

**City of Elk Grove**

**Special Provisions for Legal Relations and Responsibilities**

**May 7, 2007**

COMPLIANCE WITH LAWS AND REGULATIONS

All work shall be completed in accordance with the following:

- a) Section 6 of the City of Elk Grove 2001 Standard Construction Specifications, hereinafter referred to as the Standard Construction Specifications, which are identical to the September 2001 County of Sacramento Standard Construction Specifications.
- b) All applicable laws and regulations.

EXISTING TRAFFIC SIGNAL AND LIGHTING SYSTEMS, SIGNS AND PAVEMENT MARKINGS

The third sentence of the first paragraph of Section 6-13.10 is replaced with the following:

Existing vehicle detection shall be maintained at all times. In the event that existing detector loops must be disconnected, the Contractor shall furnish and install a replacement detection system at Contractor expense prior to disconnecting the existing loops. The replacement system may utilize video, radar, or other technology as approved by the Engineer. The replacement system shall remain in operation until permanent loops are functional or as approved by the Engineer. Traffic signal detectors that are unintentionally cut or damaged during construction shall be repaired or replaced by the Contractor at Contractor's expense, regardless of fault, within twenty-four (24) hours.

**City of Elk Grove**

**Special Provisions for Signals, Lighting and Electrical Systems**

**May 7, 2007**

INSTALLATION OF TRAFFIC SIGNAL FACILITIES

All work shall be completed in accordance with the following:

- c) Section 49 of the City of Elk Grove 2001 Standard Construction Specifications, hereinafter referred to as the Standard Construction Specifications, which are identical to the September 2001 County of Sacramento Standard Construction Specifications and which incorporate by reference the latest edition of the State Standard Plans (SSP) and Section 86 of the latest edition of the State Standard Specifications (SSS)
- d) These special provisions

The provisions of Section 7-19, "Substantial Completion", of the Standard Construction Specifications shall not apply.

REGULATIONS AND CODE

Section 49-1.03 is deleted and replaced with the following:

Section 86-1.02 of the SSS is amended to state that any City amendments to the identified codes shall be applicable.

EQUIPMENT LIST AND DRAWINGS

Section 49-1.04 is amended to delete the phrase "...and on the equipment itself..." from the third sentence.

MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

Section 49-1.06 is amended to state that paragraph 3 of SSS Section 86-1.06 shall not apply.

SCHEDULING OF WORK

Section 49-1.07 is amended to include the following:

A traffic signal turn-on will not be scheduled until a pre-turn-on inspection has been completed and related issues have been resolved. The Contractor shall obtain Agency approval of the turn-on date at least five (5) working days in advance. The Contractor shall be responsible for notification and coordination with other personnel, agencies, and entities as appropriate, including coordination of related signing and striping work.

EXCAVATING AND BACKFILLING

Sections 49-2.01 and 49-2.02 are deleted.

SSS Section 86-2.01 is amended as follows:

Paragraph 2 is amended to delete the phrase "...within 48 hours..." and replace it with the following: "...the same day the surplus material is excavated..."

Paragraph 3 is deleted and replaced with the following:

Unless otherwise shown or specified in the Contract, trench excavation and backfill shall conform to Section 19, "Trench Excavation, Bedding, and Backfill", of the Standard Construction Specifications, and restoration of surfaces shall conform to Section 14, "Restoration of Surfaces", of the Standard Construction Specifications. When trenching in pavement is allowed or required for signals, lighting and electrical systems, it may be performed by earth saw trenching in accordance with the provisions of SSS Section 86-2.05C, "Installation", as amended by these provisions.

The following is added:

The Contractor shall contact Underground Service Alert a minimum of forty-eight (48) hours before any excavation work begins. The Contractor shall outline the excavation area in white.

Attention is directed to Section 49-1.09 of the Standard Construction Specifications, which requires inspection prior to backfilling trenches, placing foundations, or pulling wire. This section is revised to delete the phrase "and ground bushings" from the first and third sentences of the second paragraph.

#### SIGNAL TURN-ON

Section 49-1.10 is hereby deleted.

