# APPLICATION FOR HCAI PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM)

OFFICE USE ONLY

**APPLICATION #: OPM-0666**

## HCAI Preapproval of Manufacturer's Certification (OPM)

**Type:** [X] New [ ] Renewal/Update

## Manufacturer Information

Manufacturer: RXL Inc.

Manufacturer's Technical Representative: Bryan Garcia

Mailing Address: 609 Science Dr., Moorpark, CA 930210000

Telephone: (805) 207-0585 Email: bgarcia@rxlusa.com



## Product Information

Product Name: RXL

Product Type: Server racks and cabinet

Product Model Number: RXL 2823x7019 7'; RXL 2823x7019 8'; RXL 5550

General Description: Anchorage of 2 post racks and cabinet

## Applicant Information

Applicant Company Name: Universal Structural Engineers, LLC

Contact Person: Kevin OKeefe

Mailing Address: 1660 S. Amphltett Blvd., Suite 335, San Mateo, CA 94402

Telephone: (650) 312-9233 Email: ktokeefe@universalstructuralengineers.com

Title: President

## Registered Design Professonal Preparing Engineering Recommendations

Company Name: UNIVERSAL STRUCTURAL ENGINEERS

Name: Kevin O'Keefe California License Number: S4192

Mailing Address: 1660 Amphlett Blvd., Suite 335, San Mateo, CA 94402

Telephone: (650) 312-9233 Email: ktokeefe@UniversalStructuralEnginees.com

## HCAI Special Seismic Certification Preapproval (OSP)

☐ Special Seismic Certification is preapproved under OSP OSP Number:

## Certification Method

Testing in accordance with: ☐ ICC-ES AC156 ☐ FM 1950-16

☐ Other(s) (Please Specify):

*Use of criteria other than those adopted by the California Building Standards Code, 2019 (CBSC 2019) for component supports and attachments are not permitted. For distribution system, interior partition wall, and suspended ceiling seismic bracings, test criteria other than those adopted in the CBSC 2019 may be used when approved by HCAI prior to testing.

☒ Analysis

☐ Experience Data

☐ Combination of Testing, Analysis, and/or Experience Data (Please Specify):



## HCAI Approval

Date: 6/12/2023

Name: Jeffrey Kikumoto Title: Senior Structural Engineer

Condition of Approval (if applicable):

GENERAL NOTES

1. THIS HCAI PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM) IS BASED ON THE 2019 CBC. THE DEMANDS (DESIGN FORCES) FOR USE WITH THIS OPM SHALL BE BASED ON THE 2019 CBC
2. THIS DOCUMENT MAY ONLY BE USED WITH THE EXPRESS WRITTEN CONSENT OF THE MANUFACTURER LISTED ABOVE FOR THE SPECIFIC PROJECT SITE AND INSTALLATION LOCATION. THIS DOCUMENT IS INVALID WITHOUT SUCH CONSENT.
3. THIS PREAPPROVAL CONFORMS TO THE 2019 CALIFORNIA BUILDING CODE WHERE $S_{DS}$ IS NOT GREATER THAN 1.70 & 2.50: SEE DETAILS FOR APPLICABILITY.
4. FORCES PER ASCE 7-16 SECTION 13.3.1, EQUATIONS 13.3-1, 13.3-2 & 13.3-3,

   WHERE $S_{DS}$ =1.70, $a_P$= 1.0, $I_P$ = 1.5, $R_P$ = 2.5, Z/H=0 AT CONCRETE SLAB. SEE FOLLOWING SHEETS FOR $\Omega_0$

   WHERE $S_{DS}$ =2.5, $a_P$ = 1.0, $I_P$ = 1.5, $R_P$ = 2.5, Z/H=0 AT CONCRETE SLAB & Z/H ≤ 1 AT CONCRETE SLAB ON METAL DECK. SEE FOLLOWING SHEETS FOR $\Omega_0$.
5. THIS PREAPPROVAL COVERS ONLY THE SUPPORTS AND ATTACHMENTS OF THE EQUIPMENT TO THE STRUCTURE.
6. ALL DESIGN FORCES SHOWN ON THE DRAWINGS ARE FACTORED LOADS THAT SHALL BE USED FOR STRENGTH DESIGN.
7. CONCRETE SLAB ON METAL DECK DETAIL VALID FOR DEMANDS SHOWN AT ANY ELEVATION IN THE BUILDING. (I.E. Z/H ≤ 1)
8. CONCRETE SLAB ON GRADE DETAIL VALID FOR DEMANDS SHOWN AT ANY ELEVATION BELOW GRADE. (I.E. Z/H ≤ 0)
9. RESPONSIBILITIES OF THE STRUCTURAL ENGINEER OF RECORD OF THE BUILDING

   A. PROVIDE SUPPORTING STRUCTURE TO SUPPORT WEIGHTS AND FORCES SHOWN IN ADDITION TO ALL OTHER LOADS.

   B. VERIFY THAT THE INSTALLATION IS IN CONFORMANCE WITH THE 2019 CBC AND WITH THE DETAILS, MATERIAL AND GAGE OF THE UNIT WHERE ATTACHMENTS ARE MADE AGREE WITH THE INFORMATION SHOWN ON THE PRE-APPROVAL DOCUMENTS.

   C. VERIFY THAT PROJECT SPECIFIC VALUES OF $S_{DS}$ & Z/H RESULT IN SEISMIC FORCES ( $E_H$, $E_V$ ) THAT DO NOT EXCEED THE VALUES ON THE DETAILS.

   D. VERIFY THAT THE CONCRETE SLAB TO WHICH THE EQUIPMENT IS ANCHORED MEETS THE REQUIREMENTS OF THE APPLICABLE ICC ESR.

   E. VERIFY THAT THE ANCHORS ARE AN ADEQUATE DISTANCE FROM ANY SLAB EDGES OR OPENINGS (SEE TYPICAL DETAIL ON SHEET S1.1).

   F. VERIFY THAT ALL NEW OR EXISTING ANCHORS ARE AN ADEQUATE DISTANCE FROM THE UNIT ATTACHMENTS AND CHECK FOR INTERACTION WHERE OTHER ANCHORS ARE WITHIN 18" OR 6 $h_{ef}$ FROM THIS UNIT'S ANCHORS.



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| | | |
|---|---|---|
| PROJECT NAME: | RXL | |
| PROJECT ADDRESS: | | |
| PROJECT NO. | 202262 | REVISIONS |
| DATE: | 09/06/22 | |
| DRAWN BY: | M.M./K.T. | |
| CHECK BY: | KTO | |

SHEET S1.0

G. EQUIPMENT MANUFACTURER MUST DESIGN UNIT TO MAKE C.G.

<= THAN THE C.G. HEIGHT DIMENSION SHOWN ON DRAWINGS.

