

STRUCTURAL CALCULATIONS

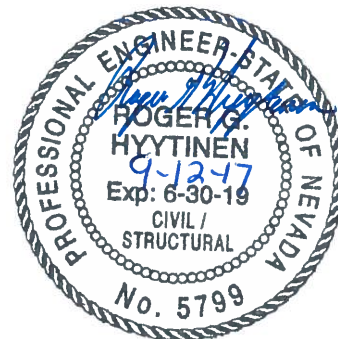
For

**VA HOSPITAL
RELOCATE BOILER PLANT ELECTRICAL ROOM
975 KIRMAN
RENO, NEVADA, 89502**

Prepared For:

**H&K ARCHITECTS
5485 RENO CORPORATE DR. SUITE 100
RENO, NEVADA 89511**

By:



HYYTINEN ENGINEERING

5458 Longley Lane, Suite B

Reno, NV 89511

775/826-3019 775/826-3076 FAX

www.hyytinenengineering.com

Design Loads:

Ground Snow Load,30 psf
Ce = 1.0; Ct = 1.0; I = 1.2
Roof Snow Load:25 psf
Floor Live Load100 psf
Mezzanine Live Load.....125 psf
Wind140 mph, Exposure C
Seismic (I=1.5).....Site Class D
Code2012 International Building Code

Design Stresses:

Soil Bearing (Existing).....Qa = 4000 psf
Concrete.....Minimum F'c = 3000 psi
Concrete Reinforcing.....ASTM A615 Grade 60
Structural Steel.....Min. ASTM A36
W Shapes.....ASTM A992
HSS Shapes.....ASTM A500 Grade B
Pipe Columns.....ASTM A501



Google earth

feet
meters

600
200



3 of 6a

Elev. = 4458
Lat. = 39.515987
Long. = -119.797407

4046a

Design Maps Summary Report

User-Specified Input

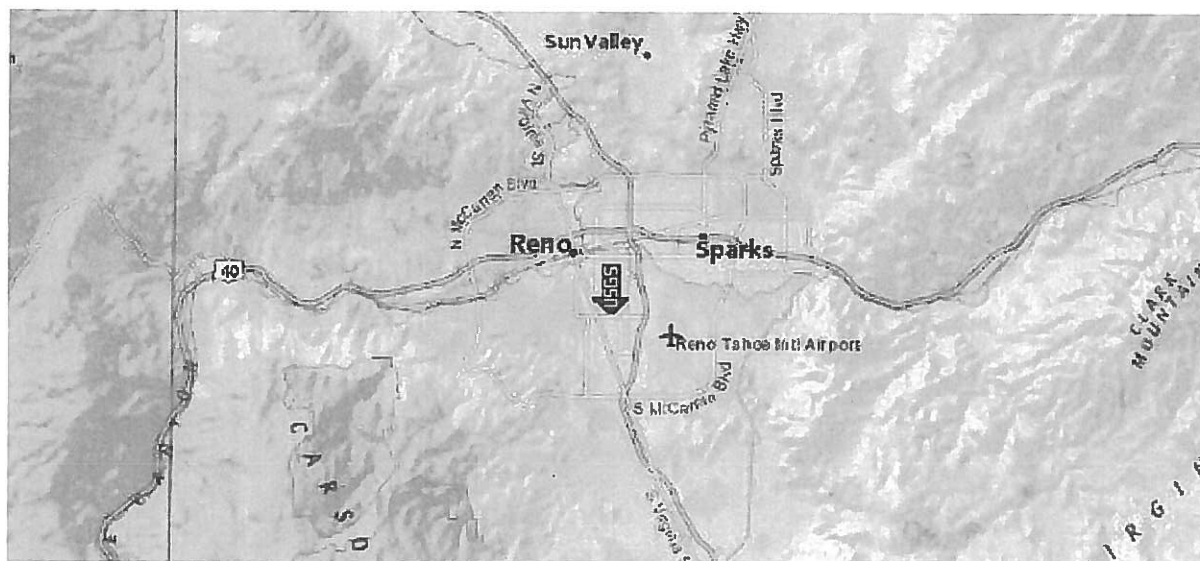
Report Title VA Hospital Electrical Room Remodel
Wed August 9, 2017 22:01:40 UTC

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 39.516°N, 119.79741°W

Site Soil Classification Site Class D - "Stiff Soil"

