



OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

APPLICATION FOR OSHPD PREAPPROVAL OF MANUFACTURER'S CERTIFICATION (OPM)

OFFICE USE ONLY
APPLICATION #: OPM-0188-13

OSHPD Preapproval of Manufacturer's Certification (OPM)

Type: [] New [] Renewal [X] Update to Pre-CBC 2013 OPA Number: 0603

Manufacturer Information

Manufacturer: Hill-Rom Company, Inc.
Manufacturer's Technical Representative: Doug Werner
Mailing Address: 1069 State Route 46 East - Batesville, IN 47006
Telephone: (812) 934-8762 Email: doug.werner@hill-rom.com

Product Information

Product Name: Liko Overhead Patient Lift Systems
Product Type: Ceiling Hoist
Product Model Number: LikoGuard L / XL; Mutirall 200; Liam Staehlin
General Description: Ceiling Mounted and Wall Mounted Overhead Patient Lift Supports, Lift Tracking, and Lift Motors.

Applicant Information

Applicant Company Name: Hill-Rom Company, Inc.
Contact Person: Doug Werner
Mailing Address: 1069 State Route 46 East - Batesville, IN 47006
Telephone: (812) 934-8762 Email: doug.werner@hill-rom.com

I hereby agree to reimburse the Office of Statewide Health Planning and Development review fees in accordance with the California Administrative Code, 2013.

Signature of Applicant: [Signature] Date: 12/17/2014
Title: Manager, LIKO Project Management and Installation Company Name: Hill-Rom Company, Inc.

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"





OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT
FACILITIES DEVELOPMENT DIVISION

Registered Design Professional Preparing Engineering Recommendations

Company Name: Simpson Gumpertz & Heger, Inc.

Name: Kevin S. Moore California License Number: 4528 (Structural)

Mailing Address: 100 Pine Street, Suite 1600

Telephone: (415) 495-3700 Email: ksmoore@sgh.com

OSHPD Special Seismic Certification Preapproval (OSP)

- Special Seismic Certification is preapproved under OSP- (Separate application for OSP is required)
Special Seismic Certification is not preapproved

Certification Method(s)

- Testing in accordance with: ICC-ES AC156 FM 1950-10
Other* (Please Specify): Elements under other current OPMs used as part of system OPM

*Use of criteria other than those adopted by the California Building Standards Code, 2013 (CBSC 2013) 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 2013 may be used when approved by OSHPD prior to testing.

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

List of Attachments Supporting the Manufacturer's Certification

- Test Report Drawings Calculations Manufacturer's Catalog
Other(s) (Please Specify): SAP Model, video of system installed in UCSD 5-story concrete building shake table test (NEES project), report of dynamic model and response for evaluation of system

OFFICE USE ONLY - OSHPD APPROVAL VALID FOR CBC 2013 ONLY

Signature: [Signature] Date: 06/22/2015
Print Name: William Staehlin
Title: SSE
Condition of Approval (if applicable):

"Access to Safe, Quality Healthcare Environments that Meet California's Diverse and Dynamic Needs"



I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:22 AM, bdalexander

TABLE OF CONTENTS	
PAGE	SHEET TITLE
0.1	TABLE OF CONTENTS
0.2	TABLE OF CONTENTS
0.3	TABLE OF CONTENTS
1	GENERAL NOTES
2	GENERAL NOTES
3	GENERAL NOTES
4	GENERAL NOTES
5	GENERAL NOTES
6	4 PENDANT TRAVERSE SYSTEM
7	6 PENDANT TRAVERSE SYSTEM
8	SPAN & OVERHANG FOR 4 PENDANT TRAVERSE SYSTEM
9	BRACING LAYOUT AND VARIANCE ALLOWANCES 4 PENDANT TRAVERSE SYSTEM
10	BRACING (W/ LASH) LAYOUT AND VARIANCE ALLOWANCES 4 PENDANT TRAVERSE SYSTEM
11	SPAN & OVERHANG FOR 6 PENDANT TRAVERSE SYSTEM
12	BRACING LAYOUT AND VARIANCE ALLOWANCES 6 PENDANT TRAVERSE SYSTEM
13	BRACING (W/ LASH) LAYOUT AND VARIANCE ALLOWANCES 6 PENDANT TRAVERSE SYSTEM
14	SINGLE RAIL SYSTEM OPM-0188-13
15	SPAN & OVERHANG LENGTH FOR SINGLE RAIL SYSTEM
16	BRACING LAYOUT AND VARIANCE ALLOWANCES – SINGLE RAIL SYSTEM
17	ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS
18	ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS
19	ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS
20	ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS
21	ALLOWABLE SPAN LENGTHS FOR SINGLE RAIL SYSTEM
22	RAIL SECTIONS
23	TYPICAL PENDANT & DIAGONAL BRACE – BRACE PERPENDICULAR TO FIXED RAIL
24	TYPICAL PENDANT & DIAGONAL BRACE – BRACE PARALLEL TO FIXED RAIL
25	TYPICAL PENDANT PRE-MANUFACTURED; LIKO (SWEDEN)
26	TYPICAL PENDANT TOP PLATES PRE-MANUFACTURED; LIKO (SWEDEN)
27	LOCKING RAIL
28	LASH BRACE CONNECTION

Sheet Title:

TABLE OF CONTENTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Scale: NONE	Date: 05/01/15	Page No.: 0.1 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

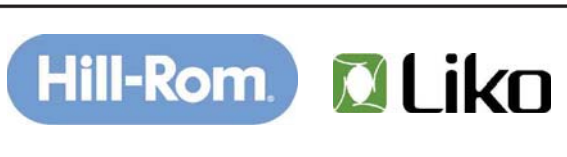
I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:23 AM, bdalexander

TABLE OF CONTENTS	
PAGE	SHEET TITLE
29	TYPICAL CONNECTION(S) TO CONCRETE OVER METAL DECK SOFFIT
30	TYPICAL CONNECTION TO CONCRETE OVER METAL DECK SOFFIT WITH 2 BOLT TOP PLATE
31	TYPICAL CONNECTION TO CONCRETE OVER METAL DECK SOFFIT WITH 4 BOLT TOP PLATE
32	TYPICAL CONNECTION(S) TO FLAT SLAB SOFFIT
33	TYPICAL CONNECTION TO FLAT SLAB SOFFIT WITH 2 BOLT TOP PLATE
34	TYPICAL CONNECTION TO FLAT SLAB SOFFIT WITH 4 BOLT TOP PLATE
35	BRACE ANCHORAGE CONNECTION TO METAL DECK – PARALLEL TO DECK FLUTE
36	BRACE ANCHORAGE CONNECTION TO METAL DECK – PERPENDICULAR TO DECK FLUTE
37	BRACE ANCHORAGE CONNECTION TO FLAT SLAB SOFFIT
38	BRACE ANCHORAGE CONNECTION TO WIDE FLANGE BEAM
39	ANCHORAGE CONNECTION TO BAR JOIST – SIDE INSTALL
40	ANCHORAGE CONNECTION TO BAR JOIST – TOP INSTALL
41	ANCHORAGE DIMENSIONS AND REQUIREMENTS
42	ISOMETRIC VIEW OF SINGLE RAIL SYSTEM ON UPRIGHT WALL SUPPORTS
43	SPAN LENGTHS FOR SINGLE RAIL SYSTEM ON UPRIGHT WALL SUPPORTS
44	ISOMETRIC VIEW OF TRAVERSE SYSTEM ON UPRIGHT WALL SUPPORTS
45	SPAN & OVERHANG LENGTH FOR TRAVERSE SYSTEM ON UPRIGHT WALL SUPPORTS
46	WALL CONNECTION – UPRIGHT SUPPORT
47	WALL CONNECTION – SLIMLINE SUPPORT
48	WALL CONNECTION – STEEL UPRIGHT SUPPORT
49	SLIMLINE AND UPRIGHT SUPPORT SECTIONS
50	STEEL UPRIGHT SUPPORT SECTION
51	ISOMETRIC VIEW OF SINGLE RAIL SYSTEM ON WALL BRACKET SUPPORTS
52	SPAN LENGTH FOR SINGLE RAIL SYSTEM ON WALL BRACKET SUPPORTS
53	ISOMETRIC VIEW OF TRAVERSE SYSTEM ON WALL BRACKET SUPPORTS
54	SPAN AND OVERHANG LENGTH FOR TRAVERSE SYSTEM ON WALL BRACKET SUPPORTS
55	BAYONET RAILS – H100 AND H140–H180
56	WALL BRACKET ASSEMBLY
57	WALL BRACKET

Sheet Title:

TABLE OF CONTENTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



Scale: NONE	Date: 05/01/15	Page No.: 0.2 of 76
----------------	-------------------	------------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

CONDITIONS OF USE

1. This OSHPD Pre-approval of Manufacturer's Certification (OPM) is based on the 2013 CBC. The Demand (design forces) for use with the OPM shall be based on the 2013 CBC.
2. SCOPE AND LIMITATIONS: This pre-approval is for the vertical and seismic support of the Liko (a Hill-Rom Company) Overhead Patient Lift System. It does not cover the capacity of the substrates to which the vertical and lateral support elements of the system attach to. These elements must be verified independently by a Structural Engineer Licensed by the State of California. The following overhead lift systems are covered by this pre-approval:
 - a. Straight Rail System (A.K.A. "Monorail")
 - i. Suspended
 - ii. Wall Mounted – Brackets
 - iii. Wall Mounted – Upright Supports
 - b. Traverse Systems (A.K.A. "X-Y" Systems)
 - i. Suspended
 - a. Four Pendant
 - b. Six Pendant
 - ii. Wall Mounted – Brackets
 - iii. Wall Mounted – Upright Supports
3. These drawings are prepared for Hill-Rom, Inc. This document may only be used with the express written consent of Hill-Rom, Inc. for each specific site and location. This document is invalid without such consent.
4. The contractor and the inspector of record shall obtain a copy of this pre-approval from the OSHPD pre-approval programs website.
5. This pre-approval is limited to indoor use.
6. The following components shown in this OPM are provided by Liko. All other components are provided by the owner: Pendant, Fixed Rail, Traverse Rail, Bayonet Rail, Wall Bracket, Upright Supports, and Locking Rails

SCOPE

1. This pre-approval may be used for the vertical and lateral support of the following Liko Overhead Lift Motors and combinations of Liko Overhead Lift Motors:

a. 440lb	d. 600lb	g. 1014lb (2 Motors)
b. 507lb	e. 800lb	h. 1100lb (2 Motors)

Sheet Title:

GENERAL NOTES

 <p>SIMPSON GUMPERTZ & HEGER Engineering of Structures and Building Enclosures</p> <p><small>Simpson Gumpertz & Heger Inc. 415.495.3700 100 Pine Street, Suite 1600 fax: 415.495.3550 San Francisco, California 94111 www.sgh.com</small></p>	 	Scale: NONE	Date: 05/01/15	Page No.: 1 of 76
		OPM-0188-13		

c. 550lb f. 880lb (2 Motors) i. 1200lb (2 Motors)

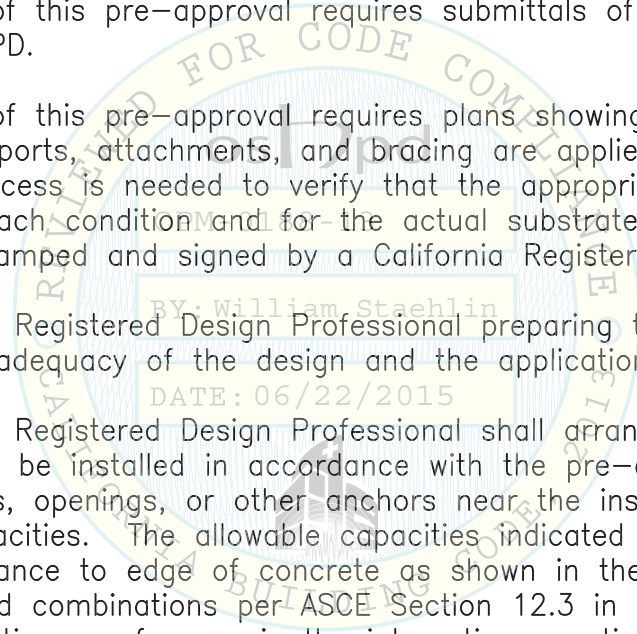
2. This pre-approval permits suspended elements to be attached to the underside of concrete flat slabs, concrete slabs over metal deck & steel beams.
3. This pre-approval permits wall supported elements to be attached to gypsum sheathed walls and concrete walls.

CONSTRUCTION TOLERANCES

1. Construction tolerance of lateral braces shall be as noted in the attached details.

HOW TO USE THIS PRE-APPROVAL

1. This pre-approval may be used to determine the vertical and lateral support of the Liko Overhead Patient Lift System. A California Licensed Structural Engineer has designed this pre-approval, the relevant details, and the supporting calculations. Configurations of the Liko Overhead Patient Lift System covered by this pre-approval need not be re-reviewed.
2. Each application of this pre-approval requires submittals of the system be reviewed and approved by OSHPD.
3. Each application of this pre-approval requires plans showing how and where pre-approved supports, attachments, and bracing are applied to the Liko Overhead Lift System. This process is needed to verify that the appropriate detail has been selected and applied for each condition and for the actual substrate that it will be attached to. Plans must be stamped and signed by a California Registered Design Professional.
 - a. The California Registered Design Professional preparing the plans is responsible for verifying the adequacy of the design and the application of this OPM.
 - b. The California Registered Design Professional shall arrange the anchors to ensure that they can be installed in accordance with the pre-approval and that there are no slab edges, openings, or other anchors near the installed anchors to reduce their allowable capacities. The allowable capacities indicated in the OPM are based on a minimum distance to edge of concrete as shown in the table on page 41 and applicable load combinations per ASCE Section 12.3 in the analysis. The allowable anchor capacities are for use in the interaction equation per ACI 318-11 Section D.7.
4. The pre-approval relies on a prescriptive approach. The pre-approved details have tables and charts associated with them that must be used to select the appropriate detail for each element and each configuration.
5. The California Registered Design Professional must review and forward the supports, attachments and bracing plans for plan check with a notation indicating that the plans



Sheet Title: **GENERAL NOTES**

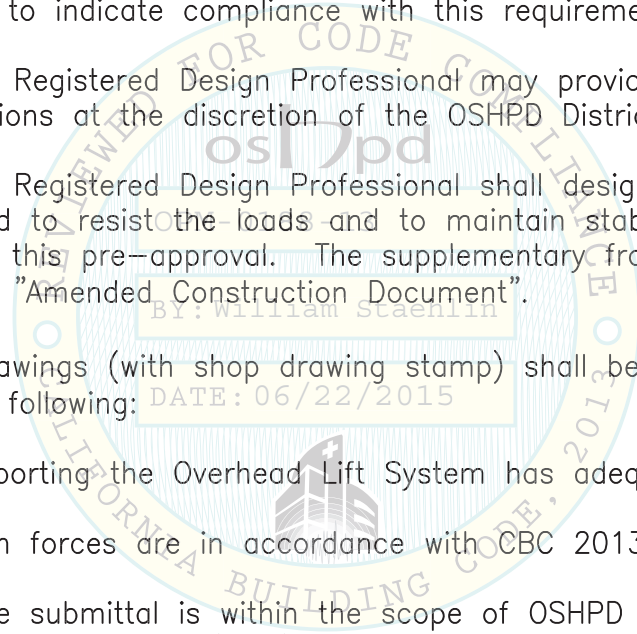
<p>SIMPSON GUMPERTZ & HEGER Engineering of Structures and Building Enclosures Simpson Gumpertz & Heger Inc. 415.495.3700 100 Pine Street, Suite 1600 fax: 415.495.3550 San Francisco, California 94111 www.sgh.com</p>		<p>Scale: NONE Date: 05/01/15 Page No.: 2 of 76</p>	<p>OPM-0188-13 Kevin S. Moore, SE California SE No. 4528</p>
---	--	---	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:38 AM, bdalexander

have been reviewed and they have been found to be in general conformance with the design of the project; See California Administrative Code Section 7-126.


6. Layout Drawings:

- a. Layout drawings of the vertical and lateral support per this pre-approval shall be submitted to the discipline in responsible charge of the project for review to verify that the details are in conformance with all code requirements. The layout drawings shall be in accordance with all code requirements. The layout drawings shall be in accordance with ASCE 7-10 Section 13.6 as modified by CBC Section 1616A.
- i. The California Registered Design Professional shall verify that the supporting structure is adequate for the loads imposed by the vertical and lateral supports installed per the pre-approval in addition to all other loads.
- ii. The California Registered Design Professional will forward the vertical and lateral supports to the discipline in responsible charge with a notation indicating that the plans have been reviewed and are in general conformance with this pre-approval and the design of the project (CAC 2013 Section 7-153). A shop drawing stamp may be used to indicate compliance with this requirement.
- iii. The California Registered Design Professional may provide a shop drawing stamp for small installations at the discretion of the OSHPD District Structural Engineer.
- b. The California Registered Design Professional shall design any supplementary framing that is needed to resist the loads and to maintain stability as required for installation of this pre-approval. The supplementary framing shall be submitted to OSHPD as an "Amended Construction Document".
- c. The layout drawings (with shop drawing stamp) shall be submitted to OSHPD for review of the following:
 - i. Structure supporting the Overhead Lift System has adequate capacity.
 - ii. Seismic design forces are in accordance with CBC 2013.
 - iii. Verify that the submittal is within the scope of OSHPD pre-approval on Manufacturer's Certification (OPM)
- d. The layout drawings (with shop drawing stamp) shall be kept on the job site and used for installation of the vertical and lateral supports. OSHPD field staff will review the installation.
- e. A copy of this pre-approval and any other referenced OPM shall be on the job site prior to starting the installation of the vertical and lateral supports. It is the



Sheet Title: GENERAL NOTES

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 

Scale: NONE	Date: 05/01/15	Page No.: 3 of 76
----------------	-------------------	----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:43 AM, bdalexander

contractor's and Inspector of Record's responsibility to obtain copies of OSHPD pre-approvals from the OSHPD pre-approval programs website.

GENERAL NOTES

1. It is the responsibility of the CDRP designing the vertical and lateral supports to verify that the system design is in conformance with the 2013 CBC Section 1616A.1.25 and with the details shown in this pre-approval.
2. Expansion Anchors:
 - a. Mechanical anchors installed in normal weight concrete or sand, lightweight concrete shall be Hilti KB-TZ as noted on these drawings, complying with ESR-1917, Reissued May 2013 corrected August 2014. Installation shall comply with Section 1616A.1.19 of the 2013 CBC.
 - b. Installation: Install the concrete anchors in accordance with the requirements given in the ICC evaluation report for the specific anchor.
 - c. Job Testing: For verifying satisfactory installation workmanship, perform job site testing in accordance with the test load table provided in this document (page 41 of 79). Test 50% of the installed anchors. The test load may be applied by any method, including manufacturer's torque criteria testing that will effectively measure the tension in the anchor such as direct pull with a hydraulic jack or calibrated spring loading devices. All tests shall be conducted by a testing laboratory in the presence of the special inspector and the inspector of record. If any anchor fails testing, test all anchors of the same type installed by the same trade and not previously tested until twenty consecutive anchors pass, then resume the initial test frequency. The test shall be performed 24 hours or more after installation. Also refer to the 2013 CBC Section 1913A.7 "Tests for post-installed anchors in concrete". Submit test results to OSHPD.
 - d. Do not cut or damage existing reinforcing steel when placing expansion anchors.
 - e. Failure/Acceptance Criteria: The following criteria apply for the acceptance of installed anchors:
 - i. Hydraulic Ram Method: Apply and hold test load for a min of 15 seconds. The anchor should have no observable movement at the applicable test load where washers are used.
 - ii. Torque Wrench Method: The applicable test torque must be reached within one half turn of the nut.

3. Structural Steel:

Sheet Title: GENERAL NOTES

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Scale: NONE	Date: 05/01/15	Page No.: 4 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:48 AM, bdalexander

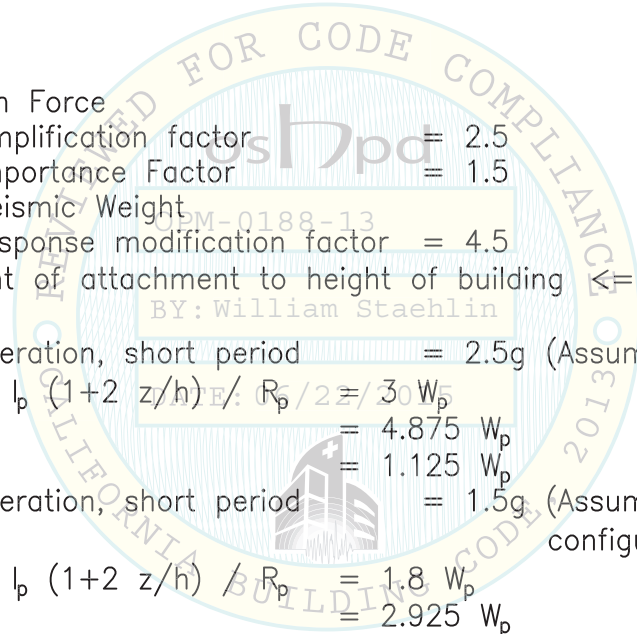
- a. Fabrication and erection of structural steel shall be in accordance with the "Specifications for Structural Steel Buildings" ANSI/AISC 360-10.
- b. Materials:
 - i. Structural steel channels & angles: ASTM A36 (Fy=36ksi)
 - ii. All other shapes & plates: ASTM A572 Grade 50 U.O.N.
 - iii. Structural steel pipes: ASTM A53B Grade B (Fy=35ksi)
- c. Bolt holes in steel shall be 1/16 inch larger diameter than nominal size of bolt used, unless otherwise noted.
- d. For bolted connections, provide 1-1/2 inch edge and end distance, unless otherwise noted.

DESIGN PARAMETERS

- 1. Design and installation of the vertical and lateral supports shall conform to 2013 CBC Sections 1613A/1616A.

DESIGN CRITERIA

- F_p = Seismic Design Force
- a_p = Component amplification factor = 2.5
- I_p = Component Importance Factor = 1.5
- W_p = Component Seismic Weight
- R_p = Component response modification factor = 4.5
- z/h = Ratio of height of attachment to height of building ≤ 1.0
- Ω_0 = 2.5
- S_{DS} = Spectral Acceleration, short period = 2.5g (Assumed)
- $F_p = 0.4 a_p S_{DS} W_p I_p (1+2 z/h) / R_p = 3.0 W_p$
- $F_{p,max} = 1.3 S_{DS} I_p W_p = 4.875 W_p$
- $F_{p,min} = 0.3 S_{DS} I_p W_p = 1.125 W_p$
- S_{DS} = Spectral Acceleration, short period = 1.5g (Assumed, for overhead patient lift configurations with lash brace)
- $F_p = 0.4 a_p S_{DS} W_p I_p (1+2 z/h) / R_p = 1.8 W_p$
- $F_{p,max} = 1.3 S_{DS} I_p W_p = 2.925 W_p$
- $F_{p,min} = 0.3 S_{DS} I_p W_p = 0.675 W_p$



I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:53 AM, bdalexander

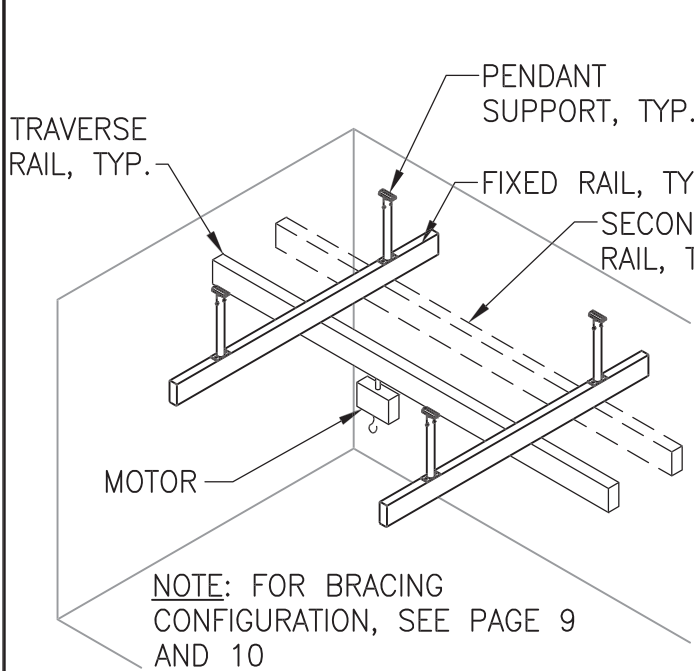
Sheet Title: GENERAL NOTES

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

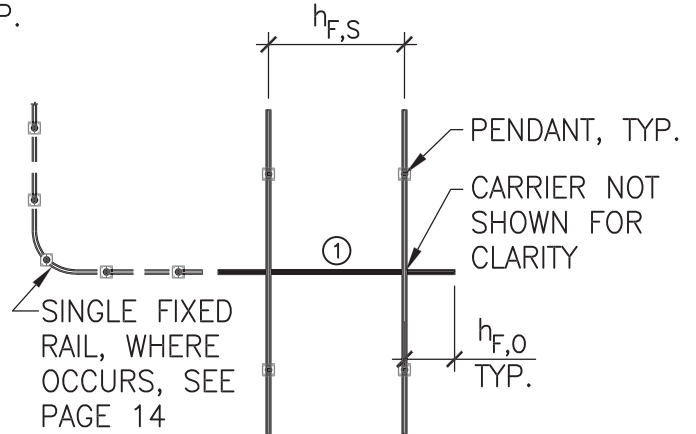
Scale: NONE	Date: 05/01/15	Page No.: 5 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:48:58 AM, bdalexander



ISOMETRIC
4 PENDANT

- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440#
- (EACH TRAVERSE RAIL) 507#
- 550#
- 600#
- 800#

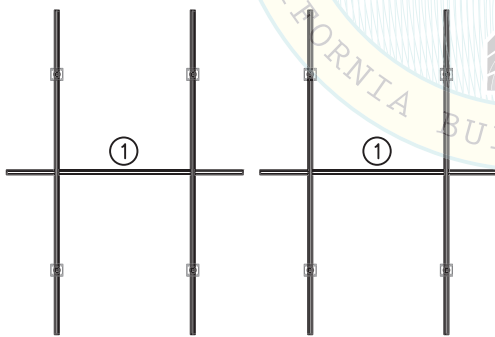


4 PENDANT SYSTEM WITH 1 TRAVERSE RAIL

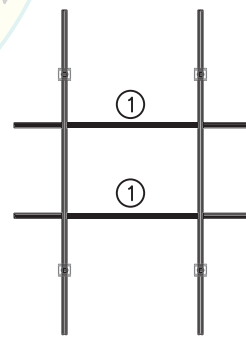
- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440#
- (EACH TRAVERSE RAIL) 507#
- 550#
- 600#
- 800#

- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440#
- (EACH TRAVERSE RAIL) 507#
- 550#
- 600#

OPM-0188-13
BY: William Staehlin
DATE: 06/22/2015



4 PENDANT SYSTEM + 4 PENDANT SYSTEM



4 PENDANT SYSTEM WITH 2 TRAVERSE RAILS

Sheet Title:

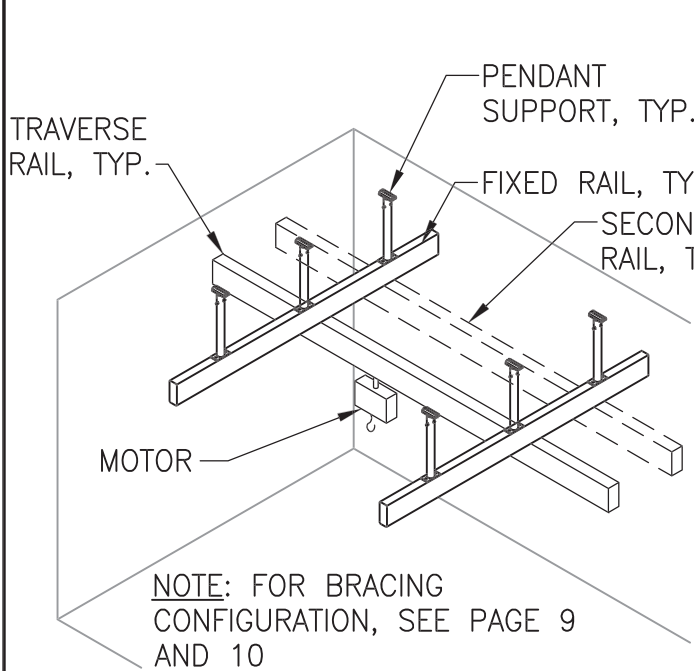
4 PENDANT TRAVERSE SYSTEM

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

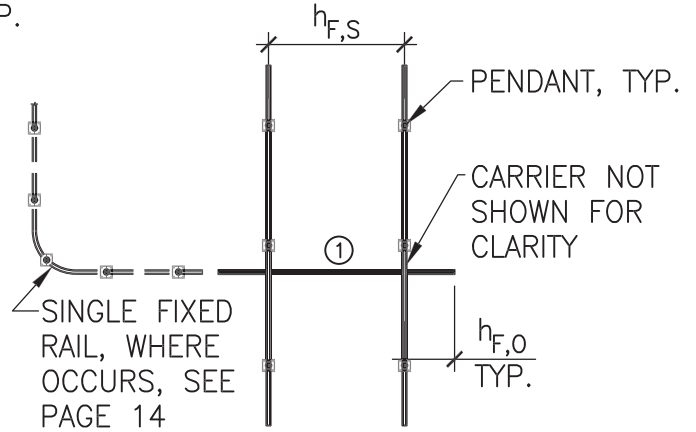
Hill-Rom **Liko**

Scale: NONE	Date: 05/01/15	Page No.: 6 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:03 AM, bdalexander



- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440# (EACH TRAVERSE RAIL) 507# 550# 600# 800#

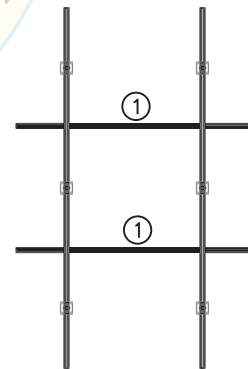
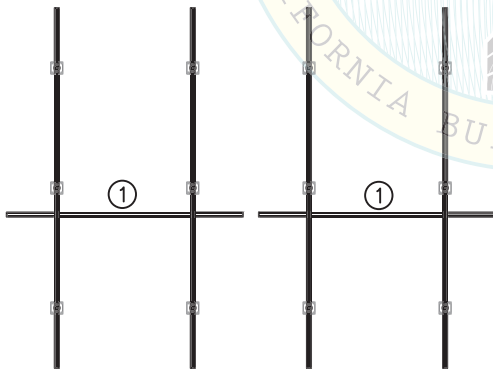
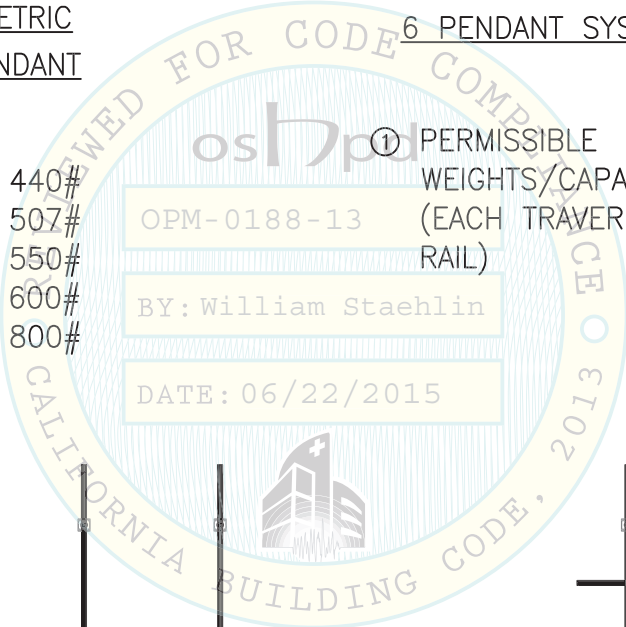


ISOMETRIC
6 PENDANT

6 PENDANT SYSTEM WITH 1 TRAVERSE RAIL

- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440# (EACH TRAVERSE RAIL) 507# 550# 600# 800#

- ① PERMISSIBLE WEIGHTS/CAPACITIES: 440# (EACH TRAVERSE RAIL) 507# 550# 600#



6 PENDANT SYSTEM + 6 PENDANT SYSTEM

6 PENDANT SYSTEM WITH 2 TRAVERSE RAILS

Sheet Title:

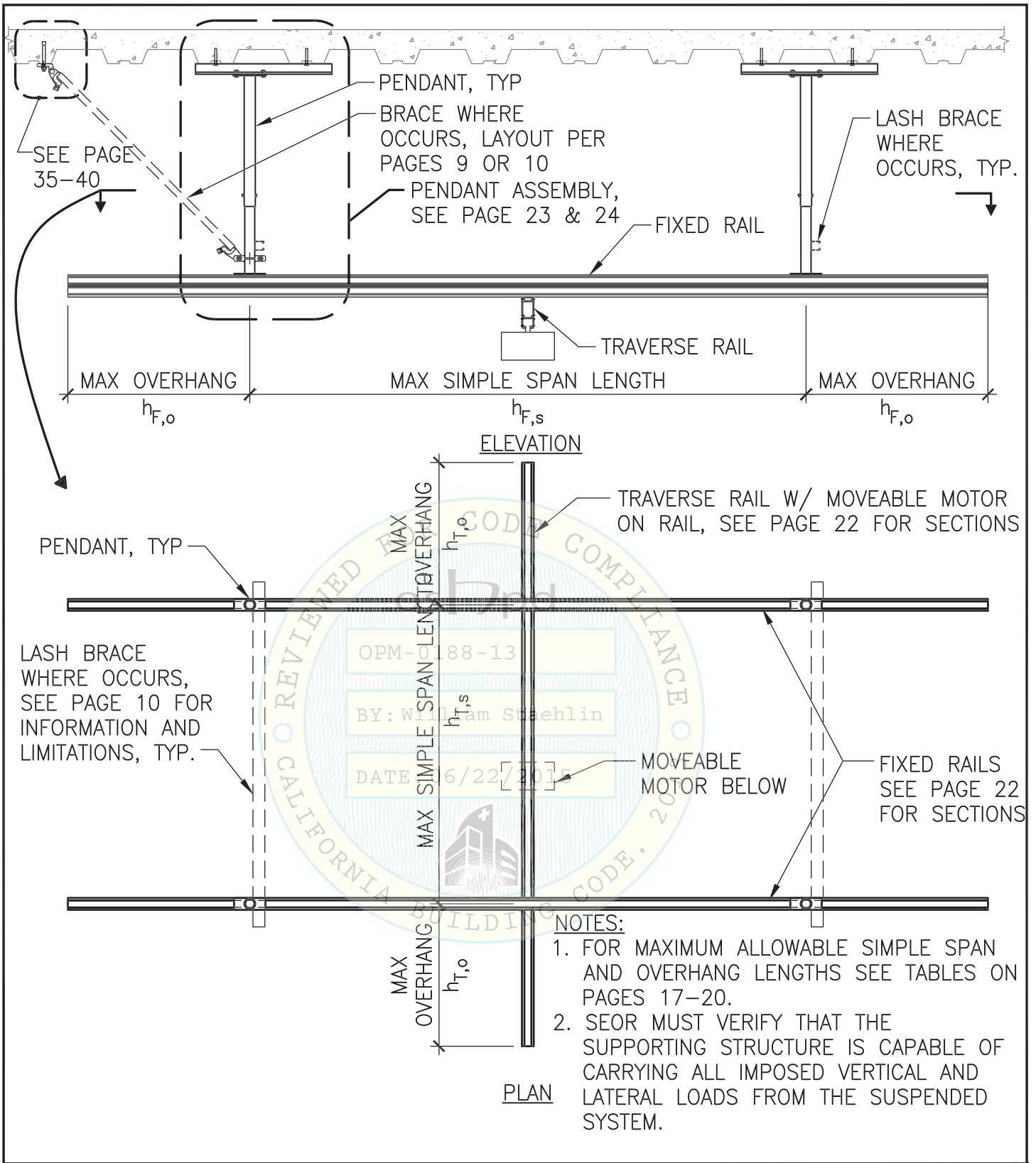
6 PENDANT TRAVERSE SYSTEM

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 7 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:08 AM, bdalexander



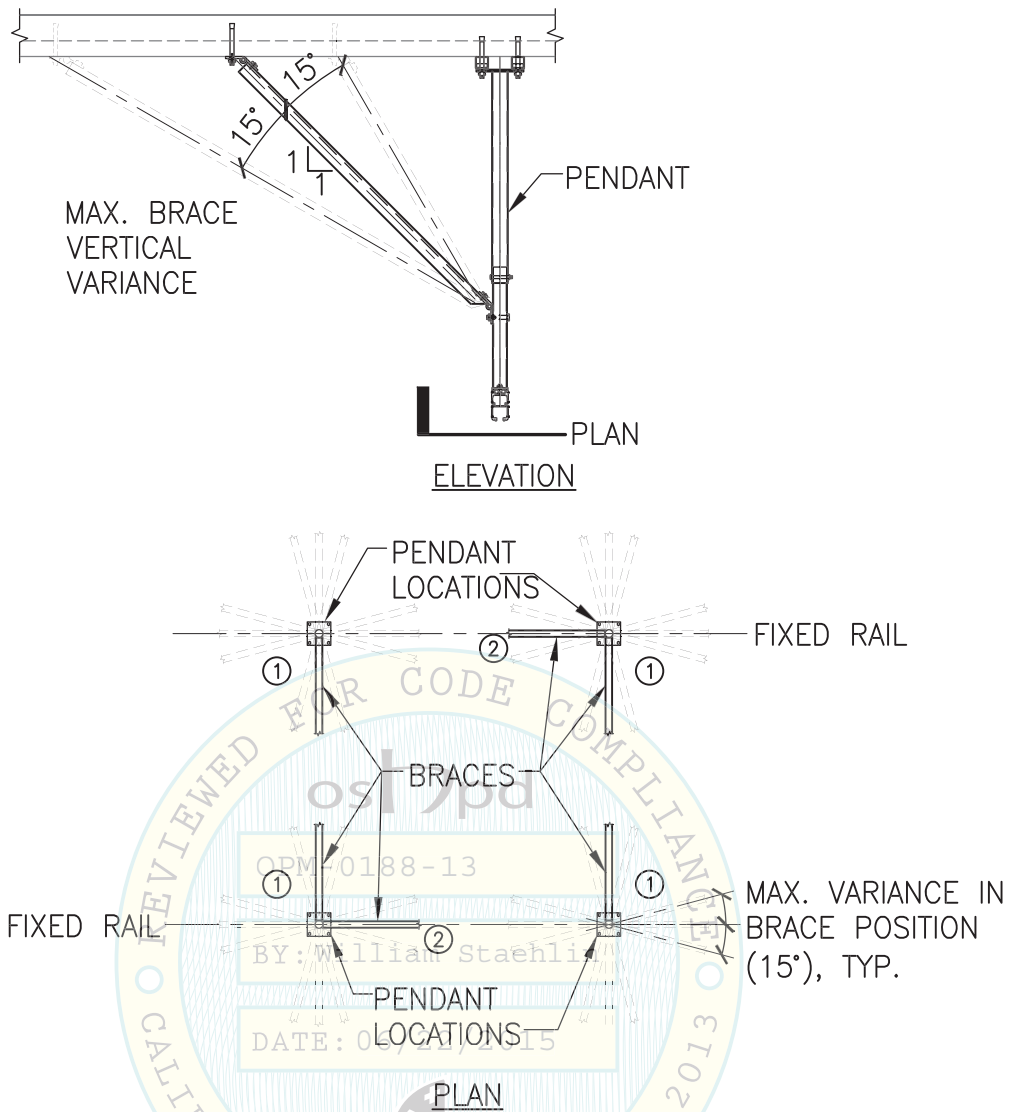
- NOTES:**
1. FOR MAXIMUM ALLOWABLE SIMPLE SPAN AND OVERHANG LENGTHS SEE TABLES ON PAGES 17-20.
 2. SEOR MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE SUSPENDED SYSTEM.

Sheet Title: **SPAN & OVERHANG FOR 4 PENDANT TRAVERSE SYSTEM**

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 8 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528



POSSIBLE LAYOUT FOR A FOUR (4) PENDANT MOUNTED OVERHEAD PATIENT LIFT SYSTEM.

1. A BRACE MUST BE ATTACHED TO EACH PENDANT TO PREVENT LATERAL MOVEMENT PERPENDICULAR TO THE RAIL AND TO KEEP RAILS PARALLEL.
2. A BRACE MUST BE ATTACHED TO ONE OF TWO PENDANTS TO PREVENT LATERAL MOVEMENT PARALLEL TO RAIL.

POSSIBLE BRACE LOCATIONS ARE SHOWN, BALANCE OCCURS PER LIMITS 1 AND 2 ABOVE. SPECIFIC LAYOUT OF BRACES SHOWN ON ROOM PLANS FOR SPECIFIC PROJECTS.

