1.1 REFERENCE MATERIAL FOR DESIGN CALCULATIONS

- □ 2009 International Building Code
- □ American Concrete Institute (ACI) 318-08
- □ Embedment Properties for Headed Studs, TRW Nelson, Design Data Catalog
- □ Steel Construction Manual, AISC 360-05
- □ ASCE 7-05

1.2 DESIGN CRITERIA USED IN CALCULATIONS

- □ Reinforcing Steel Yield Strength = fy = 60 ksi
- □ Structural Steel is ASTM A 36/A 36M-05
- □ Unconfined Compressive Strength of Concrete = f'c = 5000 psi
- □ Weight of Concrete = 115 pcf
- □ Stud Yield Strength = 50 ksi

1.3 INTERNATIONAL BUILDING CODE REQUIREMENTS

The following is a summary of the Code requirements applicable to CellXion precast concrete equipment shelters.

1.3.1 Occupancy Classification

Occupancy may be Group S-2 per sec 311.3, Group B per sec 304.1 or Group U per sec 312.1.

1.3.2 Construction Type

Type V-B per section 602.5 and Table 601.

1.3.3 Building Limitations

<u>Occupancy S-2 or B or U</u>

Relative to the location of the nearest structure or property line:

Walls must be rated one hour if less than 10 feet.	(Table 602)
Maximum size of S-2 building (Table 503) is 13,500 SF, 2 story.	(Table 503)
Maximum size of B building (Table 503) is 9,000 SF, 2 story.	(Table 503)
Maximum size of U building (Table 503) is 5,500 SF, 1 story.	(Table 503)

NOTE: STANDARD SHELTERS MAY BE RATED UP TO 2-HOURS.

REF: Table 720.1(2), Item number 4-1.1, Sand-lightweight concrete 4 inches thick.

IF PROTECTED OPENINGS ARE REQUIRED:
3/4 HOUR RATED OPENINGS ARE REQUIRED IN ONE HOUR ASSEMBLIES.
1.5 HOUR RATED OPENINGS ARE REQUIRED IN TWO HOUR ASSEMBLIES.

<u>Unprotected Openings Allowed</u>	<u>Protected Openings Allowed</u> Table 705.8
Not permitted up to 5 feet.	Not permitted up to 3 feet.
10% permitted > 5 feet to 10 feet.	15% permitted > 3 feet to 5 feet.
15% permitted > 10 feet to 15 feet.	25% permitted > 5 feet to 10 feet.
25% permitted > 15 feet to 20 feet.	45% permitted > 10 feet to 15 feet.
45% permitted > 20 feet to 25 feet.	75% permitted > 15 feet to 20 feet.
70% permitted > 25 feet to 30 feet.	No restriction > 20 feet.
No restriction > 30 feet.	

1.4 FLOOR LOADS Floor live load required (Table 1607.1) for light storage is; 125 psf

The summary loading chart in Section 2.0.1 indicates allowable loads of:

251 psf 10.000 ft wide **OK**

For a 2 sq ft area per sec 2.3.6, a concentrated load of 2020 lbs can be placed anywhere.

If the concentrated load is next to the wall, 4522 lbs can be used.

For a 3 sq ft area per sec 2.3.6, a concentrated load of 4041 lbs can be placed anywhere.

1.5 ROOF LOADS Minimum roof live load required (2009 IBC 1607.11.2.1) is:

$L_r = L_o R_1 R_2$ [sec 1607.11.2.1, Eq 16-25]

L_o = 20 [sec 1607.11.2.1]

R_1 = 1.0 (worst case for smaller shelters) [sec 1607.11.2.1, Eq 16-26]

F = .167 in per ft slope R_2 = 1.0 (for F< 4) [sec 1607.11.2.1, Eq 16-29]

L_r = 20 psf

The summary loading chart in Section 2.0.1 indicates allowable loads of:

135 psf 10.00 ft wide **OK**

Snow Loads Section 1608.2 requires use of section 7 of ASCE 7-05

$p_f = 0.7\ C_e\ C_t\ I\ p_g$ [ASCE 7-05, Equation 7-1, Sec 7.3]

p_f = (Min. design load for roofs from section 2 of these calcs)

= 135 psf 10.00 ft wide

C_e = 1.2 (worst case-ASCE 7-05,Table 7-2, lesser factors may be used as appropriate)

C_t = 1.0 (From ASCE 7-05, Table 7-3, heated structure)

I = 1.0 (Category II, ASCE 7-05 Table 7-4)

Using the design load from section 2 for p_f and solving for p_g:

$p_g = p_f\ /\ (\ 0.7\ C_e\ C_t\ I\ )$

= **(Allowable ground snow load)**

= 161 psf 10.00 ft wide

1.6 WIND LOADS

Sect. 1609.1.1 allows ASCE 7-05, Chapter 6; use sec 6.4, Method 1 - Simplified Procedure:

V = 160 mph [ASCE 7-05, Section 6.5.4 and Figure 6-1]

I = 1.0 [ASCE 7-05,Category II, Table 6-1 >> Table 1-1]

Exposure Classification: C [ASCE 7-05, section 6.5.6.3]

Exposure C category: λ = 1.21 [ASCE 7-07, section 6.4.2 & Figure 6-2]

Enclosure Classification: enclosed [ASCE 7-05, section 6.2]

Roof angle: 0 to 5 degrees K_{zt} = 1.0 [ASCE 7-05, sec 6.5.7.2]

MWFRS Design Wind Pressures: [from ASCE 7-05, Figure 6-2]

$p_s = \lambda K_{zt} I p_{s30}$ [ASCE 7-05, sec 6.4.2.1, Eq 6-1]

WALLS:	**48.4 psf**	**[zone A]**
	-25.4 psf	[zone B, negligible--> only 1 inch tall]
	32.5 psf	[zone C]
	-15.1 psf	[zone D, negligible--> only 1 inch tall]

Zone A controls, use it for analysis

Allowable load on walls: 87.3 psf(Calcs sec 2.0.1) 9.25 ft tall **OK**

ROOF:	**-59.0 psf**	**[zone E]**
	-33.6 psf	[zone F]
	-40.9 psf	[zone G]
	-25.9 psf	[zone H]

Zone E controls, use it for analysis

Allowable negative load on roof: -53.1 psf (Calcs, sec 2) 10.00 ft wide

Plus .6 x DL (45.7 psf = 27.4 psf + Allow Neg Ld = -80.6 psf **OK**

1.6.1 Check structural connections for carrying wind loads to the foundation.

The worst case for the windward forces are when they are projected onto the long walls. Half of the load is carried to the floor connections and half is carried to the roof connections. The walls are assumed to be 9.25 ft tall the worst case scenario. The connections which connect the long walls to the end walls are neglected for the purposes of this particular analysis. Analysis with Calculations from section 3

1.6.1.1 Check connections for transfer of windward loads from wall to the floor and roof.

The connections along the top and bottom of the walls are at a standard spacing of 56 inches. This will be the tributary width of wind load for each connection at the floor and roof. The load for this tributary area on the windward wall is then:

P'(w)= P(windward wall) x tributary area (for 9.25 ft tall wall)

Where tributary area = (9.25 ft / 2) x 4 ft 8 in = 21.58 sq. ft.

= 48.4 psf x 21.58 sq. ft.

P'(w)= 1,045 lbs

This load is resisted by three main components of the connection at the floor:

5.95	kips	Capacity of P/N 223100 in tension per Clacs Section 3.3.1
22.87	kips	Capacity of the Floor Lifting Insert in shear per Clacs Section 3.7
8.35	kips	Capacity of the weld which connects the plates per Clacs Section 3.8

The capacity of all 3 components exceed the wind load OK

This load is resisted by three main components of the connection at the roof:

3.52	kips	Capacity of P/N 223000 in Y-shear per Clacs Section 3.4.3
5.95	kips	Capacity of P/N 222000 in tension per Clacs Section 3.5.1
8.35	kips	Capacity of the weld which connects the plates per Clacs Section 3.8

The capacity of all 3 components exceed the wind load OK

1.6.1.2 Check connections for transfer of leeward loads from wall to the floor and roof.

The leeward wall has similar construction, but the loads are less and are outward.

P'(l)= P(leeward wall) x tributary area

Where tributary area = (9.25 ft / 2) x 4 ft 8 in = 21.58 sq. ft.

= 48.4 psf x 21.58 sq. ft.

P'(l)= 1,045 lbs (negative indicating an outward direction)

This load is resisted by three main components of the connection at the floor:

5.95	kips	Capacity of P/N 223100 in tension per Section 3.3.1
22.87	kips	Capacity of Floor Lifting Insert in shear per Section 3.7
8.35	kips	Capacity of the weld which connects the plates per Section 3.8

The capacity of all 3 components exceed the wind load OK

This load is resisted by three main components of the connection at the roof:

3.52	kips	Capacity of P/N 223000 in Y-shear per Section 3.4.3
5.95	kips	Capacity of P/N 222000 in tension per Section 3.5.1
8.35	kips	Capacity of the weld which connects the plates per Section 3.8

The capacity of all 3 components exceed the wind load OK

1.6.1.3 Windward and leeward loading transfer to endwalls:

The loads on the top half of the shelter must be transferred to the ground through the connections on the endwalls. There are three connections from the roof to the endwall and three connections from the endwall to the floor. The load on the projected area of the top half of the long side of the shelter is resisted by these connections and is assumed to distribute half of the load to each endwall.

A shelter which is 18.00 feet long has a tributary area of:

Area = (9.667 feet / 2) x (18.0 feet / 2)
43.502 sq. ft.
P(proj.)= 43.502 sq ft x 48.4 psf
= 2,105 lbs.

The roof connection consist of the same three components as were indicated in the sidewalls, except that they are loaded in a different direction. Their capacities are shown below.

7.04 kips Capacity of P/N 223000 in X-shear per Section 3.4.2
22.87 kips Capacity of the Wall Corner Insert per Section 3.6.1
8.35 kips Capacity of the weld which connects the plates per Section 3.8

Since there are three of these connections, the total capacity is: 21.12 kips **OK**

1.6.1.4 Windward and Leeward loading transfer to floor:

The same loads that are transferred to the endwalls from the roof need to be transferred to the floor panel. This is accomplished through the three connections at the base of the endwall.

The floor connections consist of the same three components as were indicated in the sidewalls, except that they are loaded in a different direction. Their capacities are shown below.

14.54 kips Capacity of P/N 223100 in X-shear per Section 3.3.2
22.87 kips Capacity of Floor Lifting Insert in shear per Section 3.7
8.35 kips Capacity of the weld which connects the plates per Section 3.8

Since there are three of these connections, the total capacity is: 25.05 kips **OK**

1.6.1.5 Find horizontal forces and overturning moments.

This is used in the tie-down anchor analysis in 1.8 below.

Shelter Dims (feet)			Shelter Weight lbs	Hor.Wind (PxA-hor) lbs	Vert. Wind (PxA-vert.) lbs	Overturn Moment ft-lbs
Width	Length	Height				
10.00	18.00	10.083	35,103	8,785	10,629	97,432

1.6.1.6 Components and Cladding:

$p_{net} = \lambda K_{zt} I p_{net30}$ [ASCE 7-05, sec 6.4.2.2, Eq 6-2]

	POS	NEG	[from ASCE 7-05, Figure 6-3]
ROOF ZONE 1:	18.0	-51.1	(100 sf effective wind area) use for analysis
ROOF ZONE 2:	21.5	-84.1	(20 sf effective wind area)
ROOF ZONE 3:	22.7	-141.3	(10 sf effective wind area)

Allowable positive load on roof: (From section 2)
135 psf 10.00 ft wide shelter
Allowable negative load on roof: (From section 2, neglecting DL)
-53.1 psf 10.00 ft wide shelter
Allowable negative load on roof: (From section 2, including .6 x DL)
Roof Dead Load: 45.7 psf X .6 = 27.4 psf
-80.6 psf 10.00 ft wide shelter **OK**

	POS	NEG	
WALL ZONE 4:	45.0	-49.6	(200 sf effective wind area) use for analysis
WALL ZONE 5:	52.4	-67.8	(30 sf effective wind area)

Allowable load on walls: (From section 2)

87 psf 9.25 ft tall wall **OK**

The larger load at the corners does not produce a significant bending stress,
and the shear strength of the roof panel will be more than adequate to resist this uplift load.
In addition, extra connections between the roof and endwalls anchor the roof at these end zones.

1.7 SEISMIC LOADS

Section 1613.1, requires ASCE 7-05 for analysis.

Site Class is E [Section 1613.5.2]

Occupancy Category: II [Table 1604.5]

Seismic Design Category: D [sec 1613.5.6]

Seismic Importance Factor, I is: 1.50 [ASCE 7-05, sec 11.5, Table 11.5-1]

$V = C_s W$ [ASCE 7-05, sec 12.8.1, Eq. 12.8-1]

$W = D$ [ASCE 7-05, sec 12.7.2]

$C_s = S_{DS} / (R / I)$ [ASCE 7-05, sec 12.8.1.1, Eq. 12.8-2]

$V = (S_{DS} / (R / I)) D$

$R = 4$ [ASCE 7-05, Table 12.2-1, A.2]

$S_{DS} = 2/3\ S_{MS}$ [Per 1613.5.4, Eq. 16-39]

$S_{MS} = F_a S_S$ [Per 1613.5.3, Eq. 16-37]

$F_a = 1.0$ [Table 1613.5.3(1)]

$S_S = 3.00$ [Fig 1613.5(1), meets all US areas]

$S_{MS} = 3.00$

$S_{DS} = 2.00$

$V = 0.750\ D$ [Use for base shear]

Determine E for use in load combinations on individual panel design.

$E = E_h + E_v$ [ASCE 7-05, sec 12.4.2, Eq. 12.4-1]

$E_h = \rho\ Q_E$ [ASCE 7-05, sec 12.4.2.1, Eq. 12.4-3]

$E_v = 0.2\ S_{DS}\ D$ [ASCE 7-05, sec 12.4.2.2, Eq. 12.4-4]

$E = \rho\ Q_E + 0.2\ S_{DS}\ D$ [ASCE 7-05, sec 12.4.2.1, Eq. 12.4-3 plus sec 12.4.2.2, Eq. 12.4-4]

$Q_E = V$ [ASCE 7-05, sec 12.4.2.1] $\rho =$ 1.0 [ASCE 7-05, sec 12.3.4.2]

$E = \rho\ V + 0.2\ S_{DS}\ D$ = 1.150 D [Use in load comb 4 & 6]

$E_m = E_{m\,h} - E_v$ [ASCE 7-05, sec 12.4.3, Eq. 12.4-6]

$E_{m\,h} = \Omega_0\ Q_E$ [ASCE 7-05, sec 12.4.3.1 Eq. 12.4-7]

$E_m = \Omega_0\ Q_E - 0.2\ S_{DS}\ D$ $\Omega_0 = 2.5$ [ASCE 7-05, Table 12.2-1, A.2]

$E_m = 1.475\ D$ [Use in load comb 7]

$D_{wall} =$ 36.3 psf $D_{roof} =$ 45.7 psf $D_{floor} =$ 43.8 psf (calcs sec 4)

Load combinations: Section 1605.3.1 & ASCE 7-05 12.4.3.2

Comb 1	D	[Notes 1, 2, 3]
Comb 2	D + L	[Notes 1, 2, 3]
Comb 3	D + L + (Lr or S or R)	[Notes 1, 2, 3]
Comb 4	D + (W or 0.7E) + L + (Lr or S or R)	[Notes 1, 2, 3, 4]
Comb 5	0.6 D + W	[Notes 1, 2, 3]
Comb 6	0.6D + 0.7E	[Notes 1, 2, 3, 4]
Comb 7	$(0.9-.2S_{DS})D + \Omega_0\ Q_E$	See analysis below:

Note 1: Roof and floor panels are designed using 1.4D and 1.7L, exceeds req'd factors.
Note 2: Wall panels are designed using 1.4D and 1.7W, exceeds req'd factors.
Note 3: S, R, and Lr are used as L in panel calculations, see section 2 of these calcs.
Note 4: Wind loads control over Seismic.

Comb 7 check					psf	Min. Design Loads	
Walls:	$(0.9-.2S_{DS})D$	+ Ω_0 Q_E	=	2.375 D_{wall} =	86	87 psf	**OK**
Roof:	$(0.9-.2S_{DS})D$	+ Ω_0 Q_E	=	2.375 D_{roof} =	109	135 psf	**OK**
Floor:	$(0.9-.2S_{DS})D$	+ Ω_0 Q_E	=	2.375 D_{floor} =	104	251 psf	**OK**

1.7.1 Seismic loads from top half of the wall panel are transferred to the roof.

Equipment permanently installed in the building is estimated at 10,000 pounds. For a 18.00 ft long shelter, this is an average of 556 pounds per linear foot. If this equipment is mounted to the floor and braced at the top, then half the seismic load from the equipment should be added to the top of the walls. Analysis uses sec 3 of these calculations.

The weight of a wall section transferred to the connections at 56" on center is:

W(wall)= (56/12 ft width) x(9.25 ft high) x (4 /12 ft thick) x (115 pcf)
= 827 lbs
W(equipment) = (56/12 ft width) x(277.778 plf) = 1296 lbs
W(top of wall) = W(wall) + W(equipment) = 2,124 lbs

For the wall panel, the seismic shear is:

V = 1,593 lbs Seismic shear per connection plate at top of walls

This load is resisted by three main components of the connection at the floor:

5.95 kips	Capacity of P/N 223100 in tension per Section 3.3.1
22.87 kips	Capacity of Floor Lifting Insert in shear per Section 3.7
8.35 kips	Capacity of the weld which connects the plates per Section 3.8

The capacity of all 3 components exceed the seismic load **OK**

This load is resisted by three main components of the connection at the roof:

3.52 kips	Capacity of P/N 223000 in Y-shear per Section 3.4.3
5.95 kips	Capacity of P/N 222000 in tension per Section 3.5.1
8.35 kips	Capacity of the weld which connects the plates per Section 3.8

The capacity of all 3 components exceed the seismic load **OK**

1.7.2 Seismic loads from roof are transferred to the top of the endwall.

The seismic load at the top connection plates of the endwalls includes the seismic loads from the top quarter of two sidewalls, one half of the roof, and one half of the total equipment.

Use a 9.25 ft tall x 17.33 ft long wall & use a 10.33 ft wide x 18.33 ft long roof.

W(quarter wall)= 9.25 ft / 2 x 17.33 ft / 2 x
4.00 /12 ft x 115 pcf = 1,537 lbs. x 2 = 3,073 lbs.
W(half roof)= 10.33 ft x 18.33 ft / 2 x
4.50 /12 ft x 115 pcf = 4,085 lbs.
W(equipment) = 9 ft x 277.7778 plf = 2,500 lbs
TOTAL: W(top of endwall) = 9,658 lbs.
The seismic load is then: V(top of endwall) = 7,243 lbs.

The roof connection consist of the same three components as were indicated in the sidewalls, except that they are loaded in a different direction. Their capacities are shown below.

7.04	kips	Capacity of P/N 223000 in X-shear per Section 3.4.2
22.87	kips	Capacity of the Wall Corner Insert per Section 3.6.1
8.35	kips	Capacity of the weld which connects the plates per Section 3.8

Since there are three of these connections, the total capacity is:

21.12 kips **This capacity exceeds the seismic load** **OK**

1.7.3 Seismic loads from endwall are transferred to the floor.

The connections at the bottom of the endwalls have the same seismic load as the connections at the top, except that the seismic load from the endwall itself is added.

The weight of the endwall is:

W(endwall)= 10.00 ft x 9.25 ft x
4.00 /12 ft x 115 pcf = 3546 lbs

V(endwall)= 2,659 lbs

V(bottom)= V(top of endwall) + V(endwall) = 9,903 lbs

The same loads that are transferred to the endwalls from the roof need to be transferred to the floor panel. This is accomplished through the three connections at the base of the endwall.

The floor connections consist of the same three components as were indicated in the sidewalls, except that they are loaded in a different direction. Their capacities are shown below.

14.54	kips	Capacity of P/N 223100 in X-shear per Section 3.3.2
22.87	kips	Capacity of Floor Lifting Insert in shear per Section 3.7
8.35	kips	Capacity of the weld which connects the plates per Section 3.8

Since there are three of these connections, the total capacity is:

25.05 kips **This capacity exceeds the seismic load** **OK**

1.8 Check shelter tie-downs to foundation

For tie-down anchor capacity see Section 3.9 of these calcs:

Horizontal: 10472 lbs Per connection
Vertical: 6615 lbs Per connection

Horizontal forces due to seismic/wind loads:

Shelter Dims (feet)			Shelter	Contents	Seis.Load	Wind load	Control'g	Tie-down	CHECK	Safety
Width	Length	Height	Weight	Weight	(W x Cs)	1.6.1.5	Load	Capacity		Factor
10.00	18.00	10.083	35,103	10,000	33,827	8,785	SEISMIC	41,887	OK	1.24

Friction against sliding is ignored.

shelters under 24 ft in length have 4 tie-downs; lengths 24 ft and over have 8 tie-downs

Overturning forces due to seismic/wind loads:

			Seis.load	Overturn	Wind Over.	Control'g	Overturn	Tie-down	CHECK	Safety
Shelter Dims (feet)			(W x Cs)	Force	See 1.6.1.5	Load	Resist.	Capacity		Factor
Width	Length	Height	lbs.	lbs.	ft-lbs.		ft-lbs.	lbs		1.5 req'd
10.00	18.00	10.083	33,827	170546	97,432	SEISMIC	157963	41,887	OK	2.15

Overturning resistance uses 0.9 x DL of shelter (no contents)

Weight of shelter and contents are the same as in the horizontal force chart above.

2.0 DESIGN CRITERIA

NOTE: These calculations represent the panels of a
10.000 ft wide x 18.000 ft long x 9.250 ft tall shelter.

STRUCTURAL PROPERTY		UNITS	LABEL
Concrete Compressive Strength	5000	psi	f'_c (sand-lightweight)
Reinforcing bar Yield Stress	60000	psi	fy[REBAR]
Concrete Density	115	pcf	DENSITY
Maximum Building Width	10	feet	BLDGW
Maximum Building Length	18	feet	BLDGL
Maximum Wall Panel Height	9.25	feet	WALLH
Max. Est. weight of Shelter	35,103	LBS.	BLDGWT
Concrete volume req'd.	10.55	YDS.	CONCYDS
Roof thickness at peak	5	inches	H[ROOF]
Roof thickness at edge	4	inches	
Rebar size used in roof #	4	Rebar	REBARROOF
Steel mesh used in roof:	W4	Wire	
Steel spacing in roof (12"max.)	4	inches	
Lateral rebar spacing: roof	12	inches	ROOFSPACING12
Longitudinal rebar spacing-roof:	18	inches	
Steel mesh used in wall:	W4	Wire	REBARWALL
Add vert steel used in wall #	4	Rebar	REBARWALL2
Steel spacing in wall (12"max.)	4	inches	WALLSPACING
Vertical Rebar spacing in wall	36	inches	WALLSPACING2
Horizontal rebar spacing in wall	48	inches	
Wall panel thickness	4	inches	WALLTHICKNESS
Rebar size used in floor #	6	Rebar	REBARFLR
Number of rebar per floor rib	2	each	REBARFLRQTY
Spacing of ribs in floor	28	inches	FLOORSPACING
Floor thickness	5.75	inches	H[FLOOR]
Floor deck thickness	2.75	inches	H[DECK]
Floor rib width	4	inches	B[RIB]
Floor deck steel size	W4	Wire	
Floor deck steel spacing	4	inches	
Area per roof rebar	**0.200**	sq. in.	A[REBARROOF]
Diameter of roof rebar	**0.500**	inches	DIA[REBARROOF]
Area per roof wire	**0.040**	sq. in.	
Area per wall wire	**0.040**	sq. in.	A[REBARWALL]
Area per extra vert wall rebar	**0.200**	sq. in.	A[REBARWALL2]
Diameter of wall wire	**0.225**	inches	DIA[REBARWALL]
Diameter of wall rebar	**0.500**	inches	
Area of floor rib rebar	**0.880**	sq. in.	A[REBARFLR]
Diameter of floor rebar	**0.750**	inches	DIA[REBARFLR]
Area of deck rebar/wire	**0.040**	sq. in.	A[REBARDECK]
Diameter of deck rebar/wire	**0.225**	inches	DIA[REBARDECK]
Area of deck steel per foot	**0.120**	sq.in./ft.	A[DECKSTEEL]
Minimum req'd deck steel/foot	**0.059**	sq.in./ft.	A[DECKSTEEL-MIN]

2.0.1 STRUCTURAL LOADING SUMMARY FOR PANELS, AS DESIGNED.

PANEL	ALLOWABLE LOAD		TYPE
	10.000	ft wide	
roof	**135**	psf	LIVE
floor	**251**	psf	LIVE
	9.250	ft tall	
wall	**87.3**	psf	WIND

2.0.2 CHECK STEEL RATIOS (ACI 318-08, sec. 21.9.2.3)

					ρ_t	ρ_v	
B_1 =	0.80			ROOF:	0.0083	0.0069	**OK**
	ρ_b	ρ_{max}	ρ_{min}	FLOOR:	0.0068		**OK**
	0.0335	0.0252	0.0033	WALL:	0.0066	0.0062	**OK**

Min reqd. per ACI 318-08, sec 21.9.2.1 0.0025

2.0.3 CHECK DEVELOPMENT LENGTH (ACI 318-08, sec. 21.7.5.1)

		Wall	Roof	Floor
Largest of:	$10\ d_b$ =	2.3 in	5.0 in	7.5 in
		7.5 in	7.5 in	7.5 in
$\ell_{dh} = 1.25\ f_y\ d_b\ /\ (\ 65 \times f'_c{}^{1/2}\ )$		3.7 in	8.2 in	12.2 in

All rebar development lengths are 18 in **OK**

2.1 ROOF PANEL CALCULATIONS

Temperature steel required: Ats
Panels are 4 in thick, minimum.
Maximum thickness of roof panel is 5 inches at center peak.
Ats = Aconc x 0.0018
= 5 in. x 12 in. x 0.0018
= 0.1080 sq. in. per foot of width of roof panel.
Use #4 rebar at 18 inches, longitudinal: Ats(actual) = 0.2533 sq. in. **OK**

2.1.1 Determine shear strength: Vu[ROOF]

b[ROOF] = **12.0** inches
d[ROOFSHEAR]= 3 in. - DIA[REBARROOF] / 2
2.75 inches
Vu[ROOF]= .85 x .85 x 2 x (fc)^.5 x b[ROOF] x d[ROOFSHEAR]
= **3372** lbs.

2.1.2 Determine allowable live load due to shear: w[ROOFSHEARLL]

ROOFSPANSHEAR= bldgw - ((d[ROOFSHEAR + 4) x 2 / 12)
= **8.875** feet 10.00 ft wide shelter
w[ROOFDL]= density x thickness (4.5 in avg) = **43.1** psf (concrete only)
w[ROOFSHEARLL]= (Vu[ROOF] / ROOFSPANSHEAR - 1.4 x w[ROOFDL]) / 1.7
= **188** psf allowable roof live load due to shear strength 10.00 ft wide

2.1.3 Determine allowable live load due to moment: w[ROOFMOMENTLL]

A[ROOFSTEEL12]= A[REBARROOF] x 12 inches / ROOFSPACING)
= **0.20** sq. inches per foot of roof panel 10.00 ft wide shelter
d[ROOFMOMENT]= (H[ROOF]) - (1 +DIA[REBARROOF] / 2)
= **3.75** inches
a[ROOF12]= (A[ROOFSTEEL12] x fy[REBAR]) / (.85 x fc x b[ROOF])
= **0.235** inches
Mu[ROOF12]= (.9/12) x A[ROOFSTEEL12] x fy[REBAR] x (d[ROOFMOMENT] - a[ROOF12] / 2)
= **3269** ft-lbs
l[ROOFSPAN]= BLDGW - .5 = **9.50** feet 10.00 ft wide shelter
w[ROOFMOMENTLL]= [(8 x Mu[ROOF] / l[ROOFSPAN]^2) - (1.4 x w[ROOFDL])] / 1.7
= **135** psf allowable roof live load due to bending strength. 10.00 ft wide

2.1.4 Determine allowable negative live load due to moment: w[ROOFNEGMOMENTLL]

d[RFNEGMOMENT]= 1 +DIA[REBARROOF] / 2)
= **1.25** inches
a[RFNEG12]= (A[ROOFSTEEL12] x fy[REBAR]) / (.85 x fc x b[ROOF])
0.235 inches
Mu[RFNEG12]= (.9/12) x A[ROOFSTEEL12] x fy[REBAR] x (d[RFNEGMOMENT] - a[RFNEG12] / 2)
1019 ft-lbs
l[ROOFSPAN]= BLDGW - .5 = **9.50** feet 10.00 ft wide shelter
w[ROOFNEGMOMLL]= [(8 x Mu[ROOF]) / (l[ROOFSPAN]^2)] / 1.7
= Allowable negative roof live load due to bending strength (neglecting dead load)
= **-53.1** psf 10.00 ft wide shelter

2.1.5 CHECK SHEAR ALLOWED PARALLEL TO PLANE OF ROOF

2.1.5.1 CHECK SHEAR ALLOWED FOR ONE CURTAIN OF REINFORCEMENT

Use a 4 inch panel, 4 foot length, for minimum A_{CV}. (ACI 318-08, 21.9.2.2)

$2\ A_{CV} \times \lambda \times f'^{1/2}_c =$ 23080 lbs [CONTROLS]

2.1.5.2 NOMINAL SHEAR FOR ROOF SECTION (per ACI 318-08, sec. 21.9.4.1, eq. 21-7)

Use a 4 inch panel, 4 foot length, for minimum A_{CV}.

$V_n = A_{CV} (\alpha_c \times \lambda \times f'^{1/2}_c + \rho_t \times f_y)$ $\alpha_c =$ 2.0 (for $h_w / l_w > 2$)

$A_{CV} =$ 192 in^2 $\lambda =$ 0.85 (per ACI 318-08 sec. 8.6.1)

$\rho_t = A_s / A_{CV} =$ 0.0083

= 118708 lbs [DOES NOT CONTROL]

2.1.5.3 NOMINAL SHEAR FOR ROOF DIAPHRAGM (per ACI 318-08, sec 21.11.9.1, eq. 21-10)

Use a 4 inch panel, 4 foot length, for minimum A_{CV}.

$V_n = A_{CV} (2 \times \lambda \times f'^{1/2}_c + \rho_t \times f_y)$

= 118708 lbs [DOES NOT CONTROL]

2.2 WALL PANEL CALCULATIONS

Temperature steel required: Ats
Panel thickness is: 4 inches
Ats= Aconc x 0.0018
= 4 in. x 12 in. x 0.0018
= 0.0864 sq. in. per foot of width of wall panel.
(ACI 318-08, sec. 14.3.5; 18" MAX) use 4x4-W4xW4 mesh:
Use #4 rebar at 48 inches, longitudinal: Ats(actual)= 0.1700 sq. in. per foot **OK**

2.2.1 Determine allowable loads perpendicular to plane of wall

2.2.1.1 Determine shear strength perpendicular to plane of wall: (Vu)

b[WALL] = 12 inches
d[WALL] = 2 inches (Distance from outside face of panel to center of rebar)
Vu[WALL]= .85 x .85 x 2 x (fc)^.5 x b[WALL] x d[WALL]
= **2452** lbs.

2.2.1.2 Determine allowable live load due to shear: w[WALLSHEARLL]

WALLSPANSHEAR= WALLH - (d[WALL] x 2 / 12)
= **8.92** feet 9.25 ft tall wall
w[WALLDL]= **38.33** psf (does not add to horizontal force)
NOTE: WALL DEAD LOAD DOES NOT ACT PERPENDICULAR TO PLANE OF PANEL.
w[WALLSHEARLL]= Vu[WALL] / (WALLSPANSHEAR] x 1.7)
= Allowable wall load due to shear strength
= **162** psf 9.25 ft tall wall

2.2.1.3 Determine allowable live load due to WINDWARD moment: w(WALLMOMENTLL)

A[WALLSTEEL]= A[REBARWALL]x(12"/WALLSPACING)+A[REBARWALL2]x12"/WALLSPACING2
= **0.19** sq. inches per foot of wall panel
a[WALL]= (A[WALLSTEEL] x fy[REBAR]) / (.85 x fc x b[WALL])
= **0.220** inches
Mu[WALL]= (.9/12) x A[WALLSTEEL] x fy[REBAR] x (d[WALL] - a[WALL] / 2)
= **1588** ft-lbs
w[WALLMOMENTLL]= [(8 x Mu[WALL] / l[WALLH]^2) - (1.4 x w[WALLDL])] / 1.7
= Allowable wall live load due to bending strength.
= **87.3** psf 9.25 ft tall wall

2.2.1.4 Determine allowable live load due to LEEWARD moment: w(WALLMOMENTLL)

d[LEEWALL] = 2 inches (Distance from intside face of panel to center of rebar)
a[LEEWALL]= (A[WALLSTEEL] x fy[REBAR]) / (.85 x fc x b[WALL])
= **0.220** inches
Mu[LEEWALL]= (.9/12) x A[WALLSTEEL] x fy[REBAR] x (d[WALL] - a[WALL] / 2)
= **1588** ft-lbs
w[LEEWALLMOMENTLL]= [(8 x Mu[WALL] / l[WALLH]^2) - (1.4 x w[WALLDL])] / 1.7
= Allowable wall live load due to bending strength.
= **87.3** psf 9.25 ft tall wall

2.2.2 CHECK SHEAR ALLOWED PARALLEL TO PLANE OF WALL

2.2.2.1 CHECK SHEAR ALLOWED FOR ONE CURTAIN OF REINFORCEMENT

Use a 4 inch panel, 4 foot length, for minimur (ACI 318-08, 21.9.2.2)

$2\ A_{CV} \times \lambda \times f'_c{}^{1/2} =$ 23080 lbs [CONTROLS]

2.2.2.2 NOMINAL SHEAR FOR WALL SECTION (per ACI 318-08, sec. 21.9.4.1, eq. 21-7)

Use a 4 inch panel, 4 foot length, for minimum A_{CV}.

$V_n = A_{CV}\ (\alpha_c \times \lambda \times f'_c{}^{1/2} + \rho_t \times f_y)$ $A_{CV} =$ 192 in^2

$\alpha_c =$ 2.0 (for $h_w / l_w > 2$) $\lambda =$ 0.85 (per ACI sec. 8.6.1)

$\rho_t = A_s / A_{CV} =$ 0.0066

= 99264 lbs [DOES NOT CONTROL]

2.2.2.3 NOMINAL SHEAR FOR WALL DIAPHRAGM (per ACI 318-08, sec. 21.11.9.1, eq. 21-10)

Use a 4 inch panel, 4 foot length, for minimum A_{CV}.

$V_n = A_{CV}\ (2 \times \lambda \times f'_c{}^{1/2} + \rho_t \times f_y)$

= 99264 lbs [DOES NOT CONTROL]

2.3 FLOOR PANEL CALCULATIONS

2.3.1 Determine temperature steel required for the deck:

Deck temperature steel required is:

ATS[DECK]= H[DECK] X 12 in. X .0018
= 2.75 in. x 12 in. x 0.0018
= 0.0594 sq. in. per foot of width of floor panel.
A[DECKSTEEL]= **0.1200** sq. in per foot of panel. **OK**

2.3.2 Determine floor deck strength:

DECKSPAN= FLOORSPACING - B[RIB]
= **24.0** inches
d[DECK]= H[DECK] -1 (Assumes mesh is 1" clear from bottom of deck)
= **1.75** inches
a[DECK]= (A[DECKSTEEL] x FY[REBAR]) / (.85 x fc x 12 in.)
= **0.1412** inches
Mu[DECK]= 0.9/12 x A[DECKSTEEL] x fy[REBAR] x (d[DECK] - (a[DECK] / 2))
= **907** ft-lbs
w[DECKTOTALMOM]= (Mu[DECK] x 8) / (DECKSPAN x 12 in. per ft.)^2
= **1814** psf
w[DECKDL]= (H[DECK] / 12 in. per ft. x 1 ft.^2 x DENSITY)
= **26.4** psf
w[DECKLLMOM]= (w[DECKTOTAL - 1.4 x w[DECKDL]) / 1.7
= **1045** psf
Vu[DECK]= .85 x .85 x 2 x (fc^.5) x d[DECK] x 12 in.
= **2146** lbs.
w[DECKTOTSHEAR]= 2 x (Vu[DECK] / L
= **2146** psf
w[DECKLLSHEAR]= (w[DECKTOTSHEAR] - 1.4 x w[DECKDL]) / 1.7
= **1240** psf

Allowable live load for the floor deck is: **1045** psf (FLOOR DECK MOMENT CONTROLS)

2.3.3 Determine floor rib strength:

Effective width of flange: ACI 318-08, sec. 8.12.2 flange width
1/4 span: = **28.5** inches
Effective width of overhang: ACI 318-08, sec. 8.12.2 (a) & (b)
(a) 8 times H[DECK] = **22** inches **48.0** inches
OR (b) 1/2 clear dist. = **12.0** inches **28.0** inches <controls>

bf= **28.0** inches
d[FLOOR]= H[FLOOR] - (.75" + DIA[REBARFLR] / 2)
4.625 inches
a[FLOOR]= (A[REBARFLR] x fy[REBAR]) / (.85 x fc x bf)
= **0.444** inches
Mu[FLOOR]= (.9/12) x A[REBARFLR] x fy[REBAR] x (d[FLOOR] - a[FLOOR] / 2)
= **17436** ft-lbs
FLOORSPANMOM= BLDGW - .5 ft. = **9.50** feet 10.00 ft wide shelter
w[FLOORMOMTOT]= 8 x Mu[FLOOR] / (FLOORSPANMOM)^2
= **1546** plf 10.00 ft wide shelter
w[FLOORDL]= ((H[DECK] x bf / 144) + b[RIB] x (H[FLOOR] - H[DECK]) / 144) x 1 ft.x DENSITY
= **71.1** plf (PER RIB) = 30.5 psf
w[FLOORMOMLL]= [W[FLOORMOMTOT] - (1.4 x w[FLOORDL])] / (1.7 x trib)
= **365** psf 10.00 ft wide shelter

2.3.4 Determine rib shear strength: Vu[FLOOR]

b[RIB] = **4.00** inches
A[RIBSHEAR]= (H[FLOOR] - (.75" + DIA[REBARFLR]/2)) x B[RIB]
18.50 sq. in.
ACI 318-08, sec. 11.2.2.1 Eq. 11-5 λ = 0.85
Vc[FLOOR]= (1.9 x λ x (fc)^.5 + (2500 x ρ_w x A[REBARFLR] / (b[RIB] x d[FLOOR])) x b[RIB] x d[FLOOR]
= **4313** lbs.
But not greater than: 3.5 x λ x f'c^.5 x b[RIB] x d[FLOOR]
= **3892** lbs.
USE **3892** lbs.
ACI 318-08, 8.13.8 Vc[FLOORALLOW]= 1.1xVc[FLOOR]= **4281** lbs.

2.3.5 Determine allowable live load due to shear: w[FLOORSHEARLL]

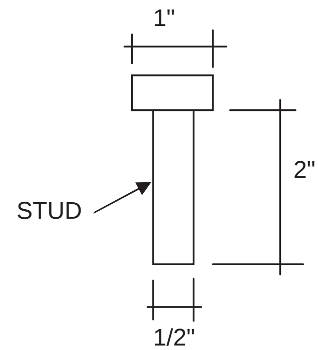
FLOORSPANSHEAR= bldgw - ((d[FLOOR + 8.5) x 2 / 12)
= **7.81** feet 10.00 ft wide shelter
w[FLOORSHEARLL]= (Vc[FLOORALLOW] / (.5xFLOORSPANSHEAR)-1.4 x w[FLOORDL]) / (1.7xFLOORSPACING/12)
= Allowable floor live load due to shear strength
= **251** psf 10.00 ft wide shelter
Allowable LL for the 10.00 ft wide floor rib is: **251** psf (FLOOR RIB SHEAR CONTROLS)
Gross allowable floor load; LL + 44 psf DL= 295 psf 10.00 ft wide

2.3.6 Determine allowable concentrated load over 2 sq ft and 3 sq ft.

2 square foot area is equivalent to approximately 17 inch x 17 inch, or 1.41 feet x 1.41 feet.
Assume one rib takes the entire concentrated load.
Allowable load based on shear is: 251 psf
For a 10.00 foot wide shelter with a 9.00 ft span, the equivalent concentrated load is:
P[shear] = 9.00 ft x 251 lbs. x 2
= **4522 lbs** **Maximum concentrated load (shear).**
Maximum live load for bending on one rib is:
w[FLOORRIBLL]= w[FLOORMOMLL] x BF / 12 = 851 plf
Make uniform load moment equal to concentrated load moment and solve for P.
w[FLOORRIBLL]x (FLOORSPANMOM^2) /8 = P x FLOORSPANMOM / 2
P(moment) = w[FLOORRIBLL] x (FLOORSPANMOM) / 4
= **2020 LBS** **Max concentrated load in center of floor (bending).**
If the load is next to the wall (as is usually the case with batteries) :
w[FLOORRIBLL]x (FLOORSPANMOM^2) / 8 = P x 1.5
P(moment) = w[FLOORRIBLL] x (FLOORSPANMOM^2) * (2 x 8)
= **6398 LBS** **Max concentrated load next to wall (bending).**
Shear controls
Shear controls when load is next to wall.
For a 3 square foot area the concentrated load will be supported by two ribs.
Maximum live load for bending on two ribs is:
w[FLOORRIBLL]= w[FLOORMOMLL] x BF / 12 = 1701 plf
Make uniform load moment equal to concentrated load moment and solve for P.
w[FLOORRIBLL]x (FLOORSPANMOM^2) /8 = P x FLOORSPANMOM / 2
P(moment) = w[FLOORRIBLL] x (FLOORSPANMOM) / 4
= **4041 LBS** **Max concentrated load in center of floor (bending).**

3.0 INSERT PLATE ANALYSIS

(Analysis per ACI 318-08, Appendix D)



3.1 Material Properties

f'_c=	5000	psi (sand-lightweight)
f_{uta} =	61	ksi
A_{se} =	0.196	in^2
A_{brg} =	0.589	in^2
h_{ef} =	2	in
d_a =	0.5	in

3.2 Stud Analysis

3.2.1 Per D.5.3.4, Eq D-15, Pullout strength in tension shall not exceed:

$N_p = 8\, A_{brg}\, f'_c$ = 23,562 lbs/stud

(due to crushing strength of concrete at the head of the stud.)

3.2.2 Basic tension breakout strength of stud shall not exceed:

$N_b = k_c\, \lambda\, (f'_c)^{1/2}\, h_{ef}^{1.5}$ [Eq D-7] Sec D.5.2.2

λ = 0.85 Sec 8.6.1 (sand-lightweight) k_c = 24 (for cast-in anchors)

N_b = 4080 lbs/stud

3.2.3 Check ductile strength of stud.

$N_{sa} = A_{se} f_{uta}$ = 11.98 kips/stud

ϕ = 0.75 [See D.4.4 a) i)]

ϕN_{sa} = 8.98 kips/stud

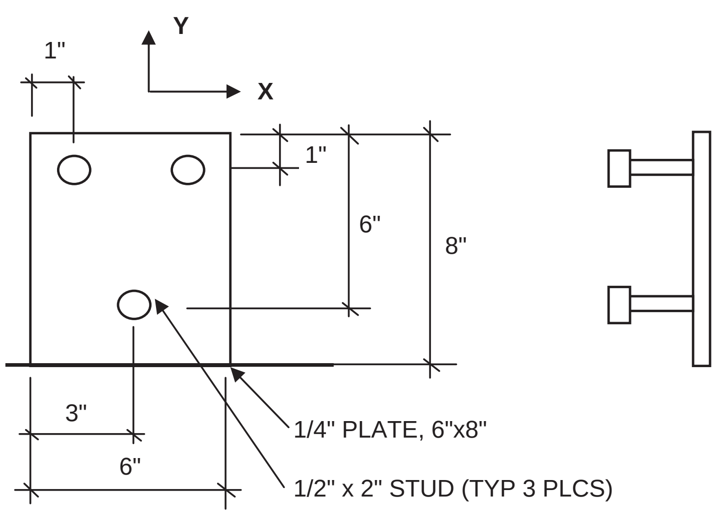
3.2.3 Check shear strength of stud.

$V_{sa} = A_{se} f_{uta}$ = 11.98 kips/stud

ϕ = 0.65 [See D.4.4 a) ii)]

ϕN_{sa} = 7.79 kips/stud

3.3 INSERT PLATE "P/N 223100" ANALYSIS



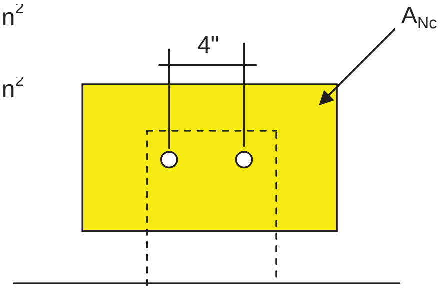
3.3.1 Tension Capacity of "P/N 223100" plate:

$N_{cbg} = (A_{nc}/A_{nco})\psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ [Eq D-5] Sec D.5.2.1

$A_{Nco} = 9h_{ef}^2$ = 36 in^2

Find A_{Nc} for just the two upper studs.

$A_{Nc} = A_{Nco} + 4(3)(h_{ef})$ = 60 in^2



$\psi_{ec,N}$ = 1.0 assume no eccentricity

$\psi_{ed,N}$ = 1.0 (c_a min > 1.5 h_{ef} for 2 studs)

$\psi_{c,N}$ = 1.25 (for cast-in anchors)

$\psi_{cp,N}$ = 1.0 (for cast-in anchors)

N_{cbg} = 8500 lbs ϕ = 0.70 [Sec D.4.4 (c) condition B]

ϕN_{cbg} = 5950 lbs
TENSION CAPACITY OF "P/N 223100" PLATE

3.3.2 Shear Capacity of "P/N 223100" plate in the X-direction:

This shear force is parallel to the edge of the panel. (equels two times perpendicular)

$V_{cbg} = 2(A_{vc}/A_{vco})\psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ V_b$ [Eq D-22 x 2] Sec D.6.2.1 (c)

$V_b = 7(l_e/d_a)^{0.2}\ (d_a)^{1/2}\ \lambda(f'_c)^{1/2}\ (c_{a1})^{1.5}$ [Eq D-24] Sec D.6.2.2

$l_e = h_{ef}$ = 2 inches λ = 0.85 Sec 8.6.1

d_a = 0.5 inches c_{a1} = 7 inches

V_b = 7270 lbs/stud $\psi_{h,V}$ = 1.0 [D.6.2.8]

$\psi_{ec,V}$ = 1.0 assume no eccentricity $\psi_{ed,V}$ = 1.0

$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

h_a = 4 inches s_1 = 4 inches

$A_{vco} = 2(1.5\ c_{a1})\ h_{a} =$ 84 in^2

$A_{vc} = (\ 2\ (1.5\ c_{a1}) + s_1)\ h_a =$ 100 in^2

V_{cbg} = 20772 lbs ϕ = 0.70 [D.4.4 (c) condition B]

ϕV_{cbg} = 14540 lbs
SHEAR CAPACITY OF "P/N 223100" PLATE IN X-DIRECTION

3.3.3 Shear Capacity of "P/N 223100" plate in the (negative) Y-direction:

This shear force is perpendicular to the edge of the panel.

NOTE: The lower stud is ignored since it is close to the free edge.

$V_{cbg} = (A_{vc}/A_{vco})\psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}V_b$ [Eq D-22] Sec D.6.2.1 (b)

V_b = 7270 lbs/stud from 3.3.2 above

$\psi_{ec,V}$ = 1.0 assume no eccentricity

$\psi_{ed,V}$ = 1.0 $c_{a2}>1.5c_{a1}$ $\psi_{h,V}$ = 1.0 [D.6.2.8]

$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

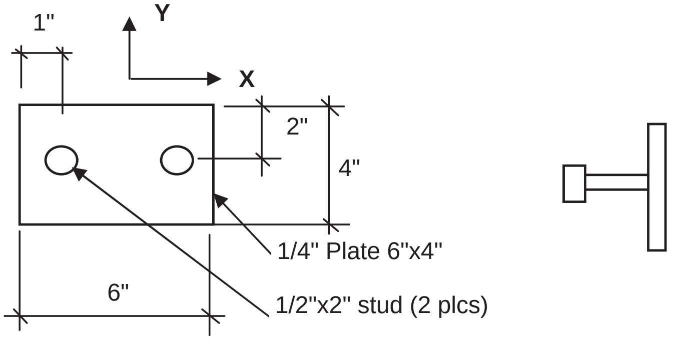
h_a = 4 inches s_1 = 4 inches

A_{vco} = 84 in^2 A_{vc} = 100 in^2 from 3.3.2 above

V_{cbg} = 10386 lbs ϕ = 0.70 [D.4.4 (c) condition B]

ϕV_{cbg} = 7270 lbs
SHEAR CAPACITY OF "P/N 223100" PLATE IN Y-DIRECTION

3.4 INSERT PLATE "P/N 223000" ANALYSIS



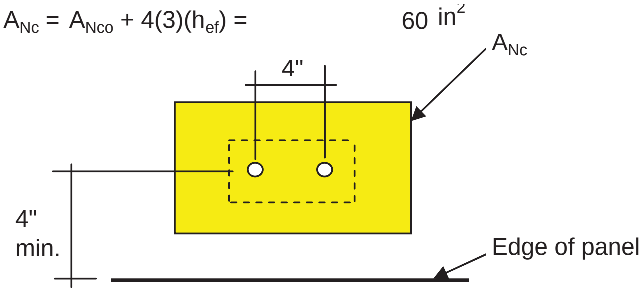
3.4.1 Tension Capacity of "P/N 223000" plate:

$N_{cbg} = (A_{nc}/A_{nco}) \psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ [Eq D-5] Sec D.5.2.1 (b)

$A_{Nco} = 9h_{ef}^2$ = 36 in^2

Find A_{Nc} for just the two upper studs.

$A_{Nc} = A_{Nco} + 4(3)(h_{ef}) =$ 60 in^2



$\psi_{ec,N} =$ 1.0 assume no eccentricity

$\psi_{ed,N} =$ 1.0 (c_a min > 1.5 h_{ef} for 2 studs considered)

$\psi_{c,N} =$ 1.25 (for cast-in anchors)

$\psi_{cp,N} =$ 1.0 (for cast-in anchors)

$N_{cbg} =$ 8500 lbs

$\phi =$ 0.70 [Use condition B, D.4.4]

$\phi N_{cbg} =$ 5950 lbs
TENSION CAPACITY OF "P/N 223000" PLATE

3.4.2 Shear Capacity of "P/N 223000" plate in the X-direction:

This shear force is parallel to the edge of the panel. (equels two times perpendicular)

$V_{cbg} = 2(A_{vc}/A_{vco}) \psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ V_b$ [Eq D-22 x 2] Sec D.6.2.1 (c)

where: $V_b = 7(l_e/d_a)^{0.2}\ (d_a)^{1/2}\ \lambda (f'_c)^{1/2}\ (c_{a1})^{1.5}$ [Eq D-24] Sec D.6.2.2

$l_e =$ hef = 2 inches λ = 0.85 Sec 8.6.1

$d_a =$ 0.5 inches $c_{a1} =$ 4 inches

V_b = 3140 lbs/stud $\psi_{h,V}$ = 1.0 [D.6.2.8]

$\psi_{ec,V}$ = 1.0 assume no eccentricity $\psi_{ed,V}$ = 1.0

$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

h_a = 3.5 inches [at step-joint] s_1 = 4 inches

$A_{vco} = 2(1.5\ c_{a1})\ h_a =$ 42 in^2

$A_{vc} = (\ 2\ (1.5\ c_{a1}) + s_1)\ h_a =$ 56 in^2

V_{cbg} = 10049 lbs

ϕ = 0.70 [Use condition B, D.4.4]

ϕV_{cbg} =	7035 lbs
SHEAR CAPACITY OF "P/N 223000" PLATE IN X-DIRECTION	

3.4.3 Shear Capacity "P/N 223000" in the neg Y-direction (toward free edge):

This shear force is perpendicular to the edge of the panel.

$V_{cbg} = (A_{vc}/A_{vco})\psi_{ec,V}\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}V_b$ [Eq D-22] Sec D.6.2.1 (b)

V_b = 3140 lbs/stud from 3.4.2 above

$\psi_{ec,V}$ = 1.0 assume no eccentricity

$\psi_{ed,V}$ = 1.0 $c_{a2}>1.5c_{a1}$ $\psi_{h,V}$ = 1.0 [D.6.2.8]

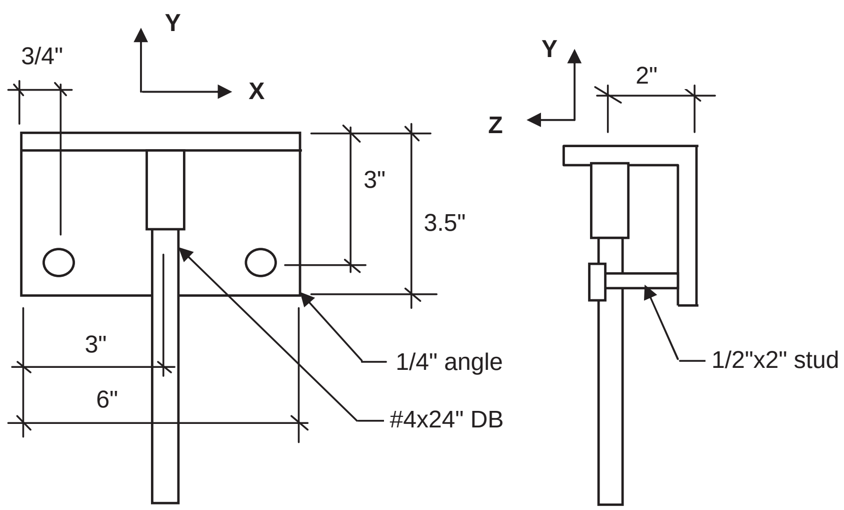
$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

A_{vco} = 42 in^2 A_{vc} = 56 in^2 from 3.4.2 above

V_{cbg} = 5025 lbs ϕ = 0.70 [Use condition B, D.4.4]

ϕV_{cbg} =	3517 lbs
SHEAR CAPACITY OF "P/N 223000" PLATE IN Y-DIRECTION	

3.5 INSERT ANGLE "P/N 222000" ANALYSIS



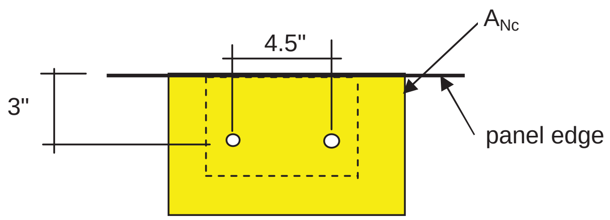
3.5.1 Tension Capacity of "P/N 222000" Insert Angle: (negative Z)

$N_{cbg} = (A_{nc}/A_{nco})\psi_{ec,N}\ \psi_{ed,N}\ \psi_{c,N}\ \psi_{cp,N}\ N_b$ [Eq D-5] Sec D.5.2.1 (b)

$A_{Nco} = 9h_{ef}^2$ = 36 in^2

Find A_{Nc} for just the two studs.

$A_{Nc} = A_{Nco} + (4.5)(3)(h_{ef}) =$ 60 in^2



$\psi_{ec,N} =$ 1.0 assume no eccentricity

$\psi_{ed,N} =$ 1.0 (c_a min > 1.5 h_{ef} for 2 studs considered)

$\psi_{c,N} =$ 1.25 (for cast-in anchors)

$\psi_{cp,N} =$ 1.0 (for cast-in anchors)

$N_{cbg} =$ 8500 lbs $\phi =$ 0.70 [Use condition B, D.4.4]

$\phi N_{cbg} =$ 5950 lbs
TENSION CAPACITY OF "P/N 222000" INSERT

3.5.2 Shear Capacity of "P/N 222000" Insert Angle in X direction:

This shear force is parallel to the edge of the panel. (equels two times perpendicular)

$V_{cbg} = 2(A_{vc}/A_{vco})\psi_{ec,V}\,\psi_{ed,V}\,\psi_{c,V}\,\psi_{h,V}\,V_b$ [Eq D-22 x 2] Sec D.6.2.1 (c)

where:

$V_b = 7(l_e/d_a)^{0.2}\,(d_a)^{1/2}\,\lambda(f'_c)^{1/2}\,(c_{a1})^{1.5}$ [Eq D-24] Sec D.6.2.2

$l_e = h_{ef} =$ 2 inches $\lambda =$ 0.85 Sec 8.6.1

$d_a =$ 0.5 inches $c_{a1} =$ 3 inches

$V_b =$ 2040 lbs/stud $\psi_{h,V} =$ 1.0 [D.6.2.8]

$\psi_{ec,V} =$ 1.0 assume no eccentricity $\psi_{ed,V} =$ 1.0

$\psi_{c,V} =$ 1.2 (for #4 bar between anchor and edge)

$h_a =$ 4 inches [at step-joint]

$s_1 =$ 4.5 inches

$A_{vco} = 2(1.5\ c_{a1})\ h_{a} =$ 36 in^2

$A_{vc} = (\ 2\ (1.5\ c_{a1}) + s_1)\ h_a =$ 54 in^2

$V_{cbg} =$ 7343 lbs $\phi =$ 0.70 [Use condition B, D.4.4]

$\phi V_{cbg} =$ 5140 lbs
SHEAR CAPACITY OF "P/N 222000" INSERT, X-DIRECTION

3.5.3 Shear Capacity of "P/N 222000" Insert Angle in Y direction:

This is for uplift forces from the roof panel.

$V_{cbg} = (A_{vc}/A_{vco})\psi_{ec,V}\,\psi_{ed,V}\,\psi_{c,V}\,\psi_{h,V}V_b$ [Eq D-22] Sec D.6.2.1 (b)

$V_b =$ 2040 lbs/stud from 3.5.2 above

$\psi_{ec,V} =$ 1.0 assume no eccentricity

$\psi_{ed,V} =$ 1.0 $c_{a2}>1.5c_{a1}$ $\psi_{h,V} =$ 1.0 [D.6.2.8]

$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

A_{vco} = 36 in^2 from 3.5.2 above

A_{vc} = 54 in^2 from 3.5.2 above

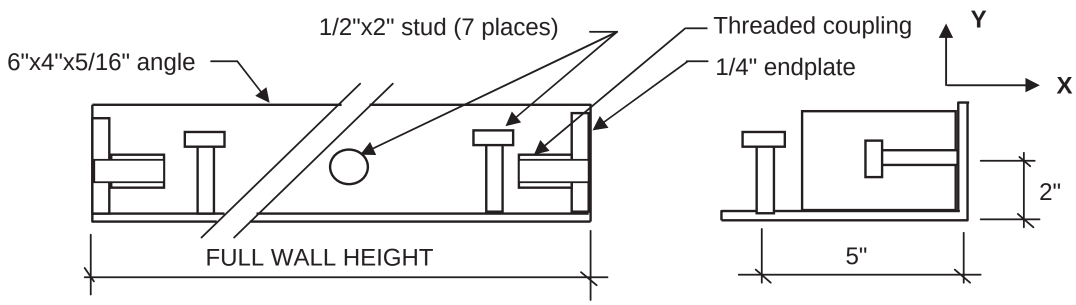
V_{cbg} = 3672 lbs

ϕ = 0.70 [Use condition B, D.4.4]

ϕV_{cbg} = 2570 lbs

SHEAR CAPACITY OF "P/N 222000" INSERT, Y-DIRECTION

3.6 WALL CORNER INSERT ANALYSIS



This insert is used on the vertical sides of the endwalls. The 4" leg forms the outside edge of the endwalls, and the 6" leg is abutted to the side walls and is used for the welded connection to the side wall, the roof, and the floor.
The primary loads on this insert are those from wind and seismic forces as they are transferred to/from the floor/roof panel by using the endwall as a shearwall against the forces as they are applied to the side walls.
The shearwall forces are applied in the X-direction as applied to the end view on the right side of the picture above. Of the 7 studs (minimum) that are on the insert, three of them would be analyzed for tension and the other four would be in shear. Depending on the direction of shear, (+X or -X direction), the free edge will come into play. This analysis will only consider the free edge allowable loads with the assumption that the insert will exceed that capacity when loaded in the opposite direction.

3.6.1 Capacity of Wall Corner Inserts in X-direction

Check capacity of individual studs on the 6" leg of the angle.
These studs would be in shear toward the free edge.

$V_{cb} = (A_{vc}/A_{vco})\ \psi_{ed,V}\ \psi_{c,V}\ \psi_{h,V}\ V_b$ [Eq D-21 Sec D.6.2.1 (a)]

where:

$V_b = 7(l_e/d_a)^{0.2}\ (d_a)^{1/2}\ \lambda(f'_c)^{1/2}\ (c_{a1})^{1.5}$ [Eq D-24] Sec D.6.2.2

$l_e = h_{ef}$ = 2 inches λ = 0.85 Sec 8.6.1

d_a = 0.5 inches c_{a1} = 5 inches

V_b = 4389 lbs/stud

$\psi_{ed,V}$ = 1.0 $\psi_{h,V}$ = 1.0 [D.6.2.8]

$\psi_{c,V}$ = 1.2 (for #4 bar between anchor and edge)

h_a = 4 inches [at step-joint] s_1 = 24 inches

$A_{vco} = 4.5\ c_{a1}^2 =$ 112.5 in^2

$A_{vc} = 2(1.5\ c_{a1})\ h_a =$ 60 in^2

V_{cb} = 5618 lbs ϕ = 0.70 [Use condition B, D.4.4]

$\boxed{\phi V_{cb} = 3932 \text{ lbs}}$
Shear capacity of studs on 6" leg, X direction.

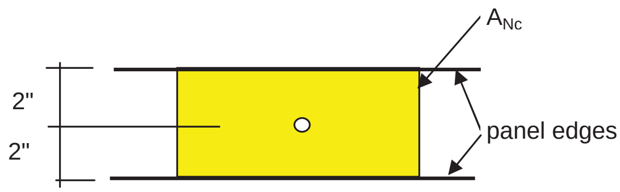
To this, add the tension load from the studs on the 4" leg.

$N_{cb} = (A_{nc}/A_{nco})\,\psi_{ed,N}\,\psi_{c,N}\,\psi_{cp,N}\,N_b$ [Eq D-4] Sec D.5.2.1 (a)

$A_{Nco} = 9h_{ef}^2$ = 36 in^2

Find A_{Nc} c_{a1} = 2 inches h_{ef} = 2 inches

$A_{Nc} = 2(c_{a1}) \times 2(1.5\,h_{ef})$ = 24 in^2



$\psi_{ed,N}$ = 1.0 (c_a min > 1.5 h_{ef} for 2 studs considered)

$\psi_{c,N}$ = 1.25 (for cast-in anchors)

$\psi_{cp,N}$ = 1.0 (for cast-in anchors)

N_{cb} = 3400 lbs ϕ = 0.70 [Use condition B, D.4.4]

$\boxed{\phi N_{cb} = 2380 \text{ lbs}}$
Shear capacity of studs on 6" leg, X direction.

