PCS Structural Solutions

Seattle 1011 Western Avenue, Suite 810 | Seattle, WA 98104 | 206.292.5076
Tacoma 1250 Pacific Avenue, Suite 701 | Tacoma, WA 98402 | 253.383.2797
Portland 101 SW Main Street, Suite 280 | Portland, OR 97204 | 503.232.3746
www.pcs-structural.com

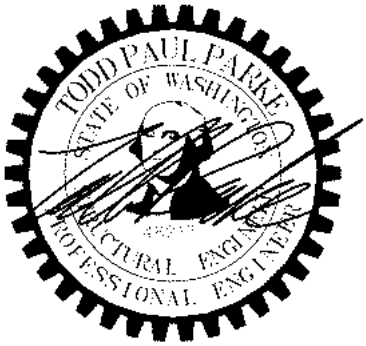
B-21-0225

STRUCTURAL CALCULATIONS

FOR

MULTICARE
GOOD SAMARITAN HOSPITAL
- OR ROOMS 7 & 8
PUYALLUP, WASHINGTON

PREPARED BY
PCS STRUCTURAL *SOLUTIONS*



APRIL 2, 2021
21-118

DESIGN CRITERIA

Hazards by Location

Search Information

Address: 407 14th Ave SE, Puyallup, WA 98372, USA

Coordinates: 47.1787571, -122.2882339

Elevation: 168 ft

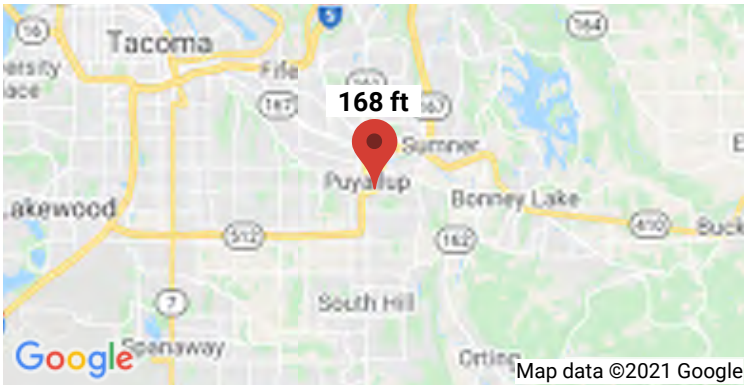
Timestamp: 2021-03-02T17:45:50.944Z

Hazard Type: Seismic

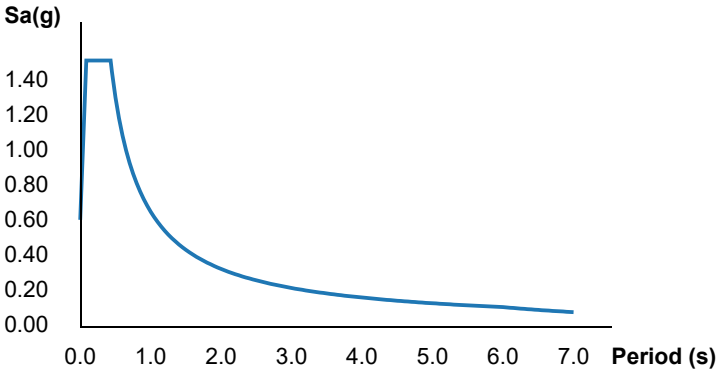
Reference Document: ASCE7-16

Risk Category: IV

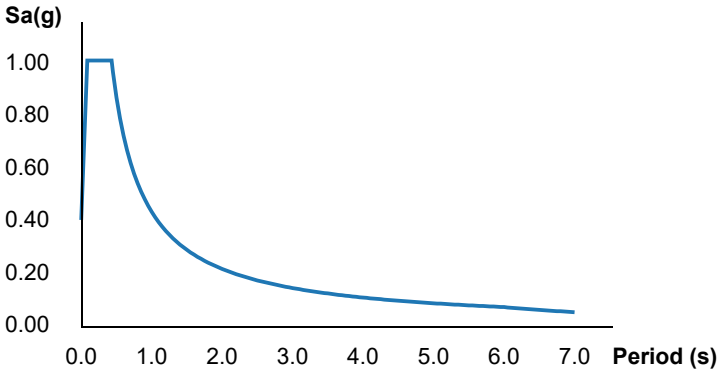
Site Class: C



MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	1.266	MCE_R ground motion (period=0.2s)
S_1	0.436	MCE_R ground motion (period=1.0s)
S_{MS}	1.519	Site-modified spectral acceleration value
S_{M1}	0.654	Site-modified spectral acceleration value
S_{DS}	1.013	Numeric seismic design value at 0.2s SA
S_{D1}	0.436	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s

CR_S	0.914	Coefficient of risk (0.2s)
CR_1	0.898	Coefficient of risk (1.0s)
PGA	0.5	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.6	Site modified peak ground acceleration
T_L	6	Long-period transition period (s)
SsRT	1.266	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.385	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	1.5	Factored deterministic acceleration value (0.2s)
S1RT	0.436	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.485	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.6	Factored deterministic acceleration value (1.0s)
PGAd	0.5	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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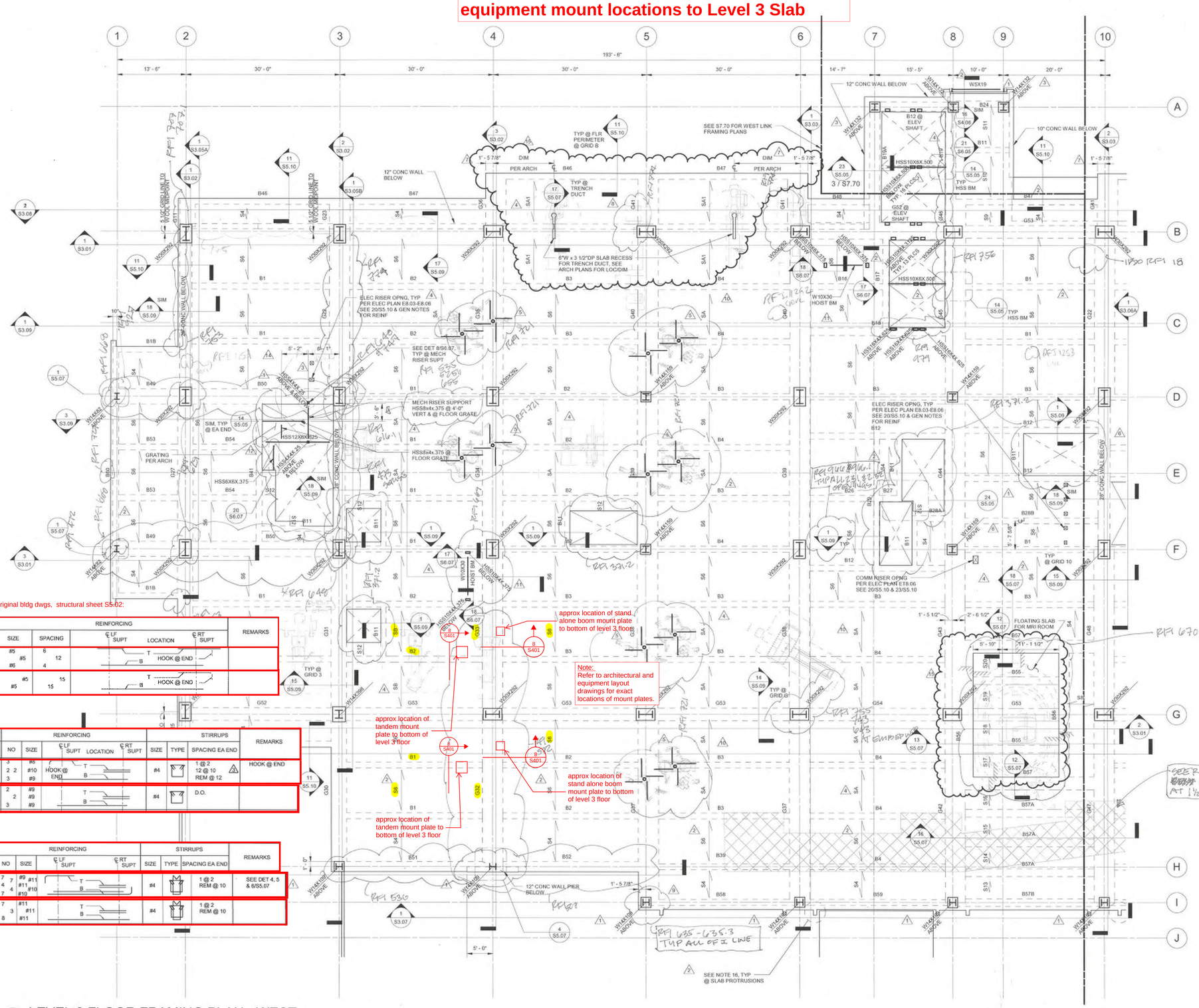
Original structural drawings with OR room 7 & 8 equipment mount locations to Level 3 Slab



Snapshots from original bldg dwgs, structural sheet S5.02:

SLAB MARK	SLAB THK	REINFORCING SIZE	SPACING	℄ LF SUPT	LOCATION	℄ RT SUPT	REMARKS
SB	6"	#5 / #6	6 / 4	#5	12	HOOK @ END	
S8	6"	#5	15	#5	15	HOOK @ END	

BEAM MARK	SIZE W	SIZE D	REINFORCING NO	SIZE	℄ LF SUPT	LOCATION	℄ RT SUPT	STIRRUPS SIZE	TYPE	SPACING EA END	REMARKS
B1	14	24	3 / 2 2 / 3	#8 / #10 / #9	HOOK @ END	T / B		#4		1 @ 2, 12 @ 10, REM @ 12	HOOK @ END
B2	14	24	2 / 2 / 3	#9 / #9 / #9		T / B		#4		D.O.	

BEAM MARK	SIZE W	SIZE D	REINFORCING NO	SIZE	℄ LF SUPT	LOCATION	℄ RT SUPT	STIRRUPS SIZE	TYPE	SPACING EA END	REMARKS
G32	48	36	7 / 4 / 7 / 4	#9 / #11 / #11 / #10		T / B		#4		1 @ 2 REM @ 10	SEE DET 4, 5 & 6/S5.07
G33	48	24	7 / 3 / 8	#11 / #11 / #11		T / B		#4		1 @ 2 REM @ 10	

1 LEVEL 3 FLOOR FRAMING PLAN - WEST

1/8" = 1'-0"

NOTES:
1. FINISH FLOOR ELEVATION = 163'-0", UNLESS OTHERWISE NOTED.
2. SEE S5.01 FOR CONCRETE COLUMN SCHEDULE AND DETAILS.
3. SEE S5.02 FOR CONCRETE SLAB/BEAM REINFORCEMENT SCHEDULE AND REINFORCING DIAGRAMS.
4. PROVIDE SLAB EDGE AND OPENING TRIM REINFORCING PER GENERAL NOTES. PROVIDE MINIMUM 2 - #4 @ 6" OC EACH WAY TOP AND BOTTOM.
5. SEE S6.01 FOR STEEL COLUMN SCHEDULE.
6. SEE ARCHITECTURAL DRAWINGS FOR EXTENT AND LOCATION OF CONCRETE CURBS, SLAB DEPRESSIONS, FLOOR DRAIN SLEEVES, OPENINGS, AND EDGE OF SLAB DIMENSIONS.
7. SEE S3.01 TO S3.04 FOR STEEL MOMENT FRAME ELEVATIONS.
8. SEE S3.05-S3.11 FOR CONCRETE WALL ELEVATIONS AND DETAILS.
9. SEE S7.60-S7.63 FOR EAST LINK PLANS AND SECTIONS.
10. SEE S7.70 AND S7.71 FOR WEST LINK PLANS AND SECTIONS.
11. SEE ARCHITECTURAL DRAWINGS FOR CONCRETE CURB LOCATIONS AND DIMENSIONS. SEE DETAIL 24/S5.09.
12. LETTERS "B" AND "G" DENOTE CONCRETE BEAM AND GIRDER MARKS. SEE S5.02 FOR BEAM AND GIRDER REINFORCEMENT SCHEDULE.
13. SEE DETAIL 2/S5.09 FOR TYPICAL ELEVATOR SILL AT CONCRETE BEAM.
14. SEE DETAILS 2/S5.09, 3/S5.09, 5/S5.09, 6/S5.09, 7/S5.09, & 12/S6.05 FOR TYPICAL ELEVATOR DIVIDER BEAM CONNECTION.
15. INDICATES 1" SLAB RECESS FOR RADIANT HEATING SYSTEM. SEE DET 16/S5.10.
16. PROVIDE 2-#4 X 3'-0" @ 3 TOP AND BOTTOM, TYPICAL AT SLAB PROTRUSIONS.
17. SLAB MARKS SA & SB INDICATE REINFORCED SLAB FOR MEDICAL EQUIPMENT. SEE ARCHITECTURAL PLANS FOR LOCATIONS.

INDICATES SKYTRON BOOM SUSPENSION SYSTEM FOR EQUIP AT FLOOR BELOW, SEE DET 1/S10.02 SEE ARCH PLAN FOR LOCATION

INDICATES SKYTRON LIGHTING SUSPENSION SYSTEM FOR EQUIP AT FLOOR BELOW, SEE DET 14/S10.02 SEE ARCH PLAN FOR LOCATION

CONFORMED CONSTRUCTION DOCUMENTS

GOOD SAM DESIGN COLLABORATIVE
A JOINT VENTURE OF CLARK KJOS AND GIFFIN, BOLTE JURGENS
710 SECOND AVE, SUITE 800
SEATTLE, WA 98104

CONSULTANT NAME

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ANDERSEN • BJORNSTAD • KANE • JACOBS
Consulting Civil and Structural Engineers
800 Fifth Avenue, Suite 2500 • Seattle, WA 98104
(206) 340-2255 • (206) 340-2266 fax • www.abkj.com

REGISTRATION STAMP

APPROVAL

KEY PLAN

PACKAGE 5
BID / CONSTRUCTION SET
CONFORMED SET - 01

	REVISIONS	DATE
0	REVISIONS TO PKG 04B	08/04/2008
1	ADDENDUM 1	09/12/2008
2	ADDENDUM 2	10/09/2008
3	RFI 10	07/23/2008
4	PCT-CCD-007	12/17/2008
5	PCT-CCD-007 IBO	12/17/2008
6	RFI 365	01/22/2009
7	PCT-ASI-026	02/13/2009
8	PCT-CCD-019	02/13/2009
9	RFI 507	02/18/2009
10	RFI 446.1	02/20/2009
11	PCT-CCD-023	02/24/2009
12	RFI 437.1	02/24/2009
13	PCT - SHELL & CORE - CONFORMED SET	02/26/2009
14	RFI 541	02/27/2009
15	PCT-CCD-013	04/03/2009

SEE RFI 651 FOR MEP PENETRATIONS

SEE RFI 256 FOR SLAB EDGE CONDITIONS

Good Samaritan
A part of MultiCare Health System
407 14th Avenue SE Puyallup, WA 98371

PCT - Shell and Core

08/04/08

SCALE:

PROJECT NO. : 07-088-00

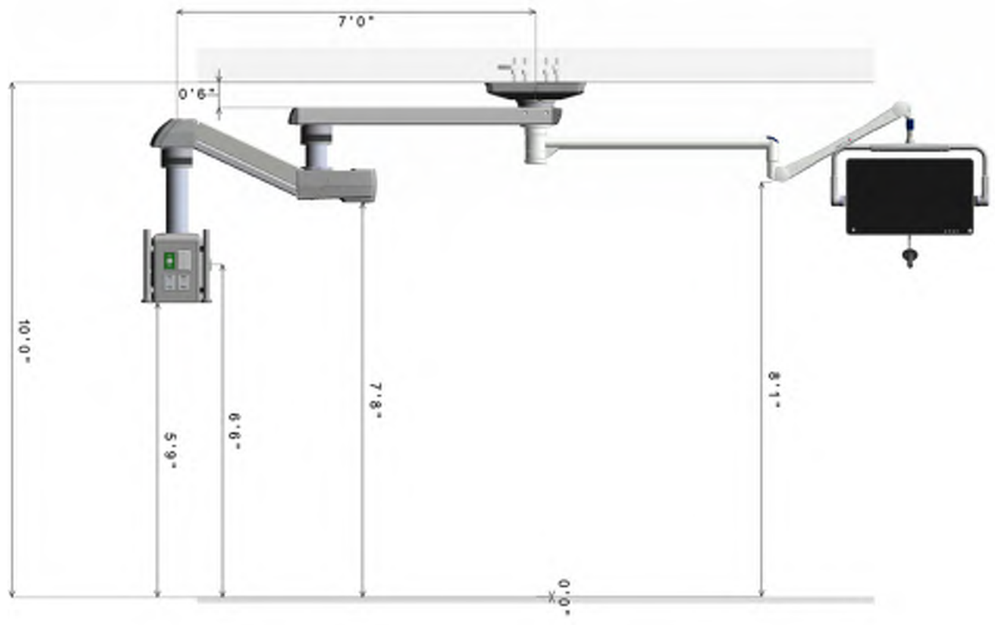
SHEET TITLE:
LEVEL 3 FLOOR FRAMING PLAN - WEST

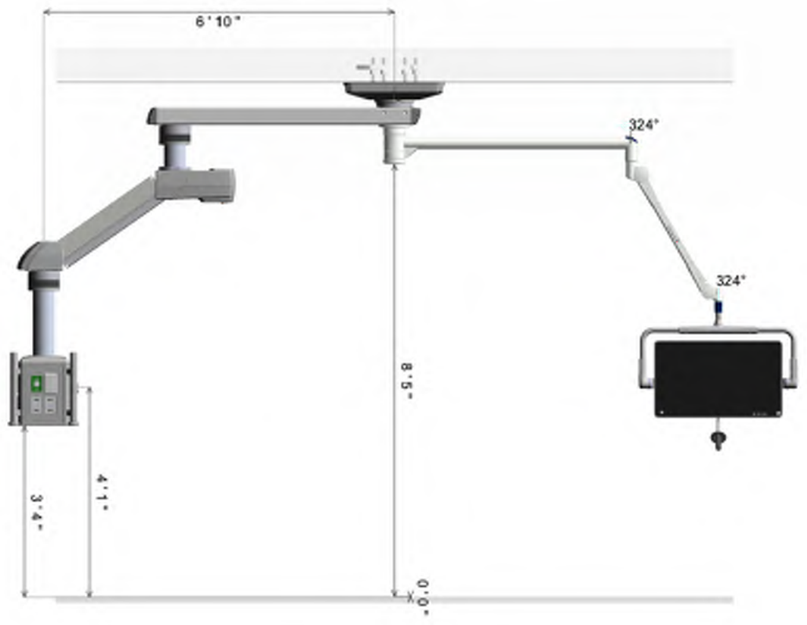
SHEET NUMBER:
S2.31

Anesthesia Boom: S-Series, Standard Powered, 2 row, 2 a / UDM

SPS-2-C / SFP

Ceiling Height: 10' 0"





Top S-Series	
Brake System	Electric
Rail Type	Fairfield
Top Arm Length	1300mm
Bottom Arm Length	900mm
Mid Tube Length	150mm
Column Tube Length	450mm
Weight Capacity (see note 5)	281 lbs.
Total Throat Used (%)	72
Gas Hose Length (ft)	15.01
Packaging Type	Stand Up
Manufacturing Notes	Assemble All MFR's

TC Configuration - Berchtold F-Gen

Arm No. 1 (MP1)	
Equipment:	SFP
Arm Length:	1400
HCT Length:	None
Monitor Size:	UDM (19" - 32")
Video Bundle:	Stryker Provided Cables-UDM

I confirm the ceiling height and agree with the dimensions as drawn. I confirm the equipment configuration as showm including arm lengths, platforms, gas key styles, brand, and locations; electric, and low voltage selections and locations. I understand that any changes made after an order is in production will result in a change order fee and a delay in shipment.

CUSTOMER APPROVALS	SIGNATURE	PRINT NAME & TITLE	DATE
CLINICAL REPRESENTATIVE			
FACILITY ENGINEERING			

NOTES:

1. Video Bundle:For weights, moments, and installation details, please refer to the Stryker TELETOM® or CHROMOPHARE® Pre-installation manuals.
2. It is the owners responsibility to provide the support structure to meet requirements listed in the Pre-install Manual.
3. Customer is responsible for reviewing and approving Gas Key Style and Manufacturer.
4. Total weight capacity available for all Stryker and customer supplied accessories, based on weights & moments listed in TELETOM® Pre-Install Manual #700000231 Current Rev.

Stryker Communications
571 Silveron Blvd.
Flower Mound, TX 75028
PHONE: (877) 789-8106
E-FAX: (408) 754-2969
www.stryker.com

Sales Analyst :
Mackenzie Schroeder
mackenzie.schroeder@stryker.com

Project: Good Sam Dally OR 7 AND 8	
Customer: GOOD SAMARITAN HOSP	
City: PUYALLUP	State: Washington
Equip ID: SPS-2-C/SFP	
Group Name: Anesthesia Boom	
Quote No.: 10100408	Quote Rev No.: 3
Quote Date: 1/7/2021	QTY: 2
Oracle Line #s: /	
DWG Rev No.:1	Block #: 136 / 137
DWG No.: 10100408S001	

Anesthesia Boom - S-Series, Standard Powered, 2 row, 2 a

FRONT

F1	N2O
F2	Med Air
F3	WAGD
F4	Distribution Bd

RIGHT

R1	O2
R2	Blank
R3	VAC
R4	VAC

BACK

B1	20A/125V Duplex (4 Outlets)
B2	20A/125V Duplex (4 Outlets)

LEFT

L1	Single DVI
L2	Six RJ-45 CAT 6
L3	20A/ 125V-5-20R Duplex
L4	S-Video/BNC/ VGA

Data Communications

Qty	Description
1	1G Blank Plate
1	Single DVI
1	S-Video/BNC/VGA
1	Distribution Board

Gas Outlets

Qty	Gas Type	Key Style	Manufacturer
1	Oxygen (O2)	Chemtron	Beacon Madeas
1	Nitrous Oxide (N2O)	Chemtron	Beacon Madeas
1	Medical Air	Chemtron	Beacon Madeas
2	Vacuum	Chemtron	Beacon Madeas
1	WAGD	Chemtron	Beacon Madeas

High Voltage

Main Power Type:	Isolated
Main Power Source:	Emergency
Manufacturer:	Leviton

Loc.	Circuit Ref #	# of Circuits	Color	Outlet Box	Description
B1	1	1	Red	A	20A/125V Duplex (4 Outlets)
B2	2	1	Red	A	20A/125V Duplex (4 Outlets)
L3	3	1	Red	A	20A/125V-5-20R Duplex

Circuits

Qty	Description
3	Total 15A/20A Circuits
1	Circuit for Motor and Brake

Multi-Functional Rail (MFR)

Front	406mm
Back	406mm
Control	Rear Only

I confirm the ceiling height and agree with the dimensions as drawn. I confirm the equipment configuration as showm including arm lengths, platforms, gas key styles, brand, and locations; electric, and low voltage selections and locations. I understand that any changes made after an order is in production will result in a change order fee and a delay in shipment.

CUSTOMER APPROVALS	SIGNATURE	PRINT NAME & TITLE	DATE
CLINICAL REPRESENTATIVE			
FACILITY ENGINEERING			

NOTES:

1. For weights, moments, and installation details, please refer to the Stryker S-Series or CHROMOPHARE® Pre-installation manuals.
2. It is the owners responsibility to provide the support structure to meet requirements listed in the Pre-install Manual.
3. Bottom of Stryker mounting plate must be installed at 3.0" above finished ceiling plane. All vertical boom dimensions shown in drawing are dependent on this requirement.
4. Customer is responsible for reviewing and approving Gas Key Style and Manufacturer.
5. Total weight capacity available for all Stryker and customer supplied accessories, based on weights & moments listed in S-Series Pre-Install Manual.

