DIVISION 7. STREET LIGHTING & ELECTRICAL

7-10 GENERAL:

This section describes Street Lighting Standards for development within the City of Bremerton. Street Light(s) or Street Lighting referred to in this standard is defined as that street lighting owned and maintained by the City of Bremerton. Existing lighting on public right of way that is not currently owned and maintained by the City shall be replaced by new lighting, designed and installed in accordance to City Standards. The owner or developer shall pay for design and installation and deed to the City once the City has approved of such installations.

This street lighting standard sets minimum illumination levels and uniformity for various classifications of roadways within the City of Bremerton. Lighting systems are to be designed to meet the desired illumination in accordance with these Standards.

7-10.1 Standards and Regulations:

7-10.1 (A) Conformance with All Applicable Codes

All electrical equipment shall conform to the requirements of these Specifications, the plans and special provisions, all material and work shall conform to the requirements of the following in the order noted:

ANSI / IESNA American National Standard Practice for Roadway Lighting (RP-8)
Roadway Lighting Design Guide (AASHTO)
Latest adopted (by Washington State) edition of the National Electrical Code (NEC).
Laws, Rules, & Regulations for Installing Electric Wires & Equipment, Department of Labor & Industries, State of Washington (L&I).
National Electrical Manufacturers Association (NEMA).
American Society for Testing and Materials (ASTM).
Illumination Engineering Society (IES).
American Standards Association (ASA).
Puget Sound Energy (Puget Power).
City of Bremerton Street Lighting Design Standard Drawings (City Standard Drawings).
American National Standards Institute (ANSI).
Washington State Standard Specifications for Road, Bridge and Municipal Construction (Standard Specifications).
Washington State Standard Plans for Road, Bridge and Municipal Construction (Standard Plans).
All material must be Underwriters laboratories Listed (UL)
Other City ordinances or requirements that may apply.

Prior to start of work, all necessary licenses, permits and approvals shall be obtained. The Contractor shall comply with all laws, ordinances, rules, orders, and regulations relating to the performance of the work, the protection of adjacent property and the maintenance of all other facilities. The Contractor will be required to comply with all the provisions of these instruments and shall save and hold the City harmless from any damage which may be incurred as a result of the Contractor's failure to comply with all the terms of these permits.

The Contractor is advised that an Electrical Work Permit from the State Department of Labor and Industries is required for all projects.

7-10.1 (B) Design Standards

Street lighting shall be designed in conformance with these specifications, and the most current version of the ANSI / IESNA American National Standard Practice for Roadway Lighting (RP-8) except as modified by this standard. Conformance shall be obtained by calculations meeting the requirements of the City Standards.

All luminaires shall have a nominal correlated color temperature (CCT) of 3000 Kelvin.

All street lighting designs must be approved by City of Bremerton Engineering Department.

7-10.2 Roadway Classification:

Roadway classifications are based on Bremerton Standard Detail Drawing 3001 for Functional Roadway Classification.

7-10.3 Street Lighting Required:

Street lighting shall be required for all lots and parcels being developed or constructed upon. Street lighting will also be required for any frontage of existing streets not already illuminated.

In addition, street lighting may be required for lots and parcels containing existing structures which are being improved or altered, depending on the nature and extent of the work. Placement of the street lighting will be in accordance to the engineered lighting design.

Street lighting will not be required for a single residence.

7-10.4 Developer’s Responsibility for Relocation of Existing Street Lights:

Existing street lighting that must be relocated or repositioned, as a result of the construction of new streets or driveways into a development shall be the responsibility of the developer.

7-10.5 Utility Company Authorization:

A written notice from the serving utility company, stating that line clearances and service have been checked and are adequate, shall be submitted to the Engineer for all developments.

7-10.6 Submittal Requirements:

A full submittal shall be dropped off to the City of Bremerton Electronics Division personnel. The submittals shall consist of:

Catalog cuts that clearly identifies all poles, base type, lighting fixtures, service cabinets, junction boxes, lamps, photoelectric eyes, splice methods, wire, fuse holders and products that are to be used in this project.

Completed Bremerton Standard Drawing for Lighting Design Summary.

Lighting System Design drawing showing pole locations and conduit runs, per. Bremerton Standard Drawings.

Pole Schedule giving pole heights, base type, pole arm lengths, pole identification numbers, and luminaire wattages, per Bremerton Standard Drawings.

