TOLBrace™ Seismic Bracing Calculations

V8.8.137

Project Address: Centeris - UPS & Battery Rms
1023 39th Ave SE
Puyallup, WA
Job # 231213RL01

Contractor: Columbia Fire LL
Address: 111 S Findlay St.
Seattle, WA 98108
Phone: (206) 232-8569
License: COLUMFL795NJ

Calculations based on 2019 NFPA Pamphlet #13

Expires DEC 31,24
WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS
Matthew William Kunkle
4960-0322-C LEVEL 3
Columbia Fire, LLC
COLUMFL795NJ
Signature
04/08/2024
Date

Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

Orientation to Connecting Surface NFPA Type B

Fastener

Type	Fig.828 Along 1/2" - 7/8" Thick Flange
Diameter	N/A
Length	N/A
Maximum Load	1370 lbs (621 kg)

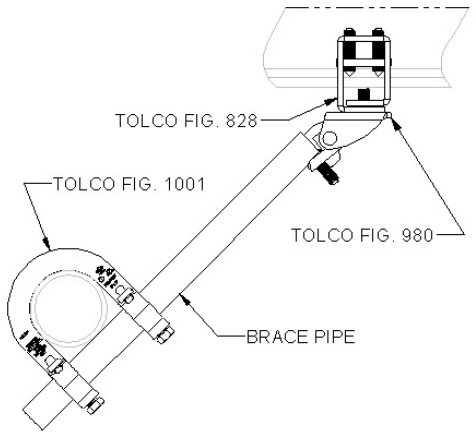
Prying Factor N/A

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 1001 Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
Fig.828 Along 1/2" - 7/8" Thic	1370 lbs (621 kg)	968 lbs (439 kg)

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for TOLCO™ components only. Use of any other components voids these calculations and the listing of the assembly.

Seismic Brace Assembly Detail



Brace Identification on Plans LATERAL - ALONG STEEL - BULI

Brace Type Lateral [X] Longitudinal [ ] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	40 ft (12.2 m)	40 ft (12.2 m)	11.78 lb/ft (17.53 kg/m)	471 lbs (214 kg)

Subtotal Weight	471 lbs (214 kg)
Wp (incl. 15%)	542 lbs (246 kg)
Total (Fpw)	320 lbs (145 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	769 lb (348 kg)

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	40

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LATERAL - ALONG STEEL - BULK MAIN
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	40' 0" (12.19 m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	Fig.828 Along 1/2" - 7/8" Thick Flange Beam
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	40 ft (12.2 m)

G-Factor Used 0.59

Allowance for Heads and Fittings 15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	320 lbs (145 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	969 lbs (439 kg)
Fig. 1001 Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	STEEL I-BEAM

Calculations prepared by Luke Thompson

* The description of the Structural Member is for informational purposes only.
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Date

Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

Orientation to Connecting Surface	NFPA Type B
Fastener Type	Fig.828 Across 1/2" - 7/8" Thick Flange
Diameter	N/A
Length	N/A
Maximum Load	1370 lbs (621 kg)
Prying Factor	N/A

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 1001 Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
Fig.828 Across 1/2" - 7/8" Thi	1370 lbs (621 kg)	968 lbs (439 kg)

*Calculation Based on CONCENTRIC Loading
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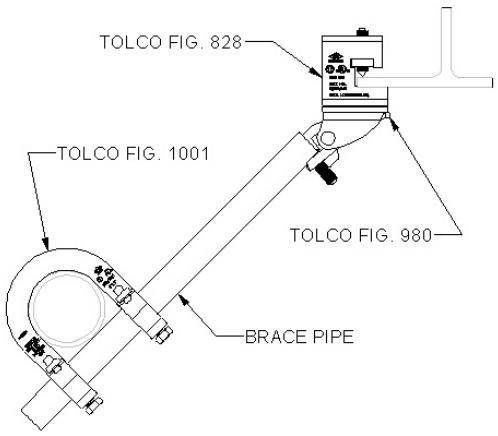
Seismic Brace Assembly Detail



