



# ENGINEERED SEISMIC BRACING

## DRAWING INDEX

### ISAT

K-AB29-126-001	COVER SHEET	K-AB29-126-120
K-AB29-126-002	RESTRAINT LEGENDS & TDLF	K-AB29-126-125
K-AB29-126-003	SEISMIC DETAILS	K-AB29-126-130
K-AB29-126-004	SEISMIC DETAILS	K-AB29-126-135
K-AB29-126-005	SEISMIC DETAILS	K-AB29-126-140
K-AB29-126-006	SEISMIC DETAILS	
K-AB29-126-007	SEISMIC DETAILS	

**FIRE PROTECTION**

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REV. BY:	ISSUE COMMENTS	DATE
AA	ISSUE FOR CONSTRUCTION	03/27/09
MM	UPDATE LEGEND & DETAILS	04/01/09

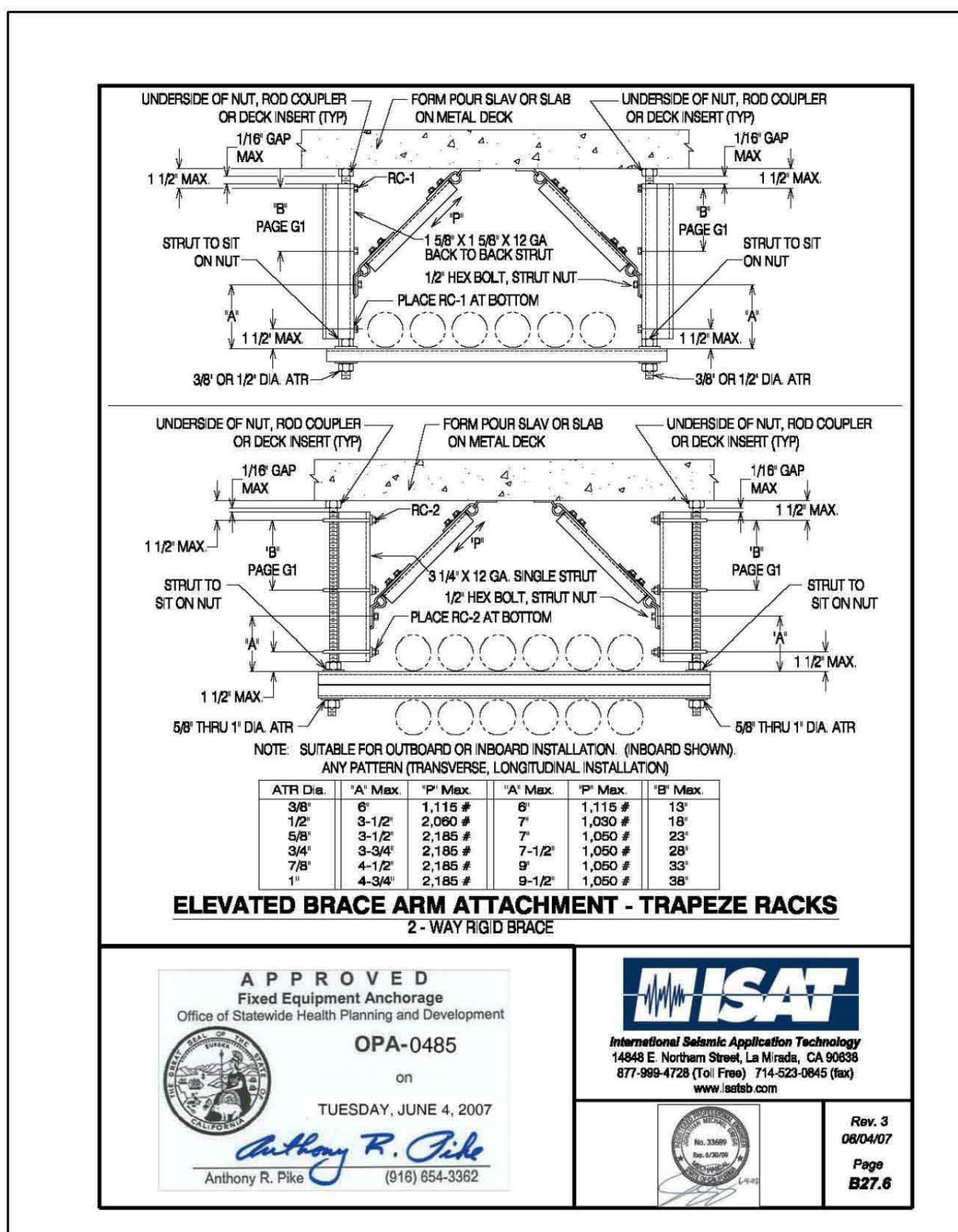
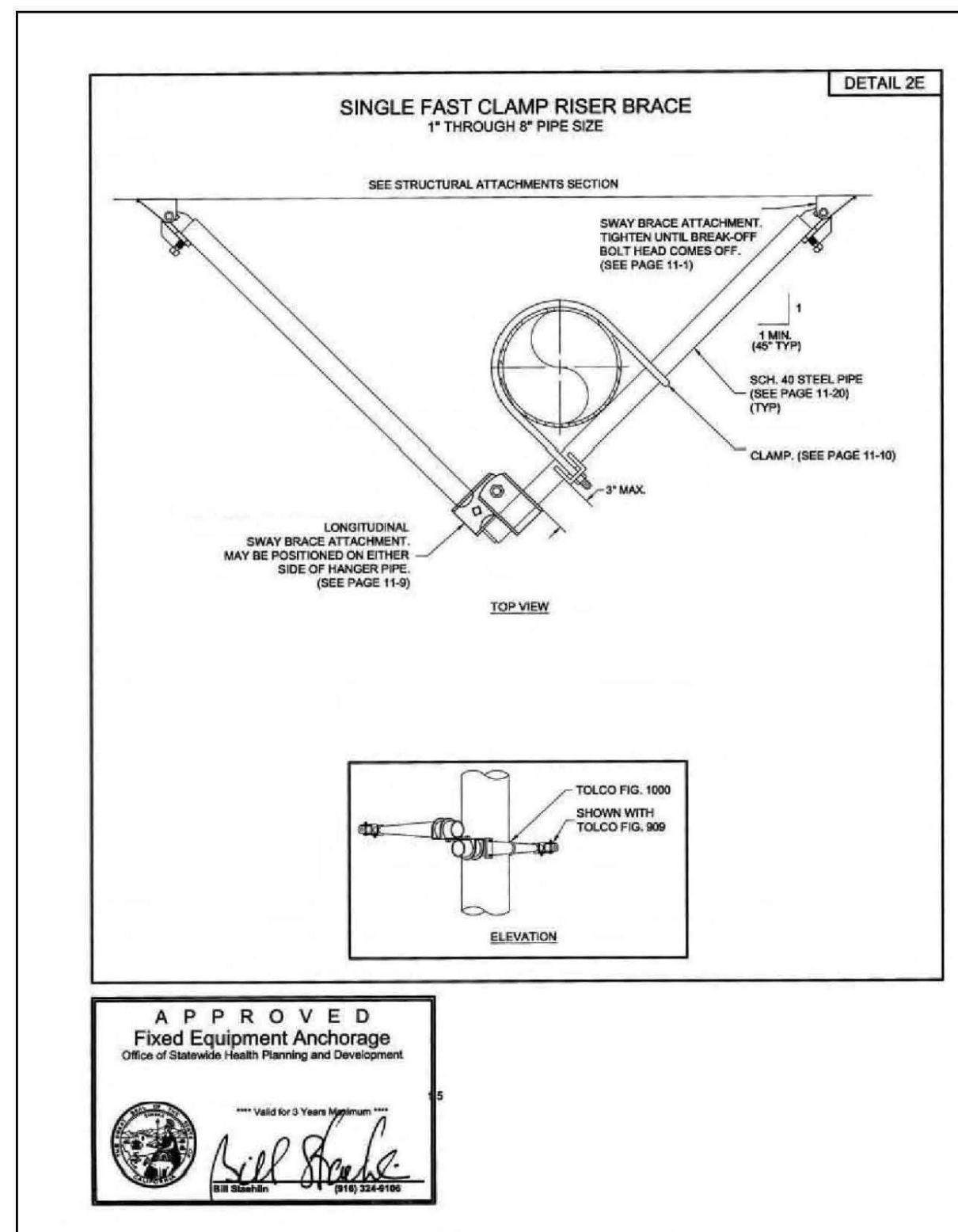
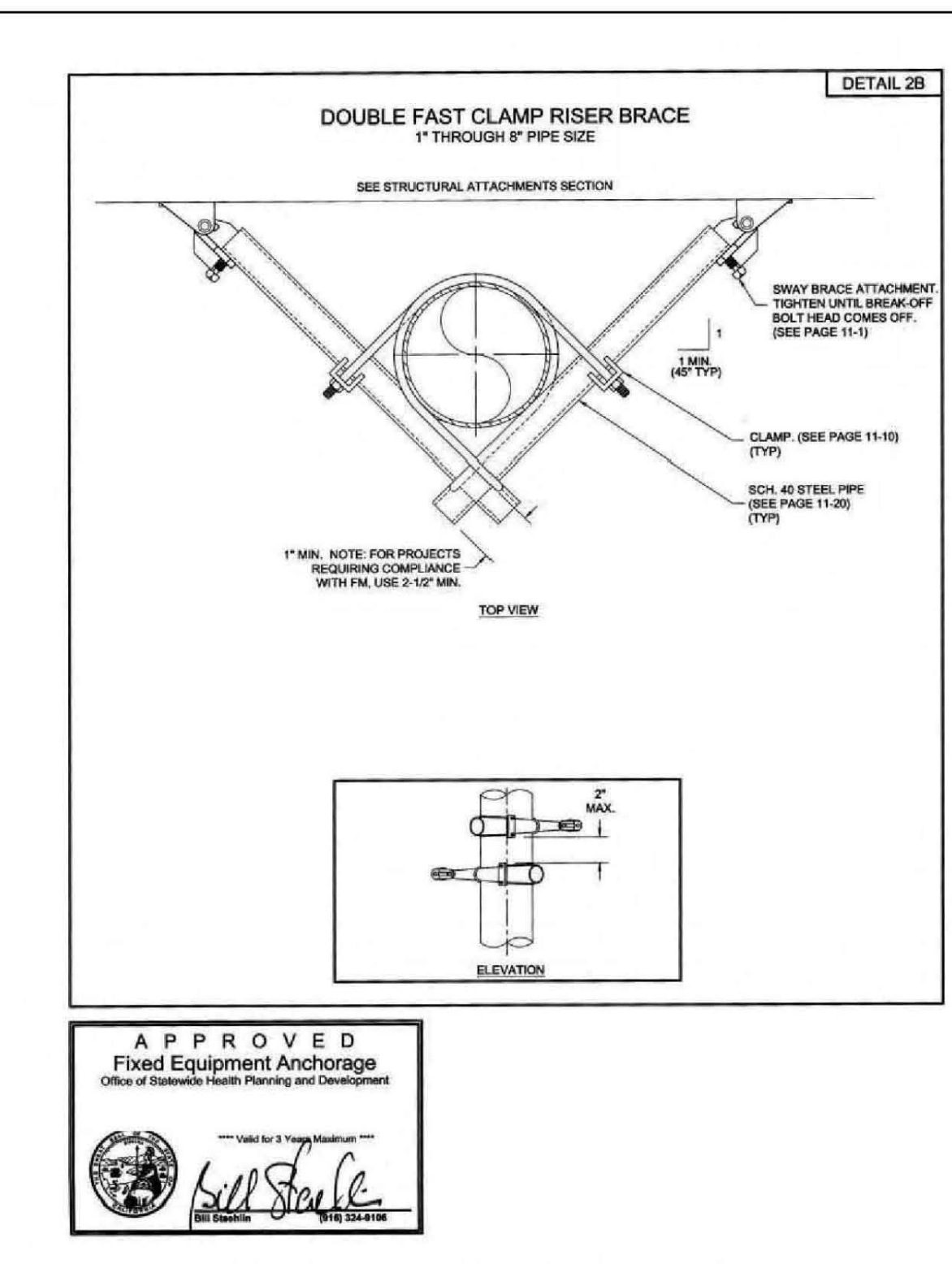
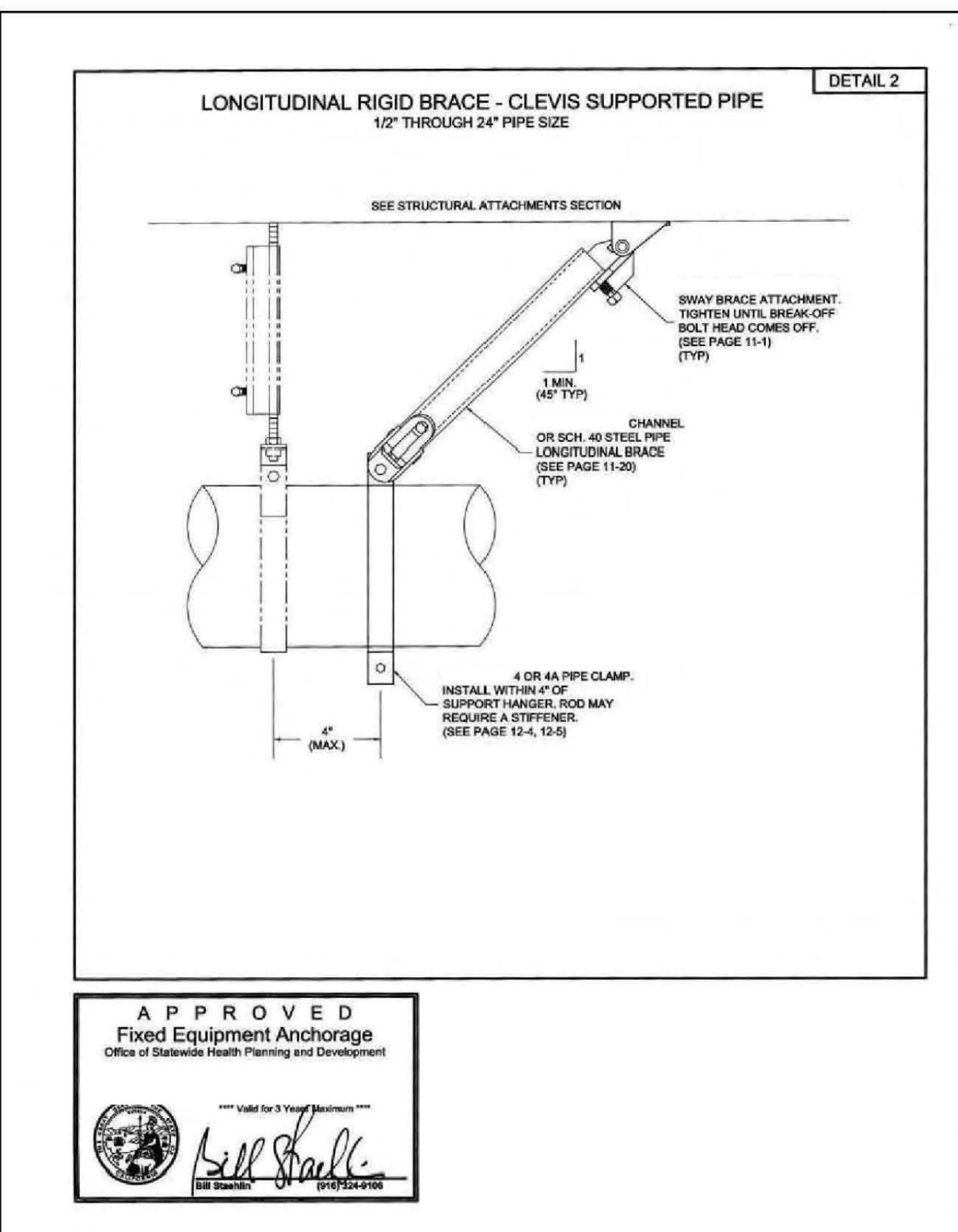
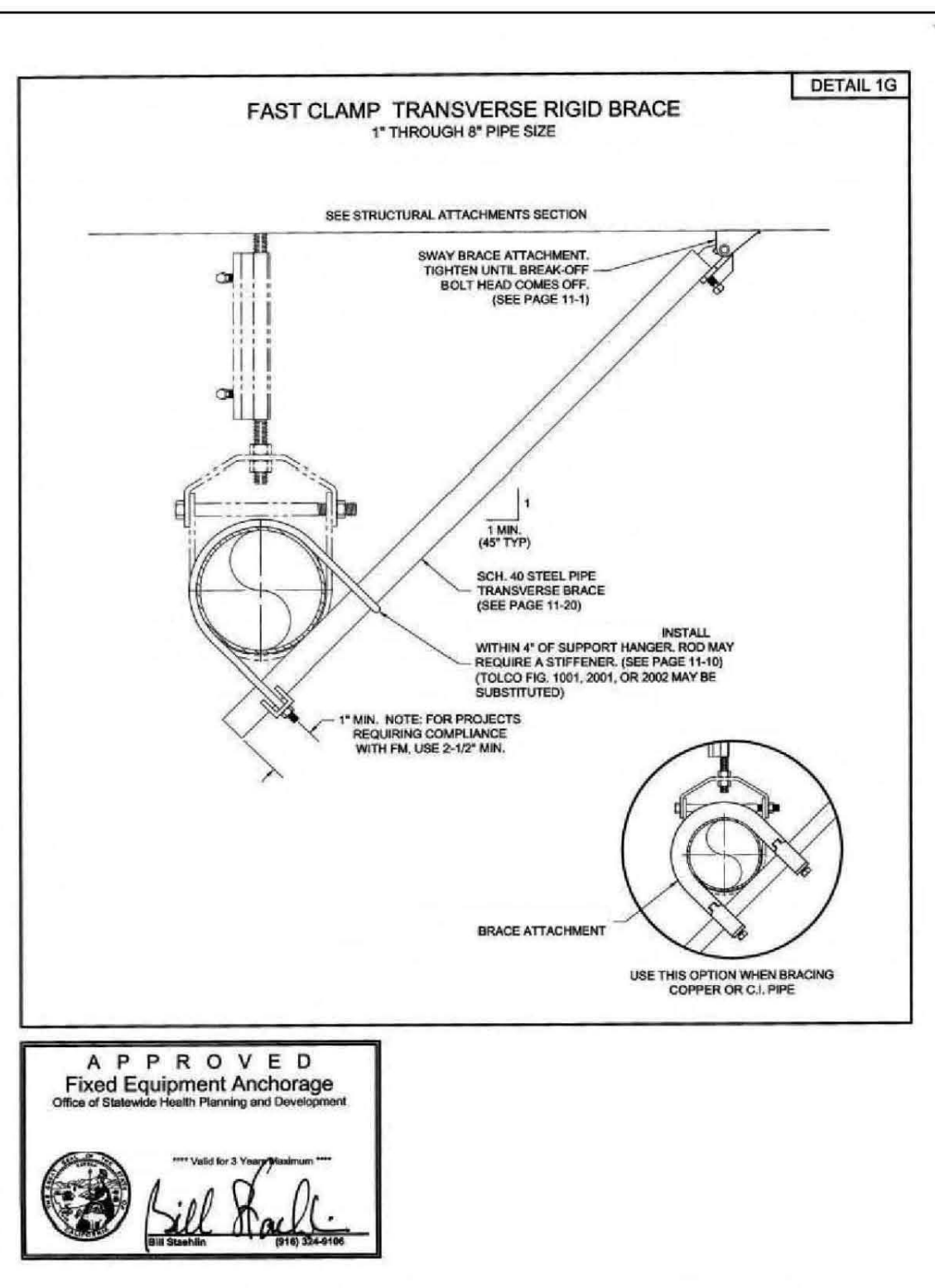
SHEET TITLE:

**COVER SHEET**

DRAWING NO.:

**K-AB29-126-001**





**ISAT TECHNICAL BULLETIN**  
**APPROVAL FOR USE OF HLT HWK BOLT 3 and HWK BOLT TZ ANCHORS**  
 HLT Bolt 3 and Bolt TZ expansion anchors are approved for use in the Power-Stub and Tubo-Stub anchors required in Pages D1, D1.3 and D2 thru D2.4 respectively of OPA-0485.  
 The original ISAT D1 and D2 some installation details are to be utilized with the Bolt 3 or Bolt TZ substituted for an anchor of equal diameter installed to the same minimum embedment depth.  
 The following installation torque guidelines apply:  
 Bolt 3 Torque: 20 ft-lb (2.7 kNm)  
 Bolt TZ Torque: 25 ft-lb (3.4 kNm)  
 Bolt 3 Diameter: 3/8" (9.5mm)  
 Bolt TZ Diameter: 3/8" (9.5mm)  
 Bolt 3 Length: 12" (305mm)  
 Bolt TZ Length: 12" (305mm)  
 Bolt 3 Design Value: 1,000 lbs (445 kN)  
 Bolt TZ Design Value: 1,000 lbs (445 kN)  
 Bolt 3 Allowable Design Value: 1,000 lbs (445 kN)  
 Bolt TZ Allowable Design Value: 1,000 lbs (445 kN)  
 In addition the following substitutions are allowed:  
 Bolt 3 Design Value: 1,000 lbs (445 kN)  
 Bolt TZ Design Value: 1,000 lbs (445 kN)  
 Bolt 3 Allowable Design Value: 1,000 lbs (445 kN)  
 Bolt TZ Allowable Design Value: 1,000 lbs (445 kN)  
 When installed per ISAT D1 thru D2.4 anchor details for metal deck, the Bolt 3 and Bolt TZ anchors may be installed offset from the hole center-line up to a maximum of 1/4" as illustrated below.