H. ALL HOLES THROUGH STEEL FOR BOLTS SHALL BE STANDARD HOLE SIZE PER ANSI/AISC360-16 TABLE J3.3.

10. EXPANSION ANCHORS:

A. ATTACHMENT IS TO BE MADE WITH THE ANCHORS LISTED BELOW AND INSTALLED AS DESCRIBED IN THE CORRESPONDING ICC REPORT.

| ANCHOR DIAMETER | CONCRETE TYPE | MIN. F'C (PSI) | ANCHOR TYPE | ICC REPORT NO. | $h_{ef}$ | MIN. SPACING | MIN. EDGE DIST. | MIN. CONC. THICKNESS | TORQUE TEST: STAINLESS STEEL | TORQUE TEST: CARBON STEEL |
|---|---|---|---|---|---|---|---|---|---|---|
| RXL 2823X78019 SERVER RACK | | | | | | | | | | |
| $S_{DS}$<1.70, SLAB ON GRADE | | | | | | | | | | |
| 5/8" CARBON STEEL | NORMAL WEIGHT | 3000 | HILTI KWIK BOLT TZ2 | ESR-4266 | 3¼" | 2¾" | 7" | 6" | 60 FT-LB | 40 FT-LB |
| 1.7<$S_{DS}$<2.5, SLAB ON GRADE | | | | | | | | | | |
| ¾" CARBON STEEL | NORMAL WEIGHT | 3000 | HILTI KWIK BOLT TZ2 | ESR-4266 | 3¾" | 3¾" | 8" | 6" | 125 FT-LB | 110 FT-LB |
| RXL-RD29&RXL-RD34 | | | | | | | | | | |
| $S_{DS}$<1.70, SLAB ON GRADE | | | | | | | | | | |
| ⅜" CARBON STEEL | NORMAL WEIGHT | 3000 | HILTI KWIK BOLT TZ2 | ESR-4266 | 2" | 2¼" | 3½" | 4" | 30 FT-LB | 30 FT-LB |
| 1.7<$S_{DS}$<2.5, SLAB ON GRADE | | | | | | | | | | |
| ½" CARBON STEEL | NORMAL WEIGHT | 3000 | HILTI KWIK BOLT TZ2 | ESR-4266 | 3¼" | 3" | 8" | 6" | 40 FT-LB | 50 FT-LB |
| ¾" CARBON STEEL | LIGHT WEIGHT | 3000 | HILTI KWIK BOLT TZ2 | ESR-4266 | 3¾" | 4" | 7" | 6" | 60 FT-LB | 40 FT-LB |

NOTE:

1. REFER TO TABLE A ON S1.4 FOR CORRESPONDING SPACING FOR SPECIFIED EDGE DIST, & VICE VERSA, FOR STAINLESS STEEL, REFER TO TABLE ON S1.4. THIS TABLE TAKES PRECEDENCE OVER THE TABLE ON S1.4 IF DIMENSIONS CONFLICT.

2. FOR CONCRETE OVER METAL DECK ANCHORAGE , SEE S1.3

B. TESTING AND SPECIAL INPSECTION OF EXPANSION ANCHORS SHALL BE PERFORMED BY AN APPROVED INDEPENDENT AGENCY EMPLOYED BY THE FACILITY OWNER PER CBC 1704A & 1910A.5 AND CAC 7-149. ALL REPORTS SHALL BE SENT TO THE INSPECTOR OF RECORD, OWNER AND THE ARCHITECT OR ENGINEER IN RESPONSIBLE CHARGE.



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REGISTERED PROFESSIONAL ENGINEER KEVIN T. KEETON No. S 4192 Exp. 12/31/24 STRUCTURAL STATE OF CALIFORNIA

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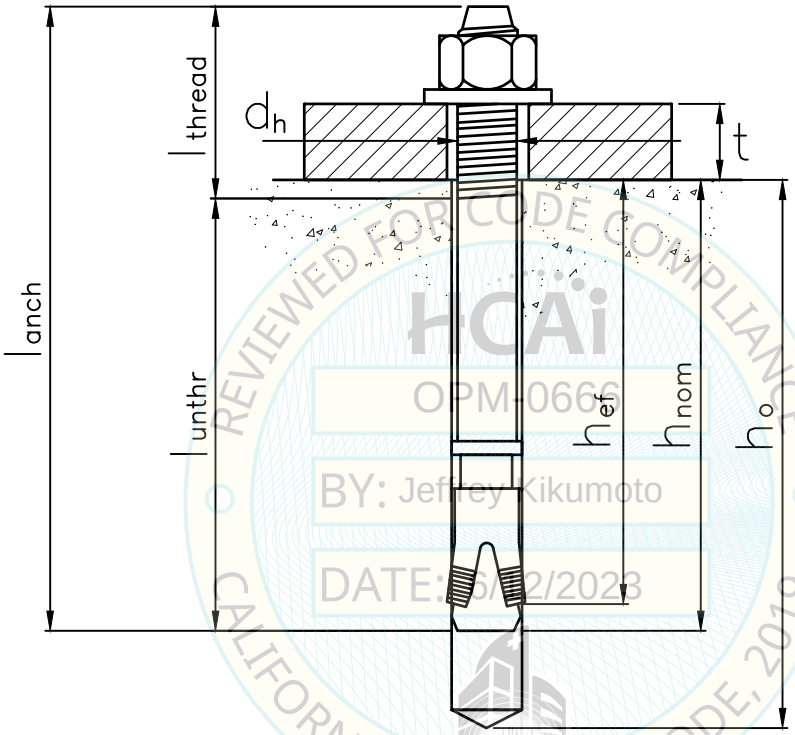
SHEET S1.1

(i) AFTER AT LEAST 24 HOURS HAVE ELAPSED SINCE INSTALLATION, TORQUE TEST AT LEAST 50% OF THE ANCHORS OR ALTERNATE BOLTS IN A GROUP, SHALL BE TESTED.

(ii) ACCEPTANCE CRITERIA PER 2019 CBC, 1910A.5.5 TORQUE TEST; THE APPLICABLE TORQUE MUST BE ACHIEVED WITHIN THE FOLLOWING LIMITS:

- THE MANUFACTURER'S RECOMMENDED INSTALLATION TORQUE BASED ON AN APPROVED EVALUATION REPORT USING CRITERIA ADOPTED IN THIS CODE.
- IF ANY ANCHOR FAILS, TEST ALL ANCHORS.

11. DIMENSIONS FOR EXPANSION ANCHORS ARE AS FOLLOWS







12. BOLTS THROUGH CONCRETE ON METAL DECK

C. BOLTS SHALL BE TORQUED BY ¾ TURN OF THE NUTS AFTER THE SNUG TIGHT ( THE SNUG–TIGHT CONDITION IS DEFINED AS THE TIGHTNESS REQUIRED TO BRING THE CONNECTED PILES INTO FIRM CONTACT) CONDITION IS ACHIEVED, UNLESS OTHERWISE NOTED.

D. THROUGH BOLT HOLES SHALL BE 1/16" LARGER THAN BOLT SIZE ( HOLE SIZE=BOLT SIZE + 1/16) FOR CONCRETE.

E. THROUGH–BOLTS IN CONCRETE SHALL RECEIVE SPECIAL INSPECTION AND TESTING (THROUGH BOLTS WITH STEEL TO STEEL CONNECTION IN TENSION DO NOT REQUIRE TENSION TESTING) IN ACCORDANCE WITH REQUIREMENTS FOR POST–INSTALLED ANCHORS.

