Form C-104
Rev. 03/2012

VALUE ENGINEERING CHANGE PROPOSAL
MISSOURI DEPARTMENT OF TRANSPORTATION

☒ **Conceptual Proposal** ☐ **Final Proposal** **Date** Feb 14, 2013

Contract ID 130125-F01 **Job No.** J6I2412/J6I2412B

County St. Charles **Route** I-70 **Original Contract Amount** $12,352,676.32

Contractor D & S Fencing Co., Inc **By** Patricia A. Schaeffer

Designed By THHinc **Phone** 636-937-8300

VECP# 13-27 **(to be completed by C.O.)** **VECP** ☒ **or** **PDVECP** ☐

1. **Description of existing requirements and proposed change(s). Advantages/Disadvantages**

VE proposal to use existing cantilever footing in place at Sign #1, #5, #57, #63, #64. Results:

Underrun Concrete Footings Boltdown--	106.5 yards @ $800/yd =	$85,200.00
Underrun Guardrail @ sign 5 --	175 Type A 7' post @ $30.25/ft	$5,293.75
	25' Type E 7' post @ $40.00/ft	$1,000.00
	2 Transition Sections @ $300.00/ea	$600.00
	1 End Anchor @ $900.00/ea	$900.00
Deduct for Larger Base Plates to match existing		-$6.000.00

2. **Estimate of reduction in construction costs.** $86,993.75

3. **Prediction of any effects the proposed change(s) will have on other department costs, such as maintenance and operations.**

None, D & S will verify bolt pattern, have truss columns made to fit existing bolt pattern, field measure spans and make trusses to fit.
Additional information on 2nd page

4. **Anticipated date for submittal of detailed change(s) of items required by Section 104.6 of the Specifications.**

N/A
(date)

5. **Deadline for issuing a change order to obtain maximum cost reduction, noting the effect of contract completion time or delivery schedule.**

N/A (date) N/A (effect)

6. **Dates of any previous or concurrent submission of the same proposal.**

N/A
(date and/or dates)

Additional Comments:

**** Portion Below This Line To Be Filled Out by MoDOT ****

Comments: I recommend approval of the submitted VECP. The MoDOT Structural Liaison Engineer has reviewed the attached design calculations showing that the existing footings are capable of handling the new sign trusses. The existing footings, pedestals and anchor bolts were visually inspected in the field and found in good condition.

Digitally signed by James Wright
DN: cn=James Wright, o=MoDOT, ou=7FCG, email=james.wright@modot.mo.gov, c=US
Date: 2013.05.14 13:55:01 -05'00'

Submitted By Resident Engineer — Date

Comments:

☒ **Approval Recommended**

☐ **Rejection Recommended**

Digitally signed by Ronald Morris
DN: cn=Ronald Morris, o=MoDOT, ou=3H35, email=Ronald.Morris@modot.mo.gov, c=US
Date: 2013.05.15 08:13:19 -05'00'

District Engineer — Date

Comments:

☒ **Approval Recommended**

☐ **Rejection Recommended**

Digitally signed by Gregory Budd
DN: cn=Gregory Budd, o=FHWA, ou, email=gregory.budd@fhwa.dot.gov, c=US
Date: 2013.05.17 16:35:16 -05'00'

Federal Highway Administration — Date

Required for FHWA Full Oversight Projects

Comments:

☒ **Approval**

☐ **Rejection**

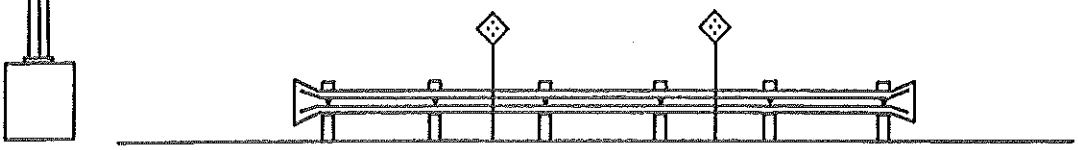
Digitally signed by Randy C. Hitt
DN: cn=Randy C. Hitt, o, ou, email=randy.hitt@modot.mo.gov, c=US
Date: 2013.05.15 10:14:35 -05'00'

State Construction and Materials Engineer — Date

Distribution: **Resident Engineer, Project Manager, District Construction & Materials Engineer, State Construction & Materials Engineer, FHWA Value Engineering Administrator – MoDOT, P. O. Box 270, Jefferson City, MO 65102**

D & S Fencing Co., Inc.
2800 Sunnyside Road
Festus, MO 63028

Phone: (636) 937-8300 • Toll Free: (636) 931-4651 • Fax: (636) 937-3619



Commercial Fence • Guard Rail • Highway Signing

April 15, 2013

Rte I-70
St Charles County
J6I2412/J6I2412B

VE Proposal

On the original proposal sent to Trabue, Hansen, & Hinshaw, Inc., Sign #1 (913+48 WBL I-70), was mistakenly listed as having a Type IV existing sign base, when in reality it has an existing Type V sign base. The existing Type V sign base will put Sign #1 in the same category as Sign #3 (954+64 EBL I-70) and Sign #5 (978+89 EBL I-70).

Please disregard any of the calculations or information referring to Sign #1 as having an existing Type IV base. I apologize for this error and any additional problems resulting from it.

I have included a revised VE Proposal Sheet that shows the correct information.

Thank you,

Jeff Schaeffer
D & S Fencing Co., Inc.

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Festus, MO 63028

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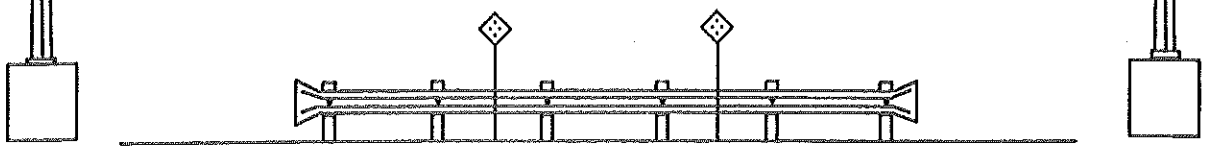


Commercial Fence • Guard Rail • Highway Signing

April 15, 2013

Rte I-70
St. Charles County
J6I2412/J6I2412B

VE Proposal

Sign #3 (954+64 EBL I-70), Sign #5 (978+89 EBL I-70), & Sign #1 (913+48 WBL I-70)
New Shoulder Pedestal Type III Aluminum Truss
Existing Shoulder Pedestal Type V Cantilever Truss

Type	Footing Size	Pedestal Size	Base Plate Size	Anchor Bolts	Reinforcement
Type III	8'6"x17'6"	7'10"x3'2"	3'4"x2'2"x1' ¾"	6 @ 2 ¼" Dia.	9-#5 & 9-#7
Type V	9'x17'	8'5"x3'8"	3'3"x2'8"x2"	10 @ 2 ¼" Dia.	9-#5 & 10-#7

Sign #57 (1000+12 WBL I-70), Sign #63 (1026+05 WBL I-70), & Sign #64 (1052+45 WBL I-70)
New Shoulder Pedestal Type IV Aluminum Truss
Existing Shoulder Pedestal Type VI Cantilever Truss

Type	Footing Size	Pedestal Size	Base Plate Size	Anchor Bolts	Reinforcement
Type IV	9'6"x19'	7'x4'	3'7"x2'4"x2"	6 @ 2 ½" Dia.	10-#5 & 10-#8
Type VI	9'x19'	7'6"x4'6"	3'6"x2'10"x2 ¼"	10 @ 2 ¼" Dia.	9-#5 & 10-#7

THHinc

Memorandum

1901 Pennsylvania
Columbia, MO 65202
573-814-1568
Fax: 573-814-1128

Date: May 2, 2013

To: Jeff Schaeffer - D&S Fencing Co., Inc.

From: Kris Bezenek, PE, MLSE

Re: Mid Rivers Rte I-70 Sign Footings - Summary of Design Data
THHinc #7012

The scope of this project involved the verification of the suitability of the existing sign foundations for us with the proposed new sign structures. The purpose of this memo is to provide documentation and clarification regarding the design approach and assumptions made for this project.

The foundation geometries from the MoDOT Standards for the new signs were modeled in RISA Foundation and then loaded to failure using gravity, M_x and M_y loads independently. The soil bearing pressures were included in the evaluations. The existing foundations were then modeled as well and were checked for deficiencies when subjected to the maximum allowable loads previously determined for the "new" standard footings. The foundation for Sign #1 was found to be deficient and remedial detail has been prepared.

The Contractor has proposed to reuse the existing anchor bolts along with the "new" base plate standards. Using the same methodology described above, the existing anchor bolt sizes and geometries were checked against the new MoDOT Standards and all were found to be sufficient.

Because the relative capacities of two similar items were evaluated no Code-prescribed load factors or combinations were used in the analysis. Likewise, since the relative strength and bearing capacity was the focus of this work, the actual applied sign support loads were not calculated, nor were they part of the relevant compared variables.

The following assumptions were used in the analysis:

- The existing foundations are oriented in the same direction as ones specified in the Contract Documents (long and short dimensions)
- The pilaster and attachment point is centered on the footings for the existing condition and proposed new construction (no geometric eccentricities)
- The existing foundations are constructed according to the original MoDOT Specifications

Cold Formed Steel Calculations
Revision #1

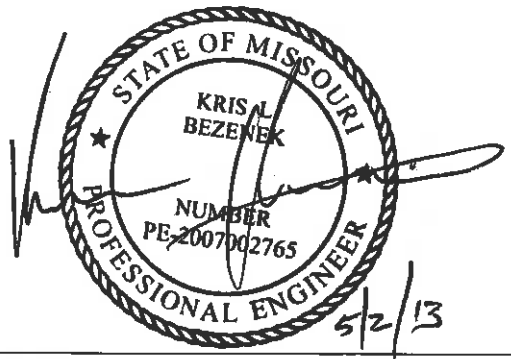
for

Mid Rivers Rte I-70 Sign Footings
St. Charles County, MO

D & S Fencing Co., Inc.
2800 Sunnyside Road
Festus, MO 63028

May 2013
THHinc # 7012

I hereby certify that these calculations were prepared by me or under my direct supervision. I am a Professional Structural Engineer in good standing in the State of Missouri.



Kris L. Bezenek, P.E. MO Registration PE-2007002765

THHinc

Trabue, Hansen & Hinshaw, Inc.
1901 Pennsylvania Avenue
Columbia, MO 65202

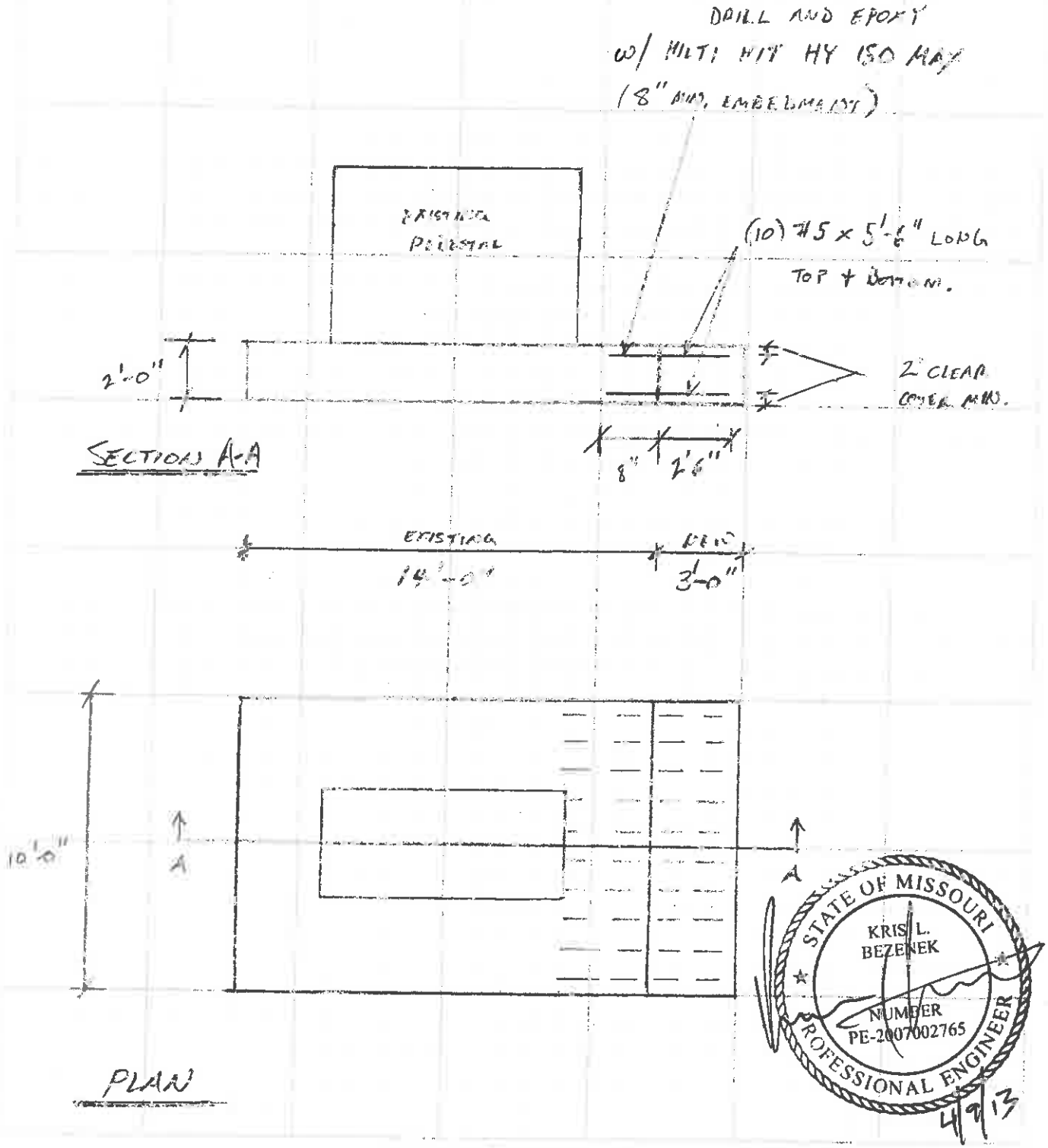
(573) 814-1568
Corp. Reg. # MO E-1454-D

TABLE OF CONTENTS

THHinc Consulting Engineers
1901 Pennsylvania Drive
Columbia, MO 65202
Phone: (573) 814-1568
www.thhinc.com
www.fb.com/thhinc.engineers

Proj. #: 7012 Date: 4-9-13
Project: I-70 SIGNS
Subject: SIGN #1
By: _____ Pg: 1 / 1

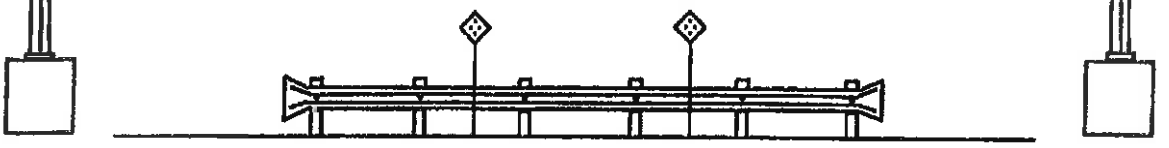
EXISTING FOOTING, REMOVE EXPOSED PORTION



STATE OF MISSOURI
KRIS L. BEZENEK
NUMBER PE-2007002765
PROFESSIONAL ENGINEER
4/9/13

D & S Fencing Co., Inc.
2800 Sunnyside Road
Festus, MO 63028

Phone: (636) 937-8300 • Toll Free: (636) 931-4651 • Fax: (636) 937-3619



Commercial Fence • Guard Rail • Highway Signing

April 1, 2013

Rte I-70
St. Charles County
J6I2412/J6I2412B

VE Proposal

Sign #3 (954+64 EBL I-70) and Sign #5 (978+89 EBL I-70)
New Shoulder Pedestal Type III Aluminum Truss
Existing Shoulder Pedestal Type V Cantilever Truss

	Type	Footing Size	Pedestal Size	Base Plate Size	Anchor Bolts	Reinforcement
	Type III	8'6"x17'6"	7'10"x3'2"	3'4"x2'2"x1' ¾"	6 @ 2 ¼" Dia.	9-#5 & 9-#7
EXISTING	Type V	9'x17' OK	8'5"x3'8"	3'3"x2'8"x2"	10 @ 2 ¼" Dia.	9-#5 & 10-#7 OK

Sign #57 (1000+12 WBL I-70), Sign #63 (1026+05 WBL I-70), & Sign #64 (1052+45 WBL I-70)
New Shoulder Pedestal Type IV Aluminum Truss
Existing Shoulder Pedestal Type VI Cantilever Truss

	Type	Footing Size	Pedestal Size	Base Plate Size	Anchor Bolts	Reinforcement
	Type IV	9'6"x19'	7'x4'	3'7"x2'4"x2"	6 @ 2 ½" Dia.	10-#5 & 10-#8
EXISTING	Type VI	9'x19'	7'6"x4'6"	3'6"x2'10"x2 ¼"	10 @ 2 ¼" Dia.	9-#5 & 10-#7

✱ Sign #1 (913+48 WBL I-70)
New Shoulder Pedestal Type III Aluminum Truss
Existing Shoulder Pedestal Type IV Cantilever Truss

	Type	Footing Size	Pedestal Size	Base Plate Size	Anchor Bolts	Reinforcement
	Type III	8'6"x17'6"	7'10"x3'2"	3'4"x2'2"x1' ¾"	6 @ 2 ¼" Dia.	9-#5 & 9-#7
EXISTING	Type IV	10'x14'	8'2"x3'10"	2'10"x2'10"x2"	10 @ 2 ¼" Dia. OK	10=#5 & 10-#5

THHinc Consulting Engineers
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Columbia, MO 65202
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www.fb.com/thhinc.engineers

Proj. #: 7012 Date:
Project: I-70 SIGNS
Subject:
By: Pg: 1

STEEL PER MODOT STANDARDS

SIGN #5 EXISTING

$$\rho = A_s/bd = (10)(0.6\ in^2)/[9(12)(21)] = 0.00264$$

SIGN #5 REQ'D

$$\rho = A_s/bd = (9)(0.6\ in^2)/(8.5 \times 12 \times 21) = 0.00252$$

SIGN #7 EXISTING

$$\rho = A_s/bd = (16)(0.6\ in^2)/(9 \times 12 \times 21) = 0.00635$$

SIGN #7 REQ'D

$$\rho = A_s/bd = 0.79(10)/(9.5 \times 12 \times 21) = 0.0083$$

SIGN #1 REQ'D

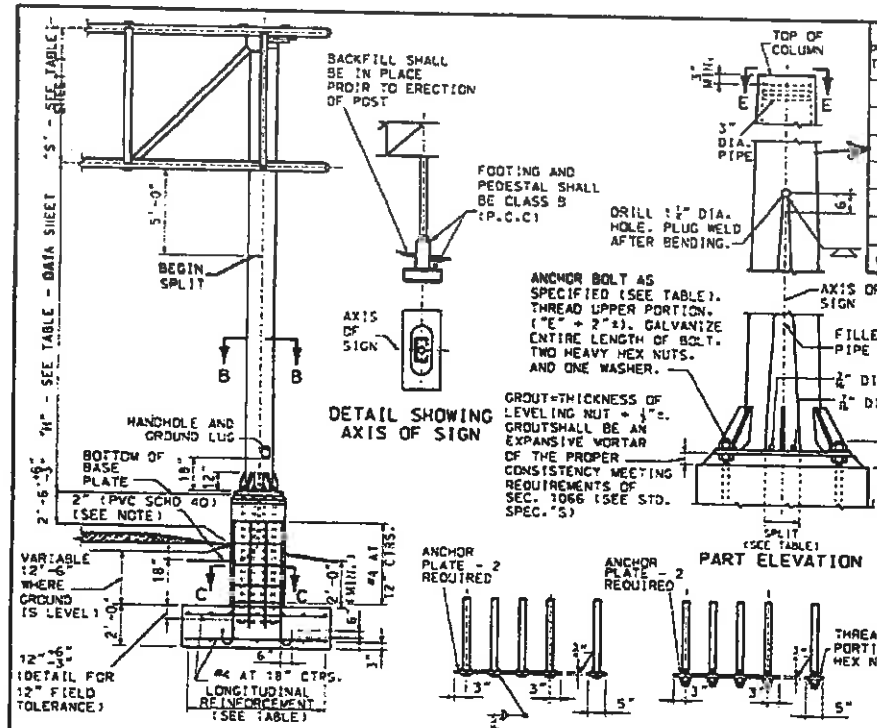
$$\rho = A_s/bd = 9(0.60\ in^2)/(8.5 \times 12 \times 21) = 0.00252$$

SIGN #1 EXIST.

$$\rho = A_s/bd = 10(0.31)/(10 \times 12 \times 21) = 0.00123$$

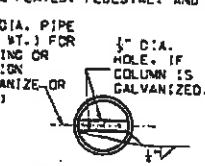
SIGN #3 + #5

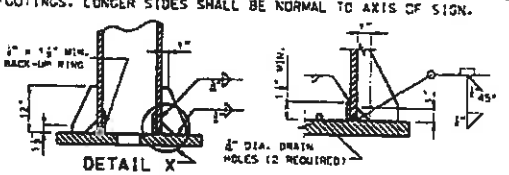
DESIGN TYPE III

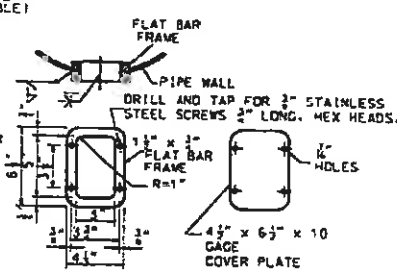


POST TYPE	PIPE COLUMN	DIMENSION "E"	SPLIT	BASE PLATE SIZE*	ANCHOR BOLTS DIA.	PEDESTAL SIZE* C	PEDESTAL SIZE* D	FOOTING SIZE*	LONGITUDINAL FOOTING REINFORCEMENT TOP	LONGITUDINAL FOOTING REINFORCEMENT BOTTOM	CONCRETE C.Y.
I	12" STD. AT 65.42	8½"	6"	2'-6"x 23"x 1½"	6 AT 2¼"	4'-0"	2'-11"	7'-0"x 14'-6"	7-#5 BARS	7-#6 BARS	10.9
II	14" O.D. AT 72.09	8½"	9½"	3'-0"x 2'-0"x 1½"	6 AT 2½"	4'-6"	3'-0"	8'-0"x 16'-0"	8-#5 BARS	9-#6 BARS	13.2
III	16" O.D. AT 82.77	8½"	11½"	3'-4"x 2'-2"x 1¾"	6 AT 2¾"	4'-8"	3'-9"	8'-6"x 17'-6"	9-#5 BARS	9 #7 BARS	15.2
IV	18" O.D. AT 93.45	9½"	12½"	3'-7"x 2'-4"x 2"	6 AT 2¾"	5'-1"	3'-4"	9'-6"x 19'-0"	10-#5 BARS	10-#8 BARS	18.1
V	20" O.D. AT 104.13	9½"	13"	3'-10"x 2'-9"x 2"	8 AT 2¾"	5'-6"	3'-9"	10'-0"x 20'-0"	10-#5 BARS	10-#8 BARS	20.6
VI	24" O.D. AT 125.49	9½"	10½"	4'-0"x 3'-3"x 2"	8 AT 2¾"	5'-6"	4'-3"	10'-6"x 21'-0"	11-#5 BARS	11-#8 BARS	23.3
VII	24" O.D. AT 125.49	9½"	13½"	4'-3"x 3'-3"x 2"	8 AT 2¾"	5'-9"	4'-3"	11'-0"x 22'-0"	11-#5 BARS	11-#8 BARS	25.1

* BASE PLATES, PEDESTAL, AND FOOTINGS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.







GENERAL NOTES:

A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE: A.S.T.M. SPECIFICATION A53. NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

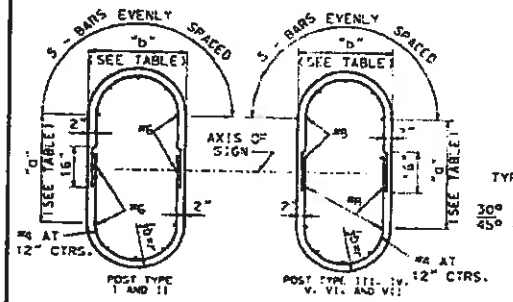
A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

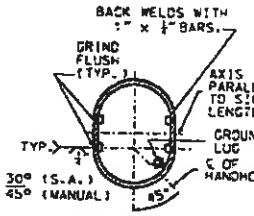
QUANTITIES FOR PEDESTAL, BASED ON NOMINAL HEIGHT OF 5'-0".

