

**Tim Gladhill, AICP
City of Ramsey
7550 Sunwood Drive NW
Ramsey, MN
55303**

5/31/2019

Dear Mr. Gladhill,

As requested, Kyle Olson, Associate Partner of BKV Group, visited Ramsey City Hall on May 23rd, 2019 to evaluate the City owned sign along Highway 10 that was damaged by a vehicle. Tim Gladhill, City of Ramsey, provided existing documentation of the sign consisting of sketches and structural calculations for the primary structure and foundation. Chloe Brigl, City of Ramsey, provided access to the sign and accompanied Kyle for observation.

Primary sign structure consists of two cantilevered HSS12x12x1/2 steel tube columns that are embedded into concrete piers. At least one horizontal steel tube connecting the two columns was observed above the area of damage that occurred. Secondary framing supporting the cladding consists of 2x wood members and plywood sheathing. Secondary framing is supported entirely from the two primary columns with miscellaneous steel angle pieces connecting the wood framing to the steel columns. There is a full-height pilaster of stone veneer adhered to the secondary wood framing on the side of the sign opposite the highway.

Cladding and secondary framing located at grade and between the primary steel tube columns was heavily damaged, requiring removal and/or replacement. The bottom section of the stone pilaster was rotated due to vehicle impact. Primary structure (steel HSS) was not damaged.

Secondary framing of the pilaster was only partially visible. Based on observations made, it could not be determined if the secondary framing supporting the pilaster was constructed with a properly engineered load path to resolve all possible load conditions into grade. Considering the damage observed to the bottom of the pilaster, BKV Group recommends complete removal and/or replacement of the pilaster.

Sincerely,

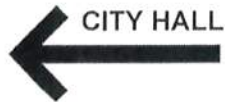


Kyle Olson, PE, SE

Senior Structural Engineer, Associate Partner

BKV Group





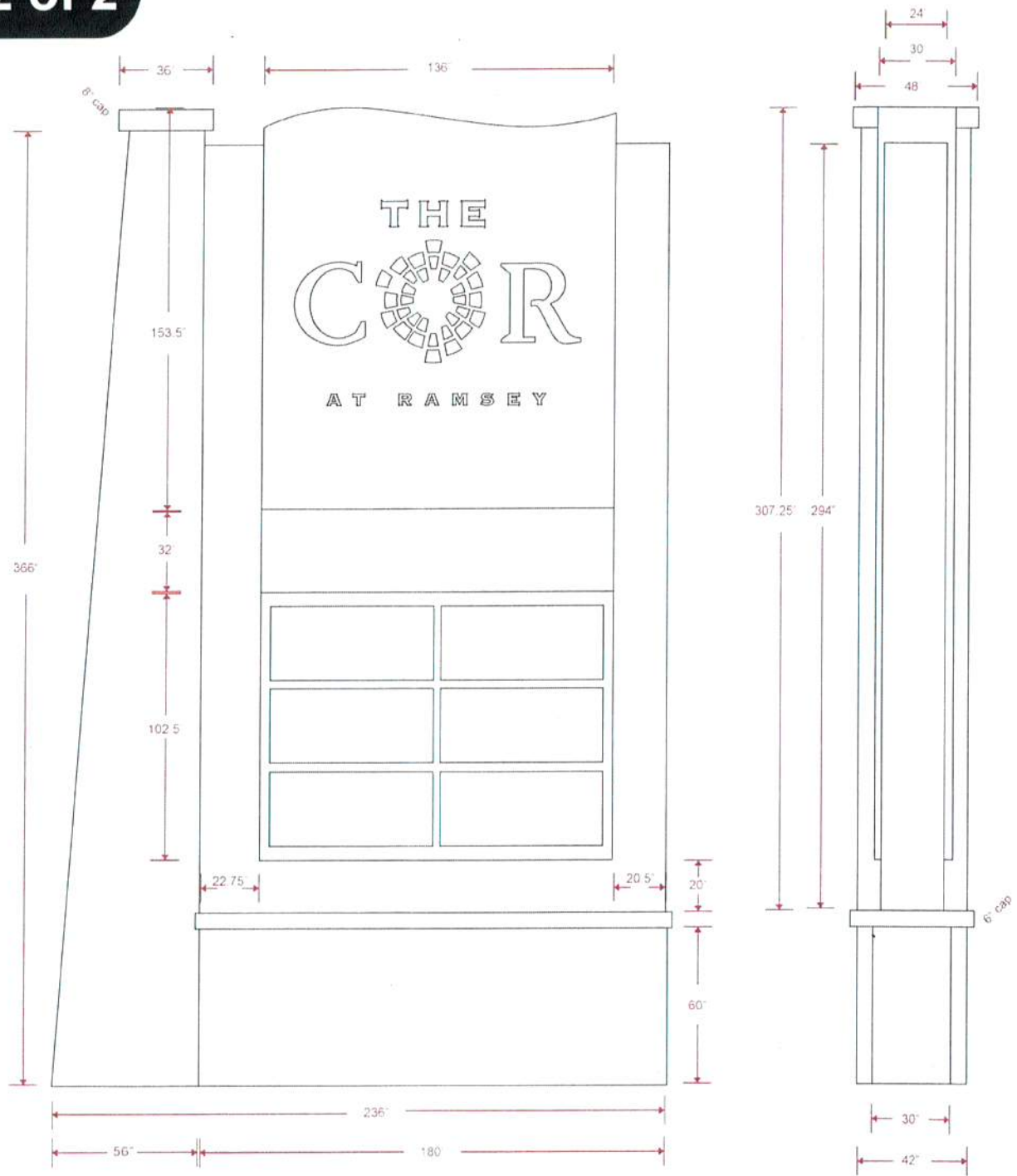
410 93rd Ave.™
 Coon Rapids, MN 55432
 763.786.5545