Brace Identification on Plans LATERAL - ACROSS STEEL - BU

Brace Type Lateral [X] Longitudinal [ ] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	40 ft (12.2 m)	40 ft (12.2 m)	11.78 lb/ft (17.53 kg/m)	471 lbs (214 kg)

Subtotal Weight	471 lbs (214 kg)
Wp (incl. 15%)	542 lbs (246 kg)
Total (Fpw)	320 lbs (145 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	769 lb (348 kg)

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	40

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LATERAL - ACROSS STEEL - BULK MAIN
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	40' 0" (12.19 m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	Fig.828 Across 1/2" - 7/8" Thick Flange Beam
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	40 ft (12.2 m)

G-Factor Used 0.59	
Allowance for Heads and Fittings	15%
Conclusions	
Total Adjusted Load of Pipe in Zone of Influence	320 lbs (145 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	969 lbs (439 kg)
Fig. 1001 Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	STEEL I-BEAM

Calculations prepared by Luke Thompson

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Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

Orientation to Connecting Surface NFPA Type B

Fastener

Type	Fig.828 Along 1/2" - 7/8" Thick Flange
Diameter	N/A
Length	N/A
Maximum Load	1370 lbs (621 kg)
Prying Factor	N/A

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 4L Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
Fig.828 Along 1/2" - 7/8" Thic	1370 lbs (621 kg)	968 lbs (439 kg)

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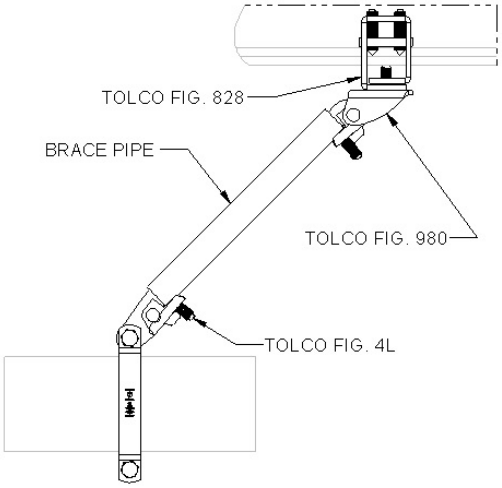
Seismic Brace Assembly Detail



Brace Identification on Plans LONGITUDINAL - ALONG STEEL

Brace Type Lateral [ ] Longitudinal [X] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	80 ft (24.4 m)	80 ft (24.4 m)	11.78 lb/ft (17.53 kg/m)	942 lbs (427 kg)

Subtotal Weight	942 lbs (427 kg)
Wp (incl. 15%)	1083 lbs (491 kg)
Total (Fpw)	639 lbs (290 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	N/A

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	80

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LONGITUDINAL - ALONG STEEL
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	80' 0" (24.38 m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	Fig.828 Along 1/2" - 7/8" Thick Flange Beam
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	80 ft (24.4 m)

G-Factor Used 0.59

Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	639 lbs (290 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	969 lbs (439 kg)
Fig. 4L Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	STEEL I-BEAM

Calculations prepared by Luke Thompson

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Signature
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Date

Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

Orientation to Connecting Surface	NFPA Type B
Fastener Type	Fig.828 Across 1/2" - 7/8" Thick Flange
Diameter	N/A
Length	N/A
Maximum Load	1370 lbs (621 kg)
Prying Factor	N/A

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 4L Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
Fig.828 Across 1/2" - 7/8" Thi	1370 lbs (621 kg)	968 lbs (439 kg)

