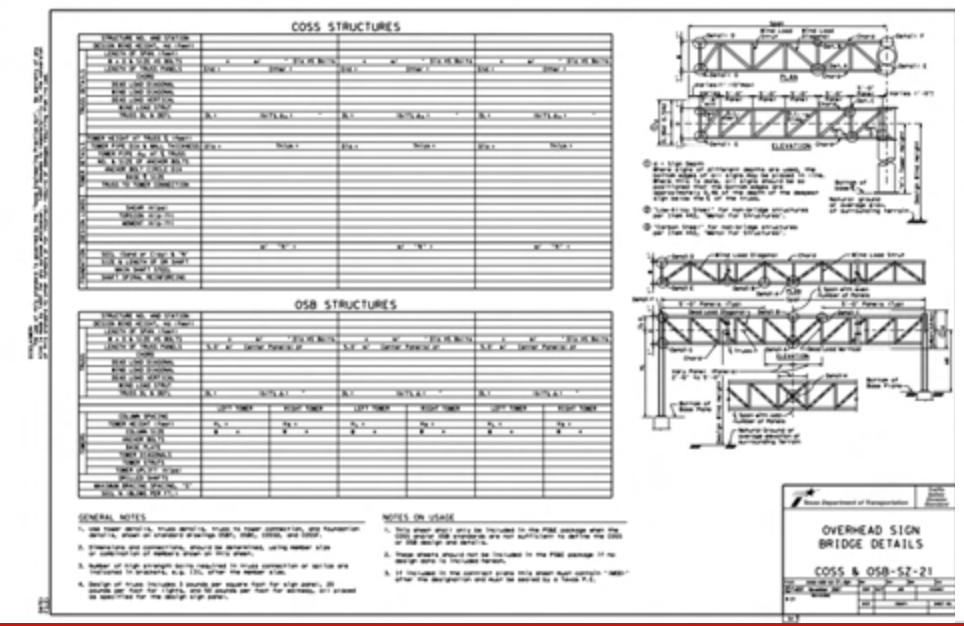
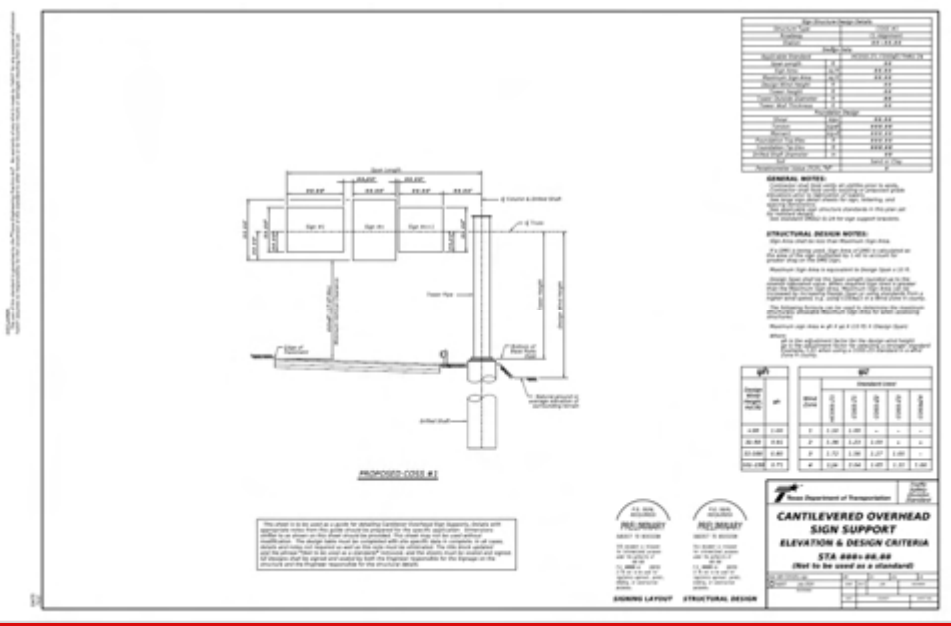
Resources

