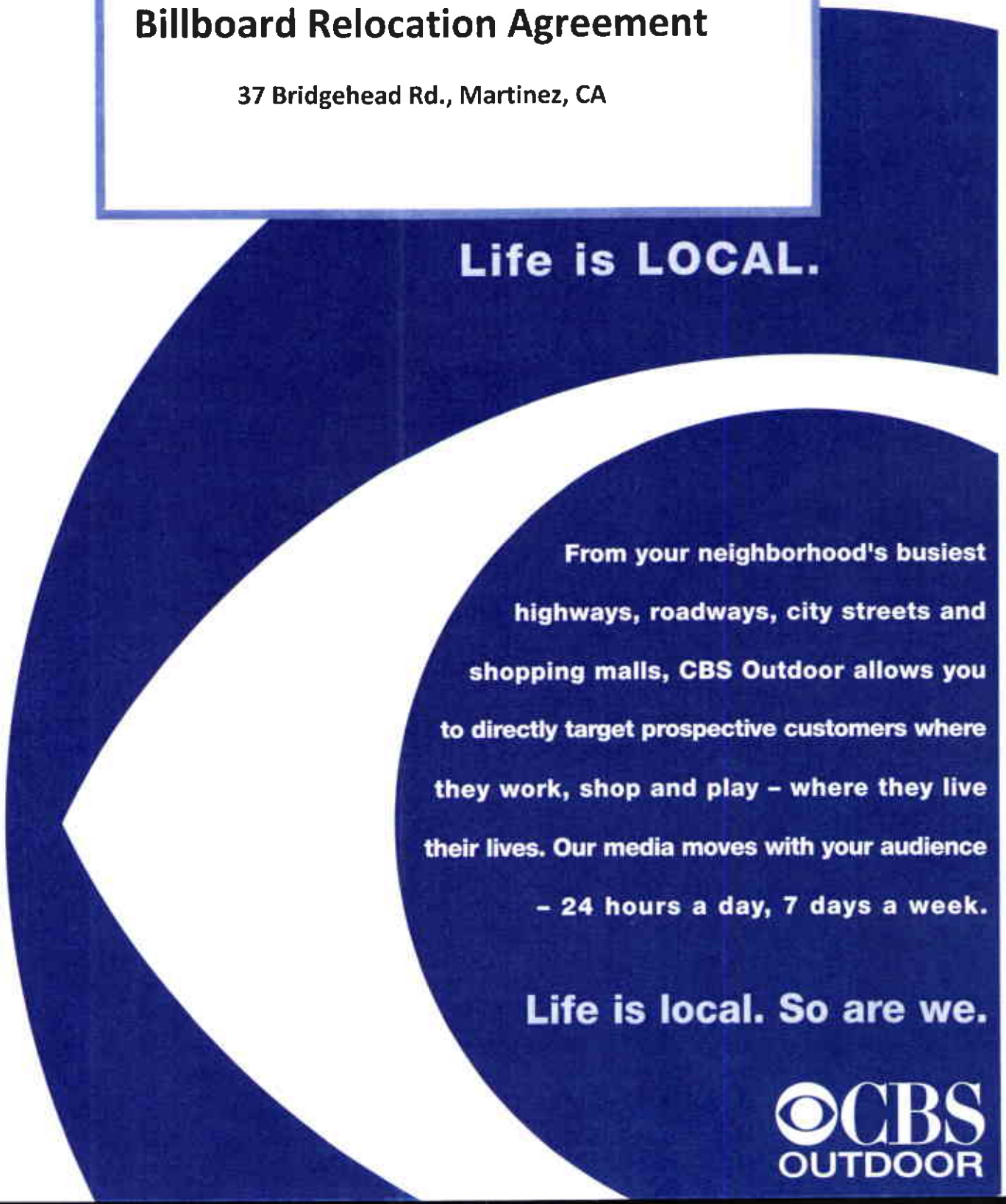
Billboard Relocation Agreement

37 Bridgehead Rd., Martinez, CA



CBS OUTDOOR

TABLE OF CONTENTS

1695 EASTSHORE HIGHWAY, BERKELEY, CA 94710 • (510) 527-3350 • FAX (510) 527-7041 • cbsoutdoor.com

CBS OUTDOOR

August 18, 2011

Planning Commission
City of Martinez
525 Henrietta Street
Martinez, CA 94553

RE: MUNICIPAL CODE TEXT AMENDMENTS TO ALLOW POSSIBLE RELOCATION OF EXISTING STATIC BILLBOARD AND REPLACEMENT WITH NEW LED BILLBOARD

Dear Planning Commissioners,

Thank you for taking the time to consider our project, which would remove our existing static display billboard located at 35 Bridgehead Road (APN 378-010-028-9) and relocate it by constructing a new Light Emitting Diode (LED) billboard at 37 Bridgehead Road (APN 378-010-024-8). Relocation of the existing billboard is a key component of this project, primarily because the existing site is on a railroad easement. Our lease with the railroad places numerous restrictions on CBS, not the least of which is the lease's duration, which essentially is a month-to-month arrangement due to federal guidelines. Moving the sign to private property enables us to secure the kind of long-term leasehold that makes this project feasible.

We believe the City of Martinez has a unique opportunity to partner with CBS Outdoor, Inc., on this project. Some of the benefits to the City would include:

- Revenue share equaling 11% of Quarterly Net Receipts from billboard advertising.
- Opportunity to advertise City-sponsored special events up to 24 times per year (as opposed to 4 times per year on static display).
- Capability for Amber Alert and other emergency messages within hours of notification.

We look forward to the Planning Commission's meeting on Tuesday, August 23rd and will be prepared to answer any questions you may have.

Respectfully,

CBS OUTDOOR, INC.

Collin Smith
Northern California Real Estate Manager

1695 EASTSHORE HIGHWAY, BERKELEY, CA 94710 • (510) 527-3350 • FAX (510) 527-7041 • cbsoutdoor.com

CBS OUTDOOR

SITE PLAN, TECHNOLOGY & DISPLAY EXAMPLES

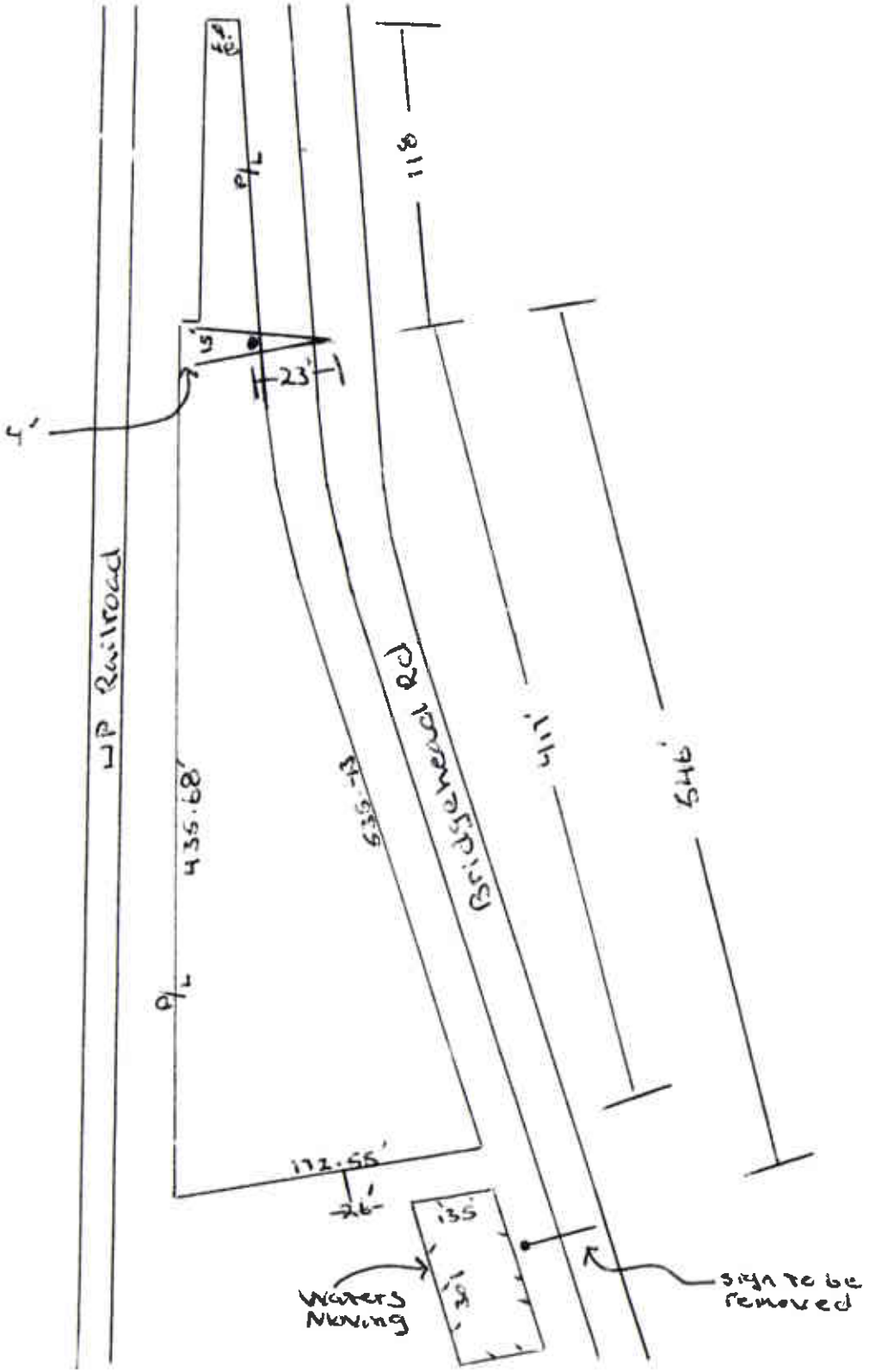
The sign relocation represents an important and unique opportunity for the City of Martinez.

Our team welcomes the opportunity to serve as creative participants in the process of conceiving and developing innovative displays that attract attention and reflect the sophistication and excitement that is emblematic of this project.

We propose removing the existing back-to-back 14' x 48' static billboard structure located on the railroad easement and relocating and replacing it with a back-to-back, 14' x 48' LED digital display structure. Subject structure shall be located on the private property located at 37 Bridgehead Road, Martinez, CA. Please refer to the Relocation Agreement for specific details.

The electronic display will feature "Mega Vision" technology. Mega Vision is exclusive CBS technology and can be seen in professional sports complexes throughout the country. Additionally, the displays would include the computer equipment and software to operate the signs. The proposed brightness level is of the purest form 10,000 NITs @ 6500 Kelvin – far exceeding all other LED display technology currently available. The narrow viewing angle (70 degree horizontal by 30 degree vertical) is designed to best target interstate traffic and impressively enhances the brightness and clarity. These displays offer the finest color capability available – utilizing a 16 bit processing system, which produces more than 281 trillion colors.

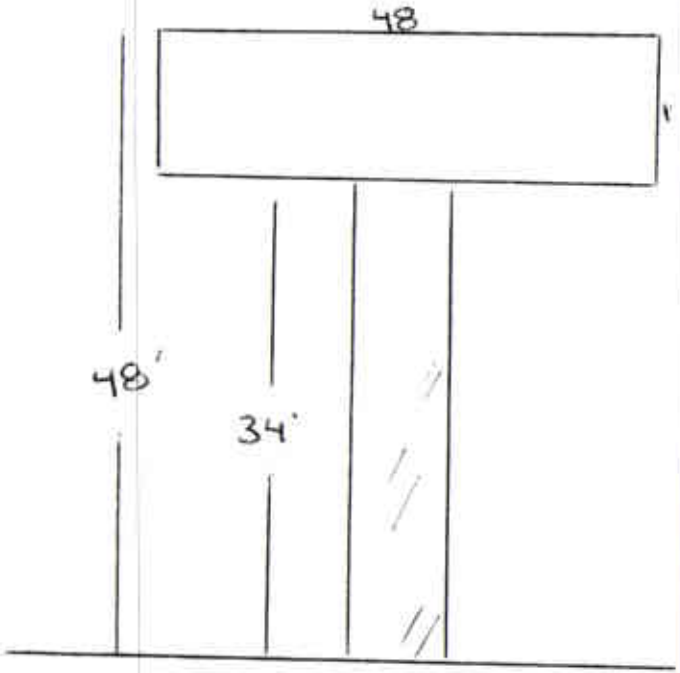
Mega vision was developed and is manufactured by Opto Tech Corporation of Hsinchu Taiwan. CBS Outdoor, through an exclusive arrangement with Opto Tech, is the sole provider in the United States of this -- the worlds most advance LED technology. Opto Tech has over 15 years of research and development invested in Mega Vision and is recognized as a pioneer in the industry.