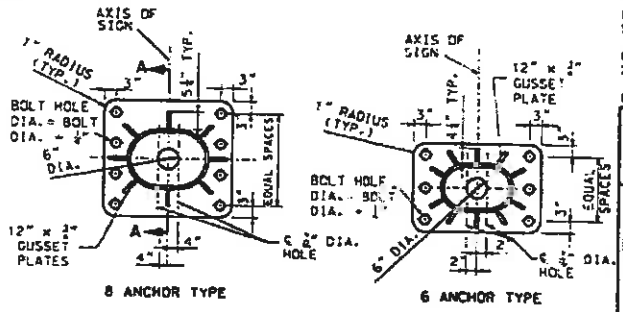
QUANTITIES FOR FOOTING, BASED ON NOMINAL DEPTH OF 2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.



NOTE: FOR DETAILS OF ALTERNATE PEDESTAL, SEE SHEET NO. 5 OF 6.





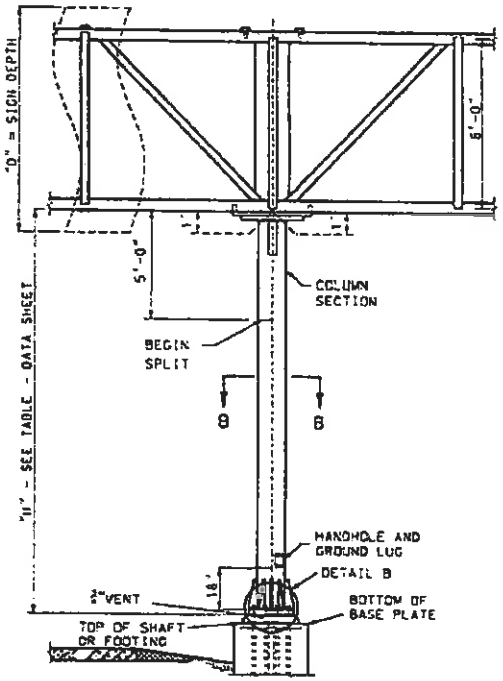
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

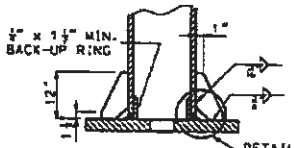
OVERHEAD SIGN TRUSSES
ALUMINUM

DATE EFFECTIVE:	10/01/2011	903.1088	SHEET NO.
DATE PREPARED:	9/30/2011		4 OF 6

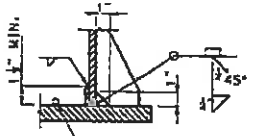
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

EXISTING TYPE IV

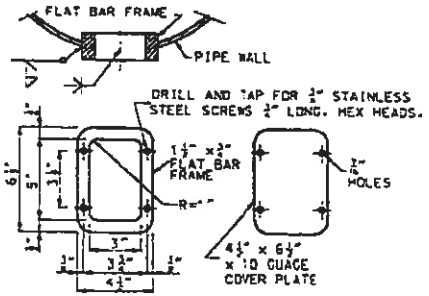




DETAIL B
(SECTION VIEW SHOWN)

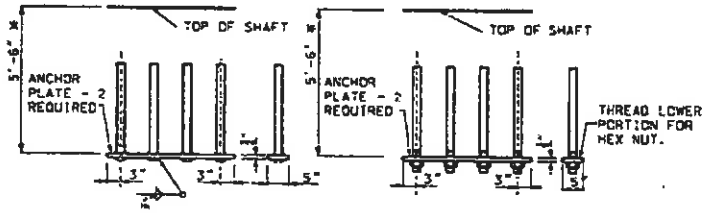


DETAIL C



HANDHOLE AND COVER DETAILS

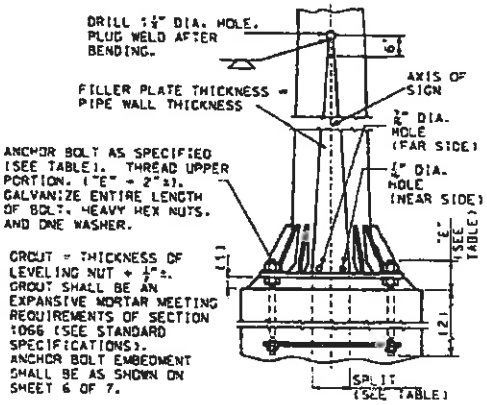
NOTE:
HANDHOLE REQUIRED ONLY IN POWER COLUMN.



DETAIL A
ANCHORAGE

DETAIL A
OPTIONAL ANCHORAGE

(BOTH DETAILS ARE SHOWN FOR 4 BOLTS - SIMILAR FOR 3 BOLTS)
* DIMENSION SHOWN FOR DRILLED SHAFT OPTION. FOR SPREAD FOOTING OPTION REFER TO SHEET 6 OF 7.



(1) GROUT = THICKNESS OF LEVELING NUT + ½"±. GROUT SHALL BE AN EXPANSIVE MORTAR MEETING REQUIREMENTS OF SECTION 1066 (SEE STANDARD SPECIFICATIONS).
(2) ANCHOR BOLT EMBEDMENT SHALL BE AS SHOWN ON SHEET 6 OF 7.

PART ELEVATION

GENERAL NOTES:

SUBSTRUCTURE SHALL BE BACKFILLED PRIOR TO ERECTION OF POST.

ASTM A 106 GRADE B STEEL PIPE OR A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

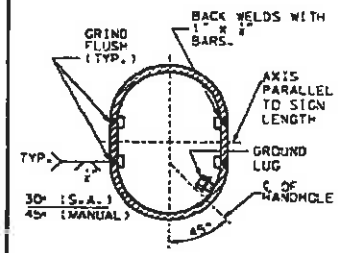
ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE; A.S.T.M. SPECIFICATION A53.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

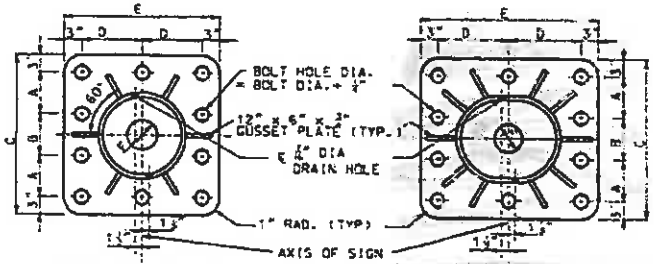
A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.



SECTION B-B
(FOR SPLIT COLUMNS ONLY)

TYPICAL BASE PLATE (10 ANCHOR TYPE) BUTTERFLY AND CANTILEVER (B.C.)					
	III	IV	V	VI	VII
A	8"	9"	8"	9"	10½"
B	10"	10"	10"	10"	11"
C	32"	34"	32"	34"	38"
D	13"	14"	16½"	18"	20"
E	32"	34"	39"	42"	46"
F	6"	6"	6"	6"	6"



III AND IV B.C. V, VI, AND VII B.C.
TYPICAL BASE PLATES

NOTE:
FOR DETAILS OF OPTIONAL SUBSTRUCTURES. SEE OTHER SHEETS.

ANCHOR BOLTS AND PLATE NOT SHOWN.

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
PHILIP MAY
NUMBER PE-2009
PROFESSIONAL ENGINEER

OVERHEAD SIGN TRUSS
COLUMN AND BASE PLATES

DATE EFFECTIVE:	12-01-2008	903.12Y	SHEET NO. 3 OF 7
DATE PREPARED:	7/18/2002		

EXISTING TYPE V

DRILLED SHAFT OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	C	FA	FB	FC	FD	FH	COLLAR REINFORCEMENT MOMENT-C1 BARS	COLLAR REINFORCEMENT MOMENT-C1 SPACING	COLLAR REINFORCEMENT SHEAR-C2 BARS	COLLAR REINFORCEMENT SHEAR-C2 SPACING	COLLAR REINFORCEMENT SKIN-C3 BARS	COLLAR REINFORCEMENT SKIN-C3 SPACING	SHAFT REINFORCEMENT LONGITUDINAL S1 QUANTITY	SHAFT REINFORCEMENT LONGITUDINAL S1 BARS	SHAFT REINFORCEMENT SHEAR-S2 BARS	SHAFT REINFORCEMENT SHEAR-S2 SPACING	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)	ALTERNATE PEDESTALS REBAR TOTAL (LBS.) TYPE A	ALTERNATE PEDESTALS REBAR TOTAL (LBS.) TYPE C	ALTERNATE PEDESTALS CONCRETE (CU. YDS.) TYPE A	ALTERNATE PEDESTALS CONCRETE (CU. YDS.) TYPE C
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	2'-10"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.4	14.5
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.5	14.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	5'-0"	13'-6"	4'-0"	5'-6"	17'-0"	#6	6"	#4	12"	#4	12"	22	#11	#6	6"	3901	26.5	3763	3782	28.8	30.7
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2½"	10	2½"	3'-0"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#4	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.1	36.2
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	3'-4"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#4	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.5	36.8

SPREAD FOOTING OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * a	PEDESTAL SIZE * b	FOOTING SIZE *	LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	PEDESTAL REINFORCEMENT NO.	PEDESTAL REINFORCEMENT BARS	PEDESTAL REINFORCEMENT NO.	PEDESTAL REINFORCEMENT BARS	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	4'-2"	3'-8"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	695	14.4
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	4'-4"	3'-10"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	733	15.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	4'-9"	3'-8"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	955	16.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2½"	10	2½"	5'-0"	3'-10"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1028	18.4
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	5'-4"	4'-2"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1196	21.5

SPREAD FOOTING OPTION WITH ALTERNATE PEDESTALS

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * c	PEDESTAL SIZE * d	PEDESTAL SIZE * e	FOOTING SIZE *	TYPE A LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE A PEDESTAL REINFORCEMENT NO.	TYPE A PEDESTAL REINFORCEMENT BARS	TYPE A PEDESTAL REINFORCEMENT NO.	TYPE A PEDESTAL REINFORCEMENT BARS	TYPE A REBAR TOTAL (LBS.)	TYPE A CONCRETE (CU. YDS.)	TYPE C LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE C PEDESTAL REINFORCEMENT NO.	TYPE C PEDESTAL REINFORCEMENT BARS	TYPE C PEDESTAL REINFORCEMENT NO.	TYPE C PEDESTAL REINFORCEMENT BARS	TYPE C REBAR TOTAL (LBS.)	TYPE C CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	2'-10"	6'-6"	15"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	757	14.4	10	#4	10	#5	12	#4	14	#8	800	15.3
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	6'-9"	18"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	795	15.6	10	#4	10	#5	12	#4	14	#8	839	16.5
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	7'-0"	12"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	1015	16.5	10	#4	10	#7	12	#4	14	#8	1059	17.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2½"	10	2½"	3'-0"	7'-6"	15"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1099	18.4	10	#4	10	#7	12	#4	14	#8	1134	19.5
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	3'-4"	7'-10"	15"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1257	21.5	10	#4	12	#7	12	#4	14	#8	1302	22.6

* BASE PLATES, PEDESTAL AND FOOTINGS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.
** BASE PLATES, PEDESTAL AND FOUNDATIONS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI — PROFESSIONAL ENGINEER

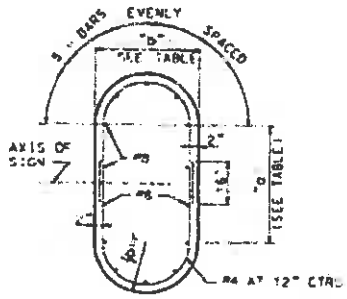
OVERHEAD SIGN TRUSSES
OPTIONAL SUBSTRUCTURE DATA

DATE EFFECTIVE: 12-01-2008
DATE PREPARED: 7/18/2012

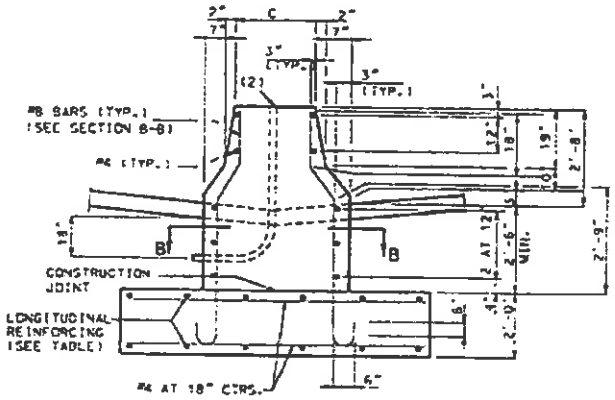
903.12Y

SHEET NO. 4 OF 7

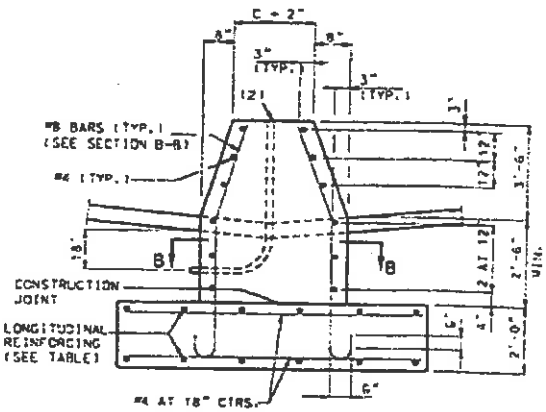
EXISTING Type V



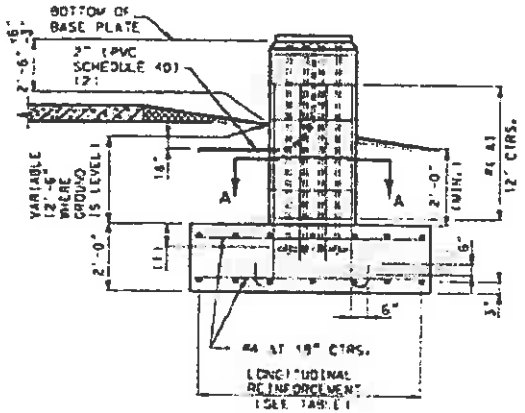
SECTION A-A
(TYPICAL SECTION SHOWING REINFORCING STEEL)



PART ELEVATION
(TYPE A CONCRETE TRAFFIC BARRIER)



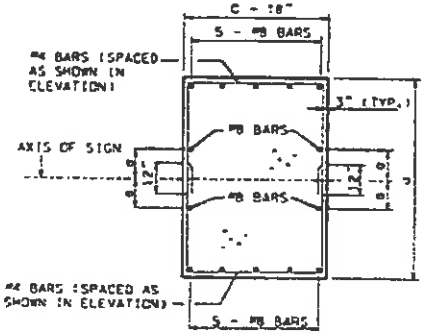
PART ELEVATION
(TYPE C CONCRETE TRAFFIC BARRIER)



ELEVATION

(1) 12"$^{+6}_{-3}$" (DETAIL FOR 12" FIELD TOLERANCE)

(2) 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MINIMUM BEND RADIUS OF 9½".



SECTION B-B
TYPICAL SECTION SHOWING
REINFORCING STEEL

DETAILS OF ALTERNATE PEDESTAL

GENERAL NOTES:

PEDESTAL AND FOOTING SHALL BE CLASS B (P.C.C.).

MINIMUM CLEARANCE TO REINFORCEMENT IS 3" EXCEPT AS SHOWN.

CONTACT THE ENGINEER IF WATER TABLE IS ENCOUNTERED DURING EXCAVATION.

PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 7 FOR DETAILS OF THESE ITEMS.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

OVERHEAD SIGN TRUSSES
SPREAD FOOTING

DATE EFFECTIVE: 12-01-2008	903.12Y	SHEET NO. 6 OF 7
DATE PREPARED: 7/18/2008		

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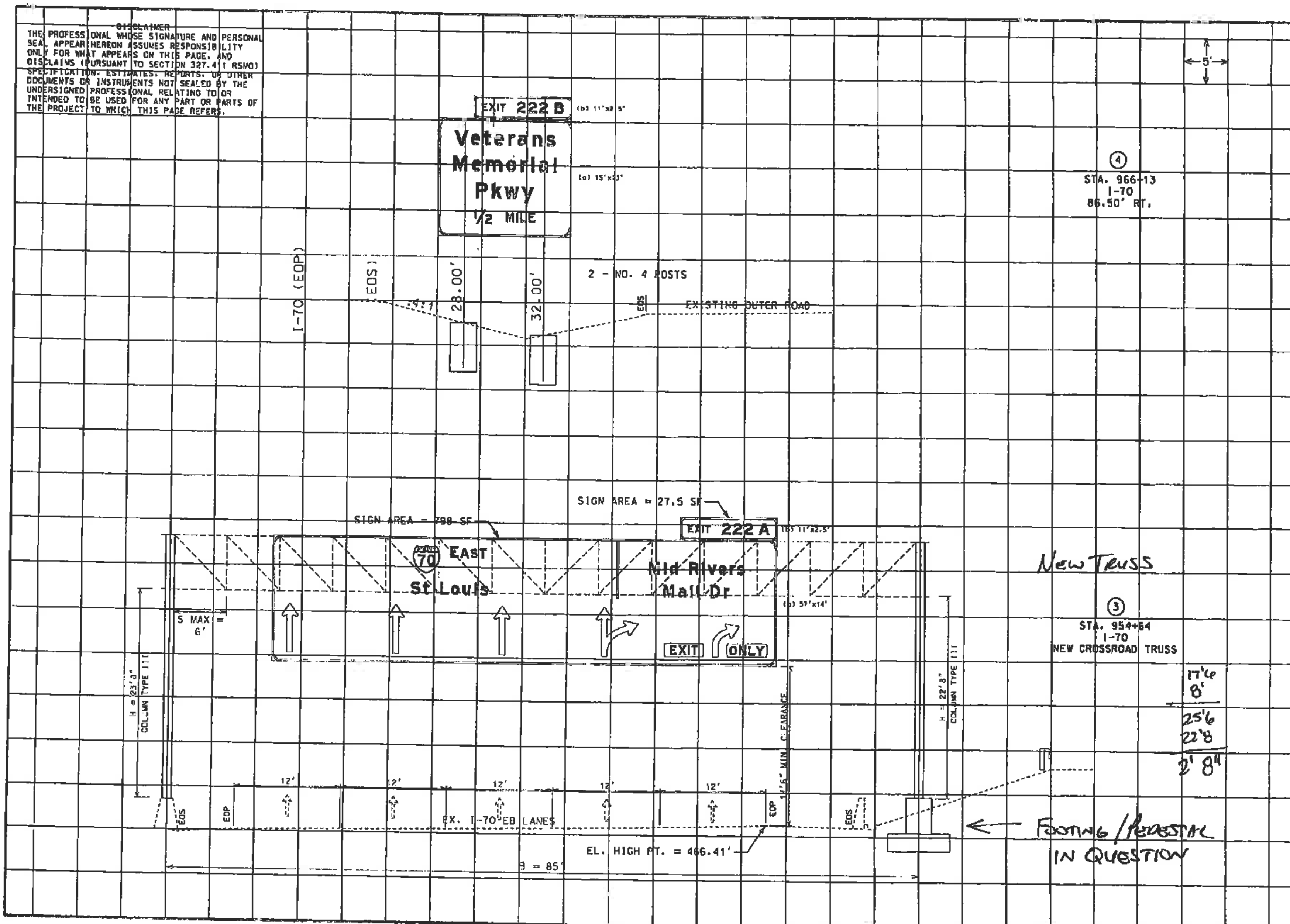


THIS SHEET HAS BEEN SIGNED, SEALED AND DATED ELECTRONICALLY

STATE OF MISSOURI
TIMOTHY J. SCHROEDER
NUMBER PE-[illegible]
PROFESSIONAL ENGINEER

DATE PREPARED	10/18/2012
ROUTE	I-70
STATE	MO
DISTRICT	SL
SHEET NO.	117
COUNTY	ST. CHARLES
JOB NO.	J6I2412
CONTRACT ID.	
PROJECT NO.	
BRIDGE NO.	A42662

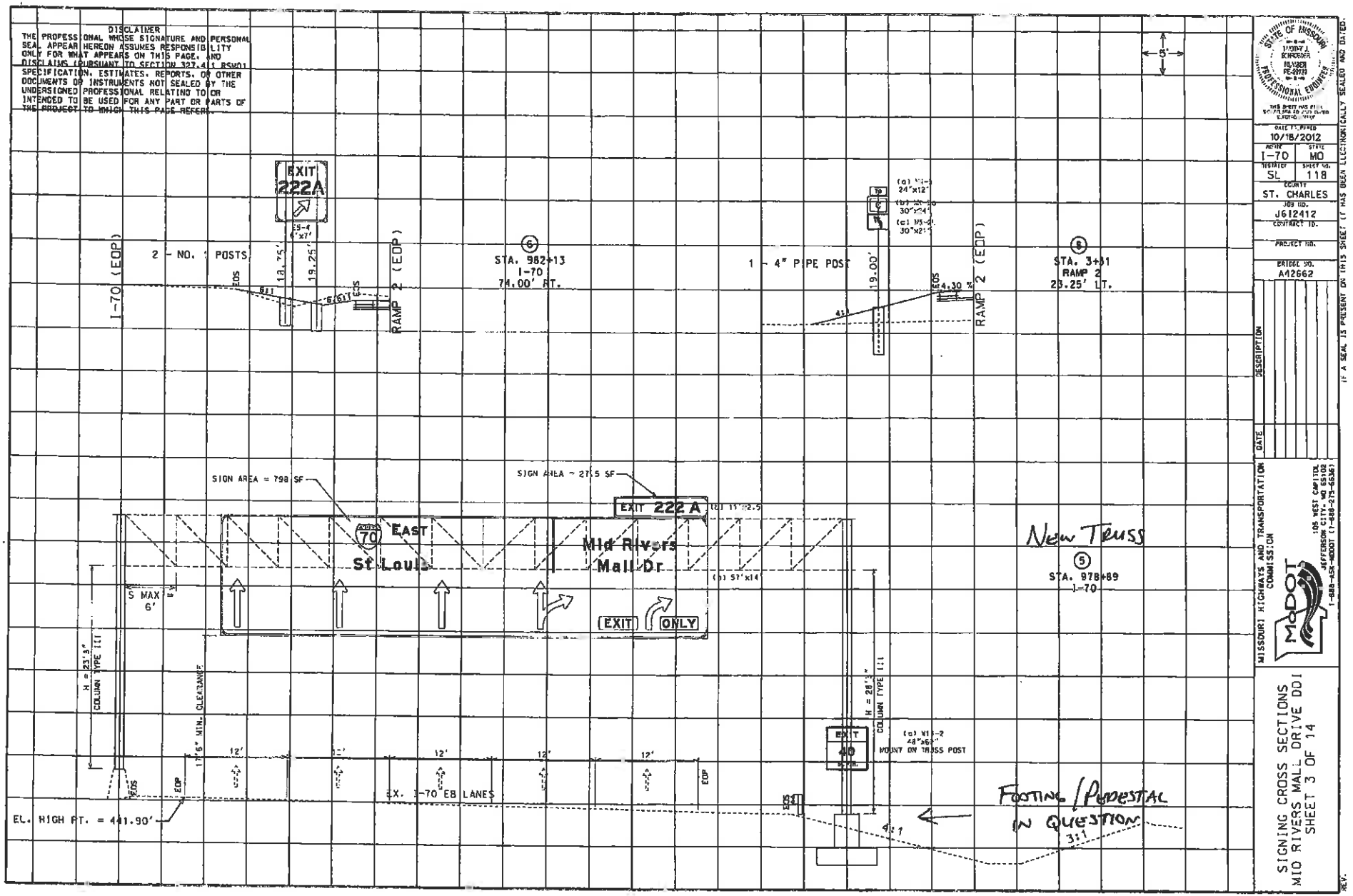
DESCRIPTION
DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

SIGNING CROSS SECTIONS
MID RIVERS MALL DRIVE DDI
SHEET 2 OF 14

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

REV.


