



DENNIS & MAGNANI
STRUCTURAL CONSULTANTS, P.C.

February 16, 2010

Mr. Andrew Hobbs
 Hobbs Building Systems
 4321 70th Street
 Urbandale, IA 50322-1706

**RE: Thermal Resistance Calculations of
 Hobbs Standard Contour Panel/Stucco
 Ready Exterior Walls**

Dear Andy;

At your request, Dennis & Magnani Structural Consultants, P.C. has performed calculations to determine thermal resistance (R-Value) of fully constructed 8'-4", 9'-4" and 10'-4" Hobbs Standard Contour Panel/Stucco Ready Exterior Walls.

Thermal resistance calculations were performed based on procedures in Chapters 25, 26 and 27 in the **ASHRAE Handbook – 2009 Fundamentals**. The constructed Hobbs Building Systems product is an insulated concrete form system wall. Wall thickness is 9 7/8 inch. Extruded furring assemblies made from Polyvinyl Chloride (PVC) are provided at 16 inch on center vertically. Specially cut expanded polystyrene rigid board foam is placed between the furring assemblies. The foam is held in place with Acrylonitrile Butadiene Styrene (ABS) clips that fasten to the furring assemblies. Refer to the attached Hobbs Building Systems drawings for information on how the foam is cut and fits to the furring channels. The walls are typical reinforced with deformed steel bars at the vertical furring assemblies and horizontally at the top and bottom of the wall.

You have provided information on the thermal conductivity for the expanded polystyrene rigid board foam. The foam is Type II ASTM C578 with a nominal density of 1.5 pounds per cubic feet. The corresponding R-Value is 4.76 hrft²°F/Btu·in at a 25 °F temperature. Concrete is assumed to have a thermal conductivity of 0.08 hrft²°F/Btu·in. A weighted R-Value was calculated for the differing Hobbs Building Systems wall heights. Refer to the attached calculations for the weighted R-Values. The "parallel-path method" outlined in Chapter 27 of the **ASHRAE Handbook** was used to determine the weighted R-Values of the Hobbs Building Systems walls.

The inside surface of the wall is assumed to be finished with an interior air film with an R-Value of 0.68 hrft²°F/Btu and 1/2 inch gypsum wall board with a R-Value of 0.45 hrft²°F/Btu. The outside wall is assumed to be finished with 3/4 inch stucco composed of Portland cement, lime, sand and water over lath with an R-Value of 0.20 hrft²°F/Btu·in. The PVC furring assemblies essentially penetrates the full depth of the wall. These represent a small cross sectional area of the wall and are judged to have a negligible effect on the overall R-Value of the wall.

Table 1 presents the calculations of the R-Values of the 8'-4", 9'-4" and 10'-4" walls


COMPONENT	WALL HEIGHT		
	8'-4"	9'-4"	10'-4"
Gypsum Wallboard, 1/2 Inch	0.45	.045	.045
Interior Air Film	0.68	.068	.068
Hobbs ICF Standard Contour Panel/Stucco Ready Exterior Wall	31.66	31.91	32.09
Stucco, 3/4 Inch	0.15	0.15	0.15
TOTAL R-VALUE	32.94	33.19	33.37

The total thermal resistance (R-Value) of the walls are 32.94, 33.19 and 33.37 hrft²°F/Btu for the 8'-4", 9'-4" and 10'-4" Hobbs wall assemblies respectively. The thermal transmittance (U-Factor) is the inverse of the total R-Values and is equal to 0.030 Btu/ hrft²°F for all three assemblies.

This report is provided to illustrate an example of thermal properties of Hobbs Building Systems Standard Contour Panel/Stucco Ready Exterior walls. Different Hobbs Building Systems wall systems and/or different wall finishes will result in different total R-values. A warranty or certification of total R-values indicated or inferred can not be provided by the author and are beyond the scope of this report.

Please call if you have questions or if you require additional information.