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 Fixed Equipment Anchorage  
 Office of Statewide Health Planning and Development  
 OPA-0485  
 November 14, 2002  
 Thursday, March 15, 2007  
 Anthony R. Pilek (916) 654-3362

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 International Seismic Application Technology  
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 877-999-4728 (Tel/Fax) 714-994-6333 (Int'l)  
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Original: 03/07  
 Page: D1

**Engineered Brace Anchor Connections**  
**Normal Weight Concrete (3,000 psi Minimum)**  
**POWER-STUD by Powers Fasteners, Inc.**  
 ICBO Report No. 5225, Table 3  
 Without Special Inspection

Anchor	Anchor Diameter	Anchor Length	Minimum Embedment Depth (inches)	Minimum Edge Distance (inches)	Minimum Spacing (inches)	Minimum Depth (inches)	Anchor Connection Hardware
AN1	D1.1	1	3/8"	4/8"	3"	12"	4-1/2"
AN2	D1.2	2	3/8"	8/8"	3"	12"	4-1/2"
AN3	D1.3	4	3/8"	1-5/8"	3"	12"	4-1/2"
AN4	D1.1	1	1/2"	7/8"	4"	18"	6"
AN5	D1.2	2	1/2"	1-1/8"	4"	18"	6"
AN6	D1.3	4	1/2"	2-5/8"	4"	18"	6"
AN7	D1.1	1	5/8"	1-1/4"	6"	20"	7-1/2"
AN8	D1.2	2	5/8"	2-1/4"	6"	20"	7-1/2"
AN9	D1.3	4	5/8"	3-3/4"	6"	20"	7-1/2"

1. Maximum Load Based on Formula for Combined Tension and Shear per ICBO Report.  
 2. Size = 1/2" x 3-1/2" x 1-5/8" x 1-5/8" with Punched Holes.  
 3. FL1 and FL2 are for Bolt Anchor Plate, Page F1.  
 4. Anchor Test Values, Page D3.  
 5. AN2, AN5 and AN6 Utilize 1/2" Diameter Hex Bolt for Bracket Attachment to Anchorage Strut or Mounting Plate.  
 6. AN3, AN4 and AN9 Utilize 3/8" Diameter Hex Bolt for Bracket Attachment to Anchorage Strut or Mounting Plate.

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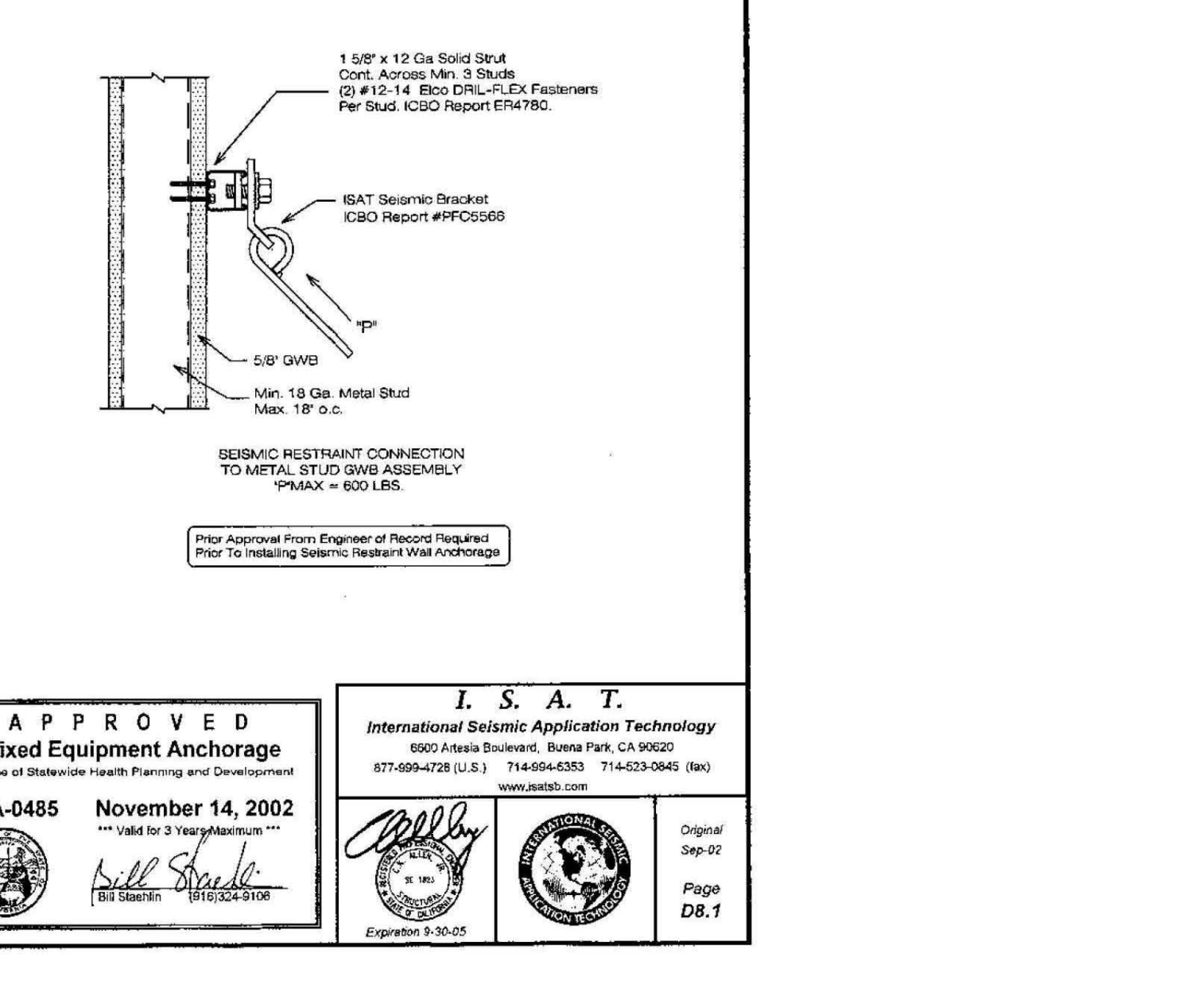
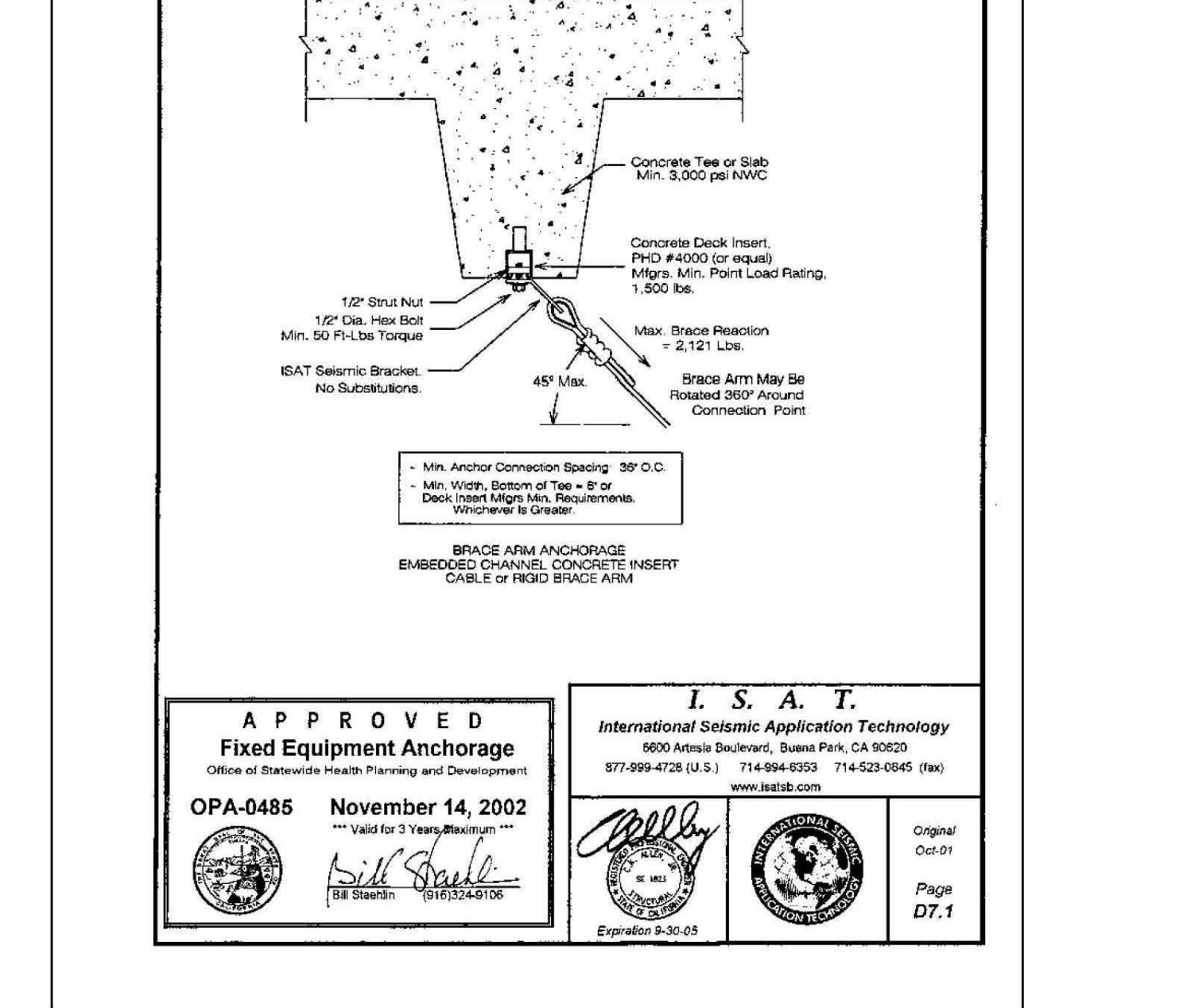
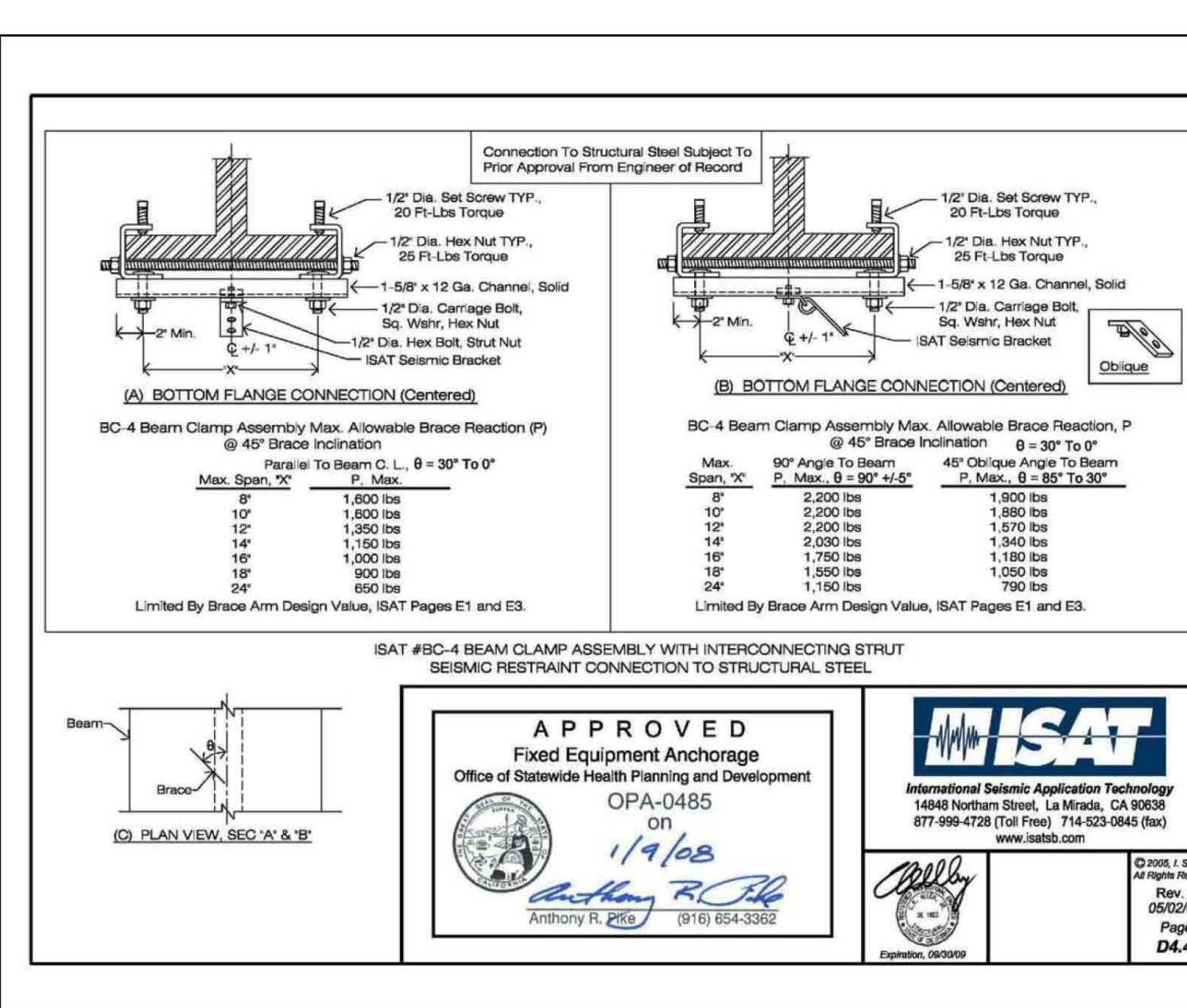
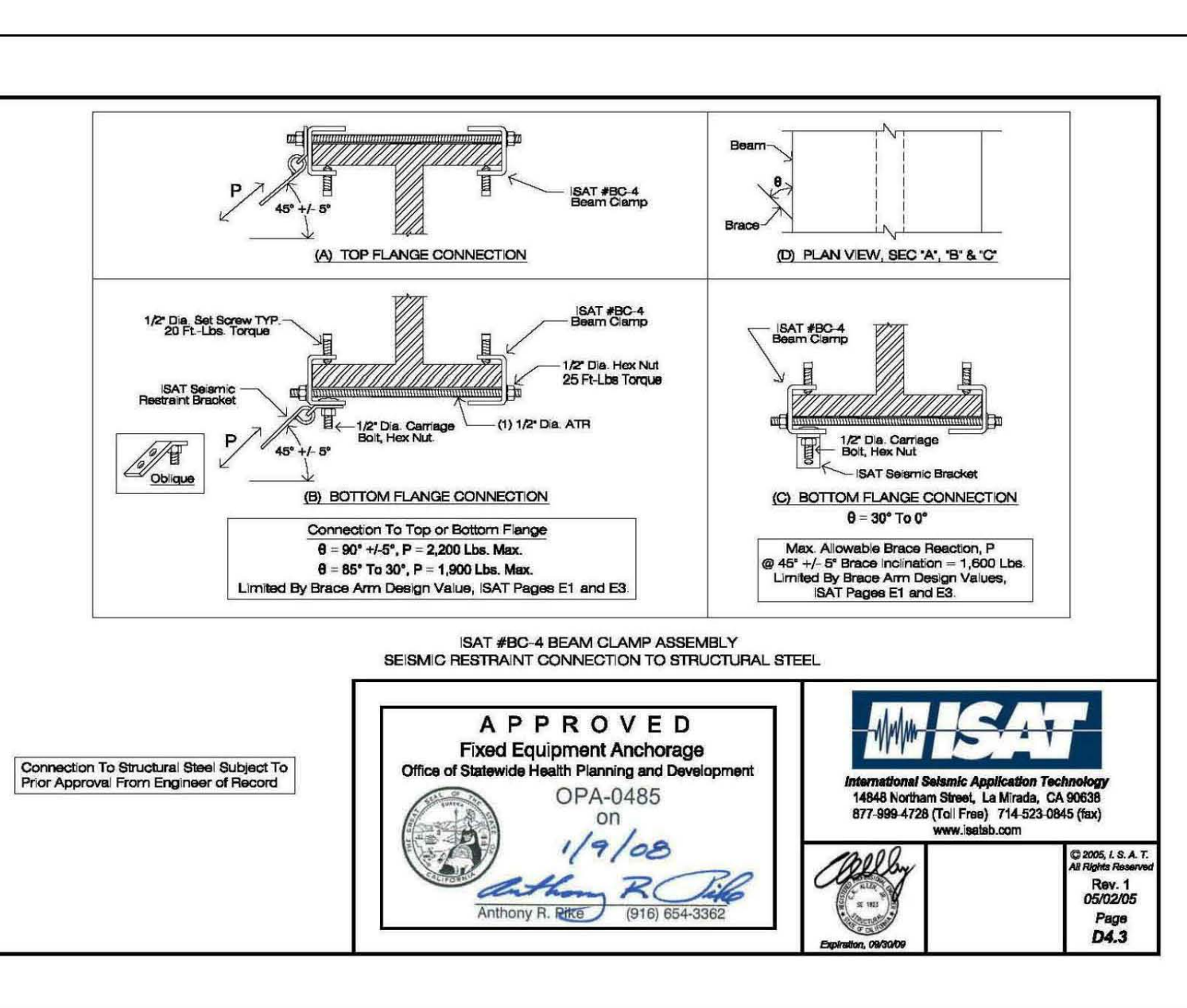
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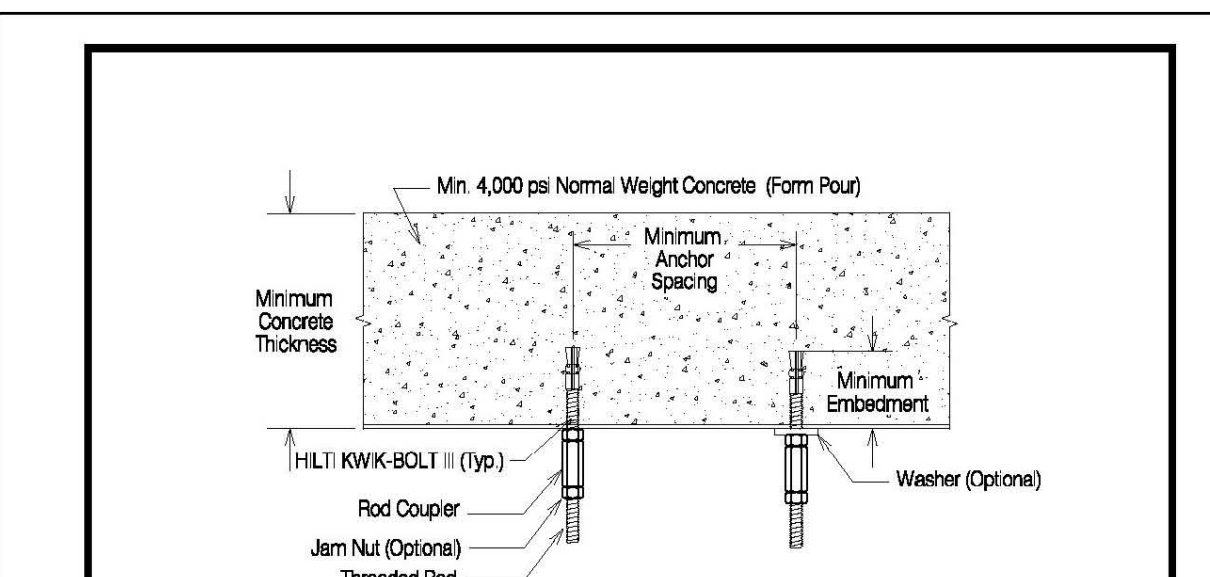
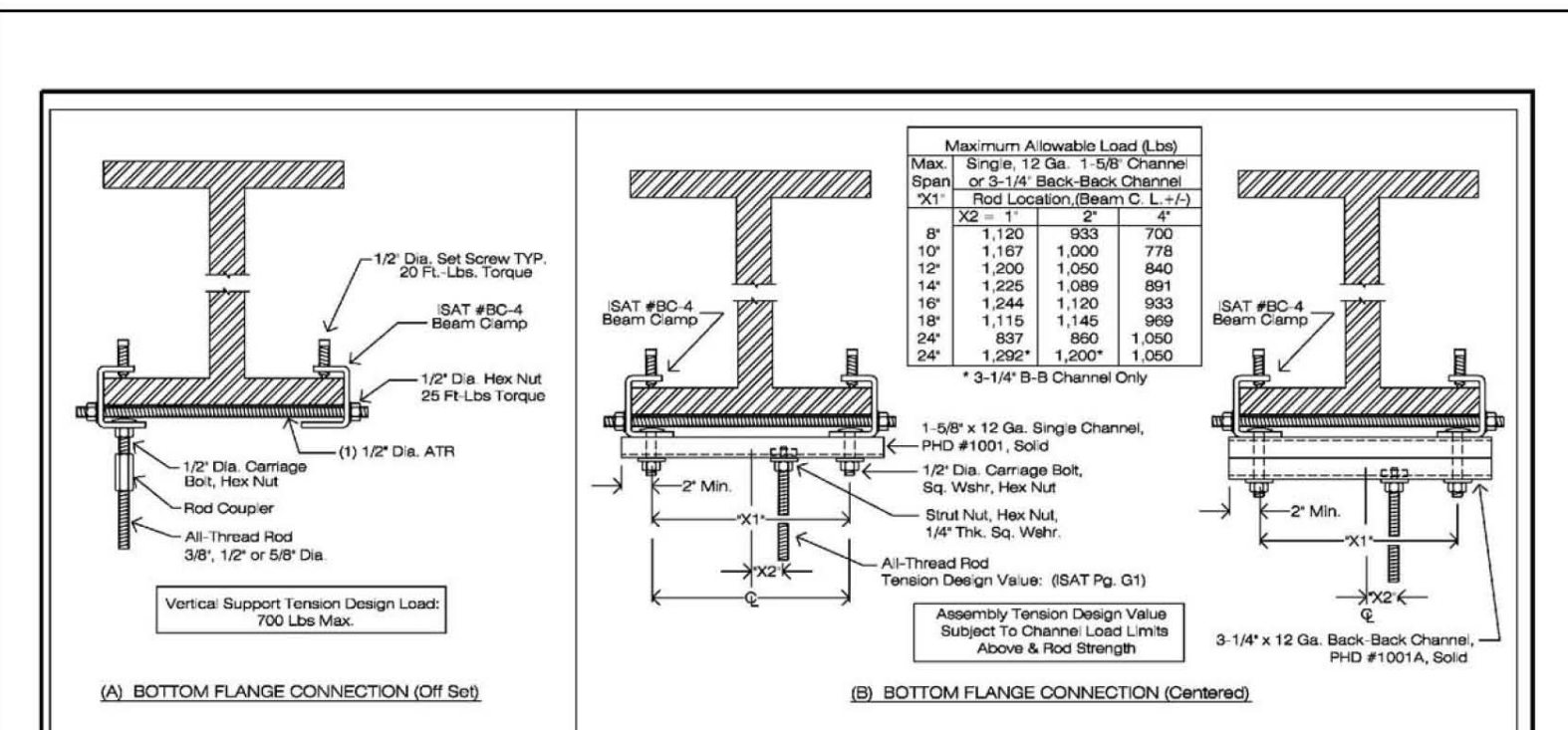
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**SHEET TITLE:**  
**SEISMIC DETAILS**

