STANDARD STRAIN POLE NOTES

PROJECT REFERENCE NO.	SHEET NO.
U-4719	Sig. 6 dwg.SP2

1. THESE NOTES PROVIDE INFORMATION AND REQUIREMENTS FOR THE DESIGN, FABRICATION, AND INSTALLATION OF STANDARD METAL STRAIN POLES. THEY ARE TO BE USED BY DESIGN ENGINEERS, CONTRACTORS, AND POLE MANUFACTURERS IN THE SELECTION, FABRICATION, AND INSTALLATION OF METAL TRAFFIC SIGNAL SUPPORTS IN NORTH CAROLINA. THE NOTES ARE CATEGORIZED FOR EASE OF USE, AND ARE NUMBERED CHRONOLOGICALLY. 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 DESIGNS 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 TRAFFIC ENGINEERIING BRANCH.
3. THESE METAL POLE STANDARDS MAKE REFERENCE TO THE NCDOT "ROADWAY STANDARD DRAWINGS" DATED JANUARY 2002 HERE IN AFTER REFERED TO AS THE STANDARD DRAWINGS AND TO THE NCDOT "STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES" DATED JANUARY 2002 HERE IN AFTER REFERED TO AS THE STANDARD SPECIFICATIONS. IF THERE IS A DISCREPANCY BETWEEN THE STANDARD DRAWINGS/SPECIFICATIONS AND THESE STANDARDS, THEN THESE DRAWINGS AND SPECIFICATIONS SHALL GOVERN.
4. POLE CASES PREAPPROVED ON THE DEPARTMENTS QUALIFIED PRODUCTS LIST (QPL) WILL NOT REQUIRE MANUFACTURER'S SHOP DRAWINGS. HOWEVER, CERTIFICATION OF COMPLIANCE WITH THE MANUFACTURER'S PREAPPROVED SHOP DRAWING ON FILE WITH THE DEPARTMENT SHALL BE FURNISHED TO THE ENGINEER. IF POLE CASES ARE NOT ON THE QPL, OR VARIATIONS TO A CASE STANDARD HAS BEEN APPROVED, MANUFACTURER'S SHOP DRAWINGS SHALL BE REQUIRED.

5. THE METAL POLE DESIGN SHALL CONFORM TO THE "2002 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINARIES AND TRAFFIC SIGNALS" AND LATEST APPROVED INTERIM SPECIFICATIONS. DESIGN WIND PRESSURES AND APPLICATIONS ARE IN ACCORDANCE WITH SECTION 3.8 AND 3.9 OF THE 2001 AASHTO SPECIFICATIONS.
6. THE THICKNESS OF A SINGLE PLY POLE MAY BE SUBSTITUTED BY USING A 2 PLY POLE AS LONG AS THE POLE BASE DOES NOT EXCEED THE SPECIFIED MINIMUM DIAMETER BY MORE THAN 1.25". NO EXCEPTIONS TO THIS DESIGN PARAMETER WILL BE ALLOWED.
7. THESE STRAIN POLE STANDARDS ALLOW FOR SIGNAL HEADS TO BE PLACED ANYWHERE ALONG THE SPANWIRE. THE MOST CRITICAL LOCATIONS ARE SHOWN IN THE TYPICAL INTERSECTION LOADING CASES SHOWN ON DRAWING SP3 (LOAD CASE AND DESIGN DETAILS SHEET) OF THESE STANDARDS. FOR DESIGN PURPOSES, USE 4% SAG FOR THE SPANWIRE. ROADWAY DESIGN CLEARANCE RANGE FROM BOTTOM OF SIGNAL HEADS TO PAVEMENT IS 17 FEET.
8. PROVISIONS SHALL BE MADE FOR DRAINAGE OF WATER FROM INSIDE THE METAL POLE.

9. PROVIDE MATERIALS FOR STEEL METAL POLES THAT COMPLY WITH SECTION 1098-15 OF THE STANDARD SPECIFICATIONS.

   POLE MONOTUBE SHALL:
   - BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.
   - USE ASTM A595 MATERIAL (55 KSI) OR EQUIVALENT AS APPROVED BY THE ENGINEER.
   - HAVE A LINEAR TAPER OF 0.14 IN/FT.

