

BPLC NORTH YARD

Seismic Calculations

**5511 INTER AVE
PUYALLUP, WA 98372**

Patriot Project No. 11-2495

Submitted To:

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PATRIFP099CF

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	03/04/2025
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Seismic Brace Report



Project Name BPLC North Yard
Date 03/04/2025
Address 2511 Inter Ave
Puyallup, WA 98372

APPROVAL STAMP

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

Remarks:

Standard NFPA 13-2019

BRACE SUMMARY

Brace Name	Drawing Reference	Seismic Design Load	Structure	Brace Description	Fastener	Attachments
4" Lateral	FP-2	566 lbf.	Horizontal Beam Flange	Lateral Orientation 45° - 59° 1 NPS Sch 40		AF727 AF727 - 1/2" AF035 - 4 NPS x 1 NPS
4" Longitudinal	FP-2	469 lbf.	Horizontal Beam Flange	Longitudinal Orientation 45° - 59° 1 NPS Sch 40		AF727 AF727 - 1/2" AF730 - 4 NPS
3" Wood Lateral	FP-2	171 lbf.	Weyerhaeuser TJI Composite Wood Joist (Douglas Fir - S50 Installation Detail)	Lateral Orientation H 45° - 59° 1 NPS Sch 40	1/2" Thru-Bolt per Weyerhaeuser S50 Installation Diagram	AF700 - 1/2" AF035 - 3 NPS x 1 NPS

NOTE: Per NFPA 13-2019, 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.

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4" LATERAL - SEISMIC BRACE CALCULATIONS

Seismic Project Retrofit
Standard NFPA 13-2019
Brace Type Lateral

Brace Name 4" Lateral
Drawing Reference FP-2
Approval Agency UL Listed

STRUCTURE INFORMATION

Structure I-Beam/Joist
Substrate Horizontal Beam Flange
Thickness 0.01 in.-0.75 in.
Load Orientation Parallel to Beam

BRACE INFORMATION

Brace Member 1 NPS Sch 40
Brace Length Max 7 ft 0 in
Brace Angle 45° - 59°
Least Radius of Gyration 0.421 in.
I/r Ratio Max 200
Max Horizontal Load 1,310 lbf.

FASTENER INFORMATION

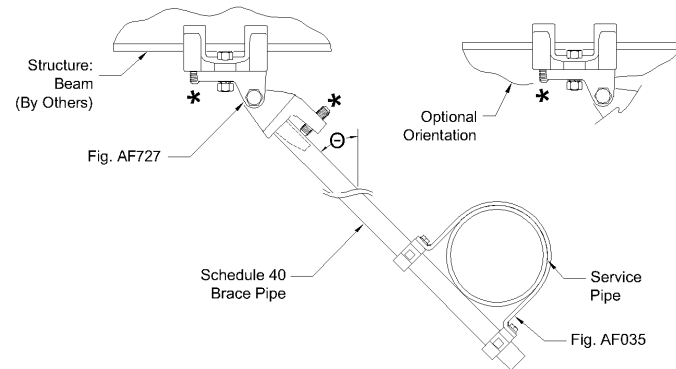
Fastener Name N/A

SEISMIC BRACE ATTACHMENTS

	Model	Size	Adj. Load
Structural Att.	AF727	N/A	1,333 lbf.
Swivel Att.	AF727	1/2"	1,333 lbf.
Pipe Att.	AF035	4 NPS x 1 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 13-2019.

SPRINKLER SYSTEM LOAD CALCULATION ($F_{PW} = C_p * W_p$) $C_p = 0.665$

Qty	Line	Description	Pipe Size/Type	Length	Weight/ft	Weight/Line	Total Weight
1	Main	Braced Pipe	4 NPS Steel Sch 10	25.50 ft.	11.78 lb/ft.	300.39 lb.	300.39 lb.
2	Branch 1	Segment A	2 NPS Steel Sch 10	52.00 ft.	4.22 lb/ft.	219.44 lb.	438.88 lb.

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

Total System Weight	739.27 lb.
System Design Weight (W_p)	851.00 lb.
Horizontal Seismic Load (F_{pw})	566 lbf.

