

STRUCTURAL CALCULATIONS

Strom Jewish Community Center ECS Interior Improvements

Weinstein AU
April 4, 2025
S22060



PREPARED BY:
Ben Barlow, SE

CHECK CAPACITY OF EXISTING ROOF TO SUPPORT NEW UNITS

UNIT WEIGHTS FROM MECH'L:

UNIT TAG	LOCATION	SERVES	SOUND dBA	WT LBS
ODU-101	ROOF	NORTH	65.0	1,500
ODU-102	ROOF	SOUTH	65.0	730
ODU-103	ROOF	NORTH	65.0	730
ODU-104	ROOF	SOUTH	65.0	730

UNIT TAG	LOCATION	AREA SERVED	WEIGHT LBS
ERV-101	ROOF	NORTH ROOMS	1020
ERV-102	ROOF	SOUTH ROOMS	780

GRAVITY CRITERIA:

SNOW LOAD = 25 PSF

DEAD LOAD AT 8" HOLLOW CORE PLANKS (SOUTH BUILDING)

62 PSF PLANK WEIGHT
5 PSF ROOFING
3 PSF CEILING
2 PSF MISC
TOTAL DEAD LOAD = **72 PSF.**

DEAD LOAD AT PRECAST T SECTION (NORTH BUILDING)

2" SLAB = 25 PSF
6"x14" T SECTIONS AT 4' oc = 22 PSF
ROOFING = 5 PSF
CEILING = 3 PSF
MISC = 2
TOTAL DEAD LOAD = **57 PSF**

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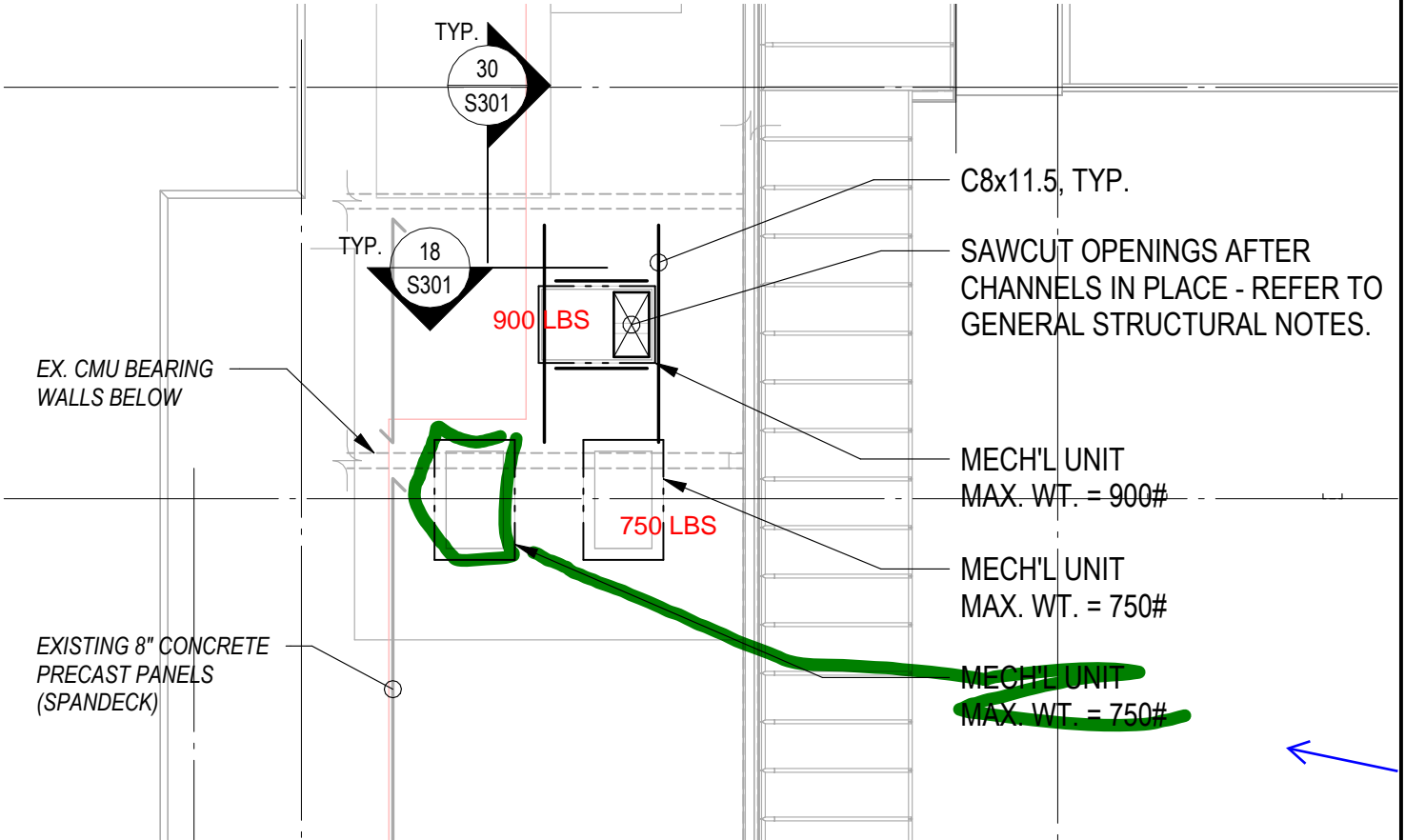
Project: **SJCC** Designed By: **BWB** Date: **4/3/25**