Texas Department of Transportation

August 15, 2025





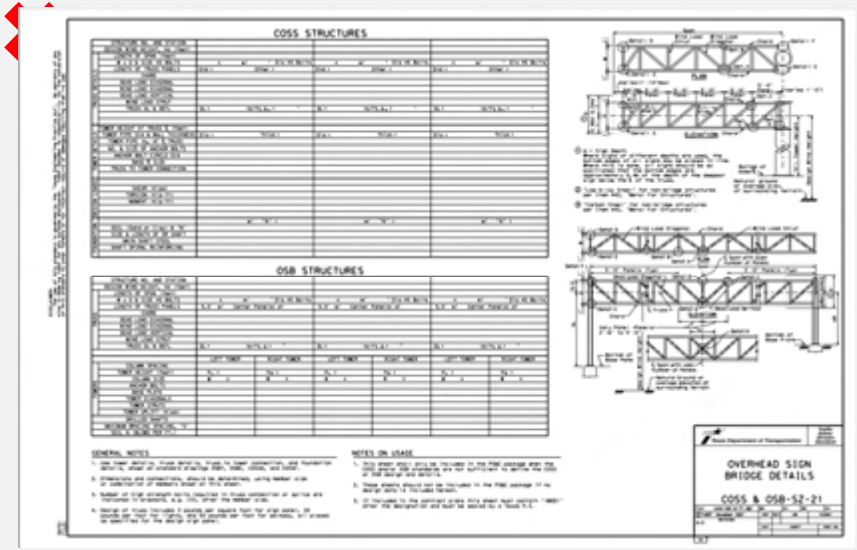
Working Drawings

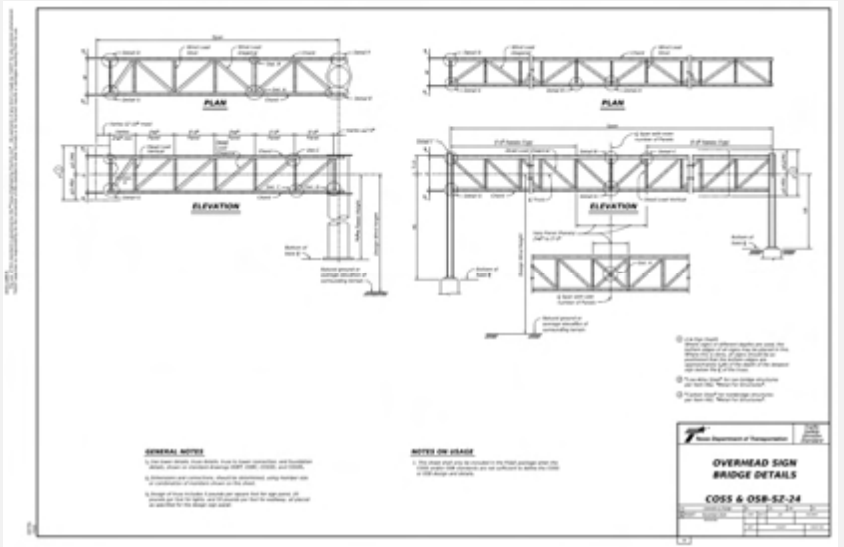
Texas Department of Transportation

August 15, 2025

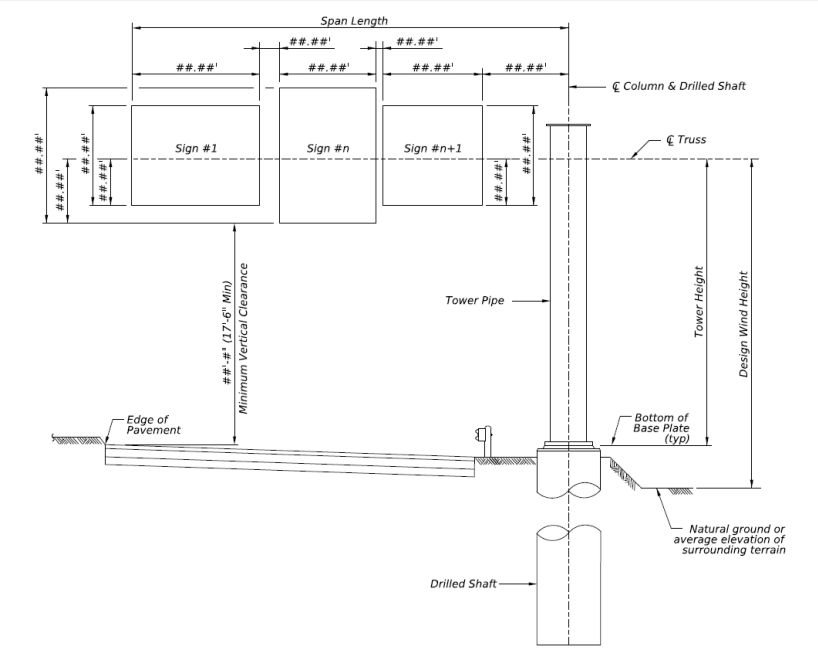
Working Drawings

COSS & OSB-SZ-21

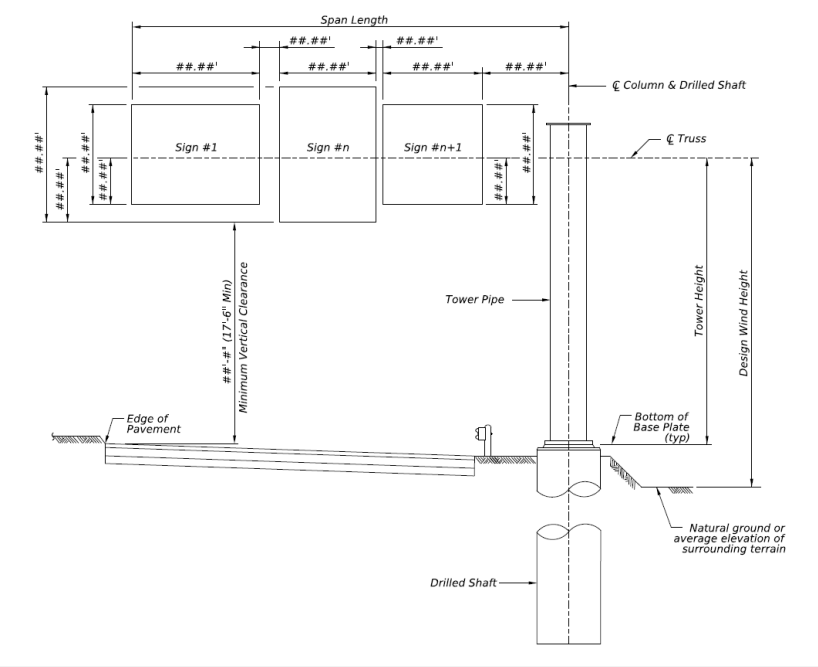




Elevation Working Drawings



Elevation Working Drawings



Sign Structure Design Details		
Structure Type		COSS #1
Roadway		CL Alignment
Station		##+##.##
Design Data		
Applicable Standard		HCOSS-Z1, COSS-Z1 THRU Z4
Span Length	ft	##
Sign Area	sq ft	##.##
Maximum Sign Area	sq ft	##.##
Design Wind Height	ft	##
Tower Height	ft	##
Tower Outside Diameter	ft	##
Tower Wall Thickness	ft	##
Foundation Design		
Shear	kips	##.##
Torsion	kip-ft	###.##
Moment	kip-ft	###.##
Foundation Top Elev	ft	###.##
Foundation Tip Elev	ft	###.##
Drilled Shaft Diameter	in	##
Soil		Sand or Clay
Penetrometer Value (TCP), "N"		#

Elevation Working Drawings

STRUCTURAL DESIGN NOTES:

Sign Area shall be less than Maximum Sign Area.

If a DMS is being used, Sign Area of DMS is calculated as the area of the sign multiplied by 1.42 to account for greater drag on the DMS sign.

Maximum Sign Area is equivalent to Design Span x 10 ft.

Design Span shall be the Span Length rounded up to the nearest tabulated value. When required Sign Area is greater than the Maximum Sign Area, Maximum Sign Area can be increased by increasing Design Span or using standards from a higher wind speed, e.g. using COSS-Z3 in a Wind Zone 4 county.

The following formula can be used to determine the maximum structurally allowable Maximum Sign Area for when assessing structures.

Maximum sign Area = ψh X ψz X (10 ft) X (Design Span)