10. BASE PLATE SHALL:
    - BE GALVANIZED IN ACCORDANCE WITH AASHTO M111.
    - CONFORM TO AASHTO M270 GRADE 36 OR EQUIVALENT.
11. ANCHOR BOLTS, NUTS, AND WASHER MATERIAL:
    - ANCHOR BOLTS - USE AASHTO M 314 GRADE 55 MATERIAL OR EQUIVALENT.
    - NUTS - USE AASHTO M291 GRADE 2H, DH, OR DH3 MATERIAL OR EQUIVALENT.
    - WASHERS - USE AASHTO M293 MATERIAL OR EQUIVALENT.
12. ALL ANCHOR BOLTS, NUTS, WASHERS SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 OR M298.

13. ALL OTHER STEEL HARDWARE MATERIAL REQUIRED BUT NOT SPECIFIED ABOVE SHALL COMPLY WITH SECTION 1098-15 OF THE STANDARD SPECIFICATIONS.
14. POLE ASSEMBLIES SHALL BE PERMANENTLY TAGGED OR ENGRAVED WITH THE FOLLOWING:
    - POLE MANUFACTURERS NAME
    - MANUFACTURE DATE
    - POLE CASE NUMBER
    - THICKNESS AND GRADE OF STEEL
15. CIRCUMFERENTIAL WELDING OF THE POLES ARE ALLOWED PROVIDED THE FOLLOWING CONDITIONS ARE MET:
    - THE METAL POLES SHALL NOT BE SPLICED WITHIN 5 FEET FROM BASE NOR WITHIN 2 FEET FROM ANY CONNECTION.
    - ONLY ONE SPLICE PER UPRIGHT WILL BE PERMITTED.
    - THE QUALITY CONTROL AND WORKMANSHIP OF THE SPLICE WELDS ARE THE SOLE RESPONSIBILITY OF THE POLE MANUFACTURER.
16. ALL WELDS SHALL BE IN ACCORDANCE WITH THE LATEST REVISION OF THE AWS D1.1 STRUCTURAL WELDING CODE.
17. PROVIDE 2- 3" FACTORY DRILLED HOLES THROUGH THE POLE WALL FOR WIRE ENTRANCE ACCESS TO THE TERMINAL STRIP INSIDE THE TERMINAL COMPARTMENT. THE HOLES SHALL BE IN THE CENTER OF THE TERMINAL COMPARTMENT (0 DEGREES ON THE POLES RADIAL INDEX) LOCATED AT 26" AND 36" FROM THE BASE OF THE POLE. SEE DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE METAL POLE STANDARDS FOR GRAPHIC DETAILS.
18. THE METAL POLE SHALL BE FABRICATED WITH 3-2" THREADED HALF COUPLINGS AND 1-1" THREADED HALF COUPLING INSTALLED 9" FROM THE TOP OF THE POLE TO RECEIVE THE WEATHERHEADS FOR SIGNAL WIRE ENTRANCES TO THE POLE. THE HALF COUPLINGS SHALL BE WELDED AT NO LESS THAN A 45 DEGREE ANGLE FROM HORIZONTAL TO PROPERLY INSTALL THE WEATHERHEADS. THE 1" HALF COUPLING FOR ELECTRICAL SERVICE ENTRANCE SHALL BE LOCATED AT 0 DEGREES ON THE POLES RADIAL INDEX. ALL OTHER 2" HALF COUPLINGS SHALL BE LOCATED AT 90 DEGREE INCREMENTS. PROVIDE WEATHER TIGHT BUSHING CAPS FOR ALL HALF COUPLINGS. REFER TO DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE METAL POLE STANDARDS FOR GRAPHIC DETAILS.
19. PROVIDE A FACTORY STANDARD "J" HOOK FOR CABLE SUPPORT WELDED INSIDE THE TOP OF THE POLE AT 225 DEGREES ON THE POLES RADIAL INDEX. REFER TO DRAWING SP4 (POLE FABRICATION DETAILS) OF THES METAL POLE STANDARDS FOR GRAPHIC DETAILS.
20. FOR ALL OTHER NON-STRUCTURAL DETAILS AND REQUIREMENTS, REFER TO APPLICABLE SECTIONS OF THESE STANDARDS, THE TRAFFIC SIGNAL PLANS AND SPECIFICATIONS.
21. AT THE TIME OF SHIPMENT FROM THE FACTORY, ENSURE THE POLE IS PACKAGED SO THAT WATER CAN NOT GET INSIDE OF THE POLE.
22. SHIP ALL POLE ACCESSORIES FOR EACH POLE IN A SEPARATE WATERTIGHT CONTAINER WITH A LABEL THAT IDENTIFIES THE SPECIFIC POLE AND DESCRIBES THE CONTENTS.