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CHECK CAPACITY OF EXISTING ROOF TO SUPPORT NEW UNITS.

PER IEBC 502.4, VERIFY GRAVITY LOAD NOT INCREASED BY MORE THAN 5%:

SOUTH BUILDING:



FOR 750 LB UNIT, VERIFY LOAD ON PANELS NOT INCREASED BY MORE THAN 5%:

EXISTING SPAN = 19.5'

DL = 72
SL = 25
TL = 97 PSF.

EXISTING M = 4.61 k-ft/ft
EXISTING V = 0.95 k/ft

ADDED M = $0.75k \times 17.5' \times 2 / 19.5' = 1.35$ k-ft (TOTAL) - SPREAD OUT OVER 8' PANEL = .17 k-ft/ft
0.17 k-ft IS LESS THAN 5% OF 4.61 k-ft, THEREFORE OK.

SHEAR ADDED = $750 \text{ lbs} \times 2/3$ (PORTION OF UNIT LANDING ON PANEL) OVER 6' OF WIDTH = .083K/ft (ADEQUATE BY INSPECTOR FOR CONCRETE PRECAST PANEL)

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SOUTH BUILDING CONTI'D:

CHANNELS UNDER ERV SUPPORT ERV PLUS PORTION OF EXISTING ROOF PANEL
THAT IS CUT:

SPAN = 10.75'

LINE LOAD = 4' OF PANEL TRIB = 288 PLF DL, 100 PLF SL

POINT LOAD AT MIDDLE = 1/2 OF UNIT WEIGHT = 450 LBS.

Mmax = 5.6 k-ft

Vmax = 2.1k

LIMIT DEFLECTION TO L/600

TRY C8x11.5

I = 32.5, S = 8.14

Mall = 14.6 k_ft (ok)

DEFLECTION = 0.12" (UNIFORM) + .02" (UNIT) = 0.14". L/600 = 0.21" (OK)

C8x11.5 OK FOR ALL MEMBERS. CONNECTIONS ADEQUATE BY INSPECTOIN.

