

MURASHIGE & ONISHI

ENGINEERING CO., INC.

Structural Engineers

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GARDENA, CALIFORNIA 90247

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Residential-Commercial-Industrial

Established 1970

Structural Calculations for

DSH METROPOLITAN CENTRAL KITCHEN

11401 Bloomfield Avenue

Norwalk, CA 90650

JCCA Job Number: 24793-9

M&O Job Date: July 8, 2025

M&O Job Number: MO-2507-165

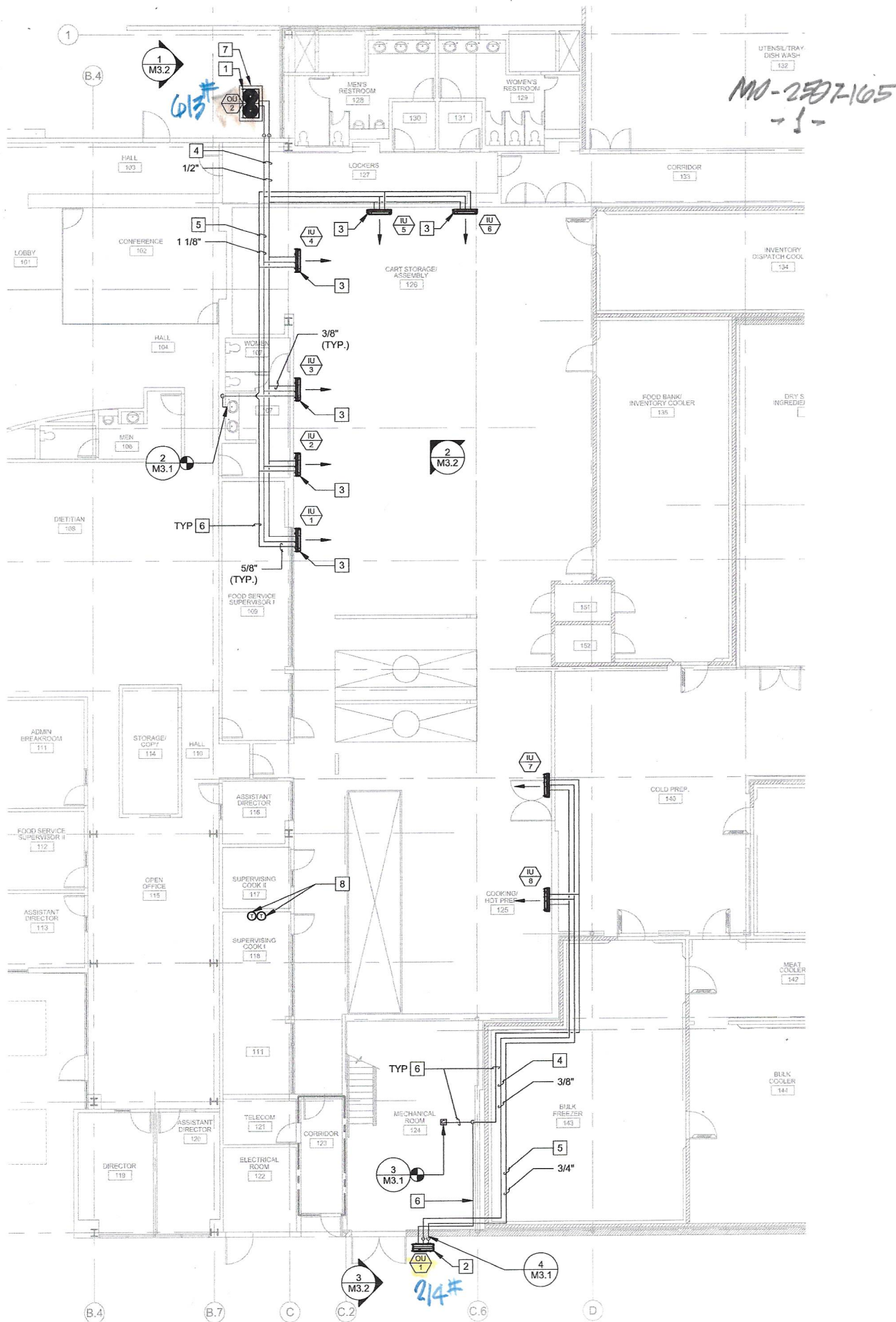
INDEX TO CALCULATIONS

Plan (showing area of new work).....	1
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SCOPE OF WORK

Supplemental HVAC for Central Kitchen.





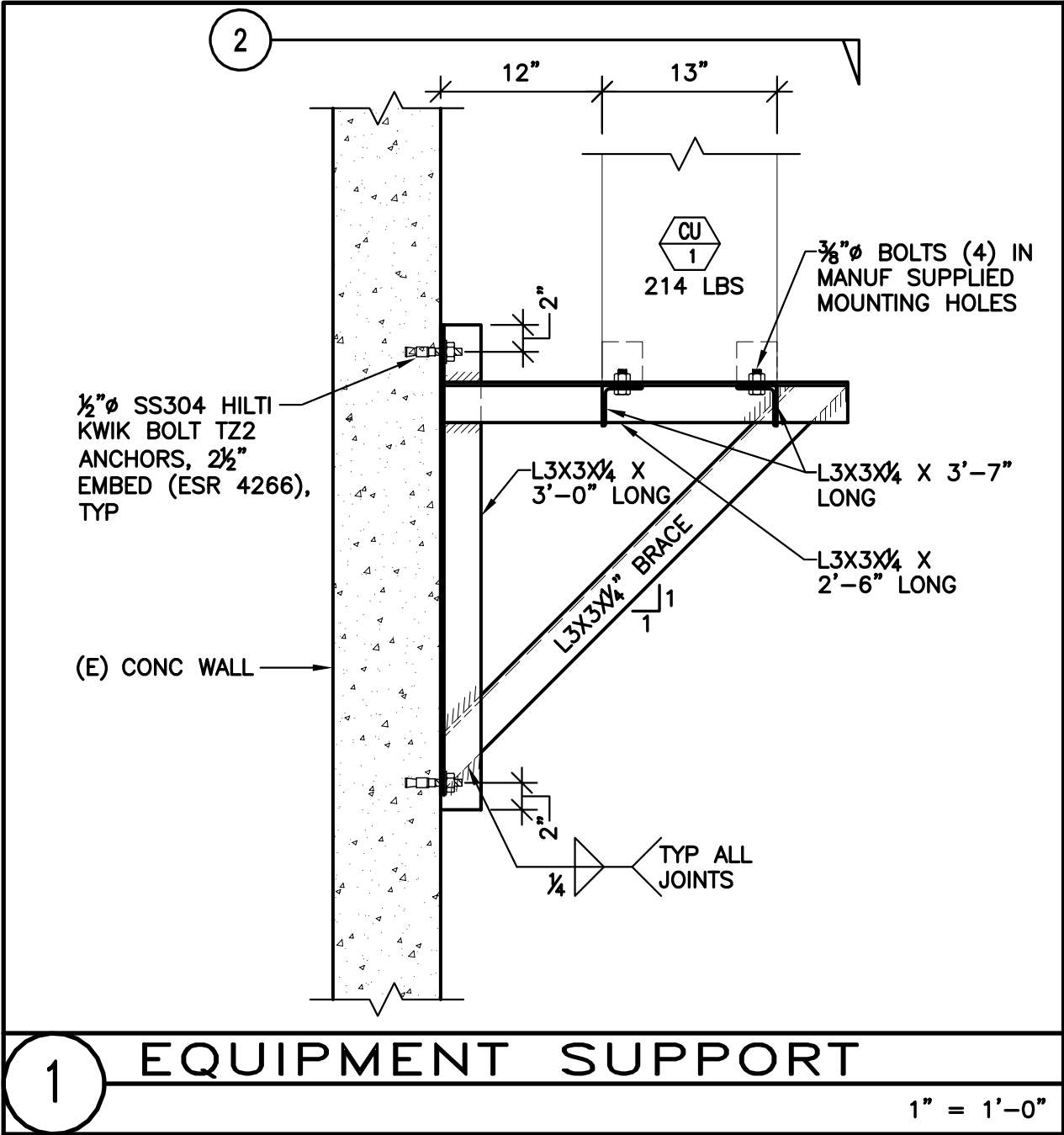
MECHANICAL NEW WORK PLAN

SCALE: 0 4 8 FEET 16
1/8" = 1'-0"