#### FOUNDATIONS

The Contractor's attention is directed to Section 49-2.04 of the Standard Construction Specifications. All traffic signal pole foundations shall be located such that no existing conduit, pipe or other underground utility facility shall conflict with the entire volume of the pole foundation. If a conflict with an existing street light conduit or an existing traffic signal conduit is determined to exist, the Contractor shall modify the existing conduit such that it is removed from the area of conflict. If a conflict with any underground utility facility other than streetlight and traffic signal conduit is determined to exist, the Contractor shall bring the potential conflict to the attention of the Engineer. The signal foundation location may be adjusted as detailed in Section 49-2.05 of the Standard Construction Specifications.

All traffic signal poles and pull boxes shall be located outside the limits of sidewalk ramps.

#### STANDARDS, STEEL PEDESTALS AND POSTS

All traffic signal poles, mast arms, luminaire arms and internally illuminated street name sign support arms at intersections in the Laguna Ridge (LR) area, which includes the area south of Elk Grove Boulevard, east of Bruceville Road and west of SR 99, shall be finished with a stock color black super-durable TGIC polyester powder coat prior to installation. Unless otherwise approved, the product used shall be Tiger Drylac 38/80020 Jet Black and a color sample shall be provided for City approval prior to painting. All pole and mast arm surfaces shall be recoatable with standard maintenance finishes. All surfaces to be powder coated shall first be swept to provide a better profile and remove oxidation. The sweeping process may consist of blasting with a light abrasive media such as glass beads or very fine sand. The sweeping shall not be so aggressive that it degrades the galvanized surface. The media shall then be blown off completely. The pretreatment is an essential step and certification of pretreatment shall be provided by the powder coat finisher. A coat of protective primer, Tiger Drylac Series 69/70000 or approved equal, shall be applied with a minimum thickness of 2 mils. The primer shall be partially cured for 2 minutes at 400 degrees at substrate. Following pretreatment and primer application, a topcoat shall be applied with a minimum thickness of 3.5-4 mils. Curing time shall be a minimum of 15 minutes at 400 degrees at substrate.

In Section 49-2.05B, the last sentence of item #5 is deleted.

## CONDUIT

Section 49-2.06 is deleted and replaced with the following:

Section 86-2.05A of the SSS is amended to include the following:

Unless otherwise indicated, conduit shall be rigid non-metallic, electrical grade and Schedule 40 or better and pole risers shall be two-inch (2") Schedule 80 rigid non-metallic.

The conduit shall be free from defects including non-circularity, foreign inclusions, etc. It shall be nominally uniform (as commercially practical) in color, density, and physical properties. It shall be straight and the ends shall be cut square to the inside diameter. The conduit system shall be designed so that straight sections and fittings will assemble without the need for lubricants. Conduits and fittings shall be fastened together with cement as recommended by the manufacturer or as approved by the Engineer.

Non-metallic conduit shall have an integral bell on each length, suitably designed to give a clearance fit on the outer diameter of the conduit. The conduit shall have a circumferential ring on the spigot end, which shall be used to insure proper insertion depth when connecting conduit ends.

### *INTERCONNECT CONDUIT*

Unless otherwise indicated, interconnect conduit shall consist of three 2" rigid non-metallic conduits. The conduits shall be Schedule 40 or better and shall be electrical grade. The following provisions shall apply:

A complete line of fittings, adapters, and bends (sweeps) shall be provided by the conduit manufacturer and shall be manufactured from the same materials and manufacturing process as the conduit. The complete system will allow for coupling kits, manhole terminator kits, lubrication fittings, repair kits, and installation accessories.

PVC conduit shall have system compatible bell and spigot ends. HDPE conduit shall be fusion welded.

All bend radii shall be two (2) feet or greater.

Conduits that can contain one cable shall be plugged using an expandable cable seal off. Immediately prior to plugging, conduits shall be blown out with compressed air until all foreign material is removed.

The conduit shall be marked with data traceable to plant location, date, shift, and machine of manufacture.

Conduits entering splice vaults and pull boxes shall be capped with conduit plugs, terminated flush with the inside walls of each vault or pull box, and terminated with a manufacturer-produced terminator connector to tightly connect to and seal the wall of the splice vault.

