State of North Carolina
Division of Highways

Standard Drawings for All Metal Poles
Zone 3 - 110 mph (49 m/s)

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

NCDOT Contacts:

Mobility and Safety Division - ITS and Signals Unit

G.A. Fuller, P.E. - State ITS and Signals Engineer
G.G. Murr, Jr., P.E. - State Signals Engineer
D.C. Sarkar, P.E. - ITS and Signals Senior Structural Engineer
C.F. Andrews - ITS and Signals Journey Structural Engineer

NCDOT METAL POLE STANDARDS

Designed in conformance with the latest
2015 Interim to the 6th Edition 2013

AASHTO
Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals

Index of Plans

<table>
<thead>
<tr>
<th>DRAWING</th>
<th>NUMBER</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig.SP 1-2</td>
<td>Standard Strain Pole Notes</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 3-7</td>
<td>Statewide Wind Zones</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 8</td>
<td>ZONE 1 140 MPH</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 9</td>
<td>ZONE 2 130 MPH</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 10</td>
<td>ZONE 3 110 MPH</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 11</td>
<td>ZONE 4 90 MPH</td>
<td></td>
</tr>
<tr>
<td>Sig.SP 12</td>
<td>ZONE 5 70 MPH</td>
<td></td>
</tr>
</tbody>
</table>

All Counties in Divisions 4, and 6.

110 / 49 mph m/s
90 / 40 mph m/s
90 / 40 mph m/s

Division 1
Division 2
Division 3
Division 4
Division 5
Division 6

All Counties in Divisions 4, and 6.
**STATE OF NORTH CAROLINA**  
**DIVISION OF HIGHWAYS**  

**STANDARD NOTES FOR METAL STRAIN POLES**

**GENERAL**

1. These notes provide information and requirements for the design, fabrication, and installation of standards metal strain poles. They are to be used by sign installers, contractors, and pole manufacturers in the fabrication, fabrication, and installation of metal traffic signal supports in North Carolina. The notes are for guidance only, and all drawings concerning design notes that are specific to a particular situation, design detail, or requirement are shown on the applicable page to clarify intent and understanding.

2. The following standard design are based on light and heavy loading cases. No variations, substitution or re-design of the specified poles and foundations will be permitted unless it is approved by the ITS and Signals Unit.

3. These metal pole standards are according to the newest "Highway Standards Drawings" dated January 2012. Hereinafter referred to as the Standard Drawings. The latest "Standard Specifications for Roads and Structures" dated January 2012. Hereinafter referred to as the Standard Specifications. If there is a discrepancy between the Standard Specifications and the Standard Drawings, those drawings and project special specifications shall govern.

4. Poles cases prepared on the ITS & Signals Qualified Products List (QPL) shall not require manufacturer's calculations. However, certification of compliance with the manufacturer's preapproved shop drawings on file with the department shall be obtained from the engineer. If pole cases are not on the QPL, QPL drawings to a case standard has been approved, manufacturer's shop drawings shall be required.

**POLE FABRICATION**

1. All other steel hardware material required but not specified above shall comply with sections 1272 and 1038 of the Standard Specifications.

2. Pole assemblies shall be permanently tagged or engraved with the following:
   - Pole manufacturer name
   - Pole number
   - Pole case number
   - Pole case manufacturer name

3. For manufacturing the metal pole, the following criteria must be adhered to:
   - The metal pole shall not be welded within 5 feet from base nor within 2 feet from any connection.
   - The quality control and workmanship of the splice welds are the sole responsibility of the pole manufacturer.
   - The pole shall be fabricated in accordance with the latest revision of the AWS D1.1 Structural Welding Code Steel.

4. All welds shall be in accordance with the latest revision of the AWS D1.1 Structural Welding Code Steel.

5. Provide 2" factory drilled holes through the pole wall for wire entrance access to the terminal support. The holes shall be at the center of the terminal support. The holes shall be of the same size in diameter on the pole (actual index located at 2" and 3" from the base of the pole). See drawing Sig.SP 4 (pole fabrication details) of these metal pole standards for graphic details.

6. The pole shall be fabricated with 1/4" threads half couplings and 1/4" threaded half couplings installed by from the top of the pole to receive the weatherhead for signal wire entrance to the pole, the 1/4" half coupling shall be welded at no less than a 45 degree angle from horizontal to properly install the weatherhead. The 1/4" half coupling for electrical service entrance shall be located at a 3 degrees on the pole (actual index located at 2" from the base of the pole). See drawing Sig.SP 4 (pole fabrication details) of these metal pole standards for graphic details.

7. Provide a factory standard 6" hole for cable support welded inside the top of the pole at 2"s distances on the pole case drain. Refer to drawing Sig.SP 4 (pole fabrication details) of these metal pole standards for graphic details.

8. For other non-structural details and requirements, refer to applicable sections of these standards, the traffic signal plans and specifications.

9. At the time of shipment from the factory, ensure the pole is packaged so that water can not get inside the pole.

10. Ship all pole accessories for each pole in a separate watertight container with a label that identifies the specific pole and describes the contents.

**DESIGN CRITERIA**


2. 2" ply poles are not acceptable. Exceptions to this design parameter will be due to the use of decorative poles.

3. These strain pole standards allow for signal heads to be placed anywhere along the spanner. The most critical locations are shown in the typical intersection loading cases shown on drawings Sig.SP 8-12 (load case and design details sheet) of these standards. For design purposes, use 1/4" for the spanner. Horizontal design clearance space from bottom of signal heads to pavement is 17 feet.

