

GENERAL NOTES

A. DESIGN CRITERIA

DESIGN SPECIFICATIONS

2001 AASHTO STANDARD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES AND TRAFFIC SIGNALS WITH CURRENT INTERIM.

NJDOT BRIDGES AND STRUCTURES DESIGN MANUAL, CURRENT EDITION.

DESIGN LOADS

DESIGN WIND VELOCITY --- 80 MPH; (ABOVE AASHTO SPECIFICATIONS APPENDIX C)
DESIGN ICE LOAD ----- 3 PSF

FATIGUE LOADS

ALL STRUCTURAL DETAILS HAVE BEEN ANALYZED AGAINST FATIGUE CATEGORY II IMPORTANCE FACTOR VALUES AS DESIGNATED IN THE ABOVE AASHTO SPECIFICATIONS.

VARIABLE MESSAGE SIGN (VMS) STRUCTURES

REFER TO THE NJDOT BRIDGES AND STRUCTURES DESIGN MANUAL WHEN FURNISHING SUPPORT STRUCTURES FOR VARIABLE MESSAGE SIGNS (VMS).

CONCRETE DESIGN STRESSES

SPECIFIED COMPRESSIVE STRENGTH (f'c) (CLASS B) --- 3,000 PSI
EXTREME FIBER COMPRESSIVE STRESS (fc) ----- 1,200 PSI

REINFORCEMENT STEEL DESIGN STRESS

YIELD STRENGTH (fy) (A615, GRADE 60) --- 60 KSI
TENSILE STRESS (fs) --- 24 KSI

STRUCTURAL STEEL DESIGN STRENGTHS

YIELD STRENGTH (Fy)
PIPES (A53, TYPE S OR TYPE E, GRADE B) --- 35 KSI (MIN.) *
(API 5L, GRADE B) --- REFER TO API SPECIFICATIONS

* FABRICATORS ARE ADVISED THAT REPAIRS TO THE MATERIALS WILL NOT BE PERMITTED. IF TEARING CRACKING OR ANY DEFECT OCCURS, THE MATERIAL WILL BE REQUIRED TO BE REPLACED.

FOUNDATIONS

MAXIMUM FOUNDATION DESIGN BEARING PRESSURE --- 2.5 KSF
FOOTINGS ARE DESIGNED SUCH THAT A MINIMUM OF 75 PERCENT OF THE FOOTING IS ALWAYS IN CONTACT; A MAXIMUM OF 25 PERCENT OF THE FOOTING IS IN UPLIFT.

BEARING PILES SHALL BE CAST-IN-PLACE CONCRETE PILES WITH A MINIMUM BEARING CAPACITY EQUAL TO 50 KIPS.

REFER TO THE NJDOT BRIDGES AND STRUCTURES DESIGN MANUAL FOR ALTERNATE FOUNDATION DESIGN CRITERIA.

CAMBER

PERMANENT CAMBER EQUAL TO L/1000 HAS BEEN PROVIDED IN ADDITION TO THE DEAD LOAD CAMBER.

B. MATERIALS

I. STEEL

STEEL PIPE SHALL BE CERTIFIED BY MILL TEST REPORT TO MEET ASTM SPECIFICATION A53, TYPE E OR S, GRADE B WITH THE EXCEPTION THAT API 5L, GRADE B MAY BE USED WHEN THE SPECIFIED WALL THICKNESS IS GREATER THAN 1/2". ONLY ELECTRICAL RESISTANCE WELDED (ERW) MANUFACTURED SINGLE SEAM PIPE IS PERMITTED. HOWEVER, WHEN THE REQUIRED PIPE SIZE IS GREATER THAN 24", DOUBLE SEAM PIPE MAY BE USED. A MILL TEST REPORT MUST BE PROVIDED, CERTIFIED AND SIGNED BY THE PIPE MANUFACTURER, CONTAINING PHYSICAL AND CHEMICAL PROPERTIES AND THE MANUFACTURING PROCESS USED TO PRODUCE THE PIPE.