Conduit Wiring Schedule giving conduit run number, conduit size and type, number and size of lighting conductors in each conduit run, number and size of grounding conductors in each conduit run, number and size of service conductors in each conduit run, number and size of photoelectric eye conductors in each conduit run, number and size of any miscellaneous conductors in each conduit run, and any special notes about each conduit run, per Bremerton Standard Detail Drawings.

Riser diagram per Bremerton Standard Detail Drawings.

Any other information or calculations necessary to verify that the submitted design meets this specification.

7-20 STREET LIGHTING - SPECIFICATIONS

7-20.1 Luminaires:

Two types of street lighting installations are permitted:

- Standard - Uses metal galvanized tapered poles and mast arms, referred to as Type 1, ranging in mounting heights from 25 to 40 feet.

- Decorative - Uses a pole with a design that has been approved for the local area, roadway, trail, or zone. The design of the pole may be found within the sub-area plan or similar document, these standards, or prescriptive by their previous use in an area, roadway, trail, or zone.

7-20.1(A) Lighting Pole Identification:

Assignment of the pole numbers shall be by the Electronics Division who will also install the stickers.

Pole Marking – Manufacturer Plate

Manufacturer

Part Number
Pole Length
Arm Length

7-20.1(B) Spare Lighting Poles:
Depending on the type of poles and quantity of poles used in this project, spare replacement poles may be required. Confirmation of whether spares are required shall be by the Electronics Division. The spare replacement poles shall be delivered to a site in the City as directed by the Electronics Division.

7-20.2 Luminaires:
The type of street light luminaire and lamp wattage shall be specified on the plans. All luminaire heads are to be Light Emitting Diode (LED) with dimmable drivers.

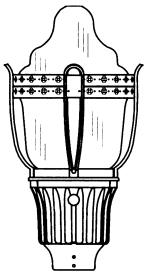
The light distribution pattern for each luminaire shall be specified on the plans.

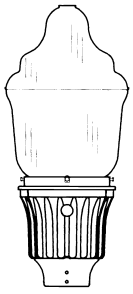
Luminaries shall have:

Corrosion resistant hardware.
Universal voltage drivers.
Must be UL Listed.
A photoelectric control receptacle (7 pin) shall be installed on each fixture.
Type 1 luminaires are to be a Gray paint finish, decorative to match the color of the pole.
Luminaries are to be leveled.
Luminaires and poles in the Central Business District shall be in accordance with Bremerton Standard Drawings 7022 through 7028.

LED Cobra-Head Luminaries shall be Cooper Lighting or Holophane Lighting Models to match city existing system. Drawing 7005.

LED Decorative Luminaires for neighborhoods or other areas shall be Holophane lighting to match City existing system. The luminaire shall be UL listed as suitable for wet locations at a maximum 60 degree C ambient temperature. A choice of the following two fixture styles may be used. Drawing 7006.


Acorn


GranVille

7-20.3 Photoelectric Controls:

Control of the street lighting is by a master photocell. This photocell controls a lighting contractor in a pad mount electrical service cabinet. The photo cell will be mounted atop the nearest light pole to the service cabinet. The photo cell will be a twist lock configure with the window pointing north and instant on/off operation, designed to turn on at 3 foot-candles, rated to operate over the voltage range of 105 to 305 volts AC, 60 Hz. The seven (7) pin turn lock shall meet the requirements of ANSI. Photoelectric control installation shall be per Bremerton Standard Detail Drawing 7017.

7-20.4 Electrical Connections At Light Pole Bases:

Electrical connections at light pole bases shall be per Bremerton Standard Drawings.. Fuse connectors shall be installed in every light pole base. Not in Junction boxes. See Drawing 7004.

7-20.4(A) Luminaire Fusing:

Fuse connectors shall be manufactured by SEC (Signal Electric Company). . The fuse holders shall be readily accessible from the Light Pole handhole, and have eighteen inches (18) of slack in the conductors.

Luminaire fusing for Lighting Poles shall conform to Bremerton Standard Drawings. Fuses shall be 13/32” x 1 1/2” Dual Element Time Delay Fuse - Bussman Type FNM, Reliance MEN, Gould-Shawmut TRM, or approved equal with the appropriate current rating as per Bremerton Standard Drawings. See Drawing 7019.

7-20.5 Service:

The Service Cabinet shall be Underwriter Laboratory listed and labeled for service entrance use. Metering is required on all installations. See City of Bremerton Standard Drawings. Lighting branch circuits are sized to maximum 80% of the branch circuit ampacity. Lighting branch circuits can be 20 or 30 amperes. Available fault current at the service point of the Service Cabinet is assumed to be 10,000 Amperes. Contractor is responsible to determine available fault current. If greater than 10,000 AIC a higher rated AIC main breaker is required, and conformance with NEC. The minimum service size is 200 amp at 240 volt. Service size may be increased to as large as 250 amps at 240 volts based on the engineered approved drawings.