Bridgehead W/L 2113' N/O

Marina Vista

APN 378-010-024-8



23' From Center of Road to Center of Pole

27' From Center of Pole to Far Fence

34' HAGL

48' Overall

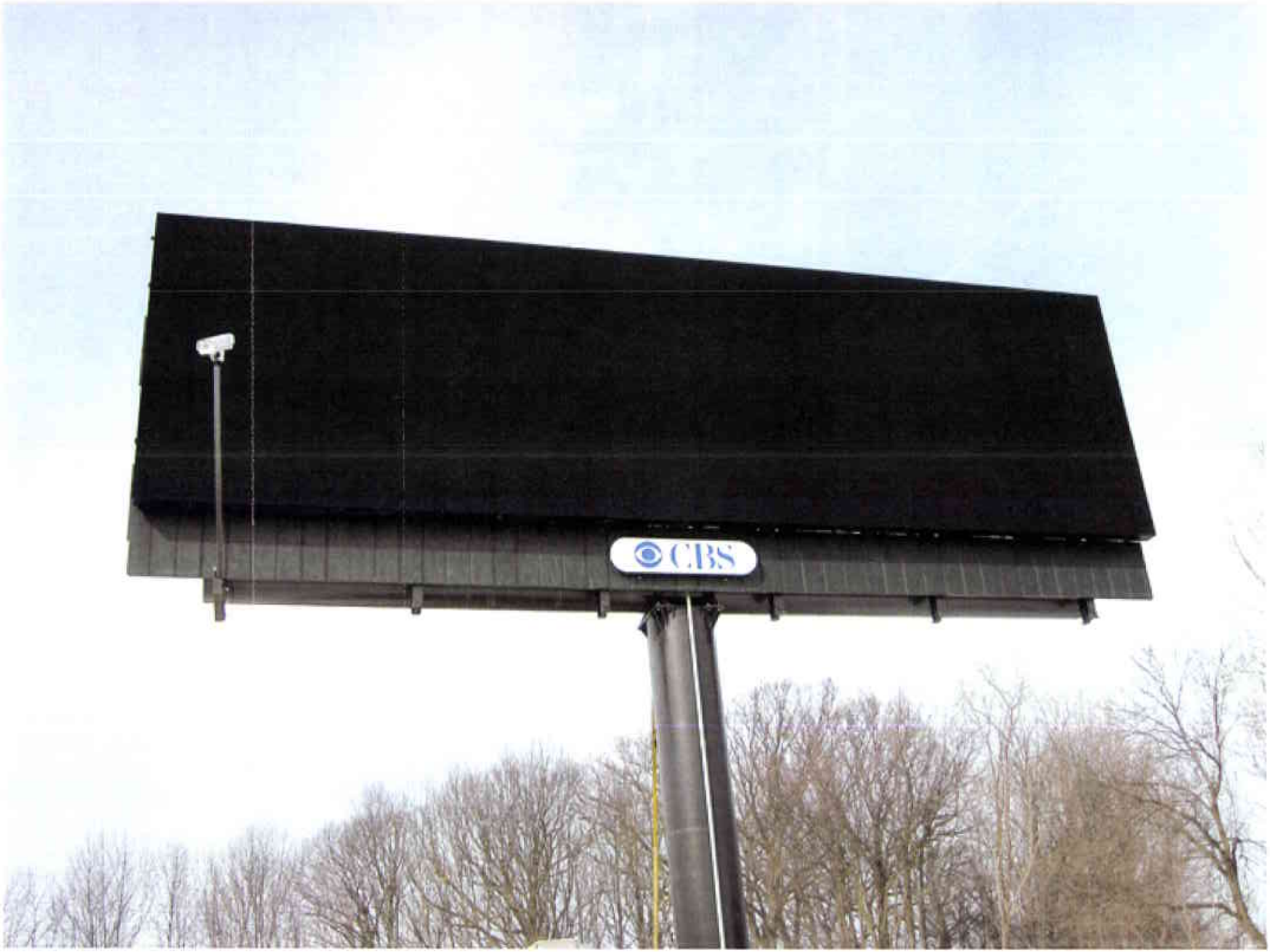
40' from Caltrans ROW to Edge of Sign

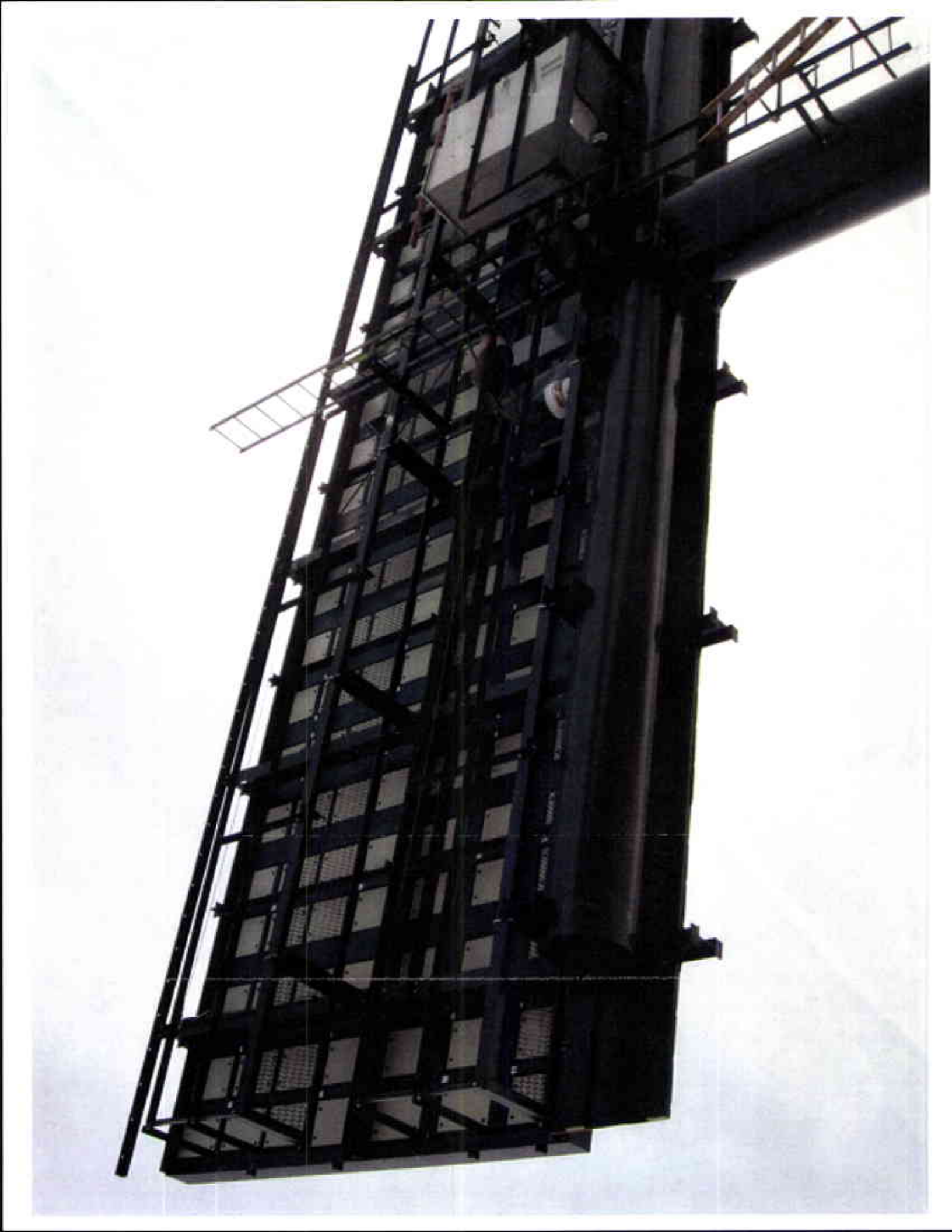
20' from Power lines to Edge of Sign

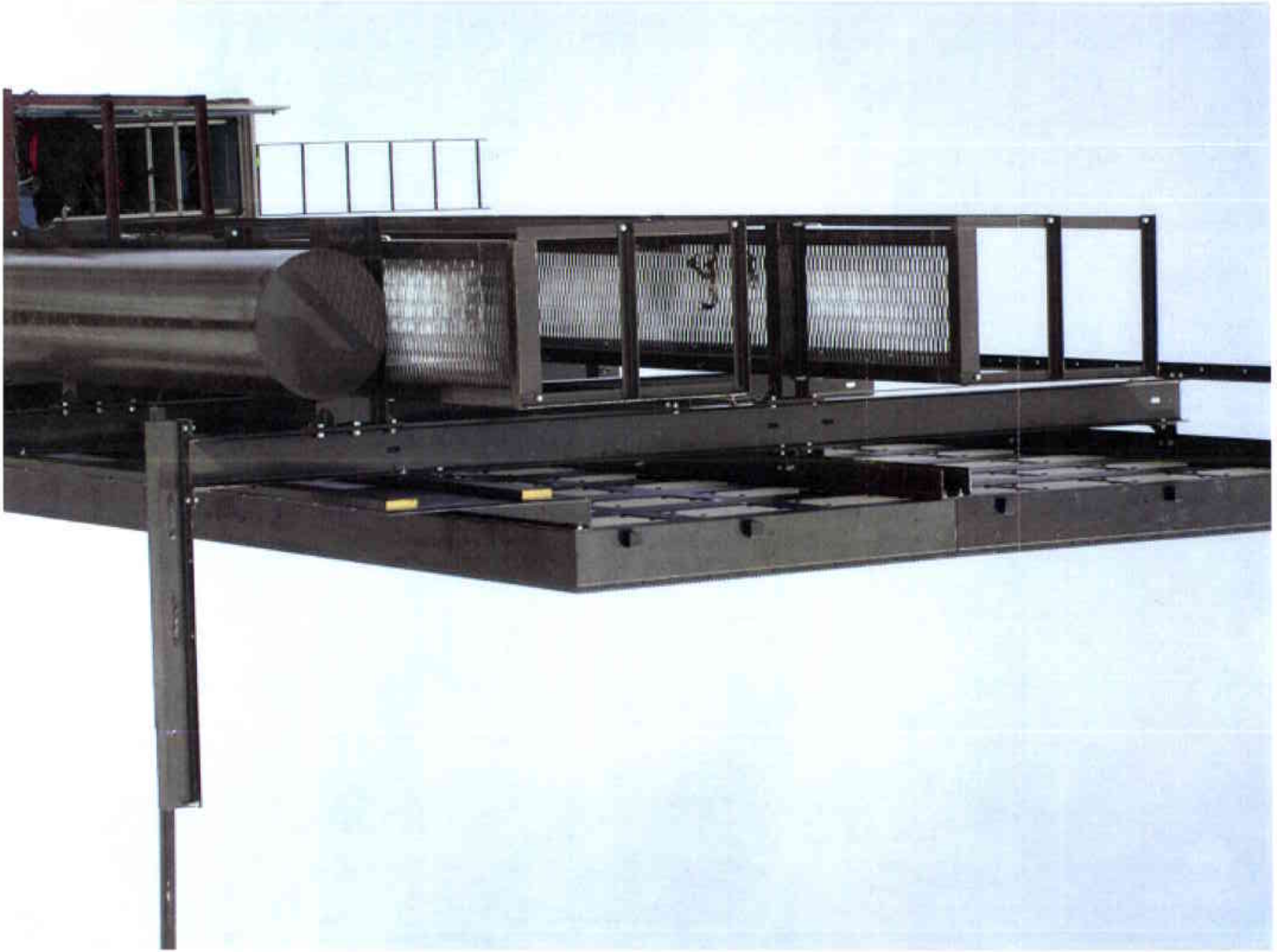

Nonstop low fares to Orlando
CBS
OUTDOOR

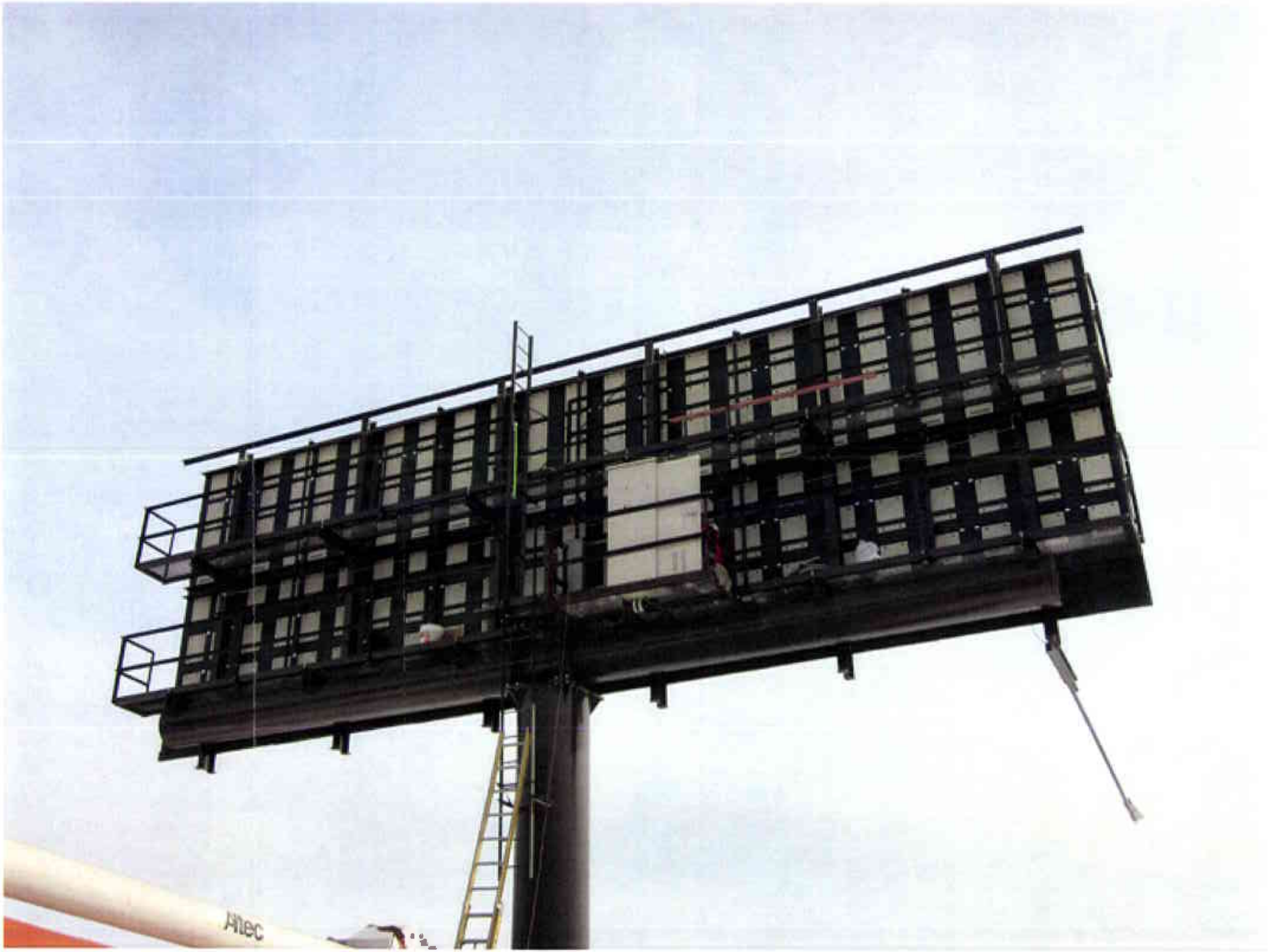

WATERS


CBS

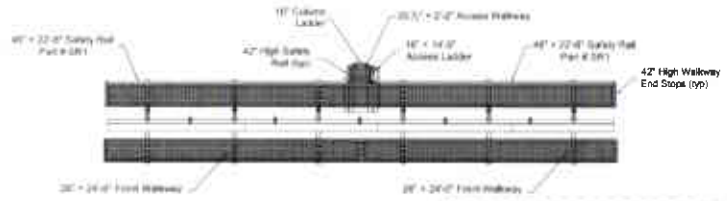

CBS





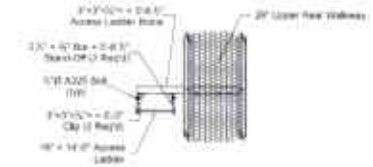

Allec

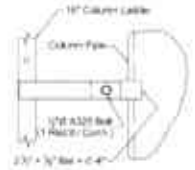
Note: This sign is designed to support a LED Digital Display on one face. The maximum Dead Load specified by CBS Outdoor, Inc. for the LED Display Modules on the face is 7,520 pounds. The schematic detailing the structural framework on which the LED Module Boxes are mounted was developed by LEEDCO ENGINEERS, INC. for CBS Outdoor, Inc., and are shown for illustration purposes only. The Dead Load Weight of this Framework was a considered factor in the design of this sign structure.



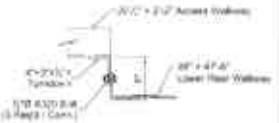
Plan View

The From Walkways and Supports are to be removed after the Digital Display System is in place.

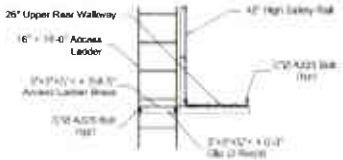




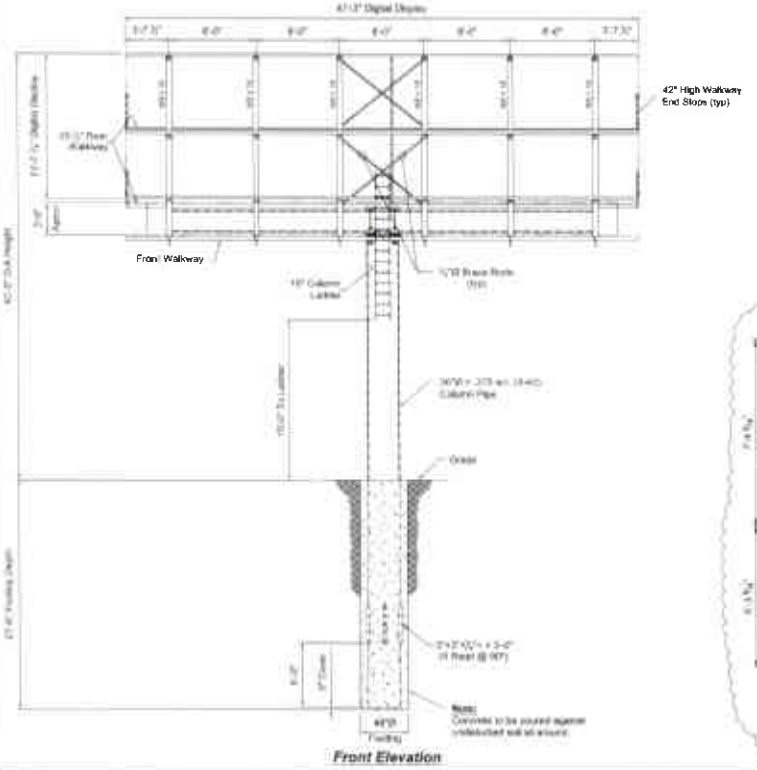
Column Ladder Connection



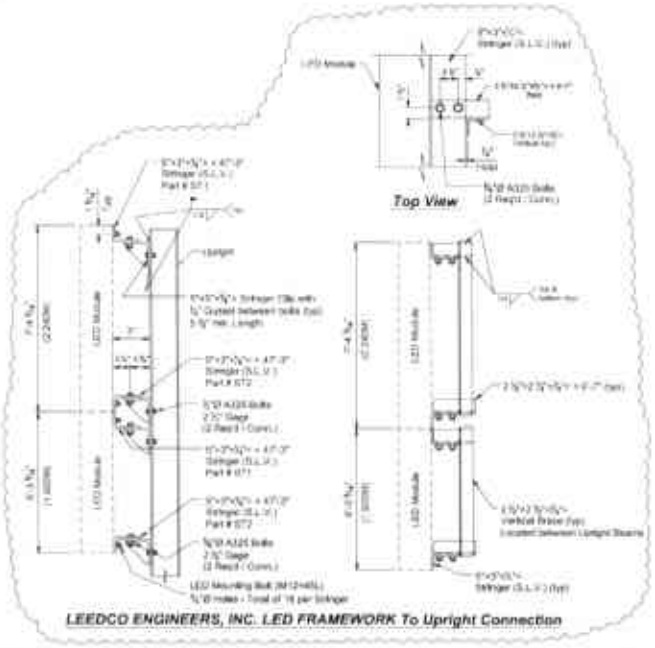
Access Walkway To Rear Walkway Connection

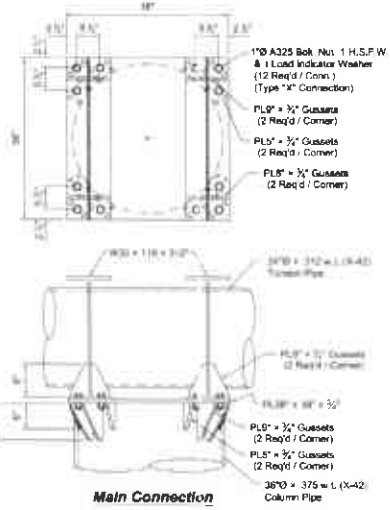


Access Ladder Connection



Front Elevation





Main Connection

NOTES :

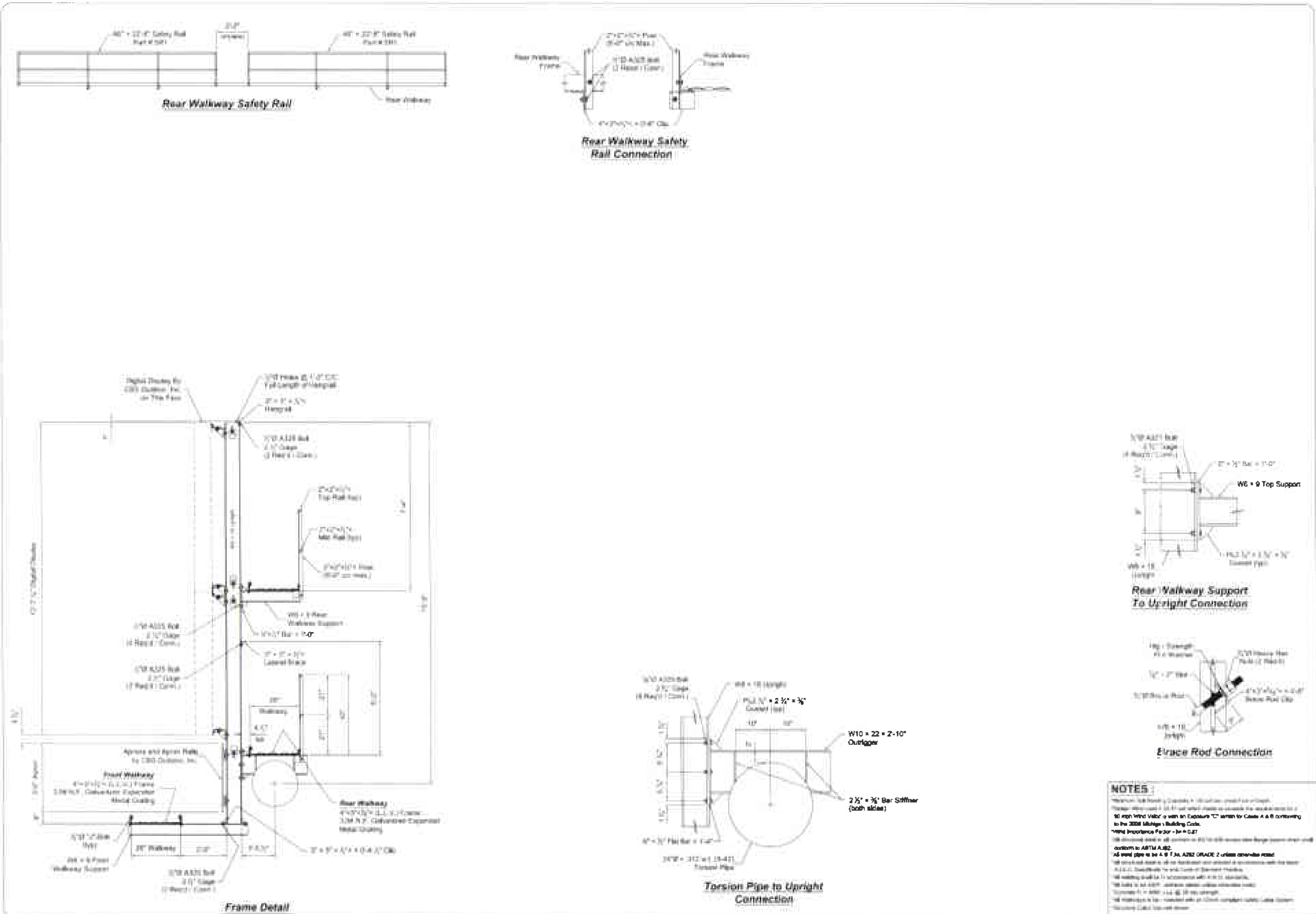
14'-0" x 48'-0" Single Face, Centermount @ 48'-0" O/A Height

CBS OUTDOOR
Grand Rapids , Michigan

Randy T. Randolph, P.E.
6036 Bluewater Drive
Lebanon , Tennessee 37087
Phone: 615-443-1915

