

## 6.4 MECHANICAL, ELECTRICAL, AND PLUMBING COMPONENTS

### 6.4.8 ELECTRICAL AND COMMUNICATIONS DISTRIBUTION EQUIPMENT

#### 6.4.8.1 ELECTRICAL RACEWAYS, CONDUIT, AND CABLE TRAYS

This category covers electrical raceways, conduit, cable trays, and bus ducts. These items may be suspended from above or be floor-, chase-, wall- or roof-mounted.

#### TYPICAL CAUSES OF DAMAGE

- Items may swing and impact structural or other nonstructural elements; they may fall and create electrical hazards.
- Vulnerable locations include seismic separations; wall, floor, or roof penetrations; and attachments to rigidly mounted equipment.

#### Damage Examples



Figure 6.4.8.1-1 Unbraced suspended piping and conduit (Photo courtesy of Wiss, Janney, Elstner Associates).

## SEISMIC MITIGATION CONSIDERATIONS

- Working around electrical equipment can be extremely hazardous. Read the Electrical Danger Warning and Guidelines in Section 6.6.8 of this document before proceeding with any work.
- Two trapeze anchorage details are shown. See Section 6.4.3.1 for additional pipe anchorage details; the same type of bracing is typically used for electrical distribution lines. Refer to FEMA 413 *Installing Seismic Restraints for Electrical Equipment* (2004) for general information on seismic anchorage of electrical equipment and to FEMA 414 *Installing Seismic Restraints for Duct and Pipe* (2004) for many different anchorage configurations for raceways, conduit and cable trays.
- Several engineered seismic bracing systems are available and can be customized for most applications. This is particularly useful for large scale projects or essential applications.

### Mitigation Examples

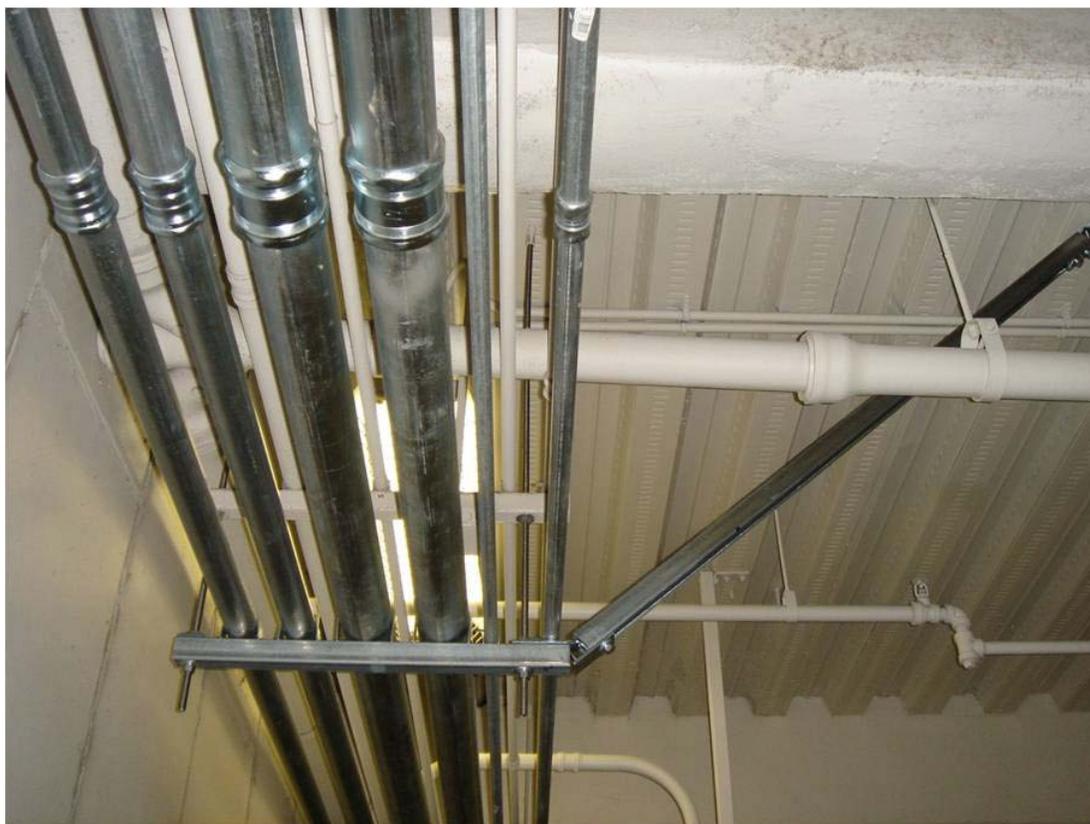


Figure 6.4.8.1-2 Rigid strut bracing provides restraint against earthquake forces perpendicular to the piping. Similar bracing is required in the direction parallel to the conduit (Photo courtesy of Maryann Phipps, Estructure).



Figure 6.4.8.1-3 Rigid strut bracing for trapeze supporting electrical conduit; conduit attached to trapeze with conduit clamp that provides lateral and longitudinal restraint (Photo courtesy of Maryann Phipps, Estructure).



Figure 6.4.8.1-4 Lateral and longitudinal rigid strut bracing for trapeze supporting electrical raceways (Photo courtesy of Maryann Phipps, Estructure).

### Mitigation Details

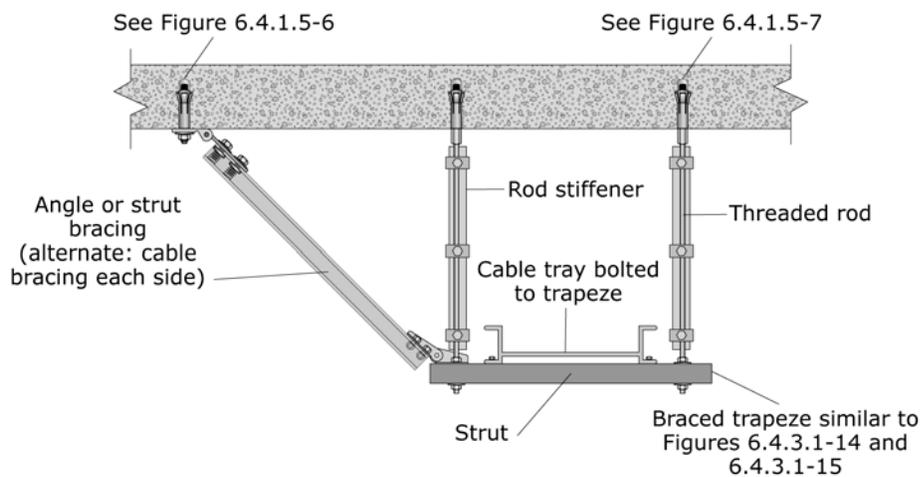


Figure 6.4.8.1-5 Cable tray on braced trapeze (ER).