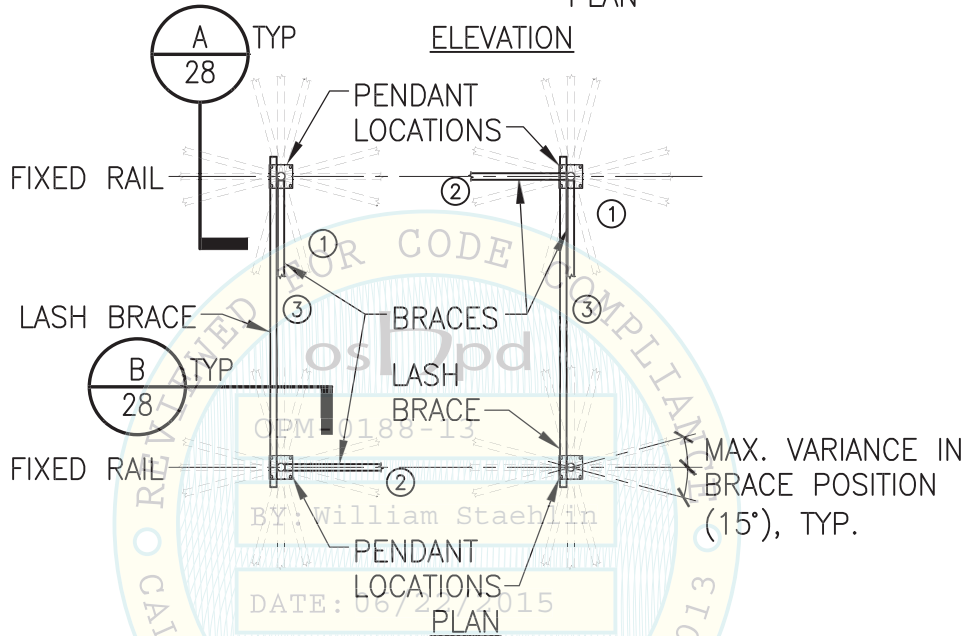
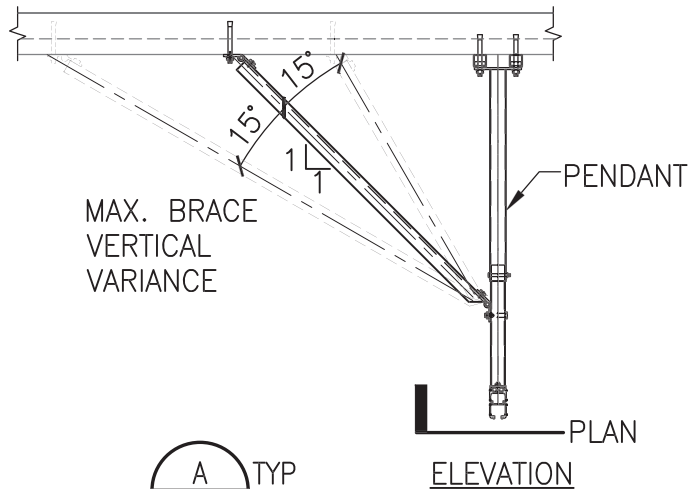
Sheet Title: BRACING LAYOUT AND VARIANCE ALLOWANCES 4 PENDANT TRAVERSE SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 9 of 76
-----------------	-------------------	----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--



ALTERNATE:

POSSIBLE LAYOUT FOR BRACE SUPPORTS FOR A FOUR (4) PENDANT MOUNTED OVERHEAD PATIENT LIFT SYSTEMS WITH LASH BRACES.

1. A BRACE MUST BE ATTACHED TO EACH PENDANT TO PREVENT LATERAL MOVEMENT PERPENDICULAR TO THE RAIL AND TO KEEP RAILS PARALLEL. REFER TO PAGE 23 FOR DETAIL.
2. A BRACE MUST BE ATTACHED TO ONE OF TWO SUPPORT PENDANTS TO PREVENT LATERAL MOVEMENT PARALLEL TO RAIL. REFER TO PAGE 24 FOR DETAIL.
3. IF, OBSTRUCTIONS PREVENT INSTALLATION AT ONE BRACE AS DESCRIBED ON PAGE 9, A LASH RAIL MAY BE PLACED BETWEEN PENDANTS. AT LEAST ONE BRACE SUPPORT NEEDS TO BE IN PLACE AS DESCRIBED IN ITEM 1 ABOVE.

NOTE: IF LASH BRACE IS USED, S_{ps} FOR THE SYSTEM DESIGN IS LIMITED TO 1.5g. FOR $S_{ps} > 1.5g$, BRACE LAYOUT PER PAGE 9 IS REQUIRED. POSSIBLE BRACE LOCATIONS ARE SHOWN, BALANCE OCCURS PER LIMITS 1,2 AND 3 ABOVE. SPECIFIC LAYOUT OF BRACES SHOWN ON ROOM PLANS FOR SPECIFIC PROJECTS.

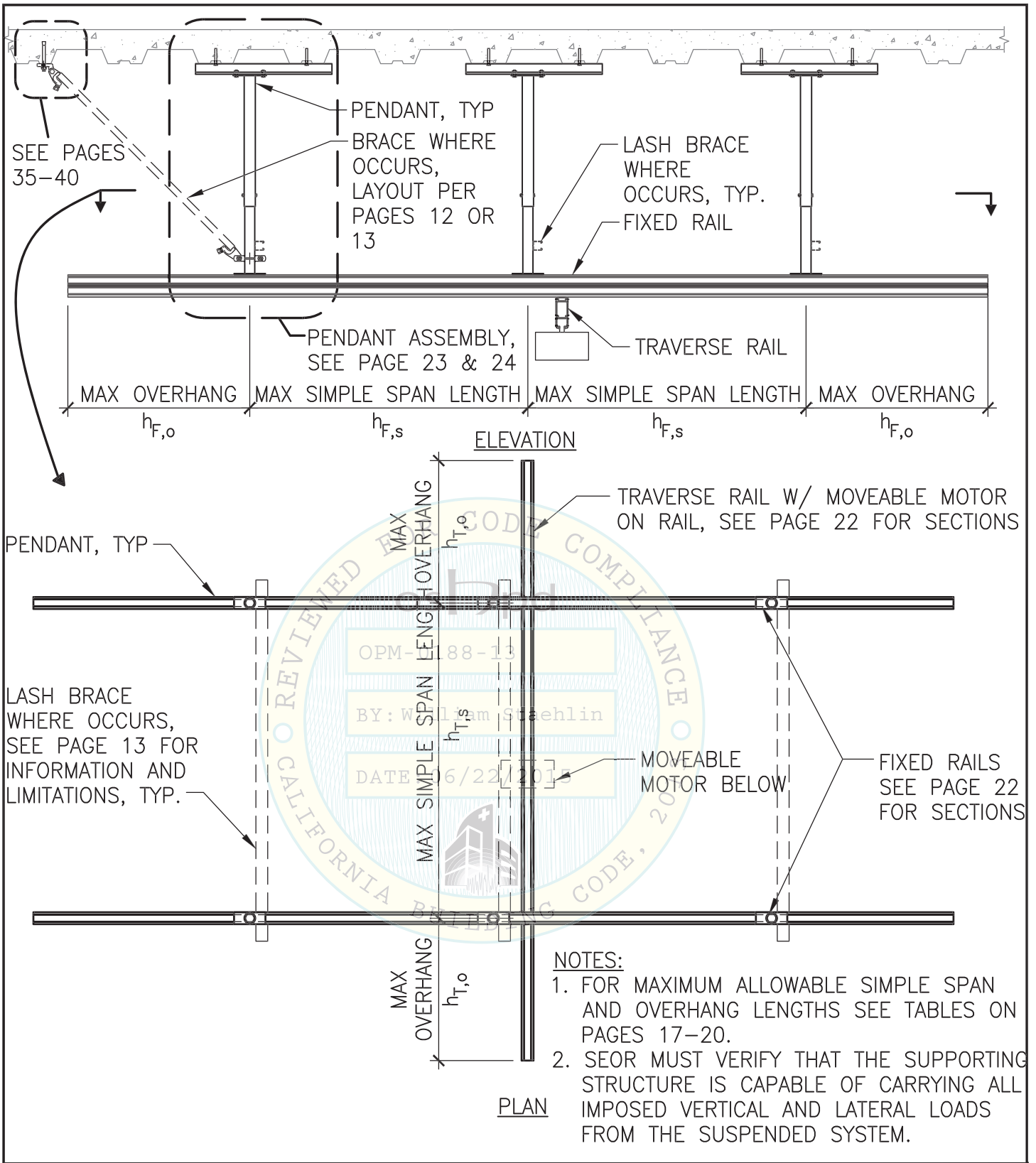
Sheet Title: BRACING (W/ LASH) LAYOUT AND VARIANCE ALLOWANCES 4 PENDANT TRAVERSE SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 10 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:23 AM, bdalexander



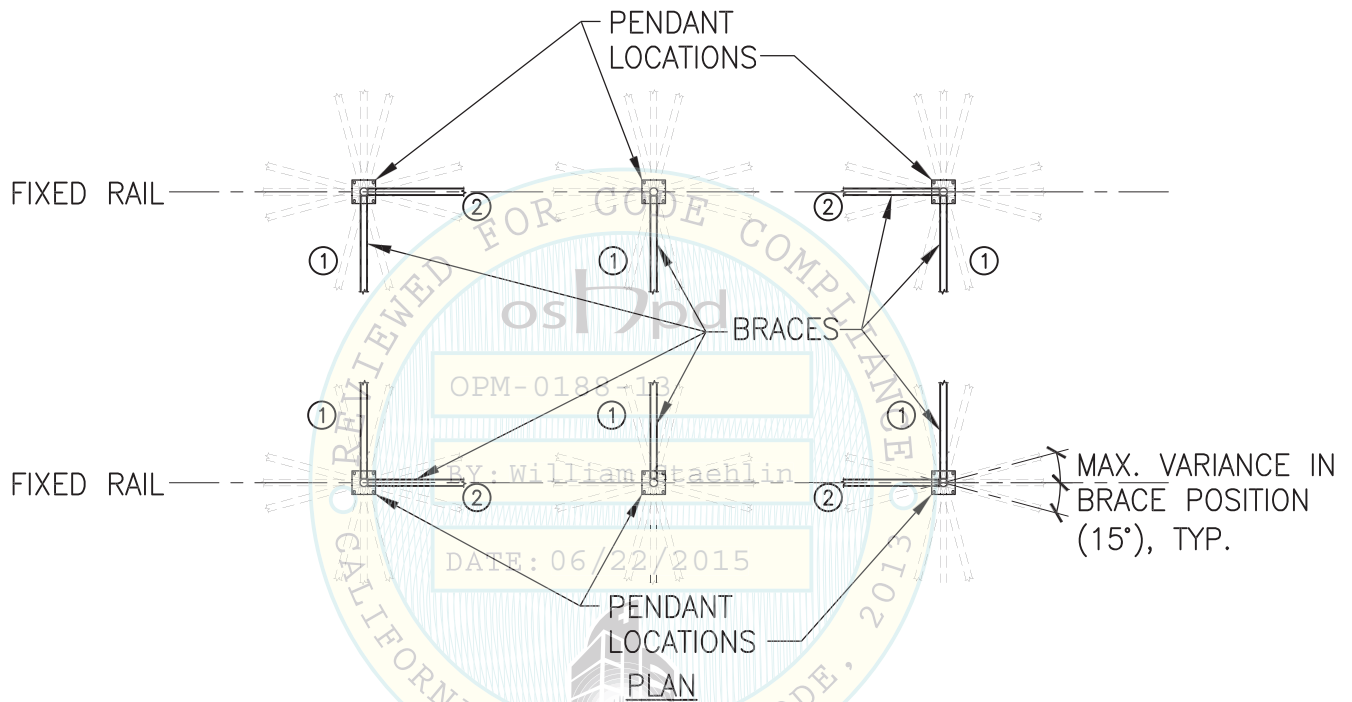
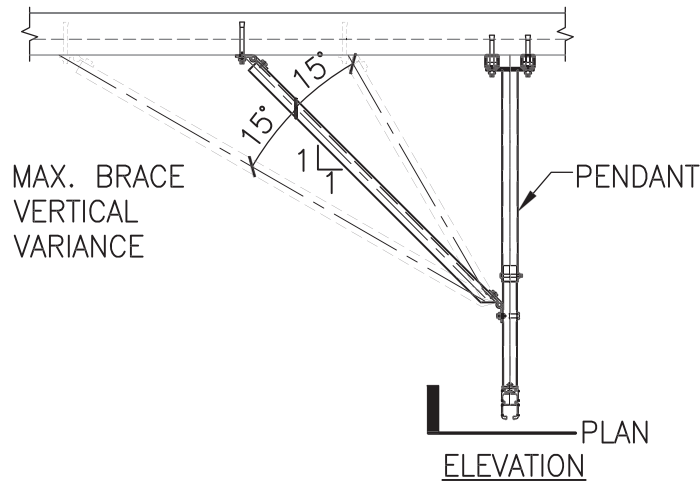
- NOTES:**
1. FOR MAXIMUM ALLOWABLE SIMPLE SPAN AND OVERHANG LENGTHS SEE TABLES ON PAGES 17-20.
 2. SEOR MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE SUSPENDED SYSTEM.

Sheet Title: **SPAN & OVERHANG FOR 6 PENDANT TRAVERSE SYSTEM**

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 11 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528



POSSIBLE LAYOUT FOR A SIX (6) PENDANT MOUNTED OVERHEAD PATIENT LIFT SYSTEM.

1. A BRACE MUST BE ATTACHED TO EACH PENDANT TO PREVENT LATERAL MOVEMENT PERPENDICULAR TO THE RAIL AND TO KEEP RAILS PARALLEL.
2. A BRACE MUST BE ATTACHED TO ONE OF TWO PENDANTS TO PREVENT LATERAL MOVEMENT PARALLEL TO RAIL.

POSSIBLE BRACE LOCATIONS ARE SHOWN, BALANCE OCCURS PER LIMITS 1 AND 2 ABOVE. SPECIFIC LAYOUT OF BRACES SHOWN ON ROOM PLANS FOR SPECIFIC PROJECT.

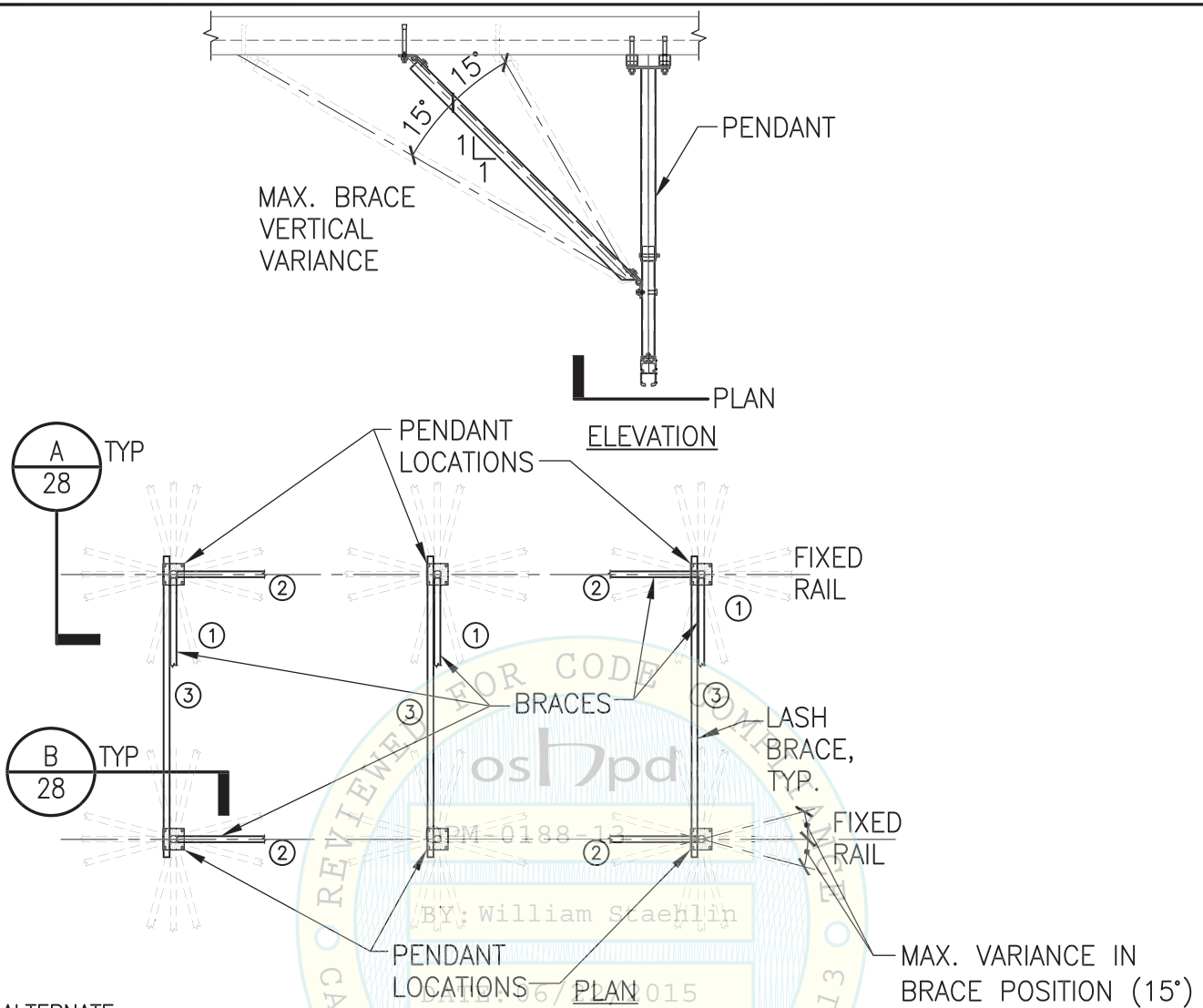
Sheet Title: BRACING LAYOUT AND VARIANCE ALLOWANCES 6 PENDANT TRAVERSE SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 12 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:33 AM, bdalexander



ALTERNATE:

POSSIBLE LAYOUT FOR BRACE SUPPORTS FOR A SIX (6) PENDANT MOUNTED OVERHEAD PATIENT LIFT SYSTEMS WITH LASH BRACES.

1. A BRACE MUST BE ATTACHED TO EACH PENDANT TO PREVENT LATERAL MOVEMENT PERPENDICULAR TO THE RAIL AND TO KEEP RAILS PARALLEL. REFER TO PAGE 23 FOR DETAIL.
2. A BRACE MUST BE ATTACHED TO ONE OF TWO SUPPORT PENDANTS TO PREVENT LATERAL MOVEMENT PARALLEL TO RAIL. REFER TO PAGE 24 FOR DETAIL.
3. IF OBSTRUCTIONS PREVENT INSTALLATION AT ONE BRACE AS DESCRIBED ON PAGE 12, A LASH RAIL MAY BE PLACED BETWEEN PENDANTS. AT LEAST ONE BRACE SUPPORT NEEDS TO BE IN PLACE AS DESCRIBED IN ITEM 1 ABOVE.

NOTE: IF LASH BRACE IS USED, S_{DS} FOR THE SYSTEM DESIGN IS LIMITED TO 1.5g. FOR $S_{DS} > 1.5g$. BRACE LAYOUT PER PAGE 12 IS REQUIRED. POSSIBLE BRACE LOCATIONS ARE SHOWN, BALANCE OCCURS PER LIMITS 1, 2 AND 3 ABOVE. SPECIFIC LAYOUT OF BRACES SHOWN ON ROOM PLANS FOR SPECIFIC PROJECT.

Sheet Title: BRACING (W/ LASH) LAYOUT AND VARIANCE ALLOWANCES 6 PENDANT TRAVERSE SYSTEM

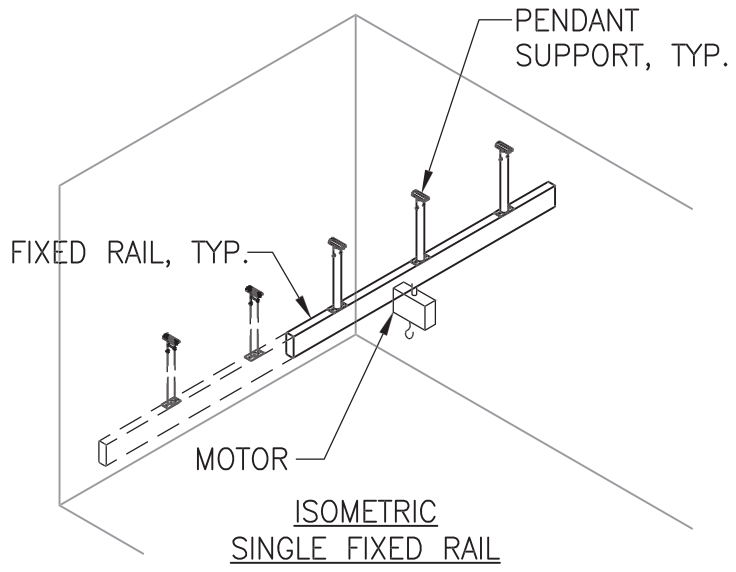
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

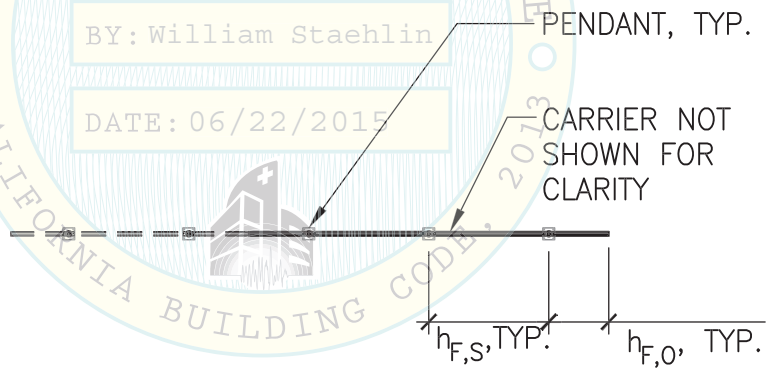
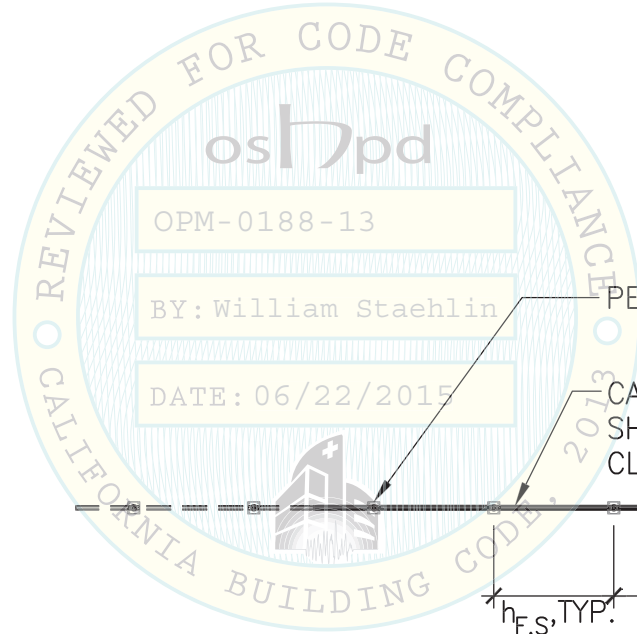
Scale: N.T.S.	Date: 05/01/15	Page No.: 13 of 76
------------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:38 AM, bdalexander



NOTE: FOR BRACING CONFIGURATION, SEE PAGE 16



NOTE: LENGTH SHOWN IS NON-DIMENSIONAL. SINGLE FIXED RAILS CAN BE SUPPORTED BY MANY PENDANTS AND CAN ALSO BE CURVED.

SINGLE FIXED RAIL

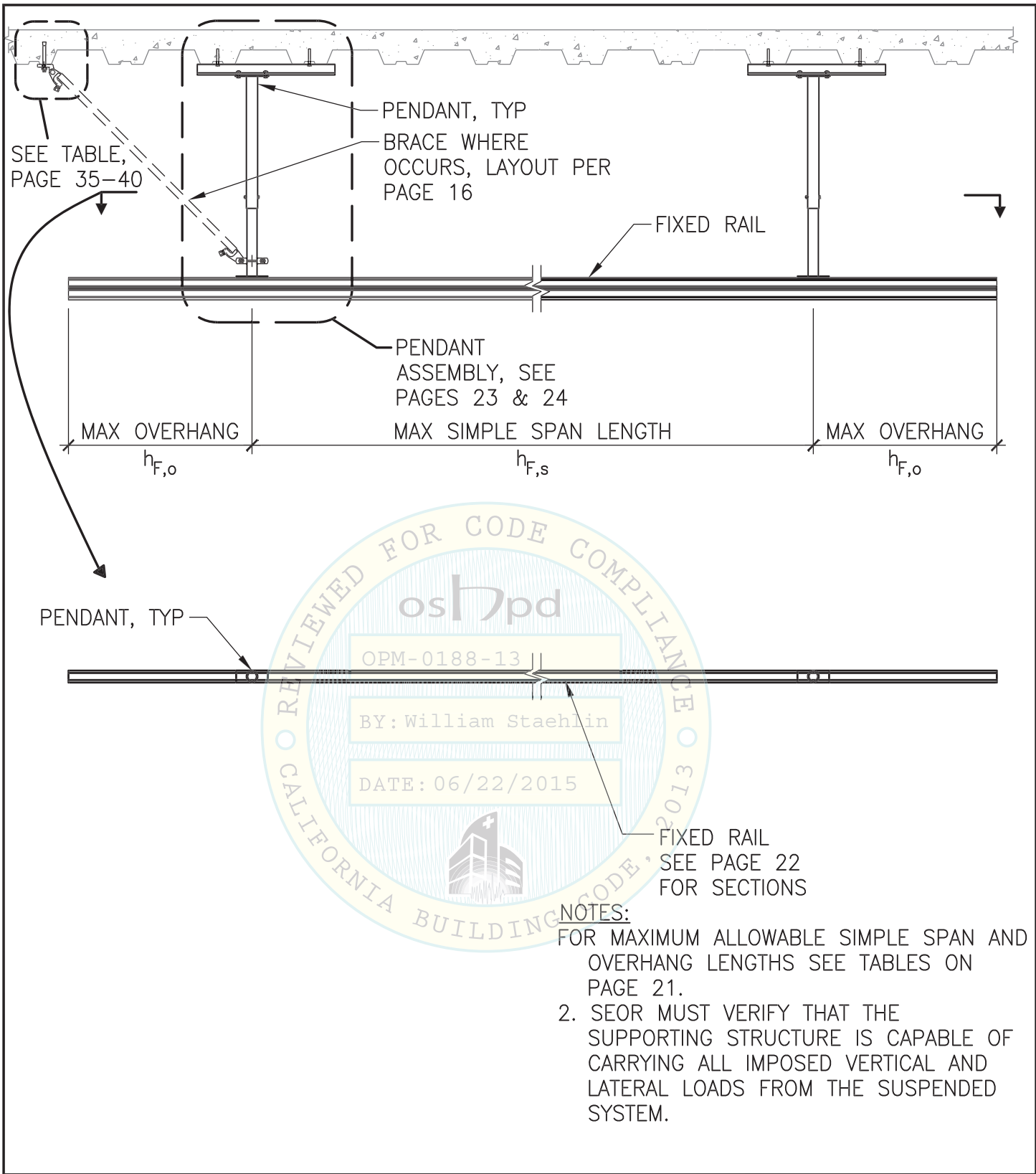
Sheet Title: SINGLE RAIL SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 14 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:43 AM, bdalexander



Sheet Title: SPAN & OVERHANG LENGTH FOR SINGLE RAIL SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc.
 100 Pine Street, Suite 1600
 San Francisco, California 94111
 415.495.3700
 fax: 415.495.3550
 www.sgh.com

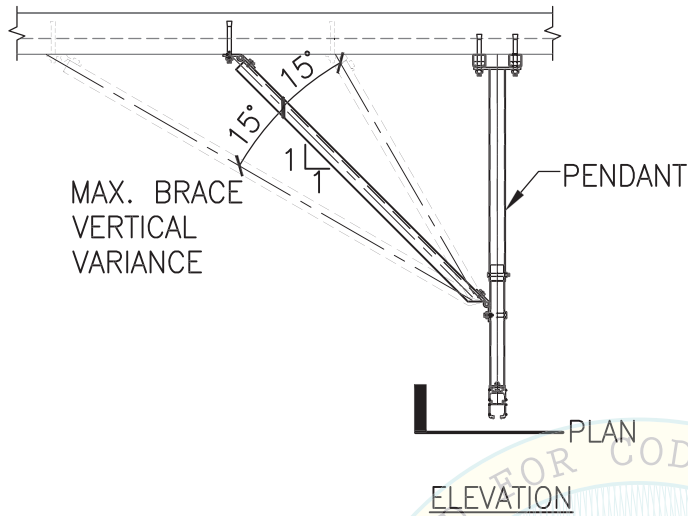
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 15 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

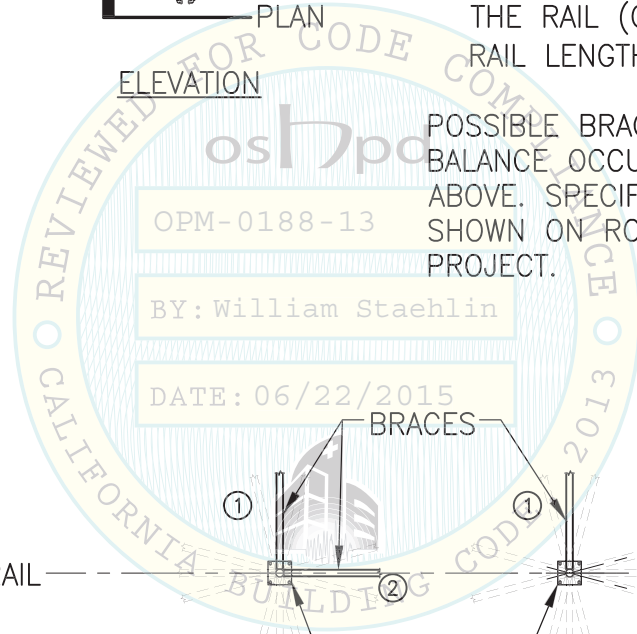
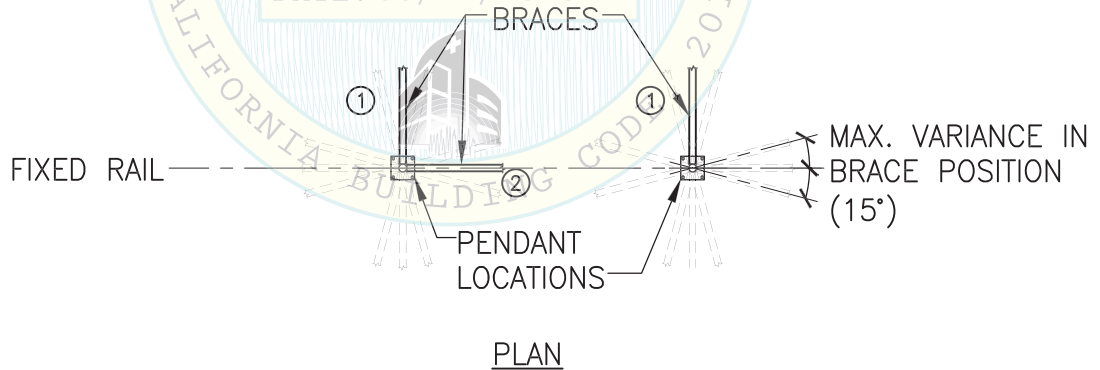
I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:48 AM, bdalexander

POSSIBLE LAYOUT FOR SIDE SUPPORTS FOR A PENDANT MOUNTED OVERHEAD SINGLE RAIL PATIENT LIFT SYSTEM.

1. A BRACE MUST BE ATTACHED TO AT LEAST EVERY SECOND PENDANT TO PREVENT LATERAL MOVEMENT PERPENDICULAR TO THE RAIL. REFER TO PAGE 23 FOR DETAIL.
2. A BRACE MUST BE ATTACHED TO ONE PENDANT TO PREVENT LATERAL MOVEMENT PARALLEL TO THE RAIL. REFER TO PAGE 24 FOR DETAIL.
3. CURVED SINGLE RAILS MUST HAVE AT LEAST 3 BRACES PERPENDICULAR TO THE RAIL AND 2 BRACES PARALLEL TO THE RAIL (ONE AT EACH END OF THE RAIL LENGTH).



POSSIBLE BRACE LOCATIONS ARE SHOWN, BALANCE OCCURS PER LIMITS 1 AND 2 ABOVE. SPECIFIC LAYOUT OF BRACES SHOWN ON ROOM PLANS FOR SPECIFIC PROJECT.



Sheet Title: BRACING LAYOUT AND VARIANCE ALLOWANCES – SINGLE RAIL SYSTEM

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 16 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:49:53 AM, bdalexander

MAXIMUM ALLOWABLE OVERHANG LENGTH ($h_{f,o}$) OF THE <u>FIXED RAIL</u> , INCHES									PENDANT TOP PLATE DETAIL	
MOTOR CAPACITY	FIXED RAIL	TRAVERSE RAIL							$S_{DS} \leq 1.5g$	$S_{DS} \leq 2.5g$
		H70	H70w30mm	H70w50mm	H70w100mm	H100	H140	H160		
440 lb	H100	18	17	17	17	17	17	17	①	①
	H140	30	27	27	27	29	28	27	①	①
	H160	39	37	36	36	38	37	36	①	①
507 lb	H100	17	17	17	17	17	17	17	①	①
	H140	26	26	25	25	26	26	25	①	①
	H160	35	33	32	32	35	34	32	①	①
550 lb	H100	17	17	17	16	17	17	17	①	①
	H140	26	26	25	25	26	26	25	①	①
	H160	32	31	30	30	33	32	31	①	①
600 lb	H100	17	17	16	16	17	17	16	①	①
	H140	26	25	25	25	26	26	25	①	①
	H160	31	31	30	30	31	31	31	①	①
800 lb	H100	15	14	14	14	15	14	14	①	①
	H140	24	23	23	23	24	24	24	①	①
	H160	29	29	29	29	29	29	29	①	①
880 lb	H100	13	13	13	13	13	13	13	①	①
	H140	22	21	21	21	22	21	21	①	①
	H160	27	26	26	26	27	26	26	①	①
1014 lb	H100	12	11	11	11	11	11	11	②	②
	H140	19	19	19	19	19	19	19	②	②
	H160	23	23	23	22	23	23	23	②	②
1100 lb	H100	11	10	10	10	10	10	10	②	②
	H140	18	18	18	18	18	18	18	②	②
	H160	21	21	21	21	21	21	21	②	②
1200 lb	H100	10	9	9	9	9	9	9	②	②
	H140	17	16	16	16	16	16	16	②	②
	H160	19	19	19	19	19	19	19	②	②


NOTES:

- ① 2-BOLT OR 4-BOLT TOP PLATE PERMISSIBLE
- ② ONLY 4-BOLT TOP PLATE PERMISSIBLE

Sheet Title:

ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 

Scale: N.T.S. Date: 05/01/15 Page No.: 17 of 76
 OPM-0188-13
 Kevin S. Moore, SE
 California SE No. 4528

MAXIMUM ALLOWABLE SIMPLE SPAN LENGTH ($h_{f,s}$) OF THE FIXED RAIL, INCHES

MOTOR CAPACITY	FIXED RAIL	TRAVERSE RAIL						
		H70	H70w30mm	H70w50mm	H70w100mm	H100	H140	H160
440 lb	H100	106	103	102	101	105	103	103
	H140	158	159	159	159	159	159	159
	H160	169	169	169	169	169	169	169
	H180	291	279	278	277	287	282	279
507 lb	H100	94	91	91	90	93	91	91
	H140	153	149	148	146	152	149	149
	H160	169	169	169	169	169	169	169
	H180	291	279	278	277	287	282	279
550 lb	H100	87	84	84	83	86	84	84
	H140	142	138	137	136	140	138	138
	H160	169	167	166	164	169	167	166
	H180	265	260	256	254	266	263	257
600 lb	H100	79	77	77	76	79	78	77
	H140	131	128	127	126	130	128	128
	H160	157	153	153	152	156	154	153
	H180	254	253	249	246	255	254	250
800 lb	H100	61	59	59	59	60	59	59
	H140	100	97	97	97	99	98	98
	H160	120	118	118	117	120	119	118
	H180	216	214	213	210	216	215	214
880 lb	H100	56	55	55	54	56	55	55
	H140	92	90	90	89	91	90	90
	H160	111	109	108	107	110	109	108
	H180	200	197	196	193	198	196	195
1014 lb	H100	49	48	47	47	48	48	48
	H140	80	78	78	77	79	79	78
	H160	96	95	95	94	95	95	95
	H180	175	172	172	171	173	173	172
1100 lb	H100	45	44	44	43	44	44	44
	H140	75	73	73	72	74	73	73
	H160	90	88	88	87	89	88	88
	H180	163	160	160	158	161	160	160
1200 lb	H100	41	40	40	40	40	40	40
	H140	68	67	67	66	67	67	67
	H160	82	81	80	80	81	81	81
	H180	149	148	147	146	148	147	147

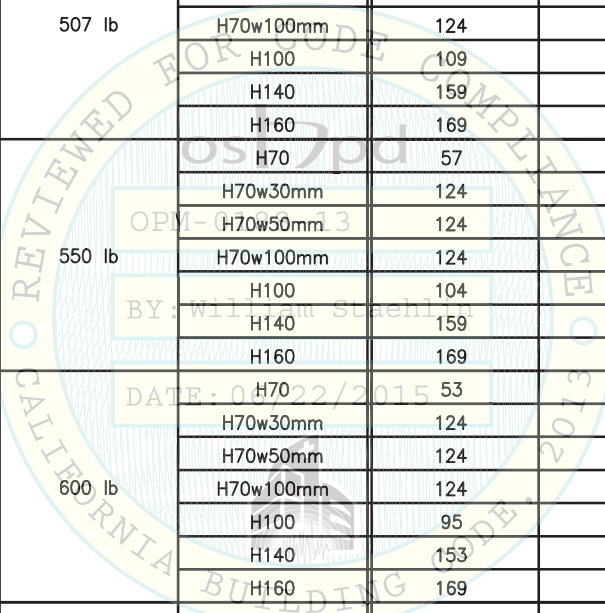
Sheet Title:

ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com


Scale: N.T.S. Date: 05/01/15 Page No.: 18 of 76
 OPM-0188-13
 Kevin S. Moore, SE
 California SE No. 4528

MAXIMUM ALLOWABLE SIMPLE SPAN ($h_{T,s}$) AND OVERHANG ($h_{T,o}$) LENGTHS OF THE TRAVERSE RAIL, INCHES			
MOTOR CAPACITY	TRAVERSE RAIL	$h_{T,s}$ (in)	$h_{T,o}$ (in)
440 lb	H70	71	11
	H70w30mm	124	29
	H70w50mm	124	30
	H70w100mm	124	30
	H100	109	20
	H140	159	35
	H160	169	41
507 lb	H70	62	11
	H70w30mm	124	25
	H70w50mm	124	30
	H70w100mm	124	30
	H100	109	19
	H140	159	31
	H160	169	40
550 lb	H70	57	11
	H70w30mm	124	24
	H70w50mm	124	29
	H70w100mm	124	30
	H100	104	18
	H140	159	29
	H160	169	38
600 lb	H70	53	11
	H70w30mm	124	22
	H70w50mm	124	26
	H70w100mm	124	30
	H100	95	18
	H140	153	27
	H160	169	36
800 lb	H70	38	9
	H70w30mm	110	19
	H70w50mm	123	20
	H70w100mm	124	30
	H100	73	17
	H140	117	26
	H160	141	32



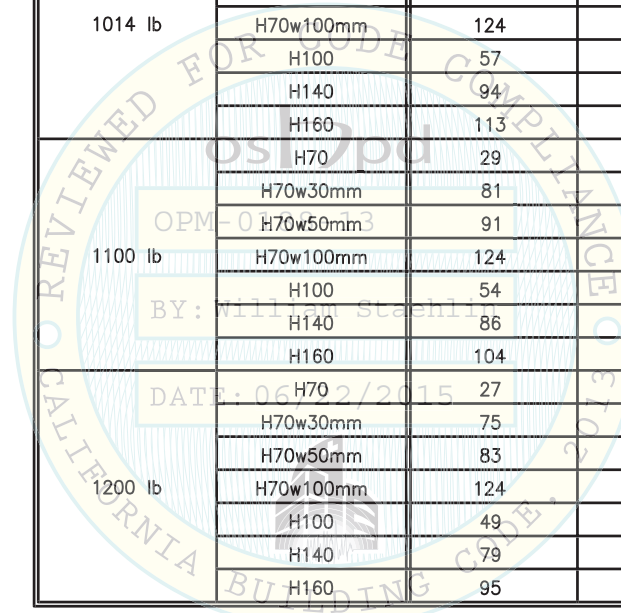
Sheet Title: ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 


Scale: N.T.S	Date: 05/01/15	Page No.: 19 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

MAXIMUM ALLOWABLE SIMPLE SPAN ($h_{T,s}$) AND OVERHANG ($h_{T,o}$) LENGTHS OF THE TRAVERSE RAIL, INCHES			
MOTOR CAPACITY	TRAVERSE RAIL	$h_{T,s}$ (in)	$h_{T,o}$ (in)
880 lb	H70	37	8
	H70w30mm	100	19
	H70w50mm	113	20
	H70w100mm	124	30
	H100	66	16
	H140	107	26
	H160	129	32
1014 lb	H70	32	7
	H70w30mm	88	19
	H70w50mm	98	20
	H70w100mm	124	30
	H100	57	14
	H140	94	22
	H160	113	27
1100 lb	H70	29	6
	H70w30mm	81	19
	H70w50mm	91	20
	H70w100mm	124	30
	H100	54	13
	H140	86	20
	H160	104	25
1200 lb	H70	27	6
	H70w30mm	75	18
	H70w50mm	83	19
	H70w100mm	124	30
	H100	49	12
	H140	79	19
	H160	95	23



Sheet Title: ALLOWABLE SPAN LENGTHS FOR SYSTEM WITH FIXED AND TRAVERSE RAILS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 

Scale: N.T.S	Date: 05/01/15	Page No.: 20 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:50:13 AM, bdalexander

MAXIMUM ALLOWABLE SIMPLE SPAN ($h_{F,s}$) AND OVERHANG ($h_{F,o}$) LENGTHS OF THE SINGLE FIXED RAIL, INCHES				PENDANT TOP PLATE DETAIL	
MOTOR CAPACITY	FIXED RAIL	$h_{F,s}$ (in)	$h_{F,o}$ (in)	$S_{DS} \leq 1.5g$	$S_{DS} \leq 2.5g$
440 lb	H70	71	11	①	①
	H100	109	20	①	①
	H140	159	35	①	①
	H160	169	41	①	①
	H180	291	–	N/A	N/A
507 lb	H70	62	11	①	①
	H100	109	19	①	①
	H140	159	31	①	①
	H160	169	40	①	②
	H180	291	–	N/A	N/A
550 lb	H70	57	11	①	①
	H100	104	18	①	①
	H140	159	29	①	②
	H160	169	38	①	②
	H180	286	–	N/A	N/A
600 lb	H70	53	11	①	①
	H100	95	18	①	①
	H140	153	27	①	②
	H160	169	36	①	②
	H180	277	–	N/A	N/A
800 lb	H70	38	9	①	②
	H100	73	17	①	②
	H140	117	26	①	②
	H160	141	32	①	②
	H180	246	–	N/A	N/A

NOTES:

- ① 2-BOLT OR 4-BOLT TOP PLATE PERMISSIBLE
- ② ONLY 4-BOLT TOP PLATE PERMISSIBLE

Sheet Title:

ALLOWABLE SPAN LENGTHS FOR SINGLE RAIL SYSTEM

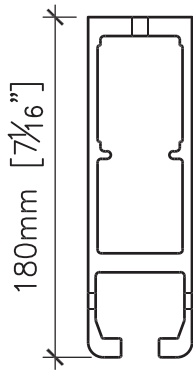
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



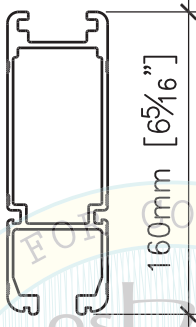
Scale: N.T.S	Date: 05/01/15	Page No.: 21 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

NOTES:

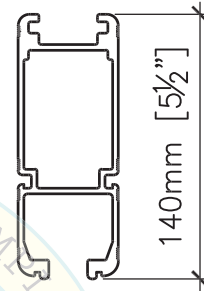
1. THE H70 SECTION CANNOT BE USED AS FIXED RAILS IN TRAVERSE SYSTEMS.
2. THE H70 WITH 30MM REINFORCING, H70 WITH 50MM REINFORCING, AND H70 WITH 100MM REINFORCING SECTIONS CANNOT BE USED AS SINGLE FIXED RAILS OR FIXED RAILS IN TRAVERSE SYSTEMS.
3. THE H180 RAIL CAN ONLY BE USED FOR WALL MOUNTED OVERHEAD LIFT SYSTEMS.