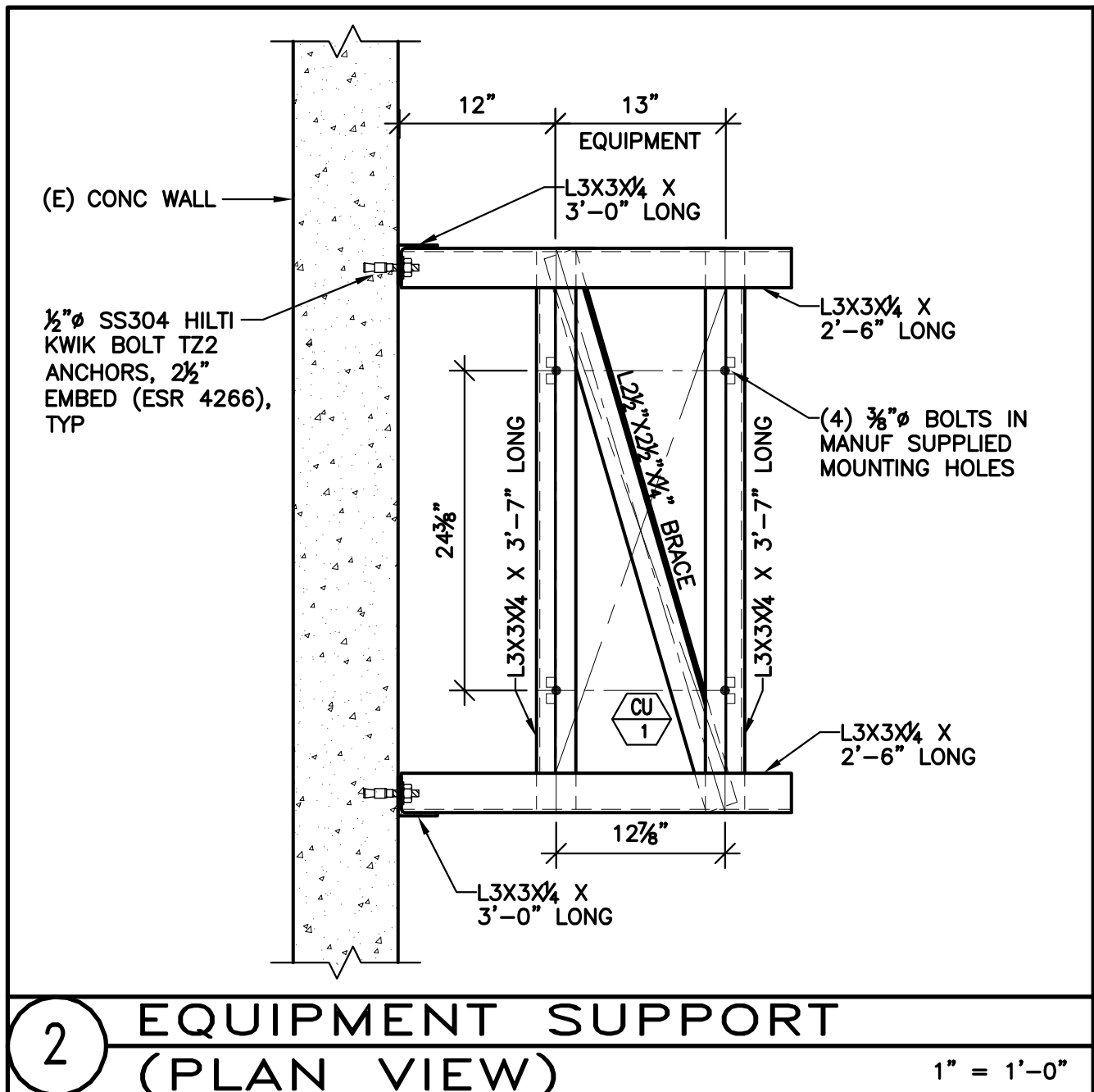
DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT DTL1



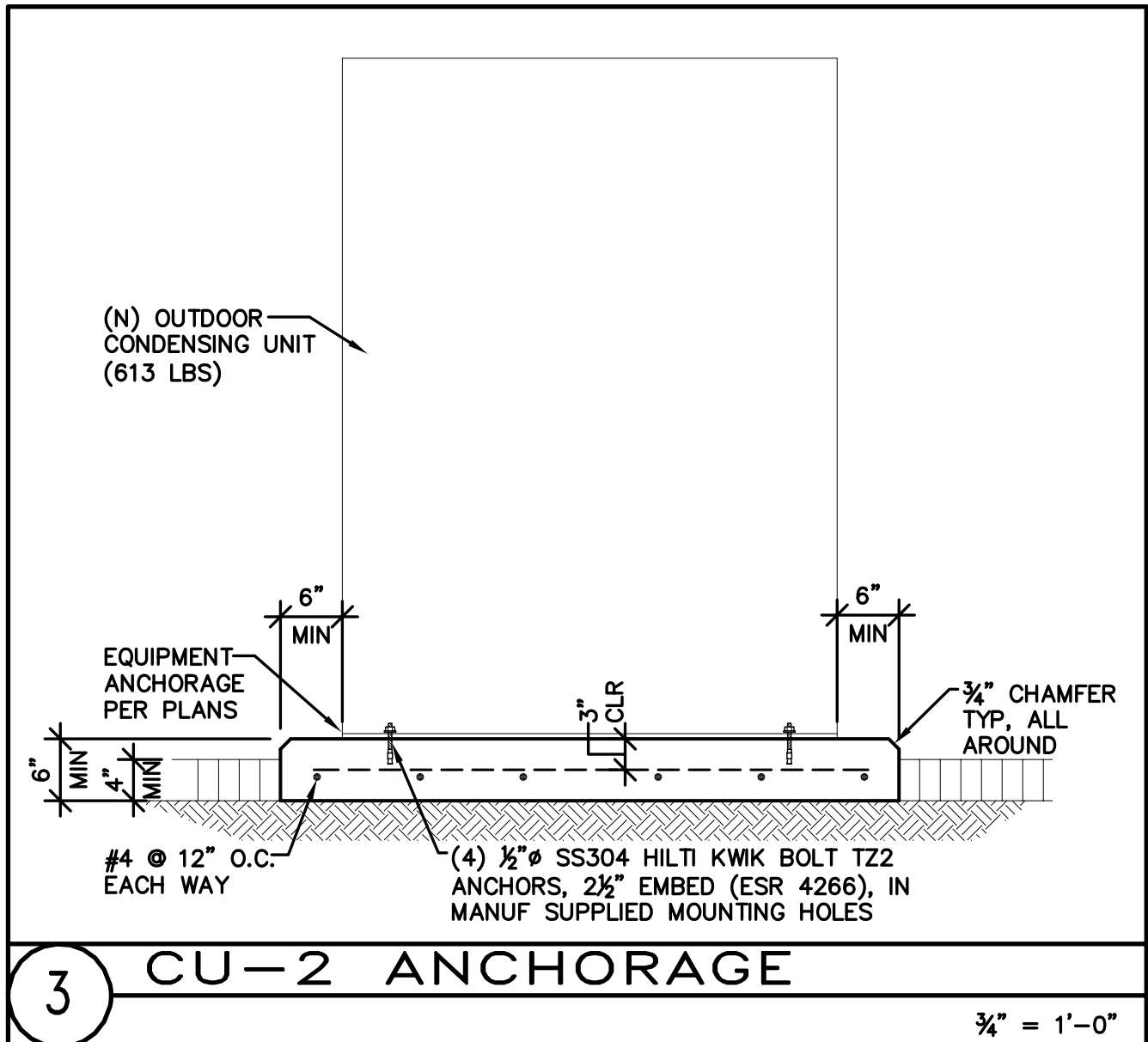
DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT DTL2



DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT DTL3



DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT SPEC1

STRUCTURAL STEEL

SHAPES AND PLATES shall conform to ASTM A36, $F_y = 36$ ksi. WF shapes shall conform to ASTM A992, $F_y = 50$ ksi min. All steel shall be identified with mark and mill certification. Mill certification to be sent to Structural Engineer. Foreign steel shall be tested for chemical and physical properties. The physical test requirement may be waived by the Structural Engineer if satisfactory mill certification can be submitted.

STEEL PIPE shall conform to ASTM A53, grade B, $F_y = 35$ ksi.

STEEL TUBE shall conform to ASTM A500, grade B, $F_y = 46$ ksi.

BOLTS All shop and/or field connections to be unfinished American Standard Regular, $\frac{3}{4}$ " diameter, unless noted otherwise. All bolts shown on structural drawings as "Anchor Bolts" shall be hook bolts (with 2" hooks) or machine bolts with plate washer 3" sq. x $\frac{1}{4}$ " thick, tack welded to bolt head. Bolts shall conform to ASTM A307.

CONNECTIONS AND FABRICATION: AISC Specification, unless noted otherwise. All structural steel shall be fabricated in a Building Department approved shop. Building Department approved licensed fabricators only.

WELDING: Shall conform with latest AWS D1.1 standards. Welding shall be performed by Building Department approved certified welders under the supervision of a Special Inspector or in the shop of an approved fabricator. Continuous inspection required for all field welding.

FIELD PAINTING: Touch up all damaged paint, bolts and welds.

