SECTION 623 - TRAFFIC SIGNALS AND STREET LIGHTING

**DESCRIPTION**

**623 G.01.01 GENERAL**

***Add the following PARAGRAPHS to this subsection:***

1. The Contractor shall provide all labor, materials, equipment, transportation and services required to install the street lighting, traffic control system, and related items on the plans and in the specifications resulting in complete and operational systems, to include fully functional opticom, video detection, pedestrian detection, and loop detection system complete with the manufacturer’s latest versions of firmware.
2. All equipment shall function as designed. All lighting standards shall be operational within fifteen (15) days after installation. The luminaries shall be leveled before they are energized.
3. The Contractor shall maintain the new lighting system and traffic signal system from the date energized until the entire project has been accepted by the City of Las Vegas. The Contractor shall repair or replace any defective component of the systems within 24 hours after notice in writing by the Engineer if of a non-hazardous nature. If public safety is endangered, the Contractor shall take immediate steps to correct the problem after verbal notice by the Engineer.
4. The contractor shall have a lighting representative present at the time the City inspects the street lighting installations.
5. The CLV Roadside Infrastructure shall consist of furnishing and installing CLV Fiber Optic (CFO) conduit with fiber, associated pull boxes and vaults, telecommunications (TELECOM) cabinets, Ethernet switches and all other appurtenant work as shown on plans, as established by the Engineer and in accordance with the specifications.

**623 G.01.05 GLOBAL POSITIONING SYSTEM (GPS) COORDINATES**

***DELETE THIS SUBSECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

A. GPS coordinates shall be determined for all new and relocated traffic signal system, CFO, ITS, 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, and service pedestals.

B. The GPS coordinates shall be submitted to the Engineer in a format specified in the Contract Documents or by the Maintaining Agency, at the end of the project prior to final acceptance. The Engineer will forward the data to the Maintaining Agency.

1. GPS coordinates for Traffic Signal, CFO, Arterial Management System (AMS), and Freeway Management System (FMS) facilities shall be provided using the CLV Coordinate System as follows:

a. NV83.NCRS-LVF

b. NV83.NCRS-LVHEF (Higher Elevations)

**MATERIALS**

**623 G.02.01 CONDUIT**

***DELETE PARAGRAPH “I” AND REPLACE WITH THE FOLLOWING:***

I. End caps with "J" hooks in place to secure the bonding conductor shall be installed in all spare conduits and conduits containing fiber optic cables as directed and to the satisfaction of the Engineer.

***DELETE PARAGRAPH “I.2” AND REPLACE WITH THE FOLLOWING:***

I. 2. ITS conduit shall have a Green No. 8 Bond Grounding conductor.

***ADD THE FOLLOWING PARAGRAPHS:***

J. All 90-degree elbows and all other conduit bends of 45 degrees or more installed as part of communications raceways for CFO, AMS, FMS, and traffic signal facilities shall be per CCAUSD drawing number 763.

K. All traffic signal, street lighting, and CFO conduits shall have at least one Green #10 AWG THW Tracer Wire. This #10 THW Tracer Wire shall be installed within all CFO conduits (empty and with cables).

L. All AMS and FMS conduits shall have a #10 AWG THW Tracer Wire.

**623 G.02.02 PULL BOXES**

***DELETE PARAGRAPH “B.2” AND REPLACE WITH THE FOLLOWING:***

B. 2. Pull box covers shall be inscribed as follows, unless otherwise specified in the Contract Documents or directed by the Engineer:

a. "TRAFFIC SIGNAL" for traffic signal and AMS pull boxes that contain traffic signal cables, or a combination of traffic signal cables and other types of cables from lighting, AMS, FMS, and CFO facilities.

b. "STREET LIGHTING" for pull boxes installed for street lighting circuits and other electrical conduit systems containing only branch power circuit conductors emanating from the electrical service pedestals.

c. "FIBER OPTIC" for AMS and FMS pull boxes.

d. "CITY FIBER OPTIC" for CFO pull boxes

***DELETE PARAGRAPH “K” AND REPLACE WITH THE FOLLOWING:***

K. The Contractor shall not modify approved pull boxes. All proposed modifications to pull box drawings within the CCAUSD and details within the project plans shall be submitted to the Engineer for approval. This includes, but is not limited to, conduit entrance adjustments needed to accommodate the quantity and size of conduits, and the positions for where each conduit enters the pull box. If requested by the Engineer, the Contractor shall provide manufacturer documentation stating that the proposed pull box modifications do not impact the H-20 rating of the pull box.

**623 G.02.04 CONDUCTORS AND CABLE**

***DELETE PARAGRAPH “A.4” AND REPLACE WITH THE FOLLOWING:***

A. 4. Electrical cable for traffic signals shall be IMSA 20‑1 approved signal cable of proper size for the required installation unless otherwise specified in the Contract Documents. All traffic signal cable shall be 25‑conductor, No. 14 AWG solid copper wire traffic signal cable or as specified in the Contract Documents or directed by the Engineer.

***ADD THE FOLLOWING PARAGRAPHS TO “A” OF THIS SUBSECTION:***

10. Ethernet cable shall be either 4 pair 100 Ohm unshielded twisted pairs (UTP), or screened twisted-pair (ScTP), consisting of 22 AWG or 24 AWG solid conductors individually insulated by a thermoplastic material and then formed into 4 twisted pairs with an overall thermoplastic jacket and an RJ-45 connector installed on each end:

a. Cables shall be outdoor rated for installations within underground conduit, outdoor controller cabinets, and outdoor telecom cabinets.

b. Cables shall support Power over Ethernet (PoE) per the IEEE 802.3bt standard for PoE++ delivering at least 71W with the maximum cable of 328 ft.

c. TIA rated CAT6 (category 6) cable shall be used for 1 Gb/s, and less, Ethernet interconnect applications with cable lengths up to 328 ft.

d. TIA rated CAT6a (category 6a) cable shall be used for 10 Gb/s Ethernet (10GBASE-T) interconnect applications with cable lengths up to 328 ft.

e. Ethernet interconnect applications with cable lengths greater than 328 ft shall use fiber optic cable as specified in Section 680.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.02.08 CLV TELECOMMUNICATIONS (TELECOM) CABINET**

1. Pole Mounted CLV TELECOM cabinets shall be a NEMA 3R rated Hoffman Enclosures U6969APP and provided with the following:
	1. Two Hoffman CPMK24 pole mount kits with 3/4" stainless steel straps
	2. Two 2" threaded chase nipples with plastic bushings to provide cable raceways between the enclosure and the pole it is mounted to. One 2” chase nipple shall be installed towards the top of the enclosure for communications cables, and the other installed at the bottom of the enclosure for the cabinet power cables from the service pedestal. A third 2” threaded chase nipple shall be installed towards the top, if necessary, to support additional communications cable capacity.
	3. A 2-pole, 20 Amp, 120/240 VAC breaker within the same service pedestal that is feeding power to the traffic signal cabinet.
	4. A power distribution assembly (PDA) within the TELECOM cabinet consisting of a main disconnect switch or breaker (2-pole, 20 Amp, 120/240 VAC) receiving the feeder from the electrical service pedestal and two duplex outlets, each within a separate gang box. Each duplex outlet shall be rated 20 Amp, single pole, 120 VAC operation and each outlet shall be feed from a separate pole from the load side of the main disconnect. The PDA shall also provide power to the LED cabinet light and exhaust fan assembly.
	5. EIA 19-inch rack mounting provisions with a rack mounted equipment shelf.
	6. Hinged front access door with keyed lock, two latch rods and guides, door stop guide and bracket.
	7. Heat exhaust fan assembly with filtered intake and rain shield mounted on the lower right side (facing the front) of the cabinet and filtered outtake mounted on the upper left side.
	8. Solar shield mounted on top of the cabinet.
	9. Door open switch and bracket.
	10. LED cabinet light with 900 LM illumination; 120° angle of illumination, manual On/Off, motion-sensor activation, and door open switch control modes.
2. Ground Mounted CLV TELECOM cabinets shall include the foundation and shall be a Communication Cabinet with Type 1 Foundation, per NDOT Standard Plans for Road and Bridge Construction Detail Number ITS-2. Cabinet shall be a 334 type Traffic Signal Controller Cabinet (industry standard 170/2070 style cabinet) without the isolated inputs, switched outputs, PDA-3, Model 206 24 VDC plug-in power supply, load switch positions, service panel, and controller shelf. The cabinet shall meet the following minimum requirements:
	1. Dimensions: 67” H x 24” W x 30” D (rounded to the nearest inch).
	2. Material: 5052-H32 aluminum, 0.125” thick.
	3. Finishes: Natural, anodized, or powder coated.
	4. Doors: Front door (1), back door (1), both full size.
	5. Latching System: 3-point, choice of Corbin or Best locks.
	6. Handles: 3/4” round, stainless steel, with padlock feature.
	7. Door Stops: 90° and 180° (±10°), each door, top and bottom.
	8. Rack Assembly: Removable 19” EIA rack.
	9. Ventilation: Dual thermostatically controlled 100 CFM fans, louvered air intake in door, and pleated filter.
	10. Provided with a 2-pole, 20 Amp, 120/240 VAC breaker within the in same service pedestal that is feeding power to the traffic signal cabinet.
	11. Provided with a power distribution assembly (PDA) within the TELECOM cabinet consisting of a main disconnect switch or breaker (2-pole, 20 Amp, 120/240 VAC) receiving the feeder from the electrical service pedestal and two duplex outlets, each within a separate gang box. Each duplex outlet shall be rated 20 Amp, single pole, 120 VAC operation and each outlet shall be feed from a separate pole from the load side of the main disconnect. The PDA shall also provide power to the LED cabinet light and exhaust fan assembly.
	12. Provided with an EIA 19-inch rack mounted equipment shelf.
	13. Provided with a LED cabinet light controlled by a door open switch.
3. CLV TELECOM cabinets identified as a “Distribution Hub” with the splice details shall be provided with two CDCA 12-strand fiber patch panels and locations identified as an “Access Hub” shall be provided with one CDCA 12-strand fiber patch panel. The unterminated “tail” end of the CDCA fiber cable(s) shall be routed to the nearest CFO Type 200 splice vault. Refer to Section 681 for other CDCA requirements.
4. Unless otherwise specified, CLV TELECOM cabinets located within the “special areas” noted below shall be finished with the color as indicated:
	1. Downtown Centennial Plan Area: RAL 6012 “Black Green”.
	2. Summerlin: RAL 3012, Beige-Red (“Summerlin Hummingbird Brown”)
	3. All other areas coordinate the color with the engineer and include the color on the material submittal.