DISCLAIMER
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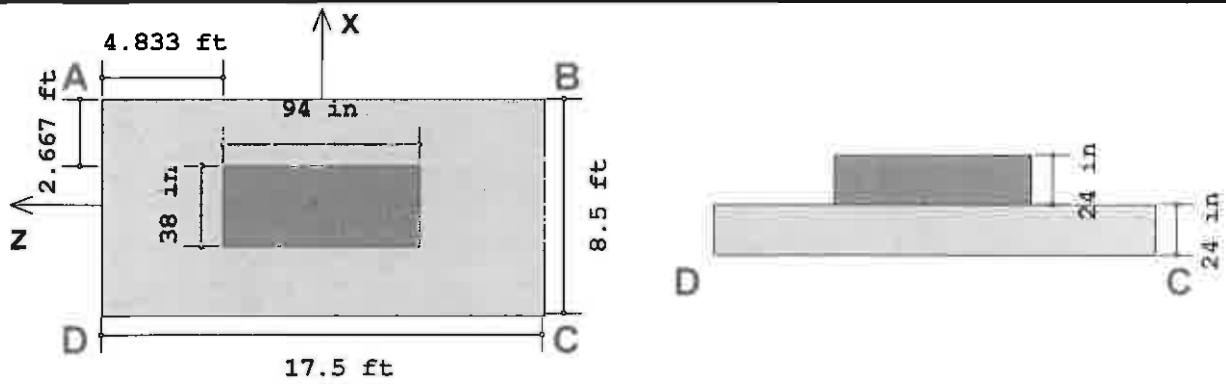
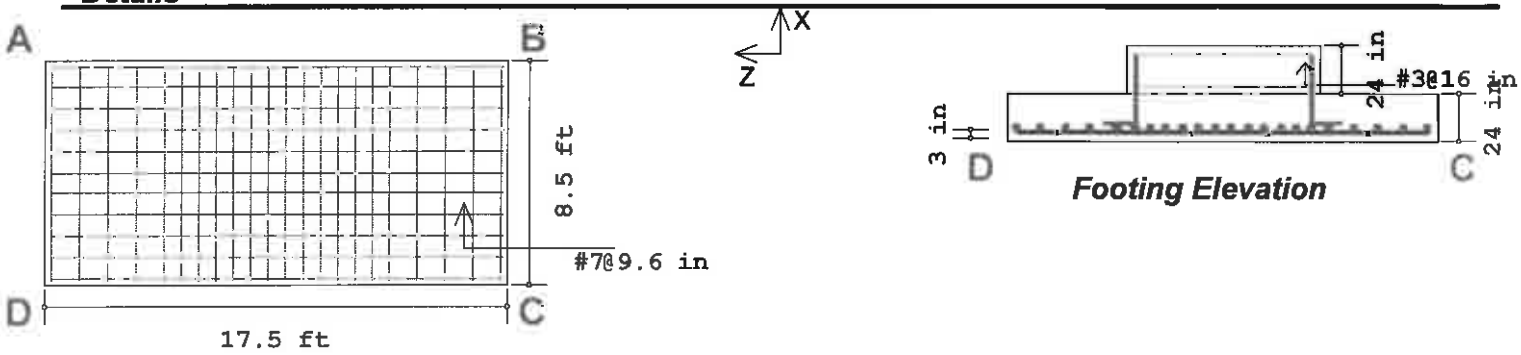
EXIT 222A
I-70 (EOP)
2 - NO. 1 POSTS
RAMP 2 (EOP)
STA. 982+13
I-70
74.00' RT.
1 - 4" PIPE POST
STA. 3+31
RAMP 2
23.25' LT.
SIGN AREA = 798 SF
SIGN AREA = 275 SF
EXIT 222 A
EAST
St Louis
Mid Rivers
Mall Dr
EXIT
ONLY
New Truss
STA. 978+89
I-70
S MAX
6'
COLUMN TYPE III
EX. I-70 EB LANES
EL. HIGH PT. = 441.90'
FOOTING / PEDESTAL
IN QUESTION
3:1
4:1
EXIT
40
MOUNT ON TRUSS POST
5'
STATE OF MISSOURI
VINCENT J. SCHRODER
NUMBER PE-2010
PROFESSIONAL ENGINEER
DATE SIGNED
10/18/2012
ROUTE
I-70
STATE
MO
DISTRICT
SL
SHEET NO.
118
COUNTY
ST. CHARLES
JOB NO.
J6I2412
CONTRACT NO.
PROJECT NO.
BRIDGE NO.
A12662
DESCRIPTION
DATE
IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)
SIGNING CROSS SECTIONS
MID RIVERS MALL DRIVE DDI
SHEET 3 OF 14
REV.

Company	: THHinc.		April 30, 2013
Designer	: MDH		
Job Number	: 7012	I-70 Signs (Sign 3&5 Required)	Checked By:_____

Sketch



Details



Footing Elevation

Controlling X direction steel requires the following placement:

Region 1 (starts at A):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**
Region 2 (middle):	**102 in**	Steel: **8.42 in^2 (14 #7 @7.85 in)**
Region 3 (ends at B):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**

Bottom Rebar Plan

Geometry, Materials and Criteria

Length	: 17.5 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 8.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00252
Thickness	: 24 in	pX	: 38 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00252
Height	: 24 in	pZ	: 94 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				360		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1484.19 (B)	.989

1DL+1WL
QA: 0 psf
QB: 1484.19 psf
QC: 1484.19 psf
QD: 0 psf
NAZ: 169.79 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	71.007	.771	4.98055e-9	0

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	59.087	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 103.278k-ft,212.63k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1410.51 k One Way (X Dir. Cut) Vc 229.756 k One Way (Z Dir. Cut) Vc: 473.027 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/ØVc	Vu(k)	Vu/ØVc	Vu(k)	Vu/ØVc
Comparison Load	1DL+1WL	1.568	.001	19.108	.111	1.33512e-9	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 18217.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/ØBc
Comparison Load	1DL+1WL	89.25	.008

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	360	780.937	0	379.312	2.169	NA

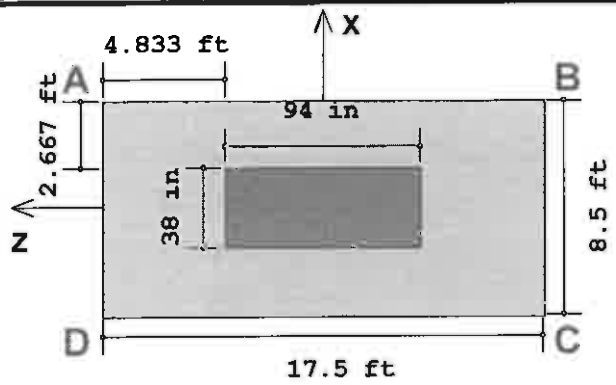
Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

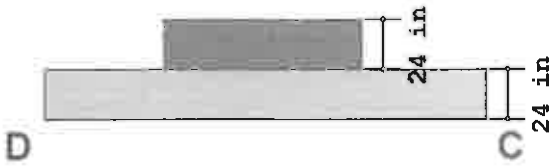
Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign 3&5 Required)

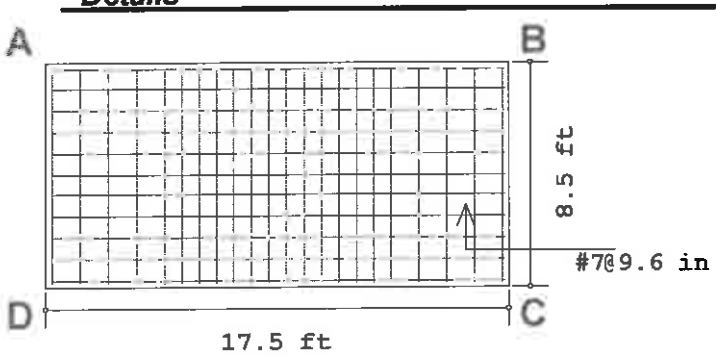
April 30, 2013
Checked By:_____

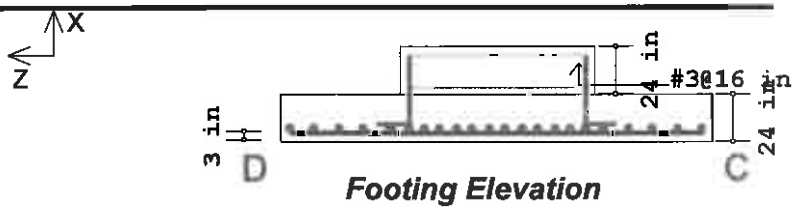
Sketch





Details





Footing Elevation

Controlling X direction steel requires the following placement:

Region 1 (starts at A):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**
Region 2 (middle):	**102 in**	Steel: **8.42 in^2 (14 #7 @7.85 in)**
Region 3 (ends at B):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**

Bottom Rebar Plan

Geometry, Materials and Criteria

Length	: 17.5 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 8.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00252
Thickness	: 24 in	pX	: 38 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00252
Height	: 24 in	pZ	: 94 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	125					

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1440.34 (A)	.96

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign 3&5 Required)

April 30, 2013
Checked By:_____

1DL+1WL
QA: 1440.34 psf
QB: 1440.34 psf
QC: 1440.34 psf
QD: 1440.34 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	83.433	.306	52.288	.566

Footing Shear Check

Two Way (Punching) Vc: 1410.51 k One Way (X Dir. Cut) Vc 229.756 k One Way (Z Dir. Cut) Vc: 473.027 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	85.848	.081	22.284	.129	14.017	.04

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 18217.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	214.25	.018

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	1874.69	0	910.562	NA	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

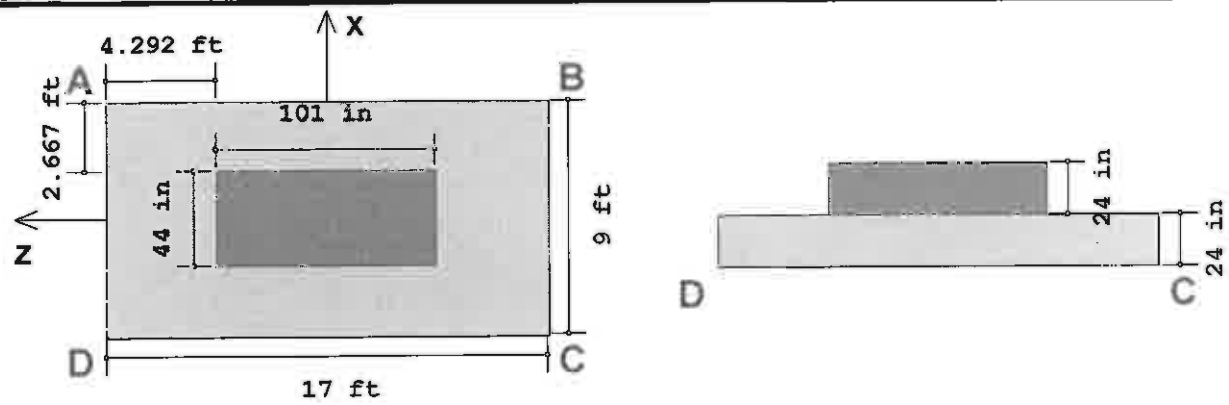
Company : THHinc.
Designer : MDH
Job Number : 7012

April 30, 2013

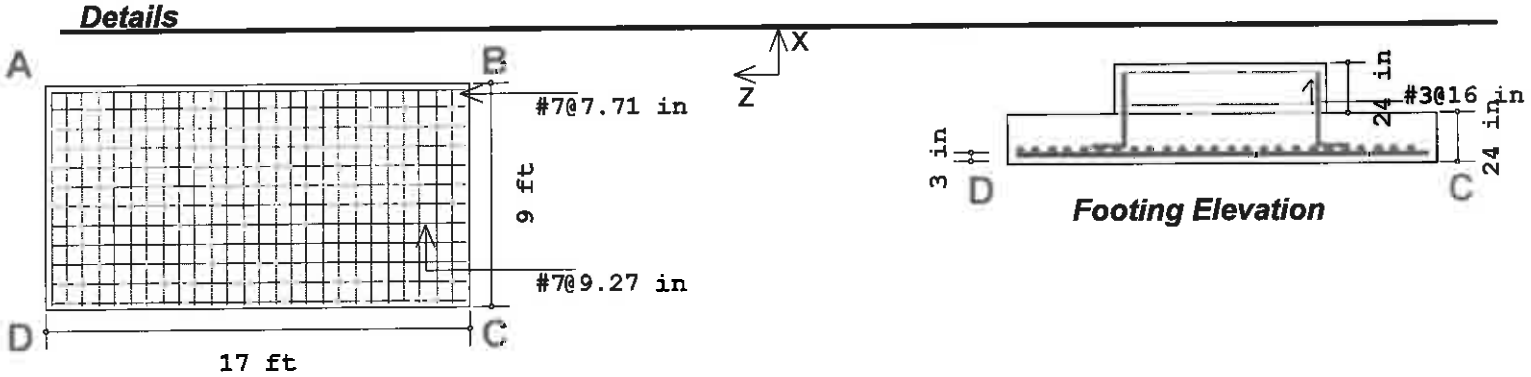
I-70 Signs (Sign 3&5 Existing)

Checked By:_____

Sketch



Details



Bottom Rebar Plan

Footing Elevation

Geometry, Materials and Criteria

Length	: 17 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00264
Thickness	: 24 in	pX	: 44 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00264
Height	: 24 in	pZ	: 101 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				360		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1485.22 (B)	.99

0.99 ≈ 0.989

1DL+1WL
QA: 0 psf
QB: 1485.22 psf
QC: 1485.22 psf
QD: 0 psf
NAZ: 164.824 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	60.549	.657	5.85217e-9	0

60.55 < 71

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	49.554	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 109.353k-ft,206.555k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1569.07 k One Way (X Dir. Cut) Vc 243.271 k One Way (Z Dir. Cut) Vc: 459.512 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	1.847	.002	17.306	.095	1.56877e-9	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22664.4 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	91.8	.006

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	360	780.3	0	413.1	2.167	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

780 ≥ 780

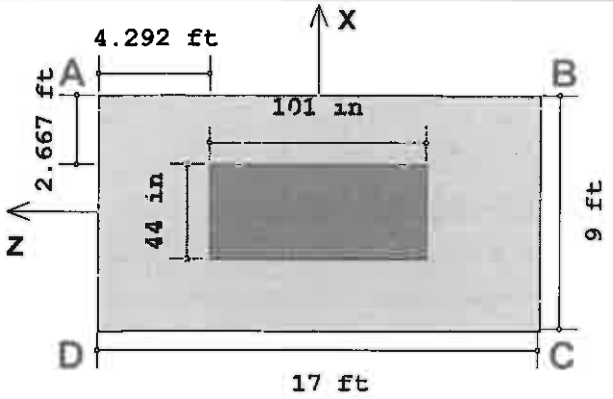
Company : THHinc.
Designer : MDH
Job Number : 7012

April 30, 2013

I-70 Signs (Sign 3&5 Existing)

Checked By:_____

Sketch



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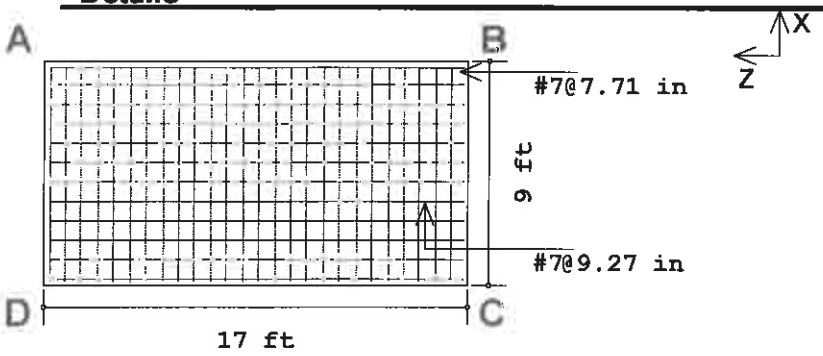
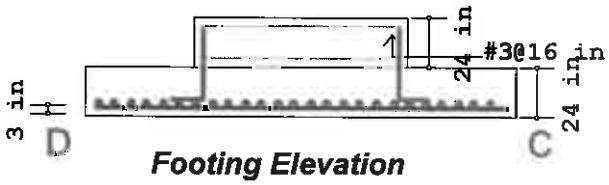


Bottom Rebar Plan



Footing Elevation

Geometry, Materials and Criteria

Length	: 17 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00264
Thickness	: 24 in	pX	: 44 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00264
Height	: 24 in	pZ	: 101 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	125					

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1416.99 (A)	.945

$C.945 < 0.96$

1DL+1WL
QA: 1416.99 psf
QB: 1416.99 psf
QC: 1416.99 psf
QD: 1416.99 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	67.715	.735	49.383	.534

67.7 < 83.4

Footing Shear Check

Two Way (Punching) Vc: 1569.07 k One Way (X Dir. Cut) Vc 243.271 k One Way (Z Dir. Cut) Vc: 459.512 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	80.472	.068	18.957	.104	13.238	.038

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22664.4 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	216.8	.015

Overturning Check (Service)

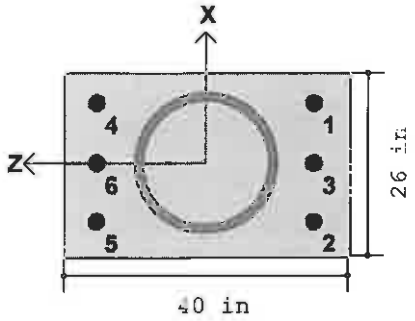
Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	1842.8	0	975.6	NA	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

1842 < 1874

45

Sign 3 Required



Plain Base Plate Connection

Base Plate Thickness	: 1.75 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.988 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.906 ksi
Max/Allowable Ratio .959 Load Comparisson (ABIF = 1.000)

Base Plate Stress

Maximum Stress 16.452 ksi
Max/Allowable Ratio .508 Load Comparisson (ASIF = 1.000)

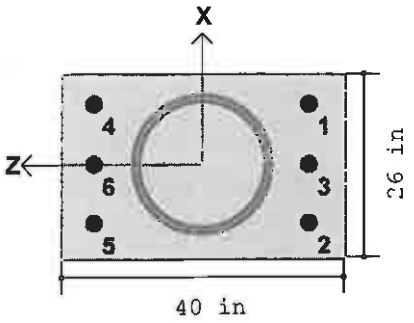
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	.036	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	11.659	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	11.659	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	18.318	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				60.		No

Sign 3 & 5 Required



Plain Base Plate Connection

Base Plate Thickness	: **1.75 in**
Base Plate Fy	: **36. ksi**
Bearing Surface Fp	: **1.988 ksi**
Anchor Bolt Diameter	: **2.25 in**
Anchor Bolt Material	: **A307**
Anchor Bolt Fu	: **60. ksi**
Column Shape	: **HSS20x0.5**
Design Code	:
Pullout Code	: **ACI 2005**

Bearing Pressure

Maximum Bearing **1.978 ksi**
Max/Allowable Ratio **.995** Load Comparisson (ABIF = 1.000)

Base Plate Stress

Maximum Stress **8.998 ksi**
Max/Allowable Ratio **.278** Load Comparisson (ASIF = 1.000)

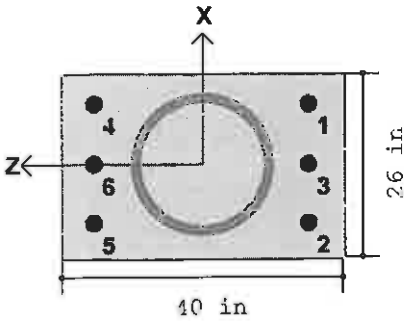
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	1.388	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	10.763	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	8.181	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	1.388	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	10.763	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	8.181	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					35.	No

Sign 3 & 5 Required

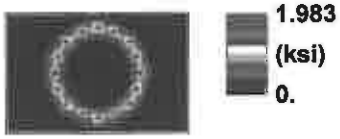


Plain Base Plate Connection

Base Plate Thickness	: 1.75 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.988 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

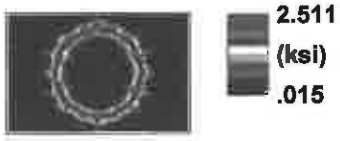
Bearing Pressure

Maximum Bearing 1.983 ksi
Max/Allowable Ratio .998 Load Comparisson (ABIF = 1.000)



Base Plate Stress

Maximum Stress 2.511 ksi
Max/Allowable Ratio .078 Load Comparisson (ASIF = 1.000)



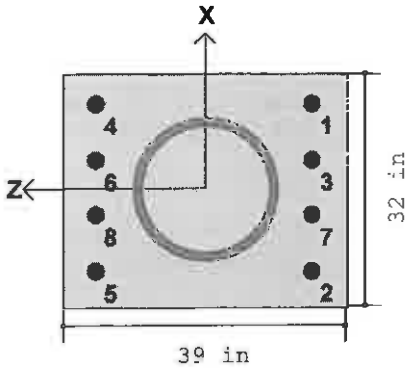
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	.356	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	.356	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	230.					No

Sign 3 Existing



Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.87 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.519 ksi
Max/Allowable Ratio .812 Load Comparisson (ABIF = 1.000)

< 0.959

Base Plate Stress

Maximum Stress 10.223 ksi
Max/Allowable Ratio .316 Load Comparisson (ASIF = 1.000)

< 0.508

Anchor Bolts

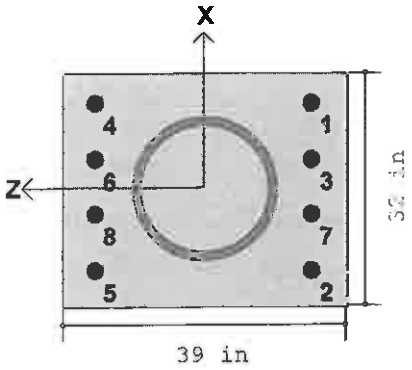
Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	11.5	-15.	.024	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-11.5	-15.	.024	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	3.7	-15.	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	11.5	15.	6.89	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-11.5	15.	6.89	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	3.7	15.	13.422	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-3.7	-15.	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-3.7	15.	13.422	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				60.		No

#5

Sign 3 Existing



Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.87 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.437 ksi
Max/Allowable Ratio .768 Load Comparisson (ABIF = 1.000)

< 0.995

Base Plate Stress

Maximum Stress 5.872 ksi
Max/Allowable Ratio .181 Load Comparisson (ASIF = 1.000)

< 0.221

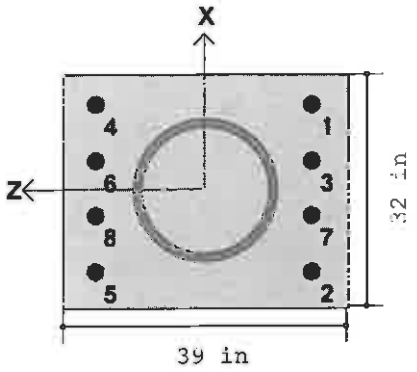
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	11.5	-15.	.184	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-11.5	-15.	7.564	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	3.7	-15.	3.57	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	11.5	15.	.184	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-11.5	15.	7.564	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	3.7	15.	3.57	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-3.7	-15.	7.746	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-3.7	15.	7.746	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					35.	No

Sign 3 & 5 Existing



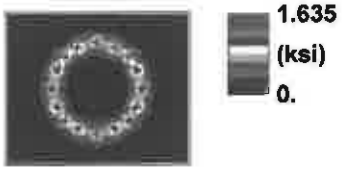
Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.87 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.635 ksi
Max/Allowable Ratio .874 Load Comparisson (ABIF = 1.000)

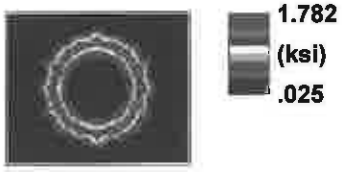
< 0.998



Base Plate Stress

Maximum Stress 1.782 ksi
Max/Allowable Ratio .055 Load Comparisson (ASIF = 1.000)

< 0.078



Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	11.5	-15.	.473	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-11.5	-15.	.473	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	3.7	-15.	.316	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	11.5	15.	.473	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-11.5	15.	.473	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	3.7	15.	.316	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-3.7	-15.	.316	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-3.7	15.	.316	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

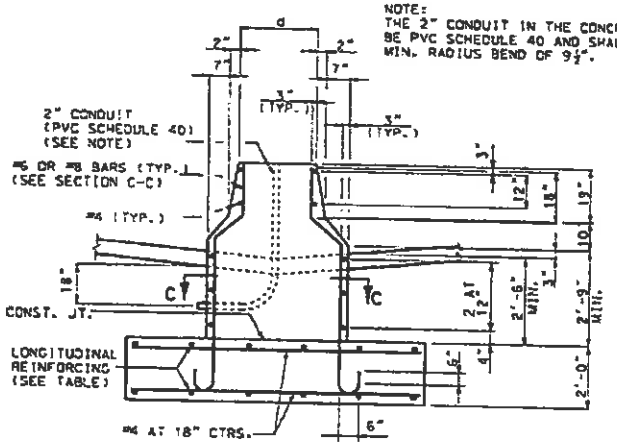
Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	230.					No

Sign #57, 63, 64

Design Type IV

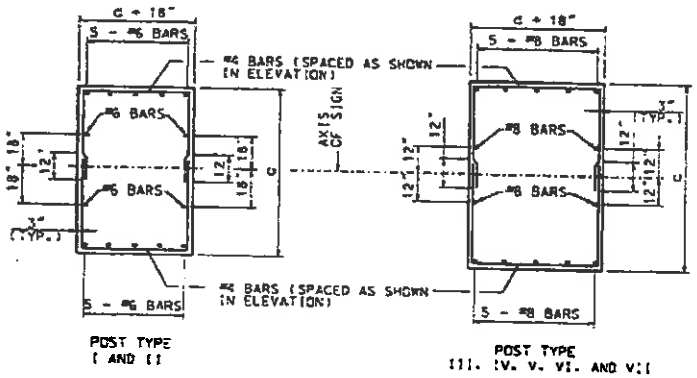
NOTE:
THE 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MIN. RADIUS BEND OF 9½".



