Seismic Brace Report

Project Name	Peirce CO. STEM Building
Date	07/26/2022
Address	1601 39th Ave SE puyallup, WA 98374
Contractor	Shinn Fire protection 425-203-9800
Engineer	Ben Bernard 425-204-3945

APPROVAL STAMP

- ☐ Approved
- ☐ Approved as Noted
- ☐ Not Approved

Remarks:

Standard NFPA 13-2016

BRACE SUMMARY

Brace Name	Drawing Reference	Seismic Design Load	Structure	Brace Description	Fastener	Attachments
SB-1	FP-2.0 - 2.3	409 lbf.	Horizontal Beam Flange	Lateral Orientation 45° - 90° 1 NPS Sch 40		AF720 AF700 - 1/2" AF730 - 4 NPS
SB-2	FP-2.0 - 2.3	483 lbf.	Horizontal Beam Flange	Longitudinal Orientation 45° - 90° 1 NPS Sch 40		AF720 AF700 - 1/2" AF730 - 4 NPS

NOTE: Per NFPA 13-2016, all load capacities listed for fasteners installed in cracked concrete have been reduced based on the prying factors listed for ASC's swivel attachments. Prying factors for NFPA fastener orientations "A" through "I" may be found in ASC's individual product submittal at asc-es.com

NFPA 13-2016 Product loads incorporate a minimum safety factor of 1.5. NFPA 13-2019 FM Product loads have been reduced to include a safety factor of 2.2 unless noted in the applicable product submittal.

The products specified within this report are limited to the capability of the sway brace assembly alone to resist the calculated seismic force resulting from user input . Point loads applied to structural elements as a result of seismic forces are not evaluated by the software. The seismic load rating of the fastener attached to a structural element is determined by one of the following: NFPA 13, UL listing, FM Global approval, or other empirical testing. The review of the of the structural element(s) as a whole and/or the entire structure and its ability to resist the seismic load(s) is beyond the scope of these seismic calculations.

ASC MAKES NO WARRANTIES , EXPRESS, IMPLIED, STATUTORY, OR OTHERWISE, WITH RESPECT TO THE SOFTWARE OR THE SEISMIC CALCULATIONS, AND ASC SPECIFICALLY DISCLAIMS ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS

Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP

03/26/2024
Signature **Date**

Expires 12/31/24

SB-1 - SEISMIC BRACE CALCULATIONS

Seismic Project	SB-1	**Brace Name**	SB-1
Standard	NFPA 13-2016	**Drawing Reference**	FP-2.0 - 2.3
Brace Type	Lateral	**Approval Agency**	UL Listed

STRUCTURE INFORMATION

Structure	I-Beam/Joist
Substrate	Horizontal Beam Flange
Thickness	0.750 in.
Load Orientation	Perpendicular to Beam

BRACE INFORMATION

Brace Member	1 NPS Sch 40
Brace Length Max	3 ft 6 in
Brace Angle	45° - 90°
Least Radius of Gyration	0.421 in.
l/r Ratio Max	100
Max Horizontal Load	4,455 lbf.

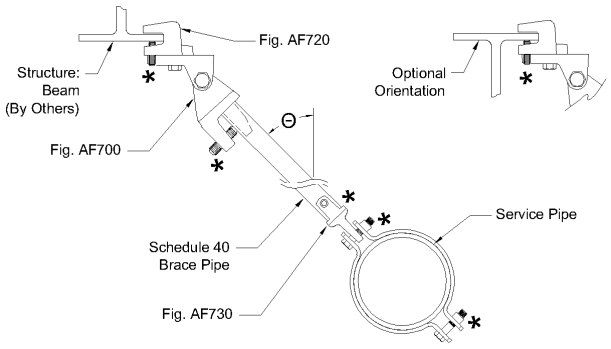
FASTENER INFORMATION

Fastener Name	N/A

SEISMIC BRACE ATTACHMENTS

	Model	Size	Load Rating
Structural Att.	AF720	N/A	1,131 lbf.
Swivel Att.	AF700	1/2"	1,333 lbf.
Pipe Att.	AF730	4 NPS	1,333 lbf.

