Naval Facilities Engineering Command
NAVFAC SOUTHEAST

CALCULATIONS

SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY
N 62467-05-D-0096

PRE-FINAL DESIGN ISSUE
MAY 15, 2009

US DEPARTMENT OF THE NAVY – NAVFAC SOUTHEAST

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FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

8.749 Acre Parcel
Located at
John C. Stennis Space Center
Hancock County Mississippi

Hydrology Study

April 6, 2009

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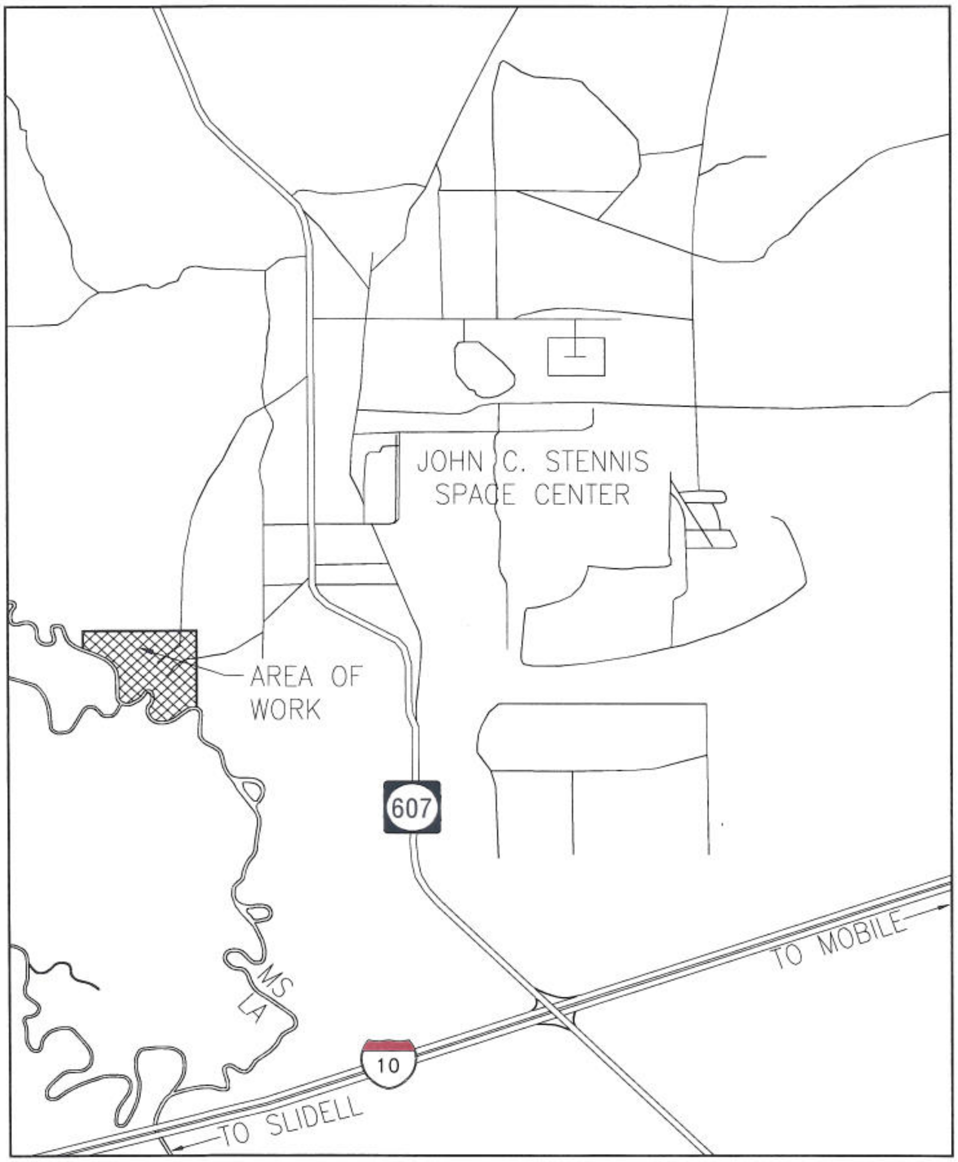


VICINITY MAP

N. T. S.

SOV RIVERINE AND COMBATANT
CRAFT OPERATIONS FACILITY
8.749 Acre Parcel
Located at
John C. Stennis Space Center
Hancock County Mississippi

SITE DESCRIPTION

The property is bounded by Lower Gainesville Road on the North, Endeavour Blvd. on the East, the Pearl River on the East, and by the East Pearl River Canal South of the Parcel.

