

# CZAR Engineering, LLC

Lamont Czar, P.E.  
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[www.czarengineering.com](http://www.czarengineering.com)

## STRUCTURAL CALCULATIONS

### WAVE WALL

ATLANTIC CITY CONVENTION CENTER  
1 CONVENTION BOULEVARD  
ATLANTIC CITY, NEW JERSEY

June 19, 2018



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Lamont H. Czar, P.E.  
NJPE Lic. No. 24GE03382700

## NOTES

### GENERAL

1. CONTRACTOR TO VERIFY EXISTING CONDITIONS AND DIMENSIONS AND SHALL REVIEW THE DRAWINGS AND SPECIFICATIONS PRIOR TO BIDDING. WORK SHALL BE PERFORMED IN ACCORDANCE WITH THESE PLANS AND THE SPECIFICATIONS, INCLUDING BUT NOT LIMITED TO THE FOLLOWING NOTES:
2. THE OWNER AND CONTRACTOR SHALL INDEMNIFY, INSURE AND HOLD HARMLESS THE ENGINEER AND EACH OF HIS DIRECTORS, OFFICERS, EMPLOYEES, ATTORNEYS, AGENTS, SUBCONSULTANTS, HEIRS AND ASSIGNS, AGAINST, AND HOLD EACH OF THEM HARMLESS FROM, ANY LOSS, LIABILITIES, DAMAGES, CLAIMS, CAUSES OF ACTION, COSTS AND EXPENSES, INCLUDING REASONABLE ATTORNEY'S FEES AND DISBURSEMENTS, SUFFERED OR INCURRED BY ANY OF THEM ARISING OUT OF, RESULTING FROM, ATTRIBUTABLE TO, OR IN ANY MANNER CONNECTED WITH THE CONTRACTOR'S PERFORMANCE, NONPERFORMANCE, NEGLIGENT PERFORMANCE, OR BREACH OF THE CONTRACT AWARDED.
3. CONTRACTOR MUST NOTIFY THE OWNER AND ENGINEER OF ANY OMISSIONS, CONTRADICTIONS OR CONFLICTS SEVEN DAYS BEFORE THE BID DATE. ENGINEER WILL PROVIDE THE NECESSARY CORRECTIONS OR ADDITIONS TO PLANS. IF HE DOES NOT NOTIFY THE OWNER AND ENGINEER OF ANY SUCH CONDITION, IT WILL BE ASSUMED HE HAS INCLUDED THE NECESSARY ITEMS IN HIS BID.
4. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH APPLICABLE LOCAL AND STATE REGULATIONS, BUILDING CODES, ORDINANCES AND GOOD CONSTRUCTION PRACTICES. IF THE CONTRACTOR FEELS A CONFLICT EXISTS BETWEEN WHAT IS CONSIDERED GOOD CONSTRUCTION PRACTICE AND THESE PLANS, HE SHALL STATE IN WRITING ALL OBJECTIONS PRIOR TO SUBMITTING QUOTATIONS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STABILITY AND INTEGRITY OF EXISTING STRUCTURES AND THE PROTECTION OF ADJACENT PROPERTY AND PUBLIC UNTIL COMPLETION OF THE WORK.
6. IT IS THE CONTRACTOR'S RESPONSIBILITY DURING THE COURSE OF THE WORK, TO BRING TO THE ATTENTION OF THE OWNER AND ENGINEER ANY DELETERIOUS CONDITIONS DISCOVERED WHERE NOT PREVIOUSLY IDENTIFIED.
7. CONTRACTOR SHALL SUBMIT ALL ALTERNATE MATERIALS, METHODS OR CONSTRUCTION DETAILS TO THE OWNER AND ENGINEER FOR APPROVAL, PRIOR SUBMITTING QUOTATIONS.
8. CONTRACTOR SHALL HAVE SOLE RESPONSIBILITY FOR THE ACCURACY OF ALL MEASUREMENTS, ESTIMATES OF MATERIAL QUANTITIES AND SIZES, AND SITE CONDITIONS THAT WILL AFFECT WORK.
9. REFER TO THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR INFORMATION NOT SHOWN HEREIN.
10. CZAR ENGINEERING'S SERVICES LIMITED TO WORK AS DESCRIBED HEREIN ONLY. NO OTHER STRUCTURE WAS REVIEWED AND WE DEFER TO THE BUILDING CONTRACT DOCUMENTS FOR ALL OTHER