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| PROJECT NAME: | RXL | SHEET |
| PROJECT ADDRESS: | | |
| PROJECT NO. | 202262 | REVISIONS |
| DATE: | 09/06/22 | S1.2 |
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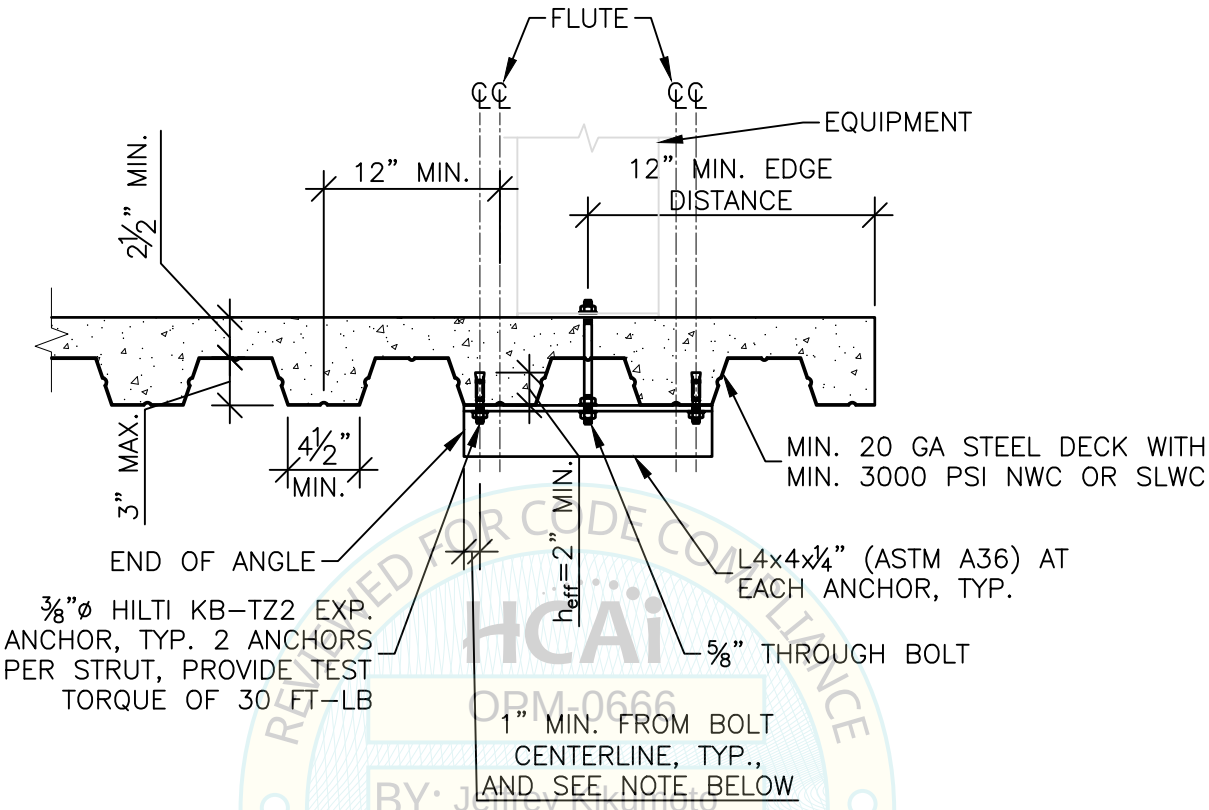
| CHECK BY: | KTO | |






## MIN. STEEL DECK REQUIREMENTS AND STRUT DETAIL

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NOTE:
1. AT DECK SOFFIT, PARALLEL w/ FLUTE, SPACING CAN BE GREATER OF 3*heff OR 1.5*FLUTE WIDTH

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| PROJECT NAME: | RXL | SHEET |
| PROJECT ADDRESS: | | S1.3 |
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| DRAWN BY: | M.M./K.T. | |
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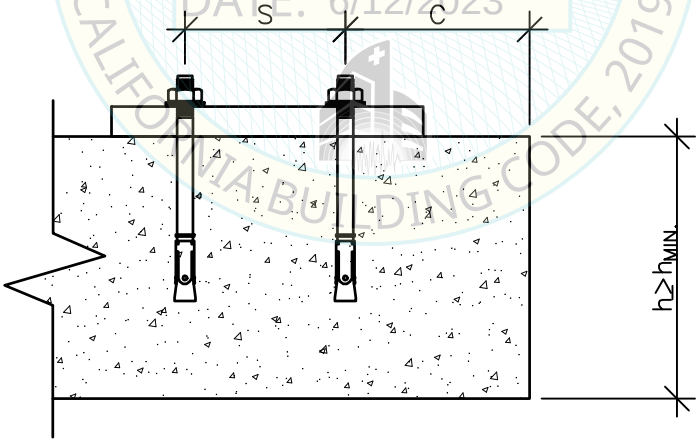
| SETTING INFORMATION | SYMBOL | UNIT | NOMINAL ANCHOR DIA. (IN) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 3/8 | 1/2 | 5/8 | | 3/4 |
| EFFECTIVE MIN. EMBEDMENT | $h_{eff}$ | in. | 2 | 2½ | 3¼ | 4 | 3¾ |
| MIN. MEMBER THICKNESS | $h_{min.}$ | in. | 4 | 5 | 5½ | 6 | 6 |
| CARBON STEEL | | | | | | | |
| MIN. EDGE DISTANCE | $C_{min.}$ | in. | 2½ | 2¾ | 3½ | 2¾ | 4 |
| | FOR S> _ | in. | 6 | 9¾ | 5½ | 7¼ | 5¾ |
| MIN. ANCHOR SPACING | $S_{min.}$ | in. | 2¼ | 3 | 2¾ | 2¼ | 3¾ |
| | FOR C> _ | in. | 3½ | 8 | 7 | 4¼ | 7¼ |
| STAINLESS STEEL | | | | | | | |
| MIN. EDGE DISTANCE | $C_{min.}$ | in. | 2½ | 2½ | 3¼ | 2¼ | 4 |
| | FOR S> _ | in. | 5 | 4½ | 5½ | 7 | 7½ |
| MIN. ANCHOR SPACING | $S_{min.}$ | in. | 2¼ | 2½ | 2¾ | 3 | 4 |
| | FOR C> _ | in. | 4 | 4½ | 4 | 4¼ | 6 |