Stryker Communications
571 Silveron Blvd.
Flower Mound, TX 75028
PHONE: (877) 789-8106
E-FAX: (408) 754-2969
www.stryker.com

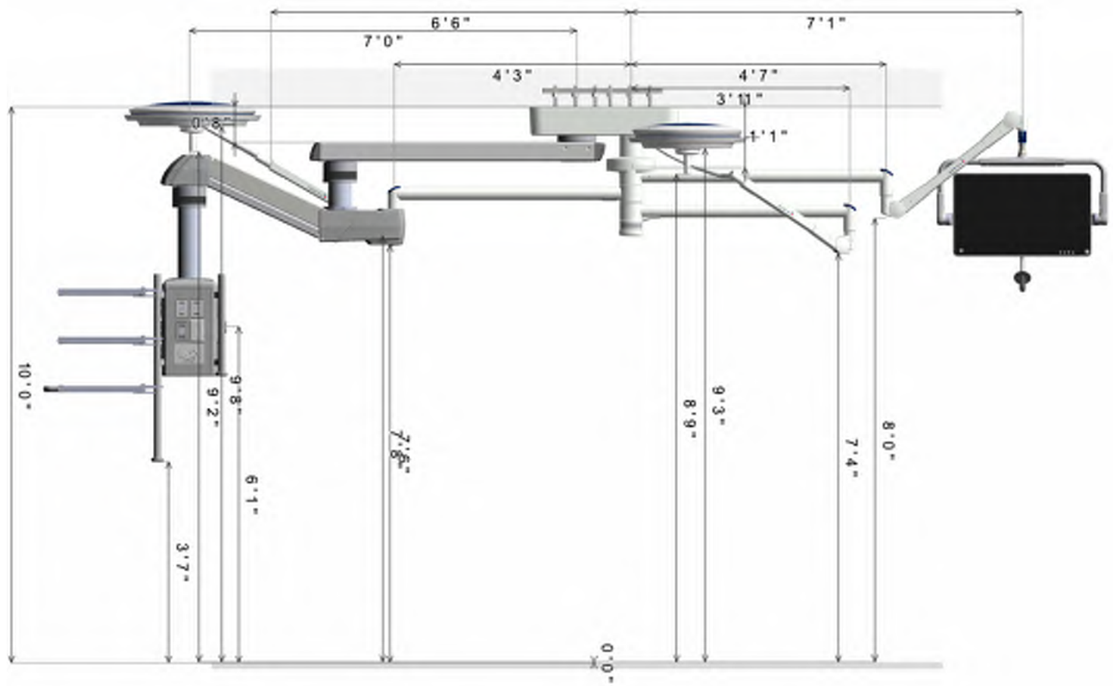
Sales Analyst :
Mackenzie Schroeder
mackenzie.schroeder@stryker.com

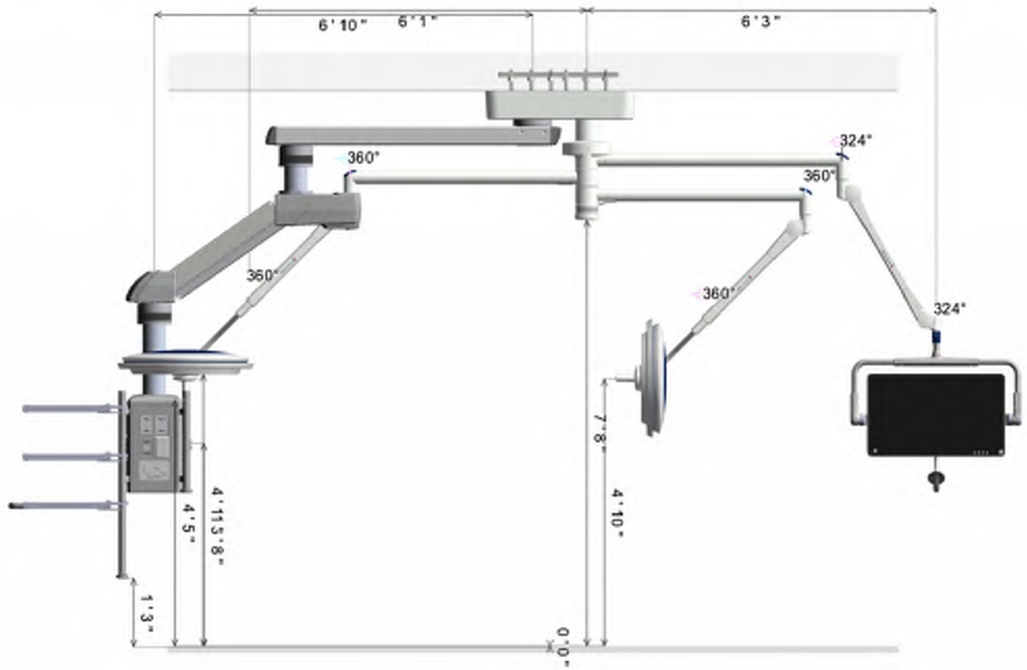
Project: Good Sam Dally OR 7 AND 8	
Customer: GOOD SAMARITAN HOSP	
City: PUYALLUP	State: Washington
Equip ID: SPS-2-C	
Group Name: Anesthesia Boom	
Quote No.: 10100408	Quote Rev No.: 3
Quote Date: 1/7/2021	QTY: 2
Oracle Line #:	
DWG Rev No.:1	Block #: 136
DWG No.: 10100408S001	

Boom LT/LT/FP: S-Series, Standard Powered, 3 row, 2 a / F628/F528/UDM

SPS-3-T / SFP/F 628/F 528

Ceiling Height: 10' 0"





Top S-Series	
Brake System	Electric
Rail Type	Fairfield
Top Arm Length	1300mm
Bottom Arm Length	900mm
Mid Tube Length	150mm
Column Tube Length	450mm
Weight Capacity (see note 5)	266 lbs.
Total Throat Used (%)	64
Gas Hose Length (ft)	15.46
Packaging Type	Stand Up
Manufacturing Notes	Do Not Assemble Front MFR

Top S-Series Shelves	
Description	
Shelf Rail Type:	Fairfield
Equipment Support Pos. 1:	750mm
Equipment Support Pos. 2:	750mm
Equipment Support Pos. 3:	750mm w/Controls

Bottom Tandem Berchtold F-Gen					
Arm No. 1 (MP1)		Arm No. 2 (MP2)		Arm No. 3 (MP3)	
Equipment:	SFP	Equipment:	F 628	Equipment:	F 528
Arm Length:	1400	Arm Length:	1300	Arm Length:	1200
HCT Length:	None	HCT Length:	None	HCT Length:	None
Tube Length:	330	Cardanic:	NFC	Cardanic:	NFC
Monitor Size:	Universal Display Mount (19" - 32")				
Video Bundle:	Stryker Provided Cables				

I confirm the ceiling height and agree with the dimensions as drawn. I confirm the equipment configuration as showm including arm lengths, platforms, gas key styles, brand, and locations; electric, and low voltage selections and locations. I understand that any changes made after an order is in production will result in a change order fee and a delay in shipment.

CUSTOMER APPROVALS	SIGNATURE	PRINT NAME & TITLE	DATE
CLINICAL REPRESENTATIVE			
FACILITY ENGINEERING			

NOTES:

1. For weights, moments, and installation details, please refer to the Stryker TELETOM® or CHROMOPHARE® Pre-installation manuals.
2. It is the owners responsibility to provide the support structure to meet requirements listed in the Pre-install Manual.

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Sales Analyst :
Mackenzie Schroeder
mackenzie.schroeder@stryker.com

Project: Good Sam Dally OR 7 AND 8	
Customer: GOOD SAMARITAN HOSP	
City: PUYALLUP	State: Washington
Equip ID: SPS-3-T/SFP/F 628/F 528	
Group Name: Boom LT/LT/FP	
Quote No.: 10100408	Quote Rev No.: 3
Quote Date: 1/7/2021	QTY: 2
Oracle Line #s: /	
DWG Rev No.:1	Block #: 134 / 135
DWG No.: 10100408ST001	

Boom LT/LT/FP - S-Series, Standard Powered, 3 row, 2 a

FRONT

F1	20A/125V Duplex (6 Outlets)
F2	Data Pass Thru
F3	Distribution Bd
F4	20A/125V Duplex (6 Outlets)

RIGHT

R1	VAC
R2	VAC
R3	CO2
R4	Blank
R5	Nitrogen Regulator

BACK

B1	VAC
B2	VAC
B3	Single DVI
B4	S-Video/BNC/VGA
B5	20A/125V Duplex (6 Outlets)

LEFT

L1	Single DVI
L2	S-Video/BNC/VGA
L3	20A/125V Duplex (8 Outlets)

Data Communications

Qty	Description
1	Data Pass Thru
1	1G Blank Plate
2	Single DVI
2	S-Video/BNC/VGA
1	Distribution Board

Gas Outlets

Qty	Gas Type	Key Style	Manufacturer
1	Nitrogen Regulator	D.I.S.S.	AMICO
1	Carbon Dioxide (CO2)	D.I.S.S.	Beacon Madeas
4	Vacuum	Chemtron	Beacon Madeas

High Voltage

Main Power Type:	Isolated
Main Power Source:	Emergency
Manufacturer:	Leviton

Loc.	Circuit Ref #	# of Circuits	Color	Outlet Box	Description
F1	1,2	2	Red	A	20A/125V Duplex (6 Outlets)
F4	3,4	2	Red	A	20A/125V Duplex (6 Outlets)
B5	5,6	2	Red	A	20A/125V Duplex (6 Outlets)
L3	7,8	2	Red	A	20A/125V Duplex (8 Outlets)

Circuits

Qty	Description
8	Total 15A/20A Circuits
1	Circuit for Motor and Brake

Multi-Functional Rail (MFR)

Front	1000mm
Back	531mm
Control	Rear Only

I confirm the ceiling height and agree with the dimensions as drawn. I confirm the equipment configuration as showm including arm lengths, platforms, gas key styles, brand, and locations; electric, and low voltage selections and locations. I understand that any changes made after an order is in production will result in a change order fee and a delay in shipment.

CUSTOMER APPROVALS	SIGNATURE	PRINT NAME & TITLE	DATE
CLINICAL REPRESENTATIVE			
FACILITY ENGINEERING			

NOTES:

1. For weights, moments, and installation details, please refer to the Stryker S-Series or CHROMOPHARE® Pre-installation manuals.
2. It is the owners responsibility to provide the support structure to meet requirements listed in the Pre-install Manual.
3. Bottom of Stryker mounting plate must be installed at 3.0" above finished ceiling plane. All vertical boom dimensions shown in drawing are dependent on this requirement.
4. Customer is responsible for reviewing and approving Gas Key Style and Manufacturer.
5. Total weight capacity available for all Stryker and customer supplied accessories, based on weights & moments listed in S-Series Pre-Install Manual.

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Sales Analyst :
Mackenzie Schroeder
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Project: Good Sam Dally OR 7 AND 8	
Customer: GOOD SAMARITAN HOSP	
City: PUYALLUP	State: Washington
Equip ID: SPS-3-T	
Group Name: Boom LT/LT/FP	
Quote No.: 10100408	Quote Rev No.: 3
Quote Date: 1/7/2021	QTY: 2
Oracle Line #:	
DWG Rev No.:1	Block #: 134
DWG No.: 10100408ST001	

Powered Boom - S-Series Standard 2-Row										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1369	1194	53.9	47.0	3688.3	2720.3	128.7	283.67	274.8	605.89
850	1568	1180	61.7	46.5	4292.7	3166.2	128.7	283.67	279.2	615.43
1000	1687	1172	66.4	46.2	4660.9	3437.7	128.7	283.67	281.8	621.15
1300	1922	1156	75.7	45.5	5409.4	3989.8	128.7	283.67	286.9	632.60

Powered Boom - S-Series Standard 3-Row										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1356	1193	53.4	47.0	3657.3	2697.5	122.0	269.07	275.0	606.18
850	1556	1179	61.3	46.4	4261.9	3143.4	122.0	269.07	279.3	615.72
1000	1675	1171	65.9	46.1	4630.2	3415.1	122.0	269.07	281.9	621.44
1300	1911	1155	75.2	45.5	5379.0	3967.3	122.0	269.07	287.1	632.89

Powered Boom - S-Series Standard 5-Row										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1336	1198	52.6	47.2	3605.8	2659.5	110.9	244.57	275.2	606.75
850	1536	1185	60.5	46.6	4210.8	3105.7	110.9	244.57	279.5	616.29
1000	1655	1177	65.2	46.3	4579.3	3377.5	110.9	244.57	282.1	622.02
1300	1891	1161	74.5	45.7	5328.6	3930.2	110.9	244.57	287.3	633.47

Powered Boom - S-Series Standard 2-Row (With TC Mount)										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1347	1065	53.0	41.9	4699.2	3465.9	128.7	283.67	355.8	784.40
850	1501	1056	59.1	41.6	5299.8	3908.9	128.7	283.67	360.1	793.94
1000	1593	1050	62.7	41.3	5665.4	4178.6	128.7	283.67	362.7	799.66
1300	1776	1039	69.9	40.9	6408.4	4726.6	128.7	283.67	367.9	811.11

Powered Boom - S-Series Standard 3-Row (With TC Mount)										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1337	1064	52.7	41.9	4668.4	3443.2	122.0	269.07	355.9	784.69
850	1491	1054	58.7	41.5	5269.1	3886.3	122.0	269.07	360.3	794.23
1000	1584	1049	62.3	41.3	5634.8	4156.0	122.0	269.07	362.9	799.95
1300	1767	1038	69.6	40.9	6378.0	4704.1	122.0	269.07	368.0	811.40

Powered Boom - S-Series Standard 5-Row (With TC Mount)										
Top Arm Length (mm)	**CGx (mm)**	**Cgy (mm)**	**CGx (in)**	**Cgy (in)**	**Moment Mx (Nm)**	**Moment Mx (ft-lbs)**	**Max Payload (kg)**	**Max Payload (lb)**	**Total Weight (kg)**	**Total Weight (lb)**
600	1322	1068	52.0	42.1	4617.2	3405.5	110.9	244.57	356.2	785.26
850	1476	1059	58.1	41.7	5218.2	3848.8	110.9	244.57	360.5	794.80
1000	1568	1053	61.7	41.5	5584.1	4118.6	110.9	244.57	363.1	800.53
1300	1752	1043	69.0	41.1	6327.6	4667.0	110.9	244.57	368.3	811.98

CALCULATIONS

OR ROOM 7 & 8
EQUIPMENT MOUNTING

Scope

Anchor ceiling mounted equipment in operating room.

Design Criteria

2018 IBC

Address : 407 14th Avenue SE Puyallup, WA 98371

Exposure B

Risk Category IV $I_e = 1.5$

Site Class C (per S0.01 of original struct. dwgs)
Seismic Design Category D

Per ATC - ASCE 7-16:

$S_s = 1.266$	$S_{m1} = 0.654$	$F_a = 1.2$
$S_1 = 0.436$	$S_{DS} = 1.013$	$F_v = 1.5$
$S_{ms} = 1.519$	$S_{D1} = 0.436$	

ASCE 7-16 Chapter 13:

$$F_h = \frac{0.4\, a_p S_{DS} W_p}{\left(R_p / I_p\right)} \left(1 + 2\frac{z}{h}\right) \leq 1.6 S_{DS} I_p W_p = 2.43 W_p$$

$$\geq 0.3 S_{DS} I_p W_p = 0.456 W_p$$

$a_p = 2.5$ $R_p = 2.5$ $I_p = 1.5$ $z = 32'$ (from 0'-0" @ 1st Floor) $h = 131'$

$$= \underline{0.905\, W_p}$$

$$F_v = \pm 0.2 S_{DS} W_p = .20 W_p$$

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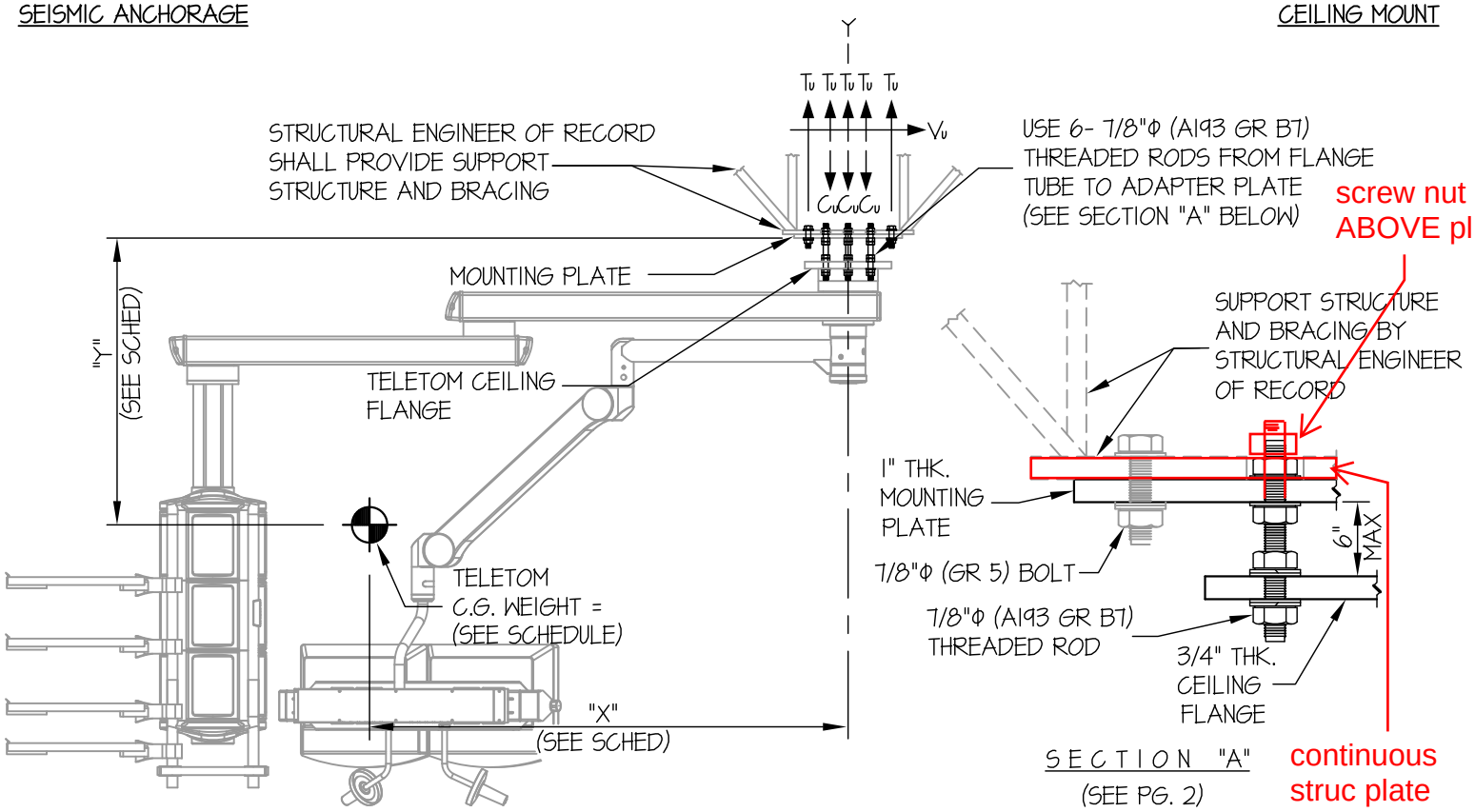
BERCHTOLD USA

TELETOM STAND ALONE BOOMS

DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/29/13
SHEET 1 OF 6 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNT



THREADED ROD FORCES
T_u = 25704 LB/BOLT (MAX)
C_u = 25325 LB/BOLT (MAX)
V_u = 883 LB/BOLT (MAX)

NOTES:

1. ANCHORAGE DESIGN PER ~~2010~~ 2018 CALIFORNIA BUILDING CODE AND ASCE ~~7-05~~ 7-16. STRENGTH DESIGN IS USED.
   HORIZONTAL FORCE (E_h) = ~~3.60~~ 0.905 W_p (S_{DS} = ~~2.00~~ 1.013, a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1.0)
   VERTICAL FORCE (E_v) = ~~0.40~~ W_p 0.20Wp
   h= 131' (above 0'-0" at first floor)
   z= 32'
   z/h=.244
2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS PRE-APPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.
3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN, IN ADDITION TO ALL OTHER LOADS.

Eh = .4*ap*SDS*Wp/(Rp/Ip)*(1+2*z/h) = 0.905Wp
<= 1.6*Sds*Ip*Wp = 2.43Wp ⟵ governs
>= 0.3*Sds*Ip*Wp = 0.46Wp

Ev = 0.2*Sds*Wp = 0.20Wp

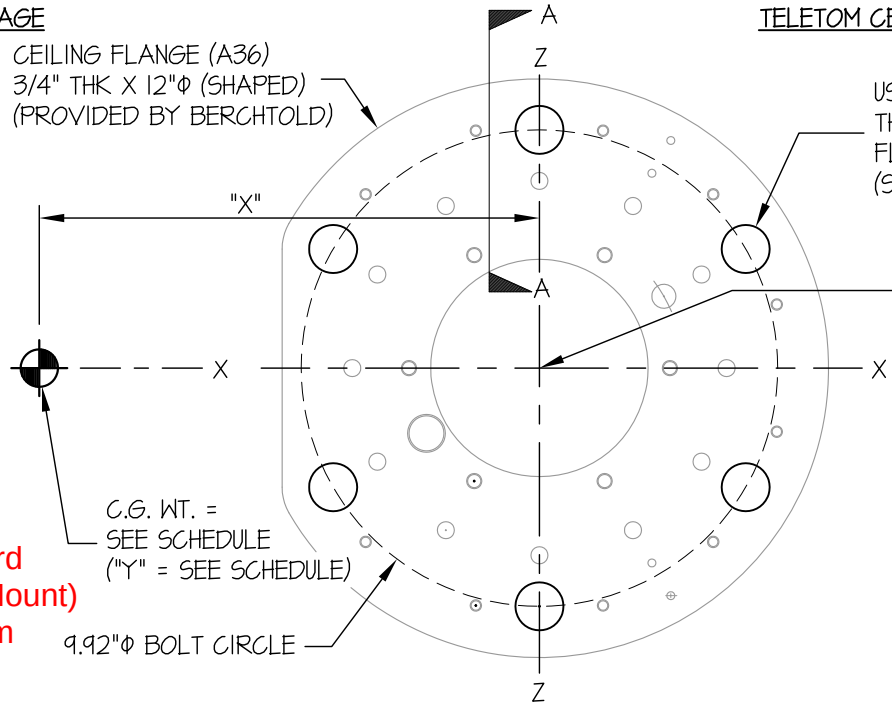
REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2014
5/29/13
STRUCTURAL
STATE OF CALIFORNIA

BERCHTOLD USA

TELETOM STAND ALONE BOOMS

DES. J. ROBERSON | EASE JOB NO. 11-1303 | DATE 5/29/13 | SHEET 2 OF 6 SHEETS

SEISMIC ANCHORAGE



TELETOM CEILING FLANGE TO MOUNTING PLATE

USE 6- 7/8"Φ (A193 GR B7) THREADED RODS FROM CEILING FLANGE TO MOUNTING PLATE (SEE SECTION "A" PG. 1)

BOLT GROUP CENTER

S-Series Standard
2-row (with TC Mount)
1300mm Top arm length

PLAN AT TELETOM CEILING FLANGE

LOADS: (BASED ON ~~TP-632~~)

WEIGHT = ~~1085~~ LB 812# 735#
HORIZONTAL FORCE (E_h) = ~~3906~~ LB
VERTICAL FORCE (E_v) = ~~434~~ LB 162#

MOMENTS: 735 40.9" 812# 162 69.9" 109,496#"

M_{XX} = ~~3906~~#(~~66.16~~") + (1.2(~~1085~~#) + ~~434~~#)~~68.97~~" = ~~378,153~~"#
M_{ZZ} = ~~3906~~#(~~66.16~~") + (1.2(~~1085~~#) + ~~434~~#)~~68.97~~" = ~~378,153~~"#
M_{YY} = 100#(~~68.97~~") = ~~6897~~"#
69.9" 6990#"

NOTE: UNIT IS FREE TO ROTATE 360 DEGREES ABOUT Y-Y AXIS. BRAKING SYSTEM RELEASES WITH APPLIED LOAD OF 25 LBS. AT C.G. LOCATION. CALCULATION USES 100 LBS. FOR A SAFETY FACTOR OF 4.