*Rigid Conduit* – If approved for use, rigid galvanized steel conduit shall be hot dipped galvanized having hard-baked enamel or heavy lacquer finish both inside and outside. Each piece of conduit shall be straight, free from blisters and other defects; cut square and taper reamed and shall be furnished in 10-foot lengths, threaded at each end. Couplings shall be applied to one end of each length of conduit and color-coded plastic threaded protectors (on sizes ½" through 1½") or combination metal and fiber lined color-coded protectors (on 2" and larger) to the other end. All threads shall be clearly cut and each length of conduit shall bear the Underwriters' Laboratories, Inc. label.

*PVC Conduit* – PVC conduit shall conform to the requirements of NEMA TC-2, NFPA 70, and UL 651.

*HDPE Conduit* – High Density Polyethylene (HDPE) conduits shall conform to the following applicable standards: NEMA TC-7, UL 651B, NFPA 70, and ASTM F2160. Each conduit shall be a different color, which shall remain consistent throughout the project. The Contractor shall submit the color coding scheme to the City for approval.

Section 86-2.05C of the SSS is amended to include the following:

Conduits shall normally be placed behind the curb. No trenching of a finish grade pavement is allowed unless otherwise approved by the Engineer. Base paving may be trenched to allow conduit installation if a final lift of asphalt will be placed by the same project.

All conduit systems, new or existing, shall be blown out with compressed air.

Conduits terminating in standards or enclosures shall emerge from the foundation vertically,  $\pm 5^\circ$  in any direction.

Conduit runs terminating in the controller cabinet shall consist of at least two 4-inch conduits.

When multiple conduits are installed by trenching, they shall be installed together in a common trench. If the resulting trench size would exceed maximums required by these special provisions, the Contractor shall obtain the City's approval for any modifications to standard trench requirements prior to beginning the work and shall be responsible for any additional traffic control, trench plating, or other work related to the trenching. To avoid modifying standard trench requirements, the City reserves the right to require conduit to be placed by boring instead of trenching.

Transition of the conduit without bends shall not exceed more than 1 foot for every 10 feet. Interconnect conduit bends shall comply with requirements stated elsewhere in these special provisions.

The Contractor shall furnish and install end bushings.

To enable tracing the location of the conduit, a #10 AWG green wire shall be installed in conduits.

After conductors have been installed, the ends of conduits terminating in pull boxes, interconnect cabinets, splice vaults, controller cabinets, and service enclosures shall be sealed with Duct Seal or other approved sealing compound.

An orange warning tape or 2-sack red slurry backfill shall be placed in all trenches six inches above the conduit.

The "Trenching in Pavement Method" section is deleted and replaced with the following:

When "Trenching in Pavement Method" is specifically allowed or required in the special provisions, installation of conduit under pavement shall conform to the following:

Conduit shall be Type 3 (rigid non-metallic). Conduit shall be placed under existing pavement in a trench approximately 2-inches wider than the outside diameter of the conduit to be installed. Trench shall not exceed 6 inches in width. Trench depth shall not exceed the greater of 14-inches or roadway structural section less 2", except that at pull boxes the trench may be hand dug to required depth. The top of the installed conduit shall be a minimum of 9-inches below finished grade.

Trenches to be made using this method shall be cut by a machine that will produce smooth edge cuts in the pavement and will move at a speed in excess of 4-feet per minute while cutting pavement. The trenching machine shall be shielded to prevent loose material from being thrown away from the machine. Loose material deposited on the pavement behind the cutting machine shall be removed from the pavement immediately and the pavement cleared to allow the passage of traffic. Only those traffic lanes occupied by the cutting machine and the cleanup operation shall be closed and they shall be opened as soon as the work has moved sufficiently to clear them.

In areas where additional pavement is to be placed, trenching installation shall be completed prior to placing the final pavement layer.

The conduit shall be placed in the bottom of the trench and the trench shall be backfilled with commercial quality concrete, colored red and containing not less than 5-sacks of cement per cubic yard. The concrete backfill shall extend to the existing pavement surface in areas that are to receive an asphalt overlay as part of the same contract, and to a point 1.5-inches from the surface of existing pavements that are not to receive an asphalt overlay as part of the same contract.