**CONSTRUCTION**

**623 G.03.01 MAINTENANCE OF EXISTING AND TEMPORARY ELECTRICAL SYSTEMS**

***ADD THE FOLLOWING TO PARAGRAPH “H” OF THIS SUBSECTION:***

Prior to start of work, Contractor shall submit drawings stamped by a Nevada Professional Engineer showing support of facilities covered by Section 623 for approval by City Traffic Engineer for all trenches that will expose greater than eight feet of conduit. The Contractor shall submit the support system to be used for all trenches exposing up to 8 feet of conduit for approval prior to trenching. Conduit support systems, at a minimum shall support all joints in the conduit, prevent the decoupling of joints, and prevent deflection greater than 6 inches.

***Add the following PARAGRAPHS TO THIS subSECTION:***

1. All equipment and materials shall be as manufactured or modified by the manufacturer and installed by the Contractor in the manner for which it was designed and intended. No equipment may be modified by the Contractor unless prior written permission is provided by the Engineer.

NOTE TO SPEC WRITER: Some signalized intersections may require temporary signalization in lieu of support. Check with TEFO prior to bidding, If you know ahead of time that you need a temporary signal and modify paragraph K accordingly. Temporary signals need to include power and there should be a bid item for Temporary signal paid by the month and temporary lighting would be per block and be paid by the month.

1. Existing service shall remain fully operational during construction. Outages required shall be scheduled with the Owner and timing devices reset after resumption of service. The Contractor shall field verify wiring connections and routing prior to disconnecting any conductors. The modification, extension or removal of the existing conductors and equipment shall be inspected by and accepted by the Engineer. Electrical work shall be in accordance with the requirements of the National Electrical Code.
2. The data indicated on the plans and in these specifications is as exact as could be secured, but its absolute accuracy is not guaranteed. Exact locations, distances, levels, and other conditions will be governed by unforeseen obstacles in the field.
3. The Contractor shall use the plans and these specifications for guidance, and secure the Engineer’s approval for all changes of location or scope of work. The Engineer should be consulted regarding the exact locations of pull boxes, vaults, poles and cabinets for the traffic signal system.
4. Once the Contractor commences work on the Project, the Contractor shall provide all maintenance for existing traffic signal facilities that are to be modified or replaced, except that the City will pay for power.  The Contractor shall provide the above maintenance until the City gives written notice that the City accepts signals back for maintenance at the end of the Project. The above maintenance does not include any prior damage such as burned out signal displays, non-operative detection, or other malfunctioning equipment.  The Contractor shall provide written documentation of all non-functioning and malfunctioning traffic signal equipment before commencing work on the project.  This malfunctioning equipment shall be inspected by both the Contractor and the Engineer, or Engineer’s Designee, prior to the commencement of work.  In the event that the Engineer does not receive written notice and the Contractor begins work on the project, this will suffice as evidence that all equipment is functional and operational.  If any traffic signal equipment fails or malfunctions during the course of the Project, the Contractor shall repair or replace traffic signal facilities as necessary to provide a fully functioning system before final acceptance for maintenance by the City.  For traffic signals, repair work by qualified electricians shall commence within one hour of notification via the Contractor’s 24-hour emergency response phone number, at which time the Contractor will have two hours to correct the noted violation. The City will program for the Traffic Signal Controller and the Malfunction Management Unit (MMU).
5. If the repair is not completed within the two-hour time limit, the **Contractor will be assessed $200.00 per hour until the repair is complete.**
6. This condition may cause the Project to “Stop Work”; this will not be grounds for a time extension of the contract.

**623 G.03.02 MAINTAINING EXISTING INTELLIGENT TRANSPORTATION SYSTEM (ITS)**

**FACILITIES**

***ADD THE FOLLOWING TO PARAGRAPH “A” OF THIS SUBSECTION:***

The requirements for ITS communications facilities within this subsection shall also apply to CLV communications facilities, including CFO conduit facilities.

**623 G.03.05 EXCAVATION AND BACKFILLING**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

M. All trenching and backfill shall comply with applicable portions of the USS, USD and plans. All trenching shall be deep enough to ensure a minimum of twenty four inches (24”) of cover over the conduit measured from the top of conduit to finish grade, *with the exception* of interconnect conduit which shall have a minimum of thirty inches (30”) of cover over the conduit. The backfill in street areas shall be Type II gravel compacted to 95% relative density or controlled low strength material (CLSM) Fill. No trench shall be left open after established working hours without approval of the Engineer.

N. Conduit locations on the plans are for reference only. Actual locations are to be determined by the Contractor as to the most economical location --either behind the curb or in front of the lip of the gutter--but in either case, the conduit must remain parallel to the back of curb or the edge of pavement between the lighting standards, and the location shall be approved by the Engineer. "As Built" marked prints showing installed locations shall be given to the Engineer by the Contractor.

O. All conduit that is terminated, stubbed and capped for future use shall be marked by a "+" a minimum of 3 inches high and directly above the conduit, cut into the face of the curb, wall, concrete paving, etc.

**623 G.03.07 FOUNDATIONS**

***DELETE PARAGRAPH “A” AND REPLACE WITH THE FOLLOWING:***

A. Foundations for traffic signal and lighting poles, and ground mounted traffic signal and CLV TELECOM cabinets, and service pedestals shall be concrete conforming to **Section 501, "Portland Cement Concrete."**

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

B. 3. Crash caps above foundations shall be sloped away from poles. All traffic signal poles shall be plumb AFTER the signal heads are in place. Any leveling shall be made before the grout cap is poured over the foundations.

C. 6. Foundations shall be excavated without disturbing surrounding material. All loose material shall be removed before concrete is placed into the opening. Foundations shall not be over-excavated.

***DELETE PARAGRAPH “G” AND REPLACE WITH THE FOLLOWING:***

G. Ground mounted traffic signal and CLV TELECOM cabinets shall have a 4-inch thick concrete slab installed in front of the cabinet.

***DELETE PARAGRAPH “G.1.” AND REPLACE WITH THE FOLLOWING:***

1. The concrete slab shall be as wide as the cabinet and a minimum of 4 feet in length from the cabinet base.

**623 G.03.08 WIRING AND CONDUIT**

***ADD THE FOLLOWING PARAGRAPHS TO “E” OF THIS SUBSECTION:***

1. Chair lugs shall be used for termination of solid conductors.
2. Solid conductors shall not be terminated with crimp-on connections.

***ADD THE FOLLOWING PARAGRAPH TO “P” OF THIS SUBSECTION:***

The minimum bend radius for all ITS communications conduit and CFO conduit shall be 3 ft.

***ADD THE FOLLOWING PARAGRAPH TO “R” OF THIS SUBSECTION:***

R. 6. CFO conduit installations shall enter in the side of P30 pull boxes and Type 200 vaults.

***DELETE PARAGRAPH “S.2” AND REPLACE WITH THE FOLLOWING:***

S. 2. ITS communications and CFO installations may be field modified only with the approval of and as directed by the Engineer.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

V. When new conduit is to be joined to existing conduit, the Contractor shall verify the integrity of the existing conduit and make necessary repairs. The Engineer shall approve any additional repair work prior to commencing.