These two were analyzed as individual studs since they are spaced 12 inches apart, far enough to act alone, not as a group.
In this direction, there would be a minimum of 4 studs in shear, and three studs in tension. The total allowable load is:

$P_x = 4(\phi V_{cb}) + 3(\phi N_{cb})$ = 22870 lbs
SHEAR CAPACITY OF WALL INSERT, +/- X-direction

3.7 FLOOR LIFTING INSERT ANALYSIS

The floor lifting inserts are made from 5"x5"x5/16" angle with a 5"x5/16" plate welded on the open top, to form a channel, and extend across the entire width of the floor panel at each end of the shelter. The inserts are similar to the wall corner inserts in design as they have no less than 6 studs, 1/2"x4" long, on 12" centers and two studs, 1/2"x2" long. These inserts provide three connection points for the endwall, and the two outer connections also double as side wall connections. The floor panel side inserts are made from a 5"x5"x5/16" angle with one side up and one side out, and extend the entire length of the shelter. They are also similar to the wall corner inserts in design by having a minimum of 6 studs, 1/2"x4" long, on 12" centers and four # 6 x 30" rebar splices. These inserts provide three or more connection points for the sidewall. By inspection these inserts are highly integrated into the floor structure. A failure would require much more than the shear cone failures as provided by the stud design manual. Therefore, the connections will be considered as equivalent to the analysis of the wall corner insert (sec 3.6.1).

3.8 CAPACITY OF WELDS AT CONNECTION PLATES

Welds to be made with SMAW, E70XX electrodes.
All standard connection plates will have a 3/16" weld, 3 inches long.
E70XX welds are good for .928 kips per inch per sixteenth inch of weld.
Weld capacity is then:

Pw = (0.928 k/inch/sixteenth) x (3 inches) x (3 sixteenths)

Pw = 8.352 kips
CAPACITY OF ALL STANDARD CONNECTION PLATE WELDS

3.9 CAPACITY OF TIE-DOWN CONNECTION PLATES

Three failure modes are noted:

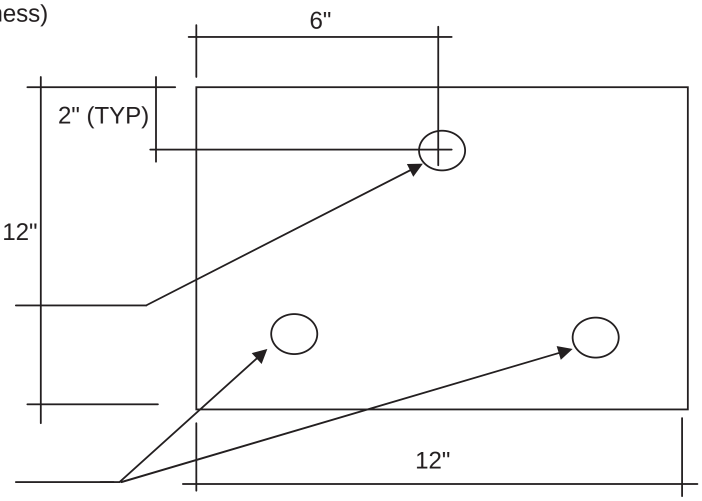
A: Failure of the connection plate.
B: Failure of the bolts connecting the plate to the shelter.
C: Failure of the expansion anchor connecting the plate to the foundation.

t = 0.25 " (plate thickness)

Fy = 36 ksi
Fu = 58 ksi

Bolt DIA = 1.00 "
1.25 "

anchor DIA = 0.75 "
0.875 "



A: Shear through edge of plate at one hole is:

HoleArea(bolt)=	D(top) x t	=	0.3125	in^2	
HoleArea(anchor)=	D(bot) x t	=	0.21875	in^2	
PL-Area =	t x (2" - (.5 x 1.25"))	=	0.34375	in^2	
	cannot exceed t x 4t	=	0.25	in^2	CONTROLS

OK [exceeds 2/3 hole area, AISC, LRFD (1999), D3.2]

Bearing on hole area: Apl(bolt)= 0.25 in^2
Apl(anchor)= 0.1875 in^2
Fp(hole) = 1.0 Fu = 58 ksi
PL-bearing = 14.50 kips/ bolt hole
PL-bearing = 10.88 kips/ anchor hole
Transient load factor: 1.333
Capacity of connection plate is: 19.33 kips (using 1 bolt and 2 anchors)
19333 lbs per connection

B: 1" bolt capacity: Use A307 bolts or better
Fv = 10.0 ksi
A(bolt) = 0.785 in^2
Transient load factor: 1.333
P(bolt) = 10.47 kips / bolt = 10472 lbs per connection

C: Expansion anchor capacity from Hilti charts:
Reference ICC report #ESR-1385 & Tables 2 & 5
Anchor is Hilti Stainless Steel Kwik Bolt 3, 3/4" x 6.5"
<u>Shear in horizontal direction (due to sliding of shelter):</u>
See Table 5, 3000 psi normal weight concrete, in ICC report.
Embedment depth: 4.75 in OK
Allowable load: 4225 lbs per anchor
See Table 2, 3000 psi normal weight concrete, in ICC report.
Edge distance for max load: 9.75 in OK (in direction of load)
Spacing req'd for full load: 10.75 in
Min. spacing allowed: 4.75 in (10% reduction per note 4, table 2)
Actual spacing: 8 in
Interpolated reduction for spacing: 4.6 %
Transient load factor: 1.333
Modified allowable horizontal shear load: 5375 lbs per anchor
times 2 = 10750 lbs per connection
<u>Shear in vertical direction (due to uplift of shelter):</u>
Hilti Kwik Bolt 3 requirements
4.75" embedment
4.875" min. edge dist. allowed => use 50% of chart loads (note 6, table 2)
9.75" required for full load strength
6" edge distance => 38.46% Interpolated reduction
Allowable vertical load in 3000 psi concrete:
61.54% x 4225 lbs = 2600 lbs per anchor
Reduction for spacing (same as above): 4.6 %
Transient load factor: 1.333
Modified allowable vertical shear load: 3308 lbs per anchor
times 2 = 6615 lbs per connection

Controlling loads for tie-down connections:

Horizontal (sliding):	10472	lbs
Vertical (uplift):	6615	lbs

4 CONCRETE BUILDING WEIGHT CALCULATOR

	Concrete Density =	115	pcf
	Concrete Required =	10.5	yards
4.1 Shelter Dimensions:		shelter dimensions	
	Width:	10.000	ft
	Length:	18.000	ft
	Height:	9.250	ft,(wall height)
		Weight, lbs	
	Material		
4.2 ROOF	CONCRETE	8377	
	2.25" INSULATION	63	
	7/16" OSB PANELING	238	
	3/8" OSB W/FINISH	202	
	Total Roof Wt.	**8880**	
	Avg. Dead Load, psf	45.7	
4.3 WALLS	CONCRETE	17331	
	1.75" INSULATION	140	
	7/16" OSB PANELING	466	
	3/8" OSB W/FINISH	400	
	Total Wall Wt.	**18337**	
	Avg. Dead Load, psf	36.3	
4.4 FLOOR	CONCRETE	7044	
	L5x5x5/16 PERIMETER BEAM	577	
	STYROFOAM (2 PCF DENSITY)	50	
	TILE, 1/8"	215	
	Total Floor Wt.	**7886**	
	Avg. Dead Load, psf	43.8	

4.5 WEIGHT SUMMARY:

		Width x	Building Length x	Height
Total Overall : lbs	**35103**	**10.000**	**18.000**	**9.250**

CODE SUMMARY

2000	INTERNATIONAL BUILDING CODE
2000	STANDARD BUILDING CODE
2003	INTERNATIONAL BUILDING CODE
2006	INTERNATIONAL BUILDING CODE
2009	INTERNATIONAL BUILDING CODE
2012	INTERNATIONAL BUILDING CODE
1994	UNIFORM MECHANICAL CODE
1996	BOCA MECHANICAL CODE
1997	STANDARD MECHANICAL CODE
1997	UNIFORM MECHANICAL CODE
2000	INTERNATIONAL MECHANICAL CODE
2000	STANDARD MECHANICAL CODE
2003	INTERNATIONAL MECHANICAL CODE
2006	INTERNATIONAL MECHANICAL CODE
2009	INTERNATIONAL MECHANICAL CODE
2012	INTERNATIONAL MECHANICAL CODE
2000	MINNESOTA STATE ENERGY CODE (CH. 1323)
2004	CHICAGO BUILDING CODE
2007	KENTUCKY BUILDING CODE
2007	MINNESOTA STATE MECHANICAL CODE (CH. 1346–2000 IMC & 2000 IFGC W/ AMEND.)
2007	MINNESOTA STATE BUILDING CODE
2009	NEW MEXICO COMMERCIAL BUILDING CODE
2008	NEW MEXICO ELECTRICAL CODE
2009	NEW MEXICO MECHANICAL CODE
2009	MICHIGAN BUILDING CODE
2009	MICHIGAN MECHANICAL CODE
2010	CALIFORNIA BUILDING CODE
2010	CALIFORNIA GREEN BUILDING STANDARDS
2010	CALIFORNIA ENERGY CODE
2010	BUILDING CODE OF NEW YORK STATE
	ELECTRICAL CODE OF NEW YORK STATE
2010	MECHANICAL CODE OF NEW YORK STATE
	NORTH DAKOTA ELECTRICAL WIRING STANDARDS
2010	FLORIDA BUILDING CODE
2010	FLORIDA BUILDING CODE ENERGY CONSERVATION
2011	MASSACHUSETTS ELECTRICAL CODE
8TH	MASSACHUSETTS STATE BUILDING CODE
2011	OHIO BUILDING CODE
2011	OHIO MECHANICAL CODE
	CALIFORNIA TITLE 25
2010	OREGON STRUCTURAL SPECIALITY CODE
2010	OREGON MECHANICAL SPECIALITY CODE
2010	OREGON ENERGY EFFICIENCY SPECIALITY CODE
2012	NORTH CAROLINA BUILDING CODE
2008	NORTH CAROLINA ELECTRICAL CODE
2012	NORTH CAROLINA MECHANICAL CODE
2012	NORTH CAROLINA ENERGY CONSERVATION CODE
2012	TEXAS ACCESSIBILITY STANDARDS
1996–2011	NATIONAL ELECTRICAL CODE
1989,1999,2001,2004,2007	ASHRAE 90.1
2000,2003,2006,2009, 2012	INTERNATIONAL ENERGY CONSERVATION CODE
2000,2003,2005,2006,2009	NFPA 101 LIFE SAFETY CODE
2002	ARKANSAS FIRE PREVENTION CODE
2009	NORTH CAROLINA FIRE PREVENTION CODE

NOTES

1. LISTED CODES INCLUDE LATEST STATE ADOPTED AMENDMENTS.
2. THIS SHELTER IS AN "ENCLOSED STRUCTURE" NOT INTENDED FOR HUMAN HABITATION.
3. APPROVED MODEL MAY BE MIRROR IMAGE.
4. OCCUPANT LOAD = 0, OHIO = 2
5. SPECIAL CONDITIONS AND PERMISSIBLE TYPES OF GASES: N/A
6. SHELTER HAS NO COUNTY PLACEMENT RESTRICTION IN THE STATE OF MARYLAND.
7. STATE INSIGNIA LABEL/DECAL IS LOCATED NEAR MAIN ELECTRICAL SERVICE PANEL.
8. DOOR MUST BE MINIMUM 90 MINUTE FIRE RATED IF USED IN 2 HOUR FIRE RATED SHELTER AND MINIMUM 45 MINUTE FIRE RATED IF USED IN 1 HOUR FIRE RATED SHELTER.
9. ENERGY CODE EVALUATION BASED ON COMCHECK-EZ AND ENERGY GAUGE FLACOM SOFTWARE.
10. NOT SUBJECT TO FLORIDA FIRE SAFETY CODE, COMPLIANCE IS THE RESPONSIBILITY OF THE LOCAL JURISDICTION CODE OFFICIAL.
11. ACCESS TO SHELTER SHALL COMPLY WITH MARYLAND ACCESSIBILITY CODE COMAR .05.02.02.07/ADAAG SECTION 4.1.2.
12. ALL WELDS SHALL BE VERIFIED BY SPECIAL INSPECTION SHOWING CONFORMANCE TO THE DESIGN DRAWINGS AND SPECIFICATIONS.
13. APPLICABLE INTERNAL PRESSURE COEFFICIENT (N/A) – THESE SHELTERS CONFORM TO THE REQUIREMENTS OF (2000,03,06,09 IBC), ASCE 7–05, METHOD 1 SIMPLIFIED PROCEDURE; (2012 IBC, 2010 FBC) ASCE 7–10 SIMPLIFIED DIAPHRAM LOW-RISE BUILDINGS.
14. WIND IMPORTANCE FACTOR – IW = 1.000
15. THESE PLANS ARE DESIGNED TO BE USED FOR THE CONSTRUCTION OF COMMERCIAL MODULAR UNITS, IN ACCORDANCE WITH CA HEALTH AND SAFETY CODE SECTION 18028, 1991 UBC, 1993 NEC, ANSI A117.1–1986.
16. THE 2005 NEC IS MORE STRINGENT THAN THE 2002 NEC, 2012 NEC.
17. HVAC UNITS ARE SIZED PER CUSTOMER REQUIREMENTS.
18. EXTERNAL GROUNDING BY OTHERS.
19. SHELTER CONSTRUCTED IN ACCORDANCE WITH 9N–3 FAC.
20. THIS BUILDING DOES NOT CONTAIN PLUMBING FACILITIES.

EXTERIOR COMPONENTS AND CLADDING POSITIVE AND NEGATIVE PRESSURES IN TERMS OF PSF

ZONE	2000 IBC, 120 MPH WIND SPEED	2003 IBC, 2006 IBC, 120 MPH WIND SPEED	2000,2003,2006,2009,2012 IBC, 150 MPH WIND SPEED	2010 FBC, 180 MPH WIND SPEED
ROOF ZONE 1 (100 SF EFFECTIVE WIND AREA)	+12.1/–28.7	+10.0/–28.7	+15.7/–44.8	+22.7/–64.5
ROOF ZONE 2 (20 SF EFFECTIVE WIND AREA)	+12.1/–46.9	+12.0/–46.9	+18.6/–73.4	+26.9/–105.8
ROOF ZONE 3 (10 SF EFFECTIVE WIND AREA)	+12.7/–79.1	+12.7/–79.1	+20.0/–123.7	+28.7/–178.1
WALL ZONE 4 (200 SF EFFECTIVE WIND AREA)	+25.8/–28.4	+25.8/–28.4	+39.6/–43.4	+58.2/–64.1
WALL ZONE 5 (30 SF EFFECTIVE WIND AREA)	+29.3/–38.0	+29.3/–38.0	+45.9/–59.2	+65.9/–92.3

INDEX OF SHEETS

LAYOUT DRAWINGS

* = DENOTES SHEETS WHICH MAY CONTAIN FIELDWORK

REFERENCE DRAWINGS

STRUCTURAL DRAWINGS (MANUFACTURE ONLY)

DESIGN PARAMETERS

USE GROUP: B (BOCA, MASBC)
S–2 (FBC, IBC, SBC, UBC)
U (OBC)

CONSTRUCTION TYPE: 5B (BOCA, MASBC)
IV–UNP (SBC)
V–B (IBC, FBC)
V–N (UBC)

ROOF LIVE LOAD: 136 PSF

FLOOR LIVE LOAD: 251 PSF

GROUND SNOW LOAD: 161 PSF (N/A FOR FBC 2007)

WIND SPEED: 156 MPH/EXPOSURE C

SEISMIC ZONE FOR SBC & UBC: 4
SEISMIC DESIGN CATEGORY FOR IBC: E (IBC)
Ss=3.00
S: = 2.00
Ip = 1.5
SPC=D
USE GROUP–III (OBC)
SITE CLASS–D (OBC)

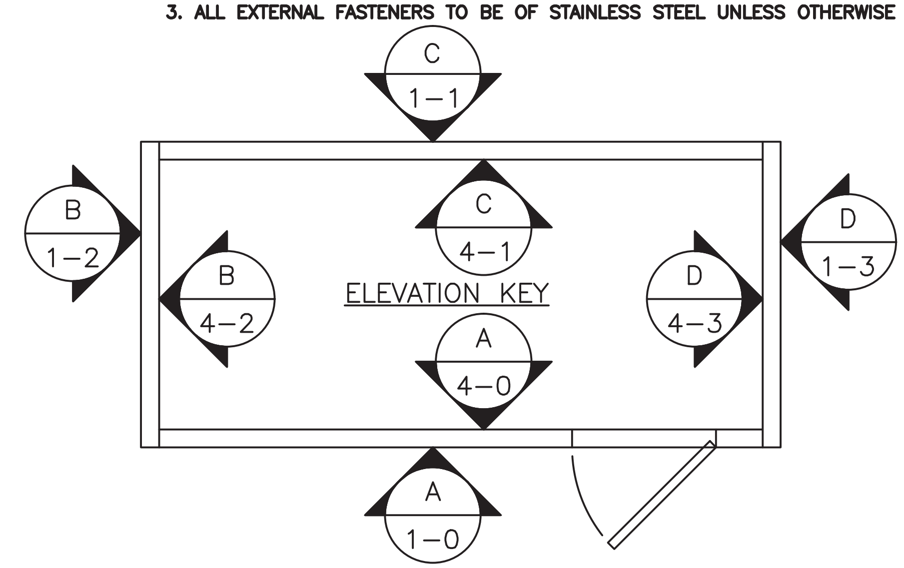
CONCRETE f'c: 5000 PSI AT 28 DAYS
CONCRETE UNIT WEIGHT: 115 PCF
FIRE RATING: 2 HOUR WALL AND ROOF (LIMITATIONS MAY APPLY DUE TO OPENINGS AND PROXIMITY ON SITE)
FIRE SEPARATION DISTANCE: 10'–0" MINIMUM

PHYSICAL PROPERTIES

SHELTER DIMENSIONS: 10'–0"W X 18'–0"L
SHIPPING DIMENSIONS: 10'–8"W X 19'–9 1/8"L X 10'–1"H
SHELTER WEIGHT: 39,400 # (SHELTER ONLY)

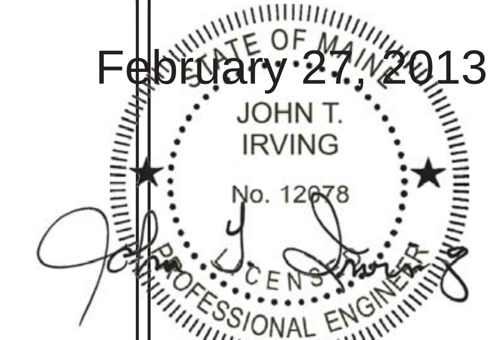
GENERAL NOTE:

1. DIMENSIONS MARKED WITH A "D" ARE DESIGN DIMENSIONS THAT NEED TO BE CHECKED. THEY TYPICALLY DICTATE A POSITION OF A SERVICE TERMINATION OR DIMENSION THAT NEEDS TO MATCH A POSITION OR DIMENSION AT THE INSTALLATION SITE.
2. PAINT UNGALVANIZED OR UNPAINTED CARBON STEEL COMPONENTS WITH
   A. TWO (2) COATS OF 201H UNIVERSAL EPOXY PRIMER 2–3 mil DFT OR TWO COATS OF DEVOE BAR–RUST 235 MULTIPURPOSE PRIMER 4–8 mil DFT THEN
   B. THEN ONE(1) COAT OF DEVTHANE 389 POLYURETHANE TWO–PART SYSTEM 4–8 mil DFT.
3. ALL EXTERNAL FASTENERS TO BE OF STAINLESS STEEL UNLESS OTHERWISE NOTED.



REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED SHEETS	LJL	10/31/12
N	JWR	6/29/12	CORRECTED NOTES	LJL	6/29/12

February 27, 2013



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5031 Hazel Jones Road
Bossier City, Louisiana 71111
voice: (318) 213–2900
fax: (318) 213–2919
www.cellxion.com

CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0"
CONCRETE SHELTER
COVER SHEET

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 0–0	
DRAWING NO.: SKBR02	REV.: P

PARTS LIST

ITEM	QTY	U/M	P/N	DESCRIPTION
1	4.0000	EA.	168177	BOLT,1/2"X2" UNC,STAINLESS STEEL (INSTALL DEPT.)
2	4.0000	EA.	168186	WASHER,1/2" FLAT,STAINLESS (INSTALL DEPT.)
3	4.0000	EA.	168188	WASHER,1/2" LOCK,STAINLESS (INSTALL DEPT.)
4	4.0000	EA.	168488	ANCHOR,DROP IN,1/2"X2",SS (INSTALL DEPT.)
5	3.0000	EA.	440093	TELEPHONE,JACK,WALL MOUNT,DUPLEX (INSTALL DEPT.)
6	2.0000	EA.	480034	TELEPHONE,RJ-11 PLUG,325954UL (INSTALL DEPT.)
7	1.0000	EA.	480175	SHELF RISER,96",WORK BENCH,R-1096 (INSTALL DEPT.)
8	1.0000	EA.	480176	WORK BENCH,96"X30",WB-1-3096P (INSTALL DEPT.)
9	1.0000	EA.	900102	HEMP CABINET (INSTALL DEPT.) (PROVIDED BY OTHERS)
10	1.0000	EA.	168283	BUSHING,PLASTIC,1/2",SNAP-IN,HEYCO
11	1.0000	EA.	170112	PIPE CAP,PLASTIC,NPT,NIAGARA #249
12	1.0000	EA.	170113	PIPE CAP,PLASTIC,NPT,NIAGARA #205
13	5.0000	EA.	170114	PIPE CAP,PLASTIC,NPT,NIAGARA #195F
14	1.0000	EA.	170125	PIPE CAP,PLASTIC,NPT,NIAGARA #257
15	1.0000	EA.	390003	ALARM,F/C,PANEL,FIKE,051
16	1.0000	EA.	390006	ALARM,F/C,MANUAL PULL,FIKE,3710
17	1.0000	EA.	390036	ALARM, RED WP BACK BOX, FIKE
18	1.0000	EA.	400666	CARD HOUSING W/AC DC 48V ADAPT
19	1.0000	EA.	410004	CONDULET,BODY COVER,1/2" ALUM (OR EQUAL)
20	2.0000	EA.	410006	CONDULET,BODY AL LB,1",LB100D
21	1.0000	EA.	410025	CONDULET,BODY AL LL,1/2",LL50D (OR EQUAL)
22	1.0000	EA.	410039	CONDULET,GASKET 1/2",GASK015N (OR EQUAL)
23	1.0000	EA.	410045	LOCKNUT,EMT,1/2"
24	12.0000	EA.	410047	LOCKNUT,EMT,1"
25	1.0000	EA.	410075	BUSHING,1/2",PLASTIC
26	0.0000	EA.	410077	BUSHING,EMT,1",PLASTIC
27	5.0000	EA.	410079	BUSHING,EMT,1 1/2",PLASTIC
28	2.0000	EA.	410080	BUSHING,2",PLASTIC
29	1.5000	EA.	410111	CONDUIT,LFMC,3/4",SEALTITE
30	4.5000	FT.	410112	CONDUIT,LFMC,1/2",SEALTITE
31	2.0000	EA.	410182	NIPPLE,RIGID,3/4"X8 1/2"
32	2.0000	EA.	410184	NIPPLE,RIGID,1/2"X7 1/2"
33	1.0000	EA.	410205	NIPPLE,RIGID,2"X8"
34	1.0000	EA.	410217	NIPPLE,RIGID,1"X8"
35	4.0000	EA.	410224	NIPPLE,RIGID,1 1/2"X8"
36	1.0000	EA.	410281	NIPPLE,RIGID,1 1/2"X8 1/2"
37	1.0000	EA.	410289	NIPPLE,RIGID,1/2"X3 1/2"LONG
38	3.0000	EA.	410347	NIPPLE,RIGID,1"X4 1/2"
39	2.0000	EA.	410352	NIPPLE,RIGID,1"X9"
40	1.0000	EA.	410357	NIPPLE,RIGID,1/2"X5"
41	1.0000	EA.	410519	CONNECTOR,FLEX CORD,.5-.75"
42	5.0000	EA.	430003	BOX,JUNCT,4 OCT X1 1/2,3/4&1/2KO
43	21.0000	EA.	430005	BOX,JUNCT,4"X4",2-1/8D,1/2"-3/4KO
44	6.0000	EA.	430029	BOX,JUNCT,4-11/16"X4-11/16"D-2 1/8"
45	1.0000	EA.	430030	BOX,JUNCT,2X4,WP,(3) 1/2"HOLES
46	4.0000	EA.	430034	RECEPTACLE,DUPLEX,125V,20A,IVORY
47	5.0000	EA.	430054	BOX,JUNCT,2"X4",1 7/8" (OR EQUAL)
48	1.0000	EA.	430146	BOX,6X6X4,SCREW COVER,NEMA 3R,A6R64
49	1.0000	EA.	430148	BOX,10X8X6,SCREW COVER,NEMA1,
50	1.0000	EA.	430208	DISCONNECT,SQD,60A,NONFUSED,DU322RB
51	1.0000	EA.	430240	BOX,BACK,GEN RECPT 60A,MELTRIC
52	1.0000	EA.	430367	COVER,BLANK PLATE,4X4 WP
53	1.0000	EA.	430568	BOX,6X6X6,SCREW COVER,NEMA6P
54	1.0000	EA.	430720	LOADCENTER,SQD,BOX,MH32
55	1.0000	EA.	430992	BOX,JUNCT,WP,DEEP,(3)1/2 HOLES, COMPLETE WITH (2) THREADED HOLE PLUGS
56	1.0000	EA.	431328	BOX,ENCLOSURE,16X16X8,HASP,NEMA1
57	20.0000	EA.	440074	SURGE PROTECT. MODULE,CIRCA,4B3S-75
58	1.0000	EA.	440079	AUTO DIALER,DUAL IN,VIKING K-202-DVA
59	5.0000	EA.	440098	SURGE PROTECT,MODULE,CIRCA,3B1E
60	1.0000	EA.	460116	CONTROLLER,COMSTAT 3,MARVAR,S/04581
61	1.0000	EA.	900154	MONITOR,FUEL,INCON,TS-550 (PROVIDED BY OTHERS)
62	2.0000	EA.	390004	ALARM,F/C,DET,PHOTOELECTIC,FIKE
63	1.0000	EA.	390007	ALARM,F/C,HORN/STROBE,FIKE,098
64	1.0000	EA.	390008	ALARM,F/C,BATTERY ASSEMBLY
65	2.0000	EA.	390033	ALARM,F/C,DET,BASE,FIKE
66	1.0000	EA.	390034	ALARM,F/C,MODULE OPTIONAL,FIKE,RM4
67	1.0000	EA.	390035	ALARM,F/C,EXTERIOR WP,STROBE
68	12.0000	FT.	400072	WIRE,#6/5,TYPE W MULTICONDUCTOR CAB
69	9.0000	EA.	400272	BREAKER,SQD,1P 20A,BOLT ON,QOB120
	4.0000	EA.	400273	BREAKER,SQD,1P 15A,BOLT ON,QOB115
72	1.0000	EA.	400303	BREAKER,SQD,3P 100A,BOLT ON,QOB3100
73	1.0000	EA.	400315	BREAKER,SQD,3P 30A,BOLT ON,QOB330
74	1.0000	EA.	400316	BREAKER,SQD,3P 35A,BOLT ON,QOB335
75	1.0000	EA.	400359	BREAKER,SQD,3P 40A,BOLT ON,QOB340
76	1.0000	EA.	400665	CONTACT,RX CARD,RLH,8C4-M2STR-01

ITEM	QTY	U/M	P/N	DESCRIPTION
77	10.0000	FT.	400846	WIRE,#22,4 PAIR,SOLID,NO SHLD,8757
78	4.0000	EA.	400893	CORD,POWERSUPPLY,12/3,PIGTAIL,8FT
79	2.0000	EA.	410000	CONDULET,BODY COVER,1" ALUM
80	2.0000	EA.	410041	CONDULET,GASKET 1",GASK035N
81	6.0000	FT.	410112	CONDUIT,LFMC,1/2",SEALTITE
82	7.0000	EA.	410117	CONNECTOR,LFMC,1/2",STRAIGHT,ST
83	2.0000	EA.	410118	CONNECTOR,LFMC,1/2",90D,SEALTITE
84	1.0000	EA.	410120	CONNECTOR,LFMC,3/4",90D,SEALTITE
85	1.0000	EA.	410129	CONNECTOR,LFMC,3/4",STRAIGHT,ST
86	1.0000	EA.	410446	CONNECTOR,CORD GRIP,1",CG1003A
87	1.0000	EA.	420006	LABEL,BLK,ELECT,"GFCI"
88	1.0000	EA.	420009	LABEL,BLK,ELECT,"INTERIOR LIGHT"
89	1.0000	EA.	420016	LABEL,BLK,ELECT,"LEAD-LAG CONTROLLER"
90	80.0000	EA.	420033	LABEL,SELF TRANSFER,PANDUIT TTSL2
91	1.0000	EA.	420036	LABEL,BLK,ELECT,"HVAC DISCONNECT"
92	1.0000	EA.	420041	LABEL,"ARC FLASH AND SHOCK WARNING"
93	7.0000	EA.	420047	LABEL,BLK,ELECT,"120V RECEPT"
94	1.0000	EA.	420079	LABEL,BLK,ELECT,"CKT 8"
95	1.0000	EA.	420080	LABEL,BLK,ELECT,"CKT 10"
96	1.0000	EA.	420091	LABEL,BLK,ELECT,"CKT 11"
97	1.0000	EA.	420111	LABEL, BLK, ELECT, "CKT 07"
98	1.0000	EA.	420143	LABEL,RED, ELECT,BONDING TAG
99	2.0000	EA.	420155	LABEL,BLK,ELECT,"CKT 9"
100	1.0000	EA.	420167	LABEL,BLK,ELECT,"CKT 23 & 25"
101	1.0000	EA.	420168	LABEL,BLK,ELECT,"CKT 27 & 29"
102	2.0000	EA.	420169	LABEL,BLK,ELECT,"208V RECEPT"
103	1.0000	EA.	420174	LABEL,BLK,ELECT,"CKT 18"
104	2.0000	EA.	420192	LABEL,BLK,ELECT,"CKT 20"
105	1.0000	EA.	420194	LABEL,BLK,ELECT,"CKT 22"
106	2.0000	EA.	420196	LABEL,BLK,ELECT,"CKT 24"
107	1.0000	EA.	420197	LABEL,BLK,ELECT,"CKT 12&14&16"
108	1.0000	EA.	420201	LABEL,BLK,ELECT,"OPTICAL CONNECTOR"
109	1.0000	EA.	420202	LABEL,BLK,ELECT,"208V 3-PHASE"
110	1.0000	EA.	420203	LABEL,BLK,ELECT,"CIRCUIT BREAKER BOX"
111	1.0000	EA.	420205	LABEL,BLK,ELECT,"CKT 17&19&21"
112	1.0000	EA.	420245	LABEL,BLK,ELECT,"HUMIDISTAT"
113	1.0000	EA.	420321	LABEL,BLK,ELECT,"NORMAL"
114	1.0000	EA.	420322	LABEL,BLK,ELECT,"BYPASS"
115	1.0000	EA.	420325	LABEL,BLK,ELEC,"FEMA PHONE JACK #1"
116	1.0000	EA.	420326	LABEL,BLK,ELEC,"PHONE JACK #2"
117	1.0000	EA.	420327	LABEL,BLK,ELEC,"PHONE JACK #3"
118	1.0000	EA.	420329	LABEL,YEL,"OSHA CLEARANCE REQUIRE"
119	6.0000	EA.	430001	COVER,BLANK PLATE,4X2,HANDY (OR EQUAL)
120	1.0000	EA.	430006	COVER,SWITCH PLATE,4X4,1 SWITCH
121	2.0000	EA.	430007	COVER,RECPT PLATE,4X4,1 REC,IND
122	11.0000	EA.	430012	COVER,BLANK PLATE,4X4
123	1.0000	EA.	430013	COVER,PLAST RING,4X4,1/4" RISE
124	6.0000	EA.	430014	COVER,BLANK PLATE,4 11/16
125	6.0000	EA.	430025	COVER,RECPT PLATE,4X4,2R
126	1.0000	EA.	430033	RECEPTACLE,GFCI,120V,20A,IVORY
127	6.0000	EA.	430034	RECEPTACLE,DUPLEX,125V,20A,IVORY
128	2.0000	EA.	430052	HUB,3/4",SS,MYERS,SSTG-2
129	1.0000	EA.	430084	SWITCH,SPST,20A,120V,IVORY
130	1.0000	EA.	430176	RECEPT,DECONTACTOR,FEMALE,MELTRIC
131	1.0000	EA.	430180	RECEPT,DECONTACTOR,MALE,MELTRIC
132	1.0000	EA.	430181	GEN RECEPT,HANDLE,METAL,MELTRIC
133	3.0000	EA.	430286	BOX,ENCLOSURE,16X16X6,HINGED,NEMA3
134	1.0000	EA.	430384	COVER,GFCI,2 REC,HORZ,WTSG15A-C
135	0.3500	EA.	430521	RAIL,DIN,AS,35MM X 7.5MM X 17.5IN

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED PARTS LIST	LJL	10/31/12
N	JWR	6/29/12	UPDATED PARTS LIST	LJL	6/29/12
N	RRG	6/13/12	UPDATED PARTS LIST	LJL	6/13/12

STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER
February 27, 2013

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CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER PARTS LIST

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 0-1	
DRAWING NO.: SKBR02	REV.: P

PARTS LIST (CONTINUED)

ITEM	QTY	U/M	P/N	DESCRIPTION
136	1.0000	EA.	430721	PANELBOARD,SQD,COVER,NC32S
137	1.0000	EA.	430792	PANELBOARD,SQD,100A,30P,3PH,NQ430L1
138	1.0000	EA.	430923	ALARM BLOCK,CIRCA,1880ECA1-25 (TELCO CONNECTION BOX)
139	10.0000	EA.	430925	TERMINAL BLOCK,40A,35 SECTIONS
140	2.0000	EA.	430994	TERMINAL BLOCK,END,BARRIER,9080GK6
141	2.0000	EA.	431361	RECEPTACLE,SINGLE,125V,15A,STRAIGHT
142	1.0000	EA.	440071	SURGE ARRESTOR,SQ-D,3PHASE,SDSA3650
143	1.0000	EA.	440114	UPS,SYSTEM,5130 SERIES,EATON
144	1.0000	EA.	440115	UPS,SYSTEM,3105 SERIES,EATON
145	5.0000	EA.	470083	LIGHT FIXTURE,60W/250V,PORCELAIN
146	5.0000	EA.	470085	LIGHT,STEEL GUARD FOR INCANSCENT
147	5.0000	EA.	470217	LIGHT BULB,60W,INCANDESCENT,120V
148	1.0000	EA.	490000	ALARM,MAGNETIC DOOR CONTACT
149	1.0000	EA.	490104	DETECTOR,HUMIDITY,DG115EZIAQ,HONEYWELL
150	1.0000	EA.	504678	SWITCH,KEYED,SECURITY,SDC702U
151	1.0000	EA.	540211	G-BAR KIT,SQUARE D,PK23GTAL
152	1.0000	EA.	900114	INTERCONNECT CENTER,WALL,WIC-012
153	2.0000	EA.	146011-007	PLATE,COVER,BLOCKOUT,22"X30",GALV.
154	2.0000	EA.	146011-008	PLATE,COVER,BLOCKOUT,22"X30",GALV.
155	1.0000	EA.	146556-003	GROUND STRIP,SS,1"X4" 18 GA
156	8.0000	EA.	168031	WASHER,3/8" FLAT,STAINLESS STEEL
157	8.0000	EA.	168032	NUT,3/8"-UNC,HEX,STAINLESS STEEL
158	8.0000	EA.	168118	BOLT,CARRIAGE,GALV.3/8"X8"
159	82.0000	EA.	168215	SCREW,OVAL,#14X1 1/2",PH,SS
160	82.0000	EA.	168216	WASHER,#14 FLANGE SS
161	8.0000	EA.	168280	NUT,3/8",ACORN,STAINLESS STEEL
162	12.0000	EA.	168536	SCREW,WOOD,#8X1/2IN,PH,ROUND,SS
163	16.0000	EA.	168553	SCREW,WOOD,#10X3/4IN,ST,ROUND,SS
164	2.0000	EA.	350054	PLATE,MOUNT,HVAC,EXT,3/4"X22"X29"
165	2.0000	EA.	350055	PLATE,MOUNT,HVAC,INT,3/4"X22"X29"
166	4.5000	FT.	400073	WIRE,#4 THHN,STRAND,GRN
167	12.0000	EA.	400371	LUG,2H,#6,BLU,1/4"BOLT,3/4"C/C,LBFW
168	1.0000	EA.	400377	LUG,2H,#4,GRY,1/4"BOLT,3/4"C/C,LBFW
169	7.0000	EA.	400390	LUG,2H,#2,BRN,1/4"BOLT,3/4"C/C,LBFW
170	4.0000	EA.	410396	BUSHING,INSULATING,CEILING BRACKET
171	2.0000	EA.	410397	BUSHING,INSULATING,WALL MOUNT BRACK
172	1.0000	EA.	420445	LABEL,BLK,"INTAKE ONLY LWR OPENING"
173	1.0000	EA.	420446	LABEL,BLK,"EXHAUST UPPER OPENING"
174	1.0000	EA.	420447	LABEL,BLK,"INTAKE ONLY, CAP VACANT"
175	1.0000	EA.	420448	LABEL,BLK,"EXHAUST ONLY, CAP VACANT
176	1.0000	EA.	470423	LOUVER,8"X9 1/2",HOFFMAN,AVK86
177	4.0000	EA.	470468	SCREEN MESH,SS,1/8"WIRE,6"DIA
178	2.0000	EA.	470646	VENT,INTAKE,6" FIXED W/BUG SCREEN
179	2.0000	EA.	470647	VENT,EXHAUST,6" GRAVITY OPERATED
180	1.0000	EA.	480005	CELLXION BRASS GREEN SERIAL NO.PLAT
181	1.0000	EA.	510000	CABLE LADDER,12"X9'8 1/2",YELLOW ZI
182	1.0000	EA.	510006	CABLE LADDER,12",CLOSING BAR,Y/Z
183	2.0000	EA.	510074	CABLE LADDER,FLOOR BRKT,3.5"X1.5"
184	2.0000	EA.	510079	UNISTRUT,1 5/8"CHANNEL,GOLDGALV,15"
185	4.0000	EA.	510155	CABLE LADDER,TRAY HANGER,17"
186	1.0000	EA.	521001	HVAC,GRILL,SUPPLY,8"X20"
187	1.0000	EA.	521101	HVAC,GRILL,RETURN,12"X20"
188	1.0000	EA.	522001-00014	HVAC,SLEEVE,8"X20"X6"
189	1.0000	EA.	522001-00015	HVAC,SLEEVE,11 3/4"X20"X6"
190	1.0000	EA.	530031	WAVEGUIDE ENTRY,1 PORT,4"
191	1.0000	EA.	530075	COAX ADAPTER PLATE,15"X17",SAT
192	4.0000	EA.	530077	ADAPTER,AMPHENOL,CO82-66-RFX
193	4.0000	EA.	530078	ADAPTER,AMPHENOL,CO83-1F
194	4.0000	EA.	530079	ADAPTER,L-COM,WPRJ-FTCAT5E
195	4.0000	EA.	530080	ADAPTER,AMPHENOL,C531-40084-1
	91.0000	FT.	540009	GROUND STRAP FLAT COPPER 4"WX100'L
199	1.0000	EA.	P540299-01	G-BAR,KIT,CU,540299-01
200	3.0000	EA.	504000	DOOR,HINGES,STAINLESS STEEL 32D
201	1.0000	EA.	504100	DOOR,CLOSER,SARGENT 1104,ALUM
202	1.0000	EA.	504102	DOOR,BUMPER,SS RUBBER STOP,BLACK
203	1.0000	EA.	504113	DOOR,HOLD OPEN,T-LATCH,6" SS
204	1.0000	EA.	504300	DOOR,LOCKGUARD,10" 32D
205	1.0000	EA.	504400	DOOR,DRIP CAP,NGF16A-48"
206	1.0000	EA.	504409	DOOR,THRESHOLD 42"X4.75",.090 ALUM
207	1.0000	EA.	504437	DOOR,THRESHOLD 42"X6.25",.090 ALUM
208	1.0000	EA.	504501	CORE,LOCKSET,BEST,CONSTRUCT,GREEN
209	2.0000	EA.	504504	DOOR,PULL HANDLE KASON,CAST,382
210	1.0000	EA.	540129	GROUND BAR, COPPER, 1/8" X 1" X 4"
211	1.0000	EA.	540216	GROUND STRAP ASSY,1/2 BRAIDED,18"
212	1.0000	EA.	146514-005	DRIP CAP,48"X3",HVAC
213	1.0000	EA.	520005	HVAC,2T,6KW,3PHASE,MARVAIR,ECON,REHT,DEHUM
214	2.0000	EA.	520343	HVAC,PORTABLE,FREIDRICH,P12B(REMOVE FOR SHIPPING)
215	1.0000	EA.	420048	LABEL,DATA,STANDARD SHELTER
216	1.0000	EA.	480001	PLATE,DATA,ALUM,8"X12",GRAY
217	3.5000	EA.	504201	DOOR,SWEEP WEATHERSTRIPPING,42"
218	1.0000	EA.	504222	DOOR,WEATHERSTRIPPING,303-TF-3670
219	1.0000	EA.	146546-006	BRACKET,HANGING,18 GA,GALV,3"X8"X2" (PACKING LIST ITEM)
220	8.0000	FT.	400036	WIRE,#8 THHN,STRAND,GRN (PACKING LIST ITEM)
221	32.0000	FT.	400567	WIRE,#2 THHN,STRAND,BLK (PACKING LIST ITEM)
222	1.0000	EA.	430134	DISCONNECT,100A,4P,DOUBLE THROW,WK (PACKING LIST ITEM)
223	2.0000	EA.	470005	LIGHT FIXTURE,70W,EXTERIOR,WALL W/PHOTOCELL (PACKING LIST ITEM)
224	1.0000	EA.	480000	TRAY,WALL FILE PLASTIC,LR-SMOKE (PACKING LIST ITEM)
225	1.0000	EA.	480087-01	PACKING KIT,TYPICAL EVERY SHELTER (PACKING LIST ITEM)
226	2.0000	EA.	480227	CHAIR,RUVIA MID-BACK,BLACK,676710 (PACKING LIST ITEM)
227	8.0000	EA.	168540	BOLT,CARRIAGE,GALV.3/8"X9"

CUT LIST

ITEM	P/N	DESCRIPTION	CUT	PCS
29	410111	CONDUIT,LFMC,3/4",SEALTITE	18"	1
30	410112	CONDUIT,LFMC,1/2",SEALTITE	18"	3
68	400072	WIRE,#6/5,TYPE W MULTICONDUCTOR CAB	144"	1
77	400846	WIRE,#22,4 PAIR,SOLID,NO SHLD,8757	120"	1
78	400893	CORD,POWERSUPPLY,12/3,PIGTAIL,8FT	48"	1
81	410112	CONDUIT,LFMC,1/2",SEALTITE	72"	1
166	400073	WIRE,#4 THHN,STRAND,GRN	54"	1
181	510000	CABLE LADDER,12"X9'8 1/2",YELLOW ZI	72"	1
196	540009	GROUND STRAP FLAT COPPER 4"WX100'L	108"	2
197	540009	GROUND STRAP FLAT COPPER 4"WX100'L	360"	1
198	540009	GROUND STRAP FLAT COPPER 4"WX100'L	516"	1
205	504400	DOOR,DRIP CAP,NGF16A-48"	46"	1
217	504201	DOOR,SWEEP WEATHERSTRIPPING,42"	42"	1
220	400036	WIRE,#8 THHN,STRAND,GRN (PACKING LIST ITEM)	96"	1
221	400567	WIRE,#2 THHN,STRAND,BLK (PACKING LIST ITEM)	384"	1

OPTIONAL COMPONENTS

OPT.	OPT. NO.	TAG NO.	QTY	U/M	PART NO.	DESCRIPTION	CUT	PCS
A	A1	1	1	EA.	500000	DOOR,3670,CURRIES,LH/RH,18G		
		2	3.5	FT.	504216	DOOR,WEATHERSTRIP,SPONGE NEOPRENE	42	1
		3	1	EA.	504222	DOOR,WEATHERSTRIPPING,303-TF-3670		
		4	1	EA.	504503	LOCKSET,DEAD BOLT,CYLINDRICAL,BEST		
		5	1	EA.	504555	DOOR,STRIKER PLATE,STANDARD		
	A2 (FLORIDA OPTION)	1	1	EA.	500083	DOOR,3670,CURRIES,RH,16GA,REINFO		
		2	3.5	FT.	504432	DOOR,THRESHOLD,42",#8135	42	1
		3	1	EA.	504220	DOOR,WEATHERSTRIP,P&S,S88BK-204		
		4	1	EA.	504626	LOCKSET,LATCH/DEADBOLT,LH,RUSSWIN		
B	B1	1	–	–	–	NOT REQUIRED		
	B2	1	1	EA.	226116	ICE SHIELD SHELTER CVR,21'6"X11'10"		

NOTE:
1. A2 OPTIONS: FLORIDA ONLY

SHELTER REQUIRES ONE OPTION NUMBER FROM EACH OPTION LISTED.

NOTE THAT SOME OPTION NUMBERS ARE A KIT W/ MULTIPLE PARTS.

OPTIONS ARE IDENTIFIED ON THE DRAWING BY THE OPTION LETTER $\boxed{X}$, BY OPTION NO. $\boxed{XX}$, OR BY THE OPTION TAG NO. $\boxed{XX-X}$

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED PARTS LIST	LJL	10/31/12
N	JWR	6/29/12	ADDED CUT LENGTH TO P/N 400893	LJL	6/29/12
N	RRG	6/13/12	UPDATED PARTS LIST	LJL	6/13/12

February 27, 2013

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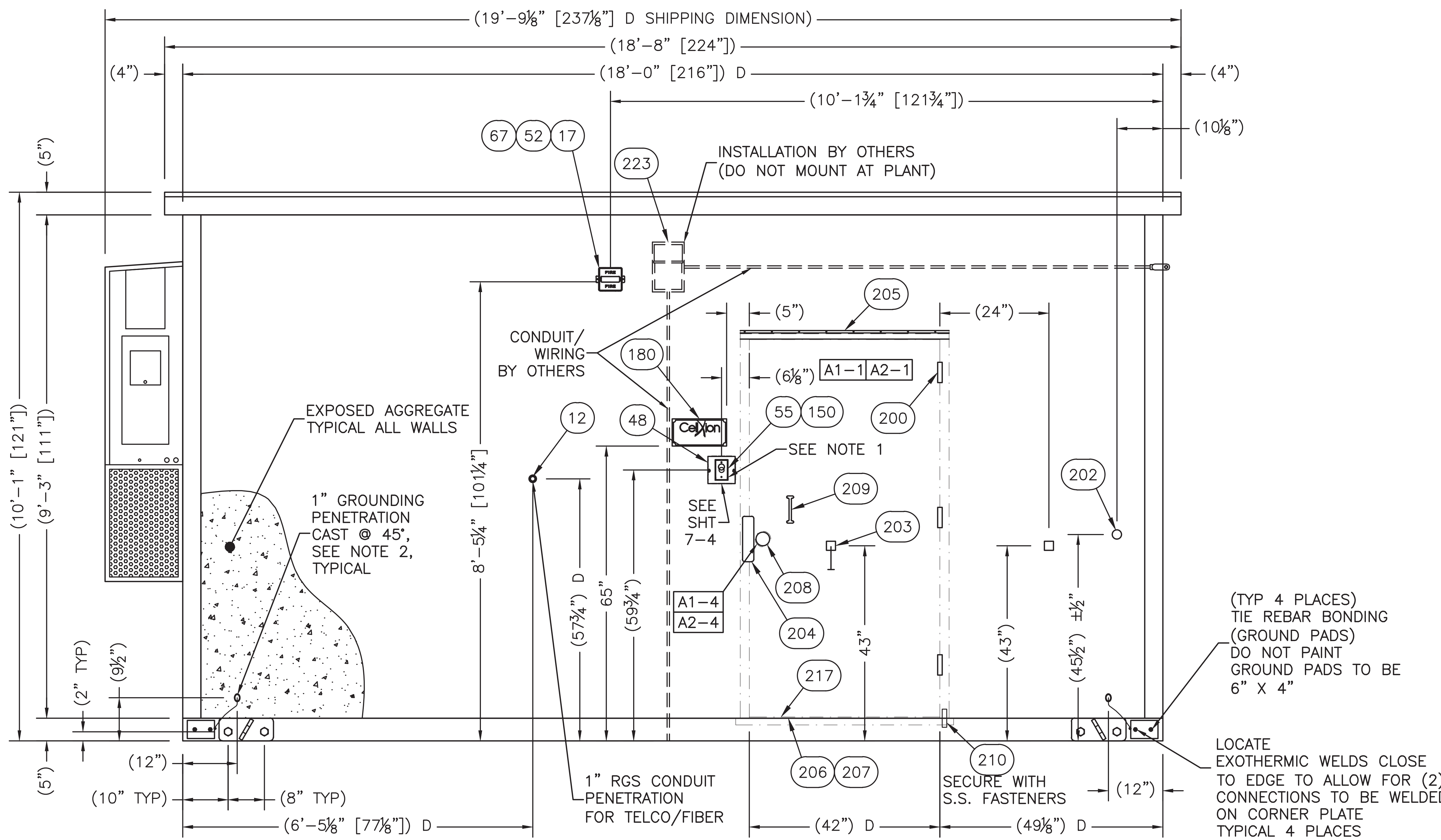
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER PART CONT./CUT LIST/ OPTIONAL COMPONENTS

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 0-2	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
205	504400	DOOR,DRIP CAP,NGF16A-48"	46"



EXTERIOR ELEVATION "A"

NOTES:
1. GROUT FILL GAPS AROUND BOX, SEAL WITH CAULK.
2. FILL ALL OPEN PVC PENETRATIONS WITH CAULK

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	ADDED & UPDATED DIMENSIONS/REMOVED NOTE	LJL	6/13/12
M	JJ	11/09/11	CHANGE DOOR SWEEP/ ADD 6X6X4 BOX	LJL	11/09/11
L	RRG	04/21/11	ADDED NOTES	LJL	04/21/11
K	JJ	4/7/11	ADDED TAMPER KEYSWITCH	LJL	4/7/11
J	AMM	02/10/11	ADDED NIPPLE FOR PENETRATION	LJL	02/10/11

February 27, 2013

STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

Cellxion
5031 Hazel Jones Road
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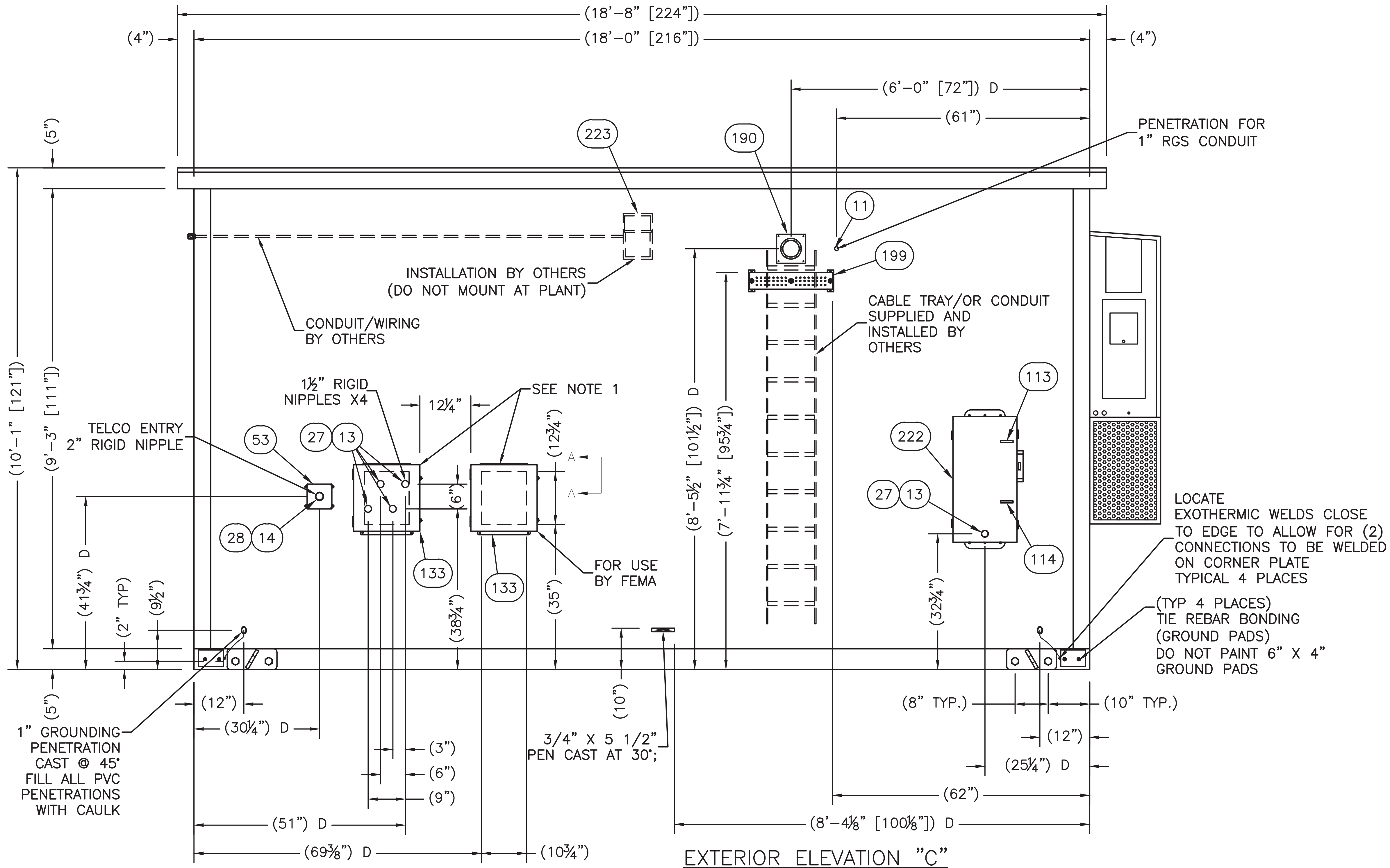
CUSTOMER: KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT: 10'-0" X 18'-0" CONCRETE SHELTER EXTERIOR ELEVATION "A"

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 1-0	
DRAWING NO.: SKBR02	REV.: P



EXTERIOR ELEVATION "C"

NOTE:
1. INSTALL BOXES 133 WITH RAIN LIPS TOP

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	ADDED LABELS/CORRECTED NOTE	LJL	6/13/12
L	RRG	04/21/11	ADDED NOTES	LJL	04/21/11
K	JJ	4/7/11	HOLE LOCATION PER CUSTOMER MARKUPS	LJL	4/7/11
J	AMM	2/3/11	CHANGED TELCO NIPPLE FROM PVC TO RIGID	LJL	2/3/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
G	MST	12/21/10	REVISED PIPE CAPS TO BE 1 1/2" (4)	WAR	12/21/10

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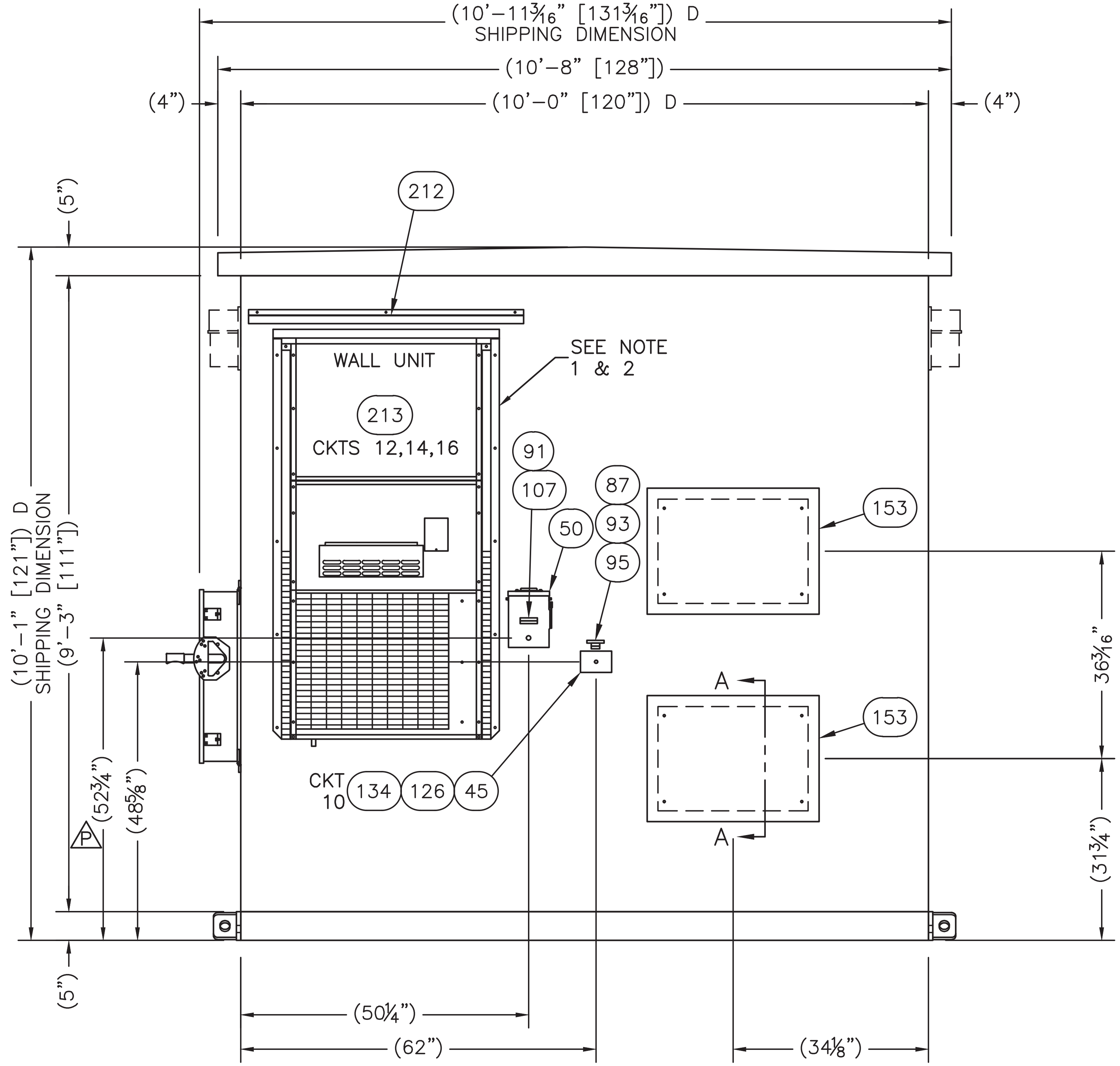
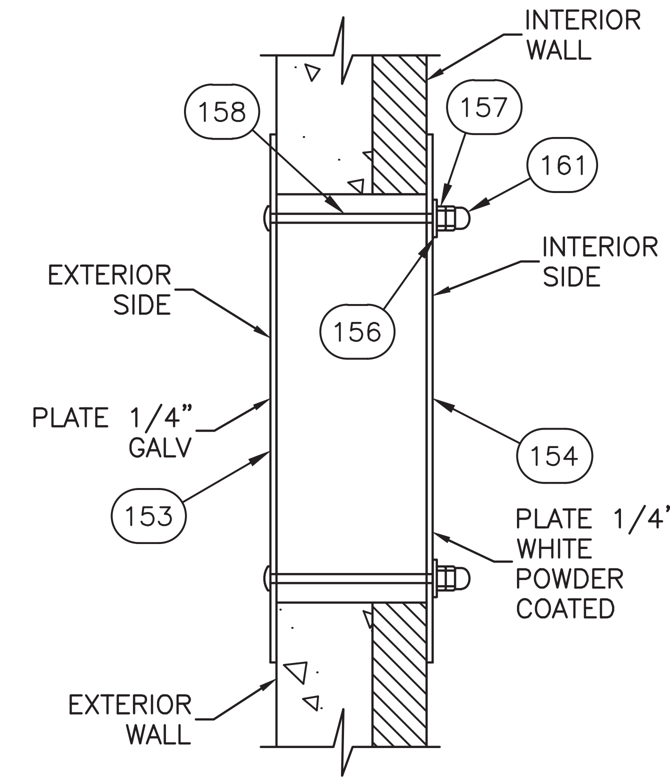
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXTERIOR ELEVATION "C"

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'–0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 1–1	
DRAWING NO.: SKBR02	REV.: P



EXTERIOR ELEVATION "B"
PRE–HEMP



SECTION A–A P

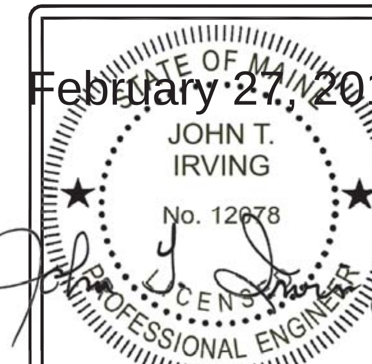
COMPLETE STEPS BEFORE INSTALLING COVERS:

NOTES:

P 1. CHECK TRANSFORMER & WIRE FOR 208VAC OPERATION PER MANUFACTURER'S INSTRUCTIONS. SET TIMER TO MAX TO REDUCE SHORT CYCLING PER MANUFACTURER'S INSTRUCTIONS.