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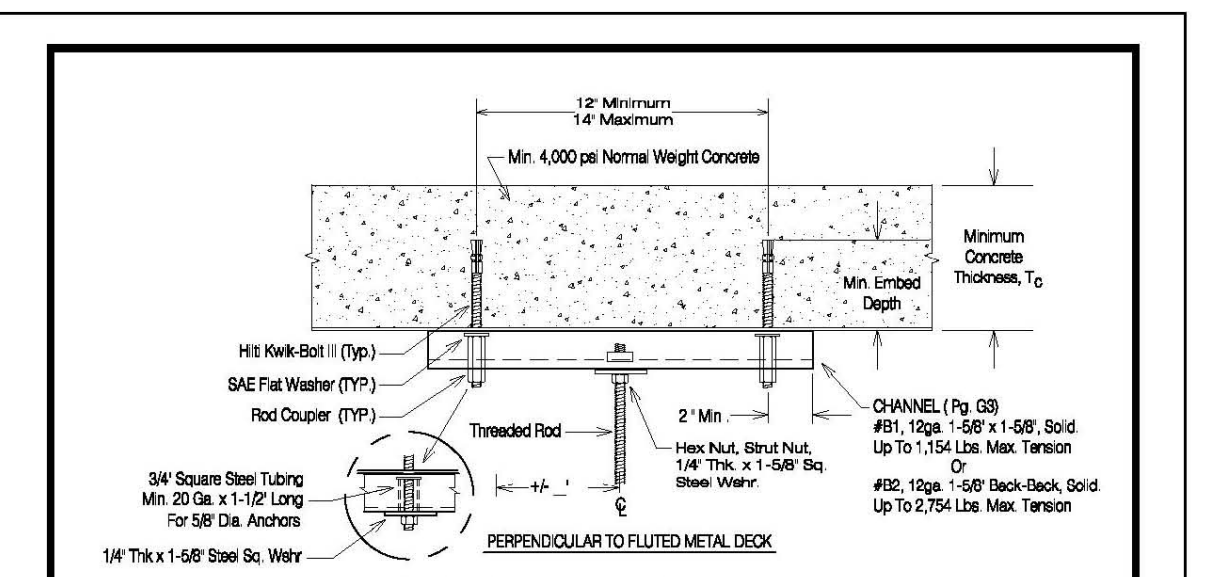


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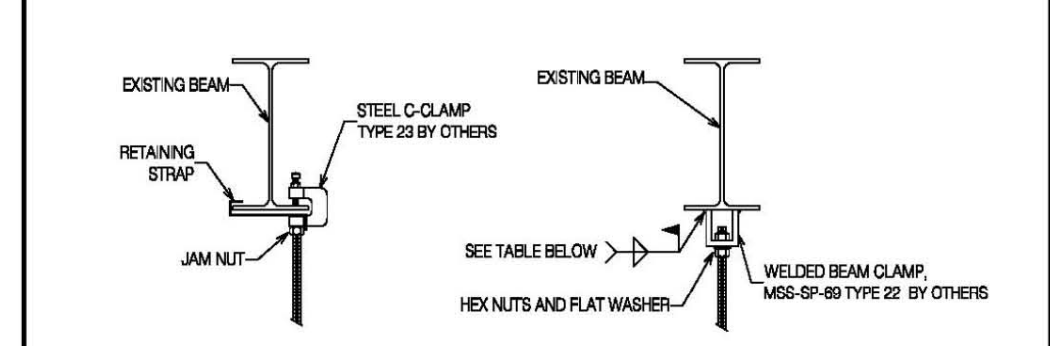
VERTICAL SUPPORT ANCHORAGE

Anchor Diameter	Minimum Truss Rod Diameter	Minimum Embedment	Minimum Spacing	Minimum Edge Distance	Minimum Concrete Thickness	Anchor Tension Total	Anchor Tension Total
1/2"	3/8"	12"	6"	8"	4"	20 kips	20 kips
3/4"	1/2"	12"	6"	8"	4"	40 kips	40 kips
1"	3/4"	12"	6"	8"	4"	60 kips	60 kips



DUAL ANCHOR VERTICAL SUPPORT CONNECTION

HLT RWK-BOLT II Separation Anchor	Min. Anchor Diameter	Min. Embedment	Min. Concrete Thickness	Min. Spacing	Min. Edge Distance	Min. Concrete Thickness	Anchor Tension Total
1/2"	3/8"	12"	4"	6"	8"	4"	20 kips
3/4"	1/2"	12"	4"	6"	8"	4"	40 kips
1"	3/4"	12"	4"	6"	8"	4"	60 kips



STEEL CLAMP AND WELDED BEAM CLAMP DESIGN TENSION VALUES

ROD DIA. (Inch)	DESIGN TENSION (kips)	ROD DIA. (Inch)	DESIGN TENSION (kips)
3/8"	400	3/8"	400
1/2"	800	1/2"	800
3/4"	1200	3/4"	1200
1"	1600	1"	1600
1 1/4"	2000	1 1/4"	2000
1 1/2"	2400	1 1/2"	2400
1 3/4"	2800	1 3/4"	2800
2"	3200	2"	3200

- PRODUCTS FROM MANUFACTURERS NOT LISTED ARE TO MEET THE MINIMUM TABLED DESIGN TENSION VALUES.
- WHEN USED AT SEISMIC VERTICAL SUPPORT LOCATIONS, C-CLAMPS REQUIRE PHD FIG. 259 RETURNING STRAPS (OR EQUAL).

BEAM CLAMP OR WELDED LUG ATTACHMENT TO WIDE FLANGED BEAM  
(NOTE: NOT FOR USE AS A SEISMIC BRACE ANCHORAGE)



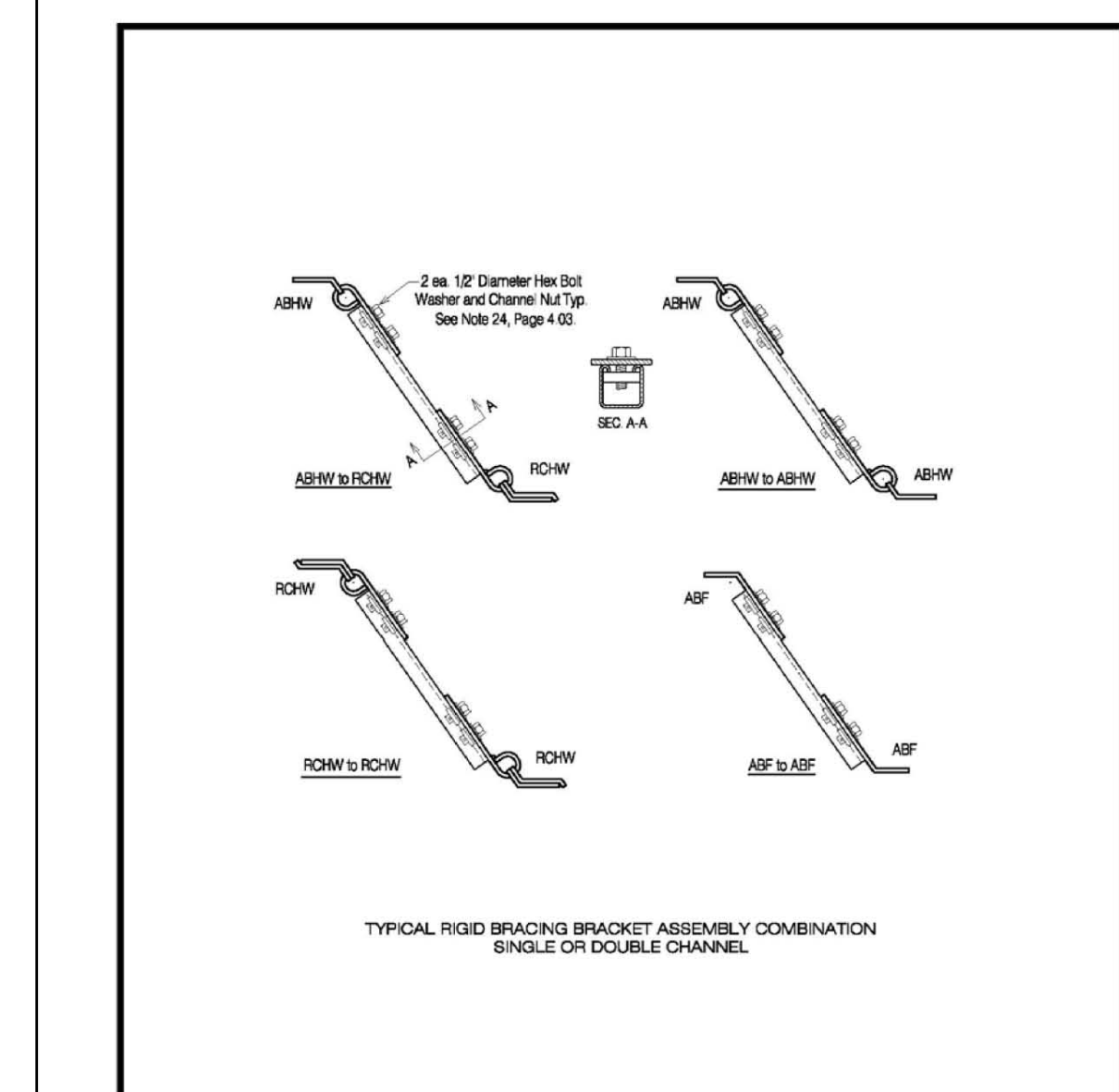
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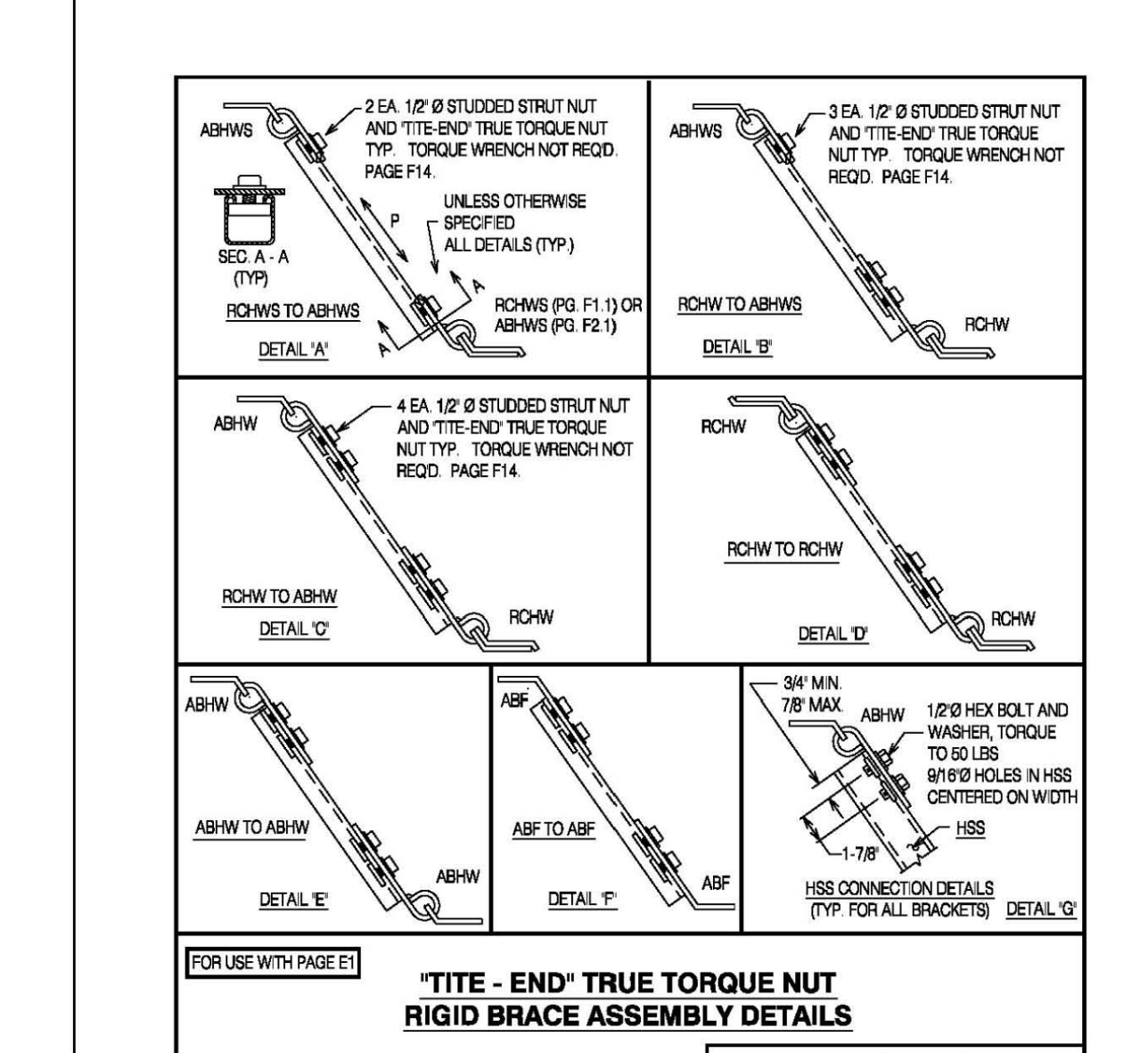
Directory - ISAT Rigid Brace Assemblies

ISAT Brace Assembly	Rod Diameter	Lower Bracket	Upper Bracket	Brace Arm	Maximum Brace Length	Maximum Reaction (kips)
R1	3/8"	RCHW08	ABW	Single Strut	9'	950
R1.1	3/8"	RCHW08	ABW	Single Strut	10'	1,115
R2	3/8"	RCHW08	ABW	Double Strut	10'	950
R2.1	3/8"	RCHW08	ABW	Double Strut	10'	1,115
R3	1/2"	RCHW12	ABW	Single Strut	9'	950
R3.1	1/2"	RCHW12	ABW	Single Strut	9'	1,850
R3.2	1/2"	RCHW12	ABW	Single Strut	10'	1,900
R4	1/2"	RCHW12	ABW	Double Strut	10'	950
R4.1	1/2"	RCHW12	ABW	Double Strut	10'	1,850
R4.2	1/2"	RCHW12	ABW	Double Strut	10'	2,000
R5	3/8"	ABF12	ABF12	Single Strut	9'	1,850
R5.1	3/8"	ABF12	ABF12	Single Strut	9'	1,850
R7	3/8"	RCHW08	ABW	Single Strut	9'	1,950
R8	3/8"	RCHW08	ABW	Double Strut	9'	1,950
R9	3/8"	RCHW08	ABW	Single Strut	9'	1,988
R10	3/8"	RCHW08	ABW	Double Strut	9'	2,145
R11	3/4"	RCHW12	ABW	Single Strut	9'	1,950
R12	3/4"	RCHW12	ABW	Double Strut	10'	1,950
R13	3/4"	RCHW12	ABW	Single Strut	9'	1,988
R14	3/4"	RCHW12	ABW	Double Strut	10'	2,185
R17	7/8"	RCHW16	ABW	Single Strut	9'	1,950
R18	7/8"	RCHW16	ABW	Double Strut	10'	1,950
R19	7/8"	RCHW16	ABW	Single Strut	9'	1,988
R20	7/8"	RCHW16	ABW	Double Strut	10'	2,185
R21	1"	ABF24	ABF24	Single Strut	9'	3,335
R22	1"	ABF24	ABF24	Double Strut	10'	3,335
R23	1"	RCHW16	ABW	Single Strut	9'	1,950
R24	1"	RCHW16	ABW	Double Strut	10'	1,950
R25	1"	RCHW16	ABW	Single Strut	9'	1,988
R26	1"	RCHW16	ABW	Double Strut	10'	2,185
R29	1"	ABW	ABW	Single Strut	9'	1,850
R30	1"	ABW	ABW	Double Strut	10'	1,850