4" LONGITUDINAL - SEISMIC BRACE CALCULATIONS

Seismic Project Retrofit
Standard NFPA 13-2019
Brace Type Longitudinal

Brace Name 4" Longitudinal
Drawing Reference FP-2
Approval Agency UL Listed

STRUCTURE INFORMATION

Structure I-Beam/Joist
Substrate Horizontal Beam Flange
Thickness 0.01 in.-0.75 in.
Load Orientation Perpendicular to Beam

BRACE INFORMATION

Brace Member 1 NPS Sch 40
Brace Length Max 7 ft 0 in
Brace Angle 45° - 59°
Least Radius of Gyration 0.421 in.
I/r Ratio Max 200
Max Horizontal Load 1,310 lbf.

FASTENER INFORMATION

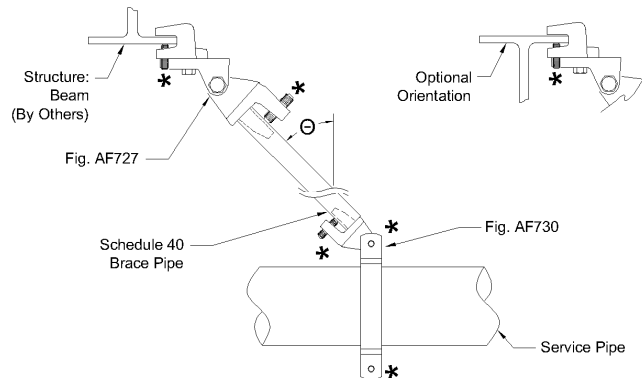
Fastener Name N/A

SEISMIC BRACE ATTACHMENTS

	Model	Size	Adj. Load
Structural Att.	AF727	N/A	1,333 lbf.
Swivel Att.	AF727	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 13-2019.

SPRINKLER SYSTEM LOAD CALCULATION ($F_{PW} = C_p * W_p$) $C_p = 0.665$

Qty	Line	Description	Pipe Size/Type	Length	Weight/ft	Weight/Line	Total Weight
1	Main	Braced Pipe	4 NPS Steel Sch 10	52.00 ft.	11.78 lb/ft.	612.56 lb.	612.56 lb.

Total System Weight	612.56 lb.
System Design Weight (W_p)	705.00 lb.
Horizontal Seismic Load (F_{pw})	469 lbf.

3" WOOD LATERAL - SEISMIC BRACE CALCULATIONS

Seismic Project Retrofit
Standard NFPA 13-2019
Brace Type Lateral

Brace Name 3" Wood Lateral
Drawing Reference FP-2
Approval Agency UL Listed

STRUCTURE INFORMATION

Structure Composite Wood Joist
Substrate Weyerhaeuser TJI Composite Wood Joist (Douglas Fir - S50 Installation Detail)
Load Orientation N/A

See following page for Weyerhaeuser TJI Joist Seismic Bracing Detail. This must be followed in order for load ratings to be valid.

BRACE INFORMATION

Brace Member 1 NPS Sch 40
Brace Length Max 7 ft 0 in
Brace Angle 45° - 59°
Least Radius of Gyration 0.421 in.
I/r Ratio Max 200
Max Horizontal Load 1,310 lbf.

FASTENER INFORMATION

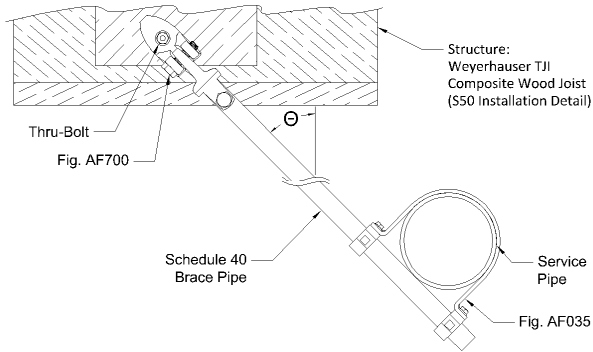
Fastener Name Thru-Bolt per Weyerhaeuser S50 Installation Diagram
Fastener Orientation H
Fastener Diameter 1/2 in.
Max Horizontal Load 690 lbf.