SHOP DETAILS to be submitted to Engineer for approval before fabrication. Steel erector shall provide all erection bracing required to maintain structure plumb and properly braced during construction.

GALVANIZING All steel exposed to weather shall be hot-dipped galvanized.

DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT SPEC2

GENERAL NOTES

Contractor shall verify all dimensions and conditions on the job and report any discrepancies to the Engineer before proceeding with the work.

No deviations from structural details without the written approval of the Structural Engineer. Approval by the City inspector does not constitute authority to deviate from plans or specifications.

The Contractor shall be responsible for supplying the means, methods, techniques, sequences, procedures and appropriate safety precautions required to perform the work.

Design soil pressure is based on sandy clay, compact with an allowable bearing pressure of 1,500 psf.

CONCRETE

CONCRETE: Shall have an ultimate compressive strength of 3,000 psi at 28 days, unless noted otherwise on plan. All concrete shall be continuously inspected by a registered Special Inspector.

Unless otherwise noted or shown on plan, the minimum clear distance of the reinforcement to the face of the concrete shall be:

- A. Slab on grade 2"
- B. Concrete against earth
 - Formed 2"
 - Without form 3"

REINFORCING: Footing reinforcing shall conform to ASTM A615, grade 60.

LAP SPLICES: Minimum length of lap splices in reinforcing steel shall be required for Class B splice (2'-0"min), unless otherwise noted on plan. Splices shall be well staggered.

CEMENT: Tested, Type II Portland, ASTM C150.

AGGREGATES: ASTM C33. Maximum size 1½" for footings and 1" for all other work.

CONSTRUCTION JOINTS: Shall be prepared by wire brushing and cleaning and brushing in a paste of neat cement mortar immediately prior to concreting. Location of construction joints shall be approved by the Structural Engineer.

DSH METRO CENTRAL KITCHEN
EQUIPMENT SUPPORT

JOB: MO-2507-165
DATE: JULY 8, 2025
SHT SPEC3

HILTI KWIK BOLT TZ2 INFORMATION (ANCHORS INTO CONCRETE)
(based on ESR 4266)

Anchor Diameter	Nominal embedment	Installation torque (ft-lbs)
$\frac{3}{8}$ "	$2\frac{1}{2}$ "	30 ft-lbs
$\frac{1}{2}$ "	$2\frac{1}{2}$ "	40 ft-lbs
$\frac{5}{8}$ "	$3\frac{1}{4}$ "	60 ft-lbs
$\frac{3}{4}$ "	4"	125 ft-lbs
1"	$6\frac{3}{8}$ "	185 ft-lbs

Note:

1. Special inspection is required for post-installed anchor installation.
2. The Special Inspector shall make periodic inspections during anchor installation as required per ESR 4266.
3. Torque test is acceptable for post-installed expansion anchor installation.

**MURASHIGE & ONISHI
ENGINEERING CO., INC.**

Structural Engineers
14426 South Raymond Avenue
Gardena, CA 90247

JOB MO-2507-105
SHEET NO. E1 OF _____
CALCULATED BY _____ DATE 7/03/25
CHECKED BY _____ DATE _____
SCALE _____

EQUIPMENT ANCHORAGE CRITERIA

$$F_{ASD} = \frac{0.4 Q_p S_{DS} W_p}{1.4 R_p I_p} \left[1 + 2 \left(\frac{Z}{h} \right) \right] = \underline{\underline{0.484 W_p}}$$

$$Q_p = 2.5 > \text{HEAT PUMP}$$

$$R_p = 3.0$$

$$S_{DS} = 1.355$$

$$I_p = 1.5$$

$$> \frac{0.3 S_{DS} I_p W_p}{1.4} = 0.430 W_p$$

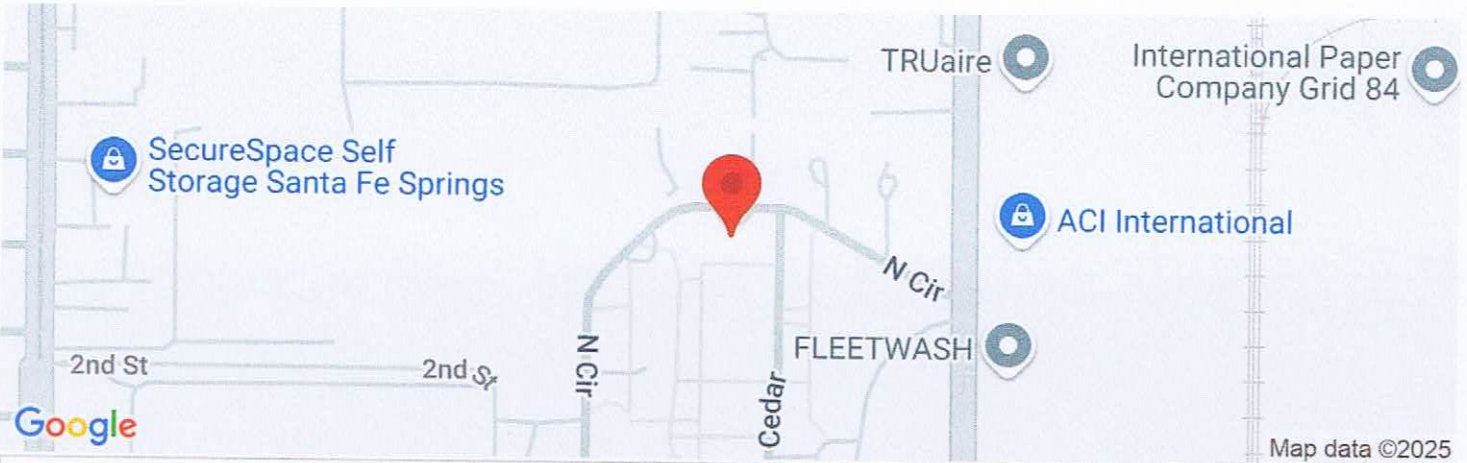
$$< \frac{1.6 S_{DS} I_p W_p}{1.4} = 2.323 W_p$$



DSH-M

BLDG 303, 11401 Bloomfield Ave, Norwalk, CA 90650, USA

Latitude, Longitude: 33.9289727, -118.0661994



Date	7/11/2025, 12:22:14 PM
Design Code Reference Document	ASCE7-16
Risk Category	IV
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.694	MCE_R ground motion. (for 0.2 second period)
S_1	0.606	MCE_R ground motion. (for 1.0s period)
S_{MS}	2.033	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8 <i>1.030</i>	Site-modified spectral acceleration value
S_{DS}	1.355	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8 <i>0.687</i>	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8 <i>P</i>	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8 <i>1.7</i>	Site amplification factor at 1.0 second
PGA	0.729	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.874	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	1.694	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.872	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	2.355	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.606	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.672	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.788	Factored deterministic acceleration value. (1.0 second)

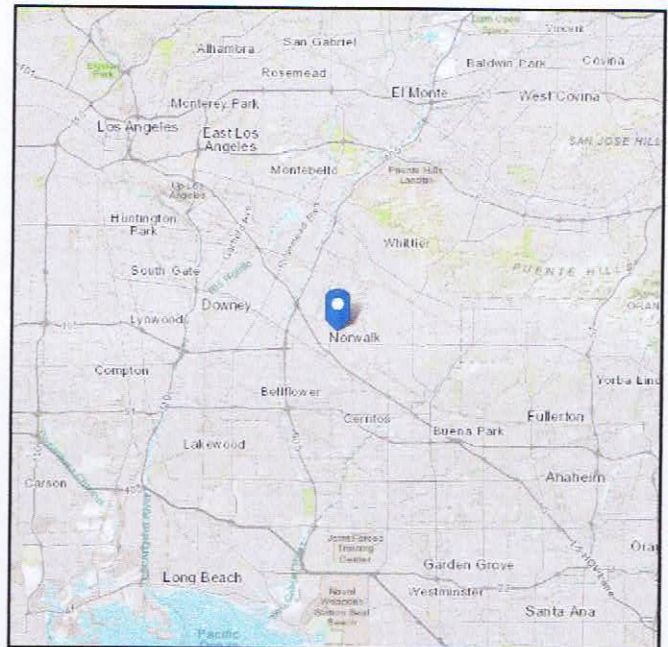
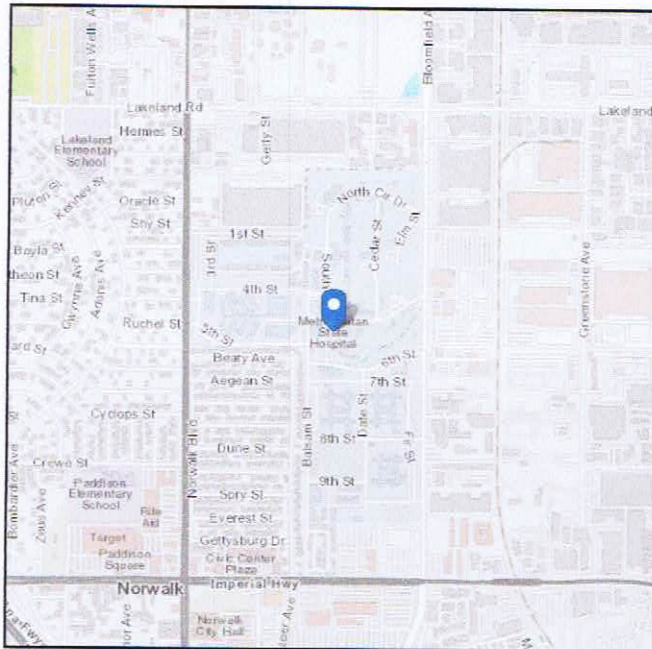
Address:
11401 Bloomfield Ave
Norwalk, California
90650