DESIGN INFORMATION. IF THE CLIENT, OWNER, CONTRACTOR, OR ANY OTHER INTERESTED PARTY ARE AWARE OF DEFICIENCIES IN THE BALANCE OF THE STRUCTURE, IT IS INCUMBENT UPON THEM TO NOTIFY CZAR ENGINEERING, IN WRITING, AND ADDITIONAL SERVICES WOULD FOLLOW UNDER SEPARATE CONTRACT. OTHERWISE, CZAR ENGINEERING AND /OR LAMONT H. CZAR, P.E. CANNOT AND WILL NOT ACCEPT LIABILITY FOR DEFICIENCIES IN THE BALANCE OF THE STRUCTURE.

#### GENERAL REQUIREMENTS & CONDITIONS

1. WHERE A SECTION OR DETAIL IS SHOWN FOR ONE CONDITION, IT SHALL APPLY TO ALL LIKE CONDITIONS EVEN THOUGH NOT SPECIFICALLY MARKED ON THE PLANS.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTION OF THE STRUCTURE DURING CONSTRUCTION AGAINST EARTH PRESSURE, WIND, AND OTHER FORCES UNTIL PERMANENT SUPPORTS ARE IN PLACE.
3. WHERE NO SPECIFIC INFORMATION IS GIVEN, CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH THE ARCHITECTURAL PLANS OR THE PRESCRIPTIVE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE.

#### WALL MOUNTED SIGN

1. WHENEVER INSTALLATION OF A SIGN ONTO NO LESS THAN A ½" GYPSUM WALLBOARD FACED HOLLOW WALL IS REQUIRED, THAT A MINIMUM WALL FASTENING SYSTEM SHALL CONSIST OF 3/8" BOLTS MANUFACTURED BY RAWLPLUG CO. OR BY ANOTHER MANUFACTURER AS MEETS THE MINIMUM STANDARDS THAT FOLLOW AND AS LOAD TESTED TO ASTM STANDARD E 488, WITH RATINGS TO BE FURTHER REDUCED BY A MINIMUM SAFETY FACTOR OF 4 TO DETERMINE WORKING LOAD:
  - A. TENSION RATING 340 LBS. / 4 = 85 LBS.
  - B. SHEAR RATING OF 440 LBS. / 4 = 110 LBS.
2. SIGN SHALL BE FASTENED TO WALL SUBSTRATE AT NO LESS THAN 36" LATERAL INTERVALS ACROSS THE BACK OF SIGN AND AT A VERTICAL POSITION NO LOWER THAN ONE THIRD THE VERTICAL HEIGHT OF THE SIGN. WHENEVER POSSIBLE, BOLTS SHALL BE FASTENED INTO VERTICAL WALL STUD FOR ADDITIONAL SUPPORT.
3. WALL SHEATHING SHALL BE STRUCTURAL I GRADE OR SHEATHING GRADE, 1/2" APA RATED PLYWOOD MINIMUM, SECURED w/ TEC SCREWS @ 12" O.C. IN FIELD, UNLESS NOTED OTHERWISE.

#### DESIGN LOAD SCHEDULE

GOVERNING CODE: 2016 NJIBC, ASCE 7-10 AND ATC COUNCIL WEB APP FOR WIND SPEED MAPPING.

1. SIGN WEIGHT = 4300 POUNDS

- 2. LATERAL LOADS = 5 PSF
- 3. SEISMIC: AV = AA = 0.06  
HAZARD EXPOSURE GROUP II  
SOIL PROFILE TYPE S4 - COEFFICIENT = 2.0  
PERFORMANCE CATEGORY B  
RESPONSE MODIFICATION FACTOR R = 4.5  
DEFLECTION AMPLIFICATION FACTOR CD = 4.0

#### CODES AND STANDARDS

- 1. THE STATE OF NEW JERSEY DEPARTMENT OF COMMUNITY AFFAIRS, CONSTRUCTION CODE ELEMENTS "UNIFORM CONSTRUCTION CODE";
- 2. INTERNATIONAL BUILDING CODE COUNCIL, AINTERNATIONAL BUILDING CODE 2016", NEW JERSEY EDITION
- 3. ASCE 7-10 A STANDARD FOR MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES

# CZAR ENGINEERING, L.L.C.

5014 Fernwood Avenue  
Egg Harbor Twp., NJ 08234  
(609) 653-9445  
lczar@czarengineering.com

JOB WAVE WALL

SHEET NO. C1

OF

CALCULATED BY CZAR

DATE 6.19.18

CHECKED BY

DATE

SCALE

$$\text{SIGN WEIGHT} = 4300 \#$$

$$\text{SIGN AREA} = 540" \times 168.5" = 632'2$$

$$W_P = 4300 / 632 = 6.80 \text{ psf.}$$

$$(1) \text{ FASTENER EVERY } 7.35 \text{ SP} = 2'-9\frac{3}{4}"$$

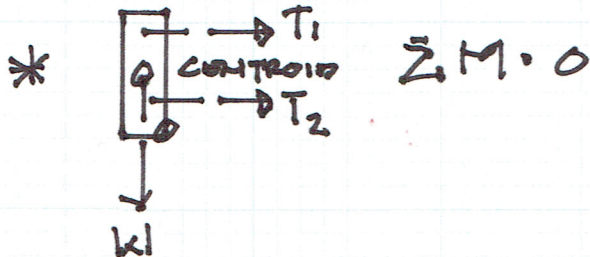
$$WT / \text{BOLT} = 6.80 (7.35) = 50 \# < \text{SHEAR RATING} = 110 \#$$

(SP = 2.20)