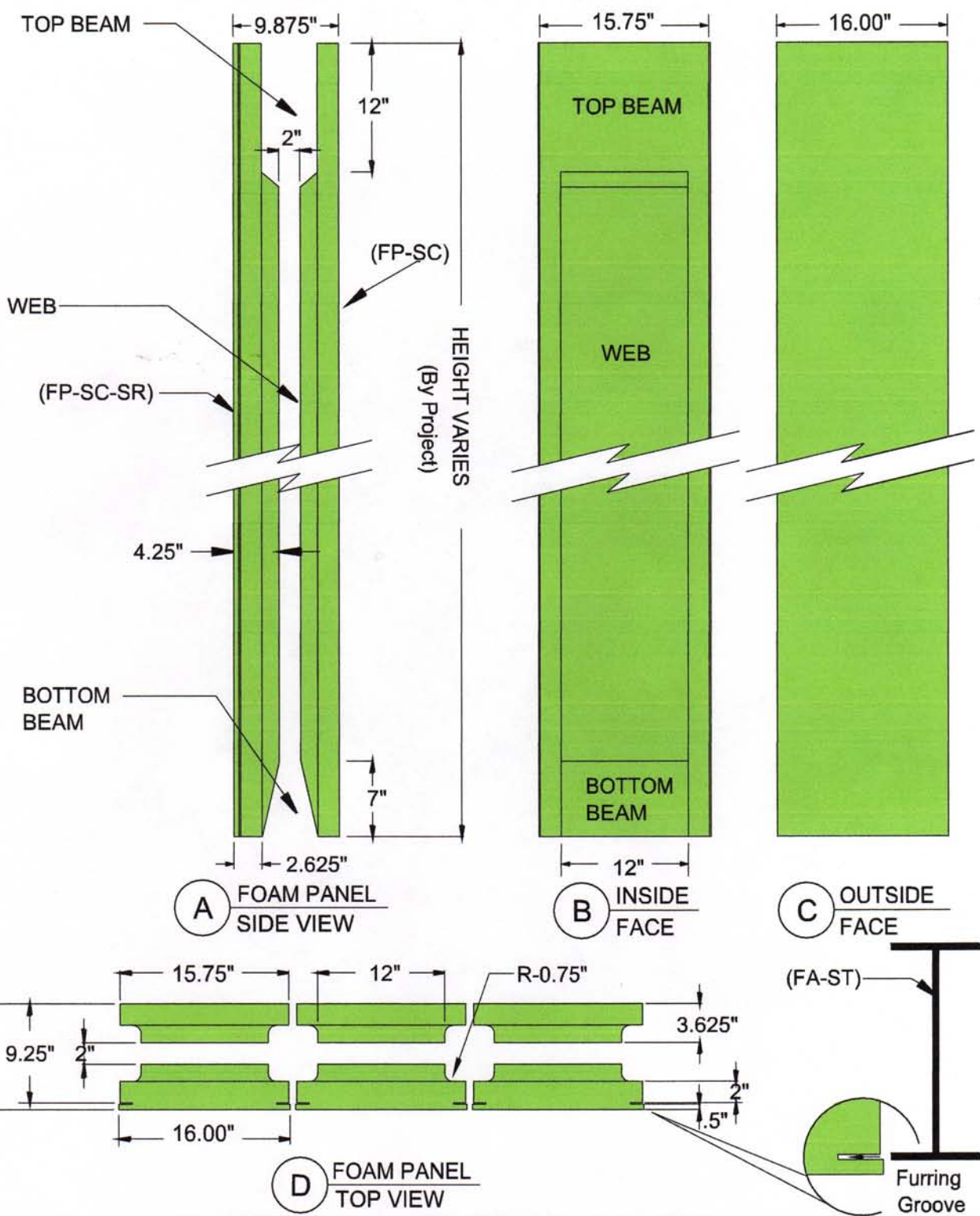
Sincerely,


Randy J. Magnani, P.E.
President

RJM/lis

Enc.





