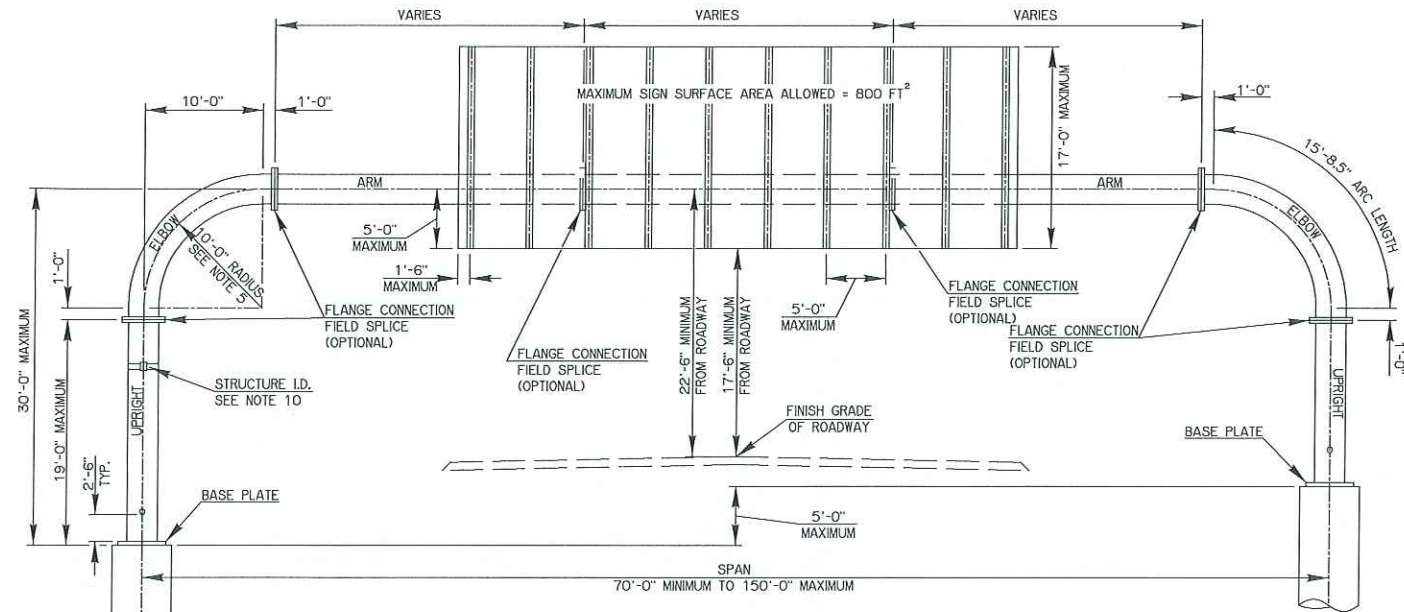
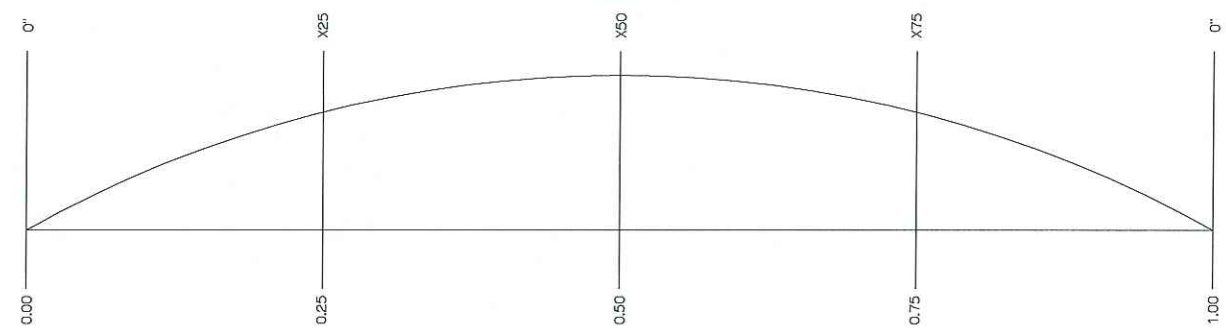