**623 G.03.09 ELECTRICAL SERVICE**

***ADD THE FOLLOWING PARAGRAPHS TO “A” OF THIS SUBSECTION:***

Each service provided by the Contractor shall have a 200 amp rating for traffic signal system, streetlight circuits, or combined services.

Services shall be 200 amp pad mount (unless otherwise noted in the plans) and shall be equipped with one 60 amp single pole breaker for the traffic signal and controller cabinet, one 40 amp single pole breaker for the intersection streetlights, and one 20 AMP 2-pole (120/240 VAC) for the CLV TELECOM cabinet. In addition, other breakers as may be shown in the service panel schedule in the plans will be required.

The Contractor shall obtain all addresses for new services from the City of Las Vegas, Department of Planning and Development, 495 South Main Street, (702) 229-5408.

***ADD THE FOLLOWING PARAGRAPH TO “B” OF THIS SUBSECTION:***

It shall be the Contractor’s responsibility to coordinate all work associated with service point connections required by this contract with Nevada Energy.

**623 G.03.10 PULL BOXES**

***DELETE PARAGRAPH “D.2” AND REPLACE WITH THE FOLLOWING:***

D. 2. ITS communications and CFO pull boxes and vaults may be field modified only with the approval of and as directed by the Engineer. Prior to Engineer approval on modified conduit entrances (“knock-outs” and cuts), the Contractor shall provide a shop drawing showing the proposed modifications. Refer to Section 623G.02.02 K for additional provisions.

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

E. The interior of pull boxes shall be void of any other materials except conduit risers and necessary wiring. All excess materials shall be removed to promote drainage.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.13 SALVAGING ELECTRICAL EQUIPMENT**

1. Where shown on the plans or ordered by the Engineer, existing electrical equipment to be removed, including controller units, cabinets, signal heads, luminaires, standards, mast arms, ballasts, transformers, service equipment, pull boxes, and detector contact units shall be salvaged for reuse by the maintaining agency.
2. Care shall be exercised in removing and salvaging electrical equipment so that it will remain in its original form and existing condition whenever possible. Attention is directed to the provisions in subsection 107.11, “Responsibility for Damage Claims”, and 107.12 “Protection and Restoration of Property and Landscape”. The Contractor will be required to replace, at his expense, any of the above-mentioned electrical equipment, which, as determined by the Engineer, has been damaged or destroyed by reason of his operations.
3. Unless otherwise specified, underground conduit, conductors, foundations, and detector frames not reused shall become the property of the Contractor and shall be removed from the City right-of-way, except if not interfering with other construction, said materials, except foundations, may, with the written approval of the Engineer, be abandoned in place. Certain other materials, where shown on the plans, shall also become the property of the Contractor.
4. Unless otherwise specified, foundations to be abandoned shall have the top 18” below the crash cap removed and the resulting excavation backfilled. Attention is directed to the provisions in subsection 623 G.03.05, “Excavating and Backfilling”, regarding foundations to be abandoned.
5. Holes formed by removing pull boxes and foundations shall be filled with material equivalent to the surrounding material.
6. All street lighting and traffic signal equipment removed and / or designated to be salvaged shall be delivered by the Contractor to the appropriate CLV Service Yard with a means to unload. A 48-hour notice of delivery is required. Call (702) 229-6331 to set up delivery time. Repair of any damage to equipment during this process will be the contractor’s responsibility, at no additional cost to the City.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.14 REINSTALLING SALVAGED ELECTRICAL EQUIPMENT**

1. When salvaged electrical equipment is to be reinstalled, the Contractor shall furnish and install all necessary materials and equipment, including signal mounting brackets, anchor bolts, nuts, washers, and concrete as required to complete the new installation.
2. All traffic signal, flashing beacon, and lighting fixtures to be reinstalled shall be cleaned and relamped.
3. Existing materials required to be relocated and found to be unsatisfactory by the Engineer shall be replaced by new material and the cost therefore will be paid for as extra work as provided in subsection 104.03, “Extra Work”.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.15 STOCKPILING SALVAGED ELECTRICAL EQUIPMENT**

Existing equipment removed and not reused shall be salvaged, dismantled and returned to the maintaining agency during normal working hours. Call the maintaining agency to arrange for a time and location to stockpile the salvaged electrical equipment. An inventory of salvaged material shall accompany each delivery.

***ADD THE FOLLOWING SUBSECTION:***

**623 G.03.16 CFO COMMUNICATIONS INFRASTRUCTURE**

A. Communications infrastructure installed for the use of the CLV shall meet the following specifications:

1. The communications conduit shall run straight through the pull box, entering the side of the box near the bottom, to allow for a continuous fiber optic pull of no more than 6,000 feet.

2. The cover depth from the finish grade of all conduits shall be a minimum of 30 inches with allowances for conduit to rise near pull boxes for entry points. If conduit exists adjacent to the proposed conduit installation, the depth and location of the end of the new conduit shall be required to match the existing conduit.

3. The installation of a Type 200 Splice Vault as shown in the Uniform Standard Drawings with the letters "CITY FIBER OPTIC" inscribed on the lid shall be as shown on the Drawings.

4. All buried conduits shall have underground marking tape placed 12 inches above the installed conduit and marked with the letters "FIBER OPTIC." GPS coordinates shall be determined for all new and relocated CLV facilities that are connected via the underground conduit system and are visible at ground level as specified in **Subsection 623 G.01.05, "Global Positioning System (GPS) Coordinates**."

5. For roadway projects where the sidewalk, curb, and gutter are already installed and communications facilities are required, the appropriate size conduit may be installed at the lip of gutter as shown on the drawings or as approved by the Engineer.

6. Installation of fiber optic cable shall conform to **Section 680, "Fiber Optic Cable.**"

7. Conduit caps with J-hooks to support the CFO cable shall be installed for all spare conduit openings to prevent the entrance of debris into the conduit.

8. A #10 AWG THW Tracer Wire shall be installed in all CFO conduit runs (empty and with cables).

**TRAFFIC SECTION**

**623 T.02.01 TRAFFIC SIGNAL CONTROLLER CABINETS**

***ADD THE FOLLOWING TO PARAGRAPH “A” OF THIS SUBSECTION:***

Cabinets shall be NEMA TS2 Type 2 cabinets with 16 load bay positions and shall be a 64 detector channel R cabinet with rack mounted detection, unless designated otherwise in the plans. The cabinet shall be either model R-44 CAB, TS2-2, LAS VEGAS, 64CH DET, Part # M73650 from McCain, Inc.; model Mobotrex LAS VEGAS TS2-TYPE2 16 POS., 64 CH. DET, Drawing # TF4216TLV01 REV 3 from Sierra Transportation and Technologies; or model TS2-2 HW 16 Position Horizontal City of Las Vegas, Part # 34413G12-2-06 from Econolite Control Products, Inc. All cabinets shall be provided with a complete set of four bus interface units (BIU’s), cabinet power supply and SDLC cables to provide a fully functioning system. Power supplies shall be Reno A&E model CPS-TS2-LED, Peek model PS101, or Econolite PS-200. BIU’s shall be Reno A&E model 1240, Peek model Bus Interface Unit 82-1886-01, or Econolite part number 160-1018-501.

***DELETE PARAGRAPH “D” OF THIS SUBSECTION AND REPLACE WITH THE FOLLOWING:***

D. Unless otherwise specified, all cabinets shall consist of Federal Specification 595 polyurethane, industrial grade pure white powder paint with 1.7 mil thickness both inside and out or approved equal. Unpainted, polished aluminum cabinets are not acceptable.

***ADD THE FOLLOWING TO PARAGRAPH “E” OF THIS SUBSECTION:***

The lifting tabs shall be bolted in place.

***DELETE PARAGRAPH “F.3” AND REPLACE WITH THE FOLLOWING:***

There shall be 3 aluminum shelves provided with all cabinets.

***DELETE PARAGRAPH “J” AND REPLACE WITH THE FOLLOWING:***

Cabinets shall have 2 LED light fixtures mounted in the cabinet interior.

***DELETE PARAGRAPH “J.1” AND REPLACE WITH THE FOLLOWING:***

One LED light shall be mounted over the door, at a location least likely to be damaged, and shall be a minimum of 20 inches in length.

***DELETE PARAGRAPH “J.2” AND REPLACE WITH THE FOLLOWING:***

The second LED light fixture shall be a 15 watt fluorescent equivalent fixture and shall be attached to the bottom of the lowest shelf above the back-panel and field terminals.

***ADD THE FOLLOWING PARAGRAPH TO “L.3” OF THIS SUBSECTION:***

The AutoCAD format used shall be compatible with the current version of AutoCAD used by the city.