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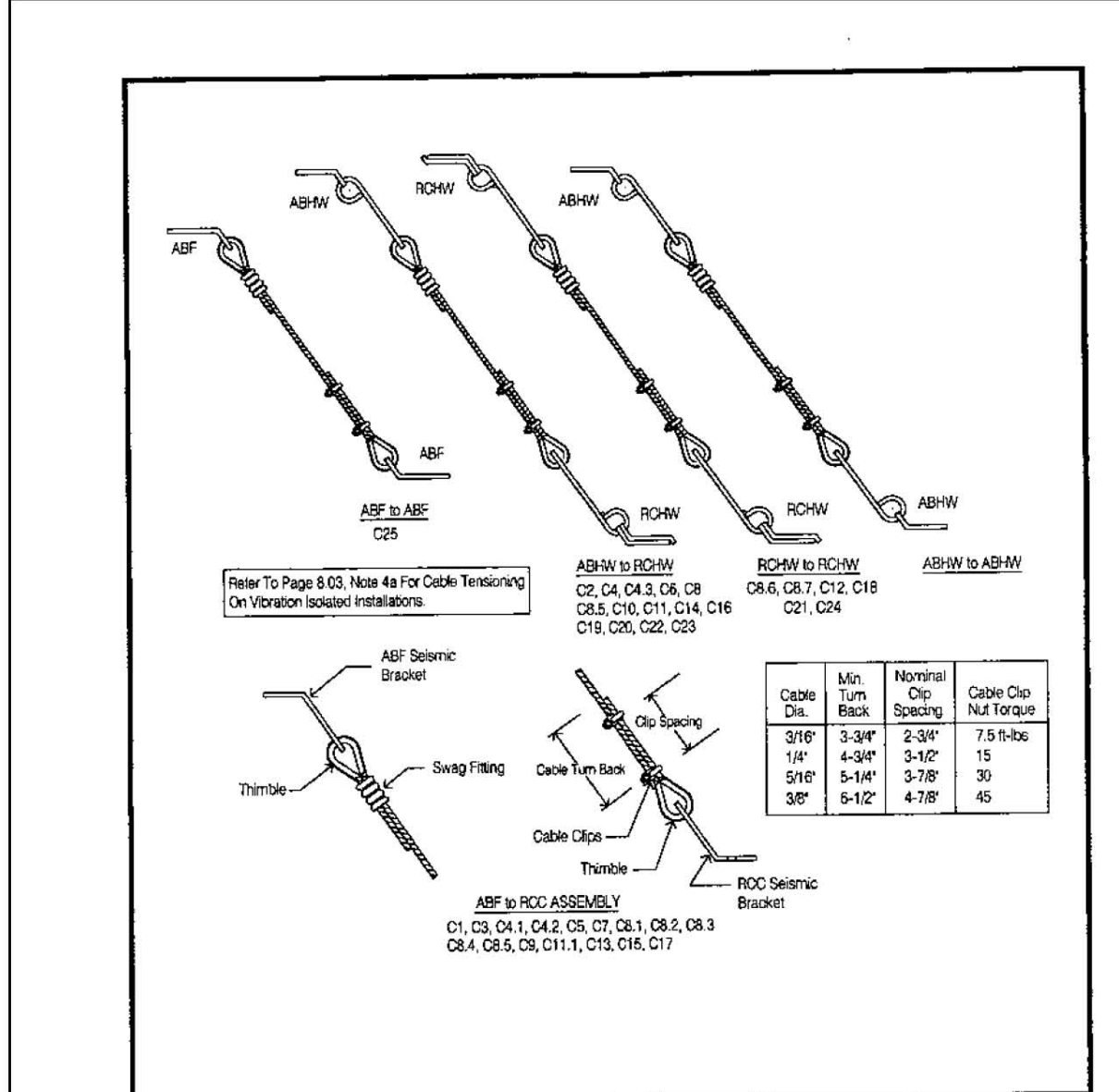
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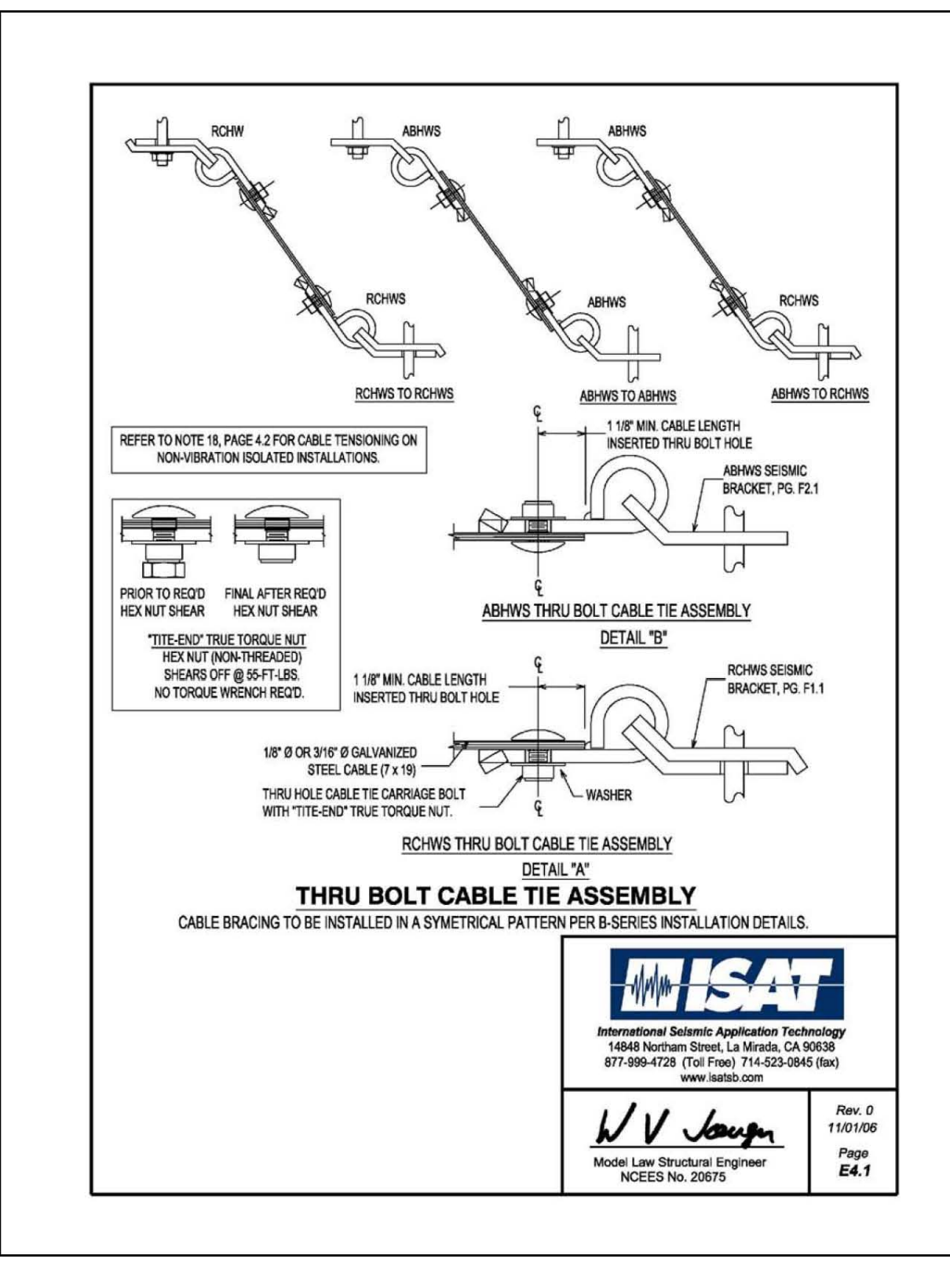
Directory - ISAT Cable Brace Assemblies

ISAT Cable Assembly	Rod Diameter	Lower Bracket	Upper Bracket	Cable Dia.	Design Value (kips)	Max. Rod To Rod
C1	3/8"	RCC08	ABF12	3/16" DIA.	840	840
C2	3/8"	RCHW08	ABW	3/16" DIA.	840	840
C3	3/8"	RCC08	ABF12	1/4" DIA.	950	950
C4	3/8"	RCHW08	ABW	1/4" DIA.	950	950
CA.1	3/8"	RCC08X	ABF12	3/16" DIA.	1,115	1,850
CA.2	3/8"	RCC08X	ABF12	1/4" DIA.	1,115	1,400
CA.3	3/8"	RCHW08X	ABW	1/4" DIA.	1,115	1,400
C5	1/2"	RCC12	ABF12	3/16" DIA.	840	840
C6	1/2"	RCHW12	ABW	3/16" DIA.	840	840
C7	1/2"	RCC12	ABF12	1/4" DIA.	950	950
C8	1/2"	RCHW12	ABW	1/4" DIA.	950	950
CB.1	1/2"	RCC12X	ABF12	3/16" DIA.	1,950	1,950
CB.2	1/2"	RCC12X	ABF12	1/4" DIA.	1,400	1,400
CB.3	1/2"	RCC12X	ABF12	1/4" DIA.	1,400	1,400
CB.4	1/2"	RCC12X	ABF12	3/16" DIA.	1,850	1,850
CB.5	1/2"	RCHW12X	ABW	1/4" DIA.	1,400	1,400
CB.6	1/2"	RCHW12X	ABW	3/16" DIA.	1,850	1,850
CB.7	1/2"	RCHW12X	ABW	3/8" DIA.	2,050	2,185
C9	5/8"	RCC16	ABF16	1/4" DIA.	1,400	1,400
C10	5/8"	RCHW16	ABW	1/4" DIA.	1,400	1,400
C11	5/8"	RCC16	ABF16	3/16" DIA.	1,950	1,950
C11.1	5/8"	RCC16	ABF16	3/16" DIA.	1,950	1,950
C12	5/8"	RCC16	ABF16	1/4" DIA.	1,400	1,400
C13	3/4"	RCC24	ABF24	1/4" DIA.	1,400	1,400
C14	3/4"	RCHW24	ABW	1/4" DIA.	1,400	1,400
C15	3/4"	RCC24	ABF24	3/16" DIA.	1,950	1,950
C16	3/4"	RCHW24	ABW	3/16" DIA.	1,950	1,950
C17	3/4"	RCC24	ABF24	1/4" DIA.	1,950	1,950
C18	3/4"	RCHW24	ABW	1/4" DIA.	2,185	2,185
C19	7/8"	RCC24	ABF24	1/4" DIA.	1,400	1,400
C20	7/8"	RCHW24	ABW	1/4" DIA.	1,850	1,850
C21	7/8"	RCC24	ABF24	3/16" DIA.	2,185	2,185
C22	1"	RCHW30	ABW	1/4" DIA.	1,400	1,400
C23	1"	RCHW30	ABW	3/16" DIA.	1,950	1,950
C24	1"	RCHW30	ABW	1/4" DIA.	2,185	2,185
C25	1"	ABF34	ABF34	3/8" DIA.	2,850	2,850

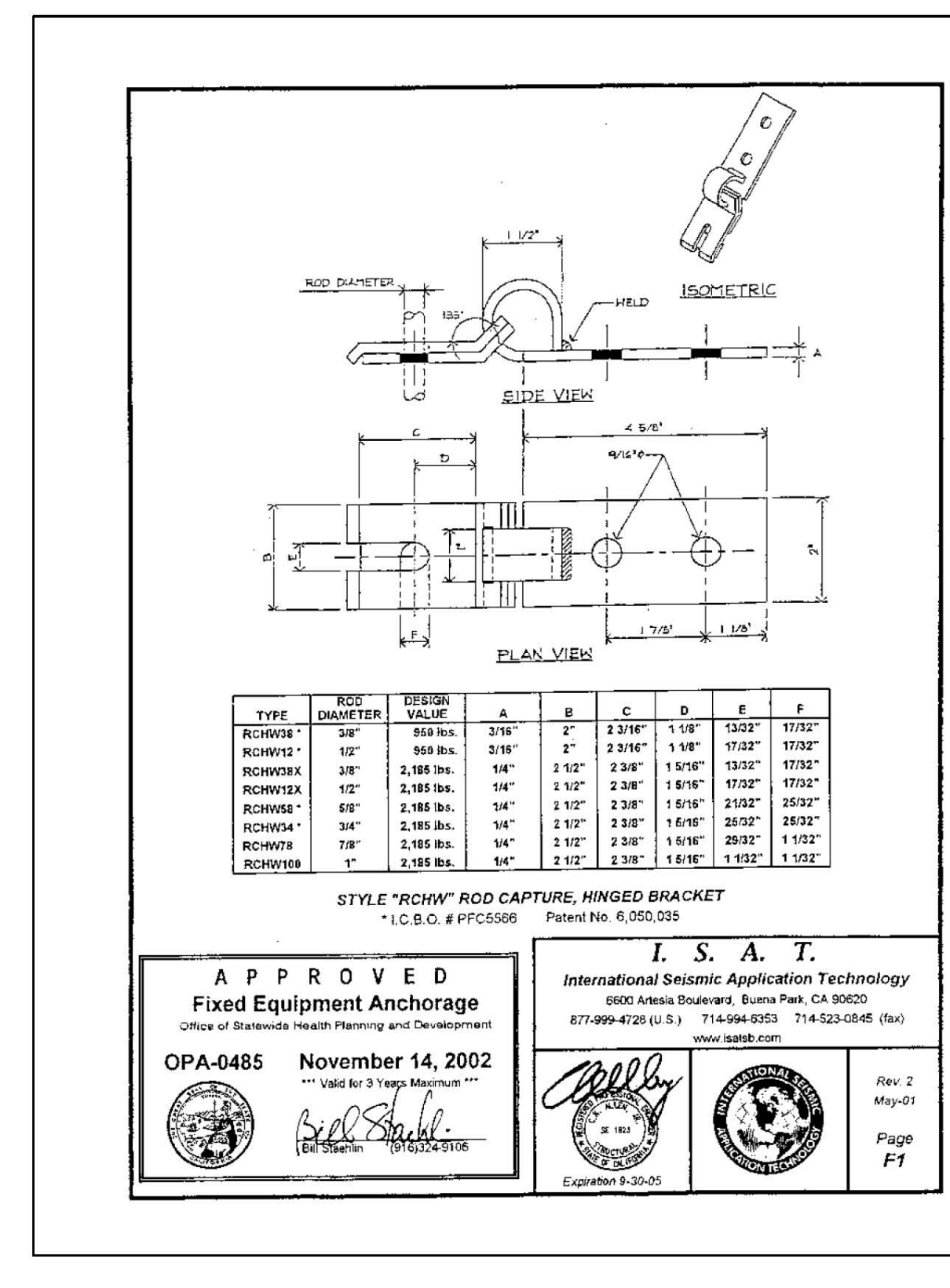


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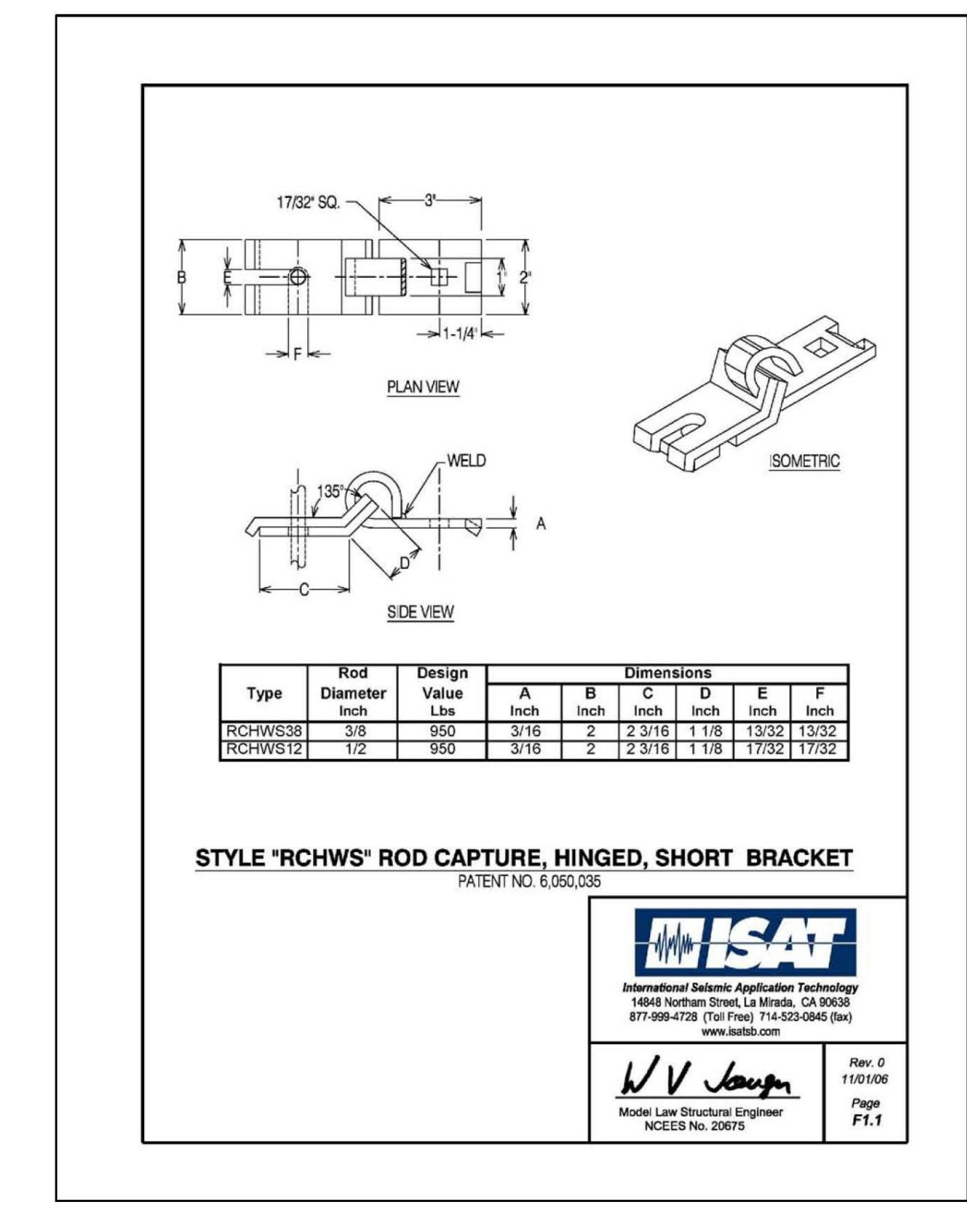
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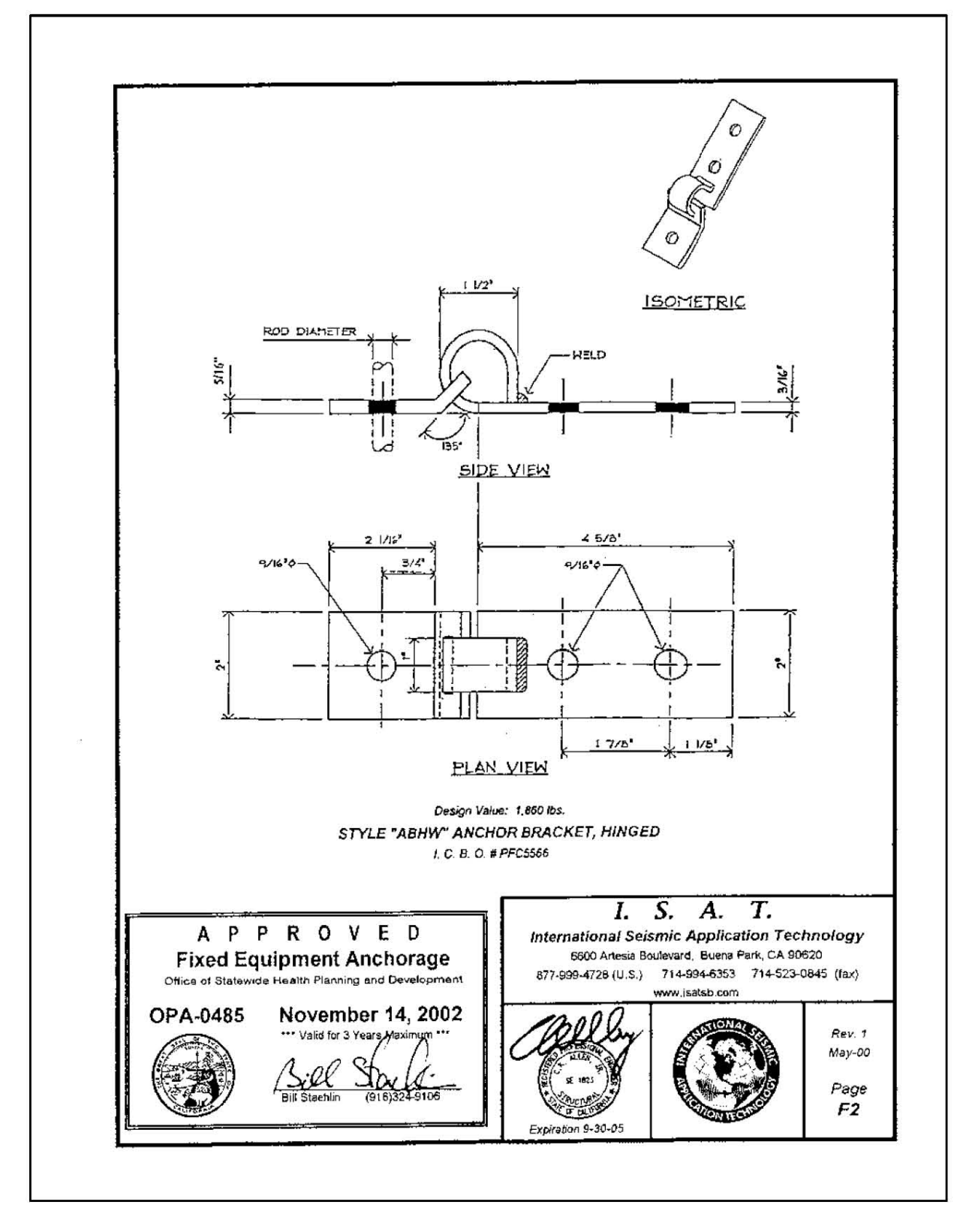
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Page F1



