ADDENDUM NO. 1

INFORMATION TO BID

1. The Bid opening date of April 5, 2019 at 2:15:00 p.m. remains unchanged.

INSTRUCTIONS TO BIDDERS

Paragraph 2, Pre-Bid and Bid Opening Dates:

2. The Bid opening date of April 5, 2019 at 2:15:00 p.m. remains unchanged.

SPECIAL PROVISIONS

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3. Add Section 623 (Page 623-1 through 623-57).

SECTION 623 TRAFFIC SIGNALS AND STREET LIGHTING

4. Add Section 623 (Page 623-1 through 623-57) See Reissued SECTION 623 with this addendum.

Except as modified herein, all other bid specifications, term and conditions and special conditions shall remain the same.

ISSUED BY:

THOMAS BOLDT, C.P.M.
Senior Purchasing Analyst

Attachment(s): Section 623, Traffic Signals And Street Lighting

Cc: Kaizad Yazdani, Public Works
    Jimmy Floyd, Public Works
    Patsy Schrader, Public Works
SECTION 623

TRAFFIC SIGNALS AND STREET LIGHTING

DESCRIPTION

623 G.01.01  GENERAL

The following is added to this subsection:

I. The Contractor shall keep the existing traffic signal in operation until the new traffic signal (poles and equipment) is fully installed.

Replace this subsection with the following:

623 G.01.05  GLOBAL POSITIONING SYSTEM (GPS) COORDINATES

Replace this subsection with the following:

A. The Contractor is responsible for documenting and providing traffic asset data to Clark County for traffic assets within the project limits.

B. Traffic assets consist of all new and relocated traffic signal systems, communication and FAST, and street lighting facilities that are connected via the underground conduit system(s) and are visible at ground level, including but not limited to poles, pull boxes, splice vaults, cabinets, service pedestals, transformers, school flasher assemblies, and changeable message signs, and shall also include all pull boxes that are buried underground as shown on the plans. Pull box asset information shall include all four corners. Communication, FAST and Electrical manholes shall include top and bottom of manhole invert.

C. The Contractor shall complete the appropriate Traffic Asset Data Collection Forms 1, 2 and/or 3 included herein and submit to Clark County Public Works in an electronic file format (.doc or .xls and .dwg and “hard copy”/paper format at the end of the project, prior to final acceptance for maintenance.

D. The asset information shall be complete and free from error, with Northing/Easting coordinates of the post construction location of each item or facility, based on NAD 1983, State Plane Nevada East, U.S. Survey Feet, as well as station and offset. The horizontal precision of the coordinates shall be recorded with a device that has an accuracy tolerance within three (3) feet of the actual location of the object.

E. Clark County will not be responsible for furnishing any traffic asset information to the Contractor for this work.

MATERIALS

623 G.02.01  CONDUIT

The following is added to this subsection:
J. Electrical conduits, fittings, and couplings shall be joined together per NEC section 352.48.

K. Microduct conduits shall be installed in high-density polyethylene (HDPE) conduit unless otherwise specified on the plans.

1. The Contractor shall use a HDPE conduit with a Standard Dimensional Ratio (SDR) of 11 or better. The HDPE formulations used by the manufacturer shall be specifically for conduit applications in accordance with ASTM F 2160: Solid Wall High Density Polyethylene Conduit Based on Controlled Outside Diameter (OD) and ASTM 3035 Polyethylene (PE) Plastic Pipe Based on Controlled Outside Diameter. It shall have a cell classification of PE334470C (for back conduit) and PE334470E (for colored conduit) per ASTM 3350: Standard Specifications for Polyethylene Pipe and Fittings Materials.

2. They Polyethylene base resin shall meet the density requirement and melt index properties described herein. The density shall not be less than 0.940 and not more than 0.955 g/CM$^3$ in accordance with ASTM D 1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique. The range for the melt index shall be between 0.05 to 0.5g/10 minutes in accordance with ASTM D 1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer. The HDPE conduit shall have a minimum Flexural Modulus, MPa (PSI) of 80,000 per ASTM D 790 and a minimum tensile strength at yield (PSI) of 3,000 per ASTM D-638.

3. Additives to the base resin shall be included to provide heat stabilization, oxidation prevention and ultraviolet (UV) protection. It shall also use between 2 to 3 percent carbon black for long term protection against UV degradation. The minimum protection period shall be for one year from date of manufacture in unprotected, outdoor storage in accordance with ASTM D 1603: Standard Test Method for Carbon Black in Olefin Plastics.

L. The microduct conduit shall have a minimum of three 1-1/4-inch HDPE conduits with three corresponding 18/14-millimeter HDPE microducts encased in one 4-inch conduit.

1. Each 1 1/4-inch encased conduit along with its 18/14 millimeter microducts shall be a different color with the exception of the outer 4-inch conduit.

M. The Contractor shall install HDPE microduct by trench methods and shall conform with the requirements of Section 208. “Trench Excavation and Backfill.”

N. Microduct conduit depths shall be a minimum of 30 inches to top of conduit, unless otherwise specified on the plans.

O. Conduit shall be placed in accordance with the lines, grades, details and dimensions as shown on the plans or as otherwise approved by the Engineer.

P. When joining segments of HDPE conduit, the contractor shall utilize non-corrosive, watertight couplings. Heat fusion, electrofusion fittings and mechanical connections shall be permitted if the HDPE conduit and joining device manufactures recommendations are observed and the internal diameter of the HDPE conduit is not reduced. Extrusion welding and hot gas welding to join HDPE conduits is not permitted. The Contractor shall provide the County a part number for couplings used to join conduit. Upon completion of joining HDPE conduit sections and setting the pull boxes, the contractor shall clean the HDPE conduit with compressed air. The contractor shall demonstrate by pulling a cleaning mandrel or ball mandrel, correctly sized for the conduit, that the conduit was not deformed during installation. If the mandrel passes through the HDPE, the Contractor shall install pull tape in each unused conduit. If the mandrel encounters a deformity in the HDPE conduit, the Contractor shall replace the entire segment of HDPE between manholes/pull boxes with new HDPE at no cost to the County.
Q. No more than one week prior to installation of any cable, all new and existing conduit runs in which cable is to be installed shall be cleared/cleaned by pulling through a metal-disc mandrel with a diameter of 90 percent of the conduit diameter, or a ball mandrel with a diameter of 80 percent of the conduit diameter. The conduit may be brushed or swabbed, if deemed necessary, prior to pulling the mandrel through the conduit. No measurement or payment shall be made for this activity, as it is considered in the cost of contract items.

R. Conduits containing fiber optic cable shall follow NEC guidelines for power conduits.

S. All spoilage shall be removed from the project within 48 hours.

T. The Contractor shall install geotextile innerduct in existing conduit where indicated on the Contract Documents.
   1. Innerduct shall be fabricated using an engineered, geotextile mesh fabric material composed of nylon and polyester.
   2. Each length of conduit that requires geotextile innerduct as shown on the Contract Documents, shall be equipped with one 1”, three-cell innerduct. The innerduct shall be continuously marked with red stitching.
   3. All geotextile innerduct shall be furnished with a detectible pull rope within each of the cells.
   4. Innerduct shall be pulled with a minimum of dragging on the ground or pavement. The Contractor shall ensure that the tensile load on the innerduct does not exceed the allowed maximum by using a break-away technique and/or pulley system with numeric readout with a means of alerting the installer when the pulling tension approaches the manufacturer’s maximum pulling tension.
   5. The Contractor shall ensure that the innerduct is protected from sharp edges and excessive bends. The Contractor shall not cause the HDPE innerduct to exceed the minimum bending radius for which the innerduct was designed. The Contractor shall not cause the geotextile innerduct to become twisted or unusable during installation.
   6. The Contractor is responsible for all damages caused during the installation of innerduct. If damage to the innerduct is noted during or after installation, or if the innerduct is otherwise unusable per the discretion of the Engineer, the Contractor shall remove the damaged or unusable innerduct and install new innerduct at no additional cost to the County.

U. All new communication, FAST and electrical conduits shall use 2” duct spacers to avoid conduit movement when backfilling.

623 G.02.02 PULL BOXES

The first sentence of paragraph B is replaced with the following:

B. Non-conductive lids shall be used for all pull box covers except for Type 200 vaults. Steel lids shall be used for Type 200 vaults. Steel lids shall be grounded using a #8 AWG green bond wire.

The following is added to this subsection:

L. Pull boxes and vaults shall not be installed within the roadway, shoulder, bike lane, sidewalk ramp, nor driveway. On new construction, Contractor may modify P-30 or No. 5 pull boxes for installation of conduits as per RTC Standard Drawing 764, as approved by the Engineer.
M. Type 200 Vaults shall be used where indicated on the plans for fiber optic splice points. Type 200 Vault shall be installed in accordance with the Uniform Standard Drawing 762.

*Replace subsection 4 of paragraph B with the following:*

4. Pull box covers inscribed with “ELECTRICAL” shall be permitted only near new smart poles or future Ticket Vending Machines locations.

**623 G.02.03 EXPANSION FITTINGS**

*This subsection is replaced with the following:*

A. Expansion fittings shall be installed where the conduit crosses an expansion joint in the structure. Each rigid conduit expansion fitting shall be provided with a bonding jumper of 7-strand, No. 4 AWG copper wire. Expansion fittings shall be used where they exit a structure or bridge abutment. Expansion connectors shall be approved prior to installation by the Maintaining Agency.

**623 G.02.04 CONDUCTORS AND CABLE**

*The second sentence of paragraph A.4 is replaced with the following:*

4. All traffic signal cable shall be 25-conductor, No. 14 AWG solid copper wire traffic signal cable.

*Paragraph A.9.b is replaced with the following:*

b. The insulation shall be 15 mils of orange PVC complying with UL62 with an overall jacket of clear nylon in accordance with ASTM D4066.

*The following is added:*

B. The induction loop wires shall be soldered and sealed to the loop lead-in wires.

**623 G.02.07 ELECTRICAL SERVICE PEDESTALS**

*Paragraph J.1 is replaced with the following:*

1. The main body of the pedestal, the hood and the main door shall be polyurethane powder coated inside and out with a gloss, mint green coating (Federal color 14672).

*Paragraph M is replaced with the following:*

M. The pedestals shall incorporate a tin-plated copper load center. Bus bars for grounding and neutral connections shall be tin plated aluminum rated for both copper and aluminum wire with facilities for landing two (2) No. 1/0 AWG conductors, six (6) No. 2 to No. 12 AWG and twelve (12) No. 4 to No. 14 AWG conductors. The utility landing lugs shall be tin plated aluminum rated for both copper and aluminum service wire.
Paragraph O.1 is replaced with the following:

1. The street lighting circuits shall have a test toggle switch (or toggle switch position) rated for 10 amps with sealed leads for testing the circuits during maintenance activities.

The following Section is added:

G.02.08 ELECTRICAL SERVICE SWITCHGEAR

A. Electrical service switchgear to be installed for street lighting systems or landscape lighting systems shall consist of two (2) sections. Section 1 (street lights) shall have a 277/240-volt, 400 Amp bus, 4-wire, three phase 42 circuit panel. Section 2 (landscape lights) shall have a 277/240-volt, 400 Amp bus, 4-wire, three phase, 42 circuit panel and a 120/240-volt, 100 A bus, 3-wire, single phase, 18 circuit panel Section 2 shall have an integrated 25kV 480V - 120/240V transformer.

B. The main breaker shall be rated for 225 amps for 277/480V panels and 100A for 120/240V panels.

C. The main enclosure of the pedestal shall be a rainproof NEMA Type 3R cabinet with construction complying with UL 50 requirements.

D. The main body of the pedestal shall be fabricated of 12-gauge metal, corrosion resistant, zinc plated steel with a vandal resistant main door to provide interior access to the breaker compartment.

   1. A dead-front door shall be provided behind the main door to enclose the internal wiring compartment.
   2. Both the main and dead-front doors shall be connected to the main body or frame of the switchgear by use of stainless steel piano hinges.
   3. A twisting lock mechanism shall be provided to secure the dead-front door to the main frame.
   4. The hood door and both hinged doors shall be constructed from 14-gauge, corrosion resistant, galvanized steel.
   5. A padlock hasp shall be provided for securing the hood door and the main door.

E. The overall dimensions of the enclosure for each panel shall not be more than 7-5 feet tall, 30 inches wide or 48 inches deep.

F. A removable utility door shall be provided in the back of the pedestal to allow service to the utility landing lugs. A padlock hasp shall be provided to lock the door in place.