NORMAL WEIGHT AND LIGHT WEIGHT SLAB ON GRADE MINIMUM EDGE DISTANCES

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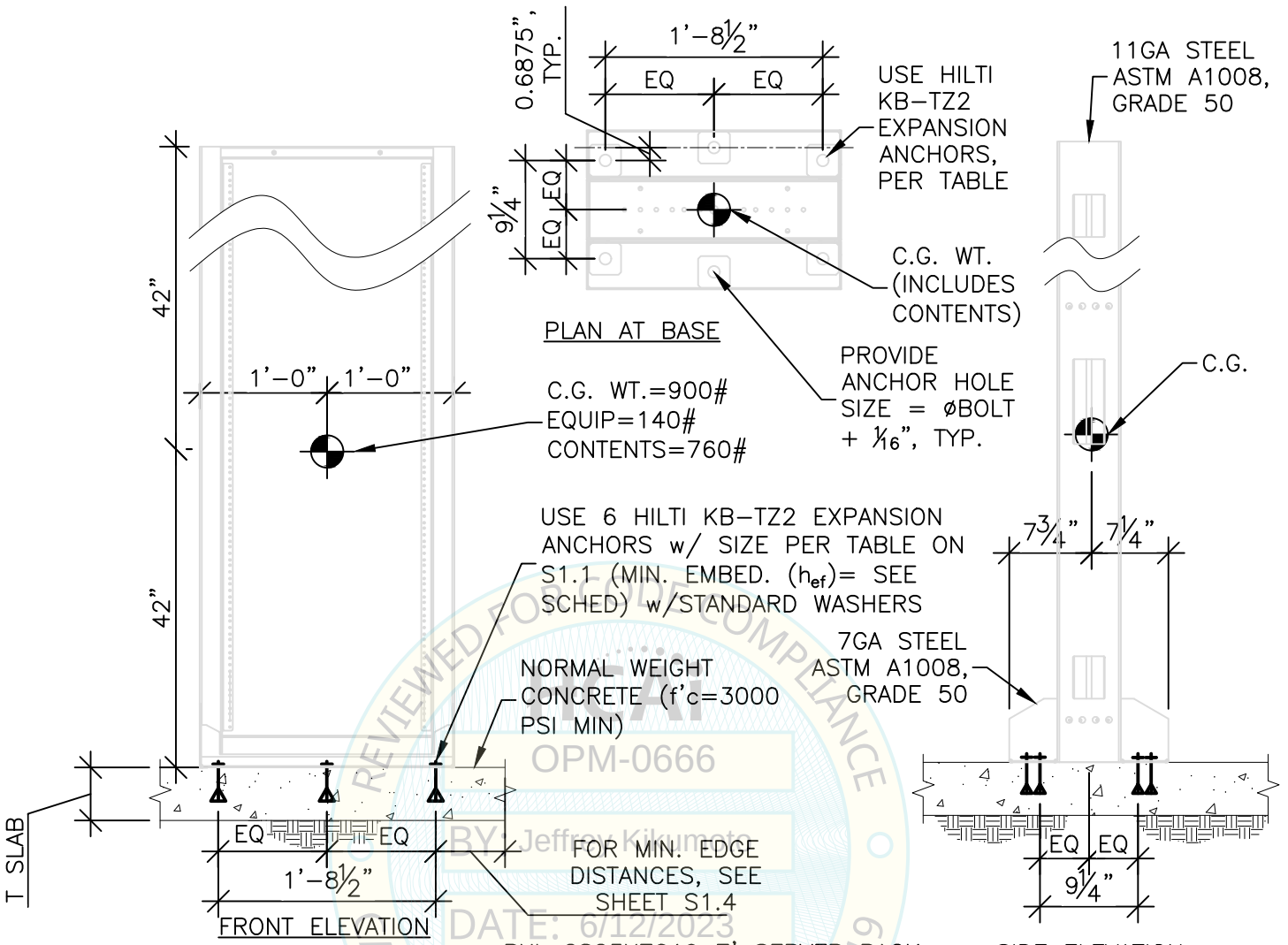
SHEET
S1.4




RXL 2823X7019 7' SERVER RACK

| MAX $S_{DS}$ | ANCHORS TYPE | DIAM | EFF EMBED | QTY | $T_{SLAB}$ | *Tu | *Vu |
|---|---|---|---|---|---|---|---|
| 1.70 | HILTI KB-TZ2 | 5/8" | 3¼" | 6 | 6" | 2320 | 290 |
| 2.50 | HILTI KB-TZ2 | ¾" | 3¾" | 6 | 6" | 3470 | 425 |

* VALUES INCLUDE $\Omega_0$



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NOTE:

1. FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16 STRENGTH DESIGN IS USED. ($a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h=0).
2. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURAL DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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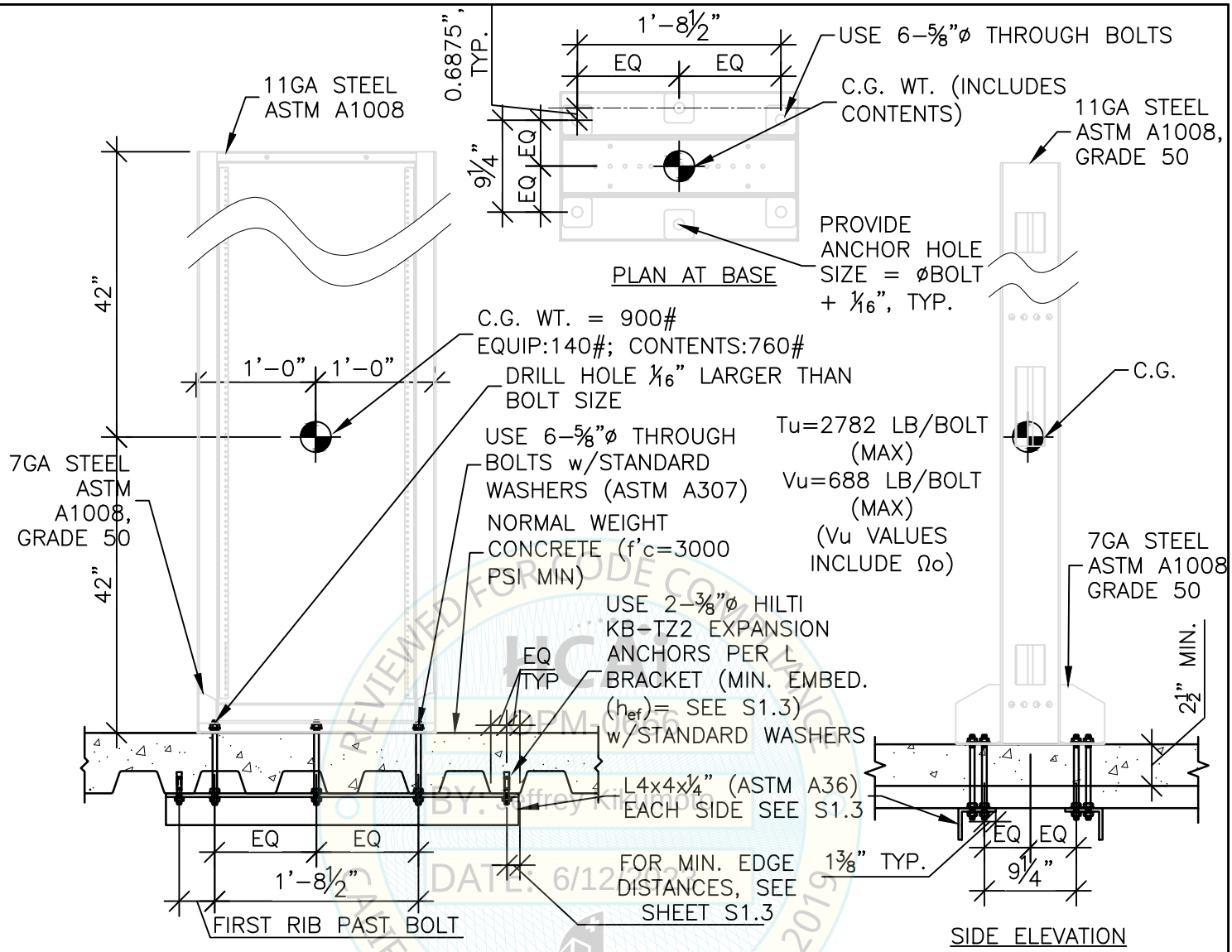
SHEET S2.0




RXL 2823X7019 7' SERVER RACK

NOTE:
FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16 STRENGTH DESIGN IS USED. ($S_{DS}$=2.5, $a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h≤1)

