

SECTION 21 TRAFFIC SIGNAL

21.01 DESCRIPTION

- A. TRAFFIC SIGNAL, SAFETY LIGHTING, signal interconnect and related electrical work shall conform to the provisions in Division X “Electrical Work - Section 86, “General” and Section 87 “Electrical Systems,” of the State Standard Specifications, these Standard Specifications and other requirements as specified in the contract documents.

21.02 REGULATIONS AND CODES

- A. ALL ELECTRICAL EQUIPMENT SHALL CONFORM to the standards of the National Electrical Manufacturers Association (NEMA), the Underwriters’ Laboratories, Inc. (UL), or the Electronic Industries Association (EIA), wherever applicable. In addition to the requirements of the Plans, these Specifications, and any Special Provisions, all materials and workmanship shall conform to the applicable provisions in Section 86 and 87 of the State Standard Specifications and Standard Plans; National Electrical Code, hereinafter referred to as the Code; California Administrative Code, Title 8, Subchapter 5, Electrical Safety Orders; Rules and Overhead Electrical Line Construction, General Order No. 95 and Rules for Construction of Underground Electrical Supply and Communication Systems, General Order No. 128, of the Public Utilities Commission; Standards of the American Society for Testing and Materials (ASTM); American National Standards Institute (ANSI), and any local ordinances which may apply.
- B. ALL SEPARATE ELECTRICAL COMPONENTS and major control assemblies shall be UL approved.
- C. WHEREVER REFERENCE IS MADE TO any of the Standards mentioned above, the reference shall be construed to mean Code, Order, or Standard that is in effect on the day the Notice to Contractors for the work is dated.

21.03 EQUIPMENT LIST AND DRAWINGS

- A. THE ELECTRICAL CONTRACTOR, through the Prime Contractor, must submit a “Notice of Materials to be Used,” (CEM 3101) of equipment and materials proposed to be installed with the list of equipment and materials proposed to be installed and supporting technical information as specified in Section 86-1.01C “Submittals,” of the State Standard Specifications or as directed by the City Engineer.
- B. THE CONTROLLER CABINET SCHEMATIC wiring diagram and intersection sketch shall be combined into one drawing, so that, when the cabinet door is fully open, the drawing is oriented with the intersection.

- C. THE CONTRACTOR SHALL FURNISH TO the City Engineer a copy of all purchase orders for equipment and materials used in reference to traffic signals within five (5) days of when such orders are placed. The Contractor shall also provide copies of all correspondence with equipment and materials suppliers concerning availability, delivery dates, anticipated delays, and shipment notices within five days of each letter. References to cost may be omitted. Consideration for recommending time extensions for materials and equipment delivery delays will not be made unless these provisions are met.
- D. THE CONTRACTOR SHALL FURNISH two (2) maintenance and operation manuals for cabinet, controller unit, auxiliary equipment, vehicle detector sensor units, control units, amplifiers, and any other auxiliary equipment furnished. The maintenance manual and operation manual may be combined into one manual. The maintenance manual or combined maintenance and operation manual shall be submitted at the time the controllers are delivered for testing.
- E. THE MAINTENANCE MANUAL SHALL INCLUDE, but need not be limited to, the following items:
 - 1. Specifications.
 - 2. Design characteristics.
 - 3. General operation theory.
 - 4. Function of all controls.
 - 5. Trouble shooting procedure (diagnostic routine).
 - 6. Parts list, description, stock numbers, and settings.
 - 7. Block circuit diagram.
 - 8. Geographical layout of components.
 - 9. Schematic diagrams.
 - 10. List of replaceable component parts with stock numbers.

21.04 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

- A. UNLESS OTHERWISE PERMITTED or restricted in writing by the City Engineer, existing traffic signal system shutdowns shall be limited to periods between the hours of 9 a.m. and 3 p.m. Monday through Friday. Traffic signal system shutdowns shall not occur outside of the periods above without approval from the City Engineer.
- B. THE CONTRACTOR SHALL NOTIFY the City Engineer at least three (3) working days prior to performing any work on existing systems. The Contractor shall ascertain the exact location and depth of existing conduits, pull boxes and other electrical facilities before using any tools or equipment that may damage such facilities or interfere with any electrical system. Where roadways are to remain open to traffic and existing traffic signal systems are to be modified, the traffic signal systems shall remain in operation and the final connection to the modified circuit shall be made so that the modified circuit will be in operation by nightfall of the same day.

21.05 EXISTING IMPROVEMENTS

- A. IMPROVEMENTS SUCH AS SIDEWALKS, curbs, gutter, Portland cement concrete, asphalt concrete pavement, underlying materials, lawns, plants, and any other improvements removed, broken or damaged by the Contractor's operations, shall be replaced or reconstructed with the same kind of material as found on the work or with materials of equal quality. Such improvements shall be left in a serviceable condition.
- B. WHENEVER A PART OF A SQUARE or slab of existing concrete sidewalk, curb, gutter, or driveway is broken or damaged, the entire square or section of slab shall be removed and the concrete reconstructed.
- C. THE OUTLINE OF ALL AREAS TO BE removed in Portland cement concrete sidewalks and driveways and in pavements shall be sawcut the full depth prior to removing the sidewalk, driveways and pavement material. Cuts shall be neat and true along score lines, with no damage outside the removal area.

21.06 MEASUREMENTS AND PAYMENT

- A. EXISTING EQUIPMENT REMOVED and not reused shall remain the property of the City. Salvaged equipment shall be delivered to the City's Corporation Yard (4300 West Capitol Avenue) unless otherwise specified.

21.07 EXCAVATING AND BACKFILLING

- A. CONDUIT SHALL NOT BE COVERED until inspected and approved by the City Engineer.
- B. TRENCHES SHALL BE BACKFILLED UP to the elevation of the top of sidewalk or adjacent finish grade and shall be leveled and smoothed. Electrical system warning tape shall be installed on top of initial backfill prior to completing the remaining trench backfill work. Backfill material and methods shall conform to City and State Standard Specifications.
- C. BACKFILL PLACED IN CONDUIT TRENCHES to be outside the hinge point of slope and not under pavement shall be compacted to a relative compaction of not less than ninety (90) percent. Backfill on slopes and in areas where pavement is to be constructed shall be compacted to a relative compaction of not less than ninety-five (95) percent.

21.08 FOUNDATIONS

- A. CONCRETE AND REBAR FOR USE IN foundations shall conform to the provisions of the State Standard Specifications.
- B. THE CONTRACTOR SHALL BE RESPONSIBLE for locating and marking the positions of all signal standards and cabinets in the field. The locations shall be approved by the City Engineer prior to commencement of foundation work.