BOLT FORCES:

TENSION (T) 109,496#"

$$T_u = \frac{\text{~~378153~~"#}(4.96")}{74} + \frac{1.2(\text{~~1085~~#}) + \text{~~434~~#}}{6 \text{ BOLTS}} = \text{~~25,704~~ LB/BOLT (MAX)}$$

812# 162# 7,529#"

COMPRESSION (C) 109,496#"

$$C_u = \frac{\text{~~378153~~"#}(4.96")}{74} - \frac{\text{~~1085~~#}(0.9) - \text{~~434~~}}{6 \text{ BOLTS}} = \text{~~25325~~ LB/BOLT (MAX)}$$

812# 162# 7244#"

SHEAR (V) 735 6990#" 357

$$V_u = \frac{\text{~~3906~~#}}{6 \text{ BOLTS}} + \frac{(\text{~~6897~~"#})(4.96")}{148 \text{ in}^4} = \text{~~883~~ LB/BOLT (MAX) -}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M) 357# 870#"

$M_{act.}$ = ~~883~~#(4.875"/2) = ~~2152~~" -#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = ~~0.98~~ 0.31 < 1.00 ∴ OK √

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = ~~0.89~~ 0.29 < 1.00 ∴ OK √

BOLT GROUP PROPERTIES:

$I_{x\text{-}x}$ = 74 in.^{4}
$I_{z\text{-}z}$ = 74 in.^{4}
$I_{y\text{-}y}$ = 148 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi ; Fu = 125 d = 0.755" ; Φ = 0.90
$Z = d^3/6 = (.755)^3/6 = 0.0717$ in.^{3}
A_g= 0.4477 in.^{2}, A_b= 0.601
r = 0.1888 in.
KL/r = 1.2(4.875")/0.1888 = 31.0
M_n = 105 ksi (0.0717^3) = 7529"-#

$M_{STR} = \phi M_n = 0.9(7529\text{"-\#}) = 6776\text{"-\#}$
T_{STR} = 42,308 lbs. (AISC Eq J3-2)
C_{STR} = 36,506 lbs. (AISC Eq E3-1)

BOLT SPEC: 7/8"ϕ (A193 GR B7) THREADED ROD

ϕT= 42,260 LB/BOLT (TENSION)
ϕV= 22,540 LB/BOLT (SHEAR)

BERCHTOLD USA

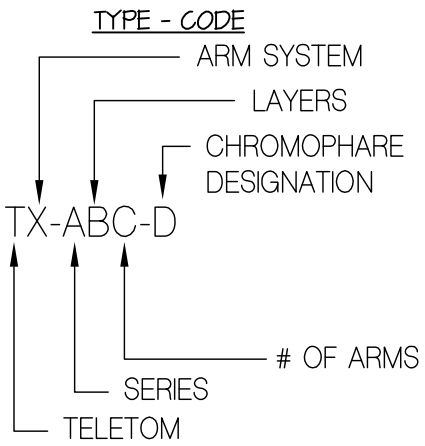
TELETOM STAND ALONE BOOMS

DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/29/13
SHEET 3 OF 6 SHEETS

SEISMIC ANCHORAGE

TELETOM CONFIGURATION	TOP ARM LENGTH (mm)	BOTTOM ARM LENGTH (mm)	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT XX (in-lb)	MOMENT YY (in-lb)
TELETOM TF-AB0	N/A	N/A	549	48.01	13.06	106,359	1306
TELETOM TF-AB2/ TF-AB1-C	600	N/A	904	47.09	39.49	210,368	3949
	850	N/A	1012	46.76	40.95	236,662	4095
	1000	N/A	1016	46.57	44.17	242,137	4417
	1300	N/A	1026	46.18	50.62	253,668	5062
TELETOM TF-AB2/ TF-AB2-C	600	600	1059	45.24	47.43	252,838	4743
	600	850	1062	45.15	52.6	261,995	5260
	600	1000	1088	44.43	55.42	270,499	5542
	600	1300	1097	44.17	61.55	282,469	6155
	850	600	1067	44.94	52.95	263,020	5295
	850	850	1070	44.86	58.1	272,268	5810
	850	1000	1096	44.15	61	281,168	6100
	850	1300	1105	43.89	67.12	293,263	6712
	1000	600	1072	44.77	56.27	269,291	5627
	1000	850	1075	44.68	61.39	278,502	6139
	1000	1000	1100	43.98	64.34	287,399	6434
	1000	1300	1110	43.72	70.46	299,842	7046
	1300	600	1082	44.42	62.88	281,883	6288
	1300	850	1085	44.34	67.97	291,188	6797
	1300	1000	1110	43.65	71.02	300,557	7102
	1300	1300	1120	43.4	77.12	313,188	7712
TELETOM TP-AB1	N/A	900	938	75.9	44.79	323,520	4479
TELETOM TP-AB2/ TP-AB2-C	600	900	1062	67.44	53.61	348,931	5361
	850	900	1070	66.98	59.11	359,203	5911
	1000	900	1075	66.7	62.4	365,457	6240
	1300	900	1085	66.16	68.97	378,153	6897
TELETOM TM-A11	N/A	900	263	68.66	34.96	79,718	3496
TELETOM TM-A12/ TM-A12-C	600	900	717	54.28	43.13	189,586	4313
	850	900	725	53.74	46.66	194,413	4666
	1000	900	730	53.43	48.8	197,412	4880
	1300	900	740	52.81	53.1	203,556	5310

TELETOM CEILING FLANGE TO MOUNTING PLATE



"A" (SERIES)	"B" (LAYERS)	"C" * (# OF ARMS)
4	1 (MIN) - 4 (MAX)	0 (MIN) - 2 (MAX)
6	1 (MIN) - 3 (MAX)	0 (MIN) - 2 (MAX)

*NOTE:
"0" REPRESENTS A "STRAIGHT DROP" WHERE THERE ARE NO HORIZONTAL ARMS

"X"	ARM SYSTEM
F	FIXED
P	POWERED
M	MANUAL GAS SPRING

NOTE:
EVERY SYSTEM HAS TO BE EITHER F, P, OR M

NOTE:
OPA ENCOMPASSES ALL COMBINATIONS UP TO THE MAX WEIGHT AND C.G LOCATIONS SHOWN

TELETOM CONFIGURATIONS;

TYPE-CODE FOR TELETOM CONFIGURATIONS

A. REPRESENTS THE HEAD SERIES WHICH CAN BE 4 OR 6, THE 6 SERIES HEADS ARE LARGER

B. REPRESENTS THE NUMBER OF LAYERS ON THE EQUIPMENT HEAD. THIS IS A BASIC REPRESENTATION OF HOW MUCH THE HEAD CAN HOLD.

C. REPRESENTS THE NUMBER OF HORIZONTAL ARMS "0" REPRESENTS A "STRAIGHT DROP" CONDITION WHERE THERE ARE NO HORIZONTAL ARMS.

D. REPRESENTS WHETHER IT IS A CHROMOPHARE. "C" OR NOTHING

X. REPRESENTS WHETHER THE ARMS ARE FIXED (F) OR CAN ARTICULATE VERTICALLY AND WHETHER THEY ARE POWERED(P) OR MANUAL WITH A GAS SPRING SYSTEM(M)

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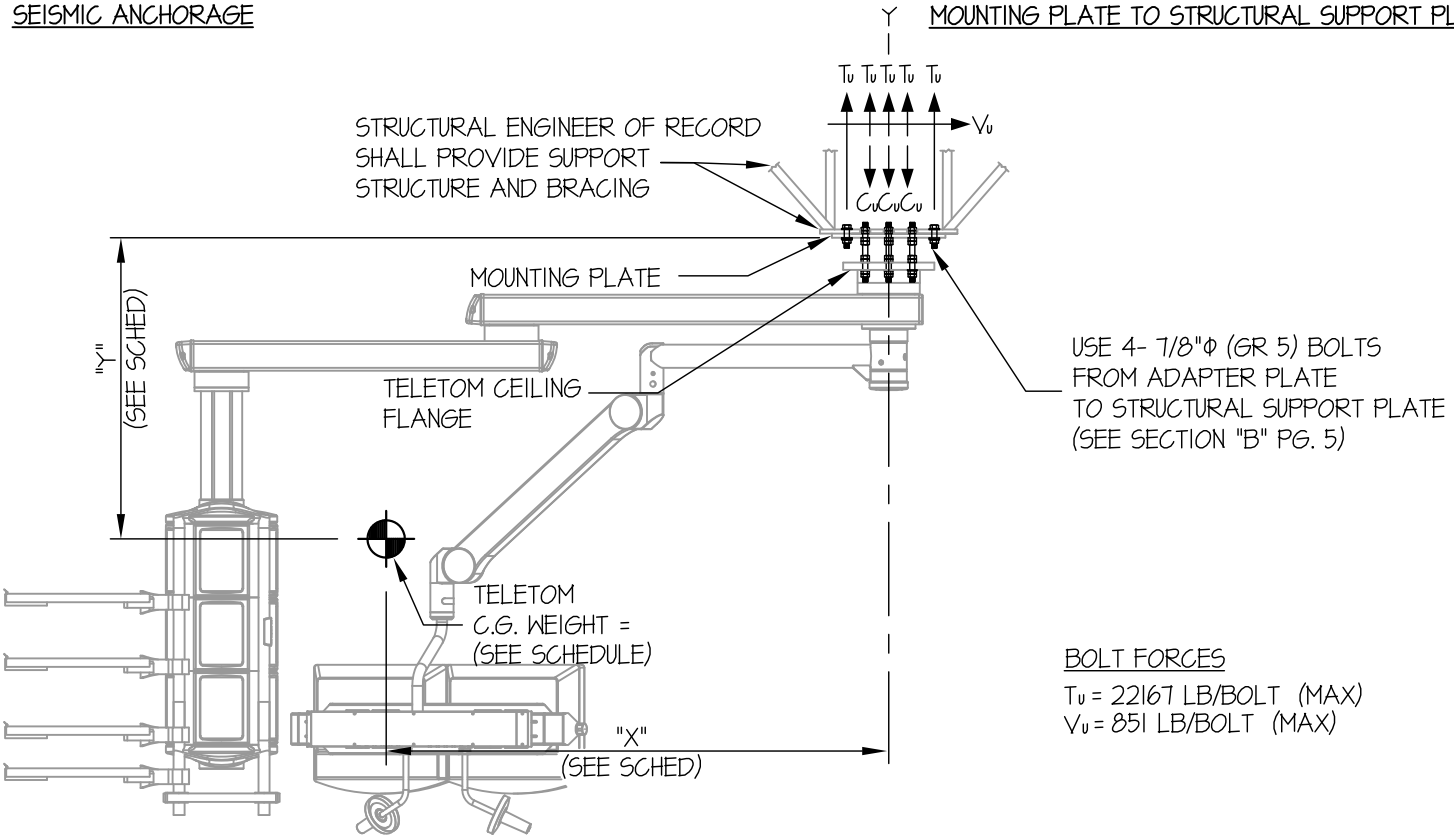
TELETOM STAND ALONE BOOMS

DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/29/13
SHEET 4 OF 6 SHEETS

SEISMIC ANCHORAGE



MOUNTING PLATE TO STRUCTURAL SUPPORT PLATE

BOLT FORCES
T_u = 22167 LB/BOLT (MAX)
V_u = 851 LB/BOLT (MAX)

LOADS: (BASED ON TP-632)

S-Series Standard 2-row (with TC Mount) 1300mm Top arm length

WEIGHT = ~~1085~~ LB 812# 735
HORIZONTAL FORCE (E_h) = ~~3906~~ LB
VERTICAL FORCE (E_v) = ~~434~~ LB
162

MOMENTS: 735 40.9" 812# 162 69.9" 109,496#"

M_{XX} = ~~3906~~#(66.16") + (1.2(~~1085~~#) + ~~434~~#)68.97" = ~~378,153~~"#
M_{ZZ} = ~~3906~~#(66.16") + (1.2(~~1085~~#) + ~~434~~#)68.97" = ~~378,153~~"#
M_{YY} = 100#(~~68.97~~") = ~~6897~~"#
69.9" 6990#"

NOTE: UNIT IS FREE TO ROTATE 360 DEGREES ABOUT Y-Y AXIS. BRAKING SYSTEM RELEASES WITH APPLIED LOAD OF 25 LBS. AT C.G. LOCATION. CALCULATION USES 100 LBS. FOR A SAFETY FACTOR OF 4.

BOLT FORCES:

TENSION (T) 109,496#"

$$T_u = \frac{\text{~~378153~~"#}(8.62")}{149} + \frac{1.2(\text{~~1085~~#}) + \text{~~434~~#}}{6 \text{ BOLTS}} = \text{~~22167~~ LB/BOLT (MAX)}$$

812# 162# 6524#

SHEAR (V) 735 6990#"

$$V_u = \frac{\text{~~3906~~#}}{6 \text{ BOLTS}} + \frac{(\text{~~6897~~"#})(8.62")}{298 \text{ in}^4} = \text{~~851~~ LB/BOLT (MAX) -}$$

325

(PER AISC J3.7, LESS THAN 20% STRESS)

BOLT GROUP PROPERTIES:

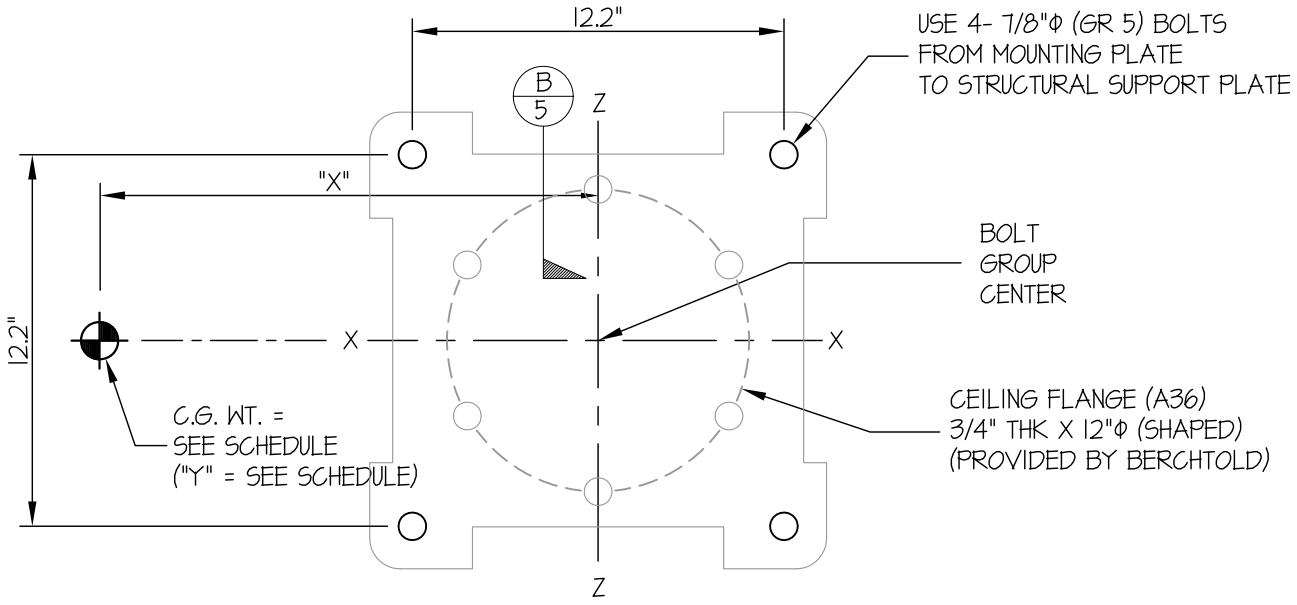
$I_{x\text{-}x}$ = 149 in.^{4}
$I_{z\text{-}z}$ = 149 in.^{4}
$I_{y\text{-}y}$ = 298 in.^{4}

BOLT SPEC: 7/8"ϕ (GR 5) BOLTS

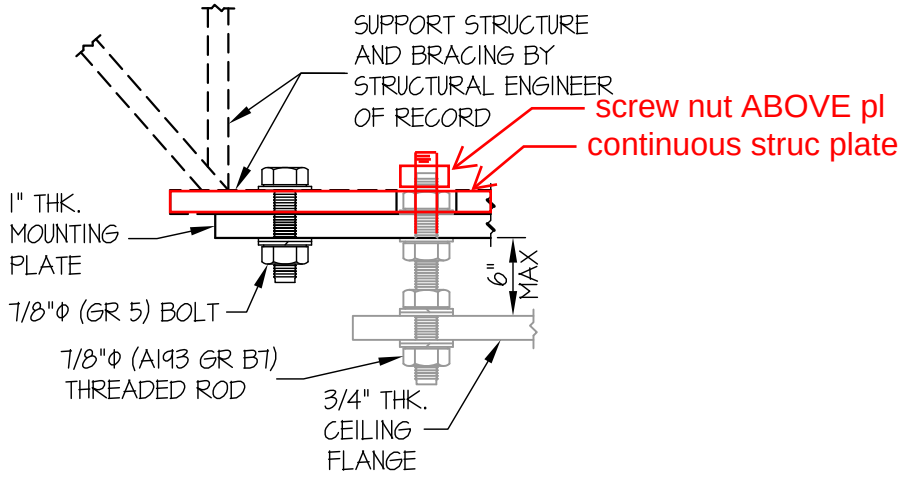
ϕT= 40,600 LB/BOLT (TENSION)
ϕV= 21,640 LB/BOLT (SHEAR)

SEISMIC ANCHORAGE

MOUNTING PLATE TO STRUCTURAL CEILING PLATE



PLAN AT MOUNTING PLATE



SECTION "B"

BERCHTOLD USA

TELETOM STAND ALONE BOOMS

DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/29/13
SHEET 6 OF 6 SHEETS

SEISMIC ANCHORAGE

MOUNTING PLATE TO STRUCTURAL SUPPORT PLATE

TELETOM CONFIGURATION	TOP ARM LENGTH (mm)	BOTTOM ARM LENGTH (mm)	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT XX (in-lb)	MOMENT YY (in-lb)
TELETOM TF-AB0	N/A	N/A	549	48.01	13.06	106,359	1306
TELETOM TF-AB2/ TF-AB1-C	600	N/A	904	47.09	39.49	210,368	3949
	850	N/A	1012	46.76	40.95	236,662	4095
	1000	N/A	1016	46.57	44.17	242,137	4417
	1300	N/A	1026	46.18	50.62	253,668	5062
TELETOM TF-AB2/ TF-AB2-C	600	600	1059	45.24	47.43	252,838	4743
	600	850	1062	45.15	52.6	261,995	5260
	600	1000	1088	44.43	55.42	270,499	5542
	600	1300	1097	44.17	61.55	282,469	6155
	850	600	1067	44.94	52.95	263,020	5295
	850	850	1070	44.86	58.1	272,268	5810
	850	1000	1096	44.15	61	281,168	6100
	850	1300	1105	43.89	67.12	293,263	6712
	1000	600	1072	44.77	56.27	269,291	5627
	1000	850	1075	44.68	61.39	278,502	6139
	1000	1000	1100	43.98	64.34	287,399	6434
	1000	1300	1110	43.72	70.46	299,842	7046
	1300	600	1082	44.42	62.88	281,883	6288
	1300	850	1085	44.34	67.97	291,188	6797
	1300	1000	1110	43.65	71.02	300,557	7102
	1300	1300	1120	43.4	77.12	313,188	7712
TELETOM TP-AB1	N/A	900	938	75.9	44.79	323,520	4479
TELETOM TP-AB2/ TP-AB2-C	600	900	1062	67.44	53.61	348,931	5361
	850	900	1070	66.98	59.11	359,203	5911
	1000	900	1075	66.7	62.4	365,457	6240
	1300	900	1085	66.16	68.97	378,153	6897
TELETOM TM-A11	N/A	900	263	68.66	34.96	79,718	3496
TELETOM TM-A12/ TM-A12-C	600	900	717	54.28	43.13	189,586	4313
	850	900	725	53.74	46.66	194,413	4666
	1000	900	730	53.43	48.8	197,412	4880
	1300	900	740	52.81	53.1	203,556	5310

NOTE:
FOR TELETOM TYPE- CODE SEE PG 3 OF 6

NOTE:
OPA ENCOMPASSES ALL COMBINATIONS
UP TO THE MAX WEIGHT AND C.G LOCATIONS SHOWN

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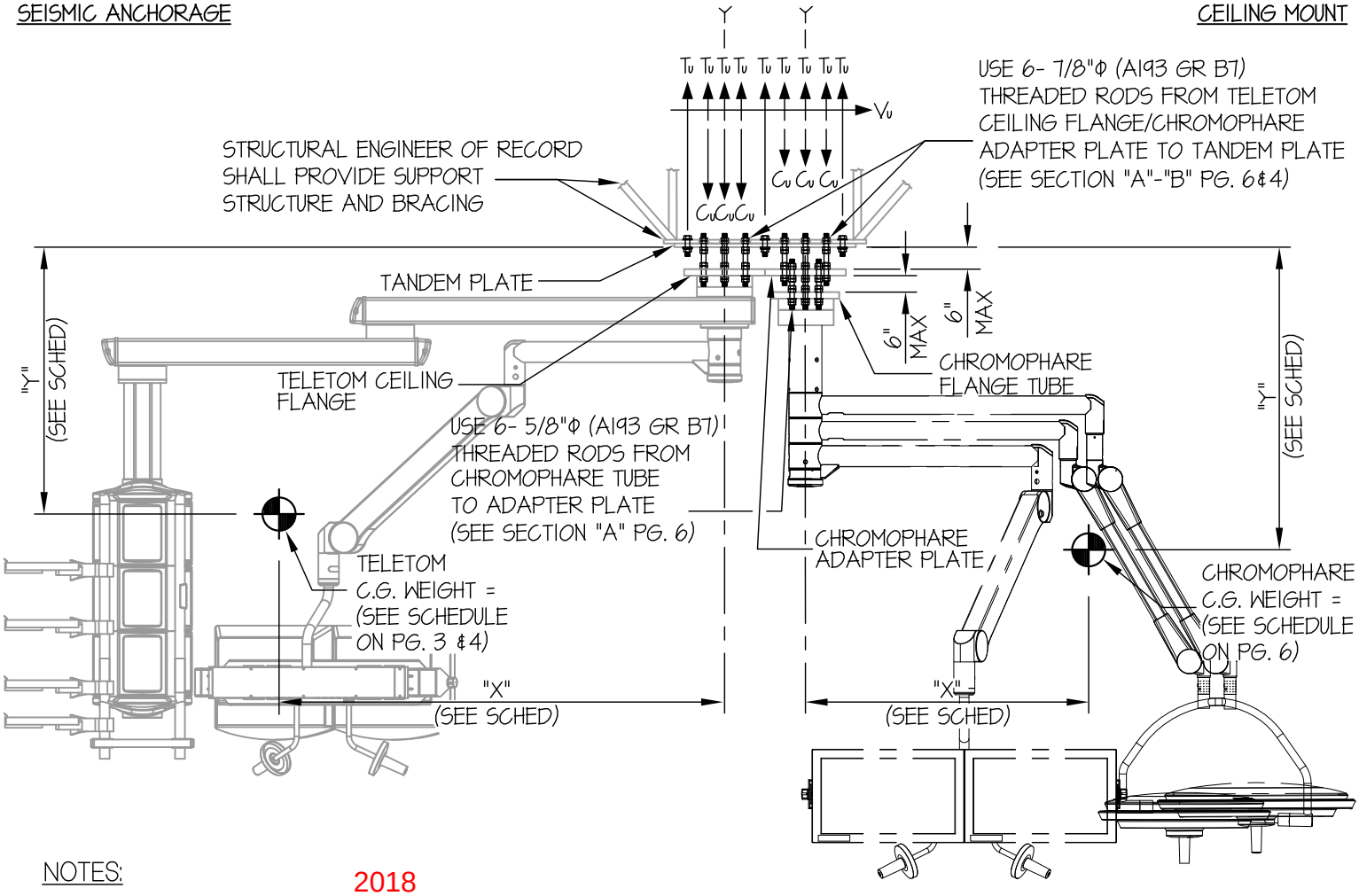
TANDEM MOUNT: TELETOM - CHROMOPHARE

DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/30/13
SHEET 1 OF 8 SHEETS

SEISMIC ANCHORAGE

CEILING MOUNT



NOTES:

1. ANCHORAGE DESIGN PER ~~2010~~ 2018 CALIFORNIA BUILDING CODE AND ASCE ~~7-05.~~ 7-16
   STRENGTH DESIGN IS USED.
   HORIZONTAL FORCE (E_h) = ~~3.60~~ 0.905 W_p (S_{DS} = ~~2.00,~~ 1.013 a_p = 2.5, I_p = 1.5, R_p = 2.5, z/h ≤ 1.0)
   VERTICAL FORCE (E_v) = ~~0.40~~ W_p 0.20Wp

   h= 131' (above 0'-0" at first floor)
   z= 32'
   z/h=.244

2. CENTER OF GRAVITY (C.G.) WEIGHT IS A MAXIMUM. THIS PRE-APPROVAL ENCOMPASSES ALL WEIGHTS UP TO THE MAXIMUM WEIGHT SHOWN.