G. A photocell shall be provided on the side of the street lights section of the switchgear. Photocell and Astronomical time clock shall be provided in the landscape light section. Coordinate with Clark County for programming requirements.

H. All fasteners including rivets, screws, nuts, and bolts shall be stainless steel.
1. Pedestal anchor bolts shall be hot dip galvanized with corrosion resistant washers and nuts. Size bolts and hardware according to manufacturer recommendations.
2. Anchor bolts shall be interior to the main body of the pedestal.

I. The internal wiring shall be completed with copper conductors rated for 194 degrees F, THW-2 or XHHW-2 insulation, and rated for 600 volts. The wire shall be sized in accordance with the National Electric Code and Underwriters Laboratories, Inc. except that wire to the street light contactors shall be No. 4 AWG stranded copper with THW-2 or XHHW-2 insulation and wired at the factory.

J. The switchgear shall be assembled by a manufacturer recognized and endorsed by Underwriters Laboratories, Inc. and shall be marked with the UL stamp of approval on the inside of the main door.

K. Bus bars for grounding and neutral connections shall be raw copper or aluminum, with facilities for landing a minimum of two No. 350 kcmil conductors, twenty-four No. 2 AWG to No. 12 AWG conductors, and eighteen No. 4 AWG to No. 14 AWG conductors.

L. The switchgear shall be designed to accept GE type THQL or equivalent breakers and shall be equipped as specified in the Contract Documents or directed by the Engineer.

M. The switchgear shall incorporate a single photocell, and astronomical time clock as required, and lighting contactors for controlling 1-pole or 2-pole, 20-amp lighting circuits. Provide control for quantity of light circuits shown in the Contract Documents plus 2 spare location.
   1. Each lighting circuit shall have a separate test toggle switch (or toggle switch position) rated for 15 amps with sealed leads for testing the circuit during maintenance activities as well as a switch to test the entire system.
   2. The test switch shall be affixed to the frame of the pedestal and extend through the dead-front door to be accessible by opening only the main door.
   3. The photocell shall be Area Research Lighting model SST-VP-IES or approved equal.

N. The main landing lugs shall be raw copper, aluminum, or zinc coated, as specified in the Contract Documents or directed by the Engineer and shall be capable of receiving the appropriate sized wire from the transformer as noted on the Drawings.

O. Appropriate labels shall be attached to the inside of the main door including a listing of circuit breakers from various manufacturers that are interchangeable with those supplied in the cabinet. A circuit diagram shall be attached to the front door.

P. An instruction manual shall be provided with the switchgear.
   1. The manual shall include installation and maintenance instructions and shall contain a wiring diagram of the switchgear and a listing of available circuit breakers to be used in the switchgear.
   2. A holding compartment shall be provided on the inside of the door to contain the manual and other plans.
3. A resealable plastic storage bag to hold the manual safe from the environment shall be provided.

CONSTRUCTION

623 G.03.07 FOUNDATIONS

The following is added:

L. Service pedestal and controller cabinet foundations shall be level.

623 G.03.08 WIRING AND CONDUIT

The following is added to paragraph D of this subsection:

D. Splices for street light wires shall be split bolt type of the appropriate size. The split bolt connector shall be copper or copper alloy with copper plating and shall accommodate range of wire sizes specified in the Drawings. The split bolt connector shall be Burndy KS22, Burndy KS23, or approved equivalent by the Maintaining Agency.

Paragraph I of this subsection is replaced by the following:

I. Wire shall be No. 14 AWG UF and shall be used between the pole-mounted “J” box and the traffic signal tenons on the traffic signal mast arms. All No. 14 AWG UF wire shall be uniquely identified in the “J” box. Six (6) conductors shall be installed from the pole mounted “J” box to any spare tenon(s) at the end of the mast arm. Four (4) conductors shall be installed from the pole mounted “J” box to any unused tenons located elsewhere on the mast arm. All empty tenons shall be sealed with 10 mil tape. Contractor shall determine and install the appropriate number of conductors from the pole mounted “J” box to all traffic signal indications.

The following subsection is added:

623 G 03.13 CONDUIT VERIFICATION AND CONDUIT BLOCKAGE

A. At locations where, existing conduit is to be utilized, Contractor shall verify condition of the conduit within 15 calendar days of NTP. In the event of a conduit blockage at existing conduit locations, the Contractor shall attempt to clear the blockages by any reasonable means to his disposal until the conduit is cleared of obstruction to the satisfaction of the Engineer or until the Engineer determines that further attempts to clear the conduit are not feasible. Reasonable means include any industry standard methods for removing conduit blockages, such as, blowing air through the blocked conduit(s) with an air compressor of a minimum size of 185 cfm, soaking the blocked conduit(s) with water for 24 hours then blowing air with an air compressor of a minimum size of 185 cfm, and any other methods as approved by the Engineer.
The following subsection is added:

623 G.03.14 RELOCATE DEDICATED SHORT RANGE COMMUNICATIONS (DSRC) UNIT

A. All existing Commsignia ITS-RS4 system shall be relocated to adjacent traffic signal pole. The system shall consist of a roadside unit, GPS unit, and Power Over Ethernet (POE) using a CAT-5 cable.

B. CAT-5 cable cannot exceed 100 meters (m) without a POE injector.

C. If the system is moved more than a few feet or if lane geometry changes then the system needs to be reconfigured. Cost of the reconfiguration will be paid for by the Contractor.

D. Existing Commsignia ITS-RS4 systems operate between the hours of 9 AM to 11 PM. Contractor shall only shut down system between 11 PM to 9 AM to reconfigure the device to the new adjacent traffic signal pole.

E. The roadside unit is connected to a Ruggedcom Layer 2 switch. IP addresses will be supplied by FAST.

623 G.03.15 LAS VEGAS METROPOLITAN POLICE DEPARTMENT (METRO) SURVEILLANCE CAMERAS

A. METRO has surveillance cameras mounted on existing traffic signal poles at several locations within the project limits. Communication to the cameras is wireless, except as noted on the plans. Power to the cameras is fed from the lighting circuit through a fuse located at the bottom of the pole.

B. The Contractor is responsible for removing and reinstalling METRO’s cameras and associated equipment including antennas, brackets and pole mounted cabinets onto the new traffic signal pole located adjacent to the pole where the camera is currently located. METRO’s equipment shall be relocated during the time when the new pole is energized, and the old pole is being removed.

C. The Contractor is also responsible for furnishing and installing the low voltage communication wiring to the camera, and the electrical wiring to the lighting circuit and fuse so that the camera is fully functional. The Contractor shall coordinate with METRO on the types of wiring and fuses needed to complete the installation.

D. A METRO representative shall be on site when this work is completed. The Contractor shall contact METRO at (702) 305-1242 a minimum of seven (7) calendar days prior to the date when the existing pole is scheduled to be removed to coordinate the time when a METRO representative can be present.

E. Out of service cameras due to construction activities shall be limited to one intersection at a time.
F. A list of locations where METRO cameras are located will be provided to the Contractor after the construction contract is awarded.

623 G.03.16 FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST) CAMERAS

A. FAST has existing Closed Circuit Television (CCTV) cameras mounted on existing traffic signal poles at several locations within the project limits. Communication to the cameras is wired using a CA295H cable.

B. The Contractor is responsible for removing and reinstalling FAST’s cameras and associated equipment including camera and lens housing and camera extension pole onto the new traffic signal pole located adjacent to the pole where the camera is currently located. FAST’s equipment shall be relocated during the time when the new pole is energized, and the old pole is being removed.

C. The Contractor is also responsible for furnishing and installing the low voltage communication wiring to the camera, and the electrical wiring to the lighting circuit and fuse so that the camera is fully functional. The Contractor shall refer to the Uniform Standard Drawings Clark County Area Drawing. No. 766 for wiring and fuses needed to complete the installation.

D. A FAST representative shall be on site when this work is completed. The Contractor shall contact FAST at (702) 432-5309 a minimum of 48 hours prior to the date when the existing pole is scheduled to be removed to coordinate the time when a FAST representative can be present.

E. Out of service cameras due to construction activities shall be limited to one intersection at a time and shall be down no more than 12 hours in a day.

623 G.03.17 COMMUNICATION, FREEWAY & ARTERIAL SYSTEM OF TRANSPORTATION (FAST), AND ELECTRICAL MANHOLES

A. Manholes shall be precast reinforced concrete of the sizes and details shown on communication plans (COM plans).
   1. Reinforcement shall have an HS20-44 rating.
   2. Manhole dimensions shall be constant for the full depth.

B. Round cast iron covers shall be used for all manholes.
   1. Manhole covers shall correspond to the manhole type called out on the plans. The labels shall be labeled as follows:
      i. “COUNTY COMM” – COMMUNICATION MANHOLES
      ii. “FAST” – FAST MANHOLES
      iii. “COUNTY ELEC” – ELECTRICAL MANHOLE

C. The dimensions of all manholes and covers shall be manufactured and delivered as shown on the plans within a tolerance of 1/8 inch or as approved by the Engineer.

D. All metal parts shall have provisions for attaching a grounding conductor.

E. All metal manhole lids shall be connected to the bonding ground using bare 7-strand No. 4 AWG copper conductor.
1. The grounding conductor shall be welded to the underside of the metal manhole cover by the Contractor or manufacturer using an exothermal welding process unless otherwise specified in the Contract Documents.

2. The grounding conductor shall have a length of 24 inches above the surrounding grade line.

F. Two 18” x 18” minimum knockout walls shall be used and installed on each wall for manholes larger than 4’x4’. All manholes that are 4 feet by 4 feet shall have only one 18” x 18” knockout wall on each wall.

G. Manholes shall have a minimum of an 18-inch concrete collar installed at the top of manhole at the final grade, as noted in the plans.

H. Microduct conduit ends shall extend a minimum of 12 inches into the manhole to account for any shrinkage after construction. Conduit ends shall be capped to prevent conduits from being filled with sand and gravel.

I. The Contractor shall not modify manholes unless otherwise approved by the Engineer.

TRAFFIC SIGNAL SECTION

623 T.01.01 GENERAL

The following is added to this subsection:

G. A Clark County-licensed Journeyman Electrician shall perform all electrical terminations.

MATERIAL

623 T.02.01 TRAFFIC SIGNAL CONTROLLER CABINETS

This subsection is replaced in its entirety with the following:

A. The type of traffic signal controller cabinet to be furnished shall be a size R cabinet and shall conform to Detail 1 and the following specifications. The cabinet shall be 0.125-inch minimum thickness of aluminum sheeting with all external seams 100 percent fillet welded (no gaps). The bottom of the cabinet shall have 0.125-inch aluminum reinforcing welded in the corners and around the bolt slots. A welded gusset reinforcing the panel shall be on the front of the cabinet below the door to help prevent deformation due to inadvertent bumping with feet or equipment. The cabinet shall be prime painted and then sealed with two coats of white enamel paint both inside and out. Painted finish shall be Federal Specification 595 polyurethane, industrial grade pure white powder paint with 1.7 mil thickness minimum or approved equal.

B. Lifting tabs shall be provided at the exterior top and center of both side panels and extend above the top of the cabinet 4 inches. The lifting tabs shall be 4 inches wide and 6 inches in height and shall be bolted to the cabinet utilizing a ½-inch diameter x 1-½-inch long carriage bolt with flat washer and lock nut. Welding of the lifting tab to the cabinet is not acceptable. A 1-½-inch diameter hole shall be drilled through the tab centered 2 inches above the cabinet top to assist in the placement of the cabinet by overhead supporting cables. The tabs shall be manufactured of the same material as the cabinet.
C. All cabinets shall include three (3) shelves. Each shelf shall be 12 inches deep and the full width of the cabinet. Cabinets shall be designed to use shelf-mounting rails that are infinitely adjustable. The rails shall be mounted on the interior of each side panel of the cabinet and shall use spring nuts in the rail channels to tighten the bolts that support the shelves. Cabinets that use carriage bolt assemblies are not acceptable. The bottom shelf shall be located immediately above the electrical “back-panel”. The bottom of the compartment under the middle shelf shall be approximately 7 inches above the bottom shelf and the top shelf shall be approximately 14 inches above the middle shelf. Small adjustments to the shelf positions will be made in the field.