ASCE Hazards Report

Standard: ASCE/SEI 7-16
Risk Category: IV
Soil Class: D - Default (see
Section 11.4.3)

Latitude: 33.924893
Longitude: -118.067278
Elevation: 117.54947447680617 ft
(NAVD 88)

MD-2507-105
E3



Wind

Results:

Wind Speed	106 Vmph
10-year MRI	66 Vmph
25-year MRI	72 Vmph
50-year MRI	76 Vmph
100-year MRI	81 Vmph

Data Source: ASCE/SEI 7-16, Fig. 26.5-1D and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed: Fri Jul 11 2025

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 1.6% probability of exceedance in 50 years (annual exceedance probability = 0.00033, MRI = 3,000 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

CONDENSING UNIT SUPPORT

OPERATING WEIGHT = 214#

DIMS: 37" W x 13" D x 47 5/8" H

BEAM B1

$$P = \frac{214\#}{2 \text{ BMS}} = 107\#/\text{SUPPORT}$$

$$M = \frac{0.11^k \times 1.58 \times 0.07}{2.25} = 0.05^k \text{ ft}$$

$$S = \frac{0.05^k \times 12}{0.60 \times 20^k} = 0.03^k \text{ in}$$

$$R_2 = 83\#$$

$$R_1 = 124\#$$

BRACE B2

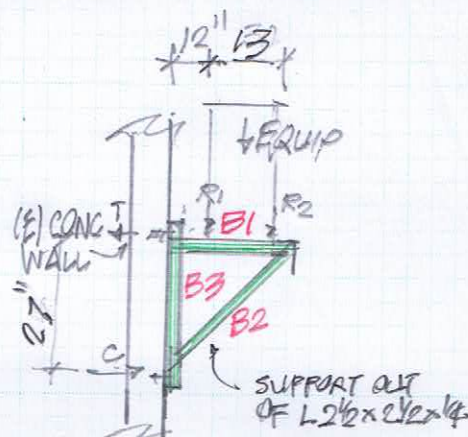
$$P_{\text{AXIAL}} = 0.83^k \times 1.41 = 0.12^k$$

$$L = 38^{\prime\prime}$$

$$\frac{KL}{r} = \frac{1.0 \times 38^{\prime\prime}}{0.491} = 77 < 200$$

$$F_a = 15.09^k \text{ ksi}$$

USE L 2 1/2 x 2 1/2 x 1/4



CONNECTION TO WALL SUPPORT

$$T = C = \frac{24 \times 12 + 83 \times 27}{27} = 94 \text{ #}$$

$$P_v = \frac{214 \text{ #}}{2.2 \text{ BMS}} = 107 \text{ #} \\ = 54 \text{ #/BOLT}$$

SECURE SUPPORT ASSEMBLY TO
(E) CONC WALL w/ 4-1/2" SS304
HILTI KB-TER ANCHORS, 2 1/2" EMBED
(ESR 4000)

EQUIP ANCHORAGE TO SUPPORT

$$F_{HSD} = 0.430 \times 214 \text{ #} = 93 \text{ #} = 24 \text{ #/BOLT}$$

$$M_{OT} = 93 \text{ #} \times \frac{2}{3} (47.4) = 2953 \text{ IN-LB}$$

$$LIFT = \frac{2953 - 214 \times 0.5}{12.8 \text{ "} \times 2 \text{ BOLTS}} + \frac{0.2 \times 1.35 \times 214 \text{ #}}{1.4 \times 4 \text{ BOLTS}}$$

$$= 10 + 10 = 20 \text{ #/BOLT}$$

TRY 3/8" BOLTS

$$\frac{.024 \times 1.068 \text{ #}}{10 \text{ KSI}} + \frac{.071 \times 1.068}{20 \text{ KSI}} = 0.09 < 1.0$$

SECURE EQUIP TO SUPPORT
ASSEMBLY w/ 4-3/8" BOLTS

CONDENSING UNIT SUPPORT



OPERATING WEIGHT = 613#

DIMS: 51" W x 30 1/8" D x 46 3/4" H $\left. \begin{array}{l} > u = 57 \text{ PSF} < \end{array} \right\} \begin{array}{l} \text{ASSUMED} \\ F_{50K} = 500 \text{ PSF} \\ \text{AT SURFACE OK} \end{array}$

$F_{H\text{ASD}} = 0.484 \times 613\# = 297\#$

$M_{OT} = 297\# \times \frac{2}{3} (46.75) = 13216 \text{ IN-LB}$

$$\text{UPLIFT} = \frac{13216 - 613\# \times 15}{2 \text{ BOLTS} \times 28"} + \frac{0.2 \times 1.355 \times 613\#}{1.4 \times 4 \text{ BOLTS}}$$

$$= 72 + 30 = 102 \#/\text{BOLT}$$

$\text{SHEAR} = \frac{297\#}{4} = 74 \#/\text{BOLT}$

SECURE EQUIP TO H.K. PAD W/
4 - 1/2" x 8504 HILTI KB-T22
ANCHORS, 2 1/2" EMBED
 (ESR 42000)



MO-2507-105
E7

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Address: 14426 S. Raymond Avenue, Gardena, CA 90247
Phone | Fax: |
Design: Concrete - Jul 15, 2025
Fastening point: condensing unit support

Page:
Specifier:
E-Mail:
Date:

1

7/15/2025

Specifier's comments: DSH-M

1 Input data

Anchor type and diameter: Kwik Bolt TZ2 - SS 304 1/2 (2) hnom1

Item number: 2210260 KB-TZ2 1/2x3 3/4 SS304

Specification text: Hilti $\varnothing$ 1/2 in Kwik Bolt TZ2 - SS 304 with 2.5 in nominal embedment depth per ICC-ES ESR-4266 , Hammer drill bit installation per MPII,

Effective embedment depth: $h_{ef,act} = 2.000$ in., $h_{nom} = 2.500$ in.

Material: AISI 304

Evaluation Service Report: ESR-4266

Issued | Valid: 10/1/2024 | 12/1/2025

Proof: Design Method ACI 318-19 / Mech

Shear edge breakout verification: Row closest to edge (Case 3 only from ACI 318-19 Fig. R.17.7.2.1b)

Stand-off installation:

Profile:

Base material: cracked concrete, 2500, $f'_c = 2,500$ psi; $h = 6.000$ in.

