MILLER
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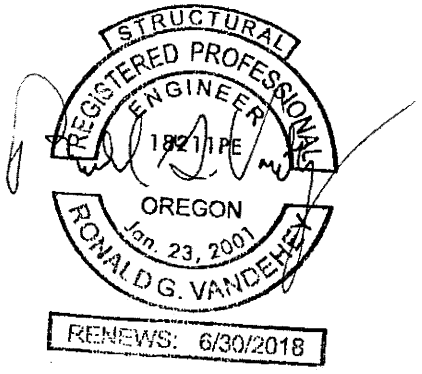
SUPPLEMENTAL STRUCTURAL CALCULATIONS

Legacy Holiday Park Chiller Replacement
815 NE Davis Street, Portland, Oregon
Johnson Controls

February 15, 2017
Project No. 161480

6 pages

Principal Checked: N



*** LIMITATIONS ***

Miller Consulting Engineers, Inc. was retained in a limited capacity for this project. This design is based upon information provided by the client, who is solely responsible for accuracy of same. No responsibility and or liability is assumed by or is to be assigned to the engineer for items beyond that shown on these sheets.

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Phone (503) 246-1250 Fax (503) 246-1395 www.miller-se.com

Building Code: 2014 Oregon Structural Specialty Code

Soils Report: No **Soils Report by:** N/A **Dated:** N/A

Soil Bearing: 1500 PSF **Retaining Walls:** No

Equivalent Fluid Pressure (active): N/A PCF **Passive bearing:** N/A PCF **Friction:** N/A

Structural System: Component

Vertical System: **Lateral Sys:**

Basic Design Loads:	**Element**				
	Load Type				
	Value (PSF)				
	Load Type				
	Value (PSF)				
	Deflection Criteria				

Lateral Design Parameters:

Wind Design: ASCE 7-10 **Wind Speed (3 sec Gust):** 130 MPH

Exposure B

Importance Factors I_W = 1.00 (ice w/ wind) I_E = 1.25 (seismic) I_S = 1.10 (snow) I_i = 1.25 (ice) **Risk Cat:** III

Seismic Design

Seismic design parameters are based on published values from the USGS web site.

See page 3 of original calculations

Latitude:
Longitude:

2% PE in 50 years, 0.2 sec SA = Ss

2% PE in 50 years, 1.0 sec SA = S1

(Site class B parameters are indicated on this page, for actual site class used in design, refer to seismic design summary)

Design Summary:

The following supplemental calculations are for the attachment of an new lighter evaporation tower to the existing steel beam sleepers. See original calculations dated 12/22/2016 for loading. No change to the gravity or lateral load resisting system of the structure.

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Project Name: Legacy Holiday Park Chiller Replacement Project #: 161480

Location: 815 NE Davis Street, Portland, Oregon

Client: Johnson Controls

BY: MRS Ck'd: MV Date: 02/15/17

Check connection from mechanical unit to (E) steel beams

T= 64# SEISMIC / fastener

= 953# WIND ← CONTROLS

V= 117# SEISMIC

= 427# WIND ← CONTROLS

SEE NEXT PG. FOR DESIGN

USE (8) 1/2" ϕ BOLTS

ATTACH STEEL BEAMS TO CONCRETE

ALL SHEAR IS TAKEN OUT IN (E) CONCRETE ANCHORS (10 per sleeper)

T_{EQ} = 105# x 4 connectors x 1.4 ULT x Ω = 2.5 = 1470# (TOTAL)

T_{WIND} = 1176# x 4 connectors x 1.6 ULT = 7526# ← controls

3 anchors = 2509#

SEE PG. 5 FOR CONCRETE ANCHOR DESIGN

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Steel Fastener Design - AISC 13th Addition

Type:	Bolt	
Grade:	A307	
Threads are	included	in the shear plane
Diameter:	0.5	in
Loading:	ASD	
T =	0.95	k, tension
V =	0.43	k, shear
A =	0.196	in^2
dr =	0.417	in
ft =	4.9	ksi = 0.95 / 0.196
fv =	2.2	ksi = 0.43 / 0.196
Ω =	0.5	

Fastener Capacity Summary:

Fnt =	45	ksi, Table J3.2
Fnv =	24	ksi, Table J3.2
Tc =	**4.41**	k = 45 * 0.196 * 0.5
Vc =	**2.35**	k = 24 * 0.196 * 0.5
ft/(Fnt*0.5) =	0.22	< 1.0 OK
fv/(Fnv*0.5) =	0.18	< 20%, effects of combined stresses need not be investigated

Combined effects are not applicable.