D. A pullout compartment shelf shall be supplied directly under the middle shelf of the cabinet. The pullout compartment shall be 30 inches wide and 12 inches deep and be manufactured of the same material as the stationary shelving. The pullout compartment shall be centered under the middle shelf for use as a laptop computer table. The compartment shall pull out to the entire depth of the shelf and have a locking mechanism for the fully pulled out and fully in positions. The compartment shall be full-depth (12 inches) for storing cabinet prints and be accessed by lifting the compartment top. The compartment shall be a minimum of 1.5 inches in height. The pullout compartment shelf shall have a knob or handle to assist in pulling out and shall freely pull out and be completely clear of any obstructions such as cables, harnesses, wires, fasteners, etc.

E. The lock of the cabinet door shall be a standard #2 lock. A spare locking mechanism shall be supplied with each controller cabinet. Three (3) each of #2 keys and Police Panel keys shall be supplied with each lock. This lock and key shall be reserved for cabinet purchases made by Clark County and shall not be supplied with any other cabinets.

F. All cabinets shall be provided as a complete unit to include all shelves, anchor bolts with template, interior cabinet lights, termination strips, cable harnesses, convenience outlets, circuit breakers, load switches, transfer relays, completely wired back panel, video and loop detection interface panels and harnesses, emergency vehicle detection equipment and interfaces, MMU, and all other equipment as stated in this specification, wired and terminated with all equipment functioning as intended.

G. All wiring shall be continuous from terminal to terminal. Ribbon cables, splices, jacks or connectors are not permitted.

H. One spare 60-amp circuit breaker shall be provided, and one spare solid-state contact relay shall be placed inside of the shelf door.

I. An emergency access (police panel door) shall be provided at approximately the center of the front of the door, to allow police personnel to place the signal indications in the red flashing mode of operation without opening the main door of the cabinet. The police panel door shall be attached to the cabinet with a full length, stainless steel, piano hinge, along the right side of the panel door. The police panel door shall be keyed with a standard police key lock.
J. All cabinets shall be weatherproof, properly ventilated, and have at least two (2) 110 CFM ventilation fans, with each fan having an independent 70 to 160-degree Fahrenheit thermostat. The fans shall be mounted internally and shall be vented to the outside through vent holes above the cabinet door that are directed in a downward direction. Vent holes shall be sized to accommodate the maximum fan volumes. Each fan shall have a separate duct for ventilation to the outside, a common plenum is not allowed. Ventilation through the top of the controller cabinet shall not be allowed.

K. The cabinet door shall cover at least 90 percent (90%) of the front of the cabinet and shall be mounted to the cabinet with a full length, stainless steel piano hinge. The hinge shall be bolted to the door and cabinet with stainless steel carriage bolts providing for easy replacement of the hinge. The door shall be reinforced on the inside with channel or raised panel design reinforcing to prevent flexing of the door. There shall be a standard steel multi-point doorstop to lock the door open at 45, 90 and 180 degrees and a supplemental, steel single-arm doorstop to add stability to the door when locked open. The three-position doorstop shall be mounted at the bottom of the cabinet door and the single-arm door support shall be mounted at the top of the cabinet. Each doorstop shall be fully retractable so as not to interfere with the door’s closing and opening operation. The door shall have a lockable ¾-inch solid tubular steel handle with a minimum length of 7 inches. The lock position shall be with the handle vertical and the open position shall be with the handle in a horizontal position. If right of way is available, the cabinet doors shall open on the backside of the sidewalk to avoid blocking the sidewalk while the doors are open. The Contractor shall confirm the cabinet door with the Engineer prior to pouring the cabinet foundation.

L. The anchor bolt holes in each cabinet shall conform to the anchor bolt pattern specified in Standard Drawing 725. Galvanized anchor bolts and a foundation bolt template in accordance with Standard Drawing 725 shall be provided with each cabinet.

M. Cabinets shall have two (2) LED light strips mounted in the cabinet interior. One light shall be mounted above the door, at a location unlikely to be damaged and shall be a minimum of 24 inches in length. The second LED light strip shall be attached to the bottom of the lowest shelf above the back-panel and field terminals. Both light strips shall be energized and de-energized automatically by the door, to illuminate the lights when the door is opened, and de-energize them when the door is closed.

N. The electrical "back-panel" in each cabinet shall be wired to the NEMA TS1 standard inputs and outputs. Standard NEMA "A," "B," & "C" connectors shall be provided for connection to the controller. The wiring harness for each connector shall provide a termination point onto the back panel for all pins of each connector, including spares or unassigned pins. All wiring harnesses shall be clearly marked with permanent markings. The terminals shall be clearly marked as to their associated function, with silk-screen or other approved method of marking. The bottom of the “back-panel” shall be located 14 inches above the bottom of the cabinet. All wiring shall be point to point and no intermediate splices, ribbon cables or connectors of any type shall be permitted between the initial connection to the equipment and the termination point on the back panel.

O. All traffic signal controller cabinets shall comply with the following conditions:

1. All cabinet harnesses and wiring shall be neatly and firmly laced or bound together
(with tie-rape).

2. All terminals shall be numbered and identified in accordance with the cabinet wiring diagrams and prints when all terminations are completed.

3. Cabinet wiring diagrams that show and identify the connectors for all equipment, all switches, terminal blocks, relays, flashers and other signal control equipment terminations shall be supplied with the cabinet. Three (3) complete sets of wiring diagrams on "D" size paper and one electronic file in Adobe PDF on a USB flash drive shall be provided. The cabinet wiring diagram shall have an intersection sketch with signal heads and push buttons identified as related to phasing.

4. Signal phasing shall be arranged as shown in the diagram with pedestrian movements defined according to NEMA standards. A phasing diagram similar to the example shown below shall be provided. The cabinet and controller phasing shall be referenced as follows:

5. All mechanical relays shall have clear dust covers.

6. The following equipment shall be furnished and wired in all cabinets:
a. The circuit breakers shall be Square D QO breakers, or approved equal, and shall be mounted on the matching base by the same manufacturer. The breakers shall accommodate a #2 AWG copper, 7-strand, 600-volt power conductor. One (1) spare 60-amp circuit breaker shall be provided with each cabinet. Four (4) single-pole, surface-mount circuit breakers shall be installed in the controller to protect the different circuits as follows:

1. One (1) 20-amp circuit breaker to operate all the electronic equipment including the controller, MMU, detection equipment, preemption equipment and the upper utility plugs.

2. One (1) 15-amp circuit breaker for the fans, lights and lower utility plug.

3. One (1) 60-amp circuit breaker to provide power to illuminate all the field indications at the intersection external from the cabinet.

4. One (1) 20-amp circuit breaker for video camera power.

b. There shall be a specific un-fused terminal, able to accept a #2 wire for the neutral conductor of the power supply line. This terminal point shall be in the Buss 16204-3, or approved equal, terminal block on the side panel of the cabinet. All neutrals and grounds are to remain separate. All power supply lines shall have a clear unobstructed path to the terminal point.

c. There shall be a specific un-fused terminal, able to accept a #2 wire for the chassis ground conductor of the power supply line. This terminal point shall be in the Buss 16204-3 (or approved equal) terminal block on the side panel of the cabinet. All power supply lines shall have a clear unobstructed path to the terminal point.

d. The terminal blocks for connecting the pedestrian and vehicle field wires that illuminate the independent signal heads shall be Thomas and Betts #35301 or approved equal. The bottom of these terminal blocks shall be located between 14 and 18 inches from the bottom of the cabinet. All field wires shall be connected to terminal blocks using Thomas and Betts BTC0614 (or approved equal) copper connector chair lugs. All terminals shall be labeled on both the back panel and on the terminal block. The back panel shall be labeled using silk-screening techniques and the terminal block shall be labeled correspondingly using a removable label strip with permanent etched/engraved notations. The terminal block labels shall be clearly visible when the cabinet door is open and shall not be obstructed by wiring or other materials in the cabinet.

e. Video Detection Camera terminals shall be provided at the upper left of the cabinet and shall be connected to and protected by the circuit breakers referenced above. All terminals shall be labeled using silk-screening techniques.

f. Cinch terminal blocks model 12-142 (or approved equal) with Thomas and Betts BTC0614, or approved equal, copper connector chair lugs will be used
for connection of pedestrian push button "field" conductors. All terminals shall be labeled using silk-screening techniques.

g. Terminal blocks shall be provided for all pins on wiring harnesses for all connectors of the cabinet equipment. Separate terminal blocks for termination of the wiring harnesses for the controller, MMU, loop and video detection systems, and emergency vehicle preemption systems shall be provided. All connector pins shall be wired to the harnesses and terminated on the appropriate terminal block. All terminals shall be easily visible and clearly labeled using silk-screening techniques.

h. A minimum of two (2) 16-terminal, compression-type copper terminal block shall be mounted to each side of the cabinet wall for connection of all neutral conductors. These terminal blocks shall not be connected to ground but shall be connected to the terminal block that accepts the #2 stranded conductor of the neutral power supply conductor. The neutral buses shall be mounted 6 inches above the bottom of the cabinet.

i. A 24-position compression-type, copper grounding strip shall be mounted on and grounded to each side of the cabinet wall for connection of all grounding conductors. These terminal blocks shall not be connected to the neutral and shall be connected to the terminal block that accepts the #2 stranded conductor of the grounding conductor of the power supply. The grounding strips shall be mounted 4 to 6 inches above the bottom of the cabinet.

j. Two, dual-circuit, solid state NEMA jack-mounted flashers having a flash rate of 60 flashes per minute (see Section 8, “Solid State Flashers”, of the latest TS1 NEMA specifications) shall be installed and shall be toggled together electronically so that they remain in synchronization at all times. The red position of the load switch bays shall be operated from the flasher contacts as follows:

- Flasher 1, contact A - phases 1, 4, & OLA
- Flasher 1, contact B - phases 5, 8, & OLB
- Flasher 2, contact A - phases 2, 3 & OLC
- Flasher 2, contact B - phases 6, 7 & OLD

1. The transfer relays shall be wired in such a manner that the red field wire outputs shall be flashing and pedestrian indications shall be dark when the relays are de-energized. These transfer relays must be energized to operate the traffic signal with colors.

k. One (1) duplex, "U" ground type of convenience outlet shall be furnished and mounted adjacent to the breakers in the lower portion of the cabinet on the right-side panel with outlets facing the left side of the cabinet. This outlet shall have an integral ground fault protection device. The power source for this outlet shall be the 15-amp circuit breaker.
1. Two (2) separate 15-amp, duplex, “U” ground type, convenience outlets shall be furnished for video equipment and other electronic test equipment. These outlets shall not have an integral ground fault protection device. These outlets shall be located no more than 12 inches from the roof of the cabinet on the right-side panel of the cabinet interior. The power source for these outlets shall be the 20-amp circuit breaker.

2. Two (2) 15-amp, double duplex, “U” ground type of convenience outlets shall be furnished for video equipment and other electronic test equipment. This outlet shall not have an integral ground fault protection device. This outlet shall be located no more than 12 inches from the roof of the cabinet. One outlet shall be mounted on the left side panel of the cabinet interior and other outlet shall be mounted on the right-side panel of the cabinet interior. The power source for this outlet shall be the 20-amp circuit breaker.

I. Police Panel Switch: The main police control shall be a double-pole, double-throw switch located behind the police auxiliary door and labeled "AUTO/FLASH."

The "Flash" position of the switch shall cause the following:

1. De-energize signal indication power and place the intersection into flashing red operation through the MMU (see (4) below). The controller power shall remain energized.

2. Activate the "stop time" function in the controller through the MMU (see (4) below).

3. Provide logic ground on pin "AA" of Controller Plug "A" to inform the controller that a flash switch has been switched to the flashing mode.

4. De-energize +24 volts II to the MMU to cause it to fail. This will cause the Conflict Monitor to provide a logic ground to Pin "n" of Controller Plug "A" and direct the controller to Stop Timing. This circuit must be diode-isolated.

m. The switches indicated below shall be combined on a single panel installed at the center of the interior cabinet door behind the police panel and shall function as described. A switch guard shall be installed for these switches to prevent accidental switching. The switch guard shall be a minimum 3/16-inch thick clear Lexan or Plexiglas, or approved equal, cover with piano hinge, which will rest/lock out of the way in the open position and will protect all switches in the closed position.