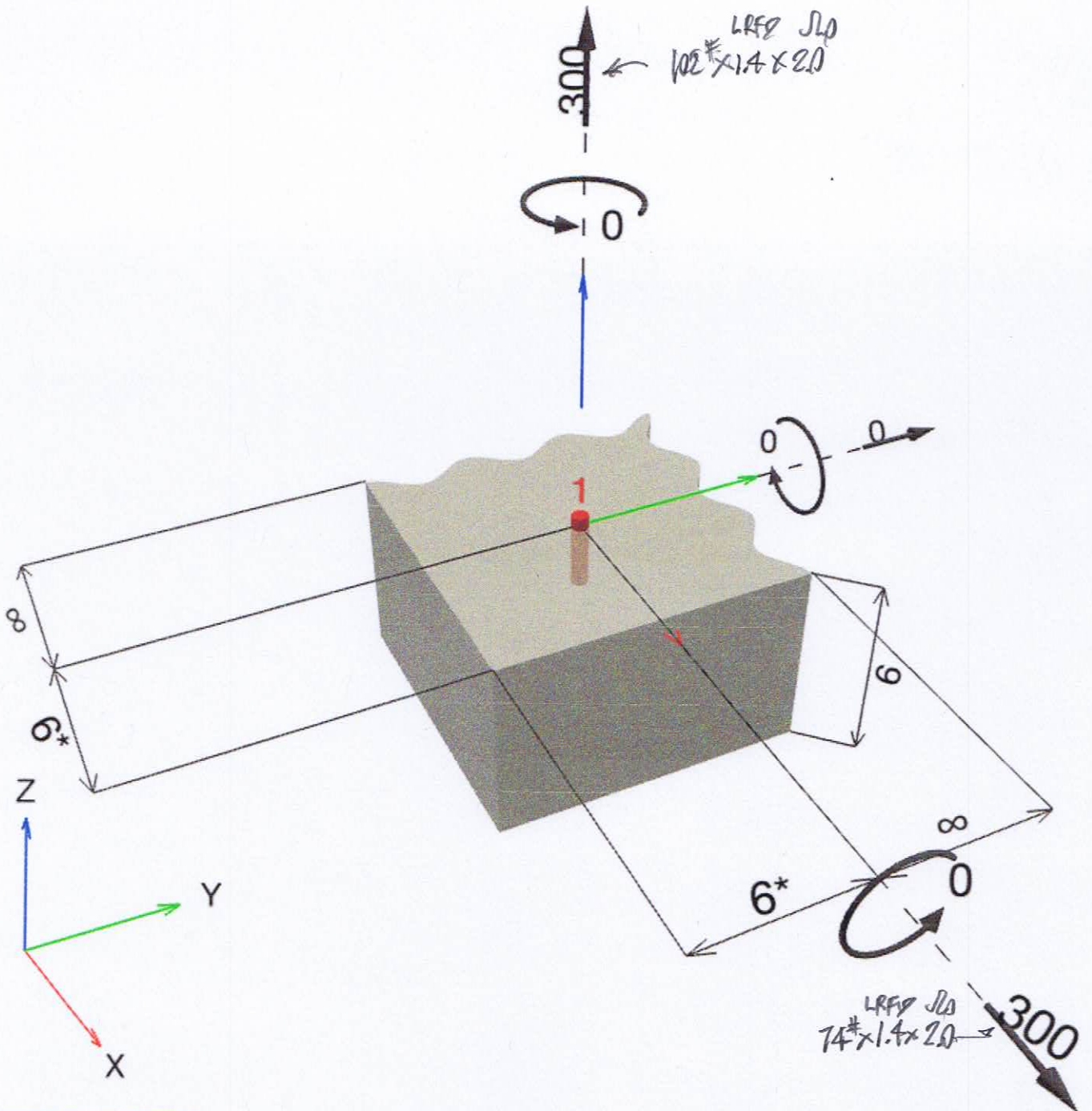
Installation: **Hammer drilled hole, Installation condition: Dry**

Reinforcement: tension: not present, shear: not present; no supplemental splitting reinforcement present
edge reinforcement: none or $\leq$ No. 4 bar

Seismic loads (cat. C, D, E, or F) Tension load: yes (17.10.5.3 (d))
Shear load: yes (17.10.6.3 (c))



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



MO-2907-105
E9

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Phone Fax:		E-Mail:	
Design:	Concrete - Jul 15, 2025	Date:	7/15/2025
Fastening point:	condensing unit support		

1.1 Design results

Case	Description	Forces [lb] / Moments [in.lb]	Seismic	Max. Util. Anchor [%]
1	Combination 1	N = 300; V _x = 300; V _y = 0; M _x = 0; M _y = 0; M _z = 0;	yes	26

2 Load case/Resulting anchor forces**Anchor reactions [lb]**

Tension force: (+Tension, -Compression)

Anchor	Tension force	Shear force	Shear force x	Shear force y
1	300	300	300	0

3 Tension load

	Load N _{ua} [lb]	Capacity ϕN_n [lb]	Utilization $\beta_N = N_{ua} / \phi N_n$	Status
Steel Strength*	300	8,906	4	OK
Pullout Strength*	N/A	N/A	N/A	N/A
Concrete Breakout Failure**	300	1,172	26	OK

* highest loaded anchor **anchor group (anchors in tension)

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3.1 Steel Strength

N_{sa} = ESR value refer to ICC-ES ESR-4266
 $\phi N_{sa} \geq N_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,N}$ [in. ²]	f_{uta} [psi]
0.10	120,404

Calculations

N_{sa} [lb]
11,875

Results

N_{sa} [lb]	ϕ_{steel}	ϕN_{sa} [lb]	N_{ua} [lb]
11,875	0.750	8,906	300

3.2 Concrete Breakout Failure

$N_{cb} = \left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b$ ACI 318-19 Eq. (17.6.2.1a)

$\phi N_{cb} \geq N_{ua}$ ACI 318-19 Table 17.5.2

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$A_{Nc0} = 9 h_{ef}^2$ ACI 318-19 Eq. (17.6.2.1.4)

$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.4.1b)

$\psi_{cp,N} = \text{MAX} \left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0$ ACI 318-19 Eq. (17.6.2.6.1b)

$N_b = K_c \lambda_a \sqrt{f_c} h_{ef}^{1.5}$ ACI 318-19 Eq. (17.6.2.2.1)

Variables

h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$	c_{ac} [in.]	K_c	λ_a	f_c [psi]
2.000	6.000	1.000	5.500	17	1.000	2,500

Calculations

A_{Nc} [in. ²]	A_{Nc0} [in. ²]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	2,404

Results

N_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕN_{cb} [lb]	N_{ua} [lb]
2,404	0.650	0.750	1.000	1,172	300

MO-2907-1605
E11

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4 Shear load

	Load V_{ua} [lb]	Capacity ϕV_n [lb]	Utilization $\beta_v = V_{ua}/\phi V_n$	Status
Steel Strength*	300	5,426	6	OK
Steel failure (with lever arm)*	N/A	N/A	N/A	N/A
Pryout Strength**	300	1,683	18	OK
Concrete edge failure in direction x+**	300	2,057	15	OK

* highest loaded anchor **anchor group (relevant anchors)

When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

4.1 Steel Strength

$V_{sa,eq}$ = ESR value refer to ICC-ES ESR-4266
 $\phi V_{steel} \geq V_{ua}$ ACI 318-19 Table 17.5.2

Variables

$A_{se,V}$ [in. ²]	f_{uta} [psi]	$\alpha_{V,seis}$
0.10	120,404	1.000

Calculations

$V_{sa,eq}$ [lb]
8,348

Results

$V_{sa,eq}$ [lb]	ϕ_{steel}	$\phi V_{sa,eq}$ [lb]	V_{ua} [lb]
8,348	0.650	5,426	300



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4.2 Pryout Strength

$$V_{cp} = k_{cp} \left[\left(\frac{A_{Nc}}{A_{Nc0}} \right) \psi_{ed,N} \psi_{c,N} \psi_{cp,N} N_b \right] \quad \text{ACI 318-19 Eq. (17.7.3.1a)}$$

$$\phi V_{cp} \geq V_{ua} \quad \text{ACI 318-19 Table 17.5.2}$$

A_{Nc} see ACI 318-19, Section 17.6.2.1, Fig. R 17.6.2.1(b)

$$A_{Nc0} = 9 h_{ef}^2 \quad \text{ACI 318-19 Eq. (17.6.2.1.4)}$$

$$\psi_{ed,N} = 0.7 + 0.3 \left(\frac{c_{a,min}}{1.5 h_{ef}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.2.4.1b)}$$

$$\psi_{cp,N} = \text{MAX} \left(\frac{c_{a,min}}{c_{ac}}, \frac{1.5 h_{ef}}{c_{ac}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.6.2.6.1b)}$$

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \quad \text{ACI 318-19 Eq. (17.6.2.2.1)}$$

Variables

k_{cp}	h_{ef} [in.]	$c_{a,min}$ [in.]	$\psi_{c,N}$
1	2.000	6.000	1.000
c_{ac} [in.]	k_c	λ_a	f'_c [psi]
5.500	17	1.000	2,500

Calculations

A_{Nc} [in. ²]	A_{Nc0} [in. ²]	$\psi_{ed,N}$	$\psi_{cp,N}$	N_b [lb]
36.00	36.00	1.000	1.000	2,404

Results

V_{cp} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕV_{cp} [lb]	V_{ua} [lb]
2,404	0.700	1.000	1.000	1,683	300

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Date: 7/15/2025

4.3 Concrete edge failure in direction x+

$$V_{cb} = \left(\frac{A_{Vc}}{A_{Vc0}} \right) \psi_{ed,V} \psi_{c,V} \psi_{h,V} \psi_{parallel,V} V_b \quad \text{ACI 318-19 Eq. (17.7.2.1a)}$$

$$\phi V_{cb} \geq V_{ua} \quad \text{ACI 318-19 Table 17.5.2}$$

$$A_{Vc} \text{ see ACI 318-19, Section 17.7.2.1, Fig. R 17.7.2.1(b)*}$$

$$A_{Vc0} = 4.5 c_{a1}^2 \quad \text{ACI 318-19 Eq. (17.7.2.1.3)}$$

$$\psi_{ed,V} = 0.7 + 0.3 \left(\frac{c_{a2}}{1.5 c_{a1}} \right) \leq 1.0 \quad \text{ACI 318-19 Eq. (17.7.2.4.1b)}$$

$$\psi_{h,V} = \sqrt{\frac{1.5 c_{a1}}{h_a}} \geq 1.0 \quad \text{ACI 318-19 Eq. (17.7.2.6.1)}$$

$$V_b = \left(7 \left(\frac{l_a}{d_a} \right)^{0.2} \sqrt{d_a} \right) \lambda_a \sqrt{f'_c} c_{a1}^{1.5} \quad \text{ACI 318-19 Eq. (17.7.2.2.1a)}$$