$$* \text{ TENSION } \Rightarrow 50 (12") = T (12)$$

$$T = 50 \# \text{ EACH (F.S.} = 1.70)$$

$$\text{COMBINED: } \frac{50}{110} + \frac{50}{85} = 1.04 \text{ (OK)}$$



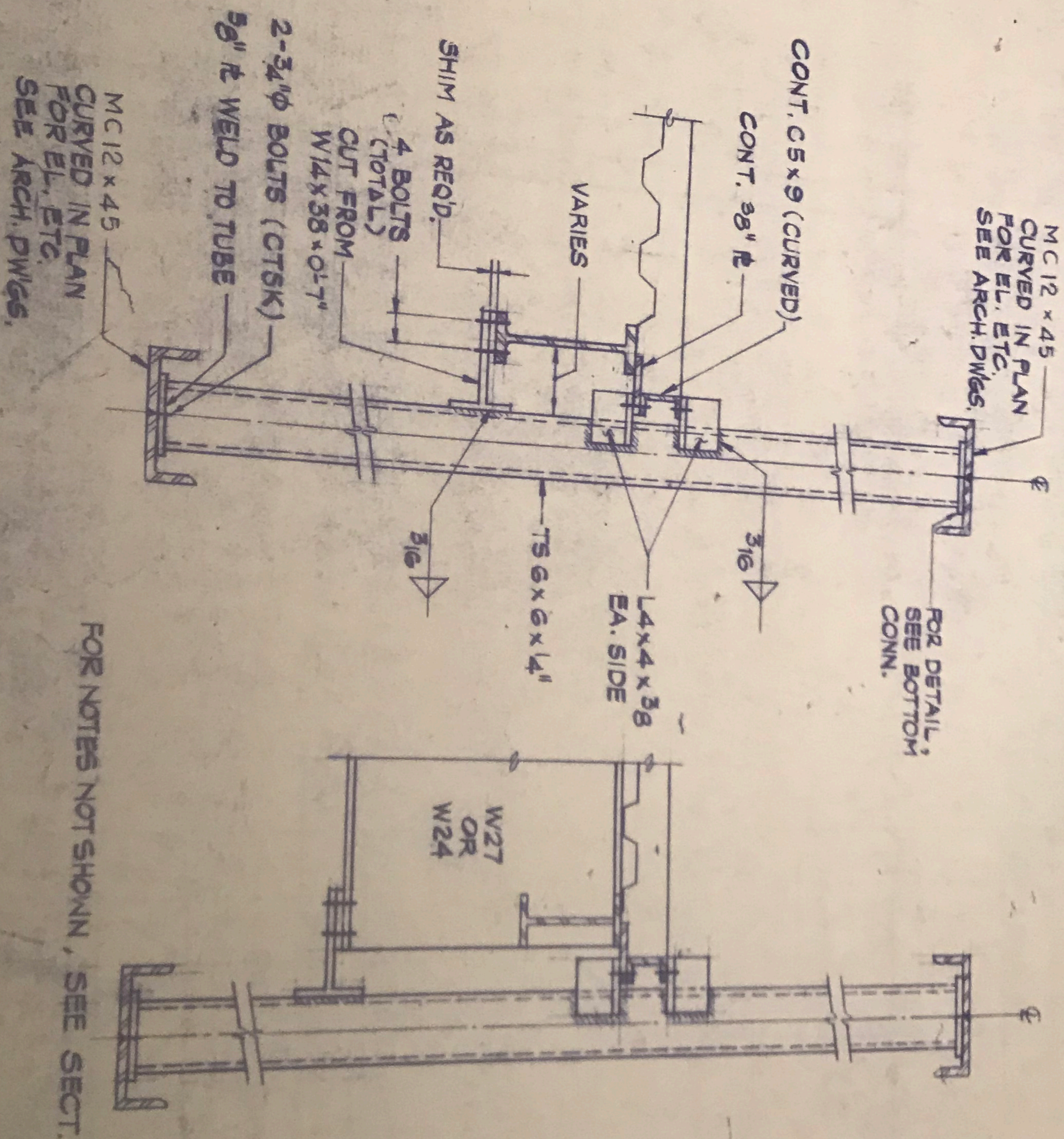


3" STIFF. R. AT 4'-0" O.C. MAX. @  
AT EVERY MILLION SUPPORT

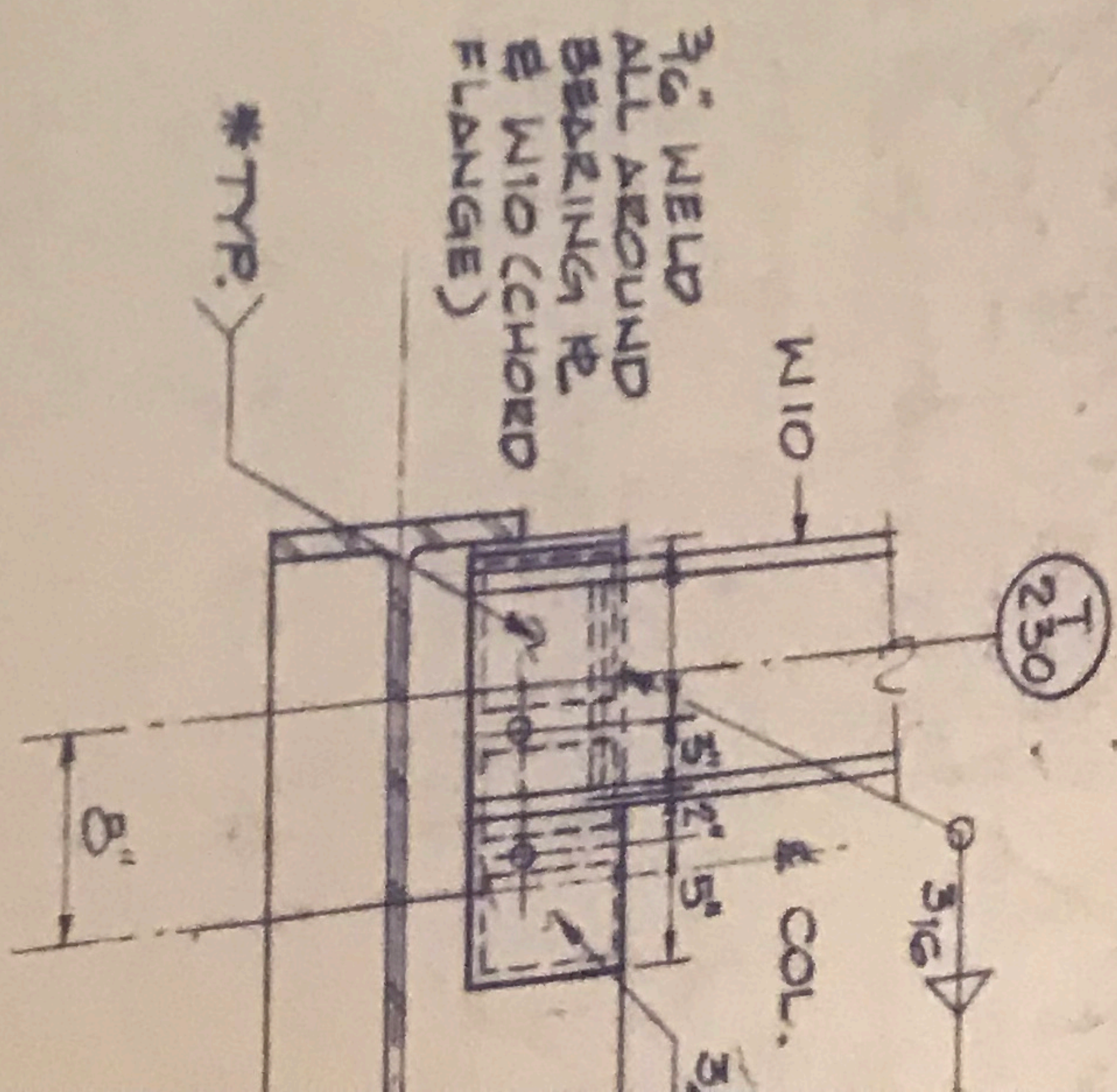
FOR CONN. TO GFR, SEE ARCH. DWGS.

