DESIGN DATA

MATERIAL:

CLASS AA CONCRETE	f'c = 4 KSI
REINFORCING STEEL	fy = 60 KSI
STRUCTURAL STEEL	Fy = 35 KSI (STRUCTURAL PIPE) Fy = 36 KSI (PLATES AND SHAPES) SEE MATERIAL DATA TABLE

LOADING:

WIND SPEED	120 MPH (3-SECOND GUST WIND SPEED) 1700-YEAR MEAN RECURRENCE INTERVAL
STATIC SIGN PANEL	3 PSF

DESIGN:

AASHTO LRFD SPECIFICATIONS FOR STRUCTURAL SUPPORTS FOR HIGHWAY SIGNS, LUMINAIRES, AND TRAFFIC SIGNALS, 1ST EDITION WITH 2020 INTERIMS

ANSI / AWS STRUCTURAL WELDING CODE D1.1 - STEEL
ANSI / AWS STRUCTURAL WELDING CODE D1.5 - BRIDGE WELDING CODE

DRILLED SHAFT DESIGN:

COHESIVE SOIL	
UNIT WEIGHT	120 PCF
COHESION	500 PSF
COHESIONLESS	
UNIT WEIGHT	120 PCF
INTERNAL FRICTION ANGLE	28 DEGREES

IF SITE CONDITIONS ARE ENCOUNTERED THAT DIFFER FROM THOSE SPECIFIED ABOVE, THE ENGINEER SHALL BE CONTACTED. SUCH CONDITIONS ARE, BUT NOT LIMITED TO, AS FOLLOWS:

- SOIL WITH HIGH ORGANIC CONTENT OR CONSISTS OF SATURATED SILT AND CLAY
- THE SITE WON'T SUPPORT THE WEIGHT OF THE DRILLING RIG
- ROCK IS ENCOUNTERED

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MINIMUM YIELD STRENGTH
MAST ARM & POST	A53 GRADE B A500 GRADE B A500 GRADE C A1085 A36 A252 GRADE 2 (SEAMLESS) API-5L PSL 2	35 KSI
ANCHOR BOLTS	F1554 GRADE 55	55 KSI
U-BOLTS	A193-B7	105 KSI
CONNECTION BOLTS	A490 TYPE 1	130 KSI
HEAVY HEX NUTS	A563 GRADE A A563 GRADE DH A194-2H (U-BOLTS)	
WASHERS	F436 TYPE 1	
DIRECT TENSION INDICATORS	F959 TYPE 490 F2437 TYPE 2 GRADE 5	