***DELETE PARAGRAPH “L.5.i ” AND REPLACE WITH THE FOLLOWING:***

Two dual-circuit, solid state, NEMA flashers having a flash rate of 50 to 60 flashes per minute (see NEMA TS-1, Section 8, “Solid State Flashers”) shall be installed.

***DELETE PARAGRAPH “L.5.i.1” AND REPLACE WITH THE FOLLOWING:***

The red position of the load switch bays shall be operated from the flasher contacts as follows:

Flasher 1, contact A - phases 1, 5, and OLA

Flasher 1, contact B - phases 2, 6, and OLC

Flasher 2, contact A – phases 3, 7 and OLB

Flasher 2, contact B – phases 4, 8 and OLD

***DELETE PARAGRAPH “L.5.j.4” AND SUBPARAGRAPHS.***

***DELETE PARAGRAPH “L.5.l.4.a”.***

***DELETE PARAGRAPH “L.5.l.6.d.3” AND REPLACE WITH THE FOLLOWING:***

The toggle switches shall place a call into the controller for the associated pedestrian or vehicular phase when placed in the down (Test) position. This position shall be a momentary position.

***ADD THE FOLLOWING PARAGRAPHS TO “L.5.l.6” OF THIS SUBSECTION:***

8) An external minimum recall (identified EMR) switch shall be provided on the interior of the cabinet door for troubleshooting purposes. It will be a single pole-single throw switch and will apply logic ground to the EMR input to the controller. An LED circuit will also be wired to indicate the switch is activated.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

M. All field cables and interconnect cable entering the traffic controller cabinet shall be permanently labeled in the cabinet with their location and destination point in the intersection (i.e. “NW Corner – XX-A Pole”). Interconnect cables shall be labeled with their direction of travel (i.e. “Interconnect – From South” or “Interconnect – To North”). Wherever possible, the phase shall be noted on the label (i.e. “NE Corner – XX-A Pole – phase 8”).

The wires shall be identified using 1-inch wide UV resistant marking tape and the tape manufacturers recommended permanent black ink marker. Once marked, a suitable diameter piece of clear heat shrink tubing shall be installed and shrunk to protect the marking tape. The tubing shall extend 1-inch past the extent of the label in each direction along the wire to prevent moisture and dirt penetration.

**623 T.02.02 TRAFFIC SIGNAL CONTROLLER CABINET EQUIPMENT**

***ADD THE FOLLOWING paragraph TO “c” of this subsection:***

1. When Audible Tactile Pedestrian Push Buttons (PPB) are specified, an Audible Tactile interface panel shall be provided and mounted on the middle left side wall above the loop detector terminal panel. Central Control Unit (CCU) and failsafe cables shall be provided, neatly installed and terminated per manufacturer instructions. A CCU shall be provided for all cabinets configured for Audible Tactile PPBs.

***delete paragraph “E” and subparagraphs and replace with the following:***

E. Loop Detection:

1. The cabinet shall be wired with rack-mounted loop detection units. There shall be enough capacity for 32-two (2) channel amplifiers (Total of 64 vehicle detector channels).
2. All detector rack slots must be clearly marked as to the appropriate phase to which it belongs.
3. The panel to be used for field input wiring (loop lead-ins) shall be installed on the lower left sidewall.
4. All cabinets shall be provided with a complete set of two (2) channel rack mount detectors to fully populate the rack detector assemblies. Two channel rack detector amplifiers shall be Eberle Design Inc., Model 622T, Reno A&E model C-1200-SS, or Oriux 222 GP8 with vehicle extend and delay capability. Bicycle detectors shall be Reno A&E Model C-1201-B or Global Traffic Technologies, LLC, Model Canoga 9004, or approved equivalent.

***Delete paragraph TO “F.1” and replace with the following:***

All cabinets shall be equipped with encoded Global Traffic Technologies (GTT) Opticom compatible Emergency Preemption.

***Delete paragraph TO “F.3” and replace with the following:***

Provide one 4 channel rack mounted phase selector card.

***Delete paragraph “F.4” AND SUBPARAGRAPHS and replace with the following:***

Cabinets shall be wired with an Opticom 768 Auxiliary Interface Panel and green-sense harness terminated on the field terminals.

***Delete paragraph “h.1” and replace with the following:***

Unless otherwise specified in the Contract Documents, all traffic control cabinets shall be supplied with a Malfunction Management Unit (MMU) with 16 channels.

***Delete paragraph “h.2” in its entirety***

***Delete paragraph “h.3” and replace with the following:***

Each MMU shall be furnished with the program card fully programmed for standard NEMA 8‑phase operation.

***Delete paragraph “h.6” in its entirety AND REPLACE WITH THE FOLLOWING:***

The wiring harness for the MMU shall have independent termination points.

***Delete paragraph “h.9” and replace with the following:***

Unused wires shall be terminated on a separate back panel terminal that is easily accessible from the front of the cabinet without removing other panels.

***Delete paragraph “i” and subparagraphs and replace with the following:***

I. All malfunction management units shall be NEMA standard, meeting all requirements of Section 6 of the latest edition of NEMA TS 2 and shall meet the following requirements:

* + - 1. Malfunction Management Units shall have 16 channels.
			2. Malfunction Management Units shall be capable of monitoring “Flashing Yellow Arrow” operations.
			3. Malfunction Management Units shall be model MMU-1600GE as manufactured by Reno A&E, or approved equal.
			4. Malfunction Management Units shall be wired per the “Interlock Diagram” shown below with the appropriate relays.
			5. Malfunction Management Units shall store all configuration settings, including communication parameters, on the program card such that swapping the card into a new monitor copies all programming, and no laptops or front panel data entry are required.

****

**INTERLOCK DIAGRAM**

**623 T.02.03 TRAFFIC SIGNAL CONTROLLERS**

***delete “B.3” of this subsection in its entirty.***

***delete “B.6.d” of this subsection and replace with the following:***

The contractor shall be responsible for configuring all electronic equipment to provide a fully functioning system which includes opticom, video and/or loop detection as applicable and pedestrian pushbutton configuration. The video detection equipment manufacturer shall provide a technical representative at the intersection during the turn-on and testing period if necessary. The contractor shall also furnish and install all Ethernet cables necessary to connect all IP capable electronic equipment to the IP switch in the cabinet.

***delete “c” and “d” of this subsection and replace with the following:***

C. Traffic signal controllers shall be **NAZTEC 980 ATC TS2 Type 2 NTCIP Compliant Signal Controller**.

1. *Note to spec writer: for city capital projects, the city will provide the controller, except on Federal projects.*

The Contractor shall supply the controller to the City of Las Vegas Traffic Engineering Field Operations (TEFO), fourteen days prior to signal turn-on, for testing. The Contractor shall deliver the controller to 3001 Ronemus Drive. Contractor shall notify TEFO (702-229-6331) seven days prior to installation.

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

***add the following to “A.1”:***

The term “loop leads” and “home runs” refers to two (2) conductors from the loop detector in the roadway to pull box. The term “loop lead in” refers to the conductors from the conductors from the pull box to the traffic signal controller cabinet.

***delete “A.4” and “A.5” of this subsection and Replace with the following:***

A. 4. Loop leads shall be properly marked in the pull box and the cabinet as to the location and which vehicular phase of the traffic signal is associated with that loop as well as a lettered designation corresponding to the designation shown on the contract drawings. For example, a loop lead for the eastbound thru movement might be labeled as either 4B, 4C, 4D, or 4E. The contractor shall contact TEFO to verify the loop numbering and labeling designations to be used before installing the loops.

A. 5. A minimum of 5 feet of loop wire and 5 feet of loop lead-in shall be provided and stored in the pull box for slack.

***delete “A.7” of this subsection in its entirety.***

***Add the following paragraph to “B.7.” of This subsection:***

B. 7. Preformed loops shall by one of the following manufacturers:

* + - * 1. Reno A & E,

 Type PLB for mill/overlay or cutting into existing pavement

Type PLH for full depth replacement

1. Approved equal.

***Add the following paragraph to “B” of This subsection:***

*[Note to spec. writer: There are two loop detector installation methods provided below for full depth pavement construction. Check with Traffic Engineering for the appropriate method to use for each project. The one not used should be removed.]*

8. *(This installation should be used when pavement is to be milled/overlay or as an alternative installation method for full-depth pavement replacement)*

[When constructing new asphalt concrete pavement] [For milling and overlay pavement operations], preformed loops shall be installed prior to the final lift of pavement in saw cut loop slots made in the dense grade pavement (i.e. prior to the final lift of dense grade asphalt concrete, open grade, or U.T.A.C.S. pavement). There shall be a minimum cover of two inches measured from the bottom of the final finish grade pavement surface to the top of the preformed loop.