8" O.C.

24 AT EVERY MILLION  
DOLLARS FOR MILLION  
DOLLARS FOR GFR.



FOR NOTES NOT SHOWN, SEE SECT.



# SECTION

SCALE : 1" = 1'-0"

TRUSS TOP

SECTION

SCALE : 1" = 1'-0"

MC 12 x 45  
CURVED IN PLAN  
FOR EL. ETC.  
SEE ARCH. DWGS.

## SECTION

SCALE: 1" = 1'-0"

100

250


COL. 10

COL.

۱۵۱

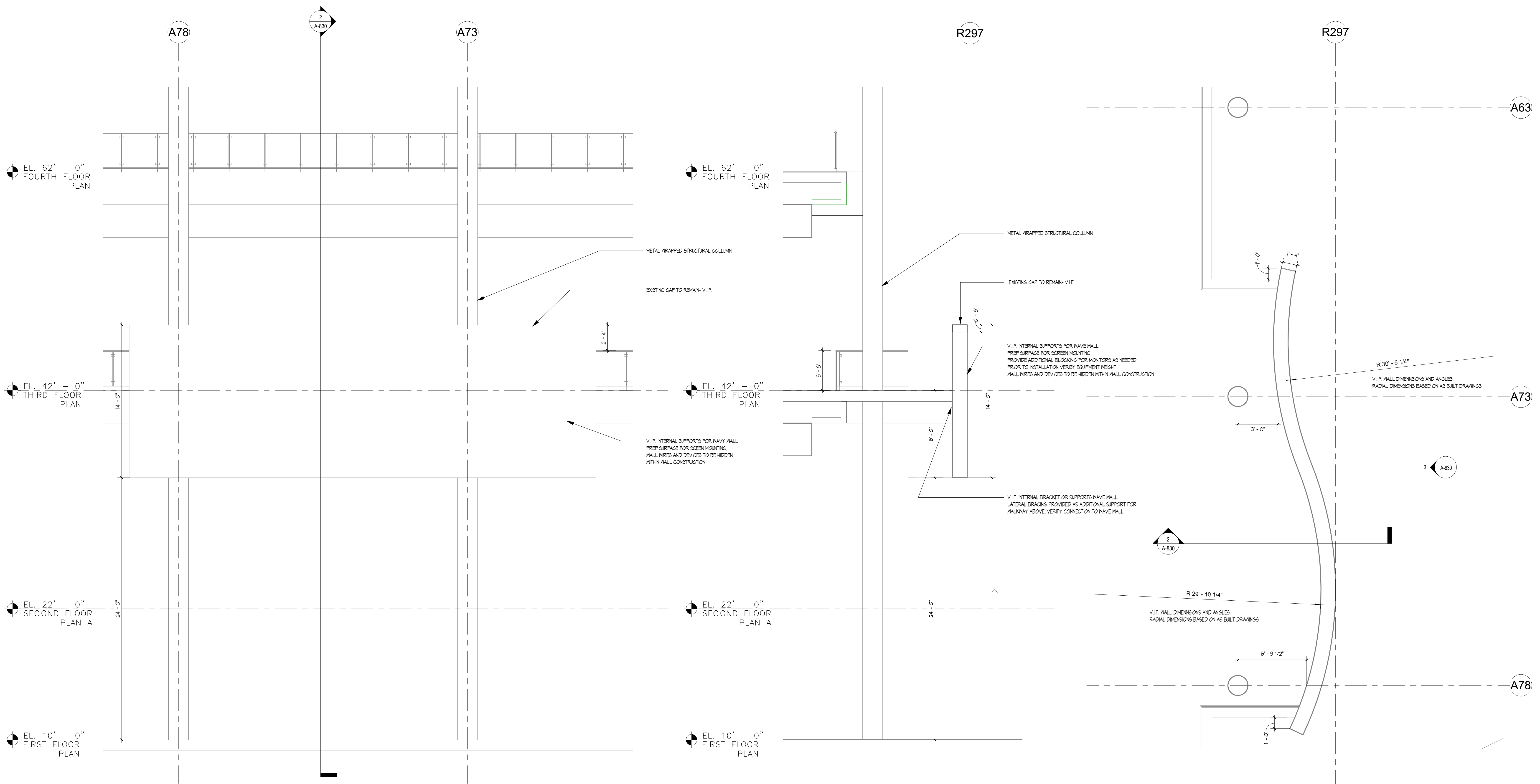
3/8" WELD  
ALL AROUND  
BEARING PL  
# W/ID (CHORD  
FLANGE)