7-20.5(A) Electrical Service:

The electrical service shall be obtained from Manufacturer by the Contractor upon the Contractor's request and full expense. The contractor shall energize the street lighting service in the contractor’s name and operate the system trouble free for a period of 90 days after the initial inspection is completed by City of Bremerton Electronics Department. 90 days after inspection / acceptance testing has been performed, approved and all work has been corrected and accepted by the City. The electrical service will then be transferred to the City of Bremerton street lighting account. If there are any additional questions, contact the Public Works Operations at 360-473-5920. The Contractor shall ascertain the requirements of Puget Sound Energy and shall seek

approval from Puget Sound Energy and the Engineer as to locations and type of construction for connecting and mounting service hardware. All service cabinet(s) shall be locked at all times that work is not being performed on the equipment.

Service conductors shall be as indicated on the wiring schedule and also must be copper type XHHW.

All street lighting systems shall have underground service provided. Service points to pole or pad mount transformer shall be provided within a utility easement immediately adjacent to or within the right-of-way and shall be open and easily accessible to the street frontage.

7-20.5(B) Electrical Service Cabinet (General):

The length of conductors within the Service Cabinet shall be sufficient to neatly train the conductor to the terminal point with no excess. Multiple conductors shall be neatly bundled, and secured with suitable nylon ties. Terminations shall be made so that there is no bare conductor at the terminal. The conductor insulation shall bear against the terminal or connector shoulder.

All galvanized conduit in contact with concrete shall be wrapped with 2" wide, 10 mil thick electrical tape, Scotchwrap 50 or approved equal, half lapped. Coat with suitable primer.

The base of the service cabinet shall be sealed to the concrete pad with a polyurethane sealant meeting ASTM C-920, Type S, Class 25, Grade NS. The color shall approximately match the color of the Service Cabinet.

Grounding of the service cabinet shall be per Bremerton Standard Detail Drawings.

Electrical Service fed from Underground Source:

Verify requirements for connections to pad mount transformer with Puget Sound Energy Engineer.
Service entrance conduit can be rigid metallic galvanized or PVC non-metallic schedule 80.
Terminate conduit 2 feet from transformer vault.
End bell for PVC conduit.
Phenolic bushing for rigid metallic galvanized.
Provide 6" of sand backfill above and below exposed conductors.
Electrical Service fed from overhead source.
Continuous conduit from service cabinet to Puget Sound Energy Pole.
Extend up pole to height as determined by Puget Sound Energy engineer or PSE handbook.
Install a PVC weather head.
Rigid metallic galvanized conduit.
Pole riser per. Bremerton Standard Detail Drawing 7018.

7-20.5(C) Electrical Service Cabinet

Service cabinet shall be Skyline Series #65100 per Bremerton Standard Detail Drawing or approved equal with the following minimum requirements:

- Cabinet
  - Shall be UL listed;
  - NEMA 3R construction, pad mount, 21" wide x 26" deep x 48" high;
  - 1/8” 5052 H-32 Aluminum Construction;
  - Removable equipment mounting pan;
  - Two screened and gasketed vents, one near the top of cabinet end, the other near the bottom (not in meter section);
  - Hinged deadfront;
- Doors
  - Heavy duty concealed barrel hinges (lift off type);
  - Load Side hinged on left;
  - Line Side hinged on left or right depending on location if opening 180° is impeded by traffic signal cabinet or other object;
  - Stainless steel vault handles, 3 point latch;
  - Closed cell neoprene gasket;
  - Openable to 180 degrees;
  - Padlockable meter door w/ polished wire glass window;
  - Cabinet lock Cores.
    - The locking cores shall be Best 6-pin lock cores with Blue construction cores.
    - The contractor shall coordinate the purchase replacement cores of sufficient quantity to replace all of the blue construction cores included with the cabinet(s) installed in this contract plus one spare.
    - The Contractor shall coordinate the purchase of the lock cores with the lock vendor and the City of Bremerton for delivery directly to the City of Bremerton Electronics Shop.
    - The core The City uses is called a 1C 6 E 1, 626. The core is a small format interchangeable core (SFIC).
  - Card holder;
- Exterior Finish
  - The outside of housing shall not be painter.
  - Dead front and wire way covers white;
- All internal fasteners to be pan head Phillips SS.
- Interior finish: white enamel paint.
- Internal wireway.
- Provide 1/2" diameter mounting holes in bottom flange.
- Cabinet wiring to be stranded, type MTW or SIS copper.
- Panelboard: Minimum 120/240 VAC, 1 Phase, 200 amp mains, 16 space, 10KAIC.