Michigan P.E.#: 36008
Date: December 1, 2010

10-068



14'×48', Single Face, Centermount @ 40'-0" O/A Height

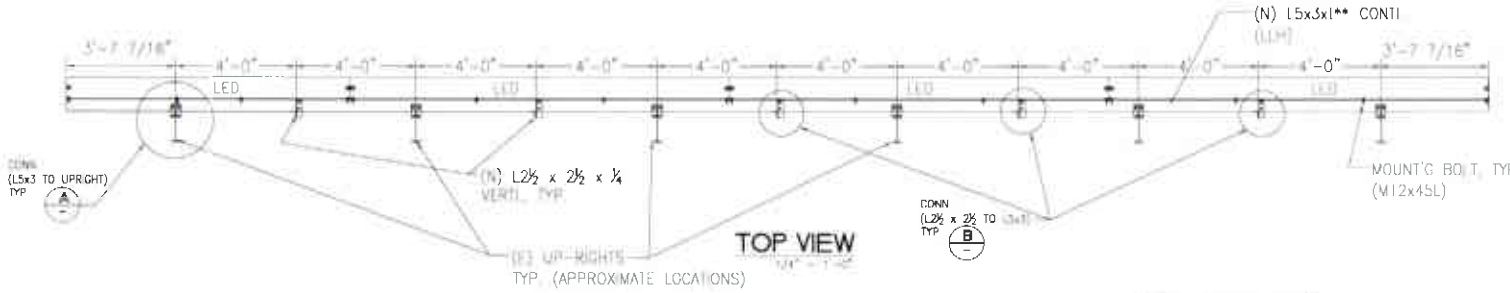
CBS OUTDOOR

Grand Rapids , Michigan

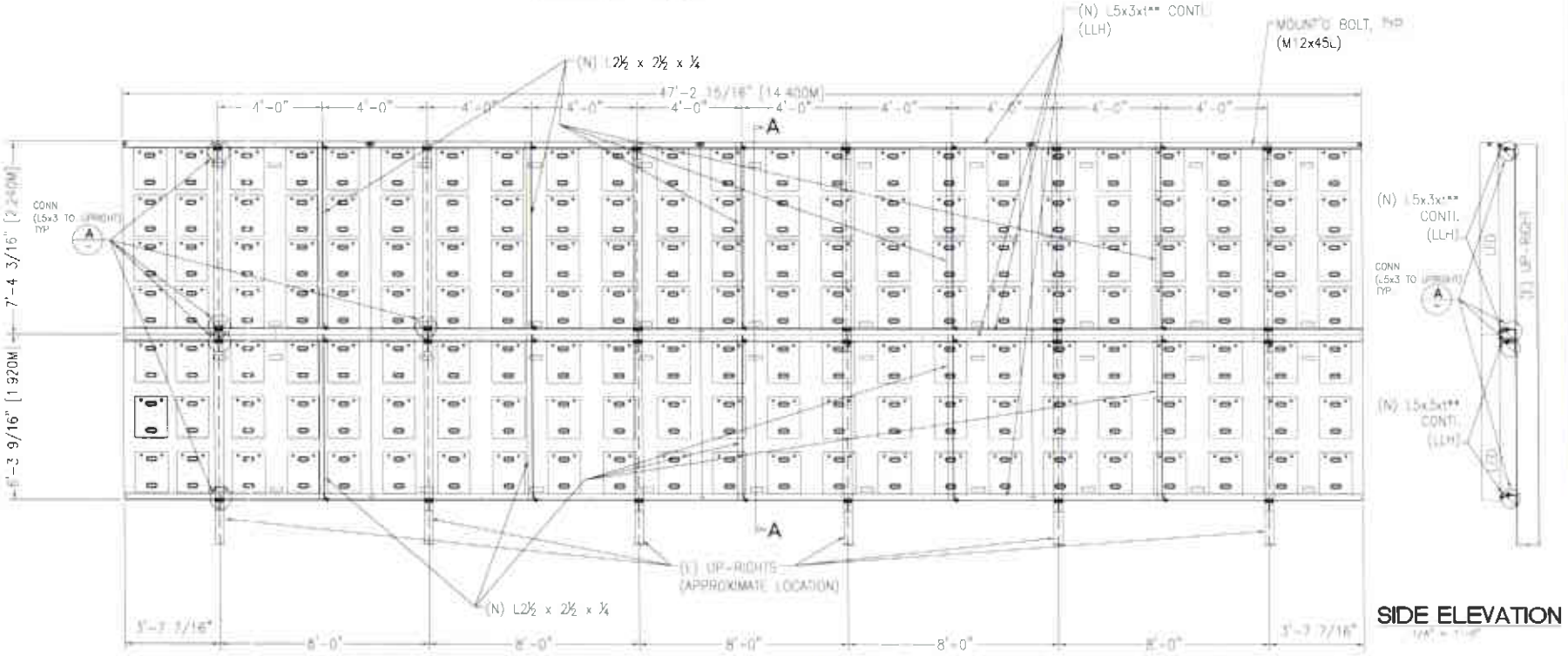
Michigan P.E.#: 30008
Date: December 1, 2010

10-068

Randy T. Randolph, P.E.
6036 Bluewater Drive
Lebanon , Tennessee 37087
Phone: 615-443-1915



TOP VIEW



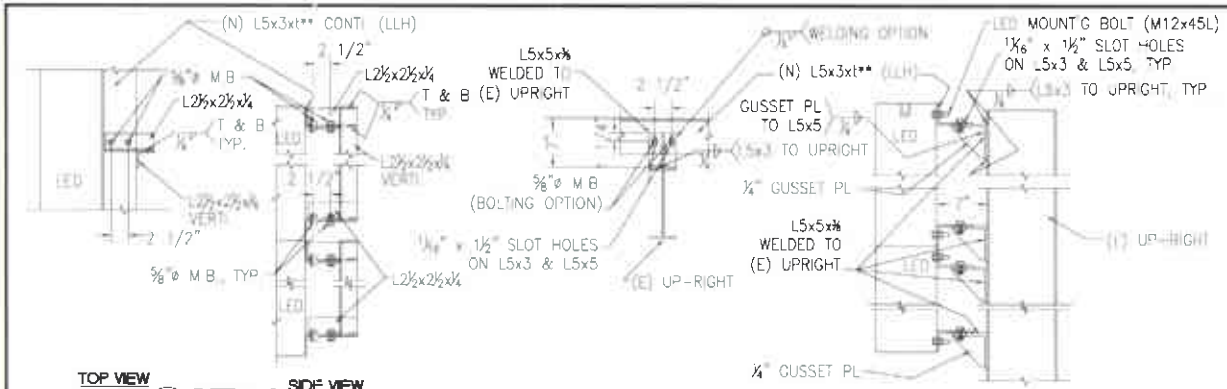
REAR ELEVATION

SIDE ELEVATION

LEEDCO ENGINEERS INC
STRUCTURAL ENGINEERING
3870 BALDWIN AVE. EL MONTE CA 9 73

TITLE
OWNER
JOB ADDRESS

C D LEE
M C
5899
9_16_2010
SHEET 1 OF 3



TOP VIEW

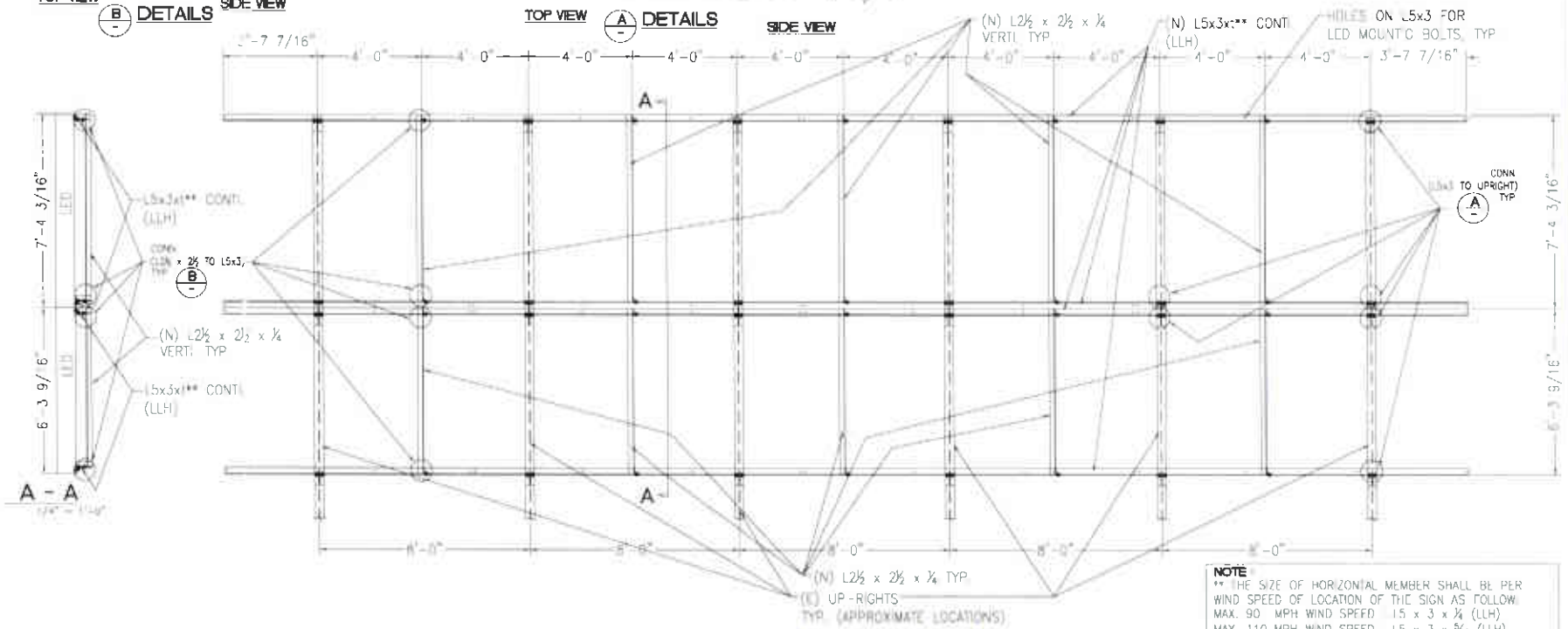
B DETAILS

SIDE VIEW

TOP VIEW

A DETAILS

SIDE VIEW



SUPPORTING FRAME ELEVATION

GENERAL NOTES

1. MAX. DESIGN WIND LOAD: 150 MPH 3-S GUST WIND SPEED, EXP "C"
2. ALL STEEL SHALL CONFORM TO ASTM A-36
3. ALL BOLTS TO BE 5/8" DIA. U.N. AND SHALL CONFORM TO ASTM A-307.
4. HIGH TENSILE BOLTS SHALL CONFORM TO ASTM A-325
5. HIGH TENSILE BOLTS ARE DESIGNED AS BEARING TYPE WITH THREADS NOT EXCLUDED FROM SHEAR PLANE. TORQUE INSPECTION IS NOT REQUIRED
6. ALL STEEL LESS THAN 1/4" THICK SHALL BE HOT DIP GALVANIZED
7. ALL WELDING SHALL BE PERFORMED IN LICENCED FABRICATION SHOP
8. ALL WELDING TO BE DONE WITH E-70 ELECTRODES.
9. STRUCTURAL OBSERVATION IS REQUIRED
10. ALL WORK SHALL COMPLY WITH THE 2006 IBC
11. PERIODIC INSPECTION REQUIRED FOR ALL HIGH STRENGTH BOLTS

NOTE

** THE SIZE OF HORIZONTAL MEMBER SHALL BE PER WIND SPEED OF LOCATION OF THE SIGN AS FOLLOW.

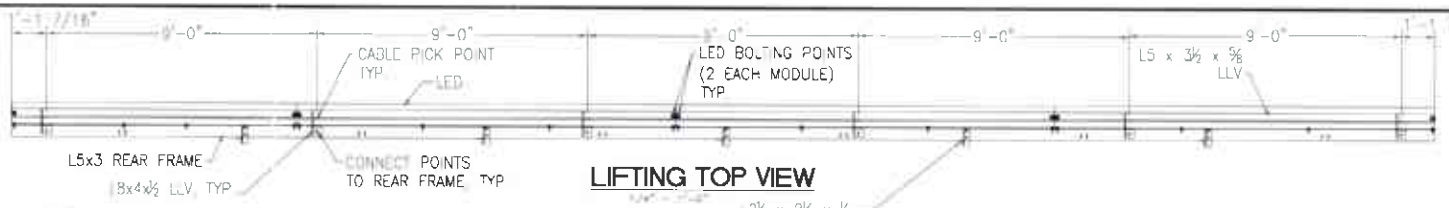
MAX. 90 MPH WIND SPEED : L5 x 3 x ¼ (LLH)
MAX. 110 MPH WIND SPEED : L5 x 3 x 5/16 (LLH)
MAX. 130 MPH WIND SPEED : L5 x 3 x ⅜ (LLH)
MAX. 150 MPH WIND SPEED : L5 x 3 x 7/16 (LLH)

LEEDCO ENGINEERS INC
STRUCTURES FOUNDATIONS
3870 BALDWIN AVE EL MONTE CA 9173 (626) 448-7870

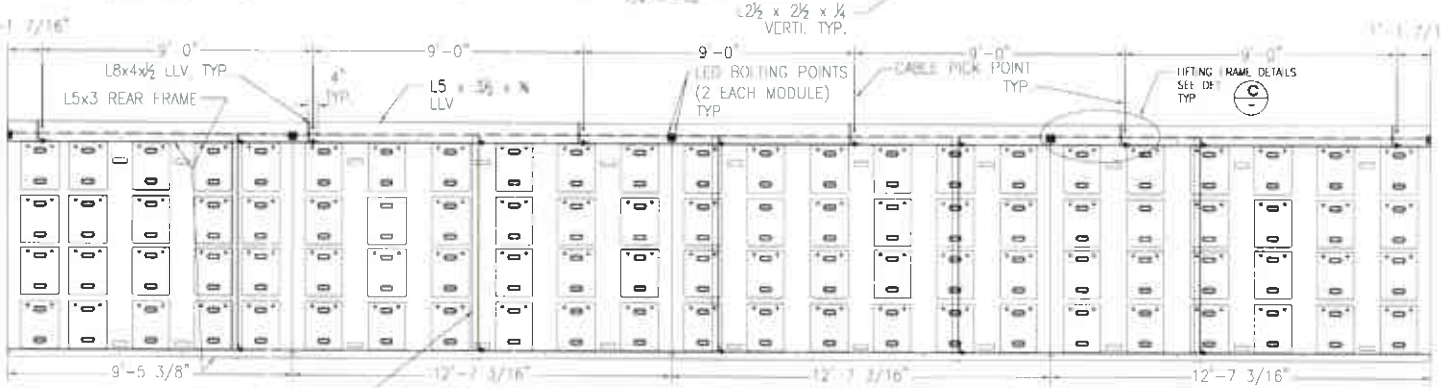
TITLE: LED ATTACHMENT
OWNER: LED SUNSIGN ADVERTISING
JOB ADDRESS: VARIES IN THE USA

APPROVED BY: C. D. LEE
JOB NO.: 6899
DRAWN BY: M. S.
DATE: 9-14-2010

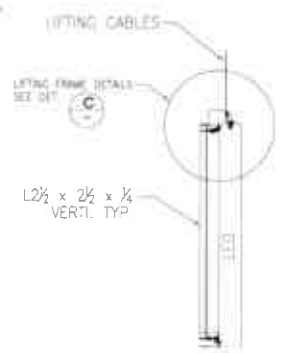
SHEET 2 OF 3

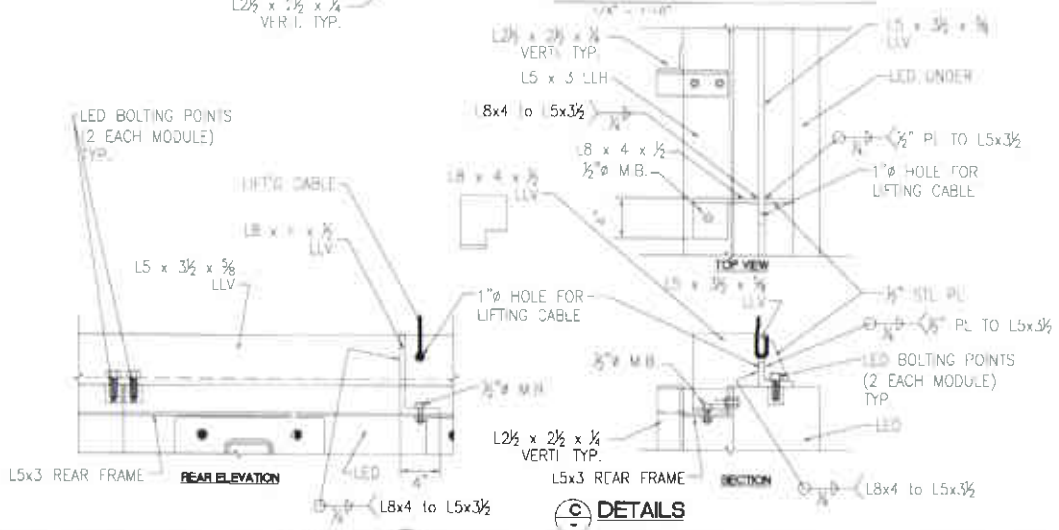


LIFTING TOP VIEW



LIFTING REAR ELEVATION





Ⓒ DETAILS

LEEDCO ENGINEERS INC
STRUCTURAL CONSULTANTS
3870 BALDWIN AVE EL MONTE, CA 9173 626 448 7870

TITLE
OWNER
JOB ADDRESS

C D LEE
6899
9_16_2010
SHEET 3 OF 3

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-230-8634 /800-525-8509
FAX 602-230-9071

CUSTOMER: CBS OUTDOOR
LOCATION: MARTINEZ, CA
ENG. REQUEST NO. G-9446
JOB # 0401-11

COVER SHEET

SIZE OF SIGN 14 X 48

H.A.G.L. 34'-0"

WIND LOAD 22.8 PSF (AVERAGE) 34.3 PSF (MAXIMUM)

SOIL: 300 PSF/FT

STRUCTURE DESING:

- ___ CENTER MOUNT
- v PARTIAL FLAG (col. loc. 20'-28')
- ___ FULL FLAG (col. loc. ___)
- ___ EXTENDED FLAG (col.loc. ___)
- ___ OFFSET ___
- v V-BUILD ___ ANGLE OR 18' FT (max:opening)
- ___ BACK TO BACK
- ___ SINGLE FACE
- ___ TRUSS

FOOTING DESIGN:

- v ROUND
- ___ SQUARE
- ___ SPREAD

SPECIAL CONDITIONS:

SIGN DESIGNED FOR 9600 lbs L.E.D. PANELS AT BOTH FACES.