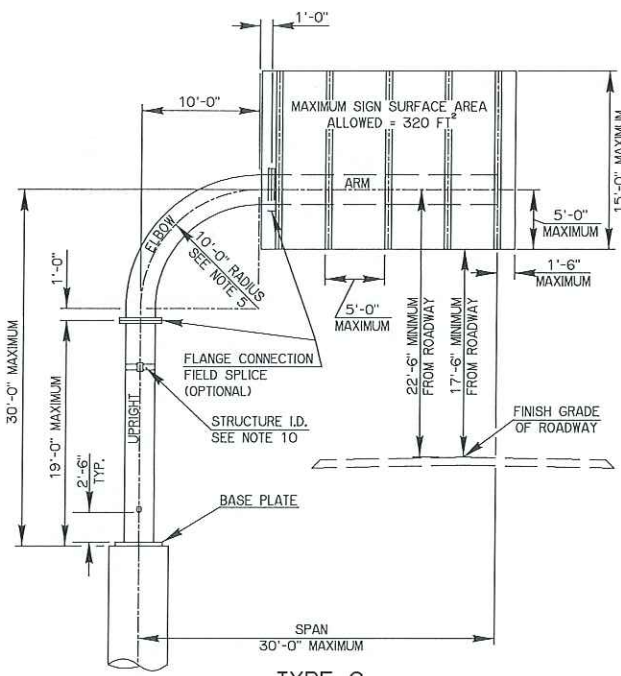
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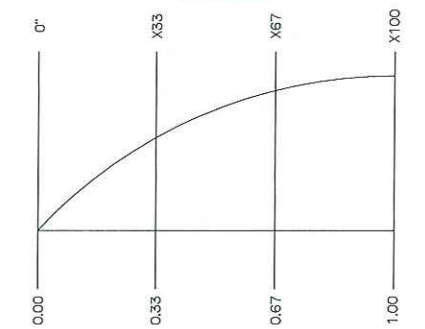
TYPE B



TYPE B CAMBER DIAGRAM (SEE CAMBER SCHEDULE)



TYPE C



TYPE C CAMBER DIAGRAM (SEE CAMBER SCHEDULE)

| SPAN (FT) | X25 (IN) | X50 (IN) | X75 (IN) |
|-----------|----------|----------|----------|
| 70 | 1.08 | 1.27 | 1.08 |
| 75 | 1.20 | 1.43 | 1.20 |
| 80 | 1.32 | 1.61 | 1.32 |
| 85 | 1.46 | 1.81 | 1.46 |
| 90 | 1.61 | 2.03 | 1.61 |
| 95 | 1.62 | 1.94 | 1.62 |
| 100 | 1.77 | 2.22 | 1.77 |
| 105 | 1.93 | 2.46 | 1.93 |
| 110 | 2.10 | 2.72 | 2.10 |
| 115 | 2.28 | 3.00 | 2.28 |
| 120 | 2.48 | 3.31 | 2.48 |
| 125 | 2.60 | 3.65 | 2.60 |
| 130 | 2.92 | 4.01 | 2.92 |
| 135 | 3.17 | 4.40 | 3.17 |
| 140 | 3.43 | 4.83 | 3.43 |
| 145 | 3.71 | 5.29 | 3.71 |
| 150 | 4.02 | 5.78 | 4.02 |

| SPAN (FT) | X33 (IN) | X67 (IN) | X100 (IN) |
|-----------|----------|----------|-----------|
| 30 | 0.86 | 1.44 | 2.03 |

GENERAL INSTALLATION PROCEDURES

ENSURE THAT ALL ANCHOR BOLTS, BASE PLATES, AND FLANGE PLATES ARE PROPERLY ALIGNED TO PREVENT UNACCEPTABLE DISTORTION OF THE STRUCTURE UPON FINAL INSTALLATION. IN THE EVENT THAT THE DRILLED SHAFT AND ANCHOR BOLTS ARE INSTALLED PRIOR TO THE FABRICATION OF THE MONOTUBE STRUCTURE, THE MONOTUBE FABRICATOR SHOULD COORDINATE WITH THE DRILLED SHAFT CONTRACTOR TO ENSURE THAT THE BASE PLATES AND FLANGES ARE FABRICATED SO THAT PROPER ALIGNMENT OF ALL BOLT HOLES IS ACHIEVED. IN THE EVENT THAT THE MONOTUBE SIGN STRUCTURE IS FABRICATED PRIOR TO THE INSTALLATION OF THE DRILLED SHAFT AND ANCHOR BOLTS, THE DRILLED SHAFT CONTRACTOR SHOULD COORDINATE WITH THE SIGN STRUCTURE FABRICATOR TO ENSURE THAT THE ANCHOR BOLT INSTALLATION ALLOWS FOR PROPER ALIGNMENT OF ALL BOLTED CONNECTIONS. CONSTRUCTION TOLERANCES SET FORTH IN THE 2009 OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION SHALL APPLY.

ERECT MONOTUBE SIGN STRUCTURE IN A MANNER APPROVED BY THE RESIDENT ENGINEER. SUPPORT ALL COMPONENTS OF THE STRUCTURE UNTIL FINAL TENSIONING OF ALL BOLTS AND FASTENERS IS COMPLETE.