When installing loops in existing asphalt concrete or portland cement concrete pavements not being milled or replaced, saw cut slots in the pavement shall be a minimum of three inches in depth and there shall be a minimum cover of two inches measured from the finish grade pavement surface to the top of the preformed loop.

When constructing new portland cement concrete pavement, preformed loops shall be installed prior to placement of the pavement at the interface between the concrete pavement and base course material.

Sawed slots shall be spaced a minimum of six inches (150 millimeters) apart and shall be blown clean of all loose material and dried prior to the installation of the preformed loop. The preformed loop shall be carefully placed into the saw slot using special tools to avoid inflicting damage to the preformed loop assembly. When more than one loop terminates in a pull box, each loop shall have a separate sawed slot for its leads and leads shall be properly marked as specified below. Loop slots shall be sealed prior to paving. Polymeric sand may be used in lieu of sealant with the approval of the Engineer. The saw cuts shall be blown clean after wire installation and before placement of sealant. The loop lead‑in cable shall be as specified below. Each loop system (i.e. advanced detection, left turn movements, thru movements, and right turn movements) shall have at least one separate lead-in to the controller cabinet.

Loop leads shall be properly marked in the pull box and the cabinet as to the location and which vehicular phase of the traffic signal is associated with that loop as well as a lettered designation corresponding to the designation shown on the contract drawings. For example, a loop lead for the eastbound thru movement might be labeled as 4B, 4C, 4D, or 4E. A minimum of five (5) feet of loop wire and five (5) feet of loop lead-in shall be provided and stored in the pull box for slack. All loop wire home run to pull box shall clearly identify the direction of the cables windings for ease of installation.

Loop wire installation shall be tested using a megohmeter both prior to the placement of loop wire sealant, as well as after installation, in the presence of a City representative. Insulation resistance readings shall not be less than 100 megohms at 1000 volts.

***delete “C” of this subsection and Replace with the following:***

C. Cable-in-Duct System.

1. The loop system shall be wired with a cable-in-duct assembly, defined as No. 14 AWG minimum, meeting IMSA Specification No. 51-5 as indicated in the Standard Drawings, directly installed in sawcut slots.

2. When constructing new asphalt concrete pavement, loop wires shall be installed prior to the final lift of pavement in saw cut loop slots made in the dense grade pavement (i.e. prior to the final lift of A.C.). There shall be a minimum cover of two inches measured from the bottom of the final asphalt concrete surface to the top of the loop.

3. When installing loops in existing asphalt concrete or Portland Cement concrete pavements not being milled or replaced, or in new Portland Cement concrete pavement, saw cut slots in the pavement shall be a minimum of three inches in depth and there shall be a minimum cover of two inches measured from the finish grade pavement surface to the top of the loop.

4. The loop or loops shall be installed in the saw cut slots in the pavement and shall be oriented and color-coded or taped in accordance with the Standard Drawings and plans. Sawed slots shall be blown clean of all loose material and dried. Loop wire shall be carefully placed into slot, avoiding damage to the wire insulation. When more than one loop terminates in a pull box, a maximum of two loop home runs shall be installed per single slot and leads shall be properly marked as specified below. Loop home runs assigned to different signal phases shall not share the same slot with loop home runs for another phase.

5. Sawed slots shall be spaced a minimum of six (6) inches (150 millimeters) apart.

6. Loops slots shall be sealed with detector sealant flush with pavement surface.

7. Each loop system shall have a separate lead-in to the controller cabinet.

8. All loops shall be megohmeter tested.

***ADD THE FOLLOWING PARAGRAPHS TO “F” of this subsection:***

Multiple Conductor Loop Lead-In Cable for connection of Multiple Loop Systems:

When multiple conductor loop lead-in cable is specified on the contract drawings, use cable that conforms to the following specifications to connect multiple loop systems to the terminal blocks in the controller cabinet:

* 1. NEC / (UL) Specification TC or CM, certified for use in underground conduit or as an aerial cable supported by a messenger
	2. 18 AWG stranded tinned copper conductors, polypropylene or polyethylene insulation. Six twisted pairs with insulation colors that match table below
	3. Each twisted pair individually shielded with an aluminum foil shield that provides 100% coverage and a 20 AWG tinned copper drain wire
	4. Outer jacket of polyvinyl chloride (PVC) or polyethylene (PE), cable rated for 300 volts minimum

**6-Pair Loop Lead-in Cable Assignments**

|  |  |  |
| --- | --- | --- |
| **Pair Number** | **Color** | **Phase Letter Designation** |
| 1 | Black & Red | A |
| 2 | Black & White | B |
| 3 | Black & Green | C |
| 4 | Black & Blue | D |
| 5 | Black & Yellow | E |
| 6 | Black & Brown | F |

***Replace EACH OF THE FOLLOWING SENTENCES OF “h” OF THIS SUBSECTION with the following:***

2. All detectors shall be of the rack-mounted type.

* + - 1. There shall be 2 channels per each loop detector.

***Add the following PARAGRAPH to “h” of this subsection:***

* + - 1. Turning off a loop amplifier shall not place a call.

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

***Add the following PARAGRAPH to this subsection:***

**Optical Preemption units shall be Global Traffic Technologies (GTT)** (encoding capable), using a Model 764 phase selector installed in a Model 760 card rack with a Model 768 Auxiliary Interface Panel mounted in the cabinet and fully wired for green sense capabilities. Optical sensors shall be Model 721 and will be interfaced to the traffic signal controller cabinet using an M-138 cable. **No other optical preemption units will be accepted**. This is necessary to facilitate area-wide vehicle encoding.

**623 T.02.06 TRAFFIC SIGNAL VIDEO IMAGE DETECTION SYSTEMS**

*[Note to spec. writer: Agency Specified- many intersections may use loop detection in lieu of video so each set of SP’s must account for the type of detection specified]*

***ADD THE FOLLOWING TO THIS SUBSECTION:***

1. All cabinets shall be wired for a Video Detection System with appropriate cameras (minimum one per vehicular direction) and cables mounted according to the manufactures specifications for each direction of vehicular travel. The following requirements must be met by the supplier of the equipment:
	1. Video detection systems shall be TS2 compatible and shall input detector calls to the controller through an SDLC cable. A TS2 SDLC cable shall be provided with each video system.
	2. All vehicle detection shall be by video image detection**.** System shall be mounted in the cabinet and shall be either Iteris EdgeConnect module with Edge2 TS2-IM module and Edge2 single input video processors, or Peek VideoTrak-IQ with ethernet port and SDLC, or Econolite Autoscope Vision system with Comm Manager and Mini Detection Programming Kit or latest versions of these devices.The Video Detection System shall be an above ground vehicle detection system that utilizes machine vision when interfaced with standard color CCD cameras to provide complete intersection and roadway detection
	3. A single NEMA certified chassis shall be supplied for each Video Image Detection System. All interface equipment including video monitor, interface panels, connectors, and cabling shall be provided and wired in the controller cabinet to accommodate a the number of cameras shown on the Contract Drawings. If a mouse or programming keypad is required to program the system, then a mouse or keypad shall be provided with each system.
	4. Each Video Detection System will include a minimum of 4 standard color cameras, or as shown on the Contract Drawings. All cameras shall be equipped with adjustable lenses, allowing the user to modify the apparent size of the lens angle. These are also referred to as “zoom lenses”. Each direction/camera shall have a minimum of 16 detector outputs to the controller, and include heater, sunshield and mounting brackets. Each camera will have power and video directly from the cabinet. Coaxial cable will be type 8281 (solid center conductor). Camera connections that use a prefabricated cable integrating power and coaxial cable into a single weatherproof connector are acceptable. An in-line filter (CX06-BNCY or equivalent) will be provided for each camera coaxial cable input. The in-line filters will be mounted on a panel (panel to be attached to the inner side wall of the cabinet). “BNC” connectors are the only acceptable termination of coaxial cables. Cameras shall be mounted per the manufacturer’s recommendations and per the CLV Traffic Engineer approval. Cameras shall be mounted using a 72” extension bracket on signal mast arms. Cameras should be centered over the lane line between the left turn lane and the through lane for the approach being detected, unless otherwise directed by Traffic Engineering Field Operations. The contractor should contact the city Traffic Signal Supervisor prior to mounting cameras for approval of the mounting locations.
	5. All delay and extension functions for an approach must be performed within the video unit.
	6. The units must be capable of simultaneously detecting all vehicles 300 feet from the stop bars on every approach.
	7. The Video Image Detection System shall have an internet protocol (IP) port for remote access capability to transmit video and detector information to a computer. The Video Image Detection System shall have the capability to remotely reconfigure detection zones and transmit video via phone line, twisted pair, coaxial cable and fiber optic interconnect, using central software that is capable of managing multiple IP addresses
	8. The Contractor shall provide a fully functioning and programmed system complete with latest version of manufacturer’s software. All software and hardware for installation, operation and maintenance will be supplied to the City along with necessary technical support upon setup, if needed.