SEISMIC BRACE ATTACHMENTS

	Model	Size	Adj. Load
Swivel Att.	AF700	1/2"	1,333 lbf.
Pipe Att.	AF035	3 NPS x 1 NPS	884 lbf.

See Appendix A for alternate seismic brace attachments.

All seismic brace attachments manufactured by ASC Engineered Solutions.



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Net Vertical Reaction Forces do not need to be addressed per NFPA 13-2019.

SPRINKLER SYSTEM LOAD CALCULATION ($F_{PW} = C_p * W_p$) $C_p = 0.665$

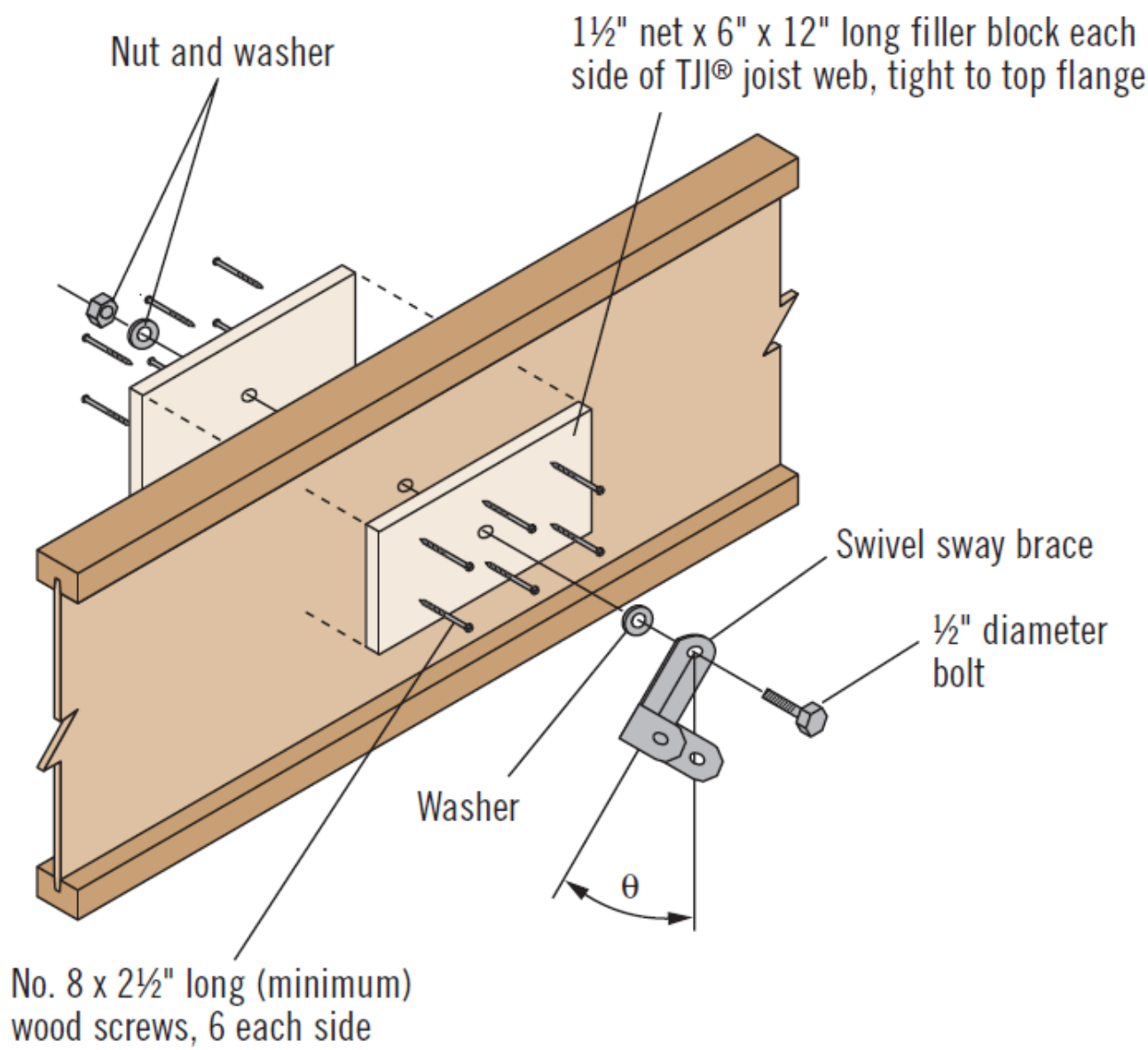
Qty	Line	Description	Pipe Size/Type	Length	Weight/ft	Weight/Line	Total Weight
1	Main	Braced Pipe	3 NPS Steel Sch 10	8.00 ft.	7.94 lb/ft.	63.52 lb.	63.52 lb.
1	Branch 1	Segment A	2 NPS Steel Sch 10	37.50 ft.	4.22 lb/ft.	158.25 lb.	158.25 lb.