HORIZONTAL FORCE ($E_h$) = 1.8 $W_p$
HORIZONTAL FORCE ($E_{mh}$) = 3.36 $W_p$ (FOR CONCRETE ANCHORAGE)
VERTICAL FORCE ($E_v$) = 0.50 $W_P$

1. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
2. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURAL DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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| PROJECT NO. | 202262 | REVISIONS |
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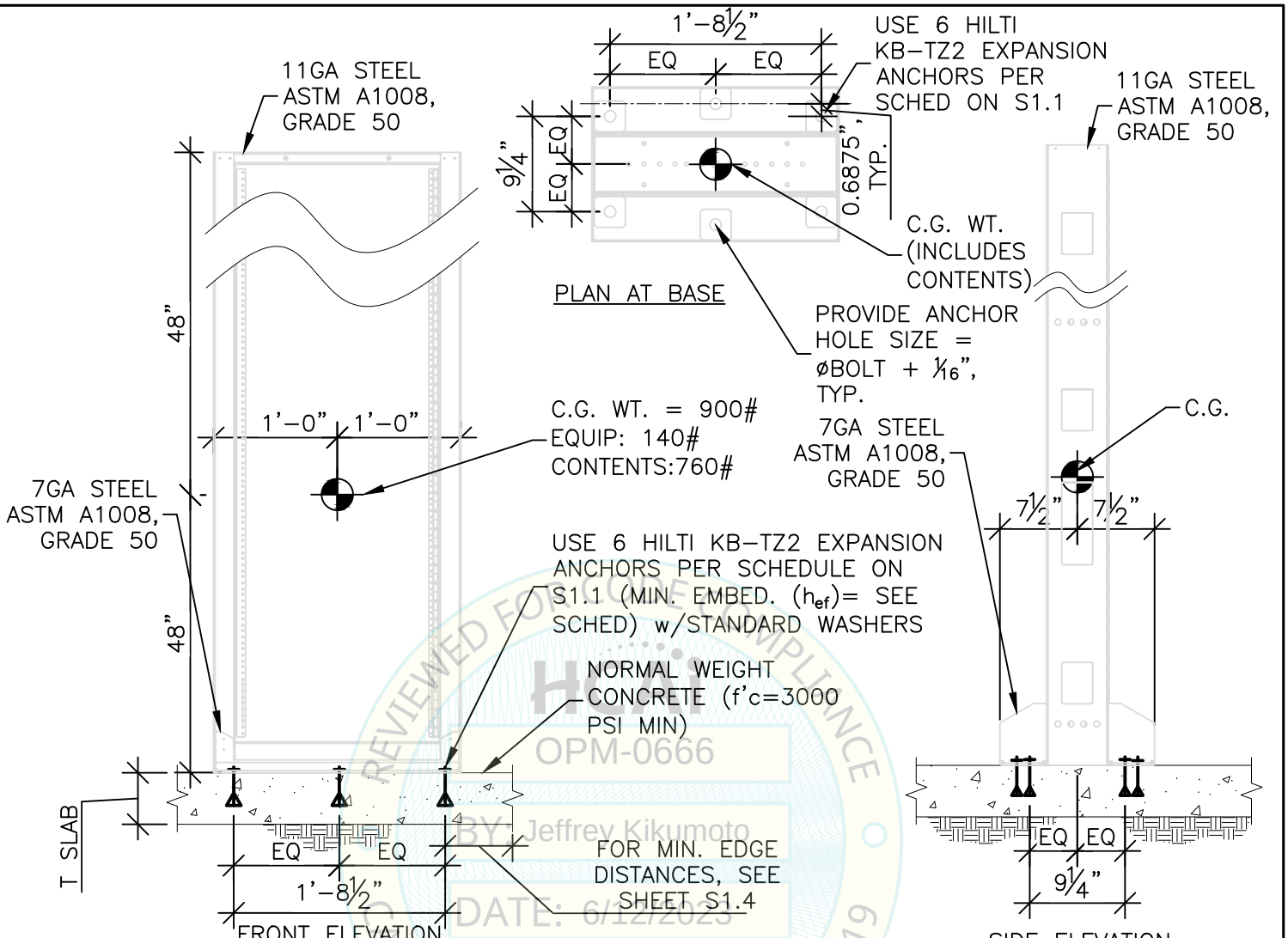


RXL 2823X78019 8' SERVER RACK

| ANCHORS | | | | | | | |
|---|---|---|---|---|---|---|---|
| MAX $S_{DS}$ | TYPE | DIAM | EFF EMBED | QTY | $T_{SLAB}$ | *Tu | *Vu |
| 1.70 | HILTI KB–TZ2 | 5/8" | 3¼" | 6 | 6" | 2663 | 339 |
| 2.50 | HILTI KB–TZ2 | ¾" | 3¾" | 6 | 6" | 3974 | 425 |

* VALUES INCLUDE $\Omega_0$



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NO

1. FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7–16 STRENGTH DESIGN IS USED. ($a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h=0).
2. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURAL DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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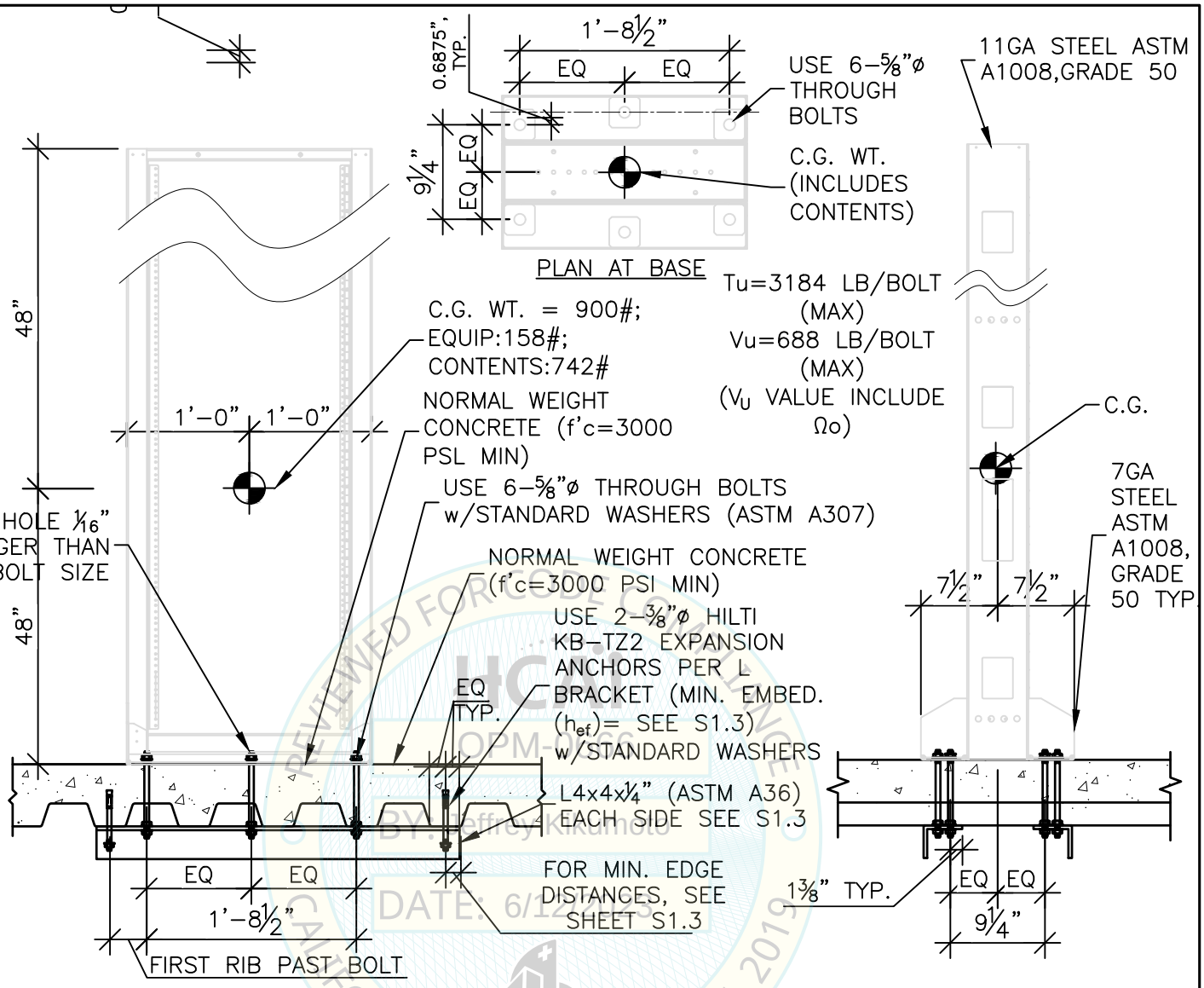