ALL OTHER STEEL SHALL CONFORM TO ASTM SPECIFICATION A709 (AASHTO M270) GRADE 36 OR GRADE 50. ALL SPECIFICATED STEEL PLATES SHALL MEET SUPPLEMENTARY REQUIREMENTS FOR NOTCH TOUGHNESS (CHARPY TESTING, ZONE #2)

UPON COMPLETION OF FABRICATION, THE FABRICATOR SHALL PROVIDE A NOTARIZED CERTIFICATION OF COMPLIANCE AS PER THE REQUIREMENT OF THE NJDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, INCLUDING A LEGIBLE COPY OF ALL MILL TEST REPORTS FOR MATERIALS INCORPORATED INTO THE WORK. ALSO, A COPY OF QC REPORTS SHALL BE PROVIDED.

STEEL ANCHOR BOLTS, NUTS AND WASHERS SHALL CONFORM TO ASTM SPECIFICATION F1554, GRADE 36 OR 55. THE ANCHOR BOLTS SHALL BE HOT DIP GALVANIZED AS PER ASTM SPECIFICATION A153, CLASS C.

CHORD SPLICE ASSEMBLY FASTENERS SHALL BE HIGH STRENGTH STEEL BOLTS CONFORMING TO ASTM SPECIFICATION A325 AND SHALL BE HOT DIP GALVANIZED AS PER ASTM SPECIFICATION A153, CLASS C. ALL OTHER FASTENERS SHALL BE STAINLESS STEEL CONFORMING TO ASTM SPECIFICATION A320, GRADE B8, CLASS 1.

CAPS FOR THE ENDS OF CHORDS AND TOPS OF POSTS SHALL BE STEEL CONFORMING TO ASTM SPECIFICATION A36 AND SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM SPECIFICATION A123.

WELDING OF STEEL SHALL BE AS SPECIFIED IN AWS D1.1, CURRENT EDITION, AND IN THE NJDOT STANDARD SPECIFICATIONS.

AFTER COMPLETE FABRICATION, EACH STEEL SECTION SHALL BE HOT DIP GALVANIZED ACCORDING TO THE REQUIREMENTS OF ASTM SPECIFICATION A123, AS MODIFIED BY THE NJDOT STANDARD

SPECIFICATIONS. A SINGLE DIP GALVANIZING PROCESS IS PREFERRED IF SIZE PERMITS.

REFER TO THE NJDOT STANDARD SPECIFICATIONS FOR CRITERIA ON FURNISHING MATERIALS OTHER THAN SPECIFIED ABOVE.

II. ALUMINUM

ALUMINUM SHALL CONFORM TO THE ASTM SPECIFICATIONS AND ALLOYS LISTED BELOW:

| APPLICATION | ASTM SPECIFICATION | ASTM ALLOY |
|---------------------------|--------------------|------------|
| ROLLED OR EXTRUDED SHAPES | B308 | 6061 - T6 |
| PLATES | B209 | 6061 - T6 |
| DRAWN SEAMLESS TUBES | B210 | 6061 - T6 |
| EXTRUDED TUBES | B221 | 6061 - T6 |

WELDING OF ALUMINUM SHALL BE AS SPECIFIED IN AWS D1.2, CURRENT EDITION, AND IN THE NJDOT STANDARD SPECIFICATIONS.

III. REINFORCEMENT STEEL

ALL REINFORCEMENT STEEL SHALL BE ASTM A615, GRADE 60.

IV. CONCRETE

ALL CONCRETE SHALL BE "CLASS B" AS DEFINED IN THE NJDOT STANDARD SPECIFICATIONS, UNLESS OTHERWISE SPECIFIED BY THE DESIGNER.

V. SIGN LIGHTING

WHEN NECESSARY, AN APPROVED SIGN LIGHTING SYSTEM MAY BE USED AND THE DETAILS OF THE SYSTEM SHALL BE PROVIDED WITH WORKING DRAWING SUBMISSION. NJDOT TRAFFIC SIGNAL AND SAFETY ENGINEERING SHOULD BE CONTACTED FOR REQUIREMENTS REGARDING THE PROVISION OF SIGN LIGHTING OR REFLECTORIZED SIGN PANELS ON A PROJECT TO PROJECT BASIS.