PART ELEVATION
(TYPE A CONCRETE TRAFFIC BARRIER)

POST TYPE	PIPE COLUMN	PEDESTAL SIZE * c	PEDESTAL SIZE * c	FOOTING SIZE *	LONGITUDINAL FOOTING REINFORCEMENT TOP	LONGITUDINAL FOOTING REINFORCEMENT BOTTOM	CONCRETE C.Y. TYPE A MEDIAN BARRIER	CONCRETE C.Y. TYPE C MEDIAN BARRIER
I	12" STD. AT 65.42	5'-9"	2'-1"	7'-0" x 14'-6"	7 - #5 BARS	7 - #6 BARS	10.9	11.6
II	14" O.D. AT 72.09	6'-2"	2'-2"	8'-0" x 16'-0"	8 - #5 BARS	9 - #6 BARS	13.2	14.0
III	16" O.D. AT 82.77	6'-7"	2'-4"	8'-6" x 17'-6"	9 - #5 BARS	9 - #7 BARS	15.2	16.1
IV	18" O.D. AT 93.45	7'-1"	2'-6"	9'-6" x 19'-0"	10 - #5 BARS	10 - #8 BARS	18.1	19.1
V	20" O.D. AT 104.13	7'-8"	2'-11"	10'-0" x 20'-0"	10 - #5 BARS	10 - #8 BARS	20.6	21.7
VI	24" O.D. AT 125.49	8'-3"	3'-5"	10'-6" x 21'-0"	11 - #5 BARS	11 - #8 BARS	23.3	24.6
VII	24" O.D. AT 125.49	8'-6"	3'-5"	11'-0" x 22'-0"	11 - #5 BARS	11 - #9 BARS	25.1	26.5

* BASE PLATES, PEDESTAL, AND FOOTINGS LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

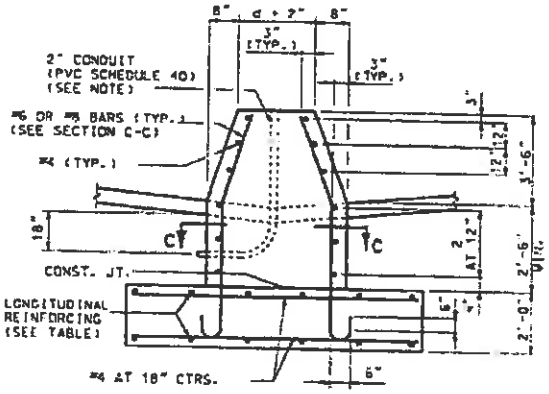


POST TYPE I AND II

POST TYPE III, IV, V, VI, AND VII

SECTION C-C
TYPICAL SECTION SHOWING REINFORCING STEEL

NOTE:
THE 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MIN. RADIUS BEND OF 9½".



PART ELEVATION
(TYPE C CONCRETE TRAFFIC BARRIER)

DETAILS OF ALTERNATE PEDESTAL
(TO BE USED ADJACENT TO TYPE "A" OR "C" MEDIAN BARRIER)

GENERAL NOTES:

A TAPERED TUBE OF EQUILVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE: A.S.T.M. SPECIFICATION A53.

NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET NO. 4 OF 6 FOR DETAILS OF THESE ITEMS.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

QUANTITIES FOR PEDESTAL, BASED ON NOMINAL HEIGHT OF 5'-2" (TYPE A MEDIAN BARRIER) OR 6'-0" (TYPE C MEDIAN BARRIER).

QUANTITIES FOR FOOTING, BASED ON NOMINAL DEPTH OF 2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

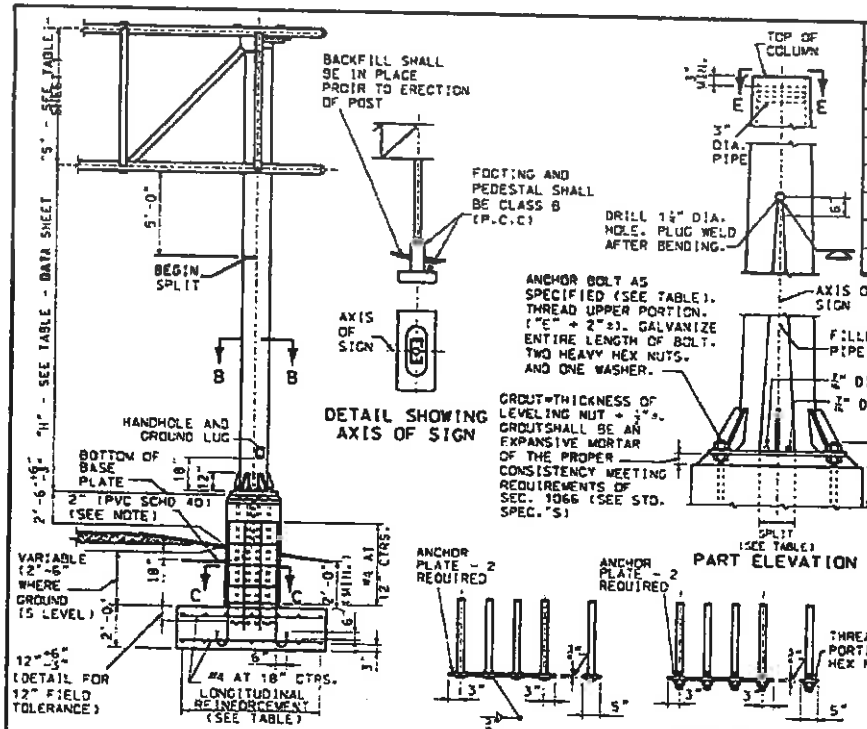
OVERHEAD SIGN TRUSSES
ALUMINUM

DATE EFFECTIVE:	DATE PREPARED:	903.1088	SHEET NO.
10/01/2011	9/30/2011		5 OF 6

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

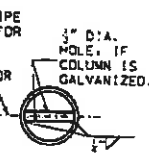
924

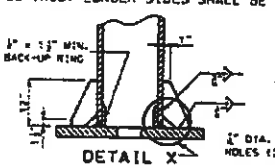
DESIGN TYPE IV

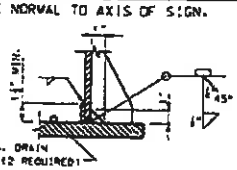


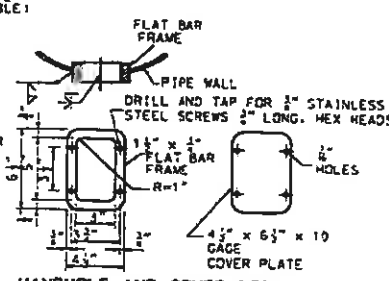
POST TYPE	PIPE COLUMN	DIMENSION "E"	SPLIT	BASE PLATE SIZE*	ANCHOR BOLTS DIA.	PEDESTAL SIZE* a	PEDESTAL SIZE* b	FOOTING SIZE*	LONGITUDINAL FOOTING REINFORCEMENT TOP	LONGITUDINAL FOOTING REINFORCEMENT BOTTOM	CONCRETE C.Y.
I	12" STD. AT 65.42	8½"	6"	2'-6"x 23"x 1½"	6 AT 2½"	4'-0"	2'-11"	7'-0"x 14'-6"	7-#5 BARS	7-#6 BARS	10.9
II	14" O.D. AT 72.09	8½"	9½"	3'-0"x 2'-0"x 1½"	6 AT 2½"	4'-4"	3'-0"	8'-0"x 16'-0"	8-#5 BARS	9-#6 BARS	13.2
III	16" O.D. AT 82.77	8½"	11½"	3'-4"x 2'-2"x 1½"	6 AT 2½"	4'-8"	3'-2"	8'-6"x 17'-6"	9-#5 BARS	9-#7 BARS	15.2
IV	18" O.D. AT 93.45	9½"	12½"	3'-7"x 2'-4"x 2"	6 AT 2½"	5'-1"	3'-4"	9'-6"x 19'-0"	10-#5 BARS	10-#8 BARS	18.1
V	20" O.D. AT 104.13	9½"	13"	3'-10"x 2'-9"x 2"	8 AT 2½"	5'-4"	3'-9"	10'-0"x 20'-0"	10-#5 BARS	10-#8 BARS	20.6
VI	24" O.D. AT 125.49	9½"	10½"	4'-0"x 3'-3"x 2"	8 AT 2½"	5'-6"	4'-3"	10'-6"x 21'-0"	11-#5 BARS	11-#8 BARS	23.3
VII	24" O.D. AT 125.49	9½"	13½"	4'-3"x 3'-3"x 2"	8 AT 2½"	5'-9"	4'-3"	11'-0"x 22'-0"	11-#5 BARS	11-#9 BARS	25.1

* BASE PLATES, PEDESTAL, AND FOOTINGS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.









GENERAL NOTES:

A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE; A.S.T.M. SPECIFICATION A53. NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

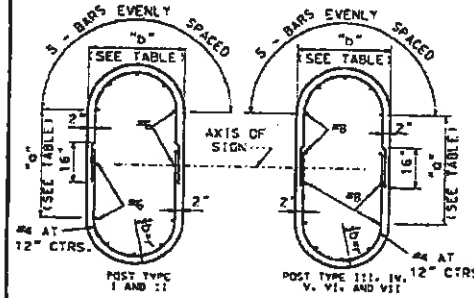
A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

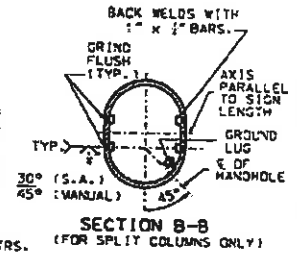
GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

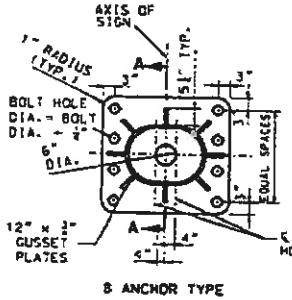
QUANTITIES FOR PEDESTAL, BASED ON NOMINAL HEIGHT OF 5'-0".

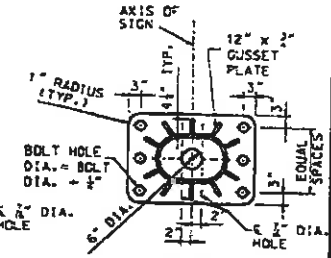
QUANTITIES FOR FOOTING, BASED ON NOMINAL DEPTH OF 2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.









TYPICAL BASE PLATES

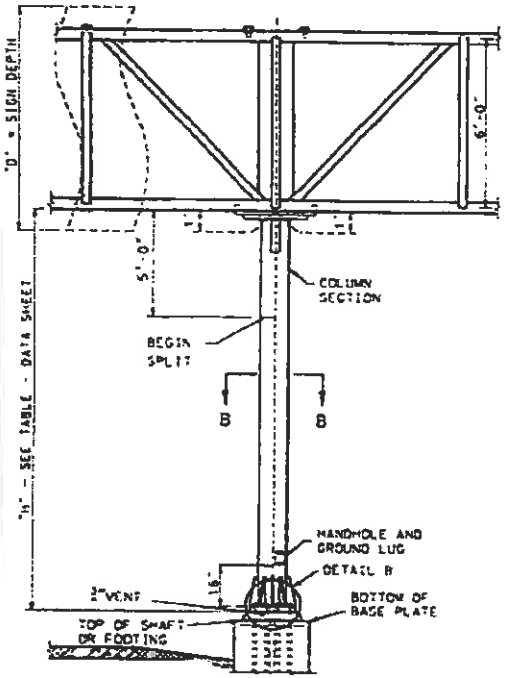
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

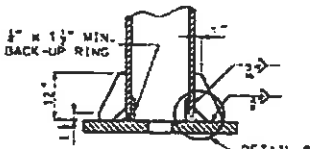
OVERHEAD SIGN TRUSSES
ALUMINUM

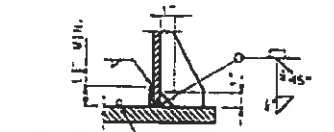
DATE EFFECTIVE:	10/01/2011	903.1088	SHEET NO. 4 OF 6
DATE PREPARED:	9/30/2011		

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

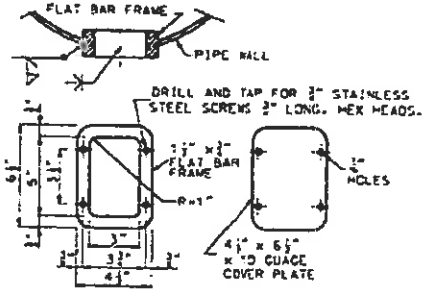
EXISTING TYPE VI





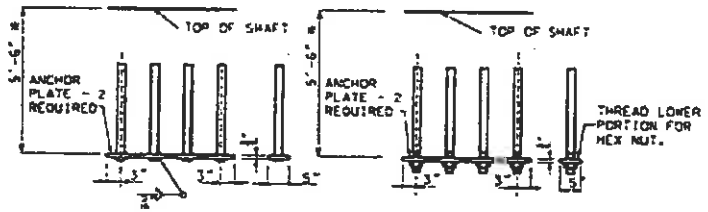


DETAIL C



HANDHOLE AND COVER DETAILS

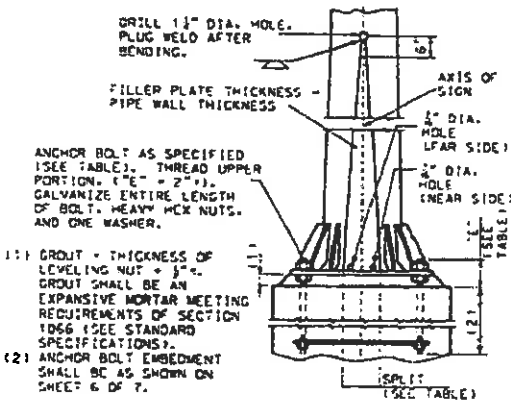
NOTE:
HANDHOLE REQUIRED ONLY IN POWER COLUMN.



DETAIL A
ANCHORAGE

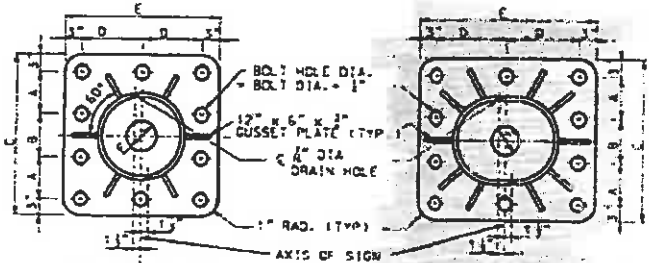
DETAIL A
OPTIONAL ANCHORAGE

(BOTH DETAILS ARE SHOWN FOR 4 BOLTS - SIMILAR FOR 3 BOLTS)
* DIMENSION SHOWN FOR DRILLED SHAFT OPTION. FOR SPREAD FOOTING OPTION REFER TO SHEET 6 OF 7.



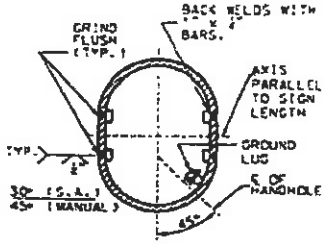
PART ELEVATION

TYPICAL BASE PLATE (10 ANCHOR TYPE) BUTTERFLY AND CANTILEVER (B.C.)					
	III	IV	V	VI	VII
A	8"	9"	8"	9"	10½"
B	10"	10"	10"	10"	11"
C	32"	34"	37"	34"	38"
D	13"	14"	16½"	18"	20"
E	32"	34"	39"	42"	46"
F	6"	6"	6"	6"	6"



III AND IV B.C. V, VI, AND VII B.C.

TYPICAL BASE PLATES



SECTION B-B
(FOR SPLIT COLUMNS ONLY)

NOTE:
FOR DETAILS OF OPTIONAL SUBSTRUCTURES, SEE OTHER SHEETS.

ANCHOR BOLTS AND PLATE NOT SHOWN.

GENERAL NOTES:

SUBSTRUCTURE SHALL BE BACKFILLED PRIOR TO ERECTION OF POST.

ASTM A 106 GRADE B STEEL PIPE OR A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE: A.S.T.M. SPECIFICATION A53.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI ENGINEER

OVERHEAD SIGN TRUSS
COLUMN AND BASE PLATES

DATE EFFECTIVE: 12-01-2003	903.12Y	SHEET NO. 3 OF 7
DATE REVISED: 7/15/2012		

TYPE VI
EXISTING

DRILLED SHAFT OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	C	FA	FB	FC	FD	FH	COLLAR REINFORCEMENT MOMENT-C1 BARS	MOMENT-C1 SPACING	SHEAR-C2 BARS	SHEAR-C2 SPACING	SKIN-C3 BARS	SKIN-C3 SPACING	SHAFT REINFORCEMENT LONGITUDINAL S1 QUANTITY	LONGITUDINAL S1 BARS	SHEAR-S2 BARS	SHEAR-S2 SPACING	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)	ALTERNATE PEDESTALS REBAR TOTAL (LBS.) TYPE A	REBAR TOTAL (LBS.) TYPE C	CONCRETE (CU. YDS.) TYPE A	CONCRETE (CU. YDS.) TYPE C
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1½"	10	2"	2'-10"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.4	14.5
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.5	14.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	5'-0"	13'-6"	4'-0"	5'-6"	17'-0"	#6	6"	#4	12"	#4	12"	22	#11	#6	6"	3901	26.5	3763	3782	28.8	30.7
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2¼"	10	2¼"	3'-0"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#4	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.1	36.2
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2¼"	10	2½"	3'-4"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#4	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.5	36.8

SPREAD FOOTING OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * a	PEDESTAL SIZE * b	FOOTING SIZE *	LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	PEDESTAL REINFORCEMENT NO.	BARS	NO.	BARS	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1½"	10	2"	4'-2"	3'-8"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	695	14.4
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	4'-4"	3'-10"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	733	15.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	4'-9"	3'-8"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	955	16.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2¼"	10	2¼"	5'-0"	3'-10"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1028	18.4
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2¼"	10	2½"	5'-4"	4'-2"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1196	21.5

SPREAD FOOTING OPTION WITH ALTERNATE PEDESTALS

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * c	PEDESTAL SIZE * d	PEDESTAL SIZE * e	FOOTING SIZE *	TYPE A LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE A PEDESTAL REINFORCEMENT NO.	BARS	NO.	BARS	TYPE A REBAR TOTAL (LBS.)	TYPE A CONCRETE (CU. YDS.)	TYPE C LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE C PEDESTAL REINFORCEMENT NO.	BARS	NO.	BARS	TYPE C REBAR TOTAL (LBS.)	TYPE C CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1½"	10	2"	2'-10"	6'-6"	15"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	757	14.4	10	#4	10	#5	12	#4	14	#8	800	15.3
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	6'-9"	18"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	795	15.6	10	#4	10	#5	12	#4	14	#8	839	16.5
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	7'-0"	12"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	1015	16.5	10	#4	10	#7	12	#4	14	#8	1059	17.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2½"	10	2½"	3'-0"	7'-6"	15"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1099	18.4	10	#4	10	#7	12	#4	14	#8	1134	19.5
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2¼"	10	2½"	3'-4"	7'-10"	15"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1257	21.5	10	#4	12	#7	12	#4	14	#8	1302	22.6

* BASE PLATES, PEDESTAL AND FOOTINGS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.
** BASE PLATES, PEDESTAL AND FOUNDATIONS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

MoDOT
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

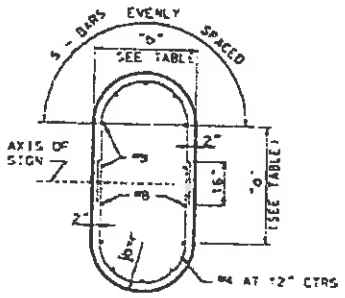
STATE OF MISSOURI
PROFESSIONAL ENGINEER

OVERHEAD SIGN TRUSSES
OPTIONAL SUBSTRUCTURE DATA

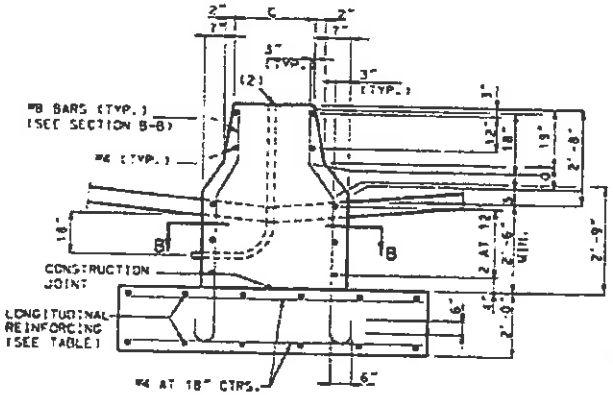
DATE EFFECTIVE: 12-01-2006
DATE PREPARED: 7/8/2012

903.12Y

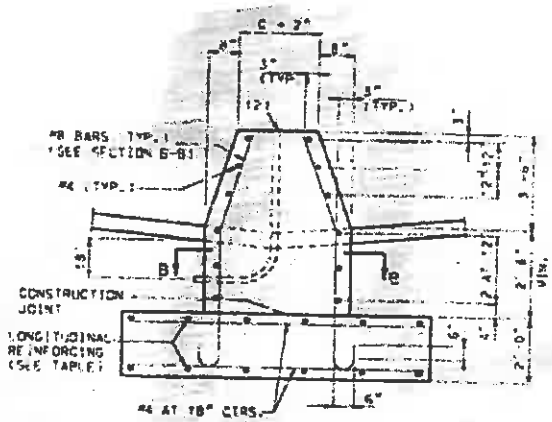
EXISTING TYPE VI



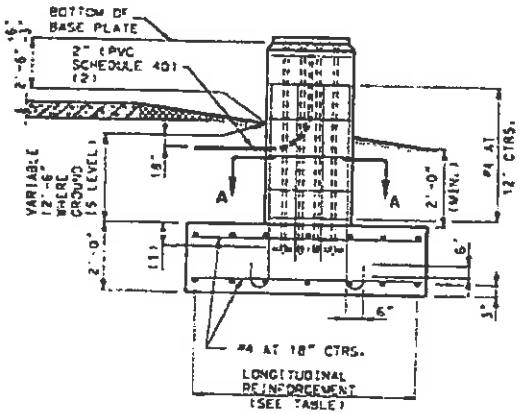
SECTION A-A
(TYPICAL SECTION SHOWING REINFORCING STEEL)



PART ELEVATION
(TYPE A CONCRETE TRAFFIC BARRIER)



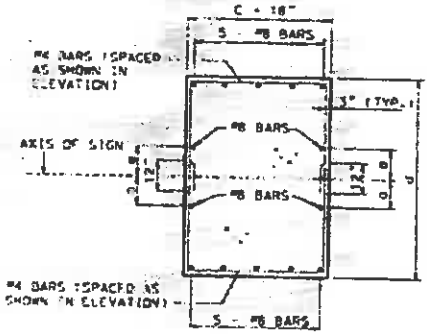
PART ELEVATION
(TYPE C CONCRETE TRAFFIC BARRIER)



ELEVATION

(1) 12"$^{+6"}_{-3"}$ (DETAIL FOR 12" FIELD TOLERANCE)

(2) 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MINIMUM BEND RADIUS OF 9½".



SECTION B-B
TYPICAL SECTION SHOWING
REINFORCING STEEL

DETAILS OF ALTERNATE PEDESTAL

GENERAL NOTES:

PEDESTAL AND FOOTING SHALL BE CLASS B (P.C.C.).

MINIMUM CLEARANCE TO REINFORCEMENT IS 3" EXCEPT AS SHOWN.

CONTACT THE ENGINEER IF WATER TABLE IS ENCOUNTERED DURING EXCAVATION.