- C. ALL MISCELLANEOUS MOUNTING MATERIALS, including nuts, bolts, and washers, shall be galvanized in accordance with the provisions of ASTM A-153. Foundation bolts and conduit to be set into the concrete shall be suspended and held in place by a template securely fastened to the foundation forms. Foundations shall be poured in two lifts, the first lift to extend up to within approximately six (6) inches of the top of finished concrete. The first lift will serve to hold the bolts in place. Nuts, with washers above and below the pole base, will be placed on the bolts and poles set upon these nuts. Anchor bolts shall be positioned so that a minimum of two and a maximum of four (4) threads will be visible above the top nuts after signal standard has been erected and plumbed. All signal standards shall have a minimum of two (2) inches and a maximum of three (3) inches of grout installed between the bottom of the base plate and the finish grade per State Standard Plan ES-6B Detail N.
- D. REINFORCED (REBAR "CAGES") cast-in-drilled-hole concrete foundations shall cure at least seven (7) calendar days prior to erecting poles. For lesser foundations, three (3) calendar days shall be the minimum.
- E. AT THE END OF SECTION 87-1.03E(3), "Concrete Pads, Foundations, and Pedestals," of the State Standard Specifications, add the following text.

"Anchor bars or studs and nuts, except for Type 30 and Type 31 lighting standards, shall conform to ASTM Designation: A 307. Headed anchor bolts for foundations shall conform to the specifications of ASTM Designation: A 307, Grade B with S1 supplementary requirements. At the option of the Contractor, non-headed anchor bolts for foundations shall conform either to the specifications of ASTM Designation: A 307, Grade C or to the provisions in AASHTO designation: M 314, grade 36 or 55 with S1 supplementary requirements. When non-headed anchor bolts conforming to the specifications of ASTM Designation: A 307, Grade C are furnished, the end of each fabricated anchor bolt shall be either coded by end stamping as required in ASTM Designation: A 307 or the end that projects from the concrete shall be permanently coded with a green color by the manufacturer."

- F. WHERE CAST-IN-DRILLED-HOLE concrete pile foundations are to be constructed in slag aggregate embankments, the diameter of the pile shall be increased to provide a minimum of three inches of concrete cover over the reinforcing steel.
- G. FULL COMPENSATION FOR THE INCREASED diameter of cast-in-drilled-hole concrete pile foundations in slag aggregate embankments, including additional Portland cement concrete, and any increased drilling and placement cost, shall be considered as included in the contract lump sum price paid for various contract items of electrical works involved and no additional compensation will be allowed therefor.

21.09 STANDARDS, STEEL PEDESTALS AND POSTS

- A. ALL STANDARDS, PEDESTALS, AND POSTS shall conform to State Specifications, City's

- Authorized Material List or as directed by the City Engineer.
- B. STANDARDS, PEDESTALS, AND POSTS SHALL BE erected and set in a vertical position. Poles shall be erected after the first lift of concrete has cured as required. All nuts shall be tightened to a snug fit prior to placing the second lift of concrete.
 - C. TRAFFIC SIGNAL POLES AND MAST ARMS SHALL BE erected so that the arm is perpendicular to the street centerline, unless otherwise shown on the plans, or directed by the City Engineer. The second lift of concrete shall be placed and finished after the pole has been erected.
 - D. THE SIGN MOUNTING HARDWARE, AS SHOWN on Detail "U" of State Standard Plan ES-7N, shall be installed at the locations per manufacturer's recommendations.
 - E. SHEET STEEL SHALL HAVE A minimum yield of forty-eight thousand (48,000) psi.
 - F. HANDHOLES FOR SIGNAL STANDARDS SHALL be located 90° clockwise from the traffic signal mast arm.
 - G. TYPE I STANDARD SHALL BE ASSEMBLED and set with the handhole on the downstream side of the pole in relation to traffic, or as shown on the plans.

21.10 CONDUIT

- A. ALL CONDUIT AND FITTINGS SHALL BE Type 3 conduit, rigid Polyvinyl Chloride (PVC) conduit, Type A, extruded complying with Underwriters' Laboratory (UL) 651 in accordance with Section 86-1.02B of the State Standard Specifications and shall be minimum Schedule 40 rigid PVC conduit pipe, unless otherwise shown on the approved improvement plans or High-Density Polyethylene (HDPE) conduit complying with UL 651A. Each complete length shall bear the manufacturer's name and UL label. The type of PVC or HDPE cement shall conform to the manufacturer's recommendations. Galvanized steel tubing shall not be used.
- B. THE CONDUIT BETWEEN A FOUNDATION and the nearest pull box shall be the same type as in the foundation. Rigid non-metallic (Type 3) conduit may be used in all foundations.
- C. WHEN A STANDARD COUPLING CANNOT be used for coupling Type 3 PVC conduit, a UL listed threaded union coupling in accordance with the manufacturer's recommendations.
- D. FOR SITUATIONS WHERE THE CONDUIT cannot meet the minimum cover requirements, it may be laid at a depth of twelve (12) inches below existing surface, providing that a minimum of six (6) inches of Slurry Cement Backfill, per Section 19-3.02E of the State Standard Specifications, be placed over the conduit. Backfill shall be completed to the top of the trench with a minimum of four (4) inches of surrounding material.
- E. AFTER CONDUCTORS HAVE BEEN INSTALLED, the ends of conduits terminating in service and controller cabinets shall be sealed with an approved type of sealing compound.
- F. AT LOCATIONS WHERE CONDUIT IS REQUIRED to be installed under pavement, where

existing underground facilities require special precautions, and if delay to any vehicle will not exceed five minutes, conduit may be installed by the “Trench-In-Pavement” of said Section 87-1.03B(3)(b)(iii) of the State Standard Specifications.

