

## GENERAL NOTES - SIGNALS:

The construction, operation and maintenance of this proposed project will be consistent with the State Implementation Plan as prepared by the Texas Air Control Board.

The CONTRACTOR'S representative who will be directly responsible for construction of this project will need to attend the pre-construction meeting.

The signal installation will consist of the following principal items for each intersection in the plans:

1. Furnishing and installing NEMA TS2 Type 2 signal controller LINUX M60 Series
2. Furnishing and installing NEMA TS2 Type 1 traffic signal cabinet assembly (Siemens Brown) with the following for each cabinet:
  - 1 Power Supply (CPS 105)
  - 1 Flasher (EDI-810)
  - 4 TS2 BIUs (EDI-BIU-700)
  - 16 Reno Load Switches (Model LS-200)
  - 1 NEMA Flasher (EDI-810)
  - 6 Flash Transfer Relays (Deltrol Controls 295-21084-8)
3. Furnishing and installing a conflict monitor (EDI 16-channel MMU-16LEip SmartMonitor with Ethernet port).
4. Furnishing and installing electrical service equipment, including electrical panel Type D(120/240)070(NS)GS(E)PS(U). The CONTRACTOR shall coordinate with Bryan Texas Utilities (979-821-5770) to obtain power for the panel (lead-times can be as long as 60-90 days).
5. Furnishing and installing battery back-up uninterrupted power supply (UPS) system (Myers MP series MP2000E-TEB), including manual bypass switch - P/N722535m – (4) 8A30 HEI Batteries. Wiring must adhere to the specifications of the manufacturer (Myers).
6. Furnishing and installing all signs. The CONTRACTOR shall provide all sign mounting hardware. All signs installed on mast arms poles shall be mounted as shown on the PLANS using "ASTRO-BRAC" type mounting bracket assembly. All sign mounting hardware shall be approved by the ENGINEER.
7. Furnish and installing pedestrian LED countdown signal modules as per the PLANS. Refer to Material Producer List for TxDOT DMS-11131.
8. Furnishing and installing all proposed pavement markings and raised pavement markers.
9. Removing and salvaging existing signs. All salvaged material shall be returned to the City of Bryan.
10. Furnish and installing video communication module (Gridsmart Single Camera Dual Processor Fish Eye Camera System with GS2 Processor Real Time Data Modules).
11. Furnishing and Installing Opticom emergency preemption as follows per traffic signal:
  - Two (2) Opticom Model 721 Infrared detectors
  - One (1) Opticom Model 768 Auxiliary Interface Panel
  - One (1) Opticom Model 138 Detector Cable
12. Furnishing and installing all steel traffic signal pole and pedestrian pole assemblies. The CONTRACTOR shall furnish and install all mounting hardware, miscellaneous signs, luminaire fixtures and lamps, and all materials and equipment necessary for the complete signal pole assemblies.
13. Furnishing and installing all signal heads with 12-inch LED lamp units. LED lamp units shall be the type with an incandescent appearance. Refer to Material Producer List for TxDOT DMS-11121. Furnish and install signal heads using support arms with CGB fittings. Refer to Item 682
14. Furnishing and installing audible pedestrian detectors as per the PLANS (Campbell Company Advanced Accessible Pedestrian Station/AGPS)
15. Furnishing and placing all concrete, reinforcing steel, and ground rods for the electrical service, foundations and ground boxes.
16. Furnishing and installing miscellaneous items essential for complete traffic signal installation and operation.
17. Furnishing and installing miscellaneous items essential for the installation of an AXIS communications AXIS Q 6115-E 2MP Outdoor PTZ Dome Security camera 0934-004.

If any repairs to existing curbs, sidewalks, and sidewalk ramps should be needed after drilling foundations, installing ground boxes, or conduit, the repairs shall be made by the CONTRACTOR as directed by the ENGINEER and shall be considered subsidiary to the various bid items.

Unless otherwise shown on the PLANS, the CONTRACTOR shall remove all existing signal equipment as directed by the ENGINEER, at the time the new signal is placed in to full stop-and-go operation. The CONTRACTOR shall deliver the signal equipment from both intersections to the City of Bryan Municipal Service Center, 1111 Waco Street, Bryan, Texas. Payment for said work shall be considered subsidiary to Item 680.