GENERAL NOTES

1. ALL CONSTRUCTION AND MATERIAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE CURRENT ODOT STANDARD SPECIFICATIONS.
2. PROVIDE STRUCTURAL STEEL FOR PLATES, SHAPES AND STRUCTURAL PIPE IN ACCORDANCE WITH CHARPY V-NOTCH IMPACT TEST REQUIREMENTS FOR NON-FRACTURE CRITICAL MEMBERS TESTED FOR ZONE 2.
3. FORM ELBOWS FOR TUBULAR FRAME BY HOT BENDING METHODS WHICH DO NOT CRIMP OR BUCKLE THE INTERIOR RADIUS OF THE PIPE BEND AND DO NOT CHANGE THE PHYSICAL CHARACTERISTICS OF THE MATERIAL.
4. BEND THE ELBOW IN ACCORDANCE WITH TPA-IBS-98 "RECOMMENDED STANDARDS FOR INDUCTION BENDING OF PIPE AND TUBE".
5. FOR SEAM WELDED PIPE, LOCATE A LONGITUDINAL SEAM WELDED AT THE NEUTRAL AXIS DURING THE BENDING PROCESS.
6. FABRICATE ALL SIGN STRUCTURES TO THE LARGEST PRACTICAL SECTION PRIOR TO GALVANIZING. ALL SPLICE LOCATIONS SHAL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO THE CONTRACTOR FABRICATING THE STRUCTURE.
7. GALVANIZE ALL STRUCTURAL STEEL IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AFTER FABRICATION UNLESS OTHERWISE NOTED. DRAIN ACID TO PREVENT ACID ENTRAPMENT UNDER BACKING RING DURING THE GALVANIZING PROCESS.
8. HOT-DIP GALVANIZE ALL TUBE MEMBERS AND PLATES PER ASTM A123. COAT ASTM A490 FASTENERS PER ASTM F1136, GRADE 3. WHEN COATING ASTM A490 FASTENERS, HYDROGEN EMBRITTLEMENT SHALL BE INVESTIGATED AND PREVENTED PER THE APPLICABLE ASTM SPECIFICATION. COAT NUTS USED WITH ASTM A490 FASTENERS PER ASTM F1136, GRADE 5. COAT WASHERS USED WITH ASTM A490 FASTENERS PER ASTM F1136, GRADE 3. COAT ANCHOR BOLTS, NUTS USED WITH ANCHOR BOLTS, AND WASHERS USED WITH ANCHOR BOLTS PER ASTM F2329.
9. ALL DIAMETERS ARE OUT TO OUT UNLESS OTHERWISE NOTED.
10. MONOTUBE SIGN STRUCTURES NOT MEETING THE REQUIREMENTS SHOWN IN THE STANDARD DRAWINGS SHALL REQUIRE A SPECIAL DESIGN THAT IS DESIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF OKLAHOMA.
11. PROVIDE MINIMUM VERTICAL CLEARANCE FROM THE EDGE OF PAVEMENT OR FACE OF BARRIER TO 12' BEYOND THE FREE END OF THE SIGN.
12. BUILD CAMBER INTO THE MAST ARM AND ERECT THE MAST ARM TO PROVIDE THE REQUIRED CAMBER ABOVE A HORIZONTAL LINE CENTERED AT THE FIELD SPLICE.
13. SHOP ASSEMBLE THE POST AND MAST ARM. DURING SHOP ASSEMBLY, BRING THE FIELD SPLICE TO A SNUG TIGHT CONDITION WITH THE REQUIRED BOLTS IN ALL HOLES THROUGH EACH PLY IN THE CONNECTION.
14. DURING ASSEMBLY OF THE FLANGE PLATE CONNECTIONS, MEMBERS SHALL NOT BE PULLED TOGETHER AND TIGHTENED IF A GAP OVER ⅛" EXISTS. A FILLER PLATE MAY BE USED AT A HORIZONTAL MEMBER FLANGE CONNECTION. THE MAXIMUM THICKNESS OF THE FILLER PLATE AT ANY FLANGE CONNECTION IS 1". IF A FILLER PLATE GREATER THAN 1" BUT LESS THAN OR EQUAL TO 6" IS REQUIRED FOR ASSEMBLY, THE REQUIRED DIMENSION SHALL BE SEPARATED INTO TWO DIFFERENT FLANGE CONNECTIONS AND SHALL BE LOCATED SYMMETRICALLY ALONG THE MONOTUBE STRUCTURE. ADDITION OF FILLER PLATES SHALL BE AT THE COST OF THE CONTRACTOR.
15. IF THE MONOTUBE FRAME IS ERECTED AS ONE UNIT, PROVIDE ADEQUATE SUPPORT TO AVOID DISTORTIONS. SUPPORT THE STRUCTURE BY THE CRANE DURING THE ANCHOR BOLT TIGHTENING PROCESS.
16. STAMP STRUCTURE IDENTIFICATION ON THE STRUCTURE POST WITH THE FOLLOWING INFORMATION:
    - STATE JOB NUMBER
    - STRUCTURE TYPE
    - STRUCTURE LENGTH
    - MAXIMUM ALLOWABLE SIGN AREA
    - MAXIMUM ALLOWABLE SIGN HEIGHT
    - DATE MANUFACTURED
    - MANUFACTURER'S NAME
17. DRILLED SHAFTS SHALL BE CONSTRUCTED ACCORDING TO THE STANDARD SPECIFICATIONS AND ASSOCIATED SPECIAL PROVISIONS.
18. DRILLED SHAFTS SHALL NOT BE CONSTRUCTED USING THE DOUBLE CASING METHOD.
19. NOTIFY THE ENGINEER FOR SITE CONDITIONS THAT ARE DIFFERENT THAN THE LIMITS USED IN THE DRILLED SHAFT DESIGN DATA.
20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONFIRMING THE LOCATION AND ELEVATION OF THE DRILLED SHAFT IS AS REQUIRED IN THE PLANS. THE CONTRACTOR SHALL COORDINATE WITH THE MONOTUBE FABRICATOR TO ENSURE THE ORIENTATION OF THE ANCHOR BOLTS IN THE DRILLED SHAFT ALLOW FOR PROPER ALIGNMENT OF ALL BASE PLATES AND FLANGES UPON FINAL INSTALLATION.
21. ALL TYPE 'C' SIGN STRUCTURES WILL HAVE A CAP AT THE END OF THE HORIZONTAL MEMBER OF THE STRUCTURE. THE CONTRACTOR MAY SUBMIT A REMOVABLE CAP ALTERNATIVE TO THE ENGINEER FOR APPROVAL.
22. WELDING OF STEEL WILL CONFORM TO THE REQUIREMENTS OF AWS D1.1 (LATEST REVISION). GRIND ALL AREAS TO BE WELDED TO BRIGHT METAL. COMPLETE ALL WELDING AND REQUIRED NON-DESTRUCTIVE TESTING BEFORE THE MATERIAL IS GALVANIZED. TEST ALL CIRCUMFERENTIAL WELDS NON-DESTRUCTIVELY USING THE ENHANCED MAGNETIC PARTICLE METHOD IN ACCORDANCE WITH ODOT STANDARD SPECIFICATION 720.03B. THE MAXIMUM WELD UNDERCUT SHALL BE 0.01".
23. ALL STRUCTURAL PIPE TO BASE PLATE COMPLETE JOINT PENETRATION GROOVE WELDS SHALL BE ULTRASONICALLY TESTED FOR CRACKS BEFORE AND AFTER GALVANIZATION.
24. WELD FILLER MATERIAL SHALL MEET ALL CHARPY V-NOTCH REQUIREMENTS SPECIFIED IN AWS D1.1 AT A TEMPERATURE OF 40°F.
25. ALL BASE METAL SHALL BE PRE-HEATED IN ACCORDANCE WITH AWS D1.1 PRIOR TO WELDING.