See Appendix A for alternate seismic brace attachments.
All seismic brace attachments manufactured by ASC Engineered Solutions.



** - denotes hardware shown with the bolt head or nut broken off, as per the product installation instructions*
Net Vertical Reaction Forces do not need to be addressed per NFPA 13-2016.

SPRINKLER SYSTEM LOAD CALCULATION ($F_{PW} = C_P * W_P$)
$C_P = 0.594$

Qty	Line	Description	Pipe Diameter/Type	Length	Weight per ft	Weight
1	Main	Braced Pipe	4 NPS Steel Sch 10	30.00 ft.	11.78 lb/ft.	353.40 lb.
4	Branch 1	Segment A	1 1/2 NPS Steel Sch 10	20.00 ft.	3.04 lb/ft.	60.80 lb.

Weakest Main Size	Spacing	Max Fpw
4 NPS Steel Sch 10	30 ft.	1,071 lbf.

Total System Weight	596.60 lb.
System Design Weight (W_p)	687.00 lb.
Horizontal Seismic Load (Fpw)	409 lbf.

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SB-2 - SEISMIC BRACE CALCULATIONS

Seismic Project	SB-1	**Brace Name**	SB-2
Standard	NFPA 13-2016	**Drawing Reference**	FP-2.0 - 2.3
Brace Type	Longitudinal	**Approval Agency**	UL Listed

STRUCTURE INFORMATION

Structure	I-Beam/Joist
Substrate	Horizontal Beam Flange
Thickness	0.750 in.
Load Orientation	Parallel to Beam

BRACE INFORMATION

Brace Member	1 NPS Sch 40
Brace Length Max	3 ft 6 in
Brace Angle	45° - 90°
Least Radius of Gyration	0.421 in.
l/r Ratio Max	100
Max Horizontal Load	4,455 lbf.

FASTENER INFORMATION

Fastener Name	N/A

SEISMIC BRACE ATTACHMENTS

	Model	Size	Load Rating
Structural Att.	AF720	N/A	1,131 lbf.
Swivel Att.	AF700	1/2"	1,333 lbf.
Pipe Att.	AF730	4 NPS	1,333 lbf.

See Appendix A for alternate seismic brace attachments.
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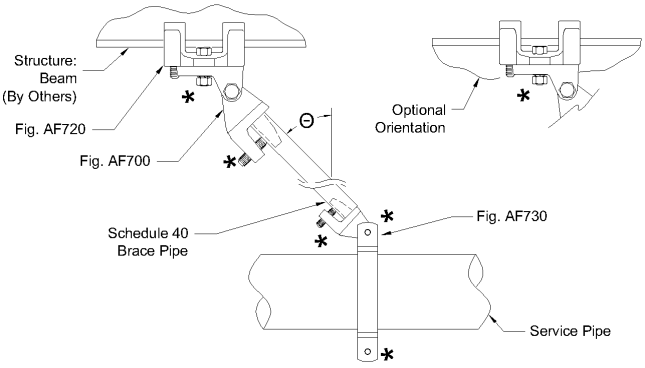

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Net Vertical Reaction Forces do not need to be addressed per NFPA 13-2016.

SPRINKLER SYSTEM LOAD CALCULATION ($F_{PW} = C_P * W_P$)
$C_P = 0.594$

Qty	Line	Description	Pipe Diameter/Type	Length	Weight per ft	Weight
1	Main	Braced Pipe	4 NPS Steel Sch 10	60.00 ft.	11.78 lb/ft.	706.80 lb.

Total System Weight	706.80 lb.
System Design Weight (W_p)	813.00 lb.
Horizontal Seismic Load (Fpw)	483 lbf.