Exact locations of the cabinet, mast arm poles, ground boxes, etc. shall be approved by the ENGINEER in the field.

Signal Technician – A representative from the City of Bryan shall be present when the new signal is placed in operation. The CONTRACTOR shall notify the City approximately 48 hours in advance of the signal turn-on.

Test Period for Signal – Once the new signal at each project intersection has been installed and placed in to operation, the installation shall operate continuously for a minimum of 30 calendar days in a satisfactory manner. Equipment failures during this 30 day test period will cause the test period to start over for the failed intersection.

Phases of Signal Operation – The signal installations shall be wired to operate in accordance with phase diagrams shown on the PLANS. Time intervals shall be adjusted and set as directed by the ENGINEER.

Wiring – Extra cable length shall be included in each run to provide adequate slack, as determined by the ENGINEER, at each ground box or foundation.

Refer to TxDOT Standard Specifications Book, Version 2004, for the following items.

ITEM 416, DRILLED SHAFT FOUNDATIONS:

The top two (2) inches of the drill shafts shall be formed to provide a smooth finish satisfactory to the ENGINEER. The cost of the work shall be included in the unit bid price for this item.

A ¼ inch chamfer shall be formed on the top edge of each traffic signal foundation.

The CONTRACTOR shall probe before drilling or excavating for foundations to determine the locations of utilities and structures. Foundations shall be paid for once regardless of extra work caused by obstructions.

All exposed signal pole and controller foundations shall receive a Class C finish as per Item 427, "Surface Finishes for Concrete."

The City may test, by ultrasonic methods, the anchor bolts for traffic signal poles after they have been placed. Faulty anchor bolts shall be replaced as directed by the ENGINEER. Anchor bolts shall not be welded.

ITEM 502, BARRICADES, SIGNS, AND TRAFFIC HANDLING:

The TRAFFIC CONTROL PLAN (TCP) for this project shall be as detailed on STANDARD PLAN SHEETS WZ (BTS-1)-03, WZ (BTS-2)-03 and as provided for in the current version of the "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES," or Texas MUTCD.

All barricades and warning signs shall have Type C - High Specific Intensity sheeting. All warning signs for barricades shall be 36 inch X 36 inch. Except for short-duration work, all construction-related signs shall meet the mounting heights defined as per TxDOT's Compliant Work Zone Traffic Control Device List (August 2011 or more recent).

Barricades and warning signs, as appropriate, are to be placed at stockpiles to adequately warn motorists. At all stockpile sites that are less than 30 feet from the edge of any traveled lane, a Class III barricade shall be erected immediately in front of or at each end, if required. When a stockpile site equals or exceeds 100 feet in length, one OBJECT MARKER (OM-2HP) per 100 feet shall be placed alongside the stockpile.

Traffic cones at least 28 inches in height may be used for channelizing purposes. For nighttime use, cones or other channelizing devices shall be retroreflectorized with two white bands (6-inch and 4-inch) separated by 3 to 4 inches. Refer to Part 6 of the current version of the Texas MUTCD for more information.

The CONTRACTOR shall plan his/her work sequence in a manner that will cause the minimum interference with traffic during construction operations. Before beginning work on this project, the CONTRACTOR shall submit, for approval by the ENGINEER, a plan of construction operations outlining in detail a SEQUENCE OF WORK to be followed, setting out the method of handling traffic along, across, and adjacent to the work.

If at any time during construction the CONTRACTOR'S proposed plan of operations for handling traffic does not provide for safe, comfortable movement, the CONTRACTOR shall immediately change his/her operations to correct the unsatisfactory condition.

Subject to the approval of the ENGINEER, portions of this project which are not affected by or in conflict with the proposed method of handling traffic or utility adjustments can be constructed during any phase.

Barricades and signs shall be placed in such a manner as to not interfere with the sight distance of drivers entering the roadway from driveways or side streets. To facilitate shifting, barricades and signs used in lane closures or traffic staging may be erected and mounted on portable supports. The design of these supports is subject to the approval of the ENGINEER.