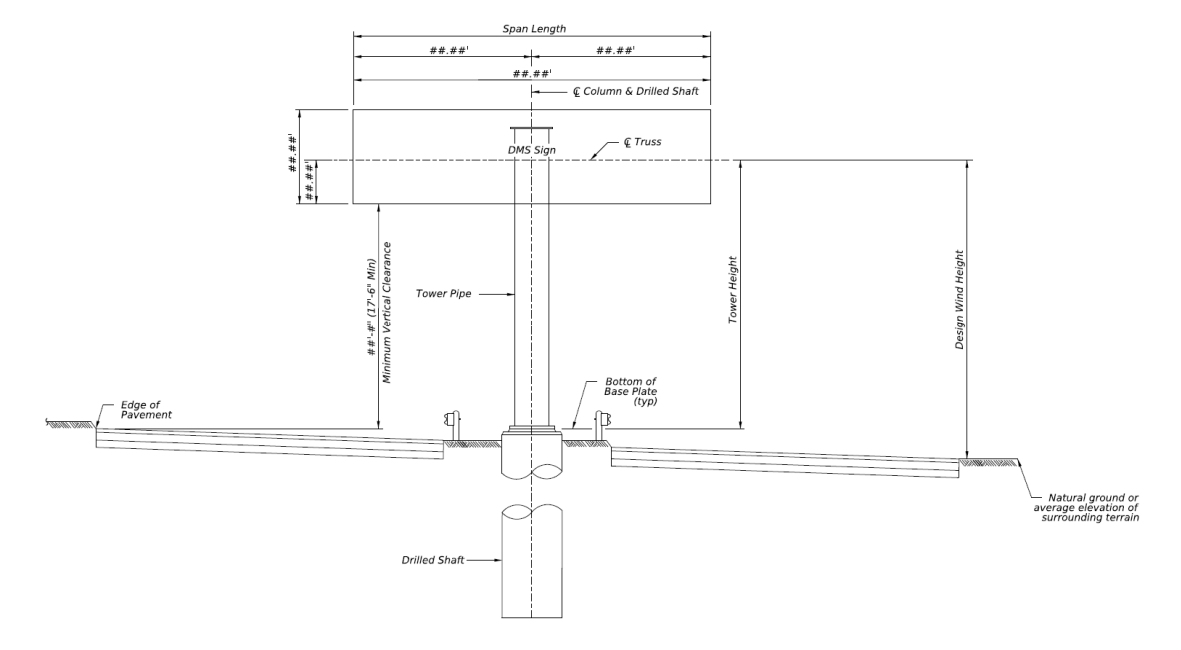
Where

ψh is the adjustment factor for the design wind height
ψz is the adjustment factor for selecting a stronger standard Example: 1.31 when using a COSS-Z3 standard in a wind Zone 4 county.

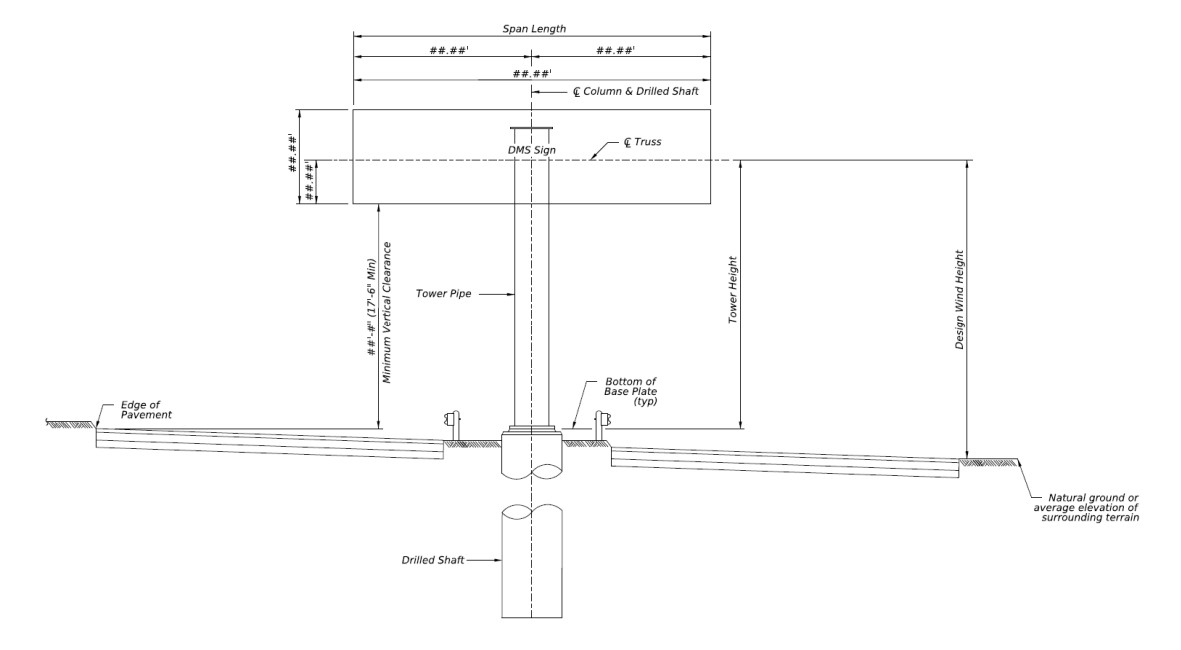
ψh	
Design Wind Height, Hd (ft)	ψh
<30	1.00
31-50	0.91
51-100	0.80
101-150	0.71

ψz					
	Standard Used				
Wind Zone	HCOSS-Z1	COSS-Z1	COSS-Z2	COSS-Z3	COSS-Z4
1	1.10	1.00	-	-	-
2	1.36	1.23	1.00	-	-
3	1.72	1.56	1.27	1.00	-
4	2.24	2.04	1.65	1.31	1.00

