

**Appendix H:  
EMF Summary Report**

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# Center-Grand Forks 345kV Transmission Line Electromagnetic Effects Estimation

EMF are naturally present in the environment and are present wherever electricity is used. The earth has both a magnetic field produced by currents in the molten core of the planet and an electric field produced by electrical activity in the atmosphere, such as thunderstorms. The flow of electricity along transmission lines also produces low levels of EMF.

Everyone is constantly exposed to about 500 mG from the earth's magnetic field and 100 V/m from the earth's electric field. However, thunderstorms can temporarily increase the electric field in a given location to several thousand V/m. In addition to the earth's natural fields, according to the Electric Power Research Institute (EPRI) the average household background magnetic field is between 0.5 and 4 mG with an average of 0.9 mG, and the average electric field is 1-20 V/m.

While there are no set federal guidelines, there are some recommended guidelines that have been published. The International Commission on Non-Ionizing Radiation Protection has established a continuous electric field exposure limit of 4.2kV/m for members of the general public. The American Council of Governmental Industrial Hygienists has set a Threshold Limit Value for occupational exposure to electric fields at 25kV/m for electric field.

Based upon the capacity of the transmission line design, calculated EMF values will not exceed 3.6kV/m under maximum operating conditions at any location near the ground level underneath or in the vicinity of the transmission line. During normal loading conditions, EMF values have been calculated to be 0.984kV/m at the edge of the right-of-way.

The electromagnetic effects of the operation of the 260 mile-long 345kV line were estimated for normal line operation. These estimates included both electric and magnetic fields near the ground line along with audible noise.

Computations were performed using industry standard approaches as outlined in the *Transmission Line Reference Book – 345kV and Above*; Second Edition, 1982, Electric Power Research Institute, Inc., Palo Alto, CA, USA, and modified by data approaches developed by Bonneville Power Administration and Washington State University.

The estimates were based on the following parameters:

- Line Operating Voltage – 362kV (110% of nominal)
- Structure Configuration – See Figure 1

- Conductors:
  - Phase – 959.6 kcmil ACSR/TW Suwannee
  - Shield wires –
    - OPGW - 7#6 Alumoweld Equivalent (.606" diameter)
    - Shield wire - ½" EHS
- Elevation – 1,400 feet – Average line elevation of in excess of 90 percent of tangent structures
- Right-of-Way Width: 150 feet
- Measurement Locations: Industry Standard
  - Edge of Right-of-Way
  - Electric Field:
    - 1.0 m (3.28ft) height above ground line
    - Maximum sag – Iced conductor condition
    - Result: kV/m

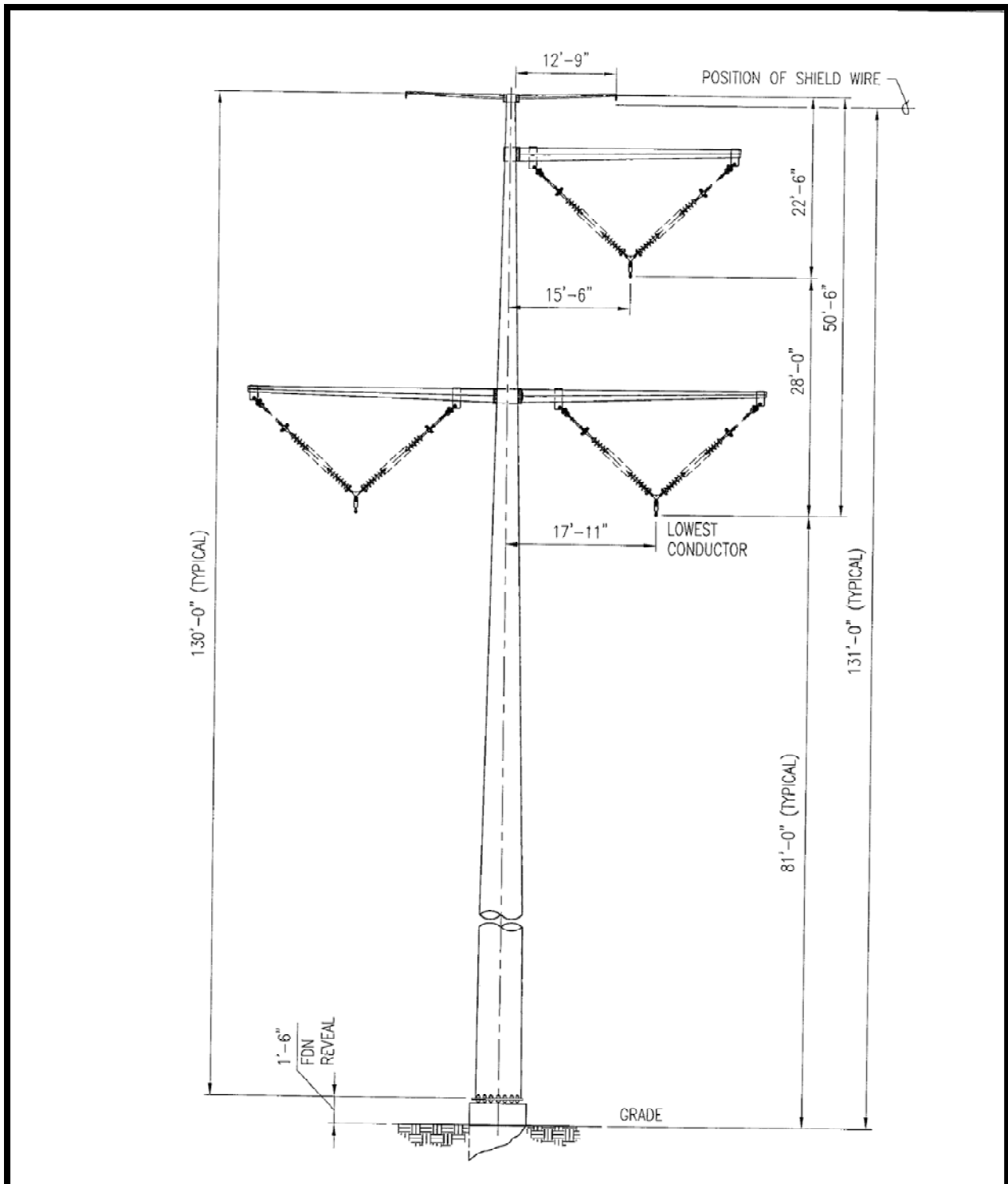


Figure 1 – Tangent structure utilized in EMF computations