The pavement shall be cold-planed to a depth of 1.5-inches for a minimum of 6-inches on each side of the trench. The cold-planed area shall extend to the lip of gutter if the trench is within 20-inches of the gutter. The sides of the trench above the concrete backfill shall be coated with an asphaltic emulsion and the remaining depth of the trench shall be backfilled with asphalt concrete placed in one layer. The asphalt shall conform to Section 23 "Asphalt Concrete" of the Standard Construction Specifications, and shall be manufactured with half-inch (1/2") maximum-sized rock.

Once work is started on a trench, all work necessary to complete that trench, with the exception of the 1.5-inch permanent asphalt concrete surfacing, shall be performed during the same day. This includes cutting, placing of conduit or cable, removing all spoils from work site, barricades, maintaining a clean road surface for the safety of vehicular and pedestrian traffic, and backfilling trench with concrete. The permanent asphalt concrete pavement replacement shall be completed no later than one Working Day following placement of the concrete backfill.

Trenching in medians shall be as specified above, except that the requirement to complete the trench on the same day shall not apply. In addition, median trenches may be backfilled to the surface of the median with concrete colored and textured to match the median surface.

## PULL BOXES

Section 49-2.07 is deleted and replaced with the following:

SSS Section 86-2.06A is amended as follows:

All new traffic signal interconnect pull boxes shall be No. 6E.

All new traffic signal pull boxes adjacent to traffic signal mast arm poles shall be No. 6.

All new traffic signal pull boxes adjacent to controller cabinets shall be No. 6E.

All new electrical service pull boxes shall comply with requirements of the serving utility.

Except for traffic-rated pull boxes, all lids for #5, #6, and #6E pull boxes shall be Fibrelyte or approved equal.

The requirement that pull box covers be secured with bolts, cap screws, or studs shall not apply except to traffic-rated pull boxes with steel traffic lids.

SSS Section 86-2.06B is amended as follows:

New metal pull box covers shall be marked by method "C."

The cover marking for all traffic signal pull boxes shall read "TRAFFIC SIGNAL."

The cover marking for all signal interconnect pull boxes shall read "SIGNAL INTERCONNECT."

SSS Section 86-2.06C is amended as follows:

Pull box spacing shall not exceed 250 feet. The pull box spacing shall not exceed 500 feet for the interconnect conduit intended for the future fabric optics and 250 feet for all other interconnect conduits.

Unless otherwise approved by the Engineer, no pull box shall be placed in the traveled way, on a driveway apron or within one foot of any existing, proposed or future (as shown on the plans) curb ramp. Unless otherwise approved by the Engineer, no traffic signal interconnect pull box shall be placed within 30-inches of any pole foundation or other location which may interfere with the movement of people or vehicles.

Excavating and backfilling shall conform to the provision in Section 86.2.01, "Excavating and Backfilling" of Caltrans Standard Specifications except that the backfill material shall not contain rocks graded larger than one inch.

The bottom of pull boxes installed in unimproved areas or in sidewalk areas shall be bedded on a six inch (6") minimum layer of three-quarter inch (3/4") crushed rock. Grout will not be required.

The top portion of the conduit shall be not more than 4" from the bottom of the pull box. The conduit shall be placed in a manner to allow the cable/wire to be pulled in a straight line.

If new pull boxes are replacing existing pull boxes, the Contractor shall protect existing conduit and cable from damage. Should the existing conduit or cable become damaged, the Contractor shall repair and/or replace damaged conduit or cable. Prior to repair/replacement, the Contractor shall notify the City of exact location, and provide a detailed description of damage.

Pull boxes within unimproved areas shall have a Class 1 flexible post delineator, per Caltrans Standard Plan A73-C installed adjacent to the pull box.

## CONDUCTORS

The second paragraph of SSS Section 86-2.08B, "Multiple Circuit Conductors" is deleted and replaced with the following:

At any point, the minimum thickness of any TW, THW, USE, RHH or RHW insulation shall conform to the requirements of the latest edition of the National Electric Code.