RXL 2823X78019 8' SERVER RACK

NOTE:

FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16
STRENGTH DESIGN IS USED. ($S_{DS}$=2.5, $a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h≤1)

HORIZONTAL FORCE ($E_h$) = 1.80 $W_p$
HORIZONTAL FORCE ($E_{mh}$) = 3.6 $W_p$ (FOR CONCRETE ANCHORAGE)
VERTICAL FORCE ($E_v$) = 0.50 $W_P$

1. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
2. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURAL DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.

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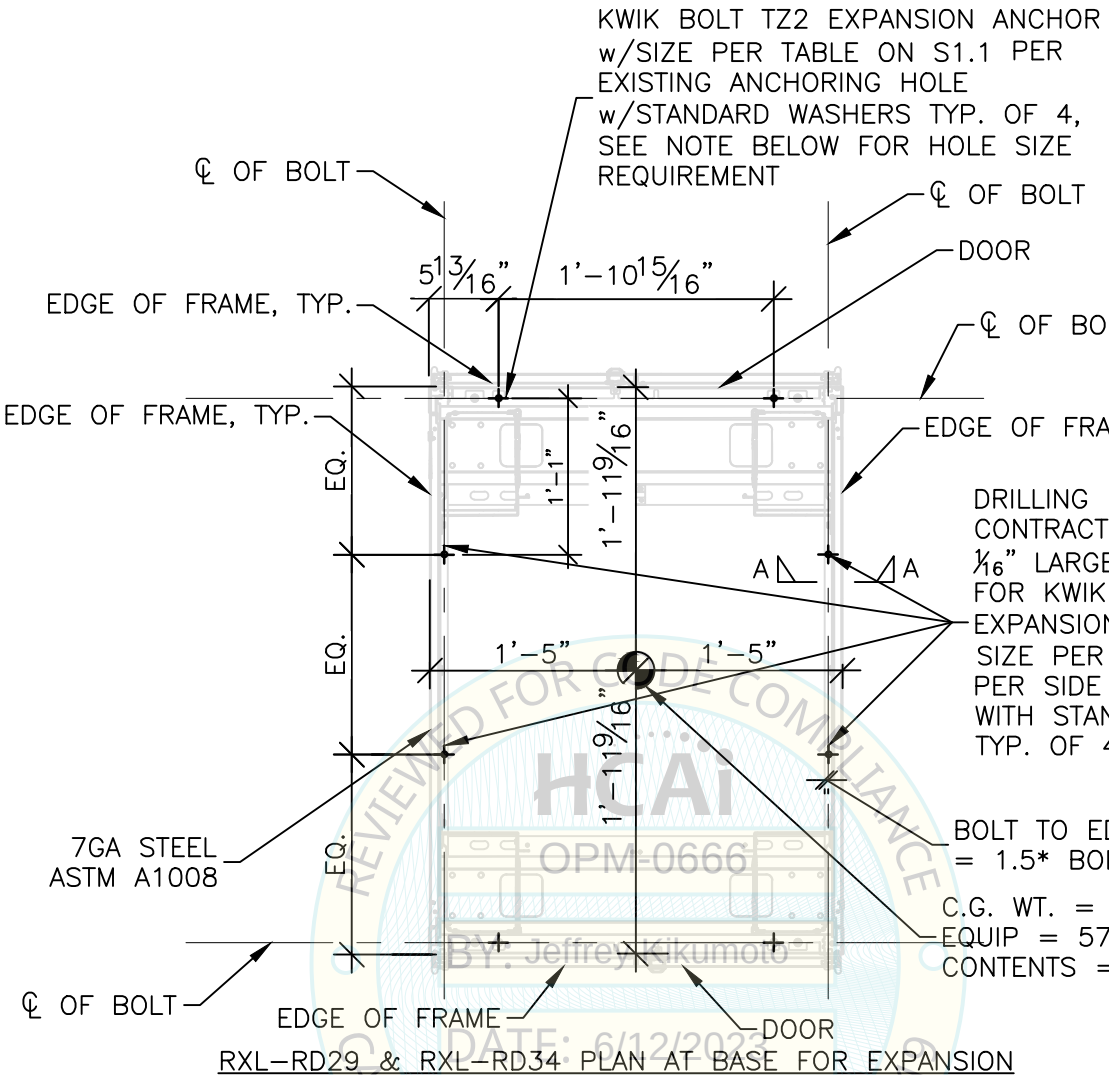
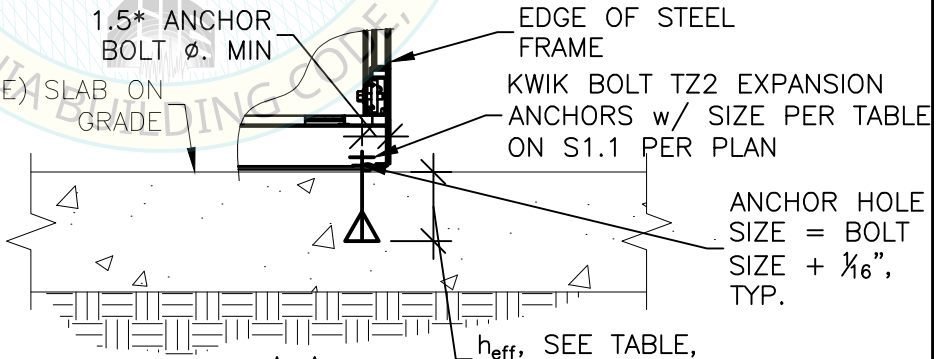



RXL–RD29 & RXL–RD34 PLAN AT BASE FOR EXPANSION ANCHORS AT SLAB ON GRADE

NOTE:
LEVELERS & CASTERS REMOVED; UNIT TO REST DIRECTLY ON SLAB/STRUCTURE, INSTALL ANCHOR TO BOLT HOLE 1/16" LARGER THAN BOLT SIZE, CONTRACTOR DRILL THE REQUIRED HOLE SIZE IF THE (E) HOLE IS SMALLER THAN THE BOLT SIZE +1/16", TYP.
IF (E) HOLE IS > BOLT SIZE +1/8", THEN USE HARDENDED F436 WASHERS.