The CONTRACTOR shall provide and maintain flaggers at such points and for such periods of time as may be required to provide for the safety and convenience of public travel and CONTRACTOR'S personnel, and as shown on the PLANS, or as directed by the ENGINEER.

The CONTRACTOR will only be allowed to work on this project from 7:00 a.m. to 7:00 p.m., MONDAY through FRIDAY. Night work (between 7:00 p.m. and 7:00 a.m.) or work on SATURDAY and SUNDAY may be allowed with the approval of the ENGINEER. No lane closures will be allowed prior to 9:00 a.m. or after 4:00 p.m., MONDAY through FRIDAY unless otherwise directed by the ENGINEER.

The CONTRACTOR will not be permitted to commence work on the road before sunrise and shall arrange his/her work so that no machinery or equipment shall be closer than 30 feet to the traveled roadway after sunset, except as authorized by the ENGINEER.

The CONTRACTOR shall keep traveled surfaces used in his/her hauling operation clear and free of dirt or other material. The use of rubber-tired equipment will be required for moving dirt and other materials along or across paved surfaces.

If applicable, after signal construction has been completed, the signal shall operate in a flashing mode for two or three days (as directed by the ENGINEER) prior to the beginning of the test period for full signal operation. The CONTRACTOR will not be charged working days during the flashing operation.

Unless otherwise directed by the ENGINEER, the new signal shall be placed in to full stop-and-go operation between 9:00 a.m. – 12:00 (noon) on a TUESDAY, WEDNESDAY, or THURSDAY only.

It is the responsibility of the CONTRACTOR to hire off-duty law enforcement personnel to assist with any traffic control during the existing signal demolition, new signal construction, when placing the new signal in flashing mode, and/or when placing the new signal in to full stop-and-go operation.

If applicable (for new signal installations only), the CONTRACTOR shall provide two (2) portable Changeable Message Signs (PCMS) for use for when the signal is in flashing mode and for three to four days after the signal is placed in to full stop-and-go operation (but not to exceed one full week), to provide supplemental warning of the new traffic signal. The location and message content of each PCMS shall be approved by the ENGINEER prior to use.

Areas within the right of way disturbed by the construction shall be restored to equal or better conditions than existing prior to construction.

**ITEM 506, TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS:**

The SW3P for this project shall consist of using the following items as directed by the ENGINEER:

- Item 506, Baled Hay for Erosion and Sedimentation Control
- Item 506, Earthwork for Erosion Control
- Item 506, Temporary Sediment Control Fence

This work shall be completed in accordance to their respective bid items. Measurement and payment shall be considered subsidiary to TxDOT Bid Item 680.

Any obstructions to existing drainage due to the CONTRACTOR'S operations will be removed by the CONTRACTOR as required by the ENGINEER at the CONTRACTOR'S entire expense.

**ITEM 610, ROADWAY ILLUMINATION ASSEMBLIES:**

The CONTRACTOR shall install new 250 watt equivalence LED illumination assemblies (consisting of luminaire head, a Ripley Long Life Photocell (6390LL), 8-foot mast arm, conduit, weatherhead, wiring, equipment and miscellaneous components) on the new steel mast arm signal poles, as designated on the PLANS.

Luminaire ballasts for fixtures located on traffic signal poles shall be rated for operation at 110 VOLTS. All luminaire arms shall be powder-coated black to match the poles, mast arms, and pedestrian poles.

**ITEM 618, CONDUIT:**

The location of conductors, conduit and ground boxes are diagrammatic only and may be shifted by the ENGINEER to accommodate field conditions.

Polyvinylchloride (PVC) or rigid metal (ferrous) conduit (RMC) may be used. A continuous bare or green insulated copper wire (No. 6 AWG or larger) shall be installed in every PVC and RMC conduit throughout the electrical system in accordance with the electrical detail sheets, and the latest edition of the National Electrical Code (NEC), except for conduit runs containing loop detector conductors only.

Conduit sizes are as follows:

- 2 inch conduit for electrical services
- 2 inch conduit for video detection
- 4 inch conduit for field wiring run from the signal cabinet to signal heads

All bores must be at least 24" deep.

When conduits are bored, the vertical and horizontal tolerances shall not exceed 18" as measured from the intended target point.