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Appendix A - Alternate Seismic Brace Attachments

SB-1

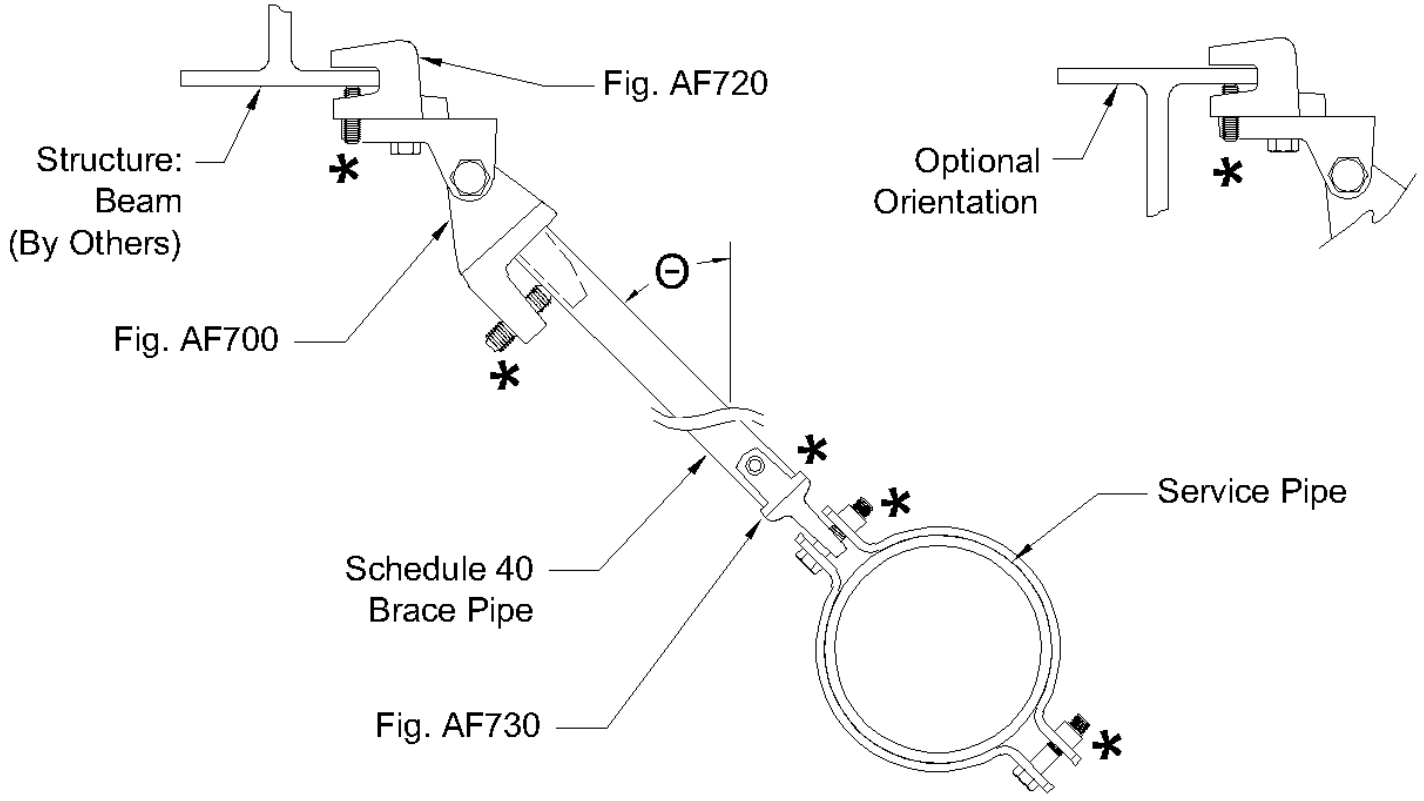
Structural Attachment	Structural Attach. Size	Structural Attach. Capacity	Swivel	Pipe Attachment
AF778	--	1,425 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	AF001 4 NPS x 1 NPS | 707 lbf.
AF778	--	1,425 lbf.	AF700 1/2" | 1,333 lbf.	AF035 4 NPS x 1 NPS | 1,955 lbf.
AF720	--	1,131 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	AF735 4 NPS x 1 NPS | 1,333 lbf.
AF727	--	1,333 lbf.	AF727 1/2" | 1,333 lbf.	AF775 4 NPS x 1 NPS | 707 lbf.
AF720	--	1,131 lbf.	AF076 1/2" | 1,955 lbf.	--
AF772	Type A	1,131 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	--
AF772	Type A	1,131 lbf.	AF700 1/2" | 1,333 lbf.	--
AF086	--	1,425 lbf.	AF075 1 NPS x 1/2" | 1,425 lbf.	--
AF086	--	1,425 lbf.	AF076 1/2" | 1,955 lbf.	--
AF086	--	1,425 lbf.	AF077 1 NPS x 1/2" | 707 lbf.	--
AF086	--	1,425 lbf.	AF700 1/2" | 1,333 lbf.	--