- G. CONDUIT SHALL BE INSTALLED FOR ALL conductors and meet State Standard Specifications, except where conductors are inside poles. All conduit shall be installed underground, shall not be smaller than one (1) inch nominal diameter, and shall be of the sizes shown on the plans or as specified in the State Standard Specifications or these construction specifications. At the Contractor’s option and expense, conduit of a larger size than that shown or specified may be used, provided that the larger size is used for the entire length of the run from outlet to outlet. Reducing couplings shall not be permitted.
- H. UNDERGROUND CONDUIT PLACED WITHIN road right-of-way areas (roadway) shall meet the NEC code, or at a minimum be thirty (30) inches deep except under public sidewalks which can be a minimum eighteen (18) inches, measured from the top of conduit to the pavement surface. Conduits crossings under existing roadways must be jacked or drilled unless otherwise approved by the City Engineer. Conduits may be installed by the Trench-in-Pavement Method as specified in Section 87-1.03B(3)(b)(iii) of the State Standard Specifications and described below. Conduits placed in roadways under construction shall be in trenches with a minimum width of six (6) inches. All conduit crossings shall be perpendicular to the street centerline.
- I. ALL CONDUIT INSTALLATION IN NEW roadways shall be performed prior to completion of subgrade. Conduit shall be placed per Section 87 of the State Standard Specifications. PVC conduit placed outside the roadway shall have a minimum cover of thirty (30) inches except under public sidewalks which can be a minimum eighteen (18) inches. In the event that required depths cannot be maintained, the conduit shall be encased with Slurry Cement Backfill, per Section 19-3.02 of the State Standard Specifications, color dyed red with a minimum thickness of six (6) inches around the conduit. The remaining backfill shall meet City backfill requirements.
- J. AT LOCATIONS WHERE CONDUIT IS REQUIRED to be installed under pavement and existing underground facilities require special precautions, conduit may also be installed by the “Trench-in-Pavement Method” as specified in Section 87-1,03B(3)(b)(iii) of the State Standard Specifications. Conduit shall be the rigid non-metallic type, Schedule 40 or 80 PVC. Conduit shall be placed under existing pavement in a trench approximately two (2) inches wider than the outside diameter of the conduit to be installed. Trenches shall not be less than six (6) inches in width. PVC conduit depth shall be installed at a depth of at least thirty (30) inches below the surface to the top of the conduit under which they are located. For installation of conduits and ducts containing cables operating at a potential above thirty-five thousand (35,000) volts, shall be installed at a depth of at least thirty-six (36) inches.
- K. IN AREAS WHERE ADDITIONAL PAVEMENT is to be placed, trenching installation shall be completed prior to completing subgrade.
- L. WHERE ANY PORTION OF A UTILITY TRENCH is to be cut in existing pavement within

thirty-six (36) inches of the concrete lip of gutter, the pavement shall be removed and replaced all the way to the gutter.

- M. THE OUTLINE OF ALL AREAS OF PAVEMENT to be removed shall be sawcut the full section thickness. Cuts shall be neat and true with no shatter outside the removal area.
- N. THE CONDUIT SHALL BE PLACED IN THE bottom of the trench and the trench shall be backfilled consistent with City and State Standard Specifications for backfill material.
- O. PRIOR TO SPREADING ASPHALT CONCRETE, paint binder (tack coat) shall be applied as specified per State Standard Specifications. Spreading and compacting of asphalt concrete shall be performed by any method, which will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.
- P. ALL EXCAVATED AREAS IN THE PAVEMENT shall be backfilled by the end of each work period.
- Q. IN ALL CONDUIT SYSTEMS, INSTALLATION shall permit the wire to be drawn into the conduit without injury. In any case, bend radii in the conduit shall not be less than six (6) times the inside diameter of the conduit.
- R. FIELD CUTS OF ALL CONDUIT SHALL BE made square and true with all burrs removed and ends cleaned prior to gluing the connection.
- S. CONDUIT TERMINATING IN STANDARDS or pedestals shall extend between three (3) and five (5) inches above the top of finished concrete foundation, whichever is accessible for maintenance, and shall be sloped toward the hand hole and below the bottom of the hand hole opening. Bell ends of conduit shall be located at each end of any run to a pedestal, pull box or other appurtenance. Conduit entering concrete pull boxes shall terminate two (2) inches away from inside the wall of the box and not less than three (3) inches above the bottom and shall be sloped to facilitate pulling of the cable. Conduit entering through the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear. At all outlets, conduit shall enter from the direction of the run.
- T. CONDUIT ENTERING SERVICE equipment enclosures shall have “end bells” and be sealed to prevent the entrance of gases by the use of duct sealing or other sealing compound approved by the City Engineer.

21.11 PULL BOXES

- A. ALL PULL BOXES, PULL BOX extensions, and pull box covers, shall be precast reinforced concrete conforming to the City’s Authorized Material List, these specifications and State Standard Specifications. Boxes may be larger in size or traffic rated load bearing, depending on the applications.
- B. PULL BOX COVERS SHALL BE OF THE locking type conforming to the City Authorized Material List or as approved by City Engineer. Any locking mechanism shall be recessed below the surface of the cover. The cover shall be marked “Traffic Signal.” Where pull boxes are to be placed in areas subject to traffic loads, a traffic load rated and lockable

steel cover of suitable design, to withstand traffic loads shall be provided instead of a concrete cover.

- C. THE OUTGOING CONDUIT SHALL BE located on the same side of the pull box as the service provider's (i.e., PG&E, SMUD, etc.) service wires. Traffic signal and streetlight conduits and conductors shall be encased in concrete as shown in the City Standard Details #601 and #606.
- D. TRAFFIC PULL BOXES SHALL BE SIZED in accordance ES-8A and ES-8B of the State Standard Plans
- E. CONCRETE PLACED AROUND AND UNDER traffic pull boxes shall be min 4,000 psi concrete strength.
- F. AFTER THE INSTALLATION OF THE TRAFFIC pull boxes, the steel covers shall be installed and kept bolted down during periods when work is not actively in progress at the pull box. When placing the steel cover for the final time, the cover and the Z-bar frame shall be cleaned of all debris and securely tightened down
- G. PULL BOXES SHALL BE INSTALLED at the locations as shown on the improvement plans, as specified in the City Design Standards, and as directed by the City Engineer.
- H. THE CONTRACTOR MAY INSTALL, at the Contractor's expense such as additional pull boxes that may facilitate the work, with the approval of the City Engineer.
- I. PULL BOXES SHALL BE INSTALLED so that the covers are level with the top of the curb, pavement, sidewalk, or level with the surrounding ground when there is no established grade. Excavation for the installation of pull boxes shall be at least eighteen (18) inches below the bottom of the pull boxes and at least six (6) inches larger on all sides of the pull boxes. This area outside the pull box shall be filled with pea gravel for drainage. Grout shall be placed in bottom of pull boxes. A minimum of three (3) inches of gap shall be maintained between the bottom of the pull box lid and the top of the conduit and end bell.
- J. ALL PULL BOXES INSTALLED IN landscape or unpaved areas shall have a six (6) inch wide by six (6) inch deep min. 4,000 psi concrete apron. Apron shall be sloped to drain away from the pull box.

