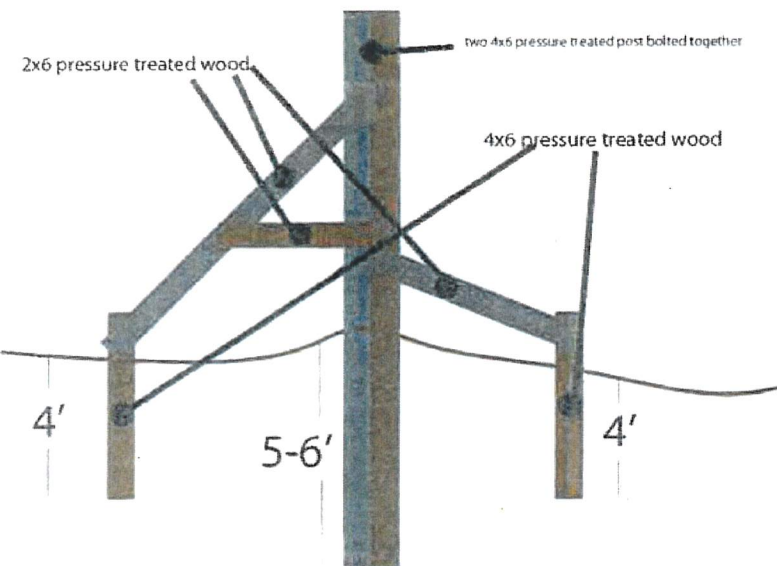
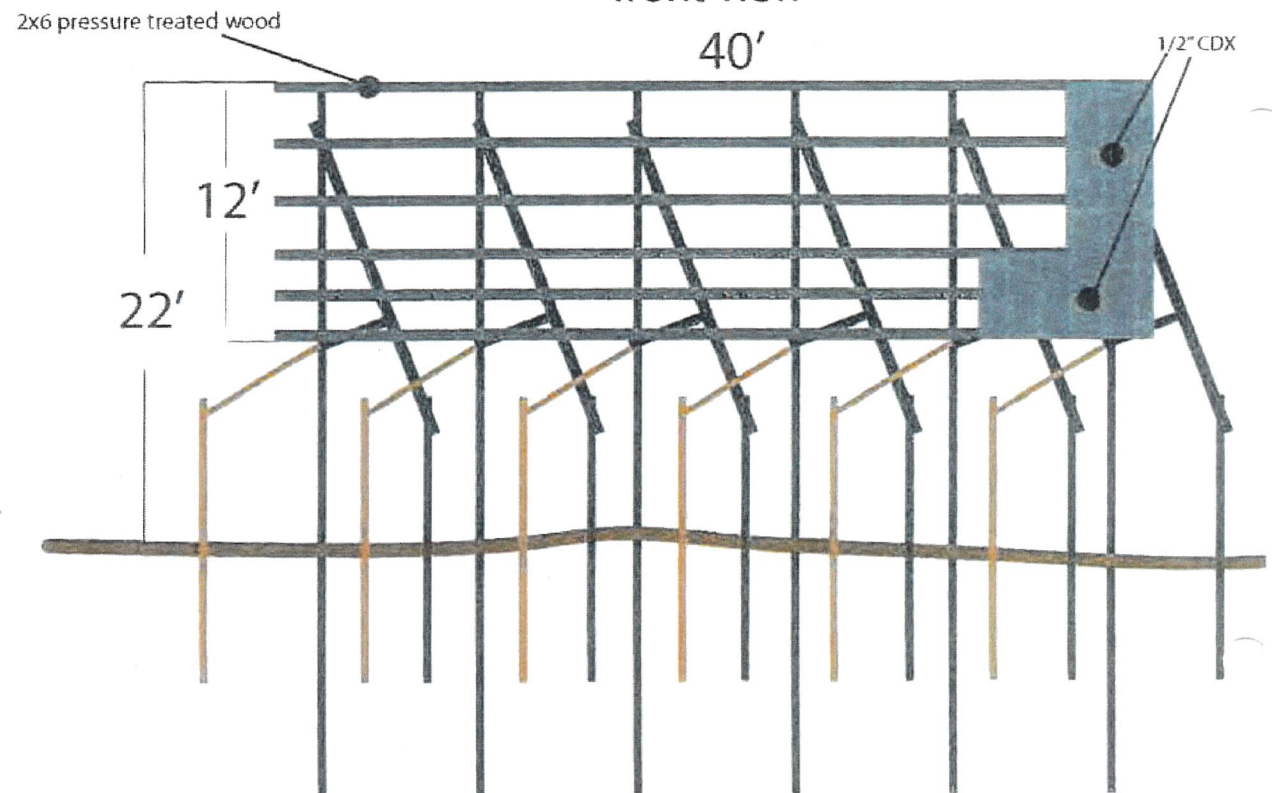