2. A/C POWER CONDUCTORS SHALL BE ROUTED SEPERATE FROM CONTROL CONDUCTORS.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	MOVED HVAC DISCONNECT/CHANGED A/C FRAME/UPDATED DETAIL & NOTES	LJL	10/31/12
N	RRG	6/13/12	ADDED NOTES	LJL	6/13/12
M	JJ	11/09/11	ADDED NOTES TO SECTION A	LJL	11/09/11
L	RRG	04/21/11	ADDED NOTES TO DIMENSIONS	LJL	04/21/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11



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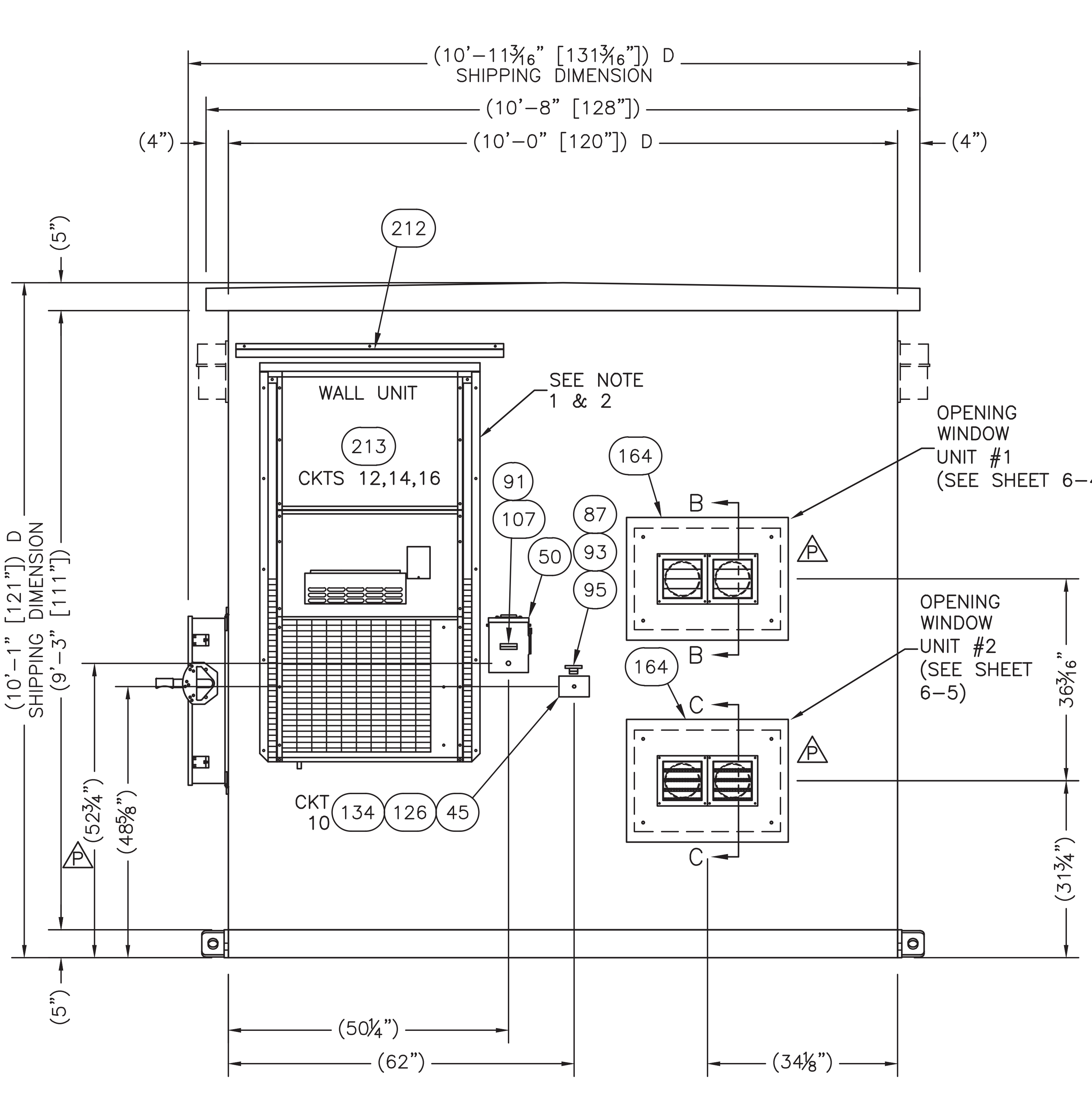
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

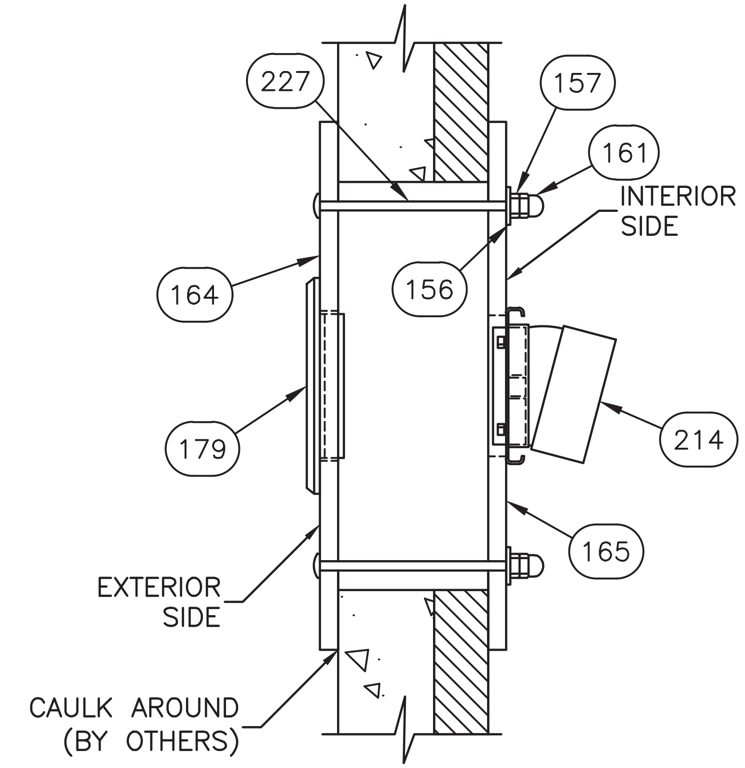
PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXTERIOR ELEVATION "B" PRE–HEMP

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'–0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 1–2	
DRAWING NO.: SKBR02	REV.: P

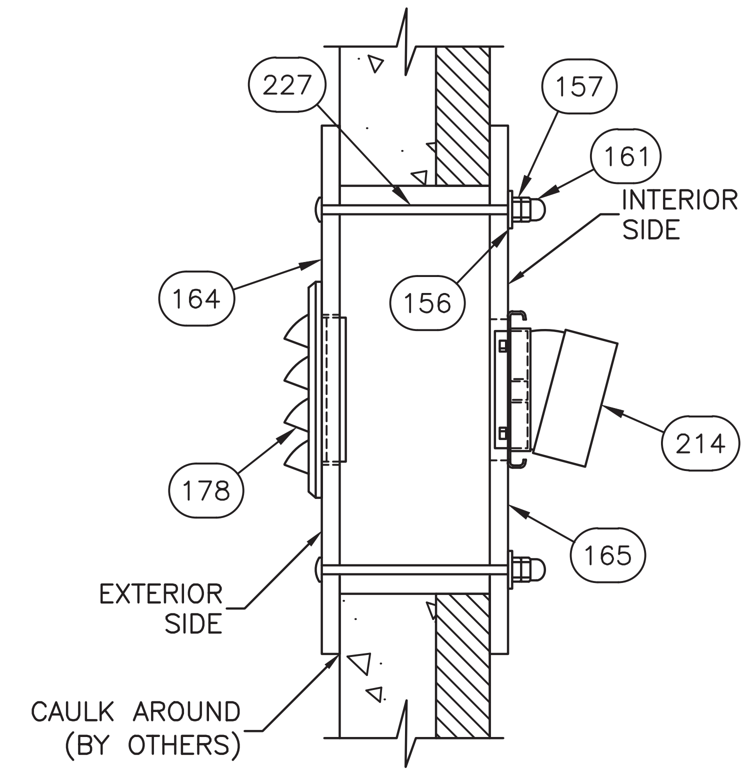
February 27, 2013



EXTERIOR ELEVATION "B"
POST–HEMP



SECTION B–B
EXHAUST PLATE DETAIL



SECTION C–C
INTAKE PLATE DETAIL

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	NEW SHEET ADDED	LJL	10/31/12

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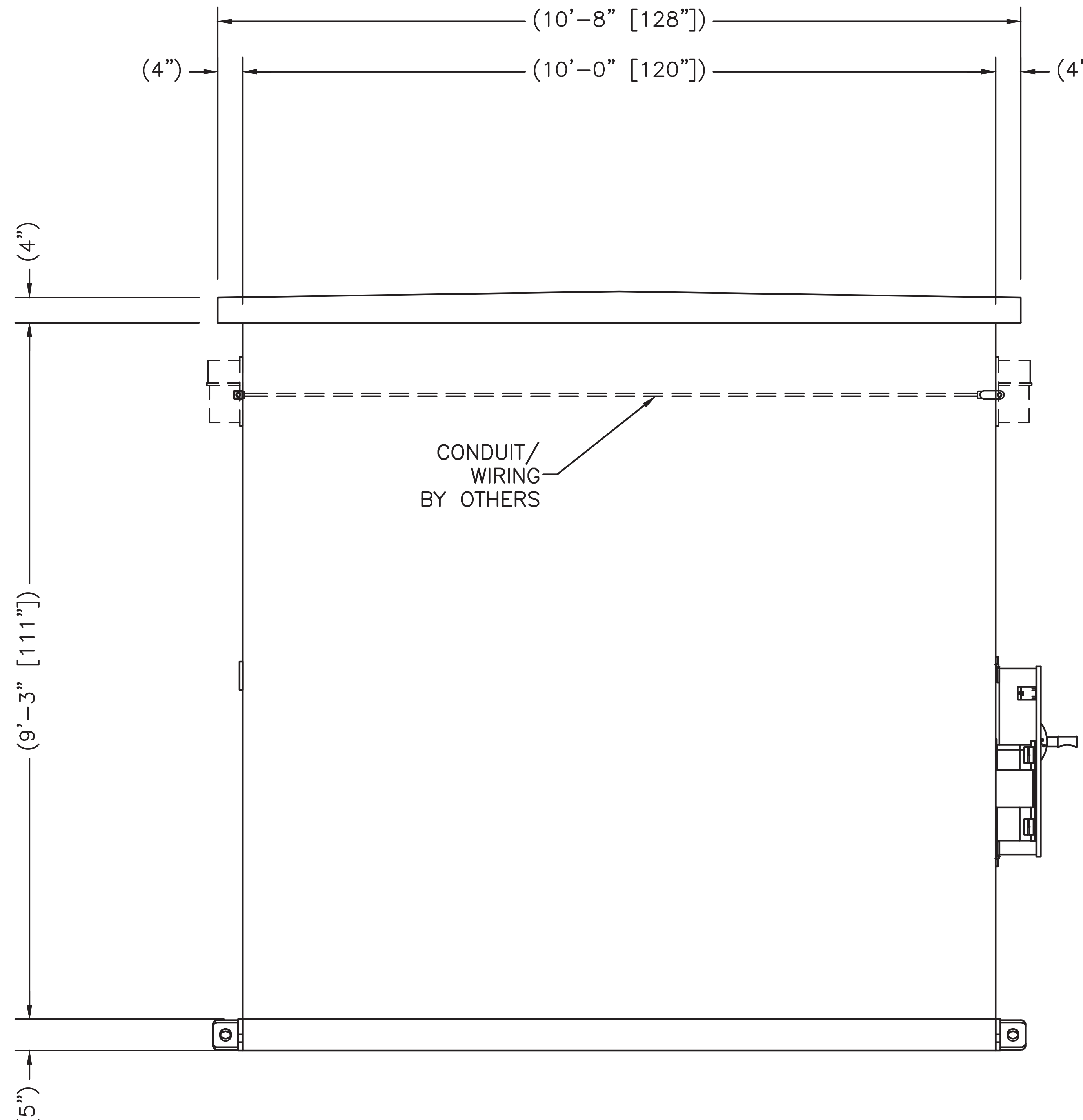
PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXTERIOR ELEVATION "B" POST–HEMP

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'–0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 1–2A	
DRAWING NO.: SKBR02	REV.: P



EXTERIOR ELEVATION "D"

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
L	RRG	04/21/11	ADDED MISSING PROFILES	LJL	04/21/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
G	MST	12/21/10	DASHED EXTERIOR LIGHTS TO MATCH VIEWS	WAR	12/21/10

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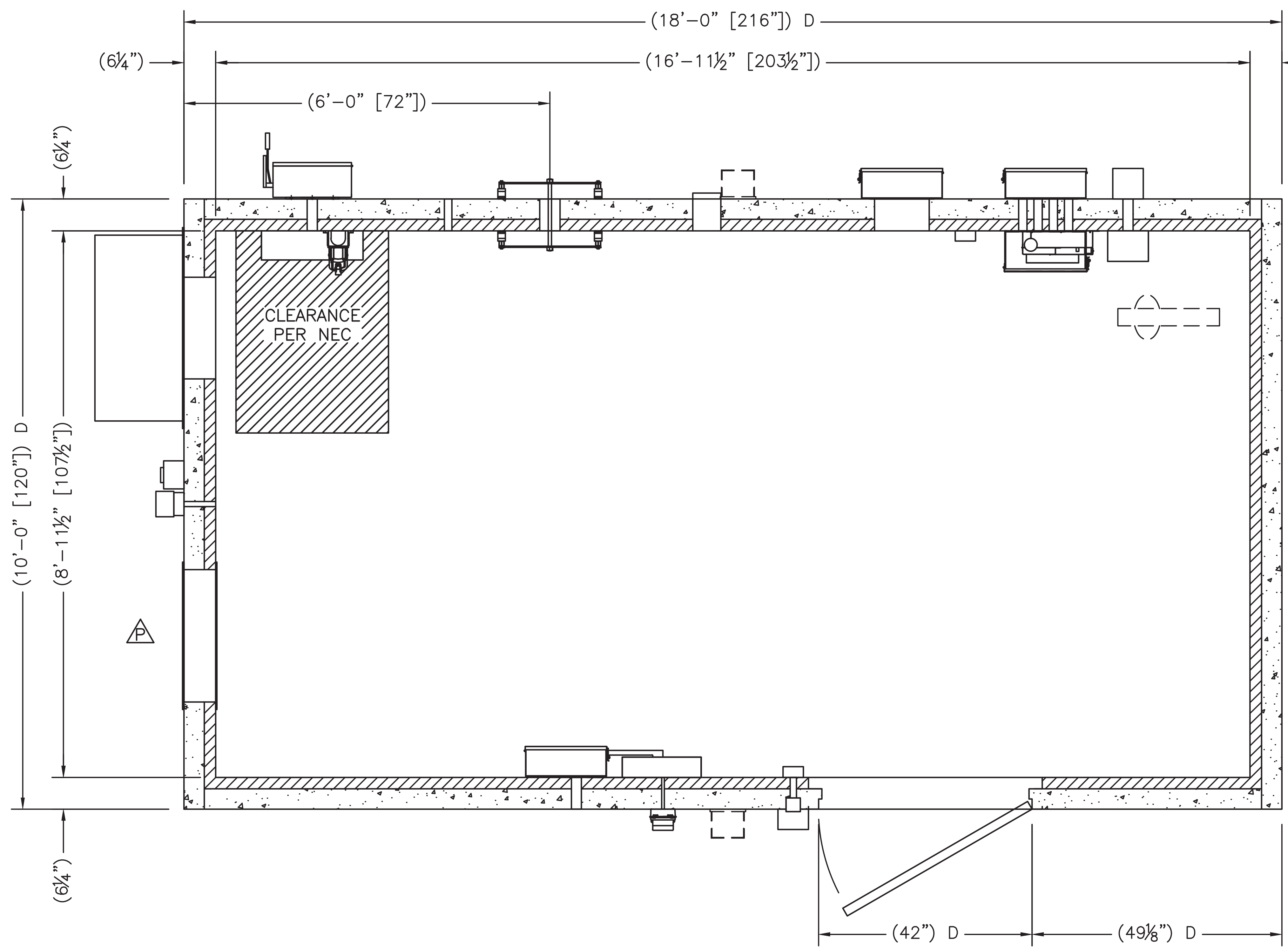
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXTERIOR ELEVATION "D"

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'–0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 1–3	
DRAWING NO.: SKBR02	REV.: P



NOTES:
1. FLOORING PROTECTIVE COVERING TO BE IN PLACE DURING INSTALL ACTIVITIES. TO BE REMOVED BY KBR FIELD PERSONEL

FLOOR PLAN
180.00 SQ. FT. EXTERIOR AREA
151.92 SQ. FT. INTERIOR AREA

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED HVAC BLOCKOUT	LJL	10/31/12
N	RRG	6/13/12	CORRECTED OVERLAYS & ADDED UPS	LJL	6/13/12
M	JJ	11/09/11	CHANGE VIEW OF INCON BOXES	LJL	11/09/11
L	RRG	04/21/11	ADDED NOTES TO DIMENSIONS	LJL	04/21/11
K	JJ	4/7/11	PER CUSTOMER MARKUPS	LJL	4/7/11

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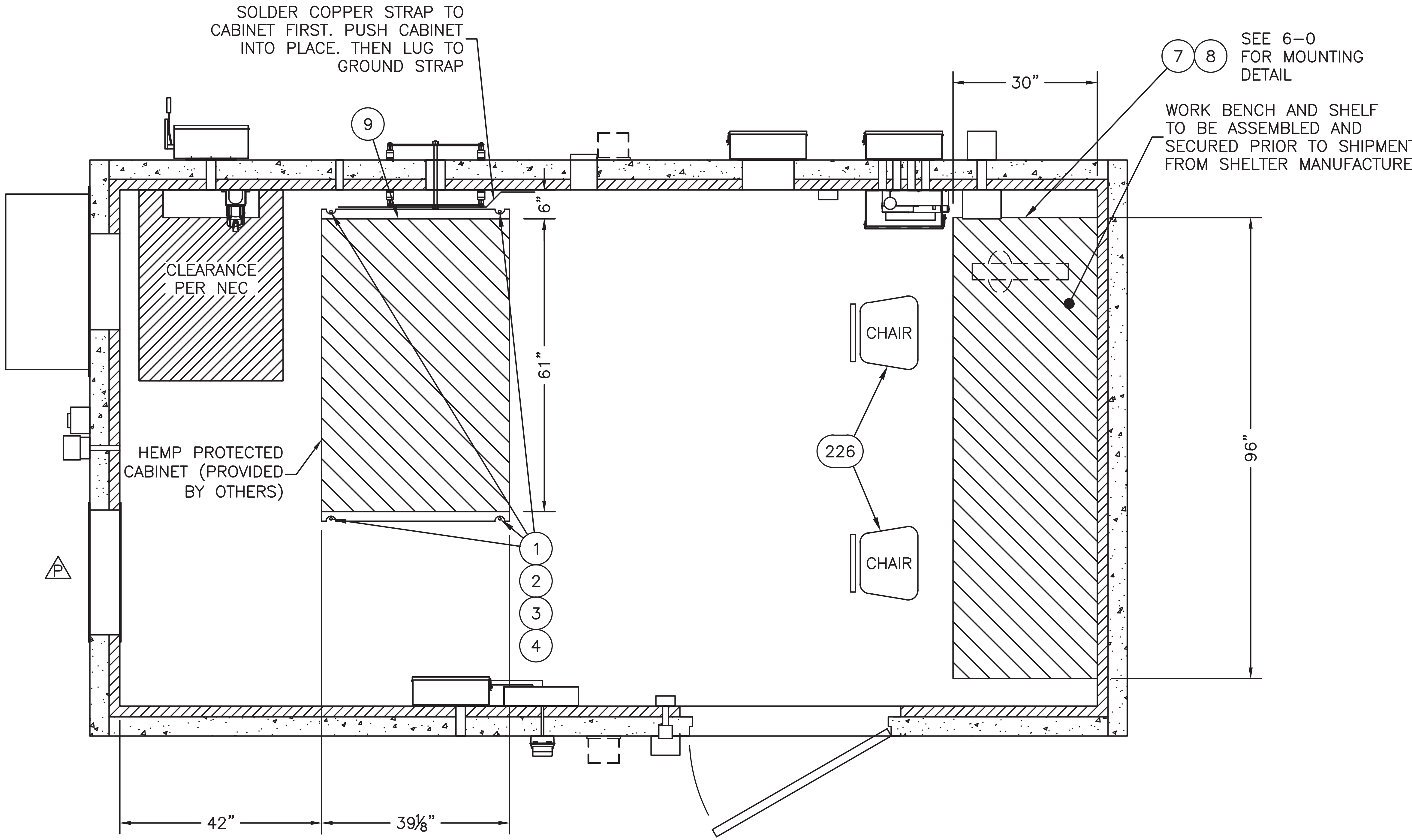
PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER FLOOR PLAN

FILENAME: KBR/SKBR02

SCALE: 1/2"=1'–0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 2–0	
DRAWING NO.: SKBR02	REV.: P



EQUIPMENT LAYOUT

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED HVAC BLOCKOUT	LJL	10/31/12
N	RRG	6/13/12	UPDATED DIMENSIONS OF HEMP CABINET & ADDED UPS	LJL	6/13/12
L	RRG	04/21/11	ADDED NOTE	LJL	04/21/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
G	MST	12/21/10	PER CUSTOMER MARKUPS	WAR	12/21/10
F	MST	12/17/10	PER CUSTOMER MARKUPS	WAR	12/17/10

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CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
EQUIPMENT LAYOUT

FILENAME: KBR/SKBR02
SCALE:
TOLERANCE:
DRWN. BY: M. FOWLER — DATE: 03/24/2010
CHK. BY: V. HASSELL — DATE: 03/24/2010
ENG. BY: — DATE:
APP. BY: A. DUMAS — DATE: 03/24/2010
SHEET NO. 2-1
DRAWING NO.: SKBR02
REV.: P

February 27, 2013

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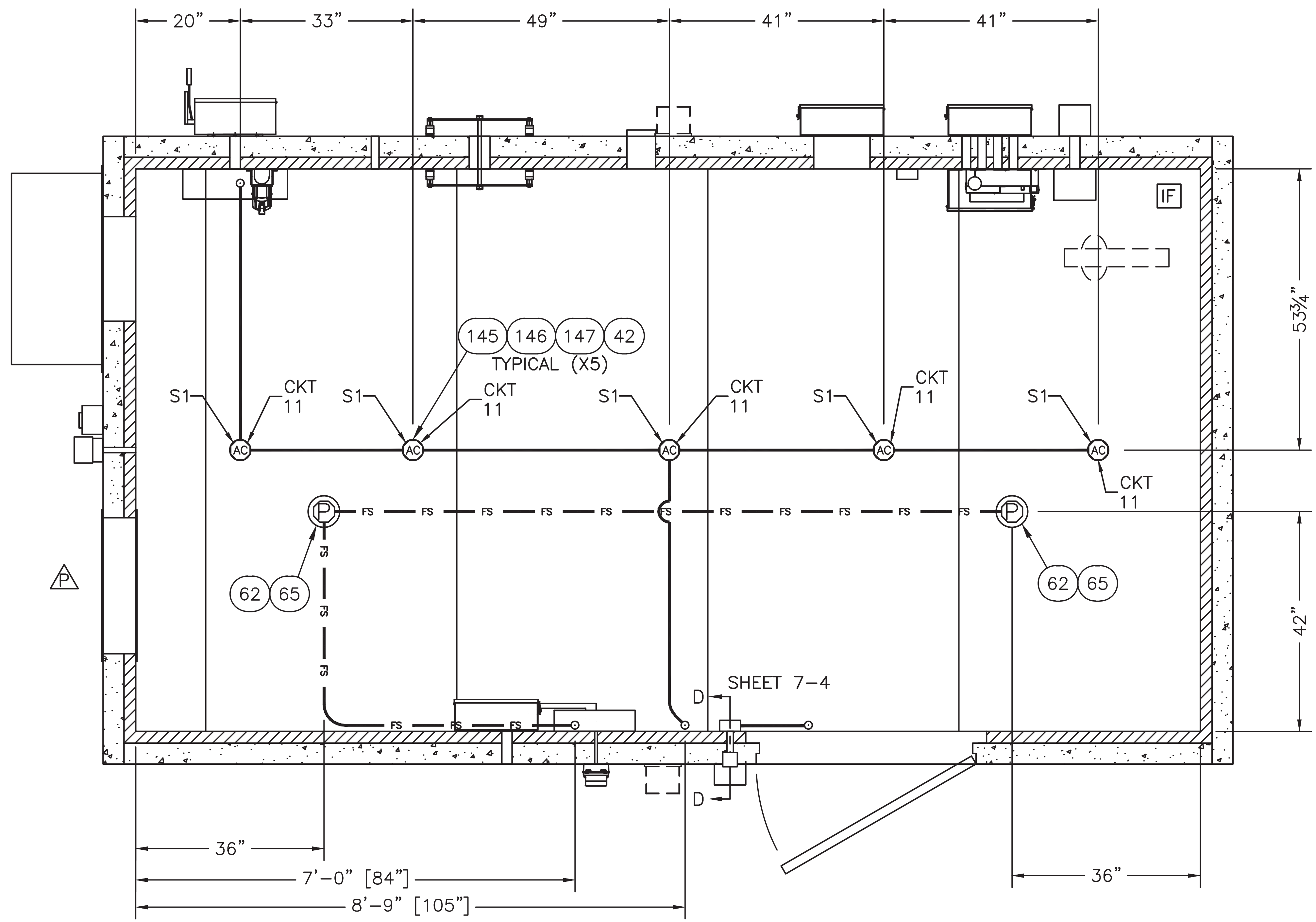

LEGEND:

1. IF = INTERIOR FINISH START PANEL

REFLECTED CEILING VIEW
ELECTRICAL

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED HVAC BLOCKOUT	LJL	10/31/12
N	RRG	6/13/12	ADDED UPS	LJL	6/13/12
L	RRG	04/21/11	ADDED NOTE	LJL	04/21/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
G	MST	12/21/10	PER CUSTOMER MARKUPS	WAR	12/21/10
F	MST	12/17/10	PER CUSTOMER MARKUPS	WAR	12/17/10

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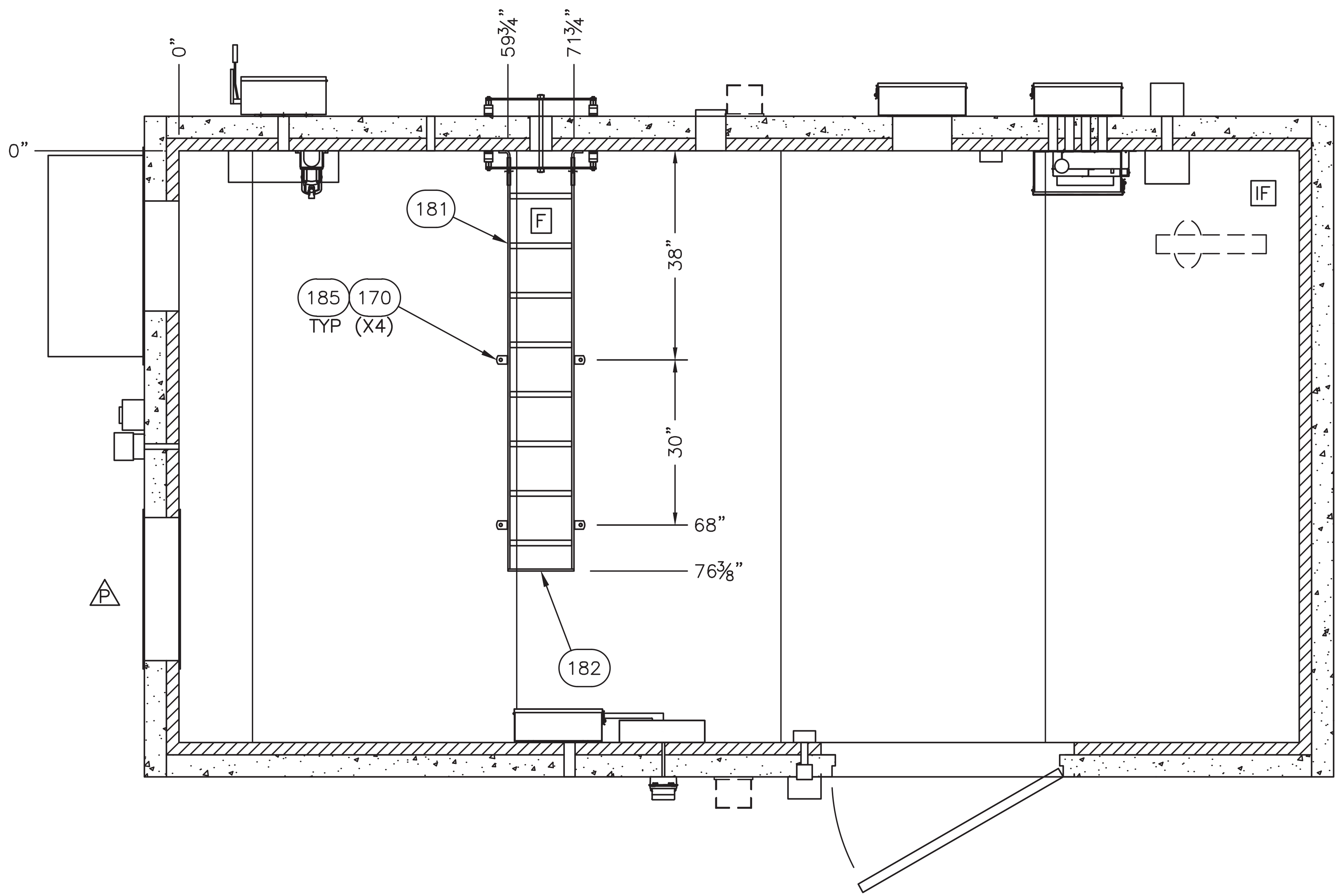
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER REFLECTED CEILING VIEW – ELECTRICAL

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 3-0	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	ORIGINAL DESCRIPTION	CUT
181	510000	CABLE LADDER,12"X9'8 1/2",YELLOW ZI	72"



LEGEND:

1. F = CABLE LADDER FACTORY END
2. IF = INTERIOR FINISH START PANEL
3. CABLE LADDER TO BE MOUNTED 7'-6 1/2" (90 1/2") A.F.F.

REFLECTED CEILING VIEW
MECHANICAL

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED HVAC BLOCKOUT	LJL	10/31/12
N	RRG	6/13/12	ADDED UPS	LJL	6/13/12
L	RRG	04/21/11	ADDED NOTE	LJL	04/21/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
G	MST	12/21/10	PER CUSTOMER MARKUPS	WAR	12/21/10
F	MST	12/17/10	PER CUSTOMER MARKUPS	WAR	12/17/10

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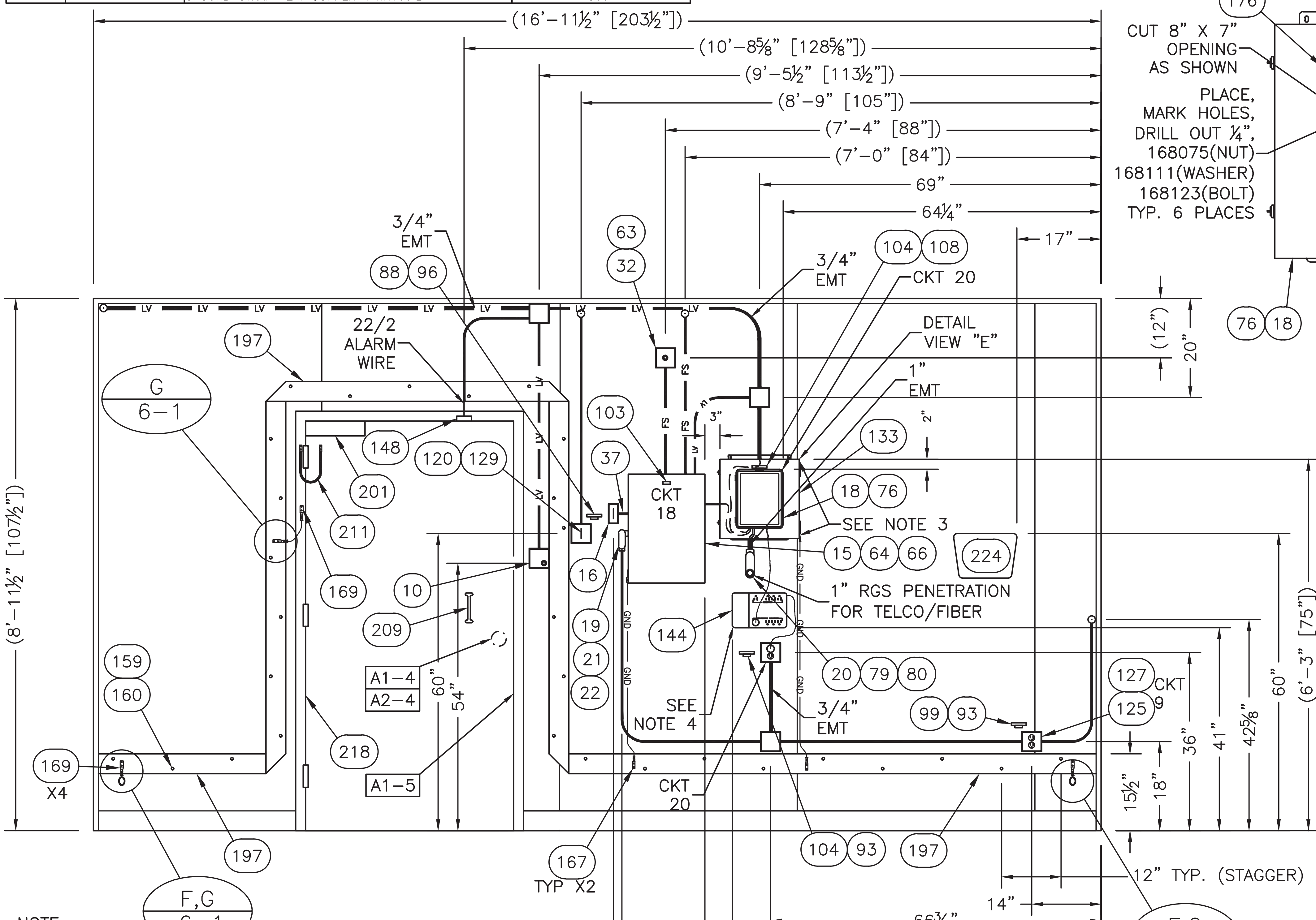
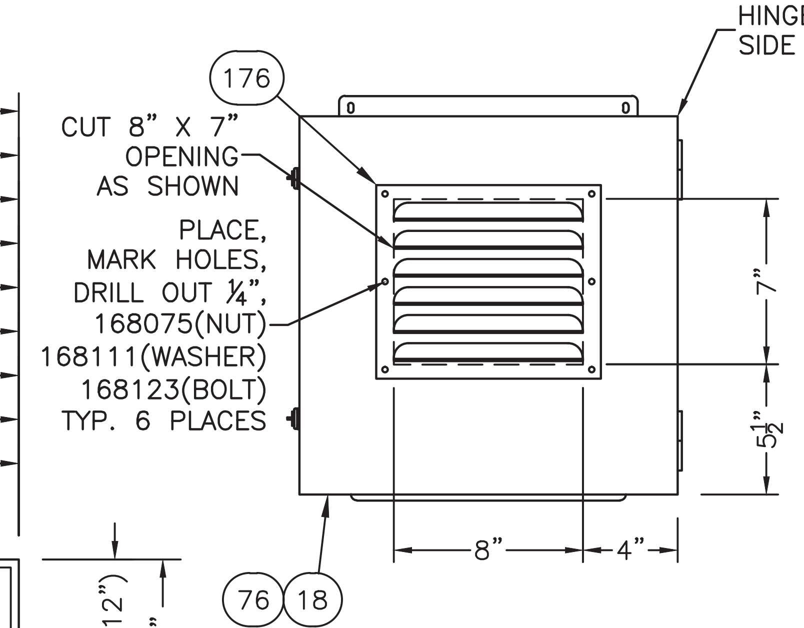
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER REFLECTED CEILING VIEW — MECHANICAL

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 3-1	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
197	540009	GROUND STRAP FLAT COPPER 4"WX100'L	360"





DETAIL "E"

✳ VENT NOT SHOWN IN ELEVATION VIEW FOR CLARITY.

NOTE:

1. ALL WIRES TO BE LUGGED TO STRAP, LUG 3" OF WIRE TO STRAP.
2. LABEL CIRCUIT NO. ON ALL OUTLETS.
3. BOX, ITEM 176 SHOWN WITHOUT DOOR ON ELEVATION VIEW ITEMS 18 76.
4. MOUNT UPS TO MOUNTING SCREWS.

INTERIOR ELEVATION "A"

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	JWR	6/29/12	ADDED BOTTOM TRIM TO VIEW	LJL	6/29/12
N	RRG	6/13/12	ADDED UPS/REROUTED FIKE CONDUIT/REMOVED CONDUIT/MOVED AND ADDED RECEPTACLES	LJL	6/13/12
M	JJ	11/09/11	MOVE GROUND FROM FIKE PANEL TO J BOX ITEM 103	LJL	04/21/11

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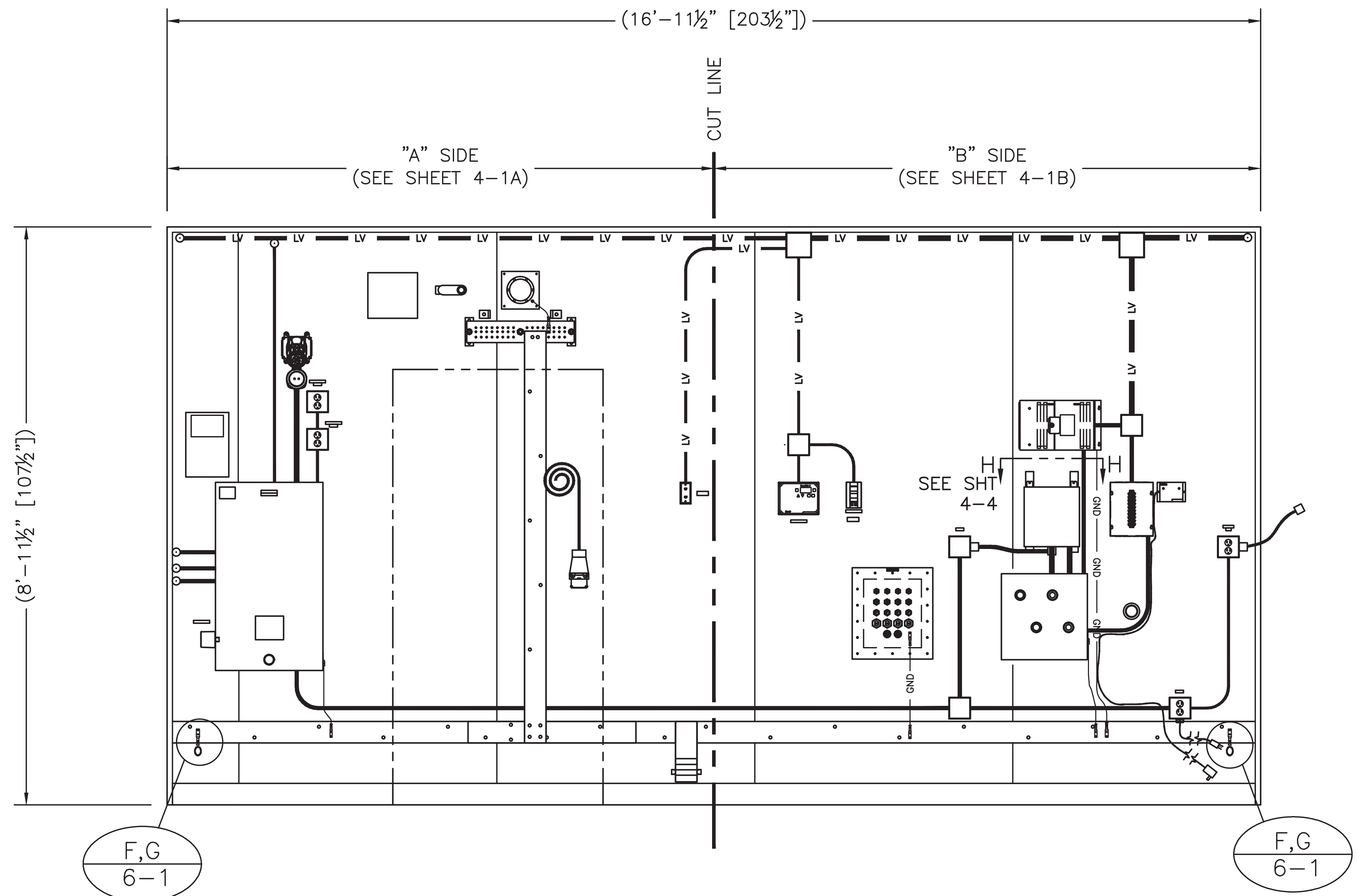
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER INTERIOR ELEVATION "A"

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-0	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
68	400072	WIRE,#6/5,TYPE W MULTICONDUCTOR CAB	144"
166	400073	WIRE,#4 THHN,STRAND,GRN	54"
198	540009	GROUND STRAP FLAT COPPER 4"WX100'L	516"



INTERIOR ELEVATION "C"

NOTES:

1. INSTALLED BY CELLXION WIRED BY OTHERS.
2. LUG 3" OF WIRE TO STRAP.
3. LABEL CIRCUIT NO. ON ALL OUTLETS.
4. MATCH LOCATE FLEX CONDUIT HOLES TO FUEL MONITOR AND NIPPLES THROUGH WALL (ITEM 30)(SEE SHT 4-1B)
5. SEE SHT 4-4 FOR POSITIONS
6. FUEL SYSTEM CONTROLLER FURNISHED BY OTHERS & INSTALLED BY CELLXION

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	JWR	6/29/12	ADDED BOTTOM TRIM TO VIEW	LJL	6/29/12
N	RRG	6/13/12	SEPERATED SHEET INTO HALVES/ADJUSTED COPPER STRAPS	LJL	6/13/12
M	JJ	11/09/11	ADDED LABEL, NOTES, GROUND WIRE & CONDUIT SIZE	LJL	11/09/11
L	RRG	04/21/11	ADDED LABEL & NOTES	LJL	04/21/11

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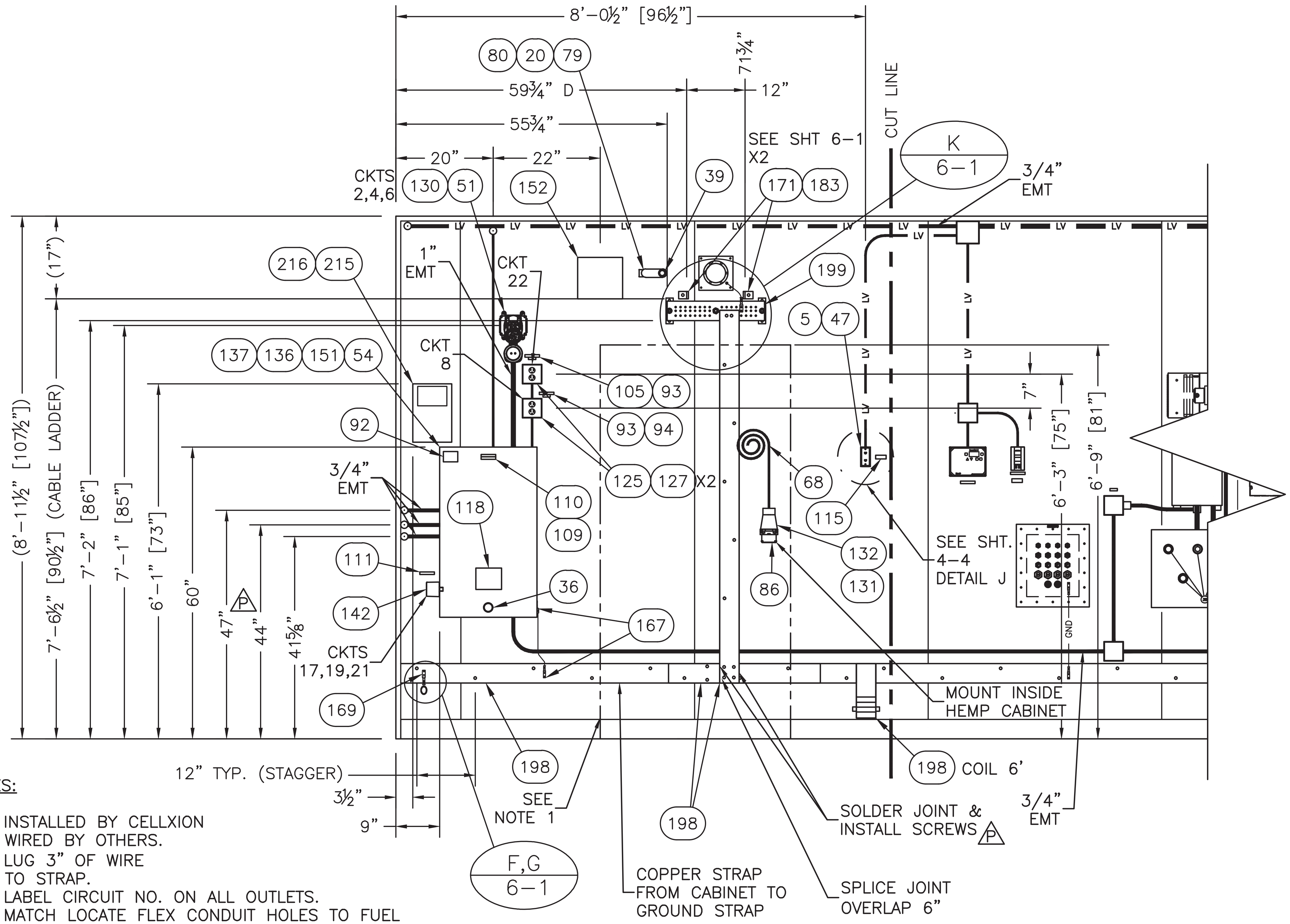
FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-1	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST

ITEM	P/N	DESCRIPTION	CUT
68	400072	WIRE,#6/5,TYPE W MULTICONDUCTOR CAB	144"
166	400073	WIRE,#4 THHN,STRAND,GRN	54"
198	540009	GROUND STRAP FLAT COPPER 4"WX100'L	516"



NOTES:

1. INSTALLED BY CELLXION WIRED BY OTHERS.
2. LUG 3" OF WIRE TO STRAP.
3. LABEL CIRCUIT NO. ON ALL OUTLETS.
4. MATCH LOCATE FLEX CONDUIT HOLES TO FUEL MONITOR AND NIPPLES THROUGH WALL (ITEM 30)(SEE SHT 4-1B)
5. SEE SHT 4-4 FOR POSITIONS
6. FUEL SYSTEM CONTROLLER FURNISHED BY OTHERS & INSTALLED BY CELLXION

INTERIOR ELEVATION "C"
("A" SIDE)

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	CHANGED CONDUIT HEIGHT & ADDED CORD GRIP CONNECTOR, MODIFIED NOTE	LJL	10/31/12
N	JWR	6/29/12	ADDED BOTTOM TRIM TO VIEW	LJL	6/29/12
N	RRG	6/13/12	ADJUSTED COPPER STRAPS	LJL	6/13/12
M	JJ	11/09/11	ADDED LABEL, NOTES, GROUND WIRE & CONDUIT SIZE	LJL	11/09/11
L	RRG	04/21/11	ADDED LABEL & NOTES	LJL	04/21/11

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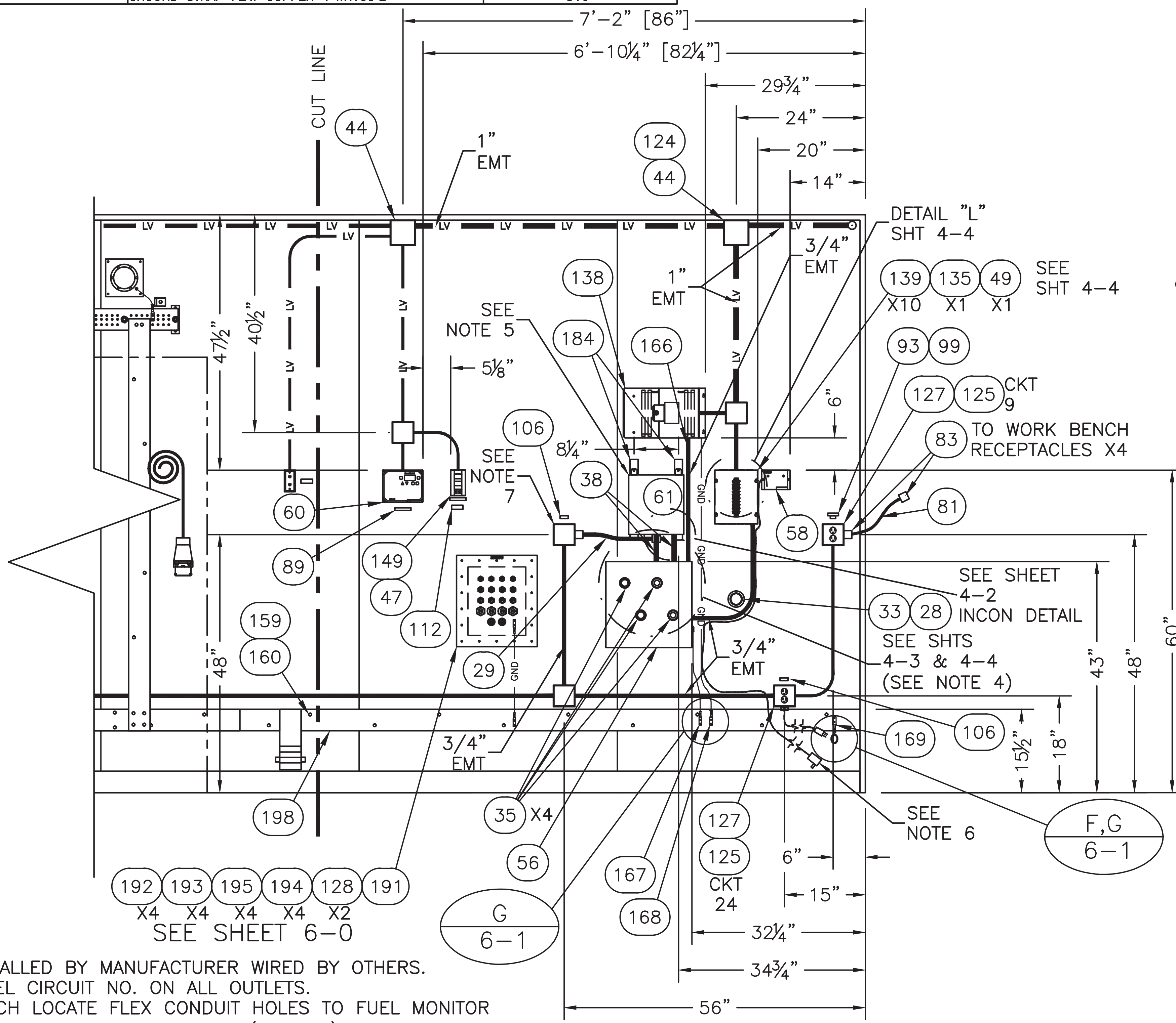
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
INTERIOR ELEVATION "C"
("A" SIDE)

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-1A	
DRAWING NO.: SKBR02	REV.: P

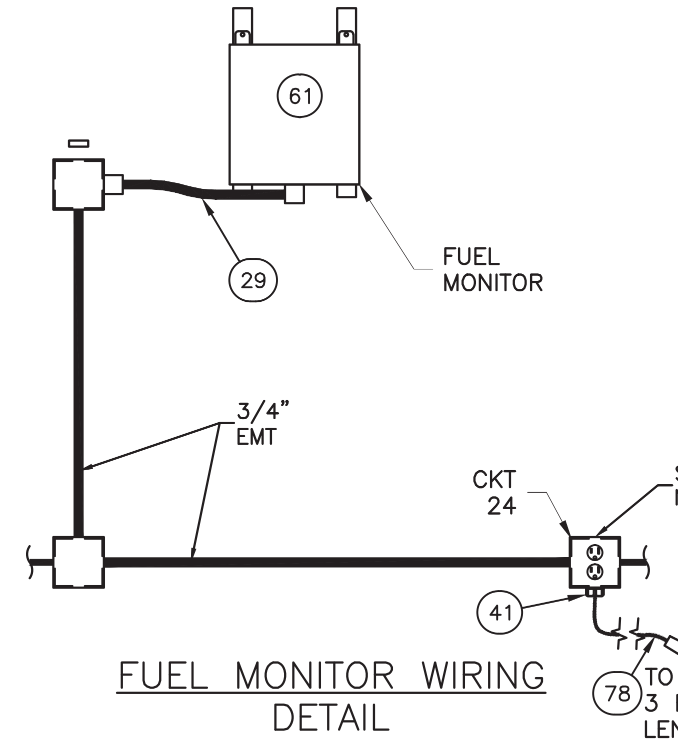
SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
68	400072	WIRE,#6/5,TYPE W MULTICONDUCTOR CAB	144"
166	400073	WIRE,#4 THHN,STRAND,GRN	54"
198	540009	GROUND STRAP FLAT COPPER 4"WX100'L	516"



INTERIOR ELEVATION "C"
("B" SIDE)

NOTES:

1. INSTALLED BY MANUFACTURER WIRED BY OTHERS.
2. LABEL CIRCUIT NO. ON ALL OUTLETS.
3. MATCH LOCATE FLEX CONDUIT HOLES TO FUEL MONITOR AND NIPPLES THROUGH WALL (ITEM 30)
4. SEE SHT 4-4 FOR POSITIONS
5. FUEL SYSTEM CONTROLLER FURNISHED BY OTHERS & INSTALLED BY CELLXION.
6. PLUG RECEPTACLE CORDS INTO UPS (440114) & SECURE THEM TO ADJACENT CONDUIT WITH TIE WRAPS.
7. CONNECT 120VAC WIRE & GROUND TO FLEXIBLE POWER CORD (400893) IN JB WITH OUTLET FOR UPS (440114)

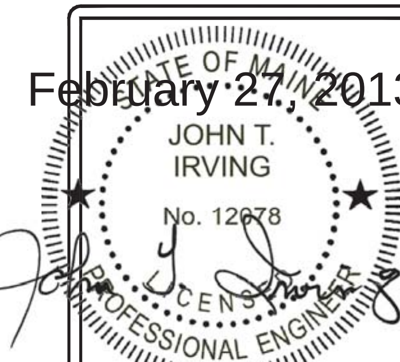


FUEL MONITOR WIRING
DETAIL

NOTE:
1. PULL #12 BLK/WHT/GRN THHN WIRE FROM FUEL MONITOR THROUGH CONDUIT PATH TO RECEPTACLE J-BOX.
2. WIRE #12 WIRE AT FUEL MONITOR TO POWER CONNECTIONS.
3. ATTACH FLEXIBLE POWER CORD (410519) TO RECEPTACLE J-BOX & WIRE TO #12 THHN WIRE PULLED TO FUEL MONITOR.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	REROUTED CONDUIT/ADDED SO CORD & DETAIL	LJL	6/13/12
N	RRG	6/13/12	REROUTED CONDUIT/ADDED SO CORD & DETAIL	LJL	6/13/12
M	JJ	11/09/11	ADDED LABEL, NOTES, GROUND WIRE & CONDUIT SIZE	LJL	11/09/11
L	RRG	04/21/11	ADDED LABEL & NOTES	LJL	04/21/11

February 27, 2013



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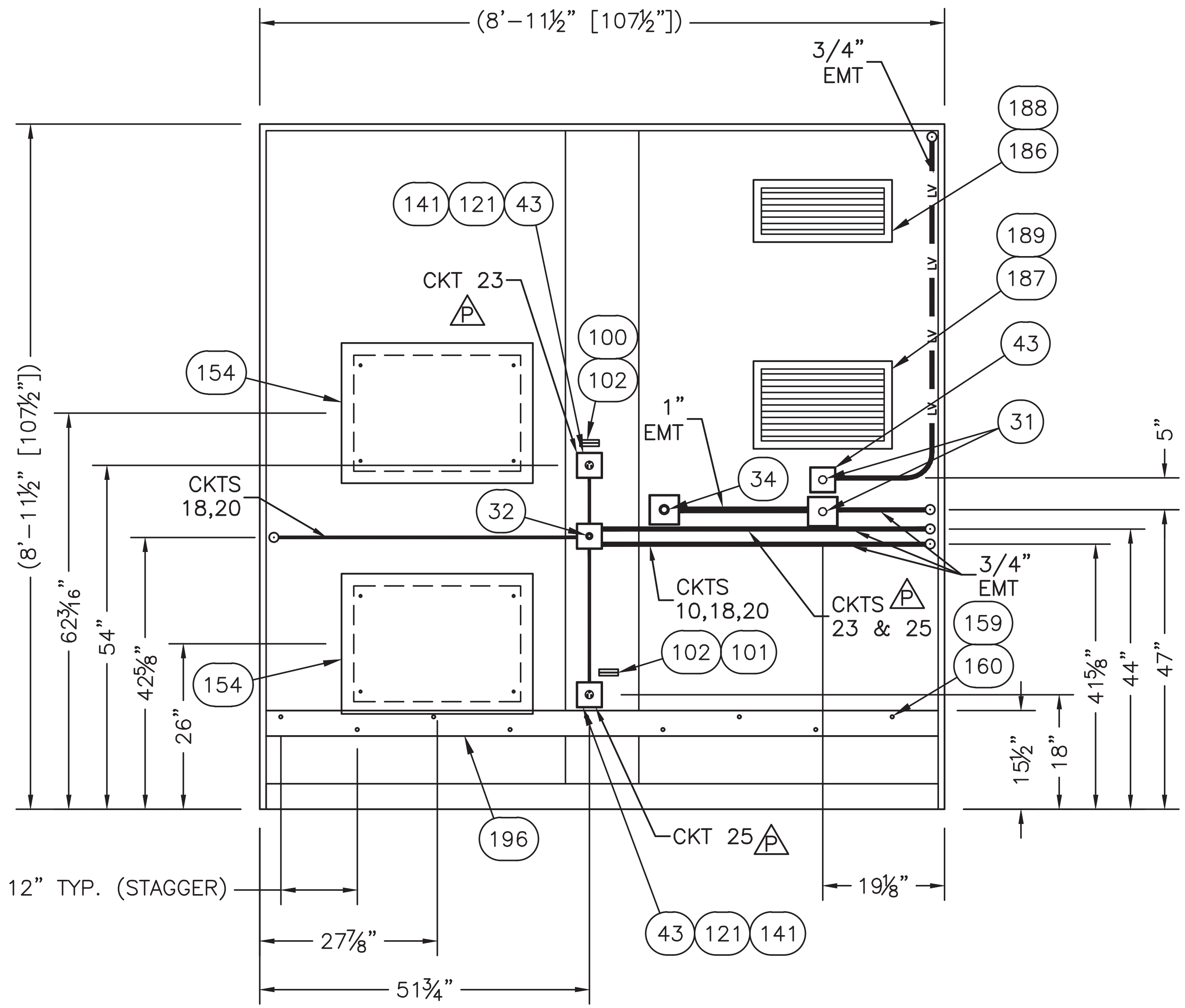
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

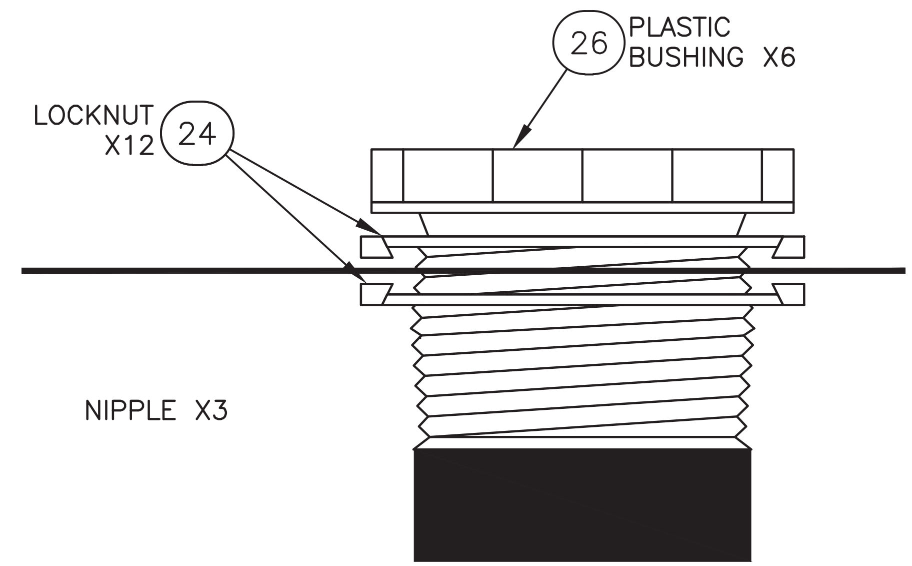
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER INTERIOR ELEVATION "C" ("B" SIDE)

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-1B	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
196	540009	GROUND STRAP FLAT COPPER 4"WX100'L	108"



INTERIOR ELEVATION "B"
(SHOWN IN NORMAL STORAGE ASSEMBLY)



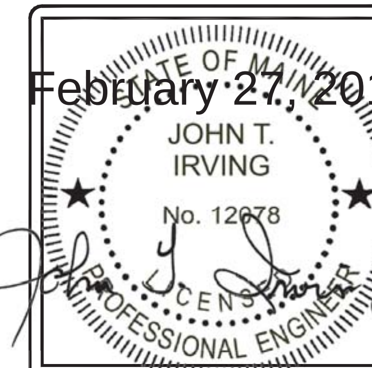
DETAIL CONNECTION
INCON BOX
SEE SHT 4-1

NOTE:

1. LUG 3" OF WIRE TO STRAP.
2. LABEL CIRCUIT NO. ON ALL OUTLETS.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED HVAC PLATE ASSEMBLY & UPDATED DETAIL	LJL	10/31/12
N	RRG	6/13/12	CHANGED CONDUIT SIZE/ADDED CIRCUIT CALLOUTS/ CORRECTED NOTES	LJL	6/13/12
M	JJ	11/09/11	ADDED DETAIL	LJL	11/09/11