3. STRUCTURAL ENGINEER OF RECORD FOR THE BUILDING SHALL PROVIDE SUPPORT STRUCTURE DESIGNED TO SUPPORT WEIGHTS AND FORCES SHOWN, IN ADDITION TO ALL OTHER LOADS.

REGISTERED PROFESSIONAL ENGINEER
JONATHAN ROBERSON
No. 4197
EXP. 6-30-2014
5/30/13
STRUCTURAL
STATE OF CALIFORNIA

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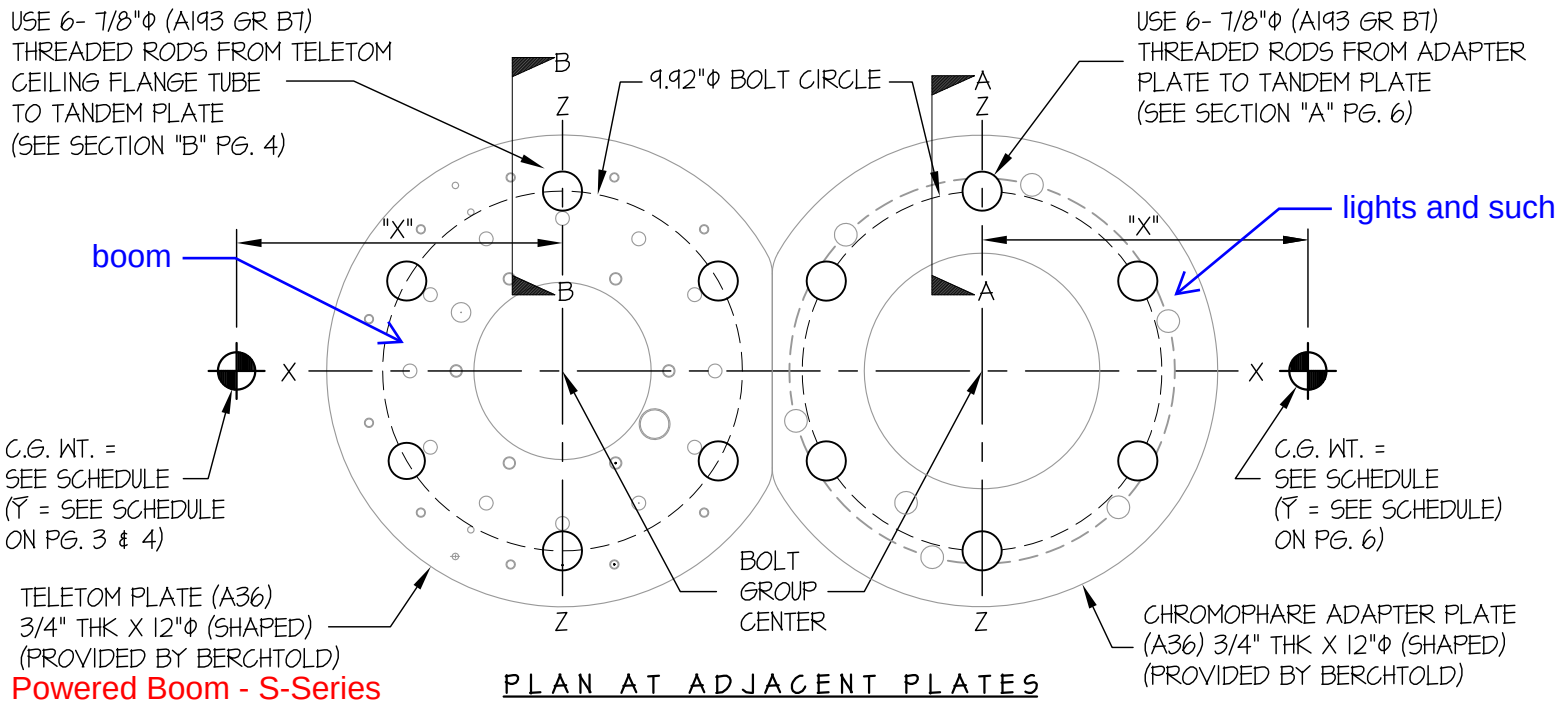
TANDEM MOUNT: TELETOM - CHROMOPHARE

DES. J. ROBERSON | EASE JOB NO. 11-1303 | DATE 5/30/13 | SHEET 2 OF 8 SHEETS

SEISMIC ANCHORAGE

TELETOM PLATE/CHROMOPHARE ADAPTER PLATE TO TANDEM PLATE



Powered Boom - S-Series
Standard 3-Row per DHD

calcs for boom

PLAN AT ADJACENT PLATES

LOADS: (MODEL ~~TF- 632 OR TF- 632-C~~)

WEIGHT = ~~1085~~ LB 632.9# 573#
HORIZONTAL FORCE (E_h) = ~~3906~~ LB
VERTICAL FORCE (E_v) = ~~434~~ LB 127#

MOMENTS: 573# 45.5" 632.9# 127# 75.2" 92,735#"

M_{XX} = ~~3906~~#(~~66.16~~") + (1.2(~~1085~~#) + ~~434~~#)~~68.97~~" = ~~378,153~~"#
M_{ZZ} = 3906#(~~66.16~~") + (1.2(~~1085~~#) + ~~434~~#)~~68.97~~" = ~~378,153~~"#
M_{YY} = 100#(~~68.97~~") = ~~6897~~"#

75.2" 7,520#"

NOTE: UNIT IS FREE TO ROTATE 360 DEGREES ABOUT Y-Y AXIS. BRAKING SYSTEM RELEASES WITH APPLIED LOAD OF 25 LBS. AT C.G. LOCATION. CALCULATION USES 100 LBS. FOR A SAFETY FACTOR OF 4.

BOLT FORCES:

TENSION (T) 92,735#" 632.9# 127#

$T_u = \frac{378153"\#(4.96")}{74} + \frac{1.2(1085\#) + 434\#}{6 \text{ BOLTS}}$ = ~~25,704~~ LB/BOLT (MAX) 6,363#

COMPRESSION (C) 92,735#" 632.9# 127#

$C_u = \frac{378153"\#(4.96")}{74} - \frac{1085\#(0.9) - 434}{6 \text{ BOLTS}}$ = ~~25325~~ LB/BOLT (MAX) 6,142#

SHEAR (V) 573# 7,520#"

$V_u = \frac{3906\#}{6 \text{ BOLTS}} + \frac{(6897"\#)(4.96")}{148 \text{ in}^4}$ = ~~883~~ LB/BOLT (MAX) - 348#
(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M) 348# 848#

$M_{act.}$ = ~~883~~#(4.875"/2) = ~~2152~~"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = ~~0.98~~ 0.28 < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = ~~0.89~~ 0.26 < 1.00 ∴ OK

BOLT GROUP PROPERTIES:

I_{x-x} = 74 in.^{4}
I_{z-z} = 74 in.^{4}
I_{y-y} = 148 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi ; Fu = 125 d = 0.755" ; Φ = 0.90
$Z = d^3/6 = (0.755)^3/6$ = 0.0717 in.^{3}
A_g= 0.4477 in.^{2}, A_b= 0.601
r = 0.1888 in.
KL/r = 1.2(4.875")/0.1888 = 31.0
M_n = 105 ksi (0.0717^3) = 7529"-#

$M_{STR} = \phi M_n$ = 0.9(7529"-#)= 6776"-#
T_{STR} = 42,258 lbs. (AISC Eq J3-2)
C_{STR} = 36,506 lbs. (AISC Eq E3-1)

BOLT SPEC: 7/8"Φ (A193 GR B7) THREADED ROD

ΦT= 42,260 LB/BOLT (TENSION)
ΦV= 22,540 LB/BOLT (SHEAR)

BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

SEISMIC ANCHORAGE

TELETOM CEILING FLANGE/CHROMOPHARE ADAPTER PLATE TO TANDEM PLATE

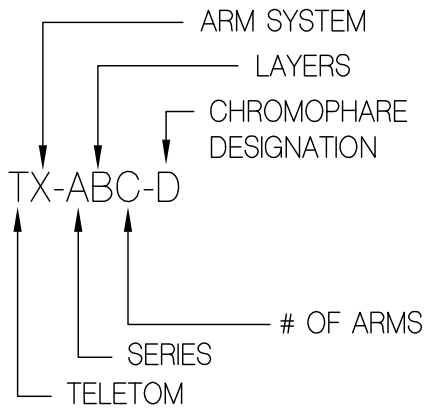
TELETOM CONFIGURATION	TOP ARM LENGTH (mm)	BOTTOM ARM LENGTH (mm)	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT XX (in-lb)	MOMENT YY (in-lb)
TELETOM TF-630	N/A	N/A	549	48.01	13.06	106,359	1306
TELETOM TF-631/ TF-631-C	600	N/A	904	47.09	39.49	210,368	3949
	850	N/A	1012	46.76	40.95	236,662	4095
	1000	N/A	1016	46.57	44.17	242,137	4417
	1300	N/A	1026	46.18	50.62	253,668	5062
TELETOM TF-632/ TF-632-C	600	600	1059	45.24	47.43	252,838	4743
	600	850	1062	45.15	52.6	261,995	5260
	600	1000	1088	44.43	55.42	270,499	5542
	600	1300	1097	44.17	61.55	282,469	6155
	850	600	1067	44.94	52.95	263,020	5295
	850	850	1070	44.86	58.1	272,268	5810
	850	1000	1096	44.15	61	281,168	6100
	850	1300	1105	43.89	67.12	293,263	6712
	1000	600	1072	44.77	56.27	269,291	5627
	1000	850	1075	44.68	61.39	278,502	6139
	1000	1000	1100	43.98	64.34	287,399	6434
	1000	1300	1110	43.72	70.46	299,842	7046
	1300	600	1082	44.42	62.88	281,883	6288
	* 1300	850	1085	44.34	67.97	291,188	6797
	1300	1000	1110	43.65	71.02	300,557	7102
	1300	1300	1120	43.4	77.12	313,188	7712

* USED IN THE CALCULATION SHOWN ON PG 2 OF 8, AND PG 7 OF 8

NOTE:
OPA ENCOMPASSES ALL COMBINATIONS UP TO THE MAX WEIGHT AND C.G LOCATIONS SHOWN

NOTE: EVERY SYSTEM HAS TO BE EITHER F, P, OR M

TYPE - CODE



"A" (SERIES)	"B" (LAYERS)	"C" * (# OF ARMS)
4	1 (MIN) - 4 (MAX)	0 (MIN) - 2 (MAX)
6	1 (MIN) - 3 (MAX)	0 (MIN) - 2 (MAX)

*NOTE:
"0" REPRESENTS A "STRAIGHT DROP" WHERE THERE ARE NO HORIZONTAL ARMS

"X"	ARM SYSTEM
F	FIXED
P	POWERED
M	MANUAL GAS SPRING

TELETOM CONFIGURATIONS;

TYPE-CODE FOR TELETOM CONFIGURATIONS

A. REPRESENTS THE HEAD SERIES WHICH CAN BE 4 OR 6, THE 6 SERIES HEADS ARE LARGER

B. REPRESENTS THE NUMBER OF LAYERS ON THE EQUIPMENT HEAD. THIS IS A BASIC REPRESENTATION OF HOW MUCH THE HEAD CAN HOLD.

C. REPRESENTS THE NUMBER OF HORIZONTAL ARMS "0" REPRESENTS A "STRAIGHT DROP" CONDITION WHERE THERE ARE NO HORIZONTAL ARMS.

D. REPRESENTS WHETHER IT IS A CHROMOPHARE. "C" OR NOTHING

X. REPRESENTS WHETHER THE ARMS ARE FIXED (F) OR CAN ARTICULATE VERTICALLY AND WHETHER THEY ARE POWERED(P) OR MANUAL WITH A GAS SPRING SYSTEM(M)

BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

SEISMIC ANCHORAGE

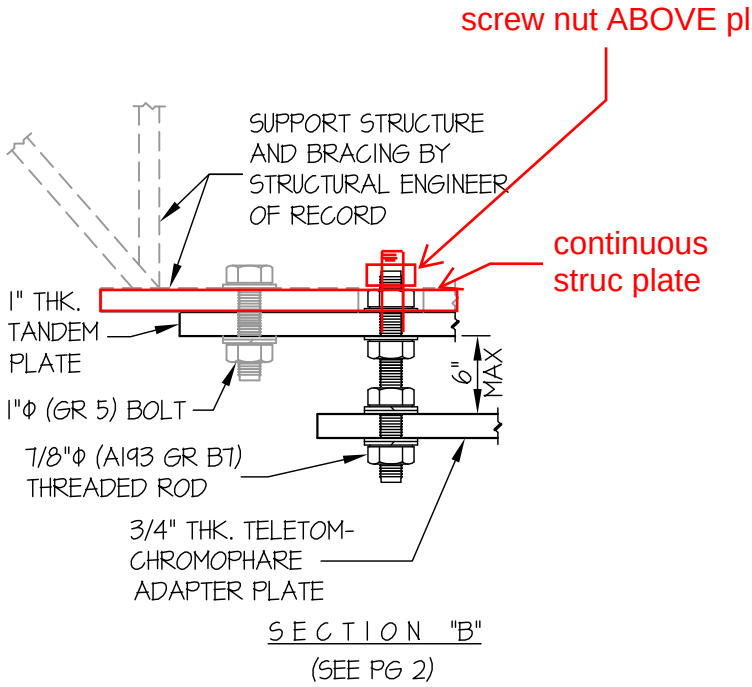
TELETOM CEILING FLANGE/CHROMOPHARE ADAPTER PLATE TO TANDEM PLATE

TELETOM TP-631	N/A	900	938	75.9	44.79	323,520	4479
TELETOM TP-632/ TP-632-C	600	900	1062	67.44	53.61	348,931	5361
	850	900	1070	66.98	59.11	359,203	5911
	1000	900	1075	66.7	62.4	365,457	6240
	1300	900	1085	66.16	68.97	378,153	6897
TELETOM TM-611	N/A	900	263	68.66	34.96	79,718	3496
TELETOM TM-612 / TM-612-C	600	900	717	54.28	43.13	189,586	4313
	850	900	725	53.74	46.66	194,413	4666
	1000	900	730	53.43	48.8	197,412	4880
	1300	900	740	52.81	53.1	203,556	5310

NOTE: SFP STANDS FOR SINGLE FLAT PANEL

CHROMOPHARE:
A CHROMOPHARE PRODUCT CAN BE ATTACHED TO THE TELETOM SYSTEM HERE ARE THE POSSIBLE CHROMOPHARE ATTACHMENTS COMBINATIONS

COMPONENT 1	COMPONENT 2
F528	N/A
	F528
	F628
	SFP
	KEYBOARD HOLDER
	MONITOR HOLDER
F628	N/A
	F628
	SFP
	KEYBOARD HOLDER
	MONITOR HOLDER
SFP	N/A
F-300	N/A
KEYBOARD HOLDER	N/A
MONITOR HOLDER	N/A



SECTION "B"

(SEE PG 2)

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
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BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

DES. J. ROBERSON | EASE JOB NO. 11-1303 | DATE 5/30/13 | SHEET 5 OF 8 SHEETS

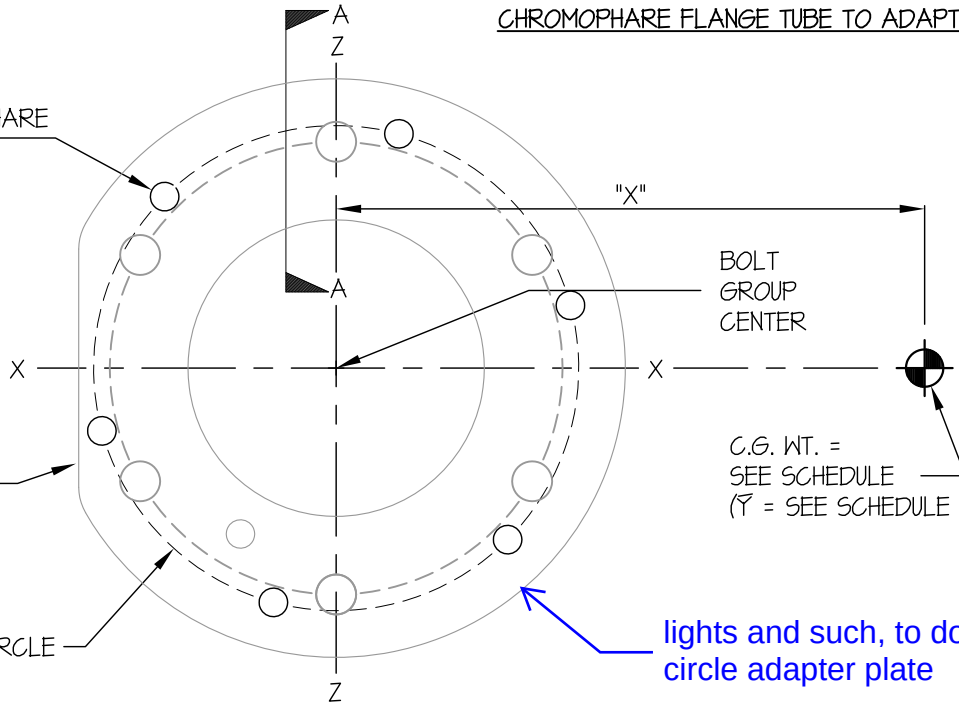
SEISMIC ANCHORAGE

USE 6- 5/8"Φ (A193 GR B7) THREADED RODS FROM CHROMOPHARE FLANGE TUBE TO ADAPTER PLATE (SEE SECTION "A" PG. 6)

FLANGE TUBE (A36) 3/4" THK X 12.2"Φ (SHAPED) (PROVIDED BY BERCHTOLD)

10.63"Φ BOLT CIRCLE

CHROMOPHARE FLANGE TUBE TO ADAPTER PLATE



FP/L/L from sheet 6

lights and such, to double circle adapter plate

PLAN AT CHROMOPHARE FLANGE TUBE

calcs for lights etc.

LOADS: (MODEL ~~DEP/L/DFP~~)

WEIGHT = ~~520~~ LB 398# 360#

HORIZONTAL FORCE (E_h) = ~~1872~~ LB

VERTICAL FORCE (E_v) = ~~208~~ LB 80#

MOMENTS: 360# 34.75" 398# 80# 51.55"

M_{XX} = ~~1872~~#(~~40.74~~") + (1.2(~~520~~#) + ~~208~~#)~~43.62~~" = ~~112,557~~"# 41,254#"

M_{ZZ} = ~~1872~~#(~~40.74~~") + (1.2(~~520~~#) + ~~208~~#)~~43.62~~" = ~~112,557~~"# 41,254#"

M_{YY} = 100#(~~43.62~~") = ~~4362~~"# 51.55" 5,155#"

NOTE: UNIT IS FREE TO ROTATE 360 DEGREES ABOUT Y-Y AXIS. BRAKING SYSTEM RELEASES WITH APPLIED LOAD OF 25 LBS. AT C.G. LOCATION. CALCULATION USES 100 LBS. FOR A SAFETY FACTOR OF 4.

BOLT FORCES:

TENSION (T) 41,254#" 398# 80#

$$T_u = \frac{\text{~~112557~~"\#(5.31")}}{86} + \frac{1.2(\text{~~520~~\#}) + \text{~~208~~\#}}{6 \text{ BOLTS}} = \text{~~7193~~ LB/BOLT (MAX)}$$

2,640#

COMPRESSION (C) 41,254#" 398# 80#

$$C_u = \frac{\text{~~112557~~"\#(5.31")}}{85} - \frac{\text{~~520~~\#(0.9)} - \text{~~208~~\#}}{6 \text{ BOLTS}} = \text{~~7011~~ LB/BOLT (MAX)}$$

2,531#

SHEAR (V) 360# 5,155#"

$$V_u = \frac{\text{~~1872~~\#}}{6 \text{ BOLTS}} + \frac{\text{~~(4362~~"\#)(5.31")}}{170 \text{ in}^4} = \text{~~449~~ LB/BOLT (MAX)} - \text{~~221~~\#}$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BENDING (M) 221# 566#"

$M_{act.}$ = ~~449~~#(5.125"/2) = ~~1151~~"-#

COMBINED STRESS CHECK:

COMPRESSION: $\frac{C}{C_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.39 = ~~0.92~~ < 1.00 ∴ OK

TENSION: $\frac{T}{T_{STR}} + \frac{8}{9}\left(\frac{M}{M_{STR}}\right)$ = 0.34 = ~~0.78~~ < 1.00 ∴ OK

BOLT GROUP PROPERTIES:

$I_{x\text{-}x}$ = 85 in.^{4}

$I_{z\text{-}z}$ = 85 in.^{4}

$I_{y\text{-}y}$ = 170 in.^{4}

BOLT PROPERTIES:

F_y = 105 ksi : Fu = 125 d = 0.527" : Φ = 0.90

$Z = d^3/6 = (0.527)^3/6 = 0.0244$ in.^{3}

A_g= 0.2181 in.^{2}, A_b= 0.307

r = 0.1318 in.

KL/r = 1.2(5.125")/0.1318 = 46.7

M_n = 105 ksi (0.0244^3) = 2562"-#

$M_{STR} = \Phi M_n$ = 0.9(2562"-#)= 2306"-#

T_{STR} = 21,586 lbs. (AISC Eq J3-2)

C_{STR} = 14,741 lbs. (AISC Eq E3-1)

BOLT SPEC: 5/8"Φ (A193 GR B7) THREADED ROD

ΦT= 21,590 LB/BOLT (TENSION)

ΦV= 11,510 LB/BOLT (SHEAR)

BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

SEISMIC ANCHORAGE

SINGLE ARM CONFIGURATION	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT Mxx (ft-lb)	MOMENT Myy (ft-lb)
L	207	21.14	33.24	26,763	3324
FP	205	19.67	34.78	25,924	3478
DFP	274	28.53	39.33	45,384	3933
VPA	196	13.93	24.35	17,465	2435

DOUBLE ARM CONFIGURATION	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT Mxx (ft-lb)	MOMENT Myy (ft-lb)
L/L	302	30.04	44.31	54,070	4431
FP/L	302	29.07	46.29	53,972	4629
L/FP	299	29.06	43.67	52,172	4367
FP/FP	300	28.08	46.51	52,651	4651
FP/DFP	370	33.76	48.41	73,627	4841
DFP/L	365	33.91	43.32	69,857	4332
L/DFP	371	34.54	47.51	74,334	4751
DFP/DFP	438	37.11	47.98	92,139	4798
DFP/FP	361	33.13	42.98	67,881	4298
VPA/L	293	25.49	39.71	45,503	3971
VPA/FP	290	24.44	39.89	44,024	3989
VPA/DFP	360	31.04	43.13	65,071	4313

TRIPLE ARM CONFIGURATION	MAX WEIGHT (lbs)	"Y" (in)	"X" (in)	MOMENT Mxx (ft-lb)	MOMENT Myy (ft-lb)
L/L/L	397	35.49	49.4	82,101	4940
L/L/FP	394	34.76	49.01	80,199	4901
L/L/DFP	467	38.88	51.75	104,033	5175
FP/L/L	398	34.75	51.55	82,617	5155
FP/L/FP	395	34.01	51.15	80,689	5155
FP/L/DFP	459	38.45	49.2	99,667	4920
DFP/L/L	454	37.93	45.19	94,819	4519
DFP/L/FP	451	37.31	44.96	93,020	4496
* DFP/L/DFP	520	40.74	43.62	112,557	4362
VPA/L/L	388	32.25	46.74	74,063	4674
VPA/L/FP	385	31.47	46.28	72,126	4628
VPA/L/DFP	457	36.20	48.97	95,363	4897

* USED IN THE CALCULATION SHOWN ON PG 5 OF 8, AND PG 7 OF 8

NOTE:
OPA ENCOMPASSES ALL COMBINATIONS UP TO THE MAX WEIGHT AND C.G LOCATIONS SHOWN

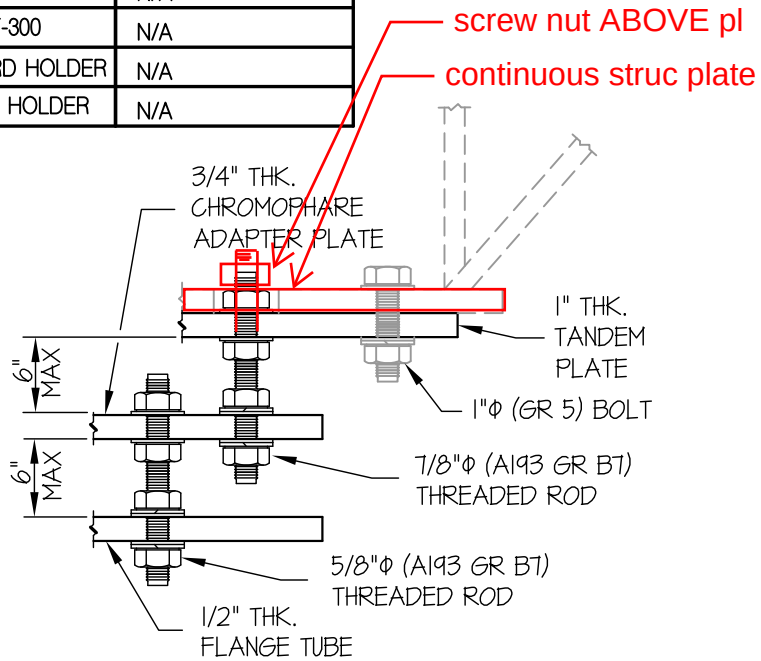
CHROMOPHARE FLANGE TUBE TO ADAPTER PLATE