21.12 CONDUCTORS AND WIRING

- A. ALL WIRES SHALL MEET State Standard Specifications, shall be copper and shall have a moisture and heat-resistant type of thermoplastic insulation (Type THW or THWN). All wires #8 American Wire gauge (AWG) and larger shall be stranded. The City Engineer will approve all wiring materials prior to their incorporation into the work.
- B. ALL CONDUCTORS SHALL HAVE clear, distinctive and permanent markings on the outer surface throughout the entire length, which indicate the manufacturer's name or trademark, insulation type letter designation, conductor size, and voltage rating. Conductor insulation shall be a solid color.
- C. THE MINIMUM SIZE FOR TRAFFIC signal conductors shall be meet State Standards. The ground wires may be bare and shall meet the minimum NEC Standard for grounding

copper wire applications. A minimum #6 solid copper ground wire shall be installed at each traffic signal as shown in the City Standard Details #602 and #603.

- D. THE CONTRACTOR SHALL PROVIDE THE City Engineer with a Certificate of Compliance from the manufacturer in accordance with the provisions of Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications for all the conductors and cables furnished for the project.
- E. CONDUCTOR INSTALLATION - No conductors shall be drawn into any conduit until the installation run of conduit is complete and inspected. Conduit within a concrete foundation shall have no wires drawn through it until the concrete has set for at least twenty-four (24) hours. Conductors shall be installed without injury to the insulation. All conductors shall be drawn into the conduit at the same time. The pull-in wire or rope used for drawing conductors into the conduit shall not be attached to the copper conductor alone. A cable grip shall be used and applied in such a manner to place tension on both conductor and insulation. A UL listed inert lubricant shall be used.
- F. CABLES OR CONDUCTORS SHALL BE continuous from luminaire to luminaire or pull box to pull box without splices. Splices, if any, shall be made in pull boxes and the base of traffic signals.
- G. CONDUCTOR SUPPORT - Conductor support shall be provided in all traffic signal poles where the distance from the post base to the luminaire exceeds twenty-five (25) feet in height. The conductor support shall be attached to the inside wall of the pole or mast arm. It shall be a clamping device constructed of or employing insulating wedges or other suitable insulating support. Where clamping of insulation does not adequately support the cable, the conductor shall also be clamped.
- H. CONNECTORS - Conductors shall be joined by the use of UL listed connectors. "Scotchcast" connectors, Scotch-Kote coating, and approved NEC approved twist on wire connectors (wire nut, wire connector, etc.) or an approved equal shall be required for splicing all #8 AWG conductors or smaller. Copper Compression type connectors, "T and B" or approved equal, shall be used to make up all splices #6 or larger on copper wire. Aluminum wire splices shall not be allowed.
- I. SPLICES - Splices will only be permitted in pull boxes and the base of traffic signal poles. All splices shall be capable of satisfactory operation under continuous submersion in water. "Scotchcast" splice kits or approved equal shall be used to insulate below-ground splices. Scotch Tape "88" and "Scotch-Kote" or approved equal shall be used to insulate above-ground splices.
- J. SPLICES SHALL BE INSULATED BY "Method B" per Section 87-1.03H(2) "Splice Insulation Methods", of the State Standard Specifications and as shown on State Standard Plan ES-13A, or, at the Contractor's option, splices of conductors shall be insulated with heat-shrink tubing of the appropriate size after thoroughly painting the spliced conductors with electrical insulating coating.
- K. FUSED SPLICE CONNECTORS - In each traffic signal pole, level with the hand hole, a fused disconnect splice connector shall be installed in each underground conductor. The fused splice connector shall be readily accessible.

- L. FOR 240 AND 277-VOLT CIRCUITS each connector shall be designed so that both underground conductors are disconnected simultaneously. The connector shall have no exposed metal parts, except the head of a stainless-steel assembly screw may be exposed. The head of the metal assembly screw shall be recessed a minimum of 1/32-inch below the top of a plastic boss which surrounds the head.
- M. THE SPLICE CONNECTOR SHALL COMPLETELY enclose the fuse and shall protect the fuse against damage from water and weather. The contact between the fuse and fuse holder shall be spring pressure. The terminals of the splice connector shall be rigidly crimped, using a tool of the type recommended by the manufacturer of the fused splice connector, onto the line conductors and the conductors to the ballasts and shall be insulated and made waterproof in accordance with the splice connector manufacturer's recommendations. Fuses shall be standard midget, ferrule type.

21.13 SIGNAL INTERCONNECT SYSTEM

- A. CABLE - Signal interconnect cable shall meet State Standard Specification requirements and shall consist of 1-12 strand single mode fiber optic cable or as directed by the City Engineer.
- B. CONDUIT - Signal interconnect conduit shall meet State Standard Specification requirements and these specifications. All conduit and fittings shall be Underwriters' Laboratory (UL) listed and shall be High-Density Polyethylene (HDPE) pipe. Each complete length shall bear the manufacturer's name and UL label. The type of PVC cement shall conform to the manufacturer's recommendations. Galvanized steel tubing shall not be used.

Conduit shall be installed for all signal interconnect and meet State Standard Specifications, except where signal interconnect are inside signal cabinets. All conduit shall be installed underground and shall not be smaller than three (3) inch nominal diameter and shall be of the sizes shown on the plans, or as specified in the State Standard Specifications, or these construction specifications. At the Contractor's option and expense, conduit of a larger size than that shown or specified may be used, provided that the larger size is used for the entire length of the run from outlet to outlet. Reducing couplings will not be permitted.

Underground conduit placed within road right-of-way areas (roadway) shall meet NEC code, or at a minimum be thirty (30) inches deep, measured from the top of conduit to the pavement surface. Conduits crossings under existing roadways must be jacked or drilled unless otherwise approved by the City Engineer. Conduits may be installed by the Trench-In-Pavement Method as specified in Section 87-1.03B(3)(iii) of the State Standard Specifications and described below. Conduits placed in roadways under construction shall be in trenches with a minimum width of six (6) inches. All conduit crossings shall be perpendicular to the street centerline.

All conduit installation in new roadways shall be performed prior to completion of subgrade. Conduit shall be placed per these Standard Construction Specification and Sections 86 and 87 of the State Standard Specifications. HDPE conduit placed outside the roadway shall have a minimum cover of thirty (30) inches. In the event that required depths cannot be maintained, the conduit shall be encased with Slurry Cement Backfill, per Section 19-3.02 of the State Standard Specifications, color dyed red, with a minimum thickness of six (6) inches around the conduit. The remaining backfill shall meet City backfill requirements.