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OPA-0485 November 14, 2002  
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Page F2

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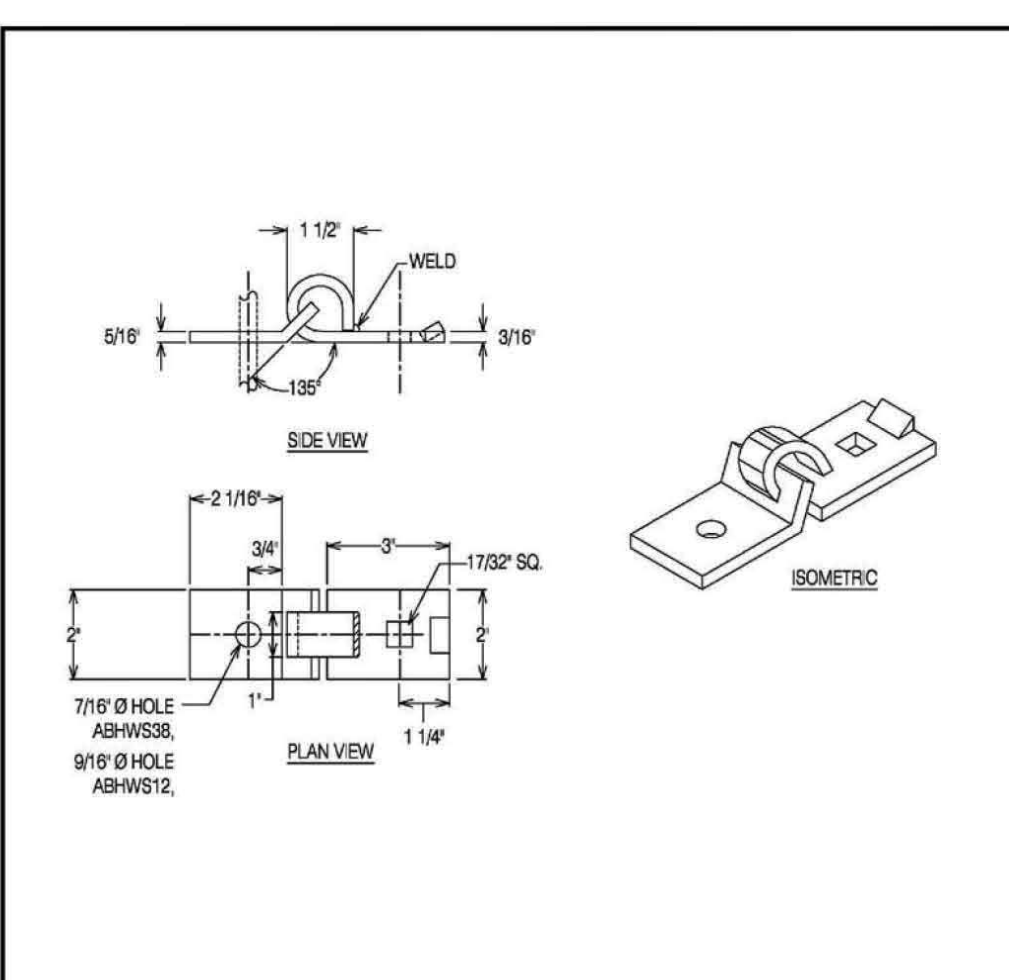
REV. BY	ISSUE COMMENTS	DATE
1	ISSUE FOR CONSTRUCTION	03/27/09
2	UPDATE LEGEND & DETAILS	04/01/09

SHEET TITLE:  
SEISMIC DETAILS

DRAWING NO.:  
K-AB29-126-004



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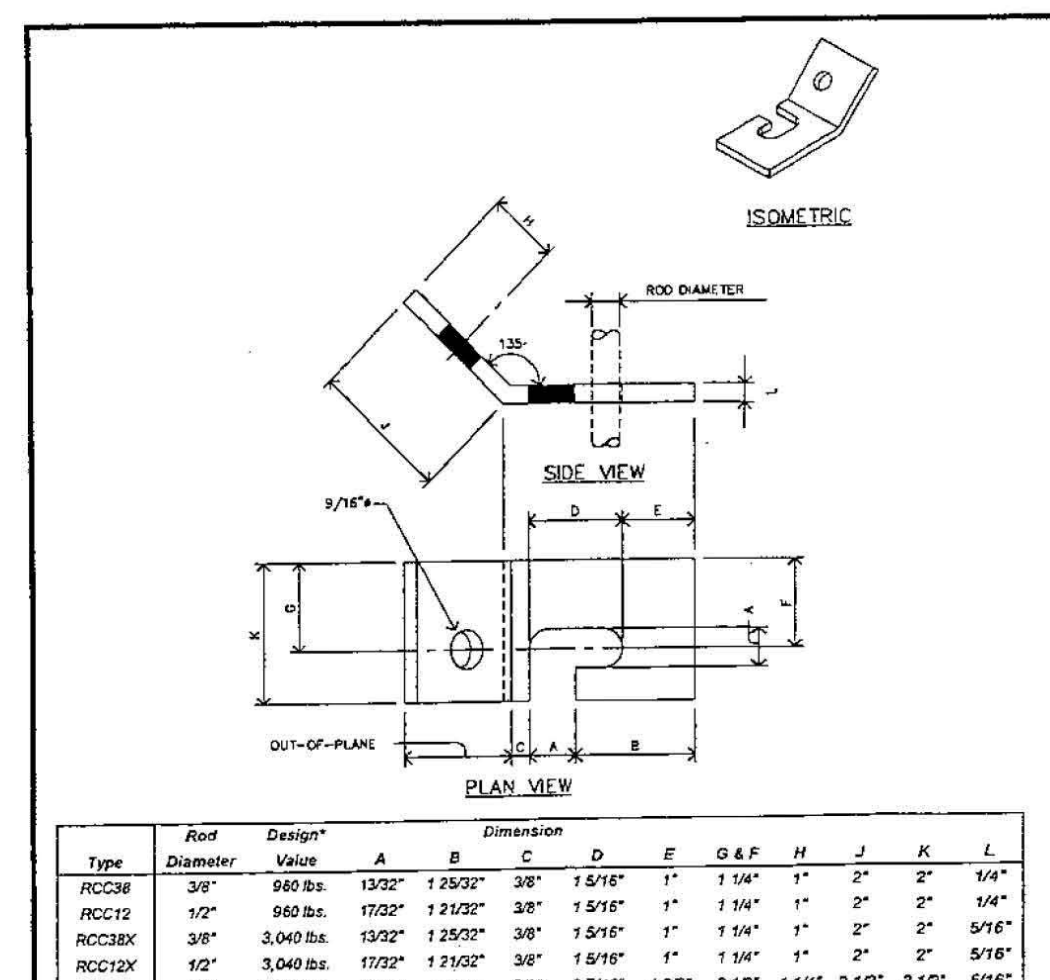


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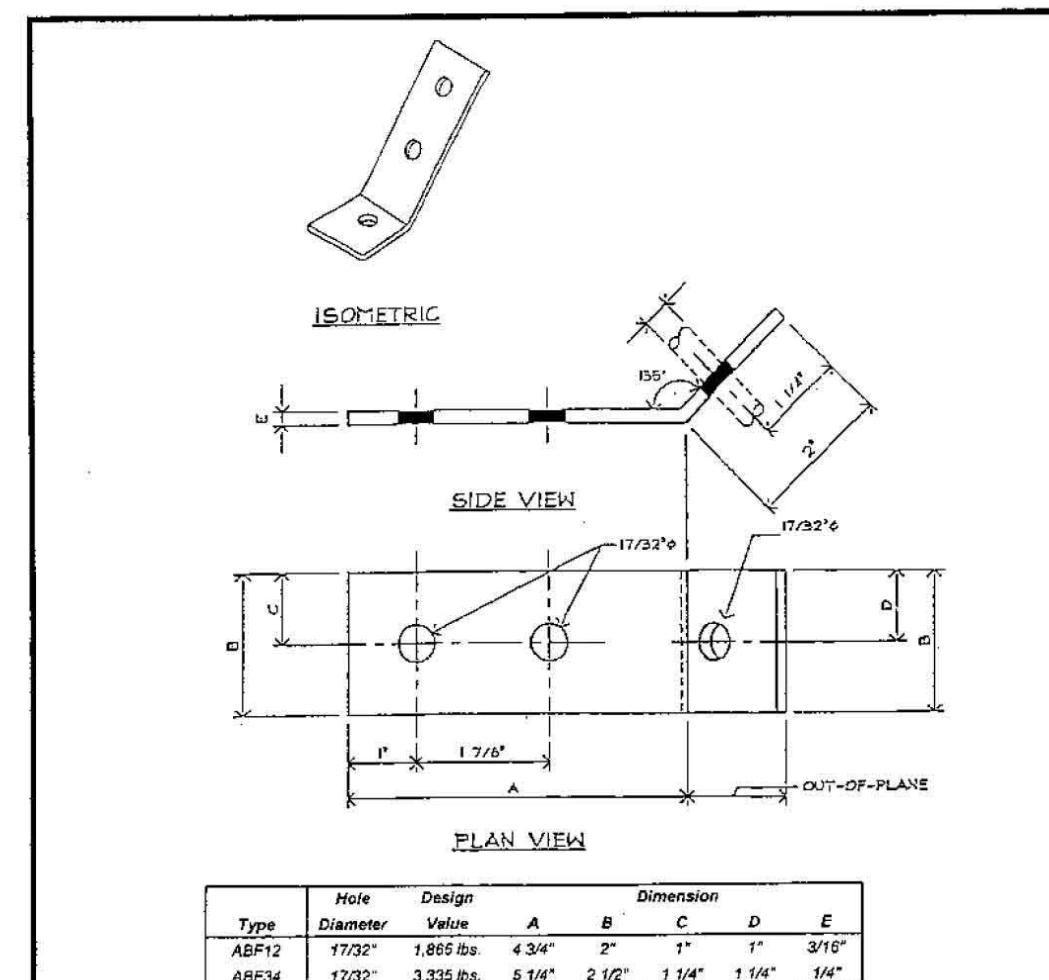
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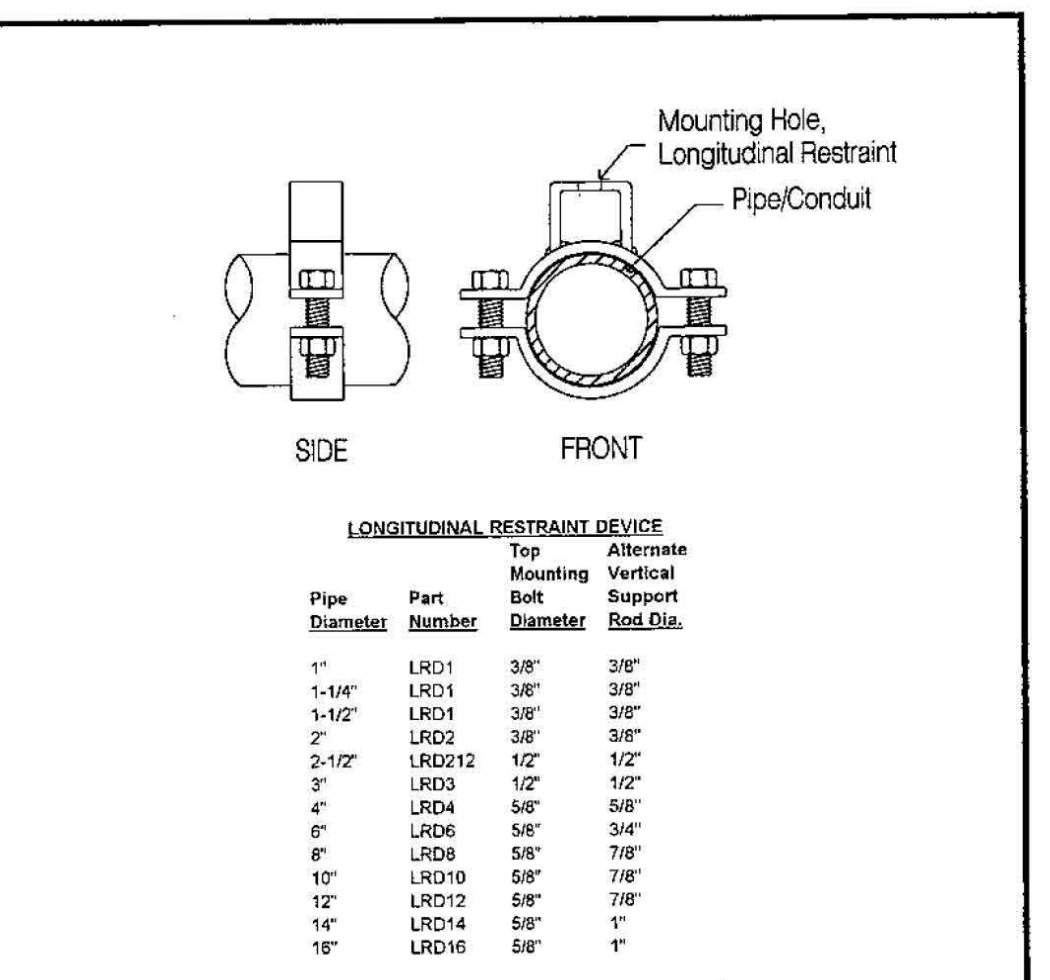
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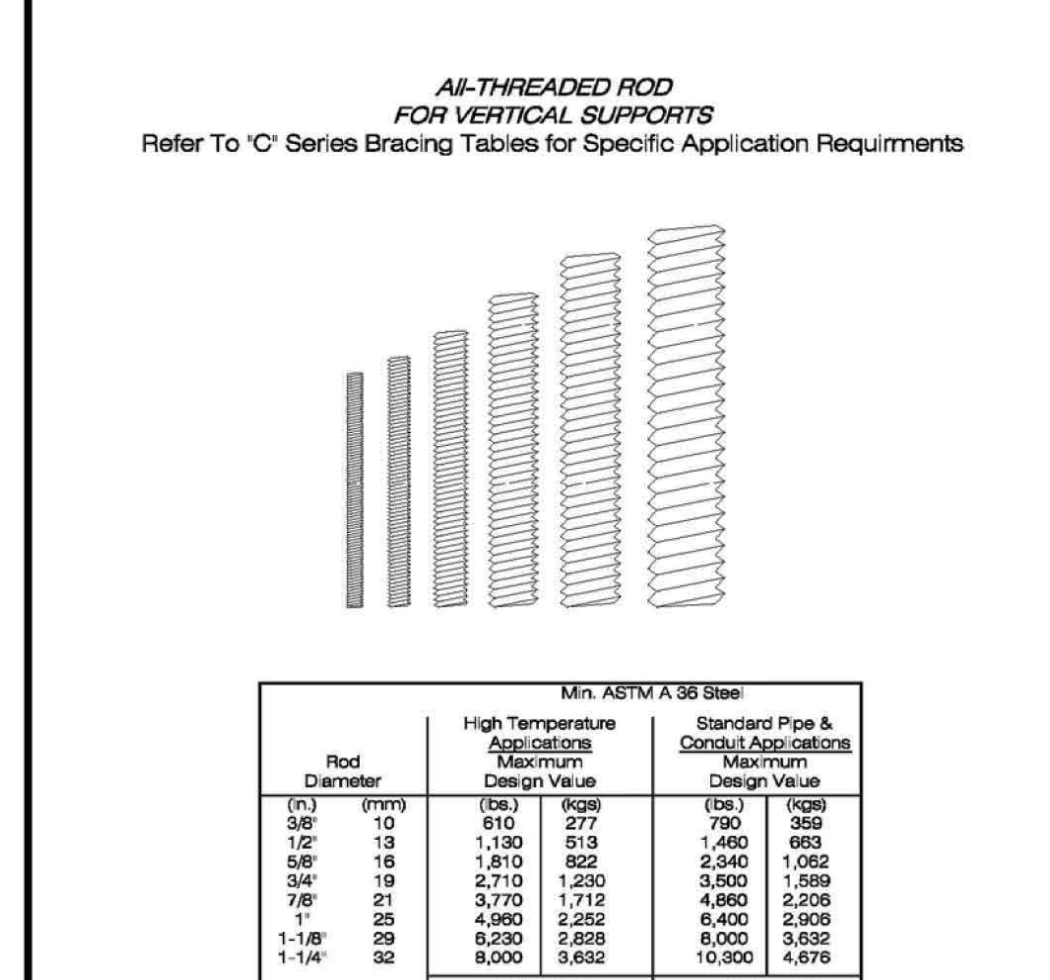
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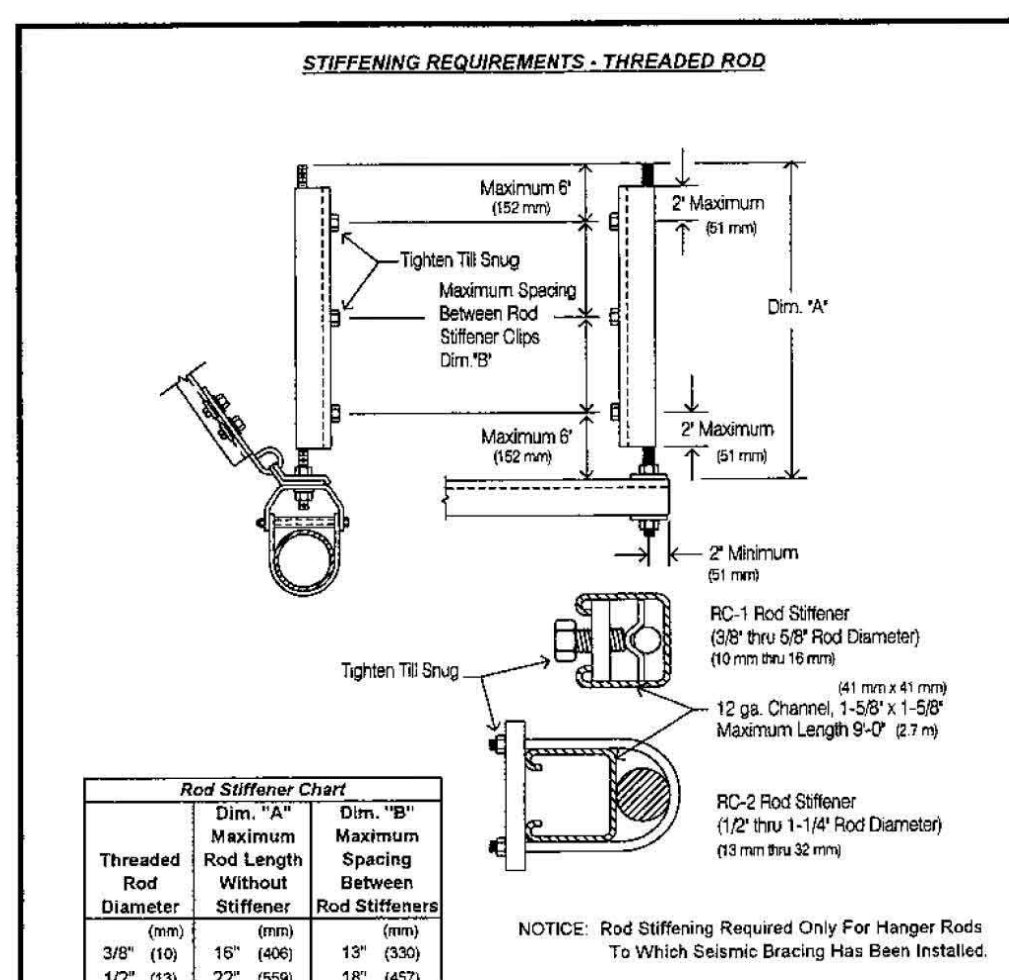
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MAXIMUM TRAPEZOID SUPPORT LOADS

