15 Fire Area Design Guidance

15.1. Purpose

This chapter describes the standard overhead design requirements for all new construction and reconstruction work in California Public Utilities Commission-(CPUC-) defined Tier 2 and Tier 3 fire threat areas **and** California Department of Forestry and Fire Protection (CAL FIRE) zones of high tree mortality (HHZ).

Exceptions: In many cases, CPUC and CAL FIRE requirements are integrated into PG&E standards and will not be listed in this manual. Use the information contained in the *Electric Design Manual* (*EDM*) in conjunction with the currently published standards and **not** in lieu of the standards.

The requirements outlined in this chapter are not intended or required for maintenance and emergency work unless the emergency in response to a fire event requiring a system rebuild.

When designing for reconstruction jobs with four or more spans, assets must be constructed to meet all high fire threat district (HFTD) requirements. Should an already hardened pole be damaged, the permanent replacement **must meet all HFTD design requirements** regardless of the number of spans involved.

15.2. General

HFTDs are designations given by the CPUC for areas at higher risk of fire-related activity. CPUC Ruling R.15-05-006 (Decision 17-12-024) defines two tiers of high fire threat, Tier 2 and Tier 3. In addition to the CPUC HFTDs, CAL FIRE provides a HHZ map.

The CPUC-defined Tier 2 and Tier 3 fire threat areas may overlap with the HHZ map as they come from different data sources. The CPUC HFTD map and the CAL FIRE HHZ map are also updated on different intervals. The HHZ map is updated yearly and the HFTD map is updated once every 10 years. These three areas require additional design consideration and are defined as follows:

- **Zone 1 HHZ:** High risk areas as defined by CAL FIRE.

  Note: When Zone 1 HHZ overlaps with T1/T2/T3, use the most conservative option for design decisions.
- **Tier 1 (T1):** Defined by PG&E as any area that is not Tier 2 or Tier 3.
- **Tier 2 (T2):** Areas at an elevated risk of utility-related wildfires as defined by the CPUC.
- **Tier 3 (T3):** Areas at an extreme risk of utility-related wildfires as defined by the CPUC.

A. See Numbered Document 072148, "Fire Responsibility and CPUC Fire Threat Areas," for additional fire-area designations and requirements.

15.2. (continued)

B. Identify HFTDs using the Electric Distribution Geographic Information System (EDGIS) Viewer. After opening the Viewer, right click on the area in question and then click "Environment" as shown in Figure 15-1, "Identifying HFTDs in the EDGIS Viewer," below.