SB-2

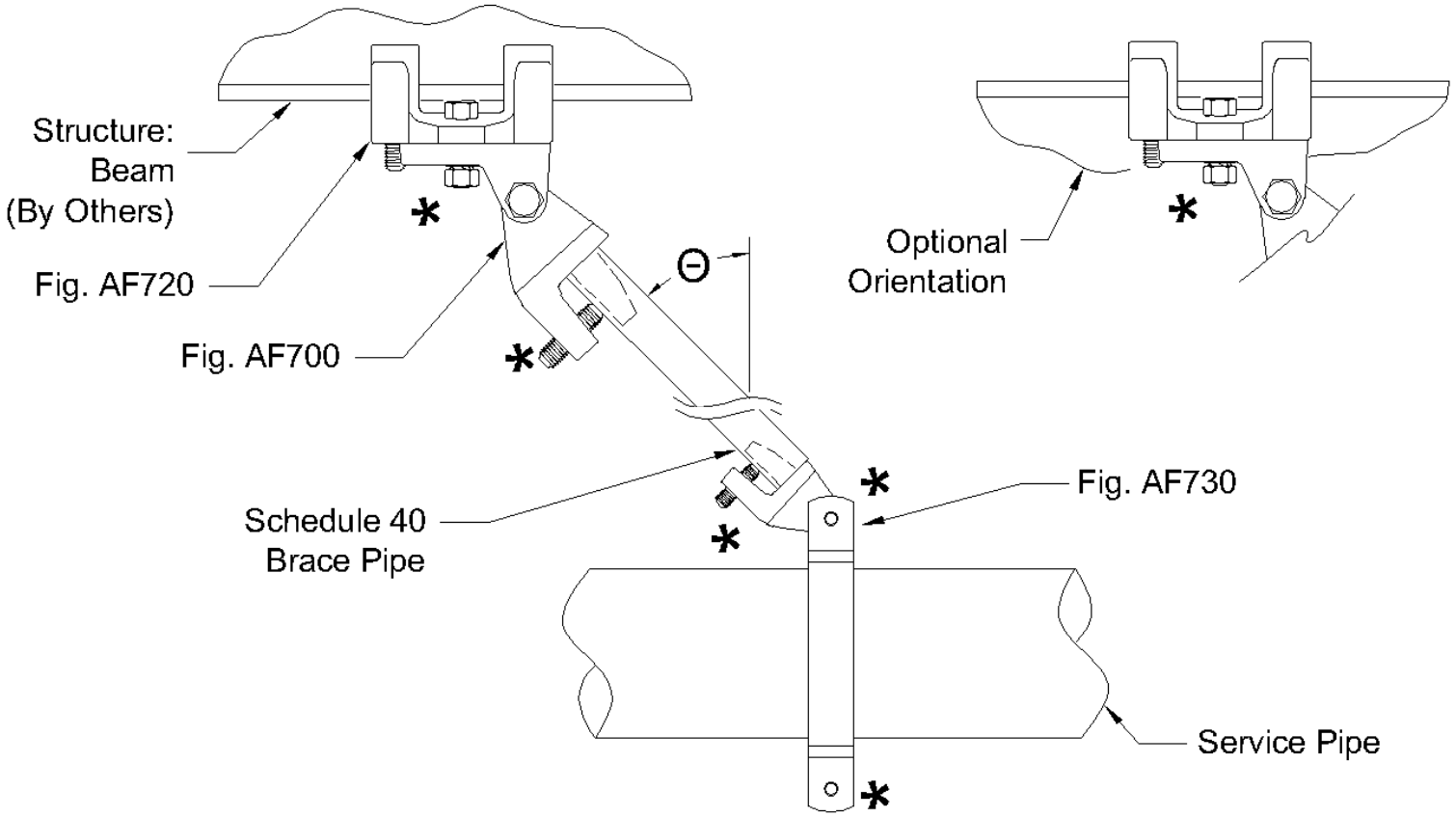
Structural Attachment	Structural Attach. Size	Structural Attach. Capacity	Swivel	Pipe Attachment
AF778	--	1,425 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	AF775 4 NPS x 1 NPS | 707 lbf.
AF778	--	1,425 lbf.	AF700 1/2" | 1,333 lbf.	--
AF720	--	1,131 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	--
AF727	--	1,333 lbf.	AF727 1/2" | 1,333 lbf.	--
AF720	--	1,131 lbf.	AF076 1/2" | 1,955 lbf.	--
AF772	Type A	707 lbf.	AF771 1 NPS x 1/2" | 2,644 lbf.	--
AF772	Type A	707 lbf.	AF700 1/2" | 1,333 lbf.	--
AF086	--	894 lbf.	AF075 1 NPS x 1/2" | 1,425 lbf.	--
AF086	--	894 lbf.	AF076 1/2" | 1,955 lbf.	--
AF086	--	894 lbf.	AF077 1 NPS x 1/2" | 707 lbf.	--
AF086	--	894 lbf.	AF700 1/2" | 1,333 lbf.	--