PVC conduit shall be heavy wall Schedule 40, unless otherwise approved by the ENGINEER.

Conduit shall be placed under existing pavement by an approved jacking or boring method unless otherwise directed by the ENGINEER. Pits for jacking or boring shall not be closer than two (2) feet from the edge of the pavement unless otherwise directed by the ENGINEER. Water jetting will not be permitted.

The CONTRACTOR shall install a non-metallic pull rope in conduit runs in excess of fifty (50) feet.

A cleaner-primer shall be used on all PVC to PVC joints before application of PVC cement.

#### ITEM 620, ELECTRICAL CONDUCTORS:

All electrical connectors for breakaway poles shall be breakaway (Buchanan 65U, Bussman HEBW, Littlefuse LEB, or equal) in accordance with Standard Sheet RID(LUM2)-07. All electrical connections for neutrals shall be breakaway, shall have a white color marking, and shall have permanently installed solid neutral (Buchanan 20U, Bussman HET, Littlefuse LET, or equal).

Grounding conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the NEC.

The single conductor No. 8 AWG (XHHW) used for the illumination circuit between the service enclosure and signal pole, shall be marked with a yellow colored tape marker at every accessible point. The colored tape marker shall consist of a half-lap of tape covering a 6-inch length of conductor.

A single conductor No. 12 AWG (XHHW) shall be used between the luminaire and the terminal strip in the pole base.

When the specifications for electrical items require UL listed products, it will be construed to mean UL Listed or CSA Listed.

#### ITEM 624, GROUND BOXES:

The CONTRACTOR shall furnish and install new ground boxes and lids with concrete aprons at the locations shown on the PLANS. New ground boxes furnished and installed by the CONTRACTOR shall be Type D ground boxes with heavy-duty covers and concrete aprons. Ground boxes used for signals shall have the legend "SIGNALS-DANGER HIGH VOLTAGE" stamped or imprinted on the cover.

#### ITEM 628, ELECTRICAL SERVICES:

The CONTRACTOR is instructed to exercise caution when connecting service wires in the meter base; these wires should not be crossed.

The new electrical service for each intersection shall be billed in the name of the City of Bryan. The CONTRACTOR shall make all arrangements for new electrical service or changes to existing services. The CONTRACTOR shall notify Bryan Texas Utilities (979-821-5770) a minimum of 30 days in advance of the need for electrical service.

The new pedestal traffic signal service enclosure and equipment shall be installed in accordance with the NEC and Bryan Texas Utility requirements. The pedestal service enclosure and equipment shall conform to requirements of details depicted on standard sheets ED (7) – 03 and ED (8) – 03. The CONTRACTOR may submit an alternate but equivalent pedestal service enclosure design for the ENGINEER's approval. New service feed conductors shall be installed between the meter base and the electric service pole by the electrical service provider.

All circuit breakers shall be UL Listed to UL489. All circuit breakers shall be switch duty.

#### ITEM 636, ALUMINUM SIGNS (TYPE A):

Signs shall be ground-mounted or mounted on the mast arm per the project PLANS. This item will be measured and paid for under the bid price for "Aluminum Signs."

Sign substrate (except street name signs) shall meet requirements for ASTM B 209 and have the following thicknesses: 0.080" for signs less than 7.5 sq. feet, 0.100" for signs 7.5 to 15 sq. feet, and 0.125" for signs greater than 15 sq. feet.

All sign sheeting materials shall meet the requirements of ASTM D 4956 Type, as follows:

Red background – ASTM Type VII, VIII, IX, or X (or TxDOT Type D), with ASTM Type III or IV (TxDOT Type C) legend/border

White background – ASTM Type III or IV (TxDOT Type C), with black acrylic legend/border

Yellow background – ASTM Type VII, VIII, IX, or X (or TxDOT Type E), with black acrylic legend/border or ASTM Type VII, VIII, IX, or X (or TxDOT Type D) legend/symbol

Fluorescent Yellow-Green background – ASTM Type VII, VIII, IX, or X (TxDOT Type E), with black acrylic legend/border (school-related warning signs)

Green, Brown, Blue backgrounds – ASTM Type III or IV (TxDOT Type C), with white ASTM Type VII, VIII, IX, or X (TxDOT Type D) legend/border.