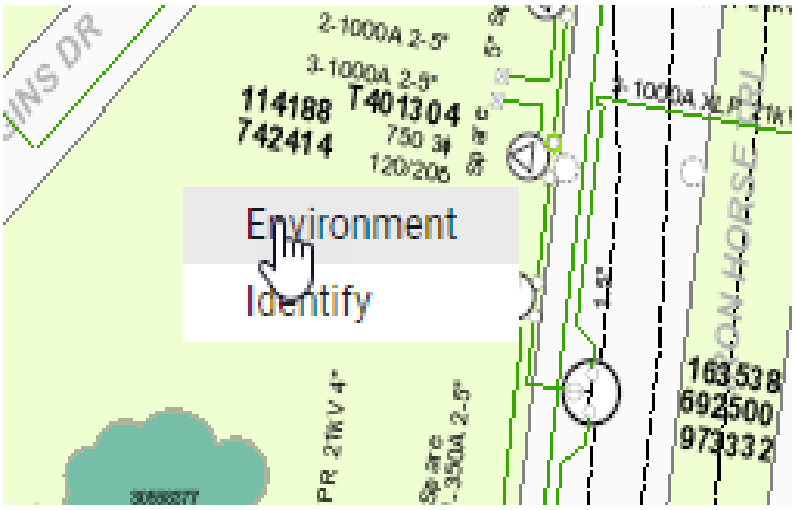

Figure 15-1
Identifying HFTDs in the EDGIS Viewer

C. The HFTD designation is shown in the Environmental Report. See Figure 15-2 below..

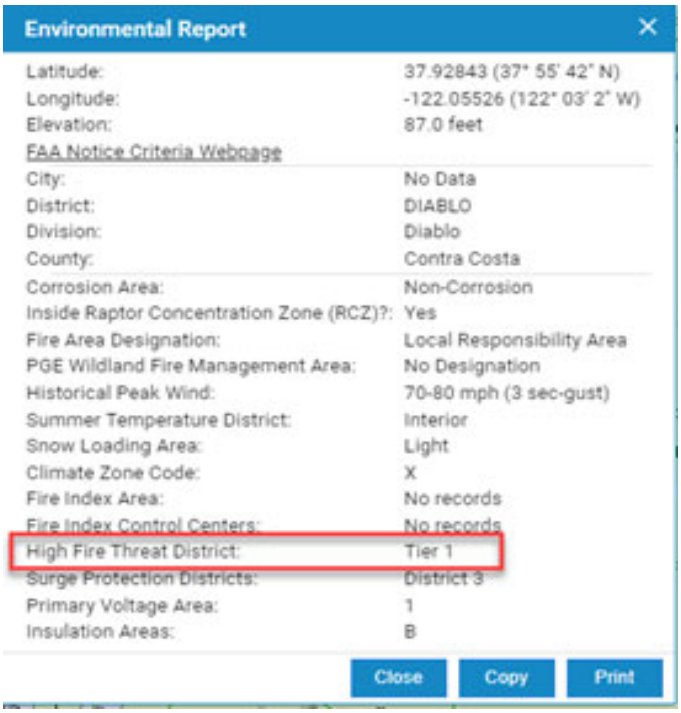

Figure 15-2
HFTD Designation

15.3. HFTD Load Case for Poles

Poles located in Tier 2 or Tier 3 fire areas are required to have pole load calculations performed to satisfy both the G.O. 95 load criteria (as described in the *EDM* Chapter 12) and the HFTD load criteria (based on National Electrical Safety Code [NESC] Rule 250c, "Extreme Wind Loading"). The HFTD load criteria uses a 50-year historical peak wind speed (3 sec gust) and no ice buildup.

HFTD load criteria safety factor values are set at 2.0 for wood poles and 1.5 for composite poles regardless of construction grade or type to achieve a probability of failure of 2% under design conditions. At elevated wind speeds present in the service territory, consider using storm guys (with easement expansion) to minimize the impact to required pole class to satisfy the HFTD load criteria. This load case is not required for emergency work, temporary construction, or for work involving a single location (such as 07D jobs with a single pole being replaced) unless the single location is part of a fire hardening project (08W) and/or is within the Work in Progress (WIP) cloud for an 08W.

Table 15-1 Safety Factors for Load Cases

Safety Factors for HFTD Load Cases	
Wood Poles	**Composite Poles**
2.0	1.5

A. Find historical peak wind speed using the EDGIS Web Viewer, right-clicking on the area in question, then clicking "Environment." See Figure 15-3 below.

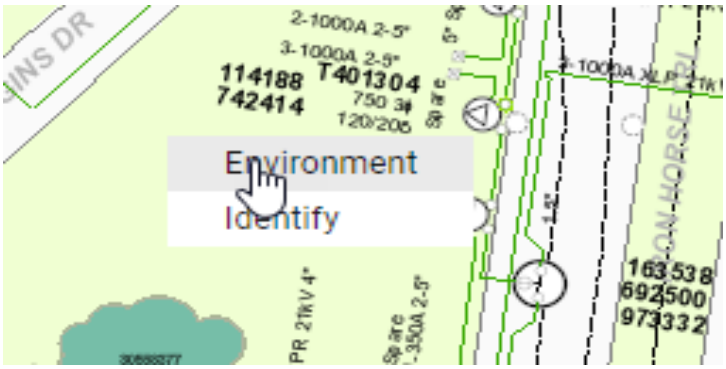

Figure 15-3
Historical Peak Wind Speeds

15.3. (continued)

B. Historical Peak Wind speed is shown in the Environmental Report. Use the corresponding HFTD load case when analyzing for the HFTD load criteria in O-Calc. HFTD load cases are configured with the wind speed corresponding to the maximum wind speed in each defined band.