1. The "Controller Power" switch shall be labeled as such and shall be marked "ON-OFF" to position the toggle. The switch shall be wired to de-energize only the controller power when moved to the "OFF" position.
2. The “Tech Flash” switch shall be labeled as such and marked "AUTO-FLASH" for positioning the toggle. This switch shall be wired to remove the electrical power feeding the load switches and transfer relays when the switch is moved to the "FLASH" position. Placing the switch in "FLASH" shall cause the intersection signals to flash red for all movements except the pedestrian movements which shall show no indication. The controller, MMU and other cabinet equipment shall remain energized. A logic ground shall be applied to controller plug "A," pin "AA" to inform the controller that a flash switch has been placed on "FLASH". The controller shall not stop-timing, while the "Tech Flash" switch has been placed in the "FLASH" position. The intersection shall resume normal operation with colors when the "Tech Flash" switch is placed back into the "AUTO" position.

3. The “Stop Timing” switch shall be labeled as such and shall be marked "ON-OFF" to position the toggle. The switch shall be wired to "stop time" ring 1 and ring 2 on the controller when switched to the "ON" position.

4. The “Internal Advance” switch shall be a momentary, push button switch mounted on a retractable cord 48 inches in length when extended. The switch shall not have the capability of locking in the "ON" position. The switch shall make electrical connection to the back-panel through a ¼-inch phone jack labeled "Interval Advance." The "Interval Advance" switch shall be enabled by the "Manual Control Enable" (MCE) switch and shall be wired to manually step the controller through intervals.

5. The manual switch to disable the field indications shall not be provided.

6. The “Manual Control Enable” switch shall be labeled "MCE" and shall be wired to enable "MCE" in the controller and allow the "Interval Advance" switch to function properly.

7. “Pedestrian and Vehicle Test” switches shall be labeled as same and marked "On/Off/Test" for positioning the toggle. The switches shall be installed on a vehicle and pedestrian detector test panel located on the inside of the cabinet door with the other test switches for the cabinet. Three (3) position toggle switches (on-off-on) shall be furnished for the "Pedestrian and Vehicle Test” switches. The switches shall be wired to permit the introduction of manual calls into the controller for all vehicle and pedestrian detector inputs associated with the cabinet. Each toggle switch shall permit detection calls to be forwarded to the controller from the vehicle and pedestrian detection source for normal operation when placed in the up position. Each toggle switch shall disconnect the vehicle and pedestrian detection source when placed in the center position. The switch shall enter a detection call when placed in the down or "test" position and shall continue to place a detection call until switched out of the "test" position. Toggle switches shall be provided for 8 vehicle and 8 pedestrian phases and wired independently to the
8. Surge Suppressors for electrical power shall be 15-amp, HESCO Model #HE-1800 (or approved equal) for protecting the cabinet electronics and Model #MDF 6 95V, or MF 25 95V (or approved equals) for telecommunications line protection. Larger protection will be required to protect the field indications and shall be included as separate protection if included in the cabinet.

n. A re-useable, stainless steel, easily washable air filter shall be provided in the lower portion of the interior door assembly behind a 1/16-inch non-rusting metal screen to prevent dust and insects from entering the cabinet. The filter and screen shall be a minimum size of 16 inch x 20 inch x 1 inch (h x w x d). The venting area shall be sized to accommodate the draw by the two 110 CFM fans installed at the top of the cabinet. The venting slots in the cabinet door shall be constructed so that the interior of the cabinet is protected from rain. The filter shall be held in place on all sides to completely cover the door vents and to secure the filter from shifting horizontally or vertically when opening and closing the door.

o. FAST Interconnect Cable Termination: Each controller cabinet shall have a telephone terminal block for terminating the systems Interconnect cable. The terminal block shall be Reliable Electric No. R66B4-25 (or approved equal) and shall be mounted in the cabinet on the upper rear of the right side panel.

p. Pedestrian Push Button Circuit Isolation: Six (6) solid state isolation circuits shall be provided in the cabinet to separate the pedestrian detector input circuits to the controller from the pedestrian push button circuits in the field. Isolation circuits one, two, three, and four shall correlate to signal phases 2, 4, 6, and 8, respectively and the wiring shall be appropriately terminated within the cabinet. Circuits five and six shall be spares and shall be terminated to allow easy access from the front side of the detector panel. The “field” pushbutton circuits shall be energized by a 12 VAC source. The isolation circuits shall be mounted individually on an edge connector-type P.C. board with all required components including the transformer, integrated circuits, transistors, resistors and other electronic components and mounted on a panel attached to the cabinet left wall panel. Each isolation circuit shall display an LED indication showing status of field buttons.

q. Video Detection: All cabinets shall be wired for Video Detection in addition to the requirement for loop detection equipment.

1. All cabinets shall have a discrete "Video Detection Interface Panel" (VDIP) installed and wired into the back-panel as appropriate. Phases 1 through 8, overlaps A, B, C, D, green and red outputs, and 24 VDC from the controller shall be wired to the VDIP from the back panel. All sixteen (16) vehicle and pedestrian phase detection inputs shall be terminated on the VDIP.

2. The VDIP shall be installed on the upper left portion of the side panel within
the cabinet where the terminal blocks are easily accessible. It shall be installed so that wiring harnesses of all Video Detection Systems manufacturers may be connected to these independent termination points.

3. Terminal strips located on the Video Detection Interface Panel shall be labeled by silk-screening the function of the connection near the terminals. Terminals used to connect the camera power for each camera must be sized to accept 10 gauge wire fork connectors.

r. Loop Detection: The cabinet shall be wired complete with four (4) single-channel loop amplifier wiring harnesses and five (5) four-channel loop amplifier wiring harnesses.

1. Single-Channel Detectors: One single-channel loop amplifier wiring harness shall be provided for each of the phases 2, 4, 6, and 8, for advance detection with added extension operation for the through phases. These harnesses and plugs shall conform to the latest TS-1 specifications. The harnesses will be wired as extension loops, with each conductor independently terminated onto an individual terminal. The harnesses shall be permanently clearly labeled with the phases they are associated with.

2. Four-Channel Detectors: Five complete wiring harnesses shall be installed and wired in the cabinet for the standard four channel detection unit specified in NEMA TS-1 standards, Section 11.2.28.2. The number of detection outputs per phase shall be as indicated below with all harness wires being terminated on separate terminals:
   - 4 channel Amplifier A – phases (1, 6, 6, 6)
   - 4 channel Amplifier B – phases (3, 8, 8, 8)
   - 4 channel Amplifier C – phases (5, 2, 2, 2)
   - 4 channel Amplifier D – phases (7, 4, 4, 4)
   - 4 channel Amplifier E – phases (1, 3, 5, 7)

3. Rack-mounted detection amplifiers are not acceptable.

s. Optical Preemption Terminal Strip Panel: All cabinets supplied shall be wired with an "Optical Emergency Preemption Panel" and shall have termination points for four preemption outputs directly wired to two-channel type discriminators. The panel shall be mounted to the right portion of the top shelf and shall be labeled "Emergency Vehicle Preemption". The M138 Emergency Preemption cable coming from the Optical Detectors shall be terminated to a terminal strip located on this panel.

   The wiring from this panel to the back panel shall be as follows:
   - Channel "A" to Controller Plug "A," Pin "q"
• Channel "B" to Controller Plug "A," Pin "y"
• Channel "C" to Controller Plug "B," Pin "W"
• Channel "D" to Controller Plug "B," Pin "X"

t. Malfunction Management Unit (MMU): The wiring harness for the MMU shall have independent termination points. All conductors shall be terminated independently onto a single terminal. Conductors shall be landed on the back panel as necessary. Unused wires shall be terminated on a separate terminal board that is easily accessible from the front of the cabinet without removing other panels. There shall be no conductors hanging loose and/or not terminated. All MMUs shall be NEMA standard, meeting all requirements of Section 6 of the latest TS1 specifications. All cabinets shall be equipped with a MMU harness completely wired in the cabinet to a separate panel for sixteen (16) channels of operation. MMUs shall be provided in all cabinets supplied. In addition, all MMUs shall be equipped with the features defined below:

1. Separate indicators for activity on each of the red, amber, green and walk inputs of each MMU channel.

2. Front panel indicators showing active channel(s), date, time and description of the current status, while showing a log of six or more of the most recent failures. All such data shall be stored in a nonvolatile memory.

3. Liquid crystal front panel displays shall be provided.

4. Failure status indicators for CVM, 24-1, 24-2, conflict, red failure, clearance failure, dual indication, and program card insertion.

5. The MMU shall provide a front panel display of the approximate time and date of the occurrence of any power failure in excess of 500 milliseconds duration and the date and time of power restoration.

6. The MMU program shall compute and log data in non-volatile memory by the end of the power restart flash interval.

7. Front panel connectors "A" and "B" mounted directly to printed circuits will not be accepted.

8. All MMUs shall have RS-232 capability. The vendor shall supply a software program which when run on an IBM compatible computer will communicate with the MMU for the downloading of failure event information and any other programmable event including timing, etc.
623 T.02.02 TRAFFIC SIGNAL CONTROLLER CABINET EQUIPMENT

This subsection is replaced in its entirety with the following:

Contractor shall furnish the equipment specified below.

A. Solid State Load Switches, Flash Transfer Relays, Sockets and all necessary cabinet wiring, connecting cables, terminal blocks and sockets shall be provided for the complete and proper functionality of an 8 vehicle, 4 pedestrian, and 4 overlap phase operation.

1. Ten insulated load switch jumpers for use with unused load switches (red jumpers) shall be provided. (Solder-less fork lug terminals are not acceptable).

2. A total of 16 NEMA load switches shall be provided with each cabinet. Two (2)
discrete NEMA flashers shall accompany each cabinet. Refer to the 1983 Sections 5 and 8 of the NEMA standard publication for operational and dimensional requirements. A wide angle, high intensity LED, clearly visible in sunlight shall be provided for each load switch and flasher indication.

3. A minimum of 6 transfer relays shall be delivered with each cabinet. These shall conform to the latest NEMA TS1 specifications. Load bay panels shall not exceed 0.125 inches (3 mm) of flex under 5 pounds pressure.

4. The load switches for the various phases shall be arranged in ascending order from left to right beginning with the vehicle phases. The pedestrian phase load switches shall be arranged to the right of and in line with the vehicle load switches. The overlap phase load switches shall be to the right and in line with the pedestrian load switches with the two flashers ending the line-up on the right. All load switches and flashers shall be in a continuous line in the following order:

   1, 2, 3, 4, 5, 6, 7, 8, 2P, 4P, 6P, 8P, OLA, OLB, OLC, OLD, FL1, FL2

B. Video Detection: A vehicle video detection system shall be provided and installed in each cabinet when video detection is specified on the plans. All necessary equipment shall be installed on the top shelf in the controller cabinet. Video detection system shall conform to subsection 623 T.02.06 in the Special Provisions.

C. Loop Detection: Four (4) single-channel loop amplifiers and five (5) four-channel loop amplifiers shall be provided and installed for each cabinet when induction loops are specified on the plans. Rack-mounted detection amplifiers are not acceptable. Induction loops shall conform to subsection 623 T.02.04 in the Standard Specifications and Special Provisions.

D. Optical Preemption: Optical detectors and priority control unit shall be provided and installed for each cabinet when optical detector(s) are specified on the plans. Two (2) GTT Model 764 emergency vehicle phase selectors shall be provided for each traffic signal system. Optical preemption system shall conform to subsection 623 T.02.05 in the Standard Specifications and Special Provisions.

E. Malfunction Management Unit (MMU): A 16-channel MMU with flashing yellow arrow capabilities shall be furnished un-programmed and the program card shall be wired by the Maintaining Agency.

F. Synchronizing Clock

1. A highly accurate synchronizing clock shall be supplied with the controller cabinet unless specified otherwise in the plans.

2. Synchronizing clock shall maintain time by referencing signals that are broadcast from Global Positioning System (GPS) satellites.

3. Synchronizing clock shall be compatible with the Naztec model 980 ATC signal controller (Naztec GPS Kit with Garmin GPS16x HVS sensor or approved equal by the Engineer). Contractor shall also provide and install all accessories and
adapters as needed to provide a complete system.

**623 T.02.03 TRAFFIC SIGNAL CONTROLLERS**

*Paragraph B.5.d of this subsection is deleted.*

*Paragraph C of this subsection is deleted.*

*Paragraph D.1 of this subsection is replaced with the following:*

1. At all new controller locations, the Contractor shall supply a Naztec Model 980 ATC signal controller with Apogee actuated signal controller software (latest version) two weeks in advance of installation.

**623 T.02.04 MAGNETIC INDUCTION LOOP DETECTORS**

*The following is added to paragraph A:*

9. A 6-foot diameter circular detection loop may be used in lieu of 6-feet-by-6-feet square detection loop. Spacing between each loop and the number of loops shall be as specified in the plans.