February 27, 2013



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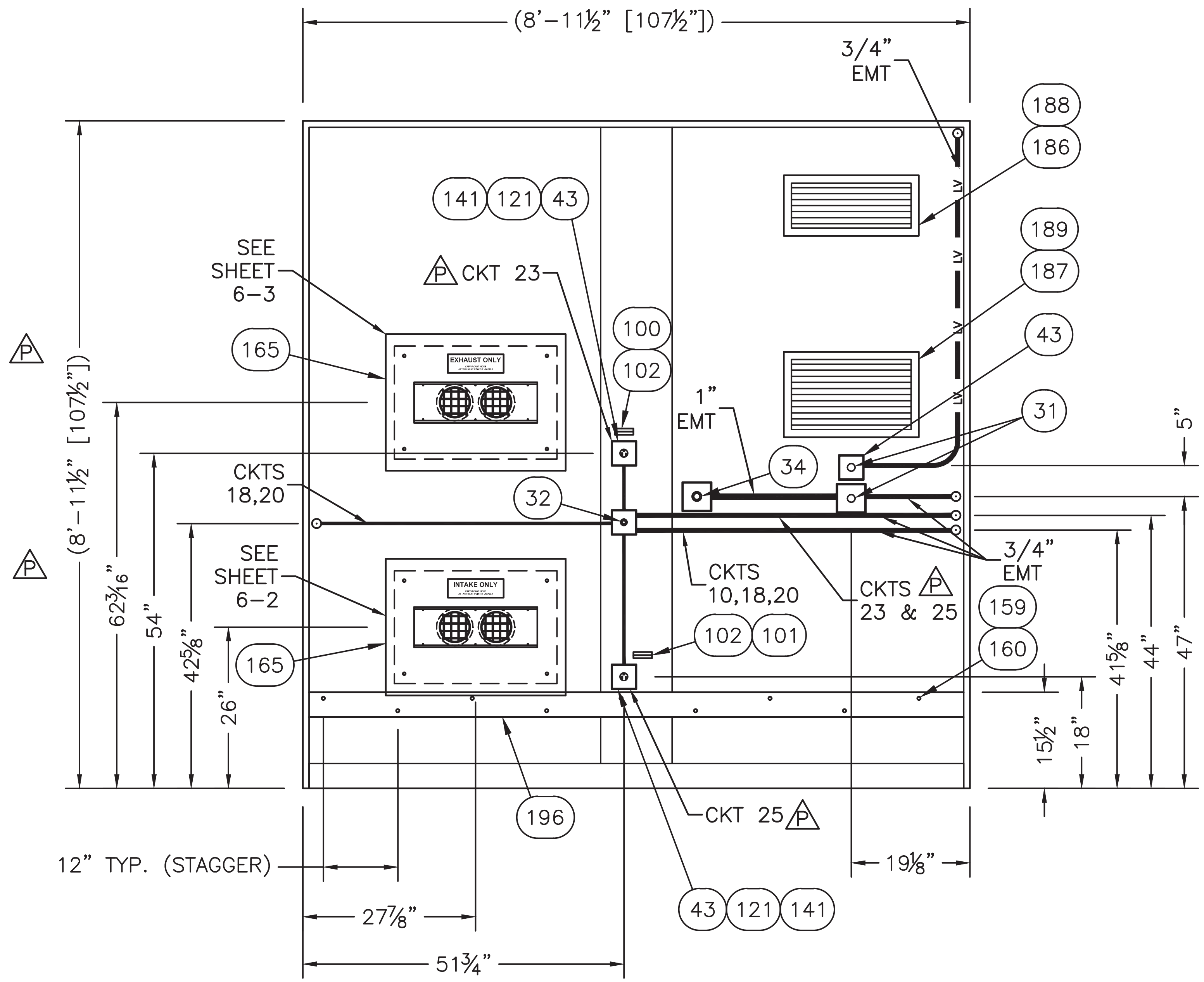
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER INTERIOR ELEVATION "B" PRE-HEMP

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-2	
DRAWING NO.: SKBR02	REV.: P

SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
196	540009	GROUND STRAP FLAT COPPER 4"WX100'L	108"



INTERIOR ELEVATION "B"

(SHOWN IN POST-HEMP ASSEMBLY)

NOTE:

1. LUG 3" OF WIRE TO STRAP.
2. LABEL CIRCUIT NO. ON ALL OUTLETS.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED SHEET, CHANGED HVAC RECEPTACLE	LJL	10/31/12

February 27, 2013

STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
PROFESSIONAL ENGINEER

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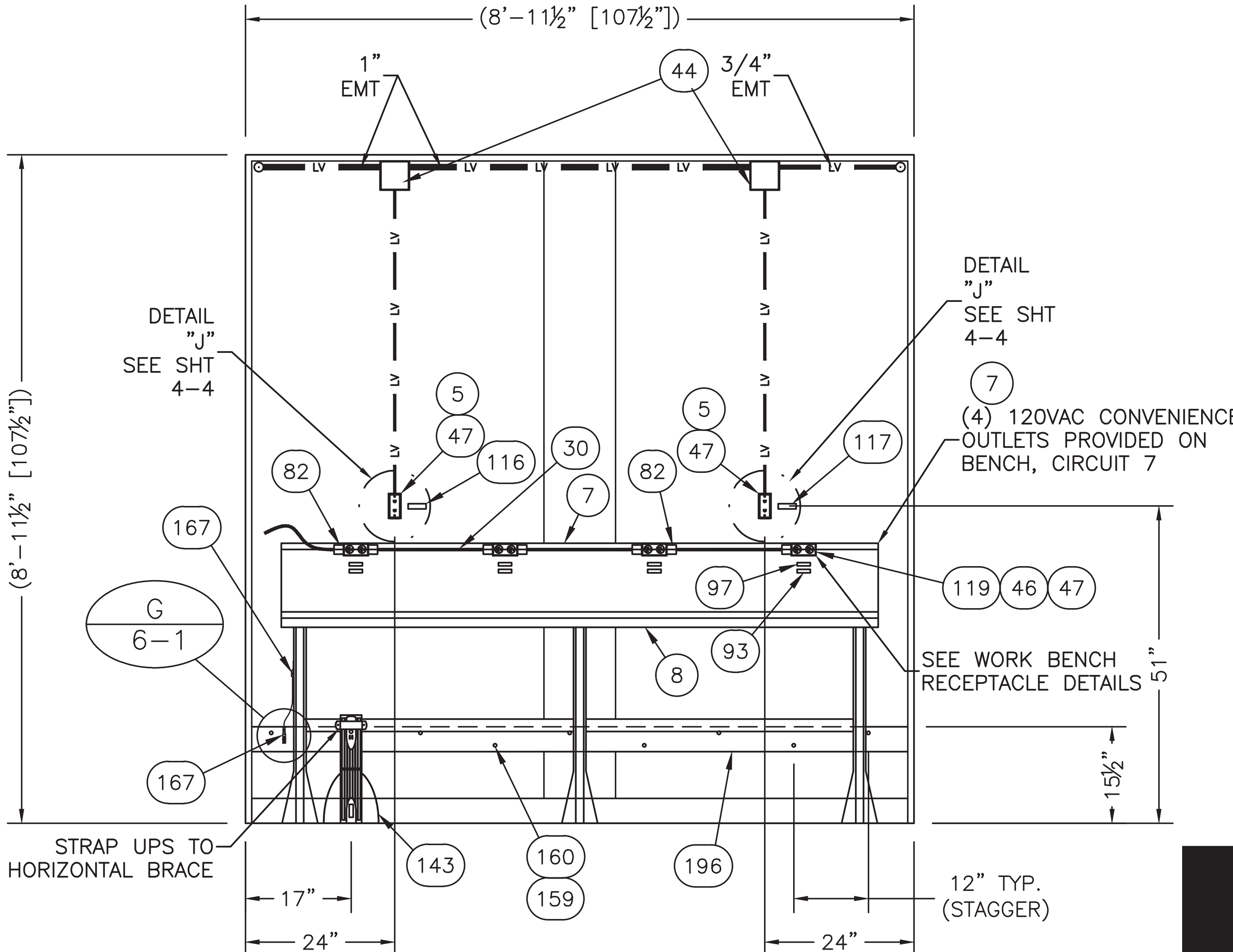
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

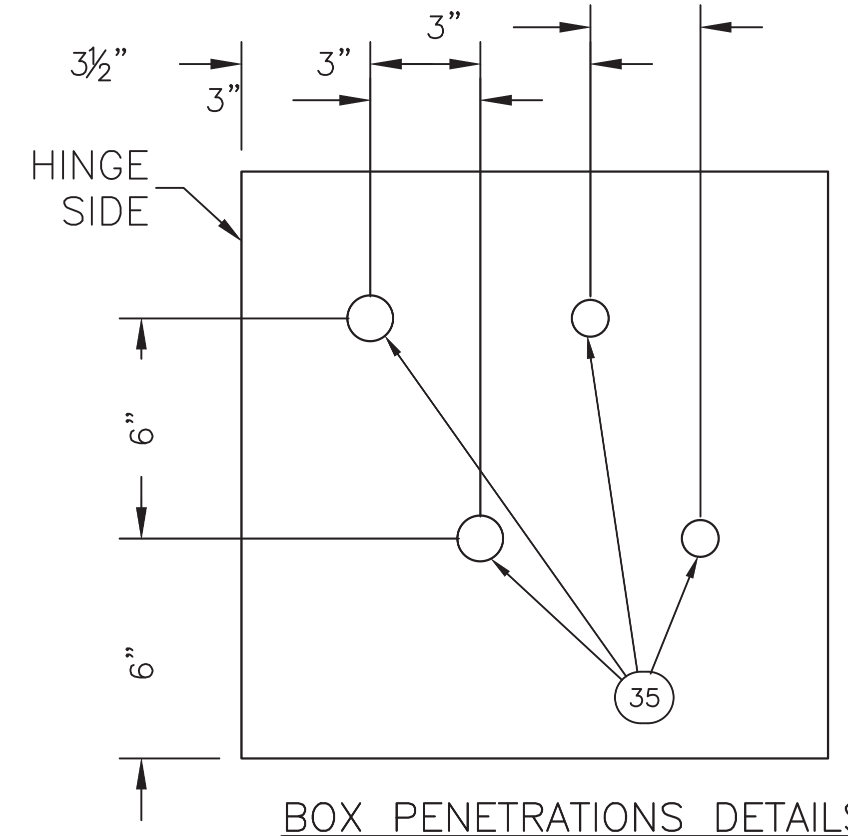
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER INTERIOR ELEVATION "B" POST-HEMP

FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-2A	
DRAWING NO.: SKBR02	REV.: P

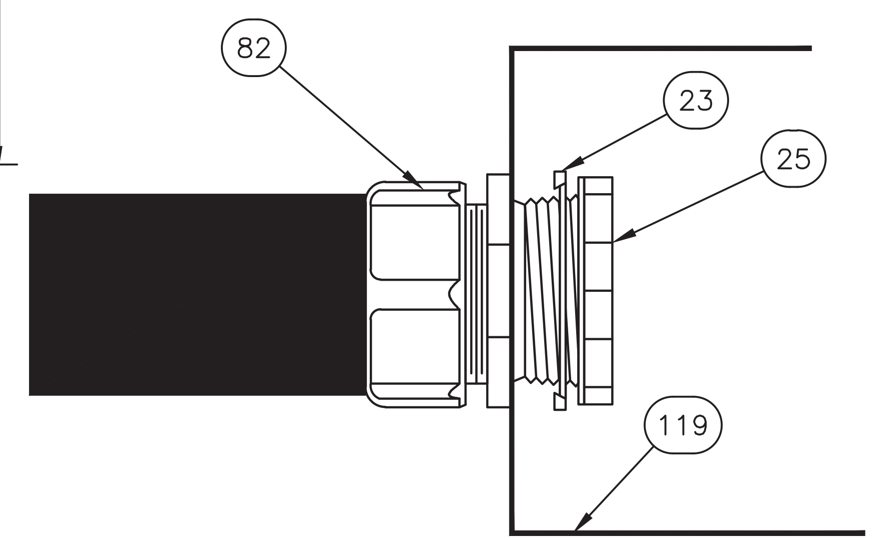
SUB-PARTS LIST			
ITEM	P/N	DESCRIPTION	CUT
196	540009	GROUND STRAP FLAT COPPER 4"WX100'L	108"



INTERIOR ELEVATION "D"



BOX PENETRATIONS DETAILS
SEE SHEET 4-1B
N.T.S.



WORK BENCH RECEPTACLE DETAILS
N.T.S.

NOTE:

1. LUG 3" OF WIRE TO STRAP.
2. LABEL CIRCUIT NO. ON ALL OUTLETS.
3. ALL COMPUTER/PHONE LINES CROSS CONNECT WIRING WILL BE COMPLETED AT THE STATION TELEPHONE BACKBOARD. 16 PAIRS MINIMUM TO BE CARRIED OVER TO STATION BACKBOARD (BY OTHERS).
4. CONNECT EACH RJ11/RJ45 DATA/PHONE JACK WITH TWO CAT5 CABLES AND RUN BACK TO CIRCA ALARM BLOCK (SEE SHEET 5-4).

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	ADDED UPS/CORRECTED NOTES	LJL	6/13/12
M	JJ	11/09/11	ADDED DETAILS TO SHEET	LJL	11/09/11
J	AMM	02/10/11	UPDATED DETAILS AND DESCRIPTION	LJL	02/10/11

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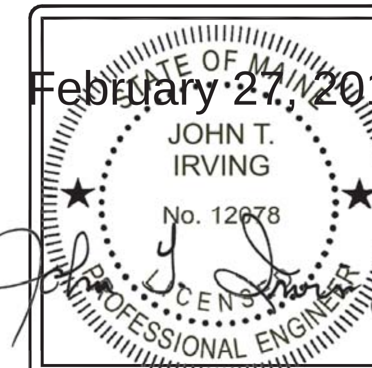

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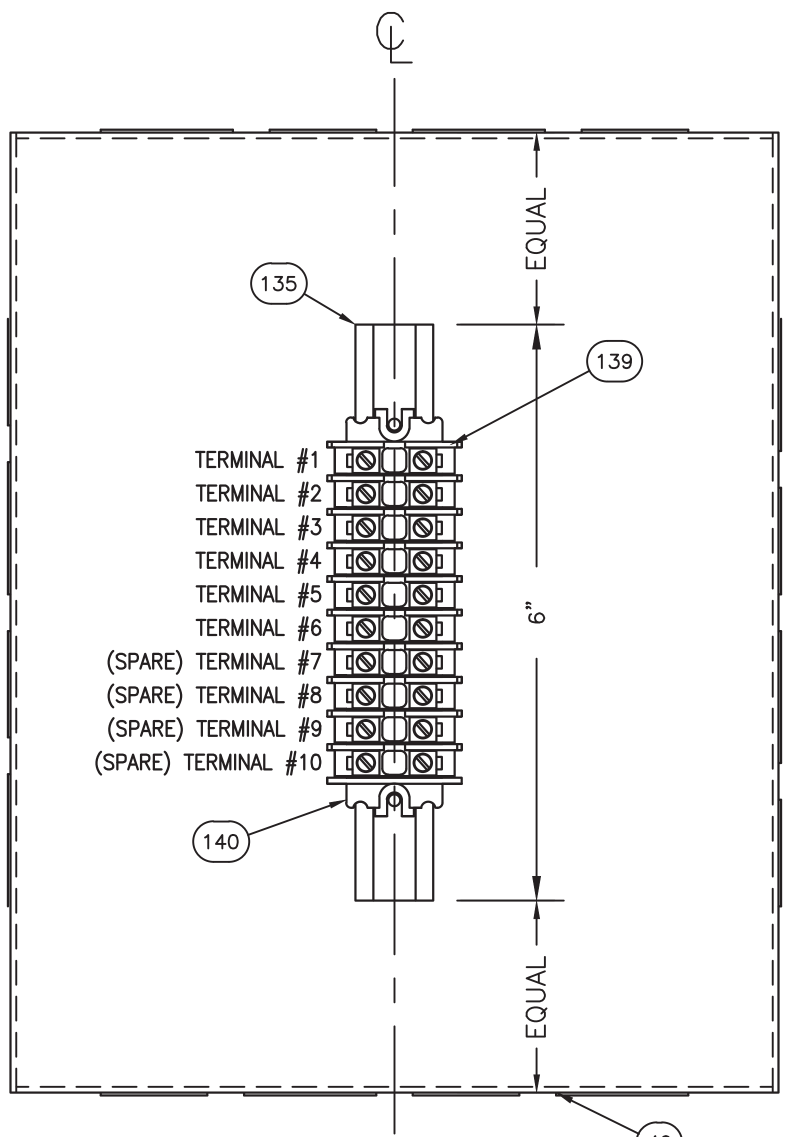
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
INTERIOR ELEVATION "D"

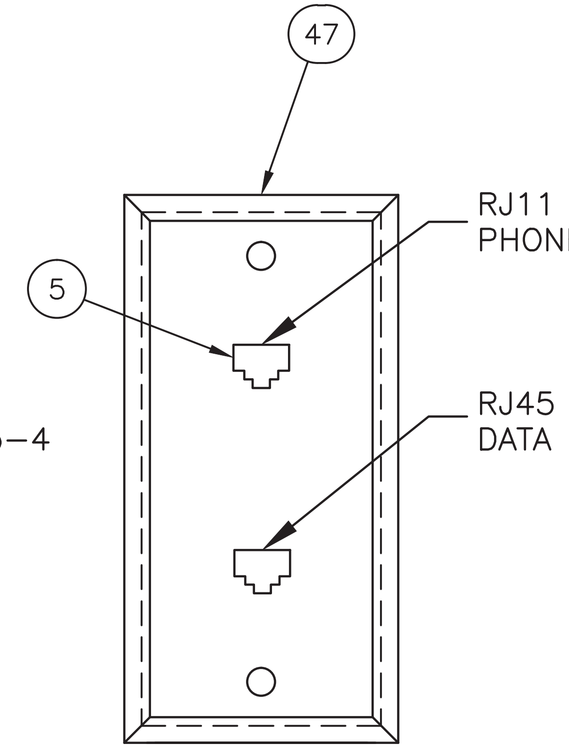
FILENAME: KBR/SKBR02	
SCALE: 1/2"=1'-0"	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4-3	
DRAWING NO.: SKBR02	REV.: P



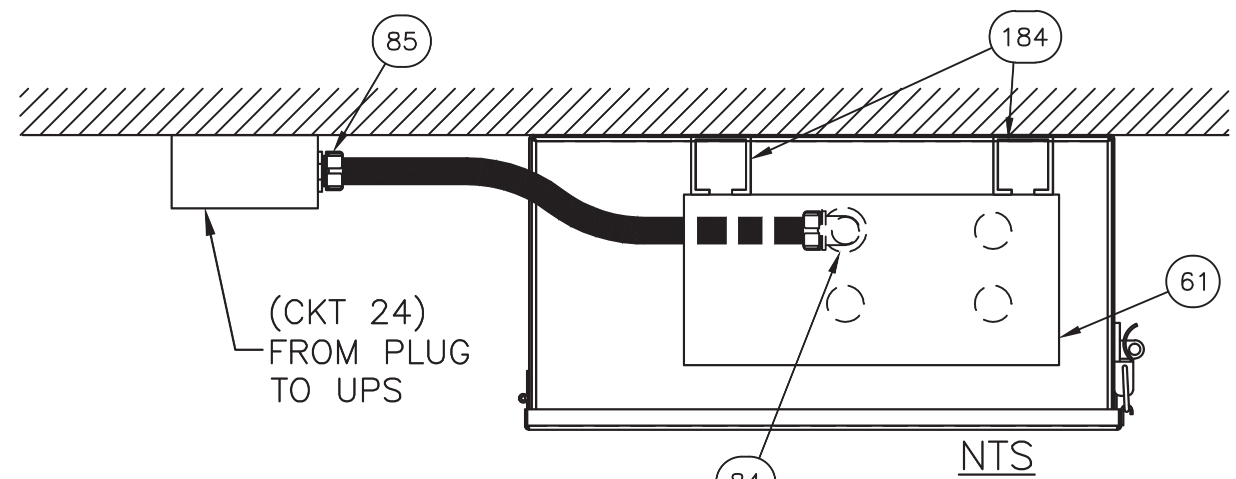
DETAIL "L"

NOTE: SEE SHEET 5–1 FOR ALARM TERMINATION
"BACKPLATE SHOWN FOR TERMINAL STRIP MOUNTING."

NOTE:
SEE SHEET 5–4



DETAIL "J"



SECTION H–H

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	JWR	6/29/12	CORRECTED DETAIL "B"	LJL	6/29/12
N	RRG	6/13/12	CORRECTED NOTES AND DETAILS	LJL	6/13/12
M	JJ	11/09/11	SHEET WAS ADDED	LJL	11/09/11

STATE OF MAINE
JOHN T.
IRVING
No. 12678
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February 27, 2013

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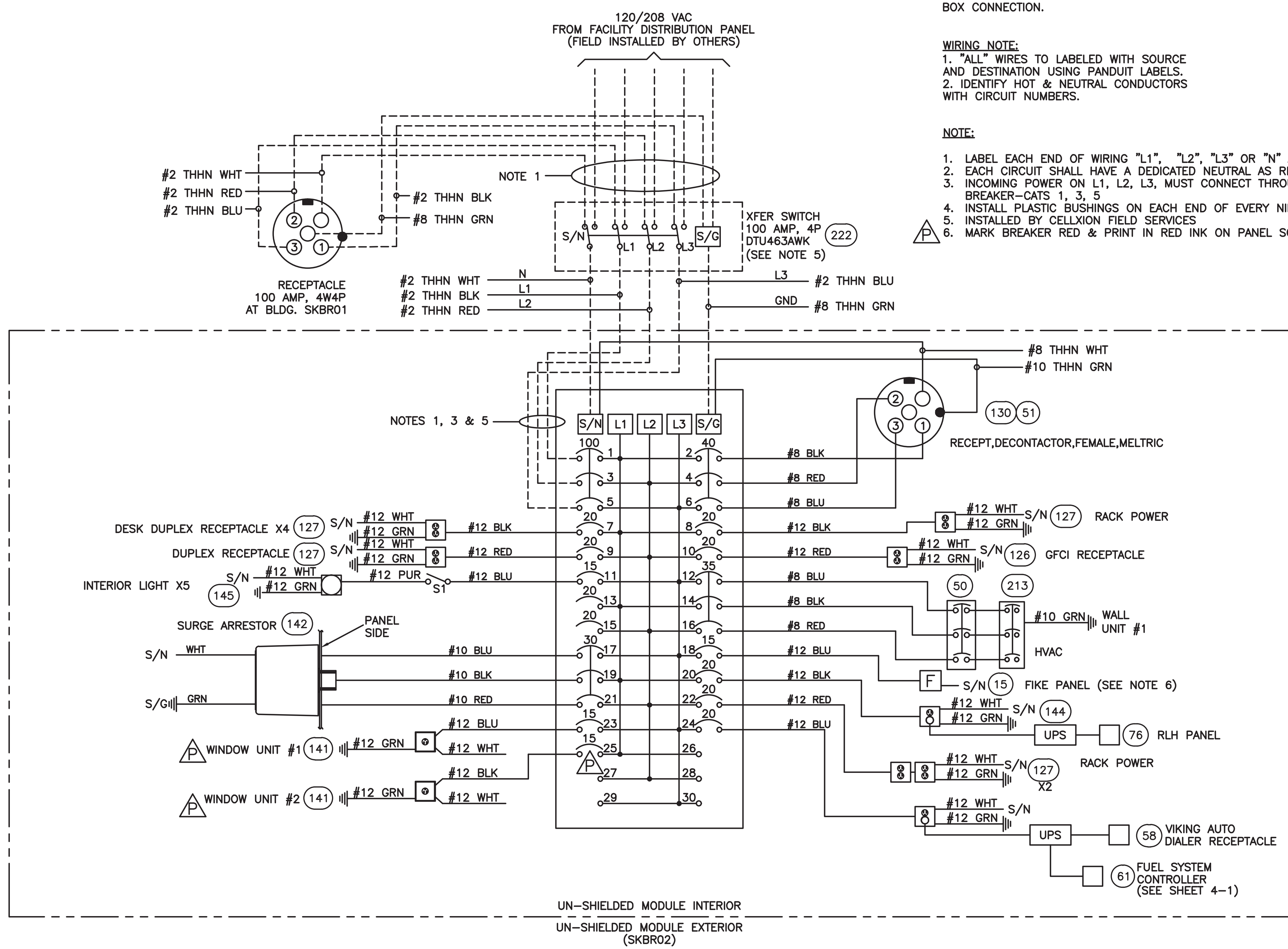
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER
TERMINATION DETAIL

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 4–4	
DRAWING NO.: SKBR02	REV.: P

February 27, 2013

STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
PROFESSIONAL ENGINEER



CONDUIT NOTE:
1. DO NOT USE REDUCING WASHERS AT ANY BOX CONNECTION.

WIRING NOTE:
1. "ALL" WIRES TO LABELED WITH SOURCE AND DESTINATION USING PANDUIT LABELS.
2. IDENTIFY HOT & NEUTRAL CONDUCTORS WITH CIRCUIT NUMBERS.

NOTE:

1. LABEL EACH END OF WIRING "L1", "L2", "L3" OR "N" AS APPROPRIATE.
2. EACH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL AS REQUIRED BY NEC
3. INCOMING POWER ON L1, L2, L3, MUST CONNECT THROUGH MASTER CIRCUIT BREAKER-CATS 1, 3, 5
4. INSTALL PLASTIC BUSHINGS ON EACH END OF EVERY NIPPLE.
5. INSTALLED BY CELLXION FIELD SERVICES
P 6. MARK BREAKER RED & PRINT IN RED INK ON PANEL SCHEDULE

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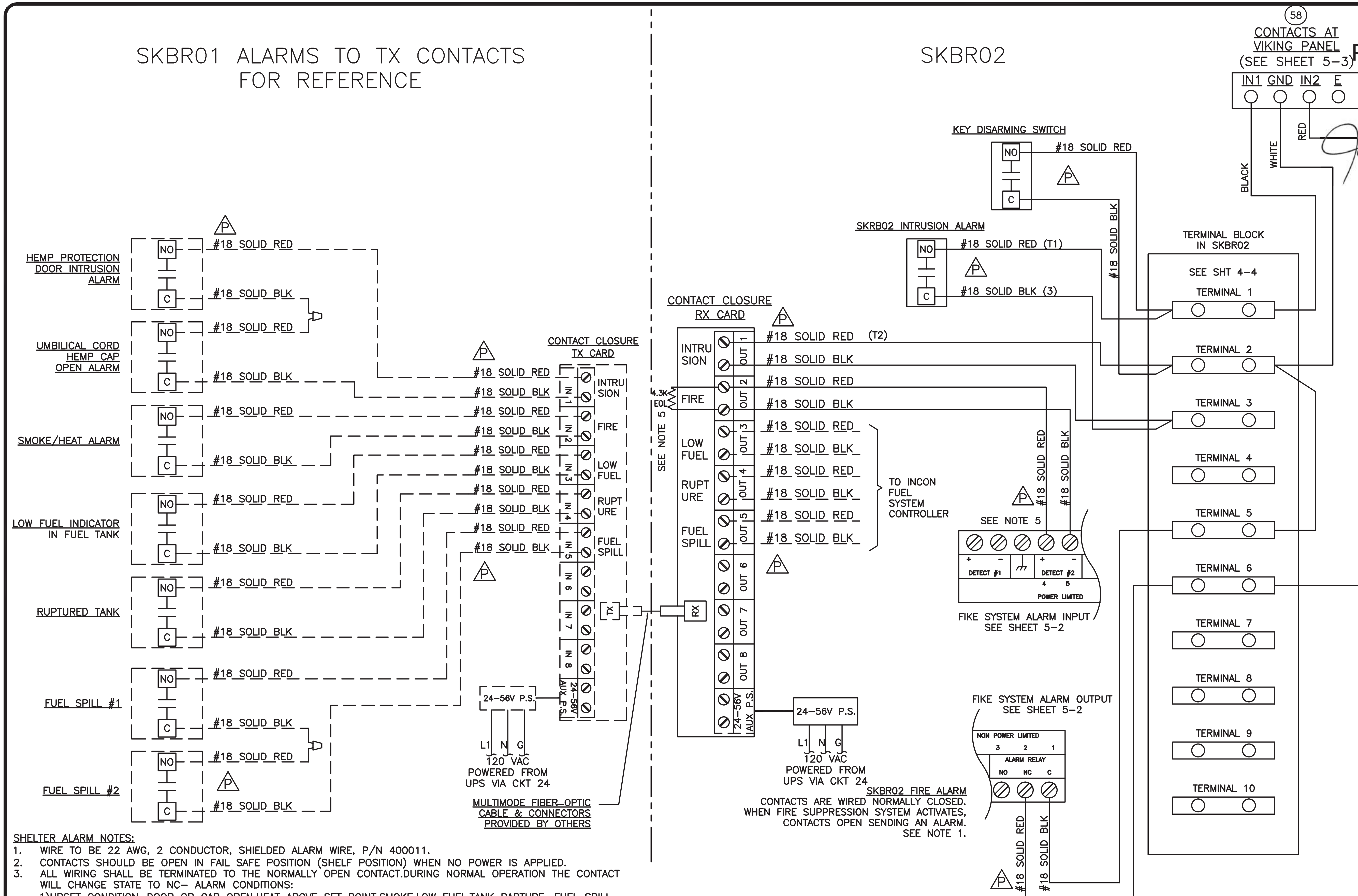
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
ELECTRICAL SCHEMATIC

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-0	
DRAWING NO.: SKBR02	REV.: P

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	REMOVED WIRE FROM WINDOW UNIT CIRCUIT/CHANGED BREAKERS & POSITION, ADDED NOTE 6	LJL	10/31/12
N	RRG	6/13/12	ADDED UPS/CHANGED BREAKER/ADDED NOTE GENERATOR RECEPTACLE WIRING NOW BY OTHERS	LJL	6/13/12
M	LJL	1/3/12	ADDED NOTE 5	LJL	1/3/12
L	RRG	04/21/11	ADDED BUBBLES & NOTES	LJL	04/21/11



SHELTER ALARM NOTES:

1. WIRE TO BE 22 AWG, 2 CONDUCTOR, SHIELDED ALARM WIRE, P/N 400011.
2. CONTACTS SHOULD BE OPEN IN FAIL SAFE POSITION (SHELF POSITION) WHEN NO POWER IS APPLIED.
3. ALL WIRING SHALL BE TERMINATED TO THE NORMALLY OPEN CONTACT.DURING NORMAL OPERATION THE CONTACT WILL CHANGE STATE TO NC– ALARM CONDITIONS:
   1)UPSET CONDITION–DOOR OR CAP OPEN,HEAT ABOVE SET POINT,SMOKE,LOW FUEL,TANK RAPTURE, FUEL SPILL.
   2)LOSS OF POWER–TRIPPED OCPD,UTILITY POWER OFF.
   3)CUT OR DISCONNECTED WIRE.
4. ALL WIRES SHOULD BE LABELED AT EACH END WITH SOURCE AND DESTINATION (TERMINATION # & ITEM #)
5. MOVE 4.3K RESISTOR FROM FIKE ALARM INPUT BOARD TO TERMINALS IN CONTACT CLOSURE CARD AS SHOWN.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	CHANGED ALL #22 WIRE TO #18	LJL	10/31/12
N	RRG	6/13/12	ADDED NOTES/CORRECTED WIRE COLOR	LJL	6/13/12
M	JJ	11/09/11	ADDED NOTE TO TERMINAL BLOCK	LJL	11/09/11

February 27, 2013

STATE OF MAINE
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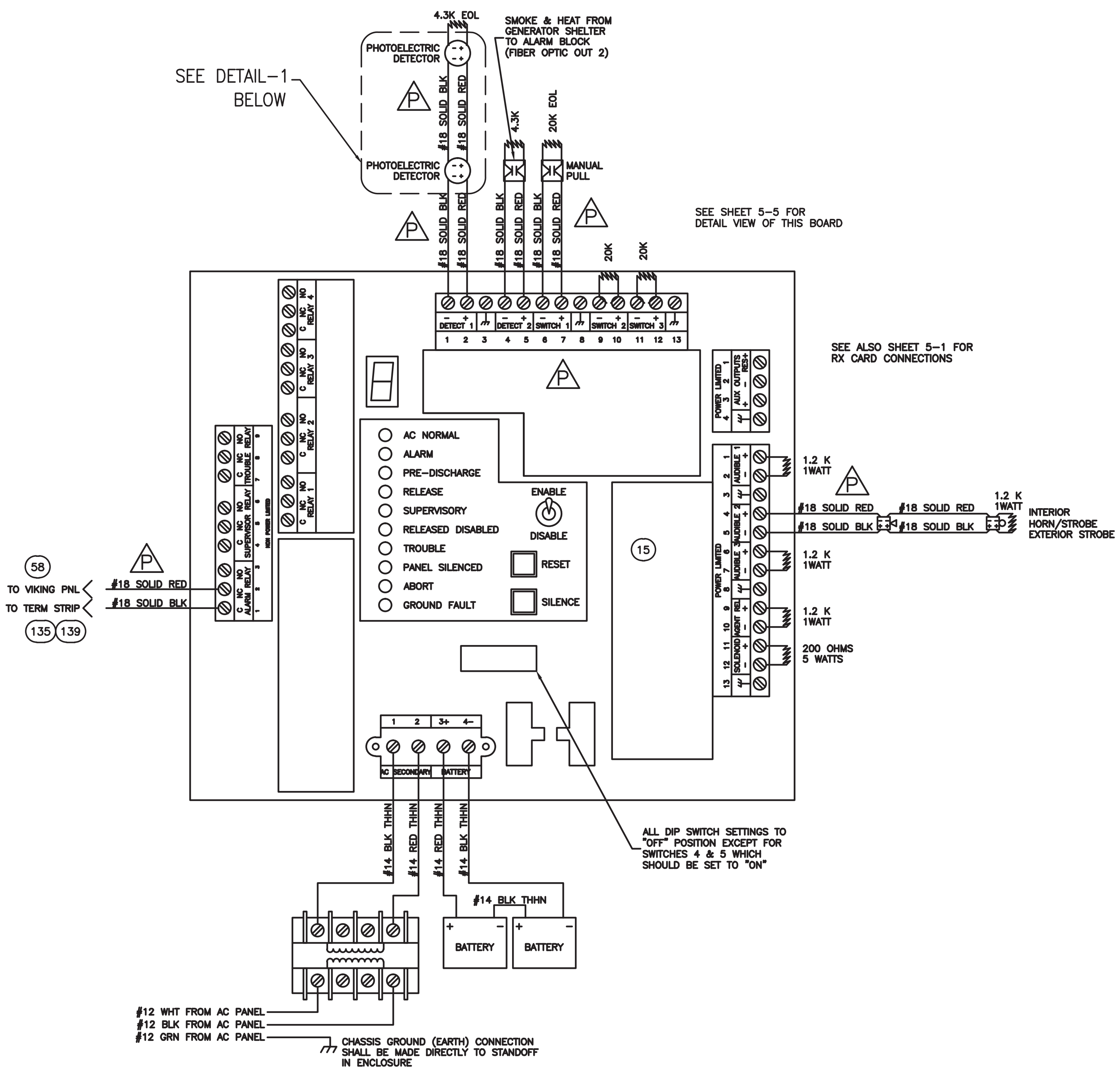
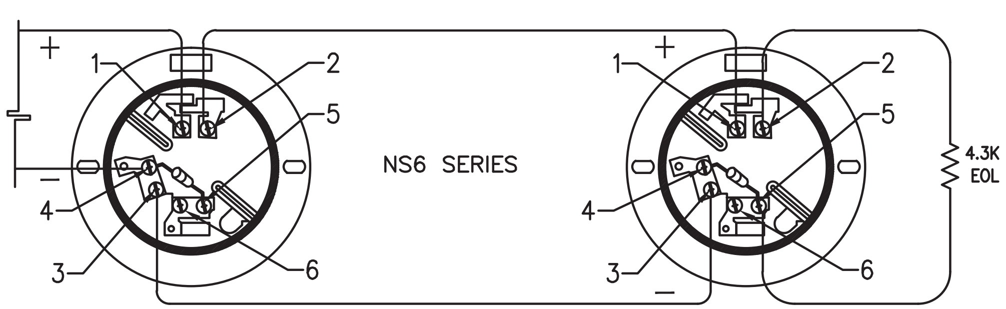
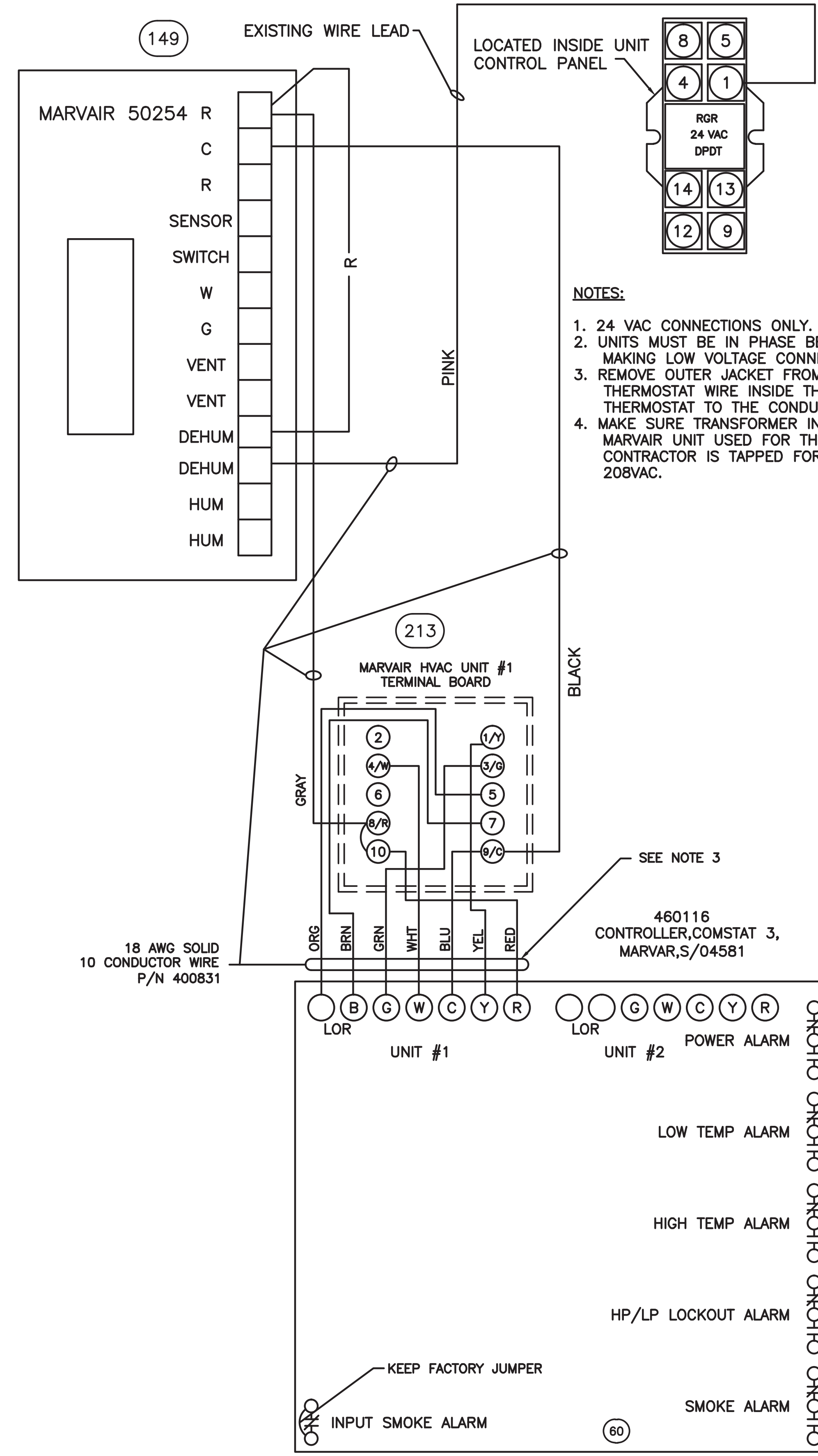
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER LOW VOLTAGE SCHEMATIC

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-1	
DRAWING NO.: SKBR02	REV.: P







NOTES:

1. 24 VAC CONNECTIONS ONLY.
2. UNITS MUST BE IN PHASE BEFORE MAKING LOW VOLTAGE CONNECTIONS.
3. REMOVE OUTER JACKET FROM THERMOSTAT WIRE INSIDE THE THERMOSTAT TO THE CONDUIT.
4. MAKE SURE TRANSFORMER IN MARVAIR UNIT USED FOR THE CONTRACTOR IS TAPPED FOR 208VAC.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	CHANGED ALL #22 WIRE TO #18	LJL	10/31/12
N	RRG	6/13/12	CORRECTED FIKE PANEL TERMINALS/REMOVED SPLICE/ CHANGED WIRE COLOR	LJL	6/13/12

February 27, 2013

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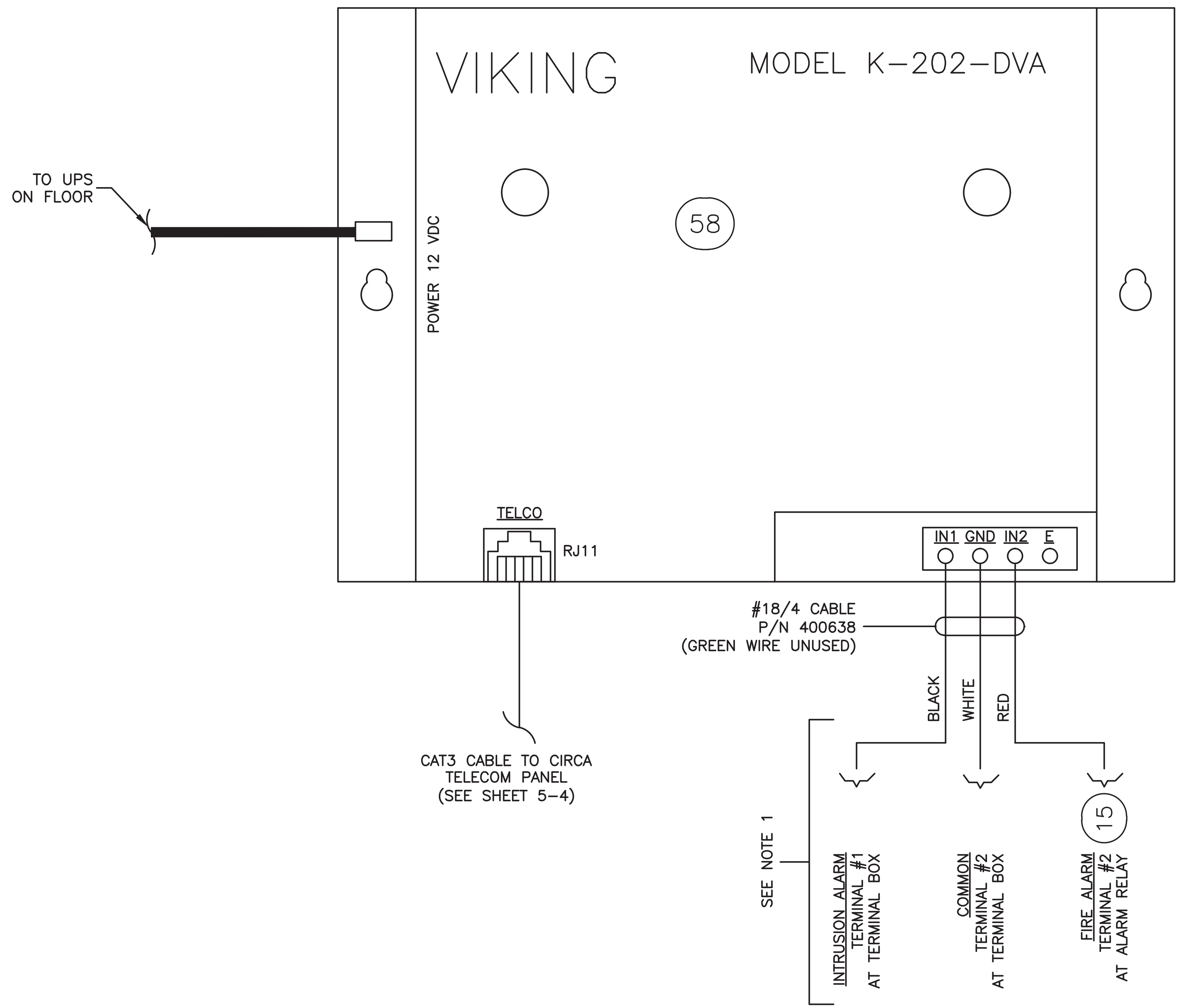
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER HVAC/FIKE SYSTEM SCHEMATIC

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-2	
DRAWING NO.: SKBR02	REV.: P

AUTO DIALER
P/N 440079



NOTE:

1. PULL ALARMS FROM TERMINAL BLOCK TO AUTO DIALER. THIS WIRING WILL TERMINATE REFERENCED ITEM DUE TO "COMMON" WIRE REQUIRED FROM BOTH SYSTEMS. SEE SHEET 5-1 FOR REFERENCED TERMINAL.
2. PROGRAMMING REQUIREMENT (SETUP) TO BE COMPLETED AT SITE.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	UPDATED DETAIL AND WIRE COLOR	LJL	6/13/12
M	LJL	1/3/12	ADDED CABLE TYPE FOR INPUTS	LJL	1/3/12
K	JJ	4/7/11	PER CUSTOMER MARKUPS	LJL	4/7/11
H	MST	01/21/11	PER CUSTOMER MARKUPS	WAR	01/21/11
F	MST	12/16/10	REVISED PER CUSTOMER MARKUPS	WAR	12/16/10
C	DJC	04/30/10	UPDATED AUTODIALER SCHEMATIC	GAB	04/30/10

STATE OF MAINE
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February 27, 2013

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CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER
AUTODIALER SCHEMATIC

FILENAME: KBR/SKBR02

SCALE: N.T.S.
TOLERANCE:

DRWN. BY: M. FOWLER
DATE: 03/24/2010

CHK. BY: V. HASSELL
DATE: 03/24/2010

ENG. BY:
DATE:

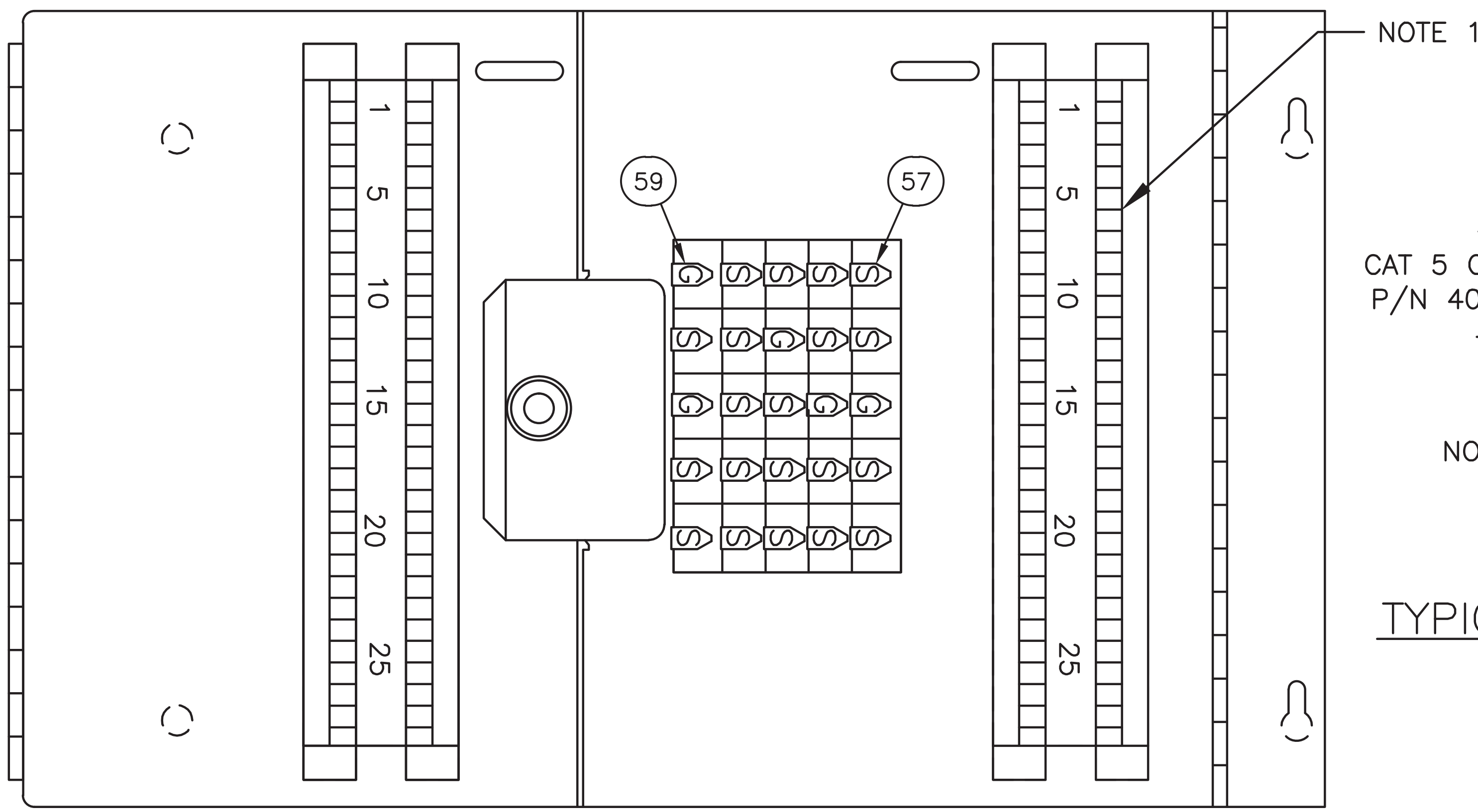
APP. BY: A. DUMAS
DATE: 03/24/2010

SHEET NO. 5-3

DRAWING NO.: SKBR02
REV.: P

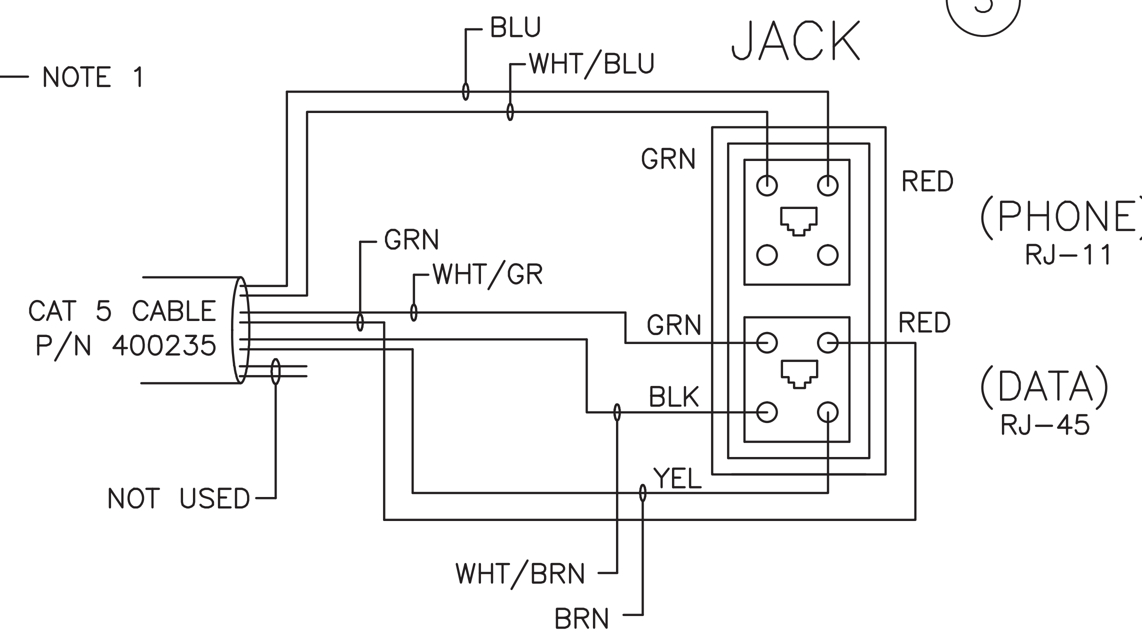
February 27, 2013

CIRCA TELECOM 1880ECA1-25 (138)



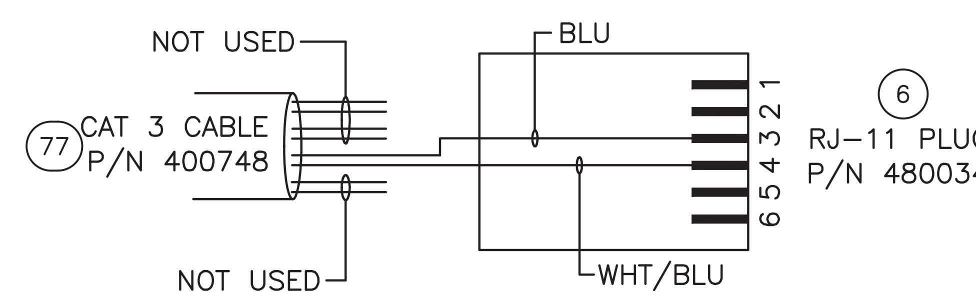
CONNECTIONS TO CIRCA PANEL

PAIR#
1. INDEC (FEMA PHONE JACK #3, CAT 5 CABLE #1) BLU, WHT/BLU
2.
3.
4.
5.
6&7. DATA (DATA JACK #3, CAT 5 CABLE #1) WHT/BRN, GRN, WHT/GRN, BRN P
8. PHONE (PHONE JACK #2, CAT 5 CABLE #2) BLU, WHT/BLU
9&10. DATA (DATA JACK #2, CAT 5 CABLE #2) WHT/BRN, GRN, WHT/GRN, BRN
11. PHONE (PHONE JACK #1, CAT 5 CABLE #3) BLU, WHT/BLU P
12&13. DATA (DATA JACK #1, CAT 5 CABLE #3) WHT/BRN, GRN, WHT/GRN, BRN
14. VIKING (CAT 3 CABLE #4, (77)) BLU, WHT/BLU (CABLE TO VIKING DIALER MADE TO LENGTH) P
15. INCON FUEL MONITOR (CAT 3 CABLE #5, (77)) BLU, WHT/BLU (CABLE TO INCON MADE TO LENGTH) P



TYPICAL FEMA PHONE/DATA JACK WIRING SCHEMATIC

NOTES:
1. CONNECT CABLES TO RIGHT SIDE OF CIRCA PANEL
2. LEAVE NO EXCESS CABLE OUTSIDE OF BOX



CAT 3/RJ-11 CONNECTOR WIRING

NOTE:
1. RJ-11 PLUG IS SHOWN WITH "HOOK CLIP" ON THE UNDERSIDE.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	LJL	12/11/12	MODIFIED NOTES 6,7,11,14&15	LJL	6/13/12
N	RRG	6/13/12	CORRECTED NOTES/ADDED DETAIL	LJL	6/13/12
M	LJL	1/3/12	UPDATED WIRING CALLOUTS & P/N'S	LJL	1/3/12
K	JJ	4/7/11	SHEET ADDED	LJL	4/7/11

STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
PROFESSIONAL ENGINEER

Cellxion
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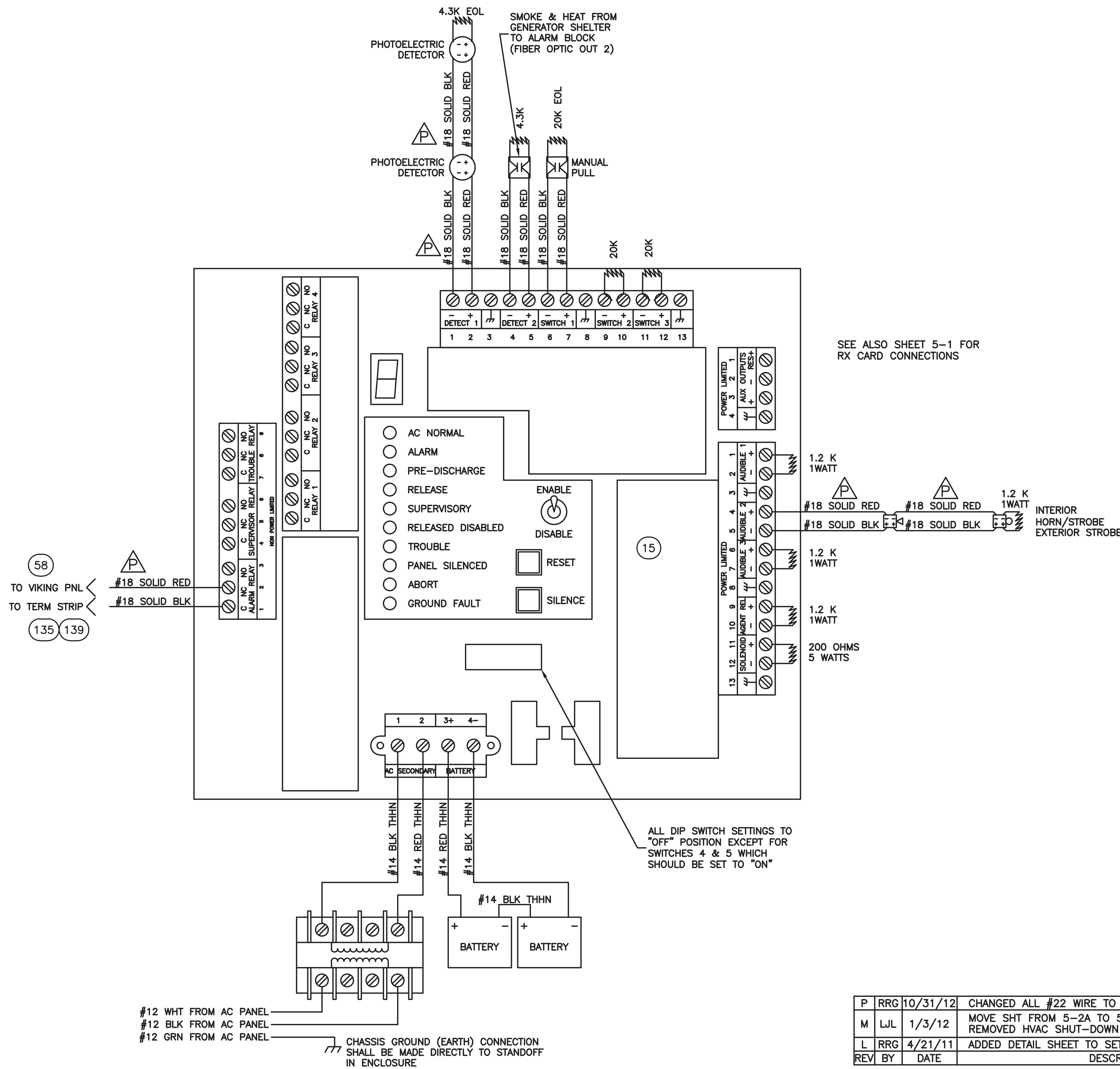
Bossier City, Louisiana 71111
voice: (318) 213-2900
fax: (318) 213-2919
www.cellxion.com

CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER PHONE/DATA WIRING

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-4	
DRAWING NO.: SKBR02	REV.: P



REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	CHANGED ALL #22 WIRE TO #18	LJL	10/31/12
M	LJL	1/3/12	MOVE SHT FROM 5-2A TO 5-5/ADDED MARVAIR TERMICAL REMOVED HVAC SHUT-DOWN	LJL	1/3/12
L	RRG	4/21/11	ADDED DETAIL SHEET TO SET	LJL	4/21/11

February 27, 2013

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CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER HVAC/FIKE SYSTEM SCHEMATIC DETAIL

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-5	
DRAWING NO.: SKBR02	REV.: P

	PANEL NAME:	PANEL "C"														
				VOLTAGE:	208	/	120					MAIN BREAKER:	Y			
	PRE HEMP LOADING			PHASE:	3							LUGS ONLY:				
	FED FROM PANEL "A"			WIRE:	4							SURFACE:	Y			
				BUS AMPS:	100		100	:MAIN CB AMPS				FLUSH:				
				SUPPLY AMPS:	50							GROUND BUS:	Y			
				MIN. SHORT CIRCUIT RATING:	10000							ISOLATED GROUND BUS:				
	INCLUDE SPARE CAP. - Y / N:	N										NEUTRAL BUS:	Y			

NOTES	SERVES	LTG	RCPT	PWR	MOT	CB *	CKT	PH	CKT	CB *	LTG	RCPT	PWR	MOT	SERVES	NOTES
	MAIN BREAKER					100	1	A	2	40					TRANSMITTER	1,2
	MAIN BREAKER					[	3	B	4	[					TRANSMITTER	1,2
	MAIN BREAKER					[	5	C	6	[					TRANSMITTER	1,2
	RECEPT (DESK)		720			20	7	A	8	20					RACK POWER	1,2
	RECEPT (W/AUTO DIALER)		600			20	9	B	10	20		180			GFCI	
	TRANSMITTER RM LIGHTING	300				15	11	C	12	35			3360		HVAC	
	SPARE					20	13	A	14	[			3360		HVAC	
	SPARE					20	15	B	16	[			3360		HVAC	
	TVSS			60		30	17	C	18	15			300		FIKE PANEL P	3
	TVSS			60		[	19	A	20	20					SPARE	
	TVSS			60		[	21	B	22	20					RACK POWER	2
2	PORTABLE AC P					15	23	C	24	20			300		FUEL SYSTEM CONTROLLER	
2	PORTABLE AC					15	25	A	26							
							27	B	28							
							29	C	30							

CONNECTED VA	A:	4,140	B:	4,200	C:	4,320

CONNECTED KVA:		D.F.	DEMAND KVA:			AMPS	KVA	
						50.0	18.0	DESIGN (BASED ON SUPPLY)
LIGHTING LOAD:	0.3	1.25	0.4			35.1	12.7	CONNECTED
RECEPT. LOAD - FIRST 10 KVA:	1.5	1.00	1.5			35.3	12.7	DEMAND
RECEPT. LOAD - REMAINDER:	0.0	0.50	0.0			14.7	5.3	SPARE
POWER LOAD:	10.9	1.00	10.9	AVG				
MOTOR LOAD EXCEPT LARGEST:	0.0	1.00	0.0	KVA		AMPS	KVA	CONNECTED
LARGEST MOTOR:	0.0	1.25	0.0	4.2		35	4.1	PHASE A
20% SPARE CAPACITY:	0.0	1.00	0.0			35	4.2	PHASE B
TOTAL CONNECTED LOAD:	12.7	TOTAL DEMAND LOAD:	12.7			36	4.3	PHASE C
					PHASE LOAD			PHASE BALANCE
					69%		98%	PHASE A
					70%		100%	PHASE B
					72%		102%	PHASE C

INSTRUCTIONS:

* - ALL BRANCH CIRCUIT BREAKERS ARE 1P20 UNLESS OTHERWISE SHOWN

[- DENOTES ADDITIONAL POLES OF MULTI-POLE CIRCUIT BREAKERS

NOTES:

1 Transmitter only operational when fed from generator power.

2 These circuits will not be connected in the "PRE-HEMP" stage and are shown for information purposes.

3 The circuit breaker shall have red identification and labeled as "FIRE ALARM CIRCUIT". P

February 27, 2013

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CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
ELECTRICAL PANEL CALC
PRE HEMP

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-6	
DRAWING NO.: SKBR02	REV.: P

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED SCHEMATIC, ADDED NOTE 3	LJL	10/31/12
N	JWR	6/29/12	UPDATED SCHEMATIC	LJL	6/29/12
N	RRG	6/13/12	UPDATED SCHEMATIC	LJL	6/13/12

February 27, 2013

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PANEL NAME:			PANEL "C"								
			VOLTAGE:	208	/	120			MAIN BREAKER:	Y	
POST HEMP LOADING			PHASE:	3					LUGS ONLY:		
FED FROM PANEL "B"			WIRE:	4					SURFACE:	Y	
VIA GENERATOR			BUS AMPS:	100		100	:MAIN CB AMPS		FLUSH:		
			SUPPLY AMPS:	90					GROUND BUS:	Y	
			MIN. SHORT CIRCUIT RATING:	10000					ISOLATED GROUND BUS:		
INCLUDE SPARE CAP. - Y / N:	N								NEUTRAL BUS:	Y	

NOTES:	SERVES	LTG	RCPT	PWR	MOT	CB *	CKT	PH	CKT	CB *	LTG	RCPT	PWR	MOT	SERVES	NOTES:
	MAIN BREAKER					100	1	A	2	40			3842		TRANSMITTER	1,2
	MAIN BREAKER					[	3	B	4	[			3842		TRANSMITTER	1,2
	MAIN BREAKER					[	5	C	6	[			3842		TRANSMITTER	1,2
	RECEPT (DESK)		720			20	7	A	8	20		1500			RACK POWER	
	RECEPT(W/AUTO DIALER)					20	9	B	10	20		180			GFCI	
	TRANSMITTER RM LIGHTING	300				15	11	C	12	35					HVAC	2
	SPARE					20	13	A	14	[					HVAC	2
	SPARE					20	15	B	16	[					HVAC	2
2	TVSS					30	17	C	18	15					FIKE PANEL	3
2	TVSS					[	19	A	20	20					SPARE	
2	TVSS					[	21	B	22	20		1500			RACK POWER	
	PORTABLE AC			1440		15	23	C	24	20					FUEL SYSTEM CONTROLLER	
	PORTABLE AC			1440		15	25	A	26							
							27	B	28							
							29	C	30							

CONNECTED VA	A:	7,502	B:	5,522	C:	5,582

						AMPS	KVA	
CONNECTED KVA:		D.F.	DEMAND KVA:			90.0	32.4	DESIGN (BASED ON SUPPLY)
LIGHTING LOAD:	0.3	1.25	0.4			51.6	18.6	CONNECTED
RECEPT. LOAD - FIRST 10 KVA:	3.9	1.00	3.9			51.9	18.7	DEMAND
RECEPT. LOAD - REMAINDER:	0.0	0.50	0.0			38.1	13.7	SPARE
POWER LOAD:	14.4	1.00	14.4	AVG				
MOTOR LOAD EXCEPT LARGEST:	0.0	1.00	0.0	KVA		AMPS	KVA	CONNECTED
LARGEST MOTOR:	0.0	1.25	0.0	6.2		63	7.5	PHASE A
20% SPARE CAPACITY:	0.0	1.00	0.0			46	5.5	PHASE B
TOTAL CONNECTED LOAD:	18.6	TOTAL DEMAND LOAD:	18.7			47	5.6	PHASE C
					PHASE			
					LOAD			PHASE BALANCE
					69%		121%	PHASE A
					51%		89%	PHASE B
					52%		90%	PHASE C

INSTRUCTIONS:

* - ALL BRANCH CIRCUIT BREAKERS ARE 1P20 UNLESS OTHERWISE SHOWN

[- DENOTES ADDITIONAL POLES OF MULTI-POLE CIRCUIT BREAKERS

NOTES:

1 Transmitter only operational when fed from generator power.

2 Devices are considered non-operational due to HEMP event. OCP'S must be opened before energizing panel after event or on generator power.

