REGISTERED ENGINEER - CIVIL

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
No.
Exp.
CIVIL
STATE OF CALIFORNIA

## SLANTED POST CANTILEVER

Span
Maximum sign panel length — 9'-2"
"L" = Sign panel length — 6'-0"
℄ CIDH Pile
℄ Mast arm
Field splice
"D" Panel depth D/2 · D/2
"R" See Table
Walkway brackets
10°
℄ Post
"H" For "H" = 29'-0" max
"h" (See Format sht)
Bottom of base ℄ (See Format sheet)
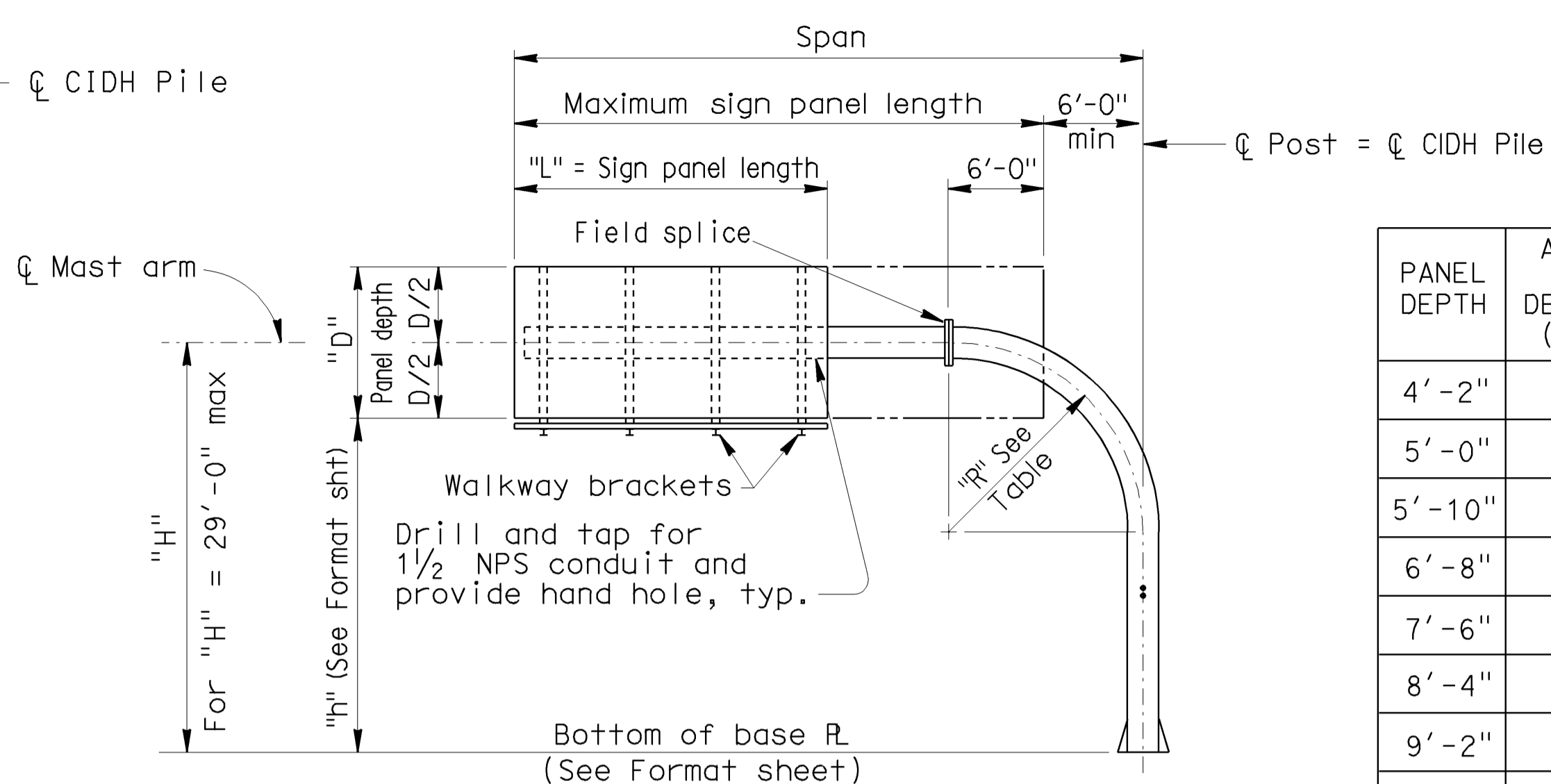
## VERTICAL POST CANTILEVER