VALID ONLY WHEN WET SEALED

MAR 28 2011

RENAISSANCE MEDIA GROUP 4425 N. 24TH ST. STE 200 PHOENIX, AZ 85016 602-230-8634 /800-525-8509 FAX 602-230-9071	TITLE: SPECIFICATIONS	CALC'S #: DATE: 3/22/2011 BY: SL SHT.#: 1 OF 20

CRITERIA SPECIFICATION

CODE: CBC 2010
STEEL: ASTM A-36 FY = 36 KSI
PIPE SECTIONS: ASTM A-53B, A 252 GR, OR API-5LX

WELDING ROD	-	ASTM E-70 SERIES LOW HYDROGEN
BOLTS	-	A 307 OR 325 TYPE "N"
CONCRETE	-	MIN. COMPRESSIVE STRENGTH OF F'C = 3000 PSI (150 PCF) AT 28 DAYS (DESIGN BASED ON 2500 PSI, SPECIAL STRUCTURAL INSPECTION NOT REQUIRED)
REBAR	-	ASTM A 615 GRADE 40 OR GRADE 60
WOOD	-	DOUGLAS FIR LARCH -#2 WITH Fb (REP.) = 1310 PSI
FOUNDATIONS	-	SPREAD FTG. ALLOWABLE BEARING PRESSURE N/A PSI SEE SOIL REPORT OF IBC TABLE NO. 1804.2 ROUND OR SQUARE CAISSON FTG. ALLOWING LATERAL BEARING PRESSURE 300 PSF/FT SEE SOIL REPORT OR CBC TABLE NO. 1804.2 (150 psf/ft WITH A FACTOR OF 2)

DESIGN LOADING

		AVERAGE	MAX.	
WIND	=	22.8 PSF	34.3 PSF	
LIVE	=	~~FRONT CATWALK - 20 PSF OR (4) 200# MEN. AT ANY POINT~~		
		REAR CATWALK - 20 PSF OR (2) 200# MEN. AT ANY POINT		
DEAD	=	SIGN FACE WT.	5/16 DURAPLY	- .9375 PSF
			2X4 (6 TOTAL HORIZ.)	- .5691 PSF
			2X6 (1 TOTAL VERT.)	- .575 PSF
			7 LAYERS-PAPER AND GLUE	- .416 PSF
				2.49 PSF - 2.5 PSF

SIGN CAPABLE FOR 9600 lbs
L.E.D. PANELS AT BOTH FACES

WIND LOAD CALCULATIONS

WIND PRESSURE ON THE SIGN DETERMINED PER ASCE/SEI 7-05 USING FORMULA:

$$P_W = q_z G C_f$$

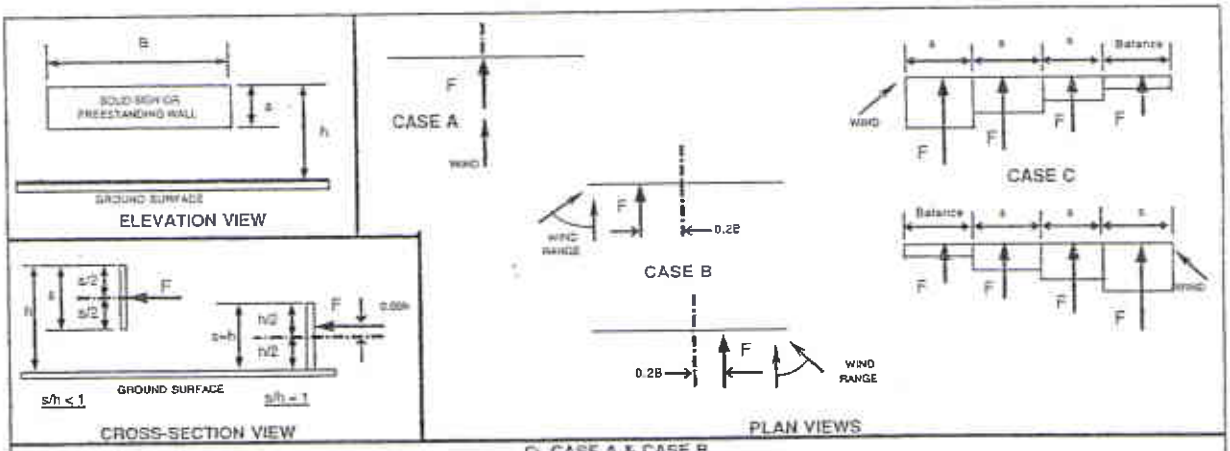
$$q_z = .00256\, k_z k_{zt} k_d V^2 I$$

$k_z = 1.08$
$k_{zt} = 1.00$
$k_d = .85$
$V = 85$ MPH
$I = .87$
$G = .85$

$$P_W = .00256 \times k_z \times 1.0 \times .85 \times V^2 \times .87 \times .85 \times C_f$$
$$= .001609\, k_z V^2$$
$$P_W = .001609 \times 1.08 \times 85^2 \times C_f$$
$$P_W = 12.56\, C_f$$

FACTOR C_f CALCULATED PER METHOD SHOWN IN ASCE/SEI TABLE 6-20 (SEE Pg 2)

Other Structures – Method 2		All Heights
Figure 6-20	Force Coefficients, C_f	Solid Freestanding Walls & Solid Signs



C_f, CASE A & CASE B

Clearance Ratio, s/h	Aspect Ratio, B/s											
	≤ 0.05	0.1	0.2	0.5	1	2	4	5	10	20	30	≥ 45
1	1.60	1.70	1.65	1.55	1.45	1.40	1.35	1.35	1.30	1.30	1.30	1.30
0.9	1.85	1.75	1.70	1.60	1.55	1.50	1.45	1.45	1.40	1.40	1.40	1.40
0.7	1.90	1.85	1.75	1.70	1.65	1.60	1.60	1.55	1.55	1.55	1.55	1.55
0.5	1.95	1.85	1.80	1.75	1.75	1.70	1.70	1.70	1.70	1.70	1.70	1.75
0.3	1.95	1.90	1.85	1.80	1.80	1.80	1.80	1.80	1.80	1.85	1.85	1.85
0.2	1.95	1.90	1.85	1.80	1.80	1.80	1.80	1.80	1.85	1.90	1.90	1.95
≤ 0.16	1.95	1.90	1.85	1.85	1.80	1.80	1.85	1.85	1.85	1.90	1.90	1.95

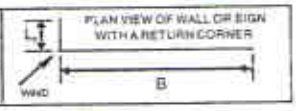
C_f, CASE C

Region (horizontal distance from windward edge)	Aspect Ratio, B/s								
	2	3	4	5	6	7	8	9	10
0 to s	2.25	2.60	2.90	3.10*	3.30*	3.40*	3.55*	3.65*	3.75*
s to 2s	1.50	1.70	1.90	2.00	2.15	2.25	2.30	2.35	2.45
2s to 3s		1.15	1.30	1.45	1.55	1.65	1.70	1.75	1.85
3s to 10s			1.10	1.05	1.05	1.05	1.05	1.00	0.95

Region (horizontal distance from windward edge)	Aspect Ratio, B/s	
	13	≥ 45
0 to s	4.00*	4.30*
s to 2s	2.60	2.55
2s to 3s	2.00	1.95
3s to 4s	1.50	1.85
4s to 5s	1.35	1.65
5s to 10s	0.90	1.10
>10s	0.55	0.55

*Values shall be multiplied by the following reduction factor when a return corner is present:

L_r/s	Reduction Factor
0.3	0.90
1.0	0.75
≥ 2	0.60



Notes:

1. The term "signs" in notes below also applies to "freestanding walls".
2. Signs with openings comprising less than 30% of the gross area are classified as solid signs. Force coefficients for solid signs with openings shall be permitted to be multiplied by the reduction factor $(1 - (1 - \varepsilon)^{1.5})$.
3. To allow for both normal and oblique wind directions, the following cases shall be considered:
   For s/h < 1:
   CASE A: resultant force acts normal to the face of the sign through the geometric center.
   CASE B: resultant force acts normal to the face of the sign at a distance from the geometric center toward the windward edge equal to 0.2 times the average width of the sign.
   For B/s ≥ 2, CASE C must also be considered:
   CASE C: resultant forces act normal to the face of the sign through the geometric centers of each region.
   For s/h = 1:
   The same cases as above except that the vertical locations of the resultant forces occur at a distance above the geometric center equal to 0.05 times the average height of the sign.
4. For CASE C where s/h > 0.8, force coefficients shall be multiplied by the reduction factor (1.8 - s/h).
5. Linear interpolation is permitted for values of s/h, B/s and L_r/s other than shown.
6. Notation:
   B: horizontal dimension of sign, in feet (meters);
   h: height of the sign, in feet (meters);
   s: vertical dimension of the sign, in feet (meters);
   ε: ratio of solid area to gross area;
   L_r: horizontal dimension of return corner, in feet (meters)

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: CHECKING WIND LOAD PER 2010 CBC

CALC'S #:
DATE:
BY: SL

$B = 48.0\,ft$
$h = 48.0\,ft$
$s = 14.0\,ft$

$\frac{B}{s} = 3.43$ $\frac{s}{h} = .292$

WIND LOAD CASE A & B

$C_{f_1} = 1.80$
$P_{W_1} = 12.56 \times 1.8 = 22.61\,psf$
$P_{W_1} = 14.0 \times 48 \times .02261 = 15.19^k$

WIND LOAD CASE C

$C_{f_2} = 2.73$ (0-s)
$C_{f_3} = 1.79$ (s-2s)
$C_{f_4} = 1.22$ (2s-3s)
C_{f_5} 1.10 (>3s)
$P_{W_2} = 12.56 \times 2.73 = 34.29\,psf$
$P_{W_3} = 12.56 \times 1.79 = 22.48\,psf$
$P_{W_4} = 12.56 \times 1.22 = 15.32\,psf$
$P_{W_5} = 12.56 \times 1.10 = 13.82\,psf$

AVERAGE WIND PRESSURE AT SIGN FROM WIND

$$P_{W_A} = \frac{14.0(34.29 + 22.48 + 15.32) + 6 \times 13.82}{48} = 22.75\,psf$$

$P_{W_2} = 14.0 \times 48 \times .02275 = 15.29^k$

RENAISSANCE MEDIA GROUP 4425 N. 24TH ST. STE 200 PHOENIX, AZ 85016 602-23008634 /800-525-8509 FAX 602-230-9071	TITLE: CHECKING FOR SEISMIC LOAD	DATE: 3/24/2011 BY: SC SHT.#: 4 OF 20

CALIFORNIA Building Code - 2010

Soil Site Class = D
Occupancy Category = II O.K.

Ss = 137.4 %
S1 = 56.6 %

Site Class	Table 1615.1.2 (1) (Fa) Mapped spectral response acceleration at short periods (Ss)				
	0.25	0.50	0.75	1.00	1.25
A	0.80	0.80	0.80	0.80	0.80
B	1.00	1.00	1.00	1.00	1.00
C	1.20	1.20	1.10	1.00	1.00
D	1.60	1.40	1.20	1.10	1.00
E	2.50	1.70	1.20	0.90	0.90
F	-	-	-	-	-

Fa = 1.000 **(interpolated)** **SMS = Fa * Ss =** 1.374

Site Class	Table 1615.1.2 (2) (Fv) Mapped spectral response acceleration at 1 sec. periods (S1)				
	0.10	0.20	0.30	0.40	0.50
A	0.80	0.80	0.80	0.80	0.80
B	1.00	1.00	1.00	1.00	1.00
C	1.70	1.60	1.50	1.40	1.30
D	2.40	2.00	1.80	1.60	1.50
E	3.50	3.20	2.80	2.40	2.40
F	-	-	-	-	-

Fv = 1.5 **(interpolated)** **SM1 = Fv * S1 =** 0.849

SDS = 2/3 * SMS = 0.916 **SD1 = 2/3 * SM1 =** 0.566

Sds >	Occupancy Category		
	I	II	III
0.000	A	A	A
0.167	B	B	C
0.330	C	C	D
0.500	D	D	D

Sdi >	Occupancy Category		
	I	II	III
0.000	A	A	A
0.067	B	B	C
0.133	C	C	D
0.200	D	D	D

Seismic Design Category = D

RENAISSANCE MEDIA GROUP 4425 N. 24TH ST. STE 200 PHOENIX, AZ 85016 602-23008634 /800-525-8509 FAX 602-230-9071	TITLE: CHECKING FOR SEISMIC LOAD	DATE: 3/24/2011 BY: SL SHT.#: 5 OF 20

Earthquake Lateral/Longitudinal Load to Column - 2010 CBS

Occupancy Category	=	II
Seismic Design Category	=	D
I	=	1.00
S_S	=	137.40 %
S_1	=	56.60 %
S_{MS}	=	1.374
S_{M1}	=	0.849
R	=	2.50
Height	=	48 ft
T = 0.035 * (hn)^0.75	=	0.638
r Reliability/redundancy Factor	=	1.00
S_{DS}	=	0.916
S_{D1}	=	0.566

(16-35) $V = S_{DS} / [R/I]$ = 0.366 W

(16-36) $V = S_{D1} / [(R/I)T]$ = 0.355 W

(16-37) $V = 0.044 * S_1 / [R/I]$ = 0.010 W

(16-38) $V = 0.5 * S_1 / [R/I]$ = 0.113 W

V (Controls) = 0.355 W kips

STRUCTURE WEIGHT = 40^k (SEE COLUMN DESIGN)

$V = .355 \times 40 = 14.2^k$

DESIGN WIND LOAD AT THE ~~HEAD~~ ONLY

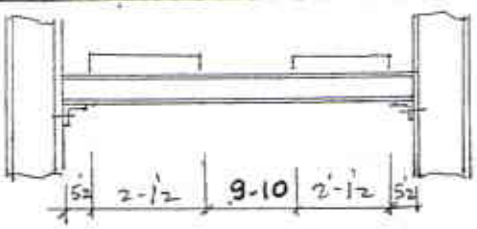
$P_W = 15.29^k > V$

WIND LOAD CONTROLS OVER SEISMIC DESIGN.

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: REAR MAINTENANCE PLATFORM

CALC'S #:
DATE: 3/24/2011
BY: SL
SHT.#: 6 OF 20



DESIGN LOAD

L.L. 20 psf × 2 × 8 = 320 #
(2) MEN + EQUIP. = 400 #

D.L. STRINGERS 4.9 × 2 = 9.8 plf
GRATING 2 × 2 = 4.0 plf
MISC 10% 1.4 plf
15.2 plf

GRATING USE 2.0 psf AMICO EXPANDED METAL GRATING, CAP @ CONC. LOAD AT CENTER OF SPAN 150 #/FT OF WIDTH.

STRINGER $M = \frac{15.2 \times 8^2}{8} + 400 \times \frac{8}{4} = 922'^{-\#}$ /(2) STRINGERS

$M = .92/2 = .46'^{-k}$/STRINGER

USE L 3 × 3 × 1/4

$f_b = .46 \times 12/.577 = 9.57$ ksi < 21.6 ksi

LEDGER $P = 15.2 \times 8 + 400 = 522 \#$

$R = 522 + 7.5 \times 9 = 590 \#$

$M = 590 \times 7.5 - 522 \times 5.98 - 9 \times 7.5^2/2 = 1050'^{-\#}$

$f_b = 1.05 \times 12/5.56 = 2.27$ ksi < 21.6 ksi

WIND PRESSURE

$P = 14.0 \times 8 \times 1/2 \times .034 = 1.90^k$

$\frac{KL}{r} = \frac{15 \times 12 \times .5}{.905} = 99.4 \rightarrow F_a = 12.98$ ksi

$f_a = 1.90/2.68 = .71$ ksi < 12.98 ksi

USE L6 × 9

CONNECTION

R = 590 # /(2) BOLTS
R = .59/2 = .29k/BOLT

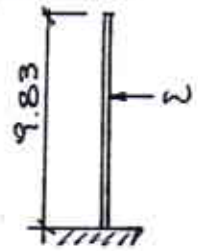
USE (2) 1/2φ A-307 BOLTS $V_{CAP} = .19 \times 20 = 3.8^k$ > .29k

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: UPRIGHT

DATE: 3/24/2011
BY: SL
SHT.#: 7 OF 20

BEAM



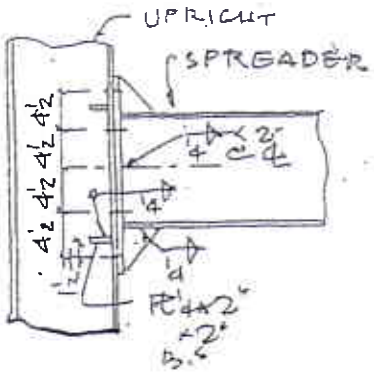
$w = .0343 \times 8 = 0.274$ k/f

$M_W = 0.274 \times 9.83^2/2 = 13.24^{1-k}$ /(2) UPRIGHTS

$M_W = 13.24/2 = 6.62^{1-k}$/UPRIGHT

USE W 12x16 USE L 10'-0"

CONNECTION



DEAD LOAD

UPRIGHT 14x16	= 224#
RR LEDGER 7.5x9	= 68#
RR W-WMM 4x8x4.9 2x2x2x8	= 221#
PANEL 9600/6	1600#
MISC 10%	217#
	2330#

$M_{DL} = 1.1(.224 + .5 + 1.6 \times 1.5) = 2.76^{1-k}$

$M_{TOT} = 6.62 + 2.76 = 9.38^{1-k}$

$J_{xx} = 2 \times 2(4.5^2 + 9.0^2) = 405 \text{ in}^4$

$c = 9"$

$T = \frac{9.38}{405} \times 12 \times 9 = 2.50^k$/BOLT

$V = 2.33/8 = .29^k$/BOLT – NEGLIGIBLE

USE (8) 5/8 ϕ A-325 BOLTS

$f_v = 2.50/.31 = 8.06$ ksi < 44 ksi

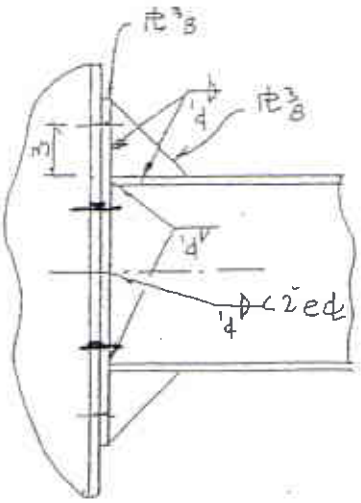
USE PL¼"x2"x2" GUSSET PL'S BETWEEN BOLTS AS SHOWN ON THE SKETCH ABOVE.

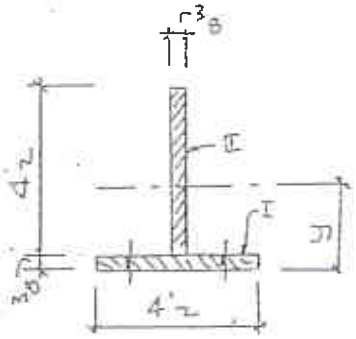
RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE:

SPREADER - UPRIGHT CONNECTION

DATE: 3/24/2011
BY: SL
SHT.#: 8 OF 20





T = 2.50k

$A_I = A_{II} = 4.5 \times .375 = 1.69 in^2$

$A = A_I + A_{II} = 1.69 \times 2 = 3.38 in^2$

$$y = \frac{1.69\,(.1875 + 2.625)}{3.38} = 1.41"$$

$$J = \frac{4.5 \times .375^3}{12} + \frac{.375 \times 4.5^3}{12} + 1.69\left[(1.41 - .187)^2 + (2.625 - 1.41^2)\right]$$

$J = 7.87 in^4$

$M = 2.50 \times 2 \times 3 = 15.0$ "-k

$$f_b = \frac{15.0}{7.87}(4.875 - 1.41) = 6.60 \text{ ksi} < 21.6 \text{ ksi}$$

USE CONNECTION AS SHOWN ABOVE

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: SPREADER

DATE: 3/24/2011
BY: SL
SHT.#: 9 OF 20

MAXIMUM CANTILEVER LENGTH 7'-6"

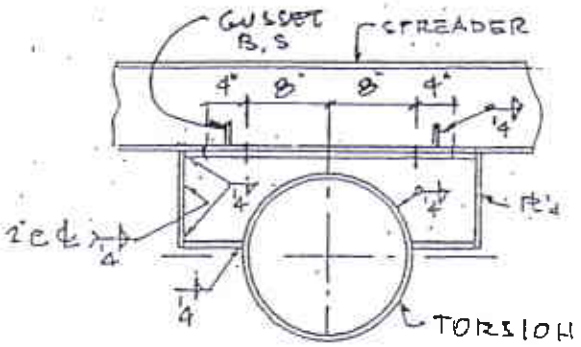
$M_{DL} = 1.1(.224 \times 8 + .068 \times 7.5 + .221 \times 7.5 + 1.6 \times 9 + .026 \times 7.5^2/2 = 21.0^{1-k}$

$M_W = 6.62^{1-k}$

$M_{TOT} = 21.00 + 6.62 = 27.62^{1-k}$

USE W 12x26 UNL 18'-0"

