

SEATTLE CITY LIGHT WIRELESS ANTENNA INSTALLATION REQUIREMENTS

115/230 kV Steel Transmission Towers and Poles

1. Drawing Submittals

- 1.1. The drawings and all other submittals for each site shall include a reference to the tower number, SCL project number, and the local contact/project manager with a phone number.
- 1.2. The drawings shall contain a note that states that Seattle City Light (SCL) will install and maintain the antennas, coaxial cables and all other wireless equipment on all towers.
- 1.3. The drawings and analysis (see below) are to be signed and stamped by a Washington State licensed professional structural engineer or architect, depending on the type of drawing.
- 1.4. Drawings and shop drawings shall reflect assumptions and findings of analysis, and shall incorporate SCL comments. Drawings shall be sufficiently detailed for construction on towers by SCL crews, and to enable a Parts List to be created. Drawings shall be reviewed and accepted by SCL before construction is scheduled.
- 1.5. Drawings of the proposed installation, including shop and assembly drawings, shall be submitted as follows: 2 sets 11 x 17 paper copy with a corresponding PDF drawing file.
- 1.6. As built drawings shall include 1 set full size paper copy and 1 set 11 x 17 paper copy with a corresponding PDF drawing file.

2. Structural Analysis. When required by SCL, a structural analysis shall include the following:

- 2.1. The structural model assumed in the structural analysis shall consider the "as-is" condition subjected to the structural loading conditions specified in the "Seattle City Light Transmission Line Design Criteria" and provided by SCL. The loading conditions include the National Electric Safety Code (NESC) and other conditions.
- 2.2. A non-linear analysis shall be performed using "Tower" and "PLS-Pole" from Powerline Systems Inc. Complete analysis output files for the proposed installation are required. Analysis of the bolted connections is required. Electronic input files for computer analysis shall be submitted; files to include '*.BAK' files.
- 2.3. A detailed combined stress analysis shall be submitted for the tower member that supports the new wireless equipment mounts. Bending, axial, shear, torsional and any secondary stresses shall be considered, as appropriate. For tubular poles, a separate check for access ports is to be done.
- 2.4. A foundation analysis is required. The foundation analysis shall reflect local soil conditions, when known and available.
- 2.5. New bolts or replacement bolts are to be galvanized ASTM 325 type 0 or better.
- 2.6. Connections to the tower legs shall be made at the joints or immediately adjacent to the joints, see D-36038. For poles, clamping is preferred; chain-mounts are not acceptable.
- 2.7. The structural analysis report shall be stamped by a Washington State licensed professional structural engineer. This report shall be provided to SCL in 2 hardcopies and electronic PDF files.
- 2.8. For poles, non-linear analysis is mandated, and shall include P-delta/large deflection effects and secondary stresses due to structure deflection. Stability, and stresses at the critical levels along the pole shall be determined, presented in a 'stress usage' report. This includes connections for arms/insulators/braces (& guys). Loads are not to be directly modeled on the pole.

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- 2.9. Where pole replacement and guying is necessary due to inadequate strength/stability of the existing pole, deflections of the new pole/foundation shall be determined and the sag & clearance of connected spans should be checked. For dead-end, angle and tangent poles, top deflections should be limited to 1.5%, 2% and 8% respectively.

3. Fences

If a fence is to be placed around the antenna equipment, it shall be a wood or 'plastic wood' fence, not a chain link fence.

4. Ground Resistance Tests, Plans and Reporting

- 4.1 After SCL's preliminary acceptance of a site for further study and design, but prior to the design, a Ground Potential Rise study will be required, and the system needs to be built to meet the touch and step potential requirements. To do the GPR study, the customer will notify SCL, and submit the GPR study request form including the GPR data request, and SCL will provide the system data for calculations required for the study and design shall be in accordance with IEEE Std 80-2000. The study report shall include: 1. Earth Resistivity Test Report, 2. Earth Resistivity Analysis, 3. Overall Data used for the Calculation, 4. Grounding Calculation, 5. Safety Calculation, 6. Recommended Remedy.
- 4.2 All survey data shall be provided to Seattle City Light including distances between electrodes, system configuration, notes of any existing grounding, and the ground resistance measurements.
- 4.3 Due to the complexity of the system and serious worker safety issues regarding the grounding, the test and report must be certified by the signature and stamp of a licensed Professional Electrical Engineer.

5. Electric Distribution and Service

- 5.1. Electric distribution and service will be determined by the serving utility.

6. Antenna, Coaxial Wire and Equipment Attachments

- 6.1. No wireless antenna or equipment shall be installed above or between the electrical powerlines.
- 6.2. Only SCL lineworkers shall install or modify wireless equipment on towers and poles.
- 6.3. Non-destructive connections are required for new attachments. No drilling or welding will be allowed. Any exceptions require written SCL authorization.
- 6.4. There shall be no attachment of any kind to the climbing legs of towers.
- 6.5. Clear distance requirements:
- 6.5.1. All wireless equipment shall be installed 10 vertical feet (min.) from 115kV conductors and 12 vertical feet (min.) from 230kV conductors, see drawing D-36038.

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6.6. Coaxial cable shall be attached as shown on D-36038. Cables are generally to be supported by strapping or suitable means on the inside of the tower leg between joints to reduce wind loading and torsion.

7. Landscaping

- 7.1. SCL's Right of Way Use Policy limits all vegetation to a height of 12 feet. All vegetation selected shall not exceed 12 feet in height at maturity. Vegetation that exceeds 12 feet in height shall be brought into compliance by City Light either by trimming or removal at the expense of the licensee of the right of way.
- 7.2. No vegetation under transmission towers will be placed within 18 inches of the tower legs or so close to the climbing leg that the vegetation would interfere with City Light crews' ability to climb the tower for operations or maintenance. No vegetation outside the transmission towers will be placed within 10 feet of the tower legs.
- 7.3. No pesticides shall be used on the right of way.

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