INSTALLATION OF ALL FASTENERS AND BOLTS USING DIRECT TENSION INDICATORS SHALL BE IN ACCORDANCE WITH THE 2009 OKLAHOMA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION. ENSURE THAT THE MONOTUBE SIGN STRUCTURE IS PROPERLY ATTACHED TO THE ANCHOR BOLTS AND THAT ALL LEVELING NUTS ARE FLUSH WITH THE BOTTOM OF THE BASE PLATE. ENSURE THAT ALL FLANGES HAVE BEEN SECURELY FASTENED.

| ITEM NO. | ITEM | UNIT |
|----------|-------------------------------|------|
| 852(D) | OVHD.SN.STR., MONOTUBE TYPE B | EA |
| 852(E) | OVHD.SN.STR., MONOTUBE TYPE C | EA |

- GENERAL NOTES**
- MAXIMUM SIGN HEIGHT TO BE USED ON THE TYPE C STRUCTURE SHALL BE 15 FEET. MAXIMUM SIGN HEIGHT TO BE USED ON THE TYPE B STRUCTURE SHALL BE 17 FEET.
 - MAXIMUM SIGN AREA TO BE USED ON THE TYPE C STRUCTURE SHALL BE 320 SQUARE FEET. MAXIMUM SIGN AREA TO BE USED ON THE TYPE B STRUCTURE SHALL BE 800 SQUARE FEET.
 - FOR SIGNS LESS THAN 10'-0" TALL, SIGNS SHALL BE CENTERED ON THE SPAN. FOR SIGNS GREATER THAN OR EQUAL TO 10'-0" TALL, BOTTOM OF SIGNS SHALL BE 5'-0" BELOW ϕ OF THE SPAN.
 - THE LENGTH OF THE ARM MEMBERS LABELED AS 'VARIES' SHOULD BE A MINIMUM OF 30'-0" FOR TYPE 'B' MONOTUBE SIGN STRUCTURES.
 - ADJUST BEND RADIUS ACCORDING TO CAMBER DIAGRAM. ALL TRANSVERSE PLATES CONNECTING TO AN ELBOW SHALL BE PERPENDICULAR TO THE CENTERLINE OF THE ELBOW AT THE LOCATION OF THE CONNECTION.
 - STRUCTURAL STEEL TUBING USED IN THE FABRICATION OF MONOTUBES SHALL EITHER BE COLD-FORMED WELDED OR SEAMLESS TUBING CONFORMING TO THE ASTM A500, GRADE C (MEETING AASHTO M270 ZONE 2 FRACTURE CRITICAL CHARPY V-NOTCH REQUIREMENTS) OR API 5L PSL 2, GRADE X52 (MEETING AASHTO M270 ZONE 2 FRACTURE CRITICAL CHARPY V-NOTCH REQUIREMENTS).
 - BASE PLATES, FLANGE PLATES, AND FILLER PLATES TO BE STRUCTURAL STEEL CONFORMING TO THE SPECIFICATIONS OF ASTM DESIGNATION: A709, GRADE 50.
 - ALL FLANGE BOLTS TO CONFORM TO THE SPECIFICATIONS OF ASTM A490, TYPE 1, AND SHALL BE TIGHTENED AND INSPECTED USING DIRECT TENSION INDICATORS TO CONFORM TO THE SPECIFICATIONS OF ASTM F959, TYPE 490. ALL WASHERS TO CONFORM TO THE SPECIFICATIONS OF ASTM F436, TYPE 1. ALL NUTS USED TO FASTEN ASTM A490 BOLTS SHALL BE ASTM A563, GRADE DH. ALL ANCHOR BOLTS TO CONFORM TO THE SPECIFICATIONS OF ASTM F1554-GRADE 55 (MEETING ASTM F1554 CHARPY V-NOTCH REQUIREMENTS) AND TO BE TIGHTENED AND INSPECTED USING DIRECT TENSION INDICATORS CONFORMING TO THE SPECIFICATIONS OF ASTM F2437 (TYPE 1 GRADE 55). ALL ANCHOR BOLT NUTS TO CONFORM TO THE SPECIFICATIONS OF ASTM A563-GRADE A. ALL ANCHOR BOLT WASHERS TO CONFORM TO THE SPECIFICATIONS OF ASTM F436, TYPE 1.
 - 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 EMBRITTELEMENT SHALL BE INVESTIGATED AND PREVENTED PER THE APPLICABLE ASTM SPECIFICATIONS. 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.
 - STAMP STRUCTURE IDENTIFICATION ON UPRIGHT OF STRUCTURE WITH THE FOLLOWING INFORMATION: JP# TYPE 'B' OR TYPE 'C', STRUCTURE LENGTH, MAXIMUM ALLOWABLE SIGN AREA, MAXIMUM ALLOWABLE SIGN HEIGHT, DATE MANUFACTURED, AND MANUFACTURER'S NAME.