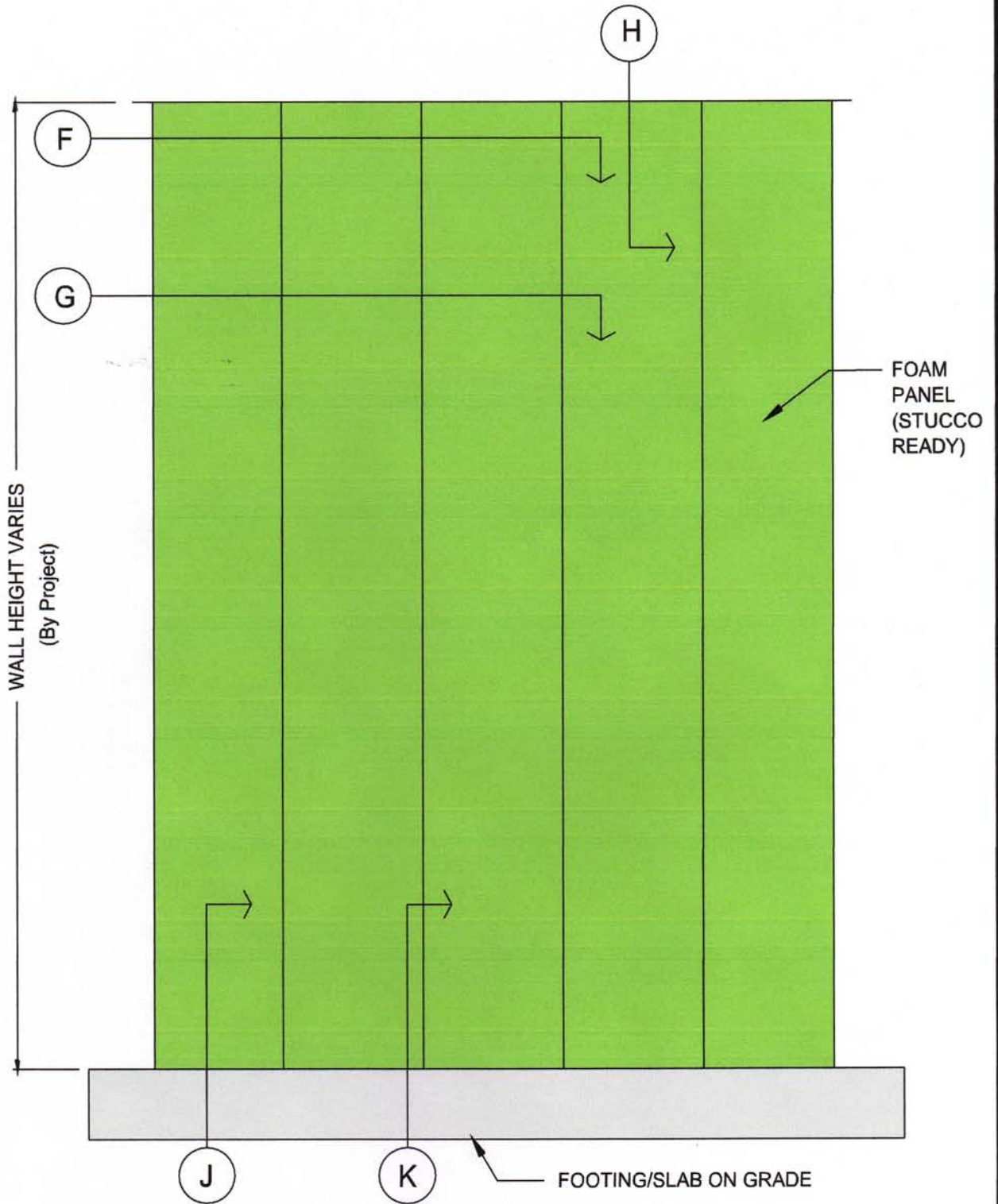
Vertical ICF Wall System
 Tell: (515) 473-9255
 Fax: (515) 974-4399
 Toll free: 866-904-9255

All drawings and details shall be constructed in accordance with the local building code regulations and construction practices

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**STUCCO READY DESIGN
 FOAM PANEL - DETAILS**

Date: 05/08/2009	Drawn By: S.K.V.	Scale: N.T.S.
Revision #: 1	DWG #:	
Revision Date: 10/27/2009	SR-20.00	