DATE: 4.25.11
 SALESMAN: Tim Olson
 LOCATION: Ramsey

NOTES: All stone is Boulder Creek Stone Products

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CUSTOMER APPROVAL X



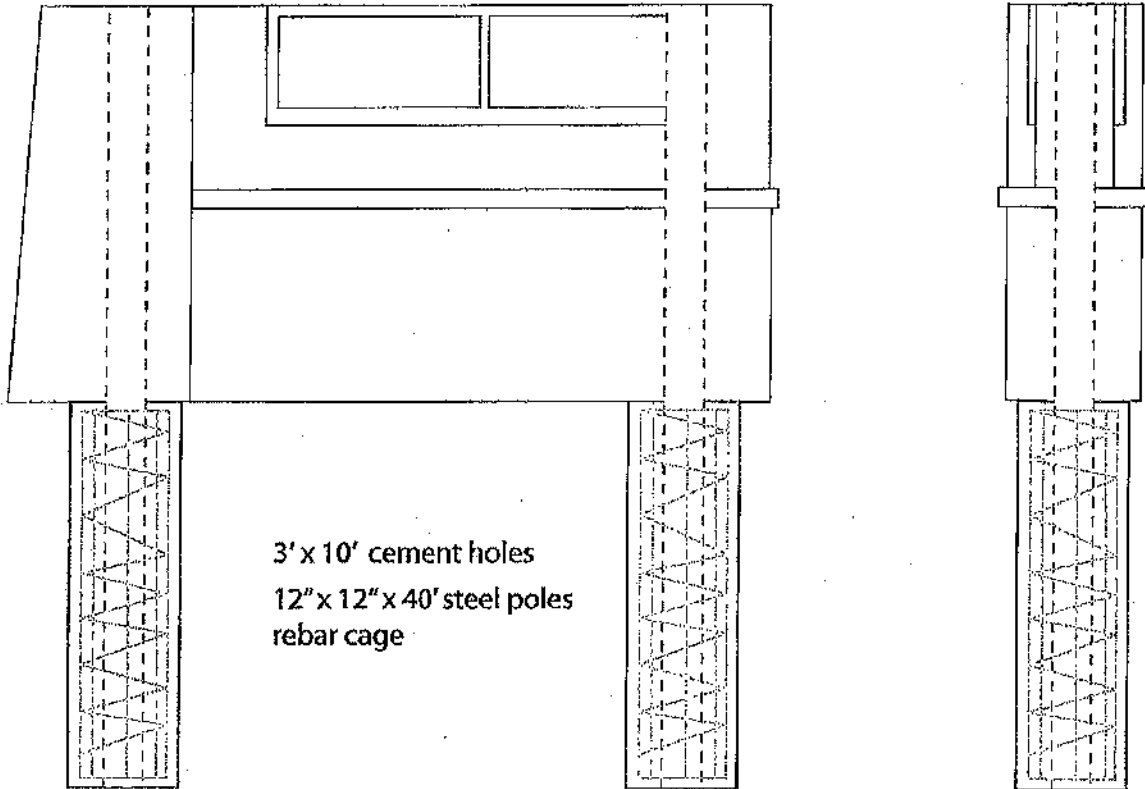
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CUSTOMER APPROVAL X

footing



3' x 10' cement holes
12" x 12" x 40' steel poles
rebar cage



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CUSTOMER APPROVAL X

SHT 1 of 3R

RAMSEY SIGN
ALTERNATE DESIGN

6-20-11

J.J.HILL

USE 2 HOLES AT 3'-0" DIAMETER

$$x^4 - \frac{8(14989)}{2(960)}x^2 - \frac{12(14989)(1376)}{2(960)} - \left[\frac{2(14989)}{2(960)} \right]^2 = 0$$