*Calculation Based on CONCENTRIC Loading
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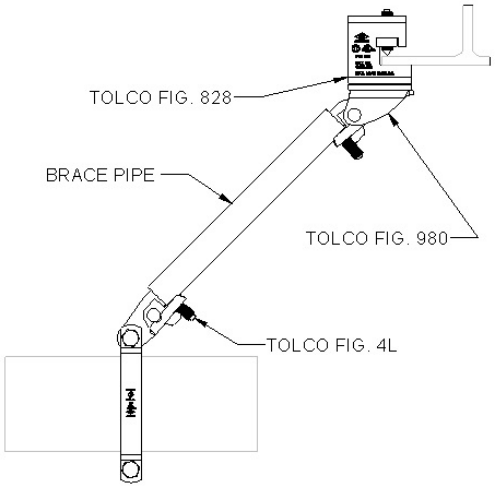
Seismic Brace Assembly Detail



Brace Identification on Plans LONGITUDINAL - ACROSS STEE

Brace Type Lateral [ ] Longitudinal [X] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	80 ft (24.4 m)	80 ft (24.4 m)	11.78 lb/ft (17.53 kg/m)	942 lbs (427 kg)

Subtotal Weight	942 lbs (427 kg)
Wp (incl. 15%)	1083 lbs (491 kg)
Total (Fpw)	639 lbs (290 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	N/A

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	80

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LONGITUDINAL - ACROSS STEEL
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	80' 0" (24.38 m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	Fig.828 Across 1/2" - 7/8" Thick Flange Beam
Length of Fastener	N/A

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	80 ft (24.4 m)

G-Factor Used 0.59

Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	639 lbs (290 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	969 lbs (439 kg)
Fig. 4L Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	STEEL I-BEAM

Calculations prepared by Luke Thompson

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Date

Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

Orientation to Connecting Surface	NFPA Type B
Fastener Type	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (3,000 PSI Sand Lighweight Cracked Concrete)
Diameter	1/2in.
Length	3 3/4in.
Maximum Load	491 lbs (223 kg)
Prying Factor	1.29

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 1001 Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
See Fastener Information		

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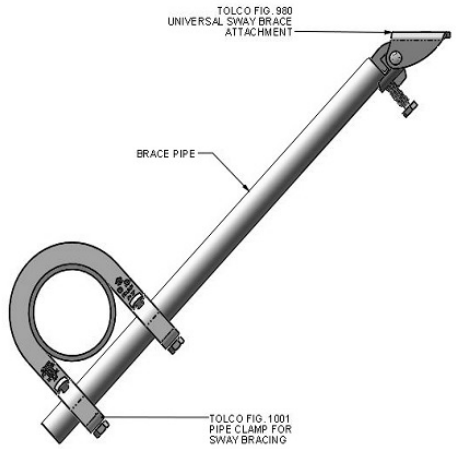
Seismic Brace Assembly Detail



Brace Identification on Plans LATERAL - BATTERY RM

Brace Type Lateral [X] Longitudinal [ ] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	17.5 ft (5.3 m)	17.5 ft (5.3 m)	11.78 lb/ft (17.53 kg/m)	206 lbs (93 kg)
2" (50 mm)	Sch. 10	83.5 ft (25.5 m)	83.5 ft (25.5 m)	4.22 lb/ft (6.28 kg/m)	352 lbs (160 kg)

Subtotal Weight	558 lbs (253 kg)
Wp (incl. 15%)	642 lbs (291 kg)
Total (Fpw)	379 lbs (172 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	1635 lb (741 kg)

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	17.5

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LATERAL - BATTERY RM
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	17' 6" (5.33 m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (3,000 PSI Sand Lighweight C
Length of Fastener	3 3/4in.