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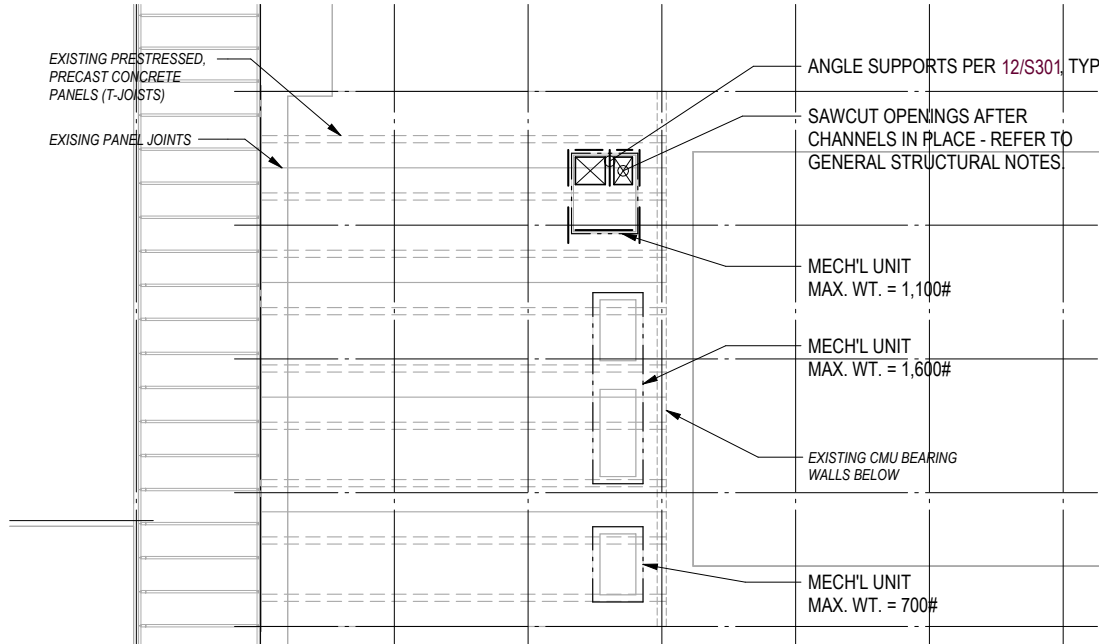
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CHECK CAPACITY OF EXISTING ROOF TO SUPPORT NEW UNITS.

PER IEBC 502.4 VERIFY GRAVITY LOAD NOT INCREASED BY MORE THAN 5%:

NORTH BUILDING:



EXISTING PRECAST T'S

EXISTING SPAN = 27.5'

DL = 57
SL = 25
TL = 82 PSF.

EXISTING M = 7.75 k-ft/ft
EXISTING V = 1.13 k/ft

ERV = 1100 LB SPREAD OVER 8' OF TRIBUTARY WIDTH = 138 lbs/ft (CONTROLLING CASE)
(CENTERED 5.5' FROM END OF SPAN)

ODU = 1600 LB SPREAD OVER 16' OF TRIBUTARY WIDTH = 100 lbs/ft

CHECK ADDED MOMENT FROM ERV (AT MIDSPAN OF T'S) = $1.1k \cdot 5.5' \cdot (27.5/2) / 27.5' = 2.29 \text{ K-FT}$
2.29 K-FT SPREAD OVER 8' PANEL = 0.286 k-ft/ft. $0.286 / 7.75 = 3.7\%$ (OK)

ADDED SHEAR = $1.1k / 8' = 0.14 \text{ K/FT}$ (GREATER THAN 5%)

CHECK SHEAR OF WT DIRECTLY: $0.75 \cdot 2 \cdot \text{SQRT}(5000 \text{ PSI}) \cdot 6" \cdot 13.5" = 8.6\text{K}$ (PER T). T'S AT 4' oc
SO CAPACITY IS 2.15K/FT (LRFD). $V_u = 1.13 \cdot 1.5 + 0.14 \cdot 1.5 = 1.91\text{k/FT}$ (CONSERVATIVE)

SHEAR AND BENDING BOTH OK.

