

**CONSTRUCTION SPECIAL SPECIFICATION****SECTION 16071****SEISMIC PROTECTION FOR ELECTRICAL EQUIPMENT****PART 1 - GENERAL****1.1 REFERENCES**

- A. ASTM E 580 - Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint
- B. FEMA 302 – NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures – Part 1 – Provisions.
- C. FEMA 303 – NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures – Part 2 – Commentary.
- D. UL 1570 - Fluorescent Lighting Fixtures
- E. UL 1571 - Incandescent Lighting Fixtures

**1.2 CODE INFORMATION**

- A. This project is subject to the seismic bracing requirements of the International Building Code, 2003 edition. The following criteria are applicable to this project.
  - 1. Seismic Use Group (Table 1604.5): II
  - 2. Site Class Category (Table 1615.1.1): D
  - 3. Design Spectral Response Acceleration (SDS, Section 1615.1.3): 0.530
  - 4. Site Coefficient (Fa, Table 1615.1.2(1)): 1.4
  - 5. Mapped Spectral Acceleration(Ss Section 1615.1): < 0.75
  - 6. Seismic Design Category (Table 1616.3(1)): D
  - 7. Seismic Importance Factor (IP, Section 1621.1.6): 1.0
  - 8. Component Amplification Factor (aP, Table 1621.3): 1.0
  - 9. Component Response Mod. Factor (Rp, Table 1621.3): 2.5

10. The total height of the structure (h) and the height of the system to be restrained within the structure (z) shall be determined in coordination with architectural plans and the General Contractor.
- B. Forces shall be calculated for the above requirements and Equation 16-67, 68, & 69 in section 1621.1.4, unless exempted by 1621.1.1.
- C. Design the bracing in accordance with FEMA 302 and FEMA 303. It is recommended that the contractor enlist the services of a qualified seismic bracing vendor/supplier. Resistance to lateral forces induced by earthquakes shall be accomplished without consideration of friction resulting from gravity loads. TI 809-04 uses parameters for the building, not for the equipment in the building; therefore, corresponding adjustments to the formulas shall be required. Loadings determined using FEMA 302 and FEMA 303 are based on strength design; therefore, the AISC LRFP specifications shall be used for the design. Provide bracing for identified electrical equipment and systems.

### 1.3 SUBMITTALS

- A. Shop Drawings: Detail drawings along with catalog cuts, templates, and erection and installation details, as appropriate, for the items listed. Submittals shall be complete in detail; shall indicate thickness, type, grade, class of metal, and dimensions; and shall show construction details, reinforcement, anchorage, and installation with relation to the building construction.
  1. Lighting Fixtures in Buildings.
  2. Equipment Requirements.
- B. Product Data:
  1. Copies of the design calculations with the detail drawings. Calculations shall be stamped by a registered engineer and shall verify the capability of structural members to which bracing are attached for carrying the load from the brace.
  2. Contractor Designed Bracing: Copies of the Design Calculations with the Drawings. Calculations shall be approved, certified, stamped and signed by a Registered Professional Engineer. Calculations shall verify the capability of structural members to which bracing are attached for carrying the load from the brace.

### 1.4 SYSTEM DESCRIPTION

- A. The requirements for seismic protection measures described in this section shall be applied to the electrical equipment and systems listed below.
- B. Electrical Equipment: Electrical equipment shall include the following items to the extent required on the Drawings or in other sections of these Specifications:

1. Light Fixtures.
  2. Transformers.
- C. Electrical Systems: The following electrical systems shall be seismically protected in accordance with this specification: Lighting, power, security and communications.
- D. Conduits Requiring No Special Seismic Restraints: Seismic restraints may be omitted from electrical conduit less than 2-1/2 inches trade size. All other interior conduit, shall be seismically protected as specified.

## 1.5 EQUIPMENT REQUIREMENTS

- A. Rigidly Mounted Equipment: Constructed and assembled to withstand the seismic forces in accordance with FEMA 302 and FEMA 303. Each item of rigid electrical equipment shall be entirely located and rigidly attached on one side only of a building expansion joint. Piping, electrical conduit, etc., which cross the expansion joint shall be provided with flexible joints that are capable of accommodating displacements equal to the full width of the joint in both orthogonal directions.

## PART 2 - PRODUCTS

### 2.1 LIGHTING FIXTURE SUPPORTS

- A. Lighting fixtures and supports shall conform to UL 1570 or UL 1571 as applicable.

### 2.2 SWAY BRACING MATERIALS

- A. Rods, Plates, Rope, Angles: As specified in Section 15071.

## PART 3 - EXECUTION

### 3.1 SWAY BRACES FOR CONDUIT

- A. Brace conduit as for an equivalent weight pipe in accordance with Section 15071.

### 3.2 LIGHTING FIXTURES IN BUILDINGS

- A. Pendant Fixtures: FEMA 302 and FEMA 303.
- B. Ceiling Attached Fixtures:
1. Recessed Fluorescent Fixtures: Recessed fluorescent individual or continuous-row mounted fixtures shall be supported by a seismic-resistant

- suspended ceiling support system built in accordance with ASTM E 580. Seismic protection for the fixtures shall conform to the requirements of FEMA 302 and FEMA 303. Recessed lighting fixtures not over 56 pounds in weight may be supported by and attached directly to the ceiling system runners using screws or bolts, number and size as required by the seismic design. Fixture accessories, including louvers, diffusers, and lenses shall have lock or screw attachments.
2. **Surface-Mounted Fluorescent Fixtures:** Surface-mounted fluorescent individual or continuous-row fixtures shall be attached to a seismic-resistant ceiling support system built in accordance with ASTM E 580. Seismic protection for the fixtures shall conform to the requirements of FEMA 302 and FEMA 303.
- C. **Assembly Mounted on Outlet Box:** A supporting assembly, that is intended to be mounted on an outlet box, shall be designed to accommodate mounting features on 4-inch boxes, plaster rings, and fixture studs.
- D. **Wall-Mounted Emergency Light Unit:** Attachments for wall-mounted emergency light units shall be designed and secured for the worst expected seismic disturbance at the site.
- E. **Lateral Force:** Structural requirements for light fixture bracing shall be in accordance with Section 15071.

END OF SECTION