10. Loop wires home run to pull box for presence loops shall be installed at the approach end of the loops.

*Paragraph G.1 is replaced with the following:*

1. A separate lead-in cable to the controller cabinet shall be provided for each left turn, straight through, and right turn lanes. One lead-in cable to the controller cabinet shall be provided for advanced detection loops for each approach. Each lead-in cable shall be individually tagged. Advance loops are on the same lead-in cable.

*Paragraph H.2 is replaced with the following:*

2. All loop amplifiers shall be shelf mounted.

**623 T.02.05 EMERGENCY VEHICLE PRIORITY CONTROL SYSTEM (INTERNAL PREEMPTION)**

*Paragraph D.4.b.1 is replaced with the following:*

1) This module unit shall be a plug-in, 4-channel device, dual-priority, multimode encoded signal device designed to be used with optical Emitters and Detectors.

*The following subsection is added:*

**623 T.02.05A GPS PRIORITY CONTROL SYSTEM**
A. GPS Priority Control System work shall consist of furnishing, installing and testing an Opticom GPS Preemption system as indicated on the plans and as specified in these Special Provisions.

B. The GPS System shall include all equipment (in cabinet only, in vehicle equipment will be provided by others): cabling, hardware, software, licenses, operating manuals/system documentation, training, testing and system integration for a complete and fully functioning GPS System.

C. GPS system equipment consists of the following:

1. GTT Opticom Model 3100 GPS Radio Unit containing a GPS receiver with antenna and a 2.4 GHz spread spectrum transceiver with antenna
2. GTT Opticom Model 1070 GPS Installation Cable
3. GTT Opticom Model 768 Auxiliary Interface Panel
4. GTT Opticom Model 764 Multimode Phase Selector

D. System server is existing and is located at FAST Traffic Management Center.

E. The GPS system shall also conform to GTT Opticom GPS Preemption manufacturer requirements.

623 T.02.06 TRAFFIC SIGNAL VIDEO IMAGE DETECTION SYSTEMS

This subsection is replaced with the following:

A. Video detection systems shall be approved by the Engineer for installation. The system shall be PEEK VideoTrak IQ, ITERIS Edge 2, ECONOLITE Auto Scope Rack Vision or an alternate system that is pre-approved by the Traffic Manager. All video detection systems installed shall have 8 channels with the capability of expanding to more channels of detection by adding additional modules. A video detection system color LCD monitor, minimum size of 9 inches, shall be provided as part of the detection system. The installation of the video detection system shall include a Pelco attachment consisting of an astro bracket with a 6-foot riser.

B. Stainless steel grade anti-seize compound shall be applied to the banding bolt thread prior to installing the nut for the bracket used for the video camera extension pole.

623 T.02.07 SYNCHRONIZING CLOCK

Paragraph B is replaced with the following:

B. The Contractor shall provide and install an accurate synchronizing clock that maintains time by referencing signals that are broadcast from Global Position System (GPS)
satellites.

1. The timing device shall be compatible with the Naztec model 980 ATC signal controller (Naztec GPS Kit with Garmin GPS16x HVS sensor or approved equal). The Contractor shall also provide and install all accessories and adapters as needed to provide a complete system.

TRAFFIC SIGNALS AND FITTINGS

623 T.02.08 VEHICLE SIGNAL FACES

The following is added to paragraph D.5:

5. Testing by an independent laboratory may be required if the LED offered does not have prior approval of the Traffic Manager. All vehicular LED modules not previously approved shall be tested by Intertek - ETL/Semko, Cortland, NY. Test reports for each ball LED module shall include verification of power consumption, chromaticity, luminous intensity and light distribution and shall indicate compliance to the ITE VTCSH-LED specification. Test reports for arrow LED modules shall indicate compliance with the luminous intensity of the CALTRANS standards and measurement criteria. All supporting data and test results shall be delivered to the maintaining Agency Operations Engineer for approval prior to the installation of the LED modules.

Paragraph I.5 is replaced with the following:

5. All traffic signal backplates shall be louvered and shall be painted or powder coated flat black (front side)/dark olive green (backside), using the same technique as on the signal housing.

The following is added to this subsection:

All traffic signal backplates shall have a 2-inch retroreflective adhesive sheeting border on the entire outer perimeter of the front side of the backplate. Retroreflective sheeting shall be fluorescent yellow, ASTM Type IV or better. The retroreflective sheeting border shall have a minimum of ½ inch clearance from all louvers. No sheeting shall be placed over any louvered area. Retroreflective sheeting border shall be installed by the manufacturer, and modifications shall not be made by the Contractor.

The backplate with retroreflective sheeting border shall be from the same manufacturer as the signal head assembly. The complete signal head assembly, including the backplate, shall be capable of withstanding winds of 90mph without damage or separation of any parts from the signal head assembly.

623 T.02.09 PROGRAMMED VISIBILITY VEHICLE SIGNAL FACES

The first sentence paragraph C is replaced with the following:

All signal sections shall be provided with an adjustable connection that permits incremental tilting from 7 degrees to 15 degrees above or below the horizontal while maintaining a common vertical
axis through couplers and mountings.

623 T.02.11 PEDESTRIAN PUSH BUTTONS

The following is added to this subsection:

Unless otherwise specified on the plans, the pedestrian push button assembly shall be a Polara EZ Communicator Navigator Accessible Pedestrian System, or an equivalent as approved by the Engineer. A system shall include a central control unit, an e-configurator, and (EN2) two-wire push button station.

Contractor shall also supply and install a 9-inch by 12-inch pedestrian push button sign and push button frame adaptors for use with 9-inch by 12-inch pedestrian push button signs.

Pedestrian push button signs shall conform to MUTCD requirements, unless otherwise specified. Signs shall be 9-inches by 12-inches in size and shall have Type XI retroreflective sheeting with protective overlay film, with four drilled and tapped holes for mounting the sign on the pedestrian push button assembly. Four stainless steel tamper-proof screws per each push button assembly shall be used to mount the pedestrian push button sign.

All existing pedestrian push button assemblies shall be removed and replaced with Polara iN 2-Wire System, or an equivalent as approved by the Engineer.

Existing holes that are no longer being used shall be tapped/plugged or welded/plugged and shall be touched up with hot-stick galvanizing.

623 T.02.13 TRAFFIC SIGNAL POLES

The following is added to paragraph B:

Multi-sided (minimum of 18 sides) steel traffic signal mast arms may be used.

Replace sentence 3 of Paragraph U with the following:

The finish shall be primed and painted using Fir Green (RAL 6009), metallic. If the Contractor chooses to have the manufacturer paint the poles, the Contractor is responsible for providing a certification from the manufacturer that the poles have been primed before painted.

623 T.02.15 RED LIGHT DISPLAY INDICATORS

Add the following to this subsection:

The Contractor shall remove all existing red light running indicators from existing traffic signal pole and relocate to new adjacent traffic signal pole as indicated on the plans. Relocation shall conform to Clark County Uniform Standard Drawings, Drawing No. 811.S1.

623 T.02.16 INTERNALLY ILLUMINATED STREET NAME SIGNS

Replace Paragraph B with the following:

2019 Las Vegas Boulevard
Roadway Improvements
From Spring Mountain Road to
Sahara Avenue

Project No. L-2210

623-26
The signs shall be 8 feet long and 22 inches high with street names on both sides of the sign. The signs shall be weather-tight and consist of 6063 T-5 alloy aluminum housing.

*Replace sentences 3 through 9 of Paragraph C with the following:*

Internally illuminated street name signs shall be provided at all traffic signal locations, with street names on both sides of the sign. The internally illuminated street name sign is an assembly that consists of an enclosure and front and back sign panels and shall be weather-tight.

Sign lettering shall be as shown on the contract plans and shall conform to the 2009 edition of the M.U.T.C.D.

The sign face shall have the compass direction of the location marked in the upper left corner of each sign panel with a 5-inch upper case letter (N, S, E, or W).

The street name suffix (Street, Way, Blvd., and so forth) shall be displayed in the upper right corner of the sign panel in 5-inch uppercase letter.

The street address number of the location shall be shown at the lower right corner in 5-inch upper case letters and numerals.

Engineer approval is required for the sign faces prior to fabrication.

*Replace Paragraph D with the following:*

**Lamp Requirements:**

The lighting for internally illuminated street name sign tube lamps shall be Light Emitting Diode (LED) and shall meet the following requirements:

- **Photometric**
  - A normal Correlated Color Temperature (CCT) of 4000°K to 5000°K
  - A Color Rendering Index (CRI) ≥ 80.
  - 180° light distribution.
  - Bi-directional (dual side’s illumination)

- **Electrical**
  - Power factor ≥ 0.92.
  - Operating voltage 120 VAC
  - Frequency 50-60 Hz.
  - Total power consumption shall be 40 watts maximum per tube lamp connector/receptacle.
  - UL 1310 class 2, UL 1598 and/or UL 8750 approved.
  - Radio frequency (RF) emission > 50 kilohertz.

- **LED Tube Lamp**
Full light output at initial turn on.
- Operating temperature range from -10°F to 120°F (-23°C to 49°C).
- Must fit into a signal pin T-12 fluorescent lamp receptacle for an 8-ft illuminated street name enclosure.
- Lamp shall have a Fa8 lamp single-pin contacts.
- Rated life ≥ 70,000 hours.
- Tube lens shall be polycarbonate.
- Luminaire must operate at 77°F (25°C) for a minimum of 50,000 hours before the LED light output has decreased to 70% of initial output (L70).
- Shall have internally built-in drivers. No external drivers are accepted.
- 8-foot tube lamp shall have light output of minimum 2,500 lumens per tube lamp.

A warranty must be provided for the replacement or repair of the tube lamp due to any electrical failure (including light source and power supplies/drivers) for a minimum of five (5) years after final acceptance of the materials. Contractor shall provide all warranty documents to Clark County Public Works Traffic Management Divisions at time of product delivery. Documents shall contain project name, bid number of the project, manufacturer, brand, model, and quantity of tube lamps delivered.

Add the following paragraphs to this subsection:

Internally illuminated street name signs shall be wired to the luminaires photocell for control with No. 10 AWG THW copper stranded wire. In the event there is no luminaire on the traffic signal pole, a 1000-Watt photoelectric control shall be mounted on the pole cap.

Internally illuminated street name signs shall be LED and shall be one of the following products or approved equal the meet the requirements below.

1. **NUART LIGHTING LED EDGE LIT SERIES** with ASTM Type IX retroreflective sheeting, and bandable mounting with L-brackets;

2. **TEMPLE EDGE-LIT 96" Model R409A** with ASTM Type IX retroreflective sheeting, and under-hang mast arm mount;

3. **SOUTHERN MANUFACTURING Part No. CP818DTJNNAAD1** with 8' x 18" Double Face Viewable Clean Profile LED; Top Mount, bandable mounting with L-brackets, “L” Adapter, No Photocell, Monarch Black, DG-Reflective / EC Film (Green); **Overall size: 8' x 21”**

Internally illuminated street name sign and associated brackets shall be from the same manufacturer. Brackets shall be primed, and painted “Fir Green” (RAL6009), metallic.

The Contractor shall supply 5 spare internally illuminated street name signs along with 5 spare (10 total; 2 per each IISNS) brackets. The spare equipment shall be delivered to 9935 S. Jones Boulevard, Las Vegas, NV 89141.

**623 T.02.18 UNINTERRUPTIBLE POWER SUPPLY SYSTEMS (UPS)**

2019 Las Vegas Boulevard Roadway Improvements
From Spring Mountain Road to Sahara Avenue
This subsection is replaced with the following:

An uninterruptible power supply system shall be supplied as an integral part of the service pedestal installed. The service pedestal shall comply with the requirements of Subsection 623 G.02.07 with the exception of the size and general make-up of the service pedestal enclosure.

The UPS enclosure shall be side-mounted to the existing or new controller cabinet unless otherwise stated on the plans. UPS enclosures that are not side-mounted shall be installed freestanding on a concrete base. Concrete base shall be considered incidental to the installation of the UPS system and designed per manufacturer’s requirements.

The enclosure shall have a single door installed on the front of the cabinet with stainless steel piano hinges that allow access to the power and distribution enclosure on the left and the UPS array on the right. Below the power and distribution enclosure and UPS array, two shelves shall be installed for up to 6 batteries. The electrical meter shall be installed under a hooded door above the distribution center that is installed with a stainless-steel piano hinge. The overall dimensions of the enclosure shall be 20 inches wide, 46 inches high and 10 inches deep or as otherwise approved by the Engineer.