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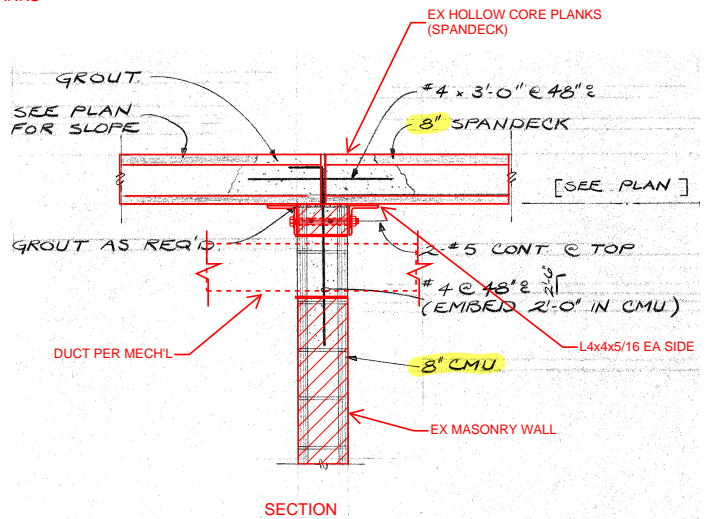
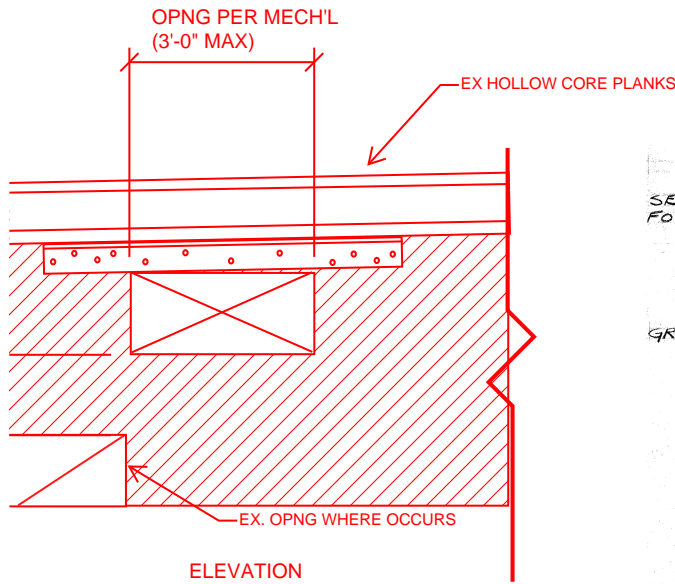
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ANGLES AT MECHANICAL OPENINGS.



MAX SPAN = 3'+1' (ACCOUNTING FOR BOLTS)

DL = 72
SL = 25
TL = 97 PSF.

MAX TRIB ON ANGLE = 9.5'

w = 0.92 k/ft

M = 1.84K-FT
V = 1.84K

LIMIT DEFLECTION TO L/600 = 0.08"
I_{reqd} = 2.28

Try Angle 4x4x5/16

M_{all} = 0.6*36*1.27 = 2.29 k-ft (ok)
I = 3.67 (OK)

CONNECTION TO WALL = (2) 5/8" THRU BOLTS EA END OF ANGLE INTO 8" SOLID CMU = 0.92K/BOLT (OK BY INSPECTION)

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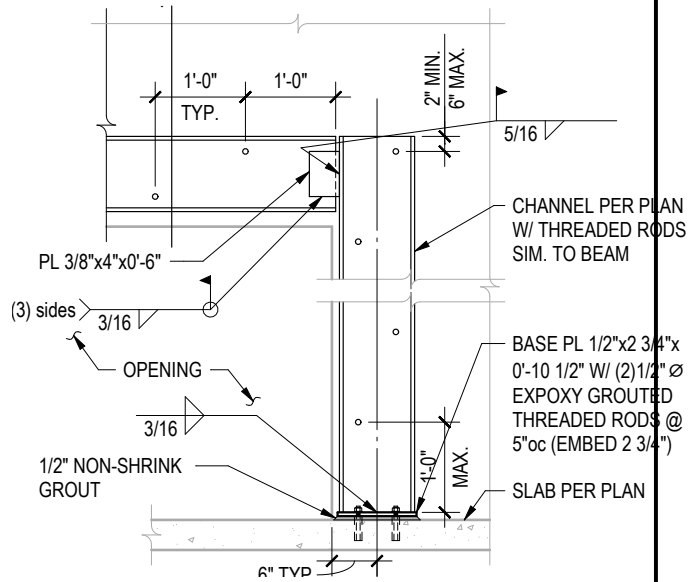
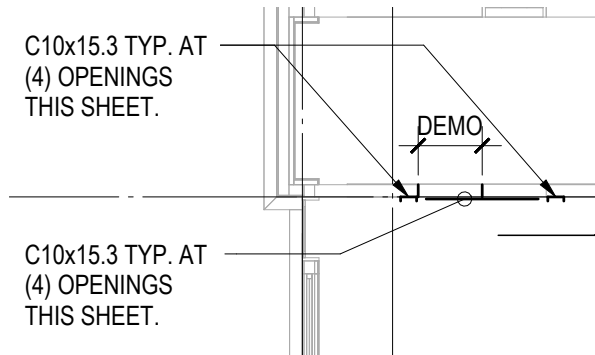
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NEW WALL OPENINGS