* 1. The Video Detection System shall utilize standard 24-volt logic signal outputs to interface with NEMA TS1/TS2, 170/179, 2070, or other future ATC controllers.
	2. The Video Image Detection System must provide logic ground to all detector outputs that shall be active during programming of detection zone layouts.
	3. All of the system’s micro-processing functions must be performed in the video unit, which must be located within the controller cabinet.
	4. All equipment schematics and technical material must accompany any equipment supplied to the City of Las Vegas Traffic Electrical Field Operations, upon turn-on of the signal.

**623 T.02.08 VEHICLE SIGNAL FACES**

***Add the following PARAGRAPH to “a” of this subsection:***

5. Vehicle signal faces shall be ETL compliant. The ETL Listed Mark indicates that the manufacturer’s production site conforms to a range of compliance measures and is subject to periodic follow-up inspections to verify continued conformance, and the product meets the minimum requirements of widely accepted product safety standards as determined through independent testing of a Nationally Recognized Testing Laboratory.

**623 T.02.10 PEDESTRIAN SIGNAL FACES**

***Add the following PARAGRAPH to “a.1” of this subsection:***

All pedestrian signal faces shall provide “Walking Person”, “Hand”, and “Countdown” messages as provided by **Duralight model #JXM-400-VIEIL** or **Dialight model #430-6479-001X** or approved equal (must be ETL compliant for consideration).

**623 T.02.11 PEDESTRIAN PUSH BUTTONS:**

***delete this subsection in its entirEty and replace with the following:***

1. Mounting height of pedestrian push buttons shall be 42” above the sidewalk. The unobstructed reach distance to the pedestrian push button shall meet current PROWAG guidelines. Use of extension brackets or similar hardware will not be allowed to meet PROWAG guidelines.
2. All pedestrian push buttons **shall be Polara iNavigator 2-Wire Pedestrian Pushbutton System with iN2 Push Button Stations and Shelf-Mount BIU control unit with SDLC Cable** Audible-Tactile Pedestrian Push Button type, or approved equivalent, in accordance with the request from the Nevada Bureau of Services to the Blind and Visually Impaired. Equivalent systems shall conform to the audible-tactile pedestrian system specifications below.
3. **AUDIBLE-TACTILE PEDESTRIAN SYSTEM SPECIFICATIONS**
4. **GENERAL DESCRIPTION**
	1. The Audible-Tactile pedestrian system shall consist of all electronic equipment, mounting hardware, power supplies, push buttons, and sign faces, which are designed to provide both a raised vibrating tactile arrow along with a variety of audible sounds for different traffic signal functions. The system shall consist of a Control Unit and Pole Mounting Assembly, as described below. Additionally, documentation shall include shop drawings for all equipment, electronic schematics, required voice setup software/ hardware, and installation/operations manuals.
5. **FUNCTIONAL REQUIREMENTS**
	1. The system shall vibrate the tactile arrow during every time the WALK interval indication is displayed.
	2. The system shall have the field-selectable function known as “Locating Beep.” This means that during the Flashing DONT WALK and the DONT WALK intervals, the system shall provide a steady, non changing, (constant dB level) pole locating tone that emanates directly in the vicinity of the Pedestrian Push Button.
	3. The system shall have the field-selectable function known as “Extended Push Activation.” This means that the audible WALK message will only be activated and sound during the WALK interval if the button is depressed for a minimum of three (3) seconds. This audible WALK message shall be able to be field set to allow for automatically adjusting to ambient noise levels via control circuitry.
	4. The system shall have the function referred to as “Voice Location Message.” This means that the location of the street to cross, and the intersection will be vocalized only when the button is depressed for a minimum of three (3) seconds. This shall be a field-settable option, and the volume shall be automatically adjusted to ambient noise levels
	5. The audible messages must be easily programmable by City staff, with the needed hardware and software to be supplied by the system’s vendor.
	6. Automatic volume adjustments for ambient noise shall be field selectable.
6. **CONTROL UNIT**

GENERAL DESCRIPTION

The equipment needed for the Control Unit must be able to be mounted in the Pedestrian Head Housing on the Traffic Signal Pole. It shall be powered from the 120 VAC, WALK/DONT WALK lamp indications in the housing. The unit shall conform to the following specifications.

1. POWER REQUIREMENTS: 115 VAC, 60Hz, (100 ma, typical)
2. Separate power inputs for “WALK” and “DONT WALK”, two ¼ AMP fuses mounted on the board
3. POWER SUPPLIED TO VIBRATOR: 12 VAC, .3A Typical, to operate during WALK interval only
4. AUDIO AMPLIFIER POWER OUTPUT: 10 W RMS into 8 ohms
5. VOLUME CONTROL: On board trimming potentiometer for overall adjustment
6. VOLUME CONTROL AUTOMATIC ADJUSTMENT RANGE: 28 Db
7. MICRPHONE FOR AMBIENT NOISE: Mounts in Pedestrian head housing. Frequency range: 170 Hz to 2.3 Khz
8. PED PUSH BUTTON INTERFACE: Accepts 12 to 24 Volts AC/DC imposed by connection to push button which will be terminated in an existing traffic signal controller cabinet
9. JUMPER SELECTABLE OPTIONS:
	1. Chirp
	2. Cuckoo
	3. Walk Message
	4. Location Message if Available
	5. Extended Push Button Triggering
	6. Locating Tone
10. MOUNTING: Mounts inside the pedestrian head housing using existing threaded holes in the rear wall on 9 ¼” centers. Designed to clear reflector in standard housing of dual incandescent pedestrian head. Not for use within the older, neon/transformer assemblies. The assembly shall accommodate a standard 9” X 12” pedestrian sign.
11. AUDIBLE LOCATING TONE: 880 Hz plus harmonics, 0.1 second duration, 1 second interval. Operates during flashing DONT WALK and solid DONT WALK indications, only
12. **POLE MOUNTING ASSEMBLY**

GENERAL DESCRIPTION:This equipment is the part that will be visible to the pedestrians. It is commonly referred to as the “Pedestrian Push Button Assembly.” This shall contain the 2” ADA-compliant Pedestrian Push Button, the directional tactile arrow, the weatherproof speaker, and the appropriate informational sign for each location.

* + 1. VIBRATOR POWER: 12 VAC, .3 A Typical
		2. SPEAKER: 8 Ohms, 15 Watt maximum, weather-proof
		3. PUSH BUTTON: Mounting height of the pedestrian push button shall be 42-inches above the sidewalk
1. **MESSAGE MARKING**

The Message Sign shall be an R10-3E sign, 9”x12” (size modified), per MUTCD 2009 edition, and shall be porcelain enameled metal.

**623 T.02.12 FLASHERS**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. **PEDESTRIAN-ACTIVATED, AC-POWERED, HARD-WIRED RECTANGULAR RAPID FLASHING BEACON (RRFB)**

Each system shall consist of an electronic control module, a wireless communication system to synchronize the flash for multiple system units, Light Emitting Diode (LED) indication light bar signals (uni-directional configuration) and housings, and pedestrian push button assemblies and controls. A single unit shall include one beacon and include side-emitting pedestrian confirmation lights. The number and configuration of Flashing Beacon units for each Pedestrian Crosswalk shall be indicated on the contract drawings.

The system shall be manufactured by RTC Manufacturing, Inc., Elteccorp, or TAPCO Inc. The systems shall be capable of fully functioning with wired connections between the cabinet and the pedestrian pushbuttons, and with wired connections between the cabinet and the RRFB modules, without wireless communications between devices.