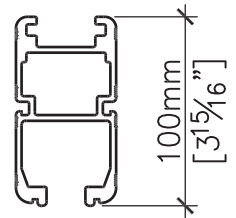
H180 RAIL



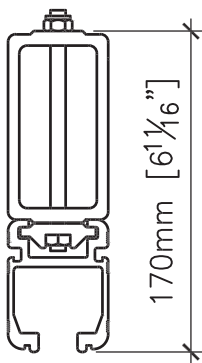
H160 RAIL



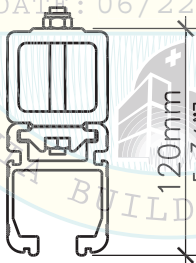
H140 RAIL



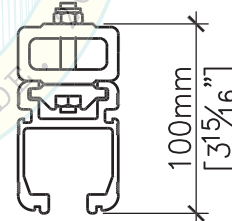
H100 RAIL



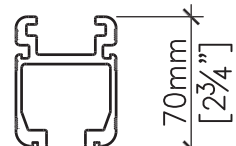
H70 RAIL C/W 100MM
REINFORCING BAR



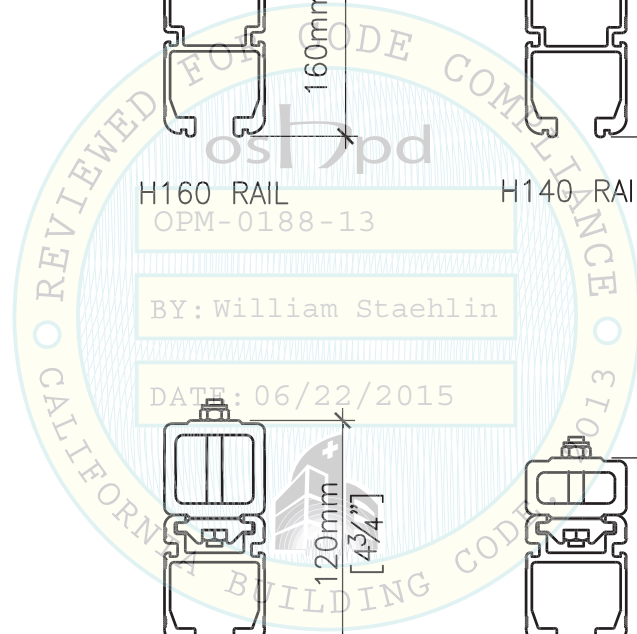
H70 RAIL C/W 50MM
REINFORCING BAR



H70 RAIL C/W 30MM
REINFORCING BAR




H70 RAIL



Sheet Title:

RAIL SECTIONS

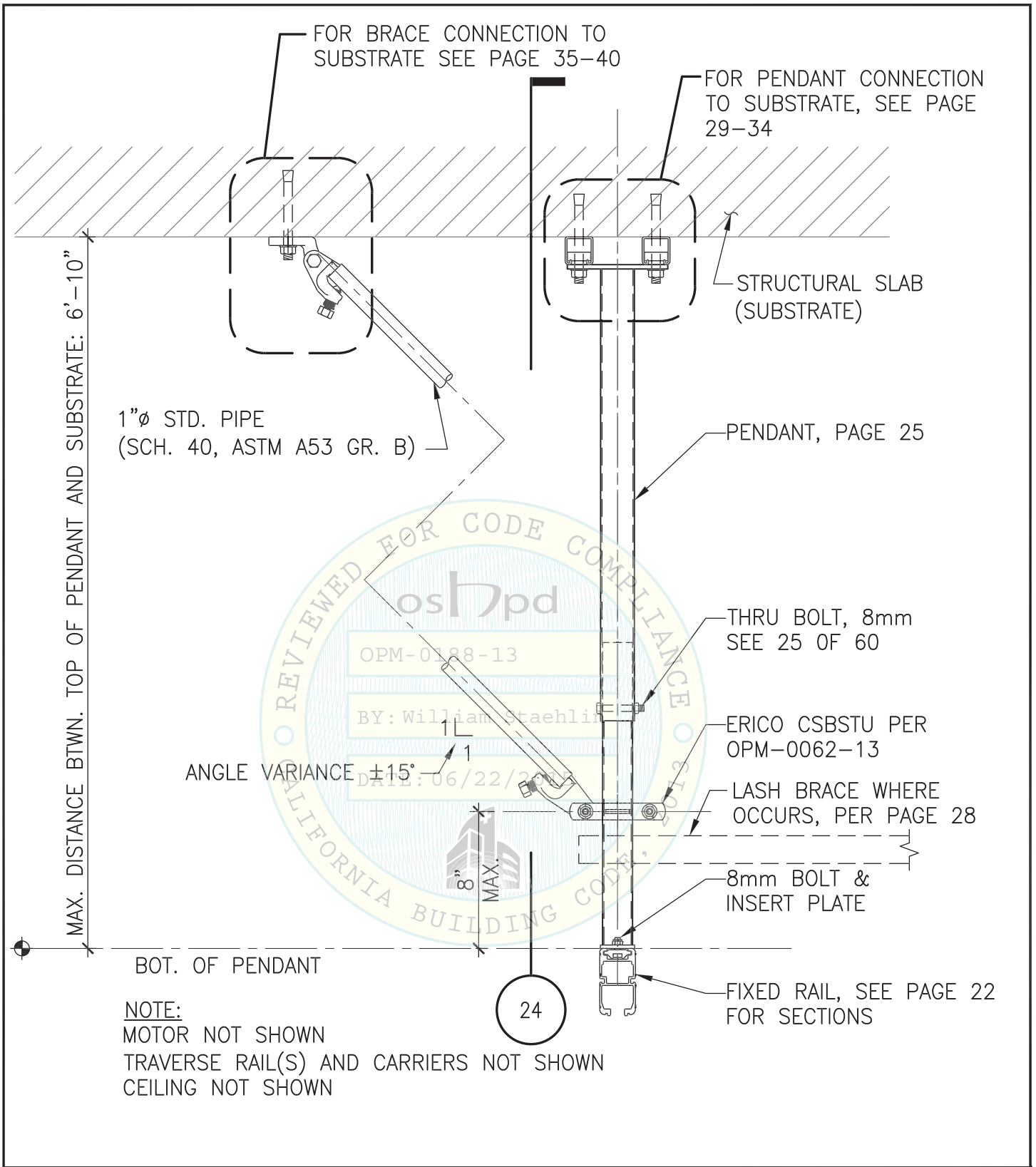
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom  **Liko**

Scale: 1 1/2" = 1'-0"	Date: 05/01/15	Page No.: 22 of 76
--------------------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:50:23 AM, bdalexander



Sheet Title: TYPICAL PENDANT & DIAGONAL BRACE – BRACE PERPENDICULAR TO FIXED RAIL

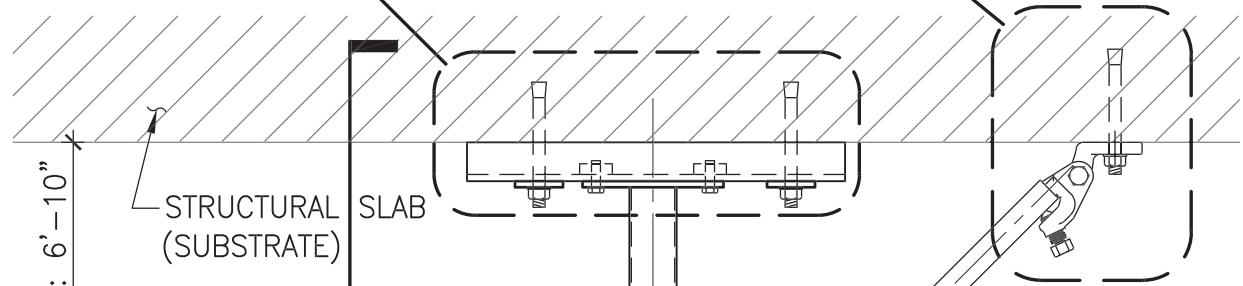
SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: 1 1/2" = 1'-0"	Date: 05/01/15	Page No.: 23 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

FOR PENDANT CONNECTION TO SUBSTRATE, SEE PAGE 29-34

FOR BRACE CONNECTION TO SUBSTRATE, SEE PAGE 35-40



MAX. DISTANCE BTWN. TOP OF PENDANT AND SUBSTRATE: 6'-10"

PENDANT, PAGE 25

1"Ø STD. PIPE (SCH. 40, ASTM A53 GR. B)

THRU BOLT, 8mm SEE 25 OF 60

ANGLE VARIANCE ±15°

ERICO CSBSTU PER OPM-0062-13

LASH BRACE WHERE OCCURS, PER PAGE 28

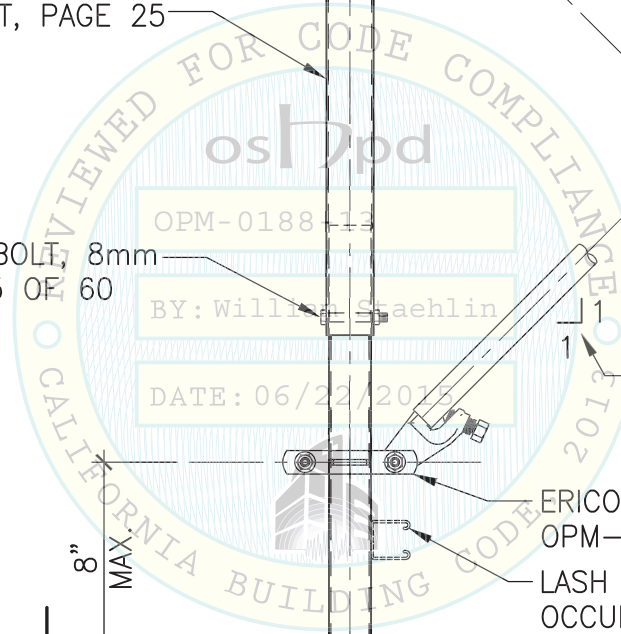
8" MAX

NOTE:
MOTOR NOT SHOWN
TRAVERSE RAIL(S) AND CARRIERS NOT SHOWN
CEILING NOT SHOWN

23

LIKO PENDANT

FIXED RAIL, SEE PAGE 22 FOR SECTIONS



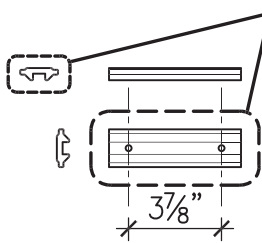
Sheet Title: TYPICAL PENDANT & DIAGONAL BRACE – BRACE PARALLEL TO FIXED RAIL

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

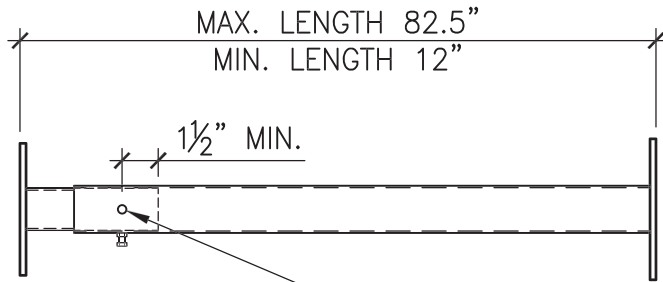
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 24 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

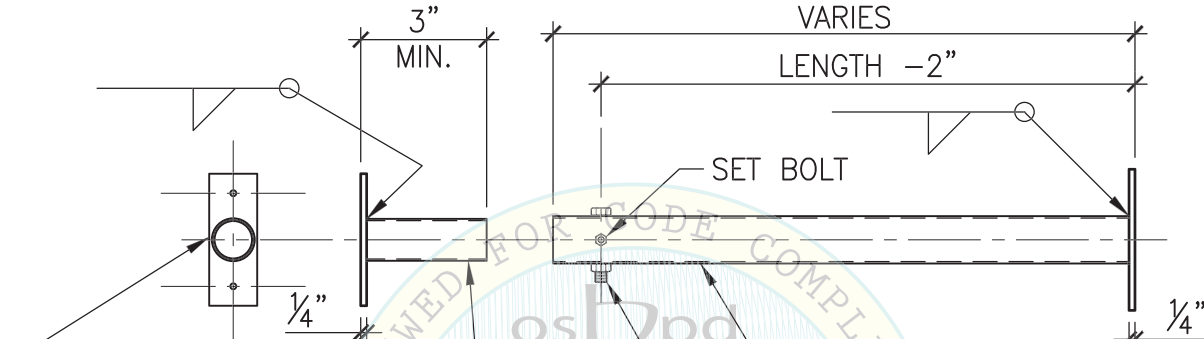
I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:50:28 AM, bdalexander



"LOCKING RAIL"
 PROPRIETARY EXTRUDED
 ALUMINUM RAIL TO PENDANT
 ATTACHMENT INSERT, SIMILAR



9mm THRU HOLE FOR A
 FIELD INSTALL M65 M8x60
 BOLT WITH NYLOC NUT



5mmx50x140 DOMEX
 240 YP TENSILE
 (KSI): [52/66 MIN.]
 YIELD (KSI): [34 MIN.]
 PAINTED WHITE TO
 PREVENT GALVANIC
 CORROSION, TYP.

REVIEWED FOR CODE COMPLIANCE
 OPM-0188-13
 BY William Staehlin
 DATE: 06/22/2015

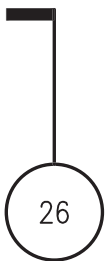
HSS50mmx2mm MIN.,
 MANUFACTURED TO SS EN10305-3
 "STANDARD MATERIAL", E220 TENSILE
 (KSI): 44 MIN. YIELD (KSI): 32 MIN.
 PAINTED WHITE.

M65 M8x60 BOLT
 W/ NYLOC NUT

HSS44.5mmx2mm
 MANUFACTURED TO
 SS EN10305-3 "STANDARD
 MATERIAL", E220
 TENSILE (KSI): 44 MIN.
 YIELD (KSI): 32 MIN.
 PAINTED WHITE TO PREVENT
 GALVANIC CORROSION, TYP.

9mm THRU HOLE FOR A
 FIELD INSTALL M65 M8x60
 BOLT WITH NYLOC NUT

8mm NUT WELDED TO HSS TO
 RECEIVE M65 M8x16 SET BOLT (NOT
 PART OF STRUCTURAL SYSTEM)



Sheet Title: TYPICAL PENDANT PRE-MANUFACTURED; LIKO (SWEDEN)

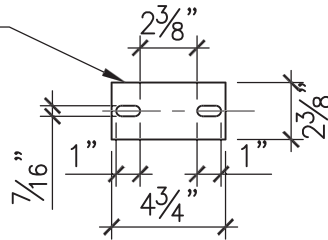
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 25 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

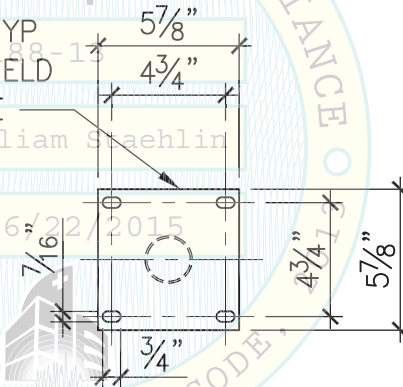
I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-1-25.dwg, 5/10/2016 11:50:33 AM, bdalexander

\bar{R} 6mmx60x120 DOMEX 240 YP
 TENSILE (KSI): 52/66 MIN. YIELD
 (KSI): 34 MIN. PAINTED WHITE



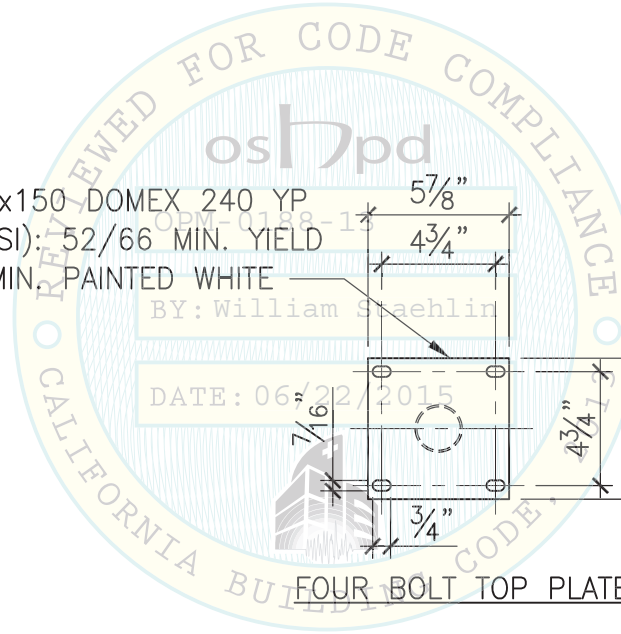
TWO BOLT TOP PLATE

\bar{R} 5mmx50x150 DOMEX 240 YP
 TENSILE (KSI): 52/66 MIN. YIELD
 (KSI): 34 MIN. PAINTED WHITE



FOUR BOLT TOP PLATE

NOTE:
 REFER TO TABLES ON PAGE 17 AND 21 FOR APPLICABLE TOP \bar{R} .



Sheet Title:

TYPICAL PENDANT TOP PLATES PRE-MANUFACTURED; LIKO (SWEDEN)

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



Scale:
N.T.S

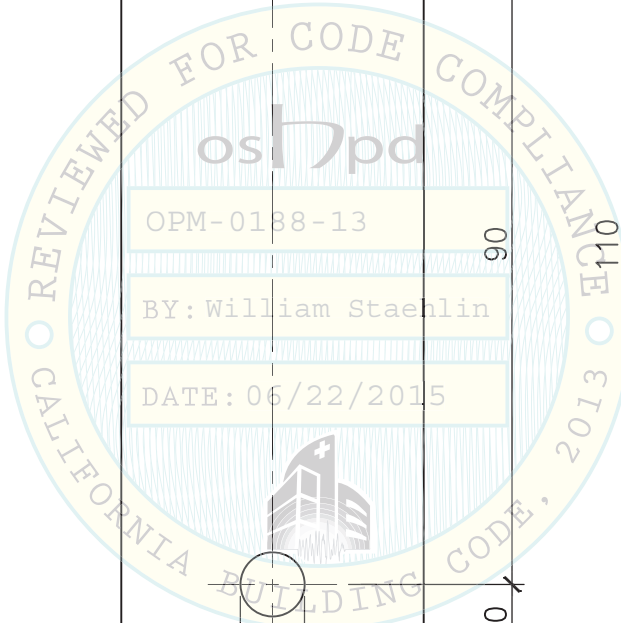
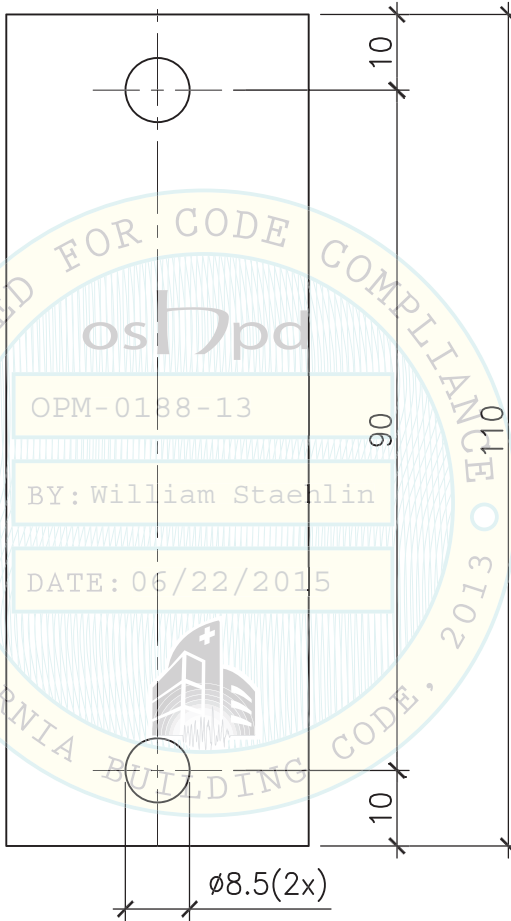
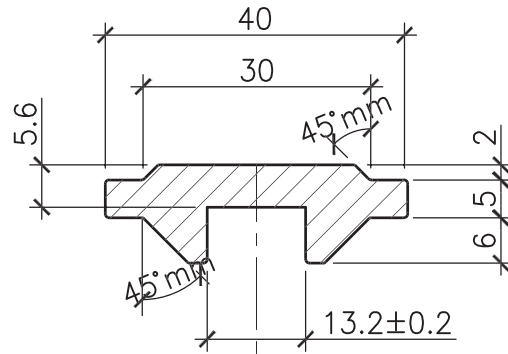
Date:
05/01/15

Page No.:
26 of 76

OPM-0188-13

Kevin S. Moore, SE
 California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:06 AM, bdalexander



LOCKING RAIL

Sheet Title:

LOCKING RAIL

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



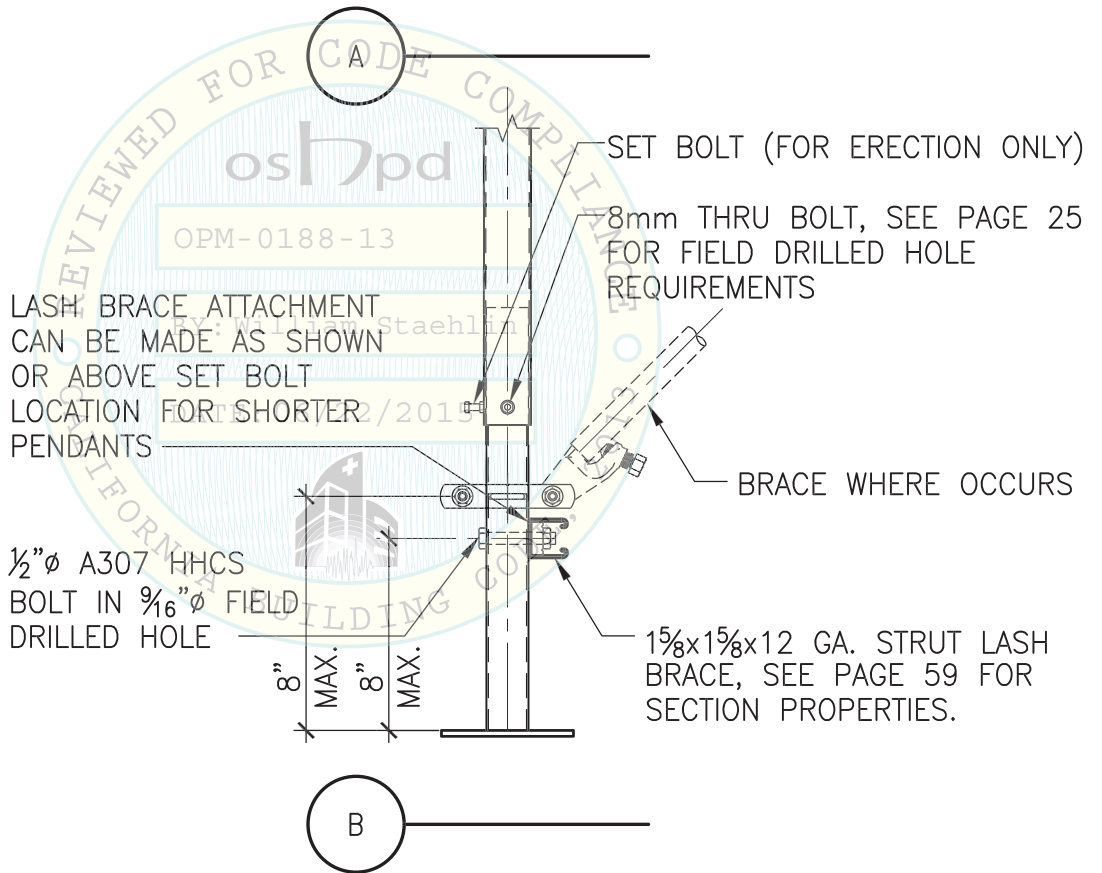
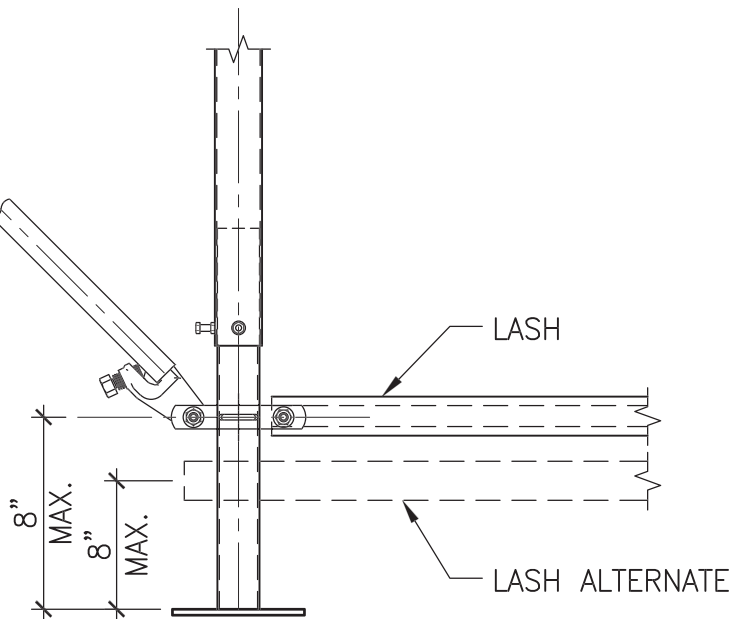
Scale: 1 1/2" = 1'-0"	Date: 05/01/15	Page No.: 27 of 76
--------------------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158-00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:11 AM, bdalexander

NOTE:
 LASH BRACE MUST BE ATTACHED TO BRACE BRACKET (ERICO CSBU PER OPM-0062-13) OR BELOW BRACE BRACKET (SEE (A) OR PAGE 23).

DETAIL (B) INDICATES ATTACHMENT TO PENDANT OPPOSITE BRACE, SEE PAGE 11.



LASH BRACE ATTACHMENT CAN BE MADE AS SHOWN OR ABOVE SET BOLT LOCATION FOR SHORTER PENDANTS

$\frac{1}{2}$ " ϕ A307 HHCS BOLT IN $\frac{9}{16}$ " ϕ FIELD DRILLED HOLE

15/8x15/8x12 GA. STRUT LASH BRACE, SEE PAGE 59 FOR SECTION PROPERTIES.

Sheet Title:

LASH BRACE CONNECTION

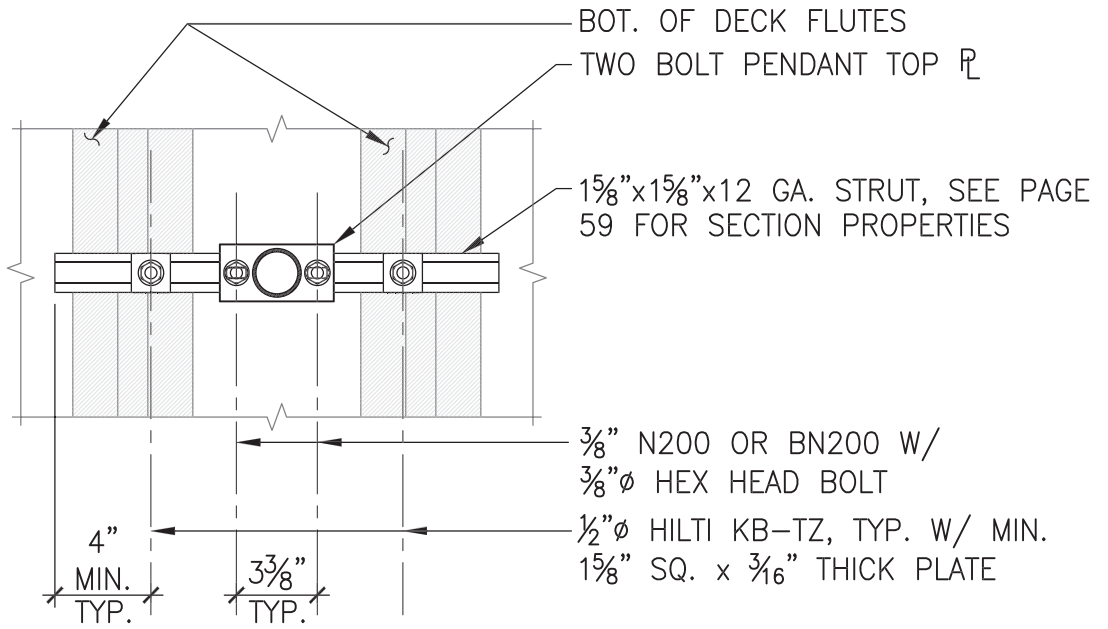
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 28 of 76
-----------------	-------------------	-----------------------

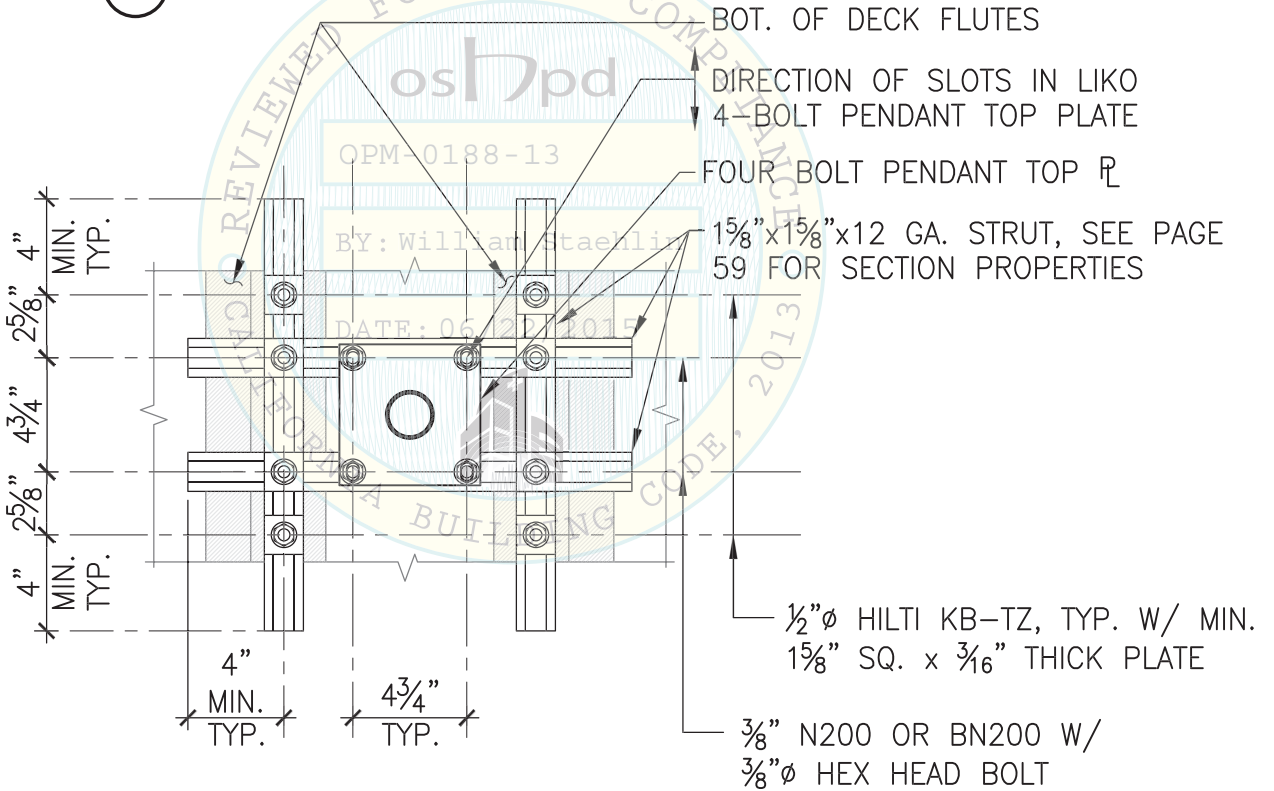
OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:16 AM, bdalexander



TWO BOLT CONNECTION

29A



FOUR BOLT CONNECTION

29B

Sheet Title:

TYPICAL CONNECTION(S) TO CONCRETE OVER METAL DECK SOFFIT

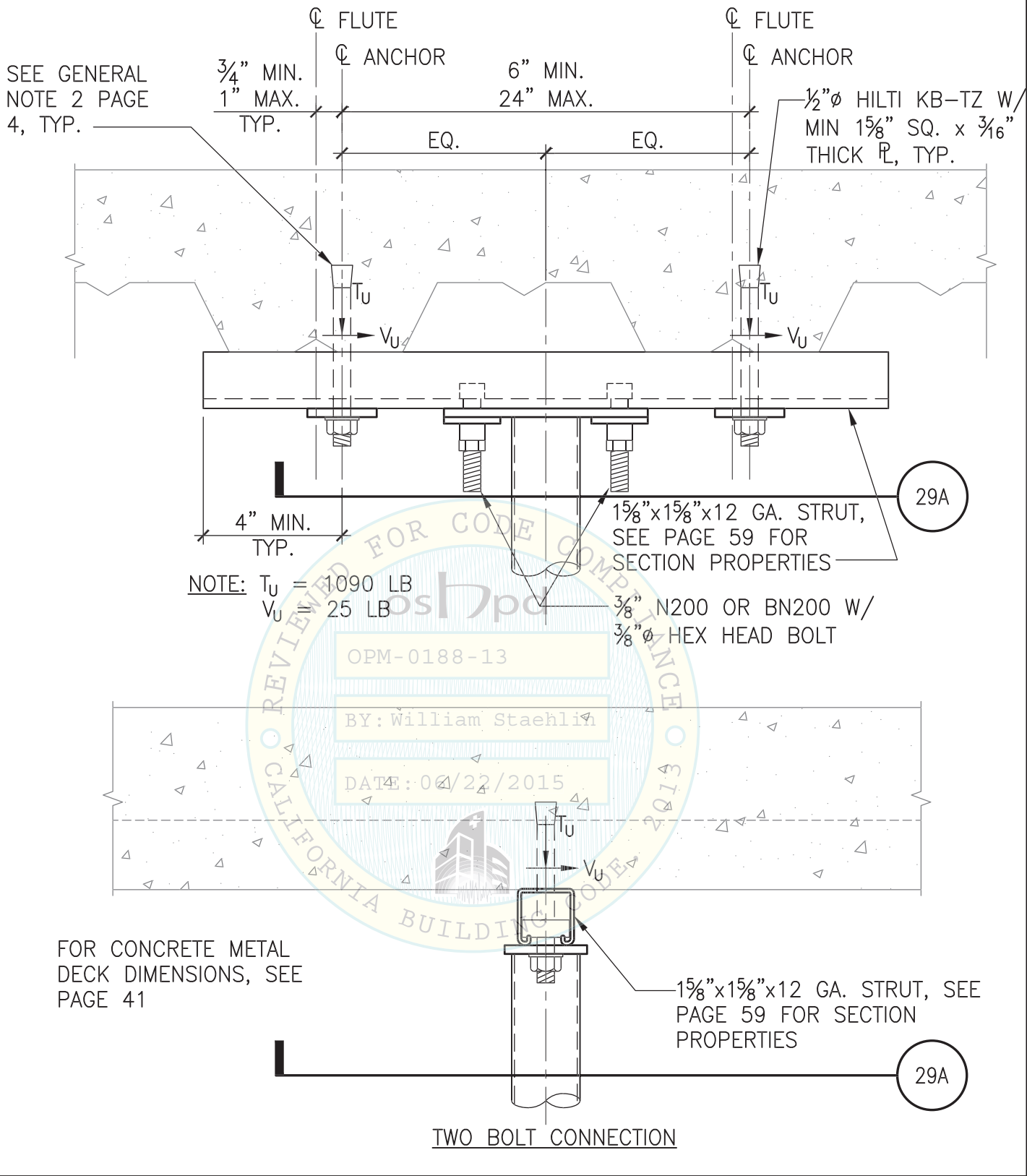
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com




Scale: N.T.S	Date: 05/01/15	Page No.: 29 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:21 AM, bdalexander



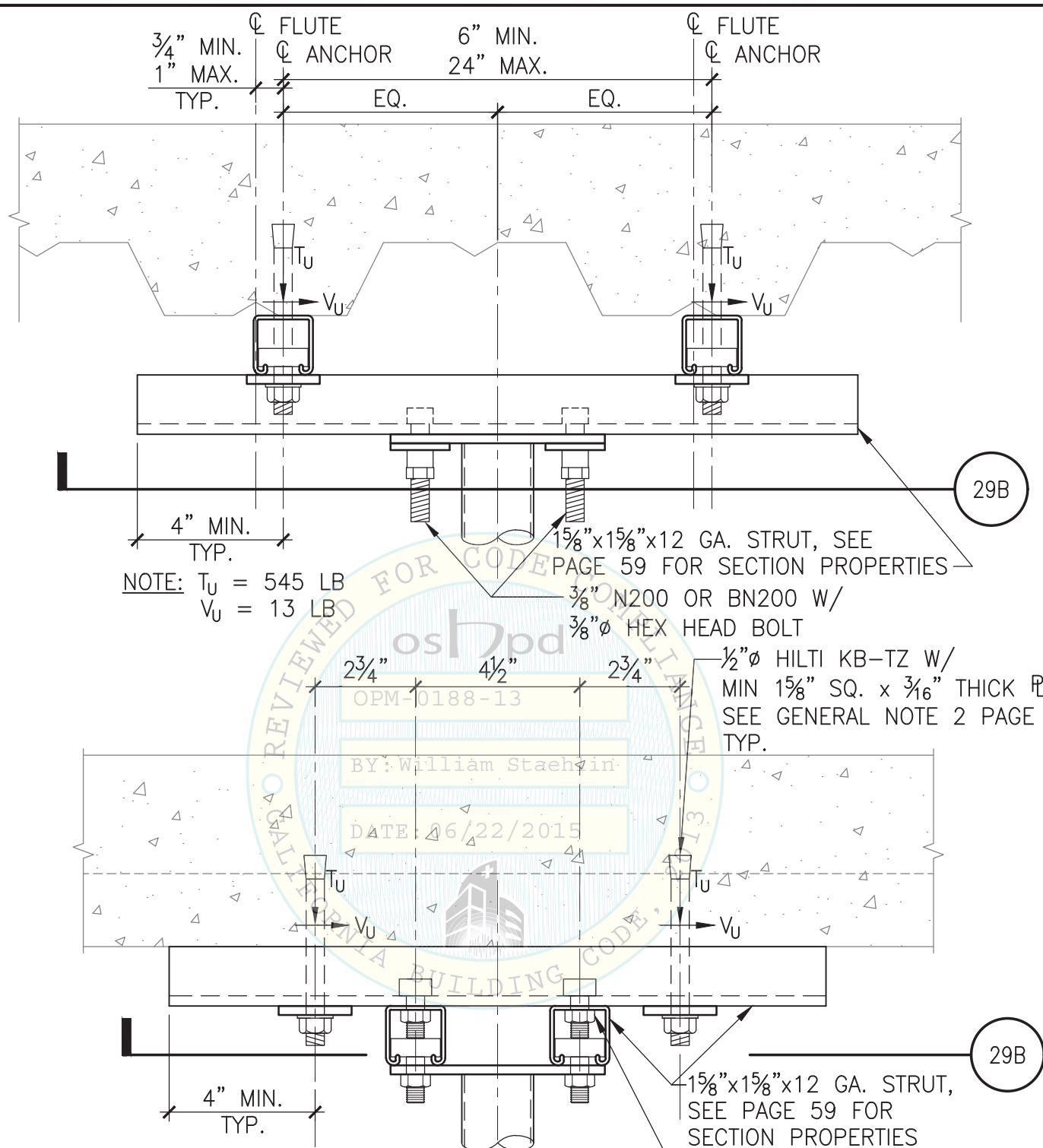
Sheet Title: TYPICAL CONNECTION TO CONCRETE OVER METAL DECK SOFFIT WITH 2 BOLT TOP PLATE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 30 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158-00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/19/2016 8:37:06 AM, bdalexander



NOTE: $T_u = 545 \text{ LB}$
 $V_u = 13 \text{ LB}$

15/8" x 15/8" x 12 GA. STRUT, SEE PAGE 59 FOR SECTION PROPERTIES
 3/8" N200 OR BN200 W/
 3/8" ϕ HEX HEAD BOLT

1/2" ϕ HILTI KB-TZ W/
 MIN 15/8" SQ. x 3/16" THICK PL.
 SEE GENERAL NOTE 2 PAGE 4, TYP.