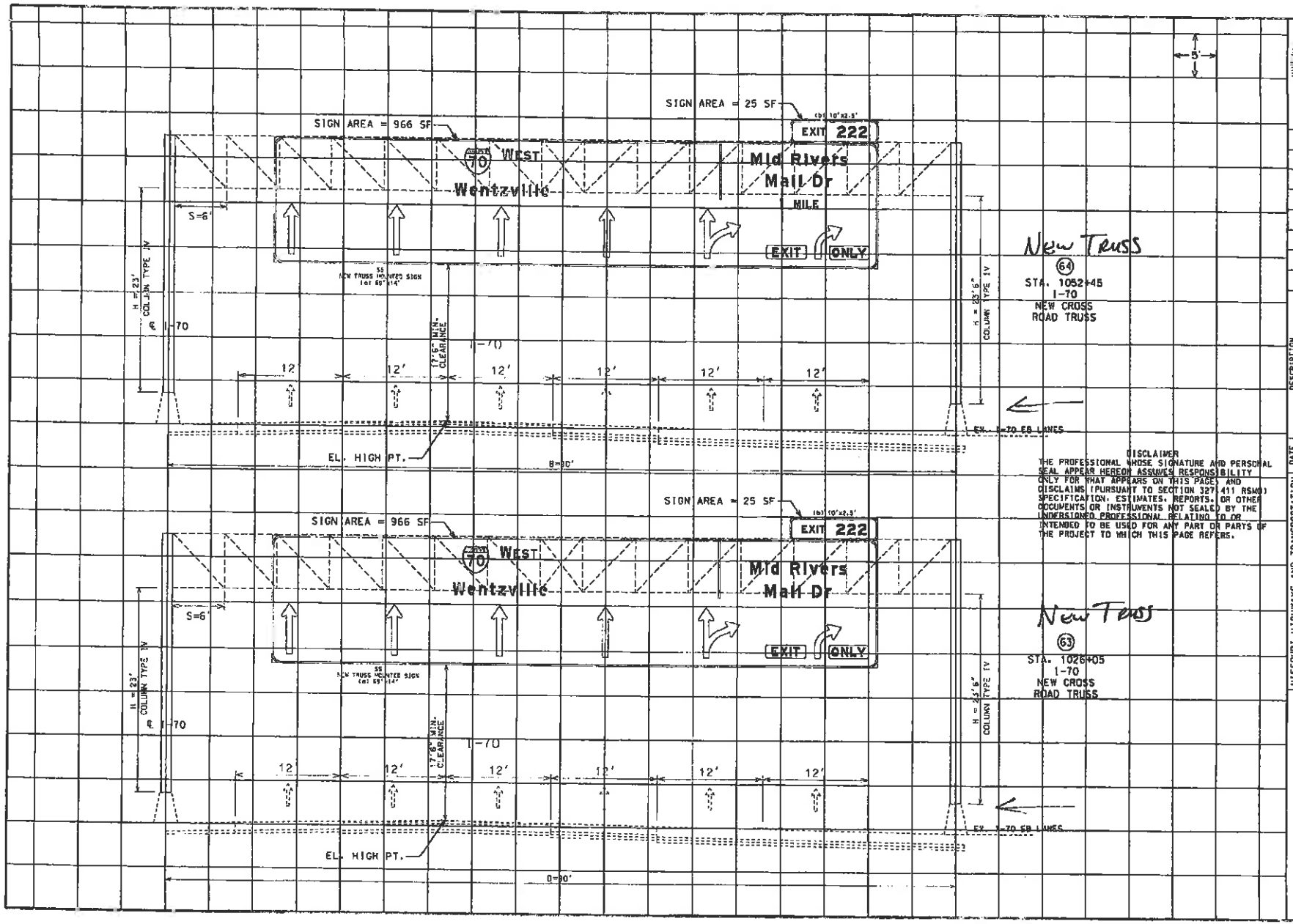
PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 7 FOR DETAILS OF THESE ITEMS.

MoDOT
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
ENGINEERING PROFESSIONAL PROBATE

OVERHEAD SIGN TRUSSES
SPREAD FOOTING

DATE EFFECTIVE:	12-01-2008	903.12Y	SHEET NO. 6 OF 7
DATE PREPARED	7/18/2012		



DISCLAIMER

THE PROFESSIONAL WHOSE SIGNATURE AND PERSONAL SEAL APPEAR HEREON ASSUMES RESPONSIBILITY ONLY FOR THAT APPEARS ON THIS PAGE, AND DISCLAIMS (PURSUANT TO SECTION 327.411 RSMO) SPECIFICATION, ESTIMATES, REPORTS, OR OTHER DOCUMENTS OR INSTRUMENTS NOT SEALED BY THE UNDERSIGNED PROFESSIONAL RELATING TO OR INTENDED TO BE USED FOR ANY PART OR PARTS OF THE PROJECT TO WHICH THIS PAGE REFERS.

STATE OF MISSOURI
TIMOTHY J. SCHROEDER
NUMBER PE-2013
PROFESSIONAL ENGINEER

DATE PREPARED
10/18/2012

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
SL	129

COUNTY
ST. CHARLES

JOB NO.
J612412

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A42662

DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

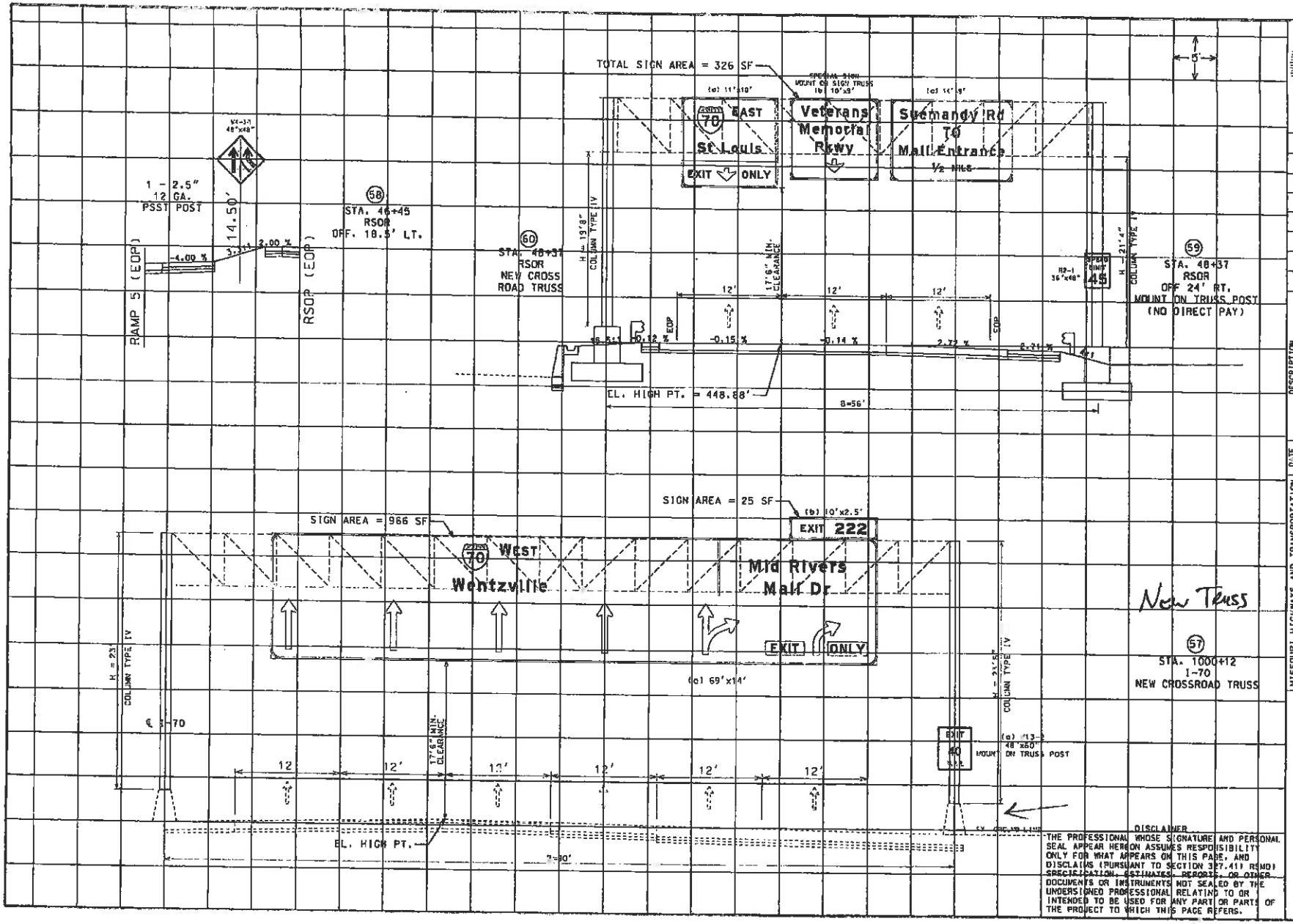
MoDOT

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

SIGNING CROSS SECTIONS
MID RIVERS MALL DRIVE DDI
SHEET 14 OF 14

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

REV.



DISCLAIMER

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STATE OF MISSOURI
TIMOTHY BOEHLER
NUMBER PE-2007
PROFESSIONAL ENGINEER

DATE PREPARED
10/18/2012

ROUTE	STATE
I-70	MO
DISTRICT	SHEET NO.
SL	127

COUNTY
ST. CHARLES

JOB NO.
J612412

CONTRACT ID.

PROJECT NO.

BRIDGE NO.
A4266G

NO.	DESCRIPTION	DATE

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

MoDOT

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

SIGNING CROSS SECTIONS MID RIVERS MALL DRIVE DD: SHEET 12 OF 14

REV.

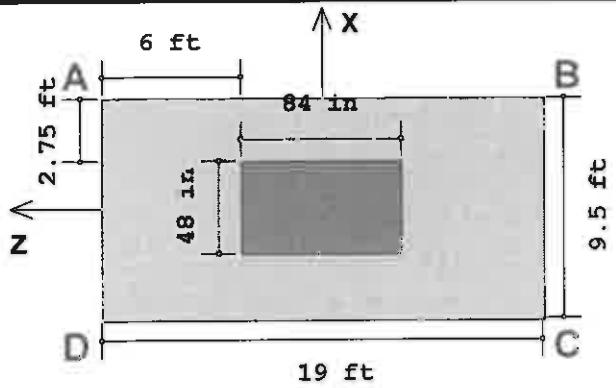
Company : THHinc.
Designer : MDH
Job Number : 7012

April 30, 2013

I-70 Signs (Sign 57,63,&64 Required)

Checked By:_____

Sketch



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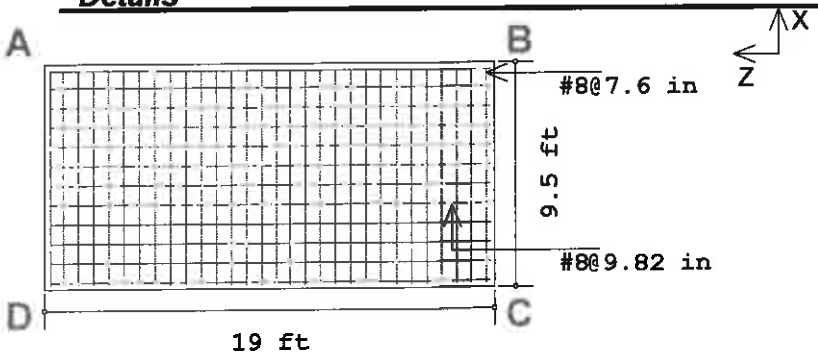
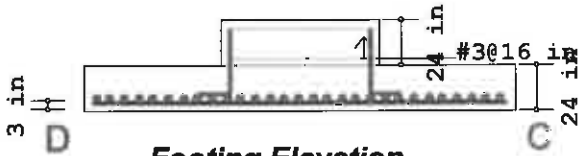


Bottom Rebar Plan



Footing Elevation

Geometry, Materials and Criteria

Length	: 19 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .0033
Thickness	: 24 in	pX	: 48 in	Concrete f'c	: 3 ksi	Maximum Steel	: .0033
Height	: 24 in	pZ	: 84 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				450		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1421.92 (B)	.948

1DL+1WL
QA: 0 psf
QB: 1421.92 psf
QC: 1421.92 psf
QD: 0 psf
NAZ: 192.416 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	110.221	1.202	5.34947e-9	0

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	98.676	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 115.428k-ft,230.856k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1554 k One Way (X Dir. Cut) Vc 256.006 k One Way (Z Dir. Cut) Vc: 512.011 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	1.02	0	25.752	.134	1.47369e-9	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 20563.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	108.3	.008

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	450	1028.85	0	514.425	2.286	NA

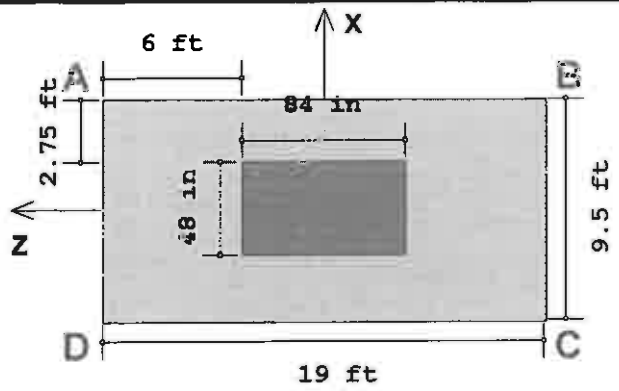
Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign 57,63,&64 Required)

April 30, 2013
Checked By:_____

Sketch



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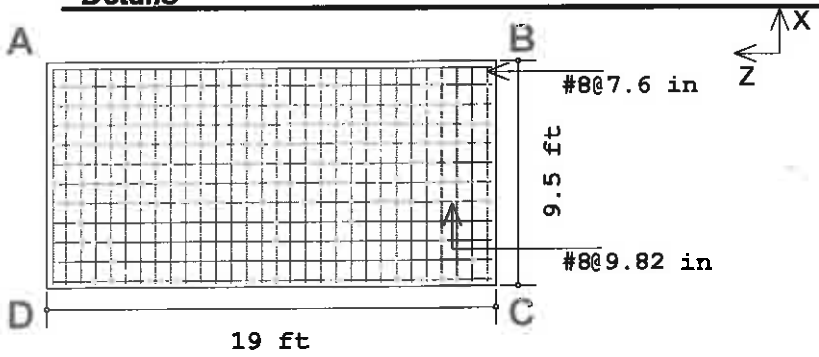
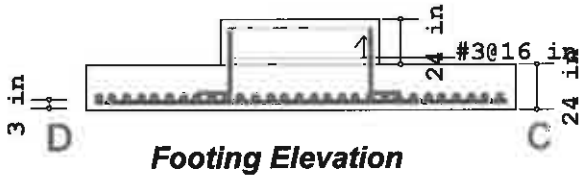


Bottom Rebar Plan



Footing Elevation

Geometry, Materials and Criteria

Length	: 19 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .0033
Thickness	: 24 in	pX	: 48 in	Concrete f'c	: 3 ksi	Maximum Steel	: .0033
Height	: 24 in	pZ	: 84 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	153					

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1447.65 (A)	.965

1DL+1WL
QA: 1447.65 psf
QB: 1447.65 psf
QC: 1447.65 psf
QD: 1447.65 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	144.947	1.584	60.898	.661

Footing Shear Check

Two Way (Punching) Vc: 1554 k One Way (X Dir. Cut) Vc 256.006 k One Way (Z Dir. Cut) Vc: 512.011 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	110.863	.095	34.559	.18	16.776	.044

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 20563.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	261.3	.02

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	2482.35	0	1241.17	NA	NA

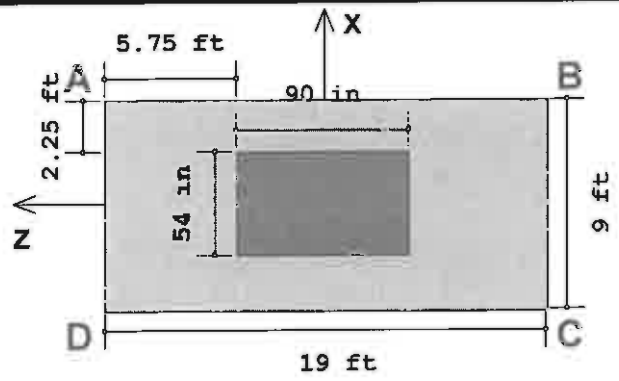
Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign 57,63,&64 Existing)

April 30, 2013
Checked By:_____

Sketch



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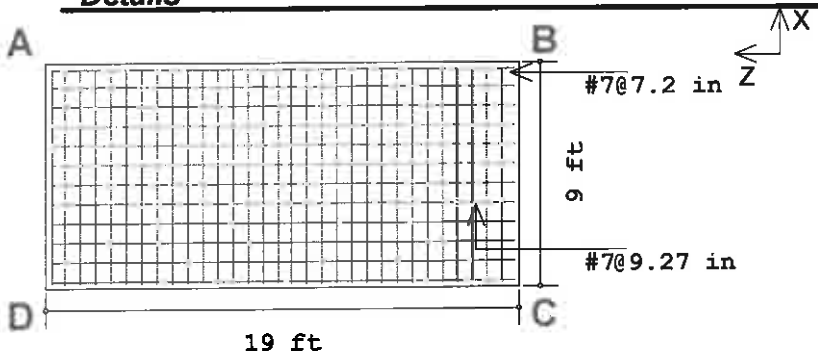
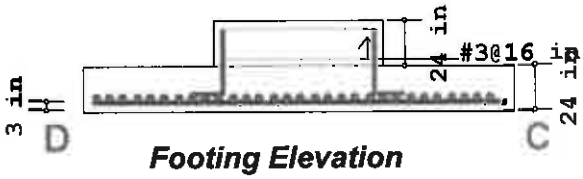


Bottom Rebar Plan



Footing Elevation

Geometry, Materials and Criteria

Length	: 19 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00265
Thickness	: 24 in	pX	: 54 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00265
Height	: 24 in	pZ	: 90 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				450		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1486.11 (B)	.991

0.991 ≠ 0.948

1DL+1WL
QA: 0 psf
QB: 1486.11 psf
QC: 1486.11 psf
QD: 0 psf
NAZ: 184.105 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	104.214	1.132	4.55624e-9	0

104 < 110

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	87.938	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 109.353k-ft,230.856k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1667.98 k One Way (X Dir. Cut) Vc 243.271 k One Way (Z Dir. Cut) Vc: 513.572 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	1.953	.002	25.089	.138	9.65624e-10	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22169.3 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	102.6	.007

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	450	974.7	0	461.7	2.166	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

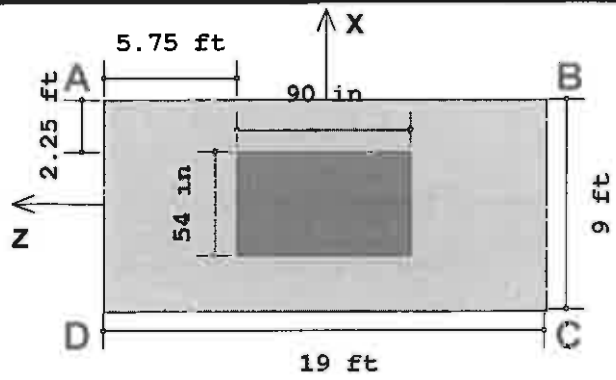
974 < 1028

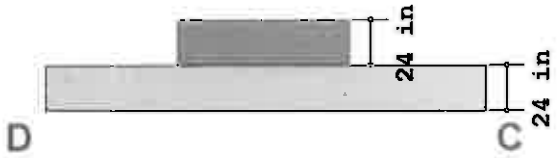
Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign 57,63,&64 Existing)

April 30, 2013
Checked By:_____

Sketch





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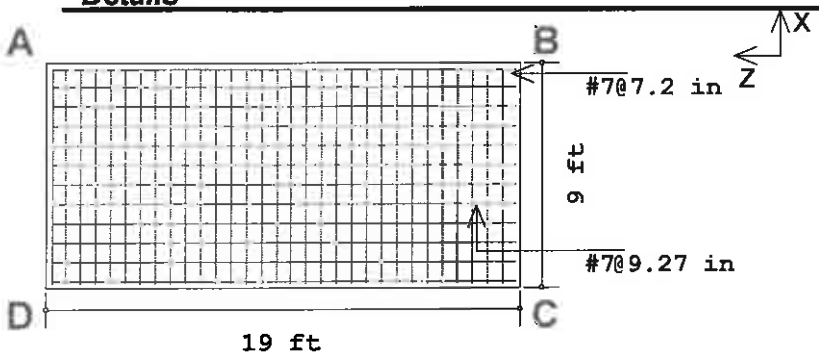
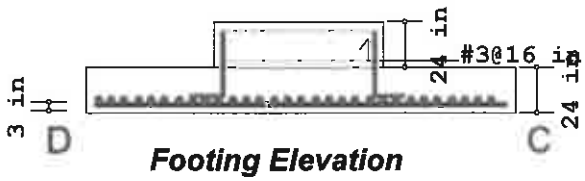


Bottom Rebar Plan



Footing Elevation

Geometry, Materials and Criteria

Length	: 19 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 9 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00265
Thickness	: 24 in	pX	: 54 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00265
Height	: 24 in	pZ	: 90 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	153					

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1494.74 (A)	.996

0.96 x 0.99

1DL+1WL
QA: 1494.74 psf
QB: 1494.74 psf
QC: 1494.74 psf
QD: 1494.74 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	133.12	1.45	43.031	.466

133 < 144

Footing Shear Check

Two Way (Punching) Vc: 1667.98 k One Way (X Dir. Cut) Vc 243.271 k One Way (Z Dir. Cut) Vc: 513.572 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	101.777	.081	32.504	.178	9.12	.024

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22169.3 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	255.6	.018

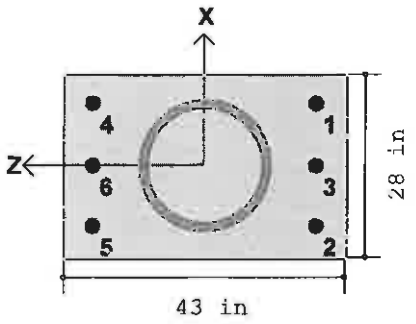
Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	2428.2	0	1150.2	NA	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

2428 ≥ 2482

Sign 57, 63, & 64 Required



Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.331 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.932 ksi
Max/Allowable Ratio .829 Load Comparisson (ABIF = 1.000)

Base Plate Stress

Maximum Stress 17.681 ksi
Max/Allowable Ratio .546 Load Comparisson (ASIF = 1.000)

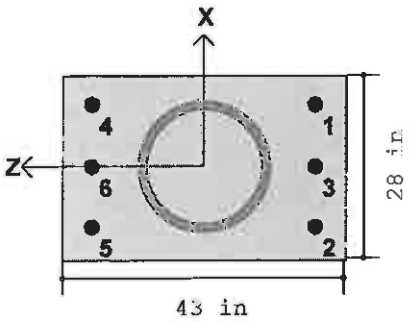
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	9.5	-17.	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-9.5	-17.	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-17.	.092	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	9.5	17.	16.396	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-9.5	17.	16.396	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	17.	24.745	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				84.		No

Sign 57, 63, & 64 Required

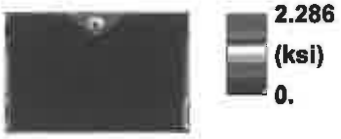


Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.331 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

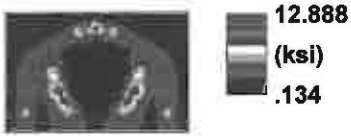
Bearing Pressure

Maximum Bearing **2.286 ksi**
Max/Allowable Ratio **.981** Load Comparisson (ABIF = 1.000)



Base Plate Stress

Maximum Stress **12.888 ksi**
Max/Allowable Ratio **.398** Load Comparisson (ASIF = 1.000)



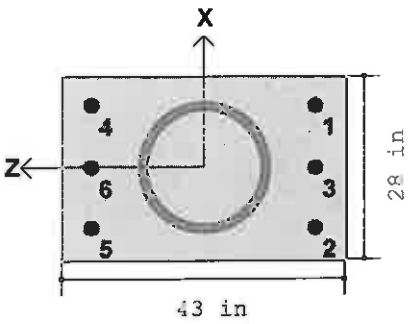
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	9.5	-17.	2.436	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-9.5	-17.	19.871	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-17.	14.034	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	9.5	17.	2.436	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-9.5	17.	19.871	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	17.	14.034	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					63.	No

Sign 57, 63, & 64 Required

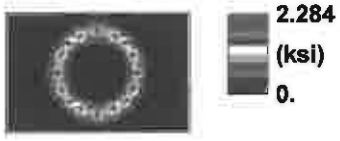


Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.331 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 2.284 ksi
Max/Allowable Ratio .98 Load Comparisson (ABIF = 1.000)



Base Plate Stress

Maximum Stress 2.501 ksi
Max/Allowable Ratio .077 Load Comparisson (ASIF = 1.000)

