coordinate delivery of salvaged items with the Transportation Engineering Division Shop at (804) 646-1466 at least three
(3) business days in advance. Label all returned equipment and material to indicate the location from which it was removed. The City will deduct the cost of City-owned equipment damaged by the Contractor from money due to the Contractor.

703.04 – MEASUREMENT AND PAYMENT

The Specifications are amended to include the following:

Install City Standard Traffic Signal Cabinet (Type) shall be measured and paid for at the Contract unit price per each City furnished cabinet that is installed and accepted. Price shall include all labor, cabinet foundation modifications, attachment hardware, conduit and fittings, and items required to provide a complete working assembly at the local intersection. No separate payment will be made for standoffs, meter bases, and service disconnects and work will be considered incidental to the cost of the cabinet when required. No separate payment will be made for removal and salvage of existing cabinets. This shall be considered incidental to the cost of installing a new cabinet.

Payment will be made under:

<table>
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<tr>
<th>Pay Item</th>
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<tr>
<td>Install City Standard Traffic Signal Cabinet (Base Mounted)</td>
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</tr>
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SECTION 704 – PAVEMENT MARKING AND MARKERS

704.04 – MEASUREMENT AND PAYMENT

Section 704.04 of the 2007 VDOT Road and Bridge Specifications is deleted and replaced by this provision.

Payment for all pavement line markings, pavement message markings, pavement markers, or eradication of pavement markings shall be considered incidental to the repair and restoration of the paved surface. Pavement markings shall not be measured or paid for separately.