CONTRACTOR shall provide shop drawings of all street name signs for approval by the ENGINEER.

All sign posts shall be 13 BWG galvanized steel tubing (as per ASTM 123 or ASTM A653 G210), and have 2.375" outside diameter and 0.095" nominal wall thickness. Post shall be black powder-coated when specified. Painted or spliced posts are not acceptable. Posts shall be seamless steel tubing, with 50,000 PSI minimum yield strength, and 70,000 PSI minimum tensile strength. Length shall be determined as per Texas MUTCD sign height requirements.

All sign posts shall be delineated with a 12-inch retroreflective strip (yellow or red) as per Section 2A.21 of the 2011 Texas MUTCD.

Sign supports shall meet crashworthy requirements of NCHRP 350, and unless otherwise specified, shall be the steel "Wedge Anchor System."

Use galvanized steel, stainless steel, or dichromate-sealed aluminum for bolts, nuts, washers, lock washers, screws, and other sign assembly hardware. Use plastic or nylon washers to avoid tearing the sheeting material.

All sign components (substrate, sheeting, post, support, mounting hardware, etc.) will not be measured or paid for directly but will be subsidiary to each unit sign.

ITEM 656, FOUNDATIONS FOR TRAFFIC CONTROL DEVICES:

Payment for furnishing and installing anchor bolts mounted in drilled shafts shall be included in the unit price bid for the various drilled shafts.

ITEM 666, REFLECTORIZED PAVEMENT MARKINGS:

The CONTRACTOR shall furnish and install Type I thermoplastic pavement markings. Application and performance of Type I markings shall be in accordance with the specification of this item. This item will be measured and paid for under the bid price for "ReflectORIZED Pavement Markings." If a pavement sealer is required as per this specification, it may be either a Type II marking or an acrylic or epoxy sealer unless otherwise shown on the PLANS. The sealer will be measured and paid for separately under the bid price for Item 666.

ITEM 672, RAISED PAVEMENT MARKERS:

Place all adhesive material directly from the heated dispenser to the pavement. Do not use non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

ITEM 677, ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS:

Existing pavement markings and markers that are required to be removed shall be removed by such methods that will cause the least possible damage to the pavement or surfacing. Markings shall be removed so that they are no longer legible and to the satisfaction of the ENGINEER.

The CONTRACTOR shall obtain the ENGINEER's approval to utilize the mechanical method for eliminating existing thermoplastic pavement markings prior to employing this method.

ITEM 678, PAVEMENT SURFACE PREPARATION FOR MARKINGS:

Blast cleaning of concrete pavement will be the required cleaning method for permanent pavement markings. Concrete pavement shall not be cleaned by grinding.

Asphaltic concrete pavement will not require blast cleaning, but shall be cleaned as required under the applicable specifications, or as directed by the ENGINEER.

Measurement and payment for this pay item shall be considered subsidiary to the respective bid Item 666, ReflectORIZED Pavement Markings.

ITEM 680, INSTALLATION OF HIGHWAY TRAFFIC SIGNALS:

At this location the PROJECT shall consist of furnishing and installing all materials and equipment necessary for the complete signal system. In addition to these items, the CONTRACTOR shall be responsible for the following:

1. Furnishing and installing signal controller, conflict monitor, and base-mounted signal controller cabinet equipment. Signal controller cabinet bases with a breakaway base design shall not be installed.
2. Furnishing and installing video detection equipment, communication modules, and video detection cable. The CONTRACTOR shall provide all mounting hardware.
3. Furnish and installing pedestrian LED countdown signal modules as per the PLANS.