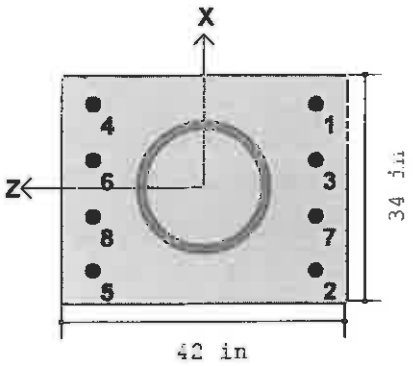
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	9.5	-17.	.595	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-9.5	-17.	.595	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-17.	.425	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	9.5	17.	.595	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-9.5	17.	.595	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	17.	.425	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	320.					No

Sign 57, 63, & 64 Existing



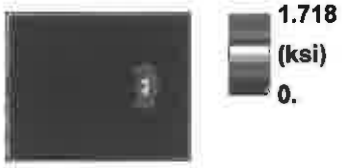
Plain Base Plate Connection

Base Plate Thickness	: 2.25 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.16 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.718 ksi
Max/Allowable Ratio .795 Load Comparisson (ABIF = 1.000)

< 0.529



Base Plate Stress

Maximum Stress 13.033 ksi
Max/Allowable Ratio .402 Load Comparisson (ASIF = 1.000)

< 0.546

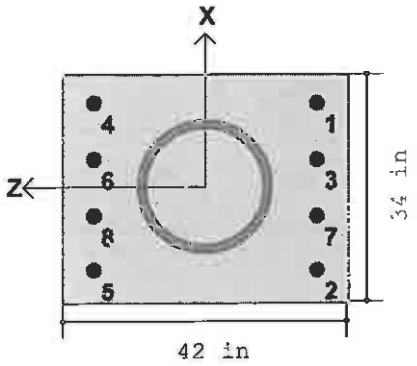
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-16.5	.059	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-12.5	-16.5	.059	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	4.2	-16.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	12.5	16.5	9.753	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-12.5	16.5	9.753	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	4.2	16.5	17.902	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-4.2	-16.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-4.2	16.5	17.902	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				84.		No

Sign 57, 63, & 64 Existing



Plain Base Plate Connection

Base Plate Thickness	: 2.25 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.16 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 2.063 ksi
Max/Allowable Ratio .955 Load Comparisson (ABIF = 1.000)

< 0.981

Base Plate Stress

Maximum Stress 9.294 ksi
Max/Allowable Ratio .287 Load Comparisson (ASIF = 1.000)

< 0.398

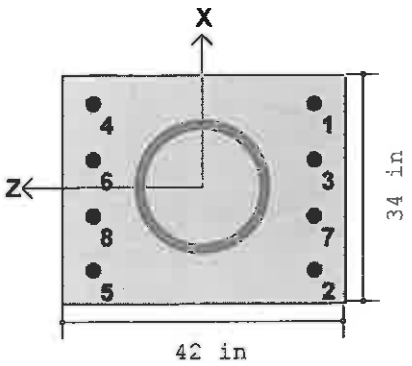
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-16.5	.342	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-12.5	-16.5	13.931	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	4.2	-16.5	5.801	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	12.5	16.5	.342	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-12.5	16.5	13.931	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	4.2	16.5	5.801	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-4.2	-16.5	13.24	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-4.2	16.5	13.24	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					63.	No

Sign 57, 63, & 64 Existing



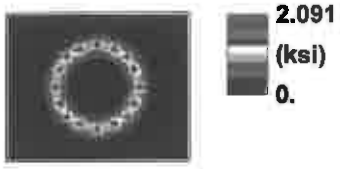
Plain Base Plate Connection

Base Plate Thickness	: 2.25 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 2.16 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 2.091 ksi
Max/Allowable Ratio .968 Load Comparisson (ABIF = 1.000)

< 0.98



Base Plate Stress

Maximum Stress 2.18 ksi
Max/Allowable Ratio .067 Load Comparisson (ASIF = 1.000)

< 0.077

Anchor Bolts

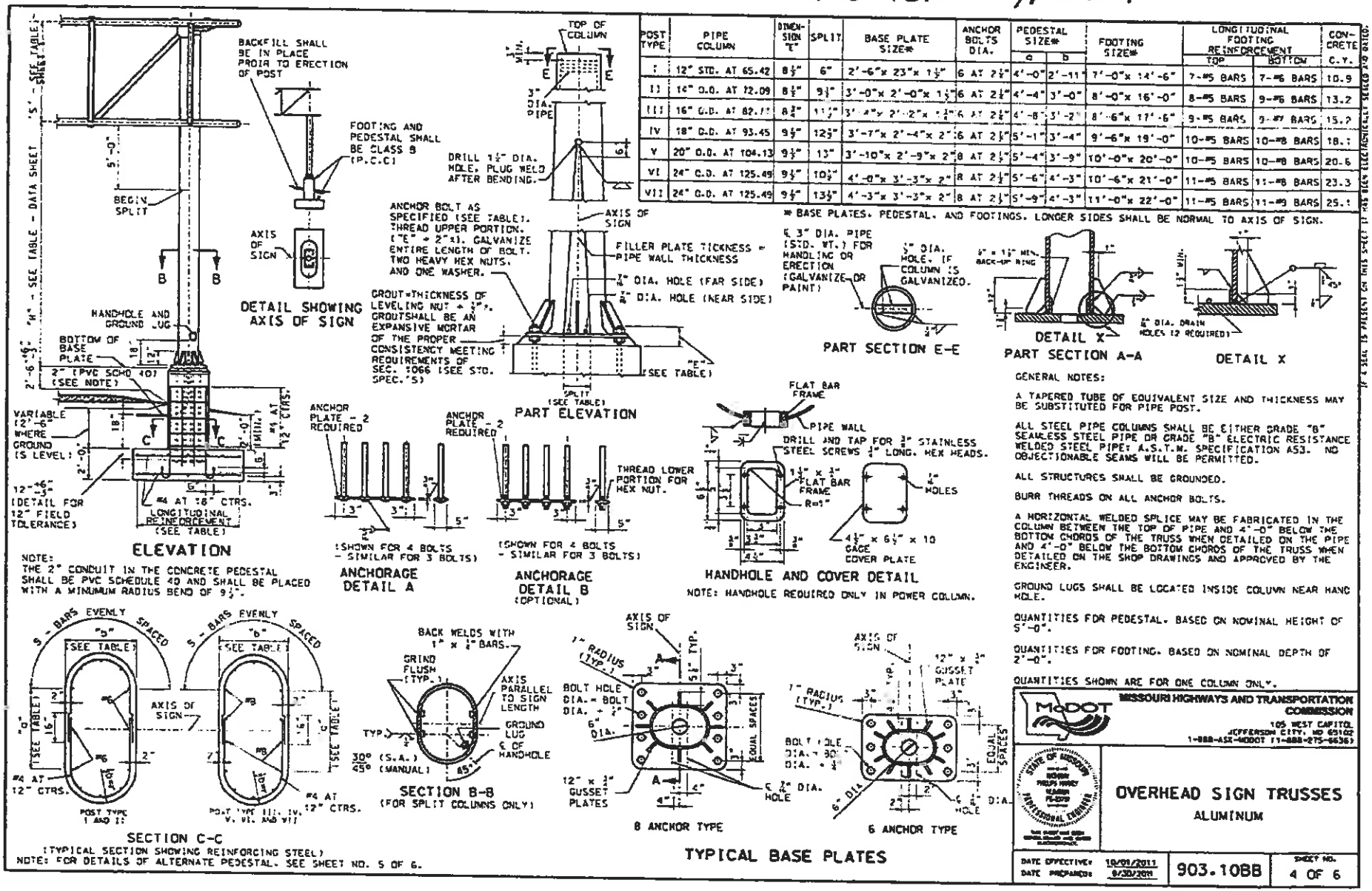
Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-16.5	.583	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
2	-12.5	-16.5	.583	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
3	4.2	-16.5	.427	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
4	12.5	16.5	.583	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
5	-12.5	16.5	.583	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
6	4.2	16.5	.427	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
7	-4.2	-16.5	.427	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]
8	-4.2	16.5	.427	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson [1]

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	320.					No

SIGN #1

DESIGN Type III



POST TYPE	PIPE COLUMN	DIMENSION "E"	SPLIT	BASE PLATE SIZE*	ANCHOR BOLTS DIA.	PEDESTAL SIZE* a	PEDESTAL SIZE* b	FOOTING SIZE*	LONGITUDINAL FOOTING REINFORCEMENT TOP	LONGITUDINAL FOOTING REINFORCEMENT BOTTOM	CONCRETE C.Y.
I	12" STD. AT 65.42	8½"	6"	2'-6"x 23"x 1½"	6 AT 2½"	4'-0"	2'-11"	7'-0"x 14'-6"	7-#5 BARS	7-#6 BARS	10.9
II	14" O.D. AT 72.09	8½"	9½"	3'-0"x 2'-0"x 1½"	6 AT 2½"	4'-4"	3'-0"	8'-0"x 16'-0"	8-#5 BARS	9-#6 BARS	13.2
III	16" O.D. AT 82.77	8½"	11½"	3'-4"x 2'-2"x 1½"	6 AT 2½"	4'-8"	3'-2"	8'-6"x 17'-6"	9-#5 BARS	9-#7 BARS	15.2
IV	18" O.D. AT 93.45	9½"	12½"	3'-7"x 2'-4"x 2"	6 AT 2½"	5'-1"	3'-4"	9'-6"x 19'-0"	10-#5 BARS	10-#8 BARS	18.1
V	20" O.D. AT 104.13	9½"	13"	3'-10"x 2'-9"x 2"	8 AT 2½"	5'-4"	3'-9"	10'-0"x 20'-0"	10-#5 BARS	10-#8 BARS	20.6
VI	24" O.D. AT 125.49	9½"	10½"	4'-0"x 3'-3"x 2"	8 AT 2½"	5'-6"	4'-3"	10'-6"x 21'-0"	11-#5 BARS	11-#8 BARS	23.3
VII	24" O.D. AT 125.49	9½"	13½"	4'-3"x 3'-3"x 2"	8 AT 2½"	5'-9"	4'-3"	11'-0"x 22'-0"	11-#5 BARS	11-#9 BARS	25.1

* BASE PLATES, PEDESTAL, AND FOOTINGS. LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

GENERAL NOTES:

A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE; A.S.T.M. SPECIFICATION A53. NO OBJECTIONABLE SEAMS WILL BE PERMITTED.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.

QUANTITIES FOR PEDESTAL, BASED ON NOMINAL HEIGHT OF 5'-0".

QUANTITIES FOR FOOTING, BASED ON NOMINAL DEPTH OF 2'-0".

QUANTITIES SHOWN ARE FOR ONE COLUMN ONLY.

MoDOT

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI — PROFESSIONAL ENGINEER

OVERHEAD SIGN TRUSSES
ALUMINUM

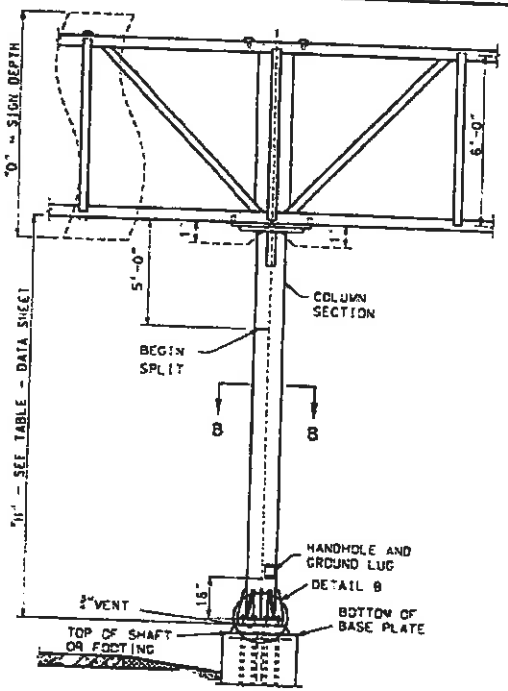
DATE EFFECTIVE: 10/01/2011
DATE PREPARED: 9/30/2011

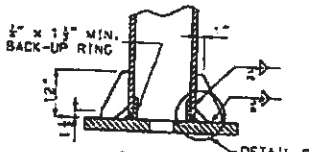
903.10BB

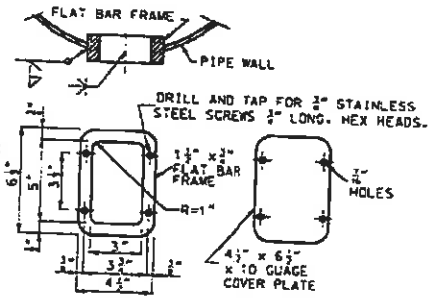
SHEET NO. 4 OF 6

54

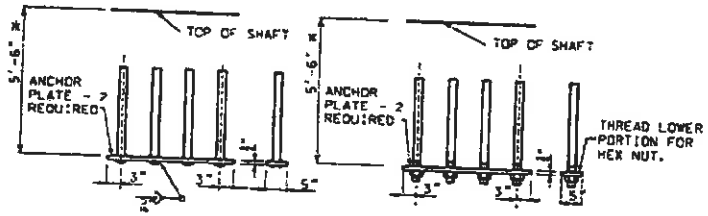
EXISTING Type IV



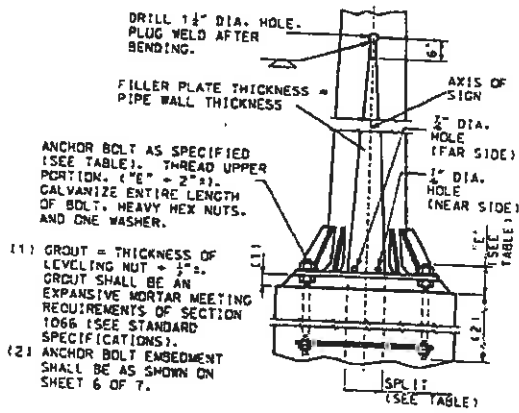




NOTE:
HANDHOLE REQUIRED ONLY IN POWER COLUMN.



(BOTH DETAILS ARE SHOWN FOR 4 BOLTS - SIMILAR FOR 3 BOLTS)
* DIMENSION SHOWN FOR DRILLED SHAFT OPTION. FOR SPREAD FOOTING OPTION REFER TO SHEET 6 OF 7.



(1) GROUT = THICKNESS OF LEVELING NUT + ½". GROUT SHALL BE AN EXPANSIVE MORTAR MEETING REQUIREMENTS OF SECTION 1066 (SEE STANDARD SPECIFICATIONS).

(2) ANCHOR BOLT EMBEDMENT SHALL BE AS SHOWN ON SHEET 6 OF 7.

GENERAL NOTES:

SUBSTRUCTURE SHALL BE BACKFILLED PRIOR TO ERECTION OF POST.

ASTM A 106 GRADE B STEEL PIPE OR A TAPERED TUBE OF EQUIVALENT SIZE AND THICKNESS MAY BE SUBSTITUTED FOR PIPE POST.

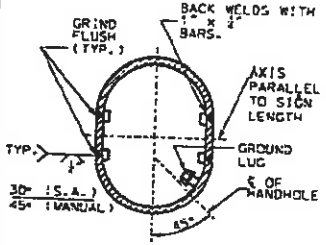
ALL STEEL PIPE COLUMNS SHALL BE EITHER GRADE "B" SEAMLESS STEEL PIPE OR GRADE "B" ELECTRIC RESISTANCE WELDED STEEL PIPE: A.S.T.M. SPECIFICATION A53.

ALL STRUCTURES SHALL BE GROUNDED.

BURR THREADS ON ALL ANCHOR BOLTS.

A HORIZONTAL WELDED SPLICE MAY BE FABRICATED IN THE COLUMN BETWEEN THE TOP OF PIPE AND 4'-0" BELOW THE BOTTOM CHORDS OF THE TRUSS WHEN DETAILED ON THE SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

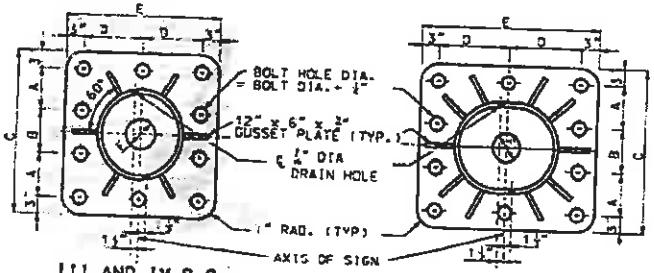
GROUND LUGS SHALL BE LOCATED INSIDE COLUMN NEAR HAND HOLE.



SECTION B-B
(FOR SPLIT COLUMNS ONLY)

TYPICAL BASE PLATE
(10 ANCHOR TYPE)
BUTTERFLY AND CANTILEVER (B.C.)

	III	IV	V	VI	VII
A	8"	9"	8"	9"	10½"
B	10"	10"	10"	10"	11"
C	32"	34"	32"	34"	38"
D	13"	14"	16½"	18"	20"
E	32"	34"	39"	42"	46"
F	6"	6"	6"	6"	6"



TYPICAL BASE PLATES

NOTE:
FOR DETAILS OF OPTIONAL SUBSTRUCTURES. SEE OTHER SHEETS.

ANCHOR BOLTS AND PLATE NOT SHOWN.

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

OVERHEAD SIGN TRUSS
COLUMN AND BASE PLATES

DATE EFFECTIVE: 12-01-2008	903.12Y	SHEET NO. 3 OF 7
DATE PREPARED: 7/18/2012		

EXISTING Type IV

DRILLED SHAFT OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	C	FA	FB	FC	FD	FH	COLLAR REINFORCEMENT MOMENT-C1 BARS	MOMENT-C1 SPACING	SHEAR-C2 BARS	SHEAR-C2 SPACING	SKIN-C3 BARS	SKIN-C3 SPACING	SHAFT REINFORCEMENT LONGITUDINAL S1 QUANT	LONGITUDINAL S1 TY	LONGITUDINAL S1 BARS	SHEAR-S2 BARS	SHEAR-S2 SPACING	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)	ALTERNATE PEDESTALS REBAR TOTAL (LBS.) TYPE A	REBAR TOTAL (LBS.) TYPE C	CONCRETE (CU. YDS.) TYPE A	CONCRETE (CU. YDS.) TYPE C
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	2'-10"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.4	14.5
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	4'-0"	7'-6"	1'-6"	4'-6"	14'-0"	#6	6"	#4	12"	#4	12"	19	#10	#5	6"	2126	12.4	2066	2077	13.5	14.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	5'-0"	13'-6"	4'-0"	5'-6"	17'-0"	#6	6"	#4	12"	#4	12"	22	#11	#6	6"	3901	26.5	3763	3782	28.8	30.7
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2¼"	10	2¼"	3'-0"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#6	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.1	36.2
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	3'-4"	5'-0"	14'-0"	4'-0"	6'-0"	18'-0"	#6	6"	#4	12"	#4	12"	27	#11	#6	6"	4742	31.8	4528	4547	34.5	36.8

SPREAD FOOTING OPTION

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * a	PEDESTAL SIZE * b	FOOTING SIZE *	LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	PEDESTAL REINFORCEMENT NO.	PEDESTAL REINFORCEMENT BARS	NO.	BARS	REBAR TOTAL (LBS.)	CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	4'-2"	3'-8"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	695	14.4
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	4'-4"	3'-10"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	733	15.6
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	4'-9"	3'-8"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	955	16.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2¼"	10	2¼"	5'-0"	3'-10"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1028	18.4
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	5'-4"	4'-2"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1196	21.5

SPREAD FOOTING OPTION WITH ALTERNATE PEDESTALS

POST TYPE	PIPE COLUMN O.D.	PIPE COLUMN WEIGHT (LBS.)	"E"	SPLIT	BASE PLATE SIZE**	ANCHOR BOLT NO.	ANCHOR BOLT DIA.	PEDESTAL SIZE * c	PEDESTAL SIZE * d	PEDESTAL SIZE * e	FOOTING SIZE *	TYPE A LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE A PEDESTAL REINFORCEMENT NO.	BARS	NO.	BARS	TYPE A REBAR TOTAL (LBS.)	TYPE A CONCRETE (CU. YDS.)	TYPE C LONGITUDINAL FOOTING REINFORCEMENT TOP NO.	TOP BARS	BOTTOM NO.	BOTTOM BARS	TYPE C PEDESTAL REINFORCEMENT NO.	BARS	NO.	BARS	TYPE C REBAR TOTAL (LBS.)	TYPE C CONCRETE (CU. YDS.)
III	18"	93.45	8½"	0"	2'-8" x 2'-8" x 1¼"	10	2"	2'-10"	6'-6"	15"	10'-0" x 13'-0"	10	#5	10	#5	10	#4	14	#8	757	14.4	10	#4	10	#5	12	#4	14	#8	800	15.3
IV	20"	104.13	8½"	0"	2'-10" x 2'-10" x 2"	10	2¼"	3'-0"	6'-9"	18"	10'-0" x 14'-0"	10	#5	10	#5	10	#4	14	#8	795	15.6	10	#4	10	#5	12	#4	14	#8	839	16.5
V	18"	93.45	8½"	7"	3'-3" x 2'-8" x 2"	10	2¼"	2'-10"	7'-0"	12"	9'-0" x 17'-0"	9	#5	10	#7	10	#4	14	#8	1015	16.5	10	#4	10	#7	12	#4	14	#8	1059	17.5
VI	20"	104.13	8½"	8"	3'-6" x 2'-10" x 2¼"	10	2¼"	3'-0"	7'-6"	15"	9'-0" x 19'-0"	9	#5	10	#7	10	#4	14	#8	1099	18.4	10	#4	10	#7	12	#4	14	#8	1134	19.5
VII	24"	125.49	9"	8"	3'-10" x 3'-2" x 2½"	10	2½"	3'-4"	7'-10"	15"	10'-0" x 20'-0"	9	#5	12	#7	10	#4	14	#8	1257	21.5	10	#4	12	#7	12	#4	14	#8	1302	22.6

* BASE PLATES, PEDESTAL AND FOOTINGS, LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.
** BASE PLATES, PEDESTAL AND FOUNDATIONS, LONGER SIDES SHALL BE NORMAL TO AXIS OF SIGN.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI — PROFESSIONAL ENGINEER

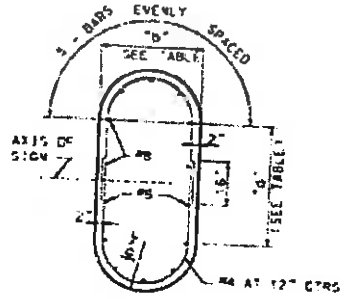
OVERHEAD SIGN TRUSSES
OPTIONAL SUBSTRUCTURE DATA

DATE EFFECTIVE: 12-01-2008
DATE PREPARED: 7/18/2012

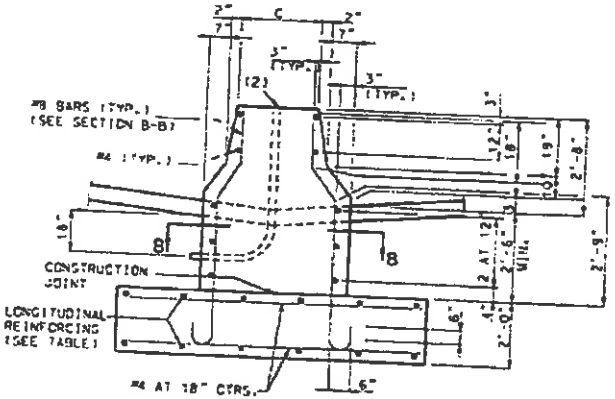
903.12Y

SHEET NO. 4 OF 7

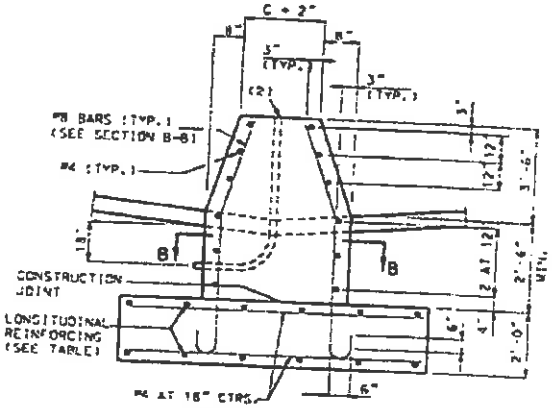
EXISTING TYPE IV



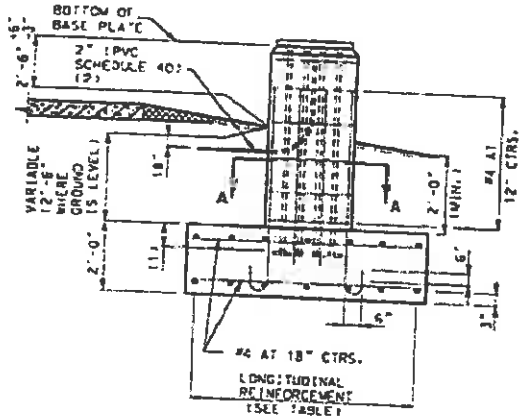
SECTION A-A
(TYPICAL SECTION SHOWING REINFORCING STEEL)



PART ELEVATION
(TYPE A CONCRETE TRAFFIC BARRIER)



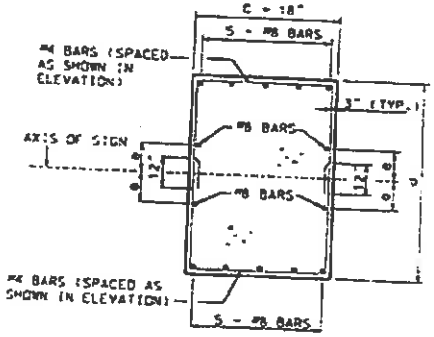
PART ELEVATION
(TYPE C CONCRETE TRAFFIC BARRIER)



ELEVATION

(1) 12"±6" (DETAIL FOR 12" FIELD TOLERANCE)

(2) 2" CONDUIT IN THE CONCRETE PEDESTAL SHALL BE PVC SCHEDULE 40 AND SHALL BE PLACED WITH A MINIMUM BEND RADIUS OF 9½".