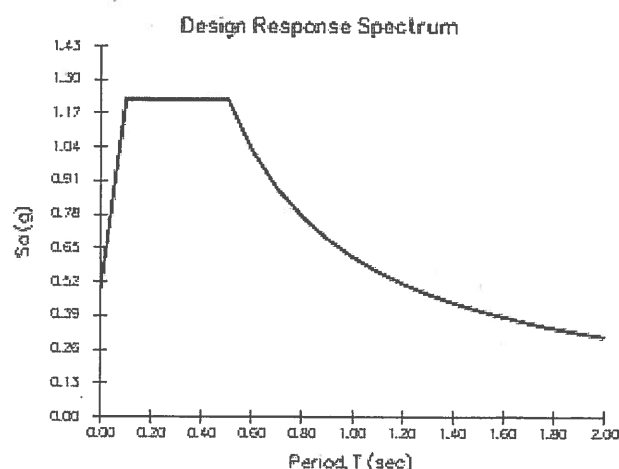
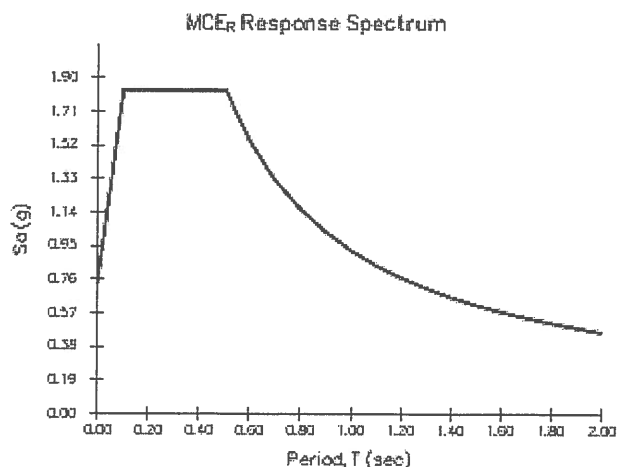
Risk Category IV (e.g. essential facilities)



USGS-Provided Output

$S_s = 1.833 \text{ g}$	$S_{MS} = 1.833 \text{ g}$	$S_{DS} = 1.222 \text{ g}$
$S_1 = 0.618 \text{ g}$	$S_{M1} = 0.926 \text{ g}$	$S_{D1} = 0.618 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.



For PGA_M , T_L , C_{RS} , and C_{R1} values, please [view the detailed report](#).

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JOB VA Boiler Plant RemodelSHEET NO. 5 OF 6CALCULATED BY BW DATE 8/16

CHECKED BY _____ DATE _____

SCALE _____

- Mezz. Unit Support (RTU): @ Max. Wt. = 600#
New Support L's; @ $l = 5'$; @ $T = 600/2 = 300\#$
 $M = (3)(5/2) = 0.75'K$; Req'd. $S_{36} = (.75)(12)/(16)(36) = 0.12 in^3$
 $R = 0.15K$

Use Min. $2 \times 3 \times 3 \times 1/4$ Support Angle
(Typ of 2)

Check Exist. Roof Joists; $W10 \times 21$ A36 @ 5'oc.; $l = 22'$

Roof LL = 21 psf Snow

Roof DL = 25 psf

TL = 46 psf

$w = (.046)(5) = 0.23 Klf$

$P = 600/2 = 0.3K$

@ Max. TL $M = (.23)(22)^2/(8) + (.3)(22)/(4) = 14.0 + 1.7 = 15.7'K$

$P_b / F_b = (15.7)(12)/(21.5)(16)(36) = 0.11 \leq 1.00$ OK

\therefore (E) $W10 \times 21$ @ 5'oc. is Adequate.

- New Mezz. Floor Opening Framing:

@ $LL = 12.5$ psf

@ $DL = 35$ psf

TL = 160 psf

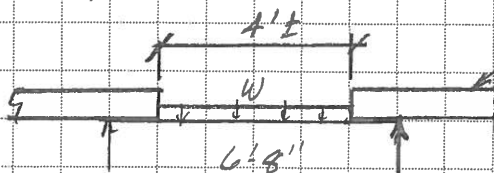
@ Max. $l = 6'-8"$; $w = (.16)(7) = 1.16 Klf$

@ Max. $M = (.16)(6.67)^2/(8) = 0.89'K$; Req'd. $S_{36} = 0.50 in^3$

$R = .54K$

Use Min. $L 3 \times 3 \times 1/4$ Support L's; $S = 0.577 in^3$

- Existing Mezz. Floor Hole Infill: (E) = $L 3 \times 3 \times 1/4$; $l = 6'-8"$



(E) Cantilevered Mtl. DK & Conc. Fill

$w = 0.16 Klf / ft$

@ Max. $M = (.16)(1.5)^2/(2) + (.16)(2)(1.5) = (.18) + .48 = 0.66'K / ft$

Allow. Exist. Flr. $M = (.16)(6.67)^2/(8) = 0.88'K / ft \geq 0.66'K / ft$ OK

\therefore (E) Framing is Adequate.