Provide following branch circuits: (See Bremerton Standard Detail Drawings).

20/2 Illumination, one per each lighting contactor required
20/4 Tree lights
15/1 Control
20/1 Signal Branch
20/1 Receptacle Branch
15/1 Heater

Lighting Contactor(s): 30 amp, 2 pole, 600 volt, 120 volt coil, Square D (Number of lighting contactors dependent upon lighting requirements).

Meterbase :200 Amp 5 jaw with bypass block , with 5 jaw at 9:00 position.

The base foundation for the service cabinets shall conform to State of Washington Standard Plans and Sections 8-20 of the Standard Specifications. The foundation will include a pad for maintenance of the cabinet of 6 inches on each side, 24 inches on the back (meter base) side, and 24 inches on the door side as per the Bremerton Standard Plans. All foundations shall include a 3/8 inch diameter plastic drain. A minimum of one spare 2 inch conduit will be installed from the panel side of the service to the nearest junction box.

7-20.6 Junction Boxes:

All junction boxes, shall be concrete with a galvanized steel lid, shown and identified on the submitted plans. All connections and splices shall be made only within junction boxes. Install junction boxes: Two way (in the splice) up to four way are the only acceptable methods. All splices made to the illumination circuits in junction boxes will be made in a Polaris insulated multi-cable connector blocs in accordance with City Standard Drawing 7003.

Enter conduit from the direction of the run. Terminating within 3 inches of the box wall nearest entry. Concrete junction boxes with steel lids shall be sized by number of conduits in the box as per the NEC as identified in Standard Plans, galvanized, with grounding strap, and locking lid, bearing the legend "LT", in conformance with Washington State Standard Plans and will be locking with SS penta head bolt. All junction boxes shall have a minimum of 6 inches of crushed gravel underneath before installation of junction box.

Concrete junction boxes with steel lids shall be used in all locations including where the junction box will be in the sidewalk.

Junction boxes shall be installed at:

Locations where two or more conduit runs intersect.
Where conduit runs are more than 300 feet long.
Where shown on the submitted plans.
At critical angle points.
Locations as directed by the Engineer.

In the sidewalk at the back of the walk whenever possible.
When located in landscape a minimum 6” concrete border shall be poured around entire junction box to assure box will not sink.
Flush with the sidewalk grade, firmly bedded and aligned as directed by the Engineer.

7-20.7 Tree Lighting

Where receptacles for tree lights are to be installed, they are to be Gard-N-Post Low Profile Support Model #GP26B. Refer to City of Bremerton Standard Plan 7007.

7-20.8 Conductors:

All conductors, including quantity and size, shall be identified on the submitted plans.

Voltage drop:

Shall be per NEC requirements.
Size lighting branch circuits for 5% voltage drop.
Size service entrance conductors for 3% voltage drop.
Calculations showing voltage drop for lighting branch circuits are required.

Wire conductors for underground feeder runs, service entrance and for circuitry from the in-line fuse in the poles to the junction box shall be six hundred (600) volt, single conductor stranded copper type, XHHW in accordance with the Insulated Power Cable Engineer's Association Specifications.

Wire conductors inside the pole from the luminaire to the in-line fuse shall be per Standard Specification Section 9-29.3; six hundred (600) volt, Pole and Bracket cable. If the luminaire requires fixture wire temperature greater than 75 C, the outer portion of the cable jacket shall be stripped for that portion of the cable inside the luminaire. The single conductors shall be sheathed with braided fiberglass sleeving of the temperature rating recommended by the luminaire manufacturer.

Minimum conductor size for lighting branch circuits is #10 AWG XHHW, including equipment ground. Minimum conductor size for photoelectric control is #12 AWG XHHW and the same type as mentioned above.

7-20.8(A) Conductor Color Coding:

Color coding shall be accomplished by colored thermoplastic electrical tape, if the conductor is not of the required color. Conductors shall be taped for a minimum of 3”, lapping each turn by 1/2.

Equipment grounding conductors and the grounded conductor shall be color coded per the National Electrical Code.

At each junction box, light standard handhole, and service cabinet, street lighting conductors shall be color coded per phase of the 120/240 volt AC service.

Remote wiring from the Service Cabinet to the photoelectric control shall be color coded as follows:

Black-Line
White-Neutral (grounded conductor)
Red-Load

These conductors shall be XHHW.