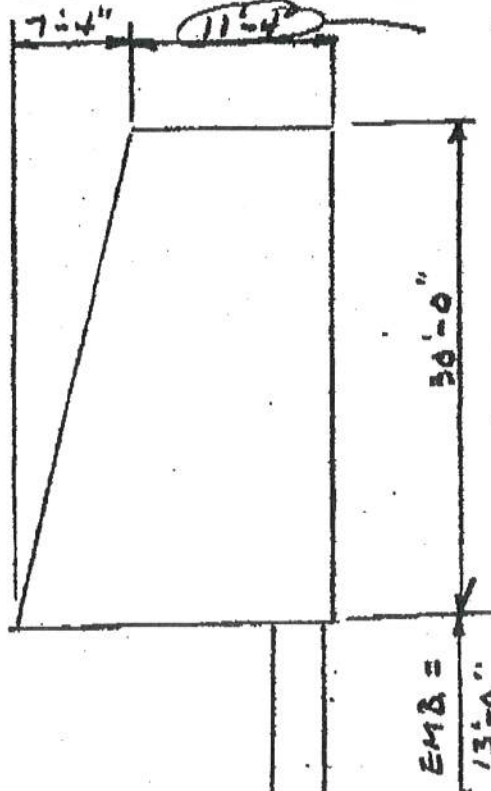
$$x^4 - 62.45x^2 - 1290.93x - 243.78 = 0$$

$$12 \rightarrow -3992 \quad 12.5 \rightarrow -1724 \quad 13 \rightarrow 981 \quad 12.173 \rightarrow 26.52$$

USE 2 @ 3'-0" Ø BY 13' DEEP

RECOMMEND 2 @ 3'-0" HOLES, 13 FEET DEEP

DESIGN OF 12" x 12" x 1/2" TUBE STEEL COLUMNS
USED FORCE OVER 2 COLUMNS -- VALUES FOR
DESIGN ARE STILL OK.



if $17'-6''$, $P = 14,700 \frac{2}{15'} + 910 \frac{2}{10'} = 15,610$

$$M = 220,500 + 9100 = 229,600 \text{ lb}$$

$$SM_{REQD} = 137.8 \text{ in}^3$$

$$2 @ 12" \times 12" \times \frac{1}{2}" \text{ TUBES, } SM = 169.3 \text{ in}^3 \text{ OK}$$

$$\text{HOLES } L = 14.71'$$

$$x^4 - 65.04x^2 - 1435x - 264.4 = 0$$

$$6x \quad x = 13' \rightarrow -1350$$

$$13.25 \rightarrow +125.4$$

$$13.17 \rightarrow -376$$

CALL 3'-0" HOLES @

13'-0" DEEP

CHECK TUBE SIZE
MOMENT

24 X 24 X 1/2" TUBE

$$M = 14,989(13.78) = 206,548 \text{ IN}^2$$

$$S_{M \text{ REQD}} = \frac{206,548(12)}{24,000} = 124.0 \text{ IN}^3$$

$$S_{M \text{ ACT}} = \frac{24^4 - 23^4}{6(24)} = 360.6 \text{ IN}^3$$

20 X 20 X 1/2" TUBE

$$S_M = \frac{20^4 - 19^4}{6(20)} = 247.9 \text{ IN}^3$$

12 X 12 X 1/2" TUBE

$$S_M = 84.15 \text{ IN}^3 \times 2 = 168.3 > 124.0 \text{ IN}^3 \text{ OK}$$

12 X 12 X 3/8" TUBE

$$S_M = 65.52 \text{ OR } 2 \text{ COLS} = 131 \text{ IN}^3 > 124 \text{ IN}^3 \text{ OK}$$