Span
Maximum sign panel length — 6'-0"
"L" = Sign panel length — 6'-0"
℄ Post = ℄ CIDH Pile
℄ Mast arm
Field splice
Panel depth "D" D/2 · D/2
"R" See Table
Walkway brackets
Drill and tap for $1\frac{1}{2}$ NPS conduit and provide hand hole, typ.
"H" For "H" = 29'-0" max
"h" (See Format sht)
Bottom of base ℄ (See Format sheet)

| PANEL DEPTH | APPROX. SPAN DEAD LOAD ( plf ) |
|---|---|
| 4'-2" | 360 |
| 5'-0" | 378 |
| 5'-10" | 397 |
| 6'-8" | 415 |
| 7'-6" | 434 |
| 8'-4" | 448 |
| 9'-2" | 462 |
| 10'-0" | 477 |

| POST TYPE | SPECIFICATION OF PIPE POST | RADIUS (ft) | lb/ft |
|---|---|---|---|
| I | 20" NPS x $\frac{1}{2}$" tk | 12 | 104 |
| II | 24" NPS x $\frac{1}{2}$" tk | 12 | 126 |
| III | 24" NPS x $\frac{5}{8}$" tk | 12 | 156 |
| IV | 30" NPS x $\frac{1}{2}$" tk | 12 | 158 |
| V | 30" NPS x $\frac{5}{8}$" tk | 12 | 196 |
| VI | 30" NPS x $\frac{3}{4}$" tk | 12 | 234 |

### EXAMPLE 1:

Column selection for vertical pipe & pipe beam (include the selection of the inclined pipe post @ 10 degrees), definition of the span length is from support to end of sign. Area of coverage of sign is 6'-0" beyond field splice to the right and measure to the end of sign at the left x panel depth. (See above drawing)

28'
22'
R
29'
5'-10"
DL=11312 LB
LL=500 LB
y
z
x
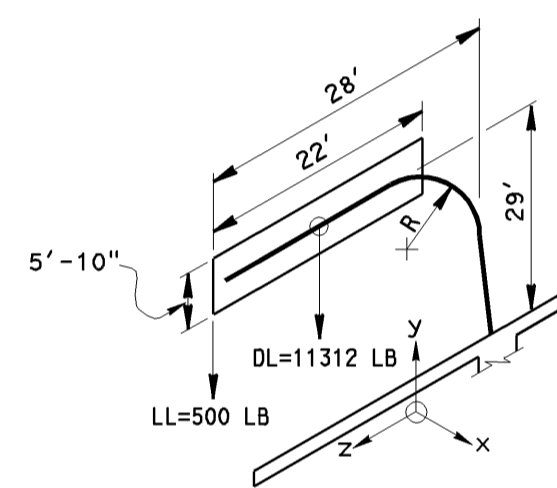
Moment(N-m) = Mx + Mz + DL x Eccentricity + (LL x arm length)
Distributed load of structure (include sign, pipe, walkway, handrails,mounting bracket assemblies, bolt & nuts, plates, steel rods...)
= 397 lb/ft ( See table )
DL = Dead Load = 397 lb/ft x 28' = 11,116 lb
Length of span = 28'
Length of sign = 22'
Depth of panel = 5'-10"
Wind pressure = 40.3 psf
Ht. of column = 29'
Radius of elbow = 12'
Longitudinal + transverse direction forces factor = 1.2

Pseudo - moment at base of column (with 20% included for lateral effects)
= Mx + Mz, (Due to wind)
= L of sign x depth of panel x wind pressure x Ht of sign x 1.2
= 22' x 5.83' x 40.3 psf x 29' x 1.2 = 179,980 lb-ft
DL x ecc = 11,116 lb x ( 28' - 11' ) = 188,972 lb-ft
LL x arm length = 500 lb x 28' = 14,000 lb-ft
PSEUDO - MOMENT = 382,952 lb-ft

| The post type # is | Column shape | Radius, ft |
|---|---|---|
| III | 24" NPS x $\frac{5}{8}$" tk, no split | 12' |

Reactions are approx as below after pipe size is known:
(Neglecting wind effect on the exposed portion of pipe)

Fx = 22' x 5.83' x 40.3 psf = 5,169 lb

Fy = Wt of pipe (See Reference Sheet No. 16, "SLANTED POST QUANTITIES") +
     Mast arm portion + (Wt of sign + walkway + HR)
   = {5648 lb + [(28' - (11.83 + 3.314) ) x 95 lb/ft]} +
     {(397 lb/ft - 95 lb/ft) x 22'}
   = 13,513 lb