Other manufacturer units may be acceptable to the City of Las Vegas that comply with the requirements of the MUTCD, latest edition, FHWA Interim Approval 21 (IA-21), and meet or exceed the following specifications:

1. **LED MODULE**
2. Each RRFB shall consist of two rectangular-shaped yellow indications, each with an LED-array based light source. Each RRFB indication shall be a minimum of approximately 7-inches wide by approximately 3-inches high.
3. LEDs shall be color emitted
4. Lens may be same color or clear
5. LED power peak consumption to be 6 watts
6. **ELECTRONIC MODULE**
7. Electronics to be housed in a weatherproof metal casing with theft resistant locking hardware
8. Flash pattern and rate shall have multiple patterns with one pattern and rate to meet MUTCD, latest edition, Section 4k.01
9. System shall include energy management systems to continuously monitor battery and solar intensity and shall have the ability to increase brightness in sunny conditions and increase longevity in overcast or night time conditions
10. System to continue to operate for a minimum of 30 days, without solar recharging with a set flash rate meeting the MUTCD specified flash pattern
11. **FLASHER UNIT**
12. Flasher unit to be integrated with no external connected parts
13. Flasher housing to be yellow in color, or as specified in the Contract Drawings
14. Flasher unit shall be powder coated cast aluminum
15. Complete flasher unit weight shall not exceed 60 lbs., including batteries
16. Flasher units shall have detachable metal backplates which shall be flat black in color
17. Flasher units shall have metal tunnel visors which shall be flat black in interior color
18. Flasher units shall be equipped with hardware and be capable of mounting to the top of a Clark County Area Standard 1-A pole with 4.5” O.D. post top collar, or to the side of a Clark County Area Standard streetlight pole, traffic signal pole, or a traffic signal mast arm.
19. Flasher unit shall follow the provisions of FHWA IA-21.
20. **ACTIVATION AND OPERATION**
21. Each flashing beacon unit or units of a system shall be capable of being activated by a pedestrian push button, and shall operate for a set flash duration upon activation. System shall reset flash duration upon activations that occur mid-cycle. The flash duration shall be user configurable in the field from 5-60 seconds, in increments of 5 seconds or less.
22. System coordination must be repeatable upon testing for at least 50 activations. Both sides must be activated, flash, and stop flashing at the same time consistently.
23. System must be able to power and be activated by a compatible pedestrian pushbutton. The button shall be capable of providing an audible tone and/or beep and a visible momentary or latched LED light to notify the user the switch was activated. The pedestrian pushbutton shall be vandal resistant.
24. Each crossing system(s) shall operate and function as a whole, one system can include as many as, but not limited to, 4 pushbuttons, and 6 flashing beacons. When a two stage crossing is noted, the system shall be capable of programming each side to function independently.
25. **ENVIRONMENTAL SPECIFICATIONS**
26. The system shall be able to withstand and operate at a temperature extremes of 10 deg F to 165 deg F
27. The system shall be designed and constructed to withstand wind loads in conformance with the requirements of the AASHTO publication, “Standard Specifications for Structural Supports of Highway Signs, Luminaries and Traffic Signals”, 4th Edition, with latest interims
28. The electronic circuit board housing, wire harnessing and connectors shall be designed in accordance to IEC International Standard 60529, Ingress Protection IP67 requiring that the enclosure be dust tight and remain completely sealed when immersed in water to a depth of 1 meter for 1 hour
29. The LED Module shall meet the following environmental tests as specified in the ITE Vehicle Traffic Control Signal Heads, Light Emitting Diode (LED) Circular Signal Supplement:
30. Mechanical vibration: MIL-STD-883
31. Temperature cycling: MIL-STD-883
32. Moisture resistance: MIL-STD-810F
33. **WARRANTY**
34. The manufacturer shall guarantee the system, including LED modules and all components, for a minimum of three years.
35. Warranty shall include all parts of the unit including batteries.

**623 T.02.13 TRAFFIC SIGNAL POLES:**

***DELETE PARAGRAPH “A” IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. All traffic signal poles shall consist of continuous, tapered round steel pole shaft of the length specified, pole cap, anchor bolt cover, and hand hole covers(s), with the bolts, nuts, and washers necessary to complete the installation of the pole shaft. Multi-sided steel traffic signal poles are not accepted.

***delete paragraph “b” in its entirety and Replace with the following:***

1. The traffic signal and luminaire mast arms shall consist of continuous, tapered round steel tubes of the length specified, mast-arm end caps and bolts, nuts, and washers necessary to complete the installation of the mast arms. Multi-sided steel traffic signal and luminaire mast arms are not accepted.

***DELETE PARAGRAPH “K” IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. The pole shafts shall be of round cross section, with a minimum outer diameter at the base as shown in the Uniform Standard Drawings for the type of pole specified, and shall uniformly decrease in diameter at the rate of 0.14 inches per foot of length.
2. Pole shafts shall be straight, with a permissive variation not to exceed ¼ inch for each 10 feet of pole shaft.
	1. A 30-foot pole would have ¾ inch allowable deviation at the midpoint of the pole shaft.
	2. A 20-foot shaft would have a ½ inch allowable deviation.
	3. A 10-foot shaft could deviate a maximum of ¼ inch at the midpoint.

***ADD THE FOLLOWING PARAGRAPHS TO THIS SUBSECTION:***

W. Tenons

1. The mast arm is to be fabricated with end tenon only. The end tenon shall be factory installed and the remaining tenons shall be fabricated in the field at the locations shown on the plans or as directed by the Traffic Engineer and/or his authorized representative.
2. For tenon fabrication details see Clark County Area Uniform Standard Drawing No. 808 and No. 810.

X. Welds

1. All welding shall conform to AWS D 2.0, “Specification for Welded Highway and Railway Bridges”, and to any additional requirements in this subsection.
2. All exposed welds, shall be painted as provided for repairing damaged galvanized surfaces.
3. All welders must be certified by the American Welding Society (AWS) or similar organization in the welding of steel and galvanized steel.
4. All exposed weld joints shall be treated with rust inhibitors (i.e. Chemtrek or equivalent) and shall be painted as provided for repairing damaged galvanized surfaces.

Y. Pole Repairs

1. Holes, larger than one inch in diameter, left in the shafts or mast arms of existing standards, due to removal of equipment, shall be repaired by welding in a suitable disk, grinding smooth, and painting as provided for repairing damaged galvanized surfaces. Welding shall be done only after all combustible materials, cables and conductors have been removed.
2. Holes, one inch in diameter or less, left in the shafts or mast arms of existing standards, due to removal of equipment, may be repaired by threading the standard and inserting a threaded zinc die cast knockout plug of the appropriate size.

**623 T.02.16 INTERNALLY ILLUMINATED STREET NAME SIGNS**

***REPLACE SENTENCES 3 THROUGH 9 OF paragraph “C” WITH THE FOLLOWING:***

1. Sign lettering shall be as shown on the contract plans and shall conform to the 2009 edition of the M.U.T.C.D.
2. 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).
3. The street name suffix (Street, Way, Blvd., and so forth) shall be displayed in the upper right corner of the sign panel.
4. The street address number of the location shall be shown at the lower right corner in 5‑inch upper case letters and numerals.
5. Engineer approval is required for the sign faces prior to fabrication.

***Add the following PARAGRAPHS TO this subsection:***

1. Internally Illuminated street name signs shall be wired to the luminaries 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.
2. Internally Illuminated street name signs shall be LED and shall be one of the following products, or approved equal:

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

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

**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"**

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

**623 T.02.19 LUMINAIRE ON SIGNAL POLES**

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for luminaires on signal poles for updated LED standards. Please refer to most recent approved fixture per CLV website, under building and safety form, prior to specifying fixture. Specific luminaire callouts shall be shown on the plans and not on the specs.*

1. Each luminaire shall have an individual 1000 Watt photoelectric control. Time delay photoelectric controls are not authorized. The standard luminaire shall be the L.E.D. type, and of style, colortemp, and amperage as shown on the Contract Drawings.
2. Special lighting requirements

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for luminaires on signal poles for updated LED standards. If approved fixture is not on CLV website, contact TED.*

1. Summerlin area
	1. The luminaire mast arms shall be 3” wide by 5” high rectangular steel tubing with an arm span of 15’.

**CONSTRUCTION**

**623 T.03.01 PAINTING**

***ADD THE FOLLOWING SUBSECTION TO THIS SECTION:***

1. Special City of Las Vegas Areas
2. Unless otherwise specified, traffic signal system equipment located within the “special areas” noted below shall be finished with the color as indicated:
	1. Downtown Centennial Plan area: **RAL 6012 “Black Green”.**
	2. Summerlin: **RAL 3012, Beige-Red (“Summerlin Hummingbird Brown”).**
3. The following signal system components located in the special areas noted above shall be painted accordingly:
4. Traffic signal pole
5. Traffic signal mast arm
6. Traffic signal tenons
7. Traffic luminaire arm
8. Traffic signal luminaire head (reference Subsection 623 T.02.19 LUMINAIRE ON SIGNAL POLES of these special provisions)
9. Traffic signal poles, mast arms, luminaire arms and other elements specified to be painted shall be factory finished with a high-build, acrylic polyurethane enamel. Alternatively, a polyester TGIC or urethane polyester powder coat finish may be used. Equipment to be painted/coated shall be prepared and painted per manufacturer’s specifications.
10. The traffic signal mast arm shall be delivered with no tenons mounted to the mast arm, except for the end tenon. After the traffic signal pole foundation is constructed, the tenons shall be fabricated in the field at the locations shown on the plans or as directed by the Traffic Engineer. All welding shall conform to 623 T.02.13 of the CCAUSS and these Special Provisions. After installation of the tenons, the mast arm shall be shop painted and finished to match the traffic signal pole. No brushes or rollers shall be used to apply primers or paint except as approved by the Engineer.