Elevation Working Drawings

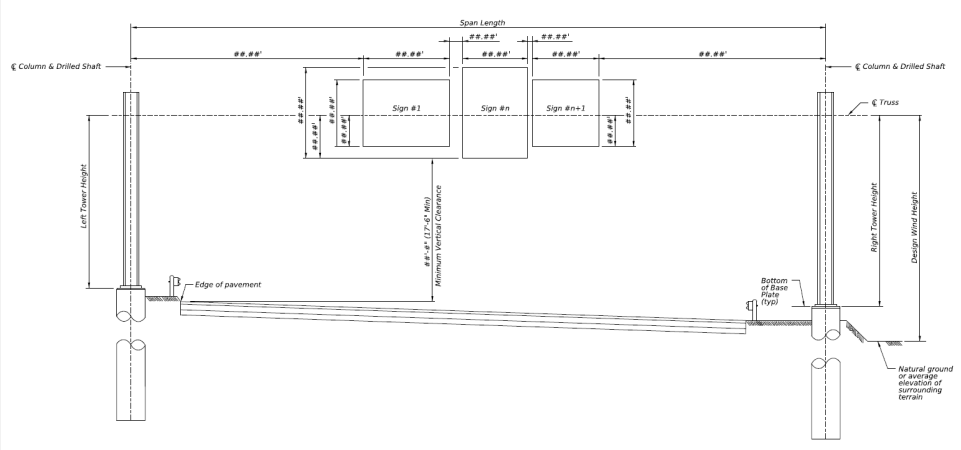


Elevation Working Drawings

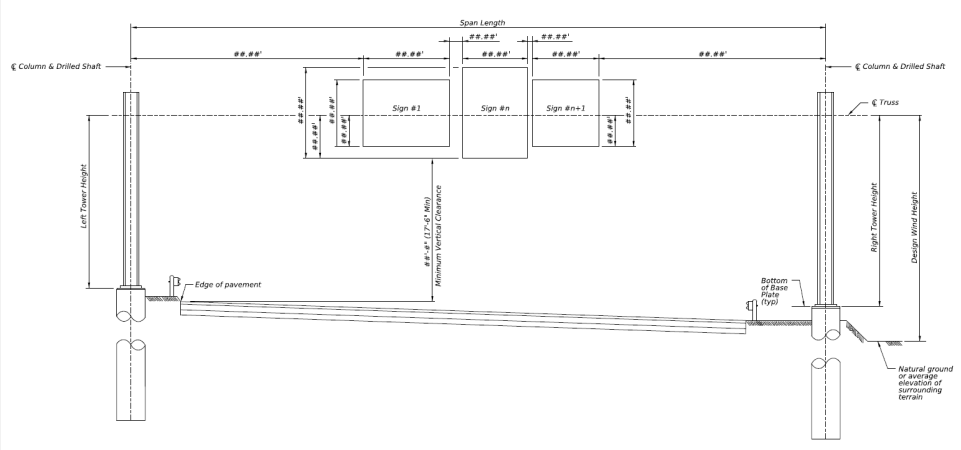


Sign Structure Design Details			
Structure Type			Double COSS DMS
Roadway			CL Alignment
Station			##+###.##
Design Data			
Applicable Standard			SZ
Span Length		ft	##
Span A Length		ft	##
Span B Length		ft	##
Sign Area		sq ft	##.##
Design Wind Height		ft	##
Truss Details			
W x D = Width x Depth		ft x ft	# x #
Length of Truss Panel		ft	End = # ; Other = #
HS Bolt Diameter		in	#/#
Total # of HS Bolts in Tower Connection			#
Chord	Member		L # x # x #/#
	HS Bolts Req'd		#
Dead Load Diagonal	Member		L # x # x #/#
	HS Bolts Req'd		#
Wind Load Diagonal	Member		L # x # x #/#
	HS Bolts Req'd		#
Dead Load Vertical	Member		L # x # x #/#
	HS Bolts Req'd		#
Wind Load Strut	Member		L # x # x #/#
	HS Bolts Req'd		#
Truss Dead Load		lb/ft	##
Truss Deflection		in	#.#
Tower Details			
Tower Height		ft	##
Tower Diameter		in	##
Tower Wall Thickness		in	##
Tower Δh at Truss CL		in	##
Base Plate	Diameter	in	##
	Thickness	in	##
Anchor Bolt	Circle Diameter	in	##
	Number of Bolt		#
	Bolt Diameter	in	##
Foundation Design			
Shear		kips	##.##
Torsion		kip-ft	###.##
Moment		kip-ft	###.##
Foundation Top Elev		ft	###.##
Foundation Tip Elev		ft	###.##
Drilled Shaft Diameter		in	##
Soil			Sand or Clay
Penetrometer Value (TCP), "N"			#
Main Drilled Shaft Steel			XX (#XX Bar)
Drilled Shaft Spiral Reinforcing			#X Spiral @ X in Pitch

Elevation Working Drawings

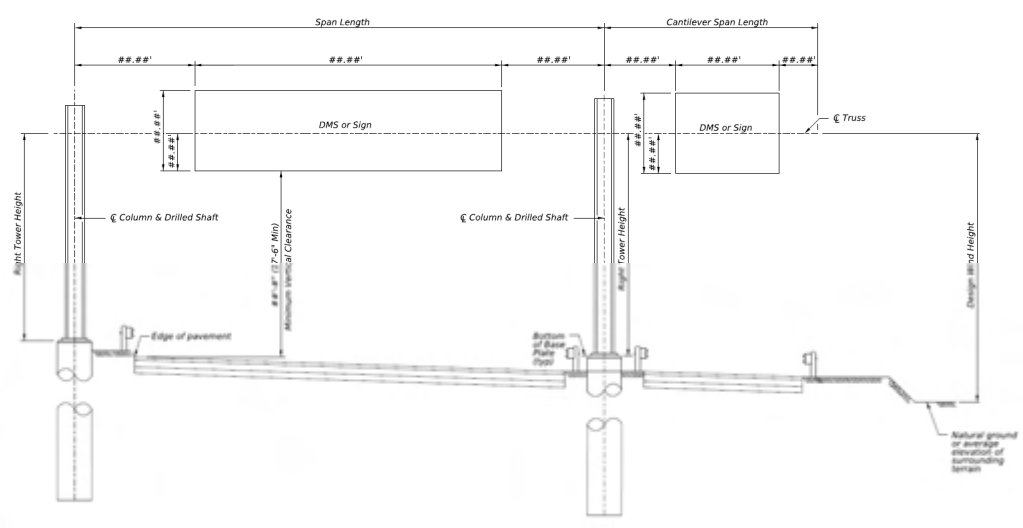


Elevation Working Drawings

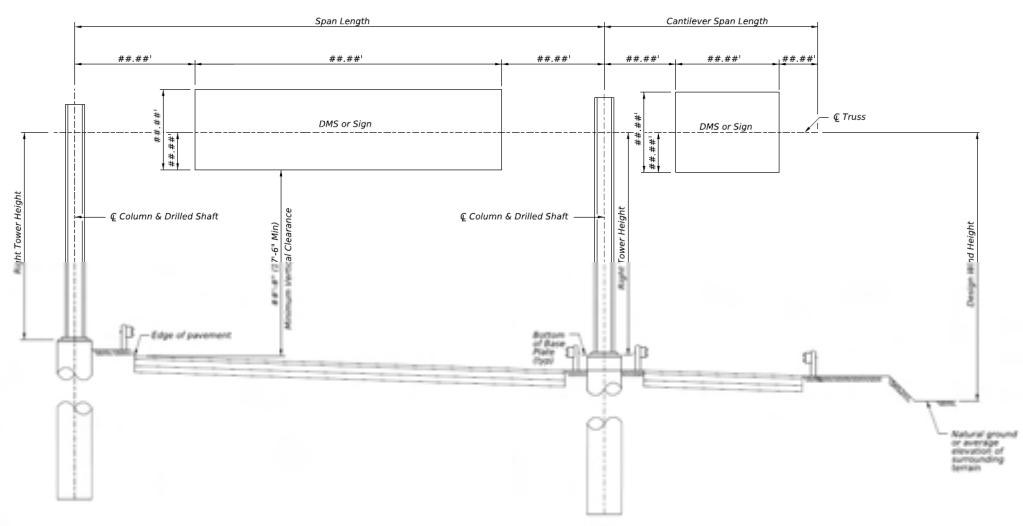


Sign Structure Design Details		
Structure Type		OSB #1
Roadway		CL Alignment
Station		##+##.##
Design Data		
Applicable Standard		OSB-Z1 thru Z4, HOSB-Z1 thru Z4
Span Length	ft	##
Sign Area	sq ft	##.##
Maximum Sign Area	sq ft	##.##
Design Wind Height	ft	##
Tower Type		Truss, Pipe or Concrete
Left Tower Height	ft	##
Right Tower Height	ft	##
Average Tower Height	ft	##
Foundation Design		
Foundation Uplift	kips	###.##
Left Foundation Top Elev	ft	###.##
Left Foundation Tip Elev	ft	###.##
Right Foundation Top Elev	ft	###.##
Right Foundation Tip Elev	ft	###.##
Number of Drilled Shafts		#
Drilled Shaft Diameter	in	##
Soil		Sand or Clay
Penetrometer Value (TCP), "N"		#