## SIGNAL INTERCONNECT CABLE

In Section 49-2.08A, the following is added to the end of the third paragraph:

Interconnect cable having damaged insulation will not be accepted. If the Contractor damages the insulation during or after installation, the entire cabinet to cabinet run shall be replaced with new cable.

The fourth paragraph is deleted and replaced with the following:

Cable shall be installed in conduit between termination points. Termination points are identified as controller cabinets, interconnect terminal cabinets, master controller building, City Hall, or transportation management center. No splices shall be allowed between termination points. A minimum of eight feet (8') of slack cable shall be coiled in each pull box and a minimum of ten feet (10') at each controller/termination cabinet.

## WIRING

Section 49-2.09 is deleted and replaced with the following:

SSS Section 86-2.09 is amended as follows:

All splices shall be by Method B.

Conductors shall not be pulled into and through conduits until after pull boxes are set to grade, drain rock sumps installed, and the conduits bonded and blown out with compressed air.

In SSS Section 86-2.095, the first paragraph is deleted and replaced with the following:

In the handhole section of each luminaire pole, a fused disconnect splice connector shall be installed in each ungrounded conductor between the line and the ballast. Luminaires with up to 200-watt bulbs shall have six-amp (6A) fuses installed. Luminaires with 250-watt to 400-watt bulbs shall have ten-amp (10A) fuses installed.

## VEHICLE SIGNAL FACES AND SIGNAL HEADS

Section 49-4.01 is amended to add the following:

All new vehicle indications shall be 12-inch.

The Contractor shall furnish a manufacturer's 5-year warranty for all new signal indications.

Attention is directed to SSS Section 86-4.02.

## PEDESTRIAN SIGNAL HEADS

The first sentence of Section 49-4.04 of the Standard Construction Specification shall be replaced with the following:

Pedestrian signal heads shall conform to the provisions of Section 49-4.04 of the Standard Construction Specifications and these special provisions. All pedestrian signal heads shall be the "countdown" variety and shall conform to the following specifications:

1. The signal head shall conform to SSS Sections 86-4.06 and 86-4.07 and Section 4E of the 2003 Edition of the Manual on Uniform Traffic Control Devices for general design requirements.
2. Signal display: high-intensity LED. Display must meet SSS Section 86-4.06 requirements for luminance. The LED display shall include solid (filled in) walking man and raised hand symbols.
3. Timer Display: High-intensity LED display, which is legible, day or night, from a minimum distance of 120 feet from the signal. Timer must have the ability to time from both the beginning of the Walk phase and from the beginning of the Flashing Don't Walk phase. Timer must also have the ability to either time down to the end of the Flashing Don't Walk phase or to the end of vehicle clearance phase associated with the pedestrian movement controlled by the unit. Timer shall calculate and display the appropriate Flashing Don't Walk time, as programmed on the signal controller, after one cycle of Flashing Don't Walk operation. The timer shall continuously recalculate Flashing Don't Walk time each

cycle so that the unit will display the proper Flashing Don't Walk time after any change in the settings for that phase on the traffic signal controller.

4. Except for the housing, which shall be all metal, the finish, control, and terminal blocks of the housing shall meet the provisions of Section 86-4.06 of the State Standard Specifications.
5. The pedestrian signal head shall be programmed to count down only during the Flashing Don't Walk interval.

## VEHICLE DETECTORS

Section 49-5.01 is amended as follows:

All detector loops shall be 5' by 5'.

Detector loops near intersection limit lines shall consist of four Type A loops in left turn lanes and through lanes and two Type A loops in right turn lanes. Spacing between loops in the same lane shall be 10-feet.

The Contractor shall be responsible for laying out all detector loops in conformance with the traffic signal and striping plans. Detector loops shall be centered within each lane except that within left turn lanes less than 11-feet wide, the right side of the loop shall be located 3.5-feet from the lane line on the right. Detector loops shall be marked and their location approved by the Engineer prior to pavement cutting.

Detector lead-in cables shall be provided as shown on the plans and loops shall be connected to the lead-in cables as shown on the plans.