Variables

c_{a1} [in.]	c_{a2} [in.]	$\psi_{c,V}$	h_a [in.]	l_a [in.]
6.000	6.000	1.000	6.000	2.000
λ_a	d_a [in.]	f'_c [psi]	$\psi_{parallel,V}$	
1.000	0.500	2,500	1.000	

Calculations

A_{Vc} [in. ²]	A_{Vc0} [in. ²]	$\psi_{ed,V}$	$\psi_{h,V}$	V_b [lb]
90.00	162.00	0.900	1.225	4,799

Results

V_{cb} [lb]	$\phi_{concrete}$	$\phi_{seismic}$	$\phi_{nonductile}$	ϕV_{cb} [lb]	V_{ua} [lb]
2,939	0.700	1.000	1.000	2,057	300

*Anchor row defined by: Anchor 1; Case 3 controls

When the input edge distance is set to "infinity", edge breakout verification is not performed in that direction

5 Combined tension and shear loads, per ACI 318-19 section 17.8

β_N	β_V	ζ	Utilization $\beta_{N,V}$ [%]	Status
0.256	0.178	5/3	16	OK

$$\beta_{N,V} = \beta_N^\zeta + \beta_V^\zeta \leq 1$$



MO-2502-105
E14

www.hilti.com

Company:	Murashige & Onishi Engineering Co., Inc.	Page:	8
Address:	14426 S. Raymond Avenue, Gardena, CA 90247	Specifier:	
Phone Fax:		E-Mail:	
Design:	Concrete - Jul 15, 2025	Date:	7/15/2025
Fastening point:	condensing unit support		

6 Warnings

- The anchor design methods in PROFIS Engineering require rigid anchor plates per current regulations (AS 5216:2021, ETAG 001/Annex C, EOTA TR029 etc.). This means load re-distribution on the anchors due to elastic deformations of the anchor plate are not considered - the anchor plate is assumed to be sufficiently stiff, in order not to be deformed when subjected to the design loading. PROFIS Engineering calculates the minimum required anchor plate thickness with CBFEM to limit the stress of the anchor plate based on the assumptions explained above. The proof if the rigid anchor plate assumption is valid is not carried out by PROFIS Engineering. Input data and results must be checked for agreement with the existing conditions and for plausibility!
- The equations presented in this report are based on imperial units. When inputs are displayed in metric units, the user should be aware that the equations remain in their imperial format.
- Condition A applies where the potential concrete failure surfaces are crossed by supplementary reinforcement proportioned to tie the potential concrete failure prism into the structural member. Condition B applies where such supplementary reinforcement is not provided, or where pullout or pryout strength governs.
- Refer to the manufacturer's product literature for cleaning and installation instructions.
- For additional information about ACI 318 strength design provisions, please go to <https://viewer.joomag.com/profis-design-guide-us-en-summer-2021/0841849001625154758?short&/>
- "An anchor design approach for structures assigned to Seismic Design Category C, D, E or F is given in ACI 318-19, Chapter 17, Section 17.10.5.3 (a) that requires the governing design strength of an anchor or group of anchors be limited by ductile steel failure. If this is NOT the case, the connection design (tension) shall satisfy the provisions of Section 17.10.5.3 (b), Section 17.10.5.3 (c), or Section 17.10.5.3 (d). The connection design (shear) shall satisfy the provisions of Section 17.10.6.3 (a), Section 17.10.6.3 (b), or Section 17.10.6.3 (c)."
- Section 17.10.5.3 (b) / Section 17.10.6.3 (a) require the attachment the anchors are connecting to the structure be designed to undergo ductile yielding at a load level corresponding to anchor forces no greater than the controlling design strength. Section 17.10.5.3 (c) / Section 17.10.6.3 (b) waive the ductility requirements and require the anchors to be designed for the maximum tension / shear that can be transmitted to the anchors by a non-yielding attachment. Section 17.10.5.3 (d) / Section 17.10.6.3 (c) waive the ductility requirements and require the design strength of the anchors to equal or exceed the maximum tension / shear obtained from design load combinations that include E, with E increased by ω_0 .
- Hilti post-installed anchors shall be installed in accordance with the Hilti Manufacturer's Printed Installation Instructions (MPII). Reference ACI 318-19, Section 26.7.

Fastening meets the design criteria!

MO-2507-105
E15

www.hilti.com

Company: Murashige & Onishi Engineering Co., Inc.
Address: 14426 S. Raymond Avenue, Gardena, CA 90247
Phone | Fax: |
Design: Concrete - Jul 15, 2025
Fastening point: condensing unit support

Page: 9
Specifier:
E-Mail:
Date: 7/15/2025

7 Installation data

Profile: -

Hole diameter in the fixture: -

Plate thickness (input): -

Drilling method: Hammer drilled

Cleaning: Manual cleaning of the drilled hole according to instructions for use is required.

Anchor type and diameter: Kwik Bolt TZ2 - SS 304 1/2 (2)
hnom1

Item number: 2210260 KB-TZ2 1/2x3 3/4 SS304

Maximum installation torque: 481 in.lb

Hole diameter in the base material: 0.500 in.

Hole depth in the base material: 2.750 in.

Minimum thickness of the base material: 4.000 in.

Hilti $\varnothing$ 1/2 in Kwik Bolt TZ2 - SS 304 with 2.5 in nominal embedment depth per ICC-ES ESR-4266 , Hammer drill bit installation per MPII

7.1 Recommended accessories

Drilling

- Suitable Rotary Hammer
- Properly sized drill bit

Cleaning

- Manual blow-out pump

Setting

- Torque controlled cordless impact tool
- Torque wrench
- Hammer

Coordinates Anchor in.