SPAN	MAXIMUM TOTAL DEFLECTION		SPAN	MAXIMUM TOTAL DEFLECTION	
	INCHES	MILLIMETERS		INCHES	MILLIMETERS
16"	1.89	0.08	24"	3.10	0.12
24"	1.89	0.13	36"	3.02	0.17
36"	1.89	0.22	48"	2.97	0.13
48"	1.89	0.30	60"	2.95	0.13
60"	1.89	0.38	72"	2.95	0.20
72"	1.89	0.46	84"	2.96	0.30
84"	1.89	0.54	96"	2.97	0.40
96"	1.89	0.62	108"	2.97	0.54
108"	1.89	0.70	120"	2.97	0.62
120"	1.89	0.78			

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RIGID BRACING - 2" Diameter STEEL PIPE, COPPER PIPE OR CONDUIT

Horizontal Spacing (ft) <th rowspan="2">Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th> </th>	Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th>	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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Horizontal Spacing (ft) <th rowspan="2">Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th> </th>	Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th>	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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Horizontal Spacing (ft) <th rowspan="2">Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th> </th>	Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th>	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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RIGID BRACING - 3" Diameter CAST IRON PIPE, PLASTIC PIPE OR NON-LISTED GROOVED COUPLING PIPE

Horizontal Spacing (ft) <th rowspan="2">Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th> </th>	Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th>	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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RIGID BRACING - 4" Diameter STEEL PIPE, COPPER PIPE OR CONDUIT

Horizontal Spacing (ft) <th rowspan="2">Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th> </th>	Vertical Spacing (ft) <th colspan="2">TRANSVERSE BRACING REQUIREMENTS</th> <th colspan="2">LONGITUDINAL BRACING REQUIREMENTS</th>	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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RIGID BRACING - 4" Diameter STEEL PIPE, COPPER PIPE OR CONDUIT

Horizontal Spacing (ft)	Vertical Spacing (ft)	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Min. Spacing (ft)	Min. Bracing Reaction (k)	Min. Spacing (ft)	Min. Bracing Reaction (k)
0.50	1.00	50	10	50	10
0.75	1.50	75	15	75	15
1.00	2.00	100	20	100	20
1.25	2.50	125	25	125	25
1.50	3.00	150	30	150	30
1.75	3.50	175	35	175	35
2.00	4.00	200	40	200	40

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REV. BY	ISSUE COMMENTS	DATE
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2	UPDATE LEGEND & DETAILS	04/01/09

SHEET TITLE:  
**SEISMIC DETAILS**

DRAWING NO.:  
**K-AB29-126-005**

**RIGID BRACING - 4" Diameter CAST IRON PIPE, PLASTIC PIPE or Non-UL LISTED, GROOVED COUPLING PIPE**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	50	25	50	R7	AN1	AL1
0.30	75	25	75	R7	AN1	AL1
0.40	100	25	100	R7	AN1	AL1
0.50	125	25	125	R7	AN1	AL1
0.60	150	25	150	R7	AN1	AL1
0.70	175	25	175	R7	AN1	AL1
0.80	200	25	200	R7	AN1	AL1
0.90	225	25	225	R7	AN1	AL1
1.00	250	25	250	R7	AN1	AL1
1.10	275	25	275	R7	AN1	AL1
1.20	300	25	300	R7	AN1	AL1
1.30	325	25	325	R7	AN1	AL1
1.40	350	25	350	R7	AN1	AL1
1.50	375	25	375	R7	AN1	AL1
1.60	400	25	400	R7	AN1	AL1
1.70	425	25	425	R7	AN1	AL1
1.80	450	25	450	R7	AN1	AL1
1.90	475	25	475	R7	AN1	AL1
2.00	500	25	500	R7	AN1	AL1

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7, 8 and 9.

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Table PR-4a  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-4a  
 Figure 9-30-05

**RIGID BRACING - 6" Diameter STEEL PIPE, COPPER PIPE or CONDUIT**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	50	60	60	R11	AN1	AL4
0.30	75	60	75	R11	AN1	AL4
0.40	100	60	100	R11	AN1	AL4
0.50	125	60	125	R11	AN1	AL4
0.60	150	60	150	R11	AN1	AL4
0.70	175	60	175	R11	AN1	AL4
0.80	200	60	200	R11	AN1	AL4
0.90	225	60	225	R11	AN1	AL4
1.00	250	60	250	R11	AN1	AL4
1.10	275	60	275	R11	AN1	AL4
1.20	300	60	300	R11	AN1	AL4
1.30	325	60	325	R11	AN1	AL4
1.40	350	60	350	R11	AN1	AL4
1.50	375	60	375	R11	AN1	AL4
1.60	400	60	400	R11	AN1	AL4
1.70	425	60	425	R11	AN1	AL4
1.80	450	60	450	R11	AN1	AL4
1.90	475	60	475	R11	AN1	AL4
2.00	500	60	500	R11	AN1	AL4

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
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Table PR-6  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-6  
 Figure 9-30-05

**RIGID BRACING - 6" Diameter CAST IRON PIPE, PLASTIC PIPE or Non-UL LISTED, GROOVED COUPLING PIPE**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	50	25	50	R11	AN1	AL1
0.30	75	25	75	R11	AN1	AL1
0.40	100	25	100	R11	AN1	AL1
0.50	125	25	125	R11	AN1	AL1
0.60	150	25	150	R11	AN1	AL1
0.70	175	25	175	R11	AN1	AL1
0.80	200	25	200	R11	AN1	AL1
0.90	225	25	225	R11	AN1	AL1
1.00	250	25	250	R11	AN1	AL1
1.10	275	25	275	R11	AN1	AL1
1.20	300	25	300	R11	AN1	AL1
1.30	325	25	325	R11	AN1	AL1
1.40	350	25	350	R11	AN1	AL1
1.50	375	25	375	R11	AN1	AL1
1.60	400	25	400	R11	AN1	AL1
1.70	425	25	425	R11	AN1	AL1
1.80	450	25	450	R11	AN1	AL1
1.90	475	25	475	R11	AN1	AL1
2.00	500	25	500	R11	AN1	AL1

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7 and 8.

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Table PR-6a  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-6a  
 Figure 9-30-05

**RIGID BRACING - 10" Diameter STEEL PIPE, COPPER PIPE or CONDUIT**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	50	100	100	R17	AN2	AL5
0.30	75	100	100	R17	AN2	AL5
0.40	100	100	100	R17	AN2	AL5
0.50	125	100	125	R17	AN2	AL5
0.60	150	100	150	R17	AN2	AL5
0.70	175	100	175	R17	AN2	AL5
0.80	200	100	200	R17	AN2	AL5
0.90	225	100	225	R17	AN2	AL5
1.00	250	100	250	R17	AN2	AL5
1.10	275	100	275	R17	AN2	AL5
1.20	300	100	300	R17	AN2	AL5
1.30	325	100	325	R17	AN2	AL5
1.40	350	100	350	R17	AN2	AL5
1.50	375	100	375	R17	AN2	AL5
1.60	400	100	400	R17	AN2	AL5
1.70	425	100	425	R17	AN2	AL5
1.80	450	100	450	R17	AN2	AL5
1.90	475	100	475	R17	AN2	AL5
2.00	500	100	500	R17	AN2	AL5

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7 and 8.

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Table PR-10  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-10  
 Figure 9-30-05

**RIGID BRACING - 10" Diameter CAST IRON PIPE, PLASTIC PIPE or Non-UL LISTED, GROOVED COUPLING PIPE**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	70	20	330	R17	AN2	AL4
0.30	105	20	330	R17	AN2	AL4
0.40	140	20	330	R17	AN2	AL4
0.50	175	20	330	R17	AN2	AL4
0.60	210	20	330	R17	AN2	AL4
0.70	245	20	330	R17	AN2	AL4
0.80	280	20	330	R17	AN2	AL4
0.90	315	20	330	R17	AN2	AL4
1.00	350	20	330	R17	AN2	AL4
1.10	385	20	330	R17	AN2	AL4
1.20	420	20	330	R17	AN2	AL4
1.30	455	20	330	R17	AN2	AL4
1.40	490	20	330	R17	AN2	AL4
1.50	525	20	330	R17	AN2	AL4
1.60	560	20	330	R17	AN2	AL4
1.70	595	20	330	R17	AN2	AL4
1.80	630	20	330	R17	AN2	AL4
1.90	665	20	330	R17	AN2	AL4
2.00	700	20	330	R17	AN2	AL4

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7 and 8.

**APPROVED Fixed Equipment Anchorage**  
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 800 Amos Boulevard, Suite Pk., CA 90632  
 877-882-4728 (US) 714-984-8228 714-922-0436 (fax)  
 www.isat.com

**OPA-0485 November 14, 2002**  
 Valid for 3 Years Maximum

Table PR-10a  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-10a  
 Figure 9-30-05

**RIGID BRACING - 12" Diameter CAST IRON PIPE, PLASTIC PIPE or Non-UL LISTED, GROOVED COUPLING PIPE**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	70	20	475	R17	AN2	AL4
0.30	105	20	475	R17	AN2	AL4
0.40	140	20	475	R17	AN2	AL4
0.50	175	20	475	R17	AN2	AL4
0.60	210	20	475	R17	AN2	AL4
0.70	245	20	475	R17	AN2	AL4
0.80	280	20	475	R17	AN2	AL4
0.90	315	20	475	R17	AN2	AL4
1.00	350	20	475	R17	AN2	AL4
1.10	385	20	475	R17	AN2	AL4
1.20	420	20	475	R17	AN2	AL4
1.30	455	20	475	R17	AN2	AL4
1.40	490	20	475	R17	AN2	AL4
1.50	525	20	475	R17	AN2	AL4
1.60	560	20	475	R17	AN2	AL4
1.70	595	20	475	R17	AN2	AL4
1.80	630	20	475	R17	AN2	AL4
1.90	665	20	475	R17	AN2	AL4
2.00	700	20	475	R17	AN2	AL4

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7 and 8.

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Table PR-12  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-12  
 Figure 9-30-05

**RIGID BRACING - 16" Diameter STEEL PIPE, COPPER PIPE or CONDUIT**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	70	20	475	R17	AN2	AL4
0.30	105	20	475	R17	AN2	AL4
0.40	140	20	475	R17	AN2	AL4
0.50	175	20	475	R17	AN2	AL4
0.60	210	20	475	R17	AN2	AL4
0.70	245	20	475	R17	AN2	AL4
0.80	280	20	475	R17	AN2	AL4
0.90	315	20	475	R17	AN2	AL4
1.00	350	20	475	R17	AN2	AL4
1.10	385	20	475	R17	AN2	AL4
1.20	420	20	475	R17	AN2	AL4
1.30	455	20	475	R17	AN2	AL4
1.40	490	20	475	R17	AN2	AL4
1.50	525	20	475	R17	AN2	AL4
1.60	560	20	475	R17	AN2	AL4
1.70	595	20	475	R17	AN2	AL4
1.80	630	20	475	R17	AN2	AL4
1.90	665	20	475	R17	AN2	AL4
2.00	700	20	475	R17	AN2	AL4

Requires Use of ISAT Seismic Brackets Per ICBO Report #FC588. Use of Any Substitute Bracket Violates Engineering.  
 10 Max. 45 Degree Inclination. \*\*Min. 3.000 psi NWC. \*\*\*Min. 3.000 psi LWC. Vertical Attachment (VA) to structural steel may require 1/2" x 1/4" steel anchor bolt.  
 Refer to Bracing Notes Pages 7 and 8.