GENERAL NOTES CONTINUED

26. SMAW ELECTRODES SHALL BE THE LOW-HYDROGEN CLASSIFICATION AS DEFINED BY AWS D1.1.
27. STORAGE, HANDLING AND USE OF LOW-HYDROGEN ELECTRODES SHALL BE IN CONFORMANCE WITH AWS D1.1.
28. THERE SHALL BE NO POST WELD HEAT TREATMENT OF THE STRUCTURAL PIPE TO BASE PLATE CONNECTION.
29. THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO ODOT BRIDGE DIVISION. A WELDING PROCEDURE SPECIFICATION SHALL BE INCLUDED WITH THE SHOP DRAWINGS.
30. THE BACKING RING MATERIAL SHALL BE IN ACCORDANCE WITH AWS D1.1.

GENERAL INSTALLATION PROCEDURES

1. ENSURE THAT ALL ANCHOR BOLTS, BASE PLATES AND FLANGE PLATES ARE PROPERLY ALIGNED TO PREVENT UNACCEPTABLE DISTORTION OF THE STRUCTURE UPON FINAL INSTALLATION.
2. IN THE EVENT THE DRILLED SHAFT AND ANCHOR BOLTS ARE INSTALLED PRIOR TO FABRICATION OF THE MONOTUBE STRUCTURE, THE MONOTUBE FABRICATOR SHALL COORDINATE WITH THE DRILLED SHAFT CONTRACTOR TO ENSURE THE BASE PLATES AND FLANGES ARE FABRICATED SO THAT PROPER ALIGNMENT OF ALL BOLT HOLES ARE ACHIEVED.
3. IN THE EVENT THE MONOTUBE SIGN STRUCTURE IS FABRICATED PRIOR TO INSTALLATION OF THE DRILLED SHAFT AND ANCHOR BOLTS, ENSURE THE ANCHOR BOLT INSTALLATION ALLOWS PROPER ALIGNMENT OF ALL BOLTED CONNECTIONS.
4. CONSTRUCTION TOLERANCES SET FORTH IN THE STANDARD SPECIFICATIONS SHALL APPLY.
5. ERECT THE MONOTUBE SIGN STRUCTURE BASED ON THE ERECTION PLAN APPROVED BY THE RESIDENT ENGINEER AND IN ACCORDANCE WITH ODOT STANDARD SPECIFICATION 852.04D. SUPPORT ALL COMPONENTS OF THE STRUCTURE UNTIL FINAL TENSIONING OF ALL BOLTS AND FASTENERS ARE COMPLETE.
6. INSTALLATION OF ALL FASTENERS AND BOLTS USING DIRECT TENSION INDICATORS SHALL BE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.
7. ENSURE THE MONOTUBE SIGN STRUCTURE IS PROPERLY ATTACHED TO THE ANCHOR BOLTS AND ALL LEVELING NUTS ARE FLUSH WITH THE BOTTOM OF THE BASE PLATE.
8. ENSURE ALL FLANGES HAVE BEEN SECURELY FASTENED.

TRAFFIC ENGINEERING DIVISION STANDARD

OVERHEAD MONOTUBE SIGN STRUCTURE GENERAL NOTES

OKLAHOMA Transportation

APPROVED BY TRAFFIC ENGINEERING DIVISION AND BRIDGE DIVISION ON 8/4/2025

2019 SPECIFICATIONS

OMSSGN-1	1

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