CURRENT DRAINAGE

The property has several peaks and valleys with a variety of contours throughout the site that allow drainage into the East Pearl River Canal at the South end of the site.

STUDY METHODOLOGY

The modified rational method was used to determine peak flows for the 10-year storm event for the limits of construction, both prior and post-development.

The swales were designed using the modified rational method for a 10-year storm event. The expected rainfall intensity was taken from Data Book for Civil Engineers Vol. 1 1960, Fig. "B" pg. 18-01 (Seelye).

The runoff from areas not serviced by a swale do not require any detention because prior and post development runoff patterns remain in place. Therefore no calculations for these areas were performed.

PROPOSED DRAINAGE

The bldg elevations are set at 16.00' and the end invert drain is set at 8.50'. On-site drainage swales are designed for a 10-year storm event and flow into an 18"x29" arch outlet pipe.

Rainwater shall run off the roofs into the gutter system and into the down spouts. Once in the down spouts water shall run onto the concrete aprons which will direct the water to the center and sides of the concrete aprons allowing the water to flow into the swales and out to the East Pearl River Canal as designed.

Improvements to the existing ditch that runs along the western limit of construction (gravel road) will preserve the natural drainage pattern and provide adequate drainage for the site development not serviced by the new swale.

Property to the north of the development will retain ponding characteristics post-development. All pond water created by the grading of the site will drain into an 8"CMP which is connected to the site swale that discharges into the East Pearl River Canal.

OVERALL SITE CALCULATIONS

PROJECT:	STENNIS RIVERINE
	STORMWATER RUN-OFF CALCULATIONS

Formulas used:

[1] RATIONAL METHOD: Q=Aci

where:
- Q= Peak discharge of watershed in cubic feet per second (cfs) due to maximum storm assumed.
- A= Area of watershed in acres.
- c= Coefficient of run-off [2].
- i= Intensity of rainfall in inches per hour based on concentration time. [3]

$$[4]\ TC= \frac{\left(L^{0.8}\left(\frac{1000}{c}-9\right)^{0.7}\right)}{(1140(s^{0.5}))}$$

where:
- TC= Time of concentration= time required for rain falling at most remote point to reach discharge point.
- c= Site run-off coefficient based on conditions shown.
- s= Percent slope of overland flow.

AREA OF WORK - PRIOR DEVELOPMENT

10 Year Frequency

Q_1 = Aci

Watertight Surfaces		0	sqft =	0.000	Acres
c(1) =	0.9				
Gravel Surface		10000	sqft =	0.230	Acres
c(2) =	0.25				
Green Space		371109	sqft =	8.519	Acres
c(3) =	0.15				
Summary		381109	sqft =	8.749	Acres
c =	0.15				

Duration (D) = Time of concentration (TC)

where	L = 810	run-off length ft	Elev diff =	6
	c = 0.15	run-off coef		
	S = 0.7407	percent slope		
therefore	TC = D = 75.12	minutes		
Expected rainfall intensity	i = 3.15	in/hr		

Q_1 = **4.206 cfs**

AREA OF WORK - POST DEVELOPMENT

10 Year Frequency

Q_2 = Aci

Watertight Surfaces		130390	sqft =	2.993	Acres
c(1) =	0.9				
Gravel Surface		10000	sqft =	0.230	Acres
c(2) =	0.25				
Green Space		240719	sqft =	5.526	
c(3) =	0.15				
Summary		381109	sqft =	8.749	Acres
c =	0.41				

D = Time of concentration (TC)

where	L = 960	Runoff length ft	Elev diff =	5
	c = 0.41	Runoff coef		
	S = 0.5208	Percent Slope		
therefore	TC = D = 36.12	minutes or		
and from Rainfall Intensity Table	I = 3.15	in/hr		

Q_2 = **11.278 cfs**

References:
1. Chen, W.F. The Civil Engineering Handbook. 1995. Eq.# 31.1, pg. 1036
2. Seelye, Elwyn E. Data Book for Civil Engineers. Vol.1 1960. Tbl. B, pg. 18-02
3. Seelye, Elwyn E. Data Book for Civil Engineers. Vol.1 1960. Fig.B, pg. 18-01
4. Chen, W.F. The Civil Engineering Handbook. 1995. Tbl. 31.2 Regan Equation (n=0.013)
5. Chen, W.F. The Civil Engineering Handbook. 1995. Eq.# 28.32, pg. 969

CALCULATIONS FOR WATERSHED SERVICED BY NEW SWALE AND OUTLET PIPES

PROJECT:	STENNIS RIVERINE
	STORMWATER RUN-OFF CALCULATIONS

Formulas used:

[1] RATIONAL METHOD: Q=Aci

where:
- Q= Peak discharge of watershed in cubic feet per second (cfs) due to maximum storm assumed.
- A= Area of watershed in acres.
- c= Coefficient of run-off [2].
- i= Intensity of rainfall in inches per hour based on concentration time. [3]

$$\text{[4] TC=}\ \frac{\left(L^{0.8}\left(\frac{1000}{c}-9\right)^{0.7}\right)}{\left(1140\left(s^{0.5}\right)\right)}$$

where:
- TC= Time of concentration= time required for rain falling at most remote point to reach discharge point.
- c= Site run-off coefficient based on conditions shown.
- s= Percent slope of overland flow.

WATERSHED SERVICED BY DRAINAGE SWALE - POST DEVELOPMENT

10 Year Frequency

Q_1 = Aci

Watertight Surfaces			108688	sqft =	2.495	Acres
c(1) =	0.9					
Gravel Surface			0	sqft =	0.000	Acres
c(2) =	0.25					
Green Space			94492	sqft =	2.169	Acres
c(3) =	0.15					
Summary			203180	sqft =	4.664	Acres
c =	0.55					

Duration (D) = Time of concentration (TC)

where	L = 960	run-off length ft	Elev diff =	6
	c = 0.55	run-off coef		
	S = 0.6250	percent slope		
therefore	TC = D = 32.09	minutes		
Expected rainfall intensity	i = 3.15	in/hr		

Q_1 = 8.099 cfs

DISCHARGE END AREA REQUIREMENTS

10 Year Frequency

Area requirements for pipe servicing swale located in Zone #1 of the corresponding Key Plan

$$\text{[5] A=}\ \frac{Q}{\left(c\sqrt{(2gh)}\right)}$$

where:
- A= Discharge Area required
- g= Acceleration of gravity
- c= Discharge coefficient
- h= Hydraulic head
- Q= Flow volume from run-off

Pipe #1: Servicing swale located in Zone #1 of the corresponding Key Plan.

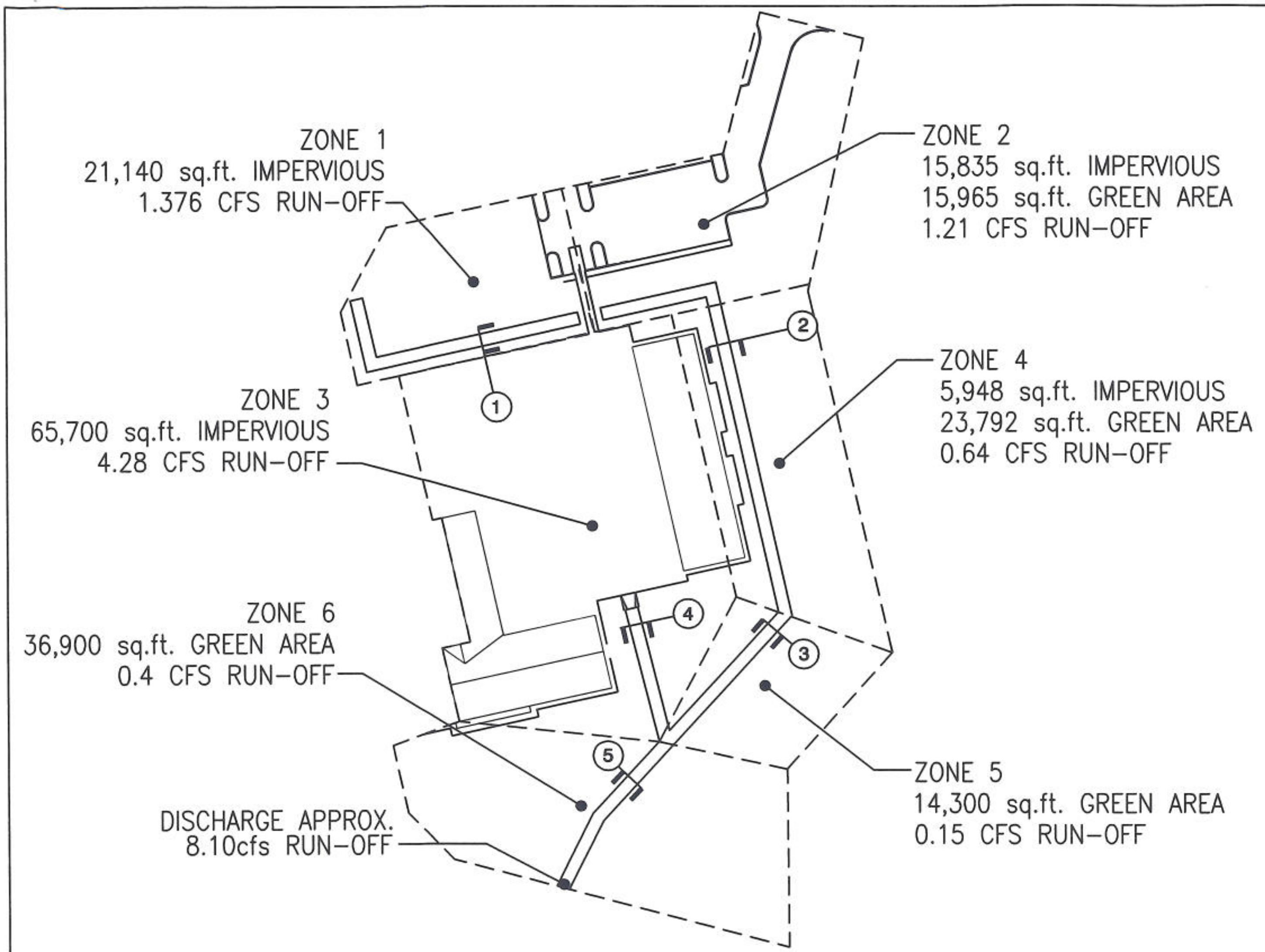
Q =	1.380	cfs	H =	3.80	feet
c =	0.62	coefficient	A =	0.14	sqft
g =	32.16	ft/ft/sec			