HOBBS

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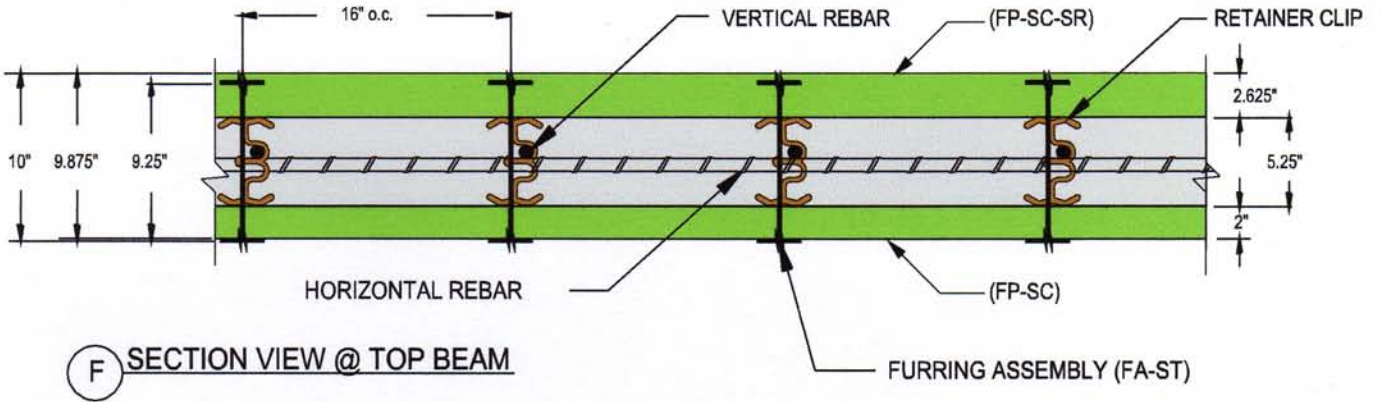
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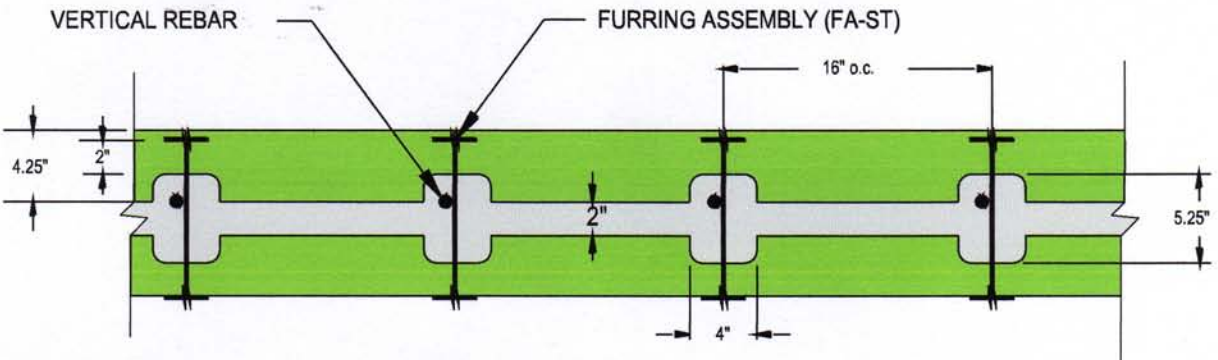
STUCCO READY DESIGN

ASEMBLED FORM
 ELEVATION
 FOUNDATION ONLY

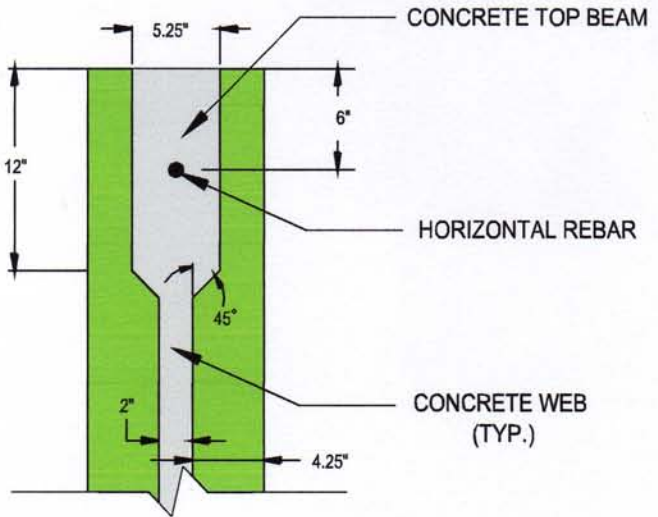
Date: 05/08/2009	Drawn By: S.K.V.	Scale: N.T.S.
Revision #: 1	DWG #: SR-30.00	
Revision Date: 10/27/2009		