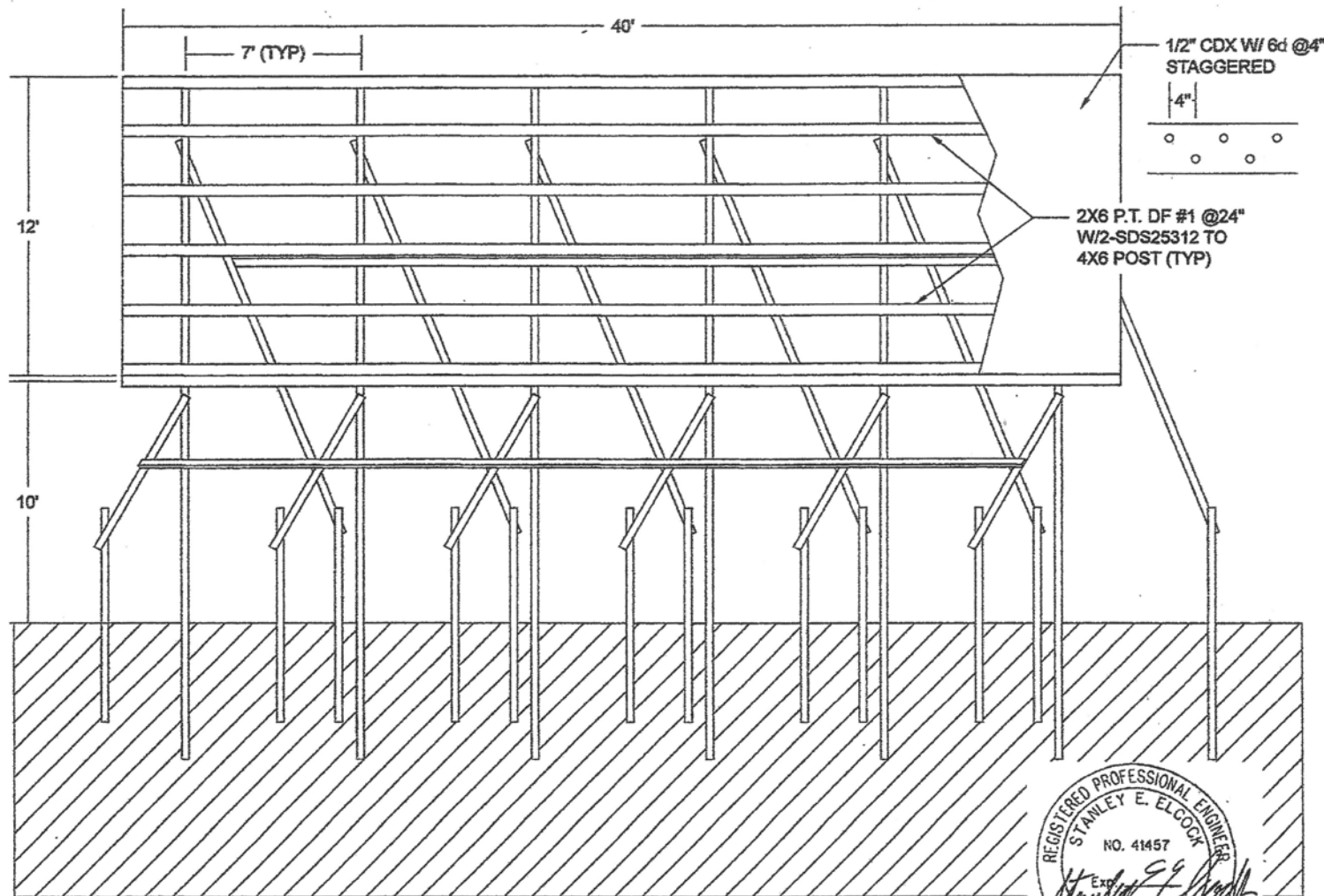