Appendix B - Enlarged Images

SB-1



SB-2



Appendix C - C_p Calculations

BRACE CALCULATION DATA

Brace Name	Brace Ref	Method	C_p	S_s	Site	F_a	S_{DS}	Z	H
SB-1	FP-2.0 - 2.3	A	0.594	1.254	--	--	--	--	--
SB-2	FP-2.0 - 2.3	A	0.594	1.254	--	--	--	--	--

CALCULATION METHODS

A	C_p calculated per NFPA 13-2016 Table 9.3.5.9.3
B	C_p entered by user
C	C_p calculated per ASCE/SEI 7-10 per NFPA 13-2016 Section 9.3.5.9.4

Notes for Calculation Method C

Per NFPA 13-2016, the following values are always assumed for a_p, R_p, and I_p:

a_p	R_p	I_p
2.5	4.5	1.5

LEGEND

F_{pw}	Seismic Horizontal Design Force
C_p	Seismic Coefficient per NFPA
S_s	Short Period MCEr Spectral Response Acceleration
F_a	Site Coefficient. See Tables Below.
S_{DS}	Short Period Spectral Acceleration
a_p	Component Amplification Factor. Taken as 2.5 for Fire Sprinkler Applications
R_p	Component Response Modification Factor. Taken as 4.5 for Fire Sprinkler Applications
I_p	Component Importance Factor. Taken as 1.5 for Fire Sprinkler Applications
W_p	Component Operating Weight. Taken as the weight of the Fire Sprinkler System in the ZOI plus 15%
z	Height in the structure where the component attaches to the structure. Height is relative to the base of the structure and shall not be taken as less than 0 and shall not be larger than “H”.
H	Average roof height of the structure relative to the base

EQUATIONS

$$F_{pw} = C_p W_p$$

$$Where: C_p = 0.7 * \frac{0.4 a_p S_{DS} I_p}{R_p}\left(1 + 2\frac{Z}{H}\right)$$

$$Where: S_{DS} = {}^{2}/_{3}\, F_a S_s$$

$$C_{p\,max} = 0.7 * 1.6 S_{DS} I_p$$

$$C_{p\,min} = 0.7 * 0.3 S_{DS} I_p$$

SITE COEFFICIENT, F_A PER ASCE/SEI 7-10

	$S_s \leq 0.25$	$S_s = 0.5$	$S_s = 0.75$	$S_s = 1$	$S_s \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1	1	1	1	1
C	1.2	1.2	1.1	1	1
D	1.6	1.4	1.2	1.1	1
E	2.5	1.7	1.2	0.9	0.9

Use straight-line interpolation for intermediate values of S_s.

SITE CLASSIFICATION PER ASCE/SEI 7-10

Site Class	Ground Structure
A	Hard Rock
B	Rock
C	Very Dense Soil and Soft Rock
D	Stiff Soil
E	Soft Clay Soil