At locations where conduit is required to be installed under pavement and existing underground facilities require special precautions, conduit may also be installed by the "Trench-in-Pavement Method" as specified in Section 87-1.03B(3)(iii) of the State Standard Specifications. Conduit shall be the rigid non-metallic type, Schedule 40 or 80 PVC. Conduit shall be placed under existing pavement in a trench approximately two inches wider than the outside diameter of the conduit to be installed. Trenches shall not exceed six (6) inches in width unless otherwise approved by the City Engineer. PVC conduit depth shall be installed at a depth of at least thirty (30) inches below the surface under which they are located. For installation of conduits and ducts containing cables operating at a potential above thirty-five thousand (35,000) volts, shall be installed at a depth of at least thirty-six (36) inches.

In areas where additional pavement is to be placed, trenching installation shall be completed prior to completing subgrade.

Where any portion of a utility trench is to be cut in existing pavement within thirty-six (36) inches of the concrete lip of gutter, the pavement shall be removed and replaced all the way to the gutter.

The outline of all areas of pavement to be removed shall be sawcut the full section thickness with a portable rock or concrete saw specifically designed for this purpose. Cuts shall be neat and true with no shatter outside the removal area.

The conduit shall be placed in the bottom of the trench and the trench shall be backfilled consistent with City and State Standards for backfill material.

Prior to spreading asphalt concrete, paint binder (tack coat) shall be applied as specified per State Standard Specifications. Spreading and compacting asphalt concrete shall be performed by any method, which will produce an asphalt concrete surfacing of uniform smoothness, texture, and density.

All excavated areas in the pavement shall be backfilled by the end of each work period.

In all conduit systems, installation shall permit the fiber optic cable to be drawn into the conduit without injury. In any case, bend radii in conduit shall not be less than six (6) times the inside diameter of the conduit.

Field cuts of conduit shall be made square and true with all burrs removed and ends cleaned prior to gluing the connection.

Conduit terminating in standards or pedestals shall extend between three (3) and five (5) inches above the top of finished concrete foundation, whichever is most accessible for maintenance, and shall be sloped toward the hand hole and below the bottom of the hand hole opening. Conduit entering concrete pull boxes shall terminate two (2) inches away from inside the wall of the box and not less than three (3) inches above the bottom and shall be sloped to facilitate pulling of the cable. Conduit entering through the bottom of a pull box shall be located near the end walls to leave the major portion of the box clear. At all outlets, conduit shall enter from the direction of the run.

Conduit entering service equipment enclosures shall have "end bells" and be sealed to prevent the entrance of gases by the use of duct sealing or other sealing compound approved by the City Engineer.

- C. PULL BOXES - All pull boxes, pull box extensions, and pull box covers, shall be precast reinforced concrete conforming to the City Authorized Material List and State Standard Specifications. Boxes may be larger in size, or be traffic rated load bearing, depending on the application.

Box covers shall be of the locking type approved by City Engineer. Any locking mechanisms shall be recessed below surface of the cover. The cover shall be marked "Traffic Signal" or "Interconnect." Where pull boxes are to be placed in areas subject to traffic loads, traffic rated load bearing and lockable steel cover of suitable design to withstand traffic loads shall be provided instead of the concrete cover.

Pull boxes shall be installed at the locations as shown on the plans, as specified in the Design Standards, and as directed by the City Engineer.

The Contractor may install, at the Contractor's expense, such additional pull boxes that may facilitate the work, with approval of the City Engineer.

Pull boxes shall be installed so that the covers are level with the top of the curb, pavement, sidewalk, or level with the surrounding ground when there is no established grade. Excavation for the installation of pull boxes shall be at least eighteen (18) inches below the bottom of the pull boxes and at least six (6) inches larger on all sides of the pull boxes. This area outside the pull box shall be filled with pea gravel for drainage. Grout shall be placed in bottom of pull boxes. A minimum of three (3) inches of gap shall be maintained between the bottom of the pull box lid and the top of the conduit and end bell.

All pull boxes installed in landscape or unpaved areas shall have a six (6) inch wide by six (6) inch deep minimum, 4,000 psi concrete apron. Apron shall be sloped to drain away from the pull box.

21.14 SERVICE

- A. CONTINUOUS WELDING OF EXTERIOR seams in service equipment enclosures is not required.
- B. TYPE III SERVICE EQUIPMENT ENCLOSURES shall be of the aluminum type and watertight.
- C. COORDINATION FOR ELECTRICAL power connection with the utility company shall be made by the Contractor with service provider (i.e., PG&E, SMUD, etc.). The Contractor shall pay all required utility fees and costs related to providing electric service connection at the sites of work. The Contractor shall obtain utility company approval of service entrance and metering equipment shop drawings prior to fabrication of service equipment.

21.15 NUMBERING ELECTRICAL EQUIPMENT

- A. THE CONTRACTOR SHALL FURNISH and place numbers on electrical equipment as directed by the City Engineer.
- B. REFLECTIVE NUMBERS SHALL BE applied to a clean surface.
- C. WHERE SHOWN ON THE PLANS, self-adhesive equipment numbers shall be placed for all electroliers associated with traffic signals. On electroliers, the numbers shall be placed per State Standard Specifications and as shown on the City's Standard Detail # 610.
- D. ADHESIVE NUMBERS FOR ALL LOCATIONS except wood poles shall be white reflective adhesive sheeting, three inches in width, with three-inch Series D letters and numbers. The letters and numbers may be screened on to the reflective sheeting or may be die cut and adhesively attached. The labels for each location may be individual characters applied, or a continuous strip applied. Reflective sheeting, numbers and letters shall meet City Standard Details.

21.16 CONTROLLER ASSEMBLY

- A. THE CONTROLLER AND CABINET assembly shall meet State Standard Specifications, City's Authorized Material List, or as directed by the City Engineer.
- B. THE CONTROLLER UNIT SHALL BE installed in a cabinet per the City AML and shall conform to City Standards. The Controller assembly shall contain all necessary equipment, including software, to provide for the operation of the traffic signal.
- C. AN INITIAL SIGNAL TIMING PLAN SHALL BE prepared by a qualified engineer and submitted to the City for approval prior to signal turn-on. The cost of preparing the signal-timing plan shall be borne by the Contractor.
- D. THE COMPLETE CONTROLLER ASSEMBLY, together with PROM and software shall be tested by a State certified testing laboratory for quality assurance and proper operations. A copy of the test results shall be provided to the City for review and

approval prior to signal turn-on. A Certificate of Compliance shall also be furnished for the Controller Assembly.