3 The circuit breaker shall have red identification and labeled as "FIRE ALARM CIRCUIT".

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	UPDATED SCHEMATIC, ADDED NOTE 3	LJL	10/31/12
N	RRG	6/13/12	UPDATED SCHEMATIC	LJL	6/13/12

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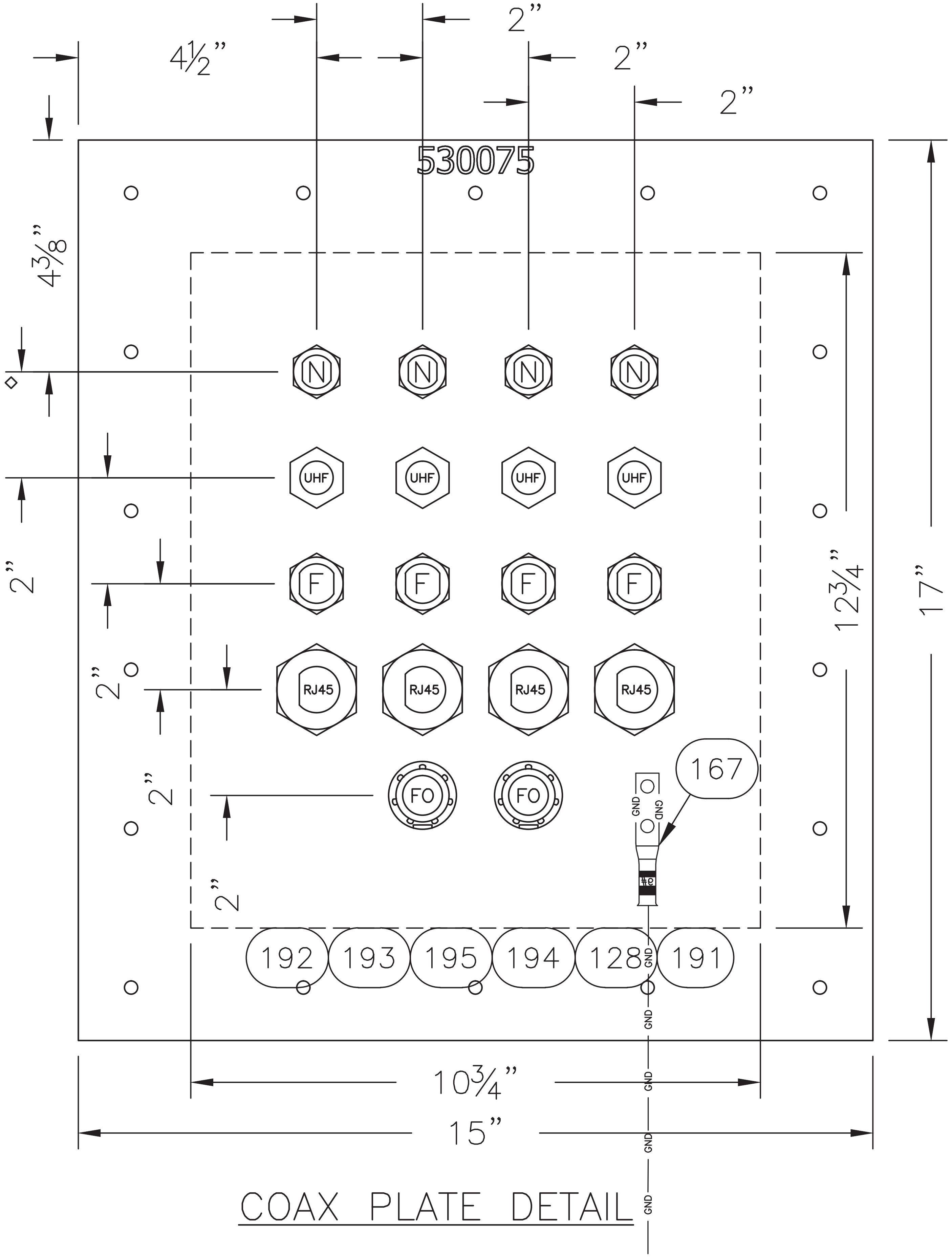
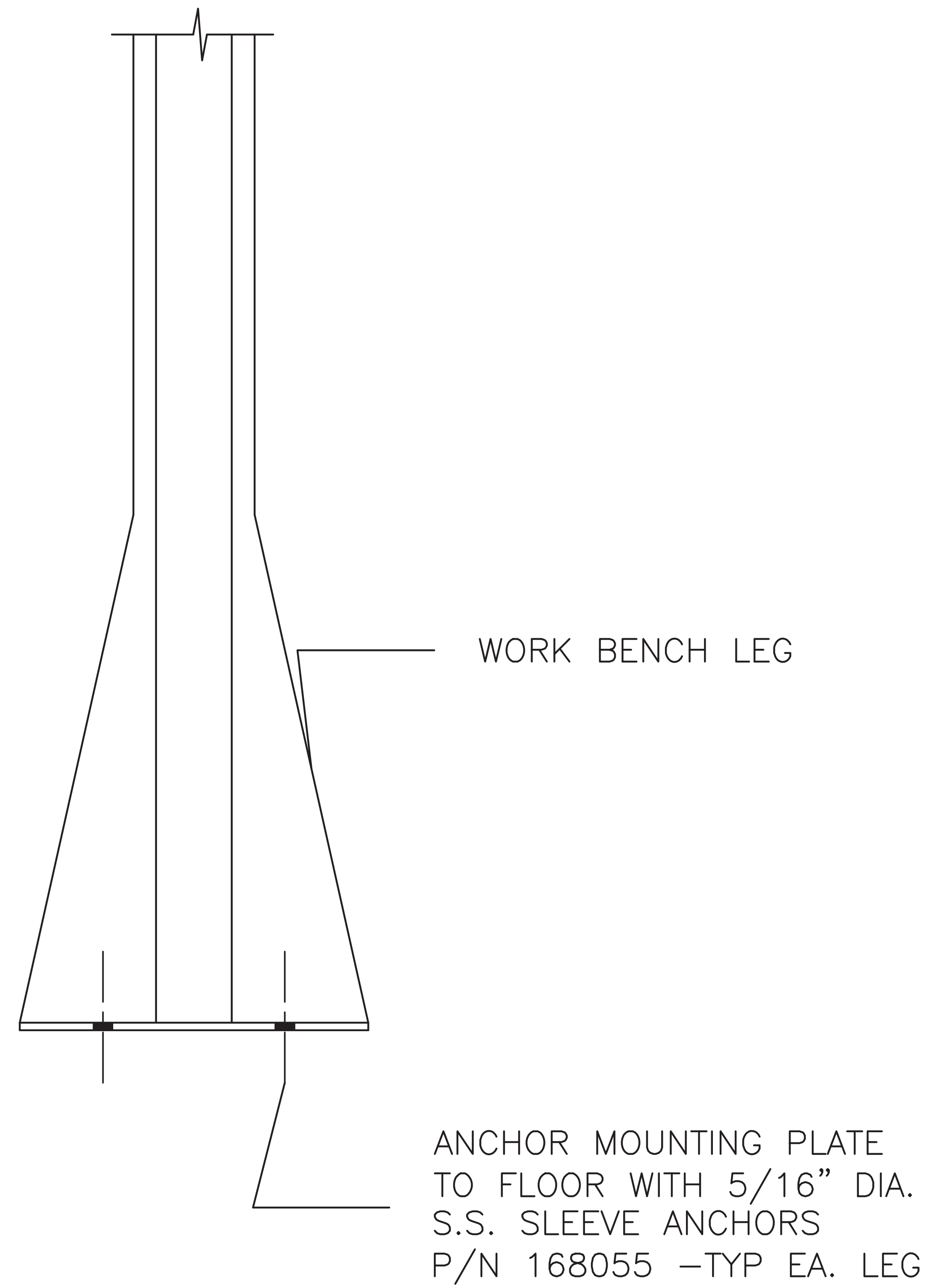
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER
ELECTRICAL PANEL CALC
POST HEMP

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 5-7	
DRAWING NO.: SKBR02	REV.: P



COAX PLATE DETAIL



REV	BY	DATE	DESCRIPTION	APP.BY	DATE
M	JJ	11/09/11	ADD COAX PLATE DETAIL	LL	11/09/11

February 27, 2013

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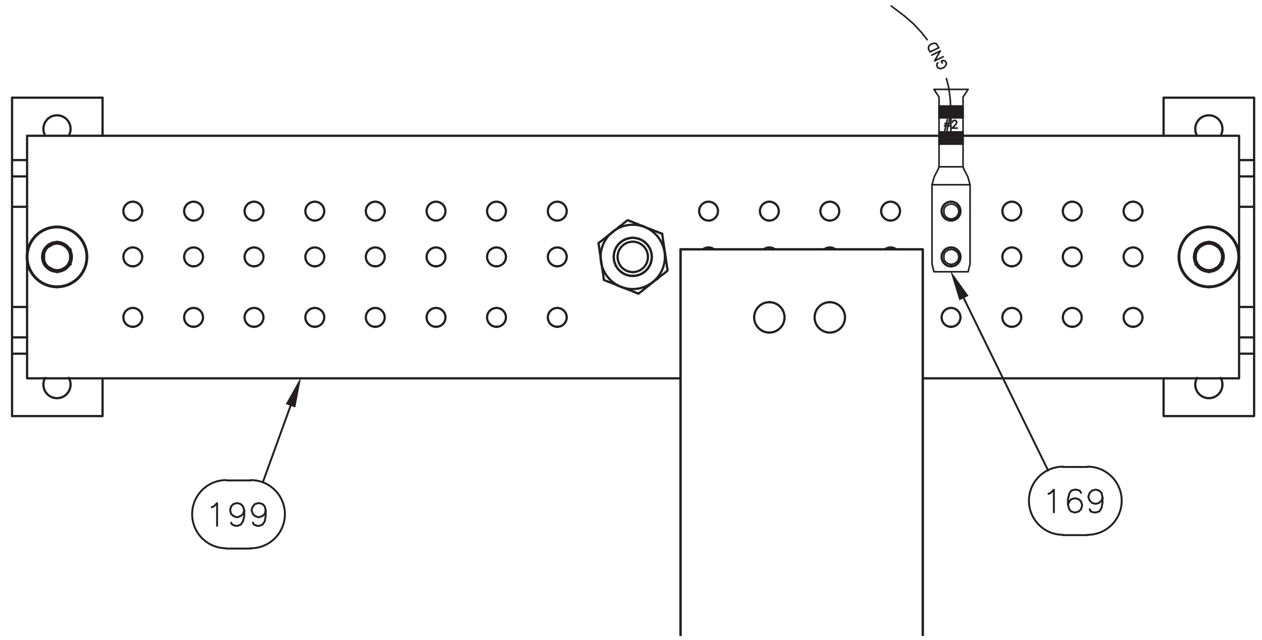
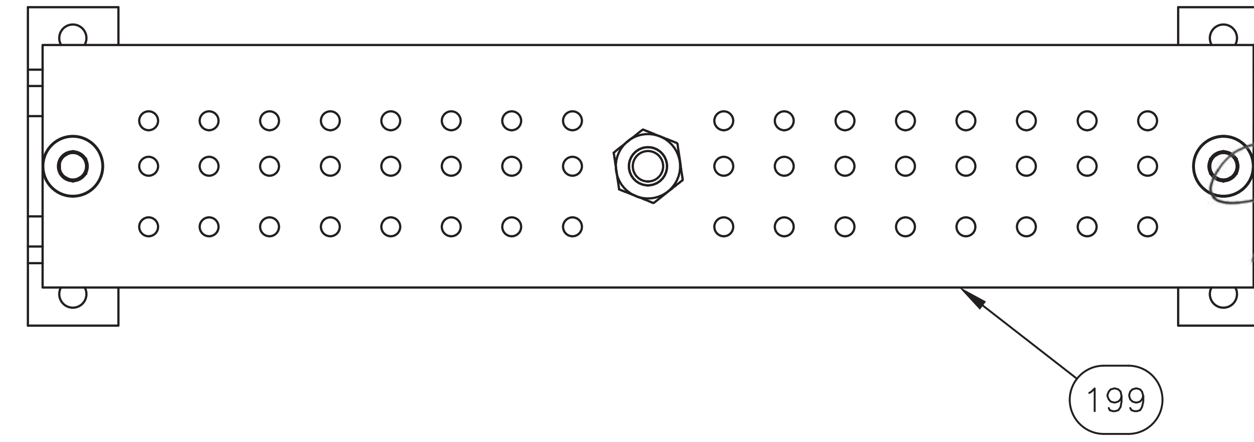
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER WORK BENCH MOUNTING DETAIL

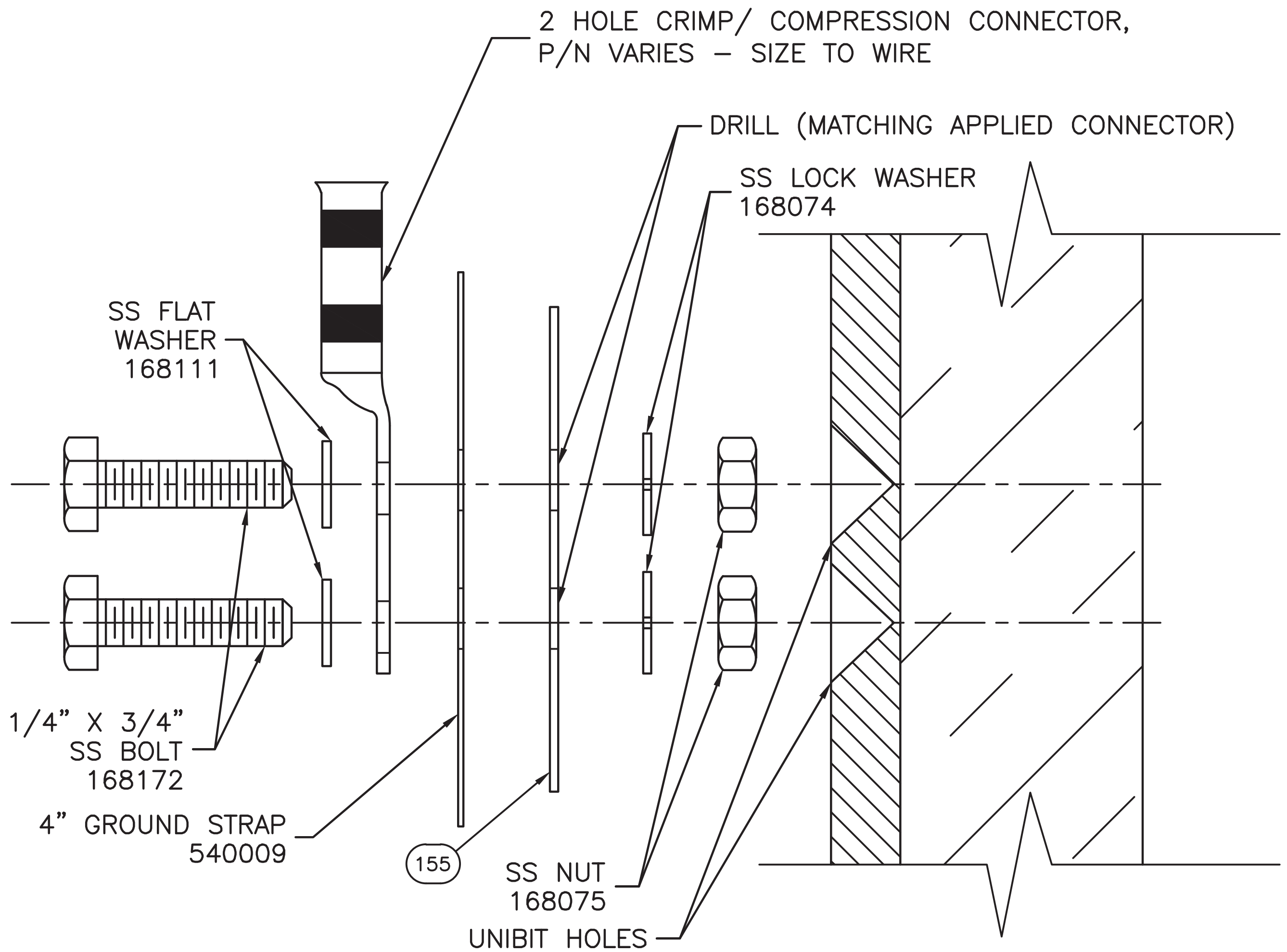
FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 6-0	
DRAWING NO.: SKBR02	REV.: P



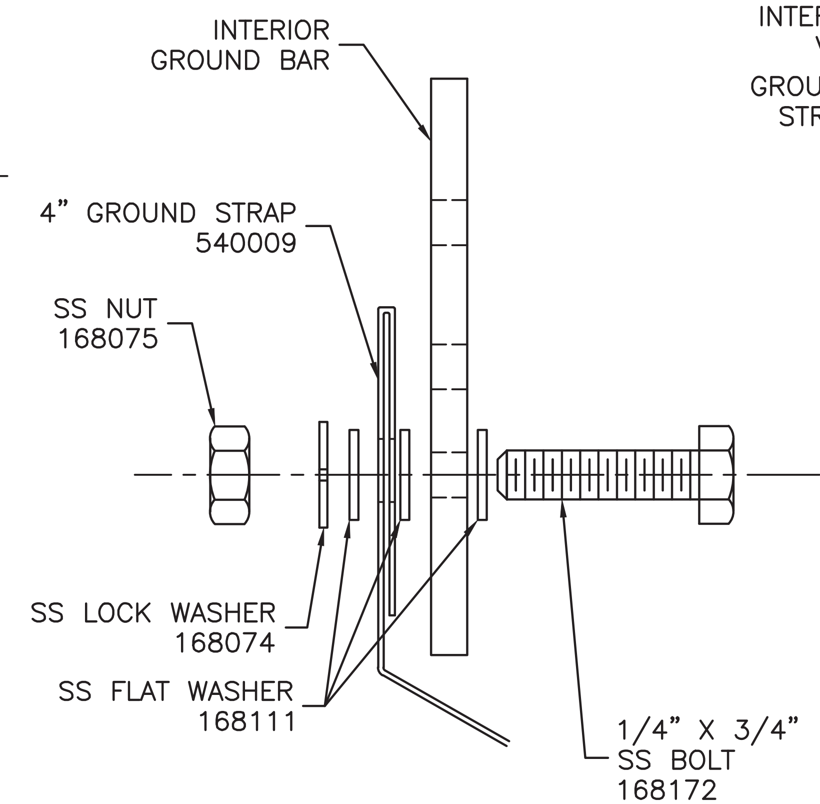
INTERIOR GROUND BAR DETAIL



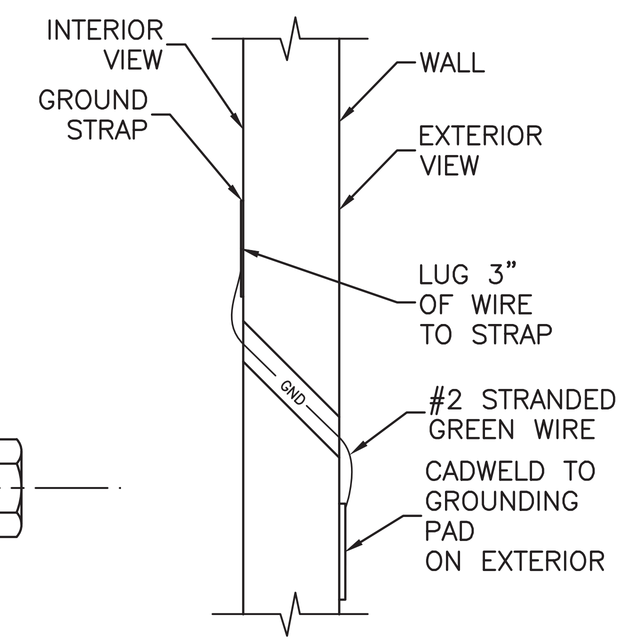
EXTERIOR GROUND BAR DETAIL



DETAIL "G"



DETAIL "K"



DETAIL "F"

N	RRG	6/13/12	CHANGED NOTE/UPDATED FOLD IN GROUND STRAP	LJL	6/13/12
M	JJ	11/09/11	UPDATED GROUND STRIP & ADDED FLAT WASHERS	LJL	11/09/11
J	AMM	2/2/11	UPDATED GROUND BAR ORIENTATION, ADDED FLAT WASHER	LJL	2/2/11
REV	BY	DATE	DESCRIPTION	APP.BY	DATE

February 27, 2013

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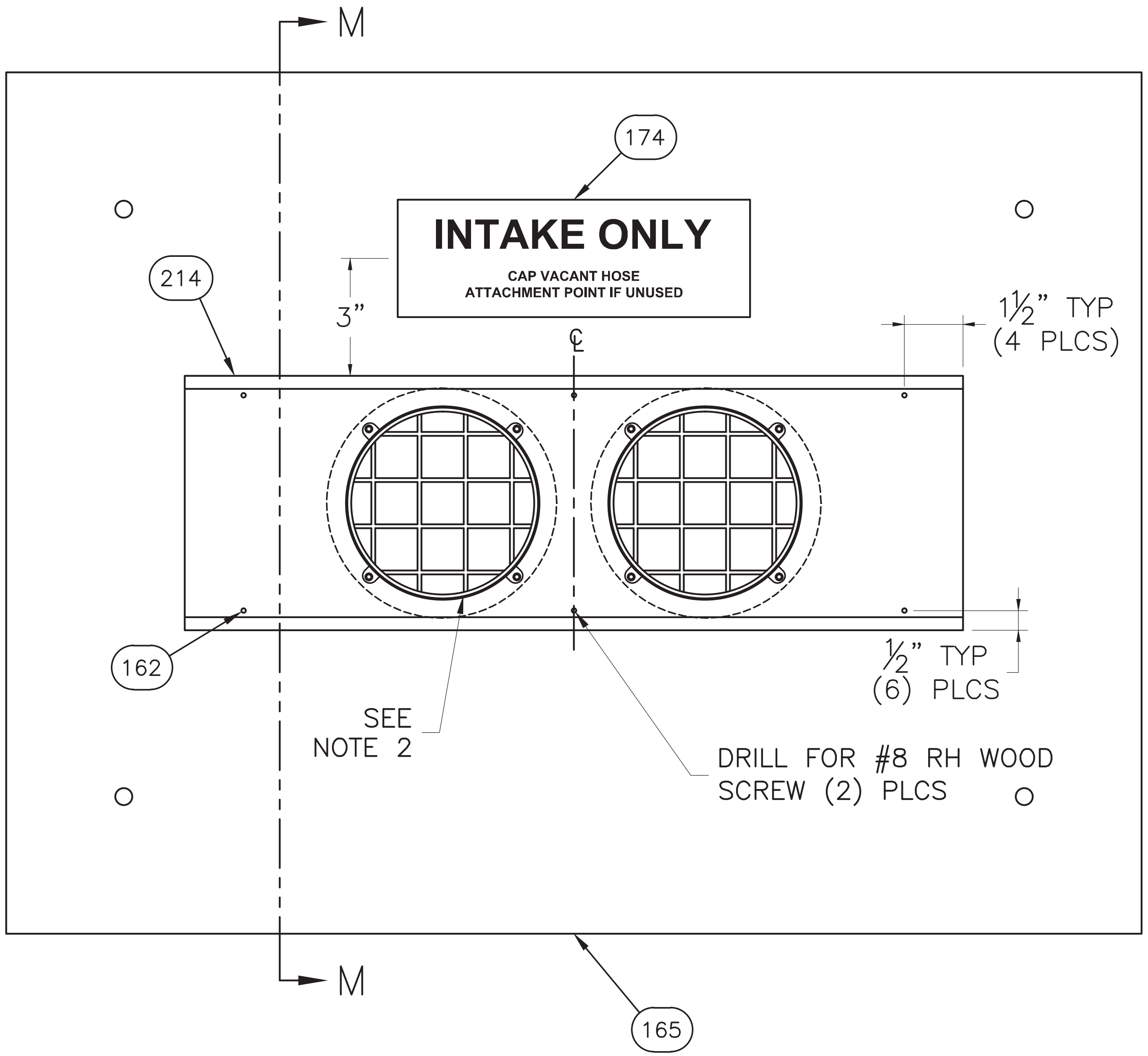
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

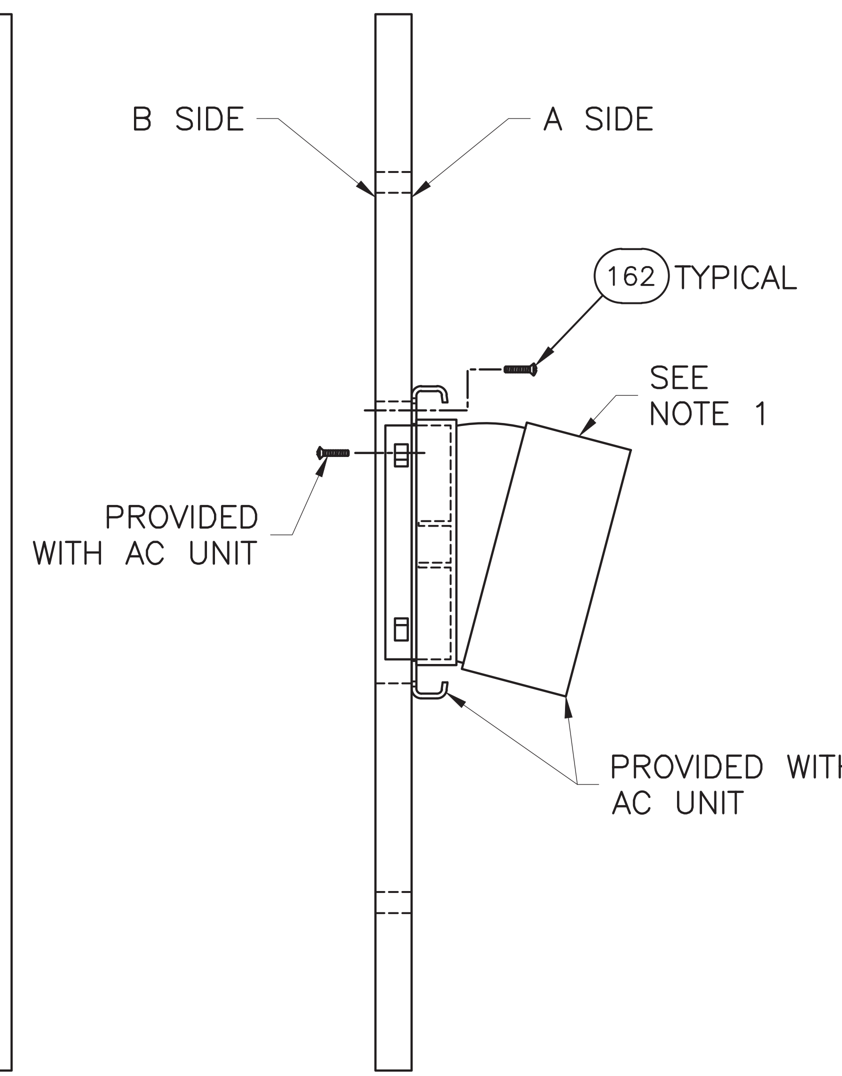
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER GROUND BAR DETAILS

FILENAME: KBR/SKBR02
SCALE: N.T.S. | TOLERANCE:
DRWN. BY: M. FOWLER | DATE: 03/24/2010
CHK. BY: V. HASSELL | DATE: 03/24/2010
ENG. BY: | DATE:
APP. BY: A. DUMAS | DATE: 03/24/2010
SHEET NO. 6-1
DRAWING NO.: SKBR02 | REV.: P

NOTES:
1. ELBOW NOT SHOWN IN PLAN VIEW FOR CLARITY



INTERIOR INTAKE PLATE
(LOWER)



SECTION M–M

February 27, 2013

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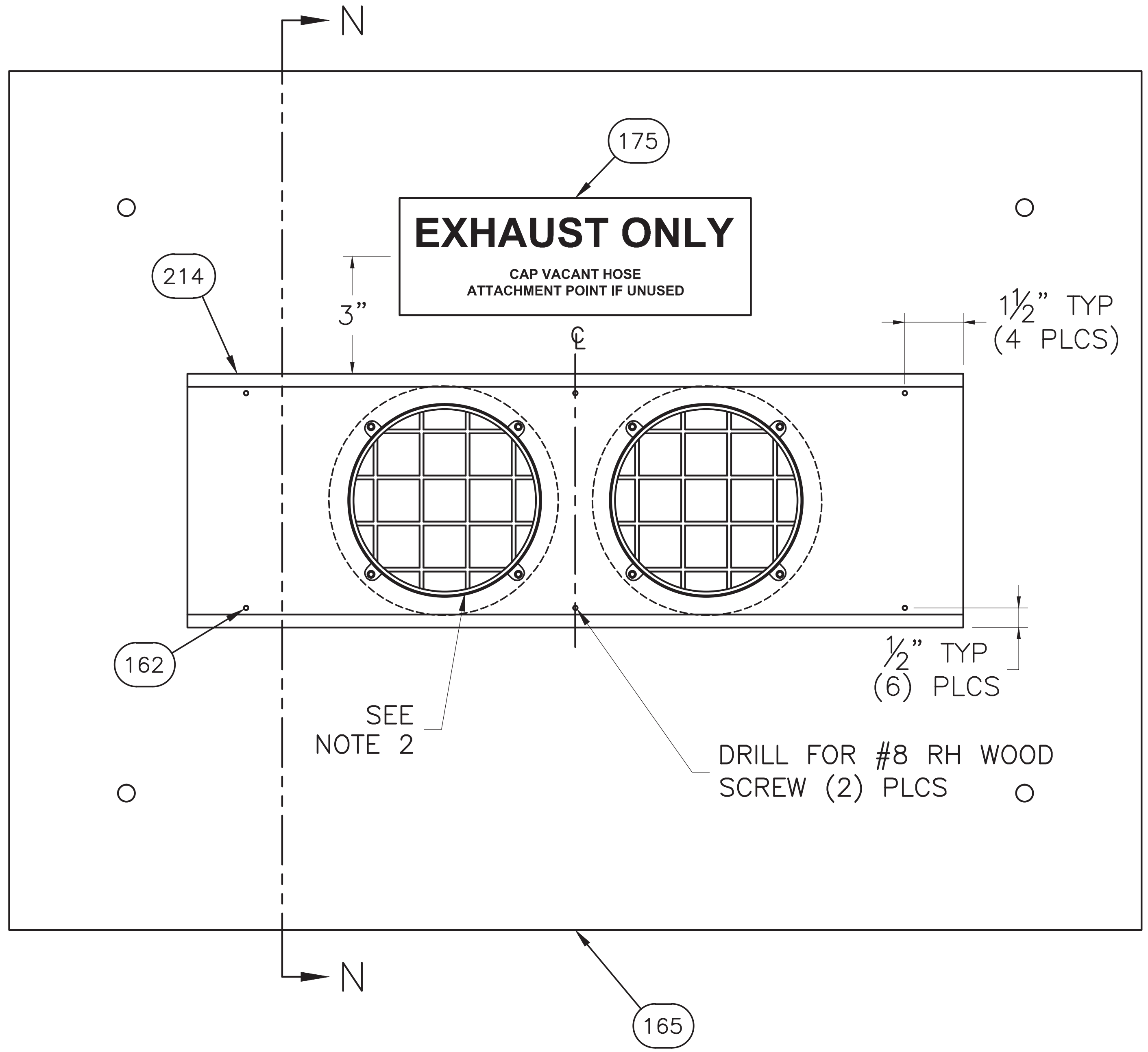
CUSTOMER:
KELLOGG BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER
INT. INTAKE PLATE ASSEMBLY (LOWER)

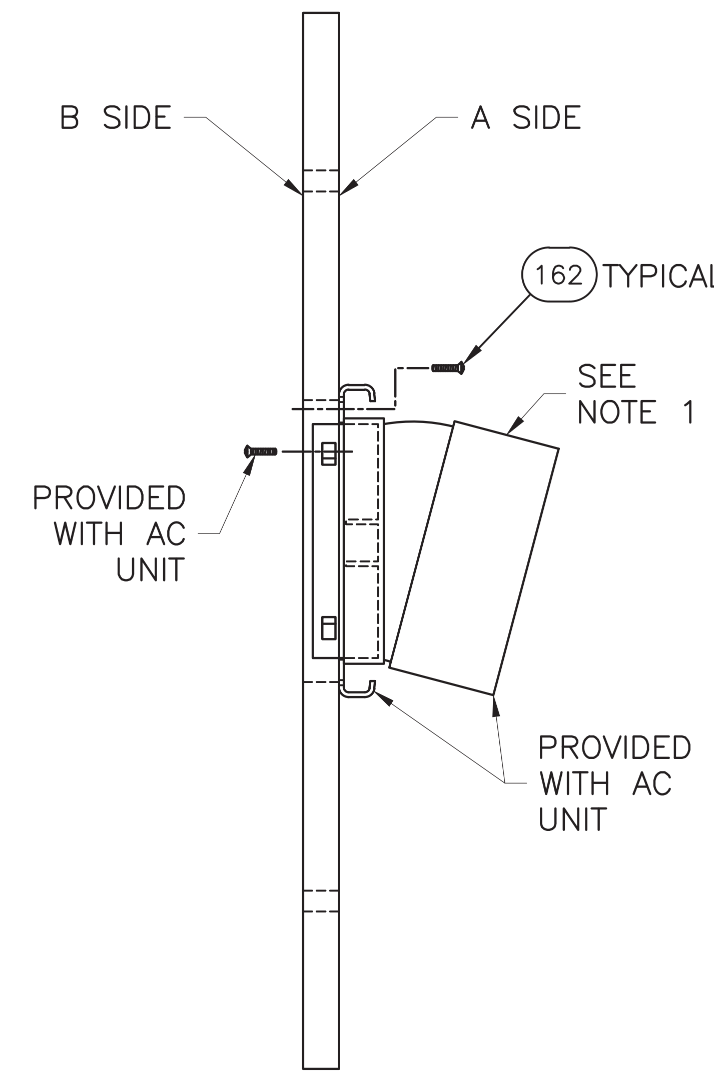
FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 6–2	
DRAWING NO.: SKBR02	REV.: P

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED SHEET	LJL	10/31/12

NOTES:
1. ELBOW NOT SHOWN IN PLAN VIEW FOR CLARITY



INTERIOR EXHAUST PLATE
(UPPER)



SECTION N–N

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED SHEET	LJL	10/31/12

February 27, 2013

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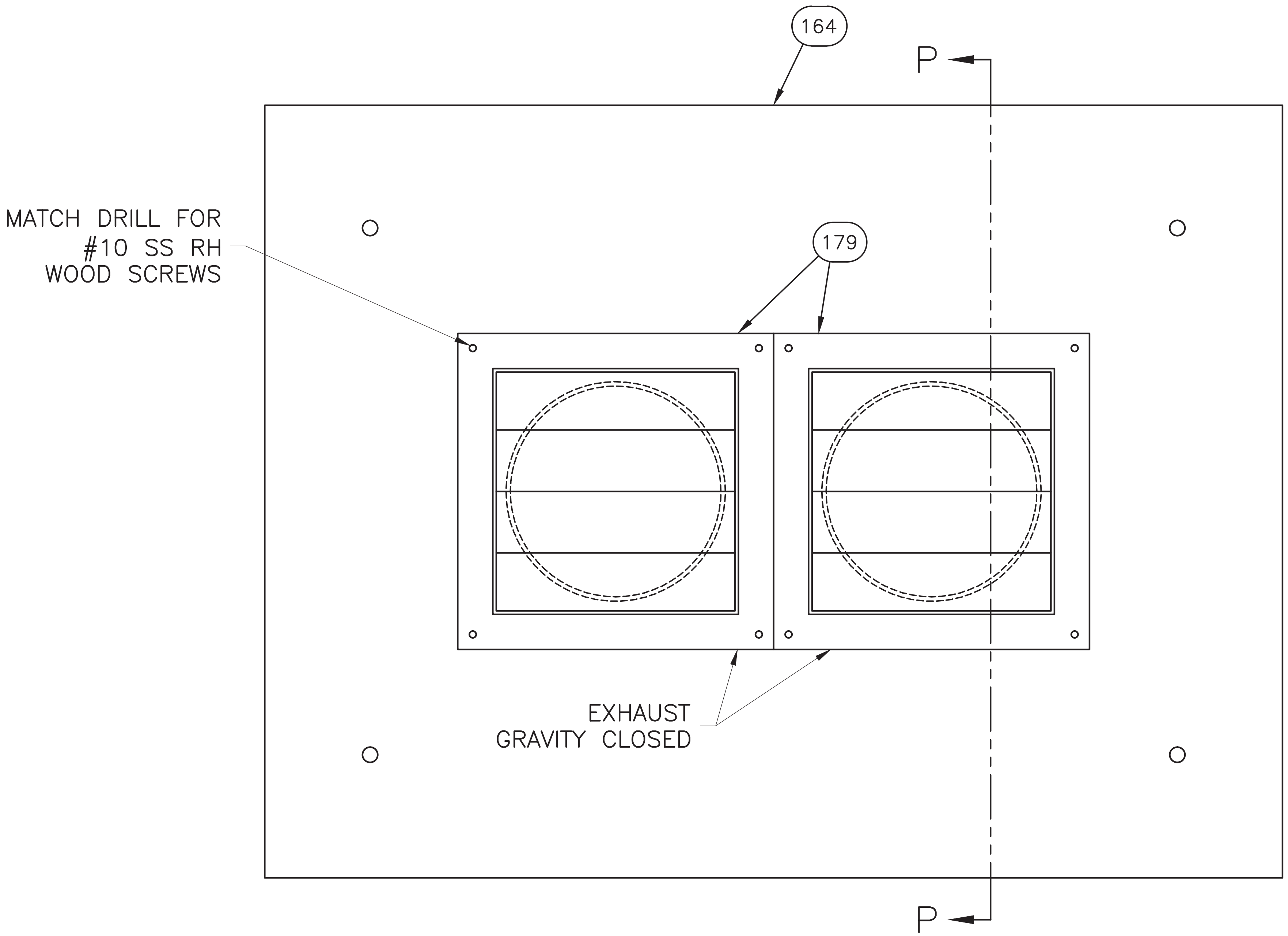
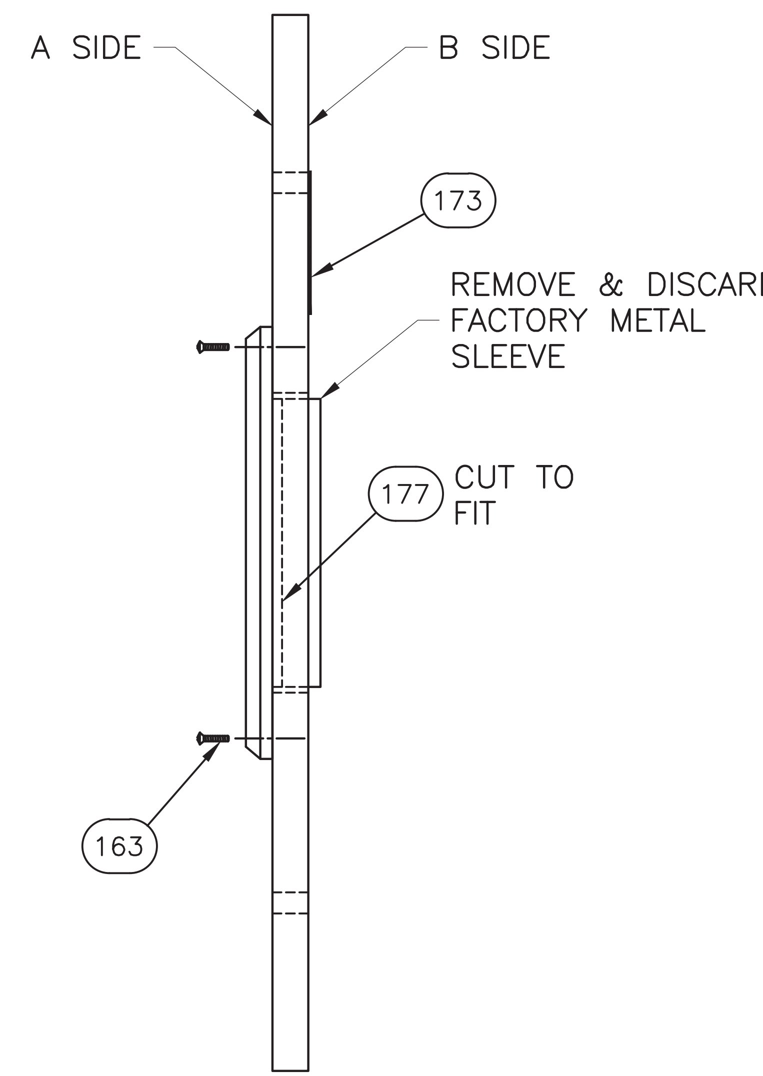
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER INT. EXHAUST PLATE ASSEMBLY (UPPER)

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 6–3	
DRAWING NO.: SKBR02	REV.: P



EXTERIOR EXHAUST PLATE
(UPPER)



SECTION P–P

February 27, 2013

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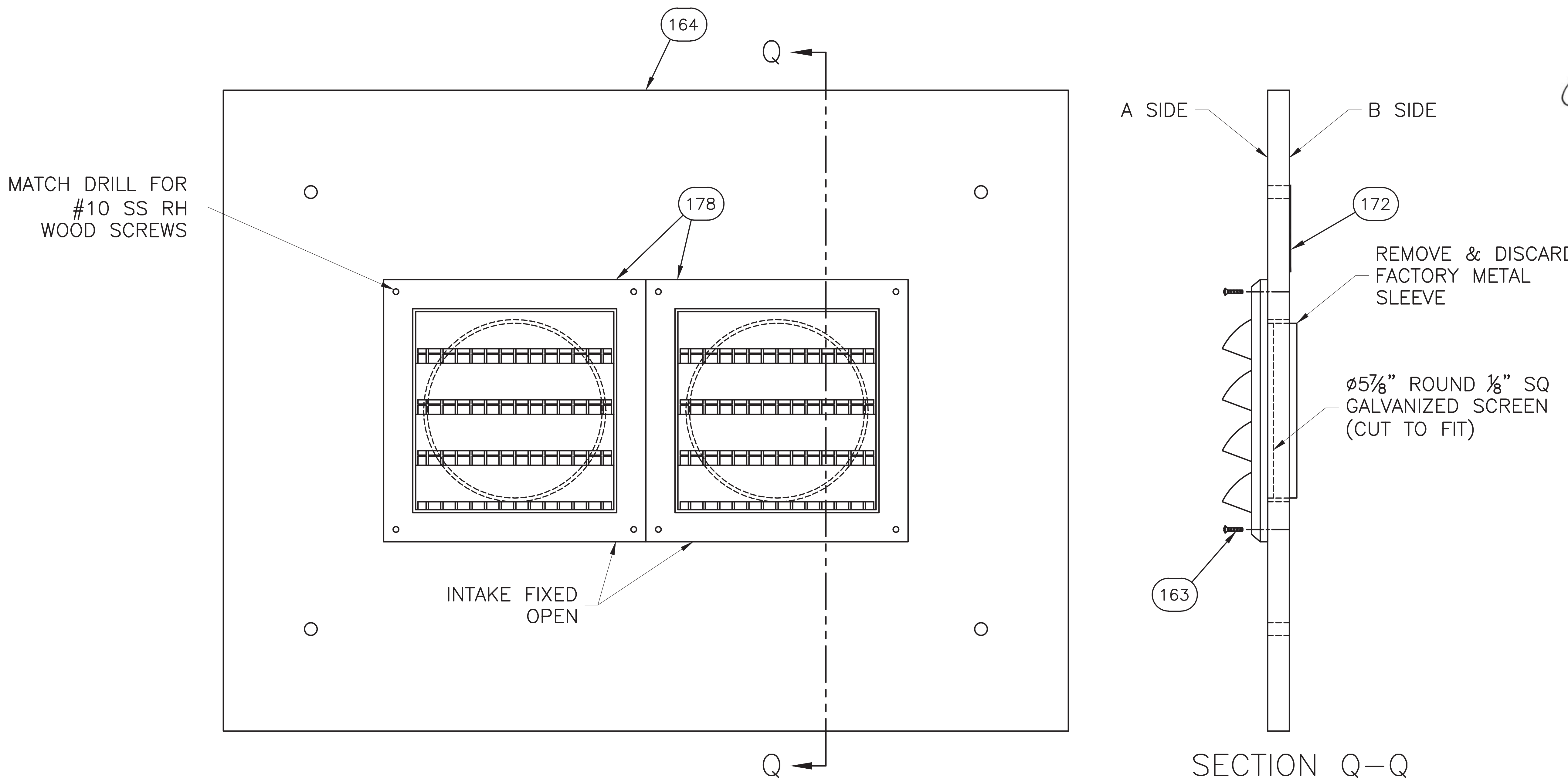
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXT. EXHAUST PLATE ASSEMBLY (UPPER)

FILENAME: *KBR/SKBR02*

SCALE: *N.T.S.*	TOLERANCE:
DRWN. BY: *M. FOWLER*	DATE: *03/24/2010*
CHK. BY: *V. HASSELL*	DATE: *03/24/2010*
ENG. BY:	DATE:
APP. BY: *A. DUMAS*	DATE: *03/24/2010*
SHEET NO. *6–4*	
DRAWING NO.: *SKBR02*	REV.: *P*

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
P	RRG	10/31/12	ADDED SHEET	LJL	10/31/12



EXTERIOR INTAKE PLATE
(LOWER)

P	RRG	10/31/12	ADDED SHEET	LJL	10/31/12
REV	BY	DATE	DESCRIPTION	APP.BY	DATE

February 27, 2013

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CUSTOMER:
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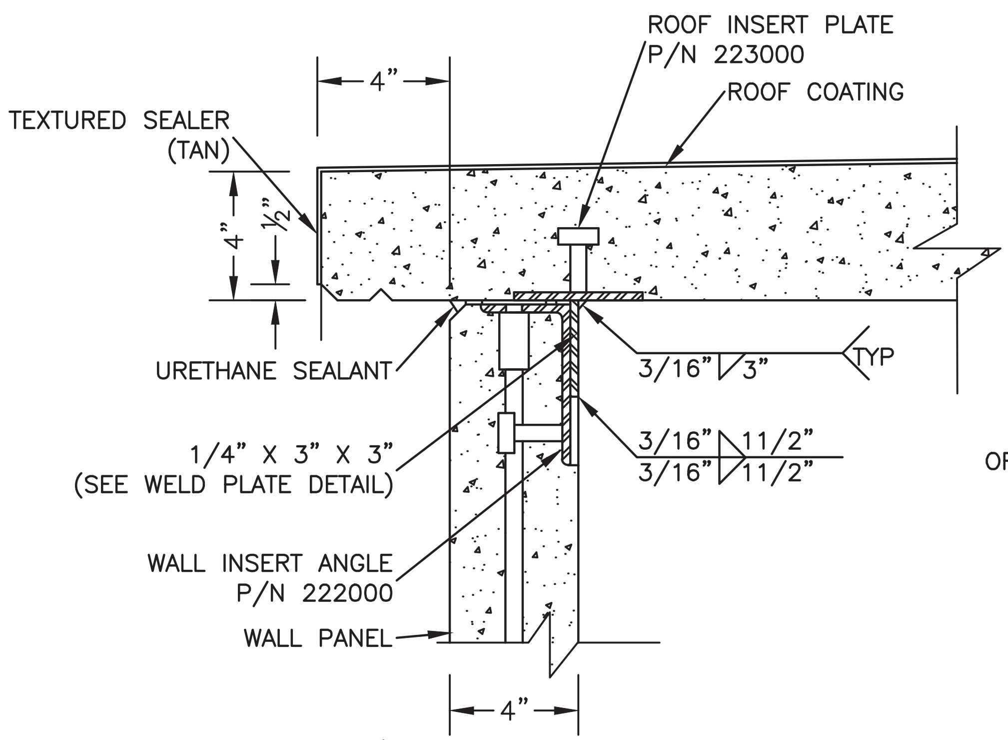
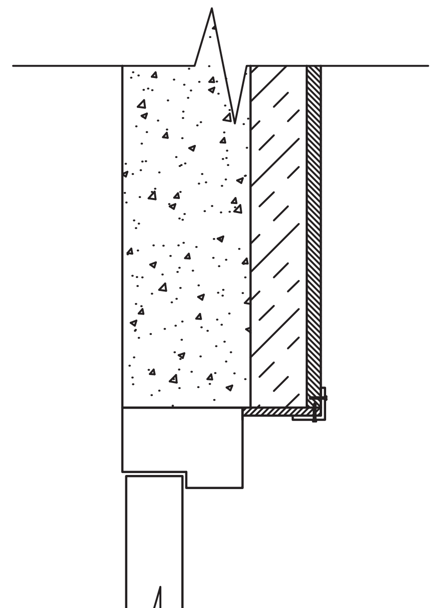
PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER EXT. INTAKE PLATE ASSEMBLY (LOWER)

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 6–5	
DRAWING NO.: SKBR02	REV.: P



WALL/ROOF CONNECTION

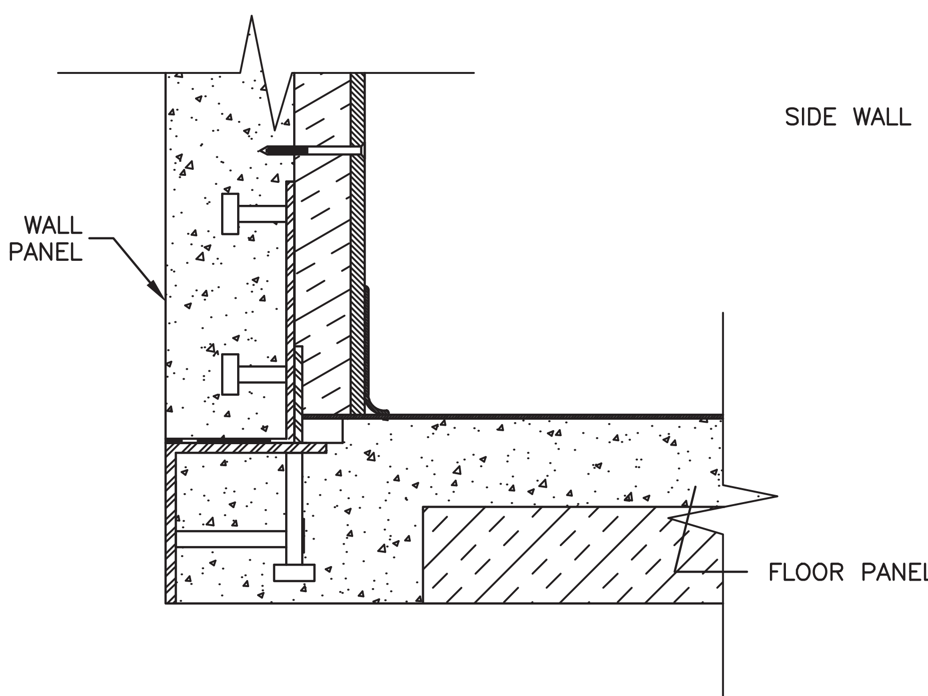
OR



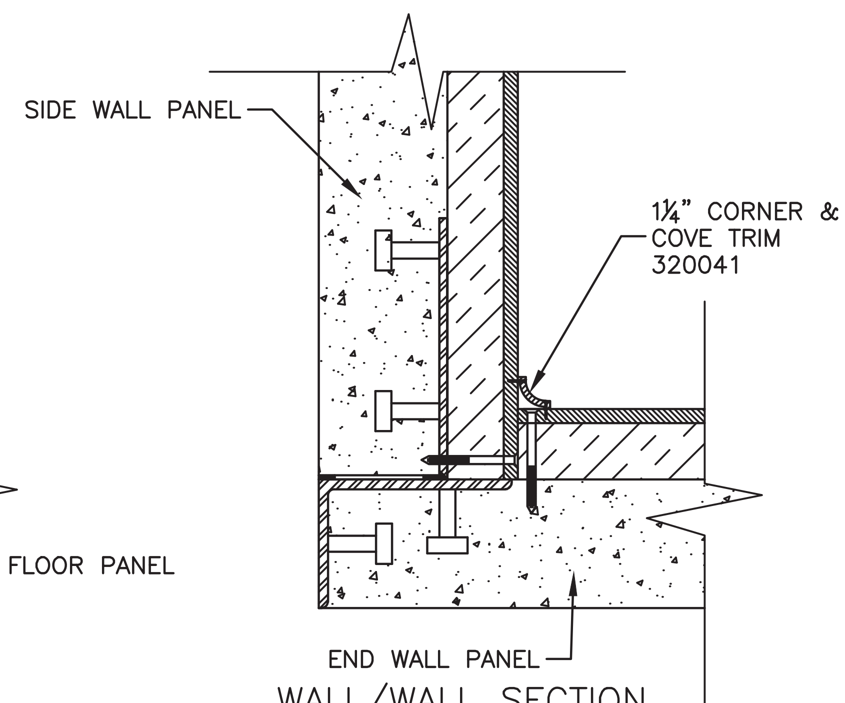
TYP DOOR SECTION
TRIM DETAIL

NOTES:

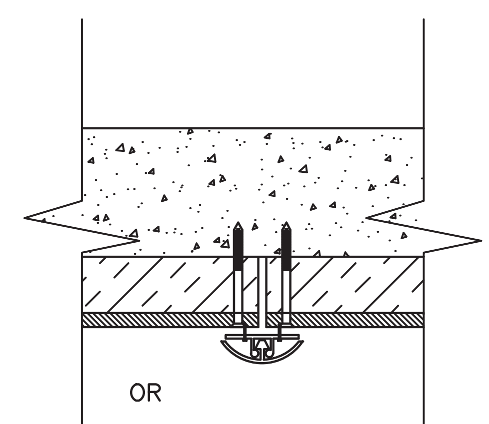
1. INSTALL INTERIOR PANELS W/ CONCRETE SCREWS (LENGTH MAY VARY) 24" O.C. MAX ALONG LENGTH OF PANELS. (NO FASTENERS REQUIRED ALONG SHORT SIDE OF PANELS IF PANEL EDGE IS AT A CORNER)
2. MAX GAP BETWEEN PANELS TO BE ¼".
3. USE COVE TRIM IN ALL CORNERS AND AROUND TOP PERIMETER. INSTALL USING ¾" BRAD NAILS.
4. TRIM ALL EXPOSED OPENINGS W/ OUTSIDE CORNER TRIM.



WALL/FLOOR SECTION



WALL/WALL SECTION



OR

JOINT DETAIL
PLAN VIEW SECTION

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	ADDED NOTE/CORRECTED SHEET TITLE	LJL	6/13/12

STATE OF MAINE
JOHN T.
IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

February 27, 2013

Cellxion
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CUSTOMER:
KELLOGG
BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

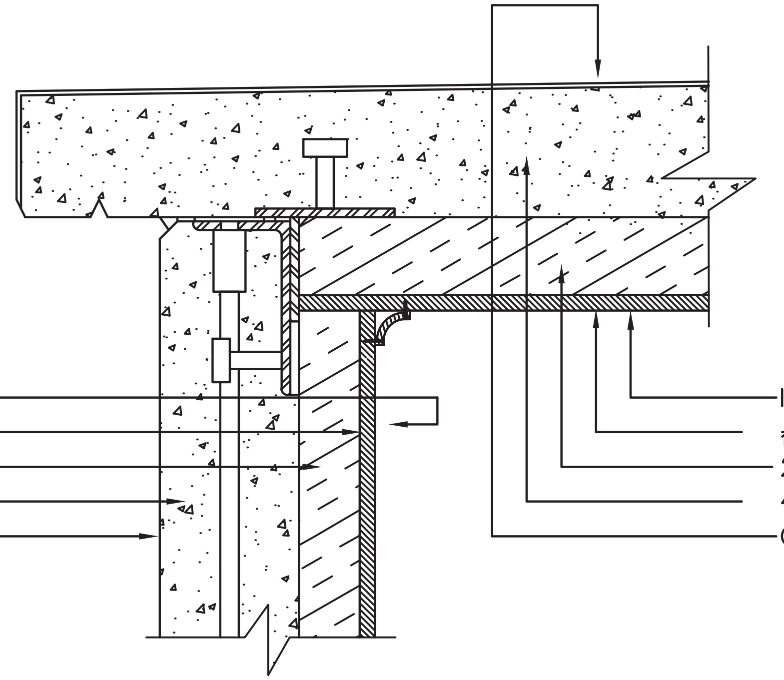
PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
INTERIOR PANELING
CONNECTIONS DETAILS

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7-0	
DRAWING NO.: SKBR02	REV.: P

WALL

(HEAT CAPACITY = 8 BTU/°F)

1.70	INSIDE AIR FILM
0.54	$\frac{7}{16}$" PANELING
11.20	$1\frac{3}{4}$" THERMAX INSUL
1.36	4" L.W. CONCRETE
0.25	OUTSIDE AIR FILM
15.05	OVERALL R–VALUE
0.066	OVERALL U–FACTOR

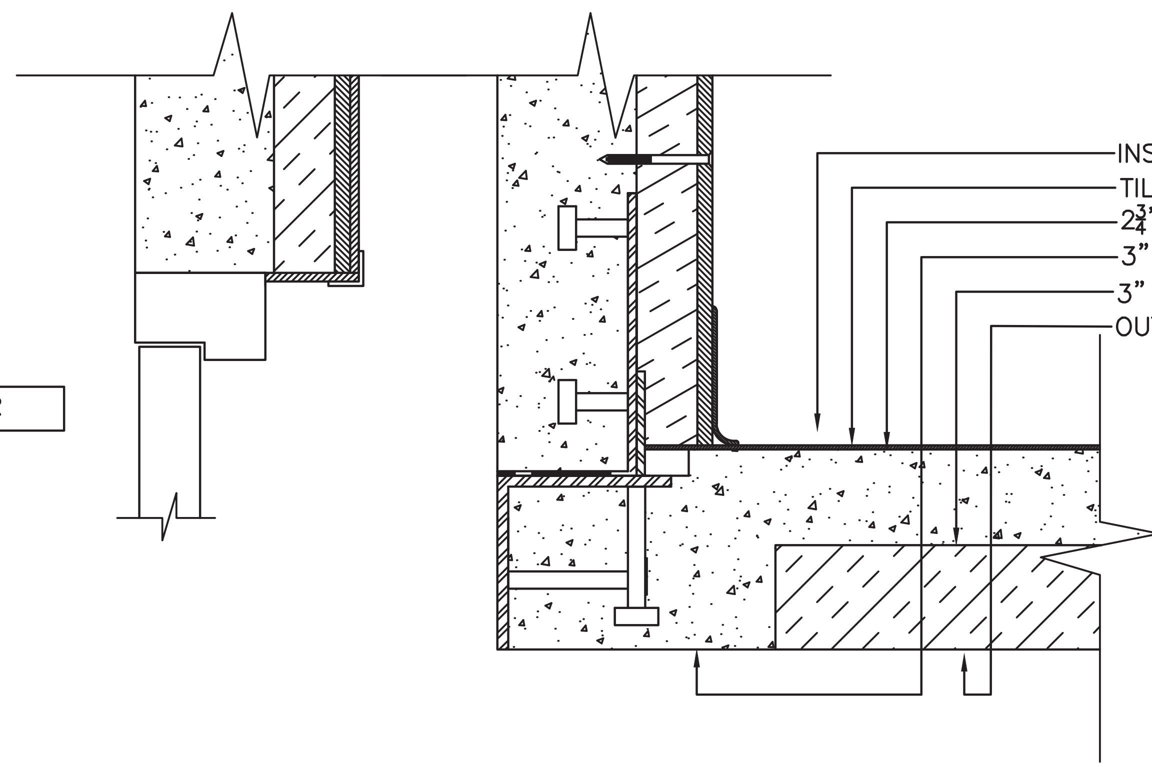


CEILING

INSIDE AIR FILM	0.61
$\frac{7}{16}$" PANELING	0.54
$2\frac{1}{4}$" THERMAX INSUL.	14.70
4.5"(AVG) L.W. CONCRETE	1.53
OUTSIDE AIR FILM	0.25
OVERALL R–VALUE	17.64
OVERALL U–FACTOR	0.057

METAL DOOR

4.167	OVERALL R–VALUE
0.240	OVERALL U–FACTOR



	RIB	DECK
INSIDE AIR FILM	0.920	0.920
TILE	0.05	0.05
$2\frac{3}{4}$" L.W. CONCRETE (DECK)	0.94	0.94
3" L.W. CONCRETE (RIB)	1.02	––
3" FOAM INSERT	––	10.800
OUTSIDE AIR FILM	0.25	0.25
TOTAL 'R'	2.140	12.460
TOTAL 'U'	0.467	0.080
SURFACE AREA RATIO	0.286	0.714
R–FACTOR PER SURFACE AREA	0.960	12.380

0.191	OVERALL U–FACTOR
5.237	OVERALL R–VALUE

February 27, 2013

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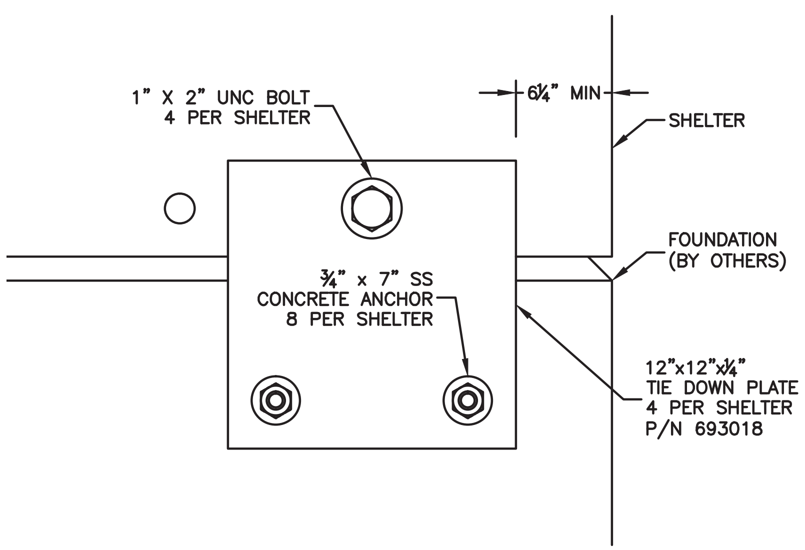
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

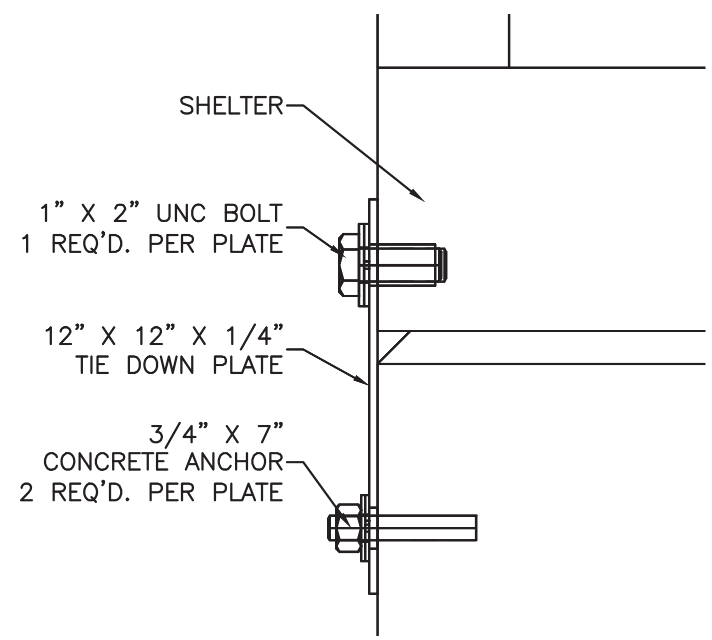
PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER INT. PANELING INSTALL R/U CALCULATIONS

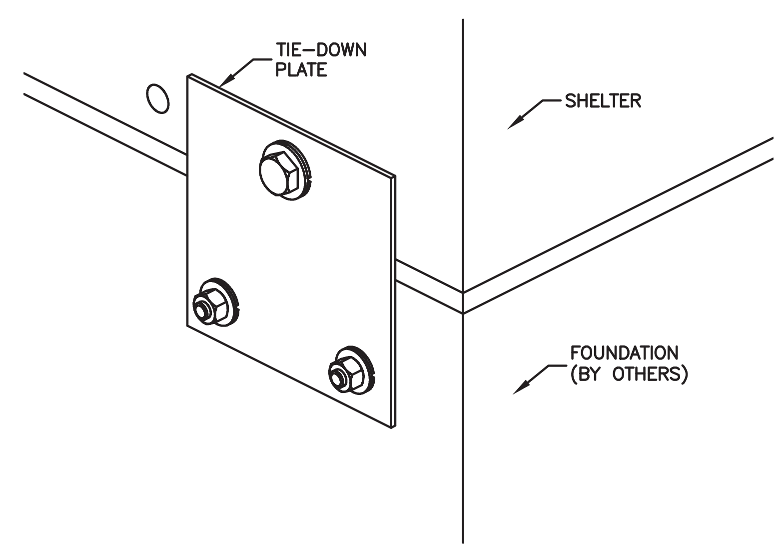
FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7–1	
DRAWING NO.: SKBR02	REV.: P

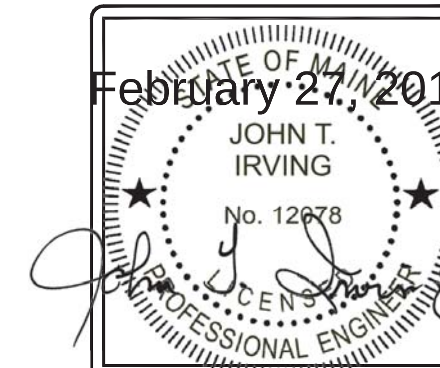
NOTES:

1. ALL REQUIRED TIE DOWN PLATES, SHIMS, BOLTS AND ANCHORS SHALL BE PLACED INSIDE SHELTER PRIOR TO SHIPMENT FROM MANUFACTURER
2. USE SHIMS AS REQUIRED TO ASSURE SHELTER IS BEARING AT PERIMETER. SEAL PERIMETER W/ CAULK OR GROUT AS DESIRED.