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	17.5 ft (5.3 m)
2" Sch.10 Steel Pipe (50.8 mm)	83.5 ft (25.5 m)

G-Factor Used 0.59

Allowance for Heads and Fittings	15%

Conclusions

Total Adjusted Load of Pipe in Zone of Influence	379 lbs (172 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	491 lbs (223 kg)
Fig. 1001 Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	CONCRETE COLUMN

Calculations prepared by Luke Thompson

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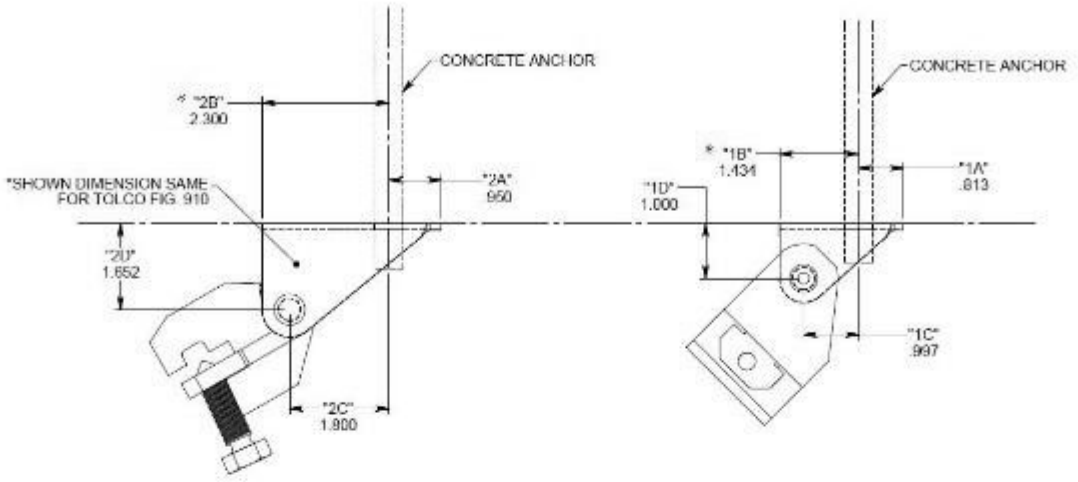
DETAIL PER NFPA 13, 2016 FIGURE A9.3.5.12.1(a - c)



TOLCO FIG. 980 **TOLCO FIG. 909**

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete slab decks								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	1.461	1.830	2.894	3.478	2.459	2.008
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	-	-	-	-	-	-

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1.125" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.003	1.230	-	-	-	-	-	-

*When intsalled in a concrete metal deck (Type W 4 1/2" x 3"), dimension 'B' would be dependent upon the contact area. For SD2 anchors the max offset is 1" so 'B' would be 1.25". For Bang-It and Wood-Knocker II + anchors, the max offset is 1.125" so 'B' would be 1.125".

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Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

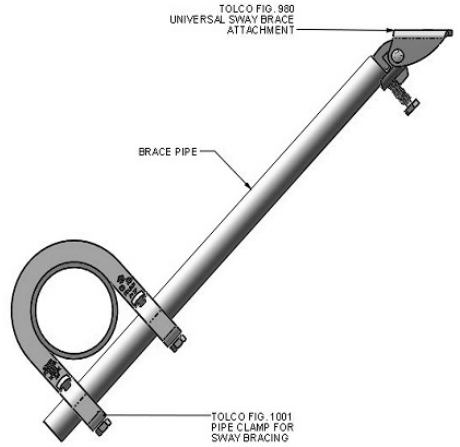
Orientation to Connecting Surface	NFPA Type B
Fastener Type	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (3,000 PSI Sand Lighweight Cracked Concrete)
Diameter	1/2in.
Length	3 3/4in.
Maximum Load	491 lbs (223 kg)
Prying Factor	1.29

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 1001 Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
See Fastener Information		

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for TOLCO™ components only. Use of any other components voids these calculations and the listing of the assembly.