VI. SIGN PANEL AND LIGHTING SYSTEM SUPPORTS

SIGN HANGERS SHALL BE ALUMINUM OR STEEL. LUMINAIRE SUPPORTS SHALL BE ALUMINUM OR STEEL. THE STEEL SHALL CONFORM TO ASTM A709 GRADE 36 OR GRADE 50 AND SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH ASTM SPECIFICATION A123. STEEL SURFACES SHALL BE PREVENTED FROM COMING INTO CONTACT WITH ALUMINUM SURFACES BY MEANS OF APPROVED PADS PLACED BETWEEN THE DISSIMILAR METALS. PADS SHALL BE STAINLESS STEEL CONFORMING TO ASTM SPECIFICATION A240, TYPE 304 OR APPROVED EQUAL. CONNECTING U BOLTS SHALL BE STAINLESS STEEL CONFORMING TO THE NJDOT STANDARD SPECIFICATIONS. INSTALLATION OF SIGN LIGHTING SYSTEM SHALL BE ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.

THE PROVISION OF MAINTENANCE WALKWAY IS NOT REQUIRED.

INSTRUCTIONS FOR DESIGNERS

STEP #1: PREPARE A SIGN SUPPORT LOCATION PLAN AND ELEVATION VIEW FOR EACH STRUCTURE.

STEP #2: ENTER THE SIGN SUPPORT NUMBER AND STATION IN THE SCHEDULE OF STRUCTURES ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS.

STEP #3: DETERMINE THE TRUSS SPAN LENGTH AND HEIGHT OF THE STRUCTURE USING SIGN STRUCTURE DRG. CA-G2. RECORD THE ACTUAL TRUSS SPAN LENGTH IN THE SCHEDULE OF STRUCTURES ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS. ROUND THIS NUMBER TO THE NEXT HIGHER LISTED SPAN LENGTH. IF THE TRUSS SPAN LENGTH IS OVER 40'-0", PROCEED TO STEP #10.

STEP #4: DETERMINE THE SIGN DESIGN LENGTH USING SIGN STRUCTURE DRG. CA-G2. DIVIDE THE SIGN DESIGN LENGTH BY THE TRUSS SPAN LENGTH DETERMINED IN STEP #3 TO OBTAIN THE PERCENT SIGN DESIGN LENGTH. USE THE NEXT HIGHER PERCENT FROM THOSE LISTED (40%, 60%, 70%, OR 80%). IF THE PERCENT IS MORE THAN 80, PROCEED TO STEP #5. OTHERWISE, SKIP TO STEP #6.

STEP #5: TO SELECT A STANDARD DESIGN, DIVIDE THE SIGN DESIGN LENGTH BY 80% AND ROUND THIS NUMBER TO THE NEXT HIGHER LISTED SPAN LENGTH. IF THE NUMBER IS LESS THAN 40'-0", RETURN TO STEP #4. OTHERWISE, PROCEED TO STEP #10.

STEP #6: HAVING OBTAINED THE TRUSS SPAN LENGTH (FROM STEP #3 OR STEP #5) AND THE PERCENT SIGN DESIGN LENGTH (FROM STEP #4), SELECT THE TRUSS SIZE AND THE TRUSS ELEMENT SIZES (I.E., CHORDS, DIAGONALS, AND STRUTS) USING THE APPROPRIATE DESIGN TABLES ON SIGN STRUCTURE DRG. CA-G3. RECORD THE DATA IN THE SCHEDULE OF STRUCTURES ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS.

STEP #7: WITH THE HEIGHT OF THE STRUCTURE OBTAINED IN STEP #3 AND USING THE ELEVATION OF THE BOTTOM OF BASE PLATE, DETERMINE THE ELEVATION OF THE CENTER LINE OF THE TRUSS AND THE DESIGN HEIGHT OF THE POST. IF THE POST HEIGHT IS MORE THAN 40'-0", SKIP TO STEP #10. OTHERWISE, SELECT THE NEXT HIGHER NUMBER FROM THOSE LISTED (25, 30, OR 40 FEET). USING THE SAME TABLE USED IN STEP #6, SELECT THE SIZE OF THE POST (I.E., OUTSIDE DIAMETER AND THICKNESS). RECORD THE DATA IN THE SCHEDULE OF STRUCTURES ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT DRAWINGS.