\*TYP.





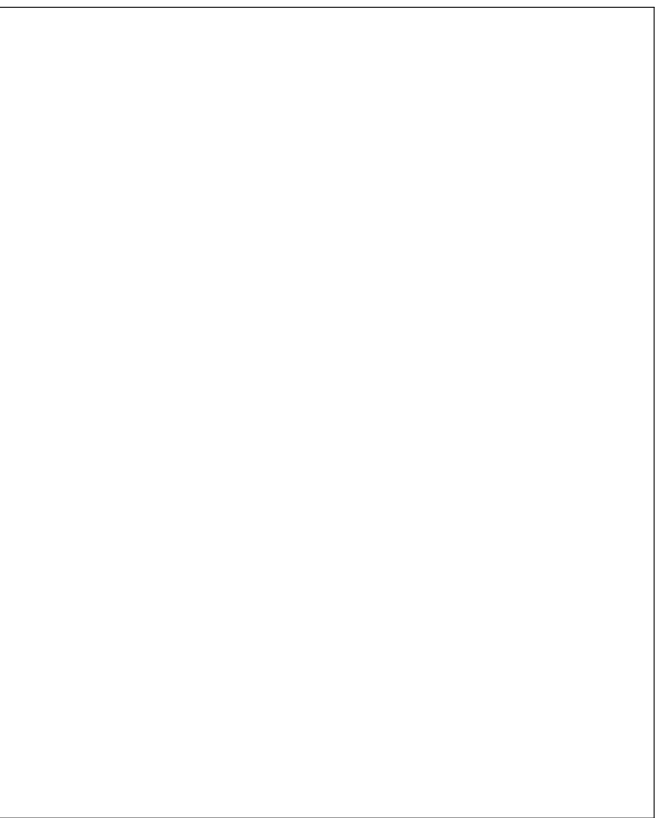




3 ELEVATION- WAVE WALL  
1/4" = 1'-0"

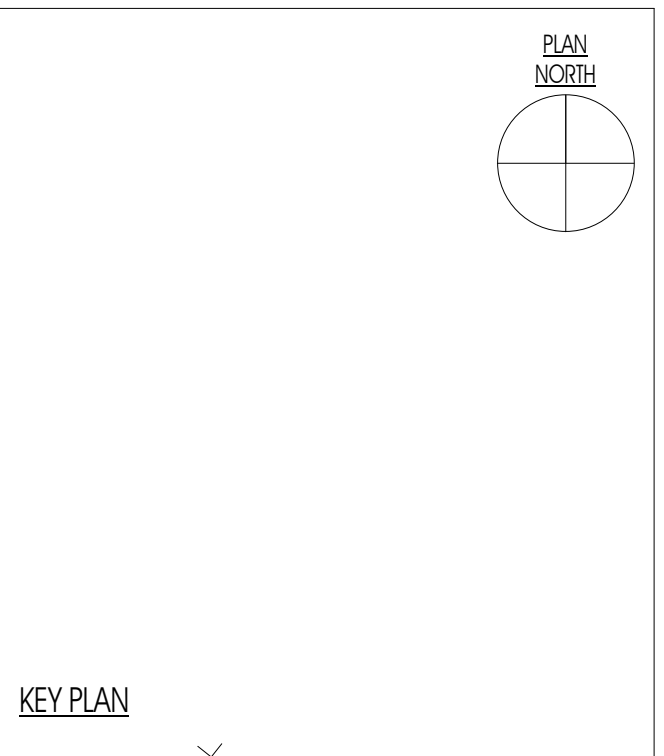
2 SECTION- WAVE WALL  
1/4" = 1'-0"