SECTION B-B
TYPICAL SECTION SHOWING
REINFORCING STEEL

DETAILS OF ALTERNATE PEDESTAL

GENERAL NOTES:

PEDESTAL AND FOOTING SHALL BE CLASS B (P.C.C.).

MINIMUM CLEARANCE TO REINFORCEMENT IS 3" EXCEPT AS SHOWN.

CONTACT THE ENGINEER IF WATER TABLE IS ENCOUNTERED DURING EXCAVATION.

PIPE COLUMN, BASE PLATE, ANCHOR BOLTS AND NOTES PERTAINING TO THESE ITEMS HAVE BEEN OMITTED FOR CLARITY. REFER TO SHEET 3 OF 7 FOR DETAILS OF THESE ITEMS.

MoDOT

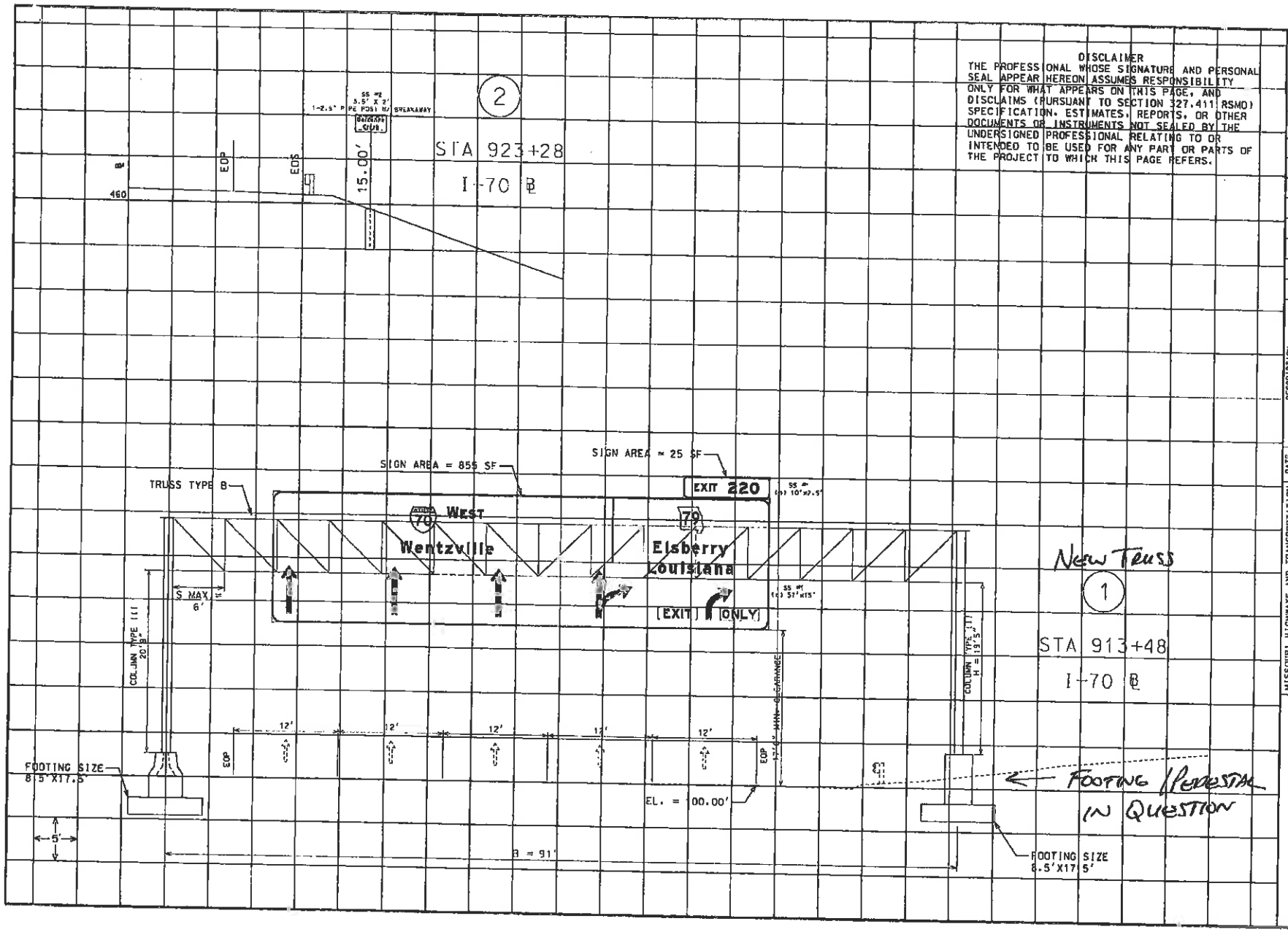
MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION

125 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

STATE OF MISSOURI
JEFFREY PHILIP KIRKEY
NUMBER
PROFESSIONAL ENGINEER

OVERHEAD SIGN TRUSSES
SPREAD FOOTING

DATE EFFECTIVE: 12-01-2008	903.12Y	SHEET NO. 6 OF 7
DATE PREPARED: 7/11/2006		



DISCLAIMER
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STATE OF MISSOURI
TIMOTHY J. SCHROEDER
NUMBER PE-2010018
PROFESSIONAL ENGINEER

DATE PREPARED 10/15/2012
ROUTE I-70 | STATE MO
DISTRICT SL | SHEET NO. 44
COUNTY ST. CHARLES
JOB NO. J6I24128
CONTRACT NO.
PROJECT NO.
BRIDGE NO.

DESCRIPTION | DATE

IF A SEAL IS PRESENT ON THIS SHEET IT HAS BEEN ELECTRONICALLY SEALED AND DATED.

MISSOURI HIGHWAYS AND TRANSPORTATION COMMISSION
MoDOT
105 WEST CAPITOL
JEFFERSON CITY, MO 65102
1-888-ASK-MODOT (1-888-275-6636)

SIGNING CROSS-SECTIONS
SHEET 1 OF 4

REV. 06 AUG 2012

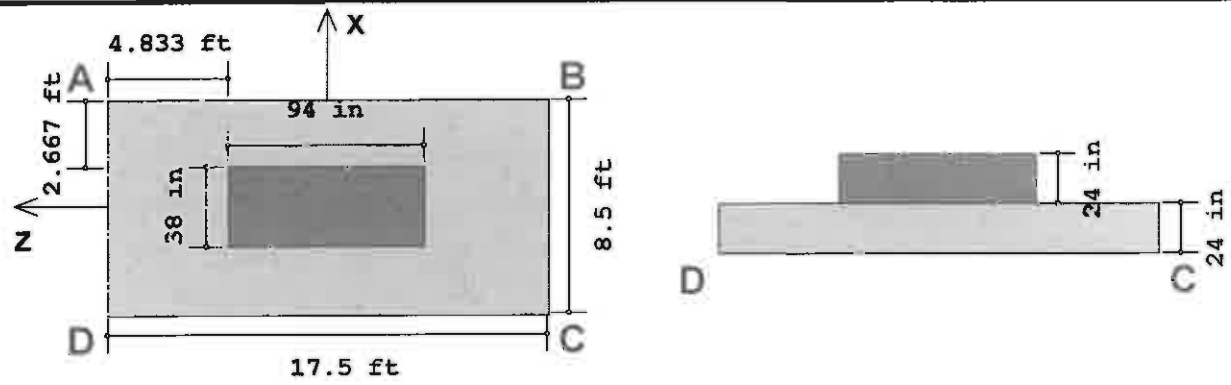
Company : THHinc.
Designer : MDH
Job Number : 7012

April 30, 2013

I-70 Signs Sign #1 Required

Checked By:_____

Sketch



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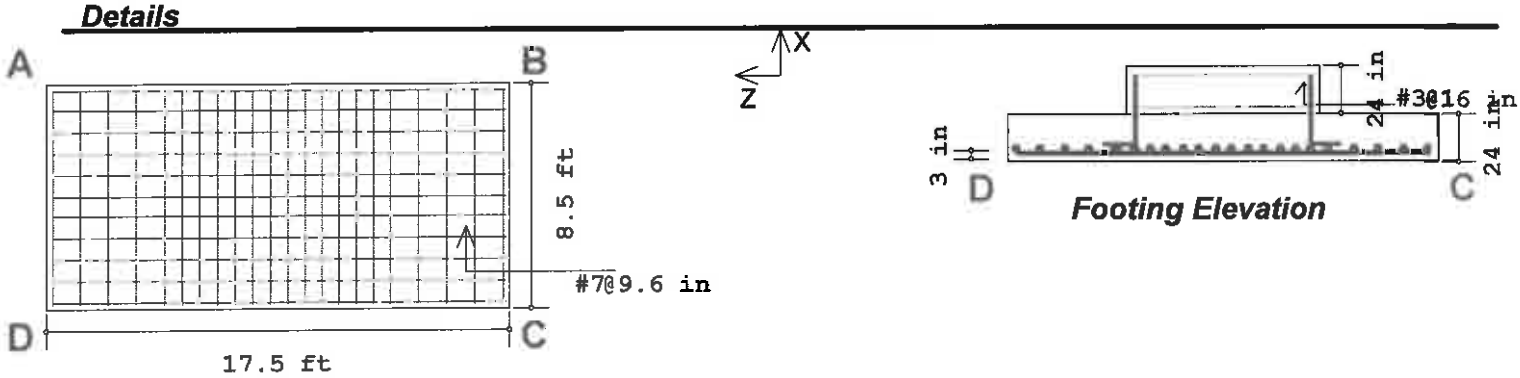


Controlling X direction steel requires the following placement:

Region 1 (starts at A):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**
Region 2 (middle):	**102 in**	Steel: **8.42 in^2 (14 #7 @7.85 in)**
Region 3 (ends at B):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**

Bottom Rebar Plan

Geometry, Materials and Criteria

Length	: 17.5 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 8.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00252
Thickness	: 24 in	pX	: 38 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00252
Height	: 24 in	pZ	: 94 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				360		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1484.19 (B)	.989

1DL+1WL
QA: 0 psf
QB: 1484.19 psf
QC: 1484.19 psf
QD: 0 psf
NAZ: 169.79 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	71.007	.77	4.98055e-9	0

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	59.087	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 103.278k-ft,212.63k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1410.51 k One Way (X Dir. Cut) Vc 229.756 k One Way (Z Dir. Cut) Vc: 473.027 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	1.568	.001	19.108	.111	1.33512e-9	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 18217.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	89.25	.008

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	360	780.937	0	379.312	2.169	NA

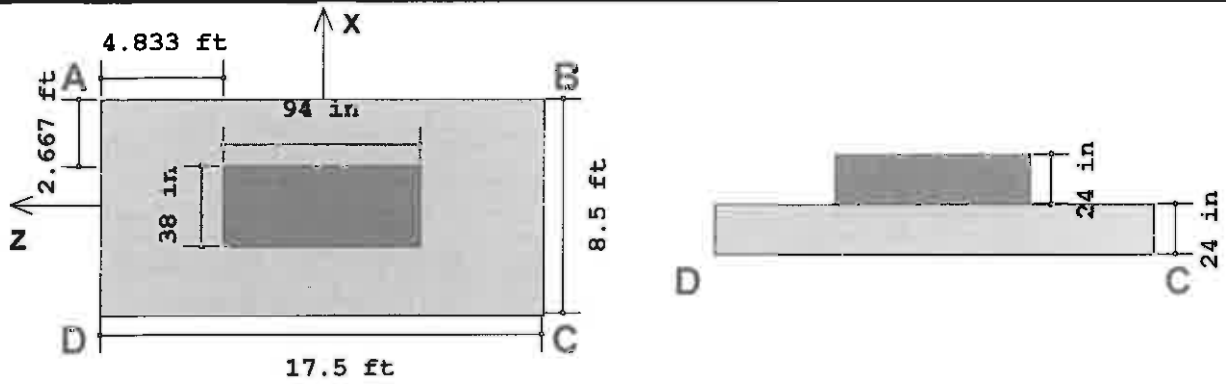
Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs Sign #1 Required

April 30, 2013
Checked By:_____

Sketch



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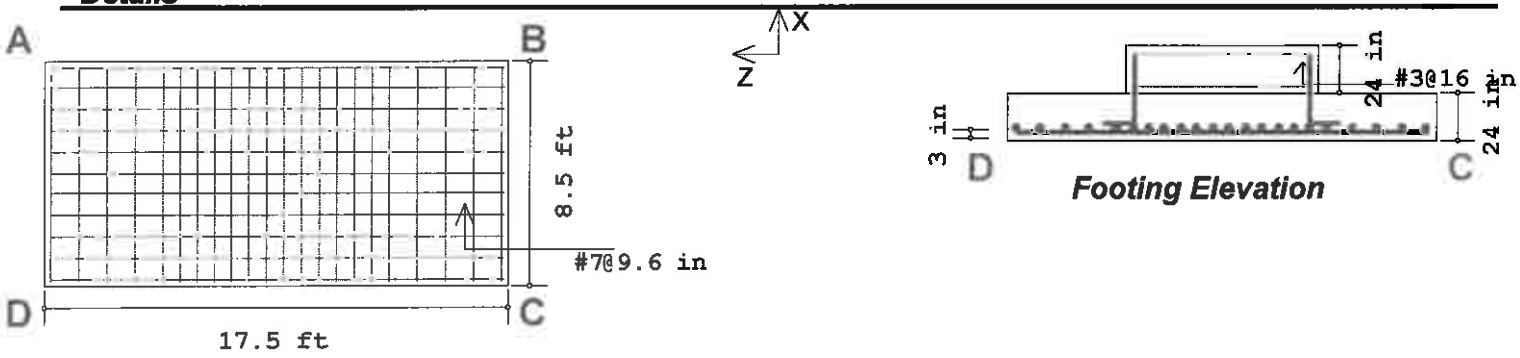


Footing Elevation

Controlling X direction steel requires the following placement:

Region 1 (starts at A):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**
Region 2 (middle):	**102 in**	Steel: **8.42 in^2 (14 #7 @7.85 in)**
Region 3 (ends at B):	54 in	Steel: 2.41 in^2 **(4 #7 @17 in)**

Bottom Rebar Plan

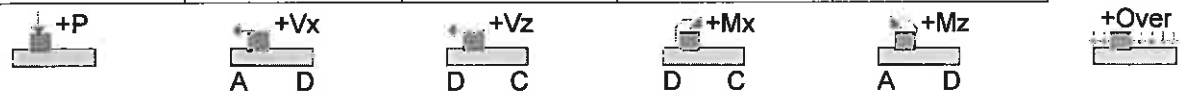
Geometry, Materials and Criteria

Length	: 17.5 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 8.5 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .00252
Thickness	: 24 in	pX	: 38 in	Concrete f'c	: 3 ksi	Maximum Steel	: .00252
Height	: 24 in	pZ	: 94 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	130					



Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1473.95 (A)	.983

1DL+1WL
QA: 1473.95 psf
QB: 1473.95 psf
QC: 1473.95 psf
QD: 1473.95 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	86.77	.043	54.379	.599

Footing Shear Check

Two Way (Punching) Vc: 1410.51 k One Way (X Dir. Cut) Vc 229.756 k One Way (Z Dir. Cut) Vc: 473.027 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/ØVc	Vu(k)	Vu/ØVc	Vu(k)	Vu/ØVc
Comparison Load	1DL+1WL	89.282	.084	23.176	.134	14.577	.041

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 18217.2 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/ØBc
Comparison Load	1DL+1WL	219.25	.019

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	1918.44	0	931.812	NA	NA

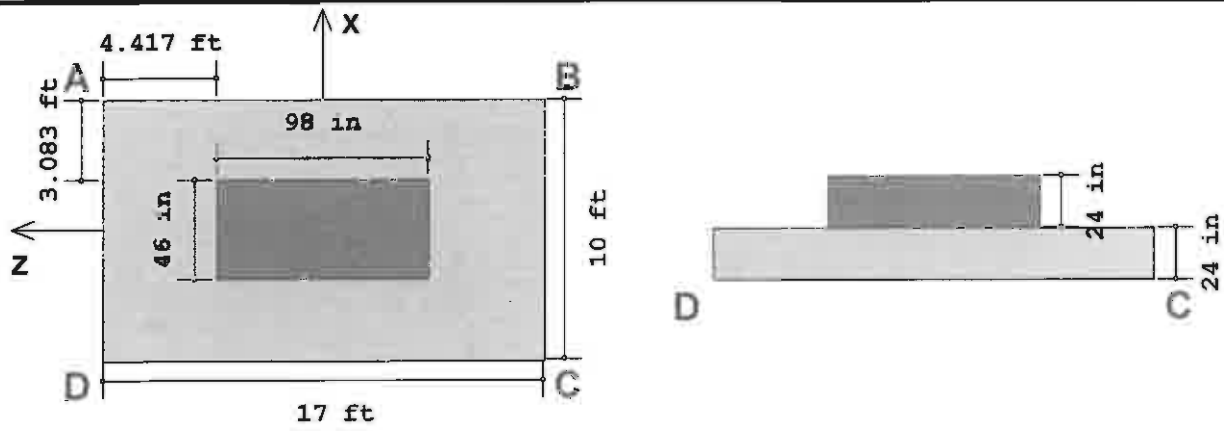
Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

I-70 Signs (Sign #1 Existing)

April 30, 2013
Checked By:_____

Sketch



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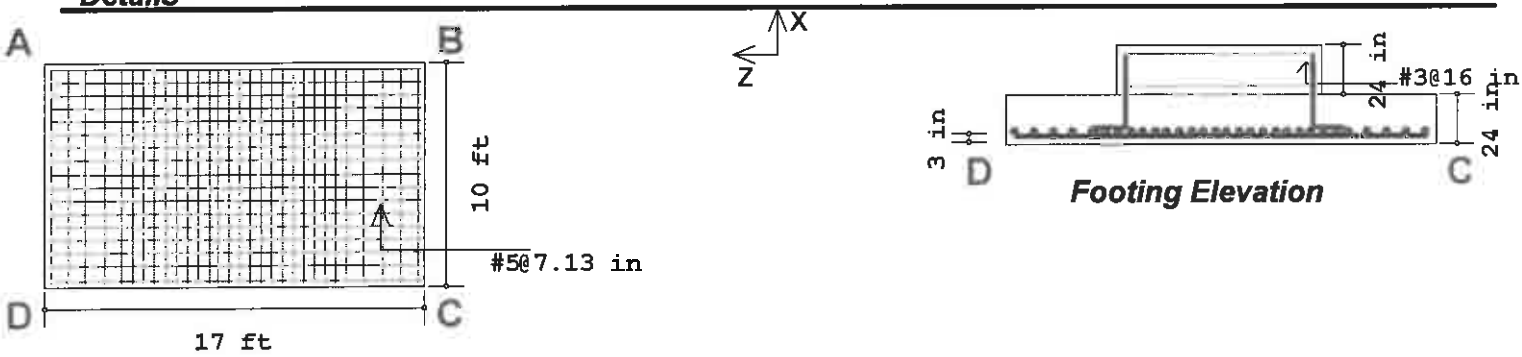


Footing Elevation

Controlling X direction steel requires the following placement:

Region 1 (starts at A):	42 in	Steel: 1.23 in^2 **(4 #5 @13 in)**
Region 2 (middle):	**120 in**	Steel: **6.75 in^2 (22 #5 @5.71 in)**
Region 3 (ends at B):	42 in	Steel: 1.23 in^2 **(4 #5 @13 in)**

Bottom Rebar Plan

Geometry, Materials and Criteria

Length	: 17 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 10 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .0018
Thickness	: 24 in	pX	: 46 in	Concrete f'c	: 3 ksi	Maximum Steel	: .0018
Height	: 24 in	pZ	: 98 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL				360		

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1368.05 (B)	.912

0.912 < 0.989

1DL+1WL
QA: 0 psf
QB: 1368.05 psf
QC: 1368.05 psf
QD: 0 psf
NAZ: 178.941 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	61.738	.695	7.14287e-9	0

61.7 < 71.0

Footing Flexure Design (Top Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
SW+OB	1SW+1OB-(Comparison ..,Comparison ..)	56.591	0	0	0

Moment Capacity of Plain Concrete Section Along XX and ZZ= 121.503k-ft,206.555k-ft Per Chapter 22 of ACI 318.