Anchor	x	y	C _{-x}	C _{+x}	C _{-y}	C _{+y}
1	0.000	0.000	-	6.000	6.000	-

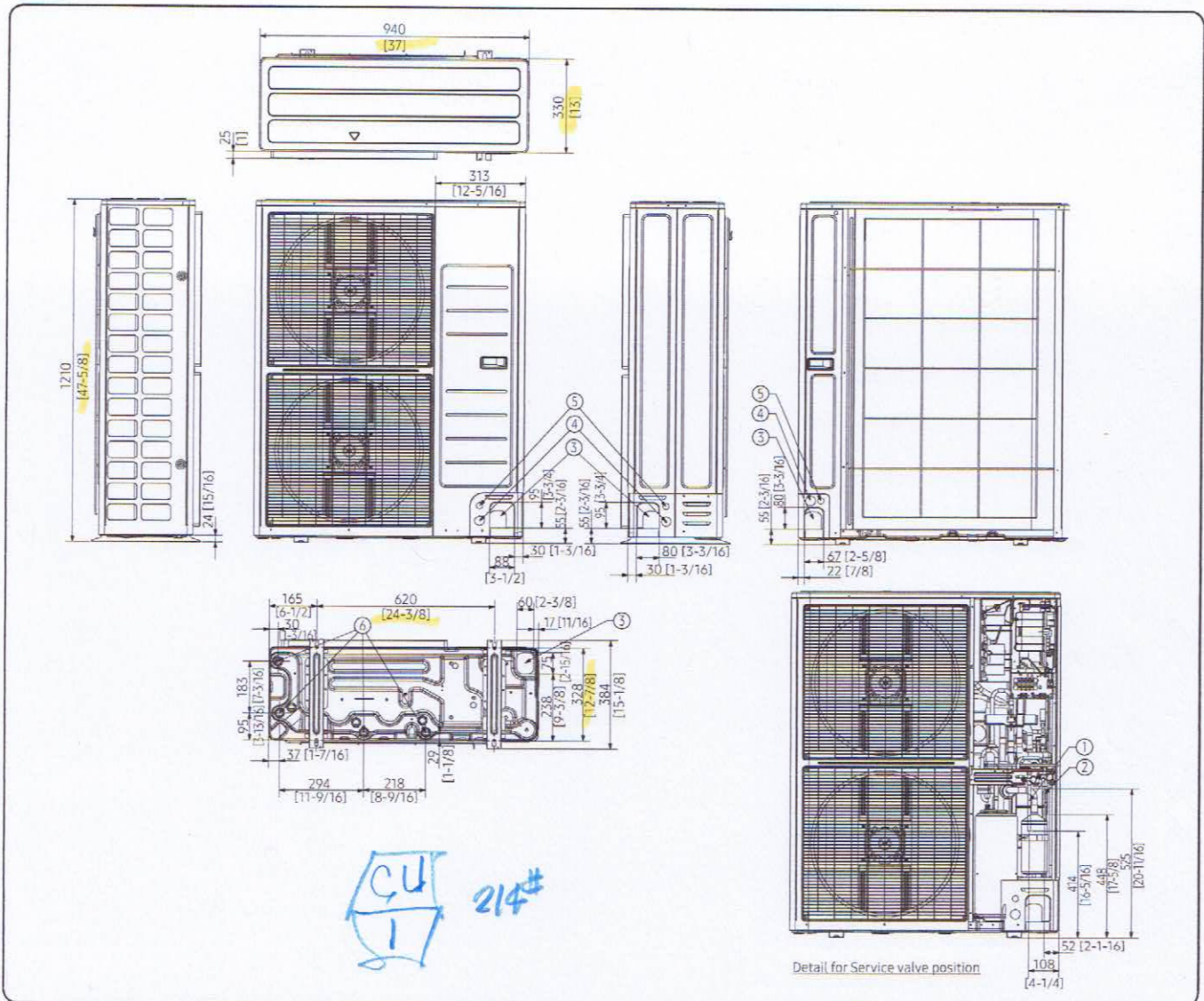
EQUIPMENT INFORMATION

(CU-1 & CU-2)

4. Dimensional Drawing

AM036NXMDCR/AA, AM048NXMDCR/AA, AM053NXMDCR/AA

Units : mm [inches]



NO	Name	Description
1	Refrigerant liquid pipe	Φ9.52 (Φ3/8)
2	Refrigerant gas pipe	19.05 (3/4")
3	Knockout hole for pipe intake	Front / Side / Rear / Bottom
4	Power wiring conduits	Front / Side / Rear, Φ34 (Φ1-3/8)
5	Communication wiring conduits	Front / Side / Rear, Φ22 (Φ7/8)
6	Drain holes	Connect with the provided drain plug.

2. Specification

Type				DVM S ECO	DVM S ECO	DVM S ECO	DVM S ECO
Model Name				AM036NXMDCR/AA	AM048NXMDCR/AA	AM053NXMDCR/AA	AM060NXMDCR/AA
Piping Connections	Total piping length (System)	Max.	m (ft)	300 (984)	300 (984)	300 (984)	300 (984)
	Level difference (ODU in highest position)	Max.	m (ft)	50 (164)	50 (164)	50 (164)	50 (164)
	Level difference (IDU in highest position)	Max.	m (ft)	40 (131)	40 (131)	40 (131)	40 (131)
	Level difference (IDU-IDU)	Max.	m (ft)	15 (49)	15 (49)	15 (49)	15 (49)
Wiring connections 4)*	Communication	Minimum	mm ²	0.75	0.75	0.75	0.75
		Remark	-	F1,F2	F1,F2	F1,F2	F1,F2
Refrigerant	Type			R410A	R410A	R410A	R410A
	Factory Charging		kg	3.2	3.2	3.3	3.7
			lbs	7.1	7.1	7.3	8.2
Sound 5)*	Sound Pressure	Cooling	dB(A)	50	51	53	58
		Heating		52	53	55	59
	Sound Power			66	67	69	76
External Dimension	Net Weight		kg	97	97	100	125
			lbs	213.8	213.8	220.5	275.6
	Shipping Weight		kg	107	107	110	135
			lbs	235.9	235.9	242.5	297.6
	Net Dimensions (WxHxD)		mm	940 x 1,210 x 330	940 x 1,210 x 330	940 x 1,210 x 330	940 x 1,420 x 330
			inch	37.01 x 47.64 x 12.99	37.01 x 47.64 x 12.99	37.01 x 47.64 x 12.99	37.01 x 55.91 x 12.99
Operating Temp. Range	Cooling		°F	23 ~ 118	23 ~ 118	23 ~ 118	23 ~ 118
			°F	-13 ~ 75	-13 ~ 75	-13 ~ 75	-13 ~ 75
	Heating		°F	-13 ~ 75	-13 ~ 75	-13 ~ 75	-13 ~ 75

NOTE

- Specifications may be subject to change without prior notice.
- 1)* Nominal cooling capacities are based on;
 - Indoor temperature : 80°F DB, 67°F WB
 - Outdoor temperature : 95°F DB, 75°F WB, Equivalent refrigerant piping : 25ft, Level differences : 0ft
- 2)* Nominal heating capacities are based on;
 - Indoor temperature : 70°F DB, 60°F WB
 - Outdoor temperature : 47°F DB, 43°F WB, Equivalent refrigerant piping : 25ft, Level differences : 0ft
- 3)* Certified performance under Unitary Small HP AHRI Standard 210/240.
 - Combination Indoor Units : Ducted indoor units.
- 4)* Select wire size based on the value of MCA
- 5)* Sound power level is an absolute value that a sound source generates.
 Sound pressure level is a relative value, depending on the distance and acoustic environment.
 Sound values are obtained in an anechoic room.
 Sound values of multi combination are theoretical values based on sound results of individual installed units.
- These products contain R410A which is fluorinated greenhouse gas.

Job Name _____
 Purchaser _____
 Submitted to _____
 Unit Designation _____

Location _____
 Engineer _____
 Reference ☐ Approval ☐ Construction ☐
 Schedule # _____

System Specifications

Performance	US Ton (nominal)		12
	Capacity (Btu/h) ¹	Nominal / Rated Cooling	144,000 / 138,000
		Nominal / Rated Heating	162,000 / 154,000
	EER	Ducted / Mixed / Non-Ducted	12.1 / 11.4 / 10.7
	IEER	Ducted / Mixed / Non-Ducted	24.4 / 23.5 / 22.6
	High Heat COP	Ducted / Mixed / Non-Ducted	3.68 / 3.6 / 3.52
Power	Voltage	(øV/Hz)	3 / 208-230 / 60
	Maximum Circuit Breaker (MCCB/ELB/ELCB)		60
	Minimum Circuit Ampacity (MCA)		52.6
	SCCR	kA	5
Indoor Units	Total Capacity (%)		50 - 184% Of outdoor unit capacity ²
	Maximum Indoor Unit Quantity		25
Compressor	Type X Qty.		Inverter Scroll X 2
	RLA (A)		19.6
	Compressor Modulation Range		5 - 100%
Refrigerant	R410A Factory Charge (lbs.)		23.1
Pipe Connections	Liquid X Suction (inches)		1/2 X 1 1/8
Refrigerant Pipe Limitations ³	Max. Length - ODU to Farthest IDU (feet)		656 (722 equivalent)
	Max. Vertical Separation	ODU to IDU (feet) ⁴	361
		Highest/Lowest IDU (feet)	164
	Max. Total Refrigerant Pipe Length (feet)		3,280
Condenser Fan	Fan	Type X Qty.	Propeller X 2
		Output (CFM)	10,171
	Motor	Type	DC
		Output (W)	620 X 2
		FLA (A)	4.2 (each)
	Max. External Static Pressure (in. WC)		0.43
Dimensions	W X H X D	Inches	51 X 66 3/4 X 30 1/8
	Weight	lbs.	595.2
	Shipping Weight	lbs.	632.7
Sound Level	dB (A)	Max.	60
Operating Temperatures	Cooling ⁵	*F (°C)	5 -122 (-15 - 50)
	Heating	*F (°C)	-22 - 75 (-30 - 24)
Safety Certifications			ETL & ETLc
Protection Devices	Intelligent logic to ensure proper operation within unit design limitations and operational parameters.		
	High pressure sensor, low pressure sensor, over-voltage protection, compressor over-current protection, current transformer, fan motor voltage protection, fan motor thermal protection, overheat protection, phase detection protection, high voltage fuses		

Accessories

Qty.	Model Number	Description
	WHG-T2-B	Top wind/hail guard (8 - 14 ton outdoor units)
	WHG-SL-B	Left side wind/hail guard
	WHG-SR-B	Right side wind/hail guard
	WHG-R2-B	Rear wind/hail guard for 8 - 14 ton units
	WHG-F1-B	Front wind/hail guard for 8 - 14 ton outdoor units
	LACH-2-KIT-B	Low ambient cooling hood and side guards (medium chassis, 1 required)
	LACH-2-SIDE KIT-B	Low ambient cooling side guards (medium chassis, 1 required)
	MCM-C200	Heat pump mode selector switch
	BPHK-230V-2	Base pan heater kit (base pan pan heater and control box, 1 required)
	MIM-B14U	External contact control interface module for operation and error output and night silent mode manual activation (1 required)



Compatibility

DVM S indoor units (AM****N****/AA, ACL-***NN), AHU Kits (MXD-K***AN), Universal Communication Kits (MCM-D211UN), and Hydro Units (AM****NB****/AA).