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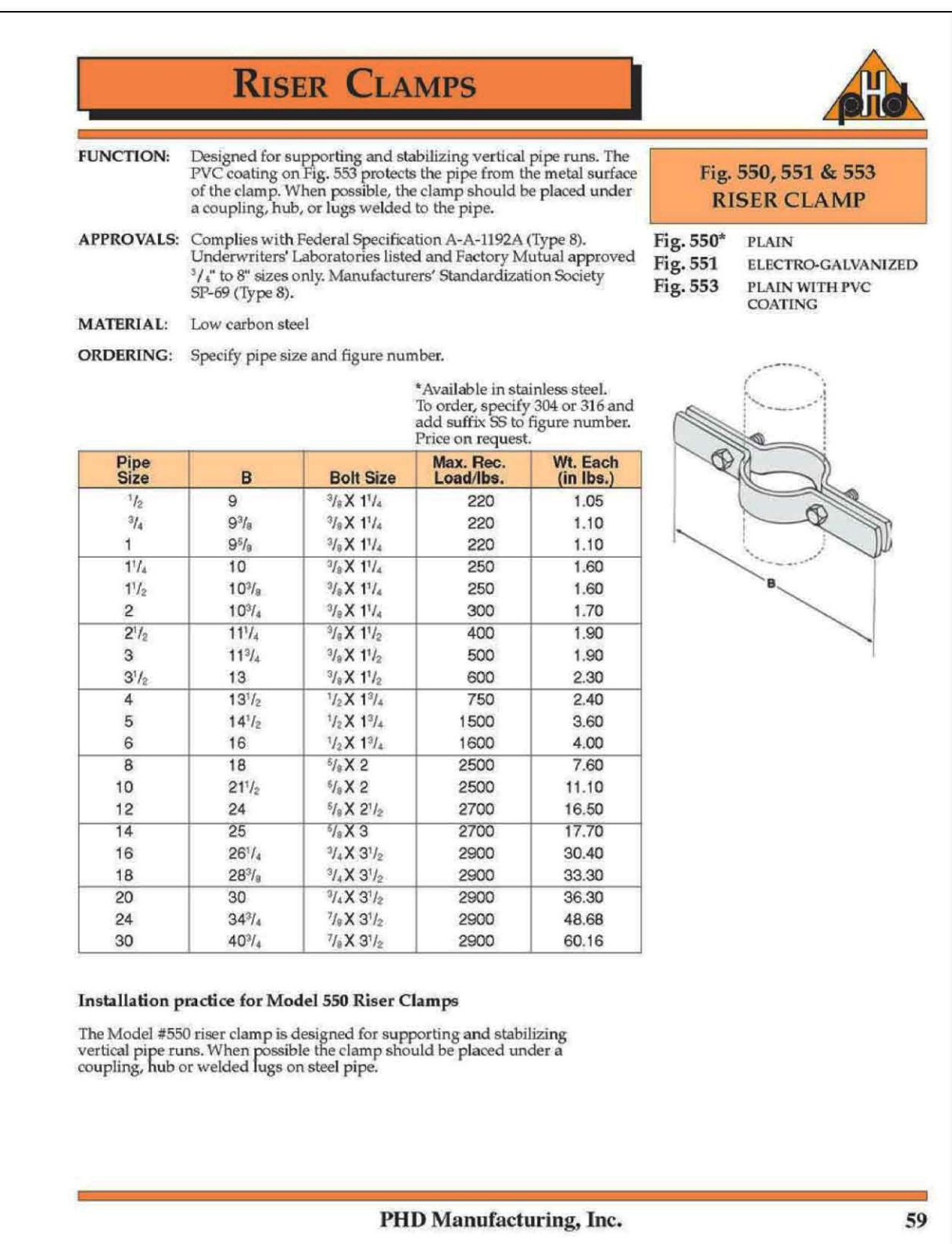
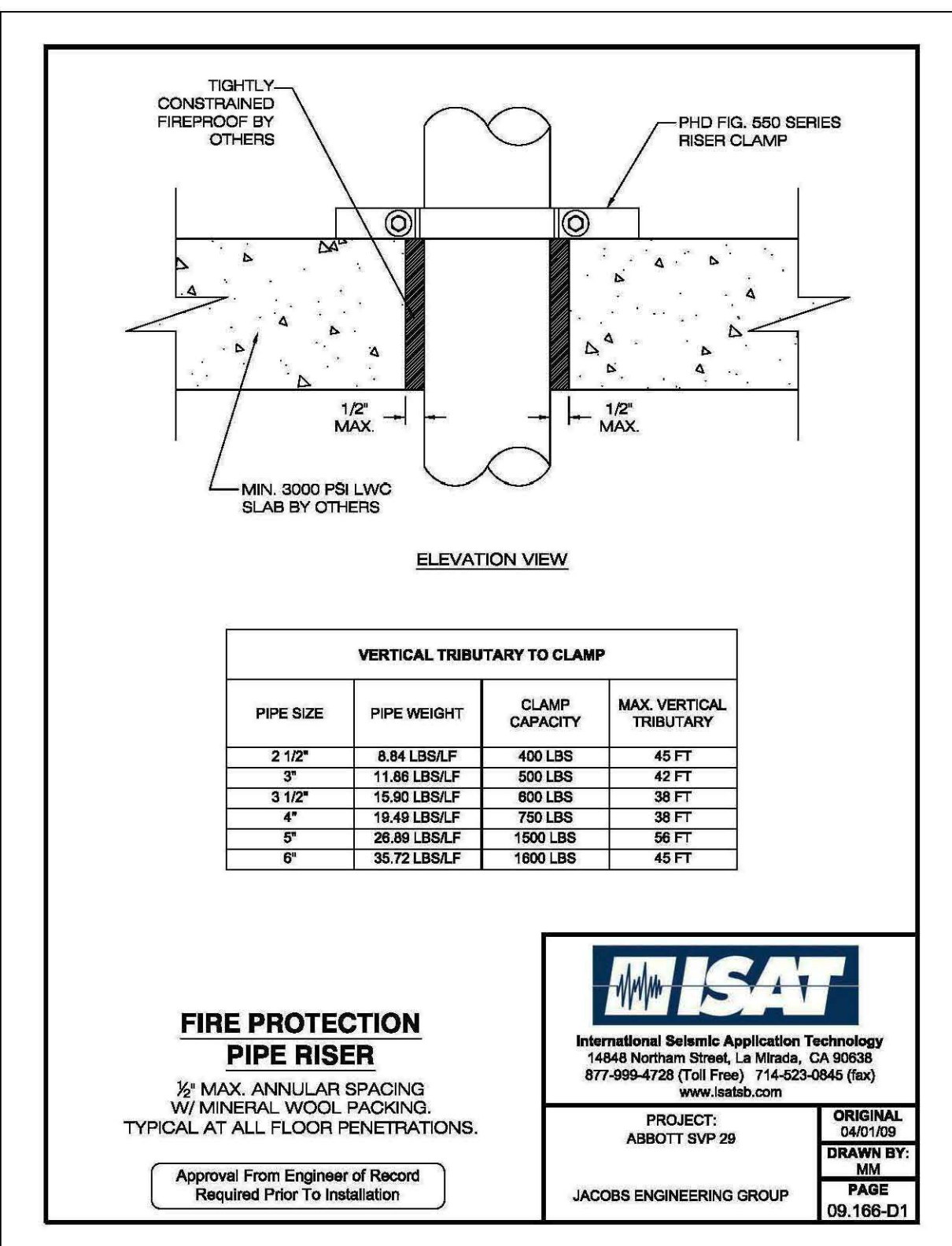
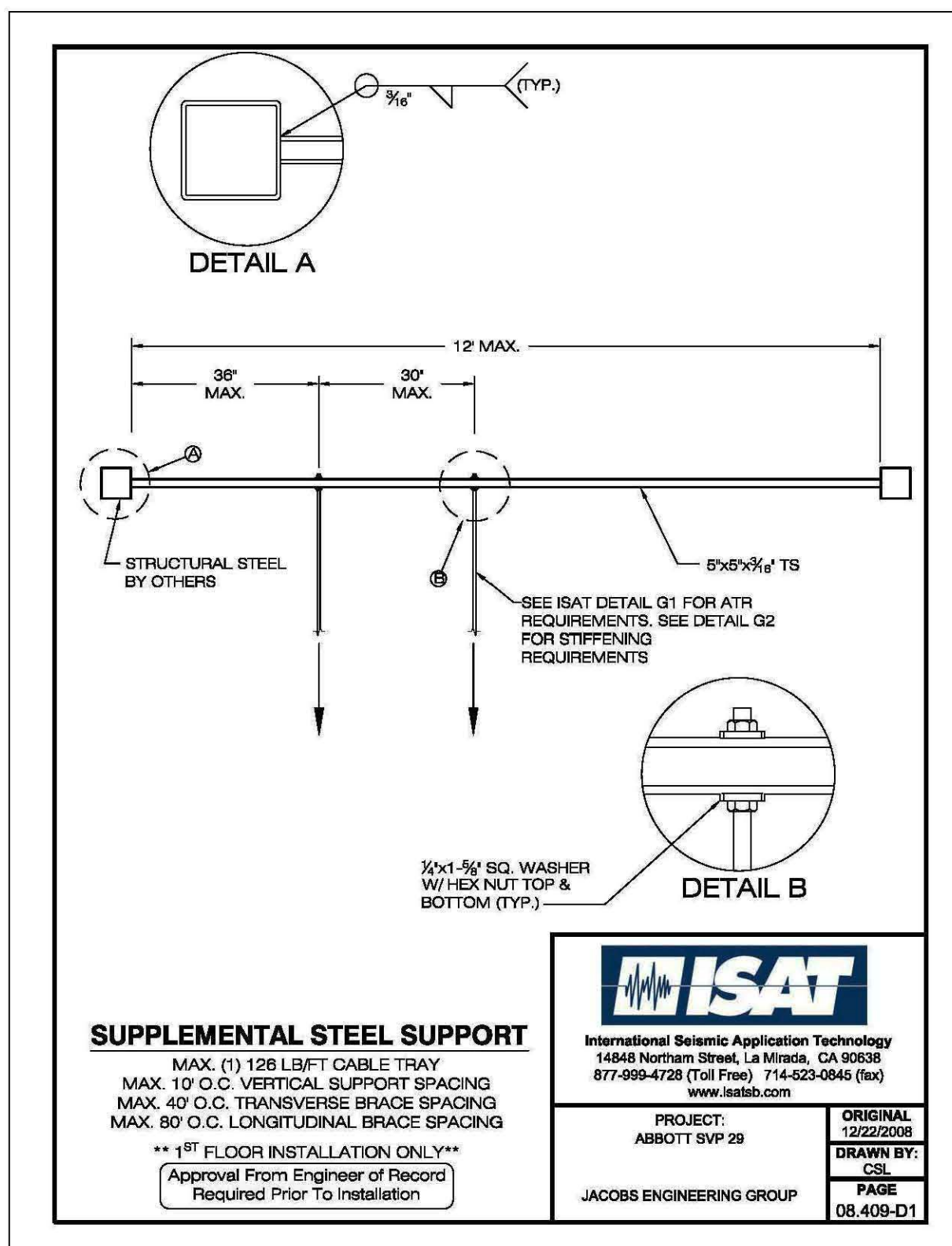
Table PR-16  
 Figure 9-30-05  
 Equipment, 9-30-05

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 Table PR-16  
 Figure 9-30-05

**RIGID BRACING - TRAPEZOID MOUNTED PIPE RACK, CONDUIT RACK, HVAC DUCT, CABLE TRAY (Max. 20 LBS/LF)**

**TRANSVERSE BRACING REQUIREMENTS**

Horizontal Force (kN)	Vertical Force (kN)	Max. Brace Spacing (m)	Min. Brace Spacing (m)	Min. Brace Reaction (kN)	Min. Brace Anchorage (kN)	Min. Brace Anchorage (kN)
0.20	50	25	330	R17	AN2	AL4
0.30	75	25	330	R17	AN2	AL4
0.40	100	25	330	R17	AN2	AL4
0.50	125	25	330	R17	AN2	AL4
0.60	150	25	330	R17	AN2	AL4



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OSHPD: \_\_\_\_\_

SCALE: **N.T.S.**

REV. BY	ISSUE COMMENTS	DATE
CH	ISSUE FOR CONSTRUCTION	03/27/09
MM	UPDATE LEGEND & DETAILS	04/01/09

SHEET TITLE:

**SEISMIC DETAILS**

DRAWING NO. : **K-AB29-126-007**

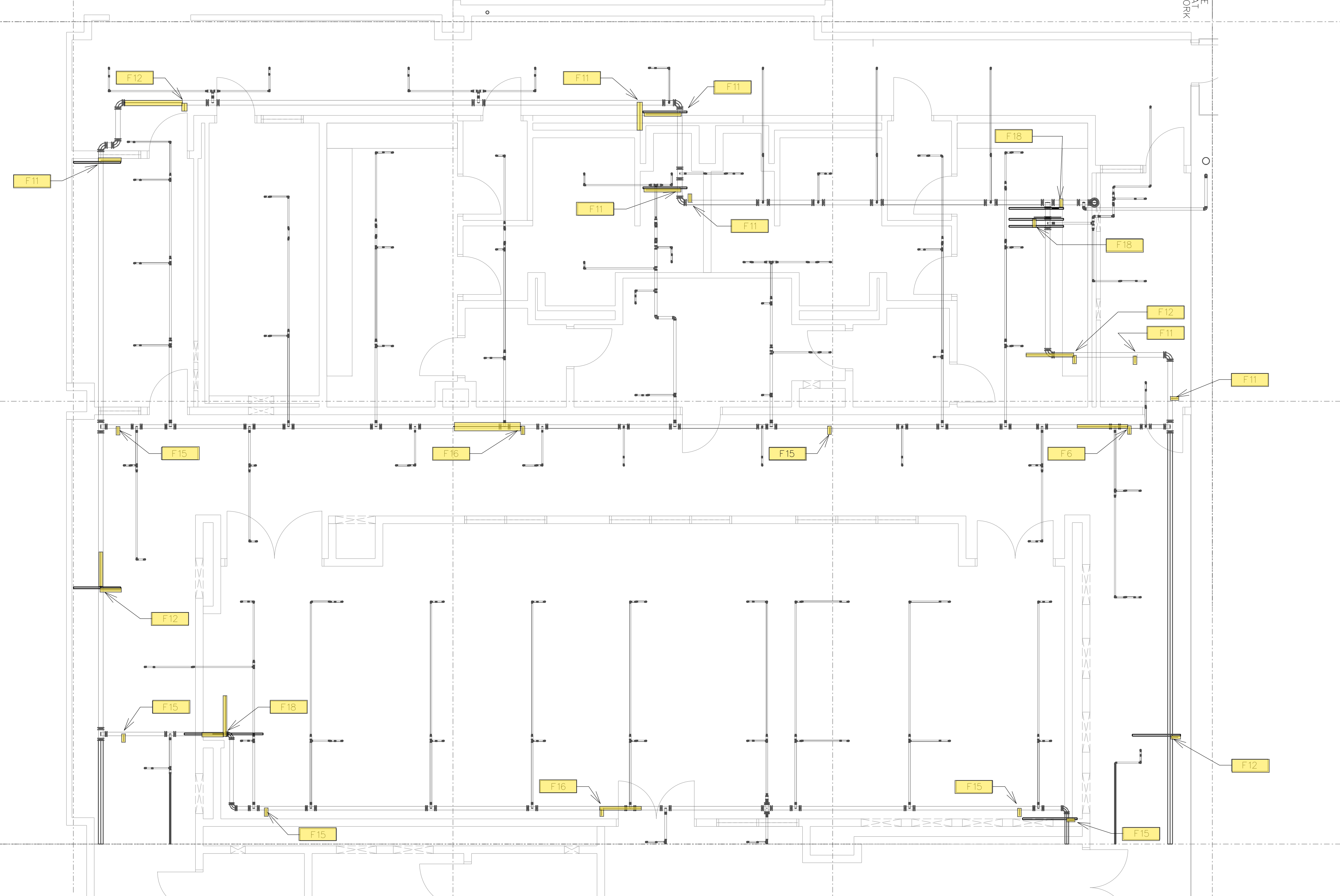
10 9 8 7

A

B

C

MATCH LINE  
OUT OF ISAT  
SCOPE OF WORK



MATCH LINE  
K-AB29-126-115

**ISAT**

**SEISMIC RESTRAINT LEGEND**  
SVP - CLEAN UTILITIES

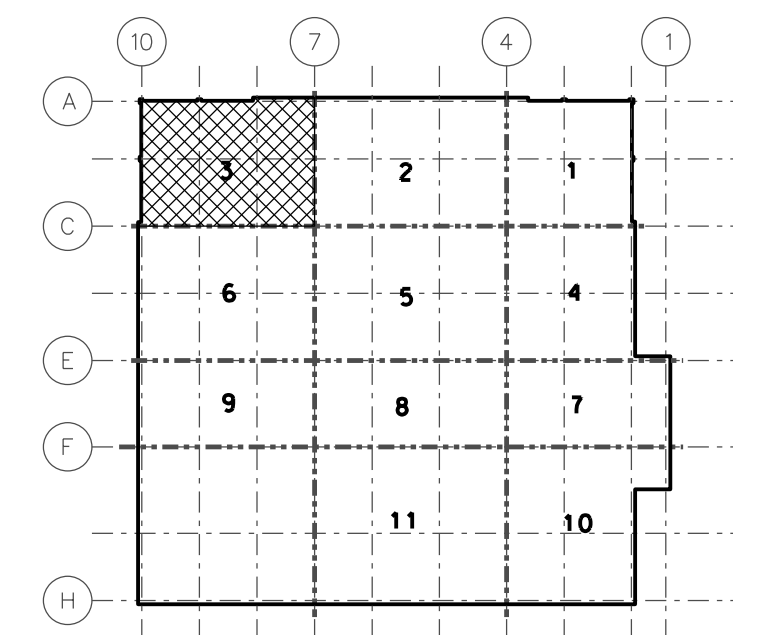
SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB -1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.\*

SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS \*

- \*Utility is within 12" of overhead deck.
- (Connections to the structure are to minimize net bending moment. Provisions shall be made to eliminate seismic impact to components vulnerable to impact.)
- \*Utility is attached directly to structure.
- \*Brace all rectangular air-handling ducts equal to or greater than 6 square feet in cross sectional area.
- \*Brace all round air-handling ducts equal to or greater than 28 inches in diameter.
- \*Brace all plumbing, process and mechanical pipe 2 1/2" trade size and larger.
- \*Brace all hazardous pipe 1" and larger.
- \*Brace all conduit 2 1/2" trade size and larger.
- \*Brace all trapezoids supporting 10 # p/f and greater.

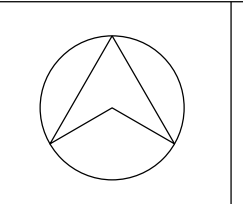
All work shall be installed in accordance with the 1997 UBC

\* See ISAT Manual and Submittal Documents  
Rod Capture Seismic Brackets per ICBO Report RRP05566  
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KEYPLAN

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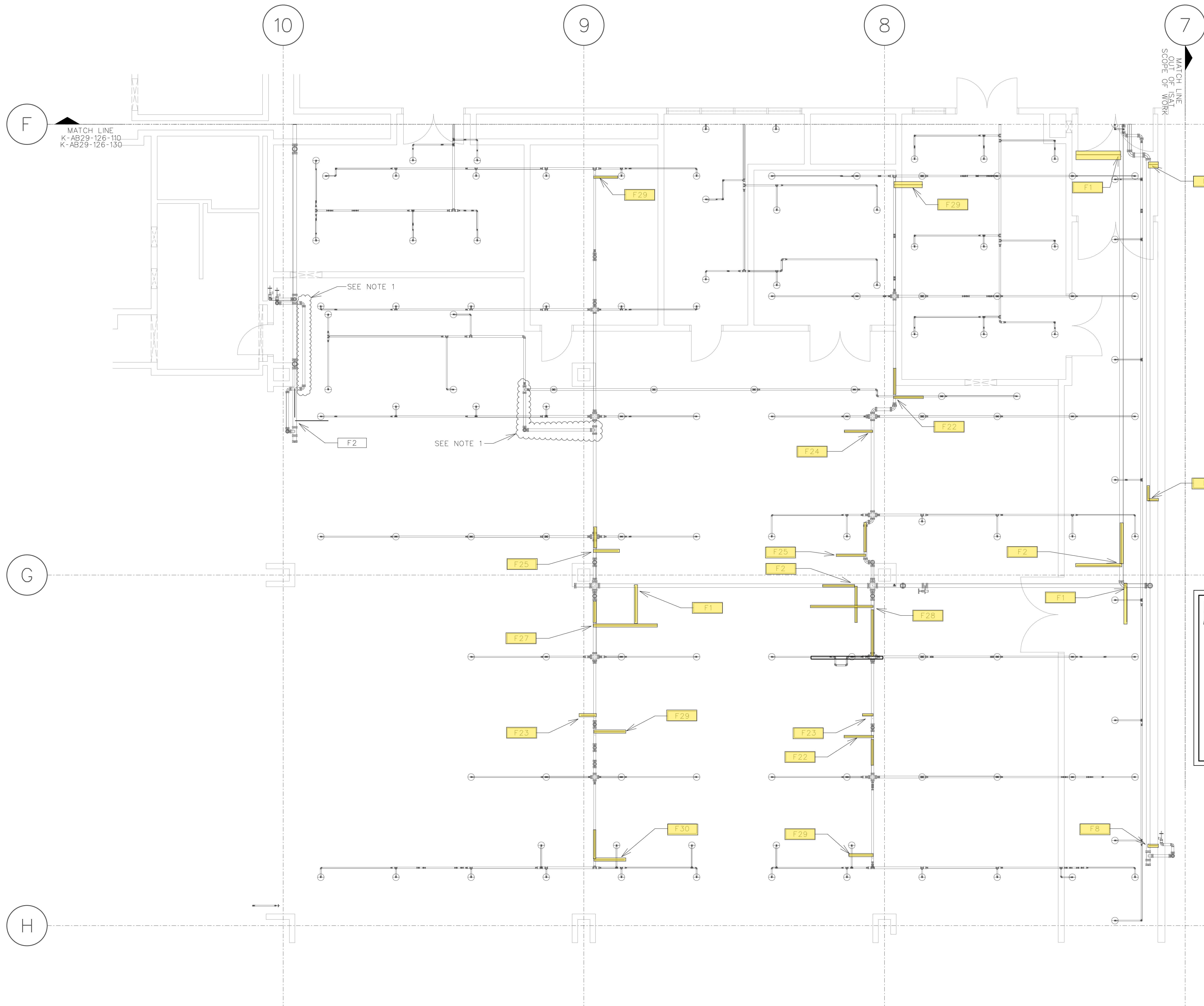
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1																							DRWG. NO.	K-AB29-126-120		

COL. A-C, 7-10  
FIRE PROTECTION SEISMIC PLAN  
FIRST FLOOR



GENERAL NOTES:

- UTILITY STRAIGHT RUN LENGTH IS LESS THAN 10'-0" THEREFORE NO SEISMIC BRACING IS REQUIRED.