4. Provisions shall be made for drainage of water from inside the metal pole.

**POLE MATERIALS**

1. Provide materials for steel metal poles that comply with Section 1272 and 1038 of the Standard Specifications and for the latest project special provisions. Pole monitoring shall:
   - Galvanize all items of the signal support structure per AASHTO M 111.
   - Use ASTM A516 material. (50 ksi) or equivalent as approved by the engineer.
   - Have a linear taper of 0.14 in/ft.

2. Base plate shall:
   - Formwork to ASTM A372 or equivalent.
   - Be galvanized in accordance with AASHTO M 111.

3. Anchor bolts, nuts, and washers shall be galvanized in accordance with AASHTO M 111.

4. Anchor bolts, nuts, washers shall be galvanized in accordance with AASHTO M 111.

5. Pole assemblies shall be permanently tagged or engraved with the following:
   - Pole manufacturer name
   - Pole number
   - Pole case number
   - Pole case manufacturer name

6. All anchor bolts, nuts, washers shall be galvanized in accordance with AASHTO M 111.

**INDEX OF PLANS**

<table>
<thead>
<tr>
<th>No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sig.SP 1-2</td>
<td>Standard Strain Pole Notes</td>
</tr>
<tr>
<td>Sig.SP 3-7</td>
<td>Standard Strain Pole Notes</td>
</tr>
<tr>
<td>Sig.SP 8</td>
<td>ZONE 1</td>
</tr>
<tr>
<td>Sig.SP 9</td>
<td>ZONE 2</td>
</tr>
<tr>
<td>Sig.SP 10</td>
<td>ZONE 3</td>
</tr>
<tr>
<td>Sig.SP 11</td>
<td>ZONE 4</td>
</tr>
<tr>
<td>Sig.SP 12</td>
<td>ZONE 5</td>
</tr>
</tbody>
</table>

**NC DOT METAL POLE STANDARDS**

**NCDOT CONTACTS:**
- Mobility and Safety Division - ITS and Signals Unit
  - G.A. FULLER, P.E. - STATE ITS AND SIGNALS ENGINEER
  - G.G. MURR, JR., P.E. - STATE SIGNALS ENGINEER
  - D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER
  - C.F. ANDREWS - ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER

**DESIGNED BY:**
- D.C. SARKAR

8/2/2016

[https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx](https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx)
STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

STANDARD NOTES FOR METAL STRAIN POLES

SOIL TESTING AND STANDARD POLE FOUNDATIONS

1. The foundation size for poles in these metal pole standards is determined by conducting a subsurface soil investigation. For details of the subsurface investigation, and provision selection/determination of the metal pole foundations, refer to and comply with the "Metal Pole Standard Foundations" special provision which is to be considered an integral part of these metal pole standards.

2. To determine the correct standard strain pole foundation depth, please adhere to the following requirements in conjunction with the standards as drawn:
   a. Using the statewide county wind zone chart develop design load case and design details, make sure you have the appropriate wind zone selected.
   b. Select the soil type that best describes the soil characteristics (either clay or sand).
   c. Perform a standard penetration test at each proposed foundation site to determine "N" value. (Number of blows per foot from standard penetration test).
   d. Use the appropriate pole load factor number from the design wind zone chart.
   e. Use the previously determined soil type and "N" value, select the appropriate column from the chart to determine the correct depth of the foundation is the value that is shown where the column and line intersect.
   f. Fill out and submit for approval to the Division the "Standard Foundation Selection Form" for each proposed foundation location.

3. The "Standard Foundation Selection Form" for each proposed foundation is required to be submitted and approved prior to anyוכליאי in the field. This form as well as the standard foundation special provisions can be obtained at the following website:

4. Comply with the provisions of Section 1741 of the standard specifications for installation.

5. Refer to standard drawing 1741.07 for foundation installation details.

6. Reinforcing steel shall be deformed and conform to AWS A302 Grade 80. Ties may be deformed or plain.

7. Circular reinforcing rings may be vertically adjusted by up to 1/2" at a depth between 2'-0" and 3'-0" to facilitate the installation of electrical conduit entering the cage.

8. The concrete shall be air entrained per cement with a minimum compressive strength of 4000 psi at 28 days in accordance with Section 1003 of the North Carolina Standard Specications. For details, see special provisions.

9. The traffic signal support structure shall not be erected before the concrete in the foundation has attained a minimum compressive strength of 3500 psi.

10. Each foundation requires a foundation identification tag. For details see the standard M7 drawings.

11. For other details regarding construction of concrete foundation, see project special provisions and M7 drawings.

12. Comply with the provisions of Section 1748 of the standard specifications for installation.

13. Refer to standard drawing 1745.07 for pole and hanger installation details.

14. When attaching pole to foundation, the distance between the bottom of the leveling nut to the top of the concrete foundation shall be greater than 1/2" and not less than 1 "anchor nut height" above top nut to facilitate the installation of a threaded nut connector.

15. Standard 4' columns added to the base of the pole when the distance between the bottom of the leveling nut to the top of the concrete foundation shall not be greater than one anchor nut height above top nut to facilitate the installation of a threaded nut connector.

16. For other details regarding metal pole installation, see latest project special provisions.

TABLE OF STATEWIDE COUNTY WIND ZONES

https://connect.ncdot.gov/resources/safety/Pages/ITS-Design-Resources.aspx

NCDOT CONTACTS:

MOBILITY AND SAFETY DIVISION - ITS AND SIGNALS UNIT

G.A. FULLER, P.E. - STATE ITS AND SIGNALS ENGINEER
G.G. MURR, JR., P.E. - STATE SIGNALS ENGINEER

D.C. SARKAR, P.E. - ITS AND SIGNALS SENIOR STRUCTURAL ENGINEER
C.F. ANDREWS - ITS AND SIGNALS JOURNEY STRUCTURAL ENGINEER