FOR CONCRETE METAL DECK DIMENSIONS, SEE PAGE 41

FOUR BOLT CONNECTION

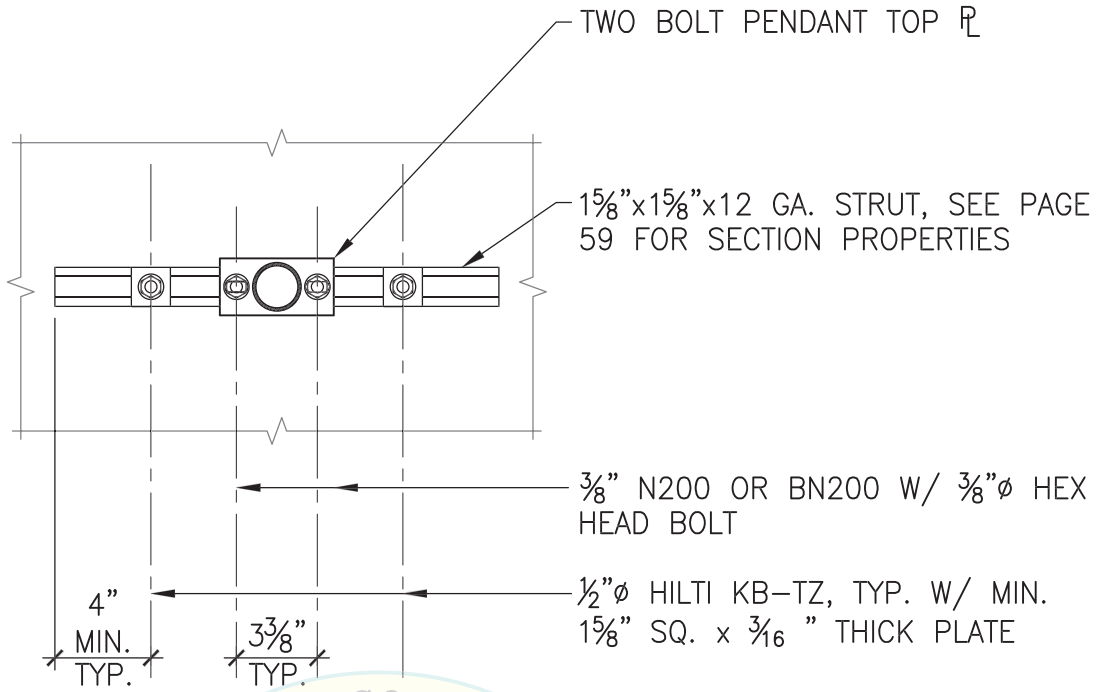
Sheet Title: TYPICAL CONNECTION TO CONCRETE OVER METAL DECK SOFFIT WITH 4 BOLT TOP PLATE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

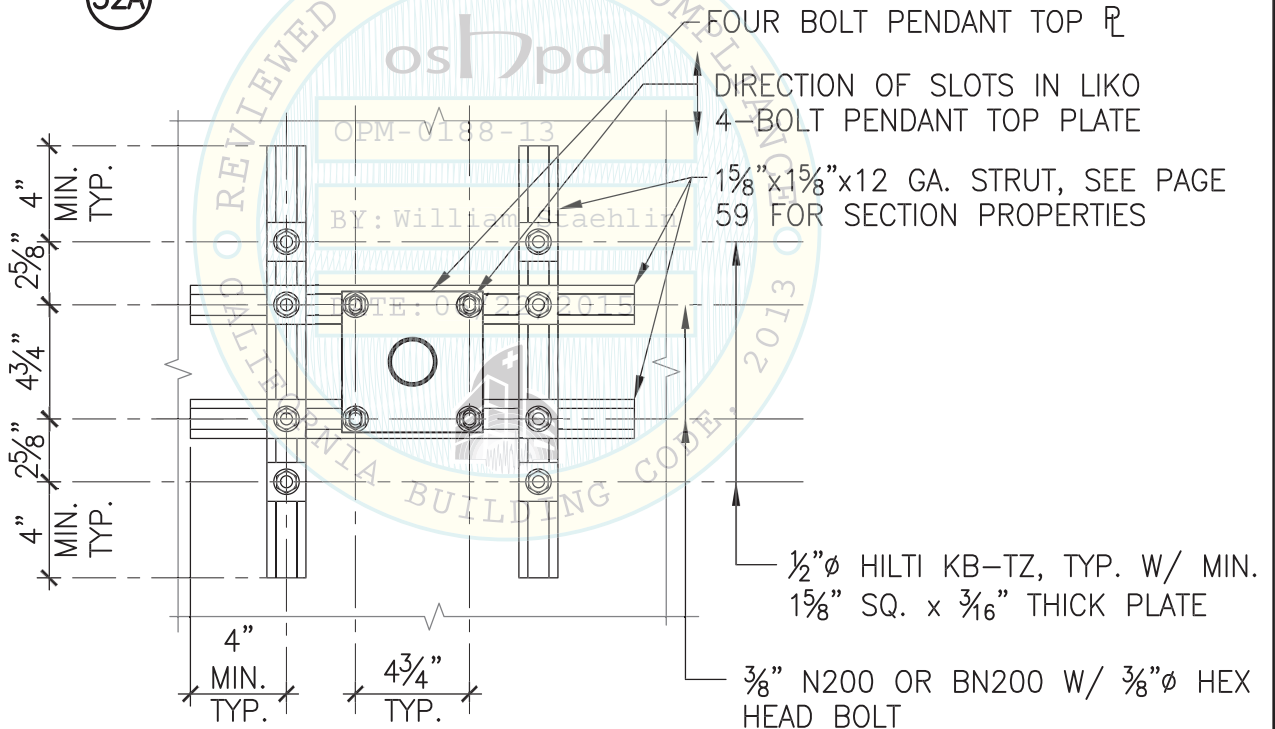
Scale: N.T.S	Date: 05/01/15	Page No.: 31 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:31 AM, bdalexander



32A

TWO BOLT CONNECTION



32B

FOUR BOLT CONNECTION

Sheet Title:

TYPICAL CONNECTION(S) TO FLAT SLAB SOFFIT

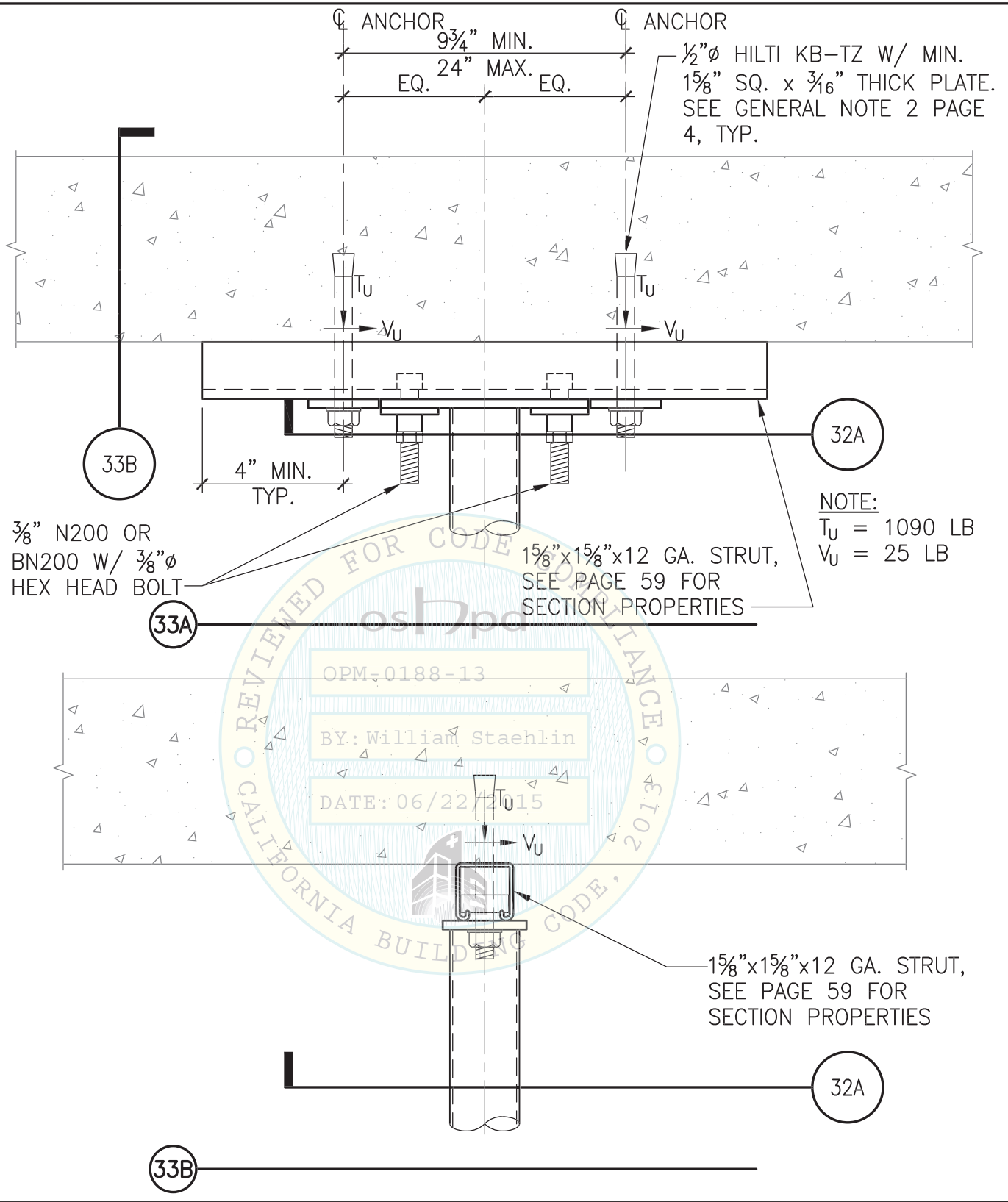
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: 1 1/2" = 1'-0"	Date: 05/01/15	Page No.: 32 of 76
--------------------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:36 AM, bdalexander



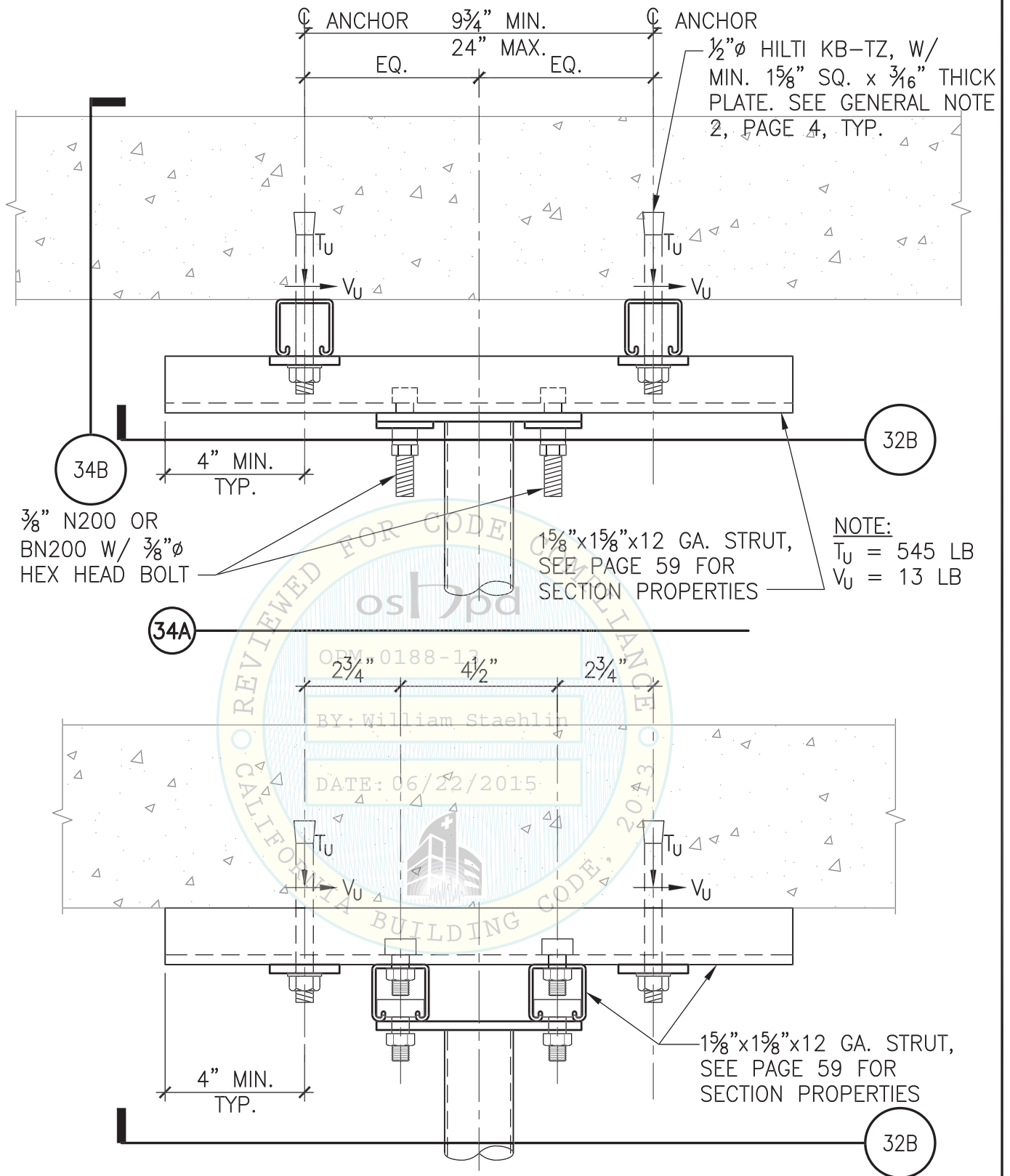
Sheet Title: TYPICAL CONNECTION TO FLAT SLAB SOFFIT WITH 2 BOLT TOP PLATE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 33 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:41 AM, bdalexander



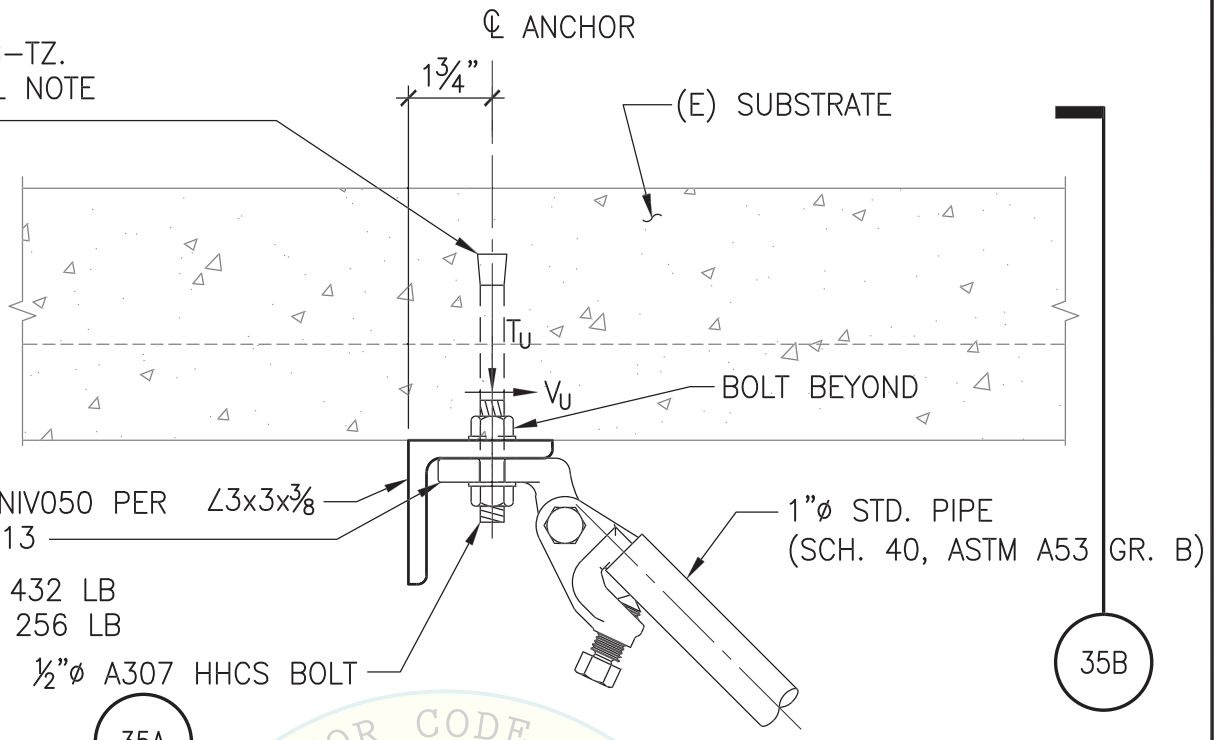
Sheet Title: TYPICAL CONNECTION TO FLAT SLAB SOFFIT WITH 4 BOLT TOP PLATE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 34 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

1/2"Ø HILTI KB-TZ.
SEE GENERAL NOTE
2, PAGE 4



ERICO CSBUNIV050 PER L3x3x3/8

1"Ø STD. PIPE
(SCH. 40, ASTM A53 GR. B)

NOTE: $T_u = 432$ LB
 $V_u = 256$ LB

1/2"Ø A307 HHCS BOLT

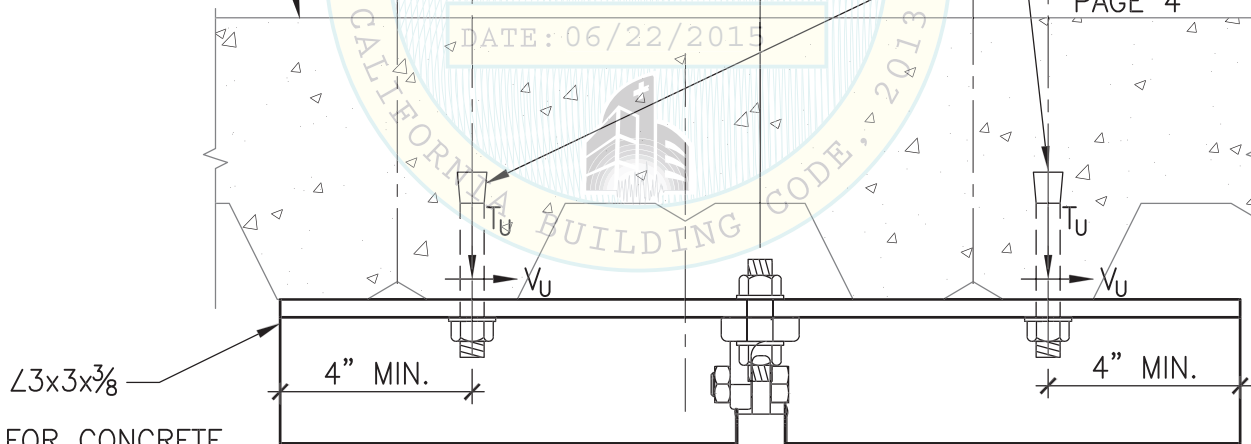
35B

35A



(E) SUBSTRATE

1/2"Ø HILTI KB-TZ. SEE
GENERAL NOTE 2,
PAGE 4



FOR CONCRETE
OVER METAL DECK
DIMENSIONS, SEE
PAGE 41

35B

Sheet Title:

BRACE ANCHORAGE CONNECTION TO METAL DECK – PARALLEL TO DECK FLUTE

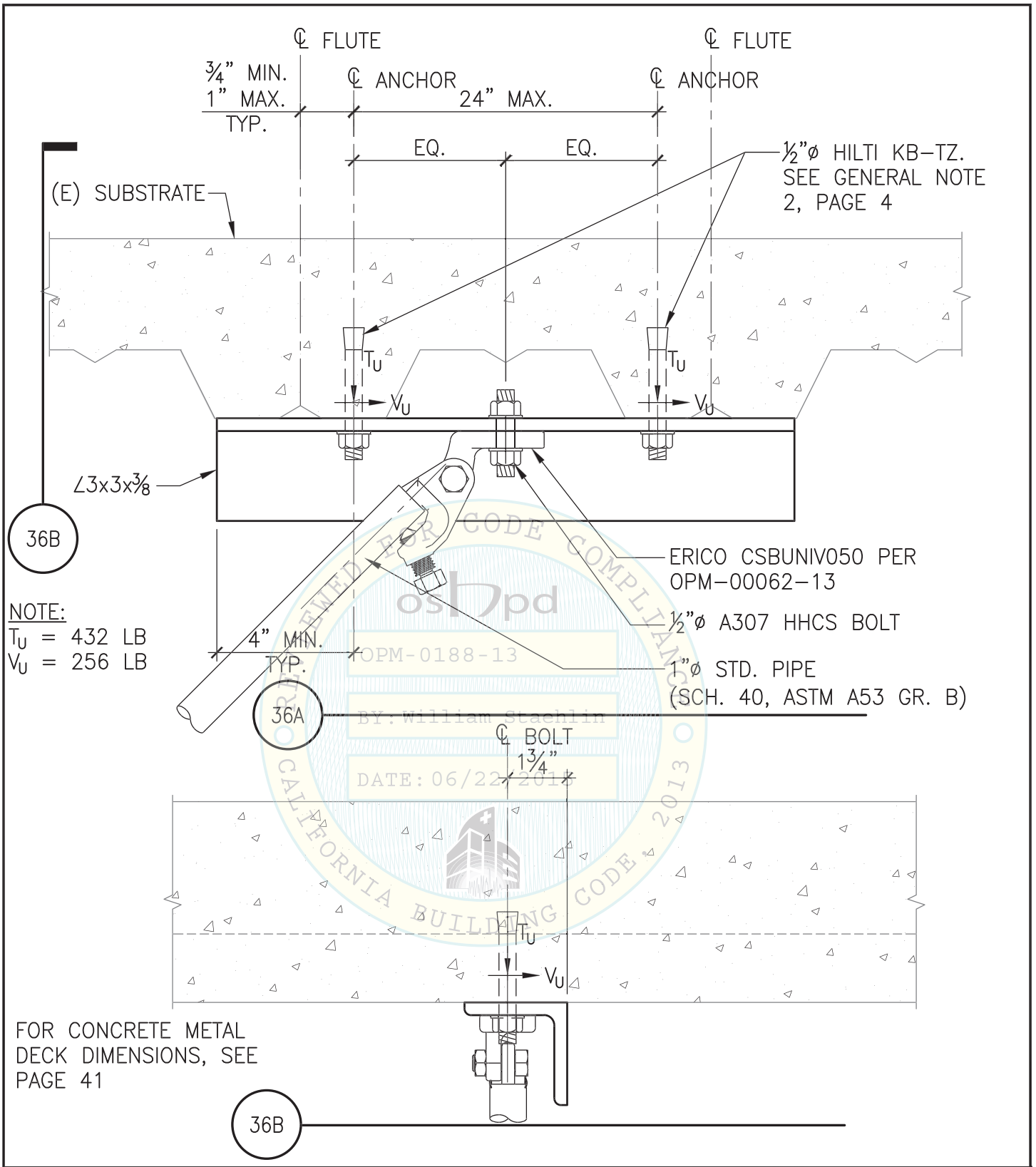
SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: Date: 05/01/15 Page No.: 35 of 76

OPM-0188-13 Kevin S. Moore, SE
California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:51 AM, bdalexander



NOTE:

$T_U = 432 \text{ LB}$
 $V_U = 256 \text{ LB}$

FOR CONCRETE METAL
 DECK DIMENSIONS, SEE
 PAGE 41

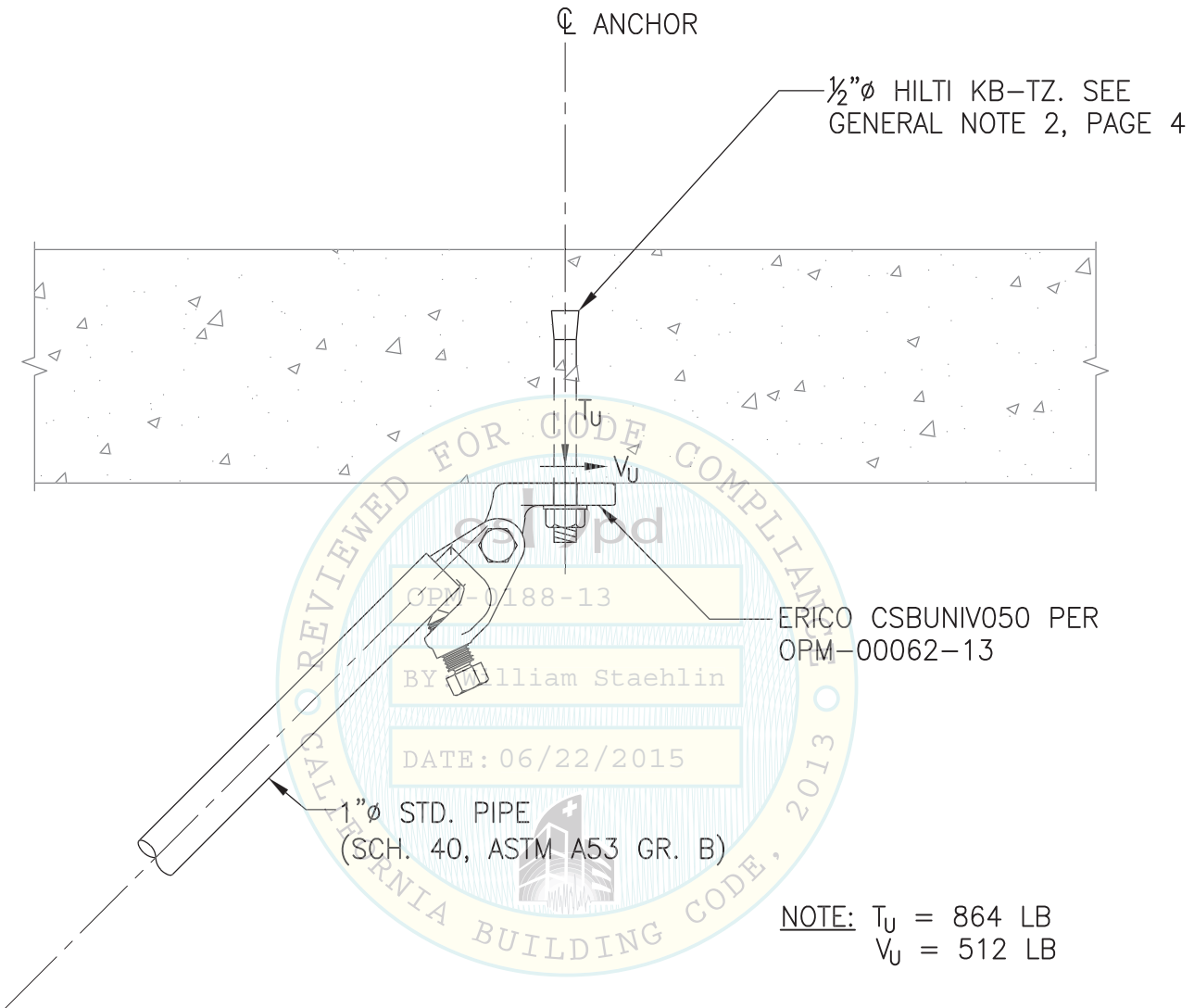
Sheet Title: BRACE ANCHORAGE CONNECTION TO METAL DECK – PERPENDICULAR TO DECK FLUTE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 36 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:45:56 AM, bdalexander



Sheet Title: BRACE ANCHORAGE CONNECTION TO FLAT SLAB SOFFIT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

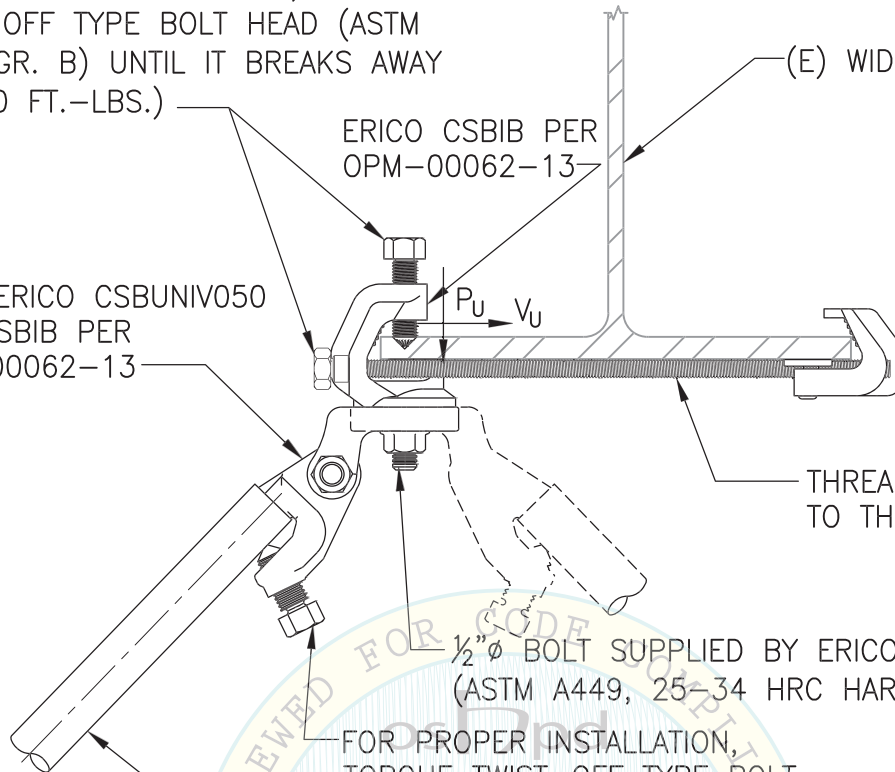
Scale: N.T.S	Date: 05/01/15	Page No.: 37 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

FOR PROPER INSTALLATION, TORQUE
TWIST-OFF TYPE BOLT HEAD (ASTM
A563 GR. B) UNTIL IT BREAKS AWAY
(40-50 FT.-LBS.)

ONLY ERICO CSBUNIV050
FOR CSBIB PER
OPM-00062-13

ERICO CSBIB PER
OPM-00062-13

(E) WIDE-FLANGE BEAM



THREADED ROD IS INTEGRAL
TO THE CSBIB, TYP. OF 2

1/2" ϕ BOLT SUPPLIED BY ERICO®
(ASTM A449, 25-34 HRC HARDNESS)

FOR PROPER INSTALLATION,
TORQUE TWIST-OFF TYPE BOLT
HEAD UNTIL IT BREAKS AWAY

1" ϕ STD. PIPE
(SCH. 40, ASTM A53 GR. B)
(ORIENTATION MAY ALSO BE
PARALLEL TO THE LENGTH OF
THE WIDE-FLANGE BEAM)

NOTE: $P_U = 864$ LB
 $V_U = 512$ LB

PART NUMBER	FLANGE THICKNESS	FLANGE WIDTH
CSBIB075085	1/4" TO 3/4"	4" TO 8 1/2"
CSBIB075145	1/4" TO 3/4"	8 5/8" TO 14 1/2"
CSBIB075085	1/4" TO 3/4"	14 5/8" TO 18"

Sheet Title:

BRACE ANCHORAGE CONNECTION TO WIDE FLANGE BEAM

SIMPSON GUMPERTZ & HEGER

Engineering of Structures
and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale:
N.T.S

Date:
05/01/15

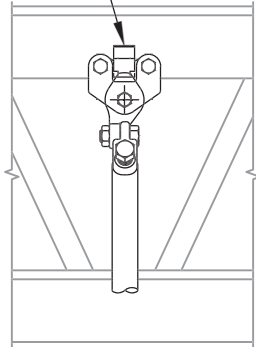
Page No.:
38 of 76

OPM-0188-13

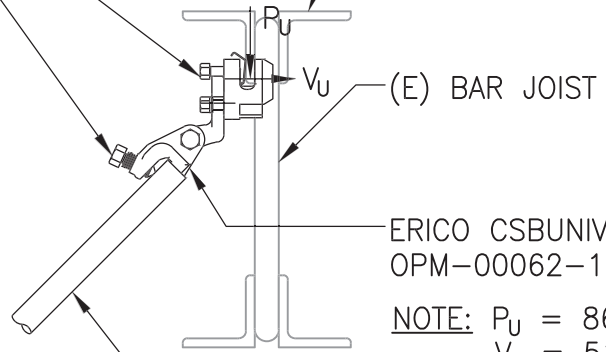
Kevin S. Moore, SE
California SE No. 4528

FOR PROPER INSTALLATION,
TORQUE TWIST-OFF TYPE BOLT
HEAD (ASTM A563 GR. B) UNTIL IT
BREAKS AWAY (40-50 FT.-LBS.)

ERICO CSBBARJ PER
OPM-00062-13



1/4" MIN. TO 1/2" MAX.
ANGLE THICKNESS



ERICO CSBUNIV PER
OPM-00062-13

NOTE: $P_U = 864$ LB
 $V_U = 512$ LB

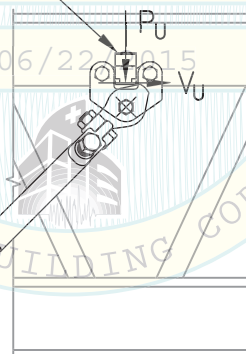
1"Ø STD. PIPE
(SCH. 40, ASTM A53 GR. B)

BRACE PERPENDICULAR TO JOIST

BRACE PERPENDICULAR TO JOIST

ERICO CSBBARJ PER
OPM-00062-13

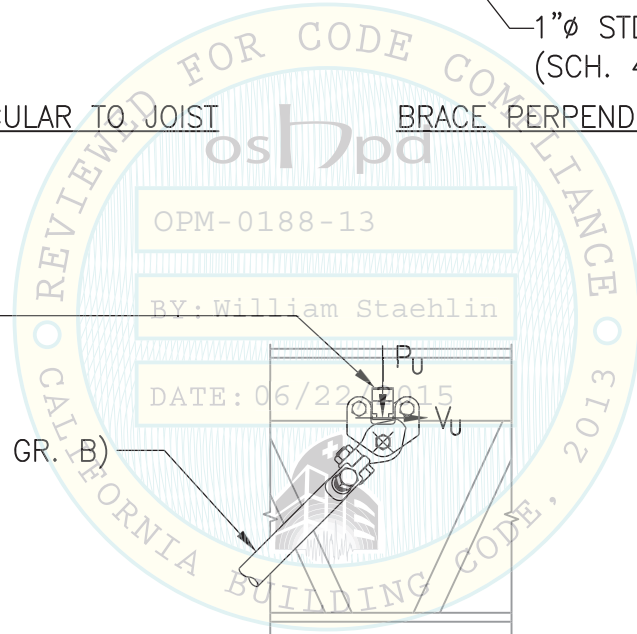
1"Ø STD. PIPE
(SCH. 40, ASTM A53 GR. B)



NOTE: $P_U = 864$ LB
 $V_U = 512$ LB

BRACE PARALLEL TO JOIST

SIDE ATTACHMENT



Sheet Title:

ANCHORAGE CONNECTION TO BAR JOIST – SIDE INSTALL

SIMPSON GUMPERTZ & HEGER

Engineering of Structures
and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com



Scale:
N.T.S

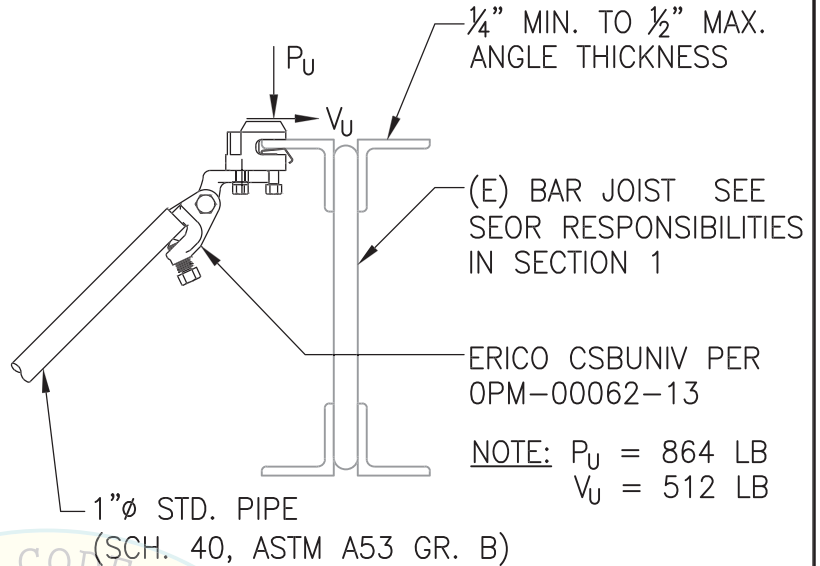
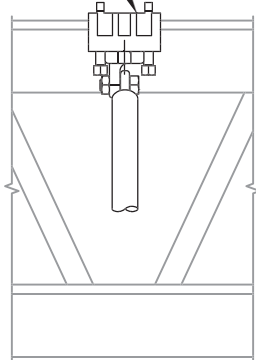
Date:
05/01/15

Page No.:
39 of 76

OPM-0188-13

Kevin S. Moore, SE
California SE No. 4528

ERICO CSBBARJ PER
OPM-00062-13

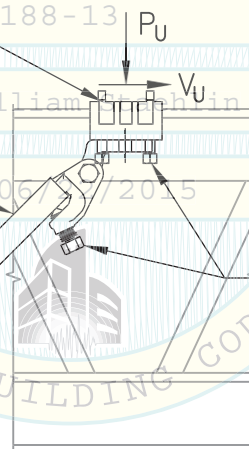
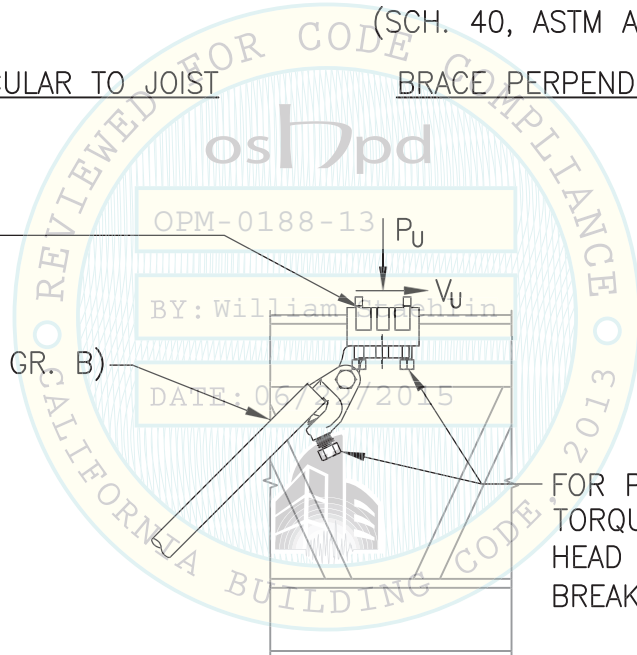


BRACE PERPENDICULAR TO JOIST

BRACE PERPENDICULAR TO JOIST

ERICO CSBBARJ PER
OPM-00062-13

1"Ø STD. PIPE
(SCH. 40, ASTM A53 GR. B)



FOR PROPER INSTALLATION, TORQUE TWIST-OFF TYPE BOLT HEAD (ASTM A563 GR. B) UNTIL IT BREAKS AWAY (40-50 FT.-LBS.)

BRACE PARALLEL TO JOIST

NOTE: $P_U = 864$ LB
 $V_U = 512$ LB

TOP FLANGE ATTACHMENT

Sheet Title:

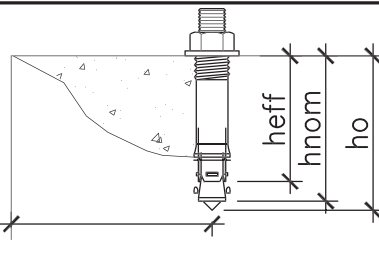
ANCHORAGE CONNECTION TO BAR JOIST - TOP INSTALL

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S.	Date: 05/01/15	Page No.: 40 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

TEST VALUES: APPLY TEST LOADS TO ANCHORS WITHOUT REMOVING NUT IF POSSIBLE, SEE TABLE BELOW:



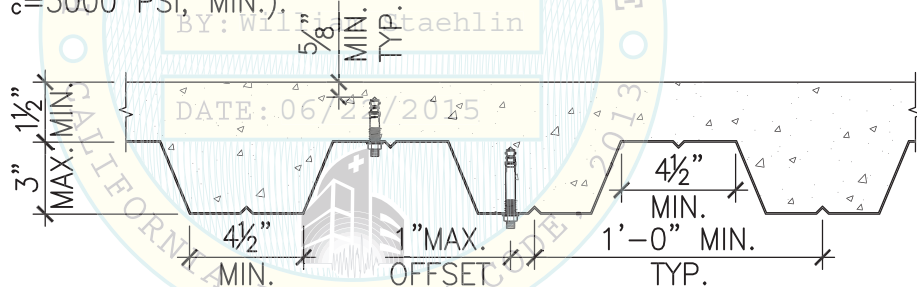
* MIN. BOLT SPACING LISTED IS PER ICC REPORT, LARGER MIN. SPACING MAY BE REQUIRED AS SHOWN IN DETAILS.