4. Furnishing and installing wireless radio communication equipment. The CONTRACTOR shall provide all mounting hardware. (Encom wireless radio, E-Lite 2.4 GHz—300 Mbps)
5. Furnishing and installing back-up battery uninterrupted power supply (UPS), batteries, and battery management system.
6. Furnishing and installing emergency preemption equipment and cable. The CONTRACTOR shall provide all mounting hardware.
7. Furnishing and installing red indication confirmation lights. The CONTRACTOR shall provide submittal documentation to the ENGINEER for approval, and all mounting hardware and cabling.
8. During the thirty (30) day test period, the CONTRACTOR shall utilize qualified personnel to respond to all trouble calls and to repair any malfunctions to new control equipment. A local telephone number (not subject to frequent changes) where trouble calls are to be received by the CONTRACTOR on a 24-hour basis shall be provided to the ENGINEER by the CONTRACTOR. The CONTRACTOR'S response to reported trouble calls shall be within a reasonable travel time from a Bryan address, but not more than two (2) hours maximum. Appropriate repairs shall be made within 24 hours. The CONTRACTOR shall place a log book in the controller cabinet(s) and keep a record of each trouble call reported. The CONTRACTOR shall notify the ENGINEER of each trouble call. The error login in the conflict monitor (MMU) shall not be cleared during the thirty-day test period without the approval of the ENGINEER.
9. Submittal literature shall be provided for all new traffic signal equipment furnished by the CONTRACTOR prior to installation.
10. The CONTRACTOR shall place duct seal at the ends of all conduits after cables have been installed. All empty conduits installed by the CONTRACTOR shall be capped with a suitable PVC plug.
11. Furnishing and installing luminaires with 250 watt equivalence luminescence per the PLANS.
12. Furnishing and installing baled hay, earthwork, and fencing for temporary erosion and sedimentation control.
13. Furnishing and installing all mast arm mounted aluminum signs (including pedestrian push button signs).

No extra compensation will be allowed for fulfilling the requirements stated above unless otherwise provided for in the PLANS.

**ITEM 682, VEHICLE AND PEDESTRIAN SIGNAL HEADS:**

All signal head attachments on mast arms furnished by the CONTRACTOR shall have a cable drip loop running from the CGB fitting on the bottom of the mast arm into the side of the signal head as shown on the PLANS. Support arms with CGB fittings should be used (Asto-Brac arm kit, AB-4001-Pelco).

The signal-to-mast arm connection must allow for adjustment about the horizontal and vertical axis. The hanger terminal housing shall have a twelve (12) circuit terminal block with spade screw terminals.

For this project, an "ASTRO-BRAC" type signal head mounting bracket assembly (both horizontal and vertical mounting positions) will be required. New vehicle and pedestrian signal heads for this project shall be black polycarbonate with black polycarbonate back plates. Vehicle signal lenses shall be polymeric. The new signal heads shall be covered with burlap or other material approved by the ENGINEER until placed into operation. Incandescent type LED lamp units for vehicle signal faces shall be furnished and installed by the CONTRACTOR and shall have the following wattage: Red – 12.5 watt ; Yellow – 36.0 watt ; Green – 19.0 watt ; Yellow Arrow – 10.0 watt ; Green Arrow – 6.5 watt.

A pedestrian signal head assembly having a one-piece reflector assembly, symbolic "WALK" and "DON'T WALK" indications with countdown display, and a flush, "egg-crated" visor will be required. Pedestrian signal head assemblies shall be drill mounted to the signal poles. Incandescent LED lamp units for pedestrian signal faces shall be furnished and installed by the CONTRACTOR.

**ITEM 684, TRAFFIC SIGNAL CABLES:**

The conductors in the traffic signal cable shall be stranded for this project. Individual conductors shall be NO. 14 AWG in groups of 2 (for luminaire wiring), and 7 and 9 (for field wiring from signal cabinet to signal heads).

A separate multi-conductor cable (No. 14 AWG) shall be used inside the mast arm signal pole shaft from the terminal strip to each signal head and pedestrian push button unit as shown in the conduit and cable charts on the PLANS.

Each cable shall be identified, as shown on the schematic drawings maintained by the ENGINEER for maintenance documentation, with permanent marking labels (Panduit Type PLM standard single marker tie, Thomas & Betts Type 548M or equivalent) at each ground box, pole base, and controller cabinet where the CONTRACTOR performs work.

Splices in the conductors inside steel signal poles from the terminal strip at the hand hole to the signal heads will not be permitted in the pole shaft or in the mast arm.