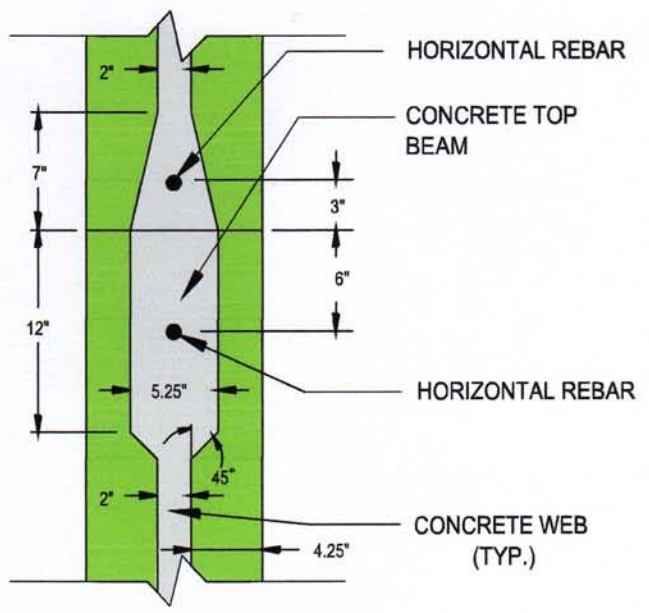
F SECTION VIEW @ TOP BEAM



G SECTION VIEW @ COLUMNS & WEB



H SECTION VIEW @ TOP BEAM & WEB



I SECTION VIEW @ TOP BEAM & WEB

NOTE: "DRAWINGS ARE EXAMPLES ONLY. REFER TO PROJECT ENGINEERING FOR EXACT SPECIFICATIONS, SUCH AS, REBAR SIZE AND PLACEMENT LOCATIONS"



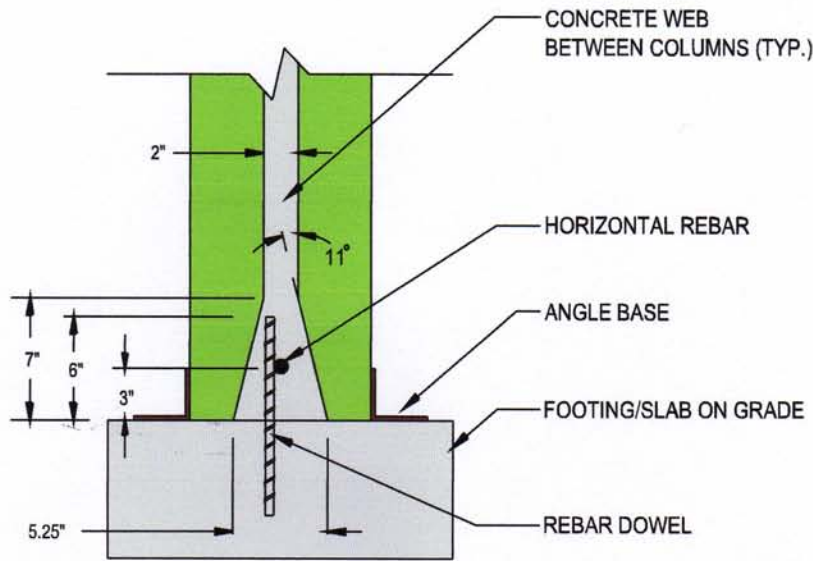
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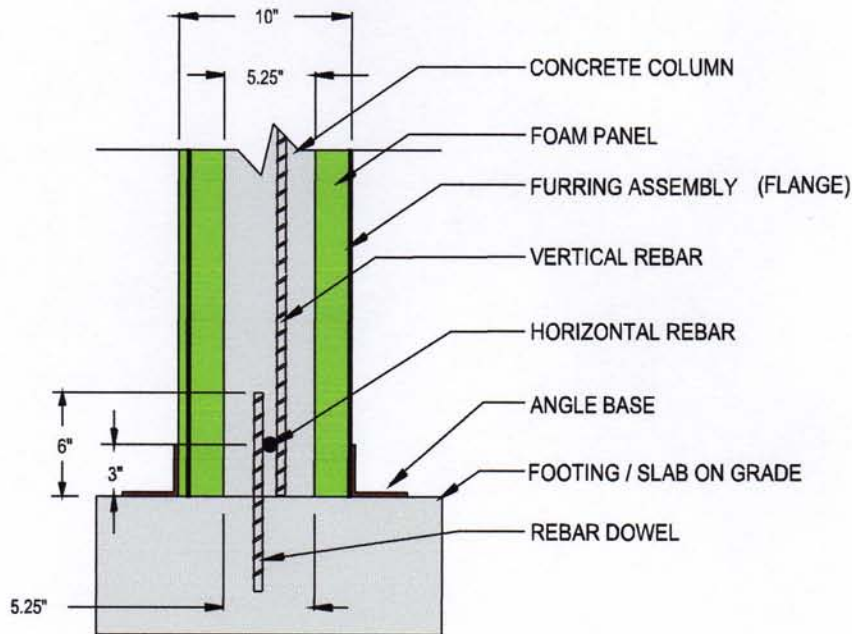
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STUCCO READY DESIGN
 ASSEMBLE FORM
 SECTIONS F, G, H & I