23. 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 PROPER 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.
24. STRAIN POLE FOUNDATIONS DEPTHS HAVE BEEN PRE-DESIGNED USING THE CHART SHOWN BELOW. TO DETERMINE THE CORRECT DEPTH OF EACH FOUNDATION:
    a.- USING THE STATEWIDE COUNTY WIND ZONE CHART ON DRAWING SP3 (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.- GET THE APPROPRIATE POLE CASE LOAD NUMBER FROM THE PLANS OR FROM THE DIVISION TRAFFIC ENGINEER.
    e.- USING THE PREVIOUSLY DETERMINED SOIL TYPE AND "N" VALUE, SELECT THE APPROPRIATE COLUMN IN THE CHART. SELECT THE APPROPRIATE LINE THAT THE POLE LOAD CASE IS SHOWN ON IN THE CHART. THE CORRECT DEPTH OF THE FOUNDATION IS THE VALUE THAT IS SHOWN WHERE THE COLUMN AND THE LINE INTERSECT.
    f.- FILL OUT AND SUBMIT FOR APPROVAL TO THE DIVISION A "STANDARD FOUNDATION SELECTION FORM" FOR EACH PROPOSED FOUNDATION LOCATION.

FOUNDATION SELECTION TABLE

42" Diameter Drilled Pier Length (L) - Feet

LOAD CASE	WIND ZONE 3 - SOIL TYPES						
	Clay				Sand		
	Medium Design N-Value 4-8	Stiff Design N-Value 9-15	Very Stiff Design N-Value 16-30	Hard Design N-Value >30	Loose Design N-Value 4-10	Medium Design N-Value 11-30	Dense Design N-Value >30
S26L2	18.5	13.0	10.5	9.0	17.5	15.0	13.5
S30L2	19.5	13.5	11.0	9.0	18.0	15.5	14.0
S36L2	20.0	14.0	11.5	9.5	18.5	16.0	14.5
S30H2	23.0	15.5	12.5	10.0	20.5	17.5	16.0
S35H2	24.0	16.0	13.0	10.5	21.0	18.0	16.5

CONCRETE VOLUME (cubic yards)=.356xL

25. A "STANDARD FOUNDATION SELECTION FORM" FOR EACH PROPOSED FOUNDATION IS REQUIRED TO BE SUBMITTED AND APPROVED PRIOR TO ANY DRILLING IN THE FIELD. THIS FORM AS WELL AS THE STANDARD FOUNDATION SPECIAL PROVISIONS CAN BE OBTAINED AT THE FOLLOWING WEBSITE:

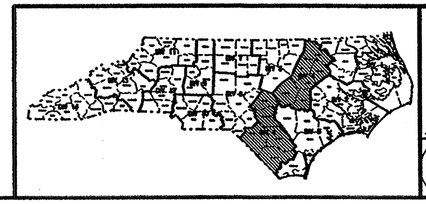
    http://www.doh.dot.state.nc.us/preconstruct/highway/dsn srvc/soils/form/default.htm