REQUIRED CONDUIT = 5.11 inch diameter

Pipe #2: Servicing all zones shown in the corresponding Key Plan.

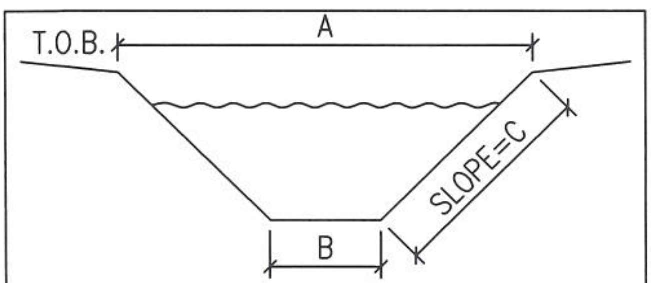
Q =	8.099	cfs	H =	3.80	feet
c =	0.62	coefficient	A =	0.84	sqft
g =	32.16	ft/ft/sec			

REQUIRED CONDUIT = 12.38 inch diameter



KEY PLAN OF WATERSHED SERVICED BY SWALE

N.T.S.



NO.	A	B	C
1	10'	2'	0.1:1
2	10'	4'	0.24:1
3	12'	4'	0.33:1
4	12'	4'	0.33:1
5	14'	4'	0.35:1

SWALE SECTION

N.T.S.

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BLDG. 2440/2441 CONVENTIONAL FOUNDATION DESIGN

January 16, 2009

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60% DESIGN BLDG 2441/2440

CONVENTIONAL SLAB ON GRADE

MODULUS OF SUBGRADE REACTION

TABLE 4-1 $K = \text{min} | lb | in^3 = K = 300$
TM 5-809-1

ALL SUBGRADE SHALL BE select GRANULAR material compacted to 95% STANDARD proctor Density

SOIL BEAR capacity 2000 psf

Assume NO ADVERSE SOIL CONDITIONS
Assume No Heavy DISTRIBUTED LOADS

MATERIAL properties

$f'c = 4000$ psi
$f_y = 60$ ksi

Concrete Flexural strength

$9\sqrt{f'c} = 9\sqrt{4000} = 569.2$ say $\underline{\underline{570}}$

TYPE TRAFFIC TABLE 5-1

FORK LIFT	# AXLES	AVG DV	MAX OPD	DESIGN VALUE
10K	1	50	50	8

TABLE 5-1 6.9 SAY 7"

CHECK 7" SLAB FOR STATIONARY LOAD

TABLE 3-1

$$d = 938 + \frac{570-550}{600-550}(1023-938) = \underline{\underline{972}}$$

$K = 300$ CONSTANT FACTOR 1.7 TABLE 3-1

$1.7 \times 972 = 1652.4$ SAY 1650 lb/FT^2

ASSUME MAX STATIONARY LOAD = 1200 lb/FT^2

1650 > 1200 $\underline{\underline{\text{OK}}}$

CHECK THICKED SLAB FOR EXTERIOR WAL

6" REINFORCED BLOCK	63 lb/FT^2 x 25 = 