CONNECTION



$P_W = .0343 \times 14 \times 8 = 3.84^k$

$M_W = .274 \times 10.33^2/2 = 14.62^{1-k}$

$M_{DL} = 21.0^{1-k}$

$M_{TOT} = 14.62 + 21.0 = 35.62^{1-k}$

$J_{xx} = 2 \times 2 (8^2 + 12^2) = 832 in^4$

$C = 12"$

$T = \frac{35.62}{832} \times 12 \times 12 = 6.14^k$/BOLT

$V = 3.84/8 = .48^k$/BOLT ← NEGLIGIBLE

USE (8) 5/8 Ø A-325 BOLTS

$f_t = 6.14/.31 = 19.81$ ksi < 44ksi

USE TEd 3" x 3" GUSSET TE'S BETWEEN BOLTS AS SHOWN ON THE SKETCH ABOVE

WELDING - TORSION PIPE 24" DIA. MIN

$V = 35.62/1 = 35.62^k$ @ PIPE PERIMETER

USE 1/4" FILLET WELD ALL AROUND THE PIPE

$V_{CAP} = 3.71^k$/INCH

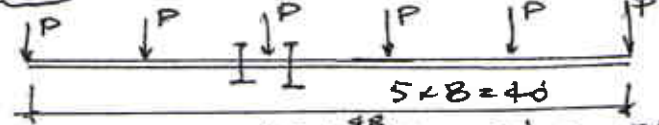
$L = 35.62/3.71 = 9.60"$ OF WELD MIN. OK

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: TORSION

DATE: 3/24/2011
BY: SL
SHT.#: 10 OF 20

PIPE



$w = 95$ plf (MAX)

$P_{DL} = 2.33 \times 2 + .026 \times 15 = 5.05^k$

$M_{DL} = 5.05(24 + 16 + 8) + .095 \times 24^2/2 = 269.76^{1-k}$

WIND LOAD CASE A & B

$P_W = 15.19^k$

$M_W = (4 + .2 \times 48)15.19 = 206.58^{1-k}$

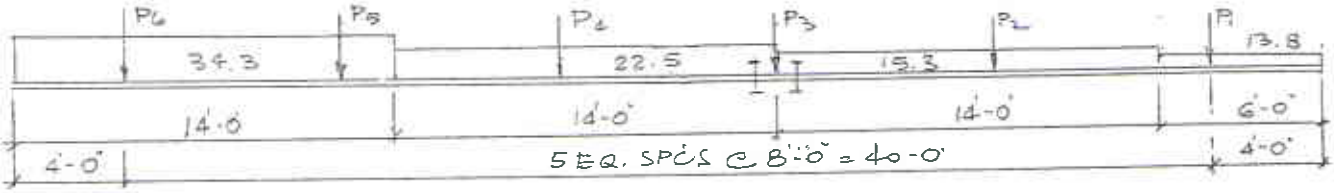
$M_b = (206.58^2 + 269.76^2)^{1/2} = 339.8^{1-k}$

$M_T = 15.19\left(\frac{14}{2} - 2.5\right) = 68.4^{1-k}$

USE PIPE 24ϕ x .375 (F_y = 42 ksi)

$$\frac{339.8}{373.7} + \left(\frac{68.4}{453.2}\right)^2 = .93 < 1.0$$

WIND LOAD CASE C



$P_1 = (.0138 \times 6 + .0153 \times 2)14 = 1.59^k$

$P_2 = .0153 \times 8 \times 14 = 1.71^k$

$P_3 = (.0153 + .0225) \times .5 \times 14 \times 8 = 2.12^k$

$P_4 = .0225 \times 8 \times 14 = 2.52^k$

$P_5 = (.0225 \times 2 + .0343 \times 6)14 = 3.51^k$

$P_6 = .0343 \times 8 \times 14 = 3.84^k$

15.29^k

$M_{W_1} = 3.84 \times 24 + 3.51 \times 16 + 2.52 \times 8 = 168.5^{1-k}$

$M_{W_2} = 168.5 - 1.71 \times 8 - 1.59 \times 12 = 135.72^{1-k}$

$M_b = (168.5^2 + 269.76^2)^{1/2} = 318.1^{1-k} < 339.8^{1-k}$

$M_T = (3.84 + 3.51 + 2.52)\left(\frac{14}{2} - 2.5\right) = 44.4^{1-k} < 68.4^{1-k}$

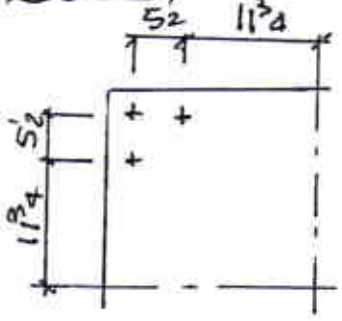
WIND LOAD CASE B CONTROLS THIS DESIGN

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: COLUMN - TORSION CONN.

DATE: 3/25/2011
BY: SL
SHT.#: 11 OF 20

BOLTS



$J_{xx} = J_{yy} = 4 \times 2 \times 17.25^2 + 2 \times 2 \times 11.75^2 = 2933 in^4$

$J = 2933 \times 2 = 5866 in^4$

$c = 17.25"$

$r = (17.25^2 \times 2)^{1/2} = 24.4"$

$M_{DL_1} = 269.76 - 5.05(8+16) - .095 \times 16^2/2$
$= 136.4^{k-ft}$

$M_{DL_2} = 9.6 \times 6 = 57.6^{k-ft}$

WIND LOAD CASE B

$P_W = 15.19^k$

$M_W = 15.19/\left(\frac{14}{2} - 1.5\right) = 83.54^{k-ft}$

$M_T = 206.6^{k-ft}$

$T_1 = \frac{136.4 + 57.6 + 83.5}{2933} \times 17.25 \times 12 = 19.59^k/\text{BOLT}$

$V_1 = \frac{206.6}{5866} \times 12 \times 24.4 + \frac{15.19}{12} = 11.58^k/\text{BOLT}$

USE (12) 1" ϕ A-325 BOLTS

$f_{t_1} = 19.59/1.227 = 15.96 ksi$

$f_{v_1} = 11.58/1.227 = 9.44 ksi$

$F_{t_1} = \sqrt{44^2 - 4.39 \times 9.44^2} = 39.30 ksi > f_{t_1}$

WIND LOAD CASE C

$P_W^F = 15.29^k$

$M_W = 15.29\left(\frac{14}{2} - 1.5\right) = 84.09^{k-ft}$

$M_T = 135.7^{k-ft}$

$T_2 = \frac{84.1 + 57.6 + 136.4}{2933} \times 12 \times 17.25 = 19.63^k/\text{BOLT}$

$f_{t_2} = 19.63/1.227 = 16.00 ksi$

$V_2 = \frac{135.7}{5866} \times 12 \times 24.4 + 15.29/12 = 8.05^k/\text{BOLT}$

$f_{v_2} = 8.05/1.227 = 6.56 ksi$

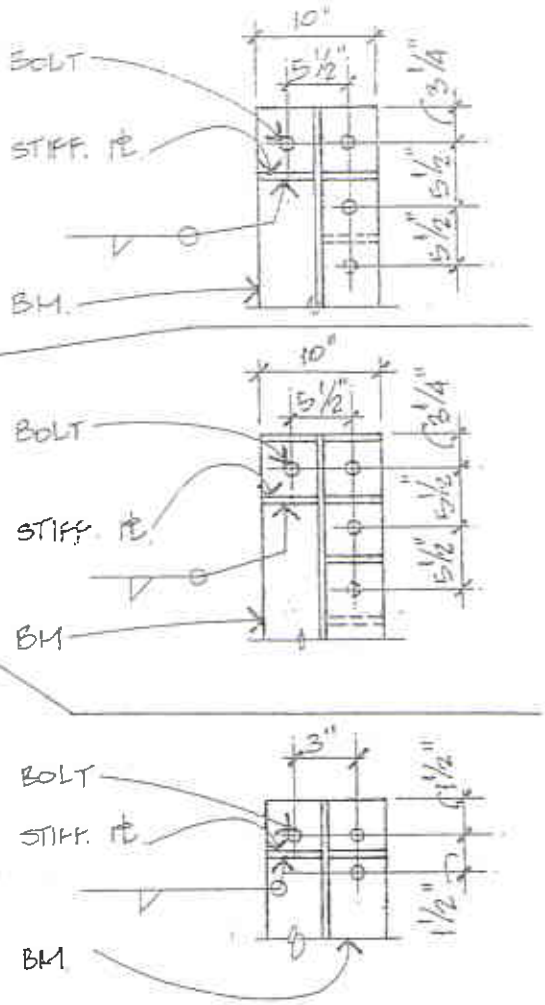
$F_{t_2} = \sqrt{44^2 - 4.39 \times 6.56^2} = 41.80 ksi > f_{t_2}$

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE:
SADDLE BOOM SELECTION TABLE

DATE: 3/25/2011
BY: SL
SHT.#: 12 OF 20

MAX. BOLT TENSION	MIN. FLANGE THICK	STIFF.	WELD
26	5/8	10 X 1/2	1/4"
31.5	11/16		
37	3/4		
43.5	13/16		
50	7/8		5/16
58	15/16		5/16
66	1		3/8
30	5/8	10 X 1/2	1/4"
40	11/16		
50	3/4		
60	13/16		
70	7/8	12 X 1/2	5/16
80	15/16		5/16
90	1		3/8
14	1/2	8 X 1/4	1/4"
18	9/16		
22	5/8		
26	3/4		
30	7/8		



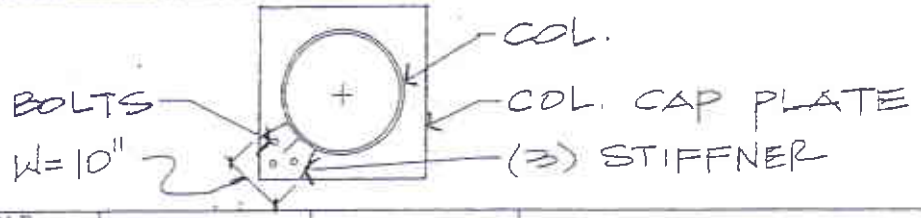
RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: CAP PL SELECTION TABLE

CALC'S #:
DATE: 3/25/2011
BY: SL
SHT.#: 13 OF 20

M_b (PLATE) = T X 2"/W =

REQ = $\sqrt{\frac{M \times 6}{27 \times 1.33}}$



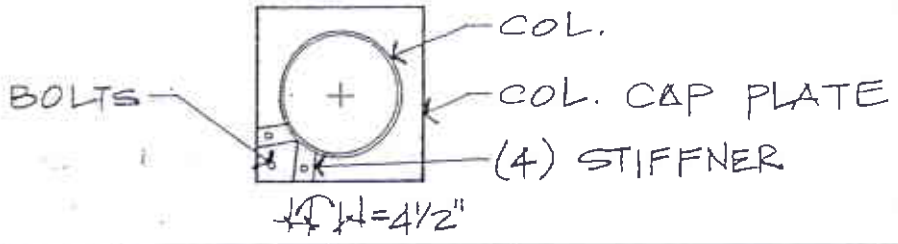
CENTER MOUNT

WIND	BOLT 38 1/2 SQ	TEN. 44 SQ	CAP PLATE THK	CAP PLATE WELD	STIFFNER THK	STIFFNER WELD
20	10K	9K	1/2	3/8	1/2X8	1/4"
30	14	13	5/8	3/8	1/2X8	1/4"
40	17	15	3/4	3/8	1/2X8	1/4"
50	20	19	7/8	3/8	1/2X8	1/4"
60	24	22	7/8	3/8	1/2X8	1/4"

MIN 45° SLOPE

M (PLATE) = T X 4.5/6
M /W = 11-K/INCH

t REQ $\sqrt{\frac{M \times 6}{27 \times 1.33}}$



FULL FLAG

WIND	BOLT 38 1/2 SQ	TEN. 44 SQ	CAP PLATE THK	CAP PLATE WELD	STIFFNER THK	STIFFNER WELD
20	40K	36K	1	45° V	1/2X8	5/16
30	43	40	1	45° V	1/2X8	5/16
40	46	43	1 1/8	45° V	1/2X8	5/16
50	50	46	1 1/4	45° V	1/2X8	3/8
60	53	50	1 1/4	45° V	1/2X8	3/8

MIN 45° SLOPE

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: COLUMN DESIGN

DATE: 3/24/2011
BY: SL
SHT.#: 14 OF 20

$M_{DL_1} = 269.76 - 5.05(8+16) - .095 \times 16^2/2) = 136.4^{1-k}$

$M_{DL_2} = 9.6 \times 6 = 57.6^{1-k}$

WIND LOAD CASE B

$P_W^R = 15.19^k$

$P_W^C = 3 \times .8 \times 34 \times .0226 = 1.84^k$

$P_W = 17.03^k$

$M_W = 15.19\left(\frac{14}{2}+34\right) + 1.84 \times 34/2 = 654.1^{1-k}$

$M_b = [(654.1+57.6)^2 + 136.4^2]^{1/2} = 724.7^{1-k}$

$M_T = 206.6^{1-k}$

USE PIPE 36 ϕ x .438 (F_y = 40 ksi)

$$\frac{724.7}{945.1} + \left(\frac{206.6}{1146.2}\right)^2 = .80 < 1.0$$

WIND LOAD CASE C

$P_W^F = 15.29^k$

$P_W^C = 3 \times .8 \times 34 \times .0228 = 1.86^k$

$P_W = 17.15^k$

$M_W = 15.29\left(\frac{14}{2}+34\right) + 1.86 \times 34/2) = 658.5^{1-k}$

$M_b = [(658.5+57.6)^2 + 136.4^2]^2 = 729.0^{1-k}$

$M_T = 135.7^{1-k}$

$$\frac{729.0}{945.1} + \left(\frac{135.7}{1146.2}\right)^2 = .79 < 1.0$$

STRUCTURE WEIGHT

HEAD W/O TORSION	$5.05 \times 6 = 30.30^k$
TORSION 40 x .095	3.80^k
COLUMN .167 x 36.5	6.10^k
	$W = 40.20^k$

$h = 729/17.15 = 42.51$ ft

↳ FOR FOOTING DESIGN

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: ALTERNATE COLUMN SPLICE

DATE: 3/25/2011
BY: SL
SHT.#: 15 OF 20

SPLICE LOCATED 8'-0" ABOVE GRADE LEVEL

$M_{DL_1} = 136.4^{1-k}$
$M_{DL_2} \approx 56.6^{1-k}$

WIND LOAD CASE B

$P_W^F =$ $= 15.19^k$
$P_W^C = 3 \times .8 \times 26 \times .0226 = 1.41^k$
$P_W = 16.60^k$

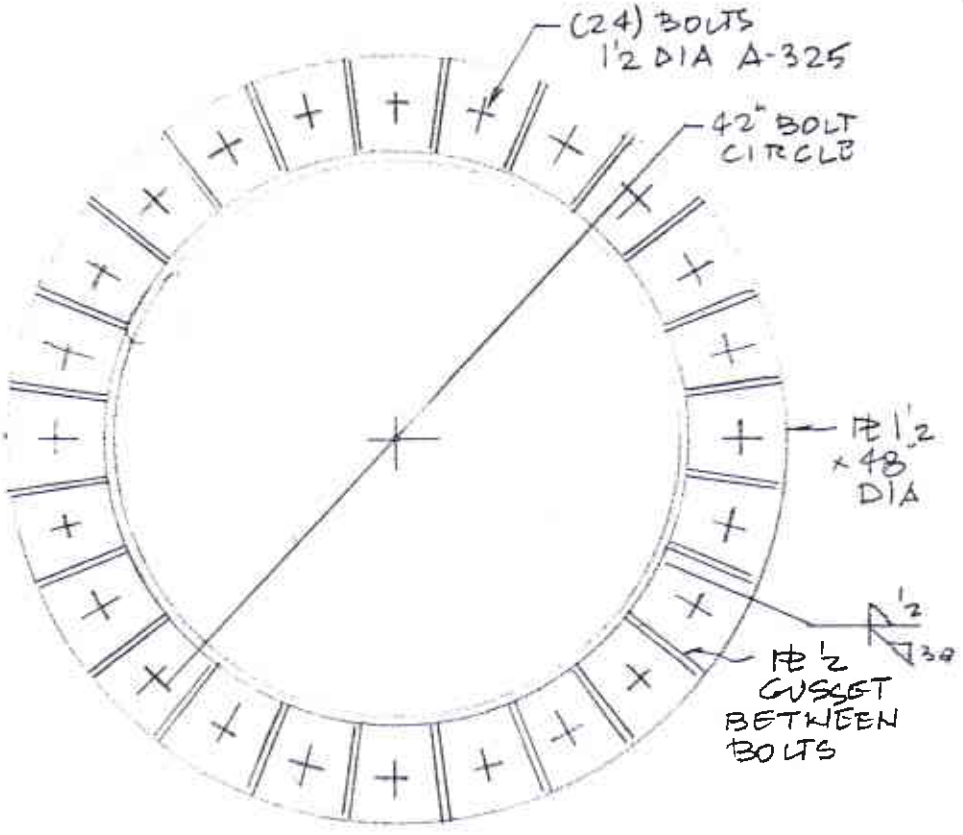
$M_W = 15.19\left(\frac{14}{2} + 26\right) + 1.41 \times 26/2 = 519.6^{1-k}$
$M_b = [(519.6 + 56.6)^2 + 136.4^2]^{1/2} = 592.1^{1-k}$
$M_T = 206.6^{1-k}$

WIND LOAD CASE C

$P_W^F =$ $= 15.29^k$
$P_W^C = 3 \times .8 \times 26 \times .0228 = 1.42^k$
$P_W = 16.71^k$

$M_W = 15.29\left(\frac{14}{2} + 26\right) + 1.42 \times 26/2 = 523.1^{1-k}$
$M_T = 135.7^{1-k}$

$M_b = [(523.1 + 56.6)^2 + 136.4^2]^{1/2} = 595.5^{1-k}$



RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: ALTERNATE COLUMN SPLICE

DATE: 3/24/2011
BY: SL
SHT.#: 16 OF 20

TRY (24) 1 1/2 ϕ A-325 BOLTS @ 5 1/2" O.C (15°)

$J_{xx} = 2\times 21^2 + 2\times 2\times 21^2(\cos^2 15° + \cos^2 30° + \cos^2 45° + \cos^2 60° + \cos^2 75°) = 5292\ in^4$

$J = 5292 \times 2 = 10584\ in^4$

$C = r = 21"$

$T = \frac{595.5}{5292} \times 12 \times 21 = 28.36^k/BOLT$

$V = \frac{206.6}{10584} \times 12 \times 21 + \frac{16.71}{24} = 5.61^k/BOLT$

USE (24) 1 1/4 ϕ A-325 BOLTS

$f_t = 28.36/1.227 = 23.11\ KSI$

$f_v = 5.61/1.227 = 4.58\ KSI$

$F_t = \sqrt{44^2 - 4.39 \times 4.58^2} = 42.94\ KSI > f_t$

CHECKING PLATE FOR BENDING

$M = 28.36 \times 5.5/6 = 26.0^{"-k}$

$\frac{M}{W} = 26/4.5 = 5.78^{"-k}/INCH$

$t_{req'd} = \sqrt{\frac{5.78 \times 6}{27}} = 1.13"$

USE CONNECTION PL 1 1/2" THK

WELDING: PLATE TO PIPE - USE FULL PEN WELD ALL AROUND THE PIPE.