26. COMPLY WITH THE PROVISIONS OF SECTION 1742 OF THE STANDARD SPECIFICATIONS FOR INSTALLATION.
27. REFER TO STANDARD DRAWING 1742.01 FOR FOR FOUNDATION INSTALLATION DETAILS.
28. REINFORCING STEEL SHALL BE DEFORMED AND CONFORM TO ASTM A615 GRADE 60. TIES MAY BE DEFORMED OR PLAIN.
29. CIRCULAR TIE REINFORCING RINGS MAY BE VERTICALLY ADJUSTED BY +/- 3" AT A DEPTH BETWEEN 2'-0" AND 3'-0" TO FACILLITATE THE INSTALLATION OF ELECTRICAL CONDUIT ENTERING IN THE CAGE.
30. THE CONCRETE SHALL BE DRILL PIER CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS IN ACCORDANCE WITH SECTION 1000 OF THE NORTH CAROLINA STANDARD SPECIFICATIONS. FOR DETAILS, SEE SPECIAL PROVISIONS.
31. THE TRAFFIC SIGNAL SUPPORT STRUCTURE SHALL NOT BE ERECTED BEFORE THE CONCRETE IN THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.
32. NON-SHRINK GROUT SHALL BE A MIX CONSISTING OF 1 PART CEMENT, 3 PARTS SAND BY WEIGHT, AND 2 GRAMS OF ALUMINUM POWDER PER 94 LBS. OF CEMENT USED. WATER SHALL BE LIMITED TO THAT AMOUNT REQUIRED TO PRODUCE A WORKABLE MIX. PROVIDE SMALL PIPE TO DRAIN WATER PER STANDARD SPECIFICATIONS.
33. THE TOP OF EACH FOUNDATION SHALL BE PERMANENTLY MARKED (WITH STAMP OR EMBEDDED PLATE) TO IDENTIFY THE TYPE OR DEPTH OF THE FOUNDATION.
34. FOR OTHER DETAILS REGARDING CONSTRUCTION OF CONCRETE FOUNDATION, SEE PROJECT SPECIAL PROVISIONS.

35. COMPLY WITH THE PROVISIONS OF SECTION 1072 & 1742 OF THE STANDARD SPECIFICATIONS FOR INSTALLATION.
36. REFER TO STANDARD DRAWING 1742.01 FOR FOR POLE AND HARDWARE INSTALLATION DETAILS.
37. SIGNAL HEADS CAN BE PLACED ANYWHERE ALONG THE SPANWIRE. THE MOST CRITICAL LOCATIONS ARE SHOWN IN THE TYPICAL INTERSECTION LOADING CASE. FOR DESIGN PURPOSES, USE 4% SAG FOR THE SPANWIRE.
38. WHEN ATTACHING POLE TO FOUNDATION, THE DISTANCE BETWEEN THE BOTTOM OF THE LEVELING NUT TO THE TOP OF THE CONCRETE FOUNDATION SHOULD NOT BE GREATER THEN ONE ANCHOR NUT HEIGHT. THE TOP OF EACH ANCHOR BOLT SHOULD NOT EXTEND MORE THAN ONE ANCHOR NUT HEIGHT ABOVE TOP NUT TO FACILITATE THE INSTALLATION OF A THREADED NUT COVER.
39. STRAP ALL SIGNAL CABLES TO THE SIDE OF THE POLE WHEN THE DISTANCE BETWEEN THE SPANWIRE ATTACHMENT CLAMP ON THE POLE AND THE WEATHER HEADS EXCEEDS 36". USE ¾" STAINLESS STEEL STRAPS TO LASH WIRE TO THE POLE. SEE DRAWING SP4 (POLE FABRICATION DETAILS) OF THESE STANDARDS FOR GRAPHIC DETAILS.
40. FOR OTHER DETAILS REGARDING METAL POLE INSTALLATION, SEE PROJECT SPECIAL PROVISIONS.

METAL STRAIN POLES

WIND ZONE 3 (110 MPH)



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SCALE: 0 NA — NONE

METAL POLE STANDARD NOTES

PLAN DATE: SEPTEMBER 2002	REVIEWED BY: R. E. MULLINAX
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REVISIONS	INIT.	DATE

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