ABBREVIATION	SPECIFIED
L	F628 AND F528 LAMPHEADS
FP	SINGLE FLAT PANEL
DFP	DUAL FLAT PANEL
VPA	VIDEO POWER ARM

COMPONENT 1	COMPONENT 2
F528	N/A
	F528
	F628
	SFP
	KEYBOARD HOLDER
	MONITOR HOLDER
F628	N/A
	F628
	SFP
	KEYBOARD HOLDER
	MONITOR HOLDER
SFP	N/A
F-300	N/A
KEYBOARD HOLDER	N/A
MONITOR HOLDER	N/A

CHROMOPHARE:
A CHROMOPHARE PRODUCT CAN BE ATTACHED TO THE TELETOM SYSTEM HERE ARE THE POSSIBLE CHROMOPHARE ATTACHMENTS COMBINATIONS

NOTE:
SFP STANDS FOR SINGLE FLAT PANEL



SECTION "A"
(SEE PG 5)

EASE EQUIPMENT ANCHORAGE & SEISMIC ENGINEERING
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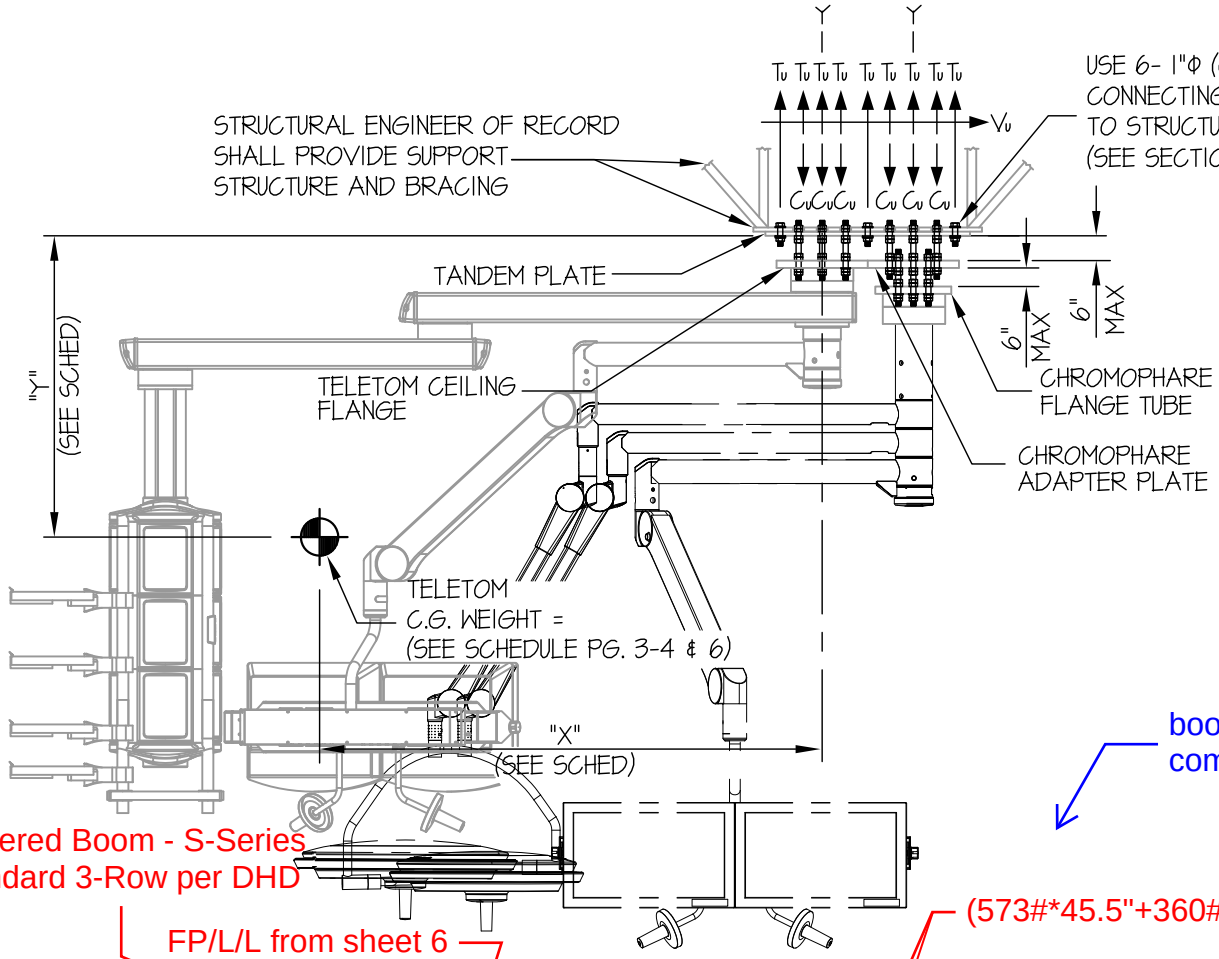
BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

DES. J. ROBERSON | EASE JOB NO. 11-1303 | DATE 5/30/13 | SHEET 7 OF 8 SHEETS

SEISMIC ANCHORAGE

TANDEM PLATE TO STRUCTURAL SUPPORT PLATE



boom and lights combined, calcs

Powered Boom - S-Series Standard 3-Row per DHD

FP/L/L from sheet 6

LOADS: (MODEL ~~TF- 632 OR TF- 632-C~~ & ~~DFP/L/DFP~~)

WEIGHT = ~~1605~~ LB 398# + 632.9# = 1031#

HORIZONTAL FORCE (E_h) = ~~5778~~ LB 933#

VERTICAL FORCE (E_v) = ~~642~~ LB 207#

(573#*45.5"+360#*34.75")/(933) = 41.35"

69.07"

MOMENTS: 933# 1031# 207#

M_{XX} = ~~5778#(57.92")~~ + (1.2(~~1605#~~) + ~~642#~~)~~62.39"~~ = ~~494,879"#~~ 138,330#"

M_{ZZ} = ~~5778#(57.92")~~ + (1.2(~~1605#~~) + ~~642#~~)~~62.39"~~ = ~~494,879"#~~ 138,330#"

M_{YY} = 100#(~~62.39"~~) = ~~6239"#~~

69.07" 6907#"

NOTE: UNIT IS FREE TO ROTATE 360 DEGREES ABOUT Y-Y AXIS. BRAKING SYSTEM RELEASES WITH APPLIED LOAD OF 25 LBS. AT C.G. LOCATION. CALCULATION USES 100 LBS. FOR A SAFETY FACTOR OF 4.

BOLT FORCES:

TENSION (T) 138,330#" 1031# 207# 5531#

$$T_U = \frac{494879"\#(13.08")}{342} + \frac{1.2(1605\#) + 642\#}{6 \text{ BOLTS}} = 19355 \text{ LB/BOLT (MAX)}$$

SHEAR (V) 933# 6907# 261#

$$V_U = \frac{5778\#}{6 \text{ BOLTS}} + \frac{(6239"\#)(13.08")}{855 \text{ in}^4} = 1058 \text{ LB/BOLT (MAX)} -$$

(PER AISC J3.7, LESS THAN 20% STRESS)

BOLT GROUP PROPERTIES:

I_{x-x} = 513 $in.^4$

I_{z-z} = 342 $in.^4$

I_{y-y} = 855 $in.^4$

BOLT SPEC: 1"ϕ (GR 5) BOLTS

ϕT= 53,000 LB/BOLT (TENSION)

ϕV= 28,260 LB/BOLT (SHEAR)

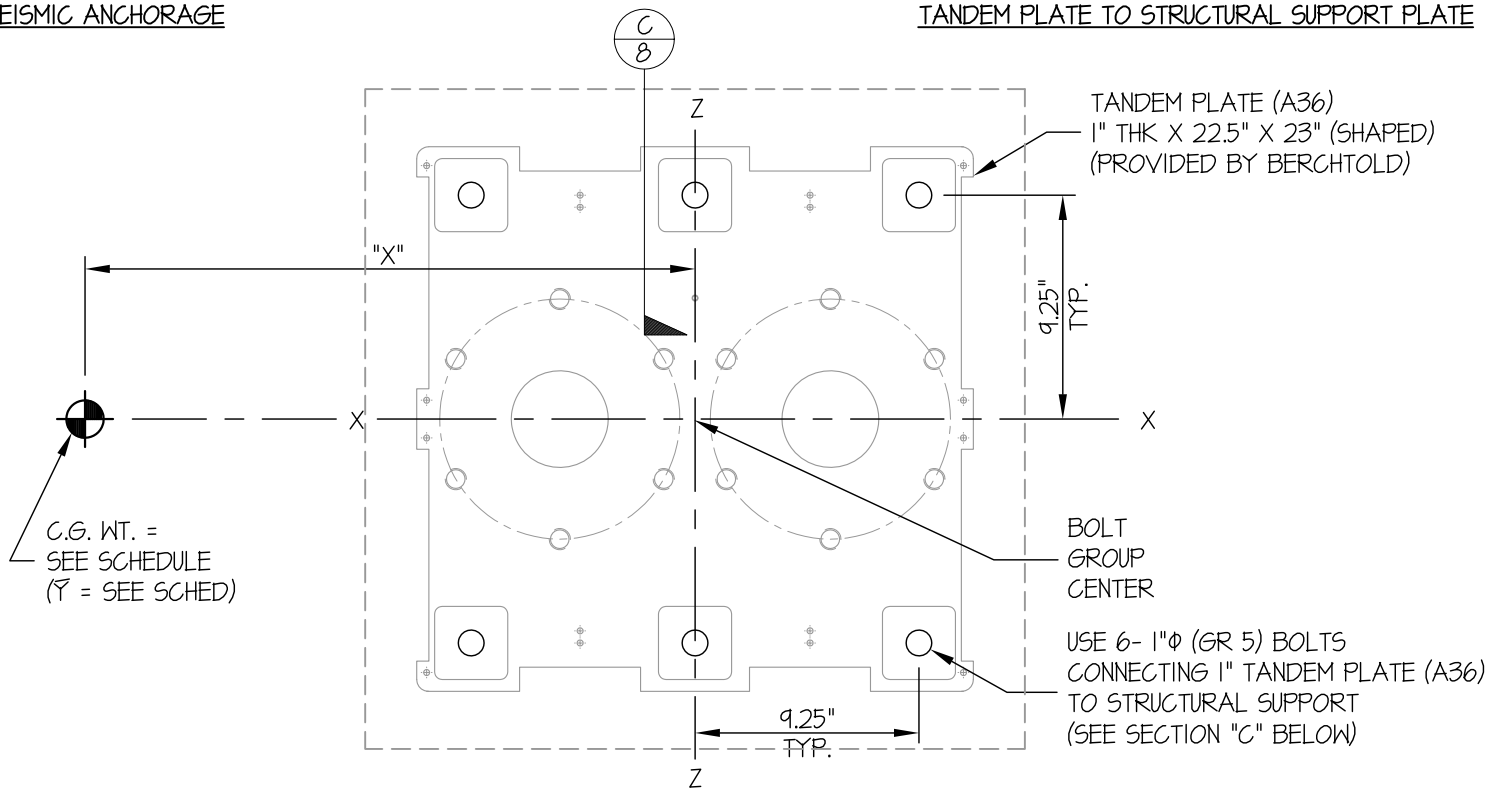
BERCHTOLD USA

TANDEM MOUNT: TELETOM - CHROMOPHARE

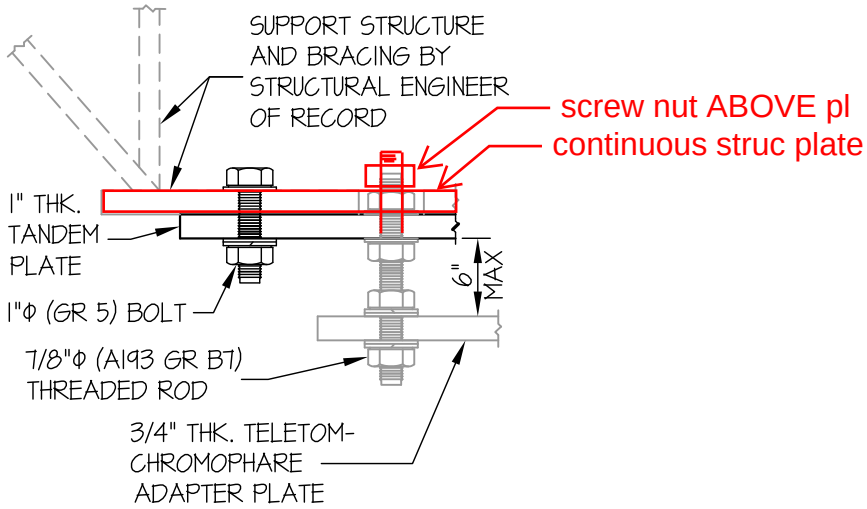
DES. J. ROBERSON
EASE JOB NO. 11-1303
DATE 5/30/13
SHEET 8 OF 8 SHEETS

SEISMIC ANCHORAGE

TANDEM PLATE TO STRUCTURAL SUPPORT PLATE



PLAN AT ADAPTER PLATE



SECTION "C"

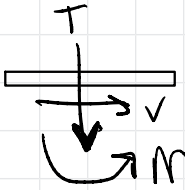
PCS Structural Solutions

Project: Good Samaritan - Equipment mount Job No: 2118
Subject: OR 7&8 Sheet Name: LMC
Originating Office: ☐ Seattle ☒ Tacoma ☐ Portland Date:

OR Room 7 & 8 Ceiling mount operating equipment

Stand Alone Boom

Resultant Forces on struct mount ℄:

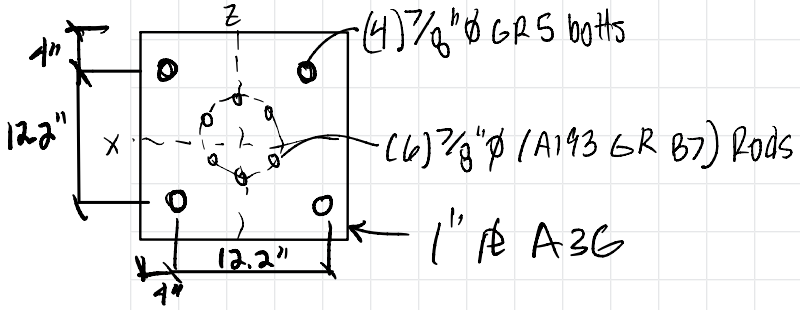


T = 974#
V = 735#
$M_{xx} = M_{zz} = 109{,}496\#''$
$M_{yy} = 6990\#''$

T/bolt = 6524# > OK by inspection
V/bolt = 325#

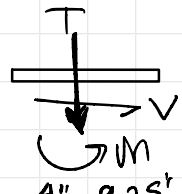
← SEE EASE CALC REMARKS

PLAN



TANDEM BOOM

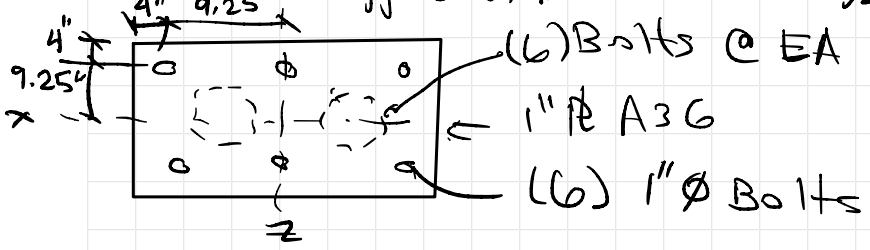
Resultant Forces on struct mount ℄:



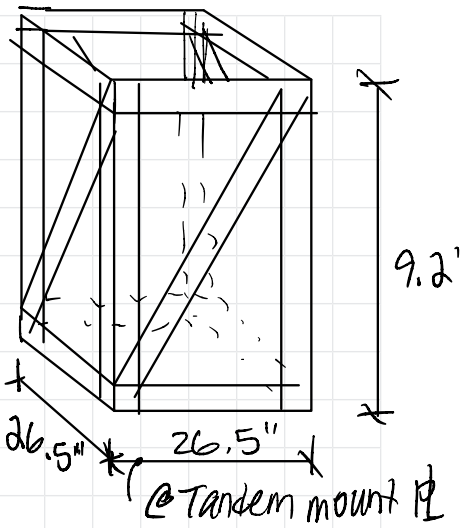
T = 1238#
V = 933#
$M_{xx} = M_{zz} = 138{,}330\#''$
$M_{yy} = 6907\#''$

T bolt = 5531# > OK by inspection
V bolt = 261#

← SEE EASE CALC REMARKS



Frame - @ tandem Boom



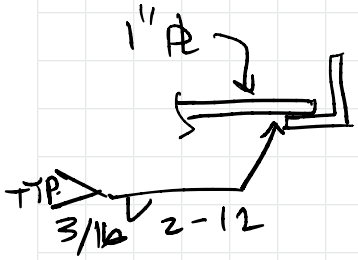
OR Rooms 7 & 8 are located on Level 2 Floor slab

Elevation Floor 3 = 163'-0"
Elevation Floor 2 = 146'-0" } = 17'

New arch ceiling @ 7'-4" A.F.F. above equipment

Frame Ht = 17' - [7'-4"] - 6" slab (min) = 9.2'

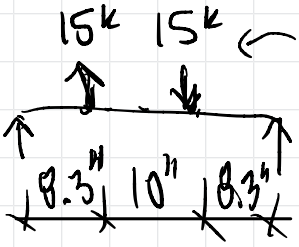
Mount PL to frame



TPL = 138,330#"/26.5" = 5.2k
VPL = 933#

1.392 x 3 x 2" = 8 k per 2" weld ✓

PL bending:



← @ time of max moment from SEISMIC

M_u = 130 k"

$M_{xx} = M_{yy} = 138,330$#"

$T = C = \frac{M}{d} = \frac{M}{9"} = 15,370$#

$\phi M_n = .9 \times F_y Z$

$Z = bd^2/4 = 20" \times 1^2/4 = 5 in^3$

$\phi M_n = .9 \times 36 \times 5 = 162$ k"/FT > 130 k" ✓

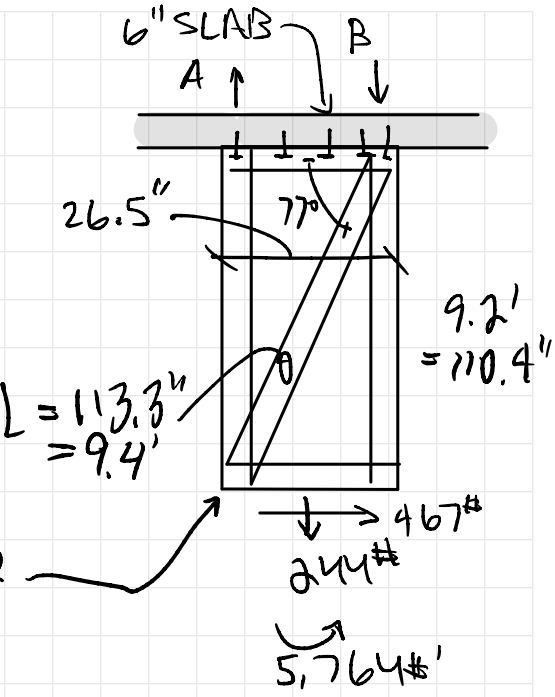
Frame Calc - @ Tandem Boom

Tandem mount @ full ht frame

$M_{max} = 138,330\#'' = \frac{11,528\#'}{2 \text{ frames}} = 5,764\#'$

$V_{max} = \frac{933\#}{2 \text{ frames}} = 467\#$

$T_{max} = \frac{974\#}{4 \text{ frames}} = 244\#$



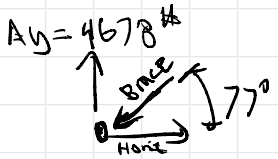
∢ 3x3x¼ TYP.
Ag = 1.44 in²

$\Sigma F_y = A_y - B_y - 244\# = 0$

$\Sigma M_A = B \times 26.5'' + 244\# \times \frac{26.5''}{2} - 5,764\#' \times 12 - 467\# \times 110.4'' = 0$

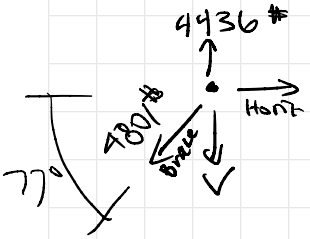
$26.5B - 117492\#'' = 0$

$B_y = 4434\# \rightarrow A_y = 4678\#$



$\sin\theta = \frac{A_y}{Brace}$ Brace = 4801#

$\tan\theta = \frac{4678\#}{Horiz.}$ Horiz = 1080#



$\cos\theta = \frac{Horiz}{4801}$ Horiz = 1080#

$\sin\theta = \frac{Brace\ vert}{4801\#}$ Brace Vert = 4678#

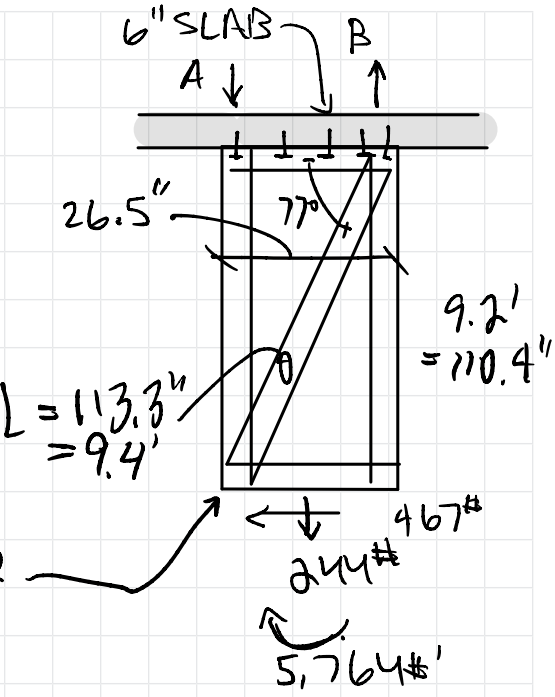
$\Sigma F_y = 4434 - V - 4678\# = 0$
$= -244\#$

3x3x¼ ∢:

max ∢ tension = 4801# < 31k (AISC Table 5-2) ✓
max ∢ Compression = 4678# (LRFD) < 9.54k (AISC Table 4-11) ✓
Weld: 1.392 x 3 x 2" = 8k for 2" of weld

Frame Calc - @ Tandem Boom

- Reverse direction of lateral force



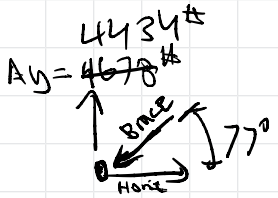
$\Sigma F_y = -A_y + B_y - 244^{\#} = 0$

$\Sigma M_A = -B \times 26.5'' + 244^{\#} \times \frac{26.5''}{2} + 5{,}764^{\#}{}' \times 12 + 467^{\#} \times 110.4'' = 0$

$26.5B - 117492^{\#}{}'' = 0$

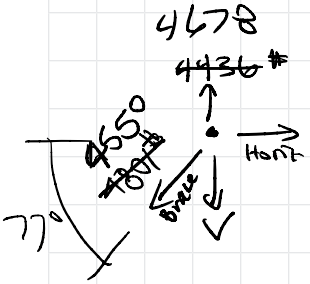
~~$B_y = 4434^{\#} \Leftrightarrow A_y = 4678^{\#}$~~

$B = 4678^{\#}$ $A = 4434^{\#}$



$\sin\theta = \frac{Ay}{Brace}$ $Brace = \frac{4678^{\#}}{\sin 77^\circ} = 4801^{\#}$ ~~4801#~~ $4550^{\#}$