1 THIRD FLOOR KEY PLAN - WAVE WALL  
1/4" = 1'-0"



**SOSH**  
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Atlantic City Convention  
Center  
Restroom Renovation  
1 Convention Boulevard  
Atlantic City, NJ 08401

SUBMISSIONS		
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DRAWING TITLE: WAVE WALL ENLARGED PARTIAL PLAN & SECTION		
NOT FOR CONSTRUCTION		
DRAWN BY: Author	DATE: 11/02/17	
REVIEWED BY: Checker		
SCALE: 1/4" = 1'-0"	DRAWING NO. A-830	
PROJECT NO. 17010.01.001		



BC H9G  
% (L &\$, J 5 7 Ž% 5 'DC K 9F 'B '8 98 7 5 H98 '7 F 7 I #Gž  
J 5 'F 97 9GG98 '@!%) 'C I H@H  
& , L 'G< 9@8 98 '7 5 H) Y#\* '8 5 H5 'B  
' ' , L 'G< 9@8 98 '7 5 H) Y#\* 'GD5 F9  
( " A 5 L A I A 'DC K 9F '7 C B G A DHC B.' ' Ž% \* 'K 'A 5 L  
5 H%\$\$! '6F ÷ <HB 9GGžGC @8 'K <#P'H9GHD5 H9FB

7 C B H9B H\$ž

5 @C K '%#&""7 @95 F5 B7 9 HC D'5 B8 '  
6C HC A ' : C F J 9B H@5 HC B

@98 : 5 7 9

CA 9F 7 J 9K

DF 9@A B5 FMC B@M! '8C 'BC H6I =@8



KMK Technologies, LLC

\_\_\_ APPROVED



☒ APPROVED AS NOTED

\_\_\_ REVISE AND RESUBMIT

\_\_\_ REJECTED

BY: B. HUFF DATE: 6/6/2018

KMK Technologies' review is for general conformance with the project design concept and information provided in the contract documents. The review does not include, and the contractor is solely responsible for dimensional accuracy, fabrication process selection, coordination with other trades, and performance of work in a safe manner.

F9J 4G BG				
NC B9	F9J *	8 9G7 F4DHC B	85H9	5DDFCJ 98
	5	DF9@A B5FMJ C @ A 9HF 7	*#( #&\$%	
APPROVALS				
DRAWN BY:		7 :	*#( #&\$%	
5DDFCJ 98 '6M		G8	*#( #&\$%	
F9@95 G98 '6M		; A	*#) #&\$%	
DCK 9F 'BDI H		85H5 'BDI H		
E I 5BHHM		E I 5BHHM		
J C @5: 9.	D@ ; 'GHM@.	HMD9.		
&\$, J 5 7	@!%)	G< 9@8 98 '7 5 H) Y#*		
5A DG	K 5HG	GD5 F985H5 '7 5 6@9G		
% 5	' ' Ž% * 'K 'A 5 L			
7 5@7 I @5H8 'K 9÷ <H		A C I BHB;		
(' '\$\$ @6G 9GHA 5H98		7 C B: ÷ I F5HC B.		
		K 5@@A C I BH		
: B G<.		6F ÷ <HB 9GG'99B GC F.		
H9LH F98 'F5J 9B '6@5 7 ?		M9G		
		SOLIDWORKS		
HC @F5B7 9G1 B@9GCHK 9FK 69@D97 ÷ 98				
: F57 HC BG '%%				
897 A 5@G '111 Ž# '\$\$) ""'11 Ž# '\$%&""'1 Ž# '\$&\$				
5B: I @5F.'"				
I B#G-B 'B7 <9G				
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TITLE:				
8-@D5M' A A ž(*K 'L ' &, Hž B5BC7I FJ 9				
SIZE	DWG. NO.			REV
7	5: 56! %&)' !J C @			5
SCALE: 1:12		DO NOT SCALE DRAWING		SHEET 1 OF 4