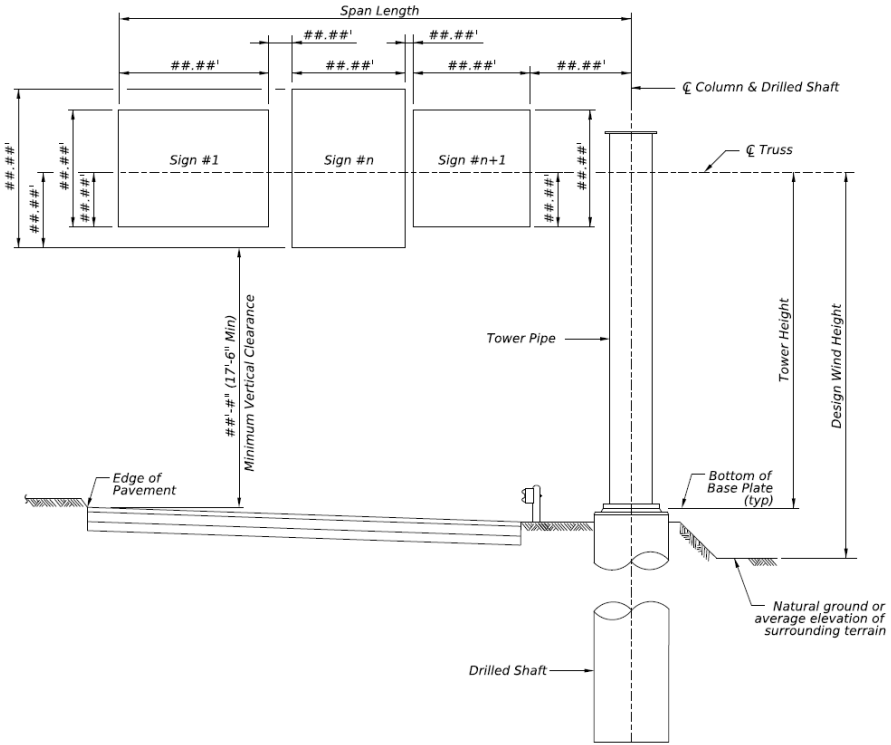
Elevation Working Drawings

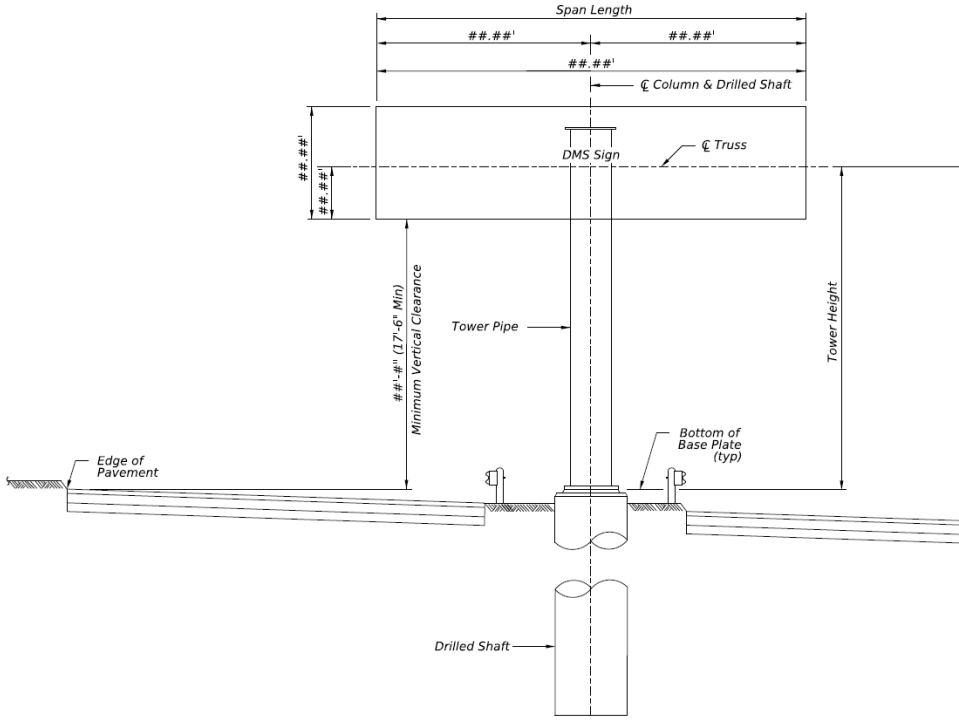


Elevation Working Drawings



Sign Structure Design Details			
Structure Type		OSB DMS with Cantilever	
Roadway		CL Alignment	
Station		##+##.##	
Design Data			
Applicable Standard		SZ	
Total Span Length	ft	##	
Simple Span Length	ft	##	
Cantilever Span Length	ft	##	
Sign Area	sq ft	##.##	
Design Wind Height	ft	##	
Truss Details			
W x D = Width x Depth	ft x ft	# x #	
Length of Truss Panel	ft	End = # , Other = x #	
High Strength (HS) Bolt Diameter	in	#/#	
Total # HS Bolts in Tower Connection		#	
Applicable Truss		Simple Span	Cantilever Span
Chord	Member	L # x # x #/#	L # x # x #/#
	HS Bolts Req'd	#	#
Dead Load Diagonal	Member	L # x # x #/#	L # x # x #/#
	HS Bolts Req'd	#	#
Wind Load Diagonal	Member	L # x # x #/#	L # x # x #/#
	HS Bolts Req'd	#	#
Dead Load Vertical	Member	L # x # x #/#	L # x # x #/#
	HS Bolts Req'd	#	#
Wind Load Strut	Member	L # x # x #/#	L # x # x #/#
	HS Bolts Req'd	#	#
Truss Dead Load	lb/ft	##	##
Truss Deflection	in	#.#	#.#
Tower Details			
Tower Type		Truss or Pipe Concrete	
Left Tower Height	ft	##	
Right Tower Height	ft	##	
Average Tower Height	ft	##	
Column Spacing	ft	#	
Column Size		W ## x ##	
Tower Diagonals		2LS # X # X #/#	
Tower Struts		2LS # X # X #/#	
Maximum Bracing Spacing "S"	ft	#	
Anchor Bolts	Diameter	in	#.##
	Length	ft - in	# - ##
Base Plate	in x in x in	# x # x # #/#	
Foundation Design		Left Tower	Right Tower
Foundation Uplift	kips	###.##	###.##
Left Foundation Top Elev	ft	###.##	###.##
Left Foundation Tip Elev	ft	###.##	###.##
Right Foundation Top Elev	ft	###.##	###.##
Right Foundation Tip Elev	ft	###.##	###.##
Number of Drilled Shafts		##	##
Drilled Shaft Diameter	in	##	##
Soil		Sand or Clay	Sand or Clay
Penetrometer Value (TCP), "N"		#	#
Main Drilled Shaft Steel		## (### Bar)	## (### Bar)
Drilled Shaft Spiral Reinforcing		## Spiral @ # in Pitch	## Spiral @ # in Pitch





