Extreme Wind

- **Transmission Line Conductors**
    - All greenfield transmission lines conform to Oncor Electric Delivery Extreme Wind Loading requirements which encompass NESC Extreme Wind loading conditions. The Oncor Electric Delivery Extreme Wind Loading requirements are designed per Oncor's service territory, and operational experience.
    - Vibration dampeners are utilized for conductors susceptible to Aeolian vibration per Oncor Electric Delivery Vibration requirements.
    - Engineers consider the following in order to minimize the probability of phase to phase contact for galloping conductors: conductor sag, structure configuration, and the span length of the transmission line.
    - All Oncor Electric Delivery horizontally bundled new construction transmission lines utilize conductor spacers installed at the recommended intervals in the span to control sub-conductor oscillation.
- **Transmission Structures**
    - All greenfield structures are designed to withstand the conductor loading conditions referenced.
- **Substation Bus Design**
    - All greenfield substations conform to Oncor Electric Delivery design requirements which encompass NESC loading conditions. IEEE 605 and NESC are referenced for the minimum requirements on vibration damping, bus clearances, and loads on bus structures.
- **Switching Station & Substation Control Centers**
    - All greenfield pre-wired control centers meet the minimum requirements set by the Metal Building Metal Association and Industrialized Housing and Building codes.
- **Referenced Industry Standards:**
    - National Electric Safety Code, IEEE C2-2017
    - IEEE Guide for Bus Design in Air-Insulated Substations, IEEE 605-2008
    - Metal Building Metal Association
    - Industrialized Housing and Building Codes

Icing

- **Transmission Line Conductors**
    - All new construction transmission lines conform to Oncor Electric Delivery Heavy Loading requirements which encompass NESC Heavy loading conditions. The Oncor Electric Delivery Heavy Loading requirements are designed per Oncor's service territory, and operational experience.
- **Transmission Line Insulators**
    - Ceramic suspension insulators are designed to withstand Oncor Heavy Loading conditions without exceeding 50% of their combined mechanical and electrical strength rating.
    - Ceramic post insulators are designed to withstand Oncor Heavy Loading conditions without exceeding 40% of the rated cantilever strength rating.
    - Non-ceramic suspension insulators are designed to withstand Oncor Heavy Loading conditions without exceeding 50% of the specified mechanical load (SML).
    - Non-ceramic post insulators are designed to withstand Oncor Heavy Loading conditions without exceeding 40% of the maximum designed cantilever load on the unit.
- **Transmission Structures**
    - All new construction structures are designed to withstand the conductor loading conditions referenced.
- **Substation Bus Design**
    - All greenfield substations conform to Oncor Electric Delivery design requirements which encompass NESC loading conditions. IEEE 605 and NESC are referenced for the minimum requirements on vibration damping, bus clearances, and loads on bus structures.
- **Recommended Industry Standards:**
    - National Electric Safety Code, IEEE C2-2017
    - IEEE Guide for Bus Design in Air-Insulated Substations, IEEE 605-2008

Extreme Temperatures

- **Transmission Terminal Equipment**

    - Oncor Electric Delivery has developed an ambient temperature steady state loading guide for transmission terminal equipment. This guide outlines the maximum continuous and emergency transmission line terminal equipment ratings adjusted based on various temperature ratings.

- **Operational Practice**

    - Oncor Electric Delivery has developed and follows summer and winter preparedness checklists for transmission facilities and equipment.

- **Referenced Industry Standards:**

    - IEEE C37.010-2016, Application Guide for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
    - IEEE C37.30.1-2011, Standard Requirements for High-Voltage Air Switches
    - IEEE C93.3-2017, Requirements for Power-Line Carrier Line Traps
    - IEEE C57.13-2016, Standard Requirements for Instrument Transformers

Flood

- **Grading**
    - The final grading elevation for substation yards is the respective flood plain elevation plus two feet.
- **Operational Practice**
    - Proactively de-energize the substation bus before it becomes a hazard for personnel and the public.

Recovery Plan Applied for all Natural Disasters

- If any damage has occurred to major equipment (i.e., Transformers, Circuit Breakers, Transmission Structures) engineers are dispatched with Operations personnel to assess. Spare equipment will be utilized depending on the criticality of the substation feed/transmission line, spare fleet, and lead time for assets.
- Oncor Electric Delivery maintains a fleet of spares and mobile equipment in case of sudden power transformer failure.