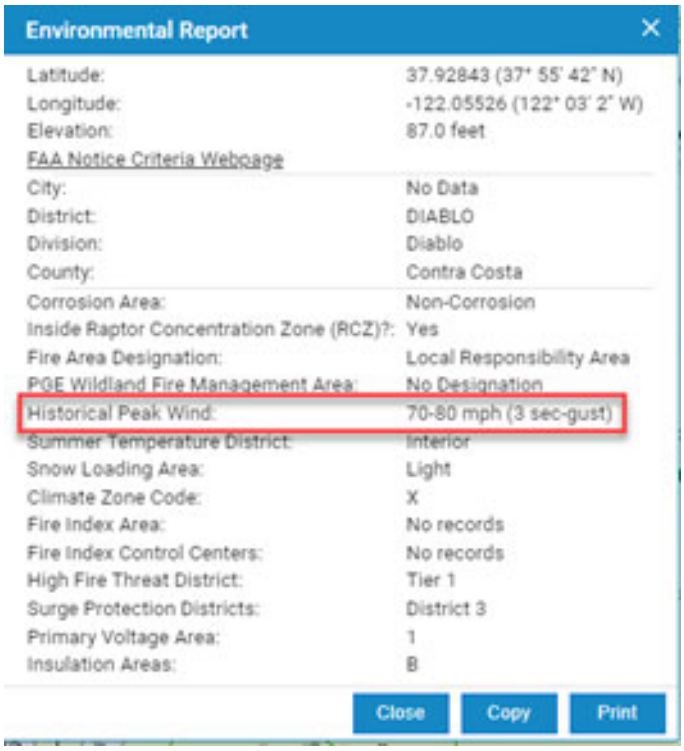

Figure 15-4
Historical Wind Speeds

15.4. Equipment and Practices in HFTDs

Certain equipment is required in HFTD areas while noncompliant equipment must not be installed or, if already existing, must not be transferred to a new pole. Additionally, specific construction practices are to be used to minimize the risk of an ignition.

A. **Do not use** the following equipment and practices in the HFTDs. This list is not comprehensive. Consult applicable PG&E standards when ordering equipment.

1. Transformers without FR3 insulating fluids
2. Any equipment that is not CAL FIRE exempt

Note: Review CAL FIRE's California Power Line Fire Prevention Field Guide for information regarding exempt equipment

15.4. (continued)

3. Piercing hot line connectors

   Note: Numbered Document 028852, "Connectors for Aluminum Conductors on Distribution Lines," and all associated bulletins do not currently restrict the use of Insulation Piercing Connectors (IPCs) on overhead, non-tension, covered, 600-volt conductors in HFTDs.

4. New in-line splices

   Note: This does not apply to repair, restoration, and emergency activities; however, all splices must be covered.

5. Pole-top extensions that require flat framing

6. Open-wire secondary located adjacent to a transformer

   Note: Replace this with standard aerial cable secondary as described in Numbered Document 059690, "General Applications of Conductors for Overhead Distribution Lines."

7. Using trees to anchor guy wires or as a means of attaching primary, secondary, or services

   Note: This practice is not allowed in general.

B. Use the following design practices and equipment in HFTDs.

1. Three-phase switching devices as required by the local planning engineer
   - Automated equipment (i.e., switches, regulators etc.) is required.
   - Isolate one tier from another (i.e., Tier 1 from Tier 2) by adding SCADA to an existing switching device, or install a new SCADA switch (recloser may be required for system protection).
   - Stagger transformer and single-phase lateral tap line connections to balance phase loading. (On three-phase line sections, **do not** reconnect transformers solely to the two outside phases.)

2. Triangular crossarm framing with PG&E-approved, bonded, composite crossarm as described in Numbered Document 066196, "Standard Framing for Tangent Construction Distribution Pole Lines (For Reference Only)," and Numbered Document 068180, "Composite Crossarms for Distribution Lines."

3. Replace obsolete gray aluminum weatherproof aerial cable (AWAC) secondary when encountered on tags (e.g., pole replacements, transformer replacements, fire hardening).

