



ENGINEERED SEISMIC BRACING

DRAWING INDEX

ISAT

K-AB29-126-001 COVER SHEET
 K-AB29-126-002 RESTRAINT LEGENDS & TDLF
 K-AB29-126-003 SEISMIC DETAILS
 K-AB29-126-004 SEISMIC DETAILS
 K-AB29-126-005 SEISMIC DETAILS
 K-AB29-126-006 SEISMIC DETAILS

K-AB29-126-124
 K-AB29-126-129
 K-AB29-126-134
 K-AB29-126-139
 K-AB29-126-144
 K-AB29-126-155
 K-AB29-126-158
 K-AB29-126-159

CABLE TRAY

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

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

SHEET TITLE:

COVER SHEET

DRAWING NO.:

K-AB29-126-001



ISAT SEISMIC RESTRAINT LEGEND

Table with columns 1-24. Row 1: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24. Contains various seismic restraint codes and descriptions.

NOTES:
1. Seismic Restraint Legend is based on the 2018 International Building Code (IBC) and the 2018 International Seismic Application Technology (ISAT) Code Book.
2. This legend is intended for use in conjunction with the ISAT Seismic Restraint Legend Application Worksheet.
3. The legend is organized into four main categories: Seismic Restraint Legend, Seismic Restraint Legend - Total Design Lateral Force, Seismic Restraint Legend - Total Design Lateral Force (Zone 4 Only), and Seismic Restraint Legend - Total Design Lateral Force (Zone 4 Only).



ISAT SEISMIC RESTRAINT LEGEND

Table with columns 1-24. Row 1: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24. Contains various seismic restraint codes and descriptions.

NOTES:
1. Seismic Restraint Legend is based on the 2018 International Building Code (IBC) and the 2018 International Seismic Application Technology (ISAT) Code Book.
2. This legend is intended for use in conjunction with the ISAT Seismic Restraint Legend Application Worksheet.
3. The legend is organized into four main categories: Seismic Restraint Legend, Seismic Restraint Legend - Total Design Lateral Force, Seismic Restraint Legend - Total Design Lateral Force (Zone 4 Only), and Seismic Restraint Legend - Total Design Lateral Force (Zone 4 Only).



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SHEET TITLE: RESTRAINT LEGENDS & TDLF
DRAWING NO.: K-AB29-126-002

SEISMIC DESIGN FORCE (SDP) CALCULATION WORKSHEET

INTERNATIONAL SEISMIC APPLICATION TECHNOLOGY
14848 Northam St., La Mirada, CA 90638
PHONE: 877-999-4728 FAX: 714-933-9045

Project Name: USC FORMULA SECTION R602, (2) - 3
Location:
Contractor:
Building Code: 1997 IBC
Seismic Zone:
Seismic Zone Factor:
Component Amplification Factor:
Component Response Modification Factor:
Importance Factor:
Roof Elevation With Respect to Grade:
Seismic Coefficient (If given by customer):

Ca Calculation (Zones 1, 2A, 2B, & 3 Only):
Soil Profile Type (If Ca is not given):
Seismic Coefficient (Round by Soil Profile Type vs. Zone):

Ca Calculation (Zone 4 Only):
Soil Profile Type (If Ca is not given):
Near Source Factor (If given by customer):
Seismic Source Type (If Na is not given by customer):
Closest Distance to Known Seismic Source (If Na is not given by customer):
Near Source Factor (Round by Seismic Source Type vs. Dist. from Table 15-5):
Ca (Round by Zone vs. Soil Profile Type, from Table 15-5):

SEISMIC BRACING CALCULATION - TOTAL DESIGN LATERAL FORCE
Fp = 0.75 Ca x Wp x (1 + 30(Hx/H)) x Wp

Table with columns: Floor # / Story, Hx (ft), Fp, Fp shall not be less than, Fp shall not be more than, Fp, Fp / A. Rows for 1st, 2nd, 3rd, 4th stories.

WHERE:
Hx = Overhead Deck Elevation From Grade (ft)
Fp* = As calculated per equation shown above.
Fp** = Resultant after comparison
Fig. 4: Converts Fp to "Allowable Stress Design". Use this value in conjunction with ISAT Bracing Tables.

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Office of Statewide Health Planning and Development
OPA-0485 November 14, 2002
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Page B27.6

ISAT TECHNICAL BULLETIN
APPROVAL FOR USE OF HLT/KWK BOLT 3 AND KWK BOLT TZ ANCHORS

HLT Bolt 3 and KWK Bolt TZ expansion anchors are an approved equal to the Power-Bolt and Trapezoid anchors required in Pages D1, D1.3, and D2, and D2.4 respectively of OPA-0485.

The original ISAT D1 and D2 series installation details are to be utilized with the KWK Bolt 3 or KWK Bolt TZ substituted for an anchor of equal diameter installed to the same minimum embedment depth.

The following installation torque guidelines apply:

Kwk Bolt 3 Torque	Kwk Bolt TZ Torque
3/8"	20'
1/2"	40'
5/8"	80'

In addition the following substitutions are allowed:

ISAT Anchorage	Page D1	Design Value	Anchor	Design Value
(1) 1/2" Dia. 2,630 lbs.	#ANS	2,100 lbs.	(1) 1/2" 1,488 lbs.	2,100 lbs.
(1) 3/8" Dia. 2,630 lbs.	#ALS	2,100 lbs.	(1) 3/8" 1,488 lbs.	2,630 lbs.

ISAT Anchorage, Page D2

ISAT Anchorage	Page D2	Design Value	Anchor	Design Value
(1) 1/2" Dia. 1,600 lbs.	#ANS	1,310 lbs.	(1) 1/2" 1,488 lbs.	1,600 lbs.
(1) 3/8" Dia. 1,600 lbs.	#ALS	1,310 lbs.	(1) 3/8" 1,488 lbs.	1,600 lbs.

When installed per ISAT D2.1 thru D2.4 anchorage details for metal deck, the KWK Bolt 3 and KWK Bolt TZ anchors may be installed offset from the Bolt center line up to a maximum of +/- 1" as illustrated below.

APPROVED Fixed Equipment Anchorage
Office of Statewide Health Planning and Development
OPA-0485
on
Thursday, March 15, 2007

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Page D-1

Engineered Brace Anchor Connections
Normal Weight Concrete (3,000 psi Minimum)

POWER-STUD by Powers Fasteners, Inc.
ICBO Report No. S225, Table 3
Without Special Inspection

ISAT Anchor	Page	Anchor Diameter (inches)	Maximum Load (lb)	Minimum Embedment (inches)	Minimum Edge Distance (inches)	Anchor Connection	
AN1	D1.1	1	36	4"	12"	Steel	
AN2	D1.2	2	36	4"	12"	Steel	
AN3	D1.3	4	36	1,958	3"	12"	4.1/2" PL1 or PL2
AN4	D1.1	1	1/2	742	4"	16"	6
AN5	D1.2	2	1/2	1,484	4"	16"	6
AN6	D1.3	4	1/2	2,967	4"	16"	6
AN7	D1.1	1	5/8	1,216	8"	20"	7.1/2"
AN8	D1.2	2	5/8	2,432	8"	20"	7.1/2"
AN9	D1.3	4	5/8	3,335	8"	20"	7.1/2"

1. Maximum Load Based on Formula for Combined Tension and Shear per ICBO Report.
2. Size = 1/2 dia x 1/8" x 1/8" Min. Punched Hole.
3. PL1 and PL2 Four Bolt Anchor Plate, Page F8.
4. Anchor Test Values, Page D3.
5. AN2, AN3 and AN4 Use 1/2" Diameter Has Not for Bracket Attachment to Anchorage Strut or Mounting Plate.
6. AN5, AN6 and AN9 Use 3/8" Diameter Has Not for Bracket Attachment to Anchorage Strut or Mounting Plate.

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April
Page D1

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Page D1.1

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SEISMIC DETAILS

DRAWING NO.:

K-AB29-126-003

When installing Anchors, Take Appropriate Precautions To Avoid Sawing, Rebar or Post Tensioned Tendons Within Concrete Deck Elements

Single Anchor Connection, Details AN2, AN5, AN8
Minimum 3,000 psi Normal Weight Concrete
Power-STRUD by Doway Fasteners, Inc. CS20 Report No. 6225
See Page D1 for Minimum Anchor Spacing Requirements.

Anchor	Anchor Qty	Anchor Diameter	Minimum Concrete Thickness	Minimum Embedment Depth
AN2	2	1/2"	4"	4"
AN5	2	3/4"	4"	4"
AN8	2	5/8"	7-1/2"	4"

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Page: D1.2

Submit Seismic Reaction Loads and Obtain Approval From Engineer of Record Before Welding to Structural Steel

WELDED STEEL BEAM CONNECTION TO STRUCTURAL STEEL BEAM OR CHANNEL

Bracket	Max. Allowable Brace Reaction
RCWV	2,185 lbs.
ABWV	1,850 lbs.
ABW	1,850 lbs.
ABW34	3,335 lbs.

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Page: D4.1

ISAT #8C-4 BEAM CLAMP ASSEMBLY SEISMIC RESTRAINT CONNECTION TO STRUCTURAL STEEL

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Page: D4.3

ISAT #8C-4 BEAM CLAMP ASSEMBLY WITH INTERCONNECTING STRUT SEISMIC RESTRAINT CONNECTION TO STRUCTURAL STEEL

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EMBEDDED CHANNEL CONCRETE INSERT CABLE TRAY BRACE ANCHORAGE

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SEISMIC RESTRAINT CONNECTION TO VERTICAL STEEL PIPE ASSEMBLY (MAXIMUM = 400 LBS.)

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ISAT #8C-4 BEAM CLAMP ASSEMBLY VERTICAL SUPPORT CONNECTIONS TO STRUCTURAL STEEL

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Page: G1.13

VERTICAL SUPPORT ANCHORAGE

Anchor Designation	Minimum Threaded Diameter	Anchor Diameter	Minimum Embedment	Minimum Tension Design Value	Minimum Spacing	Minimum Concrete Thickness	Anchor Spacing	Anchor Spacing	Anchor Spacing	Anchor Spacing
VAS	3/8"	3/8"	3"	2,025 lbs.	5-3/8"	4-1/2"	4-1/2"	4-1/2"	4-1/2"	4-1/2"
VAS	3/8"	3/8"	4"	1,183 lbs.	7-3/8"	6-1/8"	6-1/8"	6-1/8"	6-1/8"	6-1/8"
VN11	1/2"	5/8"	5"	1,870 lbs.	9-1/8"	7-1/2"	7-1/2"	7-1/2"	7-1/2"	7-1/2"

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Page: G7.11H

DUAL ANCHOR VERTICAL SUPPORT CONNECTION

Anchor Designation	Min. Anchor Diameter	Min. Embedment	Min. Concrete Thickness	Max. Allowable Tension	Min. Spacing	Min. Concrete Thickness
HLTKW-Bolt II	1/2"	4-1/2"	4-1/2"	1,421 lbs. VNS	1,253 lbs. VNS	1,113 lbs. VNS
HLTKW-Bolt II	3/4"	5-3/8"	5-3/8"	1,969 lbs. VNS	1,715 lbs. VNS	1,534 lbs. VNS
HLTKW-Bolt II	1"	6-1/8"	6-1/8"	2,670 lbs. VNS	2,370 lbs. VNS	2,130 lbs. VNS

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CABLE TRAY

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

ROD DIA.	MAX. DESIGN TENSION (k)	WELD SIZE	MAX. DESIGN TENSION (k)
3/8"	400	3/8"	316
1/2"	600	1/2"	475
3/4"	800	3/4"	634
1"	1,100	1"	893

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Directory - ISAT Rigid Brace Assemblies

ISAT Brace Assembly	Rod Diameter	Lower Bracket	Upper Bracket	Brace Arm	Maximum Brace Arm Length	Maximum Reaction (P-RAS)	Maximum Reaction (P-RAS) To Face	Maximum Reaction (P-RAS) Nut to Rod
R1	3/8"	RCW18	ABW1	Single Strut	9'	950	850	950
R1-1	3/8"	RCW18	ABW1	Single Strut	10'	1,115	1,060	1,115
R2	1/2"	RCW24	ABW2	Double Strut	10'	950	950	950
R2-1	1/2"	RCW24	ABW2	Double Strut	10'	1,115	1,060	1,115
R3	1/2"	RCW24	ABW2	Single Strut	9'	950	950	950
R3-1	1/2"	RCW24	ABW2	Single Strut	9'	1,165	1,060	1,165
R4	1/2"	RCW24	ABW2	Double Strut	10'	950	950	950
R4-1	1/2"	RCW24	ABW2	Double Strut	10'	1,165	1,060	1,165
R5	1/2"	RCW24	ABW2	Single Strut	10'	2,060	2,165	2,060
R5-1	1/2"	RCW24	ABW2	Single Strut	10'	1,855	1,865	1,855
R6	1/2"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R7	3/4"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R7-1	3/4"	RCW24	ABW2	Single Strut	9'	2,225	2,330	2,225
R8	3/4"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R8-1	3/4"	RCW24	ABW2	Double Strut	10'	1,980	1,980	1,980
R9	3/4"	RCW24	ABW2	Single Strut	10'	1,980	1,980	1,980
R10	3/4"	RCW24	ABW2	Double Strut	10'	2,185	2,185	2,185
R11	3/4"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R12	3/4"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R13	3/4"	RCW24	ABW2	Double Strut	10'	2,185	2,185	2,185
R14	3/4"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R15	3/4"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R16	3/4"	RCW24	ABW2	Double Strut	10'	2,185	2,185	2,185
R17	7/8"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R18	7/8"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R19	7/8"	RCW24	ABW2	Single Strut	9'	1,980	1,980	1,980
R20	7/8"	RCW24	ABW2	Double Strut	10'	2,185	2,185	2,185
R21	1"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R22	1"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R23	1"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R24	1"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R25	1"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R26	1"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R27	1"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R28	1"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855
R29	1"	RCW24	ABW2	Single Strut	9'	1,855	1,865	1,855
R30	1"	RCW24	ABW2	Double Strut	10'	1,855	1,865	1,855