NO POWER NEEDED,  
THIS RECEPTACLE

%L'G<9@898'75H)Y#\*85H5'B  
%L'G<9@898'75H)Y#\*85H5'GD5F9

540 in

AT EACH OF (7)  
RECEPTACLES

&L'&\$,J57ž%5'DCK9F'B  
%L'G<9@898'75H)Y#\*85H5'B  
%L'G<9@898'75H)Y#\*85H5'GD5F9

DEPENDENT ON EXACT LOCATIONS  
OF WALL STRUCTURAL ELEMENTS

8GD5M'G9HBCA B5@M\$)":FCA'ACIBHB; 'GIF:579HC'577CIBH:CF'8G7F9D5B7-9GB'GIF:579  
ACIBHB; '6F57?9HG5F9G9HBCA B5@M\$)":FCA'657?C:8GD5M  
ACIBHB; '6F57?9HG<5J958>IG56@F5B; 9C:'±\$)":FCA'BCA B5@  
@75HC BGC: 'ACIBHB; '6F57?9HG'68  
J-9K56@5F7 @B, 'K-6))&  
DCK9F'5B8'85H5'CD9B-B; '@75HC BG5F95DDFC LA 5H9'5B8'DF9@A B5FM  
:B5@@@75HC BGC: DCK9F'5B8'85H5 '@75HC BG'68

DF9@A B5FMCB@M! 8C'BC H6I @8



KMK Technologies, LLC

\_\_\_ APPROVED  
X APPROVED AS NOTED  
\_\_\_ REVISE AND RESUBMIT  
\_\_\_ REJECTED

BY: B. HUFF DATE: 6/6/2018

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SOLIDWORKS



HC@F5B79G1B@9GCH-9FK-69GD97-98

:F57HC BG'%%%

897A5@G'111Z#"\$%)'"11Z#"5%'"1Z#"5&\$

5B: I @5F:"

I B+G-B'B7<9G

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TITLE:

8GD5M' AAž(\*K'L'&H' B5BC7IFJ9

SIZE

DWG. NO.

REV

7

5:56!%%&)'!JC@ 5

SCALE:1:8

DO NOT SCALE DRAWING

SHEET 3 OF 4



5G6I @HGFI 7H F9G<CK B  
5F7 @B; H G5F98 A 9BG<BG: FCA '98; 9G<: A C I BHB; 'G F: 579  
HC '957< 'DC K 9F '5B8 '85H5 '@ 75H< BG

DC K 9F '5B8 '85H5 '@ 75H< BG  
fG99'DF 9J € I G'D5; 9L

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657?'C: '8-GD5MHC  
A C I BHB; 'G F: 579

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7 C B H B H \$ \$

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A78

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P297

8-GD5M-G9HBCA B5@M\$) '": FCA 'A C I BHB; 'G F: 579HC '577C I BH: CF '8-G7F9D5B7 9G-B 'G F: 579  
A C I BHB; '6F57?9HG5F9G9HBCA B5@M\$) '": FCA '657?'C: '8-GD5M  
A C I BHB; '6F57?9HC: '5J9'58>I G569'F5B; 9C: '±\$) '": FCA 'BCA B5@  
@ 75H< BG<: A C I BHB; '6F57?9HG58  
J 9K 56@95F7 @B; H €))&  
DC K 9F '5B8 '85H5 'C D9B-B; '@ 75H< BG5F95DDFCL A 5H9'5B8 'DF9@A B5FM  
'B5@@@ 75H< BG<: 'DC K 9F '5B8 '85H5 '@ 75H< BG'H68

DEPENDENT ON EXACT LOCATIONS  
OF WALL STRUCTURAL ELEMENTS

DF9@A B5FMCB@M! '8C 'BCH6I =@8




KMK Technologies, LLC

☐ APPROVED  
☒ APPROVED AS NOTED  
☐ REVISE AND RESUBMIT  
☐ REJECTED

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SOLIDWORKS




HC @F5B79G1 B@9GCH: 9FK -69'D97 = 98  
: F57 HC BG: %%%  
897 A 5€ '111 Z# '\$\$) '11 Z# '\$\$&'1 Z# '\$&\$  
5B: I €F: "

**I B+G-B 'B7<9G**

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NanoLumens®

TITLE:

**8-GD5M' AAŽ(\*K 'L' & HZ  
B5BC7I FJ 9**

SIZE	DWG. NO.	REV
<b>7</b>	<b>5: 56!%&amp;)'!JC@</b>	<b>5</b>

SCALE: 1:8      DO NOT SCALE DRAWING      SHEET 4 OF 4