SHEAR

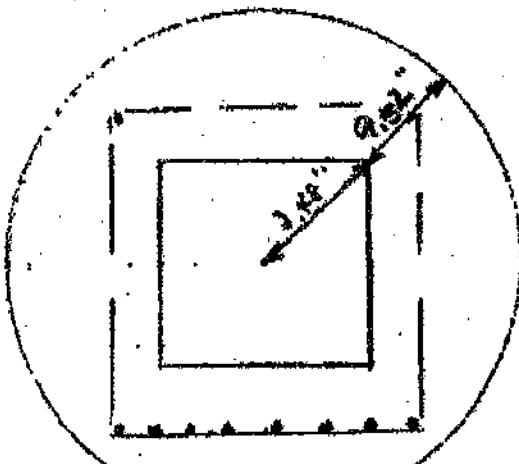
$$V = 14,989 \text{ LBS}$$

12 X 12 X 1/2" TUBE $f_s = \frac{14,989}{22.4} = 669 \text{ PSI} < 12,000 \text{ PSI} \text{ OK}$

12 X 12 X 3/8" TUBE $f_s = 877 \text{ PSI} < 12,000 \text{ PSI} \text{ OK}$

DUE TO MORE LOAD ON ONE COLUMN, RECOMMEND
12" X 12" X 1/2" TUBE FOR COLUMNS

FOOTING STEEL



SHEAR ON CONCRETE

$$\left(\frac{14,989}{2}\right) / 12 \times 9.52 = 65.60 \text{ PSI} < 75$$

USE 4000 PSI CONCRETE

BENDING IN FOOTING

$$M = \left(\frac{14,989}{2}\right)(13.78) = 103,274$$

$$A_s \text{ REQD} = \frac{103,274(12)}{24,000\left(\frac{7}{8}\right)(22)} = 2.99 \text{ IN}^2$$

$$\#5 \dots 2.75 \dots \text{ USE } 8 \text{ \# } 5$$

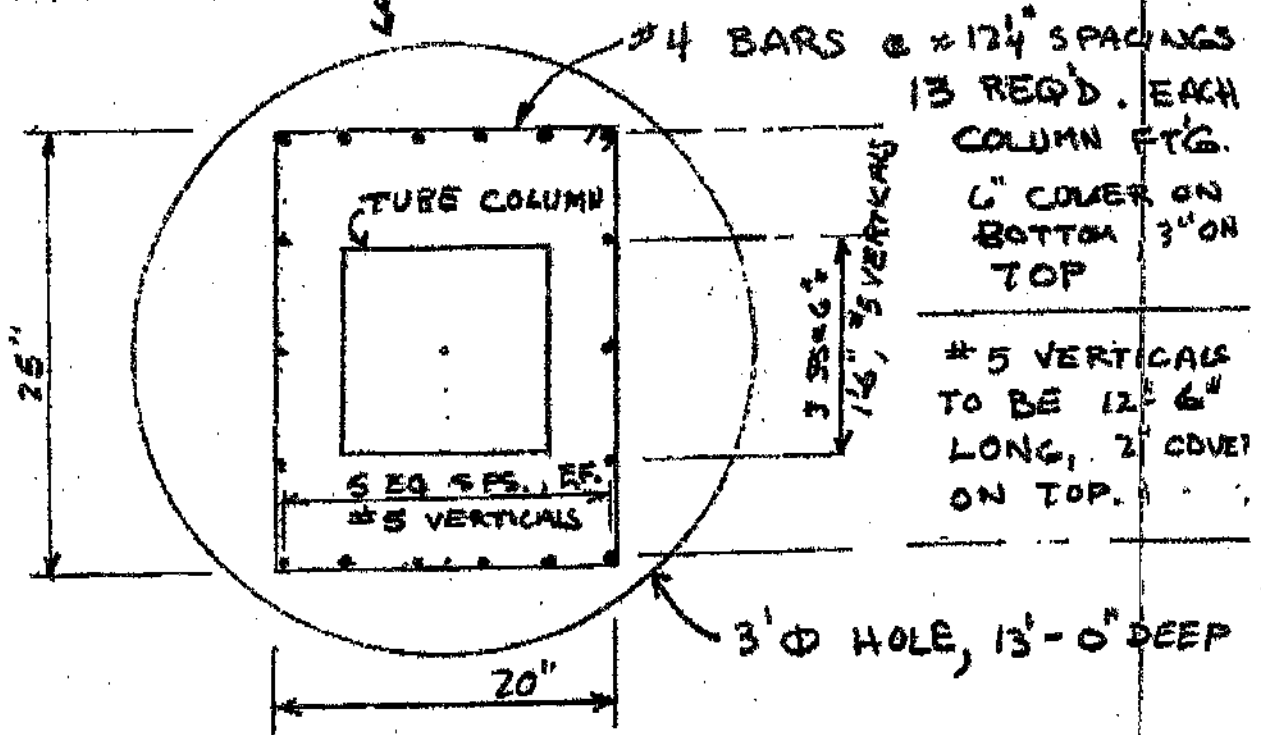
SHT 3 of 3 R

RAMSAY SIGN

K 6-2011

J.J. HILL

IF CAGE IS MADE 20" BY 26", NEED 6-#5 BARS IN MAIN FACES



PLAN OF FOOTING CAGES

1. ALL REBARS TO BE GRADE 60.
2. CONCRETE TO BE 4000 PSI STRENGTH
3. FOOTING HOLES TO BE 3'-0" IN DIAMETER, 13'-0" DEEP.

I CERTIFY THAT I HAVE MADE THIS DESIGN AND DRAWINGS, AND A DULY REGISTERED ENGINEER IN MINNESOTA

James J. Hill

REG # 7395