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TYPICAL RIGID BRACING BRACKET ASSEMBLY COMBINATION (SHOWN ON DOUBLE CHANNEL)

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'TITE-END' TRUE TORQUE NUT RIGID BRACE ASSEMBLY DETAILS

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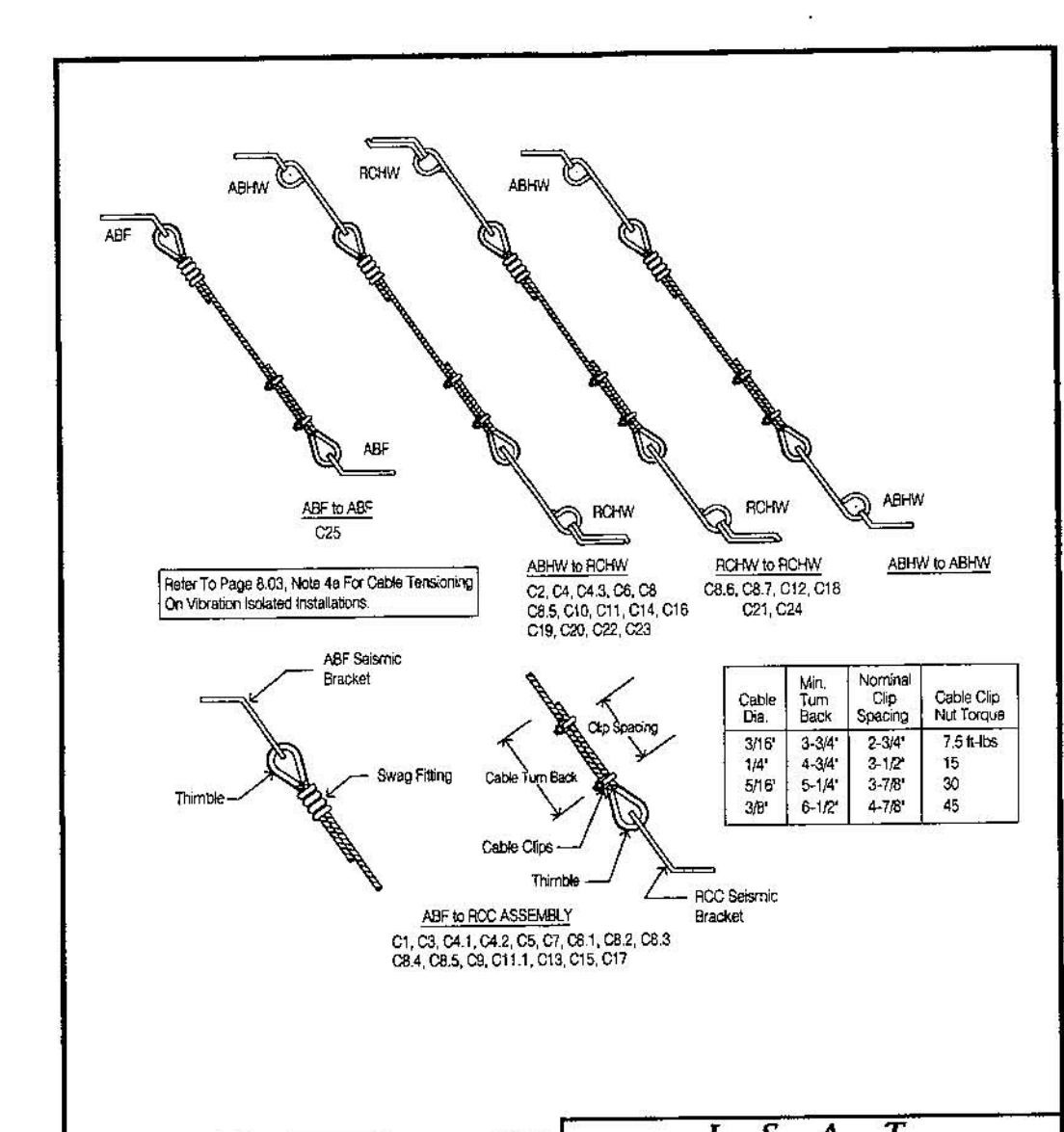
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AK	UPDATE LEGEND & DETAILS	04/01/09

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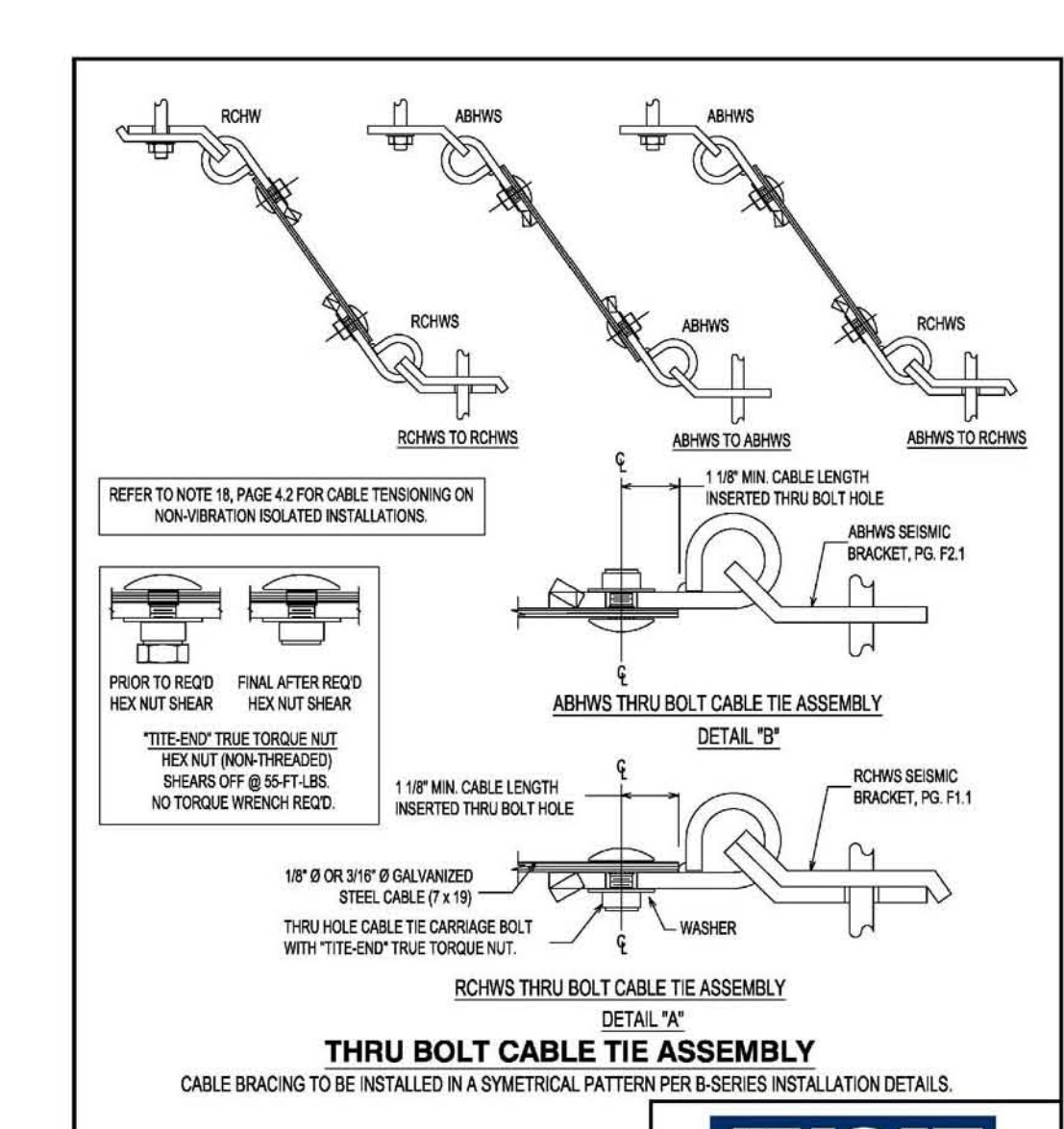
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K-AB29-126-004

Directory - ISAT Cable Brace Assemblies			
ISAT Brace Assembly	Rod Diameter	Lower Bracket	Upper Bracket
C1	3/8"	RCC38	ABF12
C2	3/8"	RCHW38	ABF12
C3	3/8"	RCC38	ABF12
C4	3/8"	RCHW38	ABF12
C4.1	3/8"	RCC38X	ABF12
C4.2	3/8"	RCHW38X	ABF12
C4.3	3/8"	RCHW38X	ABF12
C5	1/2"	RCC12	ABF12
C6	1/2"	RCHW12	ABF12
C7	1/2"	RCC12	ABF12
C8	1/2"	RCHW12	ABF12
C8.1	1/2"	RCC12X	ABF34
C8.2	1/2"	RCHW12X	ABF34
C8.3	1/2"	RCC12X	ABF12
C8.4	1/2"	RCHW12X	ABF12
C8.5	1/2"	RCC12X	ABF12
C8.6	1/2"	RCHW12X	ABF12
C8.7	1/2"	RCC12X	ABF12
C9	3/4"	RCC34	ABF34
C10	3/4"	RCHW34	ABF34
C11	3/4"	RCC34	ABF34
C12	3/4"	RCHW34	ABF34
C13	3/4"	RCC34	ABF34
C14	3/4"	RCHW34	ABF34
C15	3/4"	RCC34	ABF34
C16	3/4"	RCHW34	ABF34
C17	3/4"	RCC34	ABF34
C18	3/4"	RCHW34	ABF34
C19	7/8"	RCHW78	ABF78
C20	7/8"	RCHW78	ABF78
C21	1"	RCHW100	ABF100
C22	1"	RCHW100	ABF100
C23	1"	RCHW100	ABF100
C24	1"	RCHW100	ABF100
C25	1"	RCHW100	ABF100

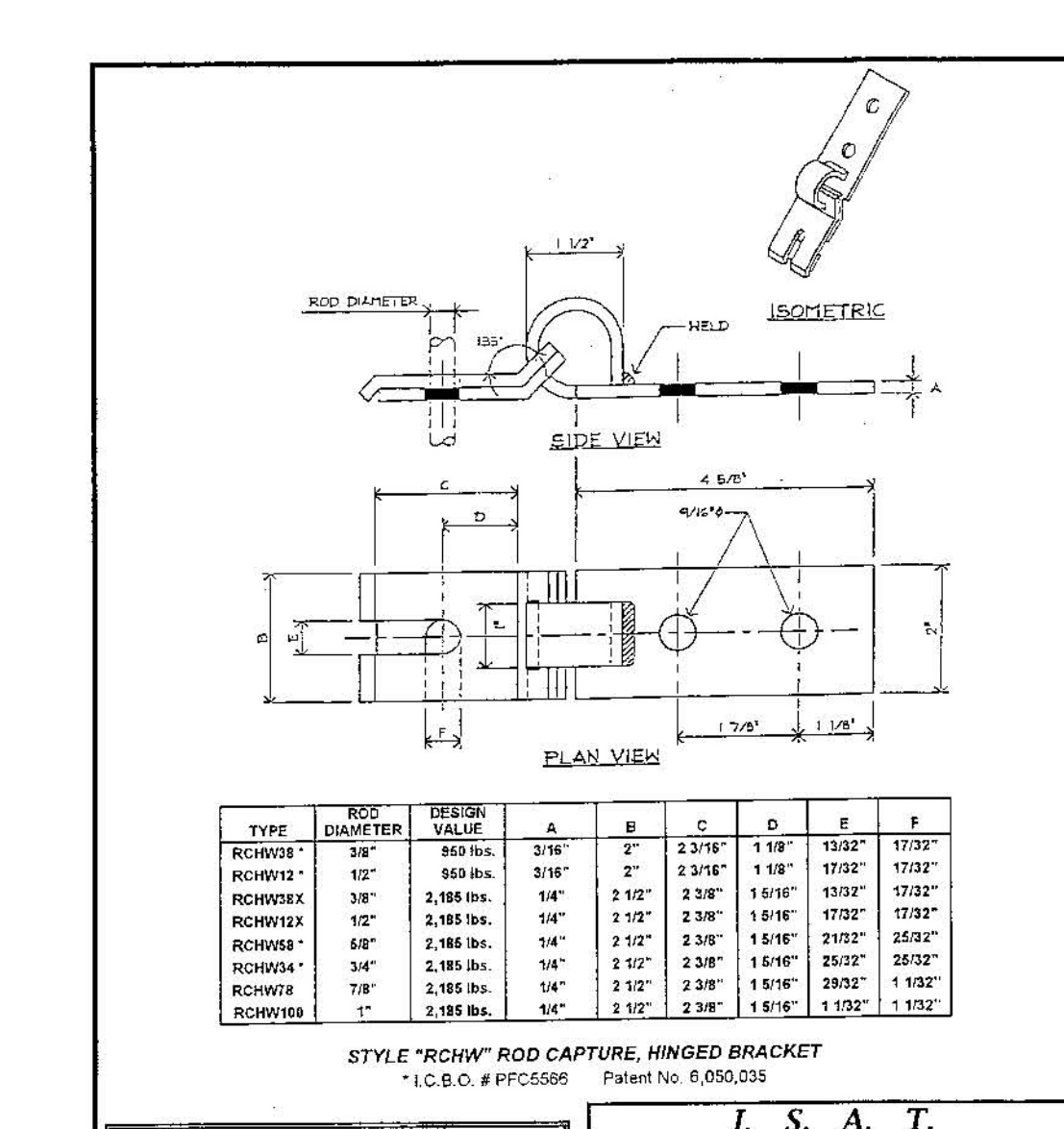
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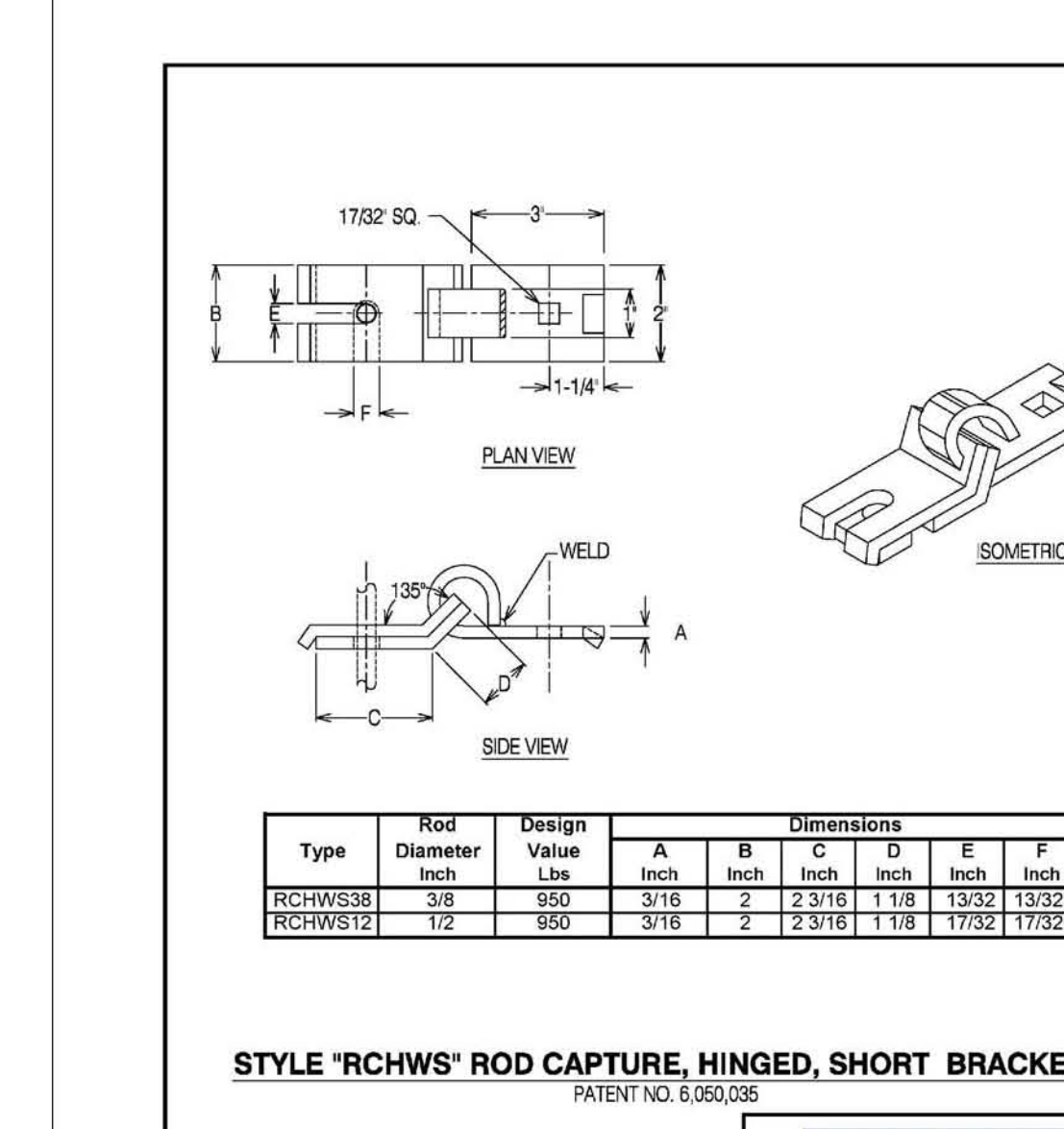
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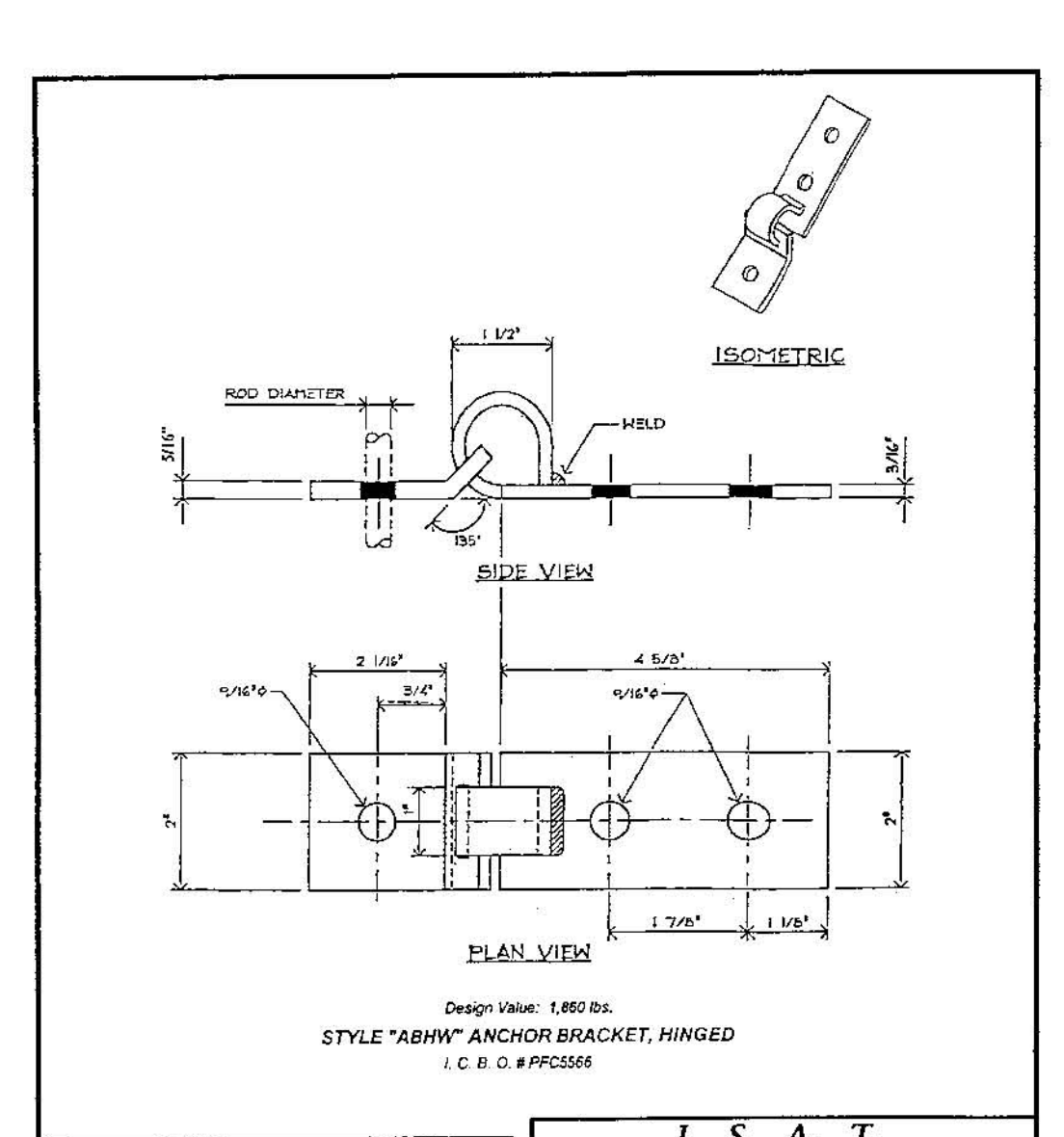
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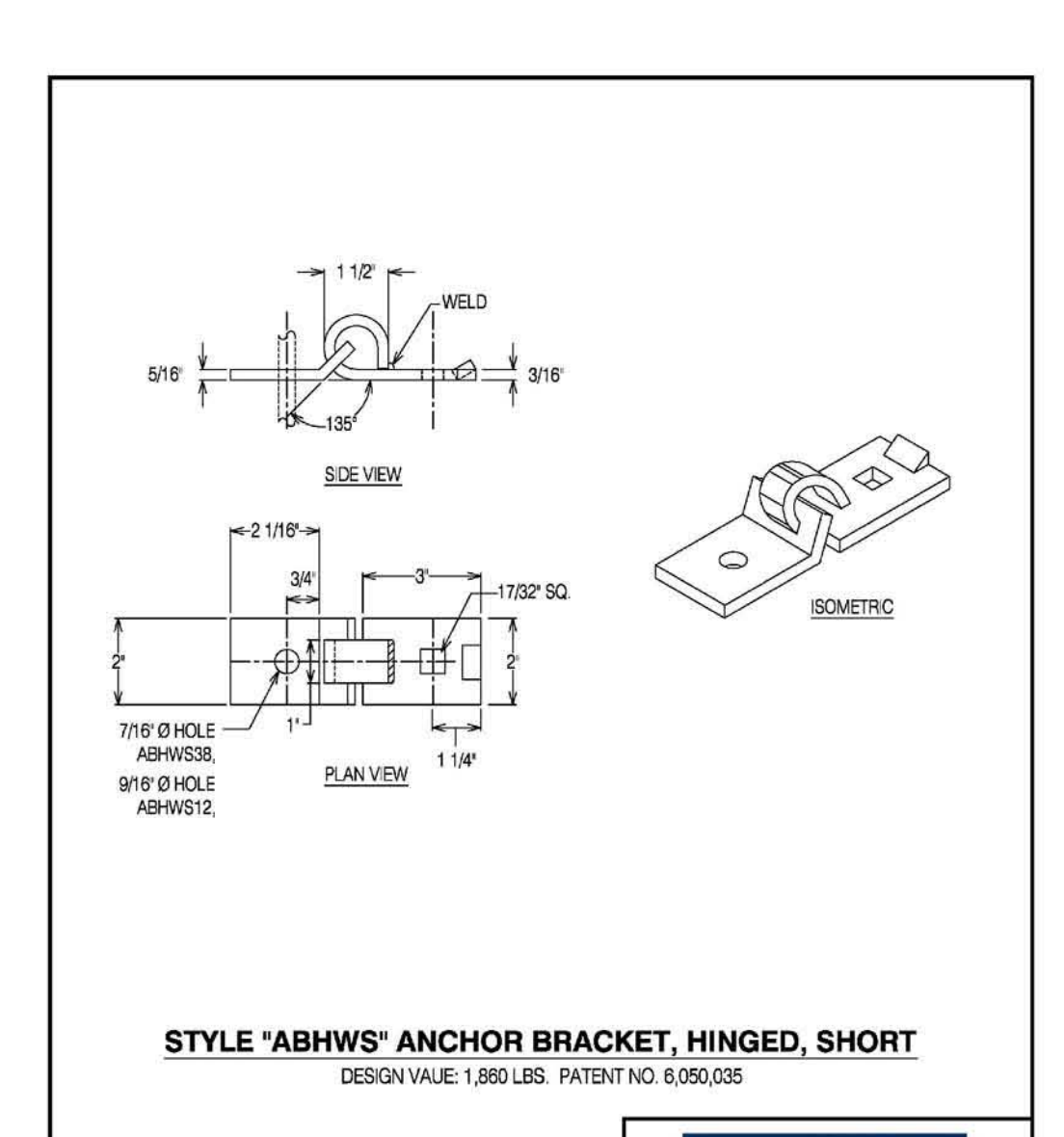
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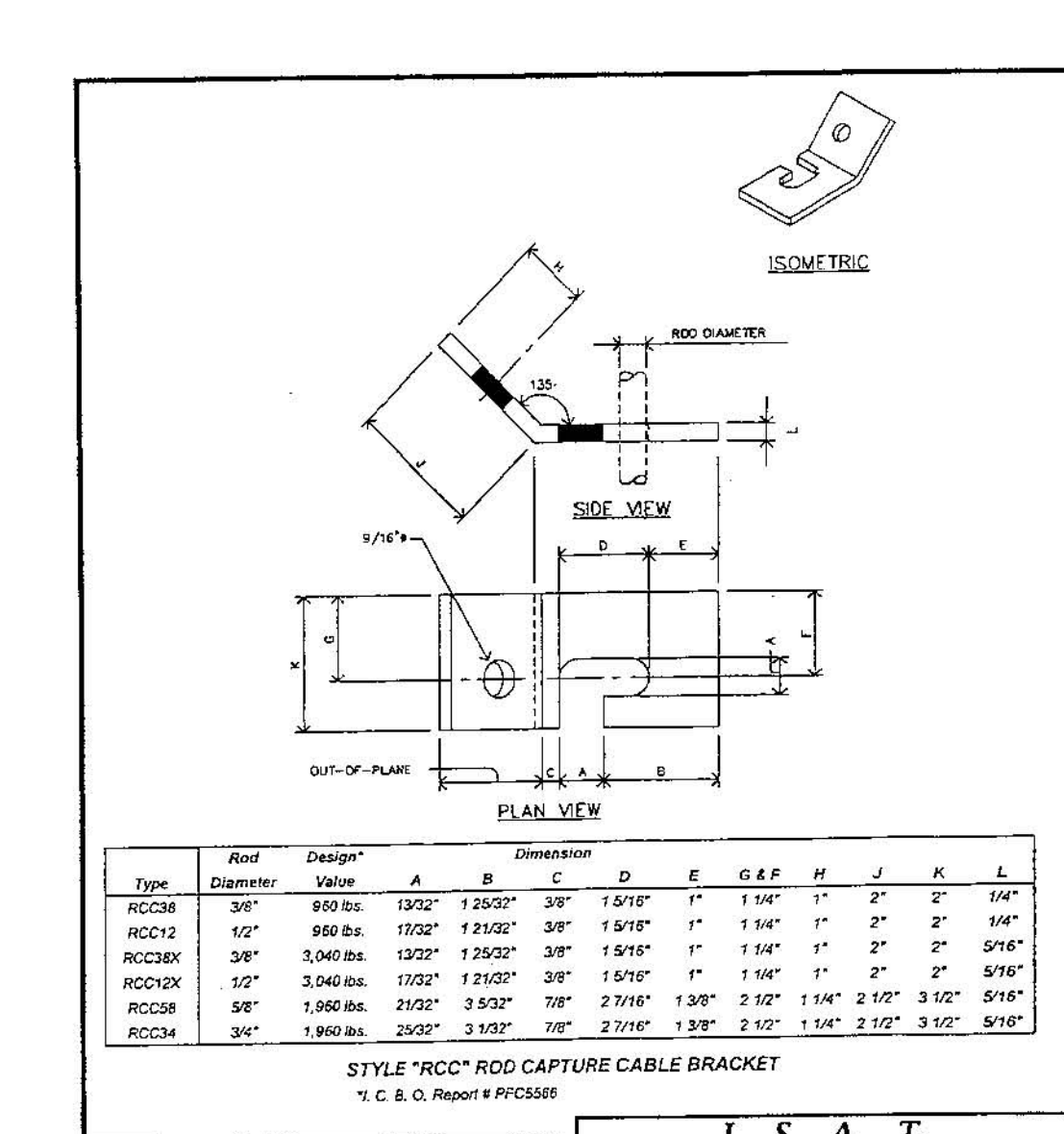
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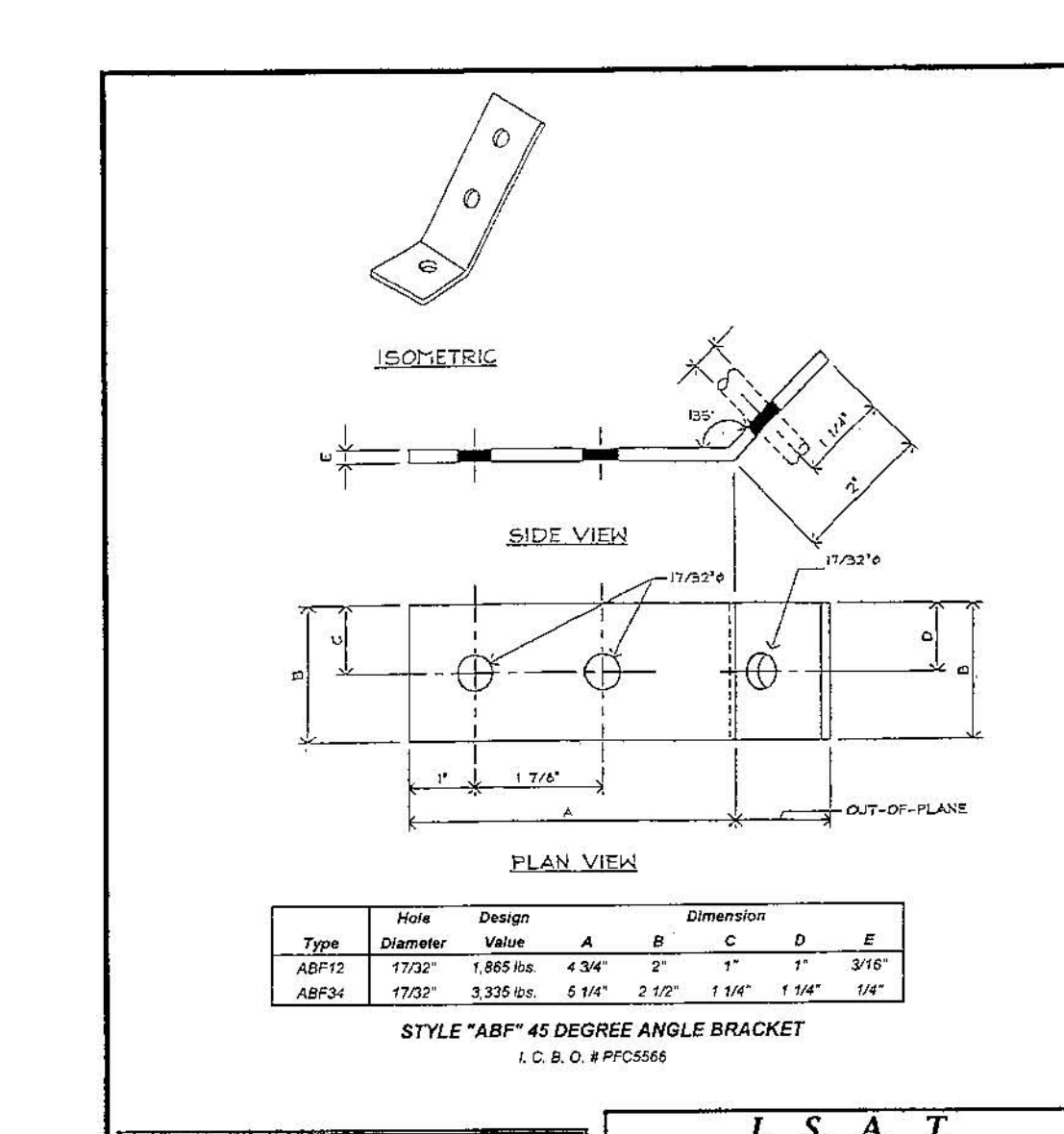
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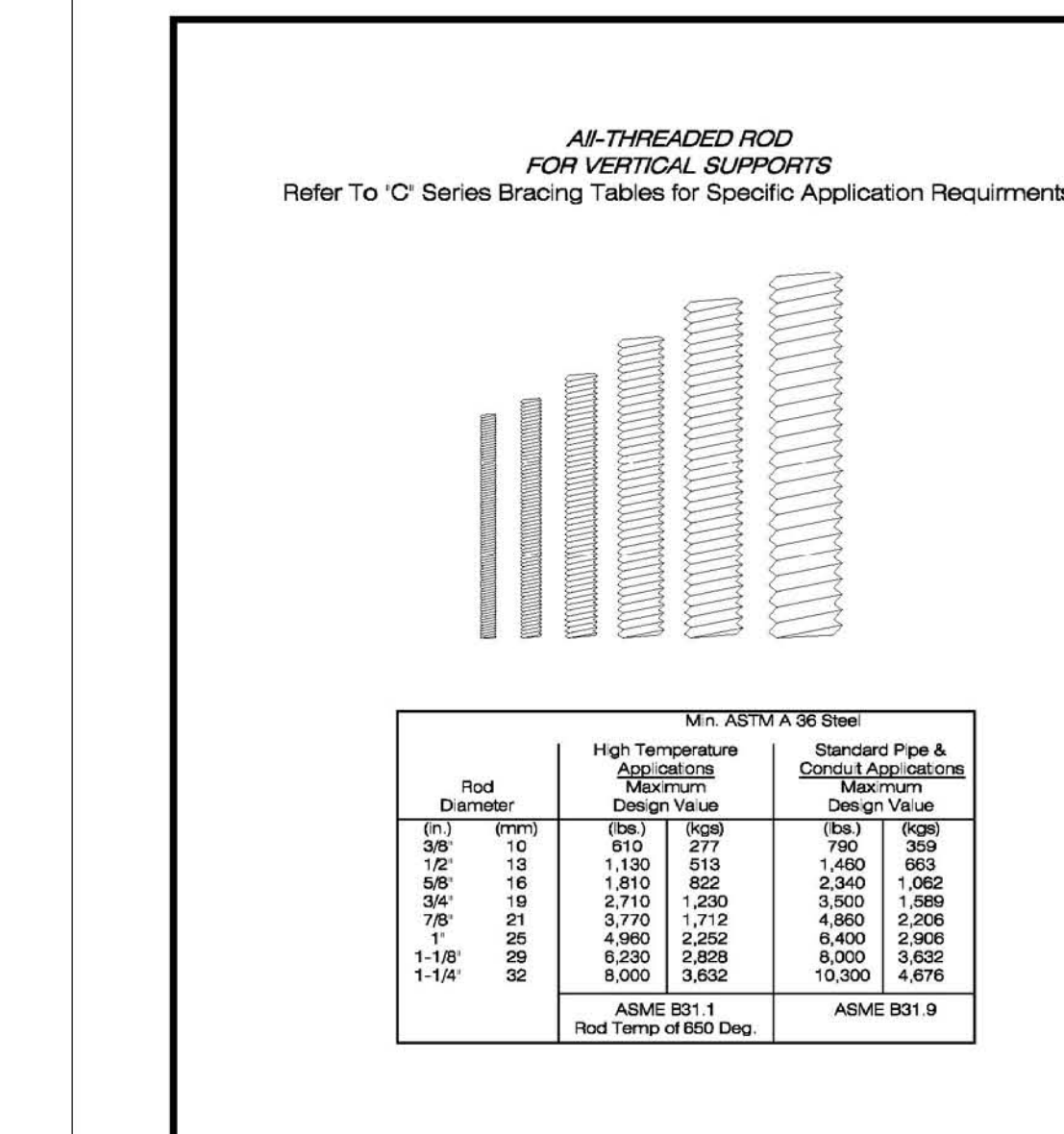
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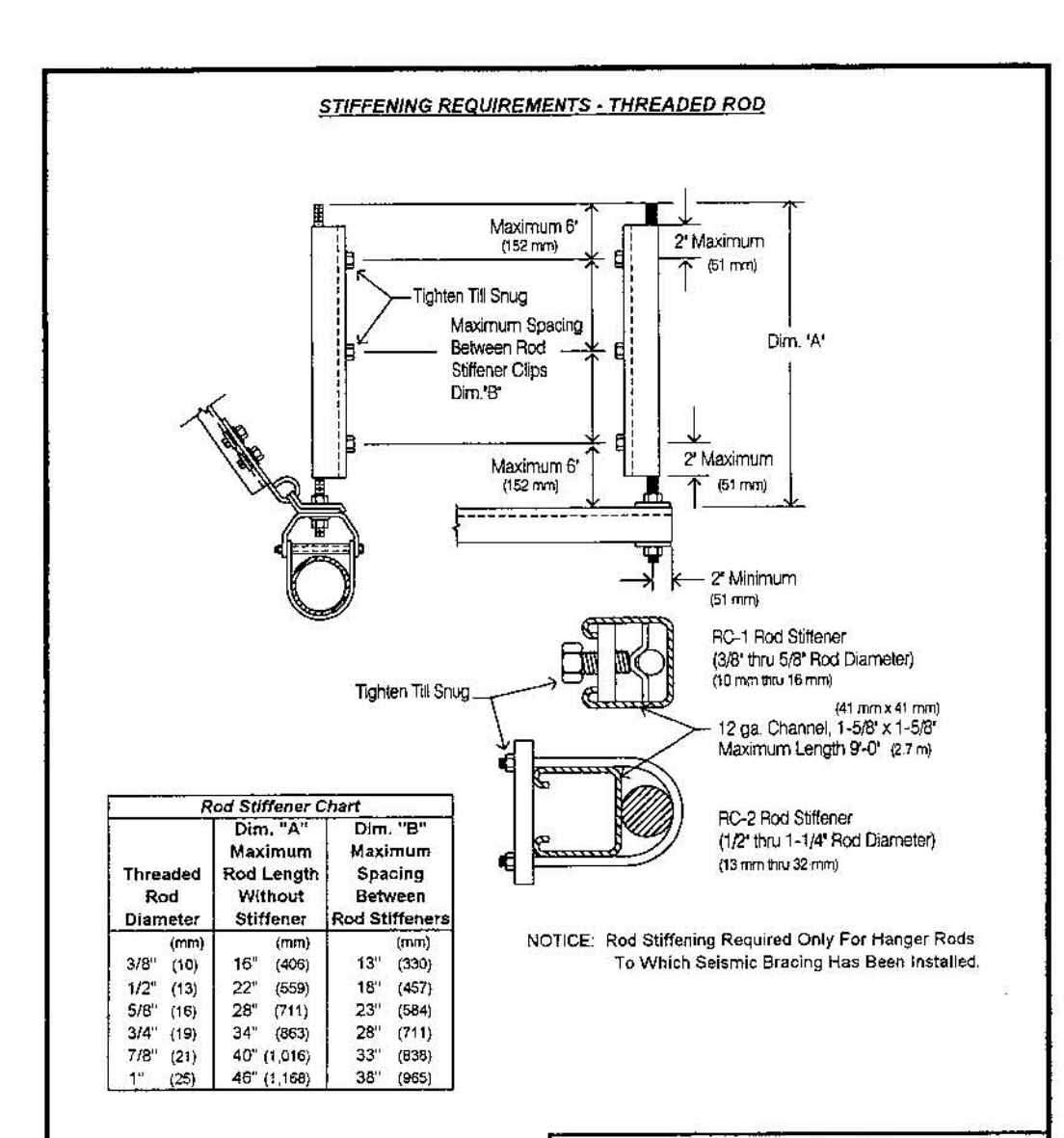
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Rev. 2 Jun-02 Page G2

MAXIMUM TRAPEZOID SUPPORT LOADS			
SINGLE CHANNEL (12 in. x 1.58" x 1.58")		DOUBLE CHANNEL (12 in. x 1.58" x 3.14")	
MAX TOTAL UNIFORM LOAD	DEFLECTION	MAX TOTAL UNIFORM LOAD	DEFLECTION
34"	2,100	15"	3,150
36"	1,800	24"	3,150
38"	1,600	30"	3,150
40"	1,400	36"	3,150
42"	1,200	42"	3,150
44"	1,000	48"	3,150
46"	900	54"	3,150
48"	800	60"	3,150
50"	700	66"	3,150
52"	600	72"	3,150
54"	500	78"	3,150
56"	400	84"	3,150
58"	300	90"	3,150
60"	200	96"	3,150
62"	100	102"	3,150

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RIGID BRACING - TRAPEZOID MOUNTED PIPE RACK, CONDUIT RACK, HVAC DUCT, CABLE TRAY (Max. 150 LBS/FT)					
Max. Spacing	Max. Rod Dia.	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Brace Spacing	Reaction Assembly	Brace Spacing	Reaction Assembly
0.20	3/8"	40	1.80	40	1.80
0.30	3/8"	40	1.80	40	1.80
0.40	3/8"	40	1.80	40	1.80
0.50	3/8"	40	1.80	40	1.80
0.60	3/8"	40	1.80	40	1.80
0.70	3/8"	40	1.80	40	1.80
0.80	3/8"	40	1.80	40	1.80
0.90	3/8"	40	1.80	40	1.80
1.00	3/8"	40	1.80	40	1.80
1.20	3/8"	40	1.80	40	1.80
1.40	3/8"	40	1.80	40	1.80
1.60	3/8"	40	1.80	40	1.80
1.80	3/8"	40	1.80	40	1.80
2.00	3/8"	40	1.80	40	1.80

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Rev. 4 Jun-02 Page TR-25

RIGID BRACING - TRAPEZOID MOUNTED PIPE RACK, CONDUIT RACK, HVAC DUCT, CABLE TRAY (Max. 150 LBS/FT)					
Max. Spacing	Max. Rod Dia.	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Brace Spacing	Reaction Assembly	Brace Spacing	Reaction Assembly
0.20	3/8"	40	1.80	40	1.80
0.30	3/8"	40	1.80	40	1.80
0.40	3/8"	40	1.80	40	1.80
0.50	3/8"	40	1.80	40	1.80
0.60	3/8"	40	1.80	40	1.80
0.70	3/8"	40	1.80	40	1.80
0.80	3/8"	40	1.80	40	1.80
0.90	3/8"	40	1.80	40	1.80
1.00	3/8"	40	1.80	40	1.80
1.20	3/8"	40	1.80	40	1.80
1.40	3/8"	40	1.80	40	1.80
1.60	3/8"	40	1.80	40	1.80
1.80	3/8"	40	1.80	40	1.80
2.00	3/8"	40	1.80	40	1.80

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Rev. 1 Jun-02 Page TR-150

RIGID BRACING - TRAPEZOID MOUNTED PIPE RACK, CONDUIT RACK, HVAC DUCT, CABLE TRAY (Max. 150 LBS/FT)					
Max. Spacing	Max. Rod Dia.	TRANSVERSE BRACING REQUIREMENTS		LONGITUDINAL BRACING REQUIREMENTS	
		Brace Spacing	Reaction Assembly	Brace Spacing	Reaction Assembly
0.20	3/8"	40	1.80	40	1.80
0.30	3/8"	40	1.80	40	1.80
0.40	3/8"	40	1.80	40	1.80
0.50	3/8"	40	1.80	40	1.80
0.60	3/8"	40	1.80	40	1.80
0.70	3/8"	40	1.80	40	1.80
0.80	3/8"	40	1.80	40	1.80
0.90	3/8"	40	1.80	40	1.80
1.00	3/8"	40	1.80	40	1.80
1.20	3/8"	40	1.80	40	1.80
1.40	3/8"	40	1.80	40	1.80
1.60	3/8"	40	1.80	40	1.80
1.80	3/8"	40	1.80	40	1.80
2.00	3/8"	40	1.80	40	1.80

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CABLE TRAY

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SHEET TITLE: SEISMIC DETAILS

DRAWING NO.: K-AB29-126-005

4 WAY SPREAD CABLE BRACING
TRAPEZE MOUNTED PIPE RACK, CONDUIT RACK, CABLE TRAY, BUS DUCT, HVAC DUCT (Max. 150 LBS./F)

BRACING REQUIREMENTS

Detail	Depth	Height	Max. Spacing	Min. Spacing	Min. Brace	Min. Brace	Min. Brace	Min. Brace	Min. Brace
Force	Support	Spacing	Height	Assembly	WCC	WCC	WCC	WCC	WCC
0.25	1/2"	40	1,200	CS-1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.30	1/2"	40	1,200	CS-1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.40	5/8"	33	1,075	C12	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.50	5/8"	27	2,024	C12	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.60	5/8"	22	1,975	C12	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.70	5/8"	19	1,936	C12	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.80	5/8"	16	1,819	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
0.90	5/8"	15	2,024	C12	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
1.00	5/8"	13	1,889	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
1.20	5/8"	11	1,979	C19	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
1.40	5/8"	9	1,889	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
1.60	5/8"	8	1,919	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
1.80	5/8"	7	1,889	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307
2.00	5/8"	6	1,759	C11.1	ANSI A307	ANSI A307	ANSI A307	ANSI A307	ANSI A307

Requires Use of ISAT Seismic Bracing per IBC 610 Report #1000-0100. Use of Any Substitute Bracing Must Be Approved by I.S.A.T. Engineering.
 @ Min. 45 Degree Inclination. * Max. 3000 lbs. WCC. ** Max. 3000 lbs. WCC. ** Max. 3000 lbs. WCC. ** Max. 3000 lbs. WCC. ** Max. 3000 lbs. WCC. ** Max. 3000 lbs. WCC.
 Vertical Spacing: Maximum 10' On Center. Minimum Rod Diameter: To Be Per Project Document Requirements or IBC 610 Section Table. Largest Diameter Permitted.
 Note: The Following Table Is One-Half The Spacing Shown Above. If No-Load Case Not. If No-Load Case Not. If No-Load Case Not. If No-Load Case Not. If No-Load Case Not.
 Refer to Bracing Notes Pages 7, 8 and 9.

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Rev. 1
Jun-02
Page
C7.6

SEISMIC BRACING NOTES
SUSPENDED ELECTRICAL SYSTEMS

Seismic bracing is to be installed on all conduit runs, cable trays and bus ducts per ISAT's engineered bracing tables, ISAT's installation details and the following criteria:

1. Install seismic bracing for all conduit 2-1/2" (63.5 mm) trade size or greater.
2. All trapeze assemblies supporting conduits, cable trays or bus ducts shall be braced considering the total weight of the elements on the trapeze. For the purposes of calculating weight, all conduits are to be treated as full.
3. Brace all trapeze racks which support conduit 2-1/2" (63.5 mm) trade size or larger. Brace all other conduit rack, cable tray or bus duct trapezes with a minimum weight in excess of 10 pounds (4.54 kg) per linear foot.
4. Conduit constructed of nonductile materials (e.g., plastic), shall have the brace spacing reduced to one-half of the spacing allowed for ductile materials.
5. Seismic bracing may be omitted from cable trays, conduit and bus ducts suspended by rod hanger supports 12" (305 mm) or less in length from the top of the element to the bottom of the structural attachment for the hanger. (On projects under the 1997 UBC, Volume 2 or the 2001 CBC, Volume 2 - applicable only where lateral motion will not cause damaging impact with other systems or loss of system vertical support and rod-hanger supports have top connections that cannot develop moments.)

Important Notice:
Elements 1 thru 5 derive from the 2001 California Building Code, Volume 2, Chapter 16A, for state owned facilities and all hospitals or essential facilities under the jurisdiction of OSHPD.

These criteria may also be used in other jurisdictions including projects under the 1997 Uniform Building Code subject to the requirements of the project documents, prior approval of the engineer of record and approval of the local code authority.

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Rev. 5
Jun-02
Page
7.00

SEISMIC BRACING NOTES
SUSPENDED ELECTRICAL SYSTEMS - CONTINUED

6. Brace spacing shall not exceed the maximum allowable brace spacing as engineered by ISAT. Refer to individual ISAT Engineered Bracing Charts compiled by conduit size or trapeze weight (Index Pages C.05 and C.06).
7. All seismic bracing assemblies shall utilize ISAT engineered and tested seismic brackets per ICBO Evaluation Services Report Number PFC 5546. **NO SUBSTITUTIONS ALLOWED.** Use of any substitute bracket not covered in the subject ICBO report voids all engineering.
8. Every conduit run which requires bracing shall have a minimum of two Transverse Braces and one Longitudinal Brace. For the purposes of this manual, a "run" is defined as suspended conduit of 5 foot minimum straight length.
9. A Longitudinal Brace at a 90 degree change in direction may act as a Transverse Brace if it is located within 2 feet of the change in direction.
10. A Transverse Brace may act as a Longitudinal Brace if it is located within 2 feet of a 90 degree change in direction and if the anchorage, brace arm and connection to the conduit have been sized to meet or exceed the requirements of a Longitudinal Brace.
11. All Longitudinal Brace locations for individually supported conduit shall employ an ISAT Longitudinal Restrain Device (LRD) as situated on Page F7 and installed per individual detail drawings, Page 51.2.
12. Any hand clevis or J hanger which complies with industry standards and is appropriately sized for the condition may be used as a support for suspended conduit.
13. Vertical support spacing for trapeze runs is to be the lesser of 10 foot maximum or as listed in the project specifications.
14. When used to construct a rigid brace arm assembly, minimum 12 gauge steel channel may be solid, punched or short slot.

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Rev. 1
Jun-02
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7.01

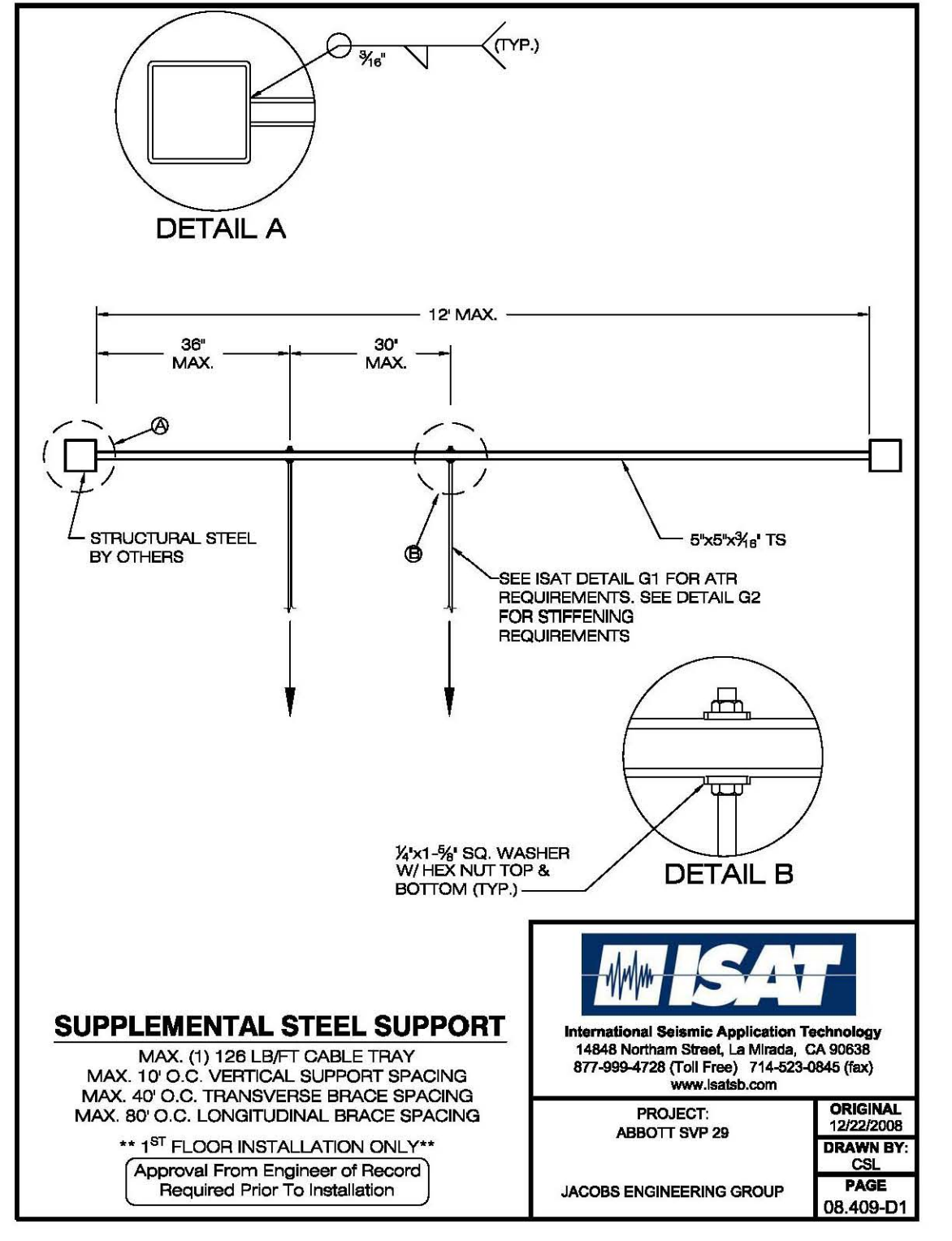
SEISMIC BRACING NOTES
SUSPENDED ELECTRICAL SYSTEMS - CONTINUED

15. Each layer of a multi-layer trapeze rack shall be braced individually based on the weight of the individual layer.
16. All vertical risers involving conduit 2-1/2" in diameter or larger shall include lateral restraint at maximum 30 foot intervals and at the top and bottom of the riser.
17. For buildings six stories or more in height, the lateral seismic restraint and the vertical support shall be engineered on an individual job basis.

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Rev. 1
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7.02



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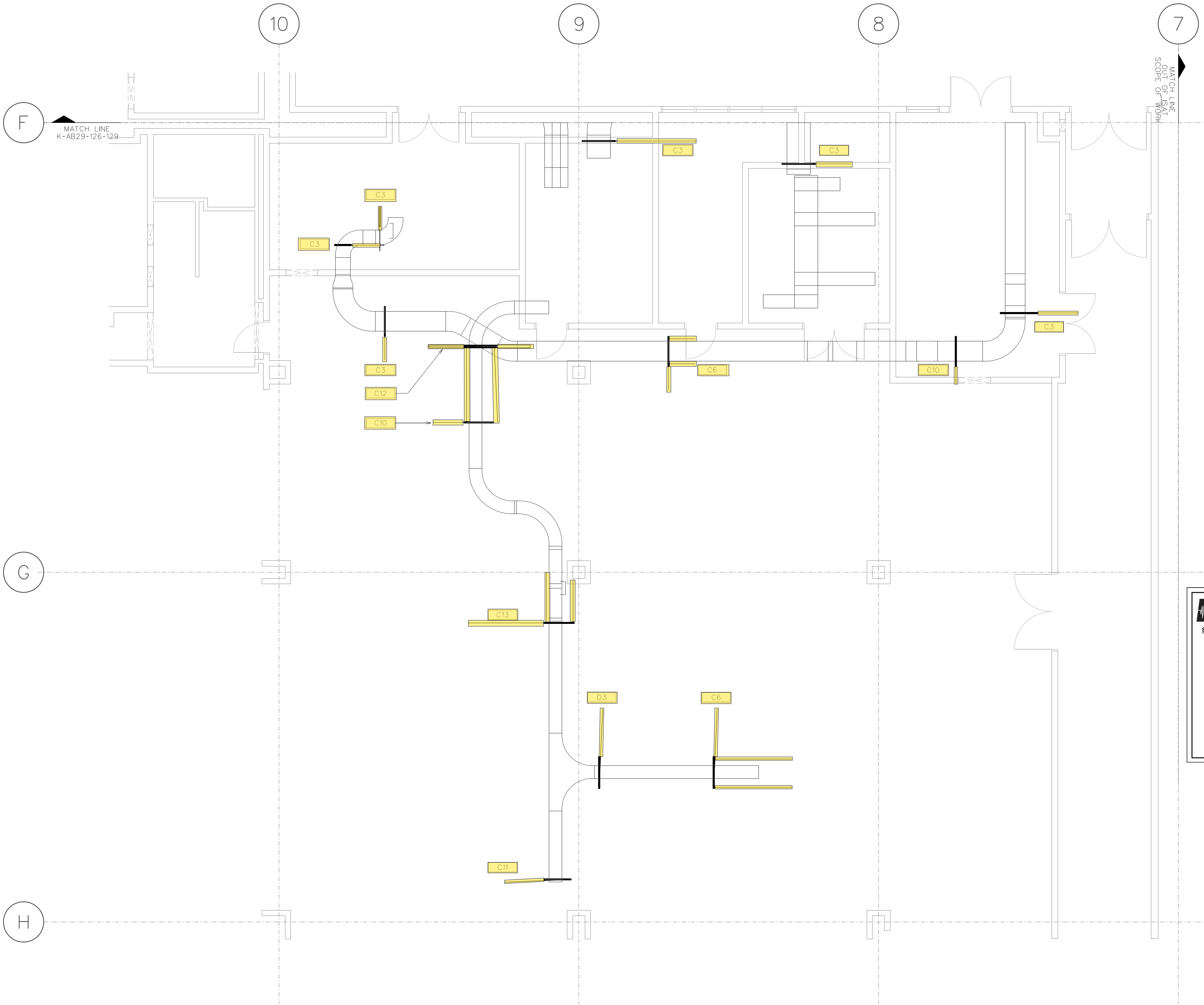
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APPROVED BY:	
JOB NO.:	
ENG. PKG. NO.:	
DATE:	03/27/09
OSHPD:	

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

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

SHEET TITLE:
SEISMIC DETAILS

DRAWING NO.:
K-AB29-126-006



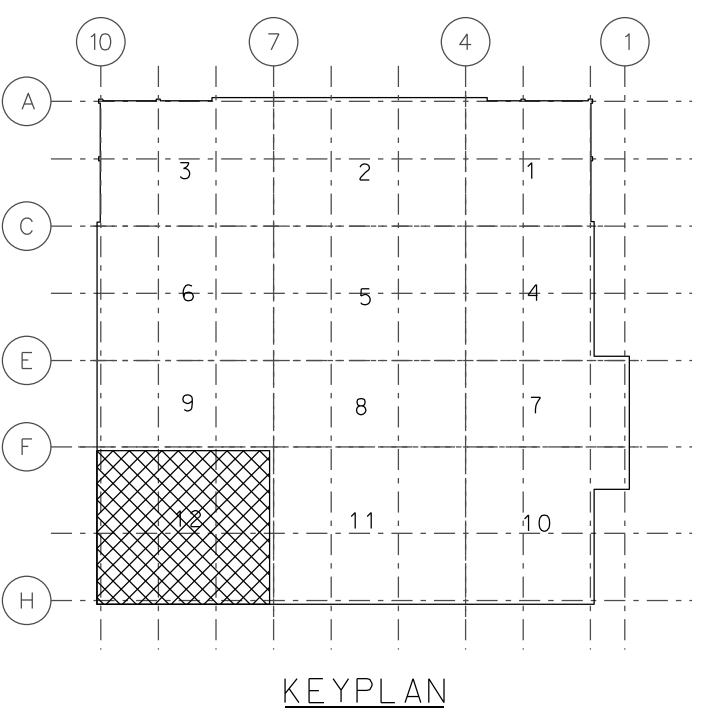
ISAT SEISMIC RESTRAINT LEGEND
SVP - CLEAN UTILITIES

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

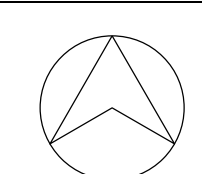
SEISMIC BRACING SHALL NOT BE REQUIRED BASED ON THE FOLLOWING CODE EXCLUSIONS*

- *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 # pfl 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 #PFC5566.
I.S.A.T. 14848 Northam St. La Mirada, Ca. 90638 Toll Free 877-999-4728 Fax 714-523-0845



NOTICE!
THIS IS A COMPUTER PLOT.
CHANGES MUST BE MADE
ON THE CADD SYSTEM



NORTH

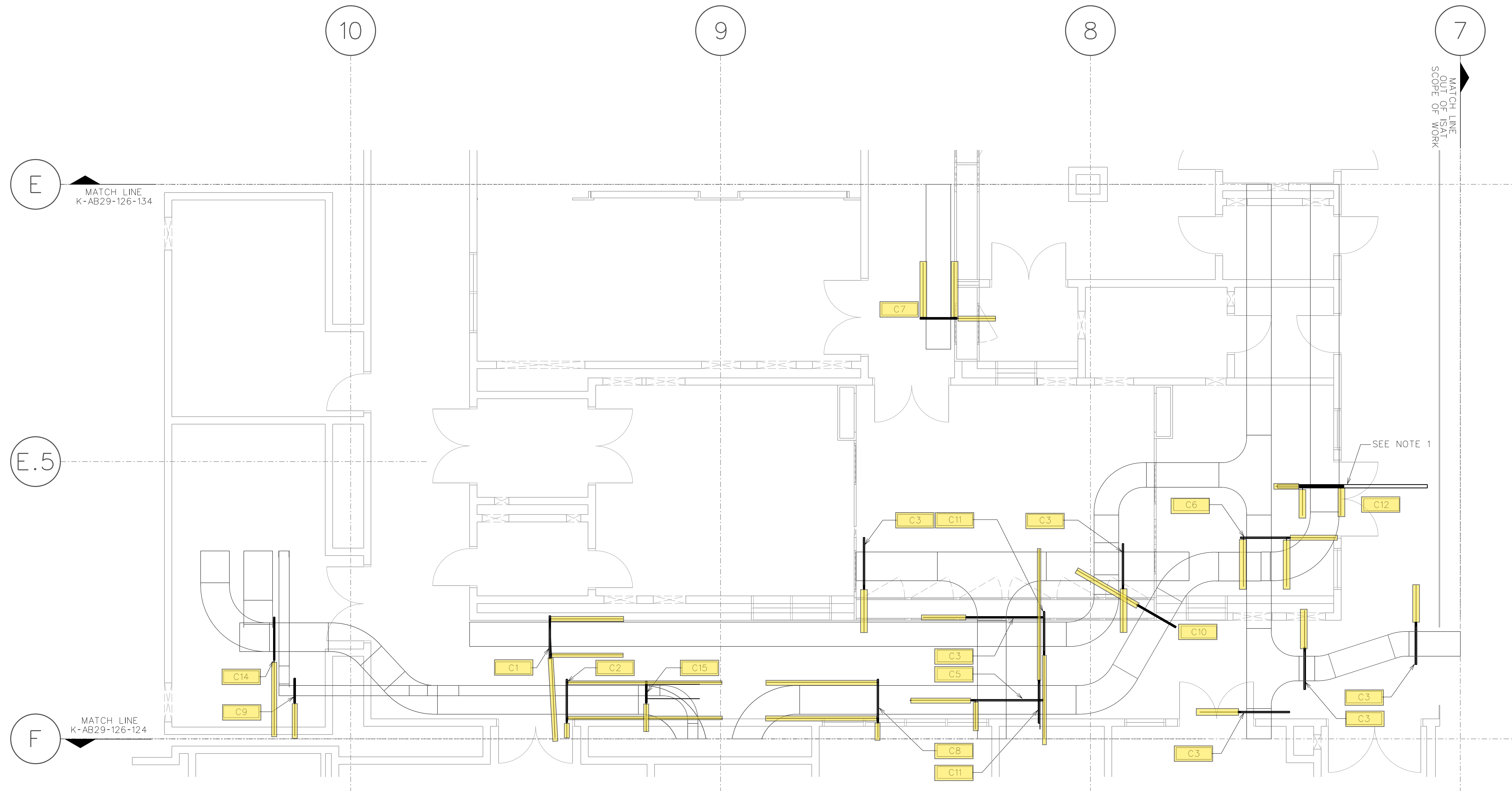
COL. F-H, 7-10
CABLE TRAY SEISMIC PLAN
FIRST FLOOR

FILE NO: AB29126124.DGN
DRAWING NO: K-AB29-126-124

NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER	DATE	SCALE	DATE	SCALE	DRWG. NO.	REV. NO.
1															03-25-09	1/4" = 1'-0"	K-AB29-126-124	1

GENERAL NOTES:

- FOR MOMENT FRAME DETAIL SEE ENGINEERING PACKAGE OR SHEET K-AB29-126-010 DETAIL 08.409-D1, TYP.



ISAT

SEISMIC RESTRAINT LEGEND
SVP - CLEAN UTILITIES

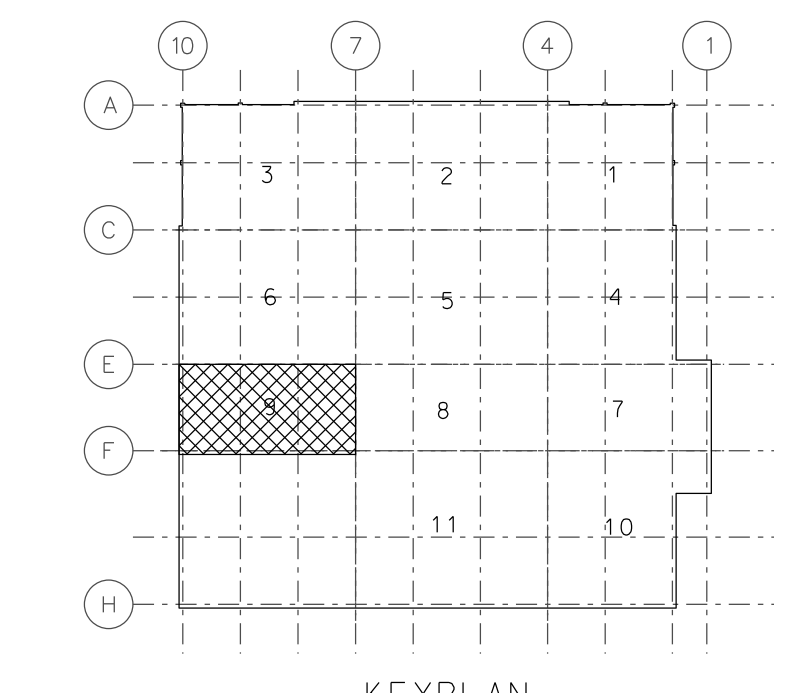
SEE ISAT SEISMIC BRACING LEGEND ON SHEET # SB -1 FOR INFORMATION ON SEISMIC LOCATIONS & ISAT KIT I.D.*

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

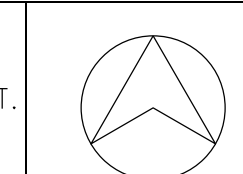
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* See ISAT Manual and Submittal Documents
Rod Capture Seismic Brackets per ICBO Report RRP05568
I.S.A.T. 14848 Northam St. La Mirada, Ca. 90638 Toll Free 877-999-4728 Fax 714-523-0845

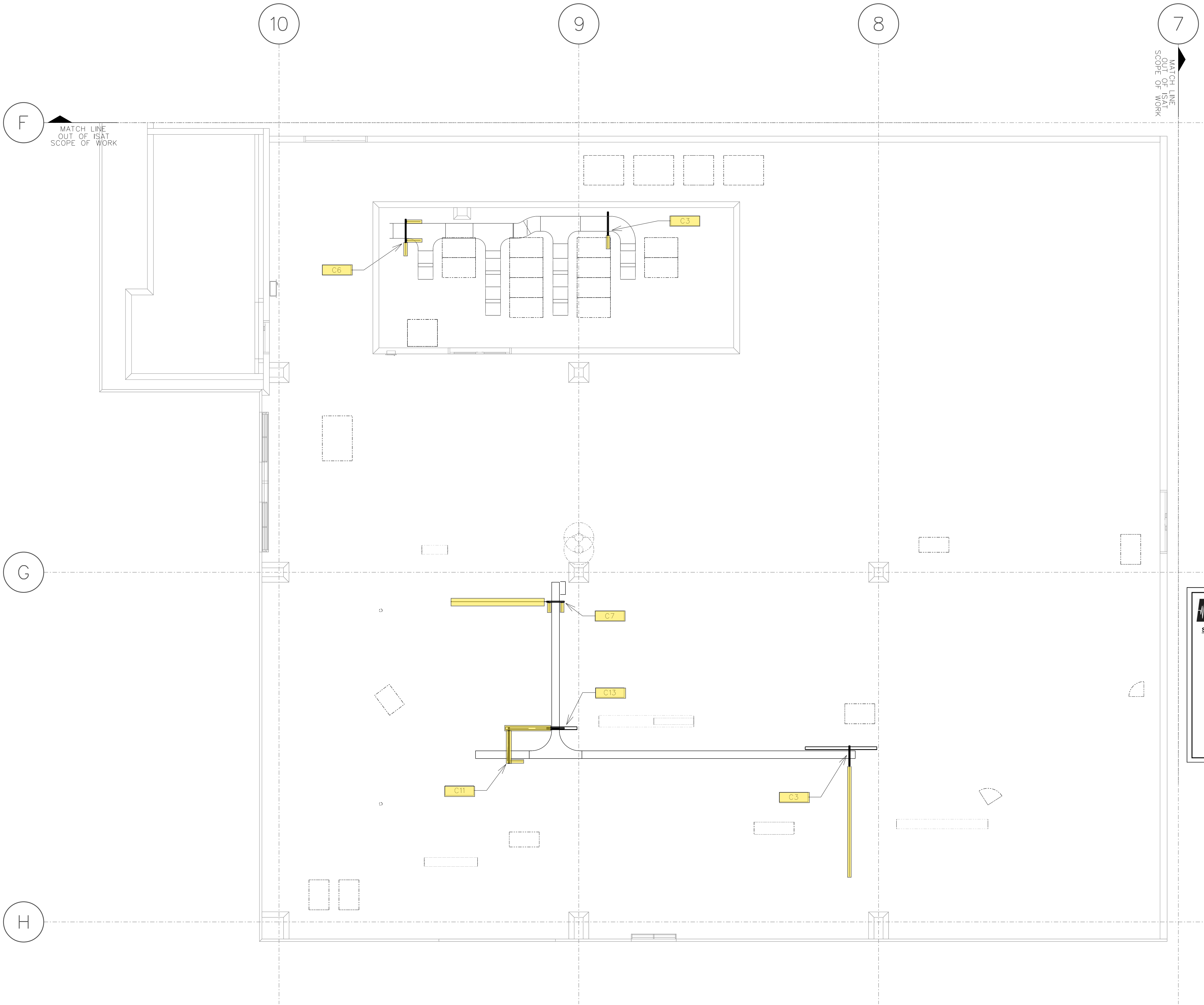


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ON THE CADD SYSTEM



COL. E-F, 7-10
CABLE TRAY SEISMIC PLAN
FIRST FLOOR INTERSTITIAL

NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER	DATE	REVISION	DRAFTER	ENGINEER	DATE	SCALE	DRWG. NO.	REV. NO.	
1																		03-25-09	1/4" = 1'-0"	K-AB29-126-129	1



MATCH LINE
OUT OF ISAT
SCOPE OF WORK

MATCH LINE
OUT OF ISAT
SCOPE OF WORK

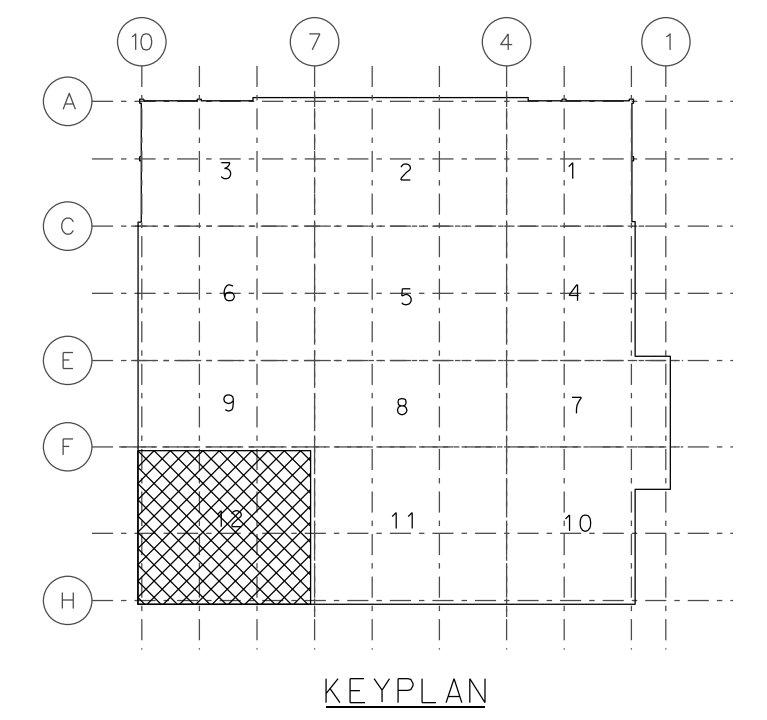
ISAT SEISMIC RESTRAINT LEGEND
SVP - CLEAN UTILITIES

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I.S.A.T. 14848 Northam St. La Mirada, Ca. 90638 Toll Free 877-999-4728 Fax 714-523-0845

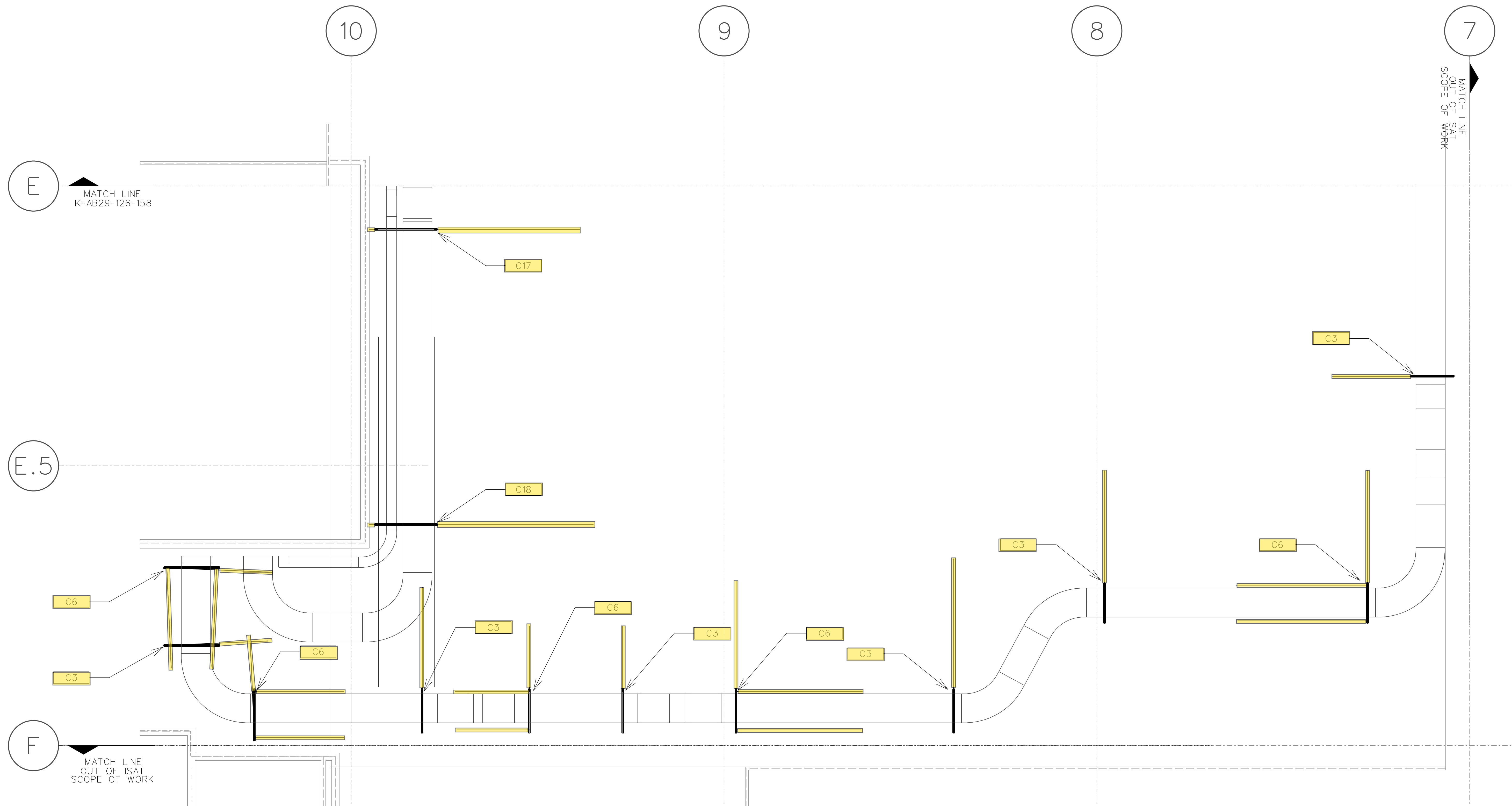


NOTICE!
THIS IS A COMPUTER PLOT.
CHANGES MUST BE MADE
ON THE CADD SYSTEM



COL. F-H,7-10
CABLE TRAY SEISMIC PLAN
SECOND FLOOR

NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER	DATE	SCALE	1/4" = 1'-0"	DRWG. NO.	K-AB29-126-144	REV. NO.	1
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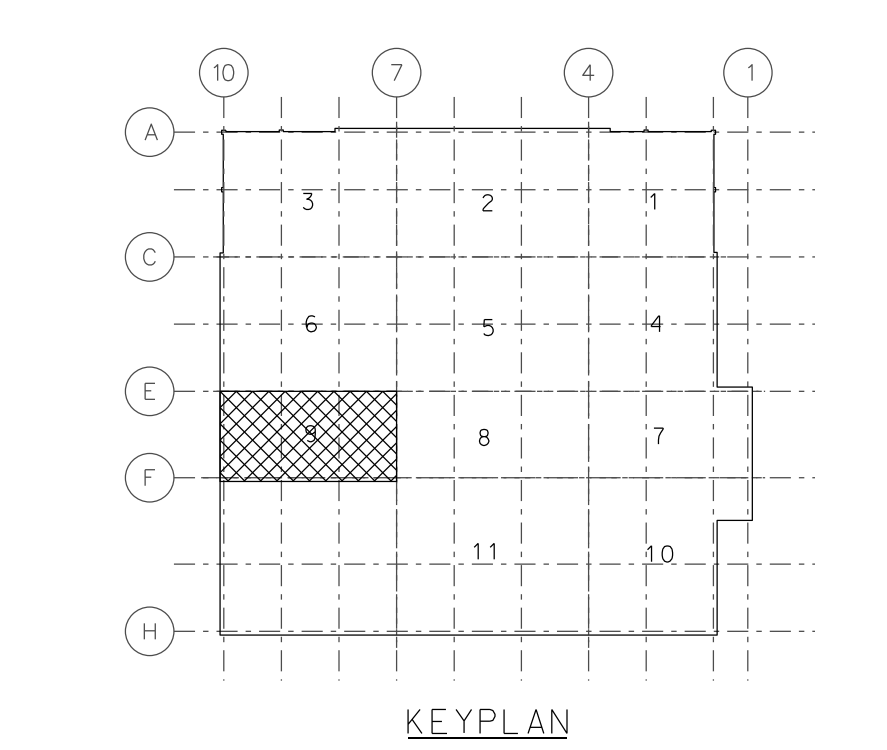
ISAT
SEISMIC RESTRAINT LEGEND
 SVP - CLEAN UTILITIES