**ITEM 686, TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL ROUND POLES):**

Traffic signal poles, mast arm assemblies, pedestrian poles, and luminaire arms for this project shall be galvanized on the exterior face. Color selection shall be black powder coating. The powder coating shall meet the following specifications:

Exterior face of poles, exposed arm, arm assemblies and other hardware such as anchor bolts, brackets, nuts, nut covers, clamps, bolts, connection or pin bolts, etc. shall be coated with high density low gloss polyester thermosetting resin, minimum of 4 mils. Coating shall be electrostatically sprayed on the substrate and fused in a high temperature oven. Adhesion shall meet the 5A or 5B classification of ASTM D3359. Outside coating shall be uniform in appearance and free of scratches. Inside of the pole shall be coated the same as the outside or may be painted with a zinc rich primer coat. Painting materials information including color sample and application procedures shall be submitted to the ENGINEER with pole shop drawings for approval.

Terminal strips in the signal pole access compartment shall be 12-circuit Buchanan Type 112SN, Kulka Type 985-GP-12 or equivalent. When more than 12 circuits are required, additional terminal strips of 8 circuits each shall be added.

All pole shafts and mast arms for this project shall be marked with the identification numbers from the Intersection Layout Sheets (Poles P-1, etc.) to facilitate assembly of these items in the field. The identification numbers shall be marked on the pole shafts and mast arms prior to the shipment from the fabricator. The pole shafts and mast arms shall also be identified by intersection on multiple intersection projects.

Poles will require nuts on the top and bottom (double nuts) of the shaft base plate. Anchor bolts shall be set so that two are in tension and two are in compression. All signal pole and mast arm nuts and bolts shall remain exposed.

The traffic signal pole heights and lengths shown in the PLANS and in the material summary are to be used for bidding purposes only. Prior to fabrication, the CONTRACTOR, in cooperation with the ENGINEER, shall make field measurements to determine the actual pole height necessary to ensure a vertical clearance of 18 feet minimum, 19 feet maximum from the roadway surface to the bottom of the lowest point on the signal head assembly or mast arm and to determine the mast arm lengths required to mount the traffic signal heads over the traffic lanes. The mast arm shall be straight and level in the span area where the signal heads are attached. These field measurements and elevations shall be determined from the actual location of the pole foundations, considering all above and below ground utilities and the existing roadway elevations and lane widths.

All steel mast arms shall be provided with approved vibration dampers fabricated from 0.125 inch minimum thickness, 4 feet minimum length by 12 inch minimum width T-6 aluminum. Dampers shall be installed using an "ASTRO-BRAC" Sign Bracket or a Signfix aluminum channel or equal, a maximum of 3 feet from the end of the mast arm. Measurement and payment for dampers shall be considered subsidiary to Item 686.

#### ITEM 688, PEDESTRIAN DETECTORS:

Pedestrian pushbuttons shall be ADA compliant ( and mounted at a height of three (3) feet - six (6) inches above the sidewalk unless otherwise noted and shall be of the type that have permanent-type signs within the pushbutton assembly which explains their purpose and indicates which crosswalk signal is actuated.( On button actuation a audible warring shall specify location to be crossed, example: "Wait to cross (street to be crossed) at (intersecting street)."

The pushbutton shall be activated by a minimum two (2) inch diameter convex plunger. A protective shroud shall encircle the plunger to deter vandalism. The shroud shall be cast as part of the housing cover. The plunger shall protrude beyond the protective shroud a distance adequate to accommodate the switch travel.

While staking the pole locations, the CONTRACTOR along with the ENGINEER shall verify the location of the pushbuttons and the direction of the arrows on the signs prior to installation.

#### ITEM 6266, VIDEO IMAGING VEHICLE DETECTION SYSTEM:

The CONTRACTOR shall furnish and install the Iteris Video Imaging Vehicle Detection System, communication modules, cable, and all mounting hardware.

#### ELECTRICAL TESTING:

All signal cables and power conductors shall be checked for insulation resistance upon installation and prior to termination. The tests shall be made with a test set operating at a minimum of 500 Volts D.C. applied to the conductors.

Each conductor in the multiconductor signal cables shall be tested for insulation resistance relative to each other and to the outer covering of the cable. The minimum acceptable value for insulation resistance shall be 50 Megohms.