GUSSETS $M = 28.36 \times 3 = 85.08^{"-k}$

$V = 85.08/8 = 10.63^k$ @ END OF GUSSETS

USE 5/16 FILLET WELD ALL AROUND THE GUSSET - $V_{CAP} = 4.62$ /INCH

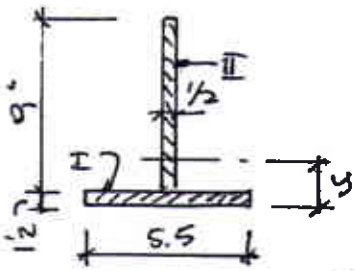
$L = 10.63/4.62 = 2.30"$ OF WELD OK

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: ALTERNATE COLUMN SPLICE

DATE: 3/24/2011
BY: SL
SHT.#: 17 OF 20

BENDING OF PL WITH GUSSETS



$A_I = 5.5 \times 1.5 = 8.25\ in^2$

$A_{II} = 9.0 \times .5 = 4.50\ in^2$

$A = 12.75\ in^2$

$y = \frac{8.25 \times .75 + 4.50 \times 6}{12.75} = 2.60"$

$I_{xx} = \frac{5.5 \times 1.5^3}{12} + \frac{.5 \times 9^3}{12} + 8.25(2.60 - .75)^2 + 4.50(6.0 - 2.60)^2$

$I_{xx} = 112.2\ in^4$

$S_{xx} = 112.2 / (10.5 - 2.60) = 14.2\ in^3$

$f_b = 85.08 / 14.2 = 5.99\ ksi < 21.6 ksi$

GUSSET PL'S 9" LONG

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: FOOTING -DESIGN

DATE: 3/24/2011
BY: SL
SHT.#: 18 OF 20

DESIGN DATA

		1
Allow Passive		300.0 psf
Max Passive	:	1500.0 psf
Load Duration Factor	:	1.000
Point Load	:	17150.0 #
Load Height	:	42.51 ft
Dist. Load	:	0.0 plf
Start Height	:	0.00 ft
End Height	:	0.00 ft
Pole Type	:	Circular
Width/Diameter	:	60.0 in
Surface Restraint	?	Free

SUMMARY

Moments @ Surface...		1
Point Load	:	729046.5 ft-#
Uniform Load	:	0.0 ft-#
... Total Moment	:	729046.5 ft-#
Total Lateral Load	:	17150.0 #

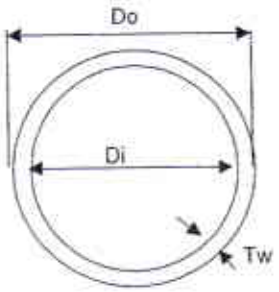
NON-RESTRAINED RESULTS

Min. Req'd Embedment		
A(1+(1+4.36h /A)^.5)/2		
A=2.34P/(S 1 b)	:	21.26 ft
Press @ 1/3 Embed		
Actual	:	1200.0 psf
Allowable	:	1500.0 psf

FOOTING 5'-0" DIA. x 21'-6"

RENAISSANCE MEDIA GROUP 4425 N. 24TH ST. STE 200 PHOENIX, AZ 85016 602-23008634 /800-525-8509 FAX 602-230-9071	TITLE: TORSION PIPE MOMENT CAPACITY	DATE: 3/24/2011 BY: SL SHT.#: 19 OF 20

Specifications



Outside Diameter (Do)	=	**24.00 in.**
Wall Thickness (Tw)	=	**0.375 in.**
Inside Diameter (Di)	=	**23.25 in.**
Column Height (L)	=	**25.00 ft.**
Material Weight	=	**490.00** lb/ft^3
Wt / ft	=	94.71 lb/ft
Section Modulus (Sx)	=	161.78 in^3
Moment of Inertia (Ix)	=	1942.30 in^4
Do/Tw	=	64.00

Allowable Stresses

Fy = **42.00 ksi**

If $\frac{Do}{Tw} < \frac{3300}{Fy}$ $Fb = .66\,Fy$

If $\frac{13000}{Fy} > \frac{Do}{Tw} > \frac{3300}{Fy}$ $Fb = \frac{662 \cdot Tw}{Do} + 4\,Fy$

Fb = **27.72 ksi**

If $\frac{Do}{Tw} < \frac{6575}{Fy^{\frac{4}{5}}\left(\frac{L}{Do}\right)^{\frac{2}{5}}}$ or $\frac{Do}{Wt} < \frac{994}{Fy^{\frac{2}{3}}}$ then $Fv = 4\,Fy$

If $\frac{Do}{Tw} > \frac{6575}{Fy^{\frac{4}{5}}\left(\frac{L}{Do}\right)^{\frac{2}{5}}}$ and $\frac{Do}{Wt} > \frac{994}{Fy^{\frac{2}{3}}}$ then $Fv = \frac{23800}{\sqrt{\frac{L}{Do}}\left(\frac{Do}{Tw}\right)^{\frac{5}{4}}}$ or $Fv = \frac{11600}{\left(\frac{Do}{Tw}\right)^{\frac{3}{2}}}$

Fv = **16.80 ksi**

Allowable Loads

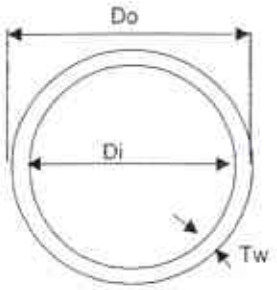
Allowable Stress Increase?	= Y	**1.00**	
Bending Moment Capacity (Mb)	=	373.70 Ft-kips	$Mb = \frac{Sx \cdot Fb \cdot A}{12}$
Mb (Allowable)	=	**373.70 Ft-kips**	
Torsional Moment Capacity (Mt)	=	453.20 Ft-kips	$Mt = \frac{Fy \cdot 2 \cdot Ix}{\frac{Do}{2} \cdot 12}$
Mt (Allowable)	=	**453.20 Ft-kips**	

RENAISSANCE MEDIA GROUP
4425 N. 24TH ST. STE 200
PHOENIX, AZ 85016
602-23008634 /800-525-8509
FAX 602-230-9071

TITLE: COLUMN PIPE MOMENT CAPACITY

DATE: 3/24/2011
BY: SL
SHT.#: 200F20

Column Specifications



Outside Diameter (Do)	=	**36.00 in.**
Wall Thickness (Tw)	=	**0.438 in.**
Inside Diameter (Di)	=	**35.124 in.**
Column Height (L)	=	**40.00 ft.**
Material Weight	=	**490.00** lb/ft^3
Wt / ft	=	166.51 lb/ft
Section Modulus (Sx)	=	429.60 in^3
Moment of Inertia (Ix)	=	7736.74 in^4
Do/Tw	=	82.19

Allowable Stresses

Fy = **40.00 ksi**

If $\frac{Do}{Tw} < \frac{3300}{Fy}$ $Fb = 0.66\,Fy$

If $\frac{13000}{Fy} > \frac{Do}{Tw} > \frac{3300}{Fy}$ $Fb = \frac{662 \cdot Tw}{Do} + .4\,Fy$

Fb = **26.40 ksi**

If $\frac{Do}{Tw} < \frac{6575}{Fy^{\frac{4}{5}}\left(\frac{L}{Do}\right)^{\frac{2}{5}}}$ or $\frac{Do}{Wt} < \frac{994}{Fy^{\frac{2}{3}}}$ then $Fv = .4\,Fy$

If $\frac{Do}{Tw} > \frac{6575}{Fy^{\frac{4}{5}}\left(\frac{L}{Do}\right)^{\frac{2}{5}}}$ and $\frac{Do}{Wt} > \frac{994}{Fy^{\frac{2}{3}}}$ then $Fv = \frac{23800}{\sqrt{\frac{L}{Do}}\left(\frac{Do}{Tw}\right)^{\frac{5}{4}}}$ or $Fv = \frac{11600}{\left(\frac{Do}{Tw}\right)^{\frac{3}{2}}}$

Fv = **16.00 ksi**

Allowable Loads

Allowable Stress Increase?	= Y	1.00	
Bending Moment Capacity (Mb)	=	945.12 Ft-kips	$Mb = \frac{Sx \cdot Fb \cdot A}{12}$
Mb (Allowable)	=	**945.12 Ft-kips**	
Torsional Moment Capacity (Mt)	=	1146.18 Ft-kips	$Mt = \frac{Fy \cdot 2 \cdot Ix}{\frac{Do}{2} \cdot 12}$
Mt (Allowable)	=	**1146.18 Ft-kips**	

CBS OUTDOOR

DIGITAL DISPLAY

- **Definition - Electronic Sign**
  - **CBS Electronic Signs display static Images that change advertisements every 4-8 seconds.**
  - **The Images change without dissolve or flashing, simply a static image in place for 4-8 seconds changing to another static image.**
  - **Digital Display Copy is changed remotely via a computer interface connected to a Network Operating Center that manages content and monitors performance of all displays.**
  - **CBS Digital Displays have the ability to post Amber Alerts within hours of notification in conjunction with the National Center of Missing and Exploited Children, (NCMEC) and the FBI.**
- **Display dimming settings**
  - **When installed, each display has a light sensing device that automatically adjusts the brightness based on ambient (surrounding) light conditions. Our units have back-up software in the event the sensor fails.**

1695 EASTSHORE HIGHWAY, BERKELEY, CA 94710 ¶ (510) 527-3350 • FAX (510) 527-7041 • cbsoutdoor.com

- **This feature is important at dusk and dawn, cloudy and raining days, north vs. south facing displays, etc.**

- **Safety Studies - Traffic Safety - Tantala Study**

  - **Tantala is a traffic consulting engineering company based in Philadelphia.**

  - **Study findings- Studied accident records for 18 months before and after Digital Displays were installed**

  - **Study concluded that Digital Displays have no statistical relationship with the occurrence of accidents**

- **Digital Benefits**
  - **Advertisers can change their messages electronically**

  - **No need to send sign hangers to install copy, no pollution from crane trucks**

  - **Ability to post National Disasters (similar to the bridge collapse in Minneapolis)**

  - **Advanced technology consistent with our changing times**

1695 EASTSHORE HIGHWAY, BERKELEY, CA 94710 • (510) 527-3350 • FAX (510) 527-7041 • cbsoutdoor.com

CBS OUTDOOR

Addendum to OAAA-NCMEC Memorandum of Understanding (MOU)

Outdoor Advertising Industry Best Practices for AMBER Alerts

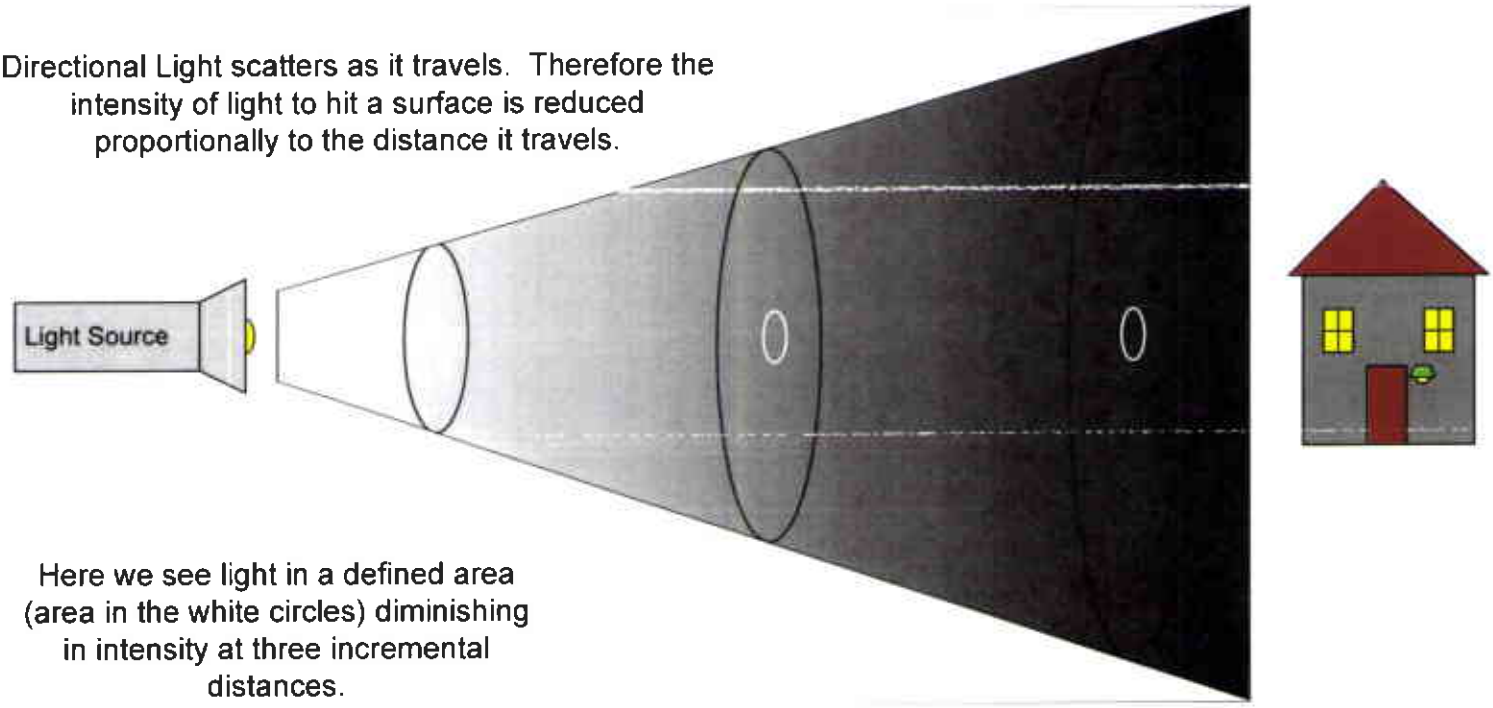
- Digital billboard advertising will be completely interrupted upon receipt of an AMBER Alert within the affected geographical boundary
- The appropriate AMBER Alert will run uninterrupted for a minimum of one hour preempting all other advertising
- During the next two hours, the same alert will be displayed in rotation along with other paid advertisers unless cancelled earlier; and, as necessary, continue for a period of up to 48 hours
- Outdoor advertising digital responders will implement the AMBER Alerts as quickly as possible (using a 24/7 response service)
- Outdoor advertising creative is designed to disseminate all relevant information so as to be quickly and easily absorbed by the traveling public – a text message and photo will be included in the AMBER Alert (standard creative design templates are attached to be used at the discretion of the local coordinator)
- Upon notification by appropriate authorities that the Alert has been cancelled or terminated, the AMBER Alert message will be promptly removed
- A server belonging to OAAA will be established to facilitate Alerts; a computer program along with maintenance criteria will be established

1695 EASTSHORE HIGHWAY, BERKELEY, CA 94710 • (510) 527-3350 • FAX (510) 527-7041 • cbsoutdoor.com

Understanding Light Output and Measurement in Simple Terms

Illuminance, aka "Light Trespass"

Directional Light scatters as it travels. Therefore the intensity of light to hit a surface is reduced proportionally to the distance it travels.



Here we see light in a defined area (area in the white circles) diminishing in intensity at three incremental distances.

WHAT IS ILLUMINANCE?

The simple perspective of Illuminance measurements is how much light is trespassing onto personal property.

It is commonly used in "Light Annoyance" Codes adopted by various municipalities and is defined by the maximum amount of light to be measured at a minimum distance.

In multiple studies on digital billboards, a 14 x 48 digital display shall not transmit more than 0.3 foot-candles at a minimum distance of 250 feet (this methodology has been adopted by the OAAA).

ADVANTAGES OF MEASUREING ILLUMINANCE

- The Light Meter to measure foot-candles is inexpensive and easily sourced.
- A clear answer regarding light trespassing to private property can be determined.
- This method has been adopted or indorsed by several lighting authorities and OAAA.

DISADVANTAGES OF MEASUREING ILLUMINANCE

- The measurement location is directly in front of display at an *exact* distance based upon size of display.
- Ad copy must stop in order to display full black and full white frames during testing.
- Ambient lighting at measurement location must be determined as part of test.

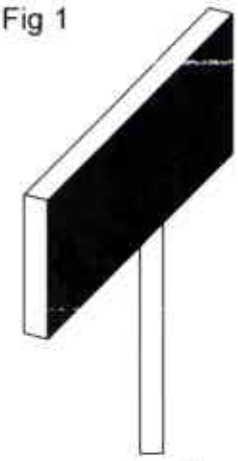
For more information regarding test prodedure see "How to Measure Brightness Using a Standard Light Meter".

GTL 02/13/09

How to Measure Sign Brightness Using a Standard Light Meter

In order to measure using a standard light meter you will need access to the display area at night. You will also need to have the ability to stop advertising rotation and turn the sign to full black and white frames at different points in the testing.

Fig 1



Using the following Chart, determine your measurement distance.

Posters	150'	10'6 x 36'	200'
14' x 48'	250'	20' x 60'	350'

Our example is a 14' x 48' and therefore measured at 250'.
TURN OFF LED DISPLAY

Fig 2

In this example, various light sources are impacting the photocell and CBS man is measuring 12.7 foot-candles of ambient light.

This is the baseline for the measurement. Write it down.

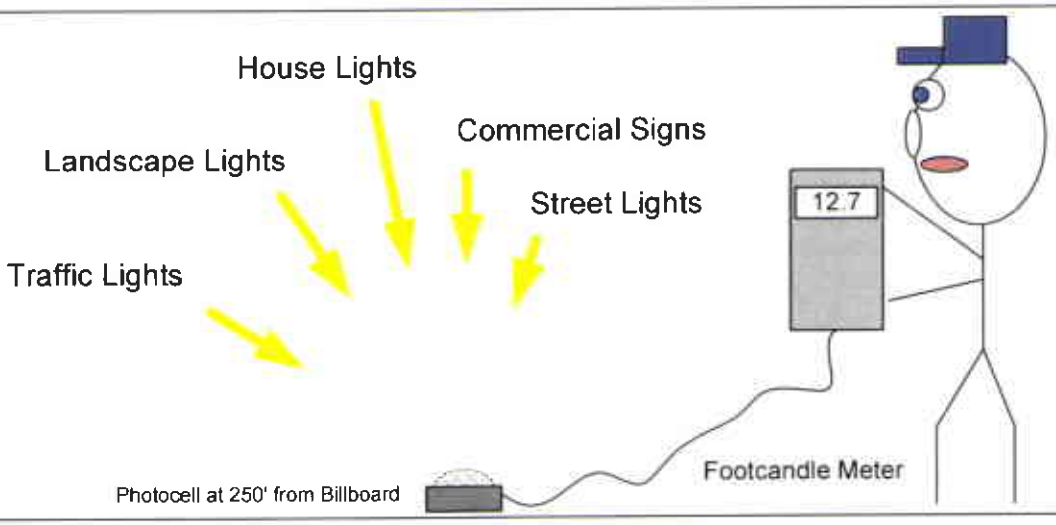
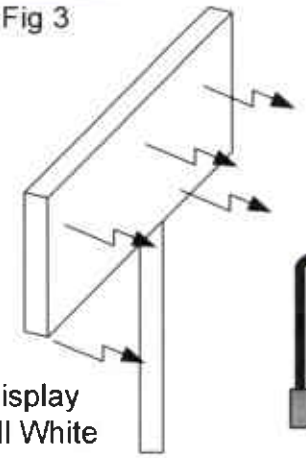
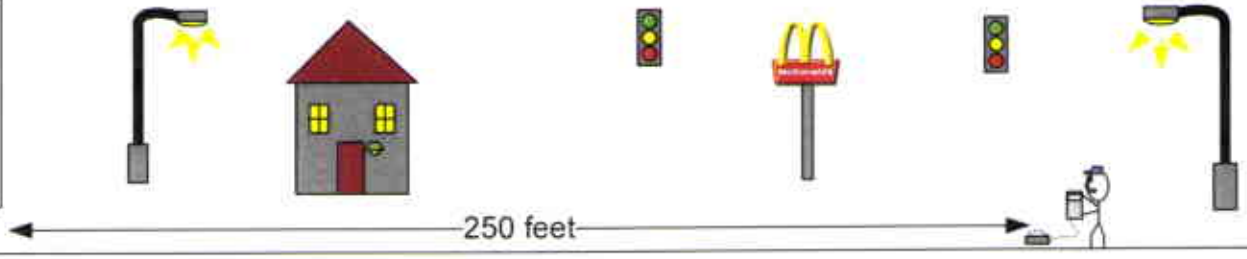


Fig 3



With LED set at night brightness (usually about 5% of full power), display a full white frame. OAAA guideline states a max increase of .3 foot-candles. In this case our ambient was 12.7. The new light reading with the LED displaying a full white frame cannot read above 13.0 or 12.7 (ambient) + .3 (threshold).