Footing Shear Check

Two Way (Punching) Vc: 1628.95 k One Way (X Dir. Cut) Vc 271.944 k One Way (Z Dir. Cut) Vc: 462.305 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	.647	0	17.355	.085	2.04268e-9	0

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22990.8 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	102	.007

Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	360	867	0	510	2.408	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

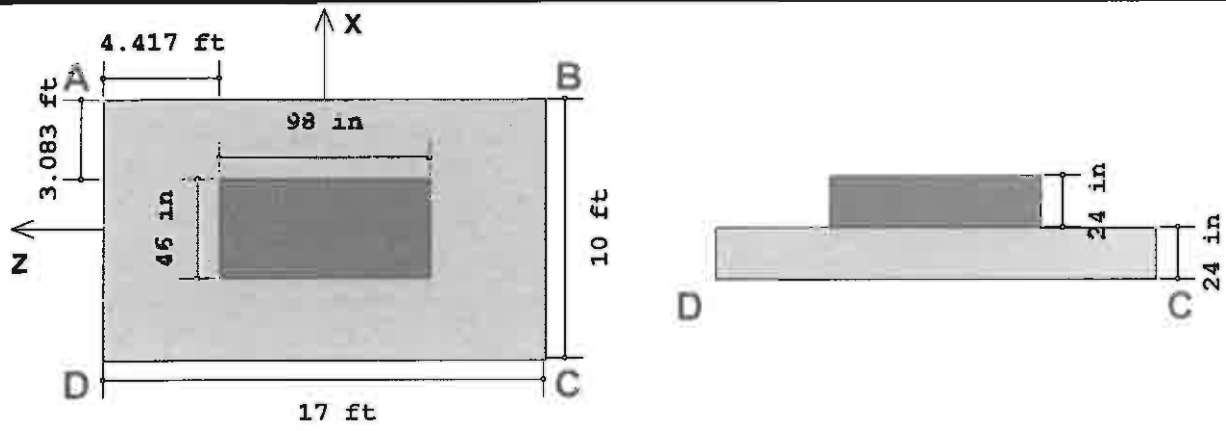
867 > 781

Company : **THHinc.**
Designer : **MDH**
Job Number : **7012**

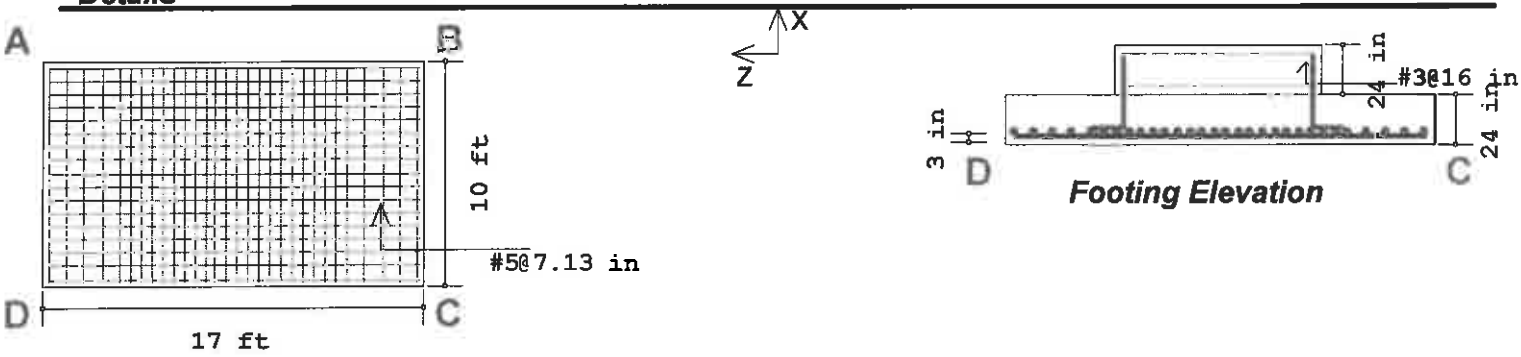
I-70 Signs (Sign #1 Existing)

April 30, 2013
Checked By:_____

Sketch



Details



Controlling X direction steel requires the following placement:

Region 1 (starts at A):	42 in	Steel: 1.23 in^2 **(4 #5 @13 in)**
Region 2 (middle):	**120 in**	Steel: **6.75 in^2 (22 #5 @5.71 in)**
Region 3 (ends at B):	42 in	Steel: 1.23 in^2 **(4 #5 @13 in)**

Bottom Rebar Plan

Geometry, Materials and Criteria

Length	: 17 ft	eX	: 0 in	Gross Allow. Bearing	: 1500 psf (gross)	Steel fy	: 60 ksi
Width	: 10 ft	eZ	: 0 in	Concrete Weight	: 150 pcf	Minimum Steel	: .0018
Thickness	: 24 in	pX	: 46 in	Concrete f'c	: 3 ksi	Maximum Steel	: .0018
Height	: 24 in	pZ	: 98 in	Design Code	: ACI 318-05		

Footing Top Bar Cover	: 3 in	Overturning Safety Factor	: 1.5	Phi for Flexure	: 0.9
Footing Bottom Bar Cover	: 3 in	Coefficient of Friction	: 0.3	Phi for Shear	: 0.75
Pedestal Longitudinal Bar Cover	: 3 in	Passive Resistance of Soil	: 0 k	Phi for Bearing	: 0.65

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Overburden (psf)
DL						300
WL	130					

Soil Bearing

Description	Categories and Factors	Gross Allow.(psf)	Max Bearing (psf)	Max/Allowable Ratio
Comparison Load	1DL+1WL	1500	1364.71 (A)	.91

0.91 < 0.983

1DL+1WL
QA: 1364.71 psf
QB: 1364.71 psf
QC: 1364.71 psf
QD: 1364.71 psf
NAZ: -1 in
NAX: -1 in

Footing Flexure Design (Bottom Bars)

Description	Categories and Factors	Mu-XX (k-ft)	Z Dir As (in^2)	Mu-ZZ (k-ft)	X Dir As (in^2)
Comparison Load	1DL+1WL	74.585	.904	61.795	.666

74 < 86

Footing Shear Check

Two Way (Punching) Vc: 1628.95 k One Way (X Dir. Cut) Vc 271.944 k One Way (Z Dir. Cut) Vc: 462.305 k

		Punching		X Dir. Cut		Z Dir. Cut	
Description	Categories and Factors	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc	Vu(k)	Vu/øVc
Comparison Load	1DL+1WL	87.968	.072	20.591	.101	17.672	.051

Concrete Bearing Check (Vertical Loads Only)

Bearing Bc : 22990.8 k

Description	Categories and Factors	Bearing Bu (k)	Bearing Bu/øBc
Comparison Load	1DL+1WL	232	.016

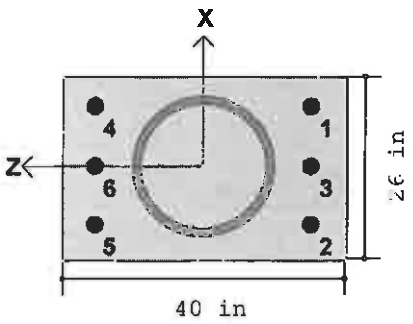
Overturning Check (Service)

Description	Categories and Factors	Mo-XX (k-ft)	Ms-XX (k-ft)	Mo-ZZ (k-ft)	Ms-ZZ (k-ft)	OSF-XX	OSF-ZZ
Comparison Load	1DL+1WL	0	1972	0	1160	NA	NA

Mo-XX: Governing Overturning Moment about AD or BC
Ms-XX: Governing Stablizing Moment about AD or BC
OSF-XX: Ratio of Ms-XX to Mo-XX

1972 > 1918

Sign 1 Required



Plain Base Plate Connection

Base Plate Thickness	: 1.75 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.988 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.906 ksi
Max/Allowable Ratio .959 Load Comparisson (ABIF = 1.000)

Base Plate Stress

Maximum Stress 16.452 ksi
Max/Allowable Ratio .508 Load Comparisson (ASIF = 1.000)

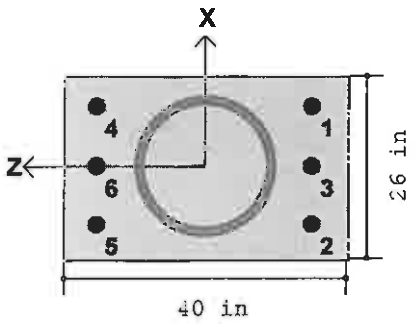
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	.036	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	11.659	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	11.659	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	18.318	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				60.		No

Sign 1 Required



Plain Base Plate Connection

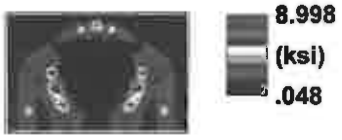
Base Plate Thickness	: **1.75 in**
Base Plate Fy	: **36. ksi**
Bearing Surface Fp	: **1.988 ksi**
Anchor Bolt Diameter	: **2.25 in**
Anchor Bolt Material	: **A307**
Anchor Bolt Fu	: **60. ksi**
Column Shape	: **HSS20x0.5**
Design Code	:
Pullout Code	: **ACI 2005**

Bearing Pressure

Maximum Bearing **1.978 ksi**
Max/Allowable Ratio **.995** Load Comparisson (ABIF = 1.000)

Base Plate Stress

Maximum Stress **8.998 ksi**
Max/Allowable Ratio **.278** Load Comparisson (ASIF = 1.000)



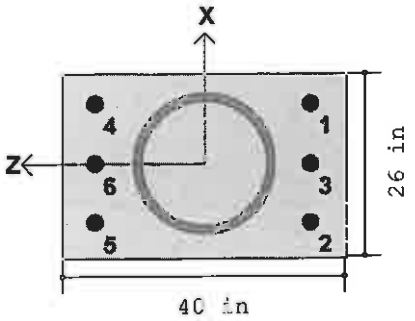
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	1.388	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	10.763	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	8.181	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	1.388	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	10.763	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	8.181	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					35.	No

Sign 1 Required

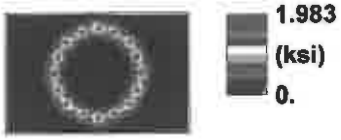


Plain Base Plate Connection

Base Plate Thickness	: 1.75 in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.988 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.983 ksi
Max/Allowable Ratio .998 Load Comparisson (ABIF = 1.000)



Base Plate Stress

Maximum Stress 2.511 ksi
Max/Allowable Ratio .078 Load Comparisson (ASIF = 1.000)

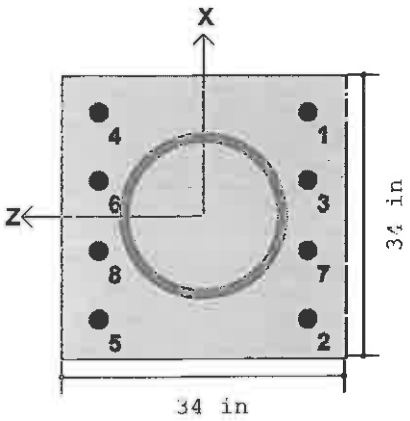
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	8.5	-15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-8.5	-15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	0.	-15.25	.356	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	8.5	15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-8.5	15.25	.499	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	0.	15.25	.356	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	230.					No

Sign 1 Existing



Plain Base Plate Connection

Base Plate Thickness	: **2. in**
Base Plate Fy	: **36. ksi**
Bearing Surface Fp	: **1.84 ksi**
Anchor Bolt Diameter	: **2.25 in**
Anchor Bolt Material	: **A307**
Anchor Bolt Fu	: **60. ksi**
Column Shape	: **HSS20x0.5**
Design Code	:
Pullout Code	: **ACI 2005**

Bearing Pressure

Maximum Bearing **1.376 ksi**
Max/Allowable Ratio **.748** Load Comparisson (ABIF = 1.000)

< 0.959

Base Plate Stress

Maximum Stress **4.804 ksi**
Max/Allowable Ratio **.148** Load Comparisson (ASIF = 1.000)

< 0.505

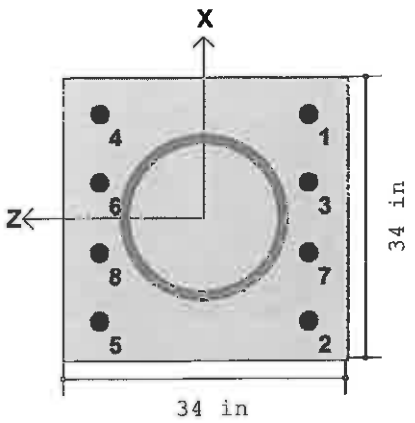
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-12.5	-12.5	5.77	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	4.2	-12.5	2.816	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	12.5	12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-12.5	12.5	5.77	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	4.2	12.5	2.816	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-4.2	-12.5	7.771	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-4.2	12.5	7.771	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL					35.	No

Sign 1 Existing



Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.84 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	:
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.519 ksi
Max/Allowable Ratio .826 Load Comparisson (ABIF = 1.000)

< 0.995

Base Plate Stress

Maximum Stress 8.353 ksi
Max/Allowable Ratio .258 Load Comparisson (ASIF = 1.000)

< 0.278

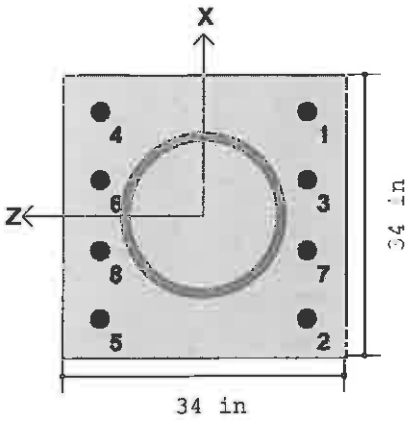
Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-12.5	.17	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-12.5	-12.5	.17	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	4.2	-12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	12.5	12.5	4.826	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-12.5	12.5	4.826	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	4.2	12.5	13.217	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-4.2	-12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-4.2	12.5	13.217	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL				60.		No

Sign 1 Existing



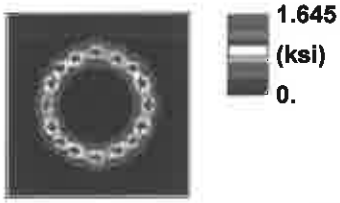
Plain Base Plate Connection

Base Plate Thickness	: 2. in
Base Plate Fy	: 36. ksi
Bearing Surface Fp	: 1.84 ksi
Anchor Bolt Diameter	: 2.25 in
Anchor Bolt Material	: A307
Anchor Bolt Fu	: 60. ksi
Column Shape	: HSS20x0.5
Design Code	: A
Pullout Code	: ACI 2005

Bearing Pressure

Maximum Bearing 1.645 ksi
Max/Allowable Ratio .894 Load Comparisson (ABIF = 1.000)

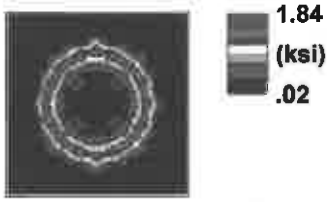
< 0.894



Base Plate Stress

Maximum Stress 1.84 ksi
Max/Allowable Ratio .057 Load Comparisson (ASIF = 1.000)

< 0.057



Anchor Bolts

Bolt	X (in)	Z (in)	Tens.(k)	Vx (k)	Vz (k)	Fnt (ksi)	ft (ksi)	Fnv (ksi)	fv (ksi)	Unity	Combination
1	12.5	-12.5	.589	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
2	-12.5	-12.5	.589	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
3	4.2	-12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
4	12.5	12.5	.589	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
5	-12.5	12.5	.589	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
6	4.2	12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
7	-4.2	-12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)
8	-4.2	12.5	0.	0.	0.	N.A.	N.A.	N.A.	N.A.	N.A.	Load Comparisson (1)

Loads

	P (k)	Vx (k)	Vz (k)	Mx (k-ft)	Mz (k-ft)	Reverse
DL	230.					No

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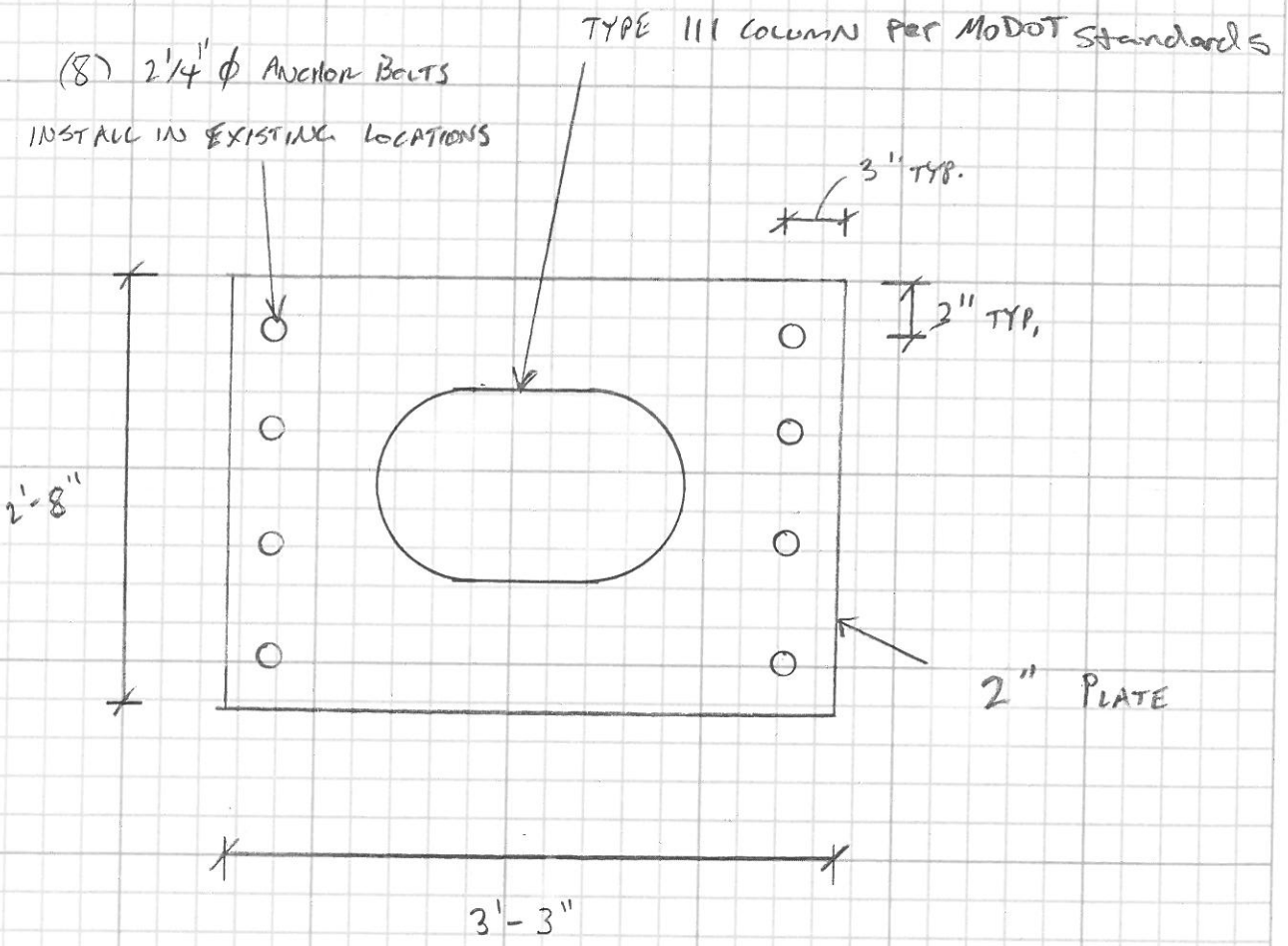
Proj. #: 2012 Date: 5/7/13
Project: Mid Rivers I-70 Signs
Subject: Base Plates
By: MDH Pg: 1

Sign #3 & 5



STATE OF MISSOURI
KRIS L. BEZENEK
NUMBER PE-2007002765
PROFESSIONAL ENGINEER
5/7/13

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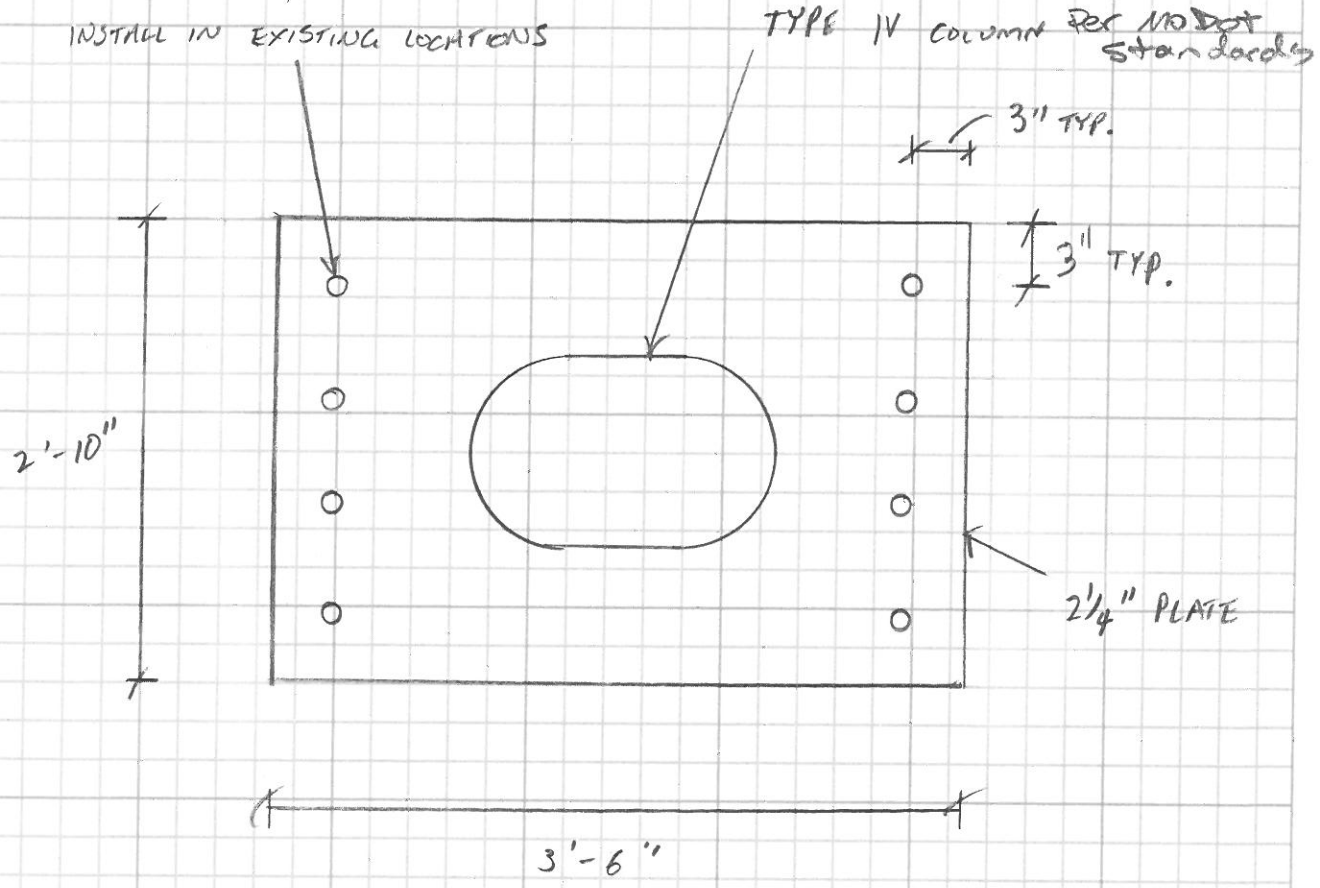
Proj. #: 2012 Date: 5/7/13
Project: MID RIVERS I-20 SIGNS
Subject: BASE PLATES
By: MDH Pg: 1

SIGN #57, 63, & 64

(8) 2 1/4" ϕ ANCHOR BOLTS
INSTALL IN EXISTING LOCATIONS



STATE OF MISSOURI
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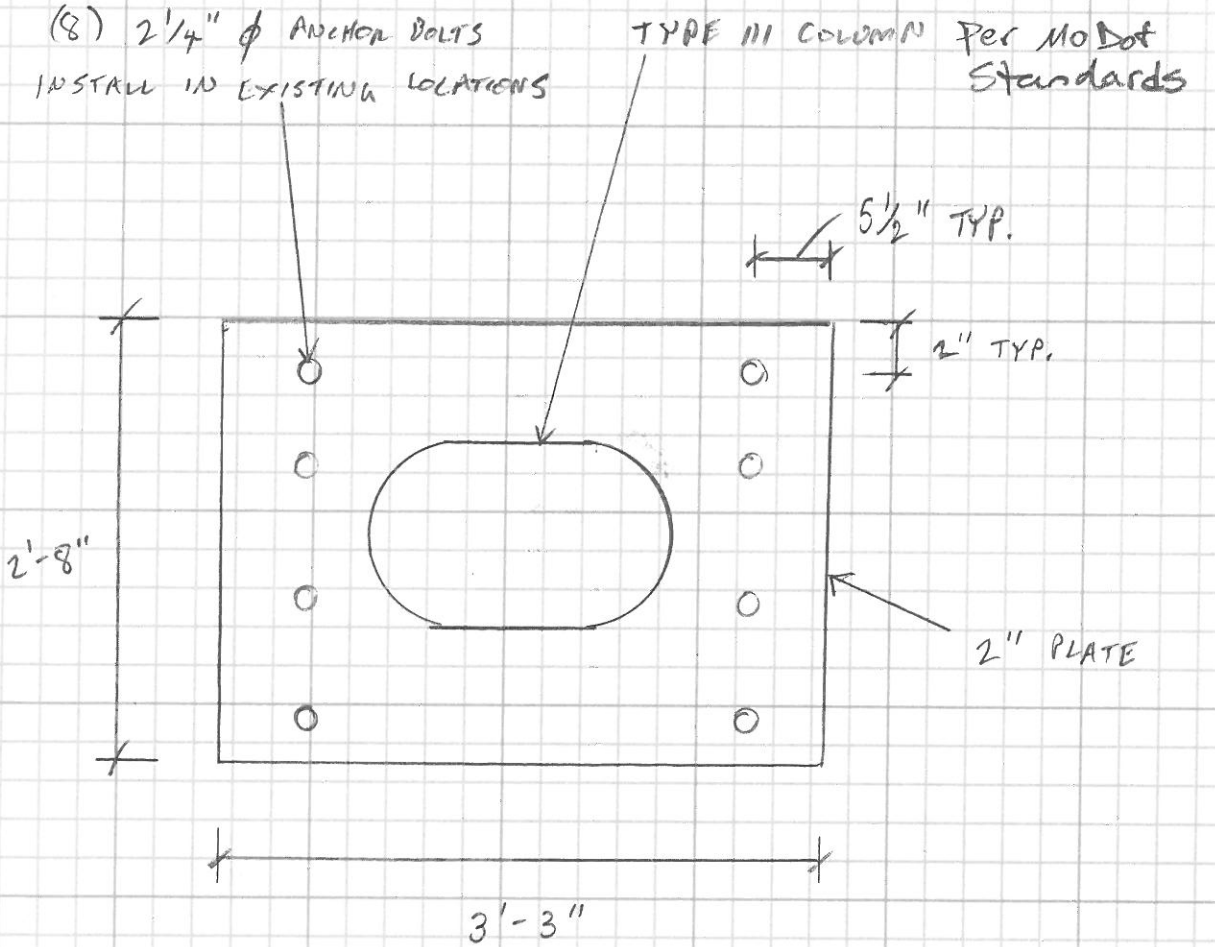
Proj. #: 2012 Date: 5/7/13
Project: MID RIVERS I-70 SIGNS
Subject: BASE PLATES
By: MDH Pg: 1

SIGN #1



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