A–A
SCALE: 1½"=1'–0"



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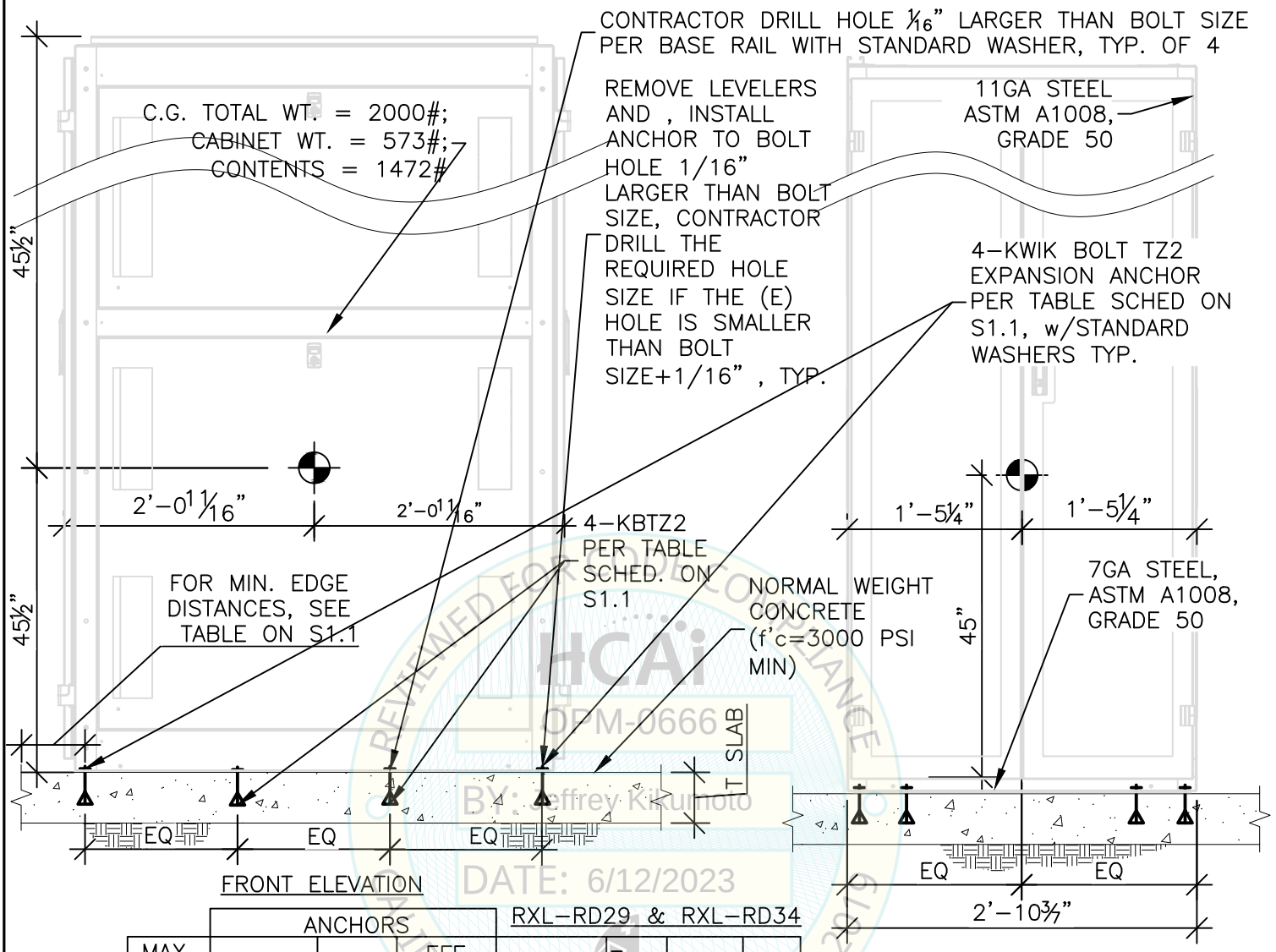
REVISIONS

SHEET
S4.0




FRONT ELEVATION

SIDE ELEVATION

RXL-RD29 & RXL-RD34

| MAX $S_{DS}$ | ANCHORS TYPE | DIAM | EFF EMBED | QTY | $T_{SLAB}$ | *Tu | *Vu |
|---|---|---|---|---|---|---|---|
| 1.70 | HILTI KB-TZ2 | ⅜" | 2" | 8 | 4" | 1460 | 526 |
| 2.50 | HILTI KB-TZ2 | ½" | 3¼" | 8 | 6" | 2249 | 772 |

* VALUES INCLUDE $\Omega_0$

NOTE:

1. FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7-16 STRENGTH DESIGN IS USED. ($a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h=0).
2. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURAL DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN IN COMBINATION WITH ALL OTHER LOADS THAT MAY BE PRESENT.



REGISTERED PROFESSIONAL ENGINEER
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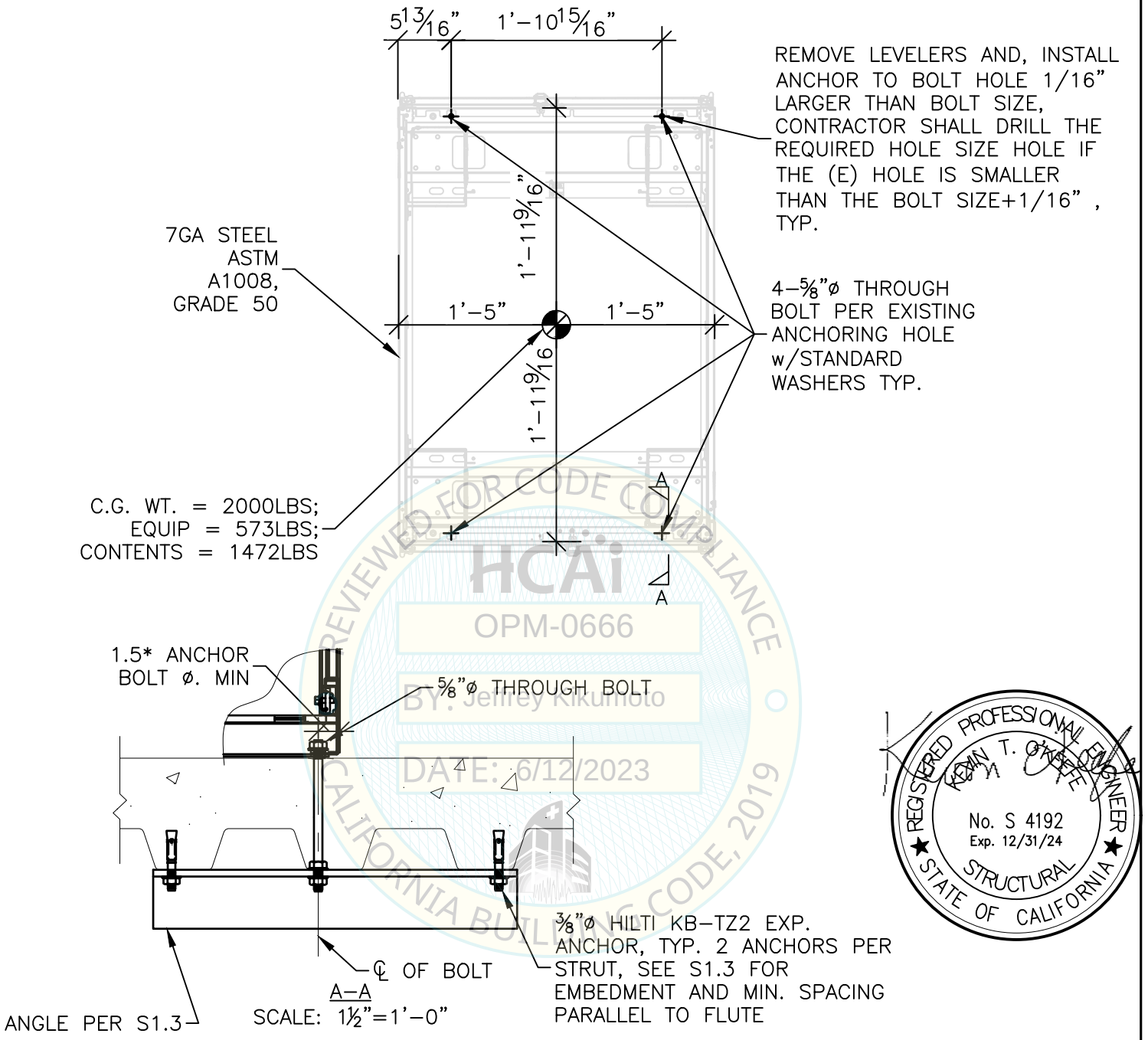
| | |
|---|---|
| PROJECT NAME: | RXL |
| PROJECT ADDRESS: | |
| PROJECT NO. | 202262 |
| DATE: | 09/06/22 |
| DRAWN BY: | M.M./K.T. |
| CHECK BY: | KTO |