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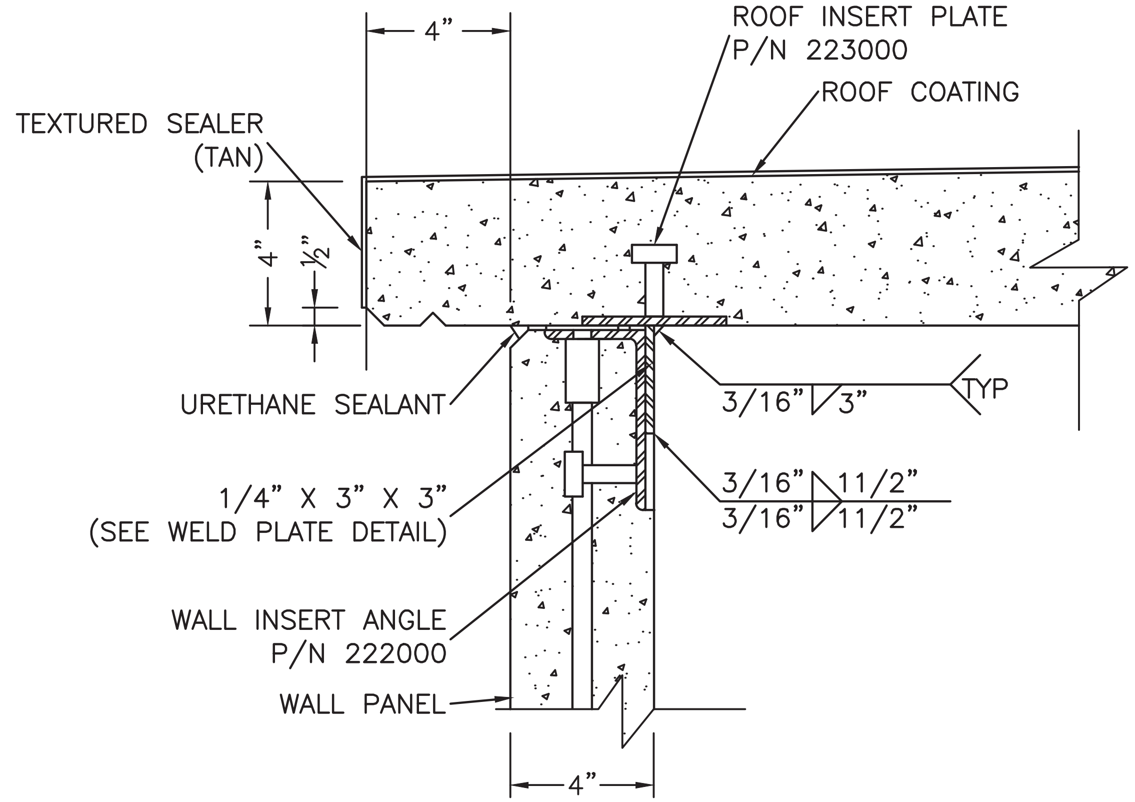
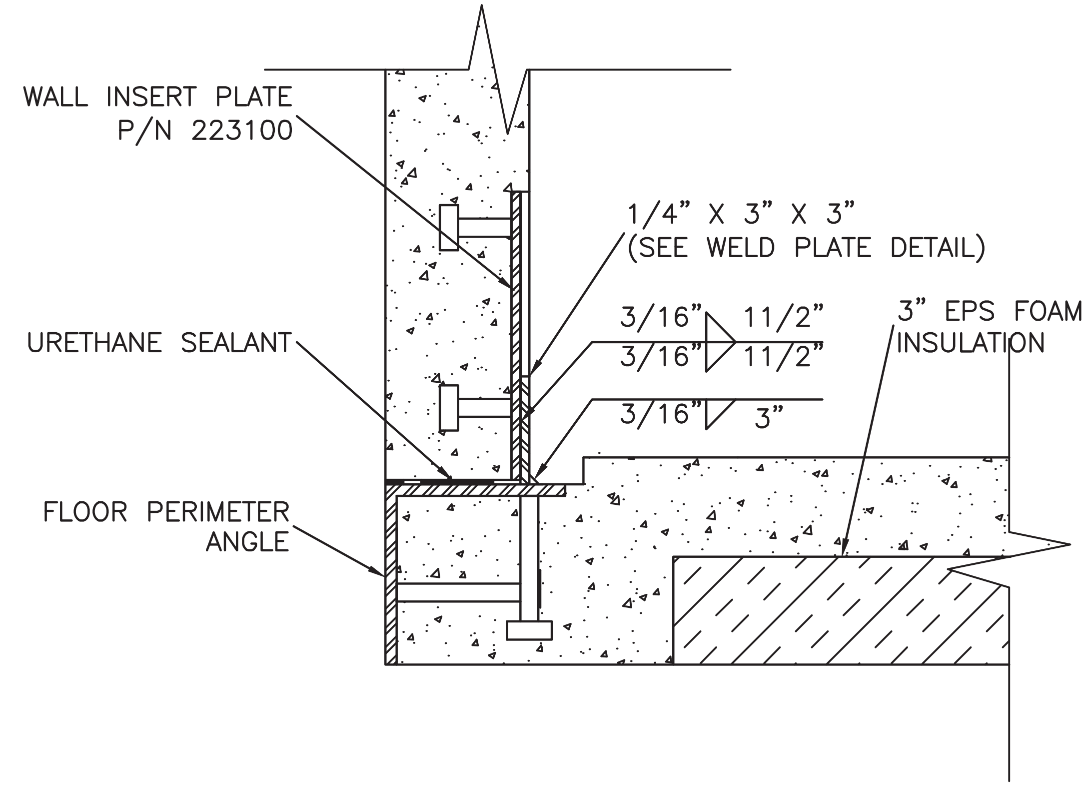
CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

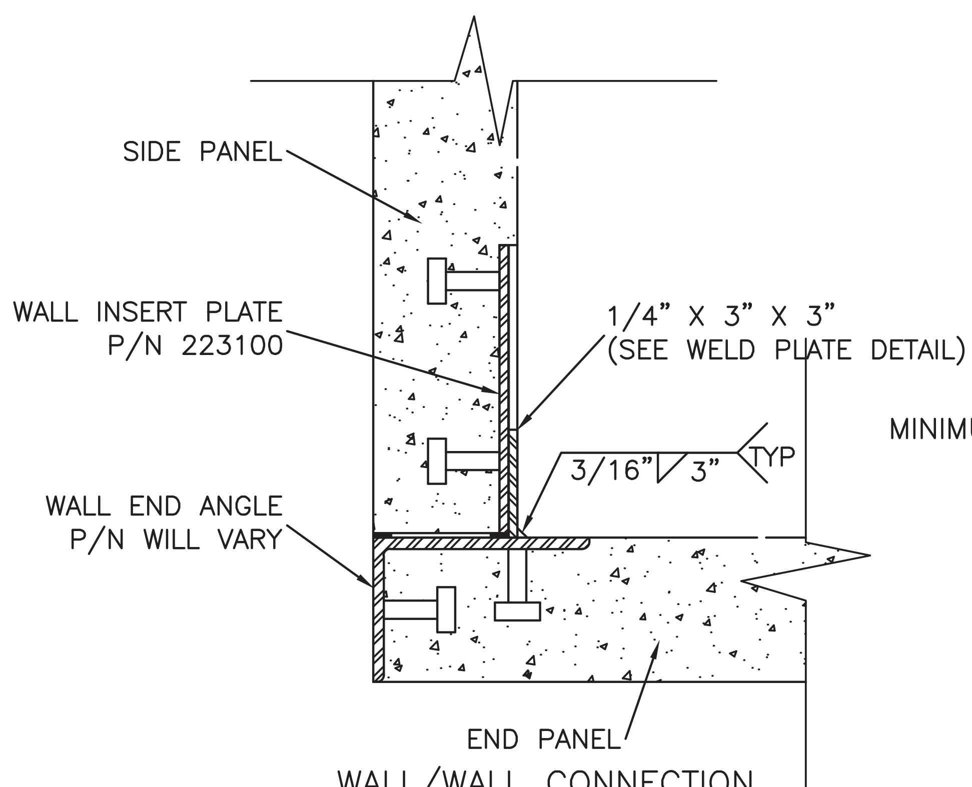
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER 6" SLAB FOUNDATION FLAT TIEDOWN DETAILS

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7-2	
DRAWING NO.: SKBR02	REV.: P

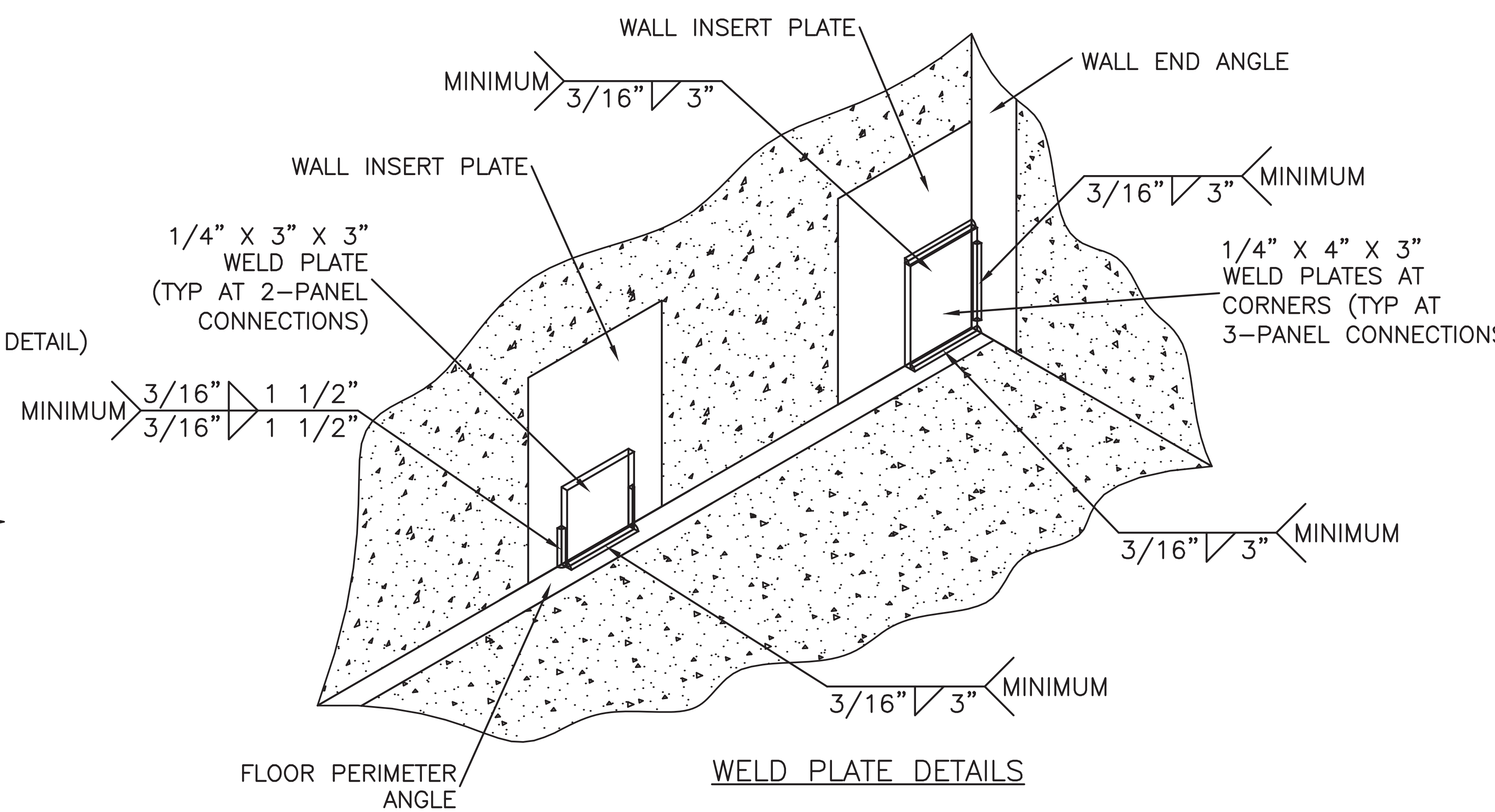


WALL/ROOF CONNECTION





WALL/WALL CONNECTION



WELD PLATE DETAILS

February 27, 2013

STATE OF MAINE
JOHN T.
IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

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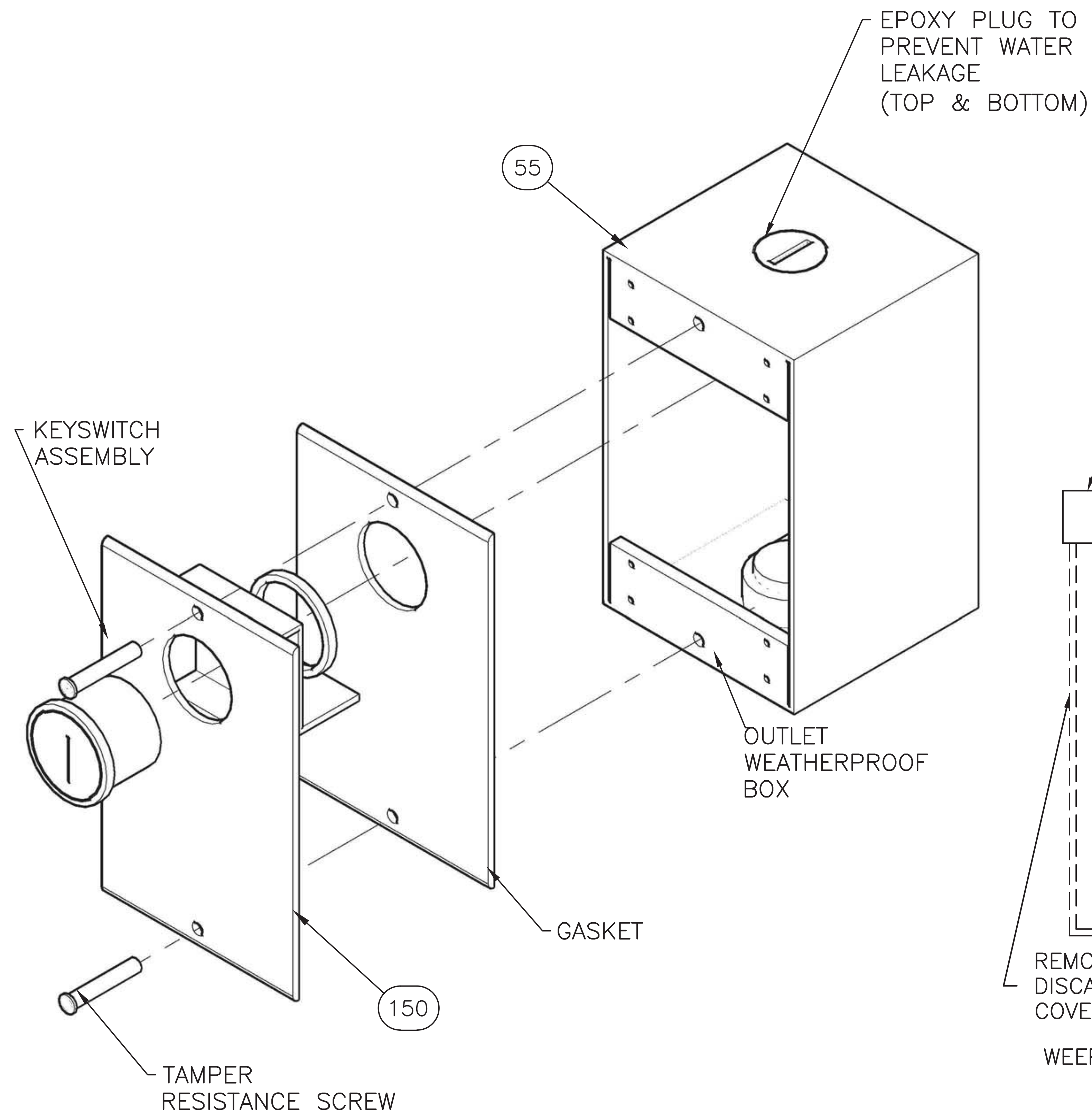
CUSTOMER:
KELLOGG
BROWN & ROOT
FEMA (PEP)
EXPANSION PROGRAM

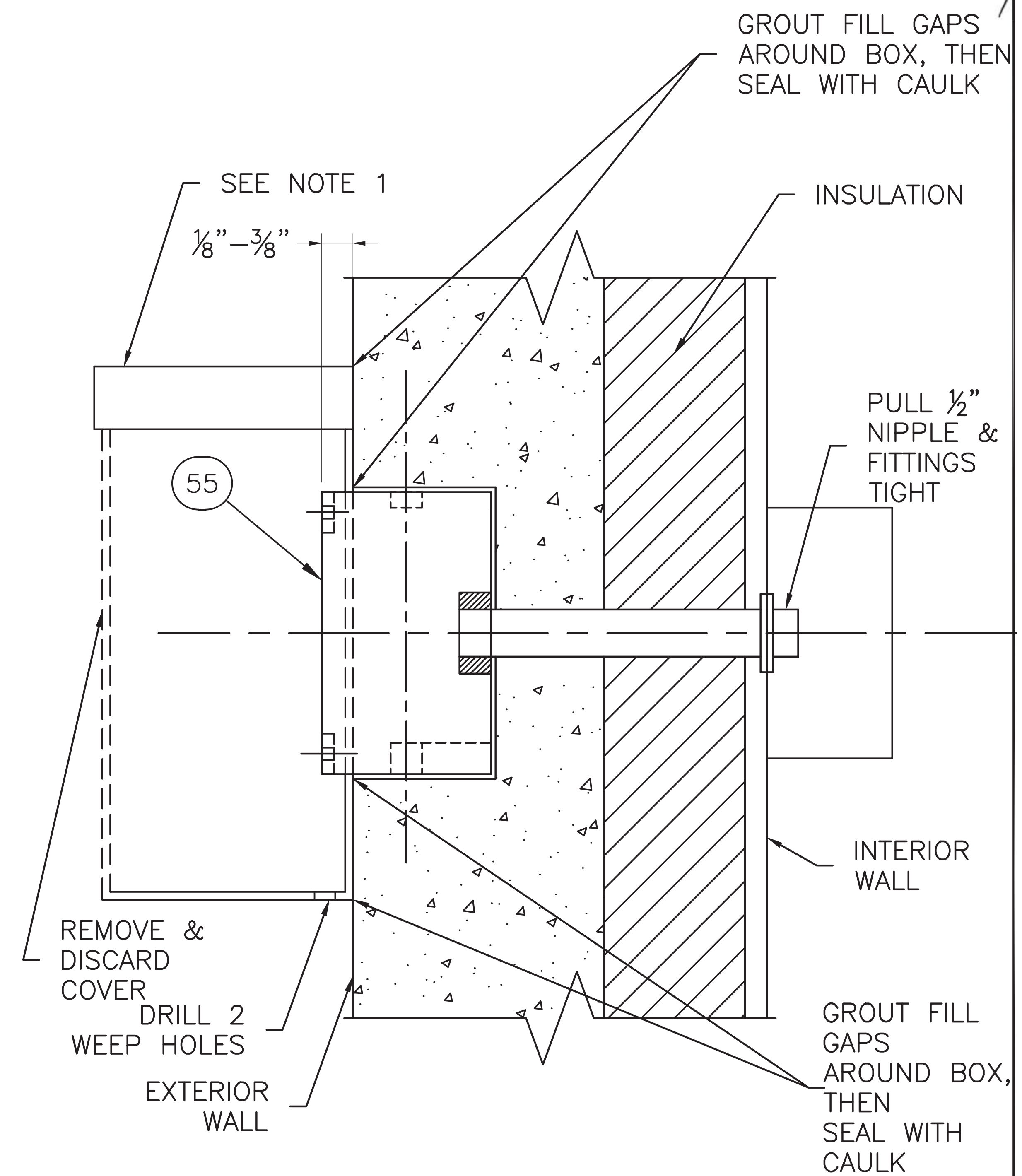
PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
PANEL CONNECTION
DETAILS

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7-3	
DRAWING NO.: SKBR02	REV.: P



OUTLET WEATHERPROOF BOX DETAIL

NOTE:
1. CUT OUT BACK OF BOX TO FIX CENTERED OVER 2X4 KEYSWITCH BOX.



SECTION D–D DETAIL

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	6/13/12	CORRECTED DIMENSION	LJL	6/13/12
M	JJ	11/09/11	CHANGED KEYSWITCH DETAILS	LL	11/09/11

February 27, 2013

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CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

PROJECT:
10'–0" X 18'–0" CONCRETE SHELTER DETAIL DRAWINGS

FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7–4	
DRAWING NO.: SKBR02	REV.: P

February 27, 2013

STATE OF MAINE
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NOTES:

1. CONDUCTOR COLORS ARE AS FOLLOWING:
   <u>120/240 SINGLE PHASE</u>
   PHASE "A" = BLACK
   PHASE "B" = RED
   NEUTRAL = WHITE
   <u>120/208 THREE PHASE</u>
   PHASE "A" = BLACK
   PHASE "B" = RED
   PHASE "C" = BLUE
   NEUTRAL = WHITE
   <u>277/480 THREE PHASE</u>
   PHASE "A" = YELLOW
   PHASE "B" = BROWN
   PHASE "C" = ORANGE
   NEUTRAL = GRAY

   ALL ELECTRICAL GROUND = GREEN
   ALL ISOLATED GROUND = GREEN/YELLOW STRIPE
   ALL SWITCHED = PURPLE

2. ALL CONDUCTORS (UNLESS OTHERWISE NOTED) TO BE STRANDED THHN OR THWN COPPER WIRE.
3. ALL CONDUIT TO BE 1/2" RIGID UNLESS OTHERWISE NOTED.
4. ALL LOW VOLTAGE CONDUIT TO BE 1/2" EMT UNLESS NOTED.
5. ALL CONDUCTOR AMPACITIES ARE BASED ON TABLE 310.15(B)(16) NATIONAL ELECTRICAL CODE.
6. CONDUIT FILL BASED ON CHAPTER 9 – NATIONAL ELECTRICAL CODE.
7. PLACEMENT OF ELECTRICAL AND CONDUIT COMPONENTS OR BOXES MAY VARY TO ALIGN WITH COMPONENTS MANUFACTURE'S PRE-MADE BOX KNOCKOUTS. THIS MAY INCLUDE ALIGNMENT WITH SHELTER PENETRATIONS AND/OR INTERFERENCE WITH OTHER COMPONENTS.
8. CONDUIT, ELECTRICAL AND MECHANICAL DIMENSION TOLERANCE SHALL BE ±1/4".
9. DASHED LINES (-----) DENOTE FIELD WORK.
10. ALL CIRCUITS ON 25 AMP THROUGH 60 AMP BREAKER MUST USE #10 GROUND CONDUCTOR.
11. CONDUCTORS SMALLER THAN 4 AWG MUST HAVE CORRECT COLOR INSULATION. CONDUCTORS 4 AWG AND LARGER MAY BE RE-IDENTIFIED BY COLORED TAPE. BLACK INSULATED CONDUCTOR SHALL BE THE ONLY COLOR TO BE RE-IDENTIFIED. IF CONDUCTORS ARE RE-IDENTIFIED, IDENTIFICATION MUST BE APPLIED IN THREE INCH (3") WRAPS, MINIMUM EVERY THREE FEET (3'-0"). RE-IDENTIFICATION SHALL BE VISIBLE BY OPENING ANY ENCLOSURE. WHITE, GRAY AND GREEN CONDUCTORS SHALL NOT BE RE-IDENTIFIED.
12. ALL METALLIC ELECTRICAL BOXES (SWITCH BOXES, DUPLEX BOXES, LIGHTS, JUNCTION BOXES, ETC) SHALL BE CONNECTED TO THE PROTECTED GROUND OF THE ACG DISTRIBUTION PANEL WITH A #12 GREEN INSULATED STRANDED CONDUCTOR WHICH SHALL BE RUN INTERNAL TO THE CONDUIT.

LEGEND

= CONDUIT (THICKNESS VARIES WITH SIZE OF CONDUIT)

GND GND = GROUND WIRE

= 4 X 4 BOX WITH DUPLEX RECEPTACLE (GROUND TERMINAL ON TOP)

= 4 X 4 BOX WITH PENETRATION

= 4 X 4 BOX BLANK

= 4 X 4 BOX WITH 2 SWITCHES

= 4 X 4 BOX WITH SINGLE SWITCH

= 4" OCTAGON BOX WITH SMOKE DETECTOR

= 4" OCTAGON BOX WITH HEAT DETECTOR

= 4 X 4 BOX WITH TWIST-LOCK RECEPTACLE

= 4 X 4 BOX WITH TIMER SWITCH

= PHOTOCELL SWITCH

= SYSTEM GROUND FOR AC CIRCUITS

IG = ISOLATED GROUND FOR AC CIRCUITS

= VENT FAN

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
N	RRG	4/17/12	CHANGES PER 12KBR02-002-2	LJL	4/17/12

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CUSTOMER:
KELLOGG BROWN & ROOT FEMA (PEP) EXPANSION PROGRAM

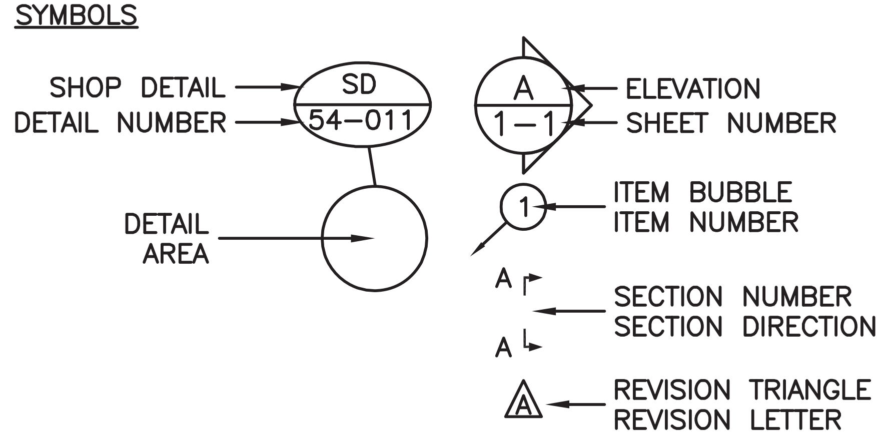
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER GENERAL ELECTRICAL NOTES & LEGEND

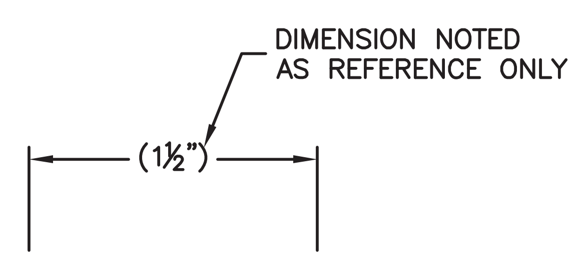
FILENAME: KBR/SKBR02	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: M. FOWLER	DATE: 03/24/2010
CHK. BY: V. HASSELL	DATE: 03/24/2010
ENG. BY:	DATE:
APP. BY: A. DUMAS	DATE: 03/24/2010
SHEET NO. 7-5	
DRAWING NO.: SKBR02	REV.: P

ABBREVIATIONS

@	AT
A	AMPS
AFF	ABOVE FINISH FLOOR
BCW	BARE COPPER WIRE
BLK	BLACK
BLU	BLUE
BRN	BROWN
BLDG	BUILDING
BOCA	BUILDING OFFICIALS CODE ADMINISTRATION
℄	CENTERLINE
C/C	CENTER TO CENTER
CKT	CIRCUIT
CONC	CONCRETE
CU YD	CUBIC YARD
DIA/ø	DIAMETER
DIM	DIMENSION
DP	DOUBLE POLE
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DT	DOUBLE THROW
DWG	DRAWING
EA	EACH
EGR	EQUIPMENT GROUND RING
ELEC	ELECTRIC/ELECTRICAL
EMT	ELECTRICAL METALLIC TUBING
ENT	ELECTRICAL NONMETALLIC TUBING
ELEV	ELEVATION
EQUIP	EQUIPMENT
EXT	EXTERIOR
FMLC	FLEXIBLE METALLIC LIQUID TIGHT CONDUIT
FNLC	FLEXIBLE NONMETALLIC LIQUID TIGHT CONDUIT
FND	FOUNDATION
FRP	FIBERGLASS REINFORCED POLYESTER
FS	FIRE SUPPRESSION
GALV	GALVANIZED
GEN	GENERATOR
GRN	GREEN
GND	GROUND
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HVAC	HEATING, VENTILATION, AND AIR CONDITIONING
HOR	HORIZONTAL
IAW	IN ACCORDANCE WITH
IN	INCH
ID	INSIDE DIAMETER/INSIDE DIMENSION
INSUL	INSULATION
INT	INTERIOR
IMC	INTERNATIONAL MECHANICAL CODE
IPC	INTERNATIONAL PLUMBING CODE
IG	ISOLATED GROUND
JB	JUNCTION BOX
KW	KILOWATT
KO	KNOCKOUT
L	LEFT
L/N	LOAD NEUTRAL
LH	LEFT HAND
LTG	LIGHT/LIGHTNING
LL	LIVE LOAD
LV	LOW VOLTAGE
MFG	MANUFACTURER
MISC	MISCELLANEOUS
NEC	NATIONAL ELECTRIC CODE
NEG	NEGATIVE
NEMA	NATIONAL ELECTRIC MANUFACTURER'S ASSOCIATION
NOM	NOMINAL
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
NTS	NOT TO SCALE
OR	ORANGE
OD	OUTSIDE DIAMETER/OUTSIDE DIMENSION
OSB	ORIENTED STRAND BOARD
P	POLE
PDC	POWER DISTRIBUTION CABINET
POS	POSITIVE
LB	POUND (S)
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
QTY	QUANTITY
RECPT	RECEPTACLE
RECT	RECTIFIER
REBAR	REINFORCING STEEL BAR
REQ'D.	REQUIRED
REV	REVISION
R	RIGHT
RH	RIGHT HAND
SHT	SHEET
1ø	SINGLE PHASE
S/G	SERVICE GROUND
S/N	SERVICE NEUTRAL
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SW	SINGLE POLE SWITCH
SQ FT	SQUARE FEET
SQ IN	SQUARE INCH
STD	STANDARD
SBC	STANDARD BUILDING CODE
SW	SWITCH
TEMP	TEMPERATURE
TSTAT	THERMOSTAT
3ø	THREE PHASE
3P	THREE POLE
3W	THREE WIRE
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES INC.
UBC	UNIFORM BUILDING CODE
UMC	UNIFORM MECHANICAL CODE
VENT	VENTILATION
V	VOLT
W	WATTS
WP	WEATHER PROOF
WLD	WELDED
WWF	WELDED WIRE FABRIC
WHT	WHITE
W/	WITH
W/O	WITHOUT
YEL	YELLOW

SYMBOLS





REV	BY	DATE	DESCRIPTION	APP.BY	DATE
D	LJL	6/1/09	ADDED ABBREVISTION: AFF	LJL	6/1/09
C	ACM	8/15/08	ADDED ABBREVISTIONS: S/N, S/G, & L/N	VGH	8/15/08
B	VGH	06/02/08	ADDED REFERENCE DIMENSION	VGH	06/02/08
A	CC	7/27/04	REVISED DETAIL SYMBOL	VGH	7/27/04

February 27, 2013

STATE OF MAINE
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CUSTOMER:
ENGINEERING STANDARD

PROJECT:
ABBREVIATIONS AND SYMBOLS

FILENAME: 108-007	
SCALE: 1"=1"	TOLERANCE: NA
DRWN. BY: C.CASINGER	DATE: 12/4/03
CHK. BY: K.BARNETT	DATE: 12/4/03
ENG. BY: K.BARNETT	DATE: 12/4/03
APP. BY:	DATE:
SHEET NO. 1 OF 1	
DRAWING NO.: 108-007	D

GENERAL NOTES

1. ALL STEEL FABRICATION AND INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL AISC LRFD(1999) AND AWS D1.1 SPECIFICATIONS.
2. ALL WELDING SHALL BE MIG TYPE WITH THE FOLLOWING OPERATING SETTINGS:
   - WIRE SIZE ------------------------ 0.35
   - WIRE FEED SPEED (in/min) ------------- 5
   - VOLTAGE, DC (+) ------------------- 18.5
   - AMPERAGE, DC --------------------- 140
   - TRAVEL SPEED (in/min) --------------- 10–12
   - SHIELDING GAS --------------------- 75/25
3. STRUCTURAL STEEL SPECIFICATIONS:
   - STRUCTURAL SHAPES ASTM A36M–97a
   - HIGH STRENGTH BOLTS, ASTM A 307–97
   - OTHER BOLTS, SAE J429 GRADE 5
4. ALL CONCRETE WORK SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE A.C.I. 318–99 BUILDING CODES 311 & 211, AND ASTM STANDARDS C–172–97, C–31/31M96, C–39–96, AND PROVISIONS OF C–94–98.
5. ALL PRECAST STRUCTURAL SAND–LIGHTWEIGHT CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS.
6. ALL REINFORCING STEEL BARS SHALL BE DOMESTIC, NEW BILLET STEEL CONFORMING TO ASTM A–615m–96a SPECIFICATIONS.
7. CONCRETE COVERAGE OVER ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3/4".
8. ALL REBAR SHALL BE TIED 100% AT THE PERIMETER, AND 50% ELSEWHERE.
9. ALL REBAR WIRE TIES TO BE 16 GAUGE.
10. FIBROUS REINFORCED LIGHTWEIGHT CONCRETE MAY BE USED IN THE ROOF AND FLOOR AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS. FIBER REINFORCEMENT MAY BE USED IN THE FLOOR IF DESIRED IN ORDER TO MAKE BATCHING OPERATION MORE EFFICIENT.
11. MAXIMUM JOINT SPACE BETWEEN PANELS SHALL BE 3/8" MEASURED BY REFUSAL OF ABILITY TO PASS A 3/8" ROD ALL THE WAY THROUGH THE JOINT AT ANY POINT ALONG THE JOINT.
12. WELD PLATE CONNECTIONS SHALL BE SPACED AT 4'–8" MAXIMUM ON THE FLOOR AND ROOF PANELS. THIS DIMENSION SHALL BE MAINTAINED EXCEPT IN CASES WHERE OPENINGS PROHIBIT.
13. TOLERANCES SHALL BE AS FOLLOWS:
    - PANEL THICKNESS: ±1/8"
    - PANEL SIZE: ±1/16"
    - PANEL SQUARENESS: ±1/8" AGREEMENT ON DIAGONALS
    - LOCATION OF BLOCKOUTS & PVC'S: ±1/4"
    - BLOCKOUT DIMENSIONS: +1/4", –0"
    - PVC SIZE: USE TRADE SIZE AS LISTED ON PROJECT DRAWINGS
14. REBAR SPLICING IS ALLOWED WHERE SPACE PERMITS. MINIMUM LAP IS 18" FOR #4 REBAR AND 30" FOR #6 REBAR.
15. CONCRETE SHALL HAVE AIR ENTRAINMENT OF 6%, MODERATE EXPOSURE AND A MAXIMUM AGGREGATE SIZE OF 3/8 INCH.
16. CONCRETE SHALL HAVE A WATER–CEMENTITIOUS MATERIAL RATIO OF 0.50.

GENERAL: THESE REBAR SIZES AND SPACING REPRESENT THE MINIMUM AMOUNT FOR ALL CASTING PLANS. PROJECT DRAWINGS MAY REQUIRE REINFORCEMENT IN ADDITION TO CELLXION STANDARDS.

ROOF PANEL: #4 (SHORT AXIS) 12" O.C. ON SHELTER WIDTH OF 11'–6" AND LESS, 10" O.C. ON SHELTER WIDTH GREATER THAN 11'–6" AND #4 (LONG AXIS) AT 18" O.C.

WALL PANEL: #4 AT PERIMETER AND 4 X 4 X W4.5 X W4.5 MESH THROUGHOUT.

FLOOR: (2)–#6 (SHORT AXIS) EACH RIB, #6 (LONG AXIS) EACH INTERIOR RIB. DECK: 4 X 4 X W4.5 X W4.5 MESH.

SEALANT APPLICATION

STEP 1. AT MATING SURFACES BETWEEN PANELS, APPLY URETHANE SEALANT (½" BEAD) DURING ASSEMBLY.

STEP 2. URETHANE SEALANT REQUIRED ON ALL JOINTS. APPLY TO EXTERIOR AFTER PANEL ASSEMBLY.

STEP 3. ROOF COATING:
APPLY SHELTER ROOF COATING PER MANUFACTURER INSTRUCTION.
ROOF COATING TO CONFORM TO, ASTM D6083–97A, OBC 1507.15.2 & 2000 IBC 1507.15.2.

STEP 4. APPLY AGGREGATE SEALER TO EXTERIOR WALLS. USE 1 GALLON PER 200 SQ. FEET.

STEP 5. USE TEXTURED SEALER ON ALL SMOOTH EXPOSED SURFACES. USE CEMENTITOUS GRAY PAINT.

February 27, 2013

STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
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CUSTOMER: ENGINEERING STANDARD

PROJECT: GENERAL CASTING SPECIFICATIONS 2000 IBC

FILENAME: 108–016	
SCALE: 1"=1"	TOLERANCE:
DRWN. BY: C.CASINGER	DATE: 7/28/04
CHK. BY:	DATE:
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 1 OF 4	
DRAWING NO.: 108–016	M

GENERAL NOTES

1. ALL STEEL FABRICATION AND INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL AISC LRFD(1999) AND AWS D1.1 SPECIFICATIONS.
2. ALL WELDING SHALL BE MIG TYPE WITH THE FOLLOWING OPERATING SETTINGS:

WIRE SIZE	0.35
WIRE FEED SPEED (in/min)	5
VOLTAGE, DC (+)	18.5
AMPERAGE, DC	140
TRAVEL SPEED (in/min)	10–12
SHIELDING GAS	75/25

3. STRUCTURAL STEEL SPECIFICATIONS:
   - STRUCTURAL SHAPES ASTM A36/A 36M–00
   - HIGH STRENGTH BOLTS, ASTM A 307–00
   - OTHER BOLTS, SAE J429 GRADE 5
4. ALL CONCRETE WORK SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE A.C.I. 318–02 BUILDING CODES 311 & 211, AND ASTM STANDARDS C–172–99, C–31/C31M98, C–39–99ae1, AND PROVISIONS OF C–94/C94M–00.
5. ALL PRECAST STRUCTURAL SAND–LIGHTWEIGHT CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS.
6. ALL REINFORCING STEEL BARS SHALL BE DOMESTIC, NEW BILLET STEEL CONFORMING TO ASTM A 615M–00 SPECIFICATIONS.
7. CONCRETE COVERAGE OVER ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3/4".
8. ALL REBAR SHALL BE TIED 100% AT THE PERIMETER, AND 50% ELSEWHERE.
9. ALL REBAR WIRE TIES TO BE 16 GAUGE.
10. FIBROUS REINFORCED LIGHTWEIGHT CONCRETE MAY BE USED IN THE ROOF AND FLOOR AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS. FIBER REINFORCEMENT MAY BE USED IN THE FLOOR IF DESIRED IN ORDER TO MAKE BATCHING OPERATION MORE EFFICIENT.
11. MAXIMUM JOINT SPACE BETWEEN PANELS SHALL BE 3/8" MEASURED BY REFUSAL OF ABILITY TO PASS A 3/8" ROD ALL THE WAY THROUGH THE JOINT AT ANY POINT ALONG THE JOINT.
12. WELD PLATE CONNECTIONS SHALL BE SPACED AT 4'–8" MAXIMUM ON THE FLOOR AND ROOF PANELS. THIS DIMENSION SHALL BE MAINTAINED EXCEPT IN CASES WHERE OPENINGS PROHIBIT.
13. TOLERANCES SHALL BE AS FOLLOWS:
   - PANEL THICKNESS: ±1/8"
   - PANEL SIZE: ±1/16"
   - PANEL SQUARENESS: ±1/8" AGREEMENT ON DIAGONALS
   - LOCATION OF BLOCKOUTS & PVC'S: ±1/4"
   - BLOCKOUT DIMENSIONS: +1/4", –0"
   - PVC SIZE: USE TRADE SIZE AS LISTED ON PROJECT DRAWINGS
14. REBAR SPLICING IS ALLOWED WHERE SPACE PERMITS. MINIMUM LAP IS 18" FOR #4 REBAR AND 30" FOR #6 REBAR.
15. CONCRETE SHALL HAVE AIR ENTRAINMENT OF 6%, MODERATE EXPOSURE AND A MAXIMUM AGGREGATE SIZE OF 3/8 INCH.
16. CONCRETE SHALL HAVE A WATER–CEMENTITIOUS MATERIAL RATIO OF 0.50.

GENERAL: THESE REBAR SIZES AND SPACING REPRESENT THE MINIMUM AMOUNT FOR ALL CASTING PLANS. PROJECT DRAWINGS MAY REQUIRE REINFORCEMENT IN ADDITION TO CELLXION STANDARDS.

ROOF PANEL: #4 (SHORT AXIS) 12" O.C. ON SHELTER WIDTH OF 11'–6" AND LESS, 10" O.C. ON SHELTER WIDTH GREATER THAN 11'–6" AND #4 (LONG AXIS) AT 18" O.C.

WALL PANEL: #4 AT PERIMETER AND 4 X 4 X W4.5 X W4.5 MESH THROUGHOUT.

FLOOR: (2)–#6 (SHORT AXIS) EACH RIB, #6 (LONG AXIS) EACH INTERIOR RIB. DECK: 4 X 4 X W4.5 X W4.5 MESH.

SEALANT APPLICATION

STEP 1. AT MATING SURFACES BETWEEN PANELS, APPLY URETHANE SEALANT (1/2" BEAD) DURING ASSEMBLY.

STEP 2. URETHANE SEALANT REQUIRED ON ALL JOINTS. APPLY TO EXTERIOR AFTER PANEL ASSEMBLY.

STEP 3. ROOF COATING:
APPLY SHELTER ROOF COATING PER MANUFACTURER INSTRUCTION.
ROOF COATING TO CONFORM TO, ASTM D6083–97A, OBC 1507.15.2 & 2003 IBC 1507.15.2.

STEP 4. APPLY AGGREGATE SEALER TO EXTERIOR WALLS. USE 1 GALLON PER 200 SQ. FEET.

STEP 5. USE TEXTURED SEALER ON ALL SMOOTH EXPOSED SURFACES. USE CEMENTITOUS GRAY PAINT.

February 27, 2013

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CUSTOMER: ENGINEERING STANDARD

PROJECT: GENERAL CASTING SPECIFICATIONS 2003 IBC

FILENAME: 108–016	
SCALE: 1"=1"	TOLERANCE:
DRWN. BY: L. DROZDZ	DATE: 9/17/07
CHK. BY:	DATE:
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 2 OF 4	
DRAWING NO.: 108–016	M

GENERAL NOTES

1. ALL STEEL FABRICATION AND INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL AISC 360-05 AND AWS D1.1-04 SPECIFICATIONS.
2. ALL WELDING SHALL BE MIG TYPE WITH THE FOLLOWING OPERATING SETTINGS:

WIRE SIZE	0.35
WIRE FEED SPEED (in/min)	5
VOLTAGE, DC (+)	18.5
AMPERAGE, DC	140
TRAVEL SPEED (in/min)	10-12
SHIELDING GAS	75/25

3. STRUCTURAL STEEL SPECIFICATIONS:
   STRUCTURAL SHAPES ASTM A36/A 36M-04a
   HIGH STRENGTH BOLTS, ASTM A 307-03
   OTHER BOLTS, SAE J429 GRADE 5
4. ALL CONCRETE WORK SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE A.C.I. 318-05 BUILDING CODES 311 & 211, AND ASTM STANDARDS C-172-04, C-31/C31M98, C-39-05e1, AND PROVISIONS OF C-94/C94M-04.
5. ALL PRECAST STRUCTURAL SAND-LIGHTWEIGHT CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS.
6. ALL REINFORCING STEEL BARS SHALL BE DOMESTIC, NEW BILLET STEEL CONFORMING TO ASTM A 615M-04a SPECIFICATIONS.
7. CONCRETE COVERAGE OVER ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3/4".
8. ALL REBAR SHALL BE TIED 100% AT THE PERIMETER, AND 50% ELSEWHERE.
9. ALL REBAR WIRE TIES TO BE 16 GAUGE.
10. FIBROUS REINFORCED LIGHTWEIGHT CONCRETE MAY BE USED IN THE ROOF AND FLOOR AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS. FIBER REINFORCEMENT MAY BE USED IN THE FLOOR IF DESIRED IN ORDER TO MAKE BATCHING OPERATION MORE EFFICIENT.
11. MAXIMUM JOINT SPACE BETWEEN PANELS SHALL BE 3/8" MEASURED BY REFUSAL OF ABILITY TO PASS A 3/8" ROD ALL THE WAY THROUGH THE JOINT AT ANY POINT ALONG THE JOINT.
12. WELD PLATE CONNECTIONS SHALL BE SPACED AT 4'-8" MAXIMUM ON THE FLOOR AND ROOF PANELS. THIS DIMENSION SHALL BE MAINTAINED EXCEPT IN CASES WHERE OPENINGS PROHIBIT.
13. TOLERANCES SHALL BE AS FOLLOWS:
    PANEL THICKNESS: ±1/8"
    PANEL SIZE: ±1/16"
    PANEL SQUARENESS: ±1/8" AGREEMENT ON DIAGONALS
    LOCATION OF BLOCKOUTS & PVC'S: ±1/4"
    BLOCKOUT DIMENSIONS: +1/4", -0"
    PVC SIZE: USE TRADE SIZE AS LISTED ON PROJECT DRAWINGS
14. REBAR SPLICING IS ALLOWED WHERE SPACE PERMITS. MINIMUM LAP IS 18" FOR #4 REBAR AND 30" FOR #6 REBAR.
15. CONCRETE SHALL HAVE AIR ENTRAINMENT OF 6%, MODERATE EXPOSURE AND A MAXIMUM AGGREGATE SIZE OF 3/8 INCH.
16. CONCRETE SHALL HAVE A WATER-CEMENTITIOUS MATERIAL RATIO OF 0.50.

GENERAL:	THESE REBAR SIZES AND SPACING REPRESENT THE MINIMUM AMOUNT FOR ALL CASTING PLANS. PROJECT DRAWINGS MAY REQUIRE REINFORCEMENT IN ADDITION TO CELLXION STANDARDS.
ROOF PANEL:	#4 (SHORT AXIS) 12" O.C. ON SHELTER WIDTH OF 11'-6" AND LESS, 10" O.C. ON SHELTER WIDTH GREATER THAN 11'-6" AND #4 (LONG AXIS) AT 18" O.C.
WALL PANEL:	#4 AT PERIMETER AND 4 X 4 X W4.5 X W4.5 MESH THROUGHOUT.
FLOOR:	(2)-#6 (SHORT AXIS) EACH RIB, #6 (LONG AXIS) EACH INTERIOR RIB. DECK: 4 X 4 X W4.5 X W4.5 MESH.

SEALANT APPLICATION

STEP 1. AT MATING SURFACES BETWEEN PANELS, APPLY URETHANE SEALANT (½" BEAD) DURING ASSEMBLY.

STEP 2. URETHANE SEALANT REQUIRED ON ALL JOINTS. APPLY TO EXTERIOR AFTER PANEL ASSEMBLY.

STEP 3. ROOF COATING:
APPLY SHELTER ROOF COATING PER MANUFACTURER INSTRUCTION.
ROOF COATING TO CONFORM TO, ASTM D6083-97A, OBC 1507.15.2 & 2006 IBC 1507.15.2.

STEP 4. APPLY AGGREGATE SEALER TO EXTERIOR WALLS. USE 1 GALLON PER 200 SQ. FEET.

STEP 5. USE TEXTURED SEALER ON ALL SMOOTH EXPOSED SURFACES. USE CEMENTITOUS GRAY PAINT.

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CUSTOMER: ENGINEERING STANDARD

PROJECT: GENERAL CASTING SPECIFICATIONS 2006 IBC

FILENAME: 108-016	
SCALE: 1"=1"	TOLERANCE:
DRWN. BY: L. DROZDZ	DATE: 10/1/07
CHK. BY:	DATE:
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 3 OF 4	
DRAWING NO.: 108-016	M

GENERAL NOTES

1. ALL STEEL FABRICATION AND INSTALLATION SHALL BE DONE IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION MANUAL AISC 360–05 AND AWS D1.1–04 SPECIFICATIONS.
2. ALL WELDING SHALL BE MIG TYPE WITH THE FOLLOWING OPERATING SETTINGS:
   - WIRE SIZE ------------------------ 0.35
   - WIRE FEED SPEED (in/min) ------------ 5
   - VOLTAGE, DC (+) ------------------- 18.5
   - AMPERAGE, DC --------------------- 140
   - TRAVEL SPEED (in/min) -------------- 10–12
   - SHIELDING GAS -------------------- 75/25
3. STRUCTURAL STEEL SPECIFICATIONS:
   - STRUCTURAL SHAPES ASTM A36/A 36M–05
   - HIGH STRENGTH BOLTS, ASTM A 307–03
   - OTHER BOLTS, SAE J429 GRADE 5
4. ALL CONCRETE WORK SHALL CONFORM TO AMERICAN CONCRETE INSTITUTE A.C.I. 318–08 BUILDING CODES 311 & 211, AND ASTM STANDARDS C–172–04, C–31/C31–06, C–39–05e1, AND PROVISIONS OF C–94/C94M–07.
5. ALL PRECAST STRUCTURAL SAND–LIGHTWEIGHT CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS.
6. ALL REINFORCING STEEL BARS SHALL BE DOMESTIC, NEW BILLET STEEL CONFORMING TO ASTM A 615M–04a SPECIFICATIONS.
7. CONCRETE COVERAGE OVER ALL REINFORCING STEEL SHALL BE A MINIMUM OF 3/4".
8. ALL REBAR SHALL BE TIED 100% AT THE PERIMETER, AND 50% ELSEWHERE.
9. ALL REBAR WIRE TIES TO BE 16 GAUGE.
10. FIBROUS REINFORCED LIGHTWEIGHT CONCRETE MAY BE USED IN THE ROOF AND FLOOR AND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 5000 PSI AT 28 DAYS. FIBER REINFORCEMENT MAY BE USED IN THE FLOOR IF DESIRED IN ORDER TO MAKE BATCHING OPERATION MORE EFFICIENT.
11. MAXIMUM JOINT SPACE BETWEEN PANELS SHALL BE 3/8" MEASURED BY REFUSAL OF ABILITY TO PASS A 3/8" ROD ALL THE WAY THROUGH THE JOINT AT ANY POINT ALONG THE JOINT.
12. WELD PLATE CONNECTIONS SHALL BE SPACED AT 4'–8" MAXIMUM ON THE FLOOR AND ROOF PANELS. THIS DIMENSION SHALL BE MAINTAINED EXCEPT IN CASES WHERE OPENINGS PROHIBIT.
13. TOLERANCES SHALL BE AS FOLLOWS:
    - PANEL THICKNESS: ±1/8"
    - PANEL SIZE: ±1/16"
    - PANEL SQUARENESS: ±1/8" AGREEMENT ON DIAGONALS
    - LOCATION OF BLOCKOUTS & PVC'S: ±1/4"
    - BLOCKOUT DIMENSIONS: +1/4", –0"
    - PVC SIZE: USE TRADE SIZE AS LISTED ON PROJECT DRAWINGS
14. REBAR SPLICING IS ALLOWED WHERE SPACE PERMITS. MINIMUM LAP IS 18" FOR #4 REBAR AND 30" FOR #6 REBAR.
15. CONCRETE SHALL HAVE AIR ENTRAINMENT OF 6%, MODERATE EXPOSURE AND A MAXIMUM AGGREGATE SIZE OF 3/8 INCH.
16. CONCRETE SHALL HAVE A WATER–CEMENTITIOUS MATERIAL RATIO OF 0.50.

GENERAL: THESE REBAR SIZES AND SPACING REPRESENT THE MINIMUM AMOUNT FOR ALL CASTING PLANS. PROJECT DRAWINGS MAY REQUIRE REINFORCEMENT IN ADDITION TO CELLXION STANDARDS.

ROOF PANEL: #4 (SHORT AXIS) 12" O.C. ON SHELTER WIDTH OF 11'–6" AND LESS, 10" O.C. ON SHELTER WIDTH GREATER THAN 11'–6" AND #4 (LONG AXIS) AT 18" O.C.

WALL PANEL: #4 AT PERIMETER AND 4 X 4 X W4.5 X W4.5 MESH THROUGHOUT.

FLOOR: (2)–#6 (SHORT AXIS) EACH RIB, #6 (LONG AXIS) EACH INTERIOR RIB. DECK: 4 X 4 X W4.5 X W4.5 MESH.

SEALANT APPLICATION

STEP 1. AT MATING SURFACES BETWEEN PANELS, APPLY URETHANE SEALANT (1/2" BEAD) DURING ASSEMBLY.

STEP 2. URETHANE SEALANT REQUIRED ON ALL JOINTS. APPLY TO EXTERIOR AFTER PANEL ASSEMBLY.

STEP 3. ROOF COATING:
APPLY SHELTER ROOF COATING PER MANUFACTURER INSTRUCTION.
ROOF COATING TO CONFORM TO, ASTM D6083–05e01, OBC 1507.15.2 & 2009 IBC 1507.15.2.

STEP 4. APPLY AGGREGATE SEALER TO EXTERIOR WALLS. USE 1 GALLON PER 200 SQ. FEET.

STEP 5. USE TEXTURED SEALER ON ALL SMOOTH EXPOSED SURFACES. USE CEMENTITOUS GRAY PAINT.

