

SECTION 421

SIGNAL AND LIGHTING SERVICE SYSTEMS

421.1 GENERAL: This work shall consist of furnishing and installing service poles, service connections, and lighting control cabinets in compliance with the specifications, details shown on the plans, and Standard Drawings at the locations shown on the plans, or as established by the ENGINEER.

421.2 REFERENCES

421.2.1 American Association of State Highway and Transportation Officials (AASHTO) Standard Specifications, Latest Edition

M133 Preservative and Pressure Treatment Process for Timber

421.2.2 American Society for Testing and Materials (ASTM) Standard Specifications, Latest Edition

A36 Structural Steel

A307 Carbon Steel Bolts and Studs; 60,000 psi Tensile

421.2.3 National Electrical Code (NEC), Latest Edition

421.2.4 National Electrical Manufacturers Association (NEMA) Standards, Latest Edition

421.2.5 Underwriters Laboratories

421.2.6 This Publication, Latest Edition

SECTION 101 PORTLAND CEMENT CONCRETE

SECTION 102 STEEL REINFORCEMENT

SECTION 420 GENERAL CLAUSES FOR TRAFFIC SIGNAL AND STREET LIGHTING SYSTEMS

SECTION 501 EXCAVATIONS AND BACKFILL FOR STRUCTURES

SECTION 701 TRENCHING, EXCAVATION, AND BACKFILL

SECTION 1502 SUBMITTALS

421.3 MATERIALS.

421.3.1 SERVICE POLE

421.3.1.1 Materials for service poles shall conform with the details shown on the plans and the requirements in the special provisions. Timber poles treated in conformity with the requirements of

AASHTO M 133 shall be provided. The pole shall be of the size called for on the plans and as a minimum shall be butt treated.

421.3.1.2 Normal service requirements for traffic signals shall be 120/240-volt, 60-cycle, 3-wire solid neutral power, and for multiple lighting systems shall be 240/480-volt, 60-cycle, 3-wire solid neutral power, unless otherwise specified in the plans or special provisions.

421.3.1.3 Service switches, when required, shall be a circuit breaker type or a disconnect switch, type HD, with fuses, with capacity and ratings as shown on the plans or in the special provisions. The service switch shall be enclosed in a NEMA raintight housing with a hinged cover. The cover shall stay in position when open and shall have a hasp for a padlock. The switch and housing shall be approved by UL.

421.3.2 SERVICE RISER: Materials for service risers shall conform with the requirements of this Section 421 and details shown on the plans, when electrical service is to be installed on an existing pole.

421.3.3 METER PEDESTAL

421.3.3.1 Materials for meter pedestals shall conform with the details shown on the plans, the requirements of the NEC, and the following requirements:

421.3.3.2 Meter pedestals shall be constructed of 14 gauge steel with corrosion resistant finish.

421.3.3.3 Meter socket shall have a minimum rating of 100 amp and be factory wired in separate wireway from terminal block to meter socket.

421.3.3.4 For services larger than 100 amp, a factory-rated 200 amp pedestal shall be used.

421.3.3.5 Insulated stud terminal blocks or bus pads shall be used to accommodate connectors.

421.3.3.6 Pedestal bonding lug grounding conductors must be continuous to the breaker panel grounding terminal.

421.3.3.7 Termination section shall have a removable raintight cover with provision for padlocking over captive pentahead bolt. All other removable portions of termination section must be sealable.

421.3.3.8 Meter pedestal shall be anchored securely to concrete foundation. Concrete foundation and anchoring system shall conform with the details shown on the plans or as shown herein.

421.3.4 SERVICE CONNECTION: Service connections (connection to existing service pole, service riser, transformer, or meter pedestal) shall conform with the details shown on the plans and the requirements of the NEC.

421.3.5 LIGHTING CONTROL CABINET

421.3.5.1 Materials for lighting control cabinets shall conform with the details shown on the plans, the requirements of the NEC, and the following requirements:

421.3.5.2 Cabinets shall be fabricated from 14 gauge steel with a durable finish consisting of a corrosion resistant durable finish.

421.3.5.3 Cabinets shall be REA approved, ground mounted, tamper proof, and lockable.

421.3.5.4 Cabinets shall be suitable for 25KV systems with ground nut and ground lug.

421.3.5.5 Cabinet hardware shall be stainless steel including hinges.

421.3.5.6 Mounting brackets shall be furnished for attaching contactors, photo electric cells, junction boxes and other auxiliary equipment.

421.3.5.7 Lighting Control Cabinet shall be anchored securely to concrete foundation. Concrete foundation and anchoring system shall conform with details shown on the plans.

421.3.6 PHOTOELECTRIC CONTROLLER

421.3.6.1 Materials for photoelectric controllers shall comply with the details shown on the plans.

421.3.6.2 The photoelectric unit shall consist of a light-sensitive element connected directly to an internal control relay without intermediate amplifications. The unit may be either the horizontal-sensing or zenith-sensing type and shall have turn-on at 1.5 ± 0.5 horizontal footcandles and a turn-off at a maximum of 5.6 footcandles with a minimum difference of 0.8 footcandle between turn-on and turn-off. The load rating shall be 1800 watts minimum (HID load).

421.3.6.3 The base of the unit shall be provided with a three-prong, EEI-NEMA standard, twist-lock type plug mounting which will enable the unit to be

mounted directly on luminaires or by the use of an adapter base on pole tops or sides. The controllers shall normally work in conjunction with external auxiliary load relays for handling required lighting loads.