REVISIONS

SHEET S4.1









RXL-RD29 & RXL-RD34 PLAN AT BASE FOR THROUGH BOLTS FOR CONCRETE OVER METAL DECK.

NOTE: LEVELERS & CASTERS REMOVED; UNIT TO REST DIRECTLY ON SLAB/STRUCTURE

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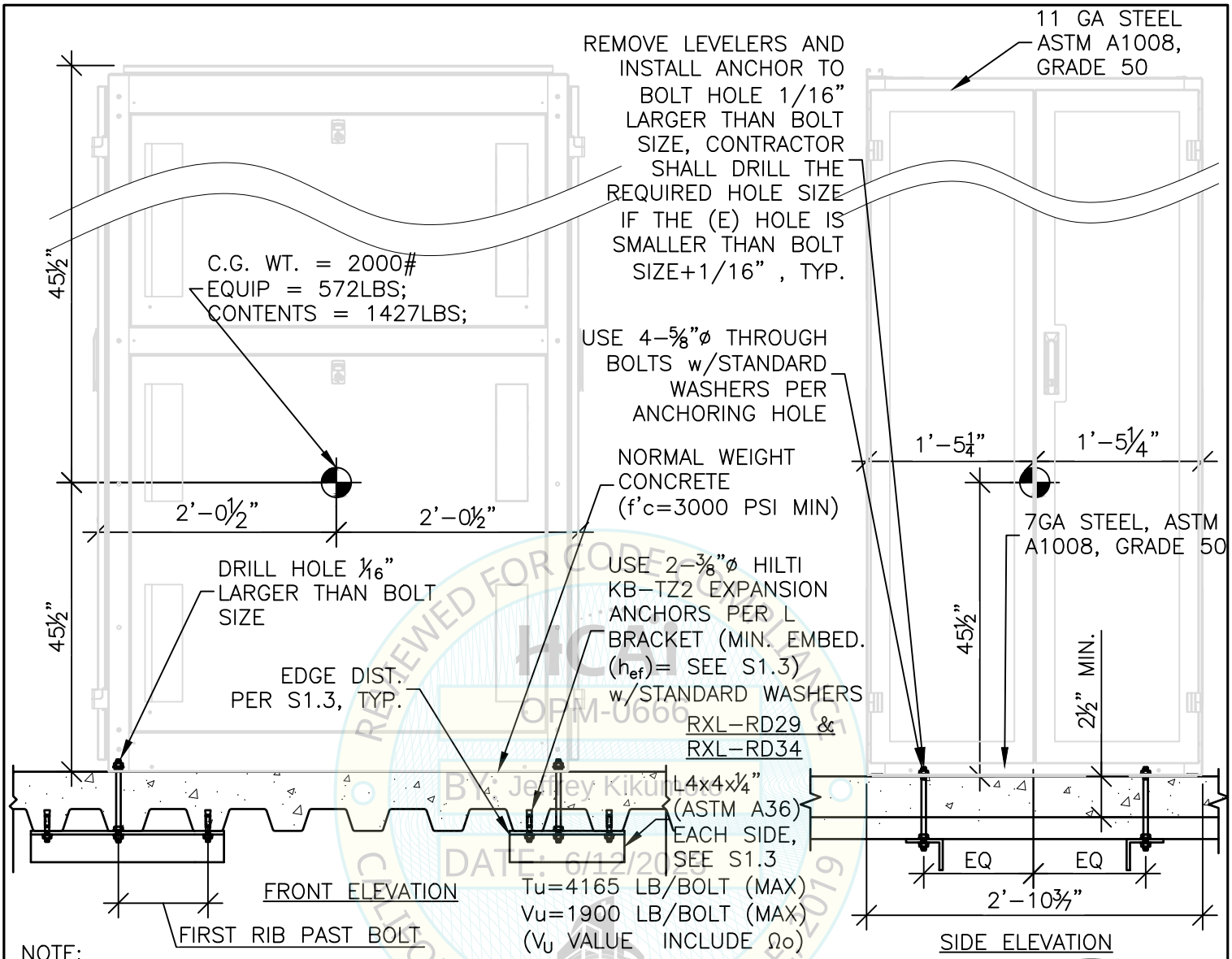
| | | |
|---|---|---|
| PROJECT NAME: | RXL | SHEET |
| PROJECT ADDRESS: | | |
| PROJECT NO. | 202262 | REVISIONS |
| DATE: | 09/06/22 | S4.2 |
| DRAWN BY: | M.M./K.T. | |
| CHECK BY: | KTO | |






NOTE:
FORCES ARE DETERMINED PER 2019 CALIFORNIA BUILDING CODE AND ASCE 7–16 STRENGTH DESIGN IS USED. ($S_{DS}$=2.5, $a_p$=1.0, $I_p$=1.5, Rp=2.5, Ωo=2.0, z/h≤1)

HORIZONTAL FORCE ($E_h$) = 1.80 $W_p$
HORIZONTAL FORCE ($E_{mh}$) = 3.6 $W_p$ (FOR CONCRETE ANCHORAGE)
VERTICAL FORCE ($E_v$) = 0.50 $W_P$

1. CENTER OF GRAVITY (C.G) AND WEIGHT ARE THE GOVERNING PARAMETERS FOR DESIGN. THIS PREAPPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN
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| DATE: | 09/06/22 |
| DRAWN BY: | M.M./K.T. |
| CHECK BY: | KTO |

REVISIONS

SHEET
S4.3