Construction

The unit shall be galvanized steel with a baked on powder coated finish.

Refrigerant System

The compressors shall be hermetically sealed, inverter driven, direct flash injected, DC scroll type with soft-start capability manufactured by Samsung. The compressor(s) shall feature an asymmetrical scroll design with rotating compressor operation/priority (where applicable). Flash injected compressors provide advanced low ambient heating performance.

The system shall have subcooling devices to maintain capacity at extreme system refrigerant pipe lengths and to minimize refrigerant noise.

The system shall allow a reduction of the main liquid refrigerant pipe (outdoor unit to first unit or Y-joint) by one diameter reducing total system refrigerant volume and pipe and insulation costs if line lengths and vertical separation are within the reduced pipe diameter guidelines. Refer to supporting documents for complete guideline details.

Heat Exchanger

The heat exchanger shall be mechanically bonded fin to copper tube. The aluminum fins of the heat exchanger shall have a protective coating.

Salt spray test method: ASTM-B117-18 - The heat exchanger showed no unusual rust or corrosion development to 3,000 hours.

The heat exchanger shall consist of two separate circuits to enhance the heat pump defrost cycle. The unit shall use the entire coil initially for the defrost cycle. To resume heating faster in extreme conditions, the upper section shall return to heating operation while the lower section continues to defrost.

Active Artificial Intelligence

The outdoor unit shall feature Active Artificial Intelligence (AI) shall monitor environmental and system operational data and use Deep Neural Network algorithms to provide optimal system performance and reliability.

Active Artificial Intelligence (AI) shall be used to optimize high pressure control, low pressure control, defrost cycle activation and operation, and low refrigerant detection.

The outdoor unit shall use Active Artificial Intelligence (AI) to monitor system refrigerant volume in real-time while in cooling mode to detect possible leaks or low refrigerant charge and provide an error code before system shutdown (conditions apply).

Controls

The outdoor unit shall have a removable EEPROM that stores unit serial number, startup information, system settings, system tag/name, and other information.

Control wiring shall be 16 AWG X 2 shielded wire.

Other Features

Inverter PCB cooling shall be done with liquid refrigerant and air to maintain optimal and safe operating temperatures.

The system shall feature advanced oil recovery cycle logic (maximum duration in cool mode: 3 minutes, maximum duration in heat mode: 6 minutes, defrost cycles lasting over 3 minutes are considered oil recovery cycles). Oil recovery operation shall not interrupt heating or cooling operation.

The outdoor unit shall feature optional night quiet modes to reduce outdoor unit sound (4 levels) with automatic activation or manual activation (with MIM-B14U accessory).

The outdoor unit shall feature advanced intelligent defrost logic to significantly reduce defrost cycle frequency by monitoring air resistance across the condenser coil during heating operation to determine defrost operation initiation to prevent unnecessary defrost cycles.

The outdoor unit shall feature optional snow blowing logic to prevent snow accumulation on idle outdoor units.

The outdoor unit shall feature maximum current control settings to limit current (50% - 100% of design current) adjustable at outdoor unit, supported central controls, and supported indoor unit wired controllers.

The outdoor unit shall feature energy savings options to reduce system energy consumption when average indoor room temperatures are greater than average indoor set temperatures in heating mode or when average indoor room temperatures are lower than average indoor set temperatures in cooling mode.

¹ Certified in accordance with the AHRI Variable Refrigerant Flow Multi-Split Air-Conditioners and Heat Pump (VRF) Certification Program which is based on the latest edition of AHRI Standard 1230-2021.

² Restrictions apply. Refer to DVM S2 technical data books for full details.

³ Other pipe restrictions and requirements exist. Please consult technical data book or installation manuals for full details regarding limitations and other requirements.

⁴ When the outdoor unit is lower than indoor units, and vertical separation is greater than 131 feet, additional conditions apply. When the outdoor unit is higher than the indoor units, and vertical separation is greater than 163 feet, additional conditions apply. Please refer to supporting documents at www.SamsungHVAC.com.

⁵ When operating in cooling mode between -13°F (-25°C) and 5°F (-15°C) OA, a low ambient cooling kit (LACH-2-KIT-B) is required. When operating in heating mode between 5°F (-15°C) and 23°F (-5°C) OA, a low ambient cooling side kit (LACH-2-SIDE KIT-B) is required. Refer to technical bulletin at www.samsunghvac.com for full details and requirements.

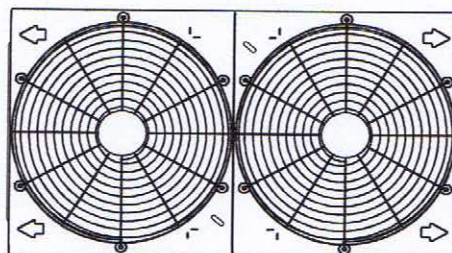
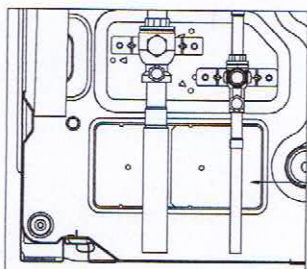
Samsung HVAC maintains a policy of ongoing development, specifications are subject to change without notice.

CU 2 6035

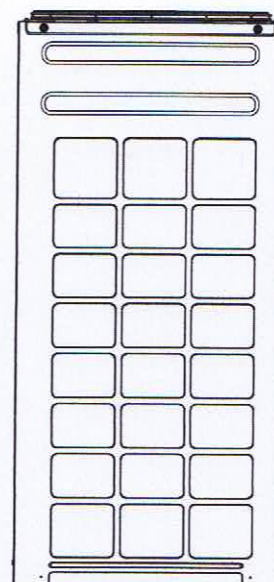
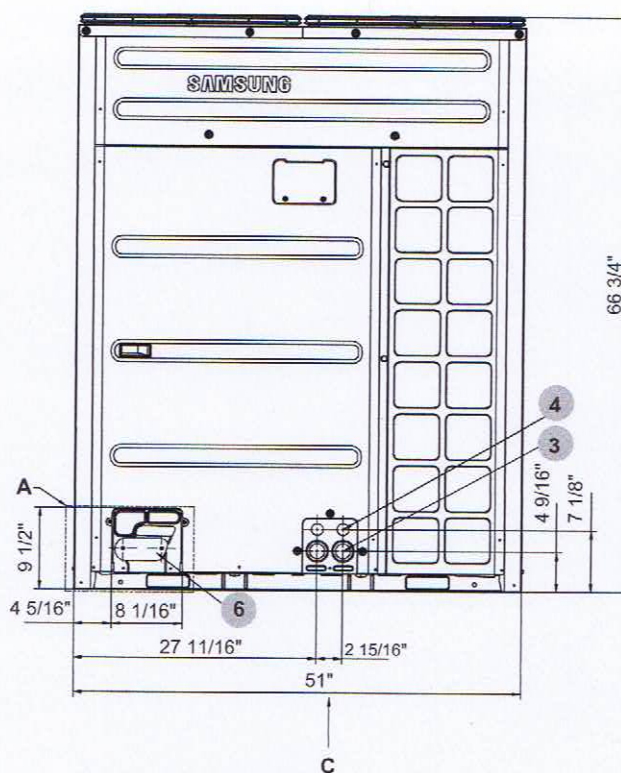
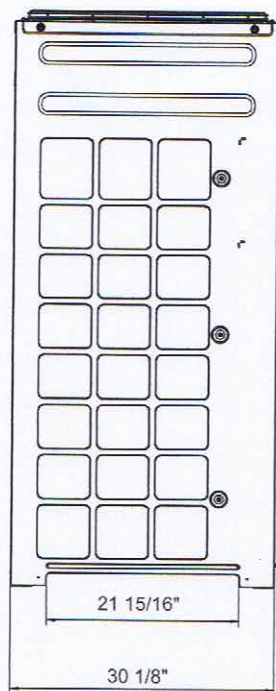
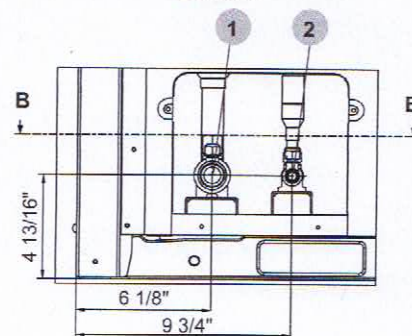


Intertek

Section B-B



Detail A



Notes

1. Detail A and SECTION B-B indicate the dimensions after connecting piping
2. View C indicates knockout hole dimensions (bottom)

No.	Description	Remark
1	Gas refrigerant pipe	1 1/8"
2	Liquid refrigerant pipe	1/2"
3	Power conduit knockout	1 3/4"
4	Communication wire knockout	1 3/8"
5	Knockout for refrigerant piping	Bottom
6	Knockout for refrigerant piping	Front

View C