Side view



front view

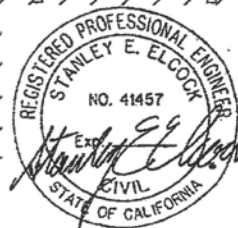




FRONT VIEW

1/8" = 1'-0"

12/05/19



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ARCATA, CA 95521
T: 707-498-6315

ALL POINTS
SIGN REPAIR
HIGHWAY 101
BETWEEN EUREKA & ARCATA

PLOT DATE:

12/5/19

DRAWN:

CEE

CHECKED BY:

SEE

CHECKED DATE:

SCALE:

1/4" = 1'-0"

REVISION DATE:

REVISION DATE:

SHEET: 2 OF 2

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OUTFRONT





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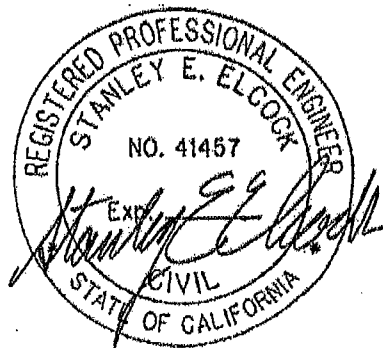
PLANS * CONSTRUCTION * SPECIAL PROJECTS * SHORING * TEMPORARY SYSTEMS
Stanley Elcock, P.E. C41457

Client: Allpoints Signs, Owner

Project: Sign Repair

Location:

Highway 101 Between Eureka and Arcata
Eureka, CA.



CALCULATIONS

Framing

References

2016 California Building Code

Western Woods Use Book

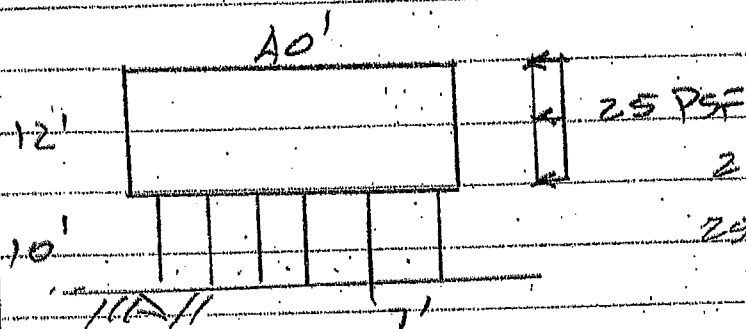
December 5, 2019

ALL POINTS
BILL BOARD
REPAIR
12-3-19

WIND

$$0.00256 (85)^2 (0.85) (1) (1.35) = 21.2 \text{ PSF}$$

$$145 \text{ 25 PSF}$$



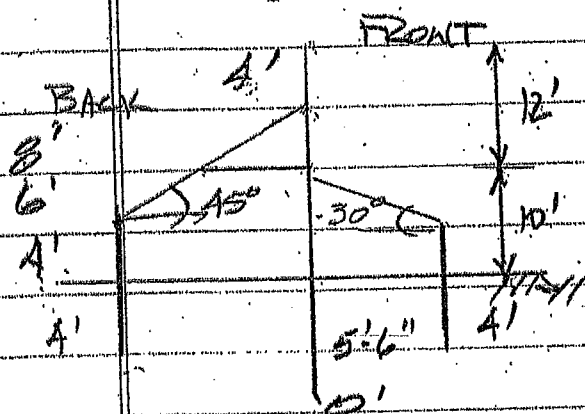
$$25 \times 12 \times 10 = 12000 \text{ # Total}$$

$$25 \text{ PSF} \times 12 \times 7' = 2100 \text{ #/Post}$$

$$\text{EM: } 12000 \times (10 + 6) = 192000 \text{ Ft-lb ATM}$$

$$192000 / 6 \text{ POSTS} = 32000 \text{ Ft-lb / Post ATM}$$

AVG



$$\text{EM: } 2100 \times 6' = 12600 \text{ Ft-lb}$$

$$F_{B1} = F_{F1} = 1244 \text{ #}$$

$$5/8" \text{ bolts} = 870 \times 1.33 \times 2 = 2314 \text{ 7124}$$

$$\text{FOR } 2 \times 6: 1244 / 8.25 = 151 \text{ psi}$$

$$180,000 / (1^2 / 1.5^2) = 151 \quad L_{max} = 7'$$

$$\text{FOR } 2 \times 8: 1244 / 10.88 = 114 \text{ psi}$$

$$180,000 / (1^2 / 1.5^2) = 114 \quad L_{max} = 8'$$

$$14 \sqrt{2} = 20'$$

2-5/8" bolt to 4x6

USE 2x8 P.T. DF No. 1 diagonal back
BRACE w/ 2 - 2x6 @ 7' max
w/ 2 - SDS x 3 1/2" Flat 2x6
to 2x8 diagonal brace