ANCHOR TYPE	ANCHOR DIA. (INCH)	EFFECTIVE EMBED. (INCH) hef	HOLE (INCH) ho	MIN. MEMBER THICKNESS (INCH), h	MIN. EDGE DISTANCE (INCH)	MIN. BOLT SPACING (INCH)*	TENSION TEST LOAD (LBS)	TORQUE TEST (FT-LBS)	COMMENTS
HILTI KB-TZ	1/2	3/4	4	SEE BELOW	8	2 3/8	1597	40	CASE 1
HILTI KB-TZ	1/2	3/4	4	6	8	2 3/8	3281	40	CASE 2
HILTI KB-TZ	5/8	4	4 3/4	SEE BELOW	8	3	2831	60	CASE 1
HILTI KB-TZ	5/8	4	4 3/4	6	8	3	4539	60	CASE 2

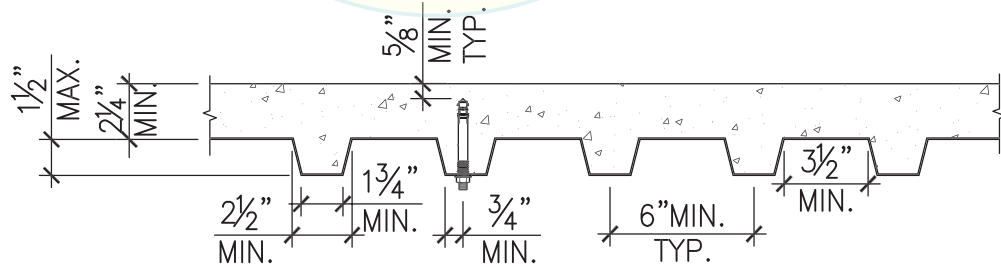
TWO (2) CONDITIONS OF ANCHORAGE TO CONCRETE ARE SPECIFIED AND PRESENTED IN THIS PRE-APPROVAL:

CASE 1: THE ANCHORAGE IS INSTALLED IN THE UNDERSIDE OF A SUSPENDED FLOOR OR ROOF OF A BUILDING. IT IS ASSUMED THE FLOOR OR ROOF IS BUILT OF NWC OR SAND LWC TOPPING OVER 20 GAUGE MIN. METAL DECK ($f'_c=3000$ PSI, MIN. AND $F_y=36,000$ PSI, MIN PER ICC-ES REPORTS) WITH SLAB DIMENSIONS AS SHOWN BELOW.

CASE 2: THE ANCHORAGE IS INSTALLED IN THE UNDERSIDE OF A SUSPENDED FLOOR OR ROOF OF A BUILDING. IT IS ASSUMED THE FLOOR OR ROOF IS BUILT OF CAST-IN-PLACE NORMAL WEIGHT REINFORCED CONCRETE WITH MINIMUM THICKNESS OF 6" ($f'_c=3000$ PSI, MIN.).



CONCRETE OVER METAL DECK FLOOR AND ROOF ASSMBLIES



CONCRETE OVER METAL DECK FLOOR AND ROOF ASSMBLIES- B DECK

Sheet Title:

ANCHORAGE DIMENSIONS AND REQUIREMENTS

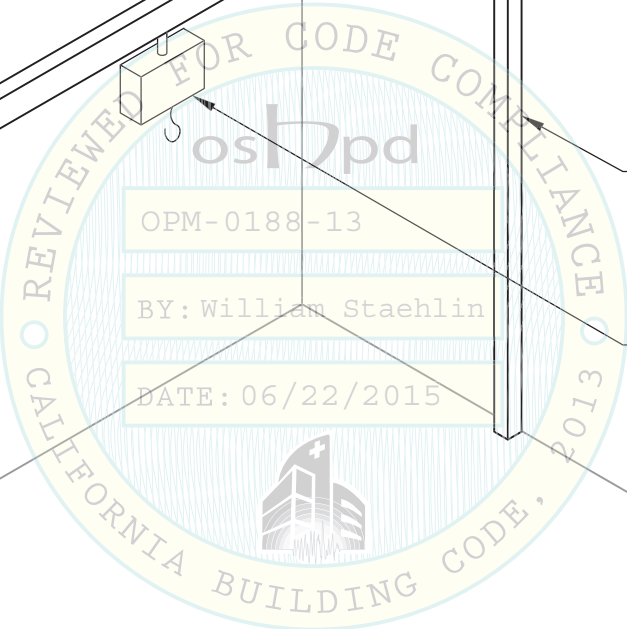
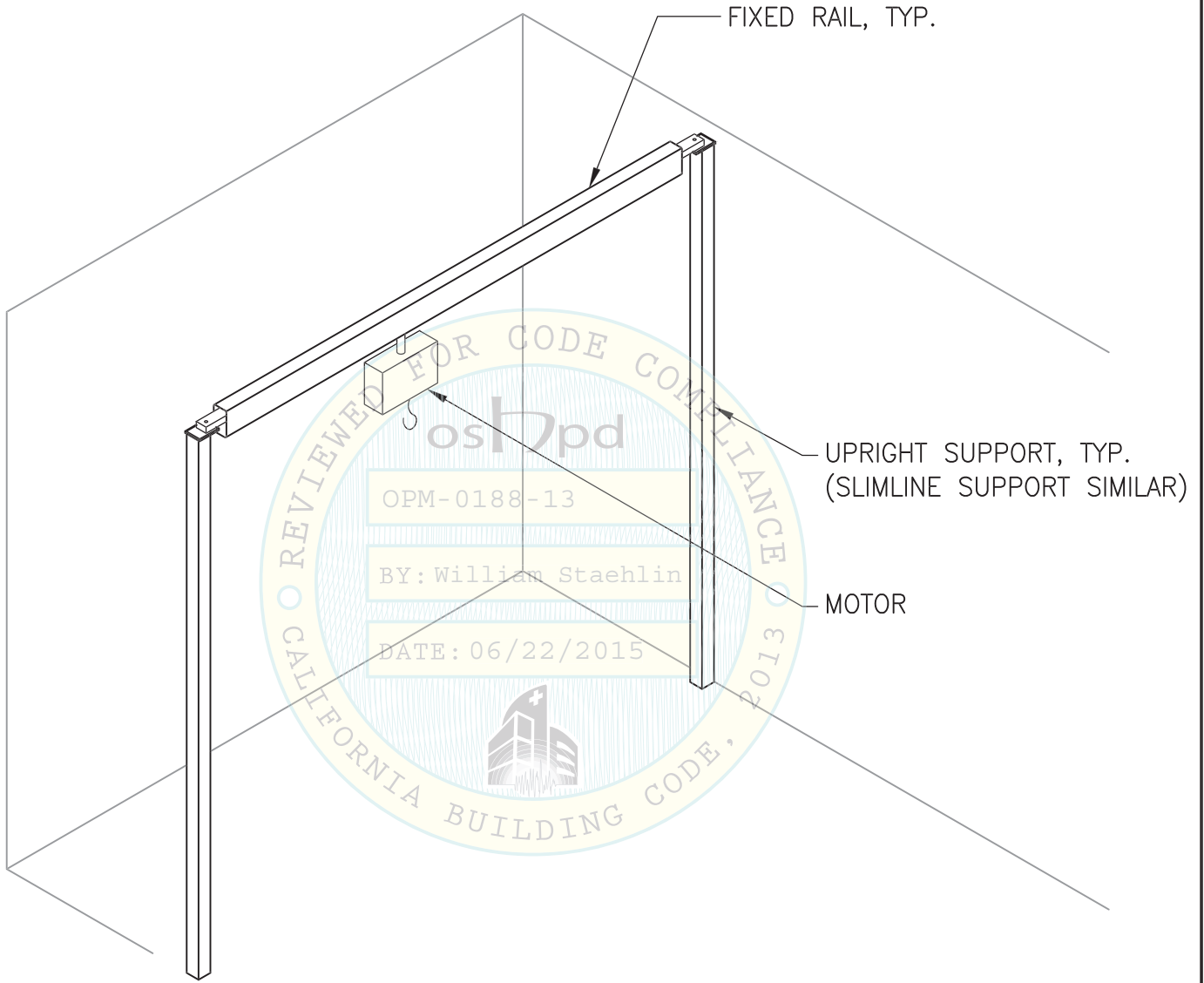
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 41 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:16 AM, bdalexander

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:21 AM, bdalexander



ISOMETRIC

Sheet Title:

ISOMETRIC VIEW OF SINGLE RAIL SYSTEM ON UPRIGHT WALL SUPPORTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

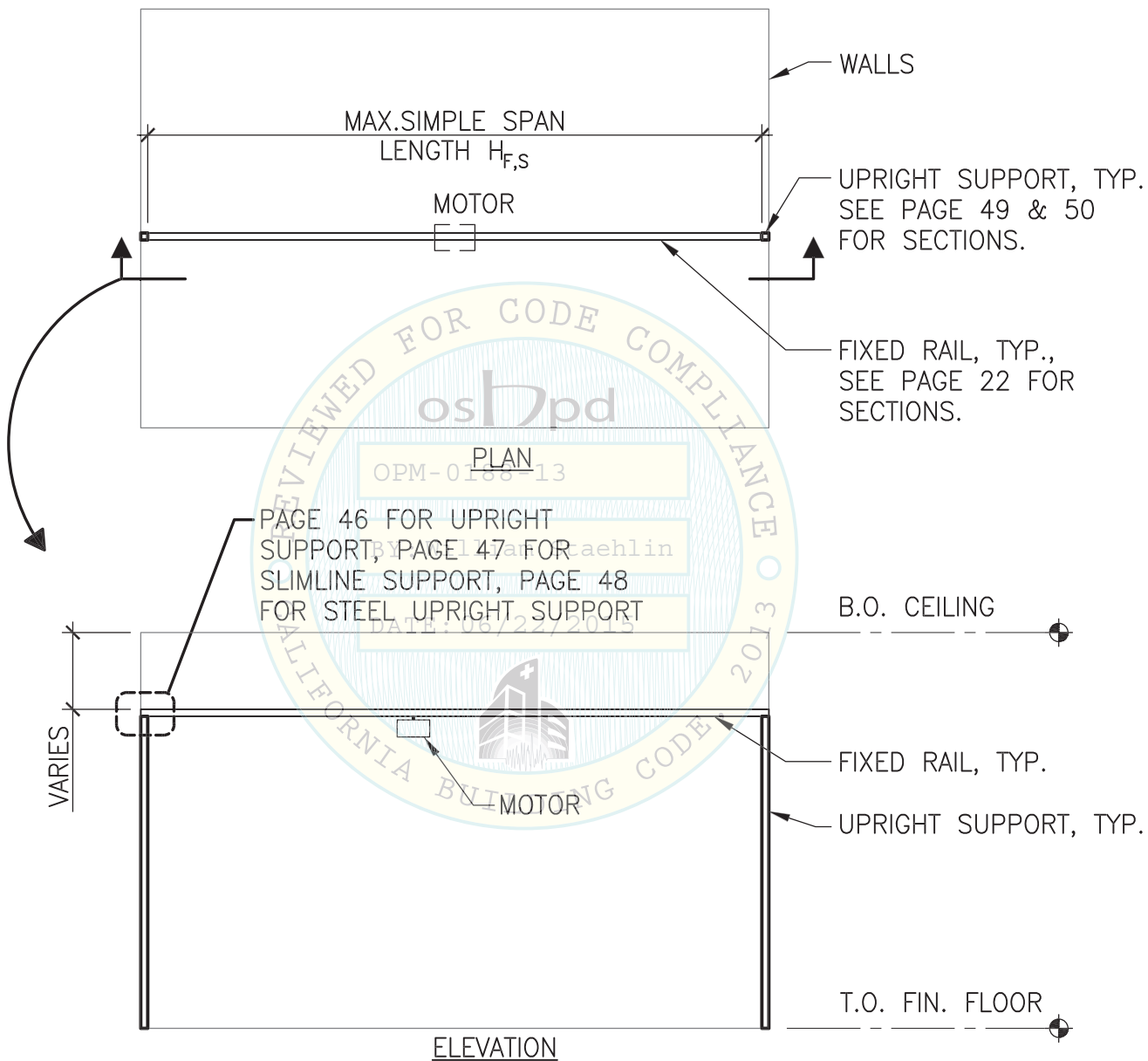


Scale: N.T.S	Date: 05/01/15	Page No.: 42 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

NOTES:

1. MAXIMUM PERMISSIBLE MOTOR CAPACITY:
- SLIMLINE: 600#
2. FOR MAXIMUM ALLOWABLE SIMPLE SPAN AND LENGTHS SEE TABLE ON PAGE 21.
3. CALIFORNIA REGISTERED DESIGN PROFESSIONAL MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE WALL/FLOOR SUPPORTED SYSTEM.



Sheet Title:

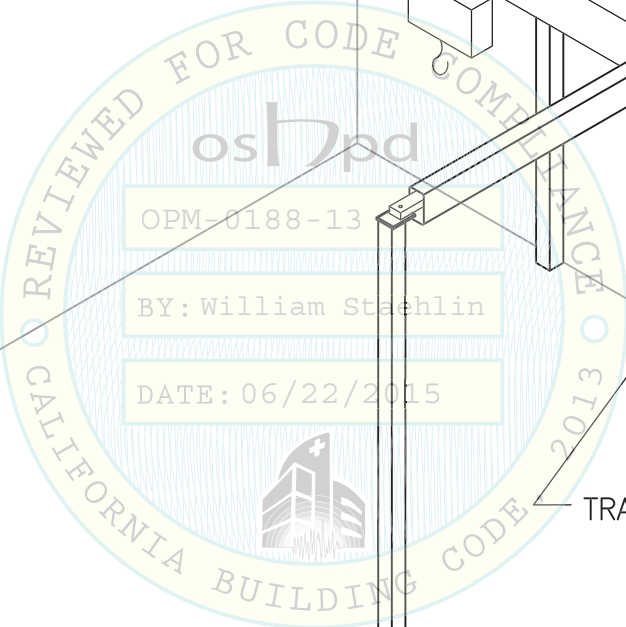
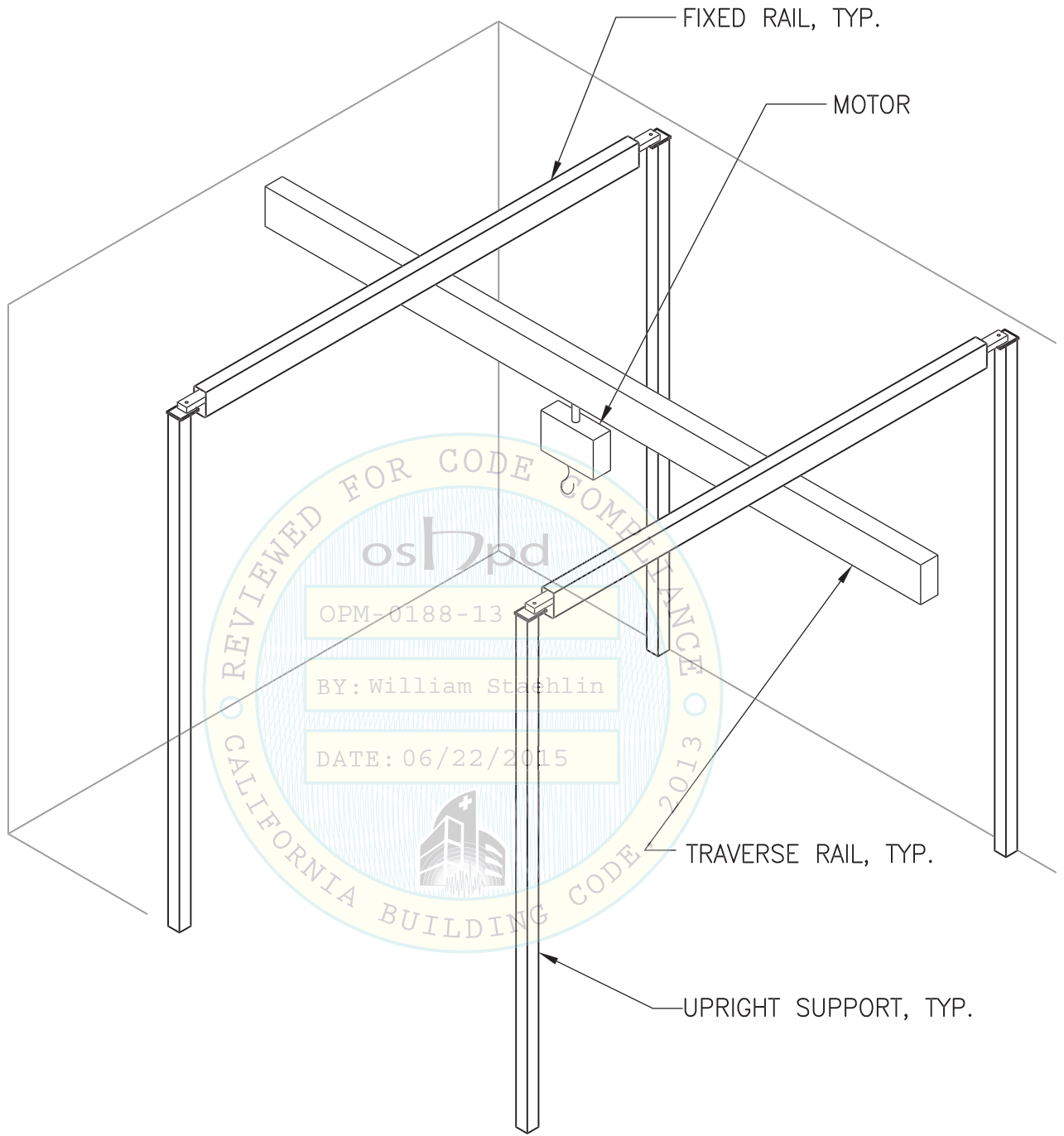
SPAN LENGTHS FOR SINGLE RAIL SYSTEM ON UPRIGHT WALL SUPPORTS

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 43 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:31 AM, bdalexander



ISOMETRIC

Sheet Title:

ISOMETRIC VIEW OF TRAVERSE SYSTEM ON UPRIGHT WALL SUPPORTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



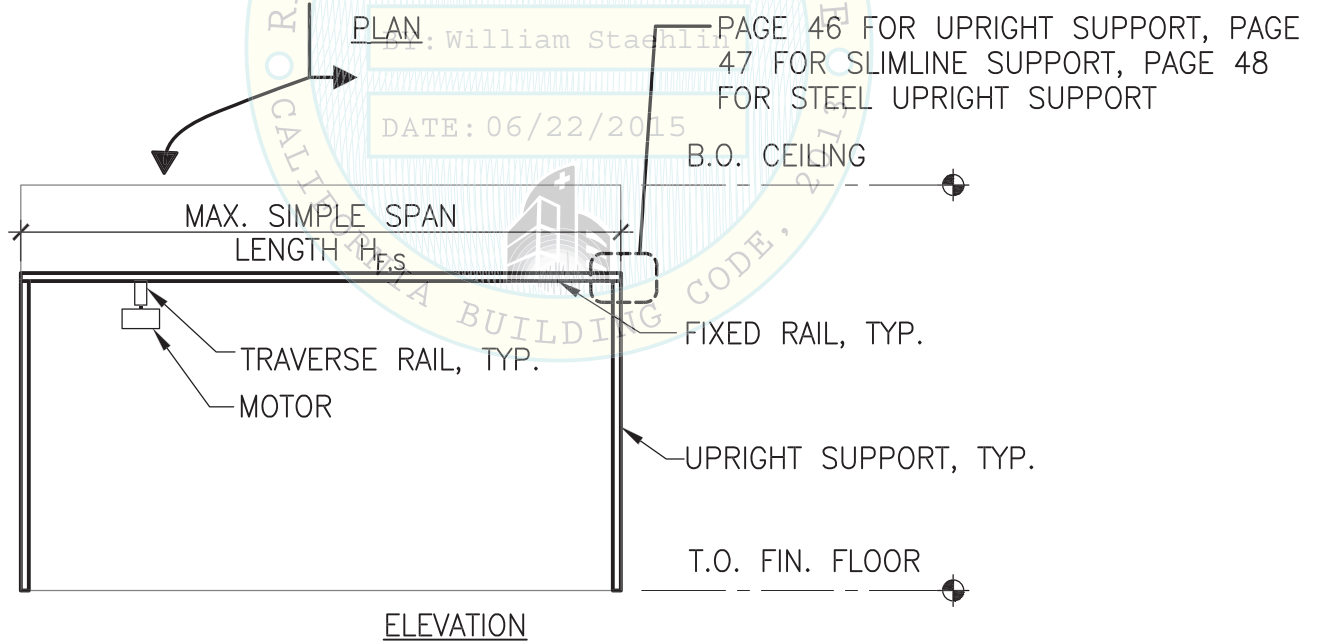
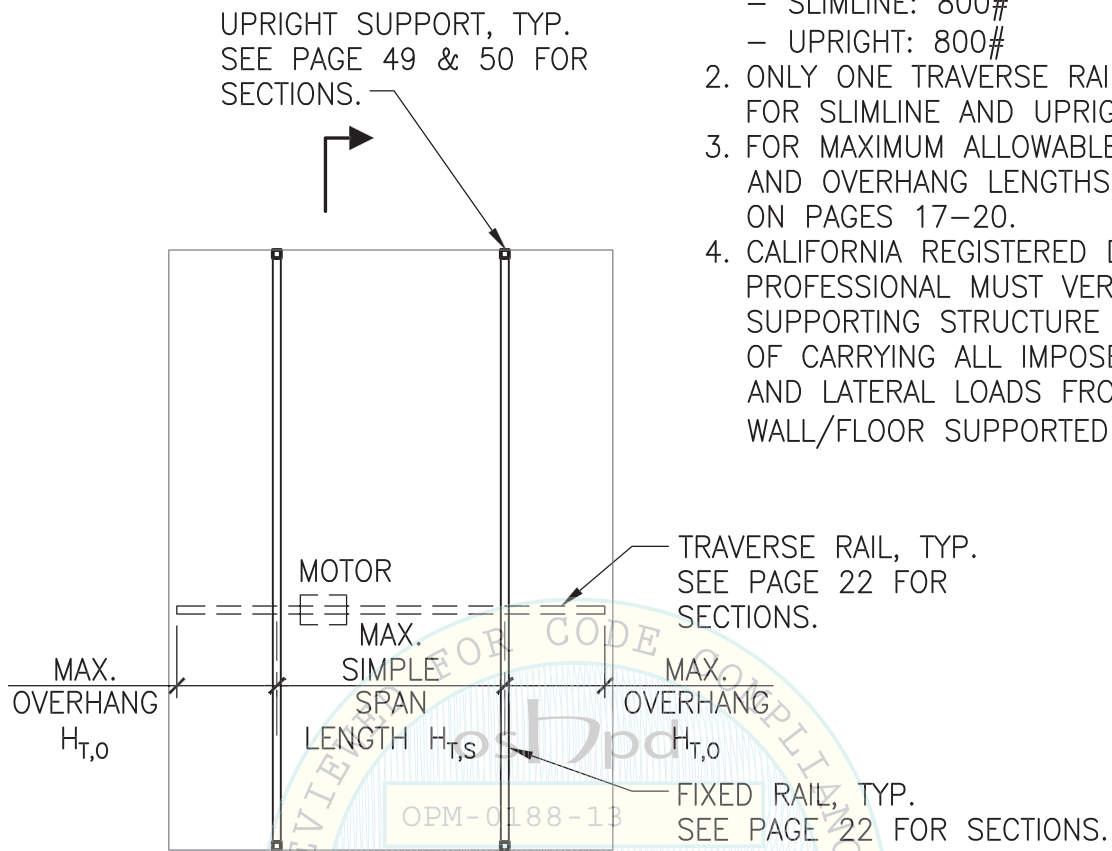
Scale: NONE	Date: 05/01/15	Page No.: 44 of 76
----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:36 AM, bdalexander

NOTES:

1. MAXIMUM PERMISSIBLE MOTOR CAPACITY:
 - SLIMLINE: 800#
 - UPRIGHT: 800#
2. ONLY ONE TRAVERSE RAIL ALLOWED FOR SLIMLINE AND UPRIGHT SUPPORTS
3. FOR MAXIMUM ALLOWABLE SIMPLE SPAN AND OVERHANG LENGTHS SEE TABLES ON PAGES 17-20.
4. CALIFORNIA REGISTERED DESIGN PROFESSIONAL MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE WALL/FLOOR SUPPORTED SYSTEM.



OPM-0188-13

DATE: 06/22/2015

REVIEWED FOR CODE COMPLIANCE BY: William Staehlin

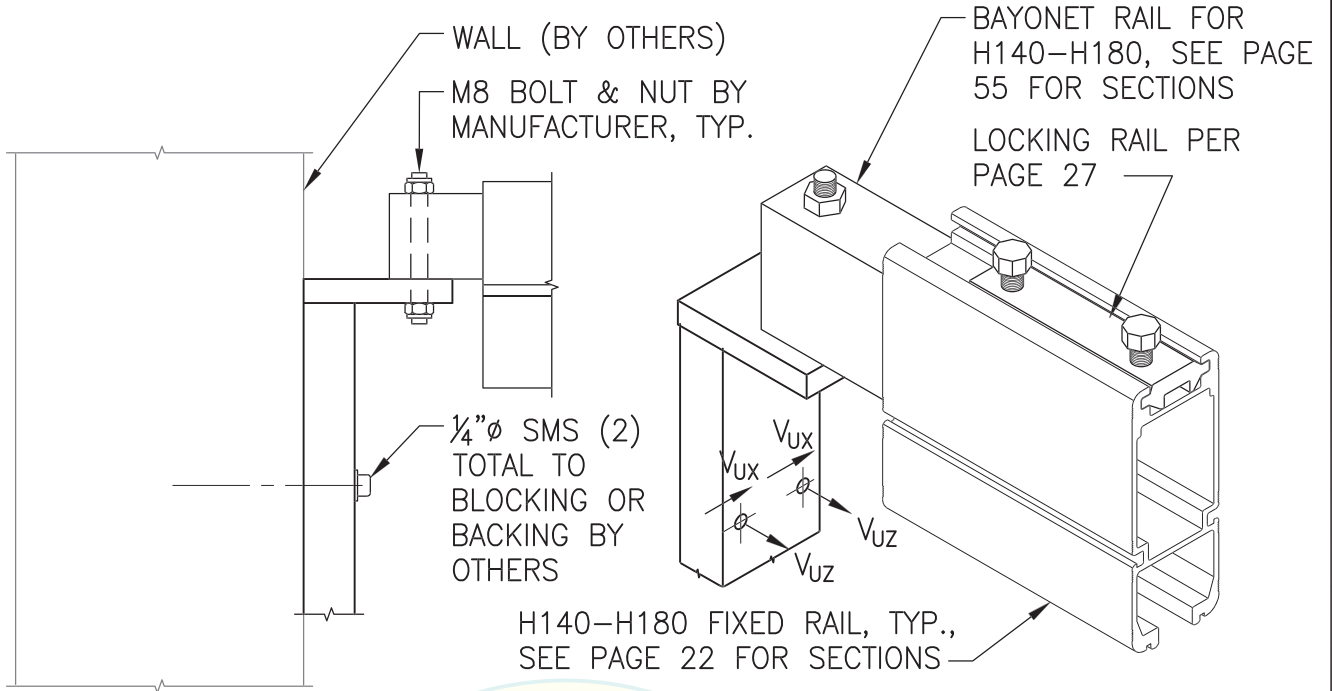
Sheet Title: SPAN & OVERHANG LENGTH FOR TRAVERSE SYSTEM ON UPRIGHT WALL SUPPORTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

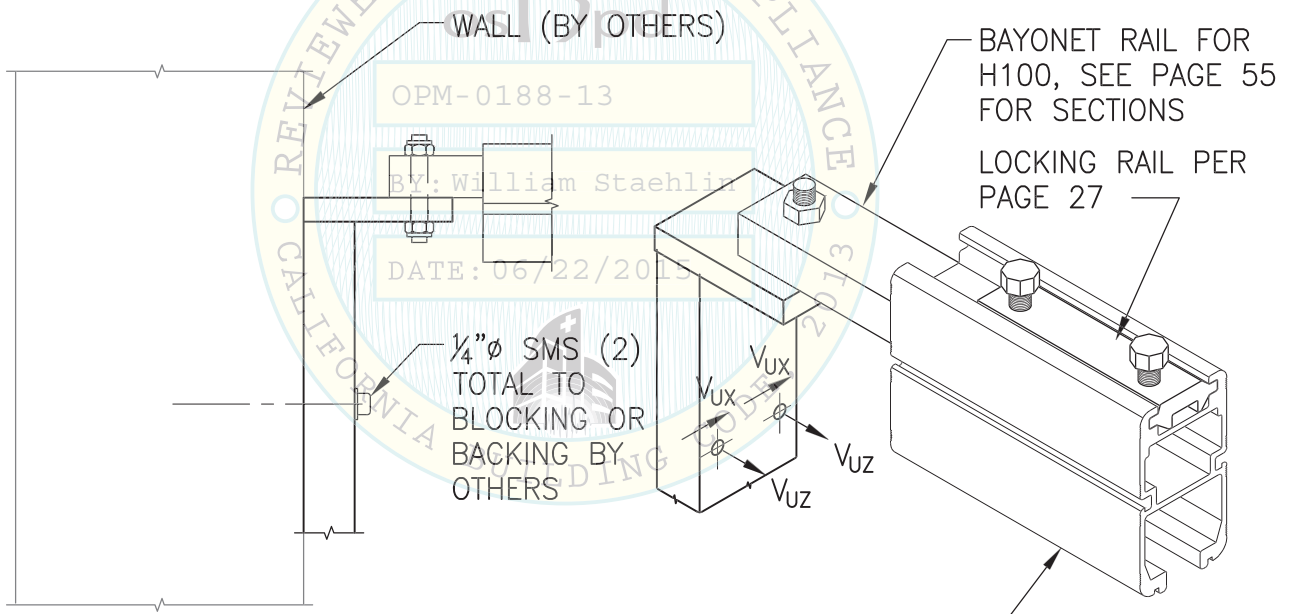
Scale: N.T.S	Date: 05/01/15	Page No.: 45 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:41 AM, bdalexander



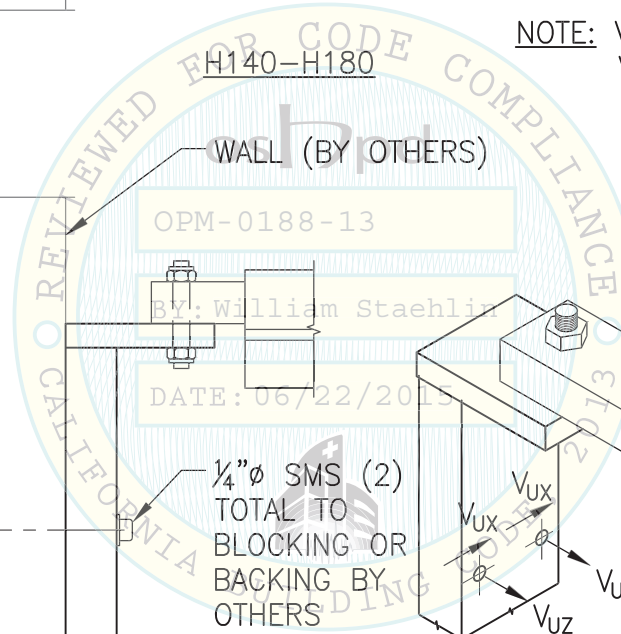
H140-H180 FIXED RAIL, TYP.,
SEE PAGE 22 FOR SECTIONS

NOTE: $V_{UX} = 235 \text{ LB}$
 $V_{UZ} = 235 \text{ LB}$



H100 FIXED RAIL, TYP., SEE
PAGE 22 FOR SECTIONS

NOTE: $V_{UX} = 172 \text{ LB}$
 $V_{UZ} = 172 \text{ LB}$



Sheet Title:

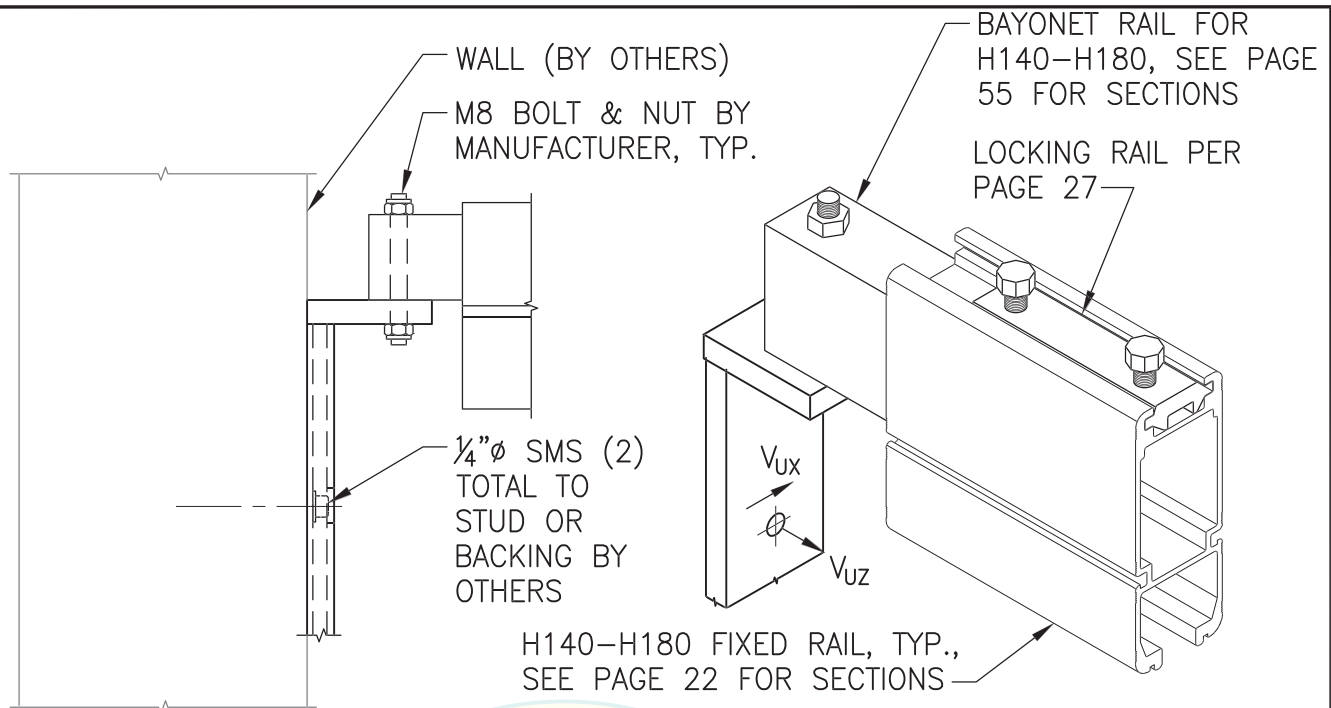
WALL CONNECTION – UPRIGHT SUPPORT

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

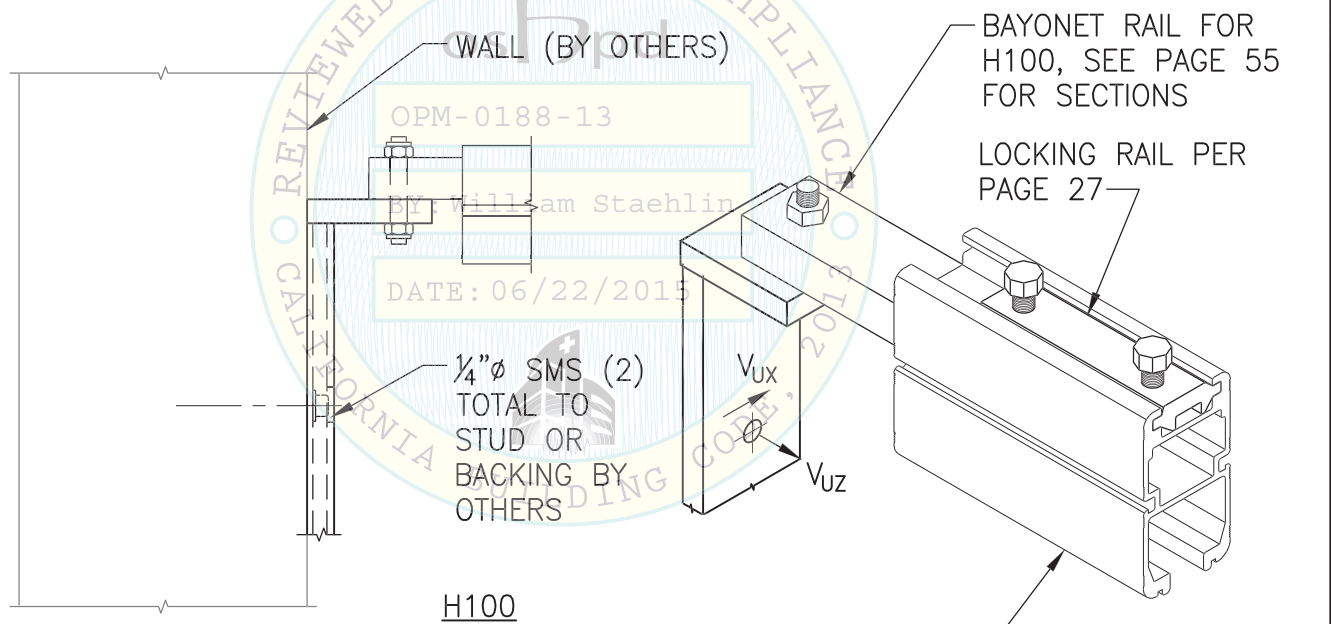
Scale: N.T.S	Date: 05/01/15	Page No.: 46 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:46 AM, bdalexander



H140-H180

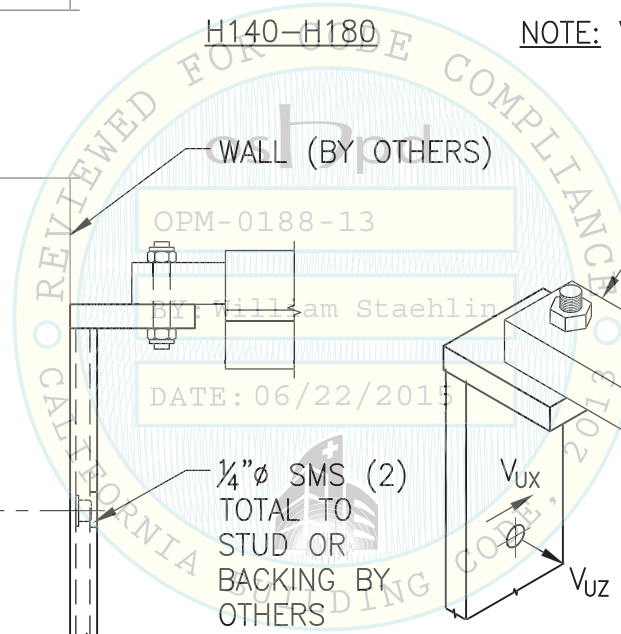
NOTE: $V_{UX} = 465 \text{ LB}$
 $V_{UZ} = 465 \text{ LB}$



H100

H100 FIXED RAIL, TYP., SEE PAGE 22 FOR SECTIONS

NOTE: $V_{UX} = 338 \text{ LB}$
 $V_{UZ} = 338 \text{ LB}$



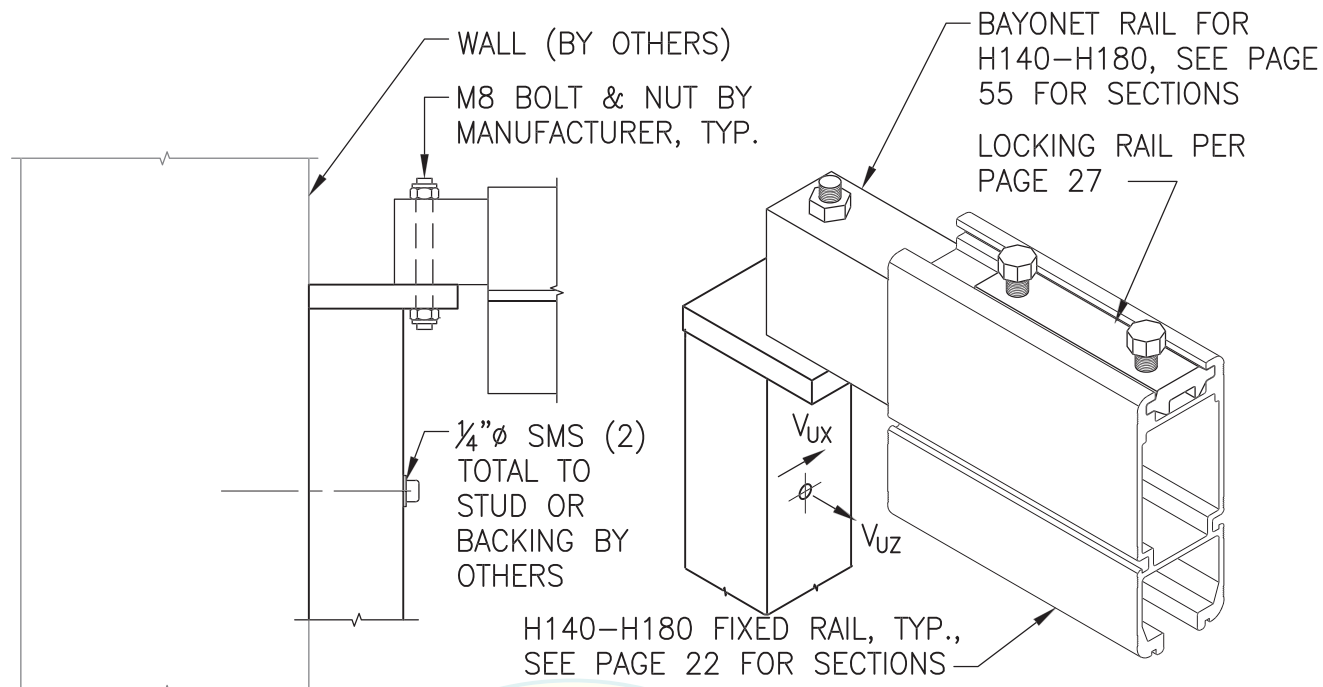
Sheet Title: WALL CONNECTION – SLIMLINE SUPPORT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