Seismic Brace Assembly Detail



Brace Identification on Plans LATERAL - UPS RM

Brace Type Lateral [X] Longitudinal [ ] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	18 ft (5.5 m)	18 ft (5.5 m)	11.78 lb/ft (17.53 kg/m)	212 lbs (96 kg)
2" (50 mm)	Sch. 10	84.75 ft (25.8 m)	84.75 ft (25.8 m)	4.22 lb/ft (6.28 kg/m)	358 lbs (162 kg)
1" (25 mm)	Sch. 40	13 ft (4 m)	13 ft (4 m)	2.05 lb/ft (3.05 kg/m)	27 lbs (12 kg)

Subtotal Weight	597 lbs (271 kg)
Wp (incl. 15%)	687 lbs (311 kg)
Total (Fpw)	405 lbs (184 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	1635 lb (741 kg)

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	18

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LATERAL - UPS RM
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	18' 0" (5.49 m)
Orientation of Brace	Lateral
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (3,000 PSI Sand Lighweight C
Length of Fastener	3 3/4in.

Summary of Pipe within Zone of Influence

4" Sch.10 Steel Pipe (101.6 mm)	18 ft (5.5 m)
2" Sch.10 Steel Pipe (50.8 mm)	84.75 ft (25.8 m)
1" Sch.40 Steel Pipe (25.4 mm)	13 ft (4 m)

G-Factor Used 0.59

Allowance for Heads and Fittings	15%

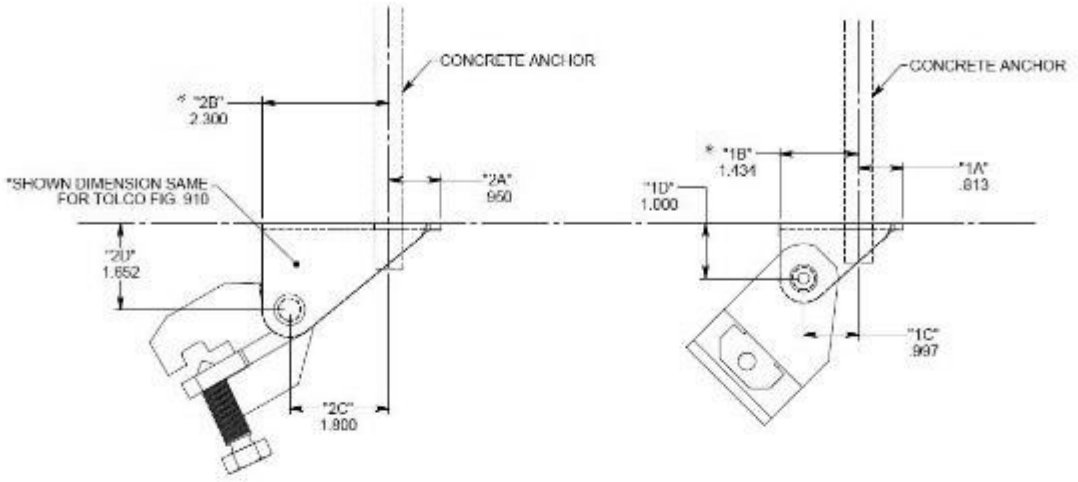
Conclusions

Total Adjusted Load of Pipe in Zone of Influence	405 lbs (184 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	491 lbs (223 kg)
Fig. 1001 Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	CONCRETE COLUMN

Calculations prepared by Luke Thompson

* The description of the Structural Member is for informational purposes only.
TOLBrace™ software calculates the brace assembly only, not the structure it is attached to.
Calculated with TOLBrace™ 8
Visit us at www.tolco.com

DETAIL PER NFPA 13, 2016 FIGURE A9.3.5.12.1(a - c)



TOLCO FIG. 980 **TOLCO FIG. 909**

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete slab decks								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	1.461	1.830	2.894	3.478	2.459	2.008
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	-	-	-	-	-	-

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1.125" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.003	1.230	-	-	-	-	-	-

*When intsalled in a concrete metal deck (Type W 4 1/2" x 3"), dimension 'B' would be dependent upon the contact area. For SD2 anchors the max offset is 1" so 'B' would be 1.25". For Bang-It and Wood-Knocker II + anchors, the max offset is 1.125" so 'B' would be 1.125".