Service pedestals shall be finished inside and out with gloss polyurethane powder coating consisting of Federal specification 595 polyurethane, industrial grade high gloss powder paint with 1.7 mil thickness minimum. The finish shall present a smooth surface, uniform in color and free of runs, sags or other irregularities.

The UPS system will be designed to automatically assume power of the signal breaker only when the line service falls below a selected amount. The unit shall not provide electrical power to the intersection unless the line power fails. The UPS will operate as a true standby power source.

A. General Features

1. Fully programmable Front Display Panel.
2. Easy Maintenance.
4. Time/Date stamp of 50 events and alarms with download and print capability including but not limited to:
   a. Date and time of power failure
   b. Reason of failure (low voltage, irregular frequency, voltage spike, etc.)
   c. Mode of initial signal operation by UPS
   d. Date and time of signal operation change by UPS
   e. Date and time of power restoration
5. Shall operate LED and incandescent loads.
6. Seamless transfer of power sources to the traffic signal.
7. Flasher circuit shall be programmable from 0.1 to 10 hours.
8. UPS system shall be PC compatible.
9. A minimum of two (2) thermostatically controlled fans shall be provided for air circulation to cool batteries with exhaust at the top of the cabinet.

B. Electrical Features

1. Power shall be held constant in the field so that dimming does not occur when the power
2. A Power Transfer Switch (PTS) shall be provided so that the UPS may be removed and serviced while the intersection remains fully operational.
3. The PTS shall allow for an AC generator to plug directly through the service pedestal.
4. Input operating voltage and frequency shall be 85-135 volts AC @ 40-70 HZ.
5. Output voltage and frequency shall be 115-125 volts @ 57-63 HZ.
6. Total harmonic distortion shall be less than 2.5 percent.
7. The power transfer time shall be less than 100 milliseconds.
8. The UPS system shall provide a true filtered sine wave as output.
9. Lighting/Surge protection shall be provided that meets or exceeds ANSI/IEEE C.62.41/C62.45 Cat A & B.
10. Six (6) Form C, dry relay contacts shall be furnished with normally open (NO) and normally closed (NC) position terminals.
11. The UPS shall incorporate input power factor correction.
12. The UPS shall provide transient voltage protection.
13. Circuit breakers shall be provided for both input and output circuits.
14. Minimum power output shall be 2000 VA; minimum active power shall be 1500 watts.
15. Utility landing lugs shall be raw copper.

C. Batteries
1. Batteries shall be maintenance free and spill-proof.
2. Batteries shall be 24V and shall be the gel type.
3. Batteries shall be connected in a parallel configuration.
4. There shall be a maximum of four batteries.
5. Batteries shall be rated for temperatures to 70 degrees C.
6. Batteries shall automatically recharge within 12 hours following discharge.
7. Battery recharge rate shall be programmable.
8. Battery temperature compensation shall be provided.

D. Operational Features
1. The UPS shall be designed to operate in three (3) modes.
2. In normal operation, the system shall operate the traffic signal indications in the standard red-yellow-green sequence commands provided by the traffic signal controller. The system shall operate for a minimum of two (2) hours with a 10-amp load.
3. Flashing operation shall put all approach indications on all-red flash while the pedestrian heads go dark. The system shall operate the signal in this mode for a minimum of four (4) hours with a 10-amp load.
4. Combination mode will require the system to support normal operation of the indications at the beginning of the power outage and convert to flashing operation after a preset time or percentage of battery usage.
5. Communication Alarms
6. LED indicators shall be provided on the front panel for the following:
   - ON SERVICE POWER
   - ON BATTERY POWER
   - LOW BATTERY
   - OVERLOAD
   - FAULT
7. Six (6) fully programmable dry contacts shall be provided to interconnect with communications network.

8. Programmable Features: The UPS shall be programmable using a keyboard and display located on the front panel of the module and via software from a laptop computer.

E. Warranty

The manufacturer shall warranty the UPS System for a full two years from the date of installation. The warranty shall cover all parts and labor necessary to repair or replace any part of or the entire system at no cost to the County. Shipping both ways shall be included in the warranty.

623 T.02.21 VANDALISM PLATES

A. Vandalism plates shall be installed on all new traffic signal poles that contains signal mast arms and shall conform to details on the plans.

B. The Contractor shall install the vandalism plates a minimum of 6 inches below traffic signal mast arm.

C. Each vandalism plate shall consist of two flat bar brackets with a minimum of sixteen 1/2-inch roll bars on each. Roll bars shall be installed on bracket, alternating 45 degrees downward and 90 degrees for each rod.

623 T.02.22 MAST ARM VIBRATION MITIGATION DEVICES

A. Vibration mitigation devices shall be installed on all new traffic signal mast arms that are 60 feet in length or longer as indicated on the plans.

B. The Contractor shall install the vibration mitigation devices as close as possible to the free end of the traffic signal mast arm, not to exceed 5 feet from the free end of the traffic signal mast arm.

C. The method of installation shall be to clamp the device to the traffic signal mast arm using a stainless-steel band with a width between 3/4 inches and 1-1/4 inches.

D. The device shall be installed plumb vertically, not to exceed 1 degree of rotation in the positive or negative direction.

Each vibration mitigation device shall consist of a steel mass suspended in an aluminum tube with a stainless-steel extension spring. The aluminum tube shall be 43 inches in length and 4.5 inches in diameter. Each unit shall not exceed 35 pounds in weight.

623 T.02.23 FAST CAMERA EXTENSION POLE

The Contractor shall install an 11'-8" high rise camera extension pole per NDOT Detail T-33.11.2 where indicated on the Contract Documents. The extension pole shall be primed and painted Fir Green (RAL6009), Metallic.

Add the following to this subsection:

623 T.03.05 GPS PRIORITY CONTROL SYSTEM

The Engineer reserves the right to inspect and/or factory test any completed assemblies prior to delivery of the material to the project site. Any deviations from these special provisions that are...
identified during such testing shall be corrected prior to shipment of the assembly to the project site.

The Contractor shall install the detector unit(s), mounting hardware, cabling, GPS unit(s), system chassis, auxiliary panel, card rack(s), central management system hardware and software and green phase monitoring and shall coordinate with the GTT Opticom representative for programming and calibration of the detector and GPS units. The Contractor shall follow step-by-step instructions provided by GTT Opticom to provide a fully functional installation.

The Contractor shall program all GPS equipment and units installed in the traffic controller cabinets, on-board vehicles for GPS operations at each of the project signalized intersections and the GPS Central Management System.

The Contractor shall demonstrate that all components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance shall be determined using the following test procedure during the functional test period.

Each system to be used for testing shall consist of a GPS emitter assembly, a GPS detector, detector cable and a GPS cabinet unit.

The GPS units shall be installed in the proper input file slot of the controller cabinet assembly.

Two tests shall be conducted for each GPS detector assemblies; one using a Class I signal emitter and a distance of 1000’ (300 m) between the emitter and the detector, the other using a Class II signal emitter and a distance of 1800’ (550 m) between the emitter and the detector. All range adjustments on the module shall be set to "Maximum" for each test.

Each above test shall be conducted for a period of one hour, during which the emitter shall be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute "off" interval. During the total test period (1) the emitter signal shall cause the proper response from the existing traffic signal controller unit during each "on" interval and (2) there shall be no improper operation of either the controller unit or the monitor during each "off" interval.

The Contractor shall calibrate the detectors to allow recognition of the transit priority call within 400 feet (minimum) of the stop bar or as directed by the Engineer (near-side stops will be case by case). The GPS recognition shall end 50’ prior to the stop bar or as directed by the Engineer.

Operational and Acceptance Testing

1. Acceptance Test Plan
   The Contractor shall provide an Acceptance Test Plan to the Engineer for review at least sixty (60) days prior to commencement of the system installation work. The acceptance Test Plan shall include the following:
   a. Installation Checklists
   b. Operational Test
c. System Acceptance Test

2. Installation Checklists
The Contractor shall prepare installation checklists for each intersection to ensure that the intersection GPS equipment has been installed according to installation plans and in a uniform manner. The checklists will be employed to record conformance with installation plans and uniformity of installation for each type of intersection.

The contractor shall prepare and submit the Installation Checklists Data for the Engineer’s review.

3. Operational Test
a. The Contractor shall conduct an Operational Test for the GPS communications equipment installed under this Contract. The Operational Test shall be conducted to verify that each component or subsystem of the GPS functions in accordance with the special provisions and as required for a fully operational communications system to support the Vehicle Signal Priority applications.

b. The Operational Test shall be performed for the GPS equipment installed at each intersection. The Operational Test shall verify that each Access Point Radio is fully operational, associates properly with adjacent Access Point Radios and GPS Terminal Servers at adjacent client-equipped intersections, and can achieve the required throughput and bandwidth when communicating with adjacent Access Point Radios and Terminal Servers as indicated on the Plans. At a minimum, the Operational Test shall consist of:

i. Ping tests from mobile client to network devices for each segment. Ping response times from client radio to any device on the network shall not exceed 100ms.

ii. Ping tests from each intersection client to the Traffic Management Center (TMC). Ping response times from City TMC to any device on the network shall not exceed 100ms.

iii. Link tests including throughput for each network link. Measured throughput shall not be less than 24 Mbps, at least 98 percent of the time, for each wireless link.

iv. Using a mobile client simulator running on a laptop computer and using a roof-mounted antenna, verify that the desired serial messages are being received by the intersection terminal servers. For each route segment, the simulated serial messages shall be received at least 99 percent of the time.

v. Test data from the TMC to each Master Controller connected to the TMC using the fiber network and to the intersection controllers running under each Master Controller.

c. The Contractor shall prepare and submit the Operational Test Results Data for Agency review.
4. System Acceptance Test
   a. The Contractor shall conduct a System Acceptance Test for the GPS Priority application utilizing the fiber and GPS furnished and installed under this Contract. The System Acceptance Test shall be conducted to verify that installed equipment and systems function in accordance with the Special Provisions and as required for fully operational GPS priority.
   b. The System Acceptance Test shall be performed after all GPS and fiber communication links, traffic signal controller and firmware upgrades, on-board GPS systems, and Vehicle Signal Priority Management Software has been implemented and completed operational testing. The Acceptance Test shall be performed using the Network Management Tool, Vehicle Signal Priority Performance Monitoring Tool, and FAST Traffic Management System.
   c. The System Acceptance Test shall be performed over a period of ninety (90) days and, at the Engineer's sole discretion, may be re-started if the Vehicle Signal Priority Systems do not operate in accordance with these Special Provisions.

5. Acceptance Test Results Data
   The Contractor shall prepare and submit the System Acceptance Test Results Data for review by the Engineer. The test shall run successfully for 30 consecutive days.

   The Contractor shall deliver 2 spare GPS Priority Control Units to the Clark County Traffic Operations Yard located at 99355 S. Jones Boulevard. Please call (702) 455-7546 seven (7) days in advance to schedule delivery.

   Prior to the delivery of any equipment, the Contractor shall make arrangements for the County to inspect all items. Any material or equipment not salvageable, as determined by the County, shall be disposed of by the Contractor at his expense.

CONSTRUCTION

623 T.03.01 PAINTING

Paragraph A.4 is replaced with the following:

Directional louvers/visors shall be painted or powder coated flat black (interior)/dark olive green (exterior) and backplates shall be painted or powder coated flat black (front side)/dark olive green (backside), using the same technique as the signal housing.

623 T.03.02 ELECTRICAL TESTING

Paragraph A.3 is replaced with the following:

A megohm test shall be conducted on all single conductors, except ground wire, between a new
service pedestal and transformer, and between service pedestal to controller cabinet. Additionally, loop continuity shall be tested using a loop amplifier. The insulation resistance shall not be less than 100 megohms when tested at 500 volts for one minute.

**STREET LIGHTING SECTION**

**DESCRIPTION**

**623 L.01.01 GENERAL**

*Paragraph G is replaced with the following:*

Refer to Subsection 623 G.01.05 GLOBAL POSITIONING SYSTEM (GPS) COORDINATES of these Special Provisions for requirements of the collection of field data including State Plane and Geodetic coordinates.