7-20.9 Conduit:

All conduit runs, including the size, shall be shown and identified on the plans. The minimum conduit for each conduit run shall be determined according to the NEC, with the minimum size between junction boxes being one and one half (1 1/2") diameter conduit for lighting branch circuits. Larger conduit may be required at the discretion of the City. These conduits shall extend to each end of the project terminating in a junction box for future expansion.

All conduit 90's and risers entering and leaving new or existing junction boxes shall be rigid metallic galvanized conduit. All conduits from the junction box feeding luminaires, tree well receptacles, and festival receptacles shall be rigid schedule 80 PVC.

A spare 2" conduit shall be installed between each junction box and shall extend to each end of the project terminating in a junction box for future expansion.

Conduit installed underground across roadways or driveways shall be Schedule 80 PVC conforming to the NEC. All conduit installed underground shall have Polyethylene Underground Hazard Marking Tape, 6 inches wide, red in color, stating "Caution-Electric Line Buried below", placed approximately 12" above the conduit.

All galvanized conduit in contact with concrete shall be wrapped with 2" wide, 10 mil thick electrical tape, Scotchwrap 50 or approved equal, half lapped. Coat with a suitable primer.

All conduits installed under sidewalk shall be Schedule 40 or 80 rigid polyvinyl chloride (PVC) unless otherwise noted on the plans. PVC conduit shall conform to the NEC.

All conduits from junction boxes to pole and/or tree well receptacle shall be Schedule 40 or Schedule 80 PVC, including conduits for grounding rods.

Conduits terminating in junction boxes shall terminate half way between junction box lid and ground level but never less than 5" from junction box lid or 2" above final grade in bottom of box. Every conduit entering such boxes shall be neatly upswept and contain an equipment ground with a minimum size 8 awg stranded copper, except for spare conduits. The only conduit bends permitted shall be either factory bends or those

formed by the use of an approved conduit bending tool employing correctly sized dies. Conduit entering any electrical enclosures shall be positioned to avoid bending or cutting cabinet braces and cross members that are formed as a part of the electrical enclosure or its pedestal. Such bending or cutting is expressly prohibited.

All metallic conduits in junction boxes shall have grounding bushings and be bonded to the system ground wire and be attached to the ground strap, lid, and box.

Size of all conduits shall be shown on the Plans.

A 200 pound breaking strength true tape with footage measurements shall be pulled into all spare conduit runs. All empty conduits shall be plugged or capped immediately after pulling through a cleaning mandrel and installation of the true tape.

7-20.9(A) Grounding of Illumination System:
The illumination system shall be bonded and grounded in accordance with Bremerton Standard Detail Drawing 7010, 7012, and 7014. Grounding bushings, where required, shall be Thomas & Betts, Blackjack type BG.

7-20.10 Acceptance Testing:
All testing shall be performed in the presence of a representative of the City Electronics Division and recorded on Bremerton Standard Detail Drawing 7009. The project will not be considered acceptable and completed until the completed Bremerton Standard Detail Drawing 7009 is submitted to the City Engineer. Testing may be scheduled through Bremerton One Call at 360.473.5920 with a minimum of three working days notice. Ask for electricians in the Electronics Department.

All measurements will be made with an instrument designed for that purpose and acceptable to the City. The Contractor may use its own instruments to verify readings. If a discrepancy exists, the readings taken with the City's instrument will be considered as the correct readings. If the contractor disputes the City's readings, the City will produce calibration documentation for the instrument or verify the readings with a third instrument.

7-20.10(A) Operational Testing:
The Contractor shall verify the correct operation of the lighting test switch, the master photocell, and the ground fault circuit interrupter receptacle.

7-20.10(B) Voltage Readings:
The Contractor shall take voltage readings at the supply side of the lighting contactor. The voltage readings will be taken with the contactor open (no lights energized) and the contactor closed (all lights on). The readings to be taken are phase A to ground, phase B to ground, and phase A to phase B.

7-20.10(C) Amperage Readings:

The Contractor shall take current readings using a clamp on amp meter with the lighting contactor closed (all lights on). The readings to be taken are phase A at the output of the lighting contactor and phase B at the output of the lighting contactor.

7-20.10(D) Record Drawings:

The contractor shall provide red lined prints of the plans showing as-built information of the field wiring prior to acceptance of the job by the City. Drawings are to be delivered to the City of Bremerton Public Works 100 Oyster Bay Ave, Bremerton Washington, 98312-, Attn: Electronics Department.