February 27, 2013

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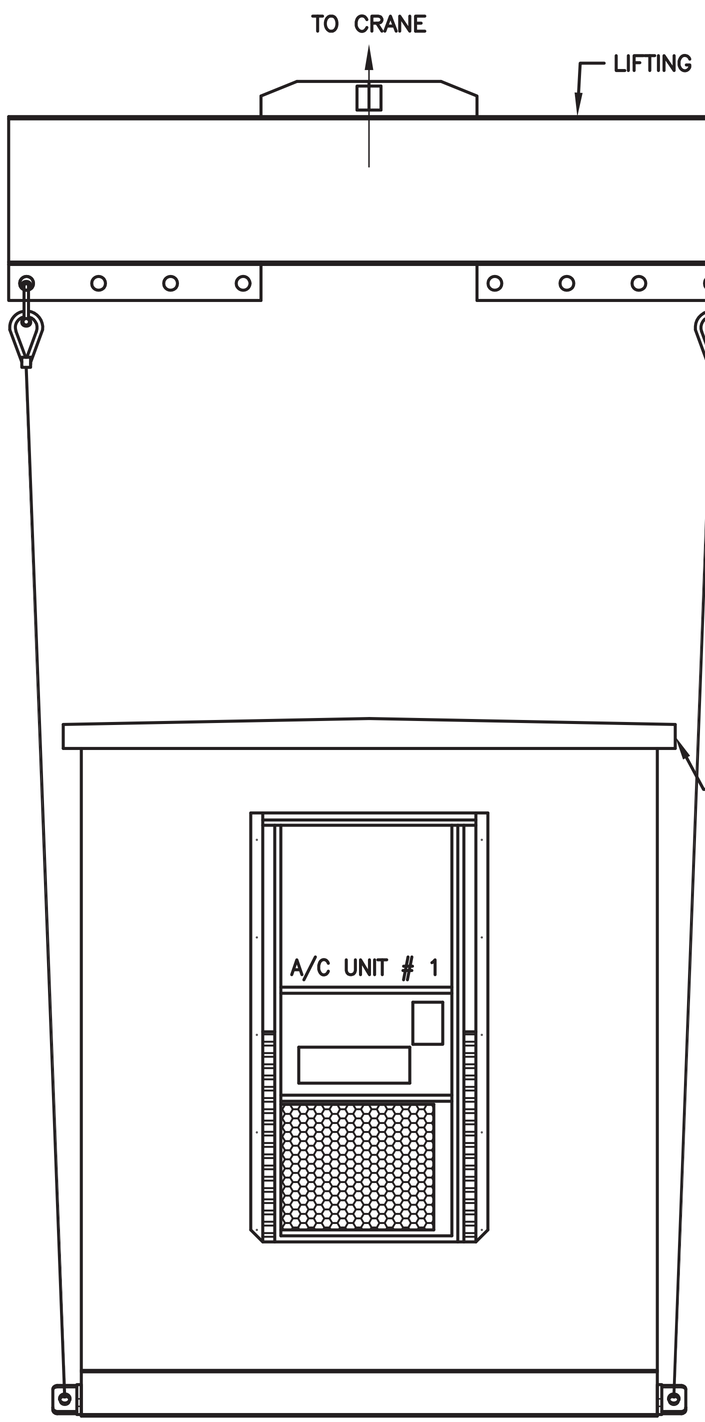
CUSTOMER: ENGINEERING STANDARD

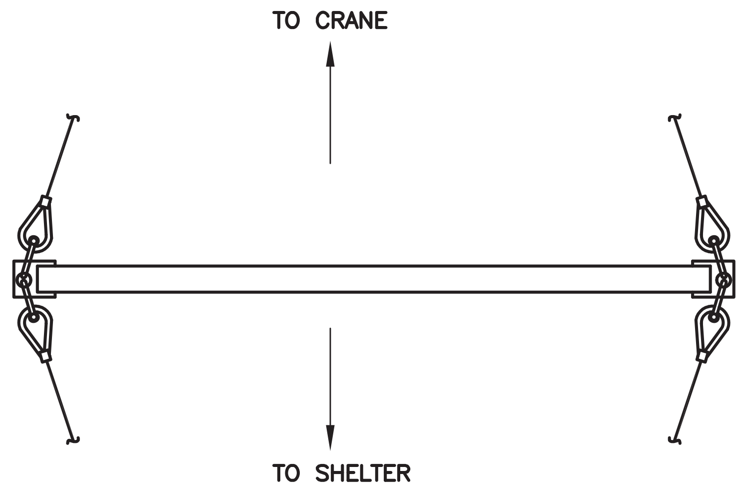
PROJECT: GENERAL CASTING SPECIFICATIONS 2009 IBC

FILENAME: 108–016	
SCALE: 1"=1"	TOLERANCE:
DRWN. BY: L. DROZDZ	DATE: 7/21/10
CHK. BY:	DATE:
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 4 OF 4	
DRAWING NO.: 108–016	M



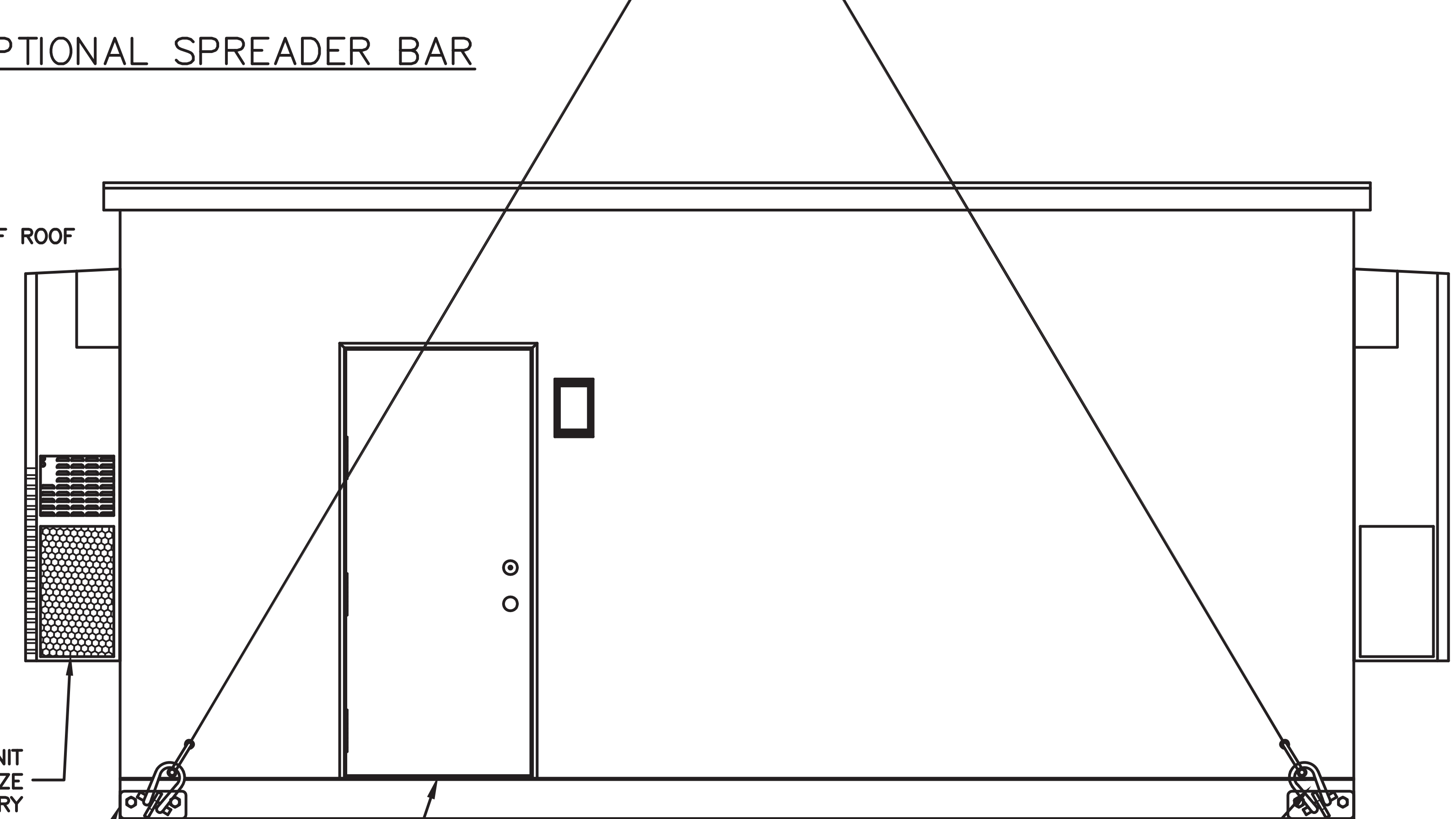
END VIEW

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



OPTIONAL SPREADER BAR

EQUIPMENT REQUIRED	
QTY.	DESCRIPTION
6	SHACKLES
8	CHOKERS (20" MIN)
1	SPREADER BAR OR LIFTING BEAM
AR	MUD MATS (SEE NOTE #2)



SIDE VIEW

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

NOTES:

1. FOUR (4) LIFTING POINTS REQUIRED ONLY FOR SHELTER LESS THAN 24' LONG.
2. SHELTER SIZE & CONFIG. MAY VARY.
3. COMPENSATE WEIGHT DIFFERENCE WITH ADDITIONAL SHACKLES IF REQ'D.
4. MUD MATS ARE TO BE USED IF SITE CONDITIONS WARRANT.
5. REVIEW WEIGHT TICKETS AND SITE CONDITIONS TO DETERMINE PROPER SIZING OF EQUIPMENT AND RIGGING.
6. SPREADER LENGTH TO BE WIDER THAN SHELTER TO KEEP CABLES FROM RUBBING AT ROOF.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
B	GAB	01/19/11	ADDED THE WORD OPTIONAL TO THE A/C	GAB	01/19/11
A	AMM	9/15/09	ADDED 8 LIFTING POINTS OPTION	LD	9/15/09

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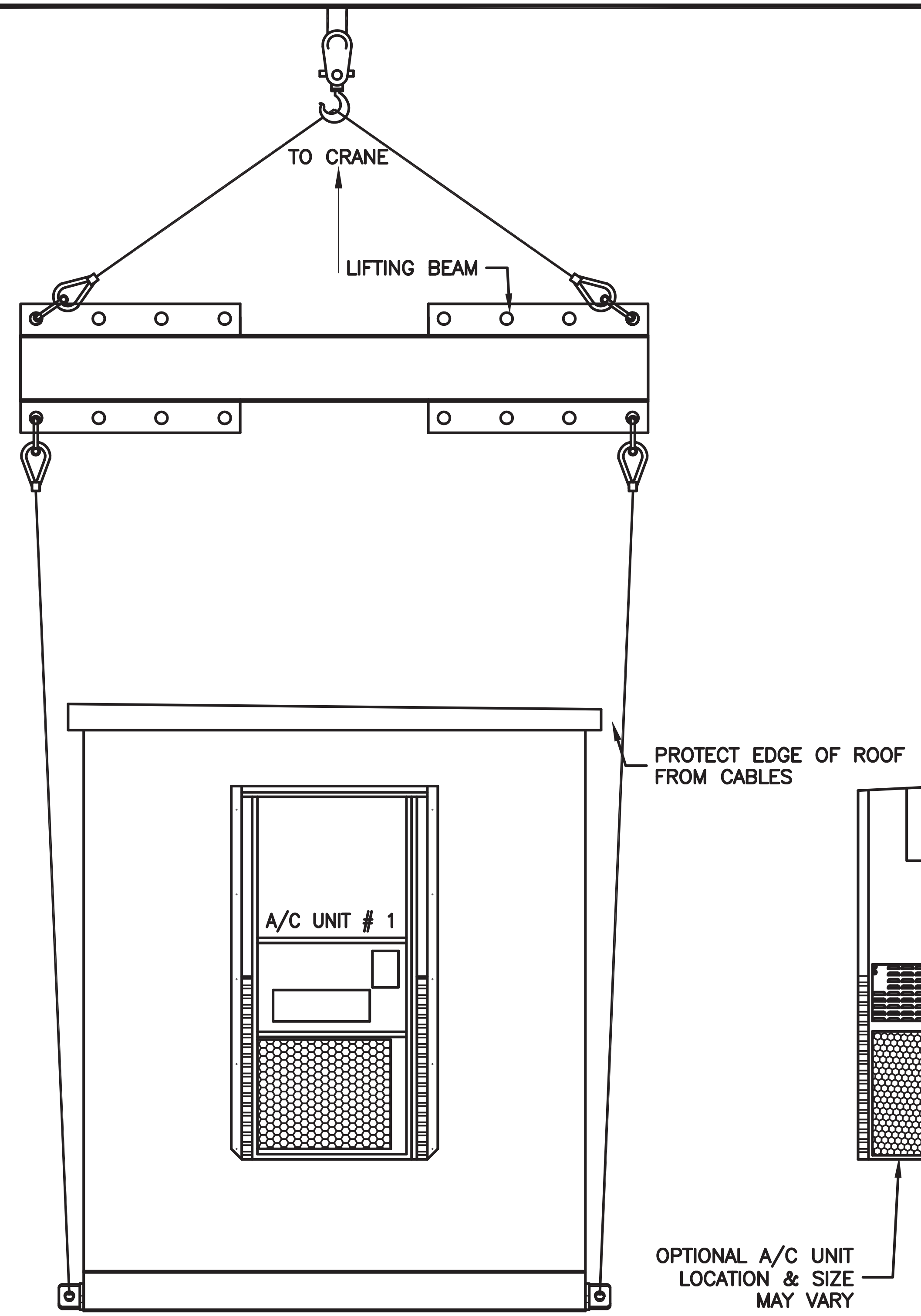
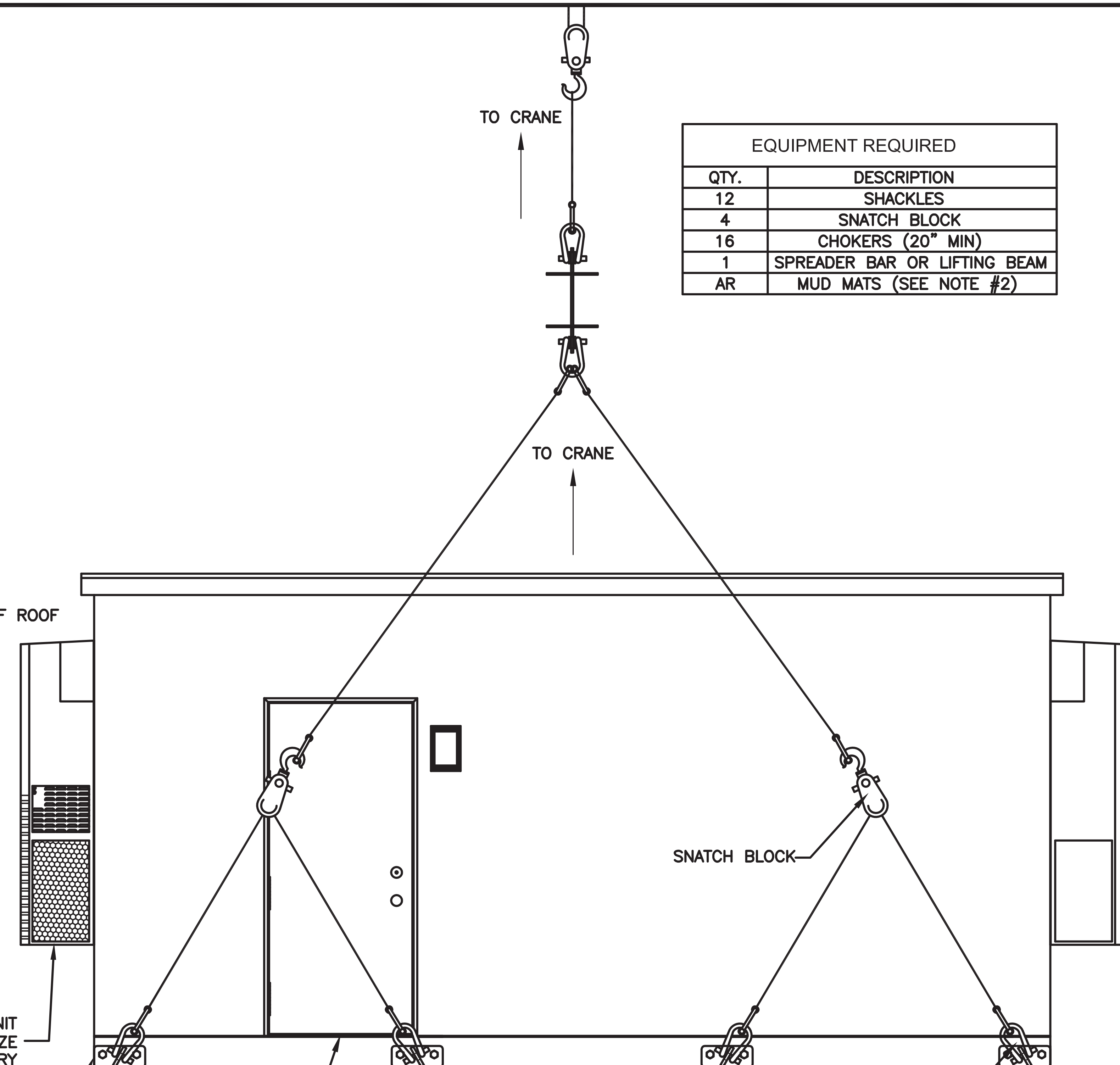
CUSTOMER:
PREP TO MOVE STANDARD

PROJECT:
SHELTER LIFTING DETAILS 4 LIFTING POINTS

FILENAME: 108-088	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. ASHLEY	DATE: 5/13/08
CHK. BY: V. HASSELL	DATE: 5/13/08
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 1 OF 3	
DRAWING NO.: 108-088	B



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



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

EQUIPMENT REQUIRED

QTY.	DESCRIPTION
12	SHACKLES
4	SNATCH BLOCK
16	CHOKERS (20" MIN)
1	SPREADER BAR OR LIFTING BEAM
AR	MUD MATS (SEE NOTE #2)

NOTES:

1. EIGHT (8) LIFTING POINTS REQUIRED ONLY FOR SHELTER 24' AND LONGER.
2. SHELTER SIZE & CONFIG. MAY VARY.
3. COMPENSATE WEIGHT DIFFERENCE WITH ADDITIONAL SHACKLES IF REQ'D.
4. MUD MATS ARE TO BE USED IF SITE CONDITIONS WARRANT.
5. REVIEW WEIGHT TICKETS AND SITE CONDITIONS TO DETERMINE PROPER SIZING OF EQUIPMENT AND RIGGING.
6. SPREADER LENGTH TO BE WIDER THAN SHELTER TO KEEP CABLES FROM RUBBING AT ROOF.

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
B	GAB	01/19/11	ADDED THE WORD OPTIONAL TO THE A/C	GAB	01/19/11
A	AMM	9/15/09	ADDED 8 LIFTING POINTS OPTION	LD	9/15/09

February 27, 2013

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CUSTOMER:
PREP TO MOVE STANDARD

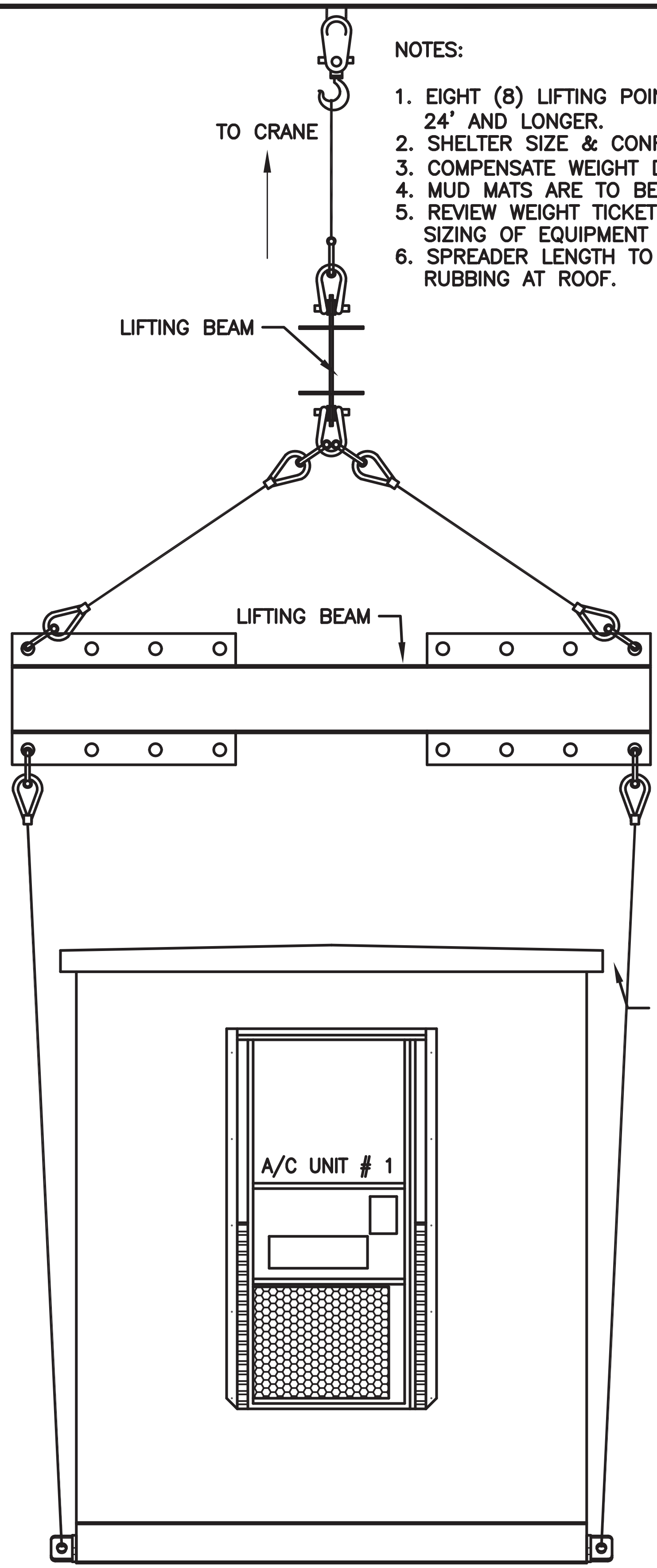
PROJECT:
SHELTER LIFTING DETAILS
8 LIFTING POINTS OPTION-1

FILENAME: 108-088	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. ASHLEY	DATE: 5/13/08
CHK. BY: V. HASSELL	DATE: 5/13/08
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 2 OF 3	
DRAWING NO.: 108-088	B

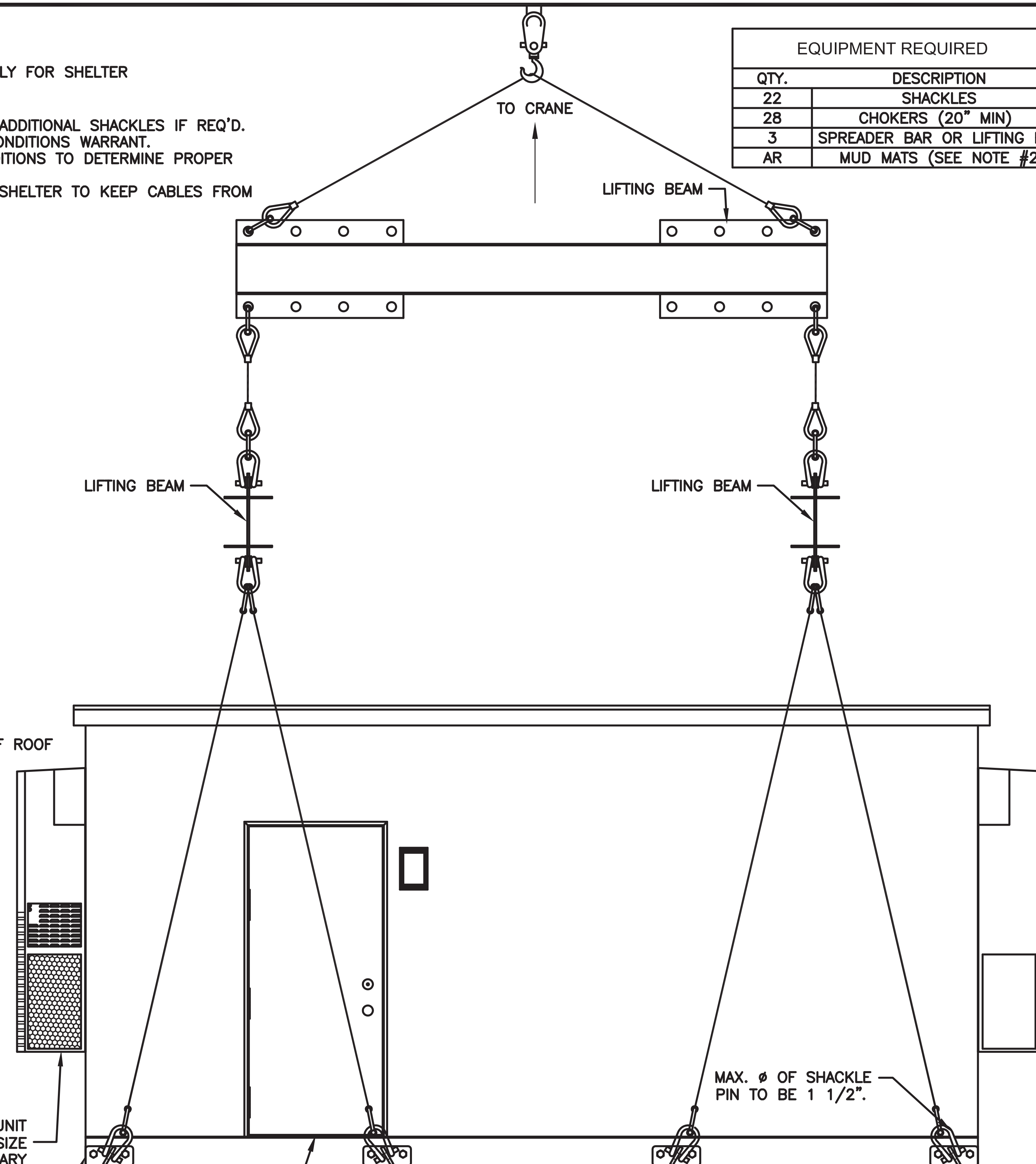
NOTES:

1. EIGHT (8) LIFTING POINTS REQUIRED ONLY FOR SHELTER 24' AND LONGER.
2. SHELTER SIZE & CONFIG. MAY VARY.
3. COMPENSATE WEIGHT DIFFERENCE WITH ADDITIONAL SHACKLES IF REQ'D.
4. MUD MATS ARE TO BE USED IF SITE CONDITIONS WARRANT.
5. REVIEW WEIGHT TICKETS AND SITE CONDITIONS TO DETERMINE PROPER SIZING OF EQUIPMENT AND RIGGING.
6. SPREADER LENGTH TO BE WIDER THAN SHELTER TO KEEP CABLES FROM RUBBING AT ROOF.

EQUIPMENT REQUIRED	
QTY.	DESCRIPTION
22	SHACKLES
28	CHOKERS (20" MIN)
3	SPREADER BAR OR LIFTING BEAM
AR	MUD MATS (SEE NOTE #2)



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



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

REV	BY	DATE	DESCRIPTION	APP.BY	DATE
B	GAB	01/19/11	ADDED THE WORD OPTIONAL TO THE A/C	GAB	01/19/11
A	AMM	9/15/09	ADDED 8 LIFTING POINTS OPTION	LD	9/15/09

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CUSTOMER:
PREP TO MOVE STANDARD

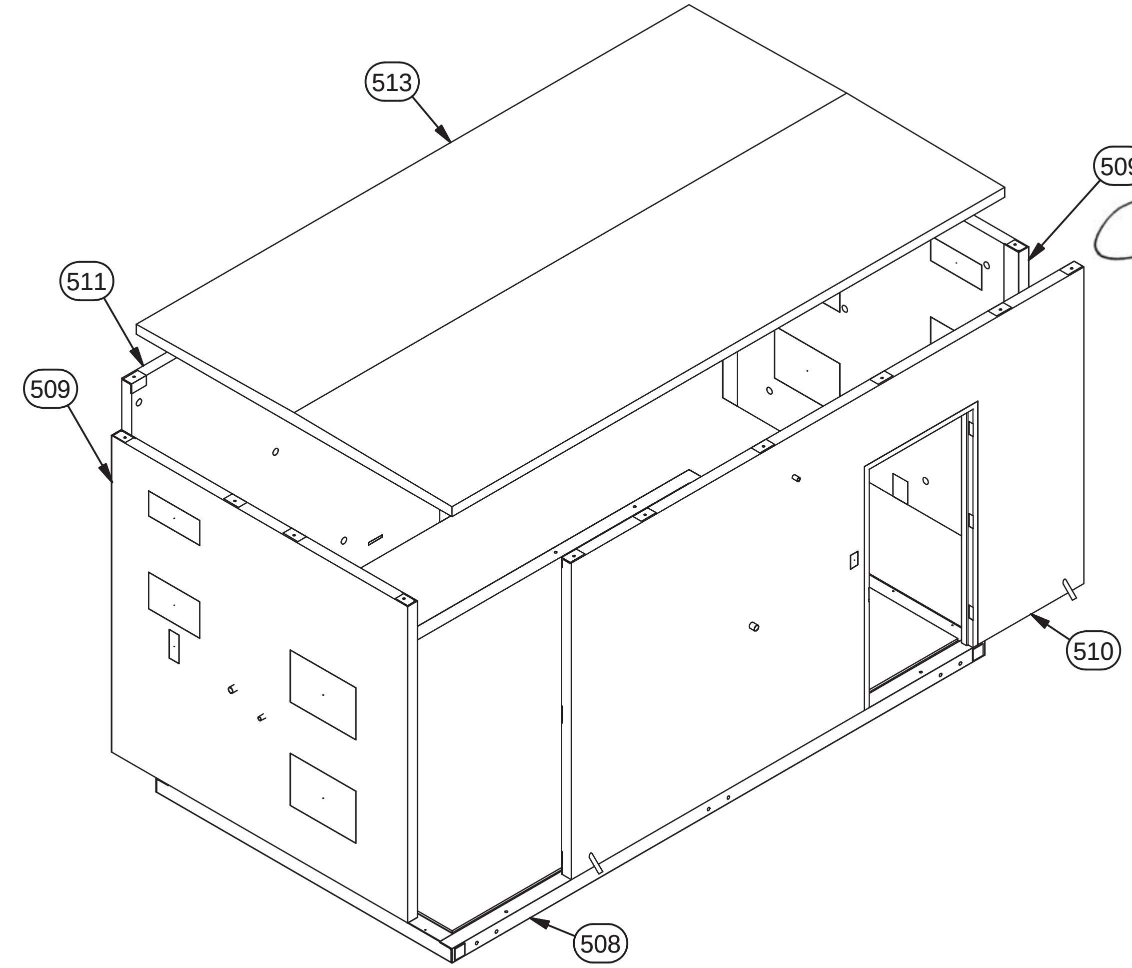
PROJECT:
SHELTER LIFTING DETAILS
8 LIFTING POINTS
OPTION-2

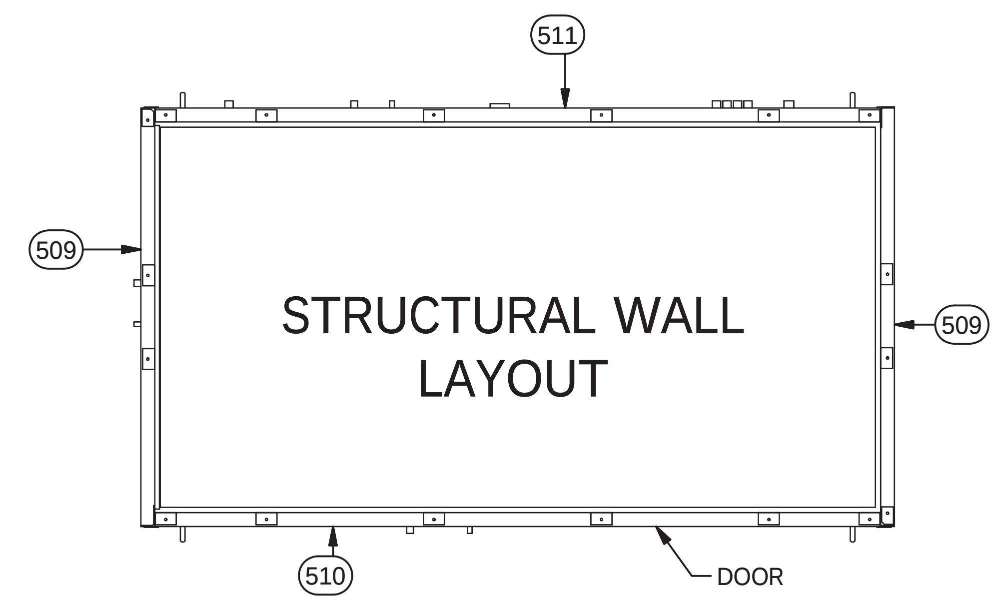
FILENAME: 108-088	
SCALE: N.T.S.	TOLERANCE:
DRWN. BY: J. ASHLEY	DATE: 5/13/08
CHK. BY: V. HASSELL	DATE: 5/13/08
ENG. BY:	DATE:
APP. BY:	DATE:
SHEET NO. 3 OF 3	
DRAWING NO.: 108-088	B

PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
500	1.500	FT	170000	PIPE, PVC, SCH 40, 1"	6.000 in			3
501	4.000	FT	170000	PIPE, PVC, SCH 40, 1"	12.000 in			4
502	0.14583 ft	FT	170000	PIPE, PVC, SCH 40, 1"	1.750 in			1
503	0.666	FT	170001	PIPE, PVC, SCH 40, 1/2"	2.000 in			8
504	1.500	FT	170003	PIPE, PVC, SCH 40, 1 1/2"	6.000 in			3
505	3.000	FT	170010	PIPE, PVC, SCH 40, 2"	6.000 in			5
506	0.50000 ft	FT	170011	PIPE, PVC, SCH 40, 2 1/2"	6.000 in			1
507	0.500	FT	350228	LUMBER,#2 PINE,1X6,RAW MATL	6.000 in			1
508	1	EA.	221-1000X1800-02	CONCRETE FLOOR ASSY KIT,10'0"X18'0"				1
509	2	EA.	222-1000X0903-008	WALL KIT,CON,END,AC,STD				2
510	1	EA.	223-1800X0903-001	WALL KIT,CON,SIDE,DR,STD				1
511	1	EA.	223-1800X0903-002	WALL KIT,CON,SIDE,BO,STD				1
512	36	EA.	223102	INSERT,WELD PLATE 1/4"X3"X4",F/B				1
513	1	EA.	226-1000X1800X4-00	ROOF ASSY.KIT,CONCRETE,10'0"X 18'0"				1
514	5.043	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	8.750 in	4.000 in	1
515	7.349	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	12.750 in	4.000 in	1
516	1.111	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.000 in	4.000 in	4.000 in	1
517	.694	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	5.000 in	5.000 in	4.000 in	1
518	3.807	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.750 in	12.750 in	4.000 in	1
519	.247	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	4.750 in	3.000 in	2.500 in	1
520	26.868	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	18.250 in	26.500 in	4.000 in	2
521	1	EA.	501001	DOOR FRM,3670,LH,CURRIES,16G,GALV				1
522	5	EA.	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				5
523	14	EA.	300032	INSULATION,1.75"RMAX,POLY,48"X110"				1
524	5	EA.	300033	INSULATION,2.25"RMAX,POLY,48"X132"				1

CUT LIST						
ITEM	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
500	170000	PIPE, PVC, SCH 40, 1"	6.000 in			3
501	170000	PIPE, PVC, SCH 40, 1"	12.000 in			4
502	170000	PIPE, PVC, SCH 40, 1"	1.750 in			1
503	170001	PIPE, PVC, SCH 40, 1/2"	2.000 in			8
504	170003	PIPE, PVC, SCH 40, 1 1/2"	6.000 in			3
505	170010	PIPE, PVC, SCH 40, 2"	6.000 in			5
506	170011	PIPE, PVC, SCH 40, 2 1/2"	6.000 in			1
507	350228	LUMBER,#2 PINE,1X6,RAW MATL	6.000 in			1
514	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	8.750 in	4.000 in	1
515	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	12.750 in	4.000 in	1
516	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.000 in	4.000 in	4.000 in	1
517	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	5.000 in	5.000 in	4.000 in	1
518	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.750 in	12.750 in	4.000 in	1
519	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	4.750 in	3.000 in	2.500 in	1
520	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	18.250 in	26.500 in	4.000 in	2

SHOP DETAILS	
DWG. NO.	DESCRIPTION
10-001	GENERAL INFORMATION SPECIFICATIONS
10-002	WALL TO ROOF CONNECTION
10-003	WALL TO FLOOR CONNECTION
10-004	WALL TO WALL CONNECTION
10-005	WELD PLATE DETAIL
10-007	CORNER BAR DETAIL
12-001	CONCRETE SHELTER FLOOR STEP JOINT
12-002	CONCRETE SHELTER FLOOR RIB SECTION
13-001	CONCRETE SHELTER ROOF RIDGE SECTION
13-002	CONCRETE SHELTER ROOF EAVE SECTION
14-001	CONCRETE SHELTER WALL BOTTOM SECTION
14-002	CONCRETE SHELTER WALL TOP SECTION
14-003	CONCRETE SHELTER END PANEL EDGE SECTION
14-004	CONCRETE SHELTER WALL BLOCKOUT SECTION
20-005	WALL/ROOF COVE INSTALLATION
20-006	CORNER COVE INSTALLATION
20-008	BATTEN TRIM INSTALLATION
20-020	1 LAYER CEILING DETAIL
20-021	1 LAYER WALL DETAIL
20-023	1 LAYER 2 PC TRIM
50-037	ALLTEL BUILDING STEEL GROUND





N	RRG	6/13/12	CHANGES PER CHANGE ORDER 12KBR02-002-2	LJL
REV	BY	DATE	DESCRIPTION	APP BY

ENGINEER SEAL
February 27, 2013
STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

CellXion
A Division of Sabre Industries, Inc.
5031 Hazel Jones Road
Bossier City, LA 71111
voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

CUSTOMER:

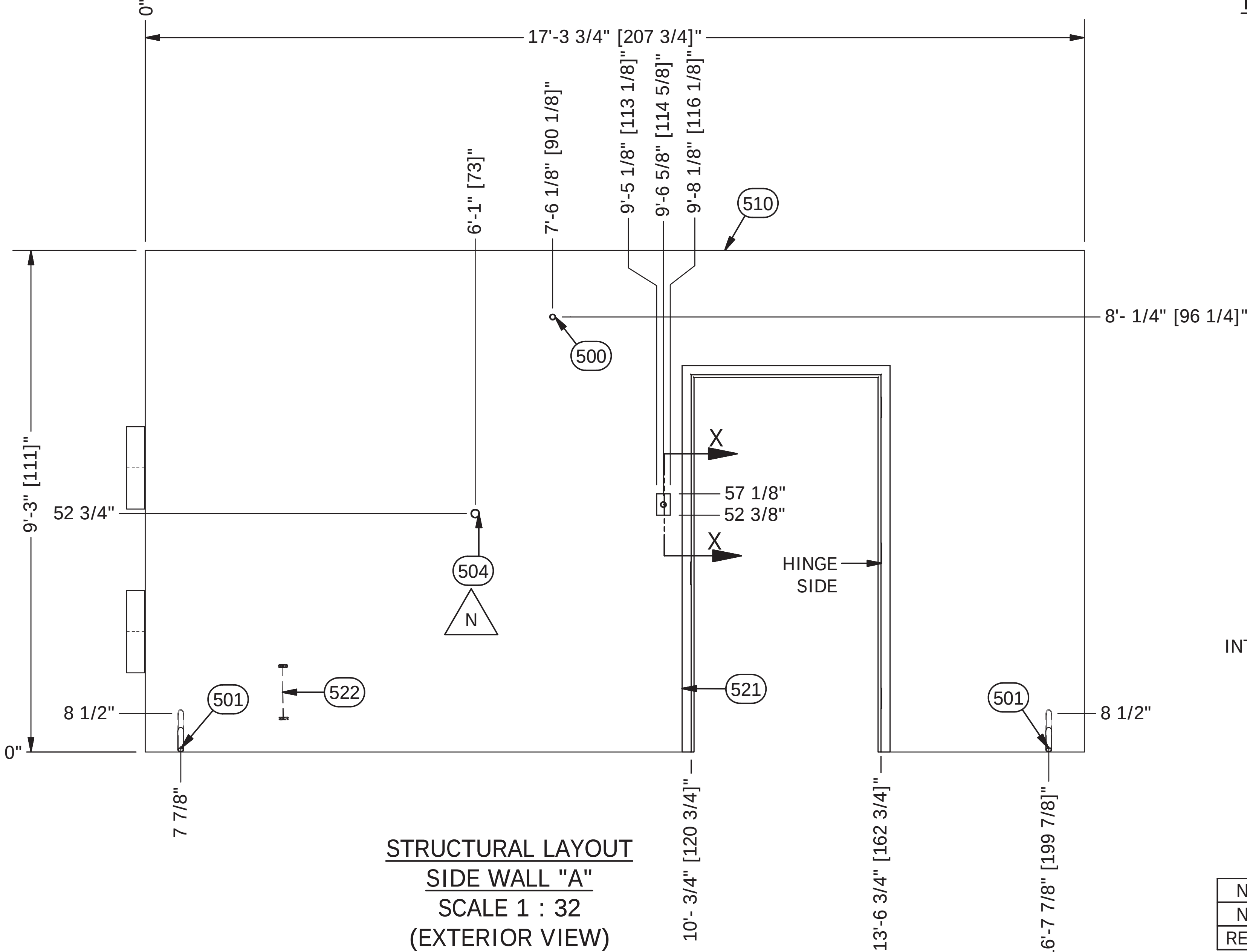
PROJECT:
10'-0" X 18'-0" CONCRETE SHELTER STRUCTURAL SPECIFICATIONS

FILENAME: SKBR02S.dwg	
DESIGN BY: M. TREKELL	DATE: 11/4/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 1 OF 6	
DRAWING NO.: SKBR02S	REV: P

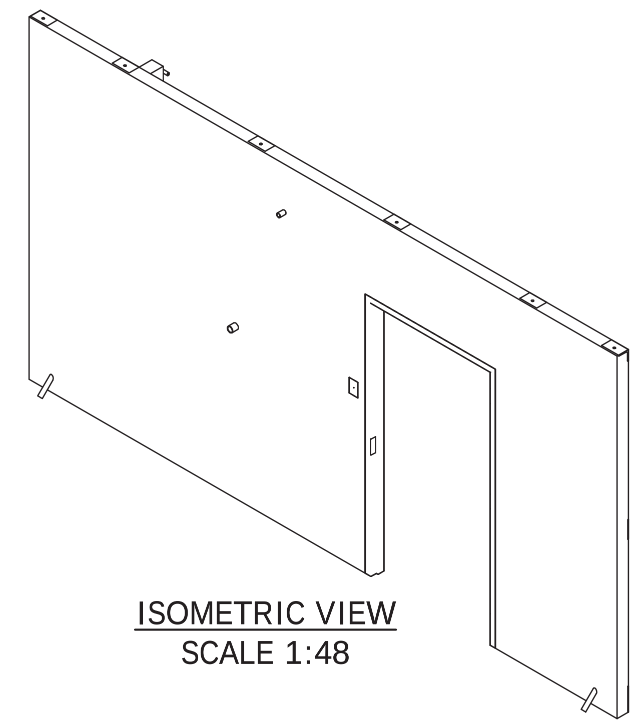
SUB - PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
500	1.500	FT	170000	PIPE, PVC, SCH 40, 1"	6.000 in			3
501	4.000	FT	170000	PIPE, PVC, SCH 40, 1"	12.000 in			4
502	0.14583 ft	FT	170000	PIPE, PVC, SCH 40, 1"	1.750 in			1
504	1.500	FT	170003	PIPE, PVC, SCH 40, 1 1/2"	6.000 in			3
510	1	EA.	223-1800X0903-001	WALL KIT,CON,SIDE,DR,STD				1
519	.247	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	4.750 in	3.000 in	2.500 in	1
521	1	EA.	501001	DOOR FRM,3670,LH,CURRIES,16G,GALV				1
522	5	EA.	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				5

NOTES:

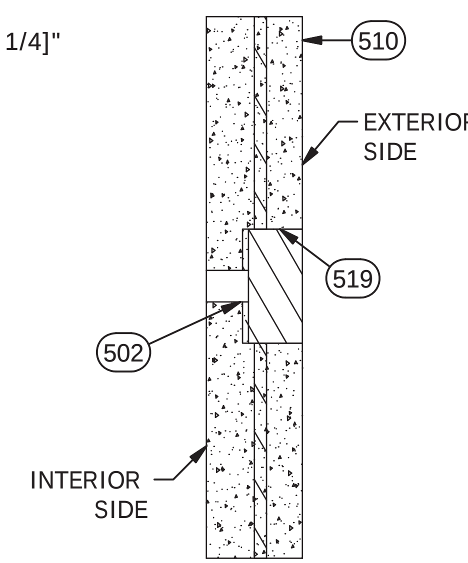
1. CUT WIRE MESH AROUND ALL BLOCKOUTS.
2. PUSH PVC 1/4" INTO FOAM TO SEAL, GLUE IF DESIRED. FOAM & PVC TO BE REMOVED AFTER CASTING.



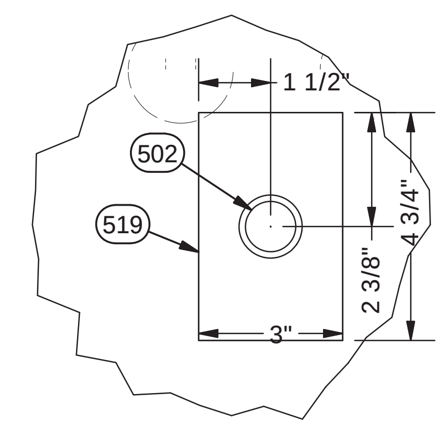
STRUCTURAL LAYOUT
SIDE WALL "A"
SCALE 1 : 32
(EXTERIOR VIEW)



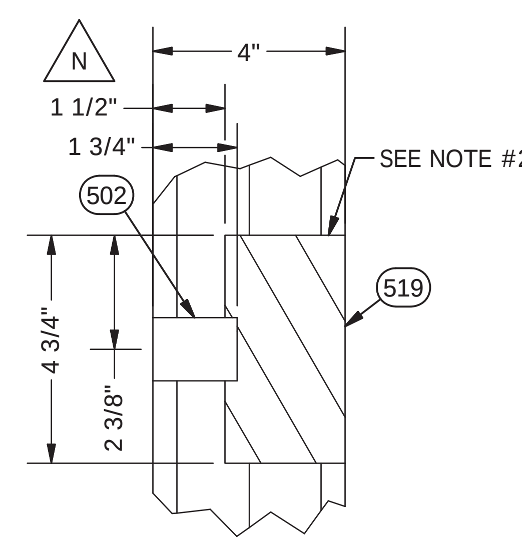
ISOMETRIC VIEW
SCALE 1:48



SECTION X-X
SCALE 1 :8



FOAM BLOCKOUT DETAIL
BACK VIEW
SCALE 1:4



FOAM BLOCKOUT DETAIL
SIDE VIEW
SCALE 1:4

REV	BY	DATE	DESCRIPTION	APP BY
N	JWR	6/29/12	CHANGED (1) 1" PVC TO 1 1/2"	LJL
N	JCL	4/26/12	CHANGED FOAM B/O SIZE AT SECTION X-X	LJL

ENGINEER SEAL:
STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER
February 27, 2013

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A Division of Sabre Industries, Inc.
5031 Hazel Jones Road
Bossier City, LA 71111
voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

CUSTOMER:

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
STRUCTURAL LAYOUT
SIDE WALL "A"

FILENAME: *SKBR02S.dwg*

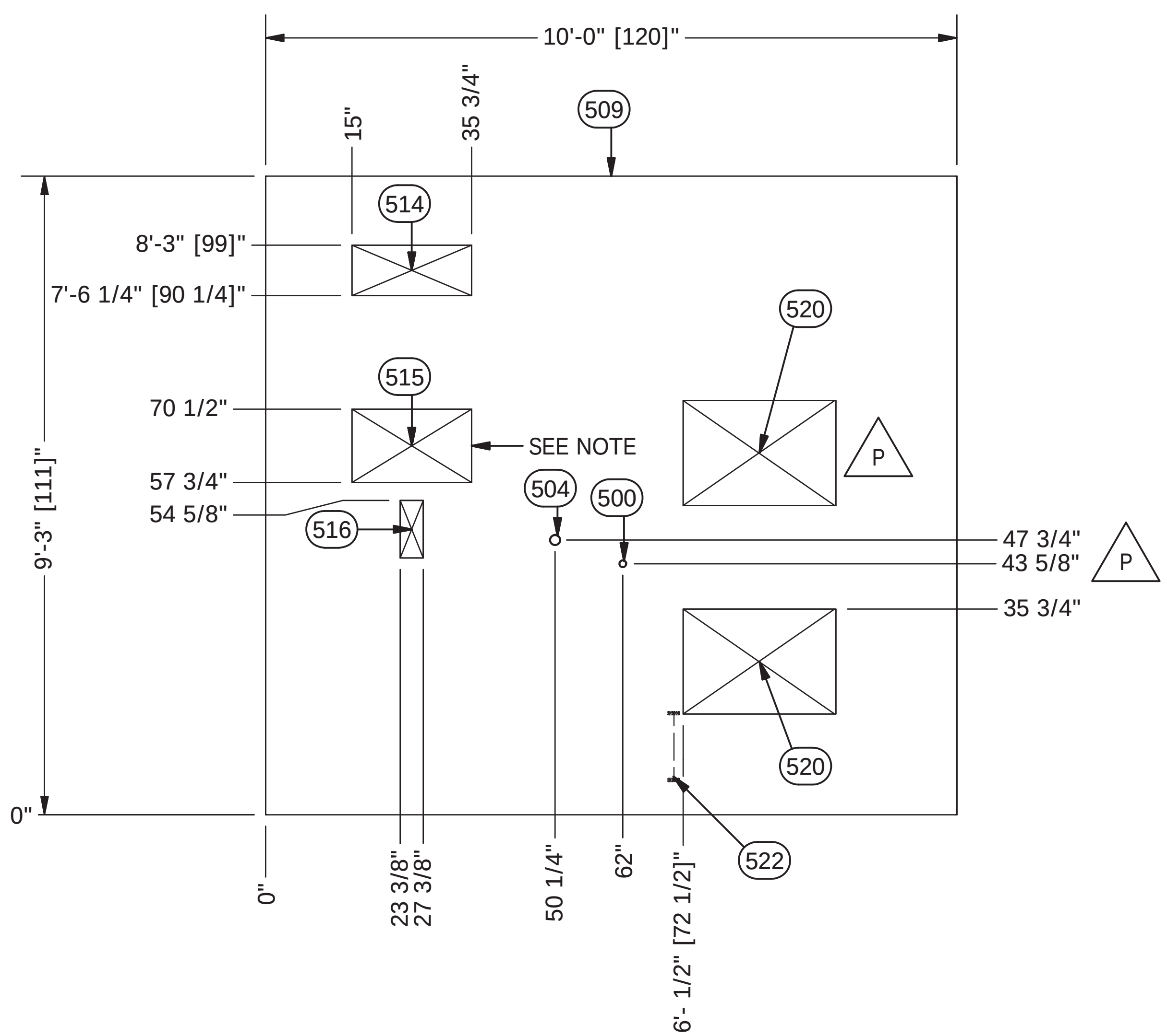
DESIGN BY: *M. TREKELL*	DATE: *11/4/2010*
DRAWN BY: *M. TREKELL*	DATE: *11/4/2010*
CHECKED BY: *W. RODRIGUEZ*	DATE: *11/4/2010*
ENGINEERED BY:	DATE:
APPROVED BY: *S. LEGGETT*	DATE: *11/8/2010*

SHEET NO.: *2 OF 6*

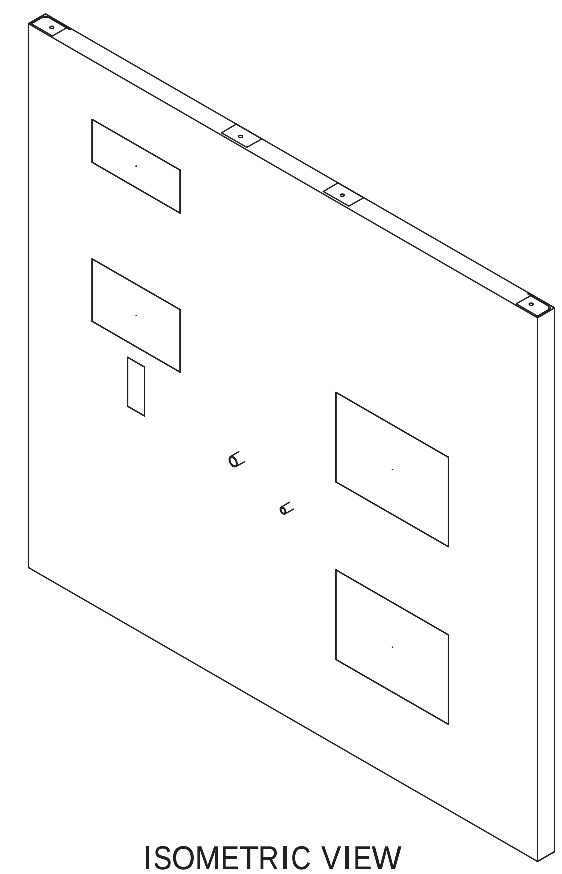
DRAWING NO.: *SKBR02S* REV: *P*

SUB - PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
503	0.666	FT	170001	PIPE, PVC, SCH 40, 1/2"	2.000 in			8
509	2	EA.	222-1000X0903-008	WALL KIT,CON,END,AC,STD				2
514	5.043	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	8.750 in	4.000 in	1
515	7.349	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	20.750 in	12.750 in	4.000 in	1
516	1.111	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.000 in	4.000 in	4.000 in	1
520	26.868	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	18.250 in	26.500 in	4.000 in	2

NOTES:
1. CUT WIRE MESH AROUND ALL BLOCKOUTS.



STRUCTURAL LAYOUT
END WALL "B"
SCALE 1 : 32
(EXTERIOR VIEW)



ISOMETRIC VIEW
SCALE 1:32

P	LJL	11/5/12	MOVED PENETRATIONS, REMOVED AC WINDOW EMBEDS	LJL
REV	BY	DATE	DESCRIPTION	APP BY

ENGINEER SEAL
STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER
February 27, 2013

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fax: 318-213-2919
www.cellxion.com

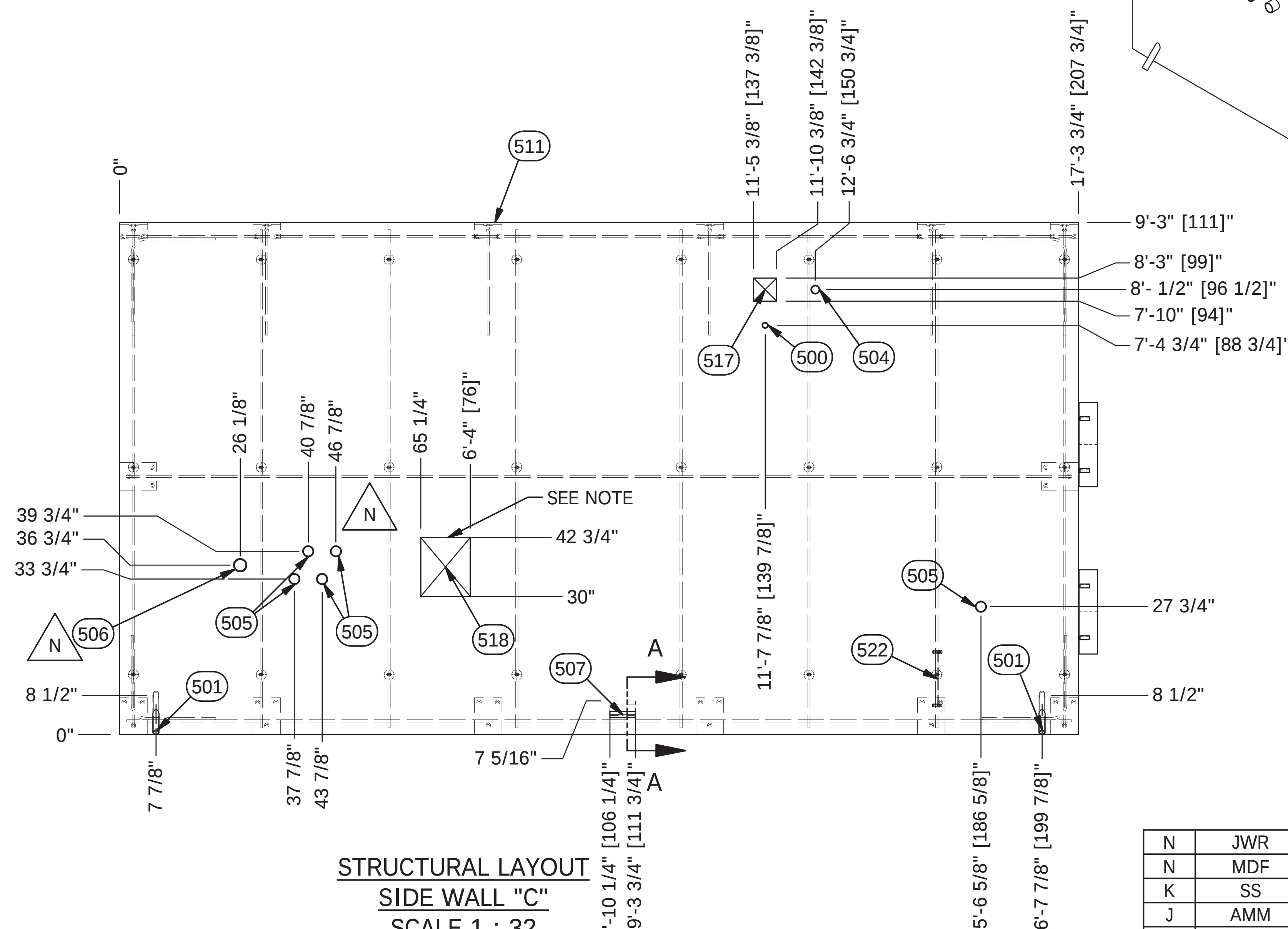
CUSTOMER:

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
STRUCTURAL LAYOUT
END WALL "B"

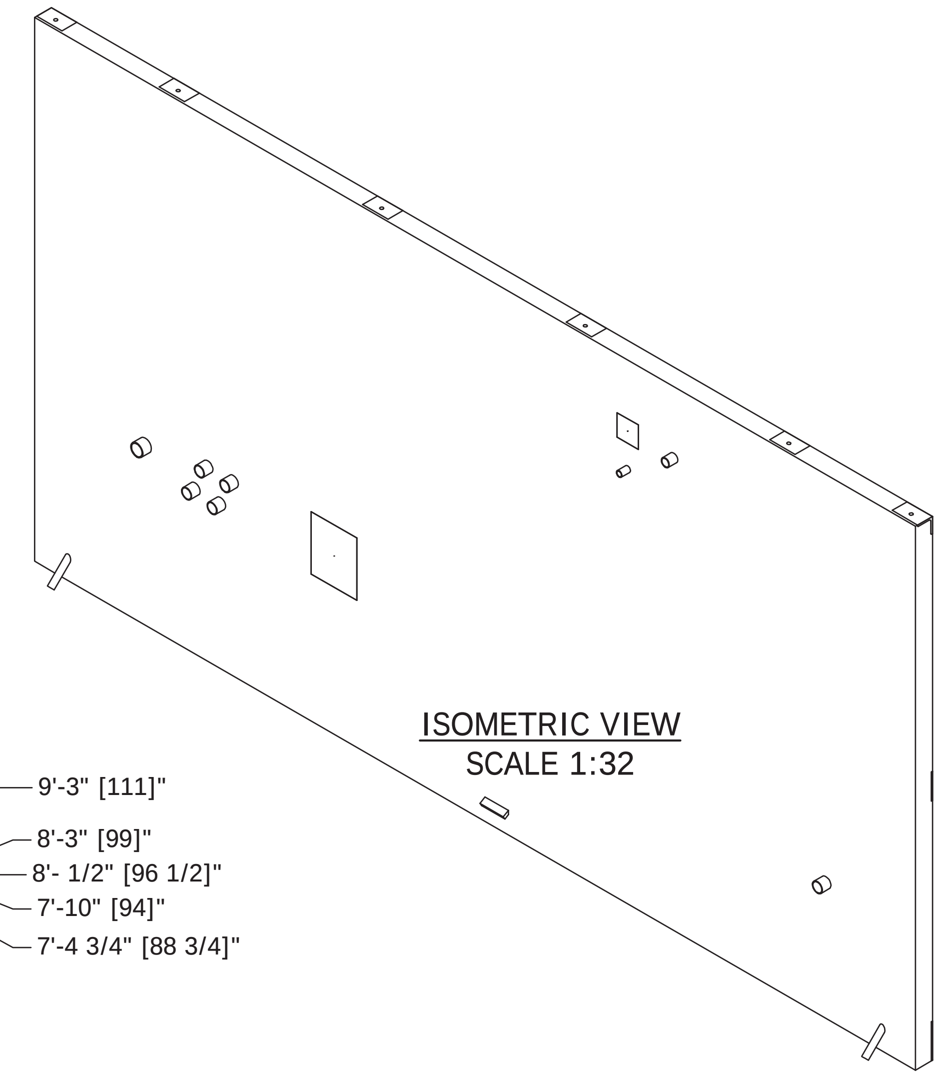
FILENAME: SKBR02S.dwg	
DESIGN BY: M. TREKELL	DATE: 11/4/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 3 OF 6	
DRAWING NO.: SKBR02S	REV: P

SUB - PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
500	1.500	FT	170000	PIPE, PVC, SCH 40, 1"	6.000 in			3
501	4.000	FT	170000	PIPE, PVC, SCH 40, 1"	12.000 in			4
504	1.500	FT	170003	PIPE, PVC, SCH 40, 1 1/2"	6.000 in			3
505	3.000	FT	170010	PIPE, PVC, SCH 40, 2"	6.000 in			5
506	0.50000 ft	FT	170011	PIPE, PVC, SCH 40, 2 1/2"	6.000 in			1
507	0.500	FT	350228	LUMBER,#2 PINE,1X6,RAW MATL	6.000 in			1
511	1	EA.	223-1800X0903-002	WALL KIT,CON,SIDE,BO,STD				1
517	.694	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	5.000 in	5.000 in	4.000 in	1
518	3.807	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	10.750 in	12.750 in	4.000 in	1
522	5	EA.	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				5

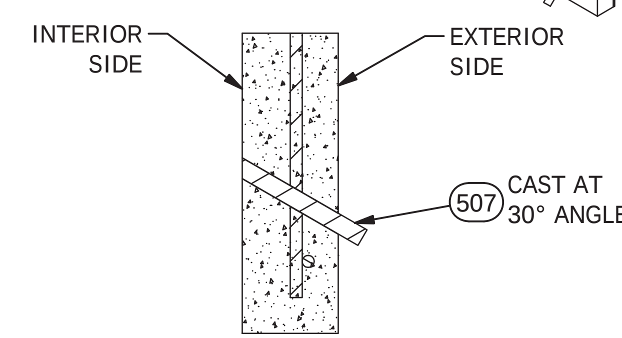
NOTES:
1. CUT WIRE MESH AROUND ALL BLOCKOUTS.