Spreadsheet Tool

Texas Department of Transportation

August 15, 2025

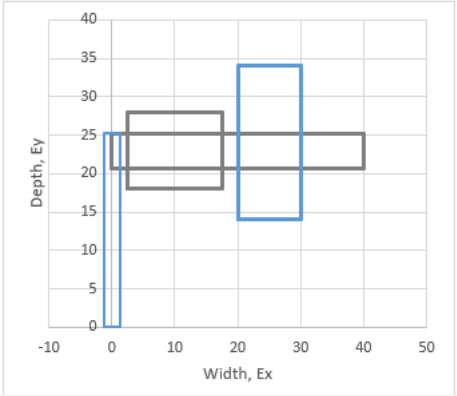
- This Spreadsheet is to assist filling out structural information for Cantilever Overhead Sign Structures
- Input Structure information in column B
- Input sign information in cells E6:I14
- Unused rows for sign information should be left blank
- Design Wind Height must be entered before selecting a Standard
- For Single Cantilever Span designs

	Used Input and modification
	Design Fails
	Design Passes

Sign Structure Structure Information	
Wind Zone	ZONE 4
Design Wind Height (ft)	60
Standard	COSS-Z3
Length of Span (ft)	40
Tower Height (ft)	23
Sign Structure Location	
Alignment?	Enter Value
Station	Enter Value
Sign Structure Foundation Information	
Top of foundation (ft):	Enter Value
Tip of foundation (ft):	Enter Value
Sand or clay:	Clay
Penetrometer Value "N" (TCP)	Enter Value

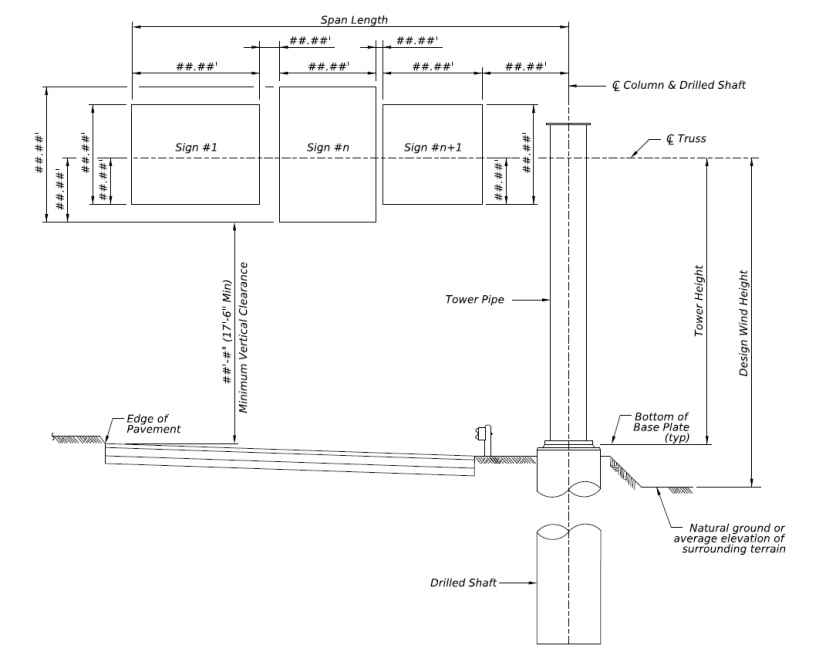
Sign capacity	
ψheight	0.80
ψzone	1.31
Sign Area	350
Maximum Sign Area (ψheight x ψzone x Sign Area)	418
Structural Design Check	350 sq ft < 418 sq ft, GOOD

	Sign Information				
	Sign	Width (ft)	Depth (ft)	E_x (ft)	E_y (ft)
1	Sign	10	20	25	1
2	Sign	15	10	10	0
3					
4					
5					
6					
7					
8					
9					