Weakest Main Size	Spacing	Max Fpw
3 NPS Steel Sch 10	20 ft.	966 lbf.

Total System Weight	221.77 lb.
System Design Weight (W_p)	256.00 lb.
Horizontal Seismic Load (F_{pw})	171 lbf.



Swivel Sway Brace on TJI® Joist Web (Loads Parallel or Perpendicular to TJI® Joists)



Appendix A - Alternate Seismic Brace Attachments

4" LATERAL

Structural Attachment	Structural Attach. Size	Structural Attach. Capacity	Swivel	Pipe Attachment
AF778	--	1,131 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	AF735 4 NPS x 1 NPS 1,333 lbf.
AF778	--	1,131 lbf.	AF700 1/2" 1,333 lbf.	AF730 4 NPS 1,333 lbf.
AF778	--	1,131 lbf.	AF076 1/2" 1,237 lbf.	--
AF720	--	1,131 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	--
AF720	--	1,131 lbf.	AF700 1/2" 1,333 lbf.	--
AF720	--	1,131 lbf.	AF076 1/2" 1,237 lbf.	--
AF087	--	968 lbf.	AF075 1 NPS x 1/2" 968 lbf.	--
AF087	--	968 lbf.	AF076 1/2" 1,237 lbf.	--

4" LONGITUDINAL

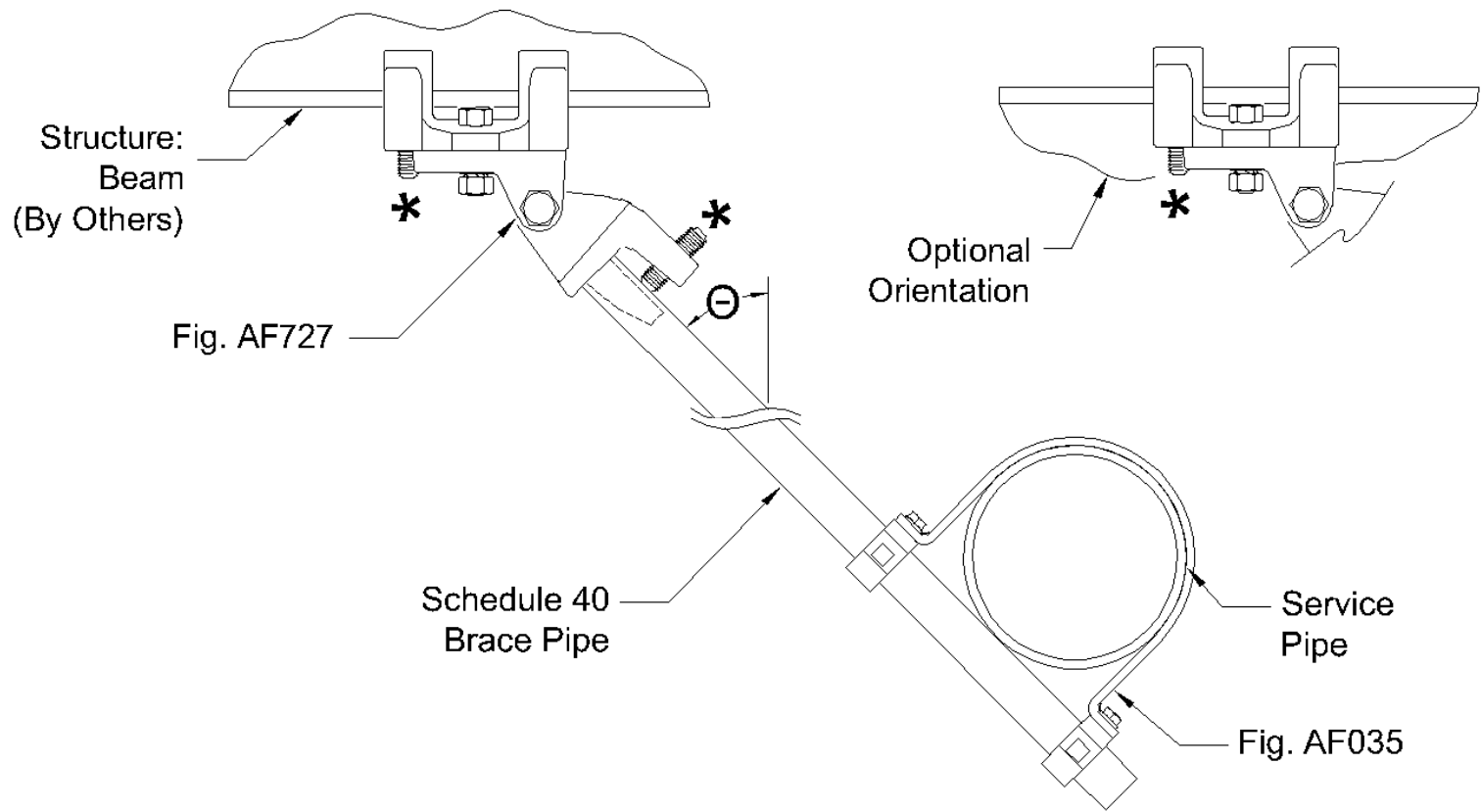
Structural Attachment	Structural Attach. Size	Structural Attach. Capacity	Swivel	Pipe Attachment