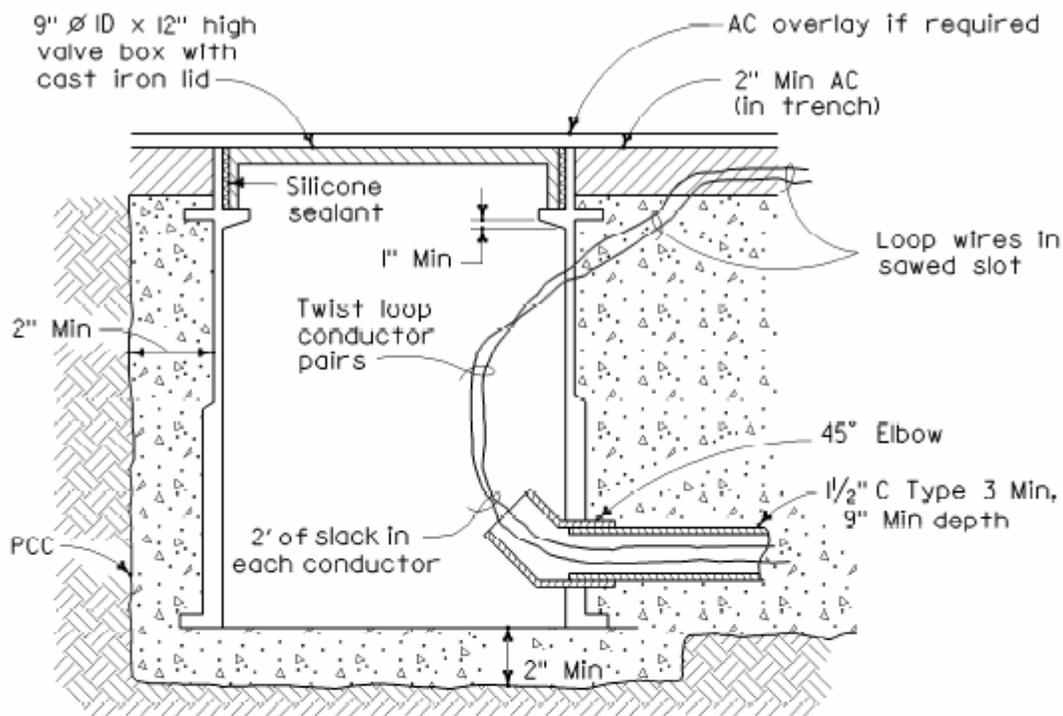
Detectors for right turn lanes shall provide an adjustable delay feature.

All testing shall be completed and approved prior to traffic signal turn-on.

Detector handholes shall be Type "A" where installed in existing surfaces that will not receive an overlay as part of the project and Type "B" where installed in new pavement or existing pavement that will receive an overlay as part of the project. Reference is made to the Caltrans Standard Plans for Type "A" handhole details and the attached drawing for Type "B" handhole details. Handholes shall be aligned with lanelines. Existing pavement to be excavated for Type A handholes shall first be sawcut to a depth of 2" or ½ the pavement thickness, whichever is greater.

All conduits connecting to detector loop handholes shall be 2-inch minimum.

The cement used to join the ABS sweep "Y" to the PVC conduit shall be capable of providing a solvent type weld between the two materials.



## TYPE B DETECTOR HANDHOLE DETAILS

### INSTALLATION REQUIREMENTS

#### TYPE B DETECTORS HANDHOLE

1. Outline of trench shall be saw cut to a minimum depth of  $\frac{3}{8}$ " except where asphalt concrete overlay is to be placed.
2. The valve box shall be fabricated of calcium carbonate and polyester resins with fiberglass reinforcement and designed for heavy traffic loads.
3. Cast iron lid shall be marked "Detector" and shall be secured in place by applying waterproof silicone sealant. Valve box shall be centered on lane line, unless otherwise shown on the plans.
4. Entire length of trench, from valve box to adjacent pull box, shall be backfilled with portland cement concrete except the top 2" in asphalt concrete surfaced roadways shall be backfilled with asphalt concrete.