Date: 05/08/2009	Drawn By: S.K.V.	Scale: N.T.S.
Revision #: 1	DWG #: SR-30.02	
Revision Date: 10/27/2009		



J SECTION VIEW @ BOTTOM BEAM & WEB



K SECTION VIEW @ BOTTOM BEAM & COLUMN

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Vertical ICF Wall System

Tell: (515) 473-9255

Fax: (515) 974-4399

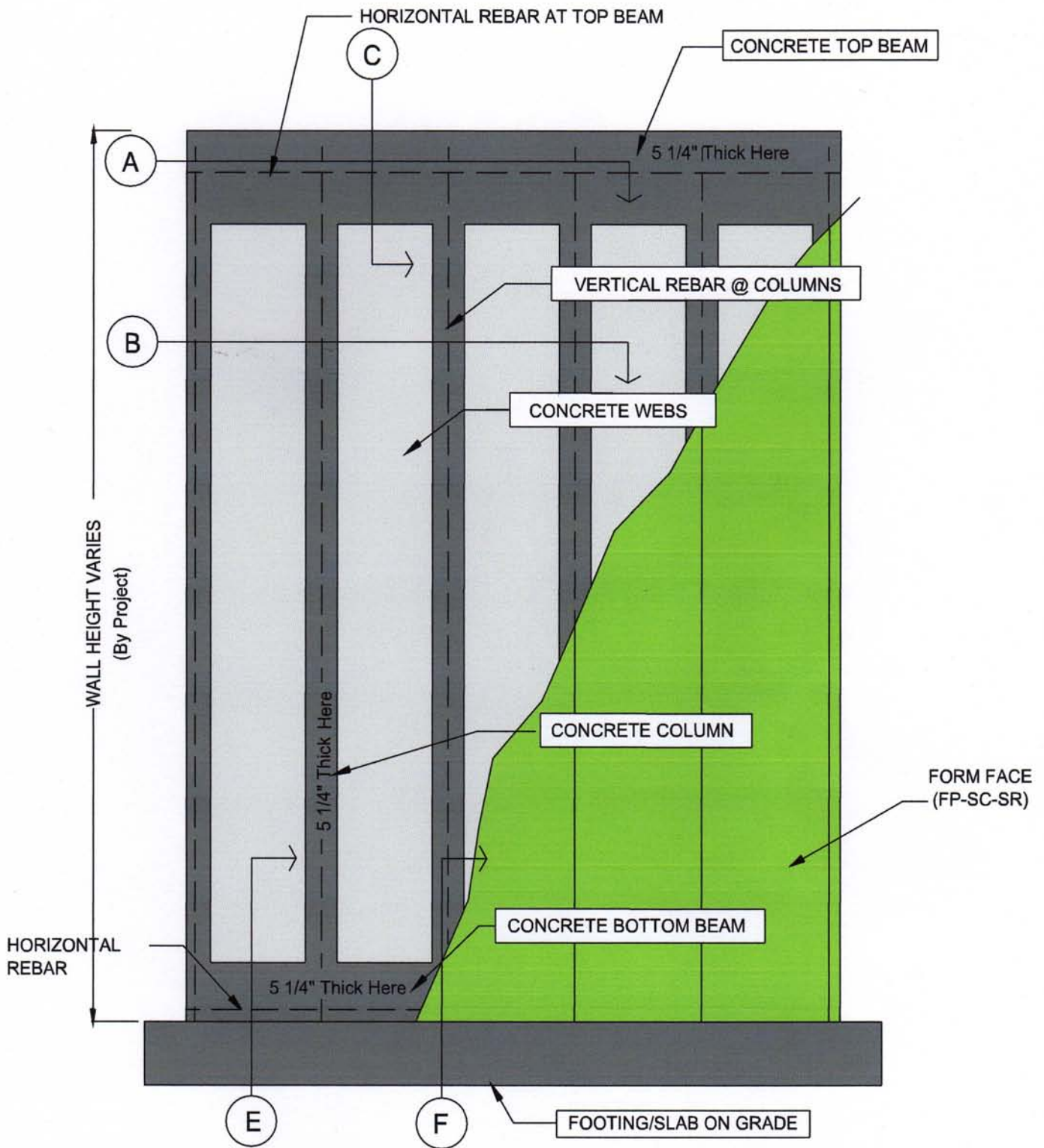
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STUCCO READY DESIGN
ASSEMBLE FORM
SECTIONS J & K

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Revision #: 1	DWG #: SR-30.03	
Revision Date: 10/27/2009		



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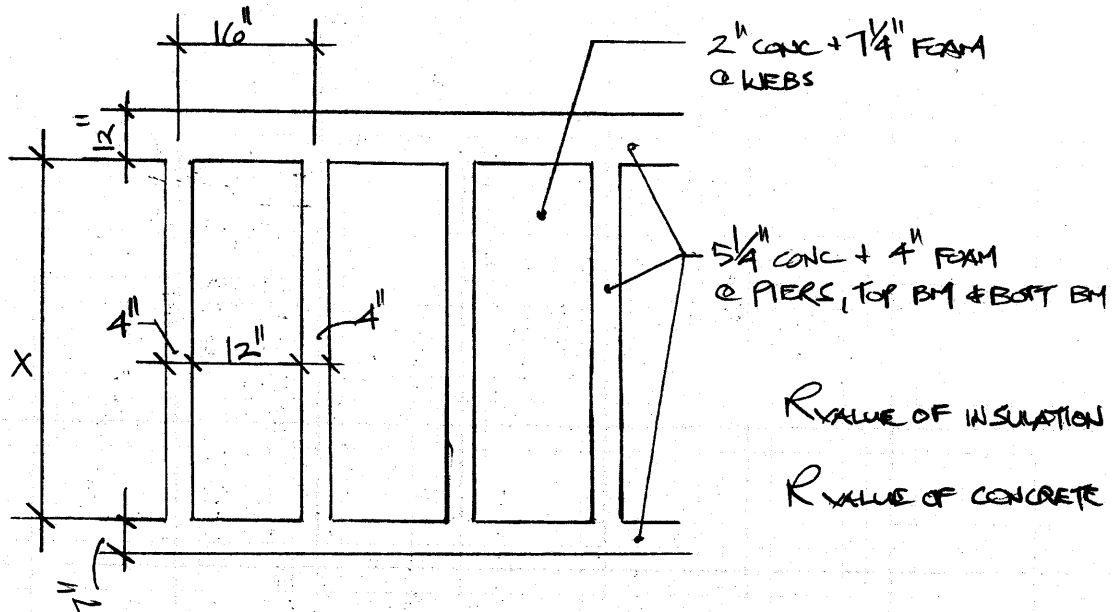
STUCCO READY DESIGN
 CONCRETE STRUCTURE
 CUT-AWAY ELEVATION
 FOUNDATION ONLY

Date: 05/08/2009	Drawn By: S.K.V.	Scale: N.T.S.
Revision #: 1	DWG #: SR-40.00	
Revision Date: 10/27/2009		

PROJECT: STANDARD CONTOUR PANEL R-VALUES SHT. NO. ONE

SUBJECT: PARALLEL PATH METHOD PER ASHRAE DESIGN BY: RJM DATE: 2/15/10

GEOMETRY - STANDARD CONTOUR PANEL



2" CONC + 1 1/4" FOAM @ WEBS

5 1/4" CONC + 4" FOAM @ PIERS, TOP BM & BOT BM

R VALUE OF INSULATION = 4.96

R VALUE OF CONCRETE = 0.08

8'-4" WALL

$X = 6'-9"$

ASSUME 16" WALL SEGMENT

AREA OF PIERS AND BEAMS = $(1.0')(1.33') + (0.5833)(1.33) + (0.33)(6.75)$
 $= 4.36 \text{ FT}^2 \rightarrow 0.393\% \text{ OF WALL AREA}$

AREA OF WEB = $(1.0')(6.75)$
 $= 6.75 \text{ FT}^2 \rightarrow 0.607\% \text{ OF WALL AREA}$

TOTAL AREA OF WALL = $(1.33')(8.33')$
 11.11 FT^2

PROJECT: STANDARD CONTOUR PANEL R-VALUES SHT. N° 2

SUBJECT: PARALLEL PATH METHOD PER ASHRAE DESIGN BY: KUM DATE: 2/15/10

R VALUE OF PIERS AND BEAMS :