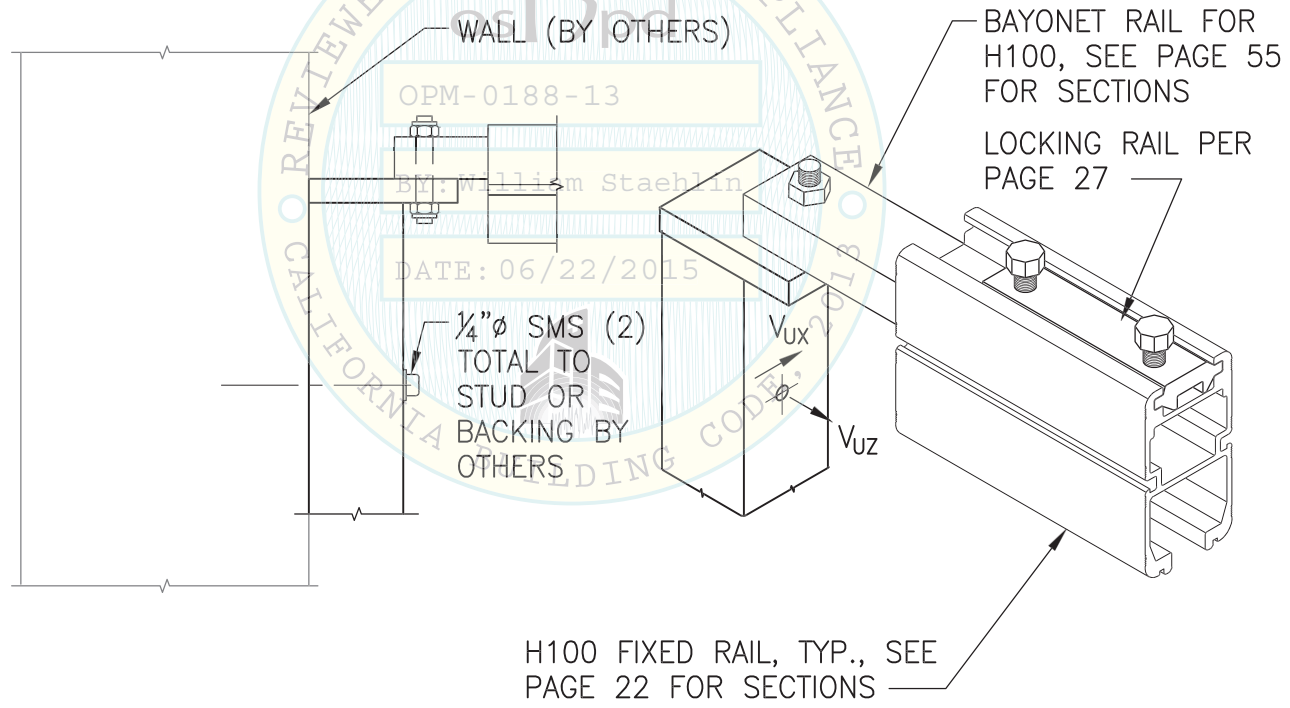
Scale: N.T.S	Date: 05/01/15	Page No.: 47 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-26-50.dwg, 5/10/2016 11:46:51 AM, bdalexander



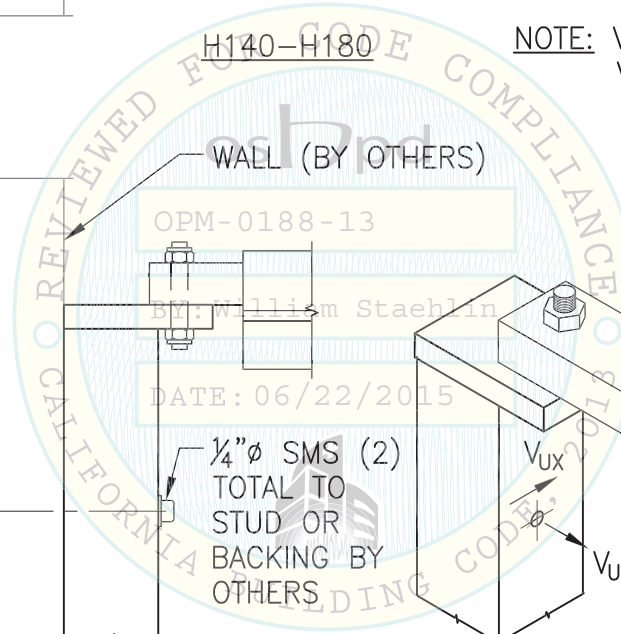
H140-H180

NOTE: $V_{ux} = 494 \text{ LB}$
 $V_{uz} = 494 \text{ LB}$



H100

NOTE: $V_{ux} = 368 \text{ LB}$
 $V_{uz} = 368 \text{ LB}$

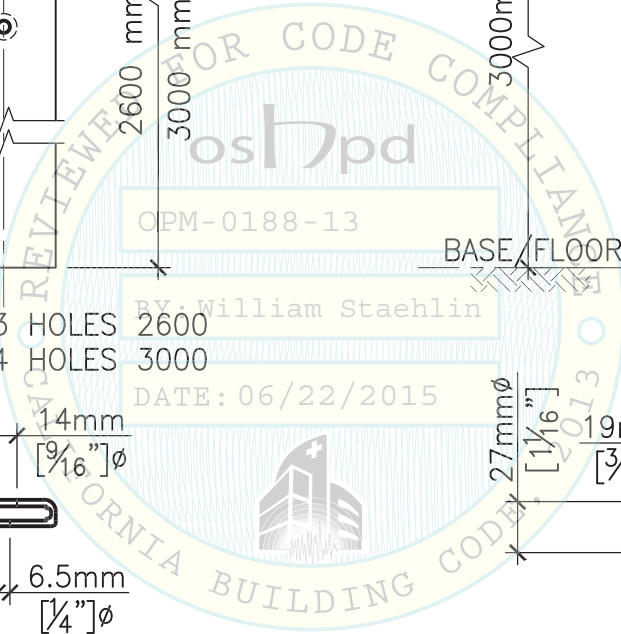
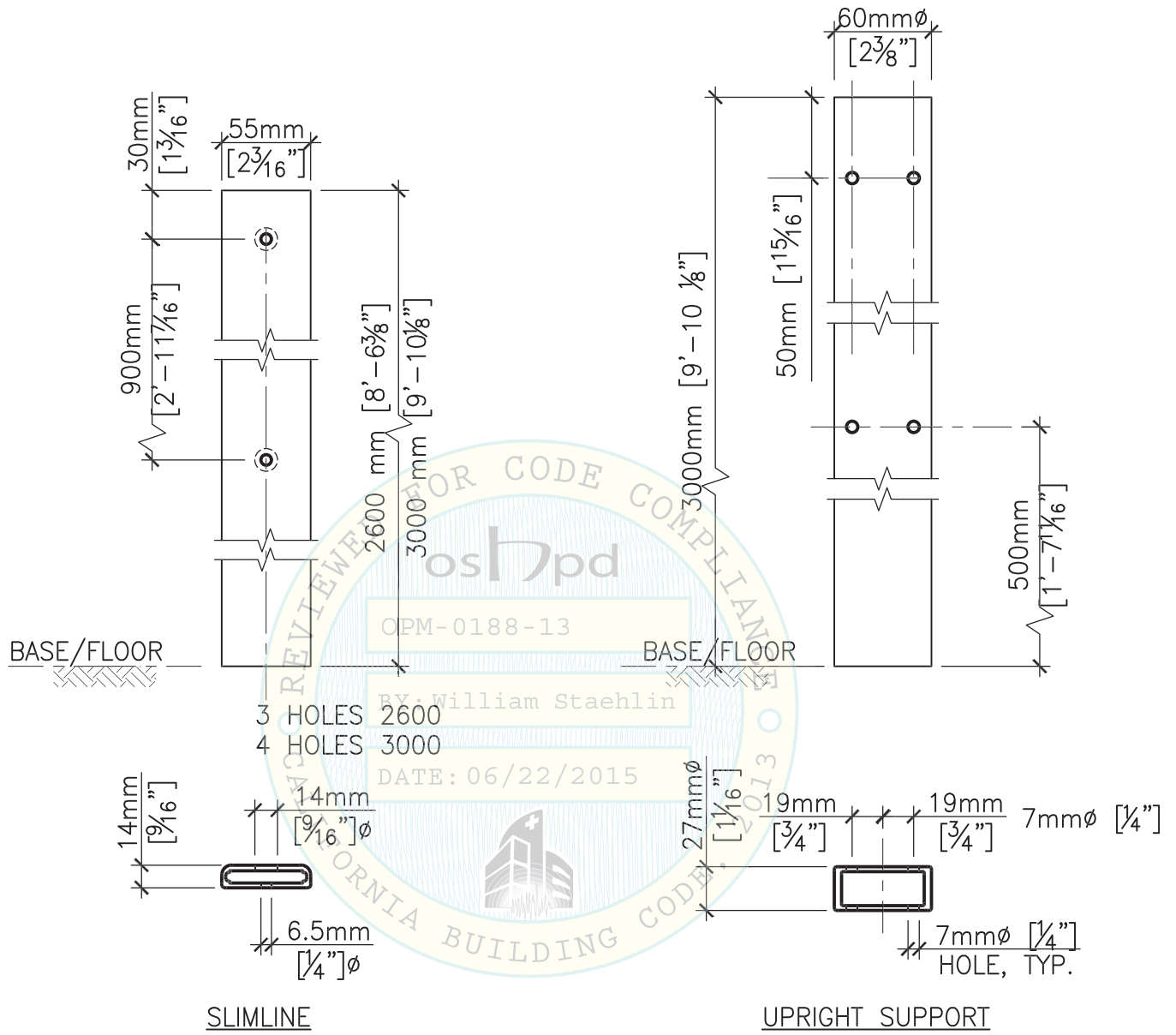


Sheet Title: WALL CONNECTION – STEEL UPRIGHT SUPPORT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

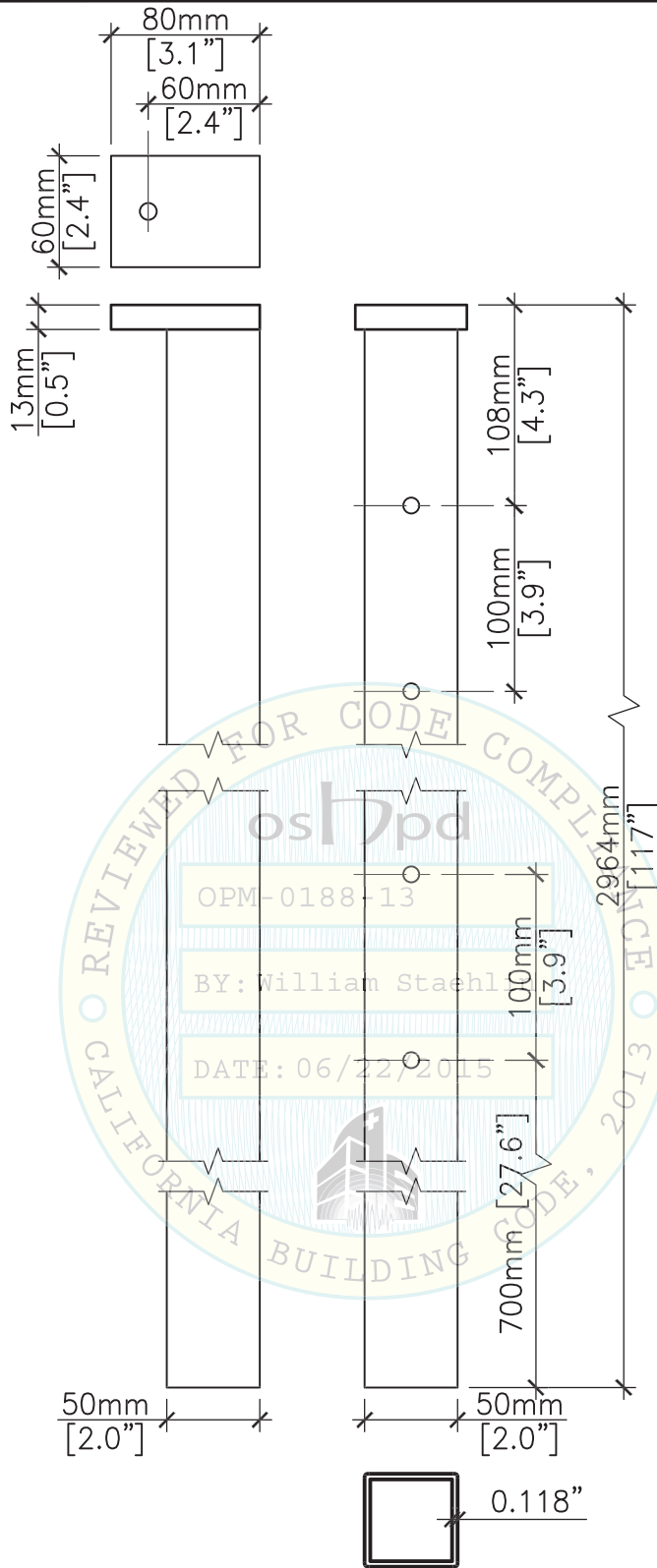
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 48 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528



Sheet Title: SLIMLINE AND UPRIGHT SUPPORT SECTIONS

SIMPSON GUMPERTZ & HEGER Engineering of Structures and Building Enclosures Simpson Gumpertz & Heger Inc. 100 Pine Street, Suite 1600 San Francisco, California 94111 415.495.3700 fax: 415.495.3550 www.sgh.com		Scale: N.T.S	Date: 05/01/15	Page No.: 49 of 76
		OPM-0188-13		



Sheet Title:

STEEL UPRIGHT SUPPORT SECTION

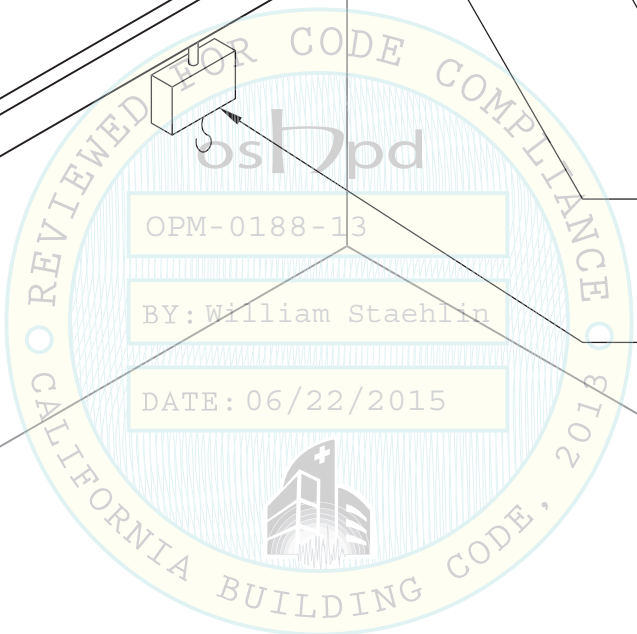
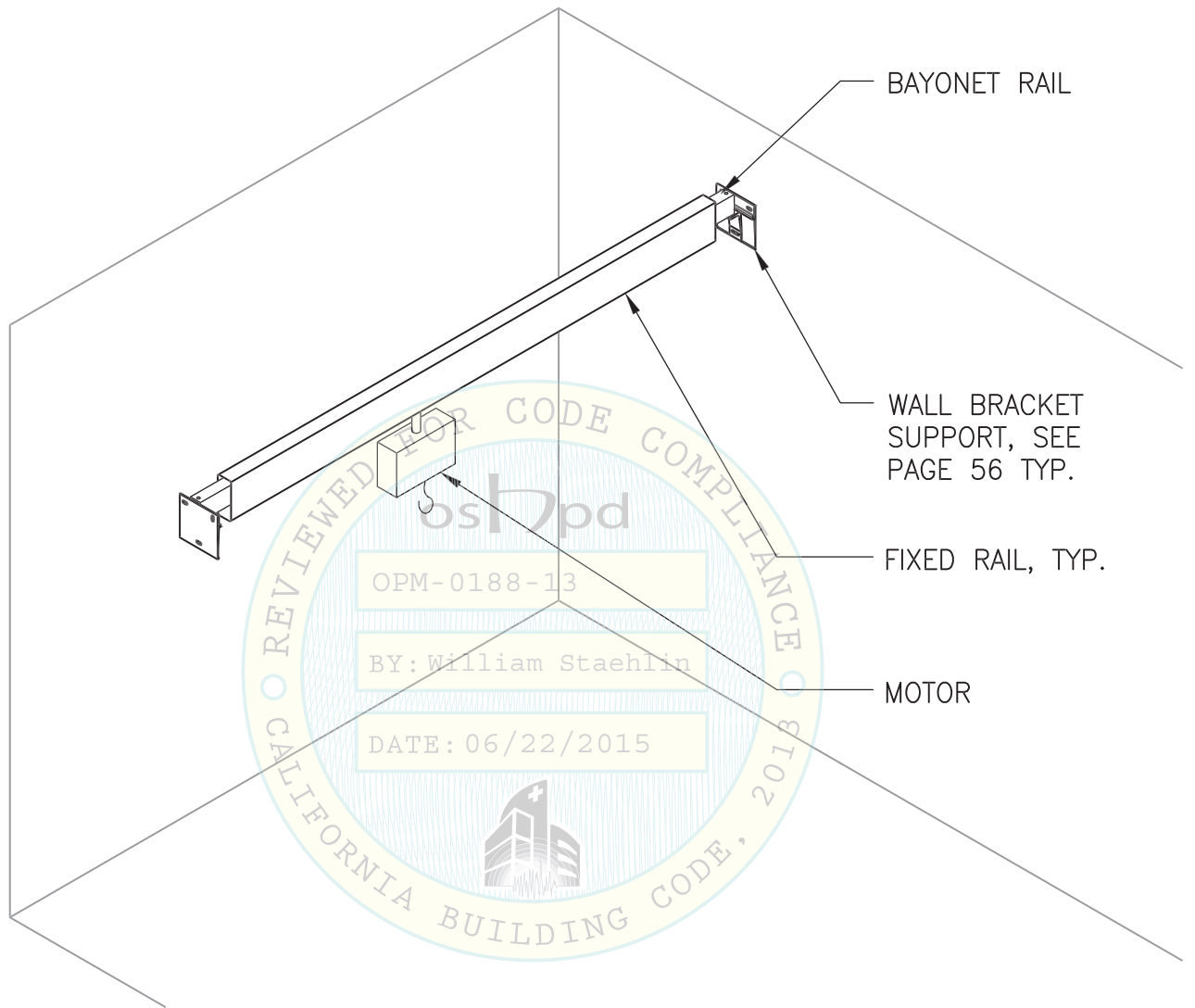
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



Scale: N.T.S	Date: 05/01/15	Page No.: 50 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:34:46 AM, bdalexander



ISOMETRIC

Sheet Title: ISOMETRIC VIEW OF SINGLE RAIL SYSTEM ON WALL BRACKET SUPPORTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 

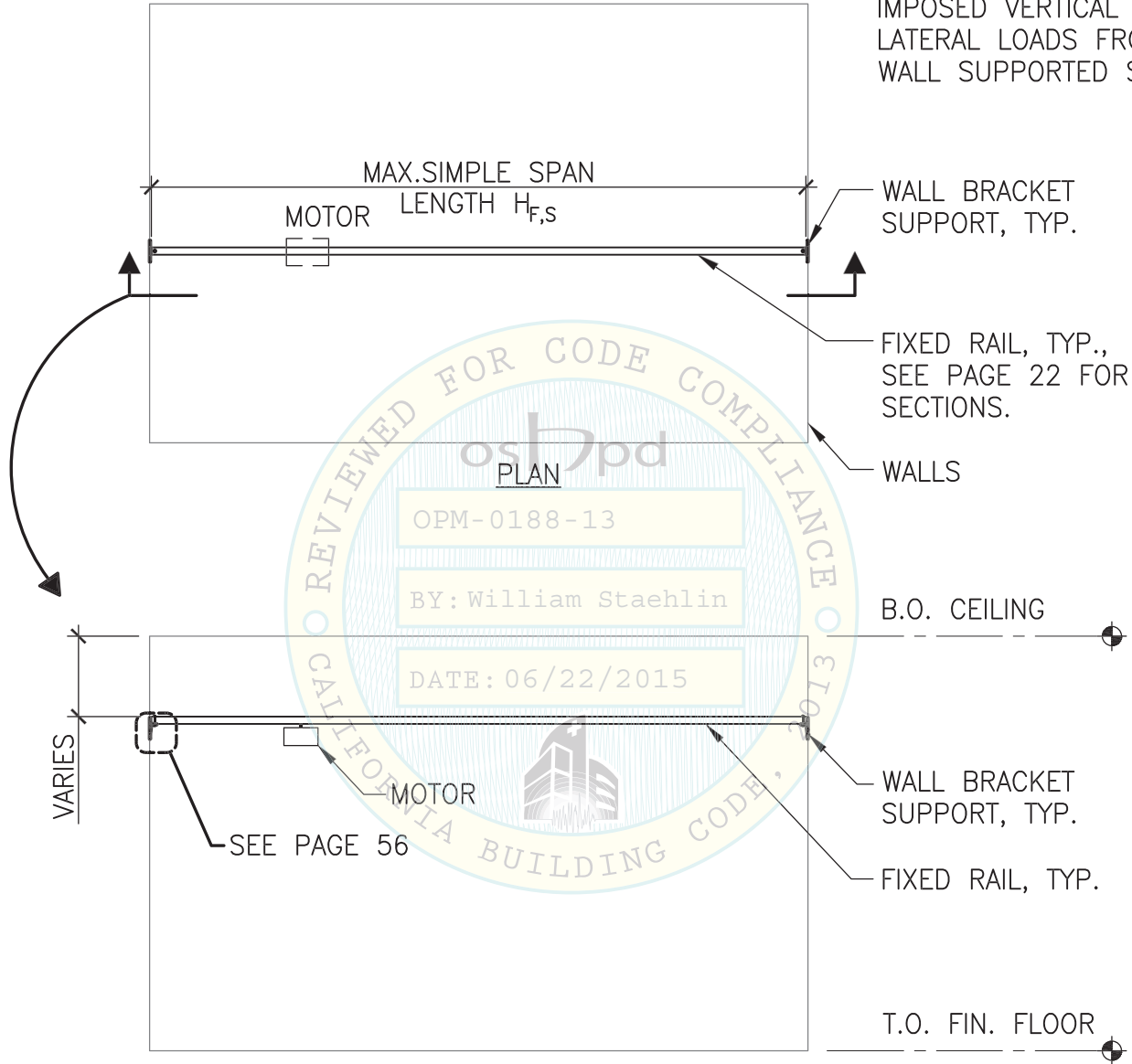
Scale: N.T.S	Date: 05/01/15	Page No.: 51 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:34:50 AM, bdalexander

NOTES:

1. FOR MAXIMUM ALLOWABLE SIMPLE SPAN LENGTHS SEE TABLE ON PAGE 21.
2. CALIFORNIA REGISTERED DESIGN PROFESSIONAL MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE WALL SUPPORTED SYSTEM.



Sheet Title:

SPAN LENGTH FOR SINGLE RAIL SYSTEM ON WALL BRACKET SUPPORTS

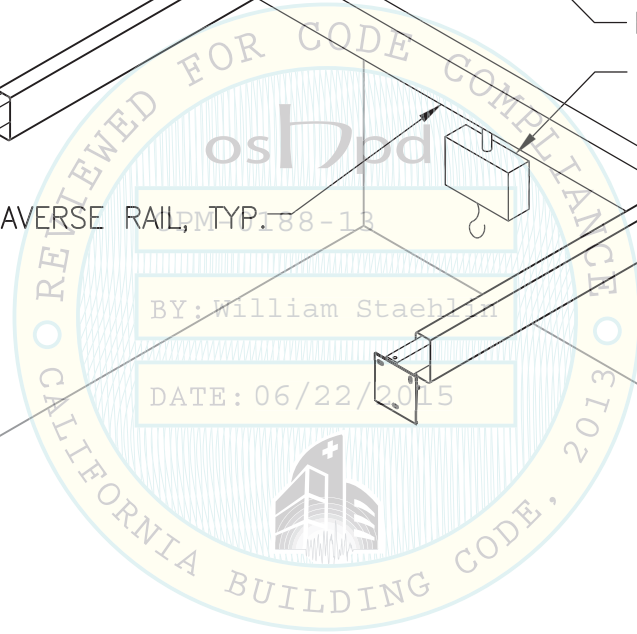
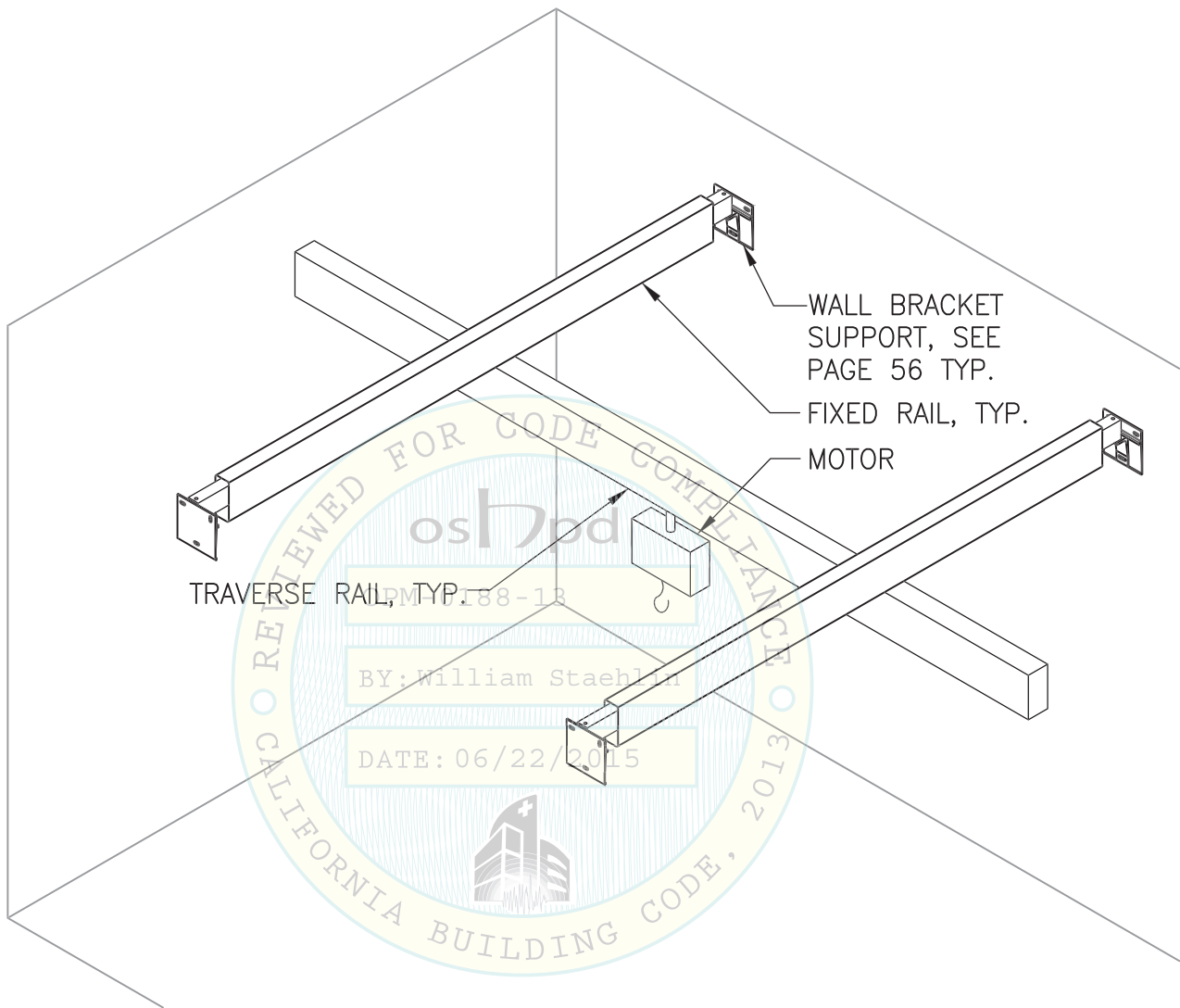
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 52 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:34:56 AM, bdalexander



ISOMETRIC

Sheet Title: ISOMETRIC VIEW OF TRAVERSE SYSTEM ON WALL BRACKET SUPPORTS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom 

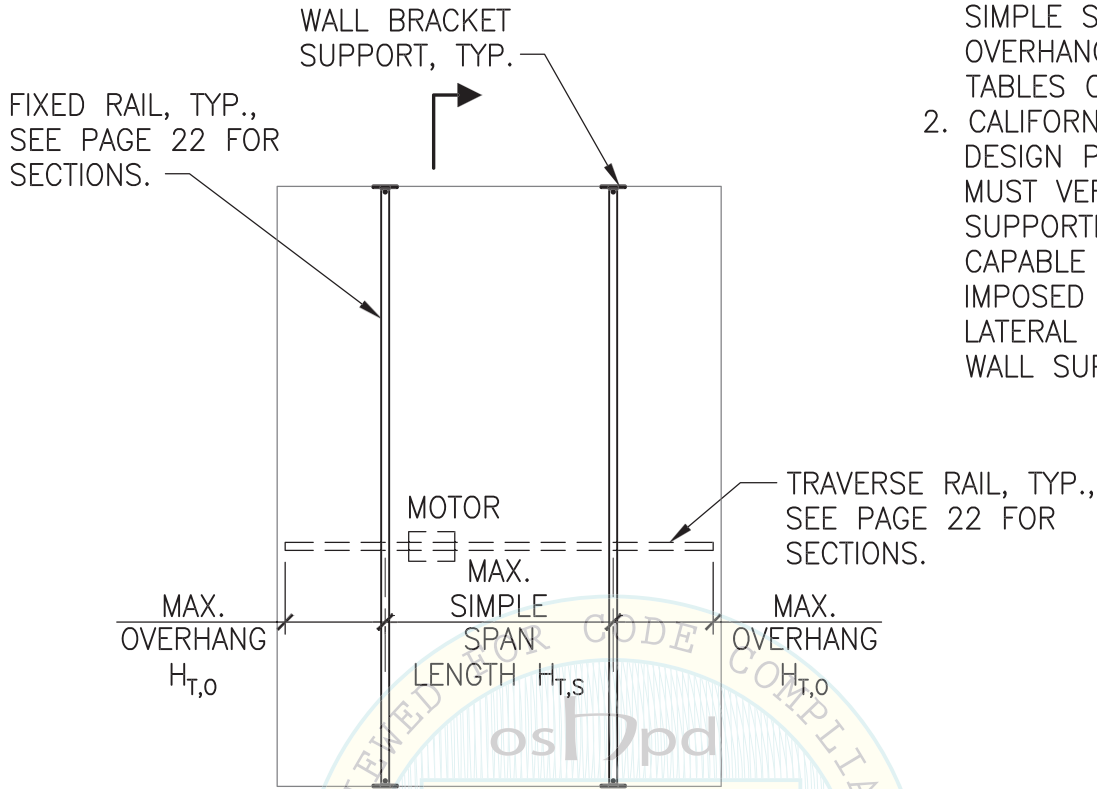
Scale: N.T.S	Date: 05/01/15	Page No.: 53 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

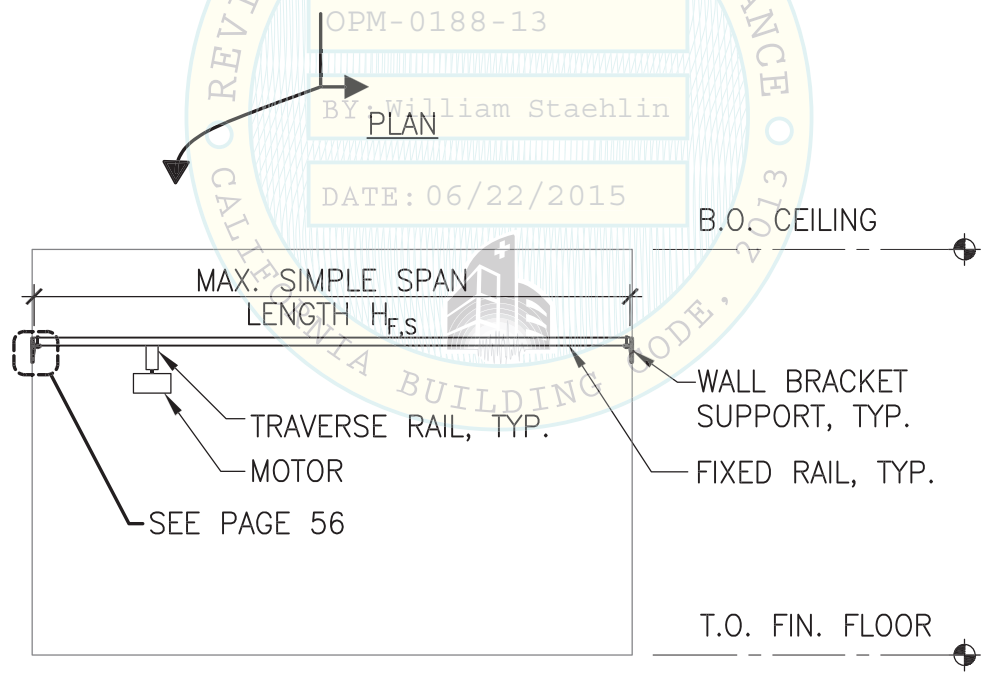
I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:00 AM, bdalexander

NOTES:

1. FOR MAXIMUM ALLOWABLE SIMPLE SPAN AND OVERHANG LENGTHS SEE TABLES ON PAGES 17-20.
2. CALIFORNIA REGISTERED DESIGN PROFESSIONAL MUST VERIFY THAT THE SUPPORTING STRUCTURE IS CAPABLE OF CARRYING ALL IMPOSED VERTICAL AND LATERAL LOADS FROM THE WALL SUPPORTED SYSTEM.



OPM-0188-13
 BY William Staehlin
 DATE: 06/22/2015



ELEVATION

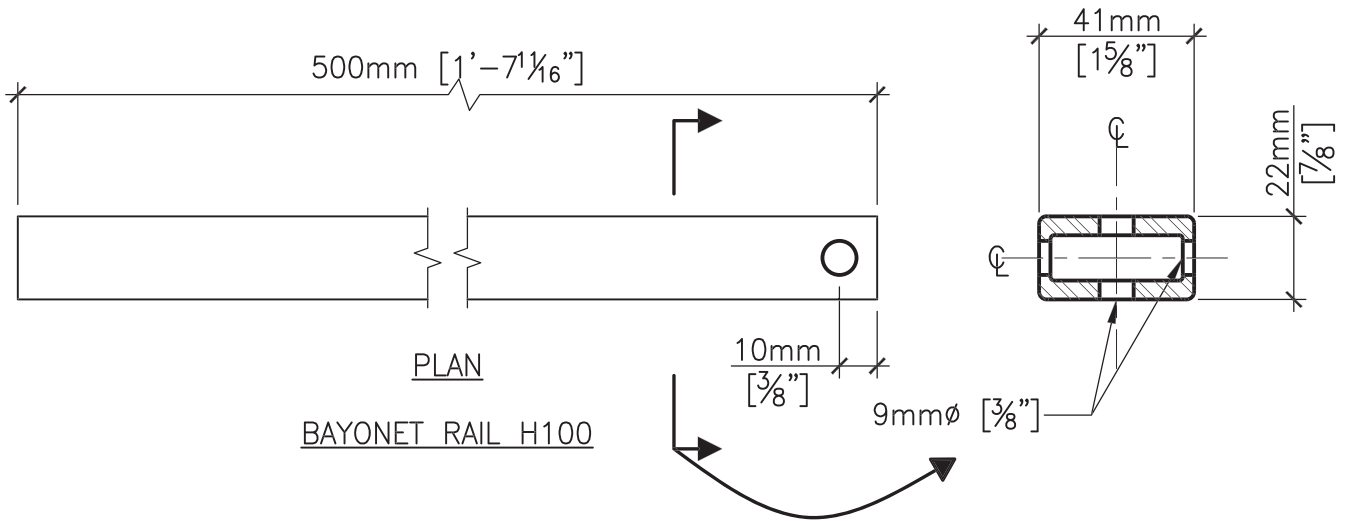
Sheet Title: **SPAN AND OVERHANG LENGTH FOR TRAVERSE SYSTEM ON WALL BRACKET SUPPORTS**

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc.
 100 Pine Street, Suite 1600
 San Francisco, California 94111
 415.495.3700
 fax: 415.495.3550
 www.sgh.com

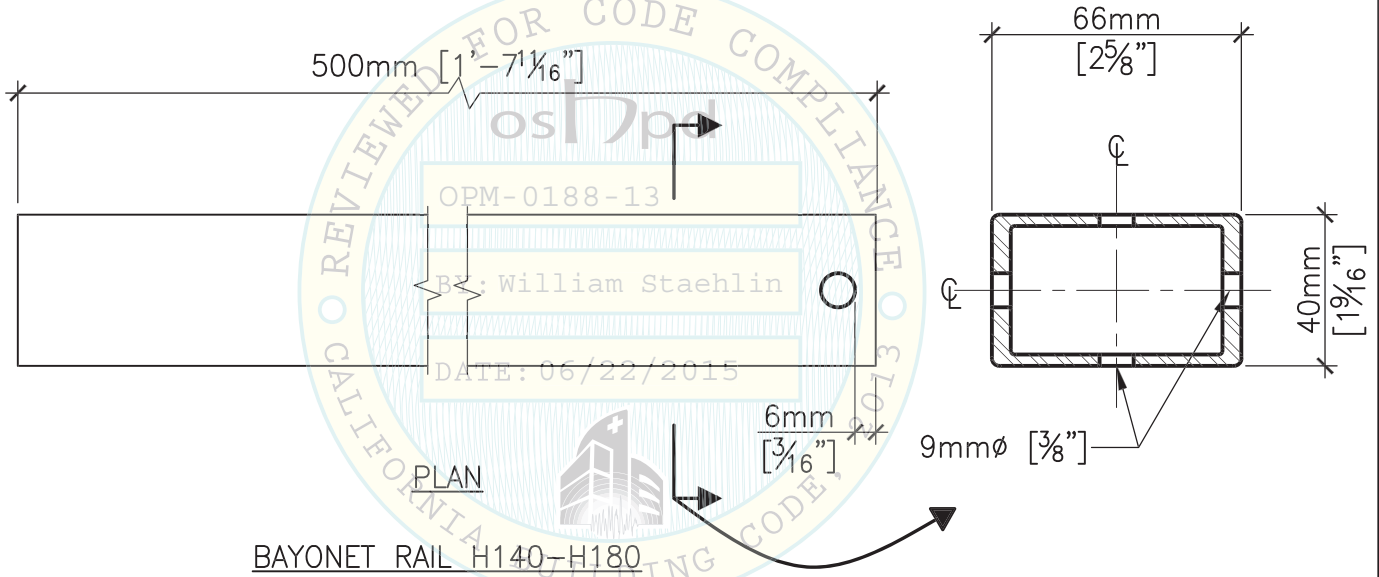
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 54 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

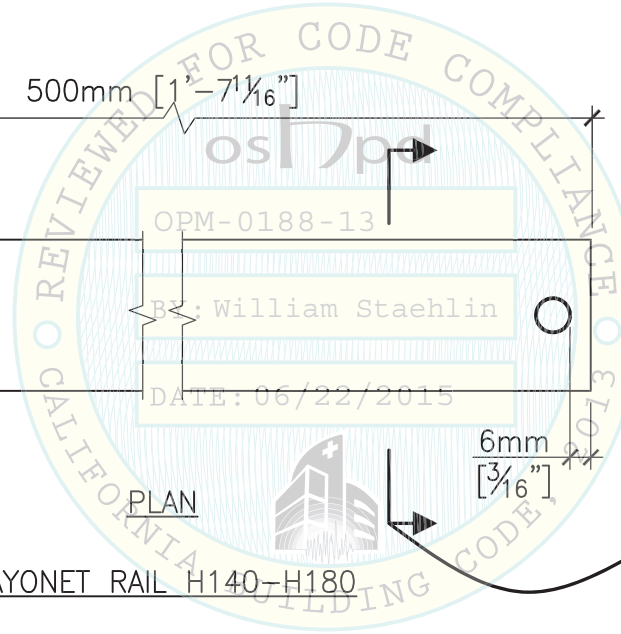
I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:05 AM, bdalexander



PLAN
BAYONET RAIL H100



PLAN
BAYONET RAIL H140-H180



Sheet Title:

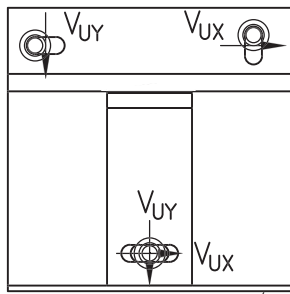
BAYONET RAILS – H100 AND H140-H180

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

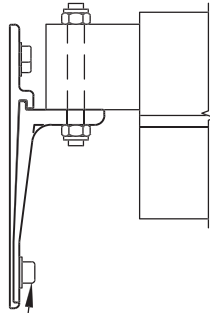
Scale: N.T.S	Date: 05/01/15	Page No.: 55 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:11 AM, bdalexander

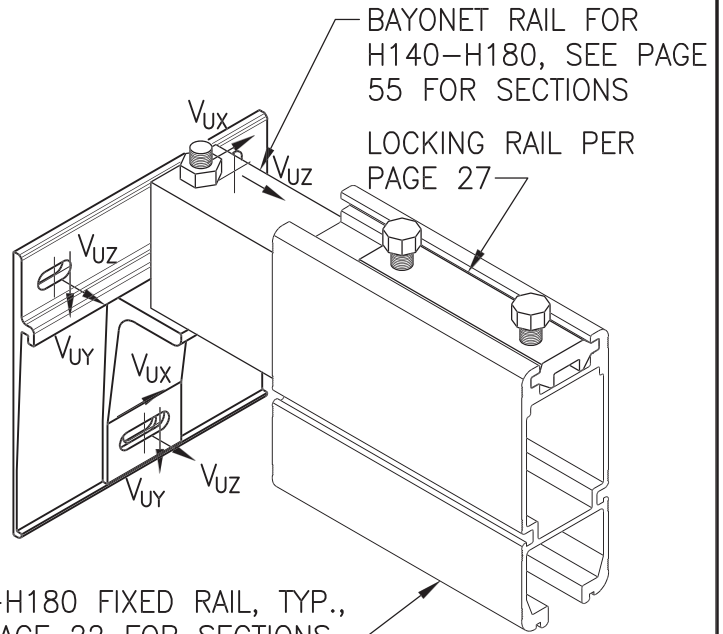


WALL BRACKET,
SEE PAGE 57

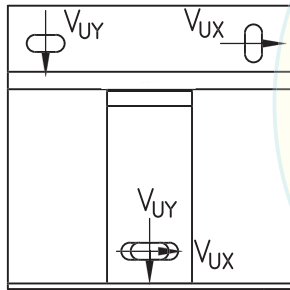
3/8" HHCS W/ NUT TO
STUD OR BACKING BY
OTHERS, TYP.