**MATERIALS**

**623 L.02.01 STREET LIGHT POLES AND ARMS**

*Paragraph O.1 is replaced with the following:*

The handhole shall be 4-inch by 6-inch I.D. reinforced frame with slip-resistant indented type cover located 12 inches above the base plate. The edges of the handhole at the base of the steel streetlight pole shall be continuously, permanently welded shut by bead welding, after project walk-thru and prior to final acceptance of the project. Welded surfaces shall be galvanized by hot-stick galvanizing per Section 623 T.03.01. Welding shall be done by American Welding Society (AWS) certified welders. Handhole covers for concrete streetlight poles shall not be welded.

**623 L.02.03 STREET LIGHTING LUMINAIRES**

*The entire subsection is replaced with following:*

Contractor shall install light emitting diode (LED) luminaires for median (Type A) and intersection (Type B) lighting.

Specifications for street lights along County roads are as follows:

**A. Photometric**

1. Median (Type A) luminaire shall have a normal Correlated Color Temperature (CCT) of 4000°K±300°K.

2. Intersection (Type B) luminaire shall have a normal Correlated Color Temperature (CCT) of 5000°K to 5700°K
3. Luminaire shall have a Color Rendering Index (CRI) \( \geq 65 \).

4. Luminaire shall have a minimum luminaire efficacy \( \geq 85 \) lumens/watt.

5. Luminaire photometric measurement shall be documented by an independent test lab report according to IESNA specification.

6. Type A LED light distribution shall be in accordance with IESNA Type IV distribution with a cutoff lens.

7. Type B LED light distribution shall be in accordance with IESNA Type III distribution with a cutoff lens.

8. Luminaire must operate at 77°F (25 °C) for a minimum of 60,000 hours before the LED light output has decreased to 80% of initial output (L80).

9. Luminaires installed for typical major roadway lighting on a local R/W greater than 100’ shall achieve average minimum cd/m² as outlined in IESNA RP-8 (latest edition), table 3 (High and Lavg/Lmin) within the given limits of the roadways utilizing the existing and or proposed lane dimensions. Supplier must provide a lighting study for the entire right-of-way, including a luminance study for the “roadway area” and an illuminance study for the “pedestrian area”, which proves that lighting luminaire standards are met per IESNA RP-8 for existing and or proposed street lighting configurations, with a minimum light loss factor of 0.84. All calculations must be done with the AGi32 modeling software and submitted in *.agi format. Attached LED fixture form must also be filled out and submitted with calculations.

10. Per IESNA TM-15-2007 (Revised) Luminaire Backlight, Uplight, and Glare (BUG) rating shall be B3 U0 G3 or better.

B. Electrical

1. Luminaire shall have a power factor of \( \geq 0.90 \).

2. Maximum LED forward current of \( \leq 530 \) mA.

3. Luminaire shall be certified by a Nationally Recognized Testing Laboratory.

4. Luminaire operating temperature shall be in the range of 0°F to 120°F (-18°C to 49°C).

5. Luminaire transient voltage/surge suppression protection must meet or exceed the requirements of ANSI/IEEE C.62.41-1991 Class A operation, which consists of seven strikes of a 100 Hz ring wave, 6KV level, for both common mode and differential mode.

6. Luminaire power supply shall have a class A sound rating for power supply per ANSI C63.4.
7. Luminaire power supply shall meet FCC 47 CFR 15/18.

8. Luminaire shall have a nominal operating voltage within a range of 120 to 277 volts at 60 Hz ± 3 Hz.

9. Power supply output operating frequency must be ≥ 120 Hz when not using direct current output.

10. Luminaire shall have a prewired heavy-duty barrier type terminal block, capable of terminating three (3) No. 14 to one (1) No. 10 AWG conductor(s). An internal fuse holder to be optional.

11. Total power consumption of the luminaire shall not exceed 160 Watts.

C. Housing

1. Luminaires shall be painted with at least one (1) 2-mill thick coat of high gloss gray enamel or polyurethane powder coating, free of lead and mercury.

2. Luminaire shall be constructed of die cast aluminum. Stamped and formed aluminum housings shall not be permitted. This shall include all external panels comprising the housing and access doors.

3. Power supply shall be mounted internally and be replaceable.

4. All luminaire components shall be corrosion resistant.

5. Luminaire shall have heat sink integrated into luminaire body, and be resistant to debris buildup that may cause degraded heat dissipation. No fans, pumps or liquids are allowed. Light engines with integrated heat sinks will not be accepted.

6. Luminaire weight shall be ≤ 50 Lbs.

7. Luminaire must withstand a minimum vibration of 2Gs per ANSI C136.31-2001.

8. The luminaire shall have a slip-fitter capable of adapting to 1-1/4-inch through 2-inch nominal pipe bracket without rearrangement of parts and be adjustable +5° degrees from horizontal. There shall be no more than four 9/16-inch hex bolts to secure luminaire to pipe. Bolts shall be secured from bottom of luminaire and mounted internally. At no point shall wires be exposed to the outside.

9. The optical assembly of the luminaire shall have a minimum IP-65 rating to protect internal components.

10. The maximum effective projected area of the luminaire (calculated from either side) shall not exceed 1.2 square feet (slim, low profile design to optimize for
wind loading).

11. The luminaire maximum dimensions shall not exceed 38 inches long x 19 inches wide x 10 inches tall.

12. Luminaire shall have bird guard or wildlife intrusion protection. Knockout panels on luminaire housing will not be accepted.

13. Luminaire shall not use plastic clips/latches to secure access panels.

14. Both Type A and Type B fixtures shall be manufactured by the same company and have the same form factor.

15. Each fixture type shall match the associated pole color. Tan in color for Type A and green in color for Type B. Coordinate with each pole manufacture for coloring details.

D. Luminaire Identification

1. Each luminaire shall have the manufacturer’s name, trademark, model number, serial number/lot number, and date of manufacture (month/year), permanently marked on the inside of each unit.

2. The wattage of the luminaire must be able to be detected visibly from an observer standing at ground elevation at base of pole. Sticker to be consistent American National Standard for Roadway Lighting Equipment, ANSI C136.15.

3. Operating characteristics shall be permanently marked inside each luminaire: Voltage rating, and power rating (in watts and or volt-ampere)

4. Each LED luminaire should be permanently marked with correlated color temperature (CCT) rating in Kelvin, color rendering index (CRI) and wattage driver current.

E. Measurements and Performance

1. IESNA LM-79-08 approved method for electrical and photometric measurements of solid-state lighting products. Documentation shall be provided with the shop drawing submittals.

2. IESNA LM-80-08 approved method for measuring lumen maintenance of LED lighting sources. Documentation shall be provided with the shop drawing submittals.

3. Illuminance study shall be submitted. Illuminance studies shall be legible and clearly show intersection dimensions and luminaire position/mounting heights used in the analysis.

4. IESNA/TM-21 report using the LM-80 data shall be submitted for luminaire
that shows projected L80 rating at 25° C.

F. **Warranty**

A manufacturer’s warranty must be provided for the replacement or repair of the luminaire due to any electrical failure which includes the light source and power supplies/drivers, for a minimum of five years from final acceptance of the project. All other components shall have a warranty for a minimum of one year after final acceptance of the project. Warranty documents shall have Clark County Public Works as the warrantee. Contractor shall provide all warranty documents to Clark County Public Works Traffic Management Division. Documents shall contain project name, bid number of the project, manufacturer, brand, model, contact information for warranty claim, and quantity of tube lamps installed. Warranty replacement of luminaire shall be delivered no more than sixty (60) calendar days upon notification by Clark County Public Works.

G. **Smart Pole and Foundation**

The Smart Poles for Type A fixtures shall be furnished by Clark County and installed by the contractor on a contractor installed foundation. Foundation shall be installed per the Smart Pole manufacture provided foundation drawings. Clark County shall supply the following:

1. Smart Pole with 10’ mast arms.
2. Mounting hardware such as anchor bolts, nuts and base plate cover plate.
3. Foundation drawings from Smart Pole Manufacturer.
4. Fuse holders.
5. Internal wiring from the pole handhole up to the mast arms.

The contractor shall be responsible or supplying all other material or equipment indicated on the plans. The contractor shall also be responsible for transporting the Smart Pole from the indicated location within Clark County to the site and any on site storage.

Repair any irrigation, landscape lighting conduit or conductors, or any other items damaged during equipment and foundation and pole installation.
TYPICAL LIMITS OF INTERSECTION DETAIL
(N.T.S.)
623 L.02.04 FUSEHOLDERS AND FUSES

Paragraph F is replaced with the following:

Fuse holders shall be rated for 600 volts. Single fuse holders shall be Littelfuse, 600-volt, Series LEB fuse holders, with WPB1 rubber boots and Littelfuse KLK10, fast-acting Midget, 600-volt fuse or approved equal. Double pole fuse holders shall be Littelfuse double fuse holder, Series LEX rated for 600 volts with Littelfuse rubber boot WPB1 and Littelfuse KLK10, Fast-Acting, Midget 600-volt fuse or approved equal for 277-volt multiple street lighting systems. Glass, paper or indicating type fuses are not acceptable.

CONSTRUCTION

623 L.03.03 ELECTRICAL TESTING

Paragraph A.3 is replaced with the following:

A megohm test shall be conducted on all single conductors, except ground wire, between a new service pedestal and transformer. The insulation resistance shall not be less than 100 megohms when tested at 500 volts for one minute.

METHOD OF MEASUREMENT

623.04.01 MEASUREMENT
The following is added to this subsection:

The service pedestal shall include all the breakers as specified in the plans. Contractor shall inspect the existing service pedestal from which the traffic signal is fed, and supply and install any missing breakers. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Verification of existing conduits and removal of conduit blockages shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

All work required to re-plumb the signal poles after the signal heads are in place shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Drilling of the holes, supplying and installing junction boxes for future pedestrian signals in the traffic signal poles as indicated in the plans shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Installation of the conductors from all empty tenons to the “J” box on the mast arm pole shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Modifying traffic signal mast arms and field drilling mast arm tenons shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Installation of the GPS Priority Control System shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of the traffic signal to which such items are incidental or appurtenant.

Relocation of existing METRO Surveillance Cameras, FAST Cameras, Dedicated Short Range Units, and Red Light Running Indicators will be measured as a unit for each item necessary to complete the work.

Installation of video image detection 6-foot riser shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the installation of video image detection system to which such items are incidental or appurtenant.

Installation of vandalism plate will be measured as a unit for each plate necessary to complete the work.

Installation of mast arm stabilizers will be measured as a unit for each stabilizer necessary to complete the work.

The unit of measurement for Type A and Type B lights assemblies including luminaire, mast arm conductors within pole, fuse and fuse holders, hardware and other appurtenances for a complete
operational light will be unit price cost.

The unit of measurement for communication/FAST conduit or duct bank will be by the linear foot for each of the configurations shown on the Contract Documents.

Installation of 1” innerduct in existing conduit along with pull tape shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of communication/FAST conduit or duct bank to which such items are incidental or appurtenant.

Installation of 2” duct spacers shall not be measured for payment directly. The cost thereof shall be considered as included in the price bid for the construction of communication/FAST and electrical conduit or duct bank to which such items are incidental or appurtenant.

The unit measurement for New Switchgear including enclosures, panels, circuit breakers, controller, hardware and other appurtenances for a complete operational switchgear will be lump sum.

The unit of measurement for electrical conduit or duct bank will be by the linear foot for each of the configurations shown on the Contract Documents.

The unit of measurement for conductors will be by the linear foot for sizes shown on the Contract Documents.

The unit of measurement for smart pole assemblies will be for each County Furnished Contractor installed pole on new foundation as shown in the Contract Documents.

BASIS OF PAYMENT

623.05.01 PAYMENT

The following is added to this subsection:

No separate payment will be made for service pedestal inspection and circuit breakers. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

No separate payment will be made for verifying existing conduits and removing conduit blockages as such. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

No separate payment will be made for replumbing the signal poles after the signal heads are in place. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

No separate payment will be made for drilling of the holes, supplying and installing junction boxes for future pedestrian signals in the traffic signal poles as indicated in the plans. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no
additional compensation will be allowed.

No separate payment will be made for installation of the conductors from all empty tenons to the “J” box on the mast arm pole. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

No separate payment will be made for modifying traffic signal mast arms and field drilling mast arm tenons. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

Full compensation for all additional materials and labor, not shown on the plans or specified, which are necessary to complete the installation of the traffic signal system, shall be considered as included in the price paid for the system, and no additional compensation will be allowed.

No separate payment will be made for GPS Priority Control System. The cost thereof shall be considered as included in the lump sum bid price for the traffic signal installation and no additional compensation will be allowed.