AF778	--	1,131 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	AF775 4 NPS x 1 NPS 480 lbf.
AF778	--	1,131 lbf.	AF700 1/2" 1,333 lbf.	--
AF778	--	1,131 lbf.	AF076 1/2" 1,237 lbf.	--
AF720	--	1,131 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	--
AF720	--	1,131 lbf.	AF700 1/2" 1,333 lbf.	--
AF720	--	1,131 lbf.	AF076 1/2" 1,237 lbf.	--
AF772	Type A	480 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	--
AF772	Type B	480 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	--
AF772	Type A	480 lbf.	AF700 1/2" 1,333 lbf.	--
AF772	Type B	480 lbf.	AF700 1/2" 1,333 lbf.	--
AF772	Type A	480 lbf.	AF076 1/2" 1,237 lbf.	--
AF772	Type B	480 lbf.	AF076 1/2" 1,237 lbf.	--
AF087	--	968 lbf.	AF075 1 NPS x 1/2" 968 lbf.	--
AF087	--	968 lbf.	AF076 1/2" 1,237 lbf.	--
AF087	--	968 lbf.	AF077 1 NPS x 1/2" 480 lbf.	--
AF086	--	968 lbf.	AF075 1 NPS x 1/2" 968 lbf.	--
AF086	--	968 lbf.	AF076 1/2" 1,237 lbf.	--
AF086	--	968 lbf.	AF077 1 NPS x 1/2" 480 lbf.	--
AF086	--	968 lbf.	AF700 1/2" 1,333 lbf.	--
AF086	--	968 lbf.	AF771 1 NPS x 1/2" 1,414 lbf.	--