4. All risers, transformers, and equipment to be fully bird/animal guarded and include insulated jumpers. Consult Numbered Document 061149, "Raptor Safe Construction and Wildlife Protection," for more information.

5. Use Numbered Document 015225, "Cutouts, Fuses, and Disconnects for Overhead Distribution Lines," and consult with the local planning engineer to select the appropriate fuses for use in HFTD areas. Be aware that fire areas in the decision tree include those defined in Numbered Document 072148 in addition to the HFTD areas defined in this document.

15.5. Conductors in HFTD Areas

The following are PG&E standard conductor sizes are allowed in Tier 2 and Tier 3 fire areas:

- 1/0 aluminum conductor steel–reinforced (ACSR) tree wire
- 397 all aluminum (Al) tree wire
- 715 all Al tree wire

For corrosion/coastal areas use:

- #2 copper (Cu) tree wire
- 397 all Al tree wire
- 715 all Al tree wire

Requirements for conductor-type use in HFTDs can also be found in Numbered Document 059690.

If using tie wire on tree wire conductor, use coated ties for pin insulators. See Numbered Document 015195, "Installation Details for Aluminum ACSR, and Copper Covered Tree Wire," Table 2, for more information on installing tree wire conductor.

Tree wire conductor will not have the same properties as bare conductor. The sag charts for tree wire are provided in Numbered Document 015221, "Sags and Tensions for Overhead Conductors on Pole Lines," and long span requirements are provided in Numbered Document 072153, "Long Span Construction for Distribution Lines."

If tree wire conductor is skinned, use raptor covers or tape (Code M390190) to cover the exposed region. Consult Numbered Document 061149 for more information.

Raptor-safe framing is not required if the conductor type is tree wire. However, raptor covers and covered jumpers are required in both raptor concentration zones (RCZs) and non-RCZ locations.

15.6. Pole Selection

In general, the default pole type for distribution poles are wood poles. However, there are certain instances where intumescent-covered poles and composite-material poles will be required.

Should a pole be located in an area where the life expectancy of a wood pole would be shortened (e.g., termite or wood pecker damage on nearby poles, miscellaneous wildlife damage on nearby poles, wetland areas, accelerated decay on nearby poles), then a composite pole is required. Occasionally a composite pole can be considered at the discretion of PG&E for aesthetic reasons as well.

Requirements for composite poles can be found in Numbered Document 066202, "Construction Requirements for Composite Distribution Poles," Attachment 1, "Construction Requirements." Requirements for intumescent-covered poles can be found in Numbered Document 015203, "Construction Requirements for Wood Distribution Poles," Attachment 1, "Application Notes."

15.6. (continued)

All new poles or poles involved in reconstruction activities in Tier 2 and Tier 3 fire areas that are accessible by bucket truck require intumescent-covered wood poles. However, if the following conditions are met, a composite pole is required instead:

- The life expectancy of a wood pole would be shortened
- If an intumescent-covered wood pole requires a setting depth that is greater than 1 foot beyond the required setting depth indicated in Numbered Document 015203.

15.7. Reference Documents

Numbered Documents

015195, “Installation Details for Aluminum ACSR, and Copper Covered Tree Wire”

015203, “Construction Requirements for Wood Distribution Poles“

015203, “Construction Requirements for Wood Distribution Poles,” Attachment 1, “Application Notes”

015221, “Sags and Tensions for Overhead Conductors on Pole Lines”

015225, “Cutouts, Fuses, and Disconnects for Overhead Distribution Lines”

028852, “Connectors for Aluminum Conductors on Distribution Lines”

059690, “General Applications of Conductors for Overhead Distribution Lines”

061149, “Raptor Safe Construction and Wildlife Protection”

066196, “Standard Framing for Tangent Construction Distribution Pole Lines (For Reference Only)”

066202, “Construction Requirements for Composite Distribution Poles,” Attachment 1, “Construction Requirements”

068180, “Composite Crossarms for Distribution Lines”

072148, “Fire Responsibility and CPUC Fire Threat Areas”

072153, “Long Span Construction for Distribution Lines”

Other Documents

California Power Line Fire Prevention Field Guide

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