NEW OPENING LENGTH = 7'

TRIB TO CHANNEL = 15'

TOTAL LOAD = 92 PSF * 15' = 1.38 k/FT (USE 1.5 TO ACCOUTN FOR CHANNEL/WALL WT)

M = 8.45 K-ft

C10x15.3 - Mall = 24.2 k-ft (OK)

BOLTS, SHEAR AND CONNECTION OK BY INSPECTION

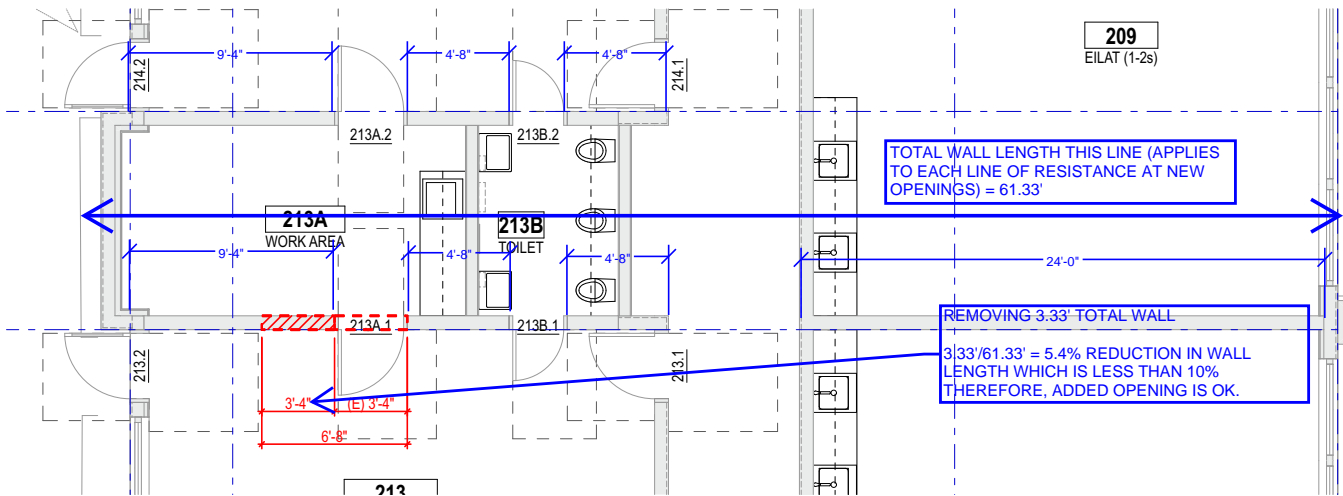
COLUMN OK BY INSPECTOIN.

CHECK LATERAL PER IEBC 502.5

Exceptions:

1. Any existing lateral load-carrying structural element whose demand-capacity ratio with the *addition* considered is not more than 10 percent greater than its demand-capacity ratio with the *addition* ignored shall be permitted to remain unaltered. For purposes of calculating demand-capacity ratios, the demand shall consider applicable load combinations with design lateral loads or forces in accordance with Sections 1609 and 1613 of the *International Building Code*. For purposes of this exception, comparisons of demand-capacity ratios and calculation of design lateral loads, forces and capacities shall account for the cumulative effects of *additions* and *alterations* since original construction.

REMOVING 3.33' OF WALL OUT OF A TOTAL OF 61.33' EACH LINE OF RESISTANCE - SEE BELOW (ACCEPTABLE)



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