- E. IF THE CONTROLLER ASSEMBLY FAILS to receive approval from the independent testing laboratory after three consecutive tests, the assembly shall be returned to the manufacturer and a new Controller Assembly shall be obtained from a different manufacturer at the Contractor's own expense. The new assembly shall be tested as before. The Contractor shall be responsible for all deliveries. Failure of the Controller Assembly to be approved by the independent testing laboratory shall not be considered a valid excuse for extension of the work schedule.
- F. THE CABINET SHALL BE INSTALLED on a foundation that meets State Standard Specifications and State Standard Plans. The Contractor for the project shall be responsible for making all field-wiring connections to the terminal blocks in the controller cabinet. The controller cabinet shall be wired for phase operation as shown on plans. Load switches shall be provided as required for the intended operation or as shown on plans. Field wiring terminal strips shall be capable of accepting up to four conductors for each phase. The controller cabinet shall be constructed of aluminum and shall be anodized by manufacturer and not painted. The copper ground rod installed in controller cabinet shall be three-quarter (3/4) inch diameter by ten (10) foot, minimum.
- G. AFTER INSTALLING THE TESTED and approved Controller Assembly and prior to the anticipated traffic signal turn-on, the Contractor shall perform the following functional tests in the presence of the City Engineer:
 - 1. All vehicular and pedestrian indications shall individually be turned on momentarily and proper operation and phasing shall be checked.
 - 2. The controller shall be turned on with the vehicle and pedestrian indications turned off, all pedestrian push buttons and inductive loop detectors or video detection system shall be checked for proper operation and phasing.
 - 3. All vehicular and pedestrian signal heads shall be properly adjusted and covered.
- H. IF ANY SYSTEM COMPONENT OR circuit does not operate properly, it shall be repaired and retested prior to traffic signal turn-on. After the successful completion of all tests, the Contractor shall notify the City Engineer five (5) working days prior to date of anticipated turn-on of the traffic signal system. Traffic signal turn-on may occur only between the hours of 9 a.m. and 3 p.m. on Monday through Friday on a week with no scheduled holidays, unless otherwise approved by the City Engineer. Advanced Changeable Message Boards shall be placed by the Contractor two (2) weeks prior to the signal activation with an approved message by the City Engineer.
- I. THE CONTRACTOR SHALL, at his own expense, arrange to have a signal technician employed by the controller unit manufacturer or his representative, who is qualified to work and implement the initial signal timing plan on the controller unit present at the project site at the time the signal is turned on. In addition, the Contractor shall arrange to have the City's signal maintenance personnel present for the signal turn-on. The initial cost for providing City's signal maintenance personnel shall be borne by

the City. However, should the initial turn-on fail, and another turn-on must be scheduled, the cost of having the City's signal maintenance personnel present for the additional turn-on shall be borne by the Contractor.

21.17 LIGHT EMITTING DIODE VEHICLE SIGNAL MODULES

- A. ALL VEHICLE TRAFFIC SIGNAL FACES shall meet the City's Authorized Materials List (AML), Caltrans Authorized Material List, State Standard Specifications, State Standard Plans or as directed by the City Engineer.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the City Engineer with a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications. The certificate shall certify that the LED signal modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the LED signal modules.

WARRANTY

The manufacturer shall provide a written warranty against defects in materials and workmanship for LED signal modules for a period of thirty-six (36) months after installation of LED signal modules. Replacement LED signal modules shall be provided within five (5) days after receipt of failed LED signal modules at no cost to the City, except the cost of shipping the failed modules. All warranty documentation shall be given to the City Engineer prior to installation.

21.18 LIGHT EMITTING DIODE PEDESTRIAN SIGNAL FACE MODULES

- A. ALL PEDESTRIAN SIGNAL FACES shall meet the City's Authorized Materials List (AML), Caltrans Authorized Material List, State Standard Specifications, State Standard Plans or as directed by the City Engineer.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the City Engineer a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications. The certificate shall certify that the PSF modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the PSF modules.

WARRANTY

The manufacturer shall provide a written warranty against defects in materials and workmanship for the PSF modules for a period of thirty-six (36) months after installation of the PSF modules. Replacement PSF modules shall be provided within five (5) days after

receipt of failed PSF modules at no cost to the City, except the cost of shipping the failed modules. All warranty documentation shall be given to the City Engineer prior to installation.

21.19 PROGRAMMED VISIBILITY VEHICLE TRAFFIC SIGNAL HEADS

- A. ALL PROGRAMMED VISIBILITY vehicle traffic signal heads shall meet the City's Authorized Materials List (AML), Caltrans Authorized Material List, State Standard Specifications, State Standard Plans or as directed by the City Engineer.
- B. THE CONTRACTOR SHALL, at his own expense, arrange to have a qualified signal technician from the manufacturer present to program the programmed visibility signal heads to the satisfaction of the City Engineer, at the time the signal heads are placed in operation.

CERTIFICATE OF COMPLIANCE

The Contractor shall provide the City Engineer with a Certificate of Compliance from the manufacturer, in conformance with the provisions of Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications. The certificate shall certify that the LED signal modules comply with the requirements of these specifications. The certificate shall also include a copy of all applicable test reports on the LED signal modules.

WARRANTY

The manufacturer shall provide a written warranty against defects in materials and workmanship for LED signal modules for a period of thirty-six (36) months after installation of LED signal modules. Replacement LED signal modules shall be provided within five (5) days after receipt of failed LED signal modules at no cost to the City, except the cost of shipping the failed modules. All warranty documentation shall be given to the City Engineer prior to installation.

21.20 PEDESTRIAN SIGNALS AND PUSH BUTTONS

- A. PEDESTRIAN SIGNALS AND PUSH BUTTONS shall meet State Standard Specifications, City's Authorized Material List, or as directed by the City Engineer. Type SP-1-T pedestrian signal mountings shall have an upper and lower mounting bracket attached to the pedestrian signal housing in the same manner as that shown on the State Standard Specifications and Standard Plans.
- B. PEDESTRIAN PUSH BUTTONS SHALL be in compliance with current Federal Americans with Disabilities Act requirements. The Contractor shall submit shop drawings and specifications to the City Engineer for approval.

21.21 TRAFFIC DETECTION

- A. LOOP DETECTION - Loop detector construction or loop detector repairs shall meet State Standard Specifications and Standard Plans or as directed by the City Engineer. In lieu of loop detection, the City may use video detection at intersections.
 - 1. Loop wire shall be Type 2.
 - 2. Loop detector lead-in cable shall be Type B.
- B. VIDEO DETECTION – MULTI SENSOR VIDEO DETECTION SYSTEM (MSVDS) - MSVDS shall meet State Standard Specifications, City’s Authorized Material List, or as directed by the City Engineer.