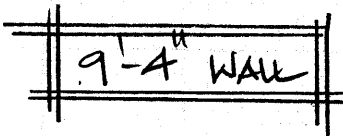
$$\begin{array}{c} \text{INSULATION} \\ (4'') \\ \text{CONC} \\ (5\frac{1}{4}'') \end{array} (4.10) + (0.08) = 19.46$$

R VALUE OF WEB

$$(1\frac{1}{4}'') (4.10) + (2'') (0.08) = 34.61$$

AVERAGE R VALUE OF 8'-4" STANDARD CONTOUR PANEL

$$\frac{(0.393)(19.46) + (0.607)(34.61)}{(1.0)} = \underline{\underline{28.69}}$$



$$x = 1'-9''$$

ASSUME 10" WALL SEGMENT

$$\begin{aligned} \text{AREA OF PIERS AND BEAMS} &= (1.0')(1.33') + (0.5833)(6.33) + (0.33)(1.15) \\ &= 4.69 \text{ FT}^2 \longrightarrow 0.377\% \text{ OF WALL AREA} \end{aligned}$$

$$\begin{aligned} \text{AREA OF WEB} &= (1.0')(7.15') \\ &= 7.15 \text{ FT}^2 \longrightarrow 0.623\% \text{ OF WALL AREA} \end{aligned}$$

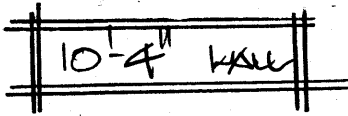
$$\begin{aligned} \text{TOTAL AREA OF WALL} &= (1.33)(9.33') \\ &= 12.44 \text{ FT}^2 \end{aligned}$$

AVERAGE R VALUE OF 9'-4" STANDARD CONTOUR PANEL

$$\frac{(0.377)(19.46) + (0.623)(34.61)}{(1.0)} = \underline{\underline{28.94}}$$

PROJECT: STANDARD CONTOUR PANEL R-VALUES SHEET NO. 3

SUBJECT: PARALLEL-PATH METHOD PER ASHRAE DESIGN BY: ROM DATE: 2/15/10



$$x = 8'-9''$$

ASSUME 16" WALL SEGMENT

$$\begin{aligned} \text{AREA OF PIERS AND BEAMS} &= (1.0)(1.33') + (0.5833)(1.33) + (0.33)(8.75) \\ &= 5.03 \text{ ft}^2 \longrightarrow 0.365\% \text{ OF WALL AREA} \end{aligned}$$

$$\begin{aligned} \text{AREA OF WEB} &= (1.0')(8.75') \\ &= 8.75 \text{ ft}^2 \longrightarrow 0.635\% \text{ OF WALL AREA} \end{aligned}$$

$$\begin{aligned} \text{TOTAL AREA OF WALL} &= (1.33)(10.33) \\ &= 13.78 \text{ ft}^2 \end{aligned}$$

AVERAGE R VALUE OF 10'-4" STANDARD CONTOUR PANEL

$$\frac{(0.365)(19.46) + (0.635)(34.67)}{(1.0)} = \underline{\underline{29.12}}$$

SUMMARY

8'-4" WALL	<u>R = 28.69</u> WEIGHTED AVERAGE
9'-4" WALL	<u>R = 28.94</u> WEIGHTED AVERAGE
10'-4" WALL	<u>R = 29.12</u> WEIGHTED AVERAGE

PROJECT: STANDARD CONTOUR PANEL R-VALUES SHIT. N° 4

SUBJECT: PARALLEL PATH METHOD PER ASHRAE DESIGN BY: RJM DATE: 2/15/10

STUCCO READY VERSION OF STANDARD CONTOUR PANEL

STUCCO READY VERSION OF PANEL HAS AN ADDITIONAL
 $\frac{5}{8}$ OF FOAM THICKNESS

$$\text{ADDITIONAL R-VALUE} = (0.625)(4.76) = 2.97$$

8 $\frac{1}{4}$ " WALL	28.09 + 2.97 =	<u>31.06</u> WEIGHTED AVERAGE <u>STUCCO READY</u>
9 $\frac{1}{4}$ " WALL	28.94 + 2.97 =	<u>31.91</u> WEIGHTED AVERAGE <u>STUCCO READY</u>
10 $\frac{1}{4}$ " WALL	29.12 + 2.97 =	<u>32.09</u> WEIGHTED AVERAGE <u>STUCCO READY</u>