The unit price paid for relocating METRO Surveillance Cameras, FAST Cameras, Dedicated Short Range Units, and Red Light Running Indicators shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including making necessary wire connections, material, labor and all other appurtenances for a complete installation.

The unit price paid for METRO Surveillance Cameras, FAST Cameras, Dedicated Short Range Units, and Red Light Running Indicators shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including making necessary wire connections, material, labor and all other appurtenances for a complete installation.

The unit price paid for installation of vandalism plates shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including necessary material, labor and all other appurtenances for a complete installation.

The unit price paid for installation of mast arm stabilizers shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including necessary material, labor and all other appurtenances for a complete installation.

The unit price paid for Type A or Type B light assemblies shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including all material, labor and testing.

The unit price paid for New Switchgear shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including all material, labor and testing.
The linear foot unit price for communication/FAST conduit or duct shall be full compensation for doing all the work in place as indicated in the Contract Documents and as directed by the Engineer, including labor, materials, trenching, locator tape, backfill, backfill material, restoration and terminations at structures.

The linear foot unit price for electrical conduit or duct shall be full compensation for doing all the work in place as indicated in the Contract Documents and as directed by the Engineer, including labor, materials, trenching, locator tape, backfill, backfill material, restoration and terminations at structures.

No separate payment will be made for installation of 1” innerduct and pull tape. The cost thereof shall be considered as included in the bid price for the communication/FAST conduit or duct bank and no additional compensation will be allowed.

No separate payment will be made for installation of 2” duct spacers. The cost thereof shall be considered as included in the bid price for the communication/FAST and electrical conduit or duct bank and no additional compensation will be allowed.

The linear foot unit price for electrical conductors shall be full compensation for doing all the work in place as indicated in the Contract Documents and as directed by the Engineer, including labor, materials, testing, terminations and splices for an operational circuit.

The unit price paid for smart poles assemblies shall be full compensation for doing all the work complete and in place as indicated in the Contract Documents and as directed by the Engineer, including transporting County finished pole to the site, all forming, setting rebar, placing concrete, installing pole, making necessary wire connections, material, labor and all other appurtenances for a complete installation.

C. Payment will be made under:

<table>
<thead>
<tr>
<th>PAY ITEM</th>
<th>PAY UNIT</th>
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</thead>
<tbody>
<tr>
<td>New Traffic Signal System – LVB at Wynn Main Entrance and Fashion Show Drive</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>New Traffic Signal System – LVB at Wynn Parking</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>New Traffic Signal Modification (Conduits) LVB at Elvis Presley/Circus Circus</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>New Traffic Signal Modification (Conduits) LVB at Sky</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>New Traffic Signal Modification (Conduits) LVB at Hilton Grand Vacation</td>
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</tr>
<tr>
<td>New Traffic Signal Modification - LVB at SLS</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>Install Power and Communication Duct Bank, See Detail A</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Install Power and Communication Duct Bank, See Detail B</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Install Communication and FAST Duct Bank, See Detail C</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Install Communication Laterals, See Detail E</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Install Communication Laterals to Service Provider, See Detail G</td>
<td>Linear Foot</td>
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<tr>
<td>Furnish and Install New Traffic Rated 4’X4’ Manhole per Detail H</td>
<td>Each</td>
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<tr>
<td>Furnish and Install New Traffic Rated 4’X6’ Manhole per Detail J</td>
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</tr>
<tr>
<td>Furnish and Install New Traffic Rated 6’X6’ Manhole per Detail I</td>
<td>Each</td>
</tr>
<tr>
<td>Furnish and Install T200 Pull Box per Modified Clark County Standard Drawing No. 762</td>
<td>Each</td>
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<tr>
<td>Furnish and Install New Clark County P30 Pull Box per Modified Clark County Standard Drawing No. 761</td>
<td>Each</td>
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<tr>
<td>Furnish and Install No. 7 Pullbox</td>
<td>Each</td>
</tr>
<tr>
<td>Furnish and Install No. 5 Pullbox</td>
<td>Each</td>
</tr>
<tr>
<td>Electrical Manhole</td>
<td>Each</td>
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<tr>
<td>Item Description</td>
<td>Unit</td>
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<tr>
<td>No. 3 ½ Pullbox</td>
<td>Each</td>
</tr>
<tr>
<td>Type A Street Light Assembly</td>
<td>Each</td>
</tr>
<tr>
<td>Install Smart Pole and Foundation</td>
<td>Each</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (12)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (11)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (10)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (9)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (8)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (7)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (6)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (5)-2&quot; in New Trench</td>
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</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (4)-2&quot; in New Trench</td>
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</tr>
<tr>
<td>Power Duct (3)-4&quot; &amp; (2)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Duct (2)-4&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Lateral (9)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Lateral (6)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Lateral (3)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Lateral (1)-2&quot; in New Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>No. 6 AWG Conductor</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>350 KCMIL Conductor</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>New Switchgear</td>
<td>Lump Sum</td>
</tr>
<tr>
<td>Power Conduit (1)-3/4&quot; Conduit in Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>Power Conduit (2)-2&quot; Conduit in Trench</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>No. 8 AWG Conductor</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>No. 6 AWG Conductor</td>
<td>Linear Foot</td>
</tr>
<tr>
<td>No. 4 AWG Conductor</td>
<td>Linear Foot</td>
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</tbody>
</table>
CLARK COUNTY PUBLIC WORKS TRAFFIC MANAGEMENT DIVISION
TRAFFIC ASSET DATA COLLECTION FORMS
FORM 1 – SIGNAL ASSET

SIGNAL ASSET:

Signal Type: ______________________ (Traffic / Fire / School Flasher / Pedestrian Flasher)

  Street name 1: _____________________________________________________________
  Street name 2: _____________________________________________________________

Controller Cabinet:
  Type: ____________________ (R-type / School / Other - Specify)
  X__________ Y__________
  Station: ___________
  Offset: ___________
  Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)

Service Pedestal: X__________ Y__________
  Station: ___________
  Offset: ___________
  Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
  Address: ____________________________________________________________
  Meter #: ____________________________________________________________
  Amp Rating: ________________ (200A / 125A / Other)

Poles:

  Pole Type: ________________ (1A / 1B / XX / XX-A / XX-B / TYPE 7 / SPECIAL)
  Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
  Pole Height: ________________
  Mast arm length: ___________ (Feet)
  Luminaries: ______ (1 / 2)
  X__________ Y__________
  Station: ___________
  Offset: ___________

  Pole Type: ________________ (1A / 1B / XX / XX-A / XX-B / TYPE 7 / SPECIAL)
  Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
  Pole Height: ________________
  Mast arm length: ___________ (Feet)
  Luminaries: ______ (1 / 2)
  X__________ Y__________
  Station: ___________
  Offset: ___________

  Pole Type: ________________ (1A / 1B / XX / XX-A / XX-B / TYPE 7 / SPECIAL)
  Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
  Pole Height: ________________
  Mast arm length: ___________ (Feet)
  Luminaries: ______ (1 / 2)
  X__________ Y__________
  Station: ___________
  Offset: ___________
CLARK COUNTY PUBLIC WORKS TRAFFIC MANAGEMENT DIVISION
TRAFFIC ASSET DATA COLLECTION FORMS
FORM 1 – SIGNAL ASSET

SIGNAL ASSET (CONTINUED)

Pull Boxes:

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________

Pull Box Type: ___________ (3½ / 5 / 7 / P30 / T200 / other)
Corner/median: ___________ (NE / NW / SE / SW / N / S / E / W)
X ____________________ Y _____________________
Station: ________________
Offset: ________________
CLARK COUNTY PUBLIC WORKS TRAFFIC MANAGEMENT DIVISION
TRAFFIC ASSET DATA COLLECTION FORMS
FORM 2 – STREET LIGHTING

STREET LIGHTING

Circuit: ________ (A, B, C, etc.)

Service Pedestal: X____________ Y ______________
Station: ______________
Offset: ______________
Address: ___________________________________________
Meter #: ___________________________________________
Amp Rating: ___________________ (200A / 125A / Other)

Poles:

Pole designation: ________ (A-1, A-2, etc.; must be same designation from the plans)
Street name: ______________ (NE / NW / SE / SW / N / S / E / W)
Pole Height: ______________ (Feet)
Pole Type: ______________ (CCPW, NDOT, Summerlin, Southern Highland, Other - Specify)
Pole Base: ______________ (Standard, Safety)
Pole Gage: ______________ (7, 11, Other - Specify)
Luminaire arms: ______________ (single, double)
Luminaire arm type: ______________ (3-Bolt / Single Bolt)
Luminaire arm length: ______________ (Feet) (8’, 12’, 15’, 18’)
Luminaire type: ______________ (HPS / Induction / LED)
Luminaire Wattage: ______________
Voltage: ______________ (120 / 240 / 277)
X __________________ Y ___________________
Station: ______________
Offset: ______________

Pole designation: ________ (A-1, A-2, A-3, etc.; must be same designation from the plans)
Street name: ______________ (NE / NW / SE / SW / N / S / E / W)
Pole Height: ______________ (Feet)
Pole Type: ______________ (CCPW, NDOT, Summerlin, Southern Highland, Other - Specify)
Pole Base: ______________ (Standard, Safety)
Pole Gage: ______________ (7, 11, Other - Specify)
Luminaire arms: ______________ (single, double)
Luminaire arm type: ______________ (3-Bolt / Single Bolt)
Luminaire arm length: ______________ (Feet) (8’, 12’, 15’, 18’)
Luminaire type: ______________ (HPS / Induction / LED)
Luminaire Wattage: ______________
Voltage: ______________ (120 / 240 / 277)
X __________________ Y ___________________
Station: ______________
Offset: ______________

Pole designation: ________ (A-1, A-2, A-3, etc.; must be same designation from the plans)
Street name 1: ______________ (NE / NW / SE / SW / N / S / E / W)
Pole Height: ______________ (Feet)
Pole Type: ______________ (CCPW, NDOT, Summerlin, Southern Highland, Other - Specify)
Pole Base: ______________ (Standard, Safety)
Pole Gage: ______________ (7, 11, Other - Specify)
Luminaire arms: ___________ (single, double)
Luminaire arm type: ___________ (3-Bolt / Single Bolt)
Luminaire arm length: ___________ (Feet) (8', 12', 15', 18')
Luminaire type: ___________ (HPS / Induction / LED)
Luminaire Wattage: ___________
Voltage: ___________ (120 / 240 / 277)
X ____________________ Y _____________________
Station: ___________
Offset: ___________
CLARK COUNTY PUBLIC WORKS TRAFFIC MANAGEMENT DIVISION
TRAFFIC ASSET DATA COLLECTION FORMS
FORM 2 – STREET LIGHTING

STREET LIGHTING (CONTINUED)

Pull Boxes:

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________

Pull Box Type: ___________ (3½ / 5 / Other)  
X ____________________ Y _____________________
Station: ___________  
Offset: ___________
CLARK COUNTY PUBLIC WORKS TRAFFIC MANAGEMENT DIVISION
TRAFFIC ASSET DATA COLLECTION FORMS
FORM 3 – COMMUNICATION AND FAST ASSET

Pull Boxes:

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<tr>
<th>Pull Box Type:</th>
<th>Corner/median:</th>
<th>X</th>
<th>Y</th>
<th>Station</th>
<th>Offset</th>
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<tbody>
<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
</tr>
<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
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<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
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<td>________</td>
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<tr>
<td>3½ / 5 / 7 /P30 / T200 / other</td>
<td>(NE / NW / SE / SW / N / S / E / W)</td>
<td>________</td>
<td>________</td>
<td>________</td>
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</table>
## Communication and Fast (Continued)

**Conduit:**

Top of Duct Bank & Lateral Trench: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

Top of Duct Bank & Lateral Conduit: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

**Conduit:**

Top of Duct Bank & Lateral Trench: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

Top of Duct Bank & Lateral Conduit: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

**Conduit:**

Top of Duct Bank & Lateral Trench: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

Top of Duct Bank & Lateral Conduit: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

**Conduit:**

Top of Duct Bank & Lateral Trench: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

Top of Duct Bank & Lateral Conduit: __________
X ____________________ Y _____________________
Station: __________
Offset: __________

**Conduit:**

Top of Duct Bank & Lateral Trench: __________
X ____________________ Y ____________________
Station: ___________
Offset: ___________
Top of Lateral Stub Out Conduit: ___________
X ____________________ Y ____________________
Station: ___________
Offset: ___________