TOLBrace™ Seismic Bracing Calculations

V8.8.137

Project Address: Centeris - UPS & Battery Rms
1023 39th Ave SE
Puyallup, WA
Job # 231213RL01

Contractor: Columbia Fire LL
Address: 111 S Findlay St.
Seattle, WA 98108
Phone: (206) 232-8569
License: COLUMFL795NJ

Calculations based on 2019 NFPA Pamphlet #13

Expires DEC 31,24
WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE SPRINKLER SYSTEMS
Matthew William Kunkle
4960-0322-C LEVEL 3
Columbia Fire, LLC
COLUMFL795NJ
Signature
04/08/2024
Date

Brace Information

Maximum Brace Length	7' 0" (2.134 m)
Diameter of Brace	1"
Type of Brace	Sch.40
Angle of Brace	45° Min.
Least Rad. of Gyration	0.42" (11 mm)
L/R Value	200
Max Horizontal Load	1310 lbs (594 kg)

Fastener Information

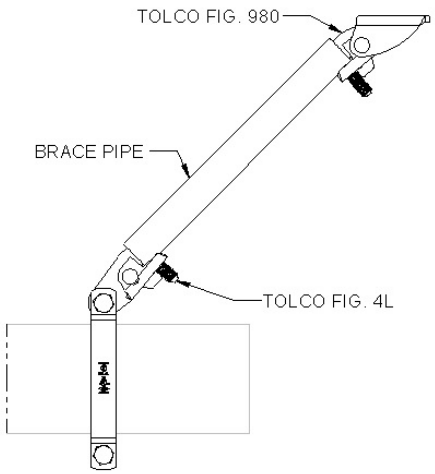
Orientation to Connecting Surface	NFPA Type B
Fastener Type	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (4,000 PSI Normal Weight Cracked Concrete)
Diameter	1/2in.
Length	3 3/4in.
Maximum Load	645 lbs (293 kg)
Prying Factor	1.29

TOLCO™ Brace Components

TOLCO™ Component	Listed Load	Adjusted Load
Fig. 4L Clamp	2000 lbs (907 kg)	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	2100 lbs (953 kg)	1485 lbs (674 kg)
See Fastener Information		

*Calculation Based on CONCENTRIC Loading
*Please Note: These calculations are for TOLCO™ components only. Use of any other components voids these calculations and the listing of the assembly.

Seismic Brace Assembly Detail



Brace Identification on Plans LONGITUDINAL - CONCRETE

Brace Type Lateral [ ] Longitudinal [X] 4-Way [ ]

Sprinkler System Load Calculation (Fpw = CpWp)

Cp = 0.59

Diameter	Type	Length	Total Length	Weight Per Unit Length	Total Weight
4" (100 mm)	Sch. 10	80 ft (24.4 m)	80 ft (24.4 m)	11.78 lb/ft (17.53 kg/m)	942 lbs (427 kg)

Subtotal Weight	942 lbs (427 kg)
Wp (incl. 15%)	1083 lbs (491 kg)
Total (Fpw)	639 lbs (290 kg)
Maximum Fpw per 18.5.5.2 (if applicable)	N/A

Main Size	Type/Sch.	Spacing (ft)
4"	Sch. 10	80

TOLBrace™ Seismic Calculations

Centeris - UPS & Battery Rms Job # 231213RL01

1023 39th Ave SE

Brace Identification	LONGITUDINAL - CONCRETE
Brace Type (Per NFPA#13)	NFPA Type B
Braced Pipe (ft)	4" Sch.10 Steel Pipe
Spacing of Brace	80' 0" (24.38 m)
Orientation of Brace	Longitudinal
Bracing Material	1" Sch.40
Maximum Brace Length	7' 0" (2.13 m)
Slenderness Ratio used for Load Calculation	200
True Angle of Brace for Calculation	45°
Type of Fastener	DeWalt Power-Stud+ SD2 1/2in. x 3 3/4in. (4,000 PSI Normal Weight Cr
Length of Fastener	3 3/4in.