#### GENERAL PROJECT NOTES:

The CONTRACTOR shall preserve and protect all trees within the project limits or adjacent to all construction activity. The CONTRACTOR shall repair any tree scars caused by construction operations with an approved pruning paint. Any and all trees and shrubs that are moved or damaged by the CONTRACTOR shall be replaced with identical species and equal size at the CONTRACTOR'S expense.

The CONTRACTOR shall be responsible for adequately protecting existing structures, utilities, trees, shrubs, sprinkler systems, and other adjoining facilities, and repair or replace due to damage caused by the CONTRACTOR, at his/her own expense.

Any permanent relocation of existing utility not shown on the drawings shall be approved by the ENGINEER prior to relocation and shall conform to the applicable governing standards and specifications of the City of Bryan.

Existing utilities shall remain in service at all times unless otherwise approved by the ENGINEER.

The CONTRACTOR shall limit operations to within the confines of the construction work limits unless otherwise directed by the ENGINEER.

#### UTILITY CONSTRUCTION NOTES:

##### Utility Service Lines

1. The information shown on these drawings concerning the type and location of all utilities underground, above ground or overhead is not guaranteed to be accurate or all-inclusive. The CONTRACTOR is responsible for making his/her own determinations as to the type and location of underground utilities as may be necessary to avoid damage thereto. CONTRACTOR shall anticipate that such service lines exist and repair them in a timely manner if damaged during construction. No separate pay will be made for repairs. The cost shall be incidental to the work. It is also the CONTRACTOR'S responsibility to make arrangements with the owners of such utilities prior to working in the area to confirm their exact locations and/or depths, and to determine whether any additional utilities other than those shown on these PLANS may be present. The CONTRACTOR shall determine for himself if any of these utilities are clear, and shall preserve and protect all of these utilities shown or found. If problems arise regarding public utilities, the CONTRACTOR should immediately notify Mr. Eddie Lovato with the City of Bryan at (979) 209-5900.

Prior to beginning any excavation work in the area of existing utilities, the CONTRACTOR shall contact the utility companies for exact locations to prevent any damage or interference with present facilities. For utilities locates, CONTRACTOR shall call:

- Lone Star 8-1-1 - Call before you dig at Toll Free 1-800-669-8344
- City Water and Sanitary Sewer at 979-209-5900
- City Storm Sewer at 979-209-5900
- City Traffic Operations at 979-209-5900
- DigTess at Toll Free 1-800-344-8377

##### Verizon-Sprint-Nextel-SuddenLink

1. CONTRACTOR shall hand dig within one (1) foot of underground conduit or cable systems.
2. The CONTRACTOR shall determine the exact location by calling 1-800-DIG-TESS before commencing work. The CONTRACTOR agrees to be fully responsible for any and all damages that might be occasioned by his failure to exactly locate and preserve these underground utilities.

##### Bryan Texas Utilities – Electric

1. Overhead and underground lines exist on the property. The CONTRACTOR shall locate the existing overhead and underground lines prior to the beginning of any construction.
2. The CONTRACTOR shall hand dig within one (1) foot of TXU underground conduit or cable systems.
3. The Contractor shall notify Bryan Texas Utilities (979-821-5770) a minimum of 30 days in advance of the need for electrical service.

##### ATMOS Energy – Gas

1. The CONTRACTOR shall hand dig within one (1) foot of ATMOS underground gas lines.
2. The CONTRACTOR shall contact ATMOS at least 72 hours prior to any work being accomplished in the construction area to verify actual locations and depths of gas mains and service lines. Adjustments to existing gas main and service lines may be required.

##### Scheduling:

Coordination of construction activities between the CONTRACTOR and the ENGINEER works to the benefit of all parties involved. Detailed time tables or schedules must be submitted in advance by the CONTRACTOR for approval by the project ENGINEER. A typical construction sequence for traffic signal installation is:

##### Underground

1. Conduit
2. Pole Foundation
3. Ground Boxes
4. Grounding
5. Preliminary Wiring

##### Aboveground

6. Vertical Signal Support
7. Mast Arms
8. Signal Heads
9. Final Wiring
10. Cabinet and Control Equipment
11. Electrical Service
12. Video detection
13. Testing