## OPTICOM CABLE AND DETECTORS

Section 49-5.02 is deleted and replaced with the following:

The Contractor shall furnish and install new 3M opticom cable, where shown on the plan. Opticom cable shall be installed to the opticom detector installed on the traffic signal mast arm, as shown on the plan. New 3M opticom detectors, Model 721 or better, shall be furnished and installed on the top of the signal mast arm for each approach as shown on the plans. For each detector installation, the associated cable shall be continuous and unspliced from the controller cabinet to each opticom detector with a minimum of five feet of slack in the pull box at the base of pole. The Contractor shall furnish and install Opticom Model 752 phase selectors as required for complete signal operations as required by the plans.

## PEDESTRIAN PUSH BUTTONS

Section 49-5.03 is amended as follows:

The third sentence of the first paragraph is deleted and replaced with the following:

All pedestrian push buttons shall be the large A.D.A. type with a two-inch (2") diameter button.

The second paragraph is deleted and replaced with the following:

Pedestrian push button signs shall conform to Standard Sign No. R10-4b of the MUTCD 2003 Edition (R62A of the MUTCD 2003 California Supplement). The signs shall be metal.

The following is added:

Bicycle push button units shall conform to all of the above requirements for pedestrian push buttons except that the signs shall conform to Standard Sign No. R62C of the MUTCD 2003 California Supplement.

## HIGH PRESSURE SODIUM LUMINAIRES

Luminaries for street lighting in Zone 2, which includes the area south of Elk Grove Boulevard, east of Bruceville Road and west of SR 99, shall be of a decorative style selected by the City.

The last sentence of the first paragraph of Section 49-6.01 is amended to read as follows:

Luminaries for street lighting shall be Type III cutoff distribution.

## INTERNALLY ILLUMINATED STREET NAME SIGNS

Section 49-6.03 is deleted and replaced with the following:

### A. General

1. Internally illuminated street name signs shall be designed and constructed to withstand 110 miles per hour wind loads in conformance with the requirements of the AASHTO publication, "Standard Specifications for Structural Supports of Highway Signs, Luminaries and Traffic Signals", 4<sup>th</sup> Edition 2001.

### B. LED Light Source

1. The light source for the signs shall be LEDs (light emitting diodes).

2. The sign and power supply should be able to withstand and operate at temperature extremes of -40 degree F to +140 degree F. The power supply shall be housed inside the sign frame assembly. Power supply shall be UL Class 2 limited output voltage and current plus isolation for safe operation, and UL Outdoor damp location rated. Power supply shall be IP66 Outdoor rated. The power supply shall carry a 7-year non pro-rated warranty.
3. The LED light engine panel shall consist of adequate LED's to provide a minimum of 200 nits (200 Candela per square meter) or an equivalent surface luminance of 1000 lux over a -40 to +60 degree C ambient temperature range. There shall be a sufficient quantity of white LED's to uniformly illuminate the viewing area. The failure of one (1) LED shall not reduce the light output by more than eight percent (8%) per foot of sign face.
4. High output LED must be mounted to aluminum substrate using 99% silver epoxy glue. Light engine circuit boards traces must be 99% silver trace silkscreen directly to an aluminum substrate, with a minimum thickness of 0.050 inch. The LED light engine panel face shall be entirely conformally coated with a 2 part urethane resin, no thinner than 0.002 inch (dry) to adequately protect the light engine from moisture and corrosion. The LED light engine panel shall be permanently attached to the LED panel. The LED light engines shall carry a 8-year non pro-rated warranty.
5. The light engine manufacture must prove its thermal management of high output LED's, that temperature of LED will not rise higher when energize to 15% above current ambient temperature. The light engine must be able to operate in a damp or flood environment without failure.
6. The LED light engine panels shall be compatible for retrofitting into all existing internally illuminated street name sign housing for light source.
7. The LED light engine panel shall pass the following tests per NEMA standards:
  - Thermal Shock Test:** 85/-40 degree C with 2-hour dwells for 5 cycles with a 2-hour presoak at -40 degree C.
  - Salt Spray and Soak Test:** The LED panel shall endure 48 hours of continuous salt spray and 240 hours of a salt water soak.
8. All LED panels shall be burned-in for 24 hours and certified for compliance by the manufacturer. The manufacturer's name and date of manufacture along with a Quality Control tracking sticker shall be mounted on the inside of the LED light engine panel.
9. The panels shall be painted white. Paint must meet GM4901 specifications.
10. The overall power required shall not exceed 2 watts per square foot for single sided signs, and 4 watts per square foot for double sided signs.
11. The light engine shall be an Energy Star Qualified Product. The light engine manufacturer must be ISO 9001 certified and made in the U. S. A. It must be on Federal Highway QPL list for manufacture of LED head lamp.