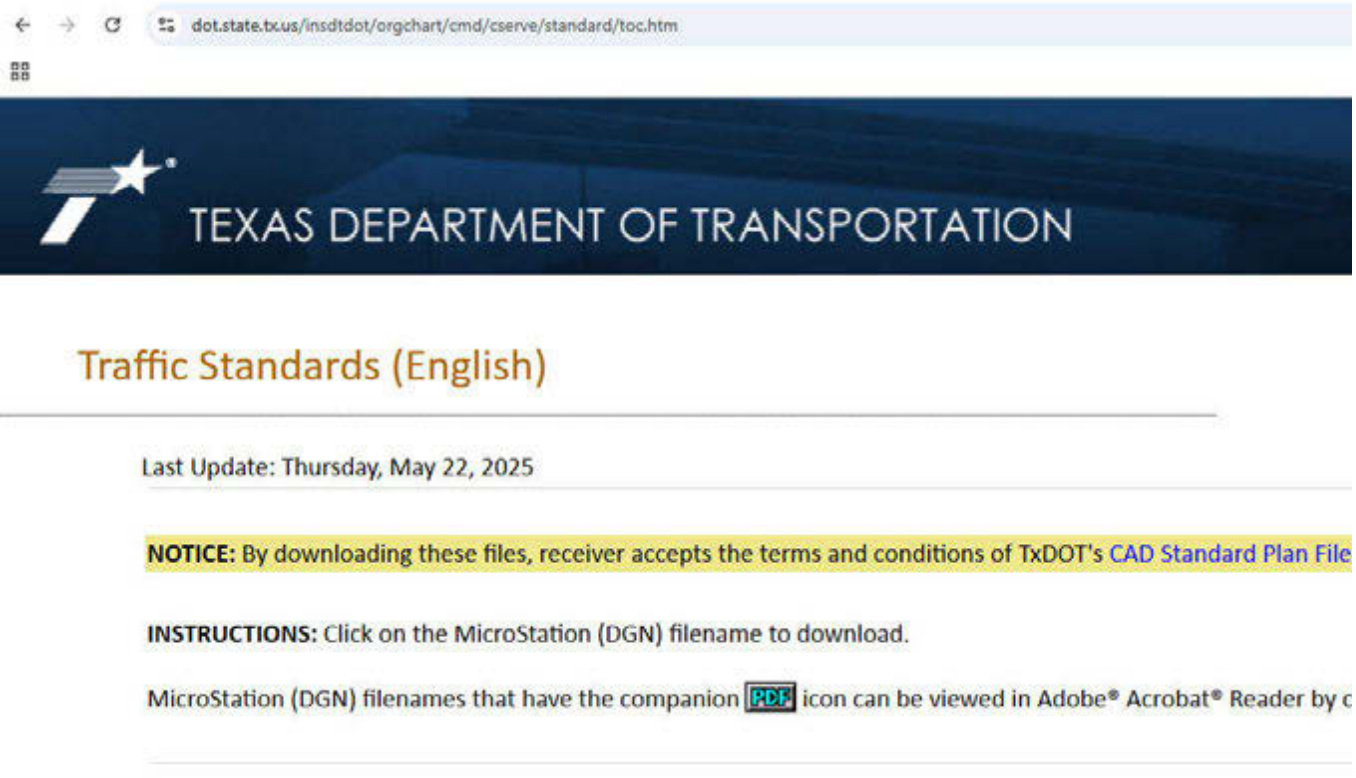


Sign Structure Design Details	
Structure Type	Single Cantilever
Roadway	Enter Value
Station	Enter Value
Standard Design Data	
Wind Zone	ZONE 4
Selected Standard	COSS-Z3
Length of Span	40 ft
Sign Area*	350 sq ft
Maximum Sign Area*	418 sq ft
Design Wind Height	60 ft
Tower Height	23 ft
Tower Diameter	30 in
Tower Wall Thickness	0.312 in
Foundation Design	
Shear	14.94 kips
Torsion	276.72 kip-ft
Moment	361.67 kip-ft
Foundation Top Elev	Enter Value ft
Foundation Tip Elev	Enter Value ft
Drilled Shaft Diameter	54 in
Soil	Clay
Penetrometer Value "N" (TCP)	Enter Value

Elevation Working Drawings



Sign Structure Design Details	
Structure Type	Single Cantilever
Roadway	Enter Value
Station	Enter Value
Standard Design Data	
Wind Zone	ZONE 4
Selected Standard	COSS-Z3
Length of Span	40 ft
Sign Area*	350 sq ft
Maximum Sign Area*	418 sq ft
Design Wind Height	60 ft
Tower Height	23 ft
Tower Diameter	30 in
Tower Wall Thickness	0.312 in
Foundation Design	
Shear	14.94 kips
Torsion	276.72 kip-ft
Moment	361.67 kip-ft
Foundation Top Elev	Enter Value ft
Foundation Tip Elev	Enter Value ft
Drilled Shaft Diameter	54 in
Soil	Clay
Penetrometer Value "N" (TCP)	Enter Value



Ancillary Structures Guidance

Texas epartment f Transp rtat n

August 15, 2025

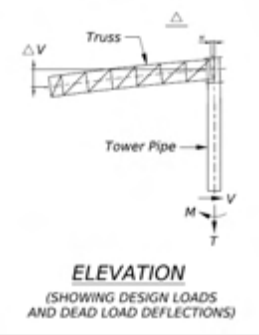
LRFD COSS/OSB Updates

Texas Department of Transportation

August 15, 2025

COSS - Material Availability

TOWER HEIGHT	10' SPAN										
	TOWER PIPE			ANCHOR BOLTS			BASE PLATE	TRUSS	DESIGN LOADS		
(ft)	O.D. (in)	WALL THICK (in)	DEFL ΔH (in)	SIZE DIA (in)	NO.	BOLT CIR DIA (in)	SIZE (in)	DEFL ΔV (in)	SHEAR V (Kips)	TORSION T (K-ft)	MOMENT M (K-ft)
14'	16	0.250	0.216	1 ½	8	19	22 x 2	0.37	8.24	39.02	126.56
15'	16	0.250	0.244	1 ½	8	19	22 x 2	0.41	8.28	39.09	135.03
16'	16	0.281	0.245	1 ½	8	19	22 x 2	0.40	8.32	39.05	143.37
17'	16	0.281	0.273	1 ½	8	19	22 x 2	0.43	8.35	39.11	151.94
18'	16	0.281	0.303	1 ½	8	19	22 x 2	0.46	8.39	39.18	160.56
19'	16	0.313	0.302	1 ½	8	19	22 x 2	0.45	8.43	39.13	169.03
20'	16	0.313	0.332	1 ½	8	19	22 x 2	0.48	8.47	39.19	177.75
21'	16	0.344	0.331	1 ½	8	19	22 x 2	0.47	8.51	39.14	186.30
22'	16	0.344	0.361	1 ½	8	19	22 x 2	0.50	8.54	39.19	195.13
23'	16	0.344	0.392	1 ½	8	19	22 x 2	0.53	8.58	39.24	204.01
24'	16	0.344	0.424	1 ½	8	19	22 x 2	0.56	8.62	39.29	212.96
25'	16	0.375	0.422	1 ½	8	19	22 x 2 ¼	0.54	8.66	39.24	221.69
26'	16	0.375	0.454	1 ½	8	19	22 x 2 ¼	0.57	8.70	39.29	230.75
27'	16	0.406	0.452	1 ½	8	19	22 x 2 ¼	0.56	8.74	39.24	239.58
28'	16	0.406	0.484	1 ½	8	19	22 x 2 ¼	0.59	8.77	39.28	248.74
29'	16	0.406	0.517	1 ½	8	19	22 x 2 ¼	0.62	8.81	39.32	257.97
30'	16	0.438	0.514	1 ½	8	19	22 x 2 ½	0.61	8.85	39.28	266.95
31'	16	0.438	0.547	1 ¾	8	19 ½	23 x 2 ½	0.64	8.89	39.31	276.29
32'	16	0.469	0.545	1 ¾	8	19 ½	23 x 2 ¾	0.63	8.93	39.27	285.41

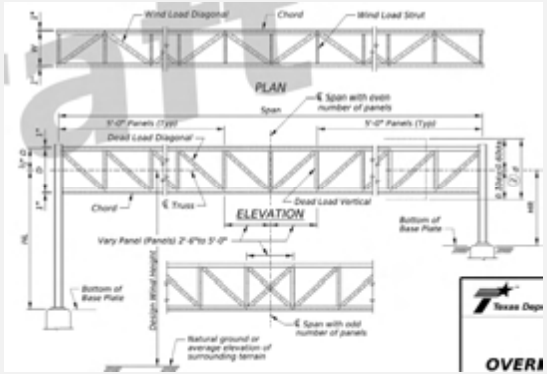


ELEVATION
(SHOWING DESIGN LOADS AND DEAD LOAD DEFLECTIONS)

SPAN	10', 15' & 20'	
W x D = WIDTH x DEPTH	4.5 x 4.5	# BOLTS
CHORD	L 4 x 4 x ¼	6
DEAD LOAD DIAGONAL	L 2 x 2 x 3/16	3
WIND LOAD DIAGONAL	L 3 x 3 x 3/16	4
DEAD LOAD VERTICAL	L 2 x 2 x 3/16	2
WIND LOAD STRUT	L 2 x 2 x 3/16	1
TRUSS BRACE	L 2 x 2 x 3/16	1
TRUSS END BRACE	L 2 x 2 x 3/16	1
TRUSS DEAD LOAD	66 lb/ft	
NO. & SIZE OF H.S. BOLTS IN CHORD ANGLE TO TOWER CONNECTION PLATE	6 ~ 5/8'' DIA ea	

OSB – Material Availability

155'		SPAN
5.0 x 5.0	# BOLTS	W x D = WIDTH x DEPTH
L 6 x 6 x ¾	16	CHORD
L 3 x 3 x ¼	5	DEAD LOAD DIAGONAL
L 4 x 4 x 5/16	5	WIND LOAD DIAGONAL
L 3 x 3 x ¼	4	DEAD LOAD VERTICAL
L 2 ½ x 2 ½ x 3/16	2	WIND LOAD STRUT
L 3 x 3 x ¼	1	TRUSS BRACE
L 6 x 6 x ⅜	1	TRUSS END BRACE
DEFL = 4.87"	DL = 215 lb/ft	TOTAL DEFL & TRUSS DL

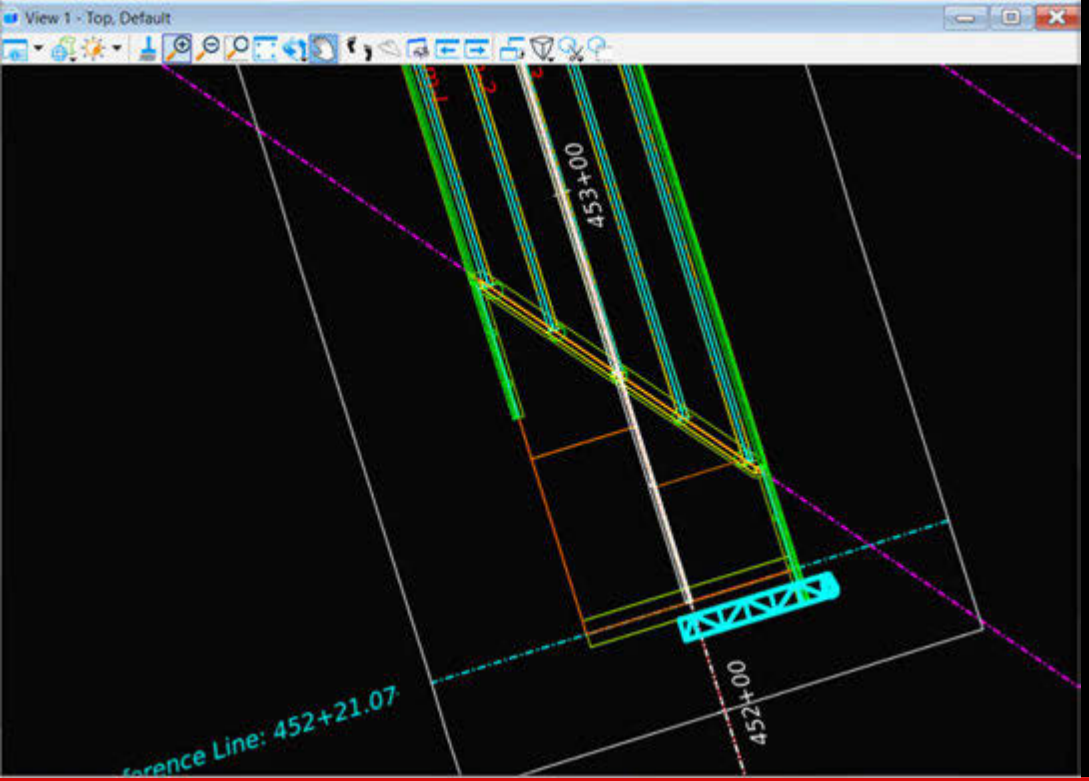


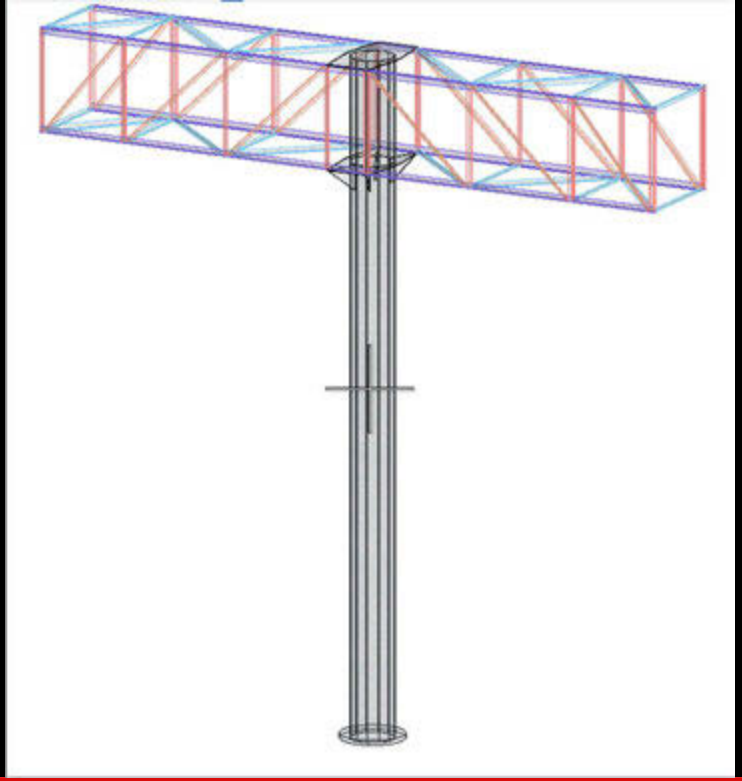
6.5'		S = COLUMN SPACING
TOWER LEG	UPLIFT (kips)	TOWER HEIGHT
W 14 x 38	(137.7)	25'
W 14 x 38	(143.7)	26'
W 14 x 38	(149.7)	27'
W 16 x 57	(155.8)	28'
W 16 x 57	(164.5)	29'
W 16 x 57	(170.8)	30'
W 16 x 57	(177.2)	31'
W 16 x 57	(183.7)	32'
W 16 x 57	(190.3)	33'
W 18 x 60	(196.9)	34'
W 18 x 60	(203.6)	35'
W 18 x 60	(210.0)	36'
W 18 x 65	(216.9)	37'
W 18 x 65	(223.8)	38'
W 18 x 65	(230.8)	39'
W 18 x 65	(237.8)	40'
W 18 x 65	(244.9)	41'
W 18 x 65	(252.1)	42'
W 21 x 73	(267.0)	43'
W 21 x 73	(274.6)	44'
W 21 x 73	(282.3)	45'

COLUMN SIZE & UPLIFT (Kips)

Tower Height = $\frac{HL + HR}{2}$ ①

① Tower heights between 20' to 28' have been evaluated with both tower legs at the same height and a 10'differential between the HL tower height and the HR tower height.





3D Modeling

Texas Department of Transportation

August 15, 2025

Thank you!

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