ALL POINTS
BILL BOARD

REPAIR

12-3-19 2)

HORIZONTAL STENT TO BACK BRACE

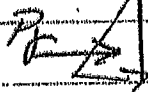
$$480000 / (96^2 / 1.5^2) = 117 \text{ psi}$$

$$117 \times 8.25 \text{ D}'' = 965 \text{ # capacity } \underline{\underline{2 \times 6}}$$

1244 #

1

4



$$M_P = 90 \text{ pcf} \times \frac{1}{2} (4)^2 \times \frac{1}{3} (4) \tan^2 60$$

$$= 2880 \text{ ft-lb}$$

$$O_{TM} = \frac{1244 \times B}{\sqrt{2}} = 7037 \text{ ft-lb}$$

$$M_P = 45 D^3 = 7037$$

$$D = 5.4' \times 1.4$$

$$= 7.5' \text{ min depth}$$

SIGN WEIGHT:

$$1/2'' \text{ CDX} = 1.5 \times 7 \times 12 = 126 \text{ # / Post}$$

$$d.b. 4 \times 6 = 35 \text{ pcf} \times \frac{38.5 \text{ D}''}{144} \times 30' = 281 \text{ # / Post}$$

BRACE

$$2 \times 6: 35 \times (8.25 / 144) (20') = 40 \text{ # / Post}$$

$$2 \times 6 @ 24 \text{ Horiz.} = (40 \text{ #} / 20) 7' \times 6 = 84 \text{ # / Post}$$

531 #

Add LL = 300 # POINT LOAD

$$\frac{300 \text{ #}}{1.33} = 225$$

757 # Total / Post

$$19.25 \text{ D}'' \times 2 \text{ Posts} = 38.5 \text{ D}'' = 0.27'$$

$$757 \text{ #} / 0.27' = 2800 \text{ PSF} > \text{BAY MUD}$$

$$\text{Side Friction} = 120 \text{ PSF} \times 7.5' \times (3.5 \times 2 + 11 \times 2) / 12$$

$$= 1812 \text{ #} + 50 \times 0.27 = 1947 \text{ #} > 757 \text{ #}$$

REPAIR 12-3-19 3/

FRONT BRACE

$$1244 \times 1.1547 = 1437^* \rightarrow$$

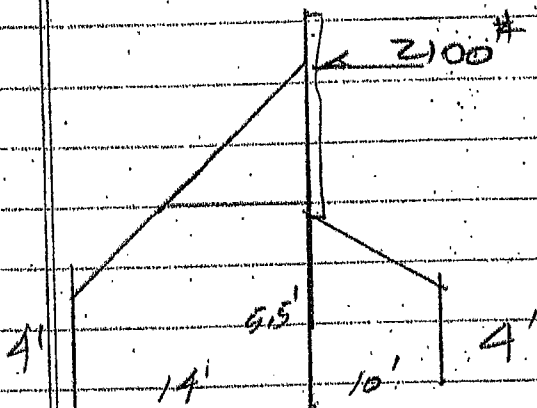
$$1437/10.88 = 132 \text{ psi}$$

$$1437/10.88 = 132 \text{ psi}$$

$$180000/L^2/2.25 = 132 \quad L_{\max} = 7\frac{1}{2}'$$

⇒ Add 2x6 Flat @ midspan

28-CHECK POST EMBEDMENT



$\Sigma m_i \cdot m_j = 2880 \text{ A-11}$

4x6 1/2" Post

$$27 \cdot 90 \left(\frac{1}{2}\right) D^2 \frac{1}{3} D \tan^2 60^\circ$$

$$7037 - 2280 = 45D^3$$

$D_{4x6} = 4.5' \times 1.4$
 $6.5'$

UPLIFT/OT

$$2100 \times 22.5 = 14R_1 + 10R_2 \quad \downarrow$$

$$A_{7250} = 14 R_1 + 10(10075F \times 4 \times 242) + 10(50075F \times 38.5''/14)$$

$R_1 = 2588^* \uparrow$ (N6)

Add deadman:

$$MR_2 = 7037 / 28\% = 2.5' \text{ min da}$$

Chex db1 4x6 bolted:

$4' \uparrow \quad \downarrow \quad \uparrow \quad x = 175 \text{ PLF} \quad 175(9)^2 / 8 \times 12 / 765 = 28.1 \text{ in} = 2.3 \text{ ft}$
 db1 4x6 (OK)

ALL POINTS
BILLBOARDS
12-5-19 4/

$$3' \text{ dia } \times 4 = 150 \pi (3')^2 / 4 \times 4 \\ = 4241\# / \pi (9')^2 / 4 = 600 \text{ PSF}$$

FOR 500 PSF:

$$3.5' \text{ dia } 531\# / \pi (3.5')^2 / 4 = 55.2 \text{ PSF}$$

$$500 - 55.2 = 444.8 \text{ PSF DL PCC}$$

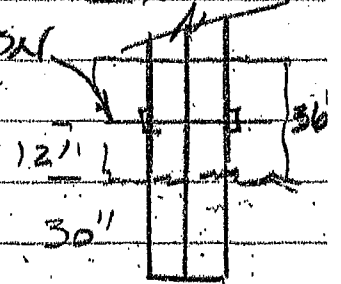
$$\text{UNREINF PCC} = 145 \text{ PCF}$$

$$444.8 / 145 = 3.1' \text{ DEEP}$$

$$145 \times 3' \times \pi (3.5')^2 / 4 = 4185\# \text{ DEAD WT.}$$

⇒ USE 4x6 MAIN POST BOLTED
w/ 5/8" MB GALVANIZED @ 4' C/L
Add 5/8" A/I Thread Galvanized x 24" LONG
IN POST 12" FROM BOTTOM PCC

3' MAX PCC
30" MIN DEPTH



2x6 Flat cantilever:

$$(25 \text{ PSF} \times 2) (2.5')^2 / 2 \times 12 / 850 \times 1.25 = 1.76 \text{ in}^3 \text{ (6P)}$$

$$A = \frac{50 (2.5')^4}{8 (1.6 \times 10^6 \times 1.55)} = 0.17" = 2/176 < 4/120$$

⇒ 2x6 Flat @ 24 cantilever is Adequate

CDX Nailing:

$$L_d = 26\# / \text{in} \times 1.5" = 39\#$$

$$50 \text{ PSF} \times 2' \times 7' = 700\#$$

$$700 / 39 = 18 \text{ nails over } 7' = L_d @ 4" OC$$

2x6 Flat @ 24 Fasteners:

$$50 \text{ PSF} \times 2 \times 7 = 700\# / 325\# / \text{SDS} = 2.15 \text{ SDS } 25312 (55)$$

Reconstruction Plan

Construction and reconstruction of billboards is performed by a 3-5 man crew and is expected to take 2-4 days. No construction equipment is needed. We use shovels and post hole diggers for the post, battery powered hand tools, ladders, and clamps, bolts and screws. No temporary structures or materials are required to reconstruct, IE we do not need to build scaffolding or set temporary brace post of any kind.

Below is a general workflow for how this location will be repaired.

1. Crews will begin demoing all non reusable elements of the structure. This consist of using sawzalls to cut wood into sizes we are able to carry. Once small enough to carry all non-usable elements are stacked in a pile on the shoulder of the highway behind the guardrail.
2. Once all non-usable parts are removed we will begin repairing the structure. This billboard actually broke about 8' up the post so in this case it looks like 6-9 of the vertical uprights will be able to be reused. For the remaining 3-6 uprights we will remove old post & concrete and dig new holes in their location. If old post cannot be removed we will dig a new hole next to old post.
3. Once all post holes are dug we set new upright in holes and hand mix bags of concrete into the hole one bag at a time.
4. Once all post are set you connect main post to back brace post.
5. Run new horizontal stringers connecting all main post.
6. Mount front and rear catwalks.
7. Sheet face with plywood
8. Install new billboard wrap.

Best Management Plan

As already outlined above, the repair and maintenance of a billboard structure has a very minimal impact as it is just a few people working with hand tools.

Since no construction equipment is used we do not have any provisions for spills as there is nothing to spill.

All new materials are stacked on the shoulder of the highway behind the guardrail until they are needed.

Construction debris only consist of empty bags of concrete and off cuts of wood, once created all bags are put into a trash bag and all off cuts are stacked on the shoulder of the highway until they are loaded up.

Soil from post holes are minimal and left on site.