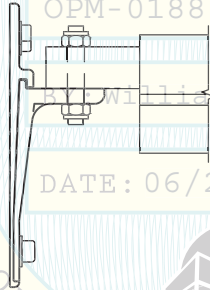
H140-H180 FIXED RAIL, TYP.,
SEE PAGE 22 FOR SECTIONS



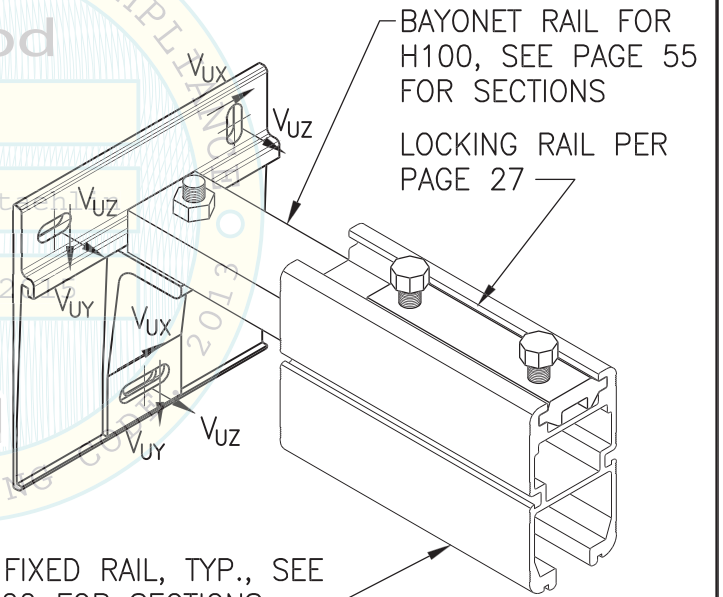
NOTE: $V_{UX} = 229$ LB
 $V_{UY} = 805$ LB
 $V_{UZ} = 229$ LB



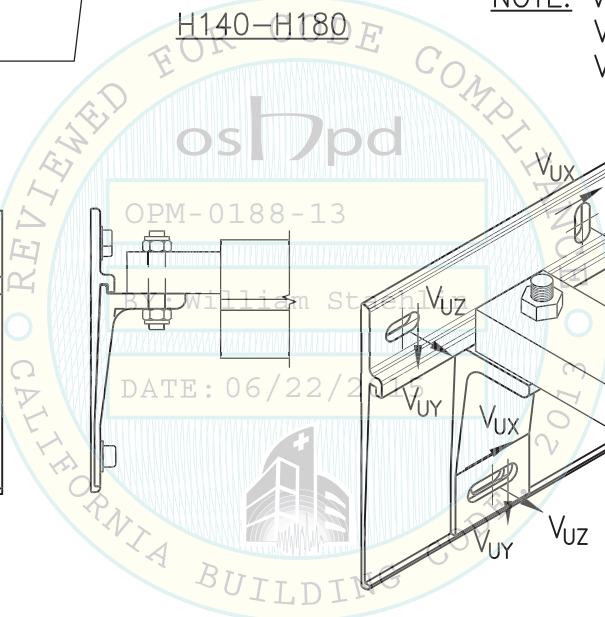
WALL BRACKET,
SEE PAGE 57



H100 FIXED RAIL, TYP., SEE
PAGE 22 FOR SECTIONS



NOTE: $V_{UX} = 166$ LB
 $V_{UY} = 790$ LB
 $V_{UZ} = 166$ LB



Sheet Title:

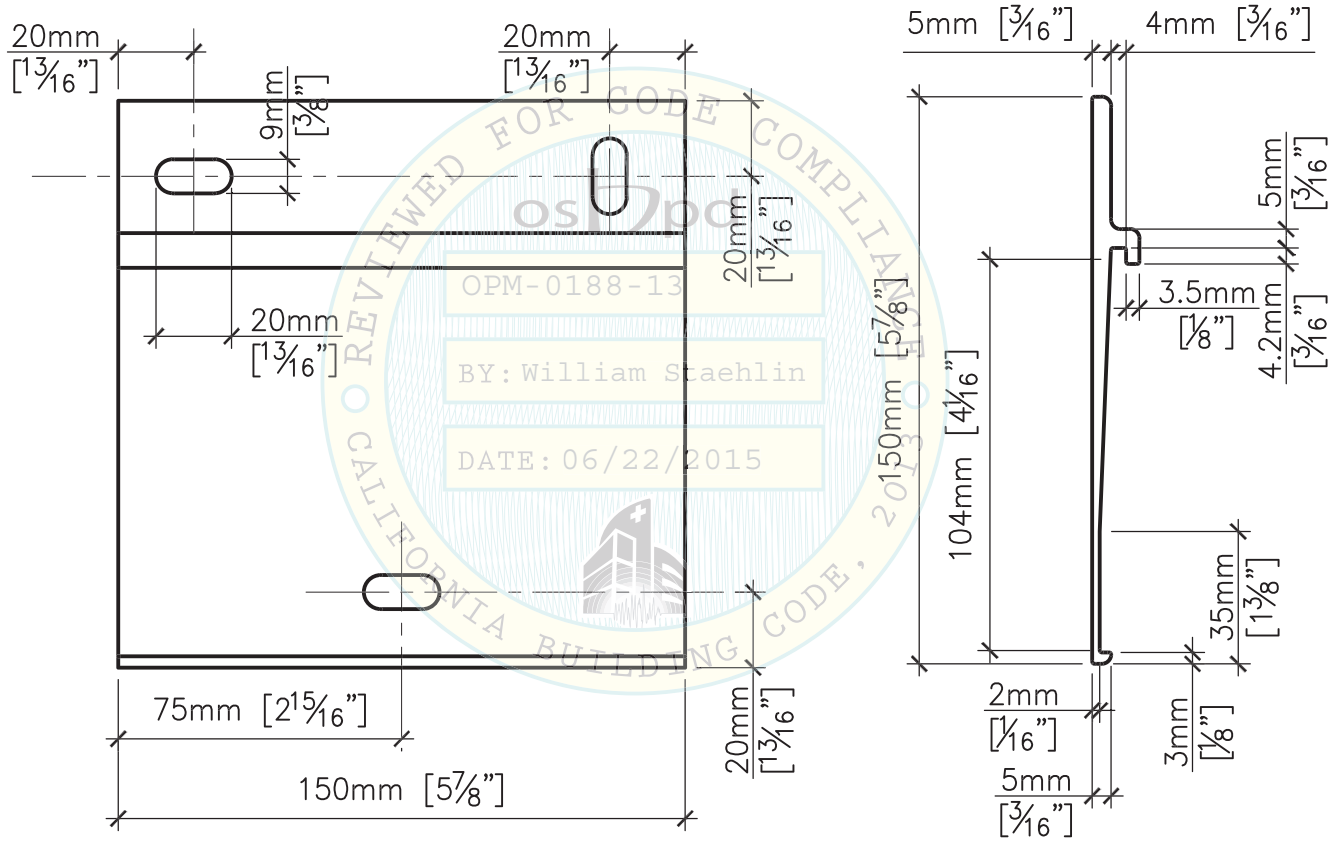
WALL BRACKET ASSEMBLY

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 56 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:16 AM, bdalexander



REVIEWED FOR CODE COMPLIANCE
 OPM-0188-13
 BY: William Staehlin
 DATE: 06/22/2015
 CALIFORNIA BUILDING CODE, 2013

Sheet Title: WALL BRACKET

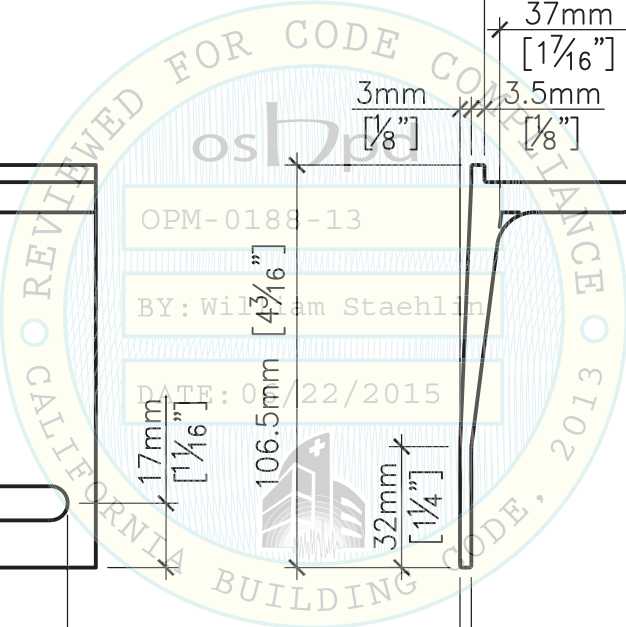
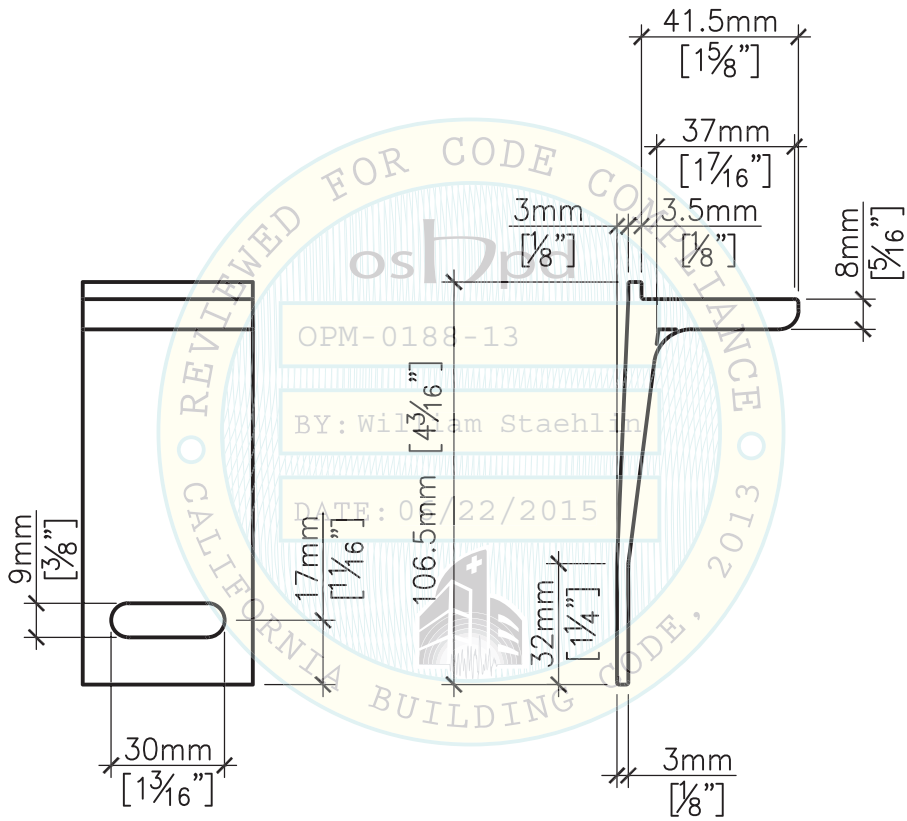
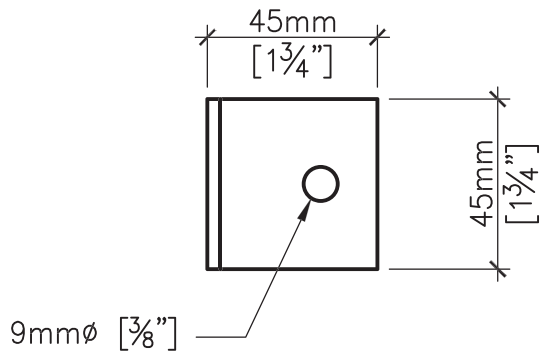
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 57 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:20 AM, bdalexander



Sheet Title:

WALL BRACKET – TURNABLE ASSEMBLY

SIMPSON GUMPERTZ & HEGER

Engineering of Structures
and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com



Scale:
N.T.S

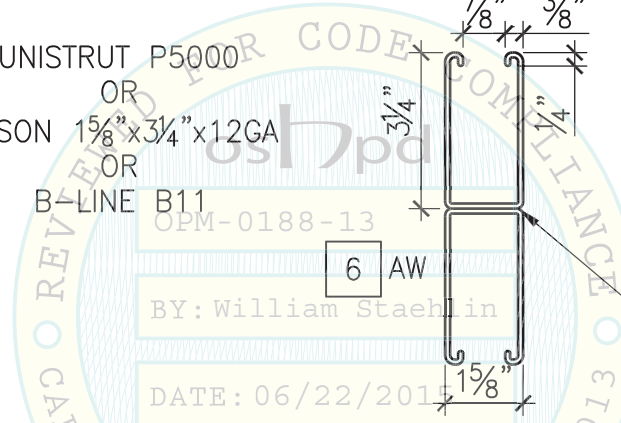
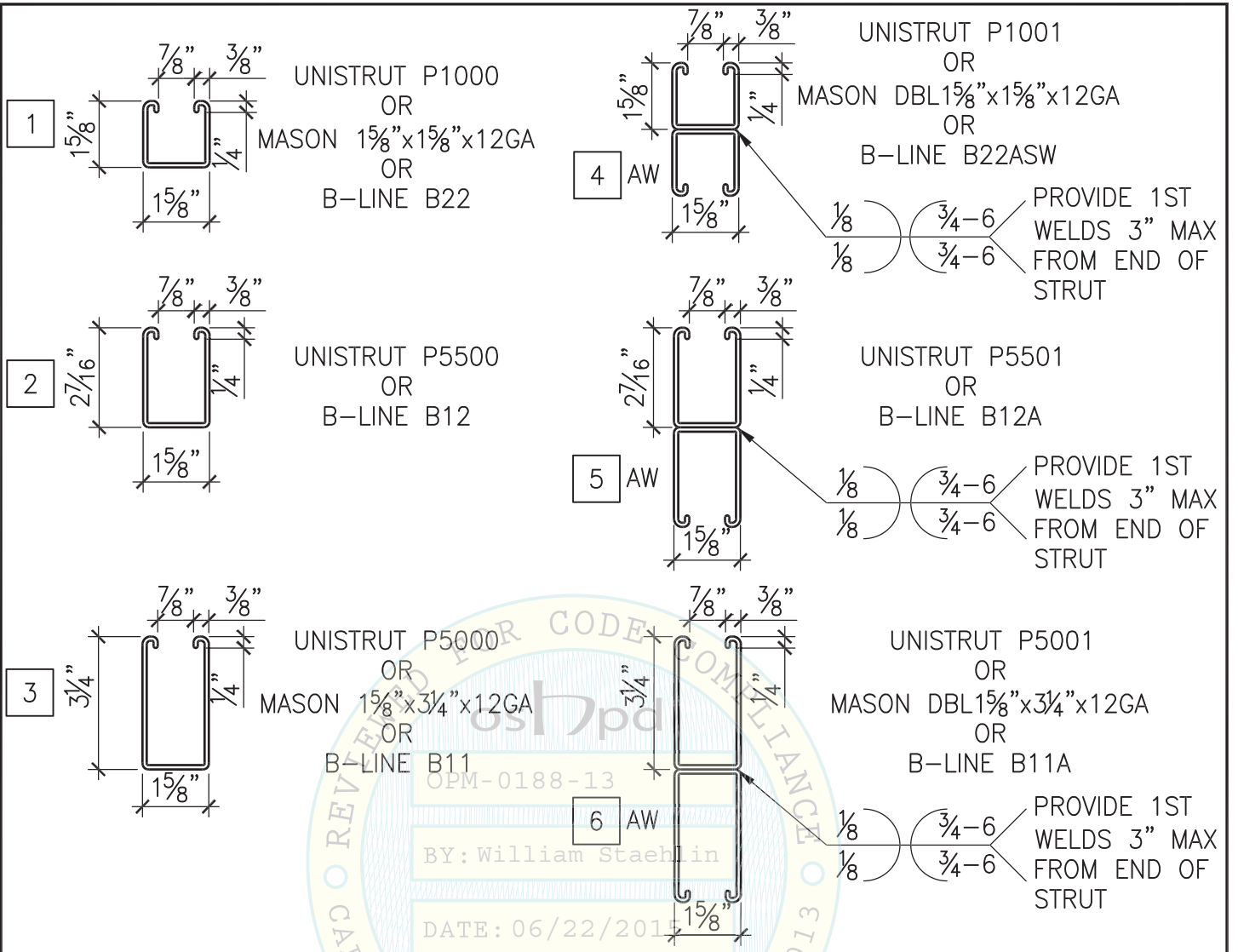
Date:
05/01/15

Page No.:
58 of 76

OPM-0188-13

Kevin S. Moore, SE
California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:25 AM, bdalexander



MINIMUM STRUT CHANNEL SECTION PROPERTIES								
STRUT MEMBER	WEIGHT (LBS/FT)	AREA (IN ²)	I _{xx} (IN ⁴)	S _{xx} (IN ³)	r _x (IN)	I _{yy} (IN ⁴)	S _{yy} (IN ³)	r _y (IN)
1	1.89	0.544	0.180	0.195	0.575	0.233	0.287	0.655
2	2.52	0.726	0.522	0.390	0.848	0.334	0.411	0.679
3	3.05	0.844	1.073	0.609	1.102	0.429	0.529	0.696
4 AW	3.78	1.088	0.896	0.570	0.908	0.466	0.574	0.655
5 AW	5.04	1.452	0.669	0.823	0.679	2.805	1.151	1.390
6 AW	6.10	1.768	6.064	1.896	1.852	0.859	1.057	0.696

1. STRUT MATERIAL TO BE MANUFACTURED OF COLD ROLLED MILD STEEL MEETING ASTM-A101155 GRADE 33
2. ALL BOLT HOLES SHALL BE STANDARD HOLES (BOLT DIA. + 1/16")
3. ALL SECTIONS SHALL BE SOLID SECTIONS, NO PUNCHED OR SLOTTED HOLES

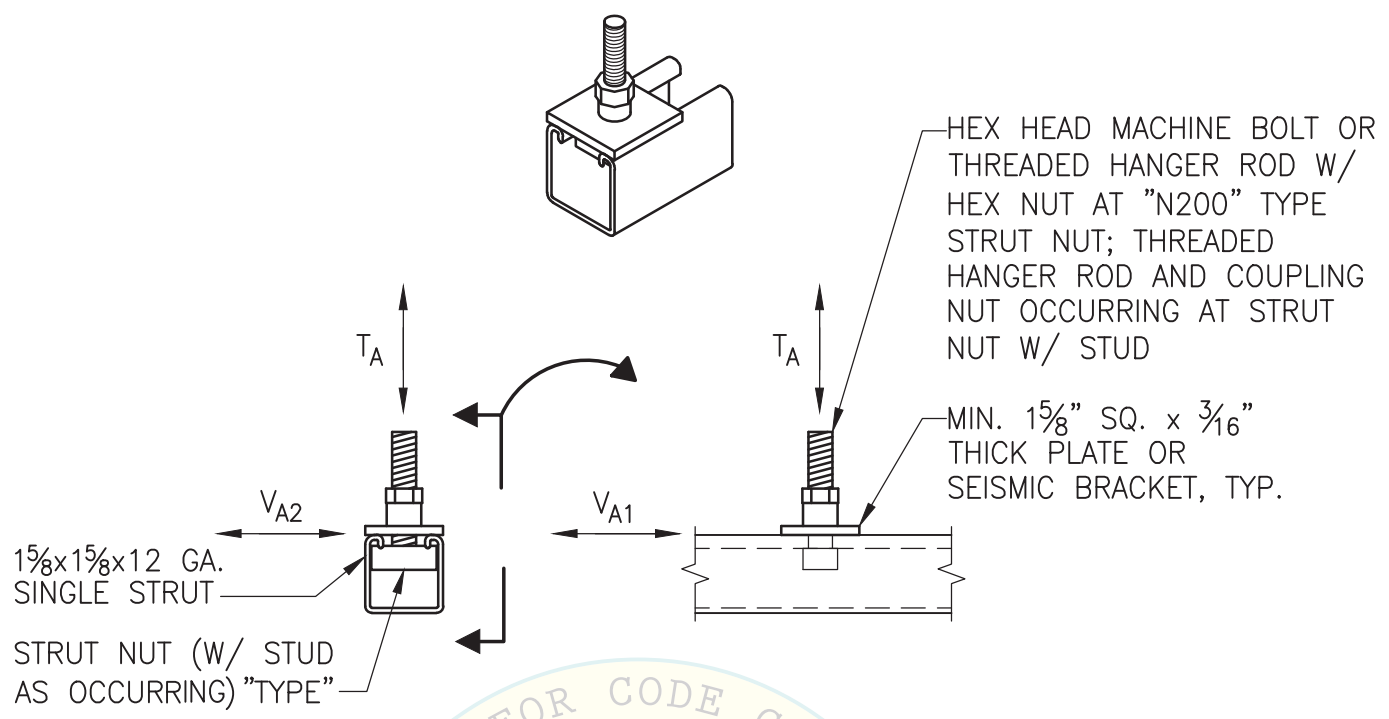
Sheet Title: STRUT CHANNEL SECTION PROPERTIES

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S Date: 05/01/15 Page No.: 59 of 76
 OPM-0188-13
 Kevin S. Moore, SE
 California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/19/2016 9:01:24 AM, bdalexander



TYPE	DIAMETER	TENSION (T_A)	SHEAR (V_{A1})	SHEAR (V_{A2})	TIGHTENING TORQUE
N200 BN200	3/8"	3959 LBS	2179 LBS	1261 LBS	19 FT-LB
N200 BN200	1/2"	3737 LBS	3115 LBS	1412 LBS	50 FT-LB
MW-SSN-1/2 & MW-BON-1/2	1/2"	2620 LBS	1630 LBS	810 LBS	50 FT-LB

NOTE:

1. COMBINED TENSION AND SHEAR LOADS SHALL BE CHECKED FOR UNITY, $T/T_A + V_1/V_{A1} + V_2/V_{A2} \leq 1.0$
2. ADJACENT BOLTS/HANGERS SHALL HAVE A MINIMUM SPACING OF 4".
3. CAPACITIES NOTED ABOVE ARE ALL ALLOWABLE STRESS DESIGN (ASD).

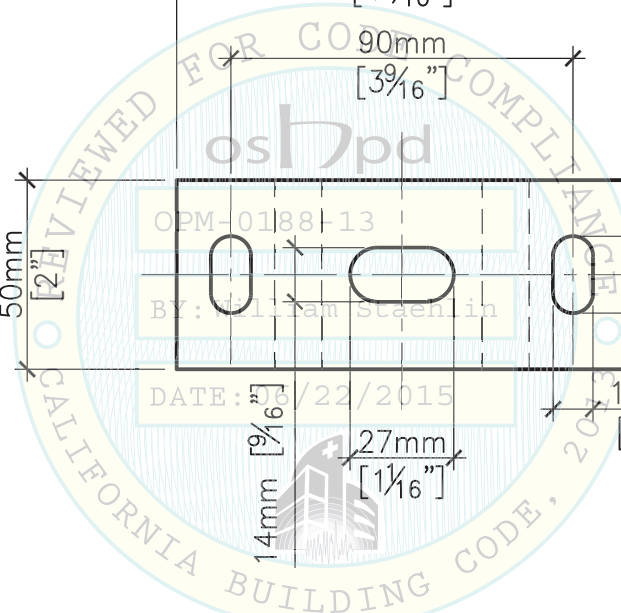
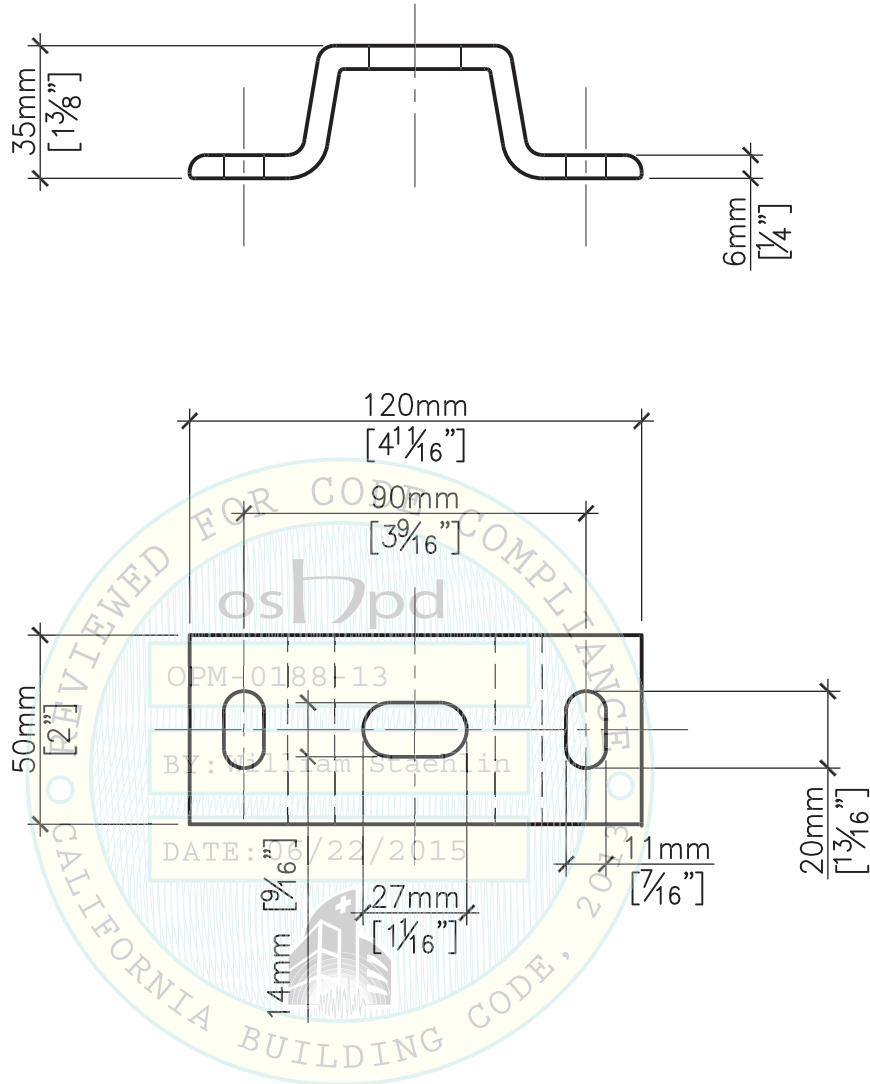
Sheet Title:

BOLT AND NUT HARDWARE

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S. Date: 05/01/15 Page No.: 60 of 76
OPM-0188-13
Kevin S. Moore, SE
California SE No. 4528



Sheet Title:

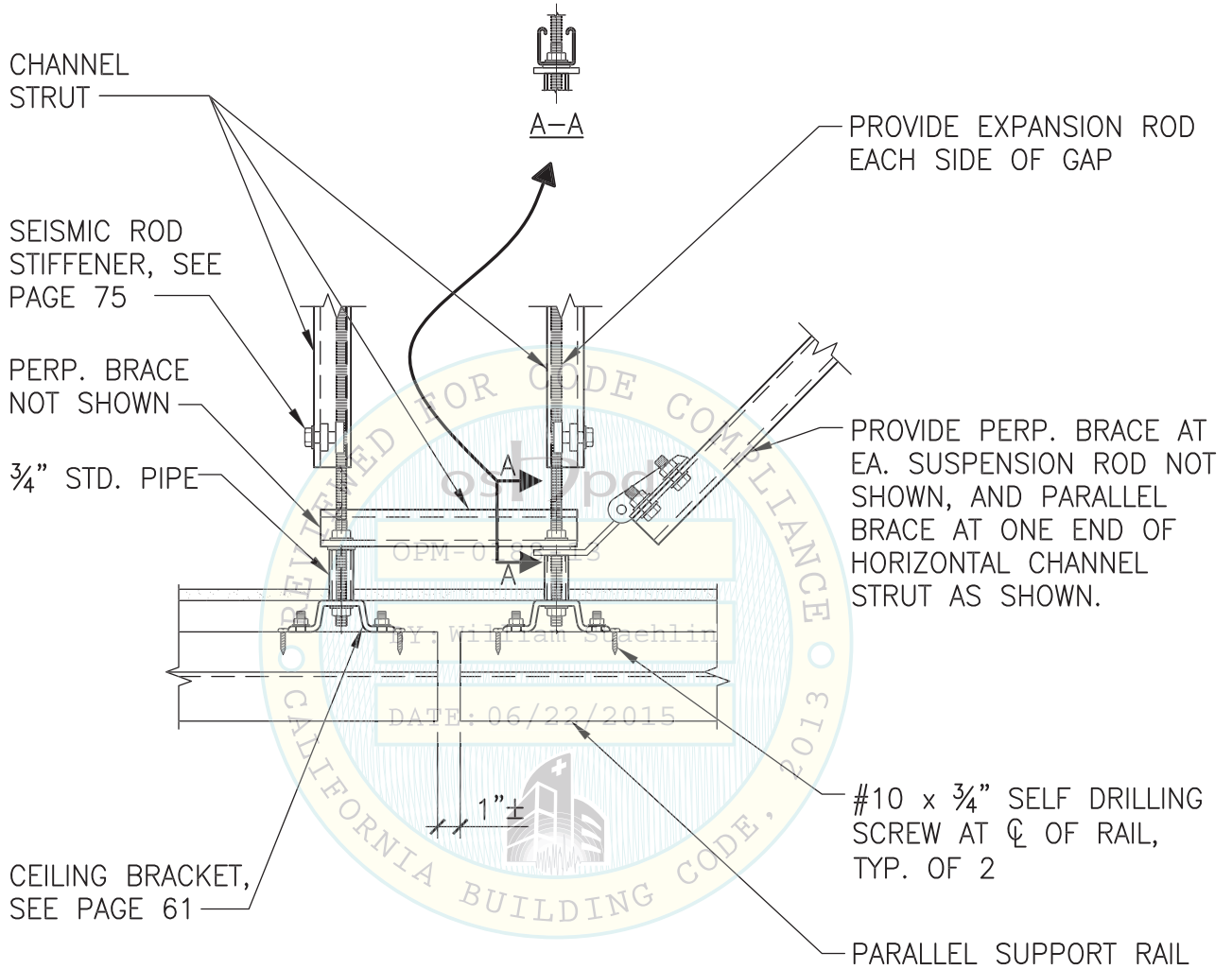
CEILING BRACKET

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 61 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:41 AM, bdalexander



Sheet Title:

RAIL GAP FOR CURTAIN

SIMPSON GUMPERTZ & HEGER

Engineering of Structures and Building Enclosures

Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 62 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/11/2016 3:09:33 PM, bdalexander

MW-SSN- $\frac{1}{2}$ TO $\frac{1}{2}$ " ϕ ROD
COUPLER, ENGAGE

MW-SSN- $\frac{1}{2}$ BY $\frac{1}{2}$ " MIN. AND
 $\frac{1}{2}$ " ϕ ROD BY $\frac{1}{2}$ " MIN.

MW-SSN- $\frac{1}{2}$ W/ MW-BON- $\frac{1}{2}$
AND MIN. $1\frac{5}{8}$ " SQ. X $\frac{3}{16}$ "
THICK PLATE, TYP.

BRACE AS NOTED BELOW

ANGLE
VARIANCE $\pm 15^\circ$

MASON IND NY
SSBS-12 (HINGE) W/
MIN. (2) MW-SSN- $\frac{1}{2}$
W/ MW-BON- $\frac{1}{2}$ PER
OPM-0043-13 FOR
EA. BRACE

STRUT PER SCHEDULE
ON PAGE 76

$\frac{3}{8}$ " ϕ A307 HHCS BOLT W/ $\frac{3}{8}$ "
N200 OR BN200 OR $\frac{3}{8}$ " ϕ NUT
AND MIN. $1\frac{5}{8}$ " SQ. X $\frac{3}{16}$ "
THICK PLATE AT TOP, TYP.

$\frac{1}{2}$ " ϕ SUSPENSION ROD
W/ STRUT STIFFENER,
TYP. SEE PAGE 75

SEE PAGES 66 TO 71
FOR CONN. OF SUSPENSION
RODS TO STRUCTURE ABOVE.

SIMPLE SPAN "L"

OBSTRUCTION

1" MIN.
TYP.
6" MAX.
TYP.

THRU BOLT,
8mm
PENDANT,
PAGE 64

8" MAX.

OPM-0188-13

8MM BOLT AND
INSERT PLATE, TYP.

FIXED RAIL, SEE
PAGE 22 FOR
SECTIONS

BRACING: PROVIDE BRACE PARALLEL TO STRUT
CHANNEL AT ONE SUPPORT POINT AS SHOWN
AND PERPENDICULAR TO STRUT CHANNEL AT
BOTH SUPPORT POINTS (NOT SHOWN). SUPPORT
POINT AT OPPOSITE END OF RAIL WOULD THEN
NOT REQUIRE A BRACE PARALLEL TO THE RAIL.
SEE PAGES 72 TO 74 FOR CONNECTION OF
BRACE TO STRUCTURE ABOVE.

NOTE: THIS TRAPEZE ASSEMBLY CANNOT
BE USED TO BRACE A DUCT IN ADDITION
TO BRACING THE LIKO SYSTEM.

SEE PAGE 23 AND 24 FOR BRACE TO
PENDANT WHERE OCCURS

Sheet Title:

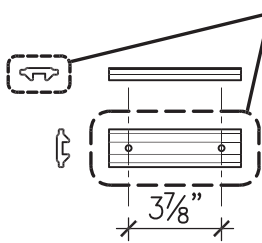
TRAPEZE ASSEMBLY FOR SUSPENSION POINT AT OBSTRUCTION

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

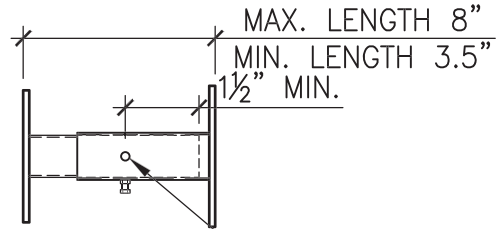
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 63 of 76
-----------------	-------------------	-----------------------

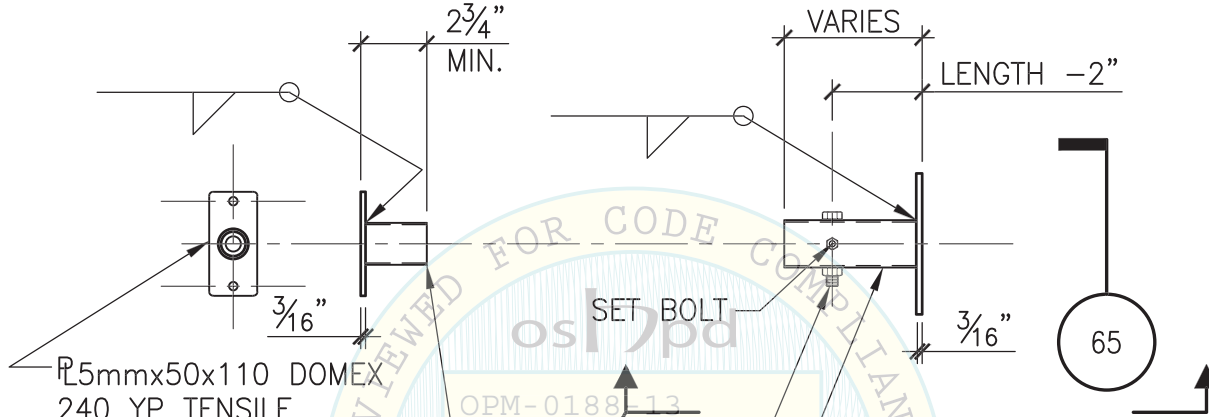
OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--



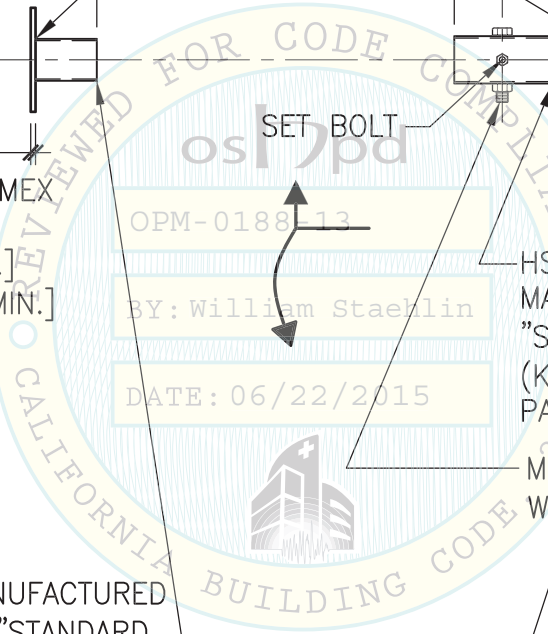
"LOCKING RAIL"
 PROPRIETARY EXTRUDED
 ALUMINUM RAIL TO PENDANT
 ATTACHMENT INSERT, SIMILAR



9mm THRU HOLE FOR A
 FIELD INSTALL M65 M8x60
 BOLT WITH NYLOC NUT



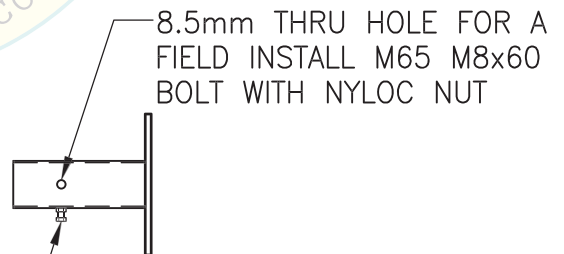
5mmx50x110 DOMEX
 240 YP TENSILE
 (KSI): [52/66 MIN.]
 YIELD (KSI): [34 MIN.]
 PAINTED WHITE TO
 PREVENT GALVANIC
 CORROSION, TYP.



HSS50mmx2mm MIN.,
 MANUFACTURED TO SS EN10305-3
 "STANDARD MATERIAL", E220 TENSILE
 (KSI): 44 MIN. YIELD (KSI): 32 MIN.
 PAINTED WHITE.

M65 M8x60 BOLT
 W/ NYLOC NUT

HSS32mmx3mm MANUFACTURED
 TO SS EN10305-3 "STANDARD
 MATERIAL", E220
 TENSILE (KSI): 44 MIN.
 YIELD (KSI): 32 MIN.
 PAINTED WHITE TO PREVENT
 GALVANIC CORROSION, TYP.