 - MAST ARMS TO BE TEMPORARILY SUPPORTED TO TAKE ALL LOAD OFF OF THE FIELD SPLICES WHILE BOLTS ARE BEING TIGHTENED IN ORDER TO FIRMLY SEAT THE FLANGE PLATES AND BASE PLATES.
 - POSTS FOR TUBULAR SIGN STRUCTURES TO BE FORMED TO THE RADII SHOWN ON THE PLANS BY FABRICATION METHODS WHICH WILL NOT CRIMP OR BUCKLE THE INTERIOR RADIUS OF THE PIPE BEND.
 - CLIPS, EYES OR REMOVABLE BRACKETS TO BE AFFIXED TO ALL POSTS AND MAST ARMS, AS NECESSARY, TO SECURE THE SIGN DURING SHIPPING AND FOR LIFTING AND MOVING DURING ERECTION. THIS IS TO PREVENT DAMAGE TO THE FINISHED GALVANIZED OR PAINTED SURFACES. BRACKETS ON TUBULAR SIGN STRUCTURES TO BE REMOVED AFTER ERECTION. DETAILS OF SUCH DEVICES TO BE SHOWN ON THE SHOP DRAWINGS.
 - BOLTS WITH DIAMETERS EXCEEDING BY UP TO 1/4 INCH THE DIAMETER OF THE BOLTS SHOWN ON THE PLANS MAY BE USED, PROVIDED THAT THE REQUIRED CLEARANCES AND EDGE DISTANCE ARE NOT REDUCED BELOW THAT REQUIRED FOR THE LARGER BOLT.
 - FABRICATE ALL SIGN STRUCTURES TO THE LARGEST PRACTICAL SECTIONS PRIOR TO GALVANIZING. SPLICE LOCATIONS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL AND THE CONTRACTOR SHALL NOT COMMENCE FABRICATION UNTIL SUCH SPLICE LOCATIONS ARE APPROVED.
 - ALL TYPE 'C' SIGN STRUCTURES TO HAVE A REMOVABLE CAP ON THE END OF THE HORIZONTAL MEMBER OF THE STRUCTURE.
 - WELDING OF STEEL TO 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 MATERIAL IS GALVANIZED. TEST ALL CIRCUMFERENTIAL WELDS NON-DESTRUCTIVELY USING THE ENHANCED MAGNETIC PARTICLE METHOD IN ACCORDANCE WITH ODOT STANDARD SPECIFICATION 720.03B. MAXIMUM WELD UNDERCUT SHALL BE 0.01".
 - ALL TUBE-TO-TRANSVERSE PLATE COMPLETE JOINT PENETRATION (CJP) GROOVE WELDS SHALL BE ULTRASONICALLY TESTED (UT) FOR CRACKS BEFORE AND AFTER GALVANIZATION.
 - WELD FILLER MATERIAL SHALL MEET ALL CHARPY V-NOTCH REQUIREMENTS SPECIFIED IN AWS D1.1 AT A TEMPERATURE OF 40°F.
 - ALL BASE METAL SHALL BE PREHEATED IN ACCORDANCE WITH AWS D1.1 PRIOR TO WELDING.
 - BACKING RING SHALL BE THOROUGHLY FUSED WITH THE WELD MATERIAL.
 - SMAW ELECTRODES SHALL BE THE LOW-HYDROGEN CLASSIFICATION AS DEFINED BY AWS D1.1.
 - STORAGE, HANDLING, AND USE OF LOW-HYDROGEN ELECTRODES SHALL BE IN CONFORMANCE WITH AWS D1.1.
 - THERE SHALL BE NO POST WELD HEAT TREATMENT OF THE TUBE-TO-TRANSVERSE PLATE CONNECTION.
 - THE CONTRACTOR SHALL PROVIDE SHOP DRAWINGS TO ODOT BRIDGE DIVISION. A WELDING PROCEDURE SPECIFICATION (WPS) SHALL BE ATTACHED TO THE SHOP DRAWINGS.
 - BACKING RING MATERIAL SHALL BE IN ACCORDANCE WITH AWS D1.1.



PREPARED BY:
OKLAHOMA DEPARTMENT OF TRANSPORTATION
BRIDGE DESIGN DIVISION
08/31/2017
DATE
JASON D. GIEBLER
OKLA. REG. NO. 24272
Signing for Monotube Sheets: M1-M7



| | | | |
|---|--------|------------|----|
| MONOTUBE STRUCTURE (TYPE 'B' & TYPE 'C') | Design | JG | JW |
| | Detail | JG | JW |
| | Check | JG | JW |
| | Squad | SUPERVISOR | |
| | Engr. | ENGINEER | |

STATE OF OKLAHOMA DEPARTMENT OF TRANSPORTATION
JOB PECE NO. 30444(06) SHEET NO. M1