**STREET LIGHTING SECTION**

**623 L.02.03 STREET LIGHTING LUMINAIRES**

*NOTE TO SPEC WRITER: TEFO is revising the special provisions for street lighting for updated LED standards. Please refer to most recent approved fixture per CLV website, under building and safety form, prior to specifying fixture. Specific luminaire callouts shall be shown on the plans and not on the specs.*

***DELETE THIS SECTION IN ITS ENTIRETY AND REPLACE WITH THE FOLLOWING:***

1. The standard luminaire shall be as specified in the Contract Drawings.

**CONSTRUCTION**

**623 L.03.01 PAINTING AND FINISH REPAIR**

***ADD THE FOLLOWING SUBSECTIONS TO THIS SECTION:***

1. Holes, larger than one inch in diameter, left in the shafts or mast arms of existing standards, due to removal of equipment, shall be repaired by welding in a suitable disk, grinding smooth, and painting as provided for repairing damaged galvanized surfaces. Welding shall be done only after all combustible materials, cables and conductors have been removed.
2. Holes, one inch in diameter or less, left in the shafts or mast arms of existing standards, due to removal of equipment, may be repaired by threading the standard and inserting a threaded zinc die cast knockout plug of the appropriate size.

**623 L.03.03 ELECTRICAL TESTING**

***ADD THE FOLLOWING PARAGRAPH TO THIS SUBSECTION:***

1. The Contractor shall be required to submit record drawings prior to any inspections being performed. He and/or his representative shall be present at the project location during the maintaining agency’s inspection of the streetlight installation.

**METHOD OF MEASUREMENT**

**623.04.01 MEASUREMENT**

*Note to Spec Writer: This section shall be customized for each project to ensure that the basis of measurement for each bid item is properly described.*

The quantity of Pedestrian Pushbutton will be measured per each, in place and operational, as shown on the contract drawings and as directed by the Engineer.

The quantity of XX-INCH PVC CONDUIT will be measured per linear foot, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TRAFFIC SIGNAL ASSEMBLY (LOCATION) will be measured per lump sum, as shown on the traffic signal plan sheets and details by location, and as directed by the Engineer.

The quantity of (TYPE) PULL BOX WITH NON-CONDUCTIVE LID will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

*[Note to spec. writer and consultant: verify that items on traffic signal sheets are specific to the traffic signal lump sum. Items not paid for under traffic signal lump sum must be shaded back on TS sheets.*

The quantity of INSTALL X GAUGE STREET LIGHT POLE ASSEMBLY, X FOOT ARM, XX LUMEN LED LUMINAIRE and FOUNDATION will be measured per each, in place and operational, as shown on the contract drawings and as directed by the Engineer.

The quantity of XX-INCH CONDUIT (CFO) will be measured per linear foot as follows, in place and operational, as shown on the contract drawings and as directed by the engineer:

(A) From center to center of pull boxes.

(B) From edge of foundation to center of pull box.

(C) From edge to edge of foundation.

(D) From end of conduit to center of pull box or foundation.

(E) From end to end of conduit when no pull boxes are used.

The quantity of TELECOM CABINET (POLE MOUNTED) will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TELECOM CABINET (GROUND MOUNTED) will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of TYPE 200 SPLICE VAULT will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

The quantity of P30 PULL BOX will be measured per each, in place and operational, as shown on the contract drawings and as directed by the engineer.

**BASIS OF PAYMENT**

**623.05.01 PAYMENT**

*This section shall be customized for each project to ensure that the basis of payment for each bid item is properly identified. The following are typical items and payment units:*

NOTE TO SPEC WRITER: if we are providing equipment (poles, mast arms, other long lead items, etc.) the contractor will need to pay the taxes. This will apply if we are not having the contractor replacing the inventory.

The following language is from the Ogden project:

The accepted quantity for TAXES FOR OWNER SUPPLIED ITEMS will be paid for at the contract unit price per lump sum and shall be full compensation for the actual costs of taxes as listed on the Bid Schedule. No Contractor profit or markup are permitted on TAXES FOR OWNER SUPPLIED ITEMS. The Contractor shall include this item on the second pay estimate and shall provide proof of payment of the taxes to the Department of Taxation to the ENGINEER with the pay estimate.

For estimating purposes get the pricing from TEFO and multiply by current sales tax rate (.0875)

Consider specifically listing the items this will apply to (see Ogden project for a great example)

The accepted quantity of Pedestrian Pushbutton will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to shipping and delivering costs, tools and required hardware for mounting, fittings, connections, equipment, making all required tests, and all other incidentals required to make the “Pedestrian Pushbutton” operational, and to function as intended as specified and shown in the contract drawings, the Clark County Area Uniform Standard Specifications, and these Supplemental Project Special Provisions.

The accepted quantity of XX-INCH PVC CONDUIT will be paid for at the contract unit price per linear foot and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, excavation, trenching, saw cutting, bedding, compacted backfill, concrete encasement, aggregate base, connections to existing conduit, pull boxes and vaults, temporary and permanent pavement patching, sidewalk and curb and gutter replacement, conduit, pull strings, tracer wire, fittings, bends, stub outs, pole risers, making all required tests and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of (TYPE) PULL BOX WITH NON-CONDUCTIVE LID will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, pull boxes, foundations, concrete collars, frames, lids, excavation, bedding, backfill and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of INSTALL X GAUGE STREET LIGHT POLE ASSEMBLY, X FOOT ARM, XX LUMEN LED LUMINAIRE and FOUNDATION will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to transportation, shipping and delivering costs, installation, tools and required hardware for mounting, crash cap, concrete and foundation, excavation (including hand digging foundations in areas of potential utility conflicts), all wiring above ground from the hand hole of the pole to the luminaires and receptacles, fittings, connections, equipment, all required tests, and all other incidentals required to make the streetlight operational, and to function as intended as specified and shown in the contract drawings, the Clark County Area Uniform Standard Specifications, and these Supplemental Special Provisions.

The quantity of TRAFFIC SIGNAL ASSEMBLY (LOCATION) will be paid for at the contract unit price per lump sum. The contract unit price for Traffic Signal Installation shall include full compensation for furnishing and installing all materials including, but not limited to, removal of foundations to a minimum 24” below proposed finished surface, saw cutting, excavation (including hand digging foundations in areas of potential utility conflicts), backfill, foundations new poles, new mast arms, new luminaires, wiring, mountings, pull boxes, new signal heads, new controllers, new cabinets, cabinet foundations traffic signal conduit, conductors, 6 Pair Loop Lead In Cables from the controller through new and existing conduit to new loop pull boxes, conductors between the service panel and the nearest pull box, time clock, loop amplifiers for bike loops and standard loops, breakers new internally illuminated street signs, loop detection system, video image detection, opticom systems, new mast arm mounted signs, and priming and painting of items detailed in Subsection 623 T.02.01 CABINET ENCLOSURES and 623 T.02.09 STANDARDS, STEEL PEDESTALS AND POSTS. the lump sum price paid for Traffic Signal Installation also includes the removal and salvage of existing poles, foundations, cabinets, pull boxes, vaults and other traffic signal equipment required for a complete and operational system as shown on the project Plans and in the Specifications and these Special Provisions.

The accepted quantity of TELECOM CABINET (POLE MOUNTED) will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, mounting, mounting hardware, fans, power receptacles, conduit, racks, connections, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TELECOM CABINET (GROUND MOUNTED) will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, foundations, mounting, mounting hardware, fans, power receptacles, conduit, racks, connections, and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

The accepted quantity of TYPE 200 SPLICE VAULT will be paid for at the contract unit price per each and shall be full compensation for all labor and materials, including but not limited to, shipping, delivery, tools, collars, concrete, forming, reinforcing steel, excavation, bedding, backfill, connections to conduit, replacement of damaged curb and gutter and sidewalk, and all required hardware to ensure item is complete, in place, operational and all other items necessary to complete the work as shown on the Plans, as specified herein and as directed by the Engineer.

Construction and installation of concrete foundations, median islands, sidewalk ramps, traffic signal poles, streetlight poles, permanent striping and permanent signs shall not be included in the unit price bid for “Solar Pedestrian Crosswalk Flashing Beacon” but shall be paid as specified in their respective sections in the Clark County Area Uniform Standard Specifications or as specified in these Supplemental Project Special Provisions.

***This specification has been written such that each “Solar Pedestrian Crosswalk Flashing*** ***Beacon” unit is bid separately, per each. Depending on the project requirements, these units could be bid as a system, optionally, including the “Pedestrian Pushbutton”. The project engineer should make the determination of what is most appropriate for the project.***

*[Note to spec. writer: Need to add 4” conduit in downtown projects (one on each side of the street with crossings and pullboxes every intersection). Also add Wifi hardward to TS poles downtown. Coordinate with Traffic for locations and Specs for each forthcoming…]*

*Note to spec. writer: Existing Type 200 Splice Vault in project vicinity will have the lid replaced to an adjustable torsion spring assisted steel cover marked “Fiber Optic”. Use standard bid item and quantity:*

Payment will be made under:

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**END OF SECTION 623**