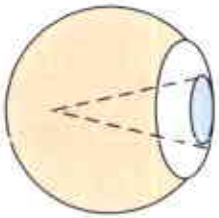
Display Full White Frame



GTL 02/13/09

Understanding Light Output and Measurement in Simple Terms

Luminance, aka "How Bright Is That?"



Human Eye Perception

Dim

Medium

Bright

Variable

WHAT IS LUMINANCE?

Different light sources are perceived by the human eye as brighter or dimmer regardless of size or distance away. This is quite simply because they are.

Limiting the output of brightness of light sources as seen in the viewing cone of vehicle operators is typical in Transportation Regulations. These limits are usually described in foot-lamberts and are associated with angle of view.

A more common unit of measure today is candela/sq m. These are also referred to as "NITs". They are measured with a Spot Photometer. Lighting authorities agree that 300 – 350 NIT max output from digital billboards at night is safe. This is in agreement with the OAAA guideline for measuring foot-candles at set distances.

ADVANTAGES OF MEASURING LUMINANCE

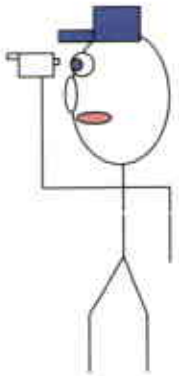
- Easy to measure. A spot photometer can be used at varying distances. Only a small portion of the display must be white to give max output readings of the display (a piece of ad copy with white background works).
- There is no need to measure ambient light at measurement location.
- Measurement process is not susceptible to operator error, no additional mathematics involved.
- Simple "point and shoot" measuring allows for quick readings of other light sources in area for reference.

DISADVANTAGE OF MEASURING LUMINANCE

- A spot photometer or other photometric device to measure candelas/sq m or NITs is costly and not easily sourced.

For more information regarding test procedure see "How to Measure Brightness Using a Spot Photometer"

How to Measure Sign Brightness Using a Spot Photometer

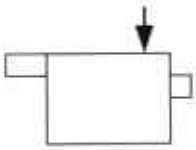


1. Stand anywhere from 50 - 200 feet from the display.

2. Wait for a piece of copy containing pure white. Aim the spot photometer at the display.

NOTE THE LITTLE BLACK DOT in the middle of your field of view while looking through the meter.

The surface area of the LED display hidden by the black dot is the only area that will be measured. In this case, a small portion of white background copy.



3. Press and hold the button to capture the measurement.

4. Read the display. NOTE if a small letter "k" appears next to the reading, you need to multiply the current reading x 1000.

In this case 7.128 x 1000 = 7128 Nit or cd/sq meter.

At night our displays should measure 300 Nit or less.

GTL 02/13/09

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Contents

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Introduction:

Opto Tech Corporation

Opto Tech Corporation is the world leader in the development and manufacturing of LED video display technology. Opto Tech has nearly 20 years invested in the development of large format LED video technology. They manufacture an LED video product that utilizes the highest quality LED components as well as their proprietary 16 bit color processing, resulting in superior image quality and true color representation. Opto Tech has hundreds of LED video displays installed throughout the world.

CBS Outdoor

CBS Outdoor is among the world's largest out-of-home media companies providing unparalleled media opportunities in the United States, Canada and Mexico and across Western Europe. Recently CBS Outdoor expanded into China where it sells advertising on 5700 buses in Beijing.

.

CBS Outdoor sells and services more out-of-home advertising than any other company in North America. With more than 1,600 U.S. employees located in more than 50 offices nationwide, we are the premier provider of out-of-home media in the United States. During the company's nearly seven decades its sole focus has been providing the very best out-of-home media opportunities to marketers across the country with more than 100,000 traditional bulletins, Street Furniture in 17 markets and transit advertising in nearly every major U.S. city.

CBS Outdoor is a division of the CBS Corporation, the number one platform in the world for advertisers. CBS Corporation has preeminent positions in television, radio, outdoor and on-line advertising and is an industry leader in the creation, promotion and distribution of entertainment, news and sports with such well known brands as CBS Television, UPN, CBS Radio, Showtime, King World, Paramount Television, Paramount Theme Parks and Simon & Schuster.

Introduction: (continued)

CBS Collegiate Sports Properties

CBS Collegiate Sports Properties (formerly Viacom Sports) is the nation's premier sports marketing organization. Since its creation in 1986 CBS Collegiate Sports Properties has been instrumental in maximizing revenues for college and professional sports facilities throughout the country through design, development, and installation of on-premise advertising systems.

CBS Outdoor Digital

CBS Outdoor Digital is the design and project management group for CBS Collegiate Sports Properties. Since its inception in 1995 CBS Outdoor Digital has established itself as a leader in the installation and support of the true color LED video display system developed and manufactured by Opto Tech Corporation. CBS Outdoor Digital has the proven track record and qualified personnel to meet the demands of any of a variety of LED projects.

LED Technology

LED (light emitting diode) is a low-power, semiconductor device that will not burn out like other video technologies. The light emitted from an LED is entirely determined by the charge applied and its chemical composition.

There are numerous companies manufacturing LEDs, but the world leader is Nichia Corporation. Nichia is a Japan-based company founded in 1956. Nichia has a plant in Hsinchu, Taiwan, where they have developed a close working relationship with Opto Tech in the co-development of LEDs and LED video displays.

Due to Opto Tech's unique relationship with Nichia, they receive the very best grade of LED components and utilize Nichia LEDs exclusively in the production of their true color video displays. While other companies can purchase the individual elements from Nichia, the final product and visual appearance are solely determined by the way the displays are engineered, assembled and controlled. Opto Tech has over 15 years of research, development and engineering invested in the MegaVision. Additionally, Opto Tech has been awarded the prestigious ISO 9001 Certification for meeting the stringent international standards for consistent high quality in design and manufacturing.

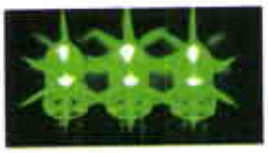
CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

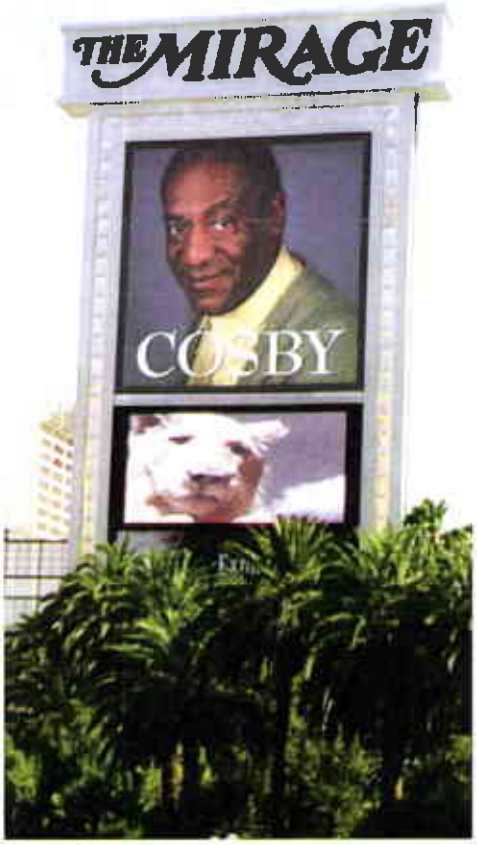
The Development of True Color LED

In the past, LED technology had been limited to applications not requiring full color capabilities (red, green and blue). The limiting factor was the industry's inability to develop a high brightness blue LED. In 1993, Nichia Corporation developed the first high brightness blue LED. This benchmark- setting development created, in theory, the opportunity for full color LED video systems. However, it was soon discovered that the green LED used so often in the past was not the correct green. Nichia accelerated their research and development and, in 1994, produced the world's first pure green LED, finally opening the door for true color LED video.

During this period of development, Opto Tech was designing the housing and processing unit to manufacture large screen, true color LED video. This co-development by Nichia and Opto Tech resulted in the MegaVision, the world's first true color, outdoor LED system, which was installed in Singapore in 1994. The outcome of this successful installation, as well as the associated market opportunity, created an "overnight" industry with numerous start-up companies.



One of the major benefits of the MegaVision display system is the fact that Opto Tech is no newcomer to the LED display industry. In fact, Opto Tech has been researching and developing LED technology for over 20 years. So while the start-ups companies are still in the true color LED learning curve, the MegaVision delivers a time-tested system taking the guesswork and gamble out of your LED video decision.



Applications

The MegaVision LED display system is ideal for multiple applications both indoors or out. Its modular design can easily be configured to accommodate sports facilities: billboards; amusement parks; auto, horse, and dog tracks; concert halls; shopping malls and more.

Further, by linking your display to corporate advertising you can turn it into an incredible revenue generator as well as a spectator pleaser.

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Video Display System

Outdoor

The MegaVision outdoor LED video displays come in four (4) standard sizes:

Pixel Pitch
16mm
25mm
30mm
35mm

The MegaVision video display has extremely wide viewing angles and has virtually no color shift up to 160 degrees.

Indoor

The MegaVision indoor LED video displays come in four (4) standard sizes:

Pixel Pitch
10mm Surface mount
12mm Surface mount
12.5mm Lamp
16mm Lamp

Custom Designed Systems

In addition to the standard systems listed above, MegaVision manufactures custom-designed displays tailored to meet a customer's specific requirements. Whether you are dealing with direct sunlight, existing structural constraints, sight-lines, retrofit or any other variables, MegaVision can deliver the custom display that you need. MegaVision systems can be delivered as both turnkey and component-only systems. We are familiar with all the major manufacturers of scoring systems and work hand-in-hand with them to insure proper design and successful system integration.

Easy Decision

With superior resolution, color uniformity, image quality, and a life expectancy of 100,000 hours, the decision between an old CRT and a new LED display is as simple as maintaining one. The MegaVision's low power consumption, long life expectancy and modular design allows for quick and easy repair in the uncommon event that service is required.

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Standard Configurations - Outdoor

Pixel Pitch:	16mm	25mm	35mm
Pixel Density:	3,906 pixels/sq. meter	1600 pixels/sq. meter	816 pixels/sq. meter
Pixel Size:	14mm	22mm	30mm
Brightness:	6000 Nits (+/- 10%)	5000 Nits (+/- 10%)	5000 Nits (+/- 10%)

Color Temperature: Color-corrected to 6500 degrees Kelvin

Brightness/Dimming: 256 levels, automatic or manual control

Color Gradation: 16 Bit - 65,536 levels per color, (281 trillion colors)

Horizontal Viewing Angle: 140 degrees

Vertical Viewing Angle: 60 degrees

Frame/Screen Rate: Refresh rate: >100 times per second

Frame speed: 60 frames per second

Video Input: 2 ea. NTSC, 1 ea. S-Video, 1 ea. VGA
1 ea. Bitmap

Uniformity: Software-controlled compensation of modules. Less than 3% variation between modules and less than 10% variation across entire screen.

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Standard Configurations - Indoor

Pixel Pitch:	12.5mm Lamp	16mm Lamp	12mm SurfacMount
Pixel Density:	6,400 pixels/sq. meter	3,906 pixels/sq. meter	6,940 pixels/sq.meter
Brightness:	2500 Nits (+/- 10%)	3000 Nits (+/- 10%)	1500 Nits (+/-10%)
Horizontal Viewing Angle:	120 degrees		140 degrees
Vertical Viewing Angle:	50 degrees		140 degrees

Color Temperature: Color-corrected to 6500 degrees Kelvin

Brightness/Dimming: 256 levels, automatic or manual control

Color Gradation: 16 Bit - 65,536 levels per color, (281 trillion colors)

Frame/Screen Rate: Refresh rate: >100 times per second
Frame speed: 60 frames per second

Video Input: 2 ea. NTSC, 1 ea. S-Video, 1 ea. VGA
1 ea. Bitmap

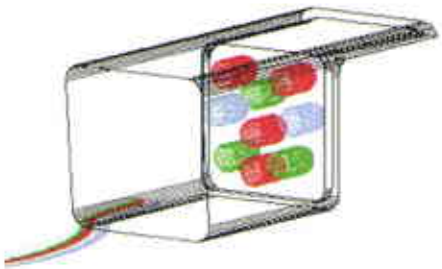
Uniformity: Software-controlled compensation of modules. Less than 3% variation between modules and less than 10% variation across entire screen.

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

MegaVision Advantages

- 15 years research and development in LED video display technology
- First installation of large-format LED true color video display in the world (1994)
- Greatest number of true color LED video installations worldwide
- ISO 9001 Certified to guarantee consistent product quality and performance
- Systems manufactured exclusively with Nichia high-quality LEDs
- Opto Tech has first priority on top grade LED production by Nichia
- Auto-sensing system for automatic adjustment of brightness intensity
- Wide viewing angles
- Excellent visibility in high ambient light conditions (i.e., direct sun)
- Interface with any standardized video and/or graphic input source
- Self-contained modular construction for ease of installation and maintenance
- High resolution for great picture quality
- Long display life
- Virtually no color shift on wide-angle viewing (approximately 160 degrees)
- High contrast ratio



CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Recent Billboard Type Installations

Bay Bridge • East / West
San Francisco, CA
2 Displays, 25mm
Display Size: 19.68' high x 59.05' wide

Detroit Highway I75
Detroit, MI
1 Display, 20mm
Display Size: 13.64' high x 47.24' wide

State Street Display
Chicago, IL
1 Display, 12.5mm
Display Size: 9.18' high x 10.49' wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Recent Billboard Type Installations

Clark Street Display
Chicago, IL
1 Display 12.5mm
Display Size: 9.18′ high x 10.49′ wide

The Cube
New York, NY
2 Displays, 16mm
Display Size: 13.43′ high x 13.07′ wide
500 plus LED Lighting Effects Tubes

Atlanta LED Display
Atlanta, GA
1 Display, 20mm
Display Size: 19.94′ high x 59.84′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

US Airways Center
formerly
America West Arena
Phoenix, AZ
4 Displays - September 1998 Install
Display Size: 10.5′ high x 13.5′ wide

Lobby Display
1 Display - May 2004 Install
Display Size: 11.5′ high x 20.4′ wide

Scoreboard Display
8 Displays - November 2004 Install
4 ea. Video Displays
Display Size: 8.93′ high x 15.75′ wide

1 ea. Ring Display
Display Size: 2.65′ high x 96.6′ wide

1 ea. Ring Display
Display Size: 1.6′ high x 42.5′ wide

1 ea. Fascia Display
Display Size: 2.6′ high x 945′ wide

1 ea. Marquee Display
Display Size: 3.1′ high x 36.75′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

University of Akron
Akron, OH
James A. Rhodes Arena
Indoor (4) Displays - Nov. 2002 Install
Display Size: 7.5′ high x 10′ wide

Arizona State University
Tempe, AZ
Wells Fargo Arena - September 2000 Install
Display Size: 7.83′ high x 10.5′ wide (4)

Sun Devil Stadium - August 1999 Install
Display Size: 21′ high x 39.3′ wide

University of Arizona
Tucson, AZ
The Arizona Stadium - August 1999 Install
Display Size: 28′ high x 36′ wide

McKale Center - August 2001 Install
Display Sizes: 8.17′ high x 11.3′ wide (4)

Frank Sancet Baseball Stadium - January 2006 Install
Display Size: 10.5′ high x 19.67′" wide

Ritta Hillenbrand Stadium - February 2006 Install
Display Size: 10.5′ high x 19.67′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

The Bellagio Resort & Casino
Las Vegas, NV
Outdoor Marquee - June 1998 Install
Display Size: 28′ high x 36′ wide

Beau Rivage Resort
Biloxi, MS
Outdoor Marquee (2) Display - April 2002 Install
Display Size: 24′ high x 31.5′ wide

Boise State University
Boise, ID
Bronco Stadium - July 2001 Install
Display Size: 17′ high x 24′ wide

The Dodge Theatre
Phoenix, AZ
Outdoor (1) Display - March 2002 Install
Display Size: 10′ high x 14.5′ wide

Florida State University
Tallahassee, FL
Doak S. Campbell Field - April 1999 Install
Display Size: 23.5′ high x 31.42′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

Georgia Dome
Atlanta, GA
Indoor (2) Display - Aug. 2002 Install
Display Size: 19.67′ high x 34.17′ wide

Indoor (2) Display - 2006 Install
Display Size: 2.5′ high x 128′ wide

University of Kansas
Lawrence, KS
Memorial Stadium - May 1999 Install
Display Size: 23.5′ high x 31.42′ wide

Kentucky Fair & Exposition - Freedom Hall
Louisville, KY
September 2001 Install
Display Size: 8.08′ high x 10.67′ wide (4)

Kentucky Fair & Exposition

Louisiana State University
Baton Rouge, LA
Tiger Stadium, 2 Fascia Displays August 2005 Install
Display Size: 2.67′ high x 150.25′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

University of Maryland
College Park, Maryland
Comcast Center
Installed -June 2002 - 4-sided indoor
Display Size: 7.92′ high x 10.5′ wide

Installed -Sept 2002 - 2 ea.
Display Size: 3′ high x 94′ wide

Installed -2006 - 1 ea.
Display Size: 3′ high x 89′ wide

Byrd Stadium
Installed -August 2002 - outdoor
Display Size: 20.67′ high x 27.5′ wide

The Mirage
Las Vegas, NV
Outdoor Marquee, May 1998 Install
Display Size: 24′ high x 41′ wide

Mid-America Center
Council Bluffs, IA
Indoor (1) Display - Oct. 2002 Install
Display Size: 12′ high x 16′ wide
Outdoor (2) Displays (Amber)
Display Size: 6′ high x 16′ wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

Mobile Vision Production
Des Moines, IA
Portable Display
Outdoor (1) Display - Sept. 2003 Install
Display Size: 15.08′ high x 18.5′ wide

Norfolk State University
Norfolk, VA
William "Dick" Price Stadium
Outdoor (1) Display (July 2003 Install)
Display Size: 13.75′ high x 18.33′ wide

University of North Carolina
Chapel Hill, NC
Kenan Stadium -May 2003 Install
Outdoor (1) Display
Display Size: 23.58′ high x 31.5′ wide

Outdoor (2) Displays July 2007
Display Size: 2.5′ high x 128′ wide

Dean Smith Center - January 2005
Scorers Table (1) Display
Display Size: 2.83′ high x 37.91′ wide
Fascia (2) Displays
Display Size: 2.52′ high x 48.71′ wide

Dean Smith Center - October 2005
Corner LED (4) Displays
Display Size: 17.67′ high x 23.5′ wide

Carmichael Auditorium - October 2005
Fascia Display
Display Size: 2.5′ high x 59.67′ wide

Installations

Northwestern University
Evanston, IL
Ryan Field
North End Zone - Aug 2001
Display Size: 17.06′ x 23.67′

University of Oregon
Eugene, OR
Autzen Stadium - September 1998 Install
Display Size: 23.5′ high x 31.5′ wide

Pershing Center
Lincoln, NE
Indoor (1) Display-Dec. 2003 Install
Display Size: 8.83′ high x 11.75′ wide