Summary of Pipe within Zone of Influence

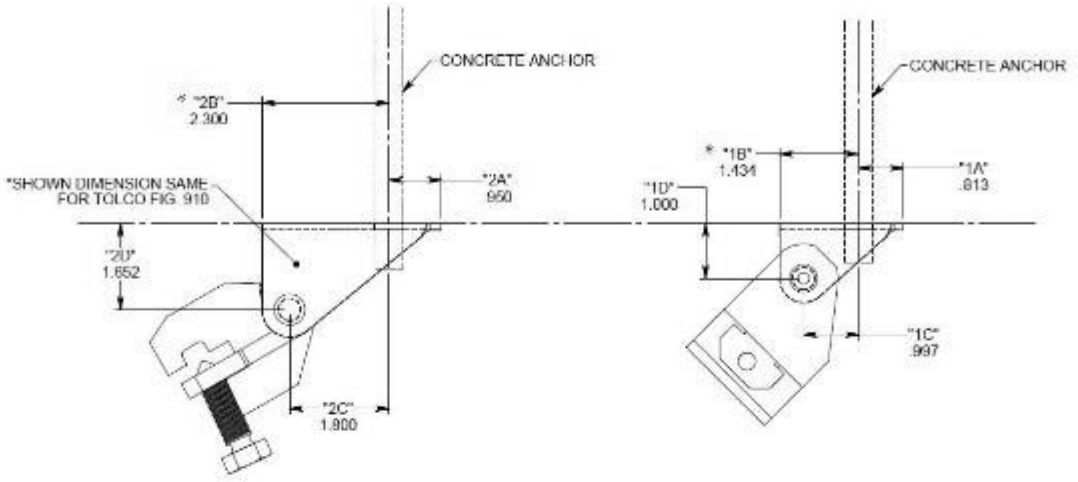
4" Sch.10 Steel Pipe (101.6 mm)	80 ft (24.4 m)

G-Factor Used 0.59	
Allowance for Heads and Fittings	15%
Conclusions	
Total Adjusted Load of Pipe in Zone of Influence	639 lbs (290 kg)
Material Capacity	1310 lbs (594 kg)
Fastener Capacity	645 lbs (293 kg)
Fig. 4L Clamp	1414 lbs (641 kg)
Fig.980 - 1/2" Universal Swivel	1485 lbs (674 kg)
Structural Member	CONCRETE COLUMN

Calculations prepared by Luke Thompson

* The description of the Structural Member is for informational purposes only.
TOLBrace™ software calculates the brace assembly only, not the structure it is attached to.
Calculated with TOLBrace™ 8
Visit us at www.tolco.com

DETAIL PER NFPA 13, 2016 FIGURE A9.3.5.12.1(a - c)



TOLCO FIG. 980 **TOLCO FIG. 909**

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete slab decks								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	1.461	1.830	2.894	3.478	2.459	2.008
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	1.513	1.487	2.226	2.460	1.740	1.420

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.002	1.230	-	-	-	-	-	-

Prying Factors per NFPA 13, 2016 Section 9.3.5.12 when installed in concrete metal decks with 1.125" center offset								
Fig. 980/910								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
3.275	1.156	1.738	-	-	-	-	-	-
Fig. 909								
A	B	C	D	E	F	G	H	I
P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r	P_r
2.626	1.003	1.230	-	-	-	-	-	-

*When intsalled in a concrete metal deck (Type W 4 1/2" x 3"), dimension 'B' would be dependent upon the contact area. For SD2 anchors the max offset is 1" so 'B' would be 1.25". For Bang-It and Wood-Knocker II + anchors, the max offset is 1.125" so 'B' would be 1.125".