$\tan\theta = \frac{4434^{\#}}{Horiz}$ $Horiz = \frac{4678^{\#}}{\tan 77^\circ} = 1034^{\#}$ ~~1080#~~



$\cos\theta = \frac{Horiz}{4550}$ ~~4801~~ $Horiz = 4550 \cos 77^\circ = 1034^{\#}$ ~~1080#~~

$\sin\theta = \frac{Brace\ vert}{4550}$ ~~4801#~~ $Brace\ Vert = 4550 \sin 77^\circ = 4433^{\#}$ ~~4678#~~

$\Sigma F_y = 4434 - V - 4678 = 0$ $V = -244^{\#}$ ~~-244#~~ $245^{\#}$

4434# 3x3x1/4:

max ∢ tension = ~~4801#~~ $4550^{\#} < 31^{k}$ (AISC Table 5-2) ✓

max ∢ Compression = ~~4678#~~ $4550^{\#} < 9.54^{k}$ (AISC Table 4-11) ✓

Weld: $1.392 \times 3 \times 2'' = 8^{k}$ for 2" of weld

PCS Structural Solutions

Project: Good Samaritan - Equipment mount Job No: 21118
Subject: OR 7 & 8 Sheet ____ Name: LMC
Originating Office: ☐ Seattle ☒ Tacoma ☐ Portland Date: ____

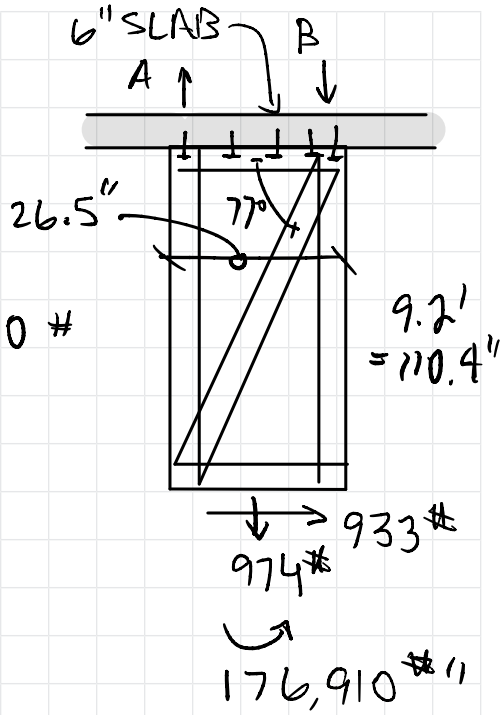
Frame Anchorbolts – @ Tandem boom

M @ LVL 3 slab w/ ΩxE in EAGE calc
= 176,910 #"

$$T = \frac{(176{,}910\#'' + 933 \times 110.9'' \times 2)}{26.5''} = \frac{14{,}450\#}{5\ \text{bolts}} = 2890\ \#$$

$$V_{a.b.} = \frac{933\#}{16\ A.B} = 58\#/\text{bolt}$$

$$T_{A.B.} = 2890\# + \frac{974\#}{16\ \text{bolts}} = 2951\#/\text{bolt}$$

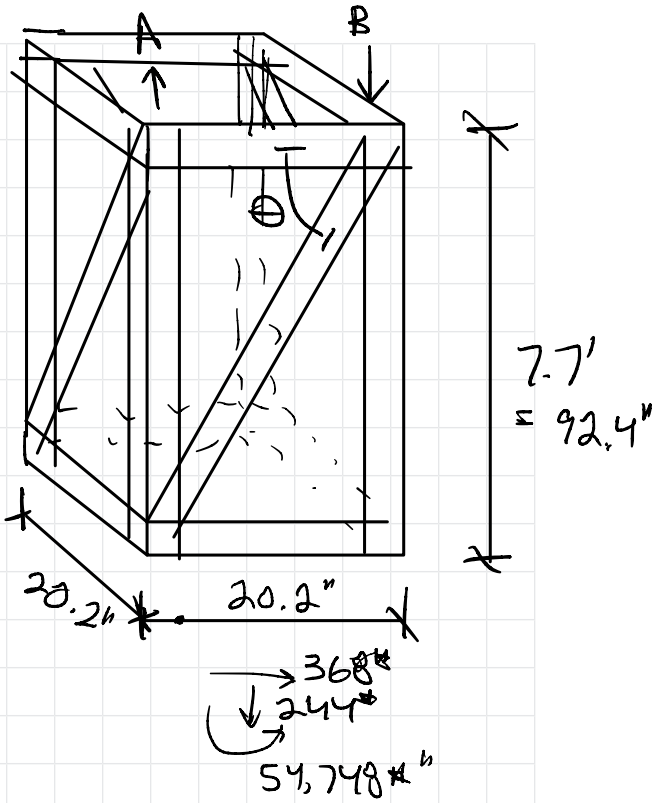


SEE A.B. calc in Simpson Software
5/8" ø CS Strong-Bolt 2 x 3" embed

PCS Structural Solutions

Project: Good Samaritan - Equipment mount Job No: 21118
Subject: OR 7 & 8 Sheet _____ Name: LMC
Originating Office: ☐ Seattle ☒ Tacoma ☐ Portland Date: _____

Frame - @ stand alone boom



Located under G33 & G32 concrete beams (@ LVL 3)

∴ Frame Ht = 17' - 2' - (7'-4") = 7.7'
(2' = bm depth)

Forces per frame

V = 735#/2 = 368#

T = 974#/4 = 244#

M = 109,496#" / 2 = 54,748 #"

θ = 77°

Angle is same as tandem boom calc.
Forces & moments are lower ∴ frame is OK, as calc'd for tandem boom.

A.B.

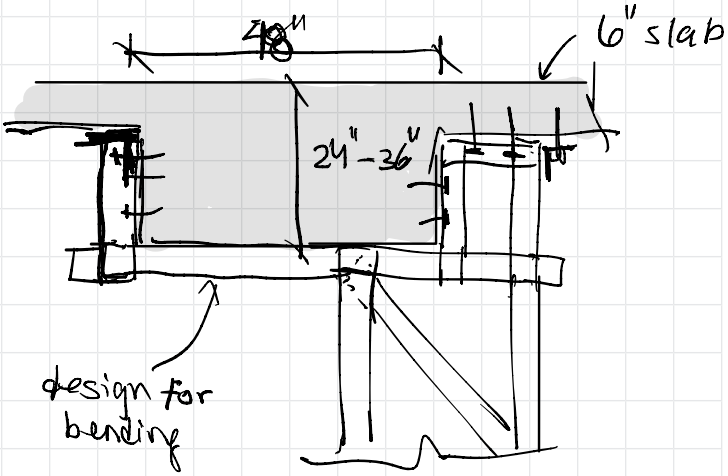
M @ LVL 3 slab w/ Ω = 2.0 = 139,557 #"

$$T = \frac{\left[139{,}557\#" + 368\# \times 92.4" \times \frac{V}{2}\right] \Omega}{20.2"} = 10{,}275\#$$

$$T = \frac{10{,}275\#}{5} + \frac{974\#}{16} = 2116\#$$

SEE A.B. calc in Simpson Software
5/8" ø CS Strong-Bolt 2 x 3" embed

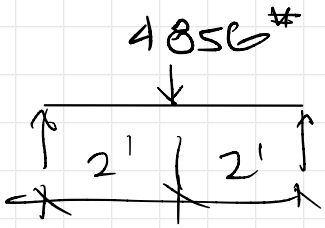
Where frame aligns w/ (e) concr. girder:



Max forces @ bott. of cage:
T = 1238#
V = 933#
$M_{xx} = M_{zz} = 138,330\#''$

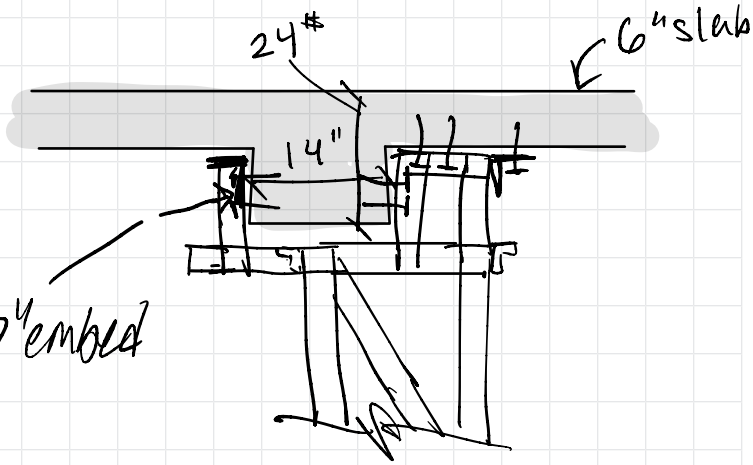
Mmax @ top of frame:
$138,330\#'' + 933 \times 110'' = 240,960\#''$

Max tension @ top of frame:
$= \frac{240,960\#''}{26.5''} = 9093\# + \frac{1238\#}{2} = \frac{9712\#}{2 \text{ frames}} = 4856\#$



M max = 4856#'
V max = 4856#
C9x7.2 ✓ AISC Table 3-8

where frame aligns w/ (e) concr. Beam:



(4) 5/8" ∅ TITEN HD x 2.97" embed
SEE A.B. calc

Company:	PCS	Date:	3/4/2021
Engineer:	LMC	Page:	1/6
Project:	Good Sam - OR room 7 & 8		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Anchorage to slab above
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Torque controlled expansion anchor
Material: Carbon Steel
Diameter (inch): 0.625
Nominal Embedment depth (inch): 3.625
Effective Embedment depth, h_{ef} (inch): 3.000
Code report: ICC-ES ESR-3037
Anchor category: 1
Anchor ductility: Yes
h_{min} (inch): 5.84
c_{ac} (inch): 7.71
C_{min} (inch): 6.50
S_{min} (inch): 4.16

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 5000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

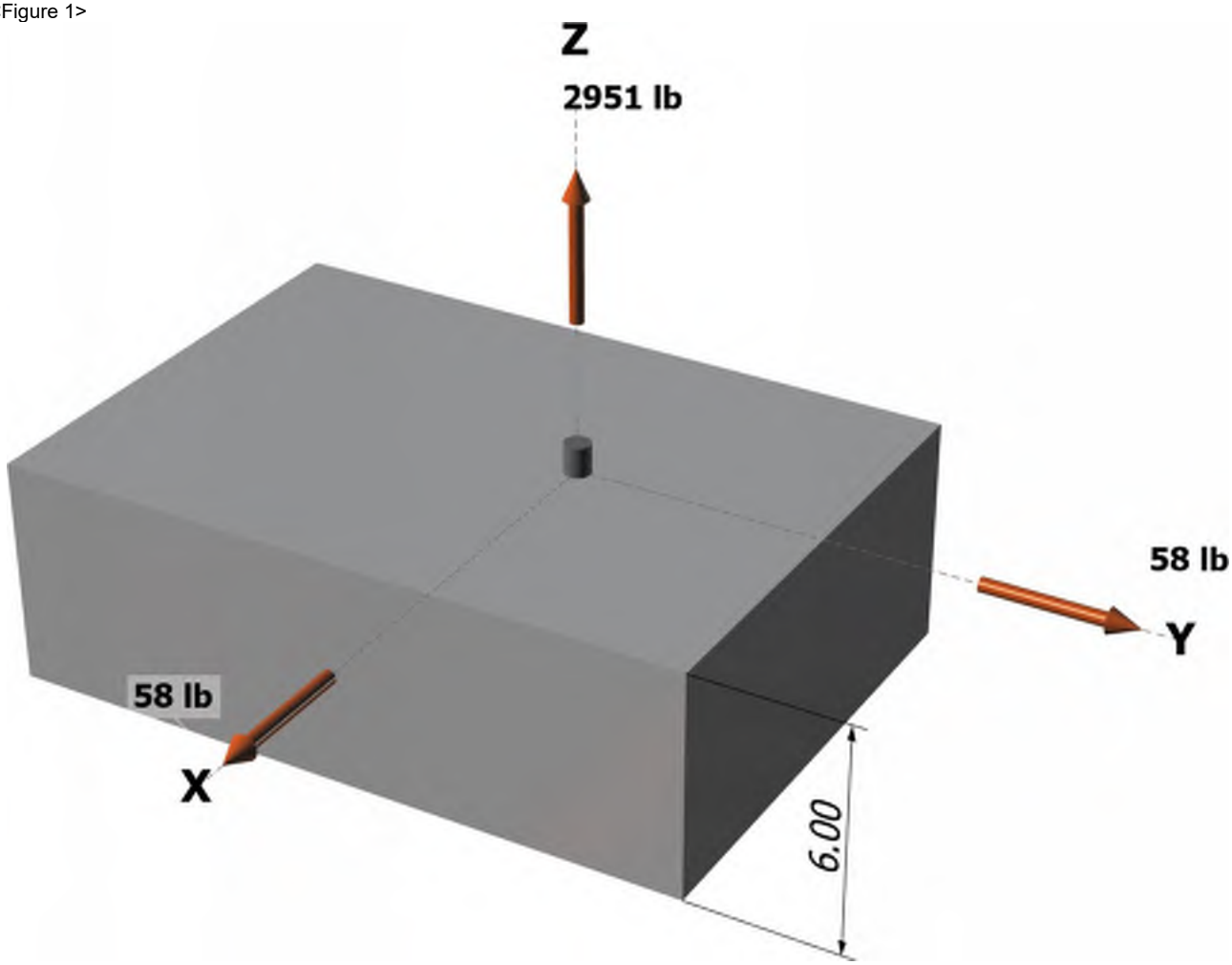
Recommended Anchor
Anchor Name: Strong-Bolt® 2 - 5/8"Ø CS Strong-Bolt 2, hnom:3.625" (92mm)
Code Report: ICC-ES ESR-3037

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.3 (a) (iii)-(vi) is satisfied
Ductility section for shear: 17.2.3.5.3 (a) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

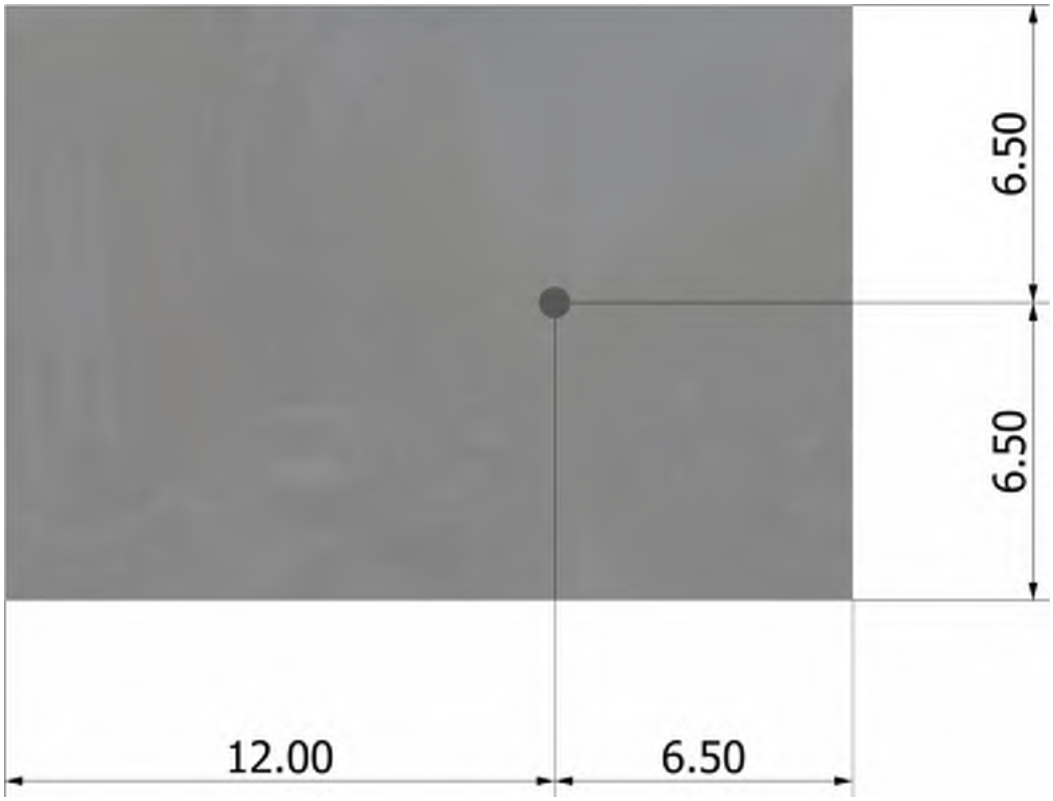
Strength level loads:

N_{ua} [lb]: 2951
V_{uax} [lb]: 58
V_{uay} [lb]: 58

<Figure 1>



<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2951.0	58.0	58.0	82.0
Sum	2951.0	58.0	58.0	82.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 2951
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

4. Steel Strength of Anchor in Tension (Sec. 17.4.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
19070	0.75	14303

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.4.2)

$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. 17.4.2.2a)

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	5000	3.000	6246

$0.75\phi N_{cb} = 0.75\phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.4.2.1a)

A_{Nc} (in^2)	A_{Nco} (in^2	$c_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75\phi N_{cb}$ (lb)
81.00	81.00	6.50	1.000	1.00	1.000	6246	0.65	3045

6. Pullout Strength of Anchor in Tension (Sec. 17.4.3)

$0.75\phi N_{pn} = 0.75\phi \Psi_{c,P} \lambda_a N_p (f'_c / 2{,}500)^n$ (Sec. 17.3.1, Eq. 17.4.3.1 & Code Report)

$\Psi_{c,P}$	λ_a	N_p (lb)	f'_c (psi)	n	ϕ	$0.75\phi N_{pn}$ (lb)
1.0	1.00	4308	5000	0.50	0.65	2970

8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
9930	1.0	0.65	6455

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.625	1.00	5000	4.33	4831

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
78.00	84.50	1.000	1.000	1.041	4831	0.70	3249

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.00	0.625	1.00	5000	6.50	8874

$\phi V_{cbx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{bx}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
97.50	190.13	0.900	1.000	1.275	8874	0.70	3655

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
3.00	0.625	1.00	5000	4.33	4831

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
78.00	84.50	1.000	1.000	1.041	4831	0.70	6498

Shear parallel to edge in y-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
3.00	0.625	1.00	5000	6.50	8874

$\phi V_{cby} = \phi\ (2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{bx}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
97.50	190.13	1.000	1.000	1.275	8874	0.70	8122

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp}(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N}N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1a)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	81.00	81.00	1.000	1.000	1.000	6246	0.70	8745

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.6.)

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	2951	14303	0.21	Pass
Concrete breakout	2951	3045	0.97	Pass
Pullout	**2951**	**2970**	**0.99**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	82	6455	0.01	Pass
T Concrete breakout y+	58	3249	0.02	Pass
T Concrete breakout x+	58	3655	0.02	Pass
|| Concrete breakout y-	58	6498	0.01	Pass
|| Concrete breakout x-	58	8122	0.01	Pass
Concrete breakout, combined	**-**	**-**	**0.02**	**Pass (Governs)**
Pryout	82	8745	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. 17.6..1	0.99	0.00	99.4%	1.0	Pass

5/8"Ø CS Strong-Bolt 2, hnom:3.625" (92mm) meets the selected design criteria.

ACI 318-14 Section 17.2.3.4.3(a) (i) & (ii) Calculations for Ductility requirement for tension load

Steel	Factored Load, N_{ua} (lb)	1.2 x Nominal Strength, N_n (lb)	Ratio	
Steel	2951	22884	12.9%	

Concrete	Factored Load, N_{ua} (lb)	Nominal Strength, N_n (lb)	Ratio	
Concrete breakout	2951	6246	47.2%	
Pullout	**2951**	**6092**	**48.4%**	**Governs**

ACI 318-14 Section 17.2.3.4.3(a) (i) & (ii) is not satisfied since steel ratio does not govern.

12. Warnings

- Brittle failure governs for tension. Governing anchor failure mode is brittle failure. Attachment shall be designed to satisfy the requirements of ACI 318-14 Section 17.2.3.4.3 for structures assigned to Seismic Design Category C, D, E, or F when the component of the strength level earthquake force applied to anchors exceeds 20 percent of the total factored anchor force associated with the same load combination. In case when ACI 318-14 Sections 17.2.3.4.3 (a)(iii) to (vi), (b), (c) or (d) is satisfied for tension loading, select appropriate checkbox from Inputs tab to disable this message. Alternatively, Ω0 factor can be entered to satisfy ACI 318-14 Section 17.2.3.4.3(d) to increase the earthquake portion of the loads as required.

- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:	PCS	Date:	3/5/2021
Engineer:	LMC	Page:	1/5
Project:	Good Sam - OR room 7 & 8		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description: Anchorage to side of beam
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Concrete screw
Material: Carbon Steel
Diameter (inch): 0.625
Nominal Embedment depth (inch): 4.000
Effective Embedment depth, h_{ef} (inch): 2.970
Code report: ICC-ES ESR-2713
Anchor category: 1
Anchor ductility: No
h_{min} (inch): 6.00
c_{ac} (inch): 4.50
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 14.00
State: Cracked
Compressive strength, f'_c (psi): 5000
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 3.00 x 10.00 x 0.25

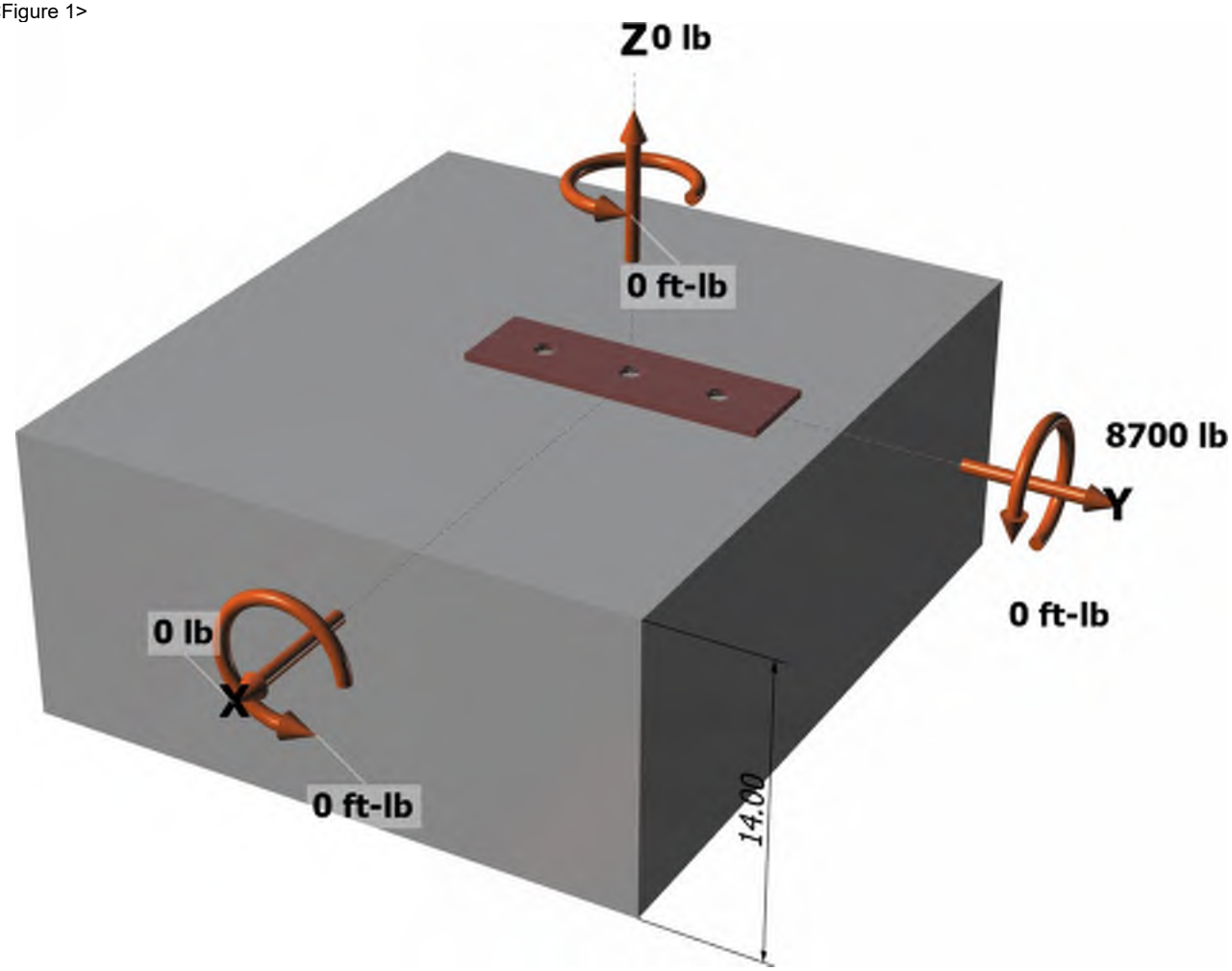
Recommended Anchor
Anchor Name: Titen HD® - 5/8"Ø Titen HD (THDB model), hnom:4" (102mm)
Code Report: ICC-ES ESR-2713