F'nt =	N/A	ksi, Eq. J3-3, page 16.1-109
T'c =	N/A	k, reduced tension capacity

Use 0.5" diameter A307 bolt

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Check (e) steel beam

T= 1176# x 4 connections / (3) anchors = 1568#

$$f_b = \frac{1568\# \times \frac{3.33" - 0.232"}{2}}{S = (16 \times 0.359")(0.359")^2/6} = 19909 \text{ psi} < \frac{36000}{1.67} = 21556 \text{ psi}$$

(E) S6x12.5 BEAM IS ADEQUATE

Check angle leg

T= 1568# x 2" = 3136" -#

$S = (1/4")(2")^2/6 = 0.17 \text{ in}^3$

$f_b = 18816 \text{ psi} < \frac{36000 \text{ psi}}{\Omega = 1.67} = 21557 \text{ psi}$ ok

USE L2x2 x1/4

Check WELD

M = 1568# x 2"/12 = 261 ft-#

T = 1568#

SEE PG. 6

USE 3/16" WELD EA. SIDE

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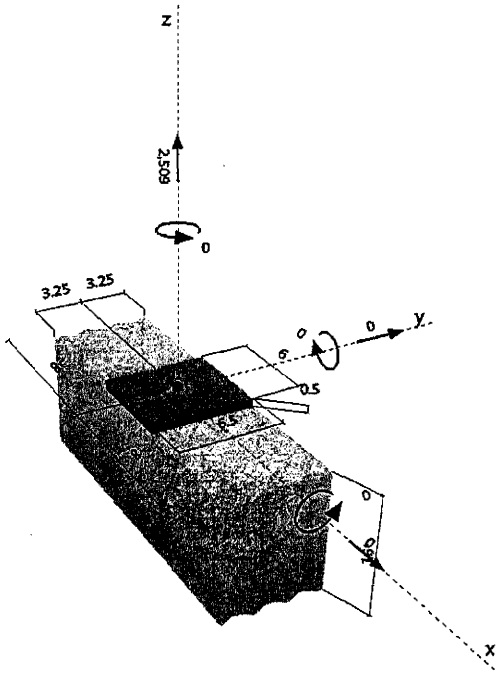
Company:		Page:	1
Specifier:		Project:	
Address:		Sub-Project I Pos. No.:	
Phone I Fax:	I	Date:	2/15/2017
E-Mail:			

Specifier's comments:

1 Input data

Anchor type and diameter:	HIT-HY 200 + HAS 5/8
Effective embedment depth:	$h_{ef,opt}$ = 5.906 in. ($h_{ef,limit}$ = 12.500 in.)
Material:	5.8
Evaluation Service Report:	ESR-3187
Issued I Valid:	6/1/2016 | 3/1/2018
Proof:	Design method ACI 318-11 / Chem
Stand-off installation:	e_b = 0.000 in. (no stand-off); t = 0.500 in.
Anchor plate:	l_x x l_y x t = 6.000 in. x 6.500 in. x 0.500 in.; (Recommended plate thickness: not calculated
Profile:	no profile
Base material:	cracked concrete, 4000, f'_c = 4000 psi; h = 16.000 in., Temp. short/long: 32/32 °F
Installation:	**hammer drilled hole, Installation condition: Dry**
Reinforcement:	tension: condition B, shear: condition B; no supplemental splitting reinforcement present edge reinforcement: none or < No. 4 bar

Geometry [in.] & Loading [lb, in.lb]



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Phone I Fax:	I	Date:	2/15/2017
E-Mail:			

2 Proof I Utilization (Governing Cases)

		Design values [lb]		Utilization	
Loading	**Proof**	**Load**	**Capacity**	**β_N / β_V [%]**	**Status**
Tension	Bond Strength	2509	2524	100 / -	OK
Shear	-	-	-	- / -	-

Loading	**β_N**	**β_V**	**ζ**	**Utilization $\beta_{N,V}$ [%]**	**Status**
Combined tension and shear loads	-	-	-	-	-

3 Warnings

- Please consider all details and hints/warnings given in the detailed report!

Fastening meets the design criteria!

4 Remarks; Your Cooperation Duties

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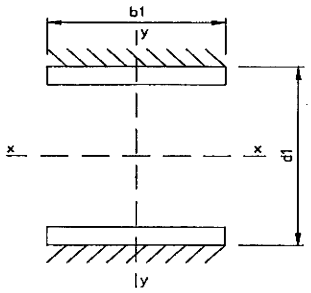
EQUAL RECTANGLES (weld on both outside faces)

Vy =		lb (asd)	
Mx =		ft-lb (asd)	
Vx =	1568	lb (asd)	
My =	261	ft-lb (asd)	
Weld size (w) =	0.1875	in =	3/16 " fillet weld
Length of weld (b1) =	2	in	
Depth of post (d1) =	0.75	in	Distance between insides of weld
d =	1.02	in	Outer depth of weld *[d = d1+2*w*.707]*
A =	0.54	in^2	= (1.02-0.75)*2
Ix =	0.11	in^4	= 2*(1.02^3-0.75^3)/(12)
Sx =	0.22	in^3	= 0.11/(1.02/2)
Iy =	0.18	in^4	= (0.1875*0.707*2)*2^3/12
Sy =	0.18	in^3	= 0.18/(2/2)
F_w/Ω =	21000	psi	
Vc =	**11340**	**lb**	= 21000*0.54
Mcx =	**385**	**ft-lb**	= 21000*0.22/12
Mcy =	**315**	**ft-lb**	= 21000*0.18/12
Capacity =	0.97	< 1.00 OK	
	Use 0.1875" fillet weld		



Check shear welds

(E) = 1/8 - 1/32" = 0.09375" x l = 3" = 0.28 in^2

Vc = 21000 psi x 0.28 in^2 = 5880 # per weld

V_{TOTAL} = 474# x 8 = 3792# < 5880#

(E) WELDS ARE ADEQUATE

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