3" WOOD LATERAL

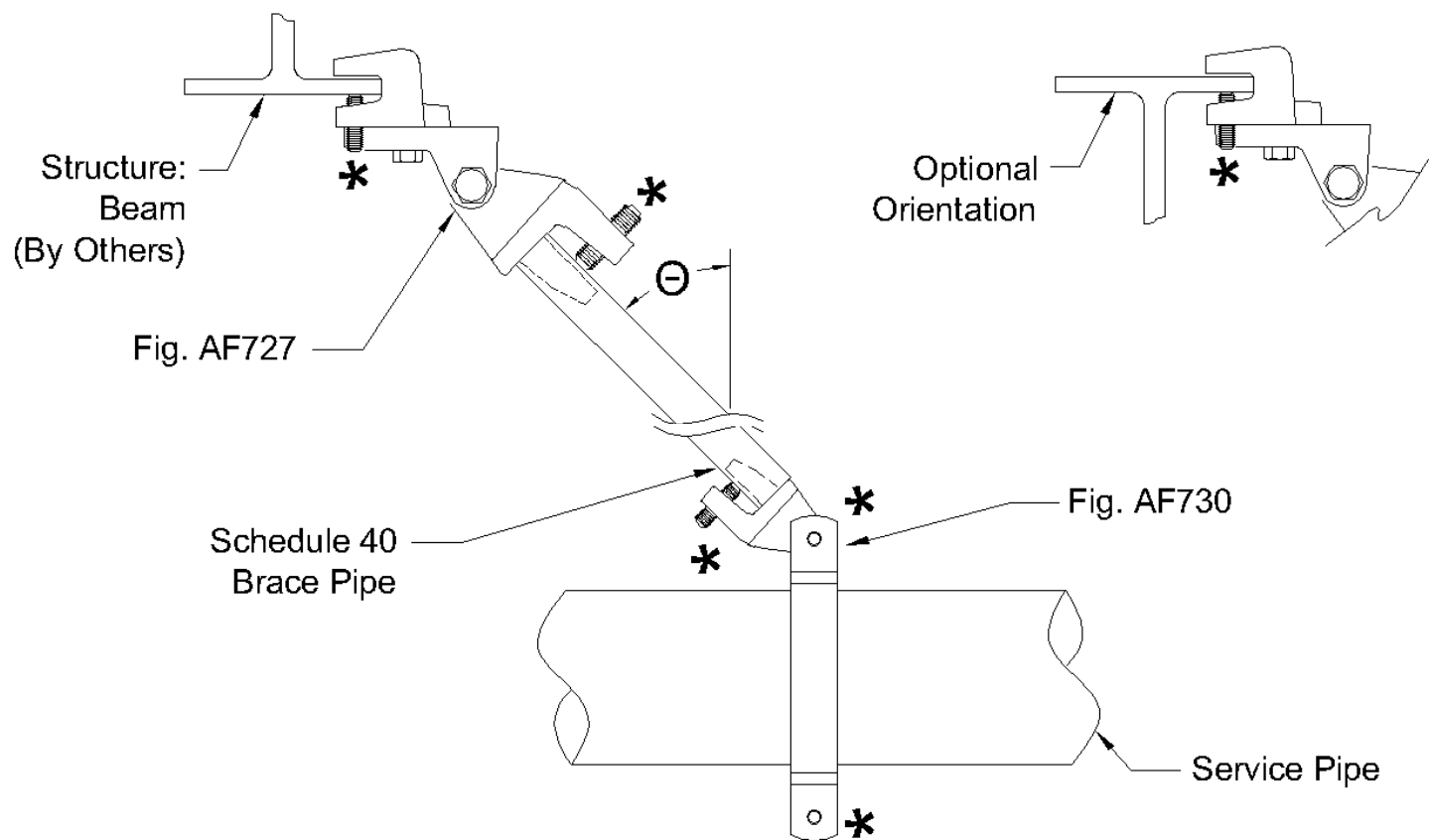
Structural Attachment	Structural Attach. Size	Structural Attach. Capacity	Swivel	Pipe Attachment
--	--	--	--	AF001 3 NPS x 1 NPS 480 lbf.
--	--	--	--	AF735 3 NPS x 1 NPS 1,333 lbf.
--	--	--	--	AF775 3 NPS x 1 NPS 480 lbf.
--	--	--	--	AF730 3 NPS 770 lbf.