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: 17.2.3.4.3 (a) (iii)-(vi) is satisfied
Ductility section for shear: 17.2.3.5.3 (a) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

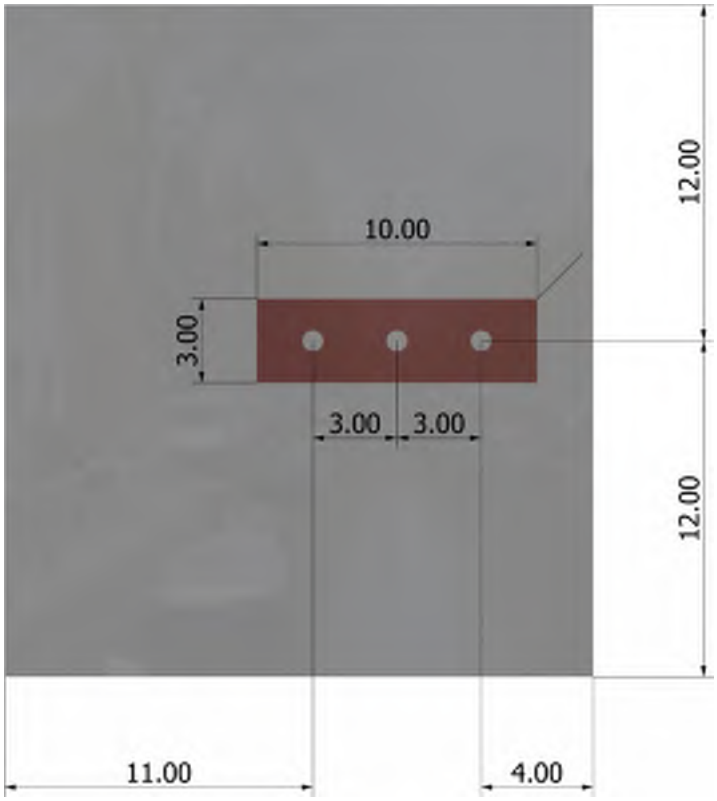
Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 0
V_{uay} [lb]: 8700
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



<Figure 2>

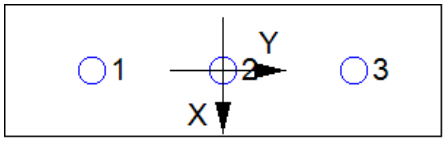


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	0.0	2900.0	2900.0
2	0.0	0.0	2900.0	2900.0
3	0.0	0.0	2900.0	2900.0
Sum	0.0	0.0	8700.0	8700.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
8000	1.0	0.60	4800

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
2.97	0.625	1.00	5000	9.33	15239

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
336.00	392.00	0.957	1.000	1.000	15239	0.70	8751

Shear parallel to edge in y-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
2.97	0.625	1.00	5000	9.33	15239

$\phi V_{cbgy} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{bx}$ (Sec. 17.3.1, 17.5.2.1(c) & Eq. 17.5.2.1b)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgy} (lb)
294.00	392.00	1.000	1.000	1.000	1.000	15239	0.70	16001

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi k_{cp} N_{cbg} = \phi k_{cp} (A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cpg} (lb)
2.0	128.79	79.39	1.000	0.969	1.000	1.000	6153	0.70	13546

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	2900	4800	0.60	Pass
T Concrete breakout y+	**8700**	**8751**	**0.99**	**Pass (Governs)**
|| Concrete breakout x-	**8700**	**16001**	**0.54**	**Pass (Governs)**
Pryout	8700	13546	0.64	Pass

5/8"Ø Titen HD (THDB model), hnom:4" (102mm) meets the selected design criteria.

12. Warnings

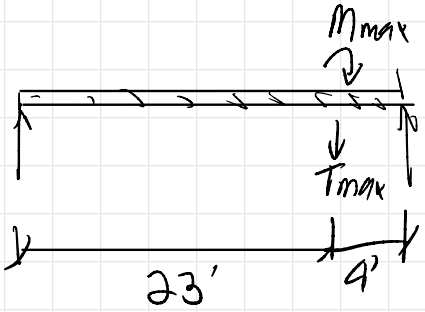
- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Check (e) beam:

B7



(e) LL per struct dwgs
= 80 PSF

trib = 21'/2

DL = 6"/12 x 150 PCF = 75 PSF

Tandem Boom = highest forces

$M_{max} = 138{,}330\#'' + 933\# \times 9.2' = 20.1k'$
(EQ) / 12

$M_{max(DL)} = 1.24^k \times \frac{27''}{12 \times 2} = 1.4k'$

$T_{max} = 1.2^k$

Beam OK, see enercalc print

- B1 has more reinf. & same boom mount loads ∴ OK
- G32 & G33 have stand alone mount connection, OK by inspection

Snapshots from original bldg structural dwgs, sheet S001:

DESIGN LOADS:

ROOF	= 25 PSF LIVE LOAD
SNOW	= P_g = 20 PSF P_f = 24 PSF C_e = 0.9 I_s = 1.2 C_t = 1.0
SNOW DRIFT	= IBC
FLOORS	= 80 PSF LIVE LOAD
PARTITIONS	= 20 PSF
CORRIDORS, STAIRS	= 100 PSF
MECHANICAL ROOF	= 100 PSF MIN OR ACTUAL EQUIPMENT + PAD WEIGHTS
MECHANICAL ROOMS	= 75 PSF

REINFORCED CONCRETE:

UNLESS OTHERWISE NOTED, ALL CONCRETE - fc = 5000 PSI, MAXIMUM W/C = .42, MINIMUM 6 1/2 SACKS OF CEMENT PER CUBIC YARD, EXCEPT COLUMNS & CONCRETE SHEAR WALLS AS NOTED - fc = 7000 PSI, (SEE CONCRETE COLUMN & CONCRETE WALL SCHEDULE). MAXIMUM W/C = .42, MINIMUM 7 1/2 SACKS OF CEMENT PER CUBIC YARD, EXCEPT CONCRETE WALLS (8", 10", 12", & 18" GRADE BEAMS, SLAB ON GRADE , ALL CONCRETE IN EAST & WEST LINKS, ALL CONCRETE IN UTILITY CROSSING - fc = 4000 PSI, MAXIMUM W/C = .42, MINIMUM 6 SACKS OF CEMENT PER CUBIC YARD. SUBMIT MIX DESIGN. SEE SPECIFICATIONS FOR ADMIXTURES. SPECIAL INSPECTION REQUIRED.

UNLESS OTHERWISE NOTED, REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60. SUBMIT REINFORCING STEEL SHOP DRAWINGS WITH DETAILS PER ACI 315 MANUAL OF STANDARD PRACTICE. LAP BARS WITH A CLASS B SPLICE.

ASTM A706, GRADE 60, REINFORCING STEEL SHALL BE USED FOR:
- WELDED OR FIELD-BENT BARS,
- SHEAR WALL BOUNDARY MEMBER REINFORCING, UNLESS THE CRITERIA OF THE IBC, SECTION 1908.1.3, ARE SATISFIED.
- MAIN REINFORCING, SPIRALS, TIES AND STIRRUPS IN THE FRAME MEMBERS (BEAMS AND COLUMNS) COMPRISING THE LATERAL FORCE RESISTING SYSTEM.

WELDED WIRE FABRIC PER ASTM A185. FURNISH IN FLAT SHEETS, NOT ROLLS. LAP EDGES 1 1/2 MESH MINIMUM.

CONCRETE COVER:

FOOTINGS 3". WALLS EXPOSED TO EARTH OR WEATHER 1 1/2" FOR #5 BARS AND SMALLER, 2" FOR #6 BARS AND LARGER. INTERIOR WALLS 1". BEAMS AND COLUMNS 1 1/2" TO STIRRUPS OR TIES. SLABS AND JOISTS 1". SLABS ON GRADE 1 1/2".

BEAMS AND SLABS:

RIGIDLY SUPPORT BARS WITH CONCRETE BLOCKS OR APPROVED ACCESSORIES. PROVIDE #5 SUPPORT BARS ALL SLABS.

WHERE MAIN SLAB BARS ARE PARALLEL TO A SUPPORT, PROVIDE #4 @ 12 TOP BARS EXTENDING 2'-0" BEYOND EACH FACE OF SUPPORT INTO SLAB. WHERE SLAB IS ON ONE SIDE ONLY, PROVIDE A 90° STANDARD HOOK AT DISCONTINUOUS FACE.

AT SLAB OPENINGS OVER 12" SQUARE, PROVIDE TWO ADDITIONAL BOTTOM MAIN SLAB BARS OR 2-#5 MINIMUM ON ALL FOUR SIDES OF THE OPENING EXTENDING 40 DIAMETER PAST OPENING. PROVIDE 1-#5x4'-0" DIAGONAL BOTTOM BAR ALL FOUR CORNERS.

PROVIDE SLAB TEMPERATURE BARS AS FOLLOWS:

4" SLABS, #3 @ 15 BOTTOM,
5" SLABS, #4 @ 18 BOTTOM,
6" SLABS, #4 @ 18 BOTTOM,
7" SLABS, #4 @ 15 BOTTOM,
8" SLABS, #3 @ 18 TOP, #4 @ 18 BOTTOM,
9" SLABS, #3 @ 18 TOP, #4 @ 18 BOTTOM,
10" SLABS, #3 @ 16 TOP, #4 @ 18 BOTTOM,
11" SLABS, #4 @ 18 TOP, #4 @ 18 BOTTOM,
12" SLABS, #4 @ 18 TOP, #4 @ 18 BOTTOM.

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Lic. # : KW-06002327 PCS STRUCTURAL SOLUTIONS

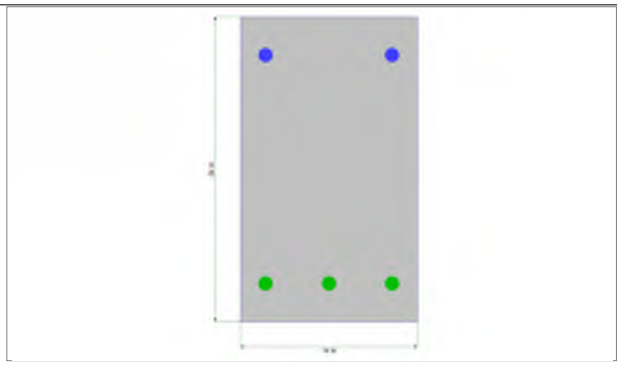
DESCRIPTION: Check (e) concrete beam B2

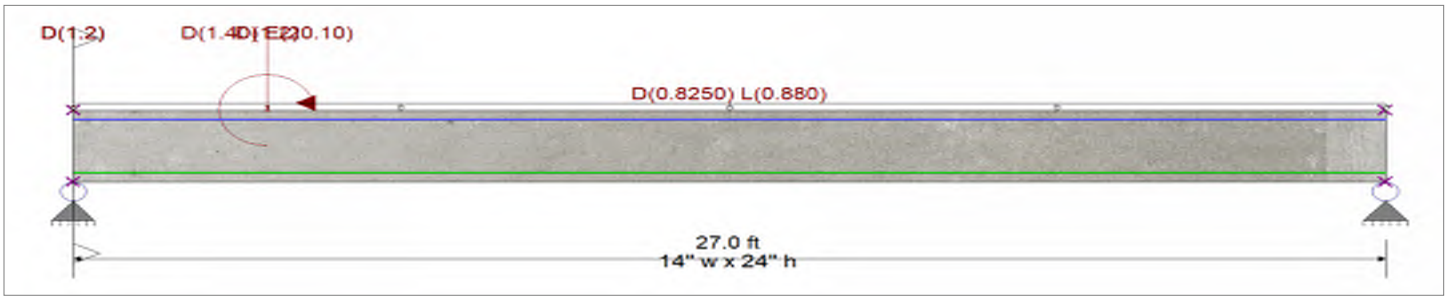
CODE REFERENCES

Calculations per ACI 318-14, IBC 2018, CBC 2019, ASCE 7-16
Load Combination Set : ASCE 7-16

Material Properties

f'c	=	5.0 ksi	ϕ Phi Values	Flexure :	0.90
fr = f'c $^{1/2}$ * 7.50	=	530.33 psi		Shear :	0.750
Ψ Density	=	145.0 pcf	β_1	=	0.80
λ LtWt Factor	=	1.0			
Elastic Modulus	=	4,030.51 ksi	Fy - Stirrups		40.0 ksi
fy - Main Rebar	=	60.0 ksi	E - Stirrups	=	29,000.0 ksi
E - Main Rebar	=	29,000.0 ksi	Stirrup Bar Size #		4
			Number of Resisting Legs Per Stirrup	=	2





Cross Section & Reinforcing Details

Rectangular Section, Width = 14.0 in, Height = 24.0 in
Span #1 Reinforcing....
2-#9 at 3.0 in from Top, from 0.0 to 27.0 ft in this span
3-#9 at 3.0 in from Bottom, from 0.0 to 27.0 ft in this span

Beam self weight calculated and added to loads
Loads on all spans...
D = 0.0750, L = 0.080
Uniform Load on ALL spans : D = 0.0750, L = 0.080 ksf, Tributary Width = 11.0 ft
Moment Load : D = 1.40, E = 20.10 k-ft, Starting at : 4.0 ft and placed every 0.0 ft thereafter
Point Load : D = 1.20 at these locations on each span: 48.0, 0.0, 0.0, 0.0 ft

DESIGN SUMMARY

Design OK

Maximum Bending Stress Ratio =	**0.986** : 1		Maximum Deflection			
Section used for this span	**Typical Section**		Max Downward Transient Deflection	0.244 in	Ratio =	1326 >=360
Mu : Applied	259.247 k-ft		Max Upward Transient Deflection	0.000 in	Ratio =	0 <360.0
Mn * Phi : Allowable	262.881 k-ft		Max Downward Total Deflection	0.989 in	Ratio =	327 >=180
Location of maximum on span	13.426 ft		Max Upward Total Deflection	0.000 in	Ratio =	0 <180.0
Span # where maximum occurs	Span # 1					

Vertical Reactions

Support notation : Far left is #1

Load Combination	Support 1	Support 2
Overall MAXimum	28.555	27.815
Overall MINimum	-0.744	0.744
+D+L+H	28.555	27.815
+D+0.750L+0.750S+H	25.585	24.845
+D+0.750L+0.750S+0.5250E+H	25.195	25.235
+0.60D+0.70E+H	9.484	10.082
D Only	16.675	15.935
L Only	11.880	11.880
E Only	-0.744	0.744

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

File: 21118 - Good Sam - OR room 7 & 8 calcs.ecd

Lic. # : KW-06002327
PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Check (e) concrete beam B2

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+0.50Lr+1.60L+1.60H	1	0.00	21.00	39.02	39.02	0.00	1.00	35.25	PhiVc < Vu	3.769	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	0.30	21.00	38.19	38.19	11.39	1.00	35.25	PhiVc < Vu	2.942	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	0.59	21.00	37.36	37.36	22.54	1.00	35.25	PhiVc < Vu	2.114	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	0.89	21.00	36.54	36.54	33.44	1.00	35.25	PhiVc < Vu	1.287	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	1.18	21.00	35.71	35.71	44.10	1.00	35.25	PhiVc < Vu	0.4596	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	1.48	21.00	34.88	34.88	54.52	1.00	35.25	PhiVc/2 < Vu <=	Min 9.6.3.1	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	1.77	21.00	34.05	34.05	64.69	0.92	34.81	PhiVc/2 < Vu <=	Min 9.6.3.1	60.0	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	2.07	21.00	33.23	33.23	74.61	0.78	34.01	PhiVc/2 < Vu <=	Min 9.6.3.1	59.2	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	2.36	21.00	32.40	32.40	84.30	0.67	33.41	PhiVc/2 < Vu <=	Min 9.6.3.1	58.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	2.66	21.00	31.57	31.57	93.73	0.59	32.94	PhiVc/2 < Vu <=	Min 9.6.3.1	58.1	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	2.95	21.00	30.74	30.74	102.93	0.52	32.56	PhiVc/2 < Vu <=	Min 9.6.3.1	57.8	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	3.25	21.00	29.92	29.92	111.88	0.47	32.26	PhiVc/2 < Vu <=	Min 9.6.3.1	57.5	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	3.54	21.00	29.09	29.09	120.58	0.42	32.00	PhiVc/2 < Vu <=	Min 9.6.3.1	57.2	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	3.84	21.00	28.26	28.26	129.05	0.38	31.78	PhiVc/2 < Vu <=	Min 9.6.3.1	57.0	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	4.13	21.00	25.99	25.99	138.76	0.33	31.47	PhiVc/2 < Vu <=	Min 9.6.3.1	56.7	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	4.43	21.00	25.17	25.17	146.30	0.30	31.32	PhiVc/2 < Vu <=	Min 9.6.3.1	56.5	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	4.72	21.00	24.34	24.34	153.61	0.28	31.18	PhiVc/2 < Vu <=	Min 9.6.3.1	56.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	5.02	21.00	23.51	23.51	160.67	0.26	31.06	PhiVc/2 < Vu <=	Min 9.6.3.1	56.3	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	5.31	21.00	22.69	22.69	167.48	0.24	30.96	PhiVc/2 < Vu <=	Min 9.6.3.1	56.2	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	5.61	21.00	21.86	21.86	174.06	0.22	30.86	PhiVc/2 < Vu <=	Min 9.6.3.1	56.1	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	5.90	21.00	21.03	21.03	180.38	0.20	30.77	PhiVc/2 < Vu <=	Min 9.6.3.1	56.0	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	6.20	21.00	20.20	20.20	186.47	0.19	30.69	PhiVc/2 < Vu <=	Min 9.6.3.1	55.9	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	6.49	21.00	19.38	19.38	192.31	0.18	30.62	PhiVc/2 < Vu <=	Min 9.6.3.1	55.8	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	6.79	21.00	18.55	18.55	197.90	0.16	30.55	PhiVc/2 < Vu <=	Min 9.6.3.1	55.7	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	7.08	21.00	17.72	17.72	203.25	0.15	30.48	PhiVc/2 < Vu <=	Min 9.6.3.1	55.7	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	7.38	21.00	16.89	16.89	208.36	0.14	30.42	PhiVc/2 < Vu <=	Min 9.6.3.1	55.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	7.67	21.00	16.07	16.07	213.22	0.13	30.37	PhiVc/2 < Vu <=	Min 9.6.3.1	55.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	7.97	21.00	15.24	15.24	217.84	0.12	30.31	PhiVc/2 < Vu <=	Min 9.6.3.1	55.5	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	8.26	21.00	14.41	14.41	222.22	0.11	30.26	Vu < PhiVc/2	lot Reqd 9.6.	30.3	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	8.56	21.00	13.58	13.58	226.35	0.11	30.21	Vu < PhiVc/2	lot Reqd 9.6.	30.2	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	8.85	21.00	12.76	12.76	230.23	0.10	30.17	Vu < PhiVc/2	lot Reqd 9.6.	30.2	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	9.15	21.00	11.93	11.93	233.87	0.09	30.13	Vu < PhiVc/2	lot Reqd 9.6.	30.1	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	9.44	21.00	11.10	11.10	237.27	0.08	30.08	Vu < PhiVc/2	lot Reqd 9.6.	30.1	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	9.74	21.00	10.27	10.27	240.43	0.07	30.04	Vu < PhiVc/2	lot Reqd 9.6.	30.0	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	10.03	21.00	9.45	9.45	243.34	0.07	30.01	Vu < PhiVc/2	lot Reqd 9.6.	30.0	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	10.33	21.00	8.62	8.62	246.00	0.06	29.97	Vu < PhiVc/2	lot Reqd 9.6.	30.0	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	10.62	21.00	7.79	7.79	248.42	0.05	29.93	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	10.92	21.00	6.96	6.96	250.60	0.05	29.90	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	11.21	21.00	6.14	6.14	252.53	0.04	29.86	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	11.51	21.00	5.31	5.31	254.22	0.04	29.83	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	11.80	21.00	4.48	4.48	255.67	0.03	29.80	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	12.10	21.00	3.65	3.65	256.87	0.02	29.76	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	12.39	21.00	2.83	2.83	257.82	0.02	29.73	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	12.69	21.00	2.00	2.00	258.53	0.01	29.70	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	12.98	21.00	1.17	1.17	259.00	0.01	29.67	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+0.90D+E+0.90H	1	13.28	21.00	-0.72	0.72	108.43	0.01	29.69	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	13.57	21.00	-1.19	1.19	221.09	0.01	29.68	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	13.87	21.00	-1.86	1.86	220.64	0.01	29.71	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	14.16	21.00	-2.53	2.53	219.99	0.02	29.74	Vu < PhiVc/2	lot Reqd 9.6.	29.7	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	14.46	21.00	-3.20	3.20	219.15	0.03	29.77	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+L+0.20S+E+1.60H	1	14.75	21.00	-3.87	3.87	218.10	0.03	29.80	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	15.05	21.00	-4.62	4.62	255.44	0.03	29.80	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	15.34	21.00	-5.45	5.45	253.96	0.04	29.84	Vu < PhiVc/2	lot Reqd 9.6.	29.8	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	15.64	21.00	-6.27	6.27	252.23	0.04	29.87	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0

Project Title:
Engineer:
Project ID:
Project Descr:

Concrete Beam

Lic. # : KW-06002327 PCS STRUCTURAL SOLUTIONS

DESCRIPTION: Check (e) concrete beam B2

Detailed Shear Information

Load Combination	Span Number	Distance (ft)	'd' (in)	Vu (k) Actual	Vu (k) Design	Mu (k-ft)	d*Vu/Mu	Phi*Vc (k)	Comment	Phi*Vs (k)	Phi*Vn (k)	Spacing (in) Req'd	Spacing (in) Suggest
+1.20D+0.50Lr+1.60L+1.60H	1	15.93	21.00	-7.10	7.10	250.25	0.05	29.90	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	16.23	21.00	-7.93	7.93	248.04	0.06	29.94	Vu < PhiVc/2	lot Reqd 9.6.	29.9	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	16.52	21.00	-8.76	8.76	245.58	0.06	29.98	Vu < PhiVc/2	lot Reqd 9.6.	30.0	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	16.82	21.00	-9.58	9.58	242.87	0.07	30.01	Vu < PhiVc/2	lot Reqd 9.6.	30.0	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	17.11	21.00	-10.41	10.41	239.92	0.08	30.05	Vu < PhiVc/2	lot Reqd 9.6.	30.1	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	17.41	21.00	-11.24	11.24	236.73	0.08	30.09	Vu < PhiVc/2	lot Reqd 9.6.	30.1	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	17.70	21.00	-12.07	12.07	233.29	0.09	30.13	Vu < PhiVc/2	lot Reqd 9.6.	30.1	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	18.00	21.00	-12.89	12.89	229.60	0.10	30.18	Vu < PhiVc/2	lot Reqd 9.6.	30.2	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	18.30	21.00	-13.72	13.72	225.68	0.11	30.22	Vu < PhiVc/2	lot Reqd 9.6.	30.2	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	18.59	21.00	-14.55	14.55	221.51	0.11	30.27	Vu < PhiVc/2	lot Reqd 9.6.	30.3	0.0	0.0
+1.20D+0.50Lr+1.60L+1.60H	1	18.89	21.00	-15.38	15.38	217.09	0.12	30.32	PhiVc/2 < Vu <=	Min 9.6.3.1	55.5	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	19.18	21.00	-16.20	16.20	212.43	0.13	30.38	PhiVc/2 < Vu <=	Min 9.6.3.1	55.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	19.48	21.00	-17.03	17.03	207.53	0.14	30.43	PhiVc/2 < Vu <=	Min 9.6.3.1	55.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	19.77	21.00	-17.86	17.86	202.38	0.15	30.49	PhiVc/2 < Vu <=	Min 9.6.3.1	55.7	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	20.07	21.00	-18.69	18.69	196.99	0.17	30.56	PhiVc/2 < Vu <=	Min 9.6.3.1	55.8	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	20.36	21.00	-19.51	19.51	191.35	0.18	30.63	PhiVc/2 < Vu <=	Min 9.6.3.1	55.8	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	20.66	21.00	-20.34	20.34	185.47	0.19	30.70	PhiVc/2 < Vu <=	Min 9.6.3.1	55.9	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	20.95	21.00	-21.17	21.17	179.35	0.21	30.79	PhiVc/2 < Vu <=	Min 9.6.3.1	56.0	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	21.25	21.00	-22.00	22.00	172.98	0.22	30.88	PhiVc/2 < Vu <=	Min 9.6.3.1	56.1	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	21.54	21.00	-22.82	22.82	166.37	0.24	30.97	PhiVc/2 < Vu <=	Min 9.6.3.1	56.2	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	21.84	21.00	-23.65	23.65	159.51	0.26	31.08	PhiVc/2 < Vu <=	Min 9.6.3.1	56.3	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	22.13	21.00	-24.48	24.48	152.41	0.28	31.21	PhiVc/2 < Vu <=	Min 9.6.3.1	56.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	22.43	21.00	-25.30	25.30	145.07	0.31	31.34	PhiVc/2 < Vu <=	Min 9.6.3.1	56.5	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	22.72	21.00	-26.13	26.13	137.48	0.33	31.50	PhiVc/2 < Vu <=	Min 9.6.3.1	56.7	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	23.02	21.00	-26.96	26.96	129.64	0.36	31.67	PhiVc/2 < Vu <=	Min 9.6.3.1	56.9	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	23.31	21.00	-27.79	27.79	121.57	0.40	31.87	PhiVc/2 < Vu <=	Min 9.6.3.1	57.1	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	23.61	21.00	-28.61	28.61	113.25	0.44	32.11	PhiVc/2 < Vu <=	Min 9.6.3.1	57.3	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	23.90	21.00	-29.44	29.44	104.68	0.49	32.39	PhiVc/2 < Vu <=	Min 9.6.3.1	57.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	24.20	21.00	-30.27	30.27	95.87	0.55	32.73	PhiVc/2 < Vu <=	Min 9.6.3.1	57.9	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	24.49	21.00	-31.10	31.10	86.82	0.63	33.15	PhiVc/2 < Vu <=	Min 9.6.3.1	58.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	24.79	21.00	-31.92	31.92	77.52	0.72	33.68	PhiVc/2 < Vu <=	Min 9.6.3.1	58.9	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	25.08	21.00	-32.75	32.75	67.98	0.84	34.37	PhiVc/2 < Vu <=	Min 9.6.3.1	59.6	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	25.38	21.00	-33.58	33.58	58.19	1.00	35.25	PhiVc/2 < Vu <=	Min 9.6.3.1	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	25.67	21.00	-34.41	34.41	48.16	1.00	35.25	PhiVc/2 < Vu <=	Min 9.6.3.1	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	25.97	21.00	-35.23	35.23	37.88	1.00	35.25	PhiVc/2 < Vu <=	Min 9.6.3.1	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	26.26	21.00	-36.06	36.06	27.37	1.00	35.25	PhiVc < Vu	0.8118	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	26.56	21.00	-36.89	36.89	16.60	1.00	35.25	PhiVc < Vu	1.639	60.4	10.5	10.0
+1.20D+0.50Lr+1.60L+1.60H	1	26.85	21.00	-37.72	37.72	5.60	1.00	35.25	PhiVc < Vu	2.467	60.4	10.5	10.0

Maximum Forces & Stresses for Load Combinations

Load Combination / Segment	Span #	Location (ft) along Beam	Bending Stress Results (k-ft) Mu : Max	Phi*Mnx	Stress Ratio
MAXimum BENDING Envelope					
Span # 1	1	27.000	259.25	262.88	0.99
+1.40D+1.60H					
Span # 1	1	27.000	152.78	262.88	0.58
+1.20D+0.50Lr+1.60L+1.60H					
Span # 1	1	27.000	259.25	262.88	0.99
+1.20D+L+0.20S+E+1.60H					
Span # 1	1	27.000	221.40	262.88	0.84
+0.90D+E+0.90H					
Span # 1	1	27.000	108.68	262.88	0.41

Overall Maximum Deflections

Load Combination	Span	Max. "-" Defl (in)	Location in Span (ft)	Load Combination	Max. "+" Defl (in)	Location in Span (ft)
+D+L+H	1	0.9889	13.500		0.0000	0.000

OR ROOM 7 & 8
C.F.S WALLS

Light Gauge Walls in OR 7 & 8

Loads = 5 PSF lat (interior walls)

15 PSF vert $P_{stud} = 15\,PSF \times \frac{16"}{12} = 20\#/1 \times 16.5' = 330\#$

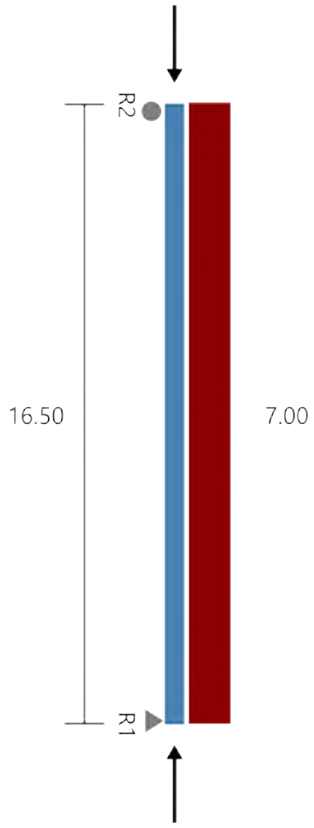
OR Rooms 7 & 8 are located on Level 2 Floor slab

Elevation Floor 3 = 163'-0"
Elevation Floor 2 = 146'-0" } = 17'

New arch ceiling @ 7'-4" A.F.F. above equipment

Wall Ht = 17' - 6" slab (lvl 3) = 16.5'

400S162 (33 GA)(33ksi)
600S162 (33 GA)(33ksi)] w/ lateral bracing @ 60" o.c.



Section : 400S162-33 (33 ksi) Single C Stud
Maxo = 492.2 Ft-Lb **Va =** 975.9 lb **I =** 0.69 in^4

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Bridging Connectors - Design Method = AISI S100

Span/CantiLever	Simpson Strong-Tie Bridging Connector	Stress Ratio
Span	N/A	-

Shear and Web Crippling Checks

Bending and Shear (Unstiffened): 5.9% Stressed @R1
Bending and Shear (Stiffened): NA
Web Stiffeners Required?: No

Simpson Strong-Tie® Connectors

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Connector Interaction	Anchor Interaction
R1	57.75	330	400T125-33 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 2500 nw concrete	22.37 %	48.13 %
R2	57.75	0	400T250-33 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 2500 nw concrete	60.48 %	74.38 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Flexural and Deflection Check

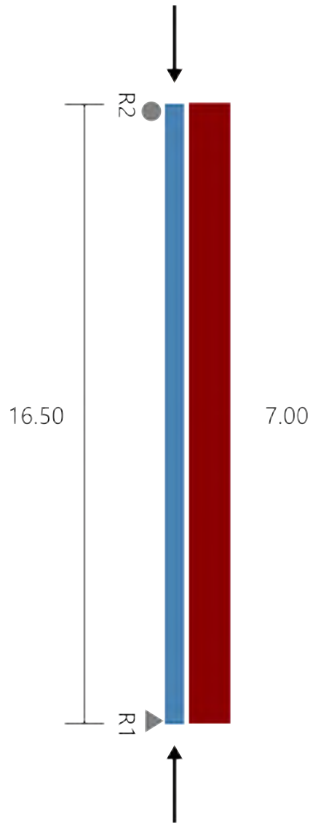
Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	238.2	0.484	238.2	60.0	453.8	0.525	0.400	L/495

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	198.0	505.5	0.471

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	330.0(c)	60.0	60.0	125	0.0	198.0	1316.4(c)	0.25	0.84



Section : 600S162-33 (33 ksi) Single C Stud
Maxo = 950.6 Ft-Lb **Va =** 638.1 lb **I =** 1.79 in^4

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Bridging Connectors - Design Method = AISI S100

Span/CantiLever	Simpson Strong-Tie Bridging Connector	Stress Ratio
Span	LSUBH3.25 (Min)	0.64

Shear and Web Crippling Checks

Bending and Shear (Unstiffened): 9.1% Stressed @R1
Bending and Shear (Stiffened): NA
Web Stiffeners Required?: No

Simpson Strong-Tie® Connectors

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie® Connector	Connector Interaction	Anchor Interaction
R1	57.75	330	600T125-33 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 2500 nw concrete	23.77 %	48.13 %
R2	57.75	0	600T250-33 (33) & (1) .157", 3/4" embed SST PDPA/PDPAT to 2500 nw concrete	60.48 %	74.38 %

* Reference catalog for connector and anchor requirement notes as well as screw placements requirement

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Deflection Ratio
Span	238.2	0.251	238.2	60.0	853.3	0.279	0.155	L/1281

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	198.0	788.8	0.302

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	330.0(c)	60.0	60.0	103	0.0	198.0	2051.3(c)	0.16	0.48

OR ROOM 7 & 8
CEILING ANCHORAGE

OR Room 7 & 8 - Ceiling Support - HGWC

$W_p = 15$ PSF

ASCE 7-16 Chapter 13:

$$F_p = \frac{.4 \times a_p \times S_{DS} \times W_p \left(1 + 2\frac{z}{h}\right)}{\left(R_p/I\right)} \quad \begin{matrix} \leq 1.6\, S_{DS} I_p W_p = 2.43 W_p \\ \geq 0.3\, S_{DS} I_p W_p = .456 W_p \end{matrix}$$

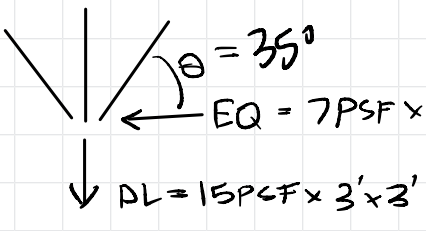
$S_{DS} = 1.013$, $a_p = 1$, $R_p = 2\frac{1}{2}$, $I_p = 1.5$, $z = 32'$, $h = 131'$ (from 0'-0" @ 1st Floor)

$= 0.36 W_p$

gov's

$= 0.456 \times 15$ PSF $=$ 7 PSF

Brace & comp post



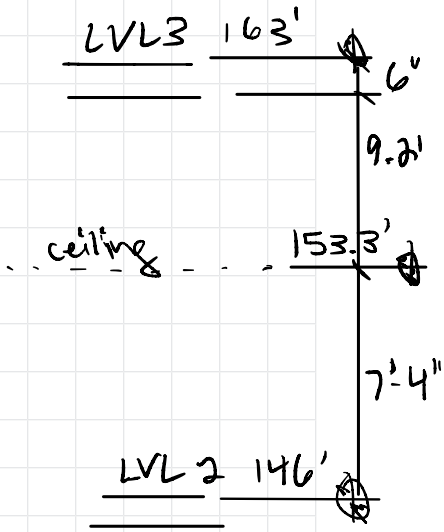
$F_{brace} = \frac{252^{\#}}{\cos\theta} = 308^{\#}$ (LRFD)

Use Gripple #9 @ 495#

$F_{compr} = \frac{252^{\#}}{\sin\theta} = 440^{\#}$

Use 350S162-54 @ D.C. = 0.8 (50ksi)

Use (2) #8 SCREWS @ 344#/screw

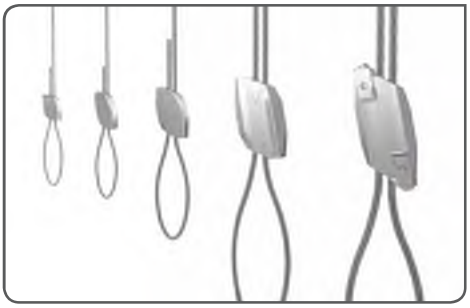


Standard Hanger

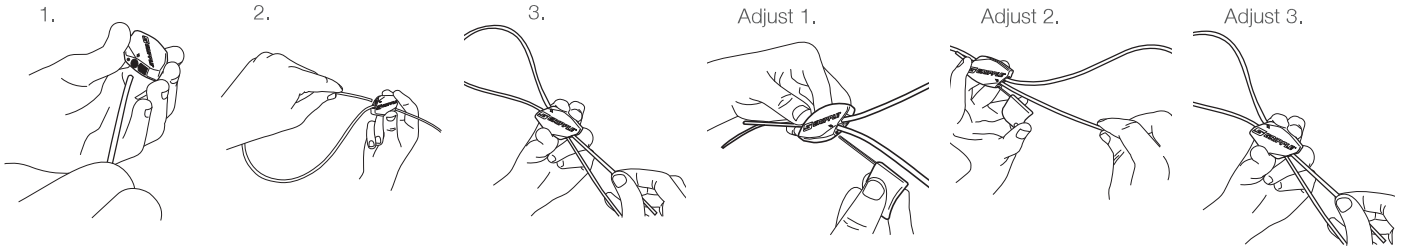
Cable hanger with fastener for the fast suspension of a variety of services in an indoor stationary setting. NOT suitable for use in chlorinated / swimming pool environments.

FEATURES / BENEFITS

- Up to six times faster to install than traditional hanging systems
- Versatile and simple to use
- Strong, safe and industry approved
- Aesthetically discreet and lightweight
- Supplied in ready-to-use kits, comprising a length of cable and pre-attached end fixing, and a Release Key

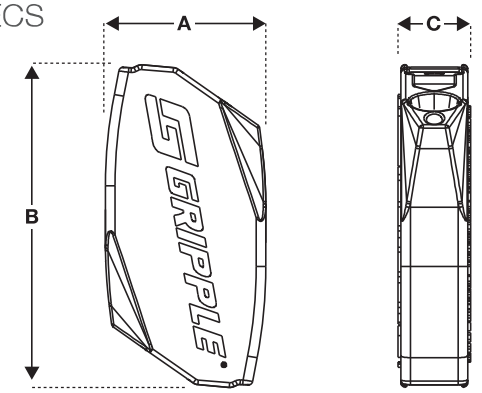


INSTALLATION & ADJUSTMENT



Ensure a minimum 3 inches of tail cable exits the hanger.

SIZE SPECS



Dimension	No.1 (inches)	No.2 (inches)	No.3 (inches)	No.4 (inches)	No.5 (inches)
A	0.63	0.71	1.02	1.47	1.69
B	0.94	1.34	1.69	2.44	4.17
C	0.24	0.31	0.31	0.43	0.51

AVAILABLE END FIXINGS

For more options on available end fixings please contact us or visit **www.gripple.com**

CABLE SPECS

Galvanized high tensile steel cable to EN12385. Standard lengths from 5ft-30ft, other lengths can be made to order.

	No.1	No.2	No.3	No.4	No.5
Cable Diameter	1/16"	5/64"	1/8"	3/16"	1/4"
Strand Configuration	7x7	7x7	7x7	7x19	7x19
Min. Breaking Load	125 lbs	500 lbs	1000 lbs	2475 lbs	3575 lbs
Max. Safe Working Load	25 lbs	100 lbs	200 lbs	495 lbs	715 lbs
Tensile Strength (lbs/sq.in.)	256,700	256,700	256,700	256,700	256,700

FASTENER SPECS

Housing - Type ZA2 Zinc
Wedge - Sintered steel hardened to min. 56 Rockwell C
Spring - Stainless Steel (Type 302)
End Cap - No.1-4: UV stabilized homopolymer propylene; No.5: Type ZA2 Zinc
Screws - No.5 only: Stainless Steel (Type 304)

Safe Working Loads:
No.1 - up to 25 lbs
No.2 - up to 100 lbs
No.3 - up to 200 lbs
No.4 - up to 495 lbs
No.5 - up to 715 lbs
All with a 5:1 safety factor

www.gripple.com

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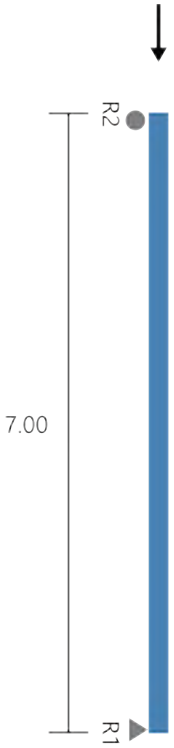

Section : 350S162-54 (50 ksi) Single C Stud
Maxo = 1061.7 Ft-Lb **Va =** 3371.6 lb **I =** 0.80 in^4

Loads have not been modified for strength checks
Loads have been multiplied by 0.70 for deflection calculations

Flexural and Deflection Check

Span	Mmax Ft-Lb	Mmax/ Maxo	Mpos Ft-Lb	Bracing (in)	Ma(Brc) Ft-Lb	Mpos/ Ma(Brc)	Deflection (in)	Ratio
Span	0.0	0.000	0.0	None	581.6	0.000	0.000	L/0

Distortional Buckling Check

Span	K-phi lb-in/in	Lm Brac in	Ma-d Ft-Lb	Mmax/ Ma-d
Span	0.00	84.0	1087.2	0.000

Combined Bending and Web Crippling

Reaction or Pt Load	Load P(lb)	Bearing (in)	Pa (lb)	Pn (lb)	Mmax (Ft-Lb)	Intr. Value	Stiffeners Required?
R2	0.0	--Shear Connection w/ clip--					NO
R1	0.0	--Shear Connection w/ clip--					NO

Combined Bending and Shear

Reaction or Pt Load	Vmax (lb)	Mmax (Ft-Lb)	Va Factor	V/Va	M/Ma	V + M Intr.
R1	0.0	0.0	0.28	0.00	0.00	0.00
R2	0.0	0.0	0.28	0.00	0.00	0.00

Combined Bending and Axial Load Details

Span	Axial Ld (lb)	Bracing(in) KyLy	Bracing(in) KtLt	Max KL/r	K-phi (lb-in/in)	Lm Bracing (in)	Allow load(lb)	P/Pa	Intr. Value
Span	1624.0(c)	None	None	139	0.0	84.0	2030.0(c)	0.80	0.80

Simpson Strong-Tie Connectors

Support	Rx(lb)	Ry(lb)	Simpson Strong-Tie Connector	Connector Interaction	Anchor Interaction
R2	0.00	0	SCB45.5(2) & (2) #12-24 SST X or XL to A36 Steel	0.00 %	0.00 %
R1	0.00	1624	350T125-33 (33) & (1) .157" SST PDPA/PDPAT-62KP to steel (3/16" to 1/2" thickness)	0.00 %	0.00 %

Simpson Strong-Tie Wall Stud Bridging Connectors

Design Method = AISI S100

Span/CantiLever	Bracing Length (in.)	Design Number of Braces	Pn(lb.)	LSUBH (Min)[1]	LSUBH (Max)[1]	SUBH (Min)[1]	SUBH (Max)[1]	MSUBH (Min)[1]	MSUBH (Max)[1]
Span	Span	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

1) Values in parentheses are stress ratios.
2) Bridging connectors are not designed for back-back,box, or built-up sections.
3) Reference www.strongtie.com for latest load data, important information, and general notes
4) CFS Designer will not select bridging connectors unless all flexural and axial bracing settings are the same.
5) If the bracing length is larger than the span length, bridging connectors are not designed.

Titen HD® Rod Hanger Design Information — Concrete

SIMPSON Strong-Tie®

Titen HD Threaded Rod Hanger Product Data

Size (in.)	Model No.	Accepts Rod Dia. (in.)	Drill Bit Dia. (in.)	Wrench Size (in.)	Min. Embed. (in.)	Hole Depth Overdrill (in.)	Quantity	
							Box	Carton
¼ x 1⅝	THDB25158RH	¼	¼	⅜	1⅝	⅛	100	500
⅜ x 1⅝	THDB37158RH	⅜	¼	½	1⅝	⅛	50	200
½ x 2¾	THD50234RH	½	⅜	11⁄16	2½	¼	50	100

Titen HD Threaded Rod Hanger Installation Information and Additional Data[1]

Characteristic	Symbol	Units	Model Number	
			THDB25158RH THDB37158RH	THD50234RH
Installation Information				
Rod Hanger Diameter	d_o	in.	¼ or ⅜	½
Drill Bit Diameter	d_{bit}	in.	¼	⅜
Maximum Installation Torque[2]	$T_{inst,max}$	ft.-lb.	24	50
Maximum Impact Wrench Torque Rating[3]	$T_{impact,max}$	ft.-lb.	125	150
Minimum Hole Depth	h_{hole}	in.	1¾	3
Embedment Depth	h_{nom}	in.	1⅝	2¾
Effective Embedment Depth	h_{ef}	in.	1.19	1.77
Critical Edge Distance	c_{ac}	in.	3	2 11⁄16
Minimum Edge Distance	c_{min}	in.	1½	1¾
Minimum Spacing	s_{min}	in.	1½	3
Minimum Concrete Thickness	h_{min}	in.	3¼	4¼
Anchor Data				
Yield Strength	f_{ya}	psi	100,000	97,000
Tensile Strength	f_{uta}	psi	125,000	110,000
Minimum Tensile and Shear Stress Area	A_{se}	in.^{2}	0.042	0.099
Axial Stiffness in Service Load Range — Uncracked Concrete	β_{uncr}	lb./in.	202,000	715,000
Axial Stiffness in Service Load Range — Cracked Concrete	β_{cr}	lb./in.	173,000	345,000

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11.
2. $T_{inst,max}$ is the maximum permitted installation torque for installations using a torque wrench.
3. $T_{impact,max}$ is the maximum permitted torque rating for impact wrenches.

Titen HD® Rod Hanger Design Information — Concrete

Titen HD Threaded Rod Hanger Tension Strength Design Data for Installations in Concrete[1]

Characteristic	Symbol	Units	Model Number	
			THDB25158RH THDB37158RH	THD50234RH
Anchor Category	1, 2 or 3	—	1	
Embedment Depth	h_{nom}	in.	1⅝	2½
Steel Strength in Tension (ACI 318-14 17.4.1 or ACI 318-11 Section D.5.1)				
Tension Resistance of Steel	N_{sa}	lb.	5,195	10,890
Strength Reduction Factor — Steel Failure[2]	ϕ_{sa}	—	0.65	
Concrete Breakout Strength in Tension (ACI 318-14 17.4.2 or ACI 318-11 Section D.5.2)				
Effective Embedment Depth	h_{ef}	in.	1.19	1.77
Critical Edge Distance	c_{ac}	in.	3	2¹¹⁄₁₆
Effectiveness Factor — Uncracked Concrete	k_{uncr}	—	30	24
Effectiveness Factor — Cracked Concrete	k_{cr}	—	17	
Modification Factor	$\psi_{c,N}$	—	1.0	
Strength Reduction Factor — Concrete Breakout Failure[3]	ϕ_{cb}	—	0.65	
Pullout Strength in Tension (ACI 318-14 17.4.3 or ACI 318-11 Section D.5.3)				
Pullout Resistance — Uncracked Concrete (f'_c = 2,500 psi)	$N_{p,uncr}$	lb.	N/A[4]	2,025[5]
Pullout Resistance — Cracked Concrete (f'_c = 2,500 psi)	$N_{p,cr}$	lb.	N/A[4]	1,235[5]
Strength Reduction Factor — Pullout Failure[6]	ϕ_p	—	0.65	
Tension Strength for Seismic Applications (ACI 318-14 17.2.3.3 or ACI 318-11 Section D.3.3.3)				
Nominal Pullout Strength for Seismic Loads (f'_c = 2,500 psi)	$N_{p,eq}$	lb.	N/A[4]	1,235[5]
Strength Reduction Factor — Pullout Failure[6]	ϕ_{eq}	—	0.65	

1. The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable.
2. The tabulated value of ϕ_{sa} applies when the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2 are used, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4(b), as applicable.
3. The tabulated values of ϕ_{cb} applies when both the load combinations of Section 1605.2 of the IBC, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-11 D.4.3(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided in concrete. For installations were complying reinforcement can be verified, the ϕ_{cb} factors described in ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c), as applicable, may be used for Condition A. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4(c) for Condition B.
4. As described in this report, N/A denotes that pullout resistance does not govern and does not need to be considered.
5. The characteristic pullout resistance for greater compressive strengths may be increased by multiplying the tabular value by $(f'_c/2{,}500)^{0.5}$.
6. The tabulated values of ϕ_p or ϕ_{eq} applies when both the load combinations of ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable, are used and the requirements of ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c) for Condition B are met. Condition B applies where supplementary reinforcement is not provided in concrete. For installations were complying reinforcement can be verified, the ϕ_p or ϕ_{eq} factors described in ACI 318-14 17.3.3(c) or ACI 318-11 D.4.3(c), as applicable, may be used for Condition A. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4(c) for Condition B.

* See p. 13 for an explanation of the load table icons.