The MSDVS shall consist of video imaging and radar. The system shall detect and track vehicles and bicycles at distances over five hundred (500) feet. In a low-visibility condition, the system shall be capable to switch automatically to either radar detection mode or constant call mode. The MSVDS shall fuse vehicle information from the two sensors to provide highly accurate and precise detection for simultaneous stop bar presence detection, advanced detection, and special or advanced applications. The System shall provide a sufficient number of cameras to process vehicles presence, advanced, and all system detection zones as shown on the Construction Plans. All equipment, system components, cables and hardware must be from the same manufacturer.

The Contractor shall, at his own expense, arrange to have a qualified signal technician from the manufacturer present to program the programmed MSVDS Sensor/Camera to the satisfaction of the City Engineer, at the time the traffic signal is placed in operation.

- 1. System Hardware - Unless otherwise required by the City, the MSVDS shall consist of hybrid video camera/radar sensors for all approaches, a shelf mounted for factor Central Control Unit (CCU) with up to four (4) detection processors capable of processing from up to four (4) sensors, video surge suppressors, a seven (7) inch monitor, keyboard, system software, and a pointing device. Should the intersection be a multi-arterial intersection or an intersection with more than four (4) legs, there may be additional requirements by the City. Verify detection system requirements with the City prior to initiating construction work.
- 2. System software shall discriminately detect the presence of individual vehicles and bicycles in a single, or multiple lanes using only the video image and sends vehicle, and bicycle calls out to the controller via separate outputs. The system software shall also utilize artificial intelligence and deep learning to automatically count and detect pedestrian movements in the crosswalk, count turning movement counts and learn the background to count and distinguish left, through and right turn movements. The system software shall be able to work simultaneously with the City’s traffic signal monitoring software system Centracs and controller assembly. Coordination with the City’s communication network may be required to establish

a connection to the City's traffic signal network. A minimum of thirty-two (32) video detection zones and thirty-two (32) radar detection zones per sensor shall be available.

3. In addition to creating vehicle and bicycle zones, the system shall provide a tracking mechanism that counts pedestrian volumes moving within the crossing zone and determines the average, maximum, and minimum speed of pedestrians moving within the crossing zone. The system shall also provide discrete outputs when pedestrians are in the crosswalk, during normal crossing phases (one in each direction of travel) and when a red phase input has been detected. The system also shall provide a visual indication on the video image that a pedestrian is in the crosswalk. Central Control Unit (CCU)
4. The CCU shall be a single detector card width and provide provisions for up to four sensors/cameras. The Detector Processor shall be embedded in the CCU to provide one single cabinet interface. Each sensor/camera shall be connected to the CCU via Ethernet cable. The interface connectors shall be RJ-45 type. The CCU shall have four detection status LEDs on the front panel. The CCU shall enable the loading of modified or enhanced software through the Ethernet or front-panel USB port (using a USB thumb drive). The shelf-mounted format CCU shall be powered by a forty-eight (48) V DC power supply. The CCU power consumption shall not exceed One-Hundred-Fifty (150) Watts. The CCU shall have logic inputs for future use. MSVDS Sensor/Camera.

The MSDVS Sensor shall have two components: a camera sensor and a radar sensor. The MSVDS Sensor shall utilize a single CATSE or CAT 6 cable for power, communications and video. Cable termination at the camera shall not require crimping or special tools. An optional RJ-45 direct connector shall be made available to the City upon request.

The MSVDS Sensor/Camera shall detect vehicles, bicycles, and pedestrians in real time as they travel across each camera detection zone. Vehicles, bicycles, and pedestrians' detection outputs shall be on separate channels with the same field of view. The MSVDS Sensor/Camera shall default to a safe condition, such as a constant call on each active detection channel, in the event of unacceptable interference or loss of the video and/or radar signal.

The MSVDS Sensor Camera and sensor system shall have the capability to change the characteristics of the detection zone based on external inputs such as signal phase. Each detection zone shall be able to switch from one zone type (i.e., presence, extension, pulse, etc.) to another zone type based on the signal state.

21.22 EMERGENCY/TRANSIT VEHICLE PRE-EMPTION SYSTEM

- A. EMERGENCY/TRANSIT VEHICLE Pre-Emption System shall meet the City Standard

Specifications, City's Authorized Material List, Manufacturers recommendations or as directed by the City Engineer.

- B. ALL NEW OR MODIFIED TRAFFIC signals shall have Global Positioning Transit Priority System (GPTSPS) for all directions of approach on public streets. The system is a matched system of emergency/transit vehicle equipment and intersection equipment that utilizes data encoded radio communications to identify the presence of emergency/transit vehicles to advance and/or hold a desired traffic signal display selected from phases normally available. The GPTSPS system must communicate with emergency/transit vehicles and other intersection radios at distances up to two-thousand five hundred (2,500) feet with no obstructed direct line of sight, unless defined otherwise.
- C. THE CONTRACTOR SHALL, at his own expense, arrange to have a qualified technician from the manufacturer present to program the GPTSPS to the satisfaction of the City Engineer, at the time the signal heads are placed in operation.

21.23 LUMINAIRES

- A. LUMINARIES FOR SAFETY LIGHTING at the signalized intersection shall meet State Standard Specifications, City's Authorized Material List, or as directed by the City Engineer. Luminaires shall be Light Emitting Diode (LED) with Type II or III, medium cutoff distribution per City Standard Detail #613.

21.24 PHOTOELECTRIC CONTROLS

- A. PHOTOELECTRIC CONTROL FOR INTERSECTION safety lighting and internally illuminated street name signs shall be operated together with a Type II Photoelectric control. Contactors shall be the mechanical armature type.
- B. PHOTO-ELECTRIC CONTROLS SHALL BE "LONG LIFE," or approved equal. All light systems shall have an external photocell control mounted within the assigned service pedestal, unless the power for the light is fed directly from a service provider, (i.e., there is no service pedestal), which will have a dedicated photocell in the luminaire.

21.25 RESERVED

21.26 RESERVED

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21.30 TESTING

- A. ALL TESTING OF TRAFFIC SIGNAL components and equipment installed shall meet State Standard Specifications and these City Standard Construction Specifications.
- B. PRIOR TO THE START OF FUNCTIONAL TESTING, the Contractor shall perform the following tests on all circuits, in the presence of the City Engineer.
 - 1. Testing of all electrical components.
 - 2. Inductive Loop Detector meg/ohm test.
 - 3. Two (2) week minimum safety lighting “burn in” test.
 - 4. Field Wiring “flash out” testing.
 - 5. EVP functional test.
 - 6. Video equipment system testing.
 - 7. GPTSPS testing.
 - 8. Other tests that may be required by the State Standard Specifications or the City.
- C. ENGINEER TO VERIFY TRAFFIC SIGNAL functionality. For example, an initial insulation resistance test shall be performed on each inductive loop detector at the pull-box adjacent to the loop. A final insulation resistance test shall be performed on the inductive loop detectors at the controller cabinet after said detectors have been installed in accordance with the details shown on the plans and the final splices have been made between the loop conductors and the lead-in cables.