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

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 Rod Capture Seismic Brackets per ICBO Report #RRC5566
 I.S.A.T. 14848 Northam St. La Mirada, Ca. 90638 Toll Free 877-999-4728 Fax 714-523-0845



NO.	DATE	REVISION	DRAFTER	ENGINEER	NO.	DATE	REVISION	DRAFTER	ENGINEER	NO.	DATE	REVISION	DRAFTER	ENGINEER	NO.	DATE	REVISION	DRAFTER	ENGINEER	
1																				

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 CHANGES MUST BE MADE
 ON THE CADD SYSTEM

NORTH

COL. E-F, 7-10
 CABLE TRAY SEISMIC PLAN
 4TH FLOOR

FILE NO: AB29126155.DGN
 DRAWING NO: K-AB29-126-155

SCALE: 1/4" = 1'-0"

REV. NO: 1

10

9

8

7

C

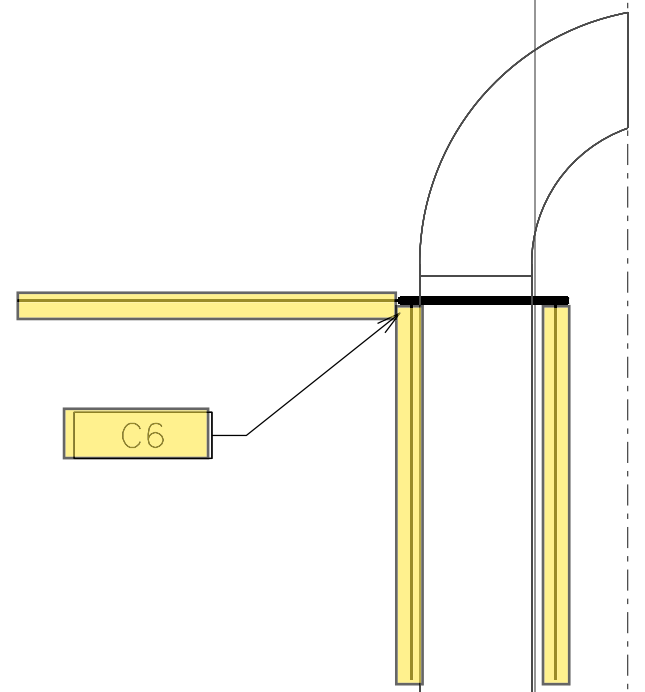
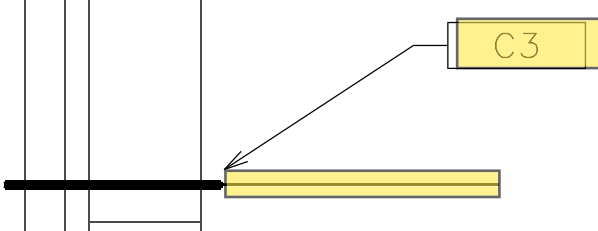
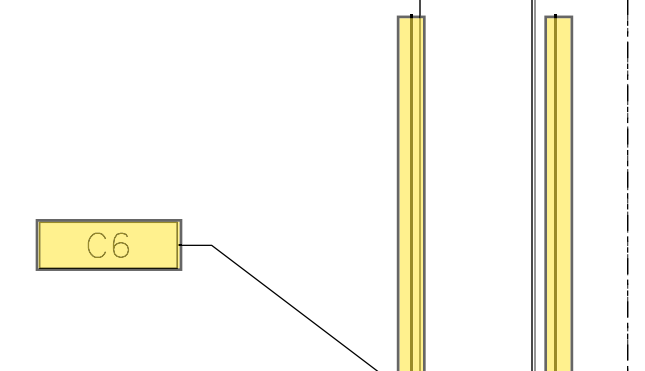
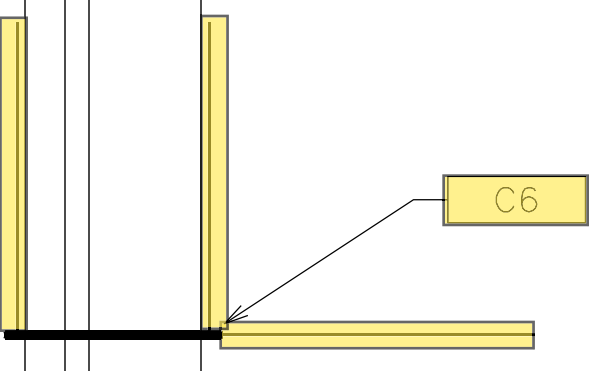
MATCH LINE
K-AB29-126-159

MATCH LINE
OUT OF ISAT
SCOPE OF WORK

D

E

MATCH LINE
K-AB29-126-155



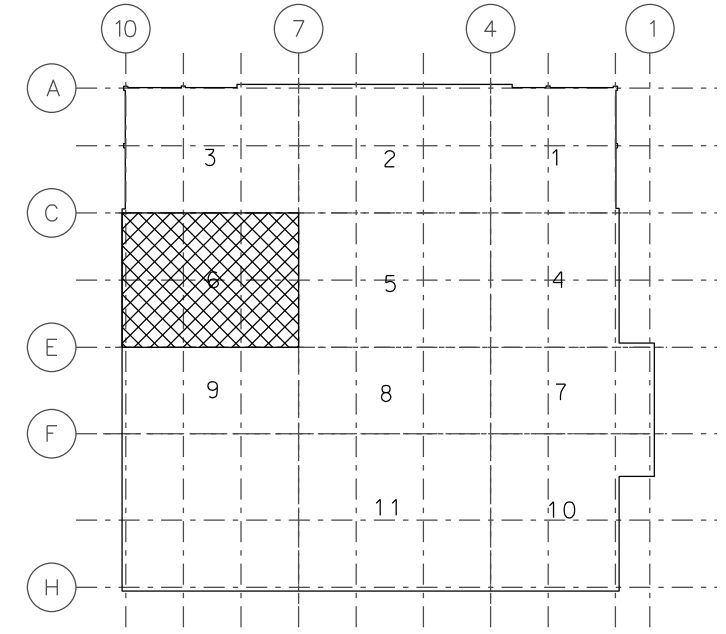
ISAT SEISMIC RESTRAINT LEGEND
SVP - CLEAN UTILITIES

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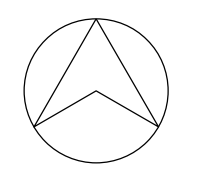
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Rod Capture Seismic Brackets per ICBO Report #PFC5566
I.S.A.T. 14848 Northam St. La Mirada, Ca. 90638 Toll Free 877-999-4728 Fax 714-523-0845



KEYPLAN

NOTICE!
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CHANGES MUST BE MADE
ON THE CADD SYSTEM



NORTH

COL. C-E, 7-10
CABLE TRAY SEISMIC PLAN
4TH FLOOR

FILE NO: AB29126158.DGN
DRAWG. NO: K-AB29-126-158
REV. NO: 1

NO.	DATE	REVISION	DRAFTER	ENGINEER	NO.	DATE	REVISION	DRAFTER	ENGINEER	NO.	DATE	REVISION	DRAFTER	ENGINEER
1														

SCALE 1/4" = 1'-0"

10

9

8

7

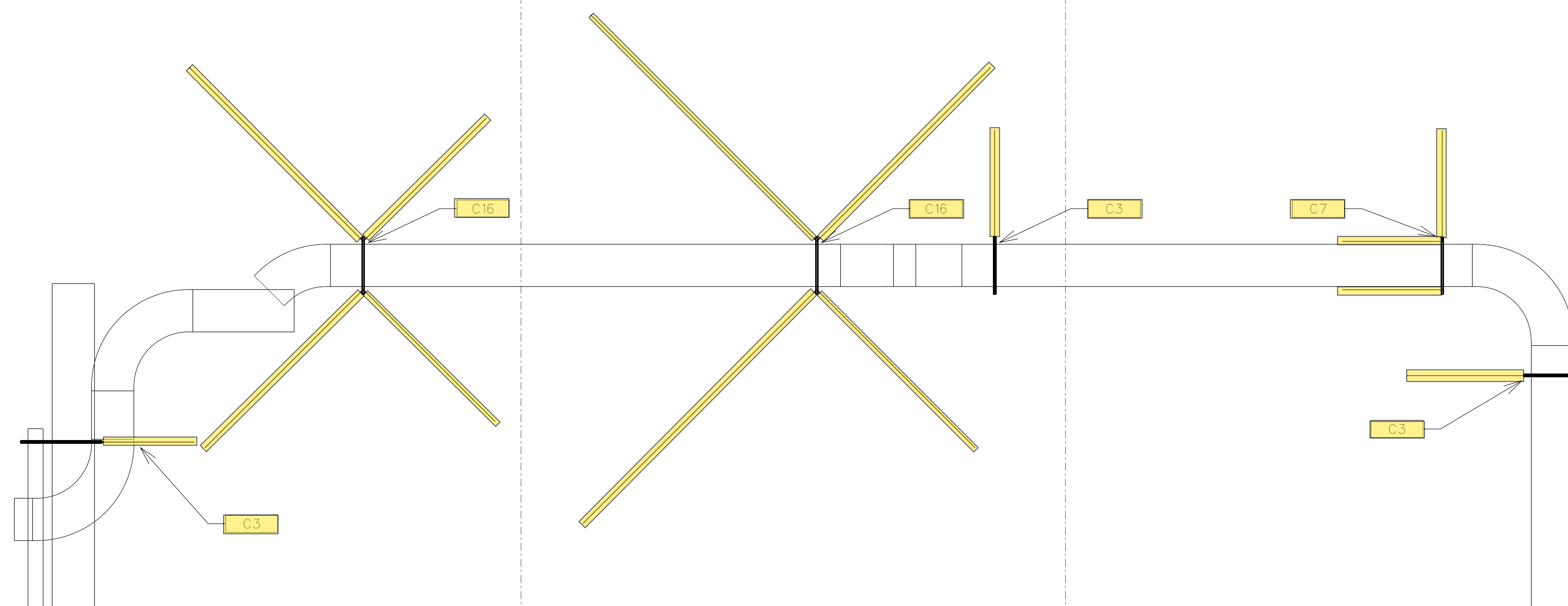
A

B

C

MATCH LINE
OUT OF ISAT
SCOPE OF WORK

MATCH LINE
K-AB29-126-158



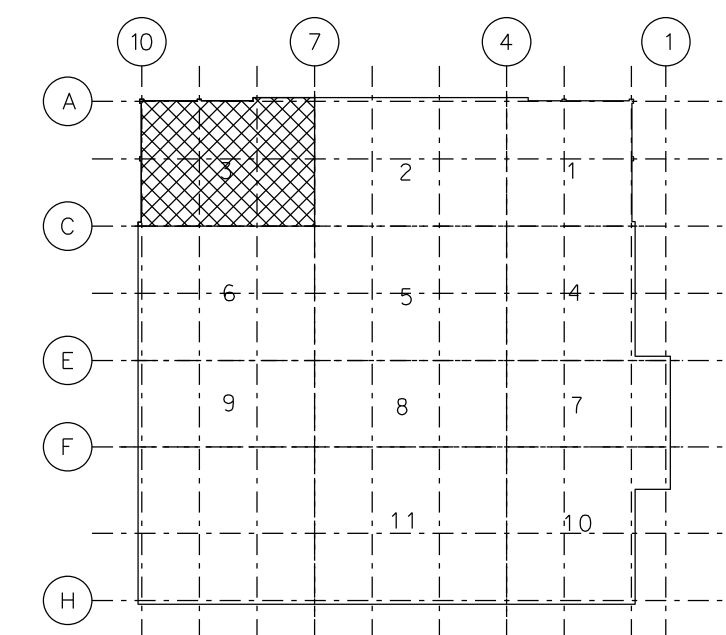
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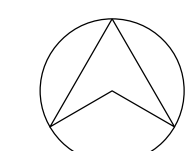
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KEYPLAN

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ON THE CADD SYSTEM



NORTH

COL. A-C.7-10
CABLE TRAY SEISMIC PLAN
4TH FLOOR

FILE NO: AB29126159.DGN
DRAWG. NO: K-AB29-126-159

REV. NO: 1

NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER NO.	DATE	REVISION	DRAFTER	ENGINEER	DATE	SCALE	DRW. NO.	REV. NO.
1														1/4" = 1'-0"	K-AB29-126-159	1