Appendix B - Enlarged Images

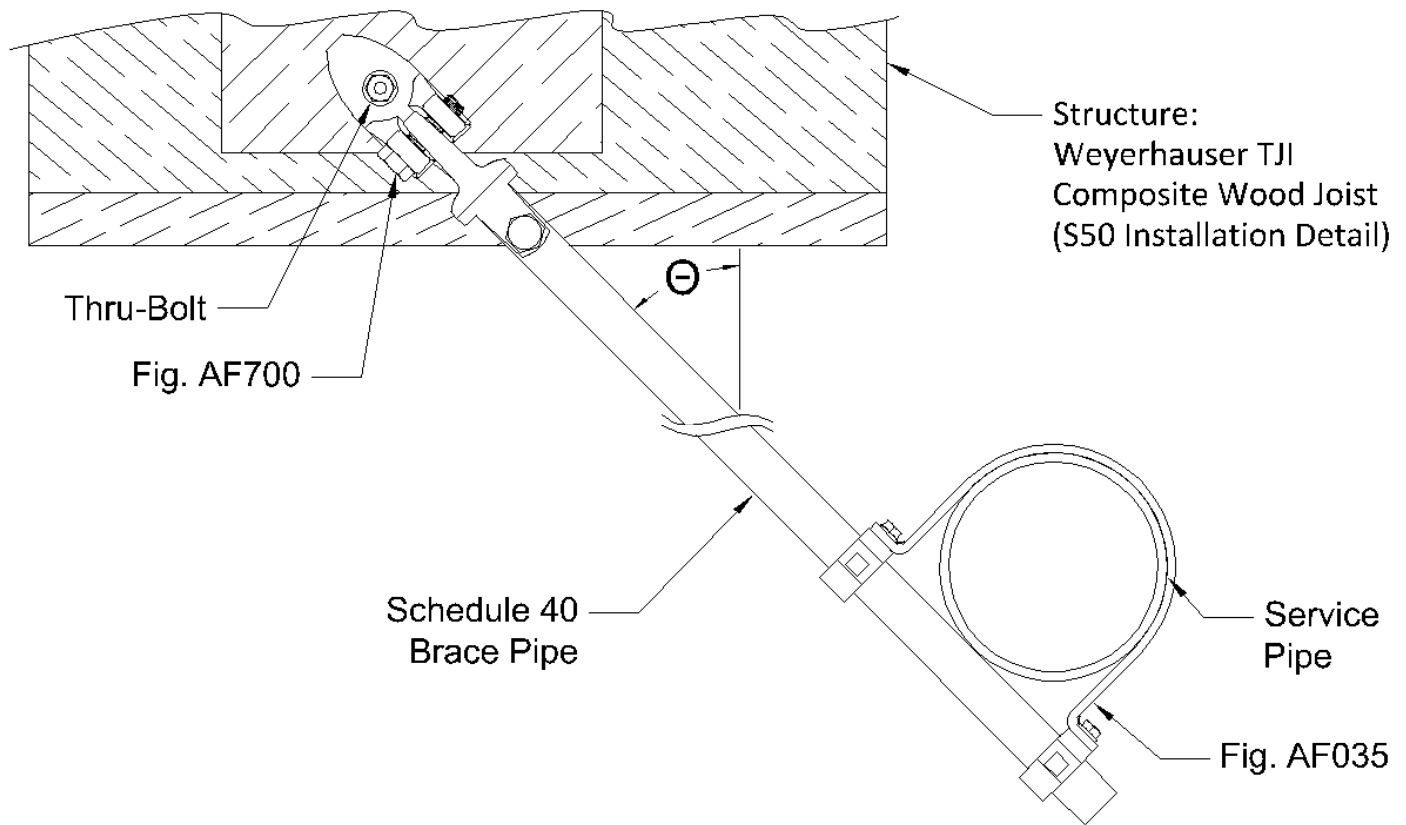
4" LATERAL



4" LONGITUDINAL



3" WOOD LATERAL



* - denotes hardware shown with the bolt head or nut broken off, as per the product installation instructions

Appendix C - C_p Calculations

BRACE CALCULATION DATA

Brace Name	Brace Ref	Method	C _p	S _s	Site	F _a	S _{DS}	Z	H
4" Lateral	FP-2	A	0.665	1.430	--	--	--	--	--
4" Longitudinal	FP-2	A	0.665	1.430	--	--	--	--	--
3" Wood Lateral	FP-2	A	0.665	1.430	--	--	--	--	--