STRUCTURAL LAYOUT
SIDE WALL "C"
SCALE 1 : 32
(EXTERIOR VIEW)



ISOMETRIC VIEW
SCALE 1:32



SECTION A-A
SCALE 1 : 8

REV	BY	DATE	DESCRIPTION	APP BY
N	JWR	6/29/12	CHANGED (1) 2" PVC TO 2 1/2"	LJL
N	MDF	2/6/12	MOVED PENETRATIONS UP	JFA
K	SS	04/09/11	MOVED THE PENETRATIONS	LL
J	AMM	02/09/11	UPDATED PENETRATION,DIMENSION & BUBBLES	LJL
F	MST	12/14/10	REMOVED 4X10 BLOCKOUT	WAR

ENGINEER SEAL
February 27, 2013
STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

Cellxion
A Division of Sabre Industries, Inc.
5031 Hazel Jones Road
Bossier City, LA 71111
voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

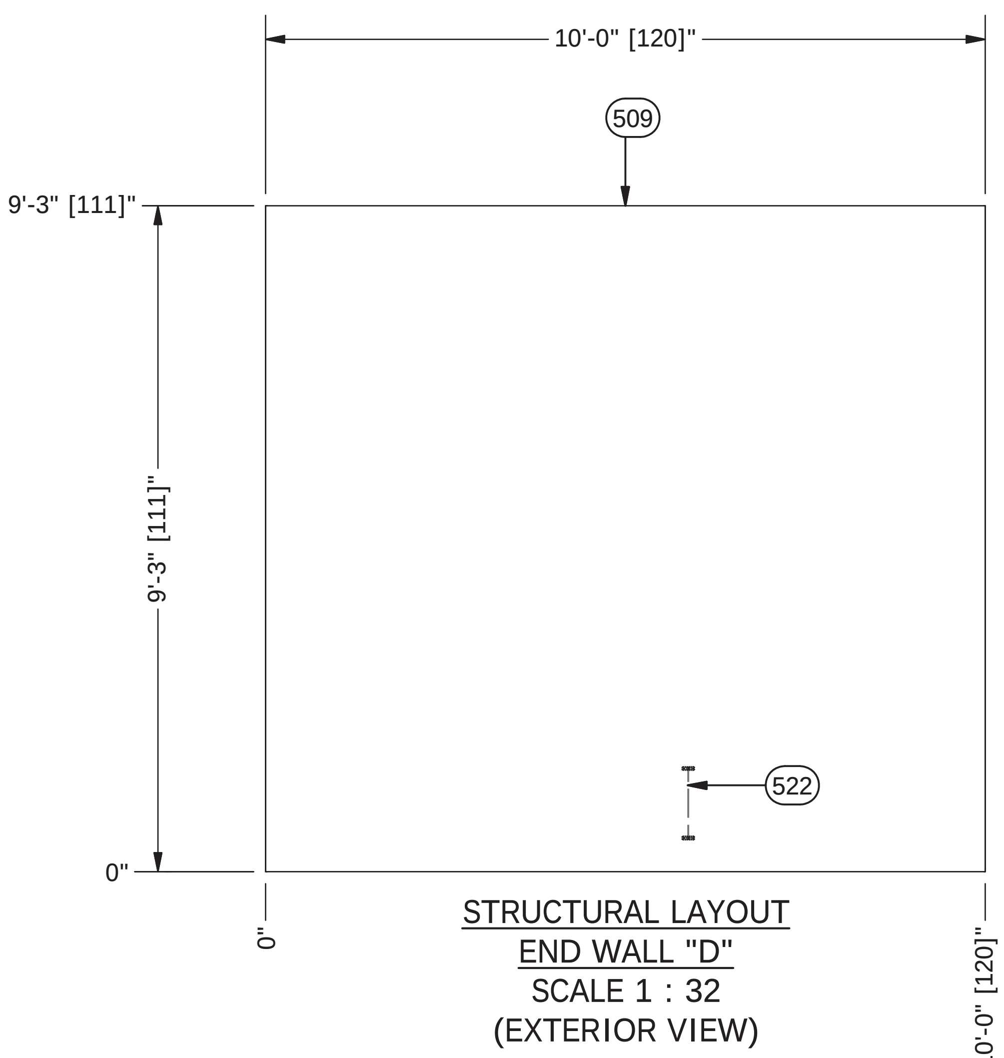
CUSTOMER:

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
STRUCTURAL LAYOUT
SIDE WALL "C"

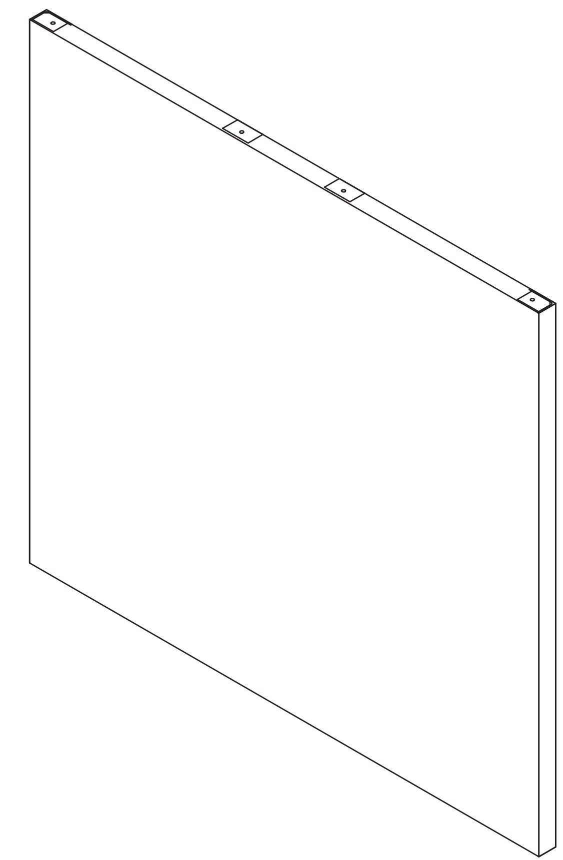
FILENAME: SKBR02S.dwg	
DESIGN BY: M. TREKELL	DATE: 11/4/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 4 OF 6	
DRAWING NO.: SKBR02S	REV: P

SUB - PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
509	2	EA.	222-1000X0903-008	WALL KIT,CON,END,AC,STD				2
522	5	EA.	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				5

NOTES:
1. CUT WIRE MESH AROUND ALL BLOCKOUTS.



STRUCTURAL LAYOUT
END WALL "D"
SCALE 1 : 32
(EXTERIOR VIEW)



ISOMETRIC VIEW
SCALE 1 :32

ENGINEER SEAL
February 27, 2013
STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

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Bossier City, LA 71111
voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

CUSTOMER:

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
STRUCTURAL LAYOUT
END WALL "D"

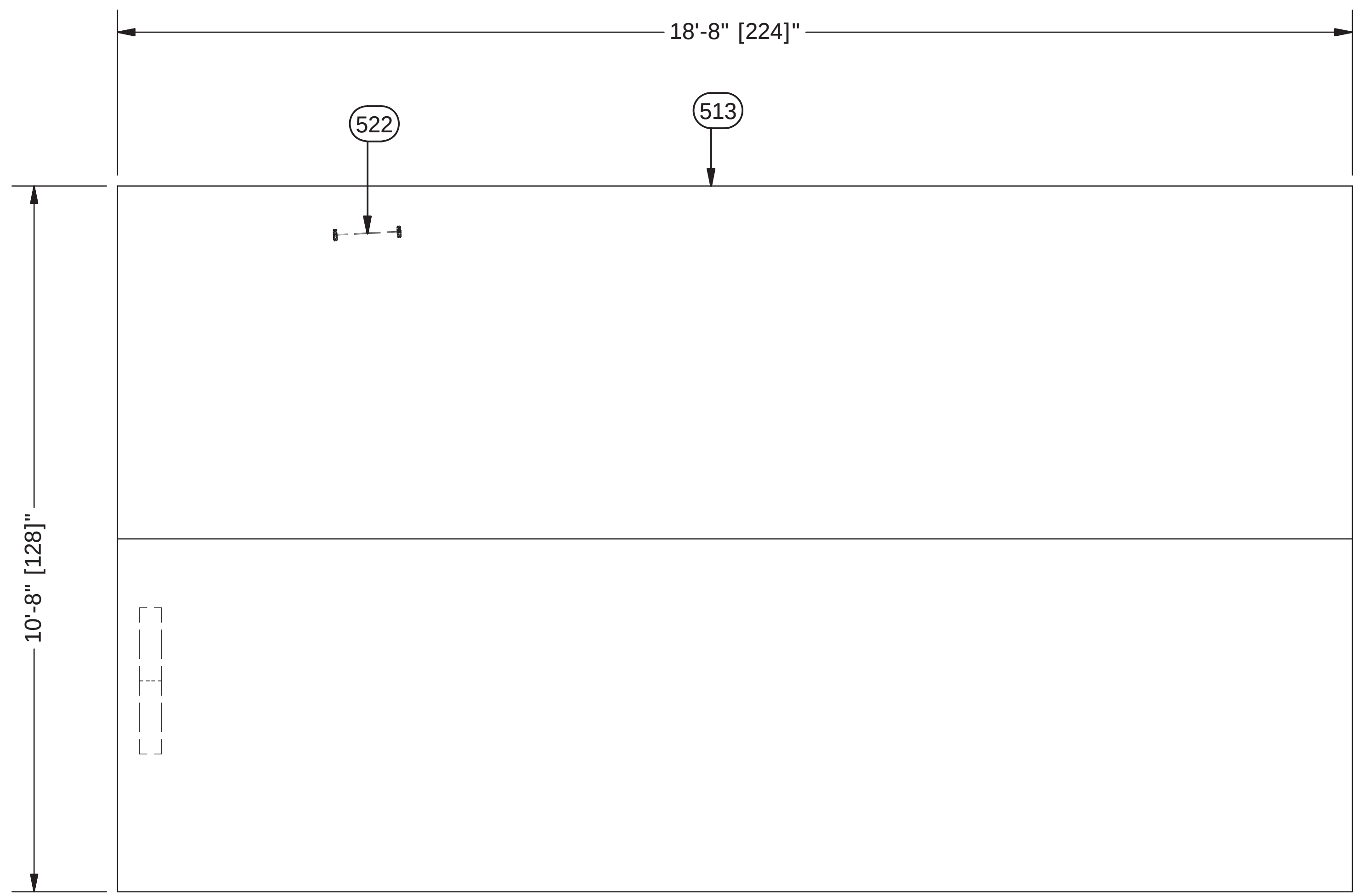
FILENAME:
SKBR02S.dwg

DESIGN BY: M. TREKELL	DATE: 11/4/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010

SHEET NO.:
5 OF 6

DRAWING NO.:	REV:
SKBR02S	P

SUB - PARTS LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
513	1	EA.	226-1000X1800X4-00	ROOF ASSY.KIT,CONCRETE,10'0"X 18'0"				1
522	5	EA.	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				5



STRUCTURAL LAYOUT
ROOF
SCALE 1:32

ENGINEER SEAL
STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED PROFESSIONAL ENGINEER
February 27, 2013

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A Division of Sabre Industries, Inc.
5031 Hazel Jones Road
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fax: 318-213-2919
www.cellxion.com

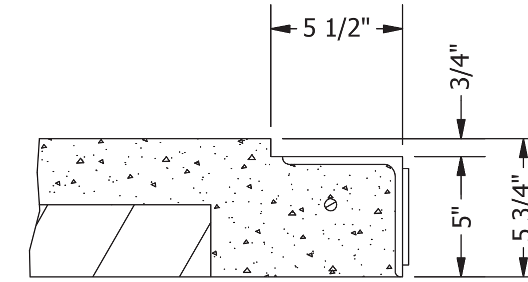
CUSTOMER:

PROJECT:
10'-0" X 18'-0"
CONCRETE SHELTER
STRUCTRUAL LAYOUT
ROOF

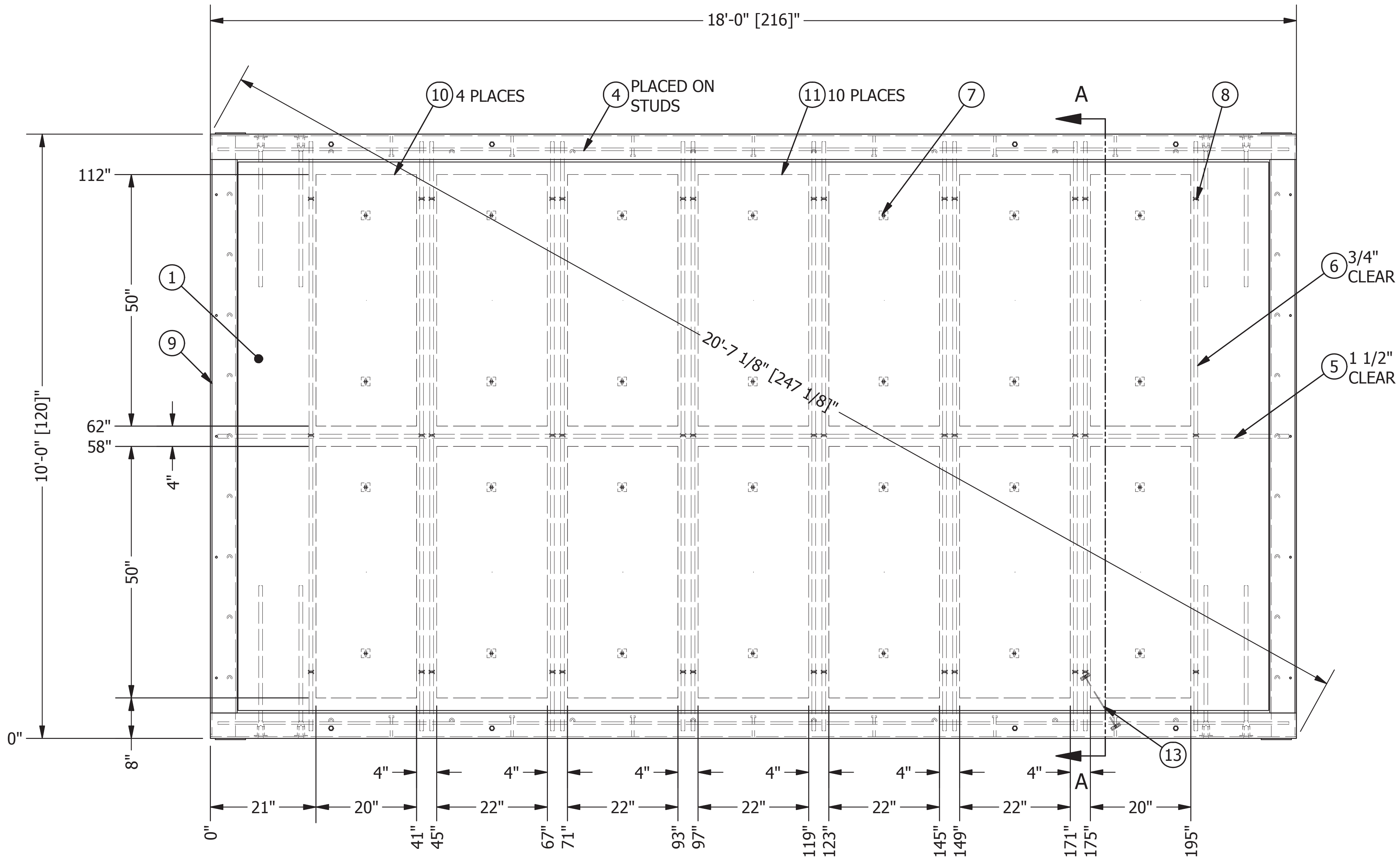
FILENAME: SKBR02S.dwg	
DESIGN BY: M. TREKELL	DATE: 11/4/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 6 OF 6	
DRAWING NO.: SKBR02S	REV: P

PART LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
1	2.1725	CU.YD.	100052-002	CONCRETE, 1 CUBIC YARD BATCH, FLOOR	216.000 in	120.000 in		1
2	.892	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	214.000 in	96.000 in		1
3	.241	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	214.000 in	26.000 in		1
4	35.5	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	213.000 in			2
5	17.75	FT.	112503	REBAR #6 (3/4") #19 METRIC, GRADE 60	213.000 in			1
6	136.5	FT.	112503	REBAR #6 (3/4") #19 METRIC, GRADE 60	117.000 in			14
7	28	Each	119013	REBAR CHAIR, PLASTIC, MESH WITH BASE 1"				28
8	42	Each	119016	REBAR CHAIR, PLASTIC, #6, 3/4"				42
9	1	Each	22-1000X1800-00	PMTR ANGLE FRAME ASSY H.S.10'0"X18'				1
10	83.333	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	50.000 in	20.000 in	3.000 in	4
11	229.167	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	50.000 in	22.000 in	3.000 in	10
12	2.00000 ft	ft	141034	FLATBAR, 1/4" X 4, GRADE 36	6.000 in			4
13	1	Each	540237	GROUND STRAP ASSEMBLY, STRUCTURE, 12" SOLID				1

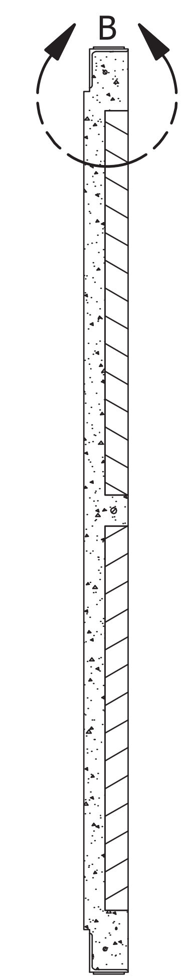
SHOP DETAILS	
DWG. NO.	DESCRIPTION
12-001	CONCRETE STEP JOINT DETAIL
12-002	CONCRETE RIB SECTION DETAILS



DETAIL B
SCALE 1:8



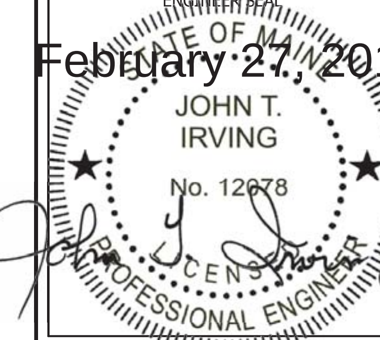
STRUCTURAL LAYOUT-FLOOR
2.17 CU.YD.
SCALE 1:25



SECTION A-A
SCALE 1:25

C	JCL	02/28/12	REPLACED 4" PAD WITH 6"PAD	JA
REV	BY	DATE	DESCRIPTION	APP BY

ENGINEER SEAL



February 27, 2013

Cellxion
A Division of Sabre Industries, Inc.
5031 Hazel Jones Road
Bossier City, LA 71111
voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

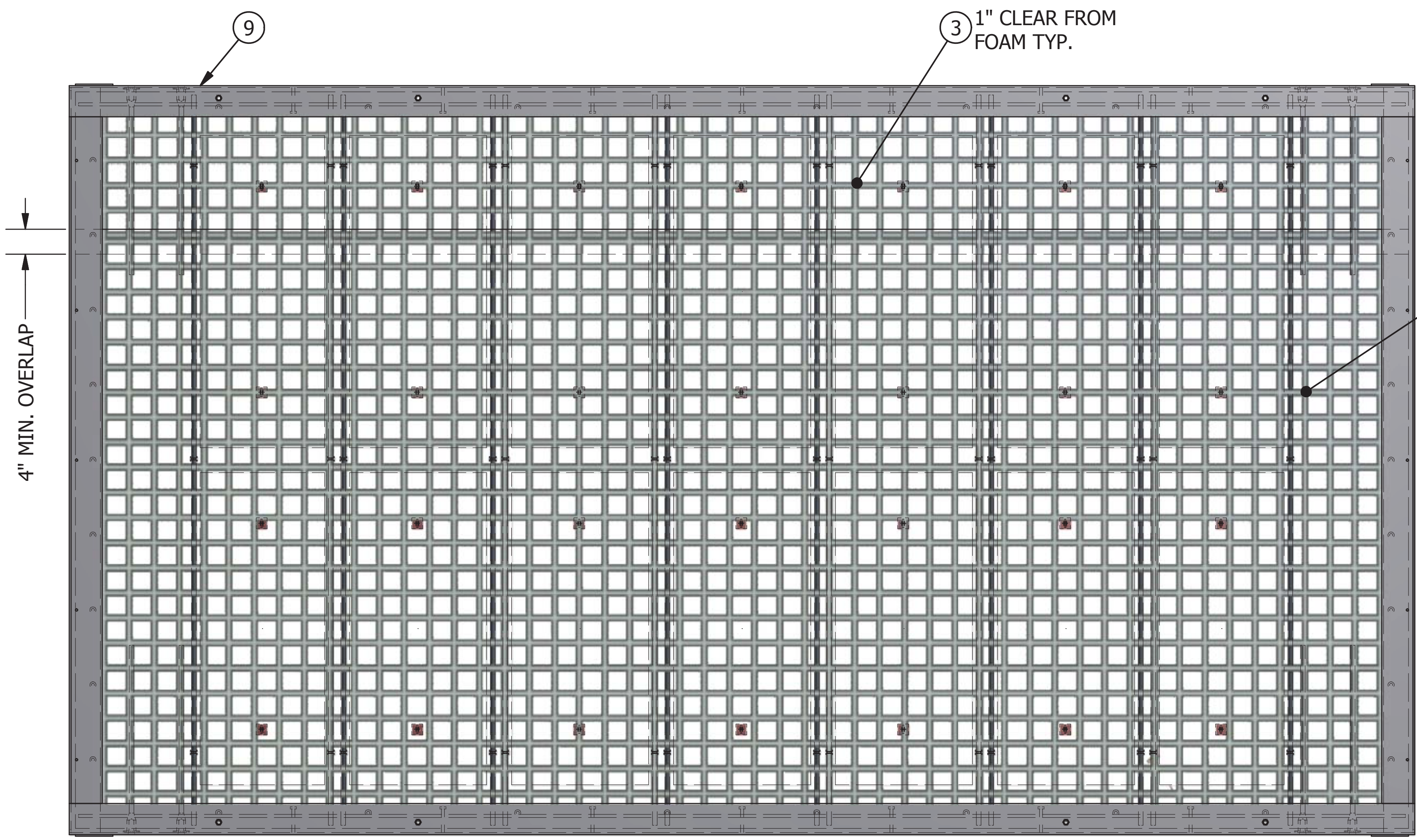
CUSTOMER:

PROJECT:
CONCRETE FLOOR ASSEMBLY KIT 10'-0"X18'-0"

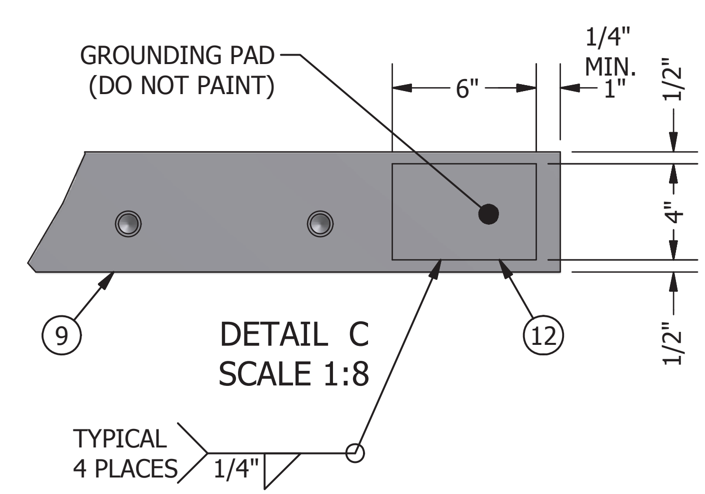
FILENAME: 221-1000X1800-02.dwg	
DESIGN BY: D. CHRISTOPHE	DATE: 5/4/2010
DRAWN BY: D. CHRISTOPHE	DATE: 5/4/2010
CHECKED BY: G. BRINKMAN	DATE: 5/4/2010
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:
SHEET NO.: 1 OF 2	
DRAWING NO.: 221-1000X1800-02	REV: C

PART LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
2	.892	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	214.000 in	96.000 in	1
3	.241	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	214.000 in	26.000 in	1
9	1	Each	22-1000X1800-00	PMTR ANGLE FRAME ASSY H.S.10'0"X18'			1
12	2.00000 ft	ft	141034	FLATBAR, 1/4" X 4, GRADE 36	6.000 in		4

CENTER PAD ON ALLOWABLE SPACE BETWEEN LIFTING PAD AND CORNER OF FLOOR FRAME



MESH LAYOUT
SCALE 1:25



DETAIL C
SCALE 1:8

ENGINEER SEAL
STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED PROFESSIONAL ENGINEER
February 27, 2013

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CUSTOMER:

PROJECT:
CONCRETE FLOOR ASSEMBLY KIT 10'-0"X18'-0"

FILENAME:
221-1000X1800-02.dwg

DESIGN BY: D. CHRISTOPHE	DATE: 5/4/2010
DRAWN BY: D. CHRISTOPHE	DATE: 5/4/2010
CHECKED BY: G. BRINKMAN	DATE: 5/4/2010
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:

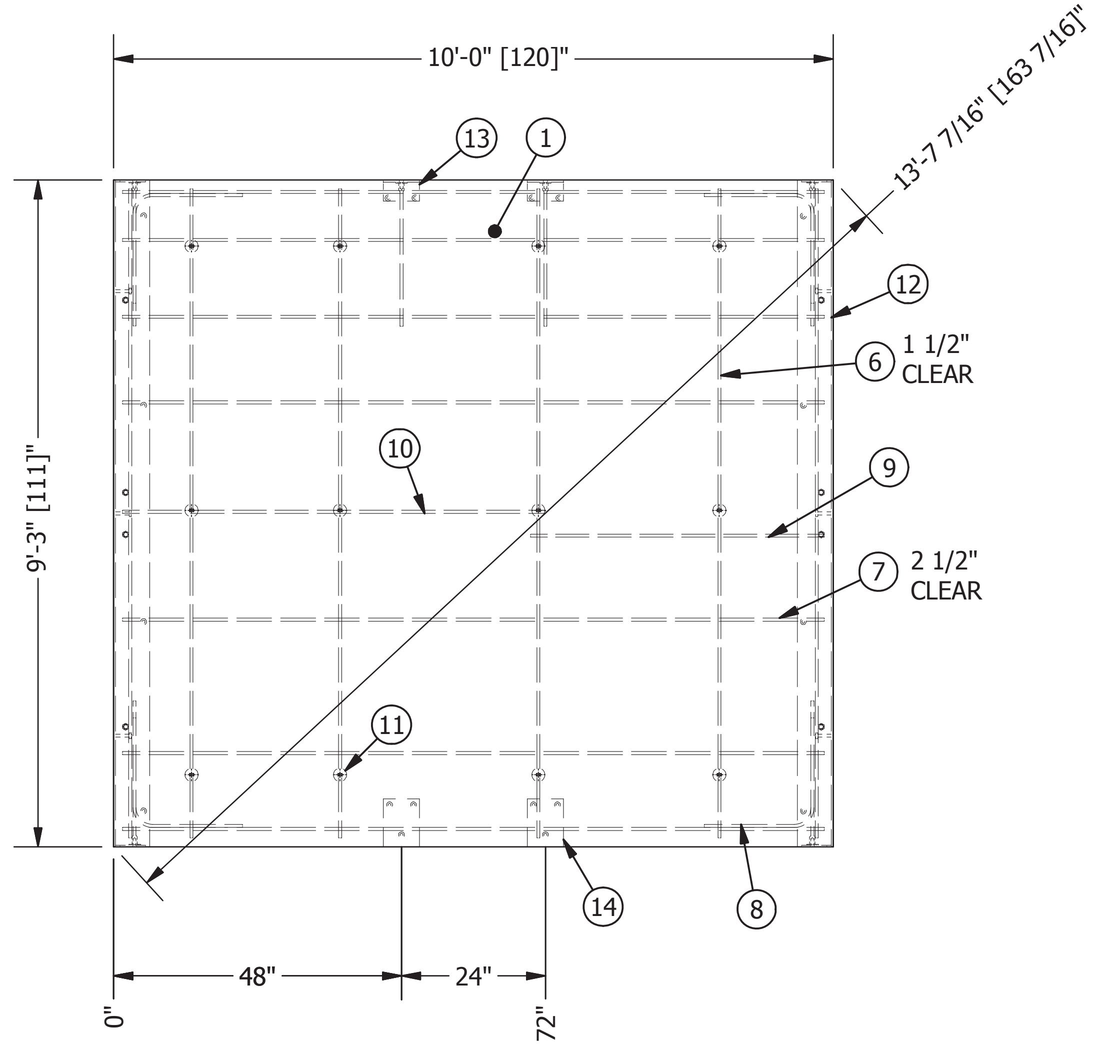
SHEET NO.: 2 OF 2

DRAWING NO.: 221-1000X1800-02 REV: C

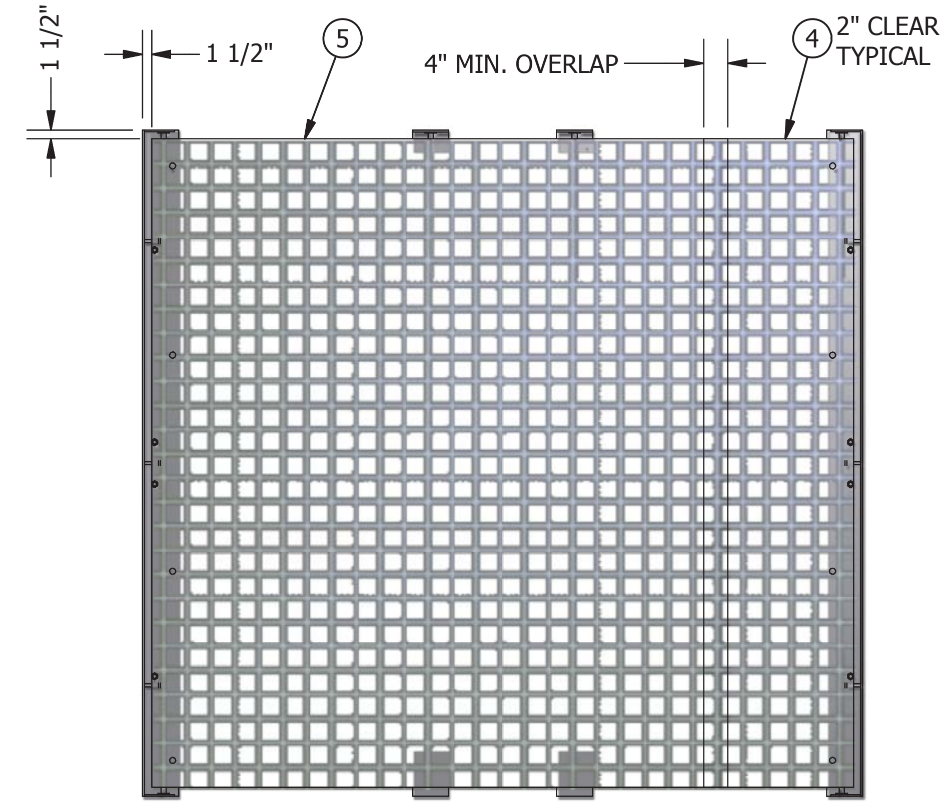
PART LIST								
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	DEPTH	PCS
1	1.142	CU.YD.	100052-001	CONCRETE, 1 CUBIC YARD BATCH, WALLS	111.000 in	120.000 in		1
2	1	Each	10RH1000-03	END WALL RAIL ANGLE,TOP,4" WALL				1
3	1	Each	10RH1000-04	END WALL RAIL ANGLE,BOTTOM,4" WALL				1
4	.117	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	25.000 in		1
5	.45	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	96.000 in		1
6	54	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	108.000 in			6
7	68.25	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	117.000 in			7
8	12	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	36.000 in			4
9	4.083	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	49.000 in			1
10	5.875	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	70.500 in			1
11	12	EA.	119015	REBAR CHAIR, PLASTIC, #4, 1 1/2"				12
12	2	EA.	221011	WALL EMBED ANGLE ASSEMBLY, 6" X 4" X 111"				2
13	2	Each	222000	INSERT ANGLE, WALL TO ROOF, 3.5" X 3.5" X 6"				2
14	2	EA.	223100	INSERT PLATE, WALL TO FLOOR/WALL				2

SHOP DETAILS	
DWG NO.	DESCRIPTION
14-001	WALL/FLOOR EMBED DETAIL
14-002	WALL/ROOF EMBED DETAIL
14-004	WALL DETAIL BLOCKOUT SECTION

WALL ASSEMBLY WEIGHT: 4250.698 lbmass
KEY WORDS: STD;AC2,L15,T12;AC1.5,R21,T39,AC1.5,R21,75.1875



STRUCTURAL LAYOUT END WALL (EXTERIOR VIEW)
SCALE 1:32



MESH LAYOUT
SCALE 1:32

NOTES:

1. SEE PROJECT SPECIFIC PLANS FOR ALL REQUIRED PVC PENETRATION AND BLOCKOUT SPECIFICAITONS.
2. CUT WIRE MESH AROUND ALL BLOCKOUTS.

ENGINEER SEAL
February 27, 2013
STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
PROFESSIONAL ENGINEER

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CUSTOMER:

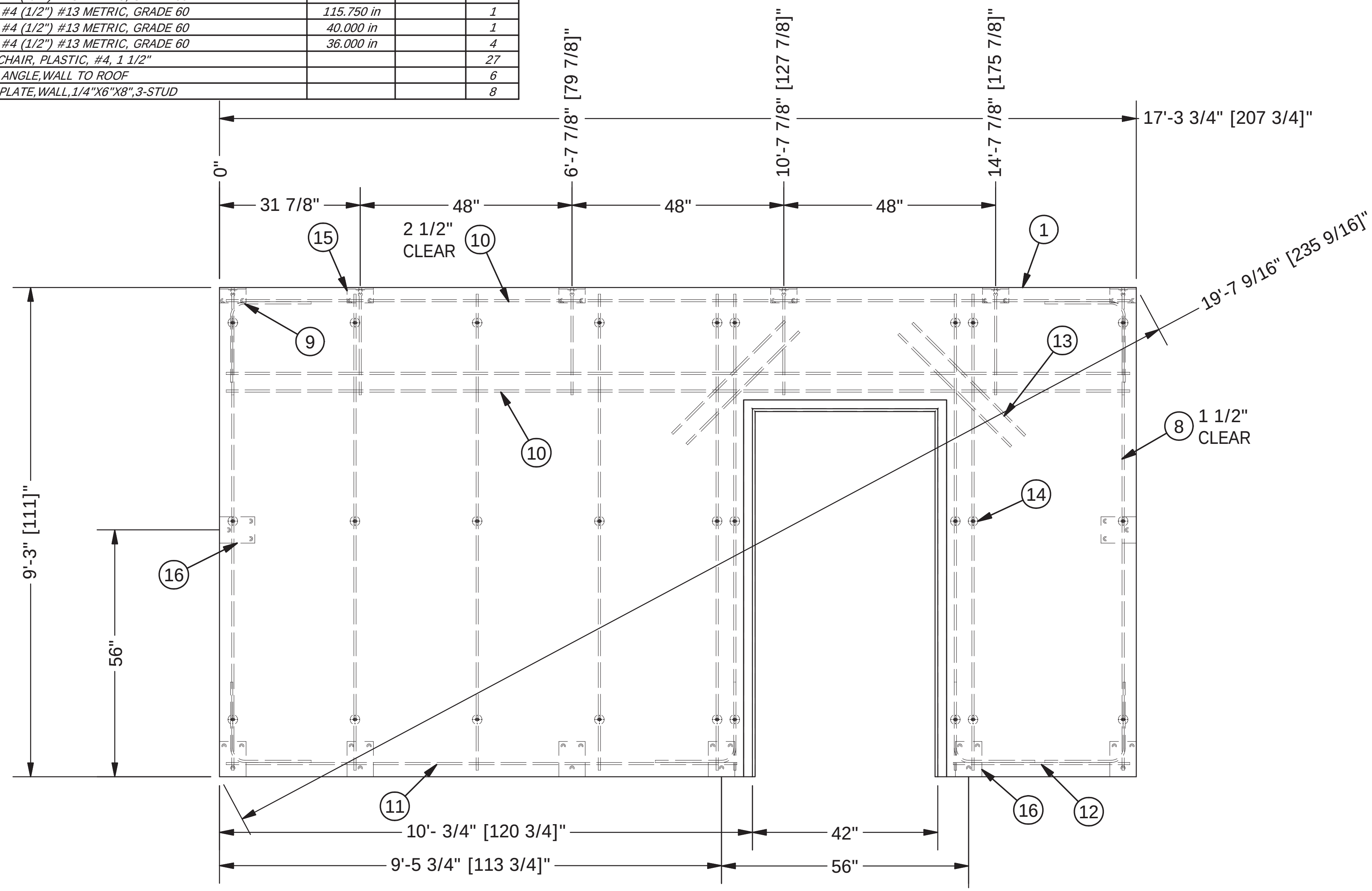
PROJECT:
CONCRETE END WALL ASSEMBLY KIT
10'0" X 9'3"

FILENAME: 222-1000X0903-008.dwg	
DESIGN BY: M. TREKELL	DATE: 11/3/2010
DRAWN BY: M. TREKELL	DATE: 11/3/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/3/2010
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:
SHEET NO.: 1 OF 1	
DRAWING NO.: 222-1000X0903-008	REV:

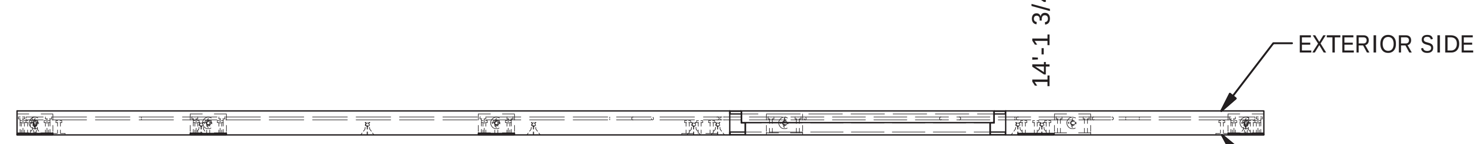
PARTS LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
1	1.63	CU.YD.	100052-001	CONCRETE, 1 CUBIC YARD BATCH, WALLS			1
2	1	Each	10RH2000-01	SIDE WALL RAIL ANGLE, 20'-0" (PRODUCTION TOOL)			1
3	1	Each	10RH2000-02	SIDE WALL RAIL ANGLE, 20'-0" (PRODUCTION TOOL)			1
4	2	Each	10RV0903-01	SIDE WALL RAIL ANGLE, 9'-3" (PRODUCTION TOOL)			2
5	.45	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	96.000 in	1
6	.416	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	88.750 in	1
7	.131	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	28.000 in	1
8	81	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	108.000 in		9
9	18	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	36.000 in		6
10	51.188	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	204.750 in		3
11	9.646	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	115.750 in		1
12	3.333	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	40.000 in		1
13	12	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	36.000 in		4
14	27	EA.	119015	REBAR CHAIR, PLASTIC, #4, 1 1/2"			27
15	6	EA.	222000	INSERT ANGLE,WALL TO ROOF			6
16	8	EA.	223100	EMBED PLATE,WALL,1/4"X6"X8",3-STUD			8

SHOP DETAILS	
DWG NO.	DESCRIPTION
14-001	WALL/FLOOR EMBED DETAIL
14-002	WALL/ROOF EMBED DETAIL
14-004	WALL DETAIL BLOCKOUT SECTION

WALL ASSEMBLY WEIGHT: 6174.999 lbmass
KEY WORDS: STD;DR3670,R45



STRUCTURAL LAYOUT - SIDE WALL
SCALE 1:32

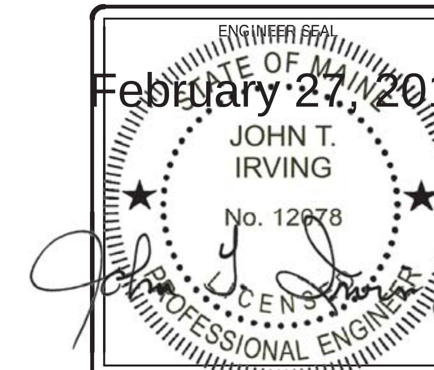


BOTTOM VIEW
SCALE 1:32

NOTES:

1. SEE PROJECT SPECIFIC PLANS FOR ALL REQUIRED PVC PENETRATION AND BLOCKOUT SPECIFICAITONS.

ENGINEER SEAL



February 27, 2013

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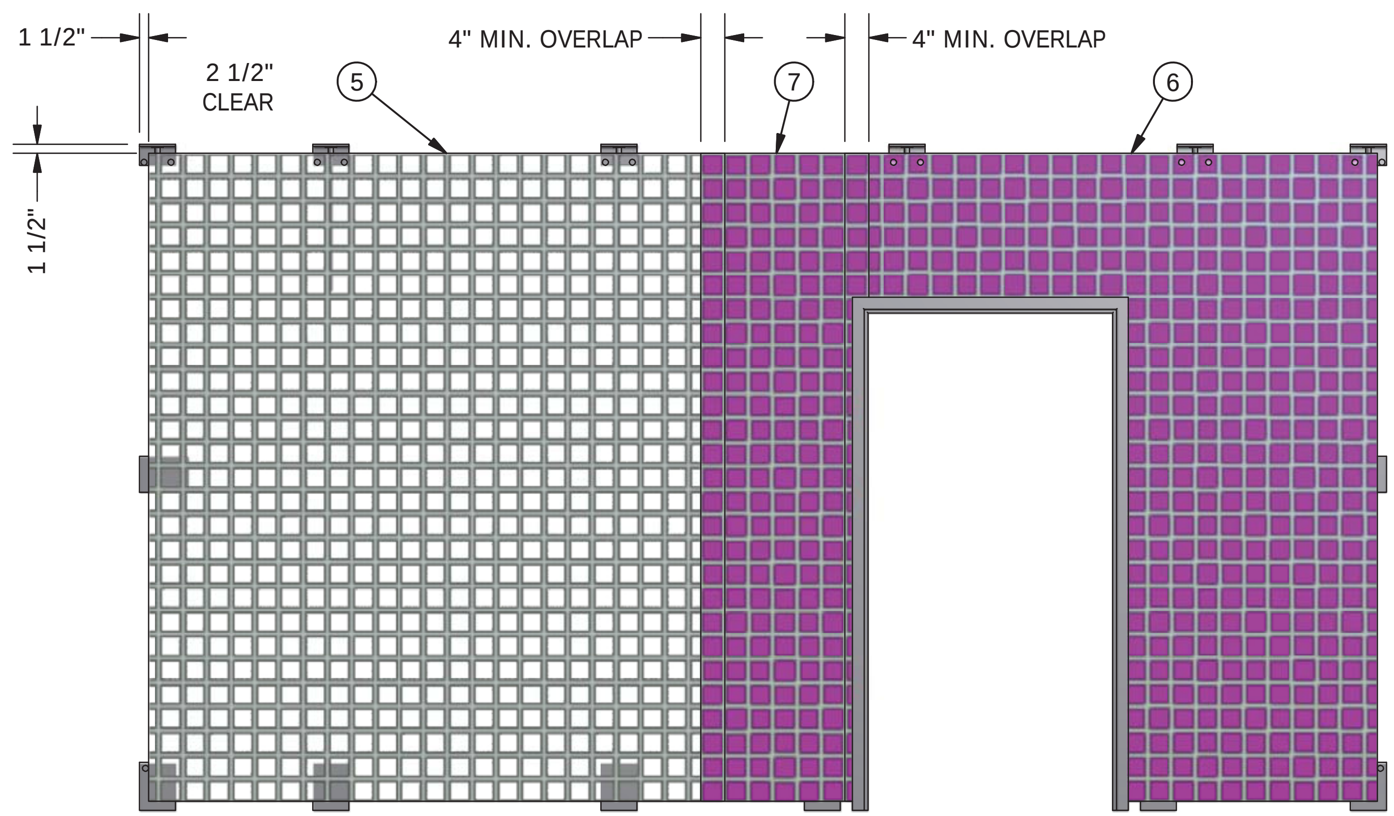
fax: 318-213-2919
www.cellxion.com

CUSTOMER:

PROJECT:
CONCRETE SIDE WALL ASSEMBLY KIT
18'0"X9'3"

FILENAME:	
223-1800X0903-001.dwg	
DESIGN BY: M. TREKELL	DATE: 11/1/2010
DRAWN BY: M. TREKELL	DATE: 11/2/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/2/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 1 OF 2	
DRAWING NO.: 223-1800X0903-001	REV:

PARTS LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
5	.45	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	96.000 in	1
6	.416	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	88.750 in	1
7	.131	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	28.000 in	1



MESH LAYOUT
SCALE 1:32

ENGINEER SEAL
STATE OF MAINE
JOHN T.
IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER
February 27, 2013

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5031 Hazel Jones Road
Bossier City, LA 71111
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fax: 318-213-2919
www.cellxion.com

CUSTOMER:

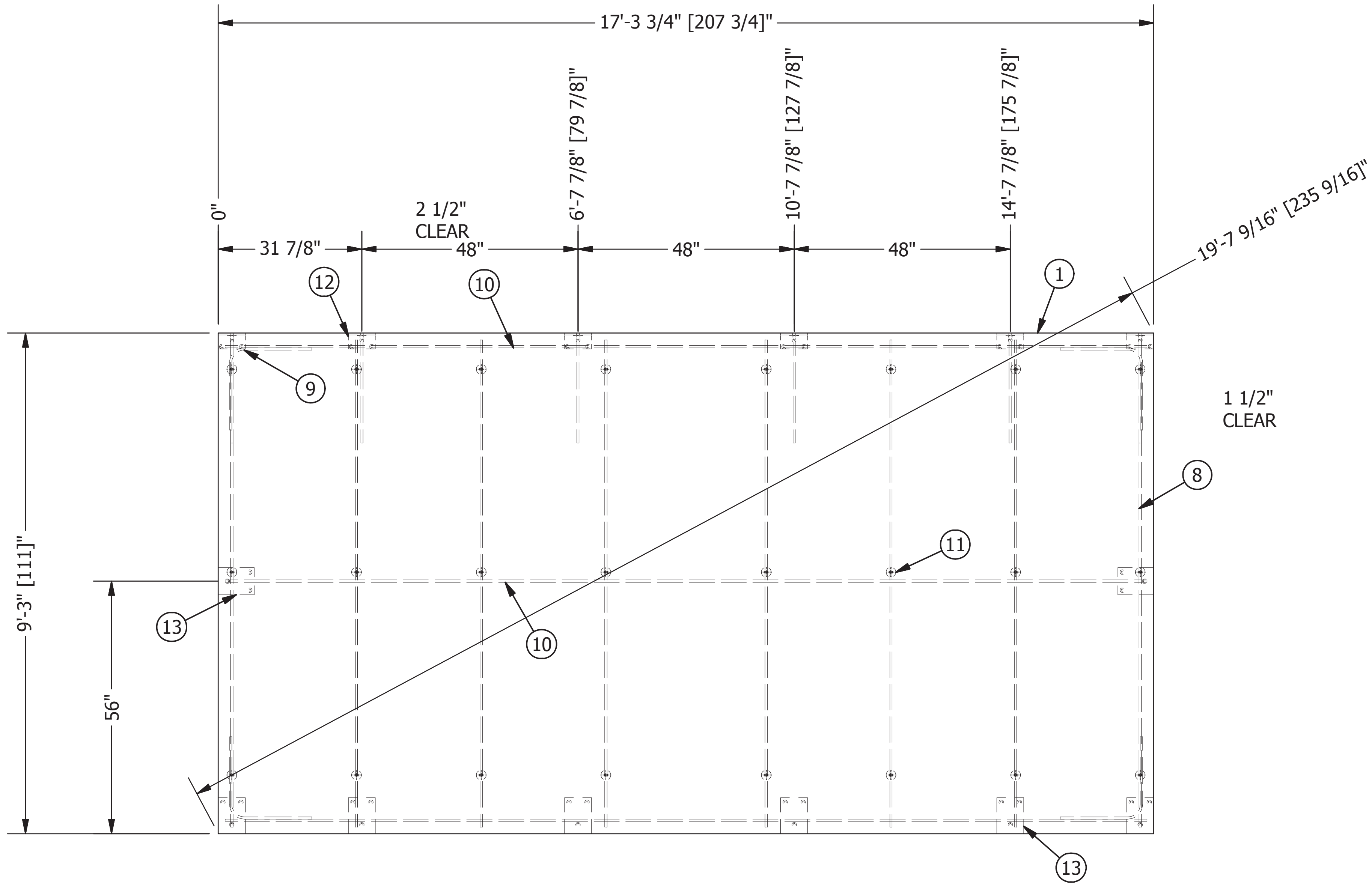
PROJECT:
CONCRETE SIDE WALL ASSEMBLY KIT 18'0"X9'3"

FILENAME: 223-1800X0903-001.dwg	
DESIGN BY: M. TREKELL	DATE: 11/1/2010
DRAWN BY: M. TREKELL	DATE: 11/2/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/2/2010
ENGINEERED BY:	DATE:
APPROVED BY: S. LEGGETT	DATE: 11/8/2010
SHEET NO.: 2 OF 2	
DRAWING NO.: 223-1800X0903-001	REV:

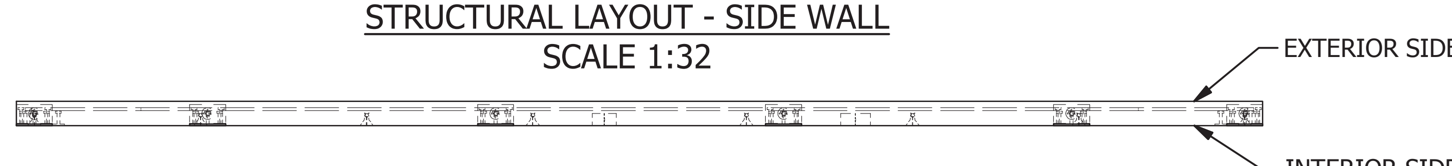
PARTS LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
1	1.977	CU.YD.	100052-001	CONCRETE, 1 CUBIC YARD BATCH, WALLS		207.750 in	1
2	1	Each	10RH2000-01	SIDE WALL RAIL ANGLE, 20'-0" (PRODUCTION TOOL)			1
3	1	Each	10RH2000-02	SIDE WALL RAIL ANGLE, 20'-0" (PRODUCTION TOOL)			1
4	2	Each	10RV0903-01	SIDE WALL RAIL ANGLE, 9'-3" (PRODUCTION TOOL)			2
5	.45	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	96.000 in	1
6	.416	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	88.750 in	1
7	.131	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	28.000 in	1
8	72	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	108.000 in		8
9	12	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	36.000 in		4
10	51.188	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	204.750 in		3
11	24	EA.	119015	REBAR CHAIR, PLASTIC, #4, 1 1/2"			24
12	6	Each	222000	INSERT ANGLE, WALL TO ROOF, 3.5" X 3.5" X 6"			6
13	8	EA.	223100	INSERT PLATE, WALL TO FLOOR/WALL			8
21	.347	FBM	360151	INSULATION,EPS,FOAM,RAW MATL B-FOOT	5.000 in	5.000 in	1

SHOP DETAILS	
DWG NO.	DESCRIPTION
14-001	WALL/FLOOR EMBED DETAIL
14-002	WALL/ROOF EMBED DETAIL
14-004	WALL DETAIL BLOCKOUT SECTION

WALL ASSEMBLY WEIGHT: N/A
KEY WORDS: STD;BO10.75X12.75,L65.25,B30



STRUCTURAL LAYOUT - SIDE WALL
SCALE 1:32



BOTTOM VIEW
SCALE 1:32

NOTES:

1. SEE PROJECT SPECIFIC PLANS FOR ALL REQUIRED PVC PENETRATION AND BLOCKOUT SPECIFICAITONS.

ENGINEER SEAL

February 27, 2013

STATE OF MAINE
JOHN T. IRVING
No. 12678
LICENSED
PROFESSIONAL ENGINEER

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voice: 318-213-2900
fax: 318-213-2919
www.cellxion.com

CUSTOMER:

PROJECT:
CONCRETE SIDE WALL ASSEMBLY KIT 18'0"X9'3"

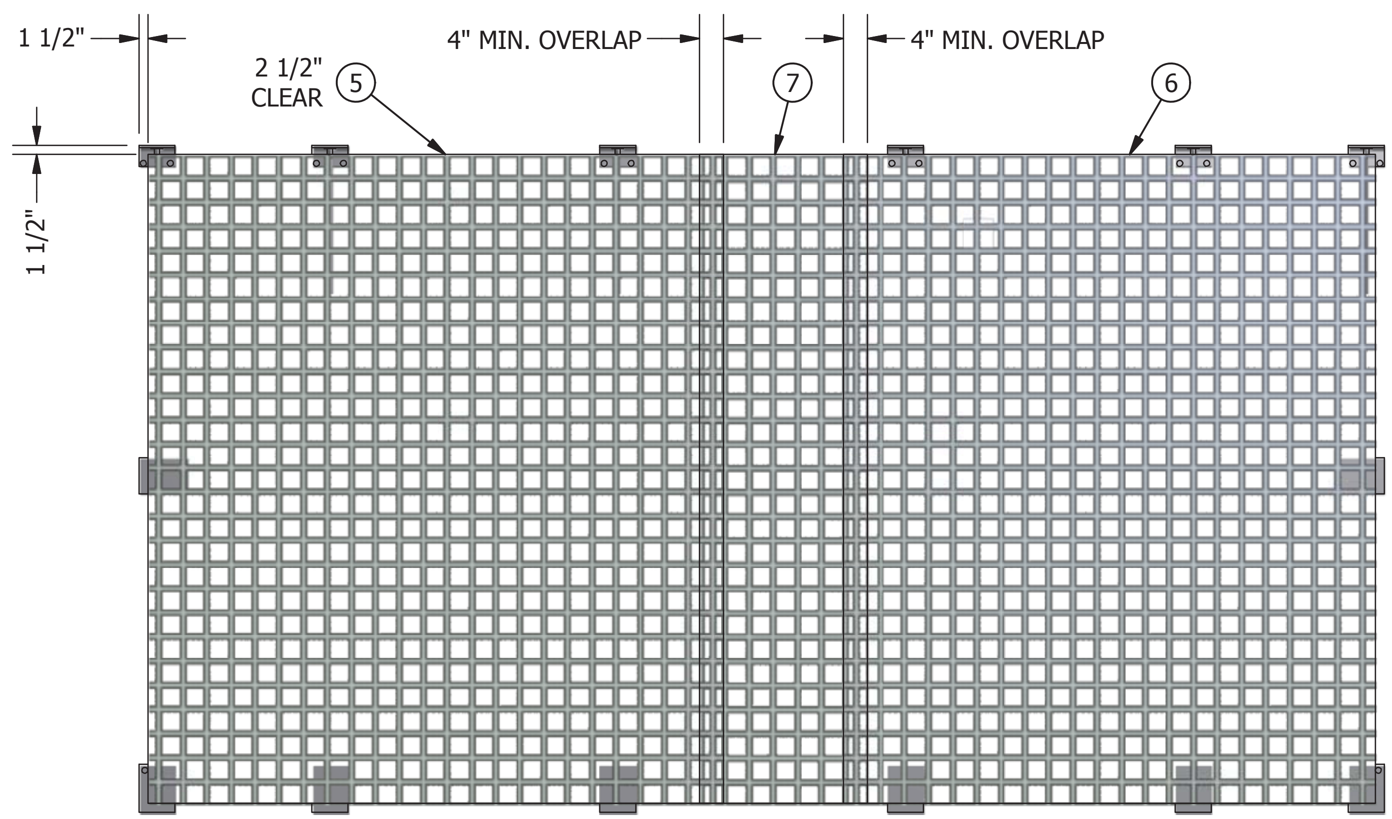
FILENAME:
223-1800X0903-002.dwg

DESIGN BY: *M. TREKELL*	DATE: *11/1/2010*
DRAWN BY: *M. TREKELL*	DATE: *11/2/2010*
CHECKED BY: *W. RODRIGUEZ*	DATE: *11/2/2010*
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:

SHEET NO.:
1 OF 2

DRAWING NO.:	REV:
223-1800X0903-002	

PARTS LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
5	.45	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	96.000 in	1
6	.416	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	88.750 in	1
7	.131	EA.	110001	MESH,WIRE,4X4,W4XW4,8'X20'	108.000 in	28.000 in	1



MESH LAYOUT
SCALE 1:32

ENGINEER SEAL
STATE OF MAINE
JOHN T. IRVING
No. 12078
LICENSED
PROFESSIONAL ENGINEER
February 27, 2013

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CUSTOMER:

PROJECT:
CONCRETE SIDE WALL ASSEMBLY KIT 18'0"X9'3"

FILENAME:
223-1800X0903-002.dwg

DESIGN BY:	DATE:
M. TREKELL	*11/1/2010*
DRAWN BY: *M. TREKELL*	DATE: *11/2/2010*
CHECKED BY: *W. RODRIGUEZ*	DATE: *11/2/2010*
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:

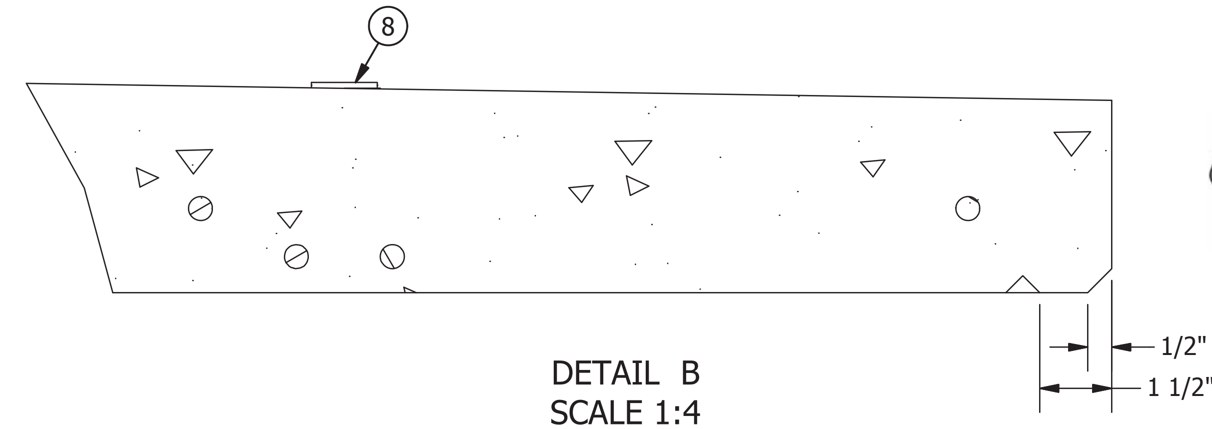
SHEET NO.:
2 OF 2

DRAWING NO.: ***223-1800X0903-002***
REV:

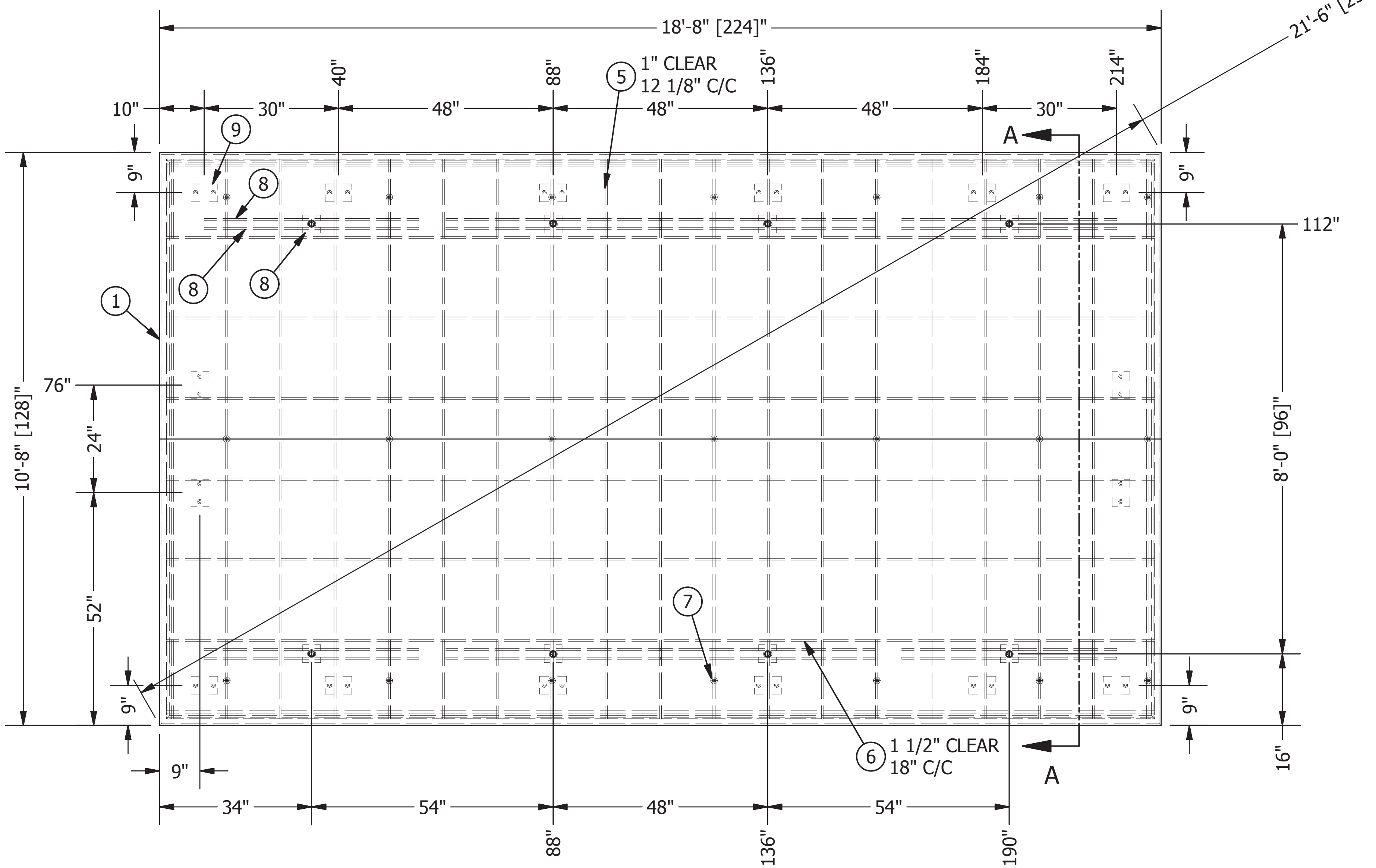
PART LIST							
ITEM	QTY	U/M	P/N	DESCRIPTION	LENGTH	WIDTH	PCS
1	2.765	CU.YD.	100052-003	CONCRETE, 1 CUBIC YARD BATCH, ROOF			1
2	2	Each	10RP1008-01	ROOF RAIL END PLATE , 10'-8",4/5 (PRODUCTION TOOL)			2
3	2	Each	10RR1000-01	ROOF END RAIL ANGLE, 10'-0" (PRODUCTION TOOL)			2
4	2	Each	10RR2100-01	SIDE ROOF RAIL ANGLE, 21'-0" (PRODUCTION TOOL)			2
5	197.917	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	125.000 in		19
6	147.333	FT.	112502	REBAR, #4 (1/2") #13 METRIC, GRADE 60	221.000 in		8
7	21	Each	119010	REBAR CHAIR, PLASTIC, #4 W/ BASE 1"			21
8	8	EA.	220211-01	ANCHOR,SWIFT LIFT,ASSEMBLY			8
9	16	EA.	223000	INSERT PLATE, ROOF TO WALL, 4" X 6" X 1/4"			16

SHOP DETAILS	
DWG NO.	DESCRIPTION
10-002	WALL TO ROOF CONNECTION
13-002	CONCRETE SHELTER ROOF EAVE SECTION
13-003	ROOF ANCHOR LIFTING INSERT DETAIL

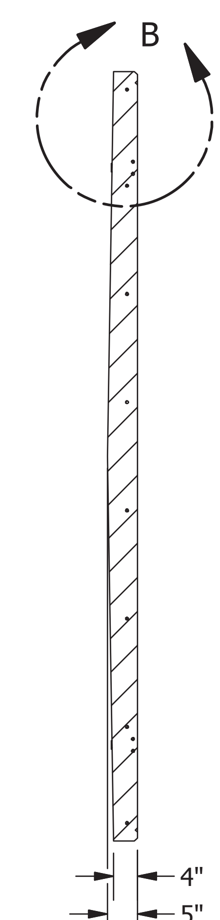
ROOF ASSEMBLY WEIGHT: N/A
KEY WORDS: S31.875,48,48,48;E48,24



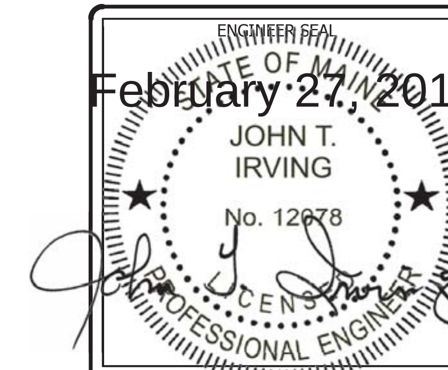
DETAIL B
SCALE 1:4



STRUCTURAL LAYOUT - ROOF
SCALE 1:32



SECTION A-A
SCALE 1:32



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CUSTOMER:

PROJECT:
10'0"X18'0"
CONCRETE ROOF
ASSEMBLY KIT

FILENAME: 226-1000X1800X4-00.dwg	
DESIGN BY: M. TREKELL	DATE: 11/3/2010
DRAWN BY: M. TREKELL	DATE: 11/4/2010
CHECKED BY: W. RODRIGUEZ	DATE: 11/4/2010
ENGINEERED BY:	DATE:
APPROVED BY:	DATE:
SHEET NO.: 1 OF 1	
DRAWING NO.: 226-1000X1800X4-00	REV: