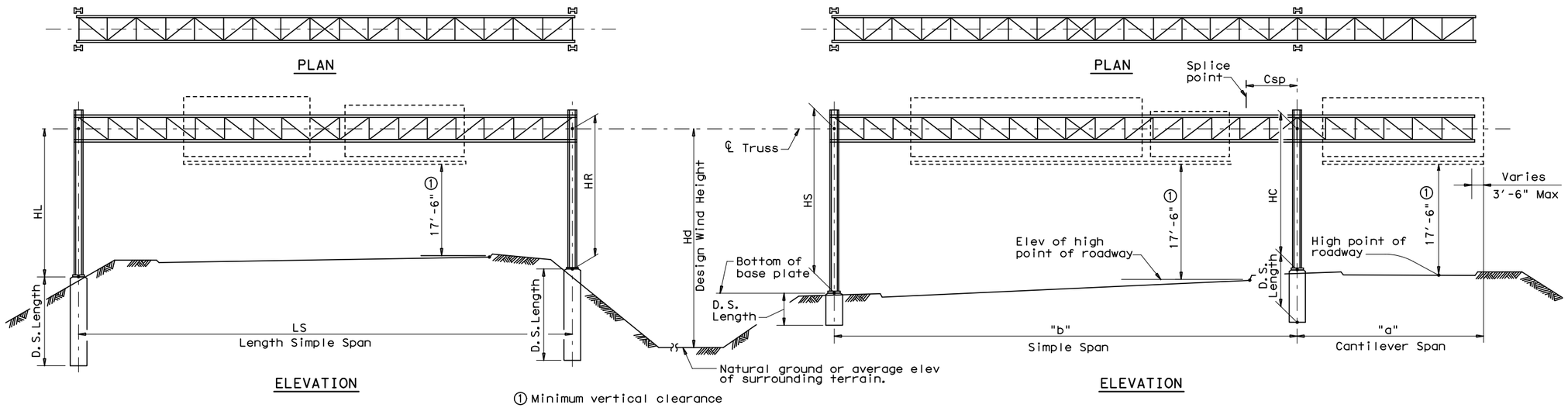
DATE:
FILE:



① Minimum vertical clearance

② "Low-Alloy Steel" for non-bridge structures per Item 442, "Metal For Structures".

③ "Carbon Steel" for non-bridge structures per Item 442, "Metal For Structures".

SIMPLE SPAN

SIMPLE SPAN PROCEDURE:

Given: Span, Ls = 93.0′; Left Tower Height, H_L = 26.3′; Right Tower Height, H_R = 22.6′; Design Height, Hd = 27.0′; Avg. Penetrometer Value, N = 25; Dawson County.

Step 1: Select applicable OSB standard. From Wind Velocity and Ice Zone sheet (WV&IZ-96) determine that Dawson County is in Zone 2 (90 mph) and ice above the ice line. Since Design Height, Hd = 27.0′, use standard OSB-Z2I. If the Design Height were more than 30.0′, the applicable standard would be HOSB-Z2I.

Step 2: Determine truss details and tower size from OSB-Z2I. For our 93.0′ span go to the next larger span, i.e. 95.0′. Truss members are:
Chord ~ L 4"x 4"x 3/8"② w/ 10 bolt splice
D.L. Diag. ~ L 3"x 2 1/2"x 3/16"③w/ 2 bolt connection
W.L. Diag. ~ L 3"x 3"x 1/4" ③ w/ 3 bolt connection
D.L. Vert. ~ L 3"x 2"x 3/16" ③ w/ 2 bolt connection
W.L. Strut ~ 2 1/2"x 2 1/2"x 3/16"③w/ 1 bolt connection
Bolts are 3/4" Dia high strength. Truss W x D = 4.5′x 4.5′. Required truss camber to compensate for dead load deflection is 1.46". Dead load of truss is 77 lb/ft. Avg. Tower Height = (26.3′+ 22.6′)÷2 = 24.45′. Use 25.0′ to determine column size and spacing for both towers, i.e. W14 x 34 spaced at 7.0′. Use actual tower heights for drilled shaft uplift as follows. For H_L = 26.3′ use 26.0′ to determine design uplift at the left tower = 79.8ᵏ. For H_R = 22.6′ use 23.0′ to determine design uplift at the right tower = 69.9ᵏ.

Step 3: Determine tower and anchor bolt details. Use OSBT standard.
From OSBT with W14 x 34 columns spaced at 7′-0":
Anchor Bolts = 1 3/4" Dia x 3′-10"
Base Plate = 11 1/2"x 2 1/4"x 2′-1"
X, Y, and Z = 9 1/2", 3", and 2 3/4" respectively
Tower Bracing = 2Ls ~ 3"x 2 1/2"x 1/4"
Foundation = 36" Dia shafts with 8 ~ #9 Bars.

Step 4: Determine drilled shaft length from OSB-FD. Enter chart for 36" Dia drilled shafts at N = 25.
Left Tower Uplift = 79.8ᵏ, therefore, L = 9′+ 3′= 12′
Right Tower Uplift = 69.9ᵏ, therefore, L = 8′+ 3′= 11′.

Step 5: Determine maximum spacing of tower bracing. The maximum spacing would normally be the same as the column spacing, i.e. 7.0′. However, the special note for tower bracing on Sheet 1 of the OSBT standard makes provision for an increase in spacing as follows:
On OSB-Z2I under 95.0′ span, the W14 x 34 column is shown for 25.0′ and 26.0′ column heights. Thus, the W14 x 34 is shown one time for heights greater than the design height of 25′-0". The special note for tower bracing allows a 1′-0" increase in the maximum spacing from 7.0′ to 8.0′.

CANTILEVER SPAN

CANTILEVER SPAN PROCEDURE:

Given: Simple Span, b = 80.0′; Cantilever Span, a = 30.0′; Left Tower Height, H_L = 20.0′; Right Tower Height, H_R = 28.0′; Design Wind Height, H = 30.0′; Avg. Penetrometer Value, N = 25.0′; Duval County.

Step 1: Calculate the following:
Equiv. Simple Span, $E_{SS} = b + 2a + (a^2 \div b)$
$= 151.30'$, Use 155.0′.
If E_{SS} exceeds 155.0′ a special tower design is required. Cantilever Equiv. Simple Span, Cess = 2a = 60.0′; Splice Point, Csp = $(a^2 \div b)$ = 11.30′;
Equiv. Simple Span for Truss Web, Essw = $b + (a^2 \div b)$ = 91.0′, Use 95.0′.

Step 2: Select applicable OSB standard. From Wind Velocity and Ice Zone sheet determine that Duval County is in Zone 4 (70 mph) and is below the ice line. Since Design Wind Height, H = 30.0′, Use standard OSB-Z4. If the Design Height were more than 30.0′ the applicable standard would be HOSB-Z4.

Step 3: Determine truss details and tower size from OSB-Z4.
Cantilever Truss: For Cess= 60.0′ truss members are:
Chord L 3"x 3"x 1/4"② with 6 bolt splice
D.L. Diag. L 2"x 2"x 3/16" with 2 bolt connection
W.L. Diag. L 2 1/2"x 2 1/2"x 3/16" with 2 bolt connection
D.L. Vert. L 2"x 2"x 3/16" with 2 bolt connection
W.L. Strut L 2"x 2"x 3/16" with 1 bolt connection
Bolts are 5/8" Dia High Strength. Truss WxD = 4.0′x 4.0′. Required cantilever truss camber to compensate for dead load deflection is 0.49".

Simple Span Truss: For b = 80.0′ truss members are:
Chord L 3"x 3"x 3/8"② with 9 bolt splice
D.L. Diag. L 2"x 2"x 3/16" with 2 bolt connection
W.L. Diag. L 3"x 3"x 3/16" with 2 bolt connection
D.L. Vert. L 2"x 2"x 3/16" with 2 bolt connection
W.L. Strut L 2"x 2"x 3/16" with 1 bolt connection
Bolts are 5/8" Dia High Strength. Truss WxD = 4.0′x 4.0′. If W and D for the cantilever and simple spans are different, increase smaller W and D to match the larger truss. Required simple span camber to compensate for dead load deflection is 1.12".

Truss from cantilever tower to splice point: Extend cantilever chords past the tower a distance, Csp= 11.2′ which falls in the third panel. The splice is permissible at any point within the third panel. Web members from the tower out to and including the splice panel, i.e. the third panel, shall be modified as follows. For Essw= 95.0′ web members are:
D.L. Diag. L 2 1/2"x 2 1/2"x 3/16" with 2 bolt connection
W.L. Diag. L 3"x 2 1/2"x 1/4" with 2 bolt connection
D.L. Vert. L 2"x 2"x 3/16" with 2 bolt connection
W.L. Strut L 2"x 2"x 3/16" with 1 bolt connection
Ignore W and D dimensions. Instead, use W and D as required for cantilever and simple span trusses. Use 5/8" Dia high strength bolts as required for 95.0′ span.

Tower Size: Avg. Tower Height = (20.0′+ 28.0′)÷2 = 24.0′. Use 24.0′ height and 155.0′ equivalent simple span to determine column size and spacing for both towers, i.e. W14 x 34 spaced at 7.5′
Use spans and actual tower heights for uplift as follows:
For H_S = 20.0′, and b = 80.0′ determine uplift = 31.7ᵏ.
For H_C = 28.0′, and E_{SS} = 155.0′ determine uplift = 77.9ᵏ.

Step 4: Determine tower and anchor bolt details. Use standard OSBT.
From OSBT with W14 x 34 columns spaced at 7.5′:
Anchor Bolts = 1 3/4" Dia x 3′-10"
Base Plate = 11 1/2"x 2 1/4"x 2′-1"
X, Y, and Z = 9 1/2", 3", and 2 3/4" respectively
Tower Bracing = 2Ls ~ 3"x 2 1/2"x 1/4"
Foundation = 36" Dia shafts with 8~#9 bars.

Step 5: Determine drilled shaft length from OSB-FD.
Enter chart for 36" Dia drilled shaft at N = 25.0′
Left Tower Uplift = 31.7ᵏ, therefore L = 6′+ 3′= 9′
Right Tower Uplift = 77.9ᵏ, therefore L = 8′+ 3′= 11′.

Step 6: Determine maximum spacing of tower bracing. The maximum spacing would normally be the same as the column spacing, i.e. 7.5′. However, the special note for tower bracing on Sheet 1 of the OSBT standard makes provision for an increase in spacing as follows:
On OSB-Z4 under 155.0′ span, the W14 x 34 column is shown for 23.0′ through 26.0′ column heights. Thus, the W14 x 34 column is shown two times for heights greater than 24.0′. The special note allows a 2.0′ increase from 7.5′ to 9.5′.

Texas Department of Transportation
Traffic Operations Division

OVERHEAD SIGN BRIDGE SELECTION EXAMPLES

OSB-SE

REVISIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
COUNT	SECT	JOB	HIGHWAY
DIST	COUNTY		SHEET NO.