CALCULATION METHODS

- A** C_p calculated per NFPA 13-2019 Table 18.5.9.3
- B** C_p entered by user
- C** C_p calculated per ASCE/SEI 7-16 per NFPA 13-2019 Section 18.5.9.4

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...

$$F_{pw} = C_p W_p$$

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

$$\text{Where: } S_{DS} = \frac{2}{3} F_a S_s$$

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

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

SITE COEFFICIENT, F_A PER ASCE/SEI 7-16

	$S_s \leq 0.25$	$S_s = 0.5$	$S_s = 0.75$	$S_s = 1$	$S_s = 1.25$	$S_s \geq 1.5$
A	0.8	0.8	0.8	0.8	0.8	0.8
B	0.9	0.9	0.9	0.9	0.9	0.9
C	1.3	1.3	1.2	1.2	1.2	1.2
D	1.6	1.4	1.2	1.1	1	1
E	2.4	1.7	1.3	1.2	1.2	1.2

Use straight-line interpolation for intermediate values of S_s .

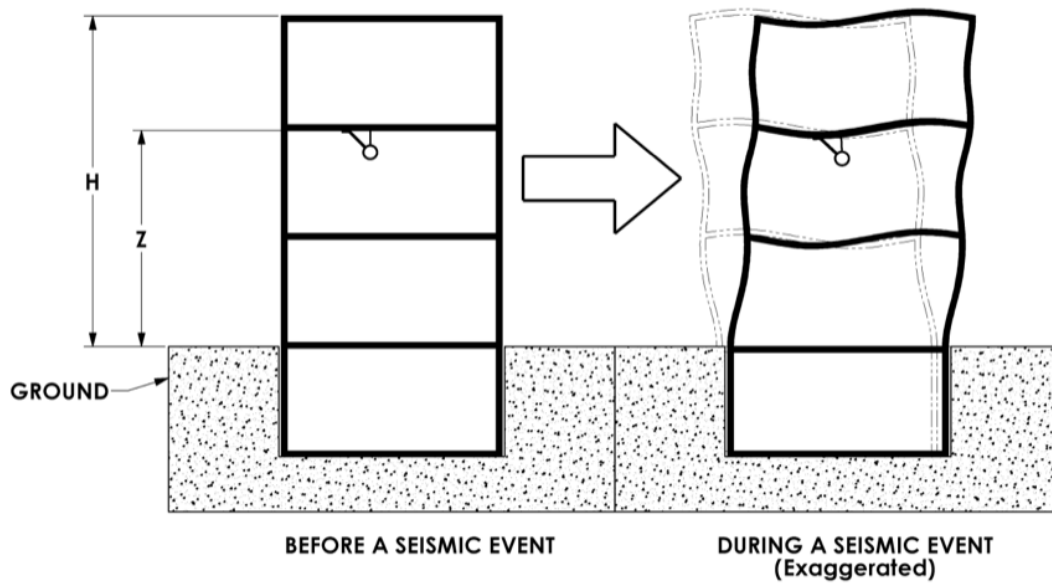
SITE CLASSIFICATION PER ASCE/SEI 7-16

Site Class

A
B
C
D
E

Ground Structure

Hard Rock
Rock
Very Dense Soil and Soft Rock
Stiff Soil
Soft Clay Soil



Appendix D - Bill of Materials

Project Name BPLC North Yard
Code Requirements NFPA 13-2019
Last Updated March 4, 2025

QUANTITY	FIGURE NUMBER	PRODUCT	DESCRIPTION
0			Fastener
0	AF727	AF727 - "Bear Claw" Universal Structural Attachment with Swivel	AF727
	AF035	4 NPS AF035 Model K Brace Clamp	AF035 - 4 NPS x 1 NPS
	AF730	4 NPS AF730 Longitudinal & Lateral Seismic Clamp	AF730 - 4 NPS
		1/2" Thru-Bolt per Weyerhaeuser S50 Installation Diagram	Fastener
	AF700	1/2" AF700 Universal Swivel Attachment	AF700 - 1/2"
	AF035	3 NPS AF035 Model K Brace Clamp	AF035 - 3 NPS x 1 NPS