421.3.6.4 Unless otherwise specified, the supply voltage rating shall be the same as the system voltage noted on plans. The minimum operating temperature range shall be -40 degrees F to 140 degrees F. The power consumption of the controller shall be less than 12 watts.

421.3.6.5 When the north sky illumination in the area falls to a preset value, the lighting load shall be turned on. A potentiometer to vary the turn-on value within the operating range shall be easily accessible for adjustment. A time delay shall be incorporated into the circuit to prevent street lights from being turned off at night by transient lights which might be focused on the controller. The controlled lighting load shall remain on or become energized in the event of any functional failure of the electronic circuit. The controller shall be equipped with a lightning arrestor capable of handling 500V at 35,000 amps.

421.3.7 AUXILIARY CONTACTOR

421.3.7.1 The contactor shall work in conjunction with a photoelectric controller and the specified lighting loads. The contactor shall be normally open and shall be double-pole, unless otherwise specified.

421.3.7.2 The contactor shall be of the electrically held type, designed to withstand lamp load inrush current and to carry full rated current on a continuous basis. The operating voltage and load rating shall be as noted on the plans.

421.3.7.3 A three position switch to permit manual operation of the lighting circuit shall be provided. The switch shall be furnished and installed with an indicating nameplate reading "PHOTO-OFF-MANUAL." The switch shall be toggle or rotary type, double-pole, triple-throw, center-off position, and shall be rated as required on the plans.

421.4 CONSTRUCTION REQUIREMENTS.

421.4.1 GENERAL

421.4.1.1 Service points shown on the plans are approximate. The CONTRACTOR shall obtain the exact location from the electric utility. The ENGINEER shall approve the final location before any service installation work is started. In the event a major change in location from that shown on the plans is required, the ENGINEER will determine the final location and the service run will be adjusted as per the contract unit price.

421.4.1.2 The CONTRACTOR shall obtain all necessary permits and electrical inspections required for service attachment. Approval of the ENGINEER shall be given before hook-up.

421.4.1.3 The CONTRACTOR shall have the OWNER shown as the customer of record for the electric utility in accordance with Section 420-General Clauses for Traffic Signal and Street Lighting Systems.

421.4.2 SERVICE POLE

421.4.2.1 Conduit shall be attached to the pole as shown on the plans. Where necessary, condulets, covers, and gaskets shall be provided and installed.

421.4.2.2 Conduit used in the service installation above ground shall be rigid steel, galvanized-type of the size specified on the plans or in the special provisions. In areas where rigid steel conduit is coupled to rigid PVC conduit used for the underground portion of the service run, joining of the conduits shall take place underground from two (2) inches to ten (10) inches below the surface. The conduit shall be securely bonded to the surface pole and the service pole ground system as required by the NEC.

421.4.2.3 Conduit, switches, and other necessary material shall be mounted on the service pole as shown on the plans. When called for, the backing board shall be 3/4-inch thick Douglas Fir Grade B-B or better exterior type plywood. The plywood shall be painted two coats of approved exterior grey paint for weatherproofing. Special care shall be taken to insure that the edges of the plywood are well sealed against moisture and general weathering.

421.4.2.4 The layout, connections, and mounting details of the various switches and associated equipment shall be as shown on the plans or as indicated in the special provisions. All switches, fittings, and necessary equipment shall be furnished and installed.

421.4.2.5 Meter sockets as required by the service utility company shall be furnished and installed as shown on the plans. The service utility company will supply and install meters.

421.4.3 SERVICE RISER: Service risers shall be installed on existing poles at locations shown on the plans. The installation of service risers shall conform to the requirements of this Section 421 and details shown on the plans. Service risers shall be installed on the quadrant of the existing pole as shown on the plans or as designated by the service utility company.

421.4.4 METER PEDESTAL: Meter pedestals shall be installed at locations shown on the plans and a minimum of ten (10) feet from the service pole. The installation of meter pedestals shall conform to the details shown on the plans.

421.4.5 SERVICE CONNECTION: Service connections shall be installed at an existing service pole, service riser, meter pedestal, or at a location shown on the plans. The installation of service connections shall conform to the details shown on the plans.

421.4.6 LIGHTING CONTROL CABINETS: Lighting control cabinets shall be installed at locations shown on the plans or determined by the ENGINEER. The cabinets shall be installed plumb on a concrete foundation with necessary grout or caulking to provide a weather resistant, dust tight installation. The installation of lighting control cabinets shall conform to the details shown on the plans.

421.5 MEASUREMENT AND PAYMENT.

421.5.1.1 Measurement of service poles including all materials shown on the plans, either with or without meter sockets and disconnect switches, will be measured by the unit complete in place.

421.5.1.2 Measurement of service risers including all materials shown on the plans, either with or without meter sockets and disconnect switches, will be measured by the unit complete in place.

421.5.1.3 Measurement of meter pedestals including concrete foundation will be measured by the unit complete in place.

421.5.1.4 Measurement of service connections will be measured by the unit complete in place.

421.5.1.5 Measurement of lighting control cabinets, including concrete foundation and all materials shown on the plans, will be measured by the unit complete in place.

421.5.2 The accepted quantities of service poles, service risers, meter pedestals, service connections, and lighting control cabinets will be paid for at the contract price per unit of measurement for each of the pay items listed as shown on the bid proposal.