Fz = 22' x 5.83' x 40.3 psf x 0.2 = 1,034 lb

Fy
Fz
Fx

Mx = Wind (20%) + DL x Eccentricity + LL x Arm length
   = (22' x 5.83' x 40.3 psf x 29' x 0.2) +
     (13,513 lb x 17') + (500 lb x 28')
   = 29,980 lb-ft + 229,721 lb-ft + 14,000 lb-ft = 273,701 lb-ft

My = (28' - 22'/2) x 22' x 5'-10" x 40 psf = 87,267 lb-ft

Mz = 22' x 5.83' x 40.3 psf x 29' = 149,897 lb-ft

My
Mz
Mx

### EXAMPLE 2:

Column selection for vertical pipe & pipe beam, definition of the span length is from support to the end of the sign. Area of coverage of sign is 6'-0" from ℄ of pile to end of sign x panel depth.
( See above drawing )

38'
32'
R
29'
6'-8"
DL=15,352 lb
LL=500 lb
y
z
x
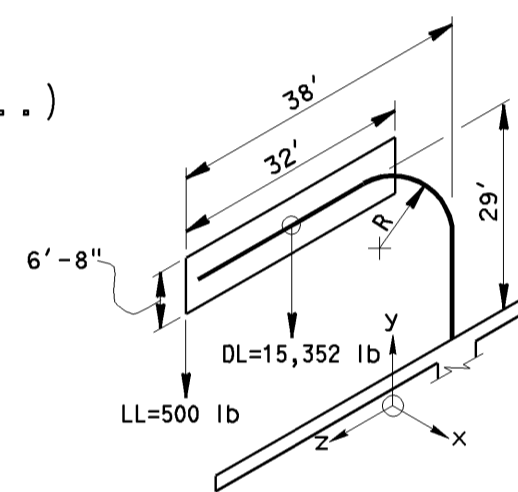
Moment(lb-ft) = Mx + Mz + DL x Eccentricity + (LL x arm length)
Distributed load of structure
= 415 lb/ft ( See table )
DL = Dead load = 415 lb/ft x 38 ft = 15,770 lb
Length of span = 38'
Length of sign = 32'
Depth of panel = 6'-8"
Wind pressure = 40.3 psf
Ht. of column = 29'
Radius of elbow = 12'
Longitudinal + transverse direction forces factor = 1.2

Pseudo - moment at base of column (with 20% include for lateral effects)
= Mx + Mz, (Due to wind)
= L of sign x depth of panel x wind pressure x Ht of sign x 1.2
= 32' x 6.67' x 40.3 psf x 29' x 1.2 = 299,337 lb-ft
DL x ecc = 15,770 lb x ( 38' - 16' ) = 346,940 lb-ft
LL x arm length = 500 lb x 38' = 19,000 lb-ft
PSEUDO - MOMENT = 665,277 lb-ft

| The post type # is | Column shape | Radius, ft |
|---|---|---|
| V | 30" NPS x $\frac{5}{8}$" tk, no split | 12' |

### NOTES:

1. The maximum sign panel overlap onto the post elbow shall be 6'-0" max from the field splice.

2. When several sign panels are to be installed with a space between the panels, the space shall be as small as possible and 2'-0" maximum.

3. Moments calculated or shown on this sheet as "pseudo-moments" are intended for use with the chart on this sheet. They do not provide all the forces in the post that would result from detailed calculations. Use where post height from bottom of base plate to ℄ to sign panel is between 21'-0" and 29'-0", and the details of the structure and sign panels conform to Standard Plans for single tubular. Center of the sign panel should be no higher than 43' above the surounding terrain. Where the span length is less than 12', use 12' for calculating post size.

4. Post Type I through VI using 2004 or 2006 Standard Plans: Structure may include an extra sign ( such as a speed limit sign ) strapped directly to a post designed using this sheet. The permissable area for the additional sign is the lesser of 50 sq feet or 10% of truss length times the overhead panel depth. This sign should be approximately centered on the post horizontally and below the elbow.

5. NPS - Nominal Pipe Size.

6. Use of distributed dead load shown in table on span is for post sizing only and not for quantity take off. This distributed dead load is assumed to act at the centerline on the sign.

## PIPE CANTILEVER, 38'-0" MAX

Pseudo - Moment ( lb-ft. )

| | Post Type |
|---|---|
| 801,585 | VI |
| 744,848 | V |
| 602,630 | |
| 469,449 | IV |
| 382,259 | III |
| 259,787 | II |
| | I |
| 0 | |

ALL DIMENSIONS ARE IN FEET UNLESS OTHERWISE SHOWN

OVERHEAD SIGNS - TUBULAR
SINGLE POST TYPE

LAYOUT AND PIPE SELECTION | 14

10/23/06