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JOB V.A. Boiler Plant RemodelSHEET NO. 6 OF 6 aCALCULATED BY RH DATE 8/1/16

CHECKED BY _____ DATE _____

SCALE _____

Check New Core Wall Infill: @ Exst. 6" Conc Walls

@ Max. Infill Height = 12'

@ Max. lateral $w = 40 \text{ psf}$ @ $F = (0.4)(1.0)(1.5)(70) = 42 \text{ psf}$; $(42)(7) = 294 \text{ psf}$ $M = (0.04)(12)^2 / (8) = 0.72 \text{ K/ft}$ Reqd. $A_s = (0.72)(1.6)(12) / (0.9)(60)(2.75 - 0.25) = 0.11 \text{ in}^2 / \text{ft}$ Use Min. #4 Verts @ 12" Max. O.C.; $A_s = 0.20 \text{ in}^2 / \text{ft}$ OKCheck @ Wind Pressures: $V_{ult} = 140 \text{ mph}$, Exp. C

ASCE 7-10 Chpt. 30

30.5.2: $p_{net} = 7 K_{zt} p_{net,30}$ $= (1.35)(1.0)(44) = 60 \text{ psf}$; $(60)(6) = 360 \text{ psf}$ $360 \text{ psf} \leq 40 \text{ psf}$ OK

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JOB V.A. Boiler Plant Remodel
SHEET NO. 6a OF 6a
CALCULATED BY BH DATE 8/16
CHECKED BY _____ DATE _____
SCALE _____

Check New Door Canopy Framing:

1. Metal Roof Decking:

@ Max. Span = 2' :

Use Min. 22 Ga Corrugated Mtl. Roofing (Or Equiv.)

Provide #12 TEK Screws (36/8) Pattern to \perp Supports

" " TEK Screws @ 12" OC to Parallel Supports

" " TEK Screw Side Lap @ 12" OC

2. Support Beams: @ $d = 4.5'$

@ Max. $w = (.035)(2) = .07 \text{ MF}$

@ Max. $M = 0.18 \text{ K}$; Req'd $S_{36} = (.18)(12)(16)(36) = 0.10 \text{ in}^3$

Use HSS 3x1 x $3/16$ Support Beams @ 24" OC

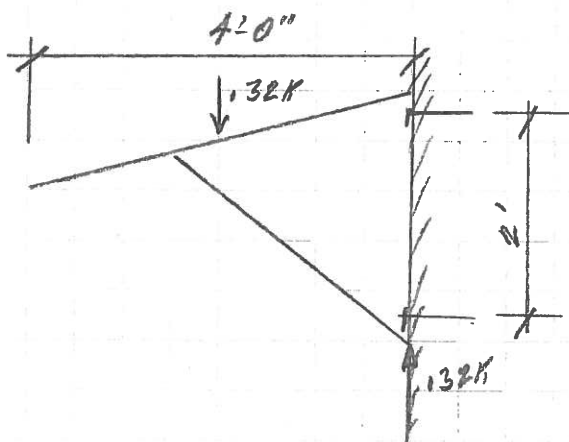
3. Check L Brackets:

@ Max. Cont. $P = (.07)(4.5)(2) = 0.16 \text{ K}$; Use 0.2 K

@ Max. Cont. $L = 1.5'$

Max. Design $M = (.2)(1.5) = 0.3 \text{ K}$; Req'd $S_{36} = 0.17 \text{ in}^3$

Use L 3x3 x $1/4$ Frame



@ Max. Total Frame DTM = $(.035)(2.25)(4)^2(2) = 0.64 \text{ K}$

Anchor $T = .64/2 = 320 \text{ \#}$ Tension
160 \# Shear

Use Min $5/8" \phi \times 4"$ Embed
Epoxy Anchors @ 12" OC
(3 Total Per L Frame)