STEP #8: CHECK AVAILABILITY OF SHAPES SELECTED IN STEPS #6 AND #7.

STEP #9: USING SOIL TEST AND SOIL BORING INFORMATION, DETERMINE THE ALLOWABLE SOIL PRESSURE AND THE REQUIRED DEPTH OF FOOTINGS.

STEP #10: DETERMINE THE PEDESTAL HEIGHT. IF THE PEDESTAL HEIGHT IS BETWEEN 4'-0" AND 6'-0", PROCEED TO STEP #11. OTHERWISE, SKIP TO STEP #16. THE PREFERRED PEDESTAL HEIGHT OF 4'-6" IS TO BE USED WHENEVER POSSIBLE. WHEN USING A BARRIER PEDESTAL, THE "COVERED" HEIGHT MUST BE 3'-0". OTHERWISE, SKIP TO STEP # 16

STEP #11: DETERMINE THE REQUIRED FOOTING SIZES USING THE DESIGN TABLE ON SIGN STRUCTURE DRGS. CA-G3. RECORD THE DATA IN THE SIGN SUPPORT FOUNDATION TABLE ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS.

STEP #12: DETERMINE THE REQUIRED FOOTING DESIGN DATA USING SIGN STRUCTURE DRG. CA-G5. RECORD THIS DATA IN THE SIGN SUPPORT FOUNDATION TABLE ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS. IF THE ALLOWABLE SOIL PRESSURE IS GREATER THAN 2.5 KSF, SKIP TO STEP #14. OTHERWISE, PROCEED TO STEP #13.

STEP #13: SELECT THE NUMBER OF CAST-IN-PLACE CONCRETE PILES NEEDED TO SUPPORT THE STRUCTURE USING SIGN STRUCTURE DRG. CA-G5. RECORD THE DATA IN THE SIGN SUPPORT FOUNDATION TABLE ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS.

STEP #14: DETERMINE WHETHER A PEDESTAL OR BARRIER PEDESTAL IS TO BE USED FOR THE FOUNDATION. SELECT ALL PEDESTAL OR BARRIER PEDESTAL DATA FROM SIGN STRUCTURE DRG. CA-G4. RECORD THE DATA IN THE SIGN SUPPORT FOUNDATION TABLE ON SIGN STRUCTURE DRG. CA-D2 OF THE CONTRACT PLANS.

STEP #15: THE DESIGN OF THE CANTILEVER SIGN SUPPORT STRUCTURE IS COMPLETE. DISREGARD STEP #16.

STEP #16: THE PARAMETERS OF THE SIGN SUPPORT STRUCTURE EXCEED THE RESTRICTIONS RELATED TO THESE STANDARD DESIGN TABLES. DESIGN THE SIGN SUPPORT STRUCTURE ON AN INDIVIDUAL BASIS.

| INDEX OF DRAWINGS | |
|-------------------|---|
| DRG. NO. | DESCRIPTION |
| CA-G1 | GENERAL INFORMATION |
| CA-G2 | GENERAL CRITERIA |
| CA-G3 | DESIGN TABLES - STEEL TRUSSES AND STEEL POSTS |
| CA-G4 | PEDESTAL AND BARRIER PEDESTAL DESIGN TABLES AND DETAILS |
| CA-G5 | FOOTING DESIGN TABLES AND DETAILS |

THIS PLATE FOR DESIGN INFORMATION ONLY. DO NOT INCLUDE IN CONTRACT PLANS.

SIGN STRUCTURE DRG. CA-G1

NEW JERSEY DEPARTMENT OF TRANSPORTATION
BUREAU OF STRUCTURAL ENGINEERING

CANTILEVER SIGN SUPPORT STANDARDS

GENERAL INFORMATION

SCALE : NONE 1
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