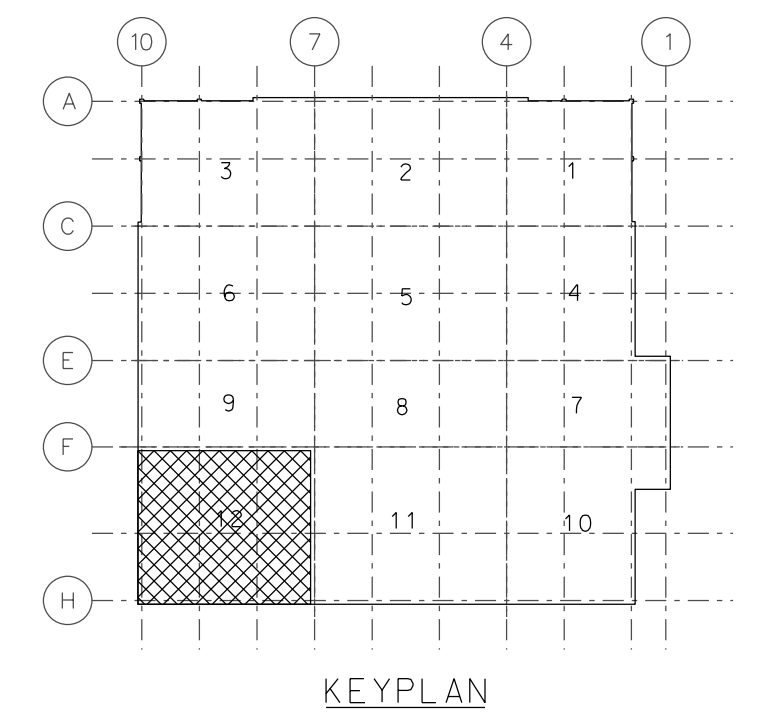
**ISAT** SEISMIC RESTRAINT LEGEND  
SVP - CLEAN UTILITIES

SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB -1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.\*

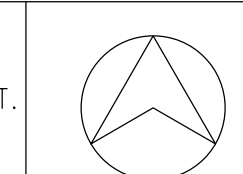
SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS\*

- \*"Utility is within 12" of overhead deck."  
(Connectors to the structure are to minimize not bending moment. Provisions shall be made to eliminate seismic impact to components vulnerable to impact.)
- \*"Utility is attached directly to structure."
- \*"Brace all rectangular air-handling ducts equal to or greater than 6 square feet in cross sectional area."
- \*"Brace all round air-handling ducts equal to or greater than 28 inches in diameter."
- \*"Brace all plumbing, process and mechanical pipe 2 1/2" trade size and larger."
- \*"Brace all hazardous pipe 1" and larger."
- \*"Brace all conduit 2 1/2" trade size and larger."
- \*"Brace all trapezes supporting 10 # pif and greater"

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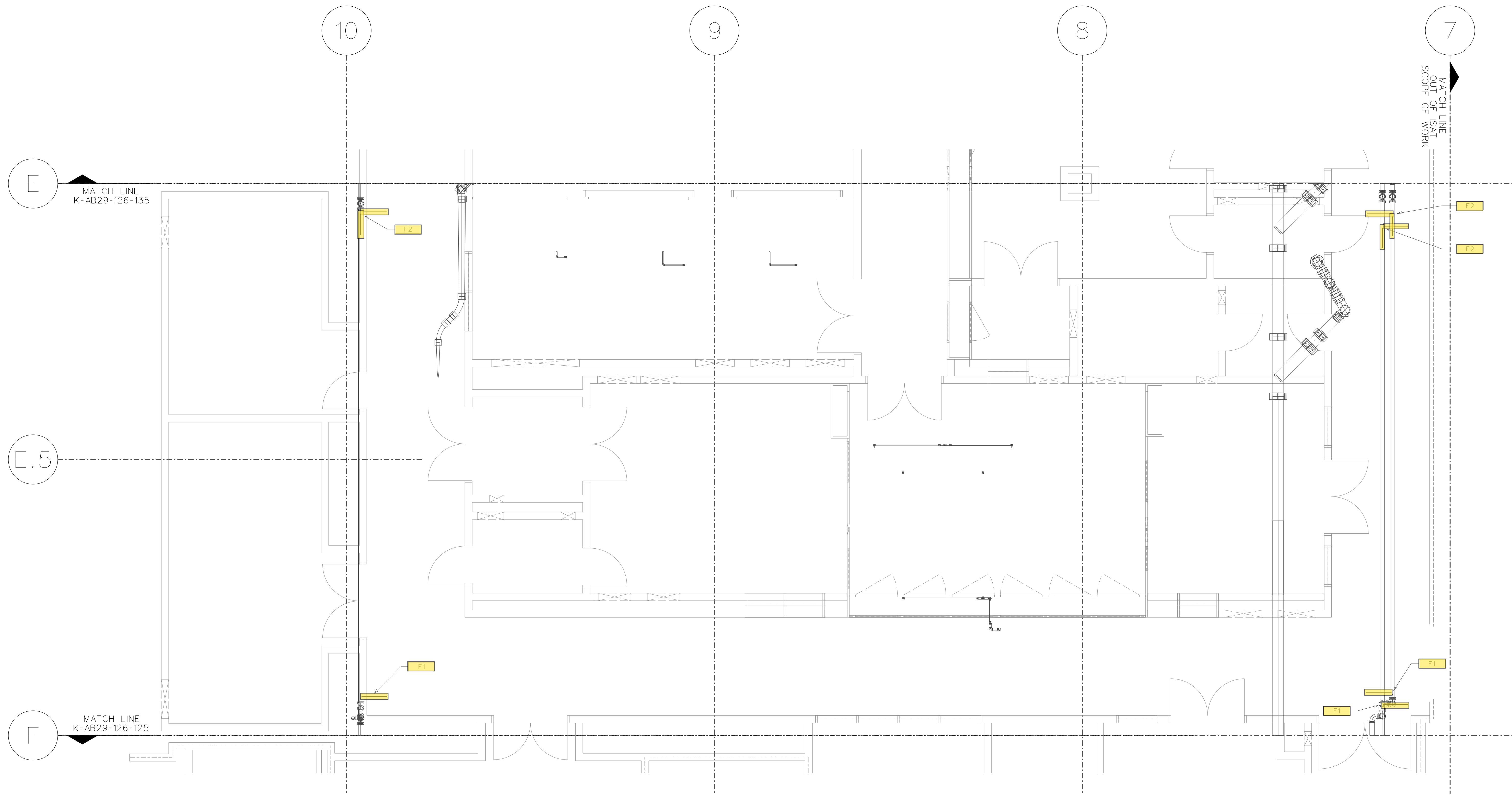


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COL. F-H,7-10  
FIRE PROTECTION SEISMIC PLAN  
FIRST FLOOR



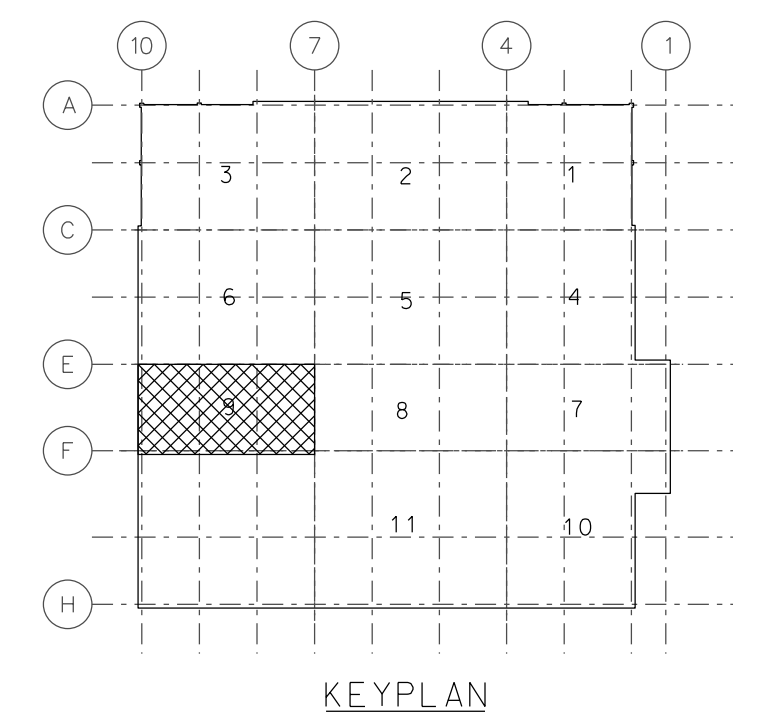
**ISAT**  
**SEISMIC RESTRAINT LEGEND**  
 SVP - CLEAN UTILITIES

**SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB -1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.\***

**SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS \***

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- \*Brace all hazardous pipe 1" and larger.
- \*Brace all conduit 2 1/2" trade size and larger.
- \*Brace all trusses supporting 10 # p/f and greater.

**All work shall be installed in accordance with the 1997 UBC**  
 \* See ISAT Manual and Submittal Documents  
 Rod Capture Seismic Brackets per ICBO Report RPPC5568  
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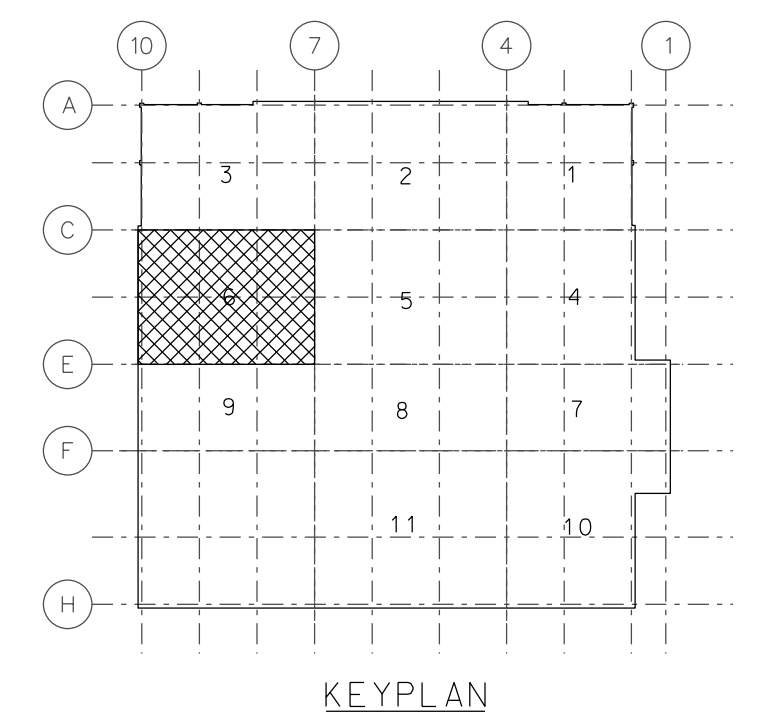
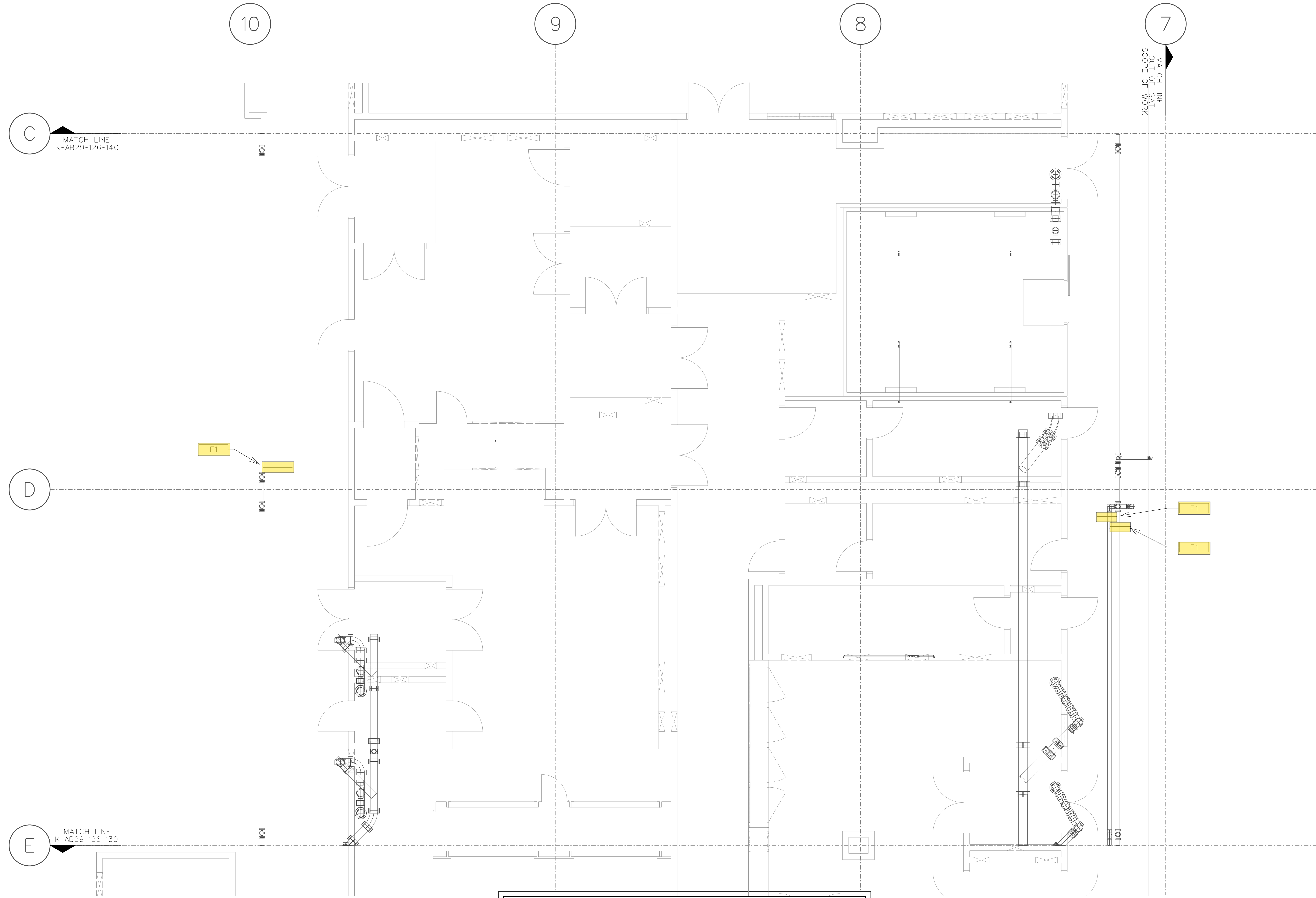


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COL. E-F.7-10  
 FIRE PROTECTION SEISMIC PLAN  
 FIRST FLOOR INTERSTITIAL



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 SVP - CLEAN UTILITIES

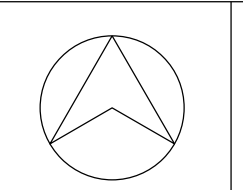
SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB-1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.\*

SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS\*

- \*"Utility is within 12" of overhead deck."  
(Corrections to the structure are to minimize rod bending moment. Provisions shall be made to eliminate seismic impact to components vulnerable to impact.)
- \*"Utility is attached directly to structure."
- \*"Brace all rectangular air-handling ducts equal to or greater than 6 square feet in cross sectional area."
- \*"Brace all round air-handling ducts equal to or greater than 26 inches in diameter."
- \*"Brace all plumbing, process and mechanical pipe 2 1/2" trade size and larger."
- \*"Brace all hazardous pipe 1" and larger."
- \*"Brace all conduit 2 1/2" trade size and larger."
- \*"Brace all trapezes supporting 10 # pfl and greater"

All work shall be installed in accordance with the 1997 UBC  
 \* See ISAT Manual and Submittal Documents  
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COL. C-E,7-10  
 FIRE PROTECTION SEISMIC PLAN  
 FIRST FLOOR INTERSTITIAL

FILE NO: AB29126135.DGN  
 DRWG. NO: K-AB29-126-135

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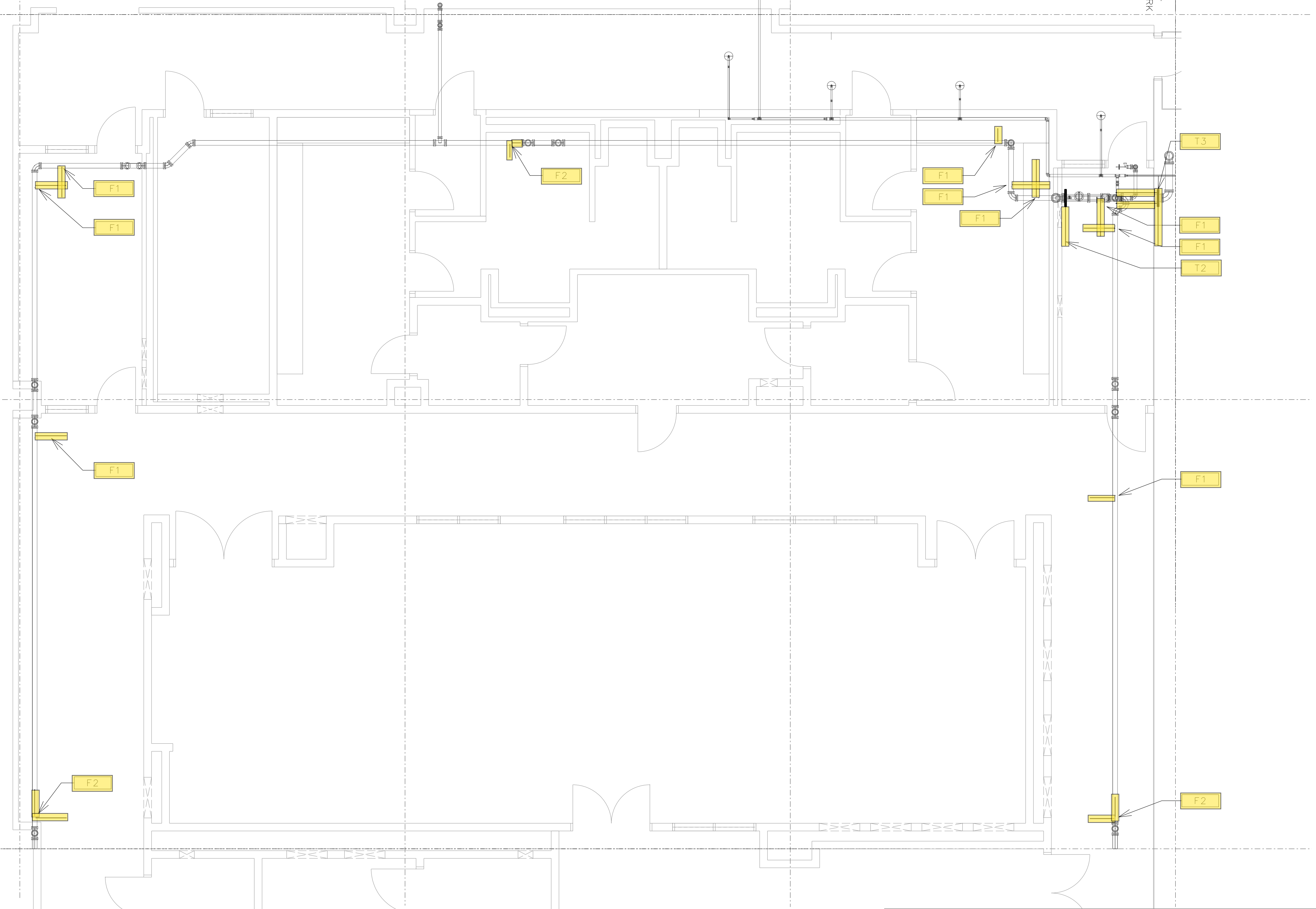
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MATCH LINE  
OUT OF ISAT  
SCOPE OF WORK

MATCH LINE  
K-AB29-126-135



**ISAT**

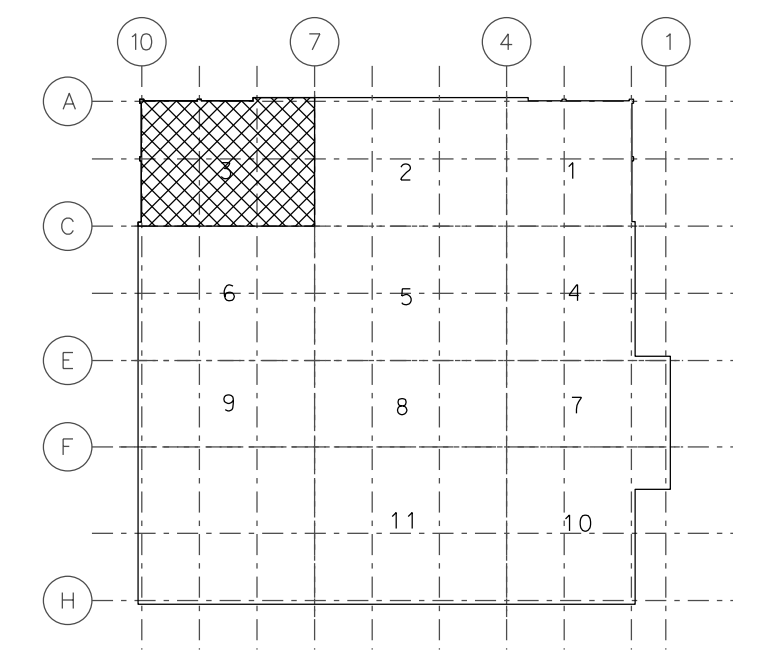
**SEISMIC RESTRAINT LEGEND**  
SVP - CLEAN UTILITIES

SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB -1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.\*

SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS \*

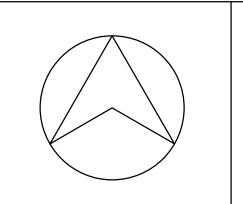
- \*Utility is within 12" of overhead deck.  
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- \*Brace all hazardous pipe 1" and larger.
- \*Brace all conduit 2 1/2" trade size and larger.
- \*Brace all trusses supporting 10 # p/f and greater\*

All work shall be installed in accordance with the 1997 UBC  
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COL. A-C.7-10  
FIRE PROTECTION SEISMIC PLAN  
FIRST FLOOR INTERSTITIAL