### C. Sign Housing

1. Internally illuminated street name signs shall have a maximum length of eight (8) feet, and be six (6) feet whenever feasible. The width of the sign shall be eighteen (18) inches. The thickness of the sign housing shall be five and a half (5.5) inches for one-sided and eleven (11) inches for double-sided sign housing.

2. The sign frame shall be 0.100 aluminum fabricated housing with side slide- mounted access for sign panel and LED light engine.
3. The internally illuminated street name signs shall be fabricated for mounting on a separate support arm between the signal mast arm and the luminaire arm, as shown on the details.
4. The sign mounting top nut shall be stainless steel Nylock self-locking type or approved equal.
5. 1/8” diameter steel safety cable with a minimum breaking strength of 1760 lbs. shall be attached to each end of the sign assembly to connect sign to the sign support arm.
6. IISNS shall be double-faced, unless otherwise noted on the plans.
7. IISNS electrical service shall be metered.

#### D. Sign Panel

1. The sign faces shall be 1/8” white polycarbonate, with flexible, colored, wide-angle prismatic retroreflective sheeting, tape and related processing materials designed to enhance the visibility of the signs.
2. The retroreflective sheeting for sign faces/finished signs shall have a smooth surface with a distinctive interlocking diamond seal pattern and orientation marks visible from the face. The sheeting shall be precoated with a pressure sensitive adhesive backing protected by a removable liner. The adhesive shall require no heat for proper bonding when applied in accordance with the manufacturer’s recommendations to substrates 65° F or above. The retroreflective sheeting shall be 3M, “Scotchlite”, Diamond grade Series 3970G or equivalent.
3. Formatted letters shall conform to State Standard Lettering, Series E, for highway signs and shall be 8” upper case and 6” lower case letters. If necessary, the width of each letter (“stroke”) and the spacing between letters may be reduced for the legend to fit on an 8-foot sign.
4. Face Colors – letters and border shall be white with a green background.

#### PHOTOELECTRIC CONTROLS

The second sentence of Section 49-6.04 is deleted.

The first sentence of Section 49-6.04A is deleted and replaced with the following:

The photoelectric unit shall be furnished and installed by the Contractor. The unit shall be designed such that, in the event of failure, it fails in the “on” mode so that the circuit is complete.

#### CITY SUPPLIED EQUIPMENT

Section 49-7 is deleted and replaced with the following:

The Contractor shall notify the Engineer 14 weeks in advance of the date when the City supplied equipment will be needed. This equipment consists of the traffic signal controller, traffic signal controller and electrical service cabinets, and the battery backup system. The Contractor shall pick up and transport to the job site all City supplied equipment and shall contact the City signal inspector at least 48 hours in advance to schedule pick-up at Republic Electric, 1513 Sports Drive, Suite 250, Sacramento, CA 95834. Tel. (916) 515-0855.

The Contractor shall supply all poles, heads, framework, all detector equipment external to the cabinet, conduit, conductors, pullboxes and all other materials and equipment not specifically identified as “City Supplied” on the Contract Plans.

### SALVAGED EQUIPMENT

Section 49-8 is deleted and replaced with the following:

All equipment shown on the plans as salvaged shall be tagged with a suitable waterproof tag and marking pen before removal from the work site. The tag shall show the date, the intersection name, and the corner from which the equipment was removed. The Contractor shall be responsible for unloading the equipment at the delivery location, including providing any necessary cranes or other lifting devices. The Contractor shall contact the City signal inspector at least 48 hours in advance to schedule delivery to Republic Electric, 1513 Sports Drive, Suite 250, Sacramento, CA 95834. Tel. (916) 515-0855. All other equipment shown to be removed and not reused shall become the property of the Contractor and shall be removed from the right-of-way and disposed of by the Contractor.