Penn State University
University Park, PA
Beaver Stadium
North End Zone - Aug 2000
South End Zone - April 2001
Display Size: 21.5′ high x 42′ wide

Portland Trailblazers
Portland, OR
Rose Garden Arena - June 2007
4 ea. Display Size: 1.5′ high x 497′ wide
1 ea. Display Size: 2.5′ high x 75′ wide
4 ea. Display Size: 2.5′ high x 23.5′ wide

Installations

SiliconView
San Francisco, CA
Video Billboard (V'd Display) - Oct. 2000
Display Size: 18.33' high x 34' wide

Spokane Arena
Spokane, WA
Indoor (1) Display -Installed Aug. 2002
Display Size: 15.08' high x 20.17' wide

Outdoor (1) Display -Installed Aug. 2006
Display Size: 9.17' high x 15.75' wide

Indoor (1) Fascia Display -Installed Aug. 2007
Display Size: 2.5' high x 796' wide

Spokane INB Center
Spokane, WA
Outdoor (2) Displays -Installed 2007
Display Size: 7.5' high x 11.5' wide

Tallahassee-Leon County Civic Center
Tallahasse, FL
September 1999 Install - 4-sided indoor
Display Size: 7.92' high x 10.5' wide

Tyson Center
Soiux City, IA
Indoor (1) Display - Dec. 2003 Install
Display Size: 12' high x 16' wide
Outdoor Marquee (2) LED Displays (Amber)
Display Size: 6' high x 20' wide

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Installations

United States Air Force Academy
Colorado Springs, CO
Falcon Stadium
Outdoor (1) Display (Aug 2003)
Display Size: 20.66′ high x 27.5′ wide

University of Utah
Salt Lake City, Utah

Rice-Eccles Stadium
Outdoor (1) Display - July 2007 Install
Display Size: 4′ high x 200′ wide

Jon M. Huntsman Center
Center Hung (4) Displays July 2007
Display Size: 8.5′ high x 13′ wide

Center LED Ring (1) Display July 2007
Display Size: 3′ high x 70′ Circumference

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

installations

University of Virginia
Charlottesville, VA
Scott Stadium - Aug. 1998 Install
Display Size: 21′ high x 27.5′ wide

Scott Stadium - Fascia -Aug. 2003 Install
Display Size: 2.58′ x 149.58′ wide

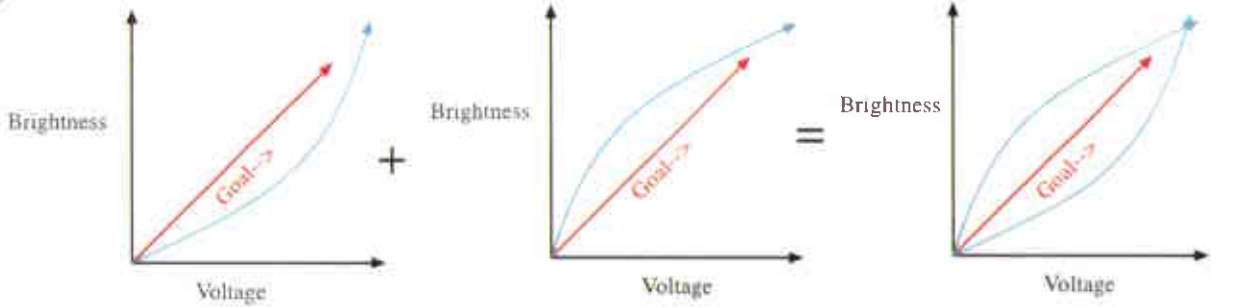
JPJ Arena - May 2006 Installation
Display Sizes:

- U Fascia - 2.5′ x 557′
- End Fascia - 2.5′ x 100.78′
- Ctr. Hung Matrix - 7.55′ x 9.2′ (8)
- Stat Display - 3.36′ x 39.5′
- Vomitory - 2.94′ x 7.56′ (12)
- Upper Ring - 2.94′ x 90.7′
- Lower Ring - 2.01′ x 42.83′
- Scorers Table- 4′ x 72′

Klockner Stadium - Sept. 2006 Install
Display Size; 11.81′ x 21′

Davenport Field - December 2006 Install
Display Size: 13.12′ x 23.62′

1 Standard TV/CRT Video Displays



CRT Curve

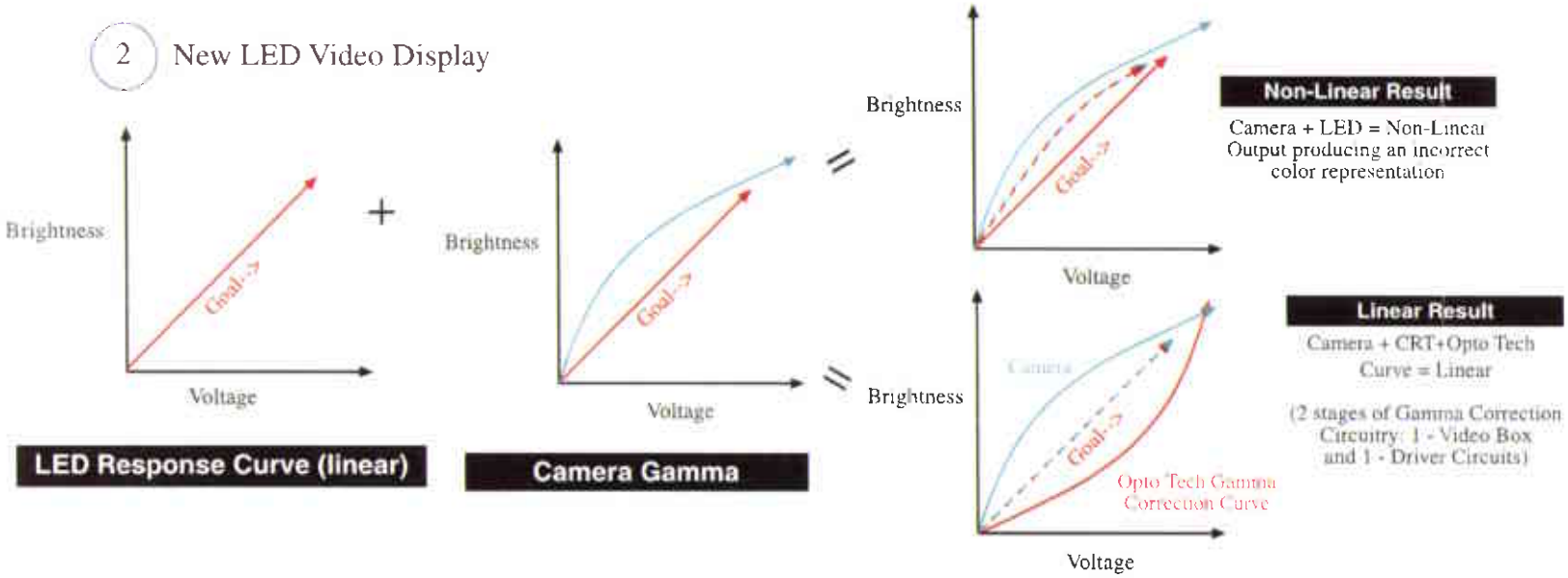
Camera Gamma

Designed to have a curve 180° of CRT

Linear Result

Camera + CRT = Linear

2 New LED Video Display



LED Response Curve (linear)

Camera Gamma

Non-Linear Result

Camera + LED = Non-Linear Output producing an incorrect color representation

Linear Result

Camera + CRT+Opto Tech Curve = Linear

(2 stages of Gamma Correction Circuitry: 1 - Video Box and 1 - Driver Circuits)

CBS OUTDOOR DIGITAL

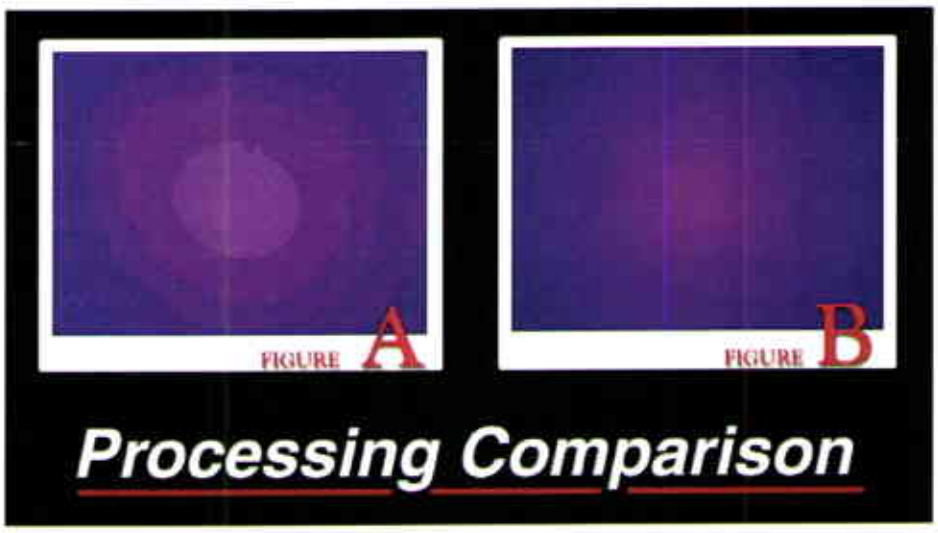
OPTO TECH CORPORATION

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

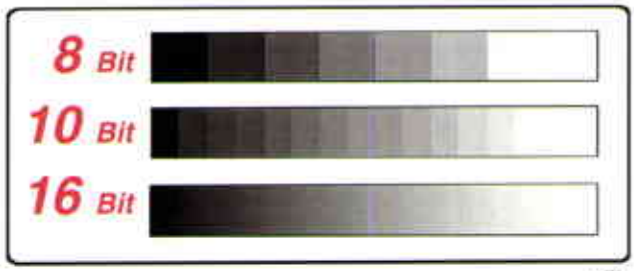
A Tale of Two Technologies

Color Processing Comparison



Opto Tech LED Video Screens use Non-Linear Bit Processing which gives superior control of the low light levels and precise control of the upper light levels. To date conventional systems have shown limited performance when it comes to the darker colors. The reproduction of low light levels such as deep purple and blue has been very difficult for large format video screens to produce. The effect that this has, is that the steps between hues can easily be seen (Fig A). Opto Tech developed the Non-Linear approach to correct this, more control is required in the low light level region, resulting in smooth transitions between darker colors and hues (Fig. B).

Another advantage of Opto Tech LED Video Screens, is 16 Bit processing. Since color representation is controlled using digital technology, the more Bits used in a system, the more color control the system has, and the more true colors can be represented. The obvious advantage over conventional 8-Bit and 10-Bit systems, are smoother transitions between hues (Fig C), either light or dark, and better true-color representation.



Simulation - Figure C

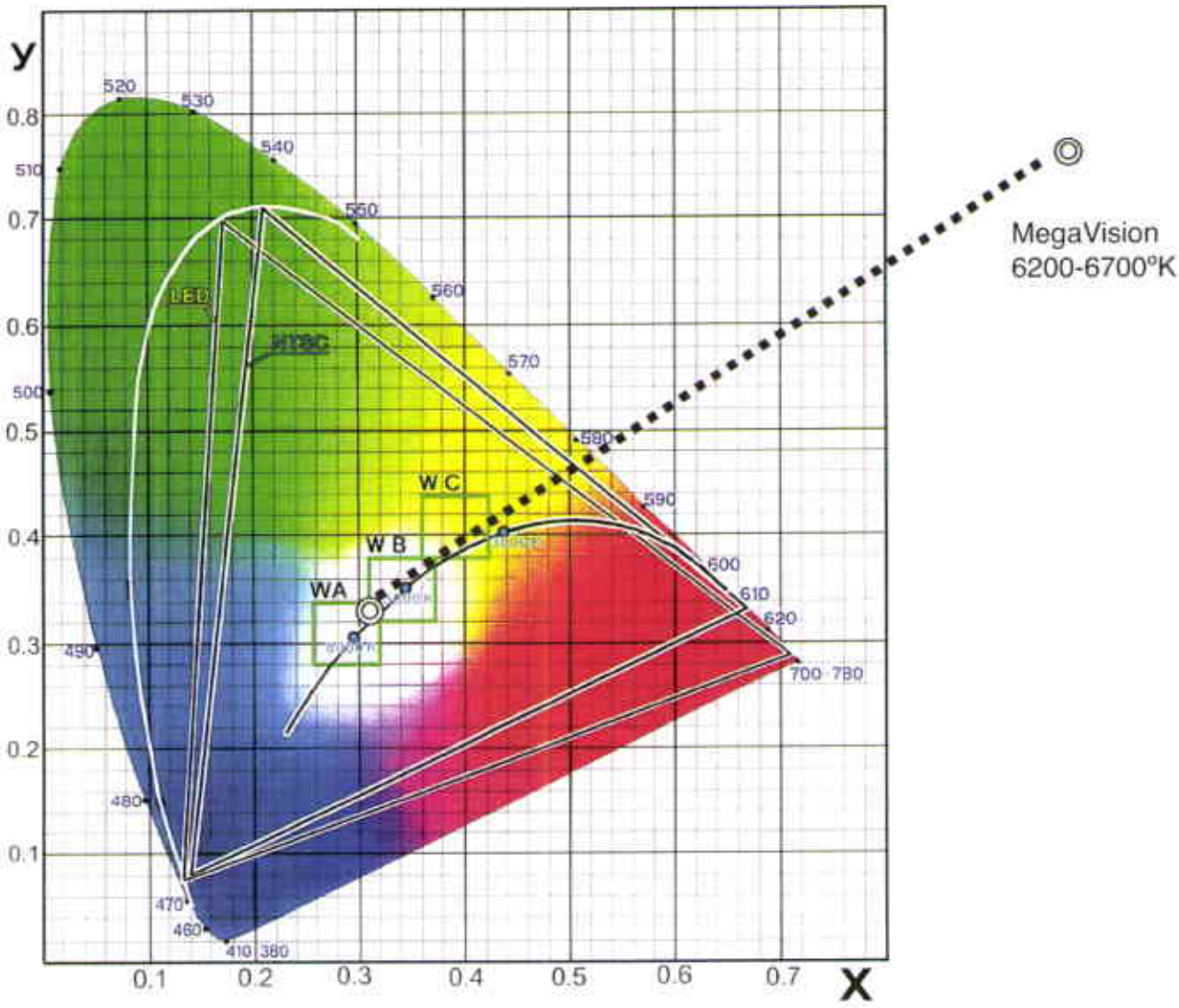
Opto Tech had been a world leader in the development and manufacturing of large format LED video technology for nearly 20 years. By combining the power of 16-Bit processing and the flexibility of Non-Linear Bit Processing they continue their leadership role, creating a new era of unparalleled video quality.

CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Chromaticity Comparison

CIE Standard Pure White: 6500°K



CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Video Processor Data

The video processing system is completely designed and built by Opto Tech Corporation. The video processor is a stand alone, full function video controller with no interface needed to any computer system. The entire display is driven as a unit by a single video processor. The video processor is capable of displaying any standard video input without external pre-processing or ancillary equipment. The video processor can be located at the display location or in a control room. The video sources are usually feed to it via fiber optic or coax cable from a video front-end system. The proprietary built in user programmable *gamma correction* feature produces the most accurate color imagery in the industry.

The video processor features include:

- Three analog video inputs; two composite and one S-Video, each of which will automatically switch between PAL and NTSC formats
- One digital input (24 bit, RGB 8,8,8)
- One VGA computer graphics input/output interface
- Built-in video screen to monitor video feed
- One RS-232/RS-422 interface for PC control of video processor functions.
- 16 Bit color 65,536 levels of each color (RGB) providing a palette of up to 281 trillion colors
- Full screen scaling
- Digital brightness control, 256 levels
- Automatic brightness control, based on ambient light levels
- Digital contrast control, 128 levels
- Digital color saturation and hue controls, 128 levels each
- Operator selectable gamma correction for optimum color correction.

Complete digital control of brightness, contrast, color hue and saturation, sign size and level of gamma correction is provided, both under local and remote control. Operators may use the diagnostics PC, either locally or remotely, to make all system adjustments and can store multiple setup files for immediate retrieval, allowing operators to custom tailor display characteristics to specific events or venue configurations, and recall those settings as needed.

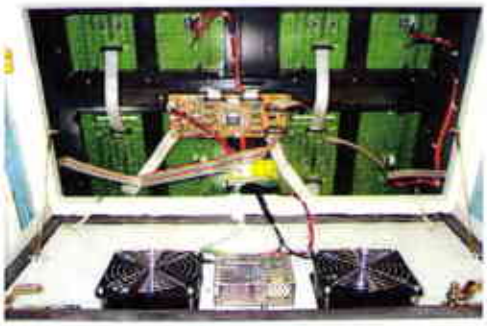
Gamma Correction

LEDs produce their output color range in a linear fashion. Video cameras produce a non-linear signal to transmit a representation of the colors within an image. This requires that an equal and opposite non-linear curve, or gamma correction, be introduced into the LED drive circuitry to produce true and accurate colors as perceived by the human eye. Two stages of gamma correction are provided in the Opto Tech display system. The first, as mentioned, is the selectable gamma correction in the video processor. A second stage of gamma correction is built into the custom designed and built LED driver ICs to fine-tune and optimize the colors displayed. The colors produced by the display are as true and accurate as the camera that captures the image can produce.

Modular Design / Serviceability

The Opto Tech LED display system is designed to produce the clearest, crispest, most accurate video picture possible on an LED display. The modular design starts with a welded steel cabinet complete with drip rails, weather stripped doors and complete gaskets around all pixel clusters. Printed circuit cards inside each module include self-diagnostics, are completely interchangeable between modules and are designed for long service life. Fans within each module help to maintain the proper operating conditions.

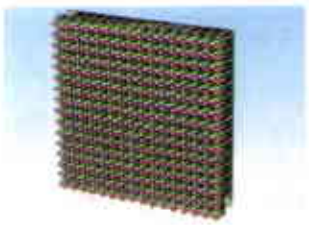
Modular design means a more efficient installation, optimum control of ambient operating conditions, and the ultimate in serviceability. A visual assessment of a situation is often all that is required to isolate the problem, meaning that needed repairs can be completed quickly without the need for cumbersome and often expensive test equipment. Service training of your personnel by factory trained engineers will allow them to isolate and repair most malfunctions with the spare parts inventory provided, and if needed, technical support is always just a phone call away.



CBS OUTDOOR DIGITAL

OPTO TECH CORPORATION

Glossary of Terms



LED:	Light Emitting Diode
PIXEL:	Individual light element made up of a number of individual red, green and blue LEDs.
PIXEL PITCH:	Center-to-center spacing of pixels.
RGB:	A full color display utilizing the primary colors of red, green and blue combining to generate a total of 16.7 million colors.
RESOLUTION:	The number of pixels per square meter.
NITS:	Number of candelas per square meter (brightness).
VIEWING ANGLE:	Degree off axis that maintains acceptable picture image which is one half the brightness intensity.
COLOR SHIFT:	The angle of viewing off axis where the slightest change in pixel coloration occurs.
COLOR ACCURACY:	Conformity or exactness of color match, clarity and accuracy within the individual primary color groups of red, green and blue.
COLOR-CORRECTED VIDEO:	Balancing of red, green and blue to achieve pure white, as a measurement of total display brightness as measured in degrees Kelvin.
VIDEO FRAME RATE:	The speed at which video frames are transmitted on the display.
CONTRAST:	Difference between applied color to applied background (i.e., white on black has best contrast).
BRIGHTNESS LEVELS:	Number of brightness settings for overall display. Auto adjusting for ambient light fluctuations.