21.31 AS-BUILTS

- A. THE CONTRACTOR SHALL KEEP accurate records on a set of project blue line prints (24" x 36") of all additions and deletions to the work, and of all changes in location, elevation and character of the work not otherwise shown or noted on contract plans.
- B. “RECORD DRAWINGS” CONSTRUCTION PLANS shall be provided with changes to the original contract work shown in red color. The Contractor shall transmit the “As-Built” plans to the City Engineer for approval. Details to be shown on the “As-Built” plans shall include, but not be limited to, type and installed depth and location of conduit runs, location of pull boxes, location of foundations and changes made to any facilities.
- C. “RECORD DRAWINGS” PLANS SHALL BE signed and dated by the Contractor or the Subcontractor that actually constructed the facility. In addition, company names of the Contractor and Subcontractors and contact information shall be shown.
- D. THE COSTS OF RECORD KEEPING and preparing accurate “Record Drawings” field prints shall be considered as included in the contract lump sum price paid for various contract items of electrical works involved and no additional compensation will be allowed, therefore.

21.32 SCHEDULE OF VALUES

- A. THE CONTRACTOR SHALL, prior to commencement of work, provide to the City Engineer a cost breakdown for the contract lump sum items of electrical work as specified in the City Capital Improvement Contract Documents.
- B. THE CONTRACTOR SHALL DETERMINE the quantities of the items required to complete all work shown on the plans. Such quantities and their values (including labor, equipment, and materials) shall be included in the cost breakdown submitted to the City Engineer for approval. The sum of the quantity unit's times the unit prices shall equal the contract lump-sum bid for each item of electrical work. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost breakdown submitted for approval. Unbalancing of the unit prices will not be allowed.
- C. OVERHEAD, PROFIT, BOND PREMIUM, temporary construction facilities and other such items shall be included in each individual unit listed in the cost breakdown, however, costs for traffic control system shall not be included.
- D. NO ADJUSTMENT OF COMPENSATION will be made in the contract lump sum price paid for various items of electrical work due to any differences between the quantities shown in the cost breakdown furnished by the Contractor and the quantities required to complete the work. The cost breakdown shall, as a minimum, include the following items:
 - 1. Foundations - each type including controller foundation.
 - 2. Standards and poles - list by each type.
 - 3. Conduit - list by each size and installation method.
 - 4. Trenching by method and depth.
 - 5. Pull boxes - each type.
 - 6. Conductors - each size and type.
 - 7. Service equipment enclosure each type by wiring diagram.
 - 8. Controller assembly including cabinet - list each type.
 - 9. Emergency vehicle pre-emption discrimination modules - each type.
 - 10. Emergency vehicle pre-emption optical detectors - each type.
 - 11. Signal heads and hardware - list each type.
 - 12. Pedestrian signal heads - each type.
 - 13. Pedestrian push buttons - each.
 - 14. Loop detectors - list by type and size.
 - 15. Traffic signal video detection equipment - each.
 - 16. CCTV Equipment - each.
 - 17. Luminaires - each type.
 - 18. Detector handholes - each.
 - 19. Internally Illuminated Street Name Signs - each type.
 - 20. Lighting Protection - each type.
- E. The costs of preparing the cost breakdown for each lump sum item of electrical works shall be considered as included in the contract lump sum price paid for various items

of electrical works involved and no additional compensation will be allowed therefor.

21.33 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

- A. SALVAGED ELECTRICAL MATERIALS shall be delivered to the City of West Sacramento, Corporate Yard, 4300 West Capitol Avenue, West Sacramento, California 95691. Deliveries shall be coordinated by contacting the Utilities Maintenance Superintendent at (916) 617-4850 between 8:00 a.m. and 3:30 p.m., Monday through Friday, a minimum of two (2) working days prior to delivery of material.
- B. THE CONTRACTOR SHALL PROVIDE EQUIPMENT, as necessary, to safely unload and stockpile the material at his own expense.

21.34 DISPOSING OF ELECTRICAL EQUIPMENT

- A. ALL BALLASTS AND TRANSFORMERS and all fluorescent and mercury lamps shall be disposed of in accordance with the California Department of Health Services Regulations set forth in Title 22, Division 4, Chapter 30, of the California Code of Regulations (CCR.)
- B. THE CONTRACTOR SHALL PACKAGE and ship recyclable hazardous waste via a currently certified hauler in conformance with Article 12, Chapter 30 of Title 22 CCR and all other applicable local, State, and Federal regulations.
- C. THE CONTRACTOR SHALL FURNISH the City Engineer with a statement as to which certified hauler and which certified recycler he proposes to utilize, together with a copy of the recycler's interim status document and/or a copy of the variance letter from the Department of Health Services. Said statement shall be furnished to the City prior to the removal of the recyclable hazardous waste.
- D. THE CITY OF WEST SACRAMENTO ASSUMES generator responsibility for these wastes. The City Engineer will prepare the Hazardous Waste Manifest for Shipment.
- E. FULL COMPENSATION FOR HAULING, stockpiling, and disposal of fluorescent and mercury lamps shall be considered as included in the contract lump sum price paid for various items of electrical works involved and no additional compensation will be allowed therefor.
- F. HANDLING AND DISPOSING OF electrical material containing PCB, after removal, will be paid for as extra work as provided in Section 14-11.03 "Hazardous Waste Management" of the State Standard Specifications.

21.35 PAYMENT

- A. THE CONTRACT LUMP SUM price paid for signal and lighting shall include all labor, materials, tools, and equipment to furnish and install traffic signal, internally illuminated street name signs, and intersection safety lighting at each location.
- B. ALL OTHER HIGHWAY AND STREET lighting work shall be considered as included in the

contract price paid for various items of electrical works as indicated in Section 18.23 "Measurement and Payment" of Street lighting.

- C. SIGNAL INTERCONNECT WORK SHALL BE considered as included in the contract lump sum price paid for signal interconnect and no additional compensation will be allowed therefor.
- D. FULL COMPENSATION FOR HAULING and stockpiling electrical materials shall be considered as included in the contract lump sum price paid for various items of electrical works involved and no additional compensation will be allowed therefor.