8.5mm THRU HOLE FOR A
 FIELD INSTALL M65 M8x60
 BOLT WITH NYLOC NUT
 8mm NUT WELDED TO HSS TO
 RECEIVE M65 M8x16 SET BOLT (NOT
 PART OF STRUCTURAL SYSTEM)

Sheet Title:

PENDANT FOR TRAPEZE ASSEMBLY, PRE-MANUFACTURED; LIKO (SWEDEN)

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

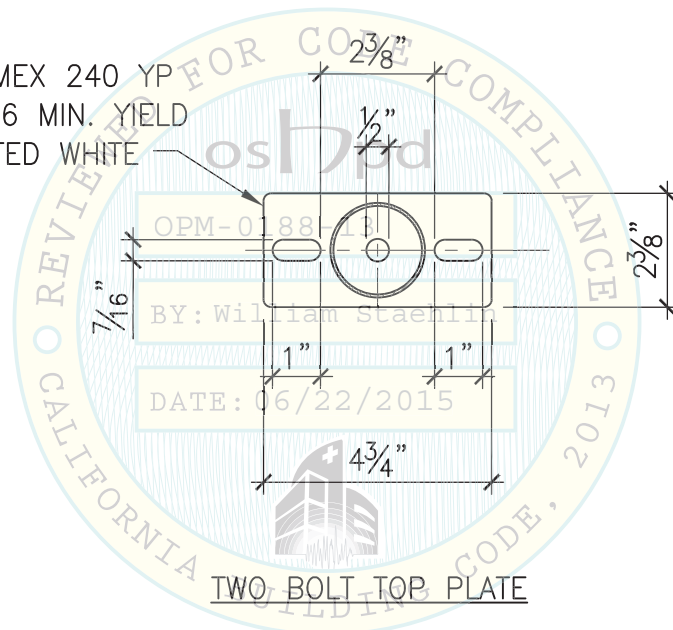
Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 64 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:50 AM, bdalexander

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:35:56 AM, bdalexander

Ⓡ 6mmx60x120 DOMEX 240 YP
TENSILE (KSI): 52/66 MIN. YIELD
(KSI): 34 MIN. PAINTED WHITE



TWO BOLT TOP PLATE

Sheet Title:

TRAPEZE ASSEMBLY PENDANT TOP PLATE PRE-MANUFACTURED; LIKO (SWEDEN)

SIMPSON GUMPERTZ & HEGER
Engineering of Structures
and Building Enclosures

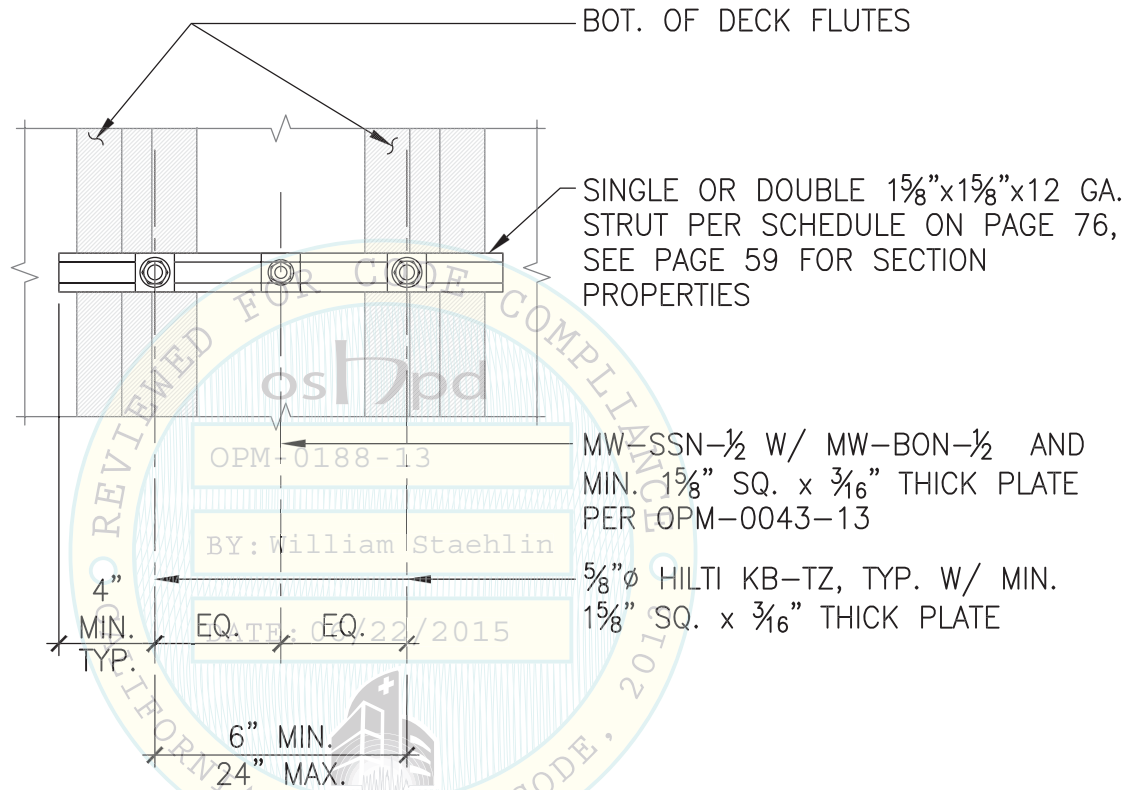
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com



Scale: N.T.S	Date: 05/01/15	Page No.: 65 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:00 AM, bdalexander



Sheet Title:

SUSPENSION ROD CONNECTION TO CONCRETE OVER METAL DECK SOFFIT

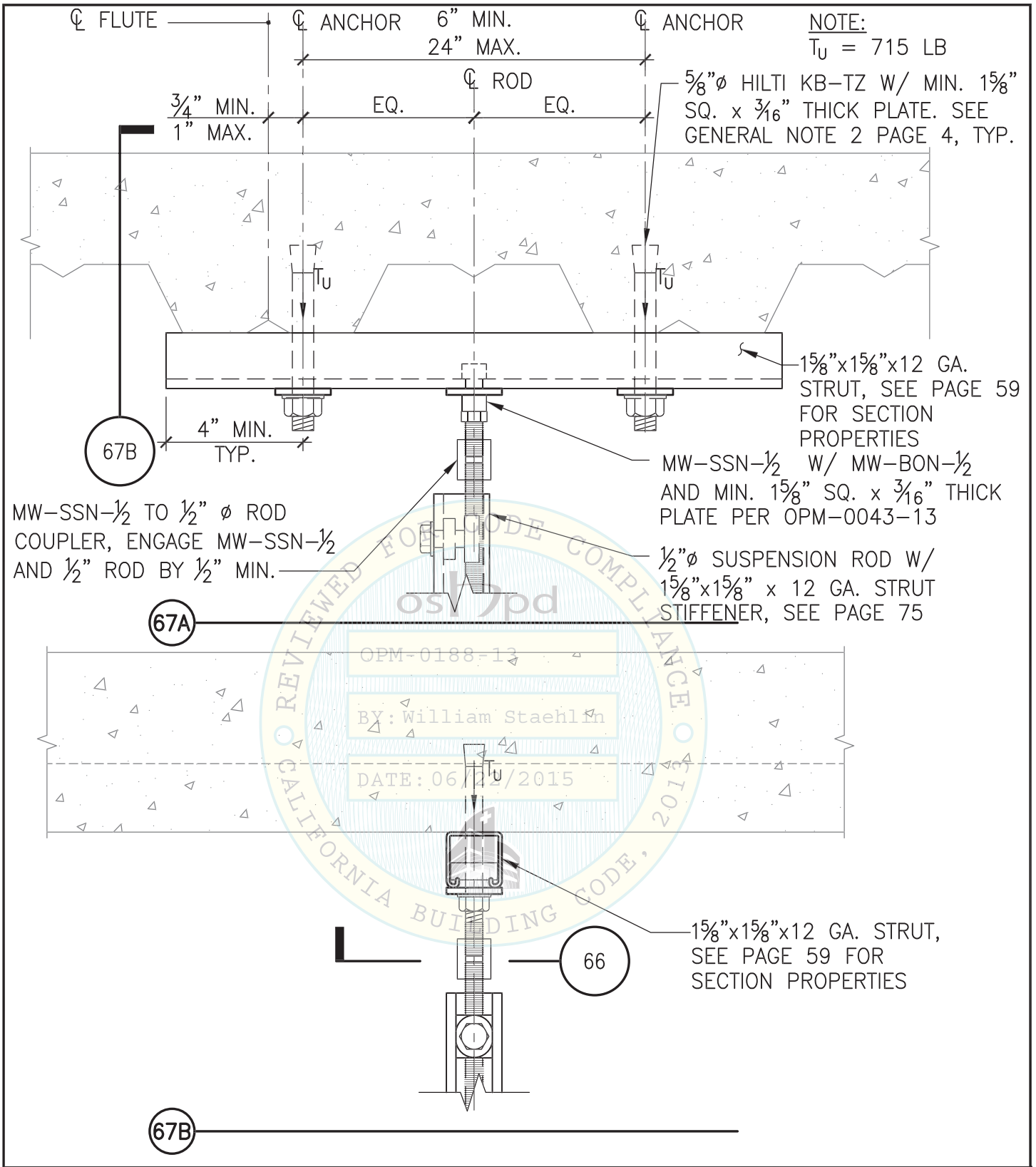
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



Scale: N.T.S	Date: 05/01/15	Page No.: 66 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:05 AM, bdalexander



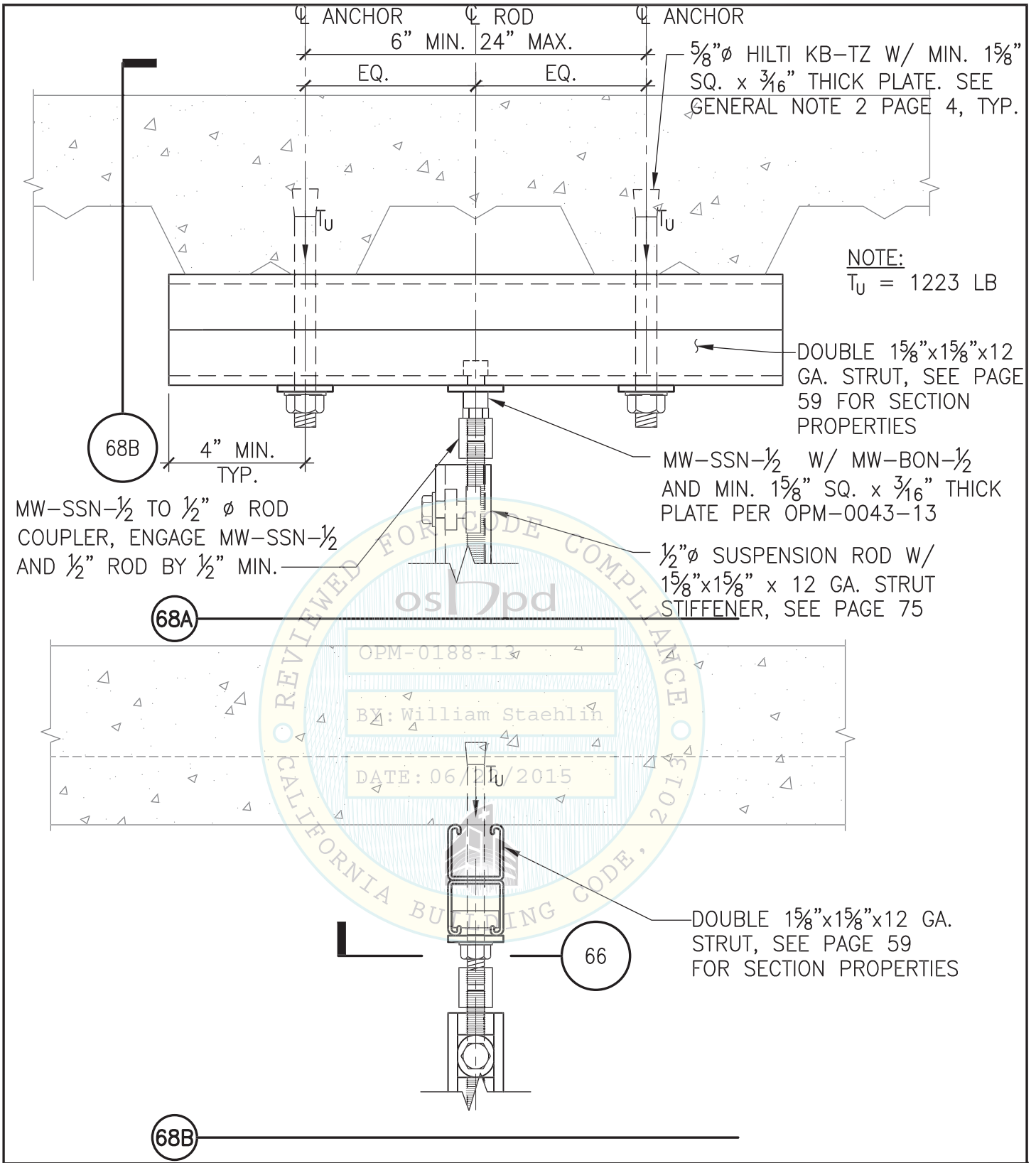
Sheet Title: SUSPENSION ROD CONNECTION TO METAL DECK – SINGLE STRUT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 67 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

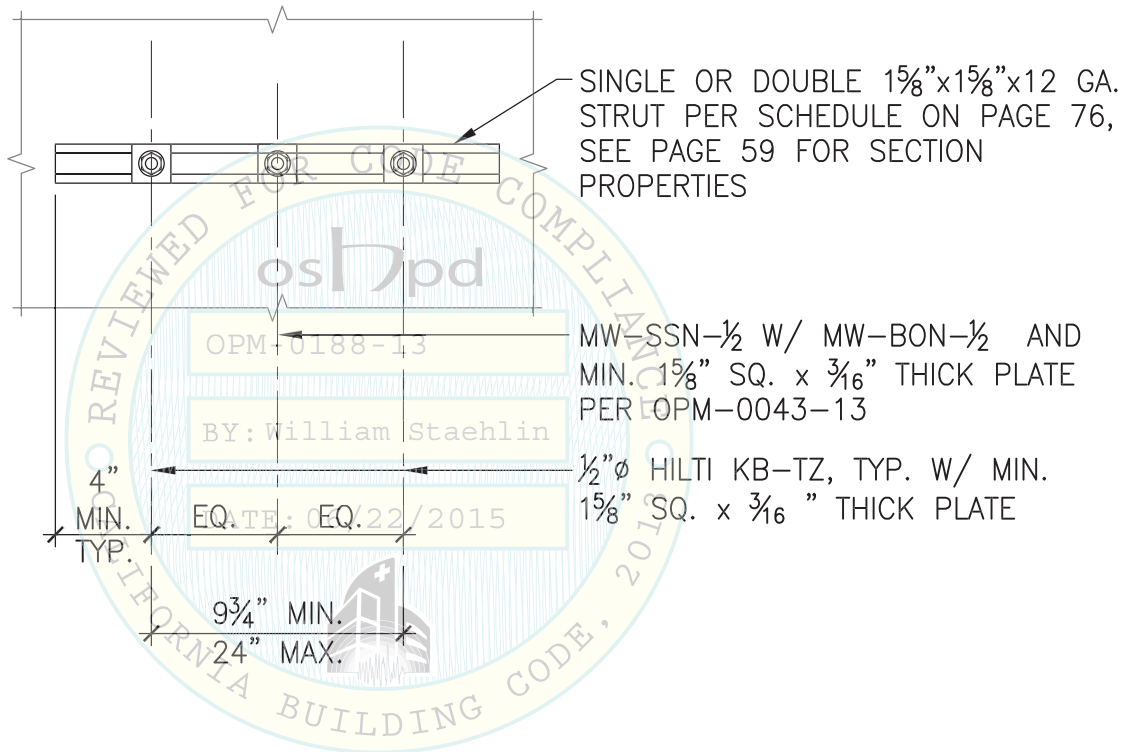
I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:10 AM, bdalexander



Sheet Title: SUSPENSION ROD CONNECTION TO METAL DECK – DOUBLE STRUT

SIMPSON GUMPERTZ & HEGER Engineering of Structures and Building Enclosures Simpson Gumpertz & Heger Inc. 415.495.3700 100 Pine Street, Suite 1600 fax: 415.495.3550 San Francisco, California 94111 www.sgh.com		Scale:	Date:	Page No.:
		N.T.S	05/01/15	68 of 76
		OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:16 AM, bdalexander



Sheet Title:

SUSPENSION ROD CONNECTION TO FLAT SLAB SOFFIT

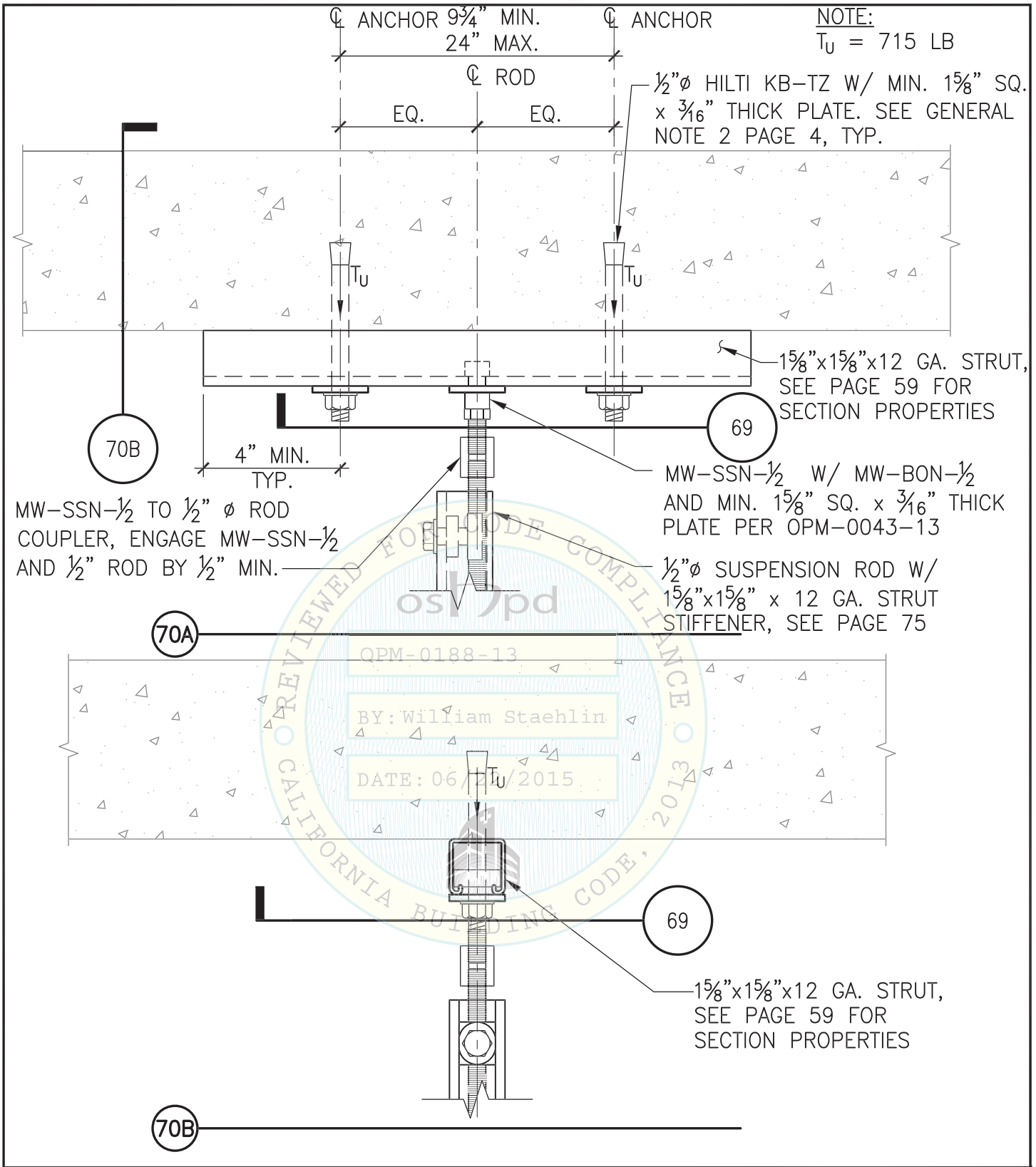
SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com



Scale: N.T.S	Date: 05/01/15	Page No.: 69 of 76
-----------------	-------------------	-----------------------

OPM-0188-13	Kevin S. Moore, SE California SE No. 4528
-------------	--

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:20 AM, bdalexander



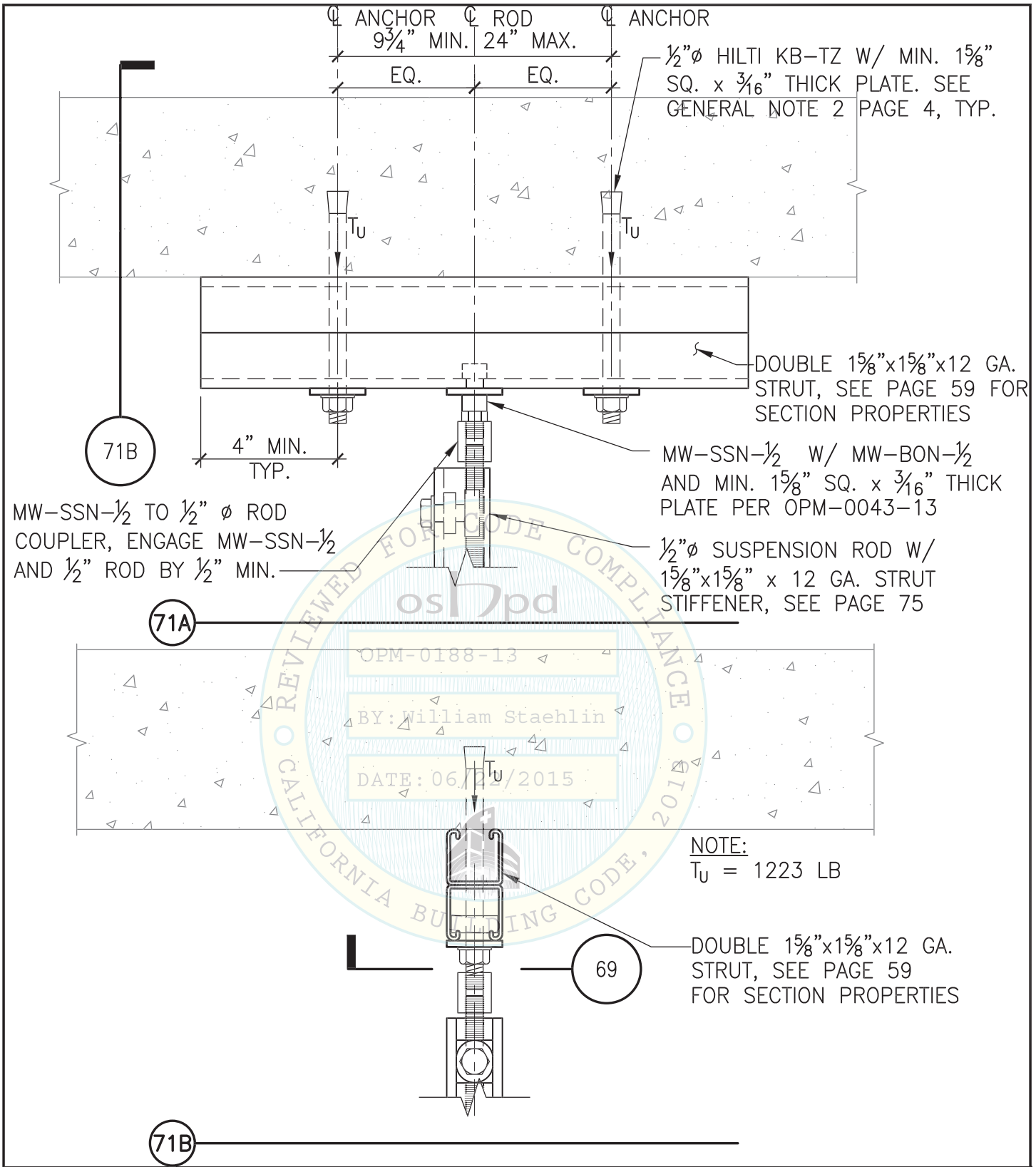
Sheet Title: SUSPENSION ROD CONNECTION TO FLAT SLAB SOFFIT – SINGLE STRUT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 70 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:26 AM, bdalexander



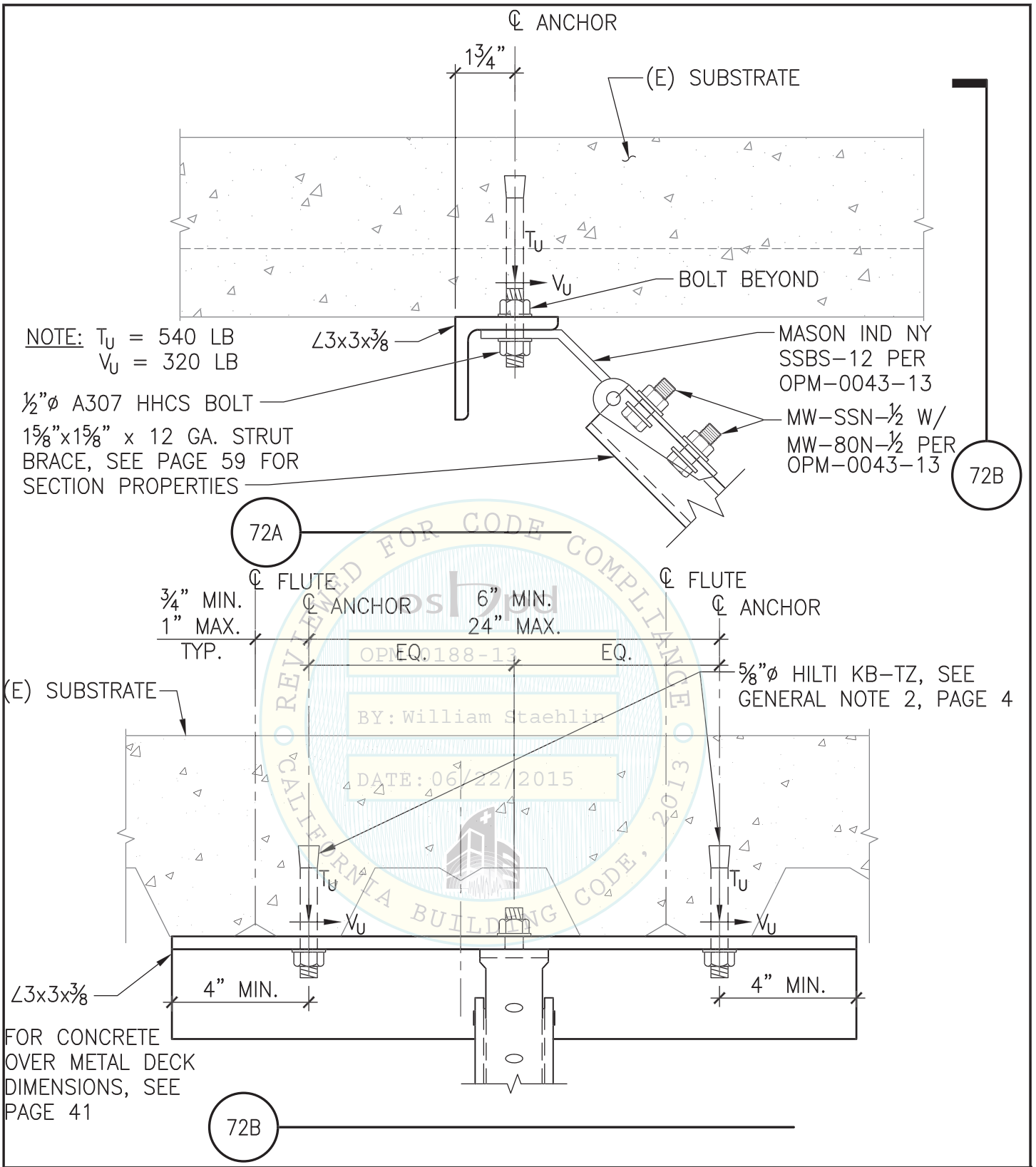
Sheet Title: SUSPENSION ROD CONNECTION TO FLAT SLAB SOFFIT – DOUBLE STRUT

SIMPSON GUMPERTZ & HEGER
Engineering of Structures and Building Enclosures
Simpson Gumpertz & Heger Inc. 415.495.3700
100 Pine Street, Suite 1600 fax: 415.495.3550
San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 71 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:31 AM, bdalexander



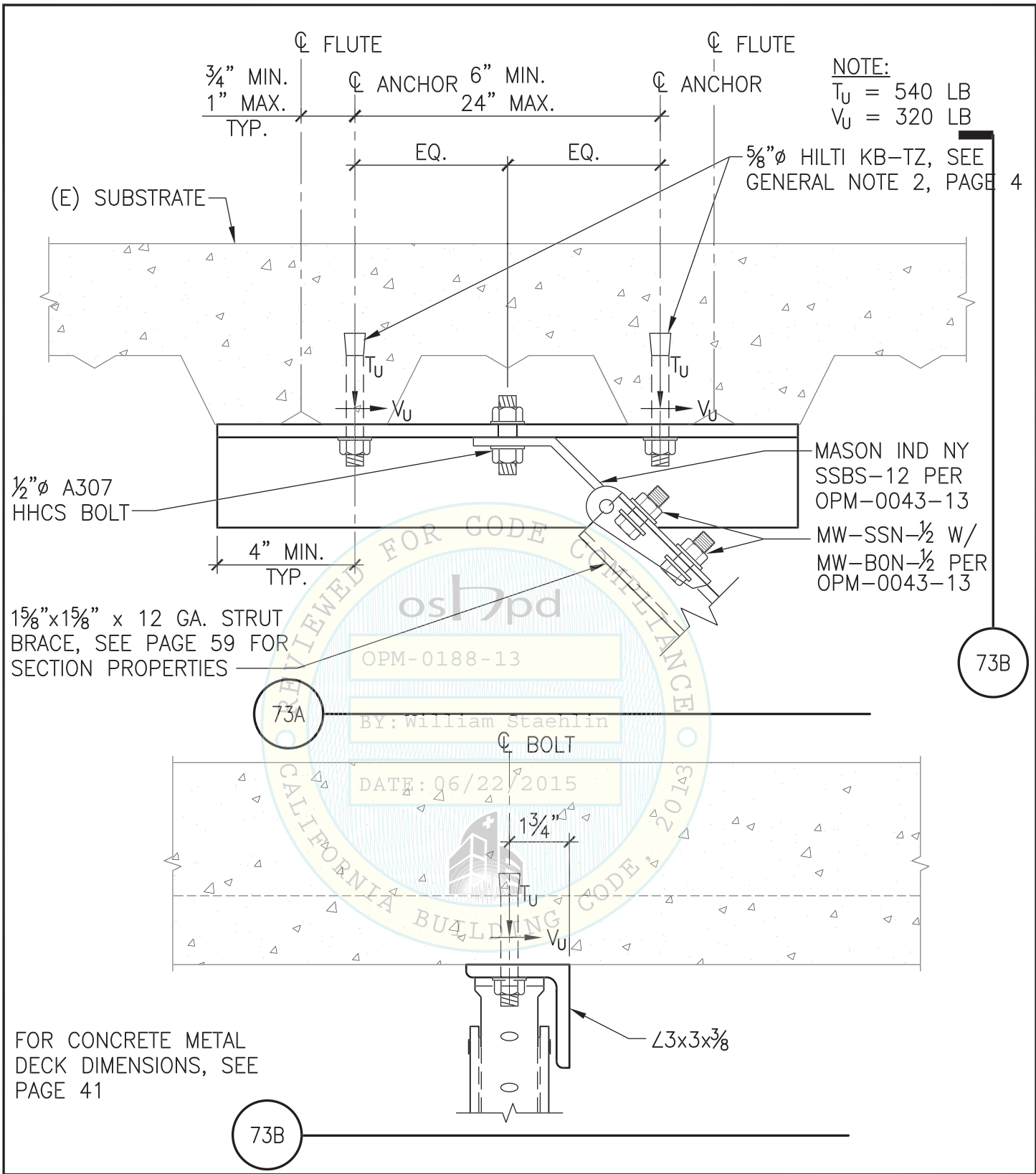
Sheet Title: TRAPEZE BRACE ANCHORAGE CONNECTION TO METAL DECK - PARALLEL TO DECK FLUTE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 72 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\147158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:36 AM, bdalexander



73B

73A

73B

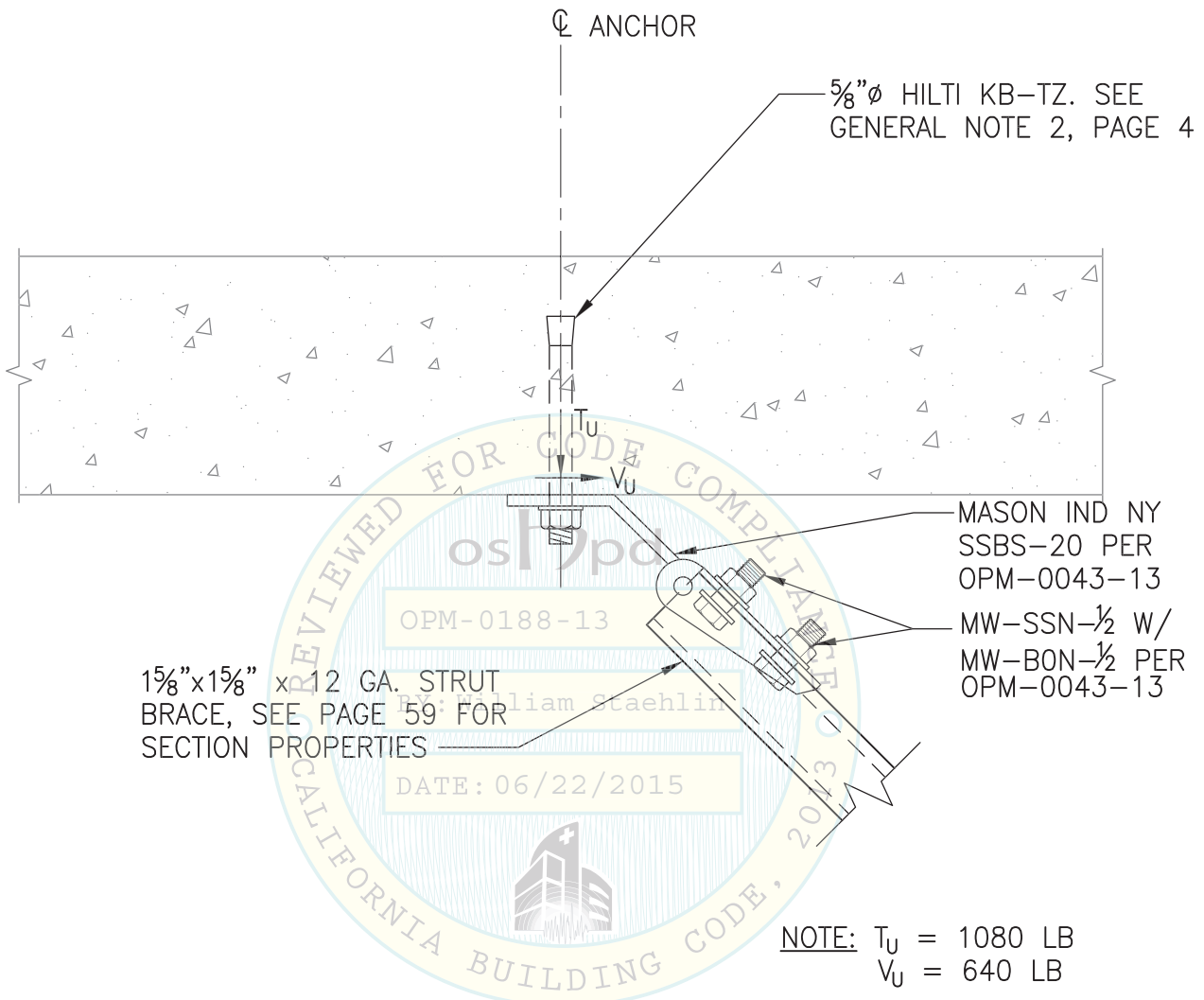
Sheet Title: TRAPEZE BRACE ANCHORAGE CONNECTION TO METAL DECK – PERPENDICULAR TO DECK FLUTE

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S	Date: 05/01/15	Page No.: 73 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:40 AM, bdalexander



Sheet Title: TRAPEZE BRACE ANCHORAGE TO FLAT SLAB SOFFIT

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

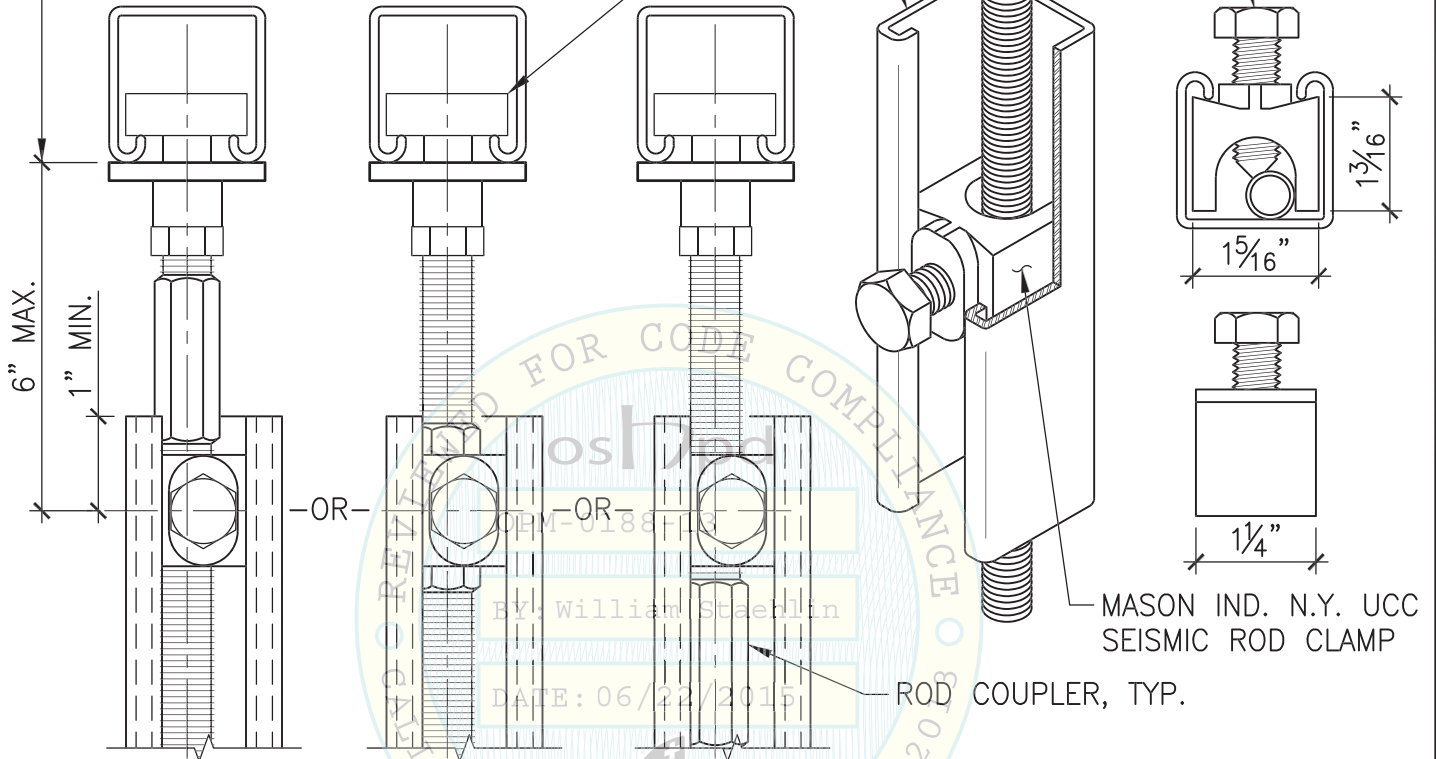
Scale: N.T.S	Date: 05/01/15	Page No.: 74 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528

1/2"Ø THREADED ROD
 1 5/8" x 1 5/8" x 12 GA. SINGLE STRUT STIFFENER,
 SEE PAGE 59 FOR SECTION PROPERTIES

1/2" x 1 1/2" x 13 UNC
 LOCKING BOLT
 TORQUED TO 10
 FT-LBS OF
 MW-UCC-BOB PER
 OPM-0043-13

MW-SSN-1/2 W/ MW-BON-1/2 AND MIN. 1 5/8" SQ.
 x 3/16" THICK PLATE PER OPM-0043-13, TYP.

BOTTOM OF SINGLE OR DOUBLE
 1 5/8" x 1 5/8" x 12 GA. STRUT



TYPE UCC WITH STEEL STRUT ASSEMBLY RATINGS (ASD)

ROD SIZE (INCHES)	MAX. COMPRESSIVE FORCE (LBS)	MAX. STRUT STIFFENER LENGTH (INCHES)	MAX. UCC SPACING (INCHES)	MAX. THREADED ROD LENGTH (INCHES)
1/2	735	82	38	94

Sheet Title:

TYPICAL SUSPENSION ROD AND STRUT STIFFENER

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc. 415.495.3700
 100 Pine Street, Suite 1600 fax: 415.495.3550
 San Francisco, California 94111 www.sgh.com

Hill-Rom **Liko**

Scale: N.T.S. Date: 05/01/15 Page No.: 75 of 76
 OPM-0188-13
 Kevin S. Moore, SE
 California SE No. 4528

I:\SF\Projects\2014\17158.00-LOPM\Drawings\Working_Set\LOPM_PAGES-51-76.dwg, 5/10/2016 11:36:51 AM, bdalexander

MAXIMUM ALLOWABLE TRAPEZE SPAN FOR SINGLE FIXED RAIL SYSTEM, INCHES							SUSPENSION ROD TOP CONNECTION DETAIL
MOTOR CAPACITY	STRUT MEMBER, SEE PAGE 59						
	1	2	3	4	5	6	
440 lb	24	36	48	72	108	120	②
507 lb	24	36	48	72	108	120	②
550 lb	24	36	48	60	96	120	②
600 lb	—	36	48	60	96	120	②
800 lb	—	24	36	48	84	96	②

MAXIMUM ALLOWABLE TRAPEZE SPAN FOR SYSTEM WITH FIXED AND TRAVERSE RAILS, INCHES							SUSPENSION ROD TOP CONNECTION DETAIL		
MOTOR CAPACITY	STRUT MEMBER, SEE PAGE 59						FIXED RAIL		
	1	2	3	4	5	6	H100	H140	H160
440 lb	36	48	60	108	144	144	①	①	①
507 lb	36	48	60	96	120	144	①	①	②
550 lb	36	48	60	96	120	144	①	①	②
600 lb	36	48	60	96	120	144	①	②	②
800 lb	24	48	48	72	120	120	②	②	②
880 lb	24	36	48	72	108	120	②	②	②
1014 lb	24	36	48	72	96	120	②	②	②
1100 lb	24	36	48	60	96	120	②	②	②
1200 lb	24	36	48	60	96	120	②	②	②

NOTES:

- ① SINGLE STRUT (PAGES 67 & 70) OR DOUBLE STRUT (PAGES 68 & 71) BRIDGING MEMBER PERMISSIBLE
- ② ONLY DOUBLE STRUT BRIDGING MEMBER PERMISSIBLE, SEE PAGES 68 & 71

Sheet Title:

ALLOWABLE TRAPEZE SPAN LENGTHS

SIMPSON GUMPERTZ & HEGER
 Engineering of Structures
 and Building Enclosures
 Simpson Gumpertz & Heger Inc.
 100 Pine Street, Suite 1600
 San Francisco, California 94111
 415.495.3700
 fax: 415.495.3550
 www.sgh.com

Scale: N.T.S	Date: 05/01/15	Page No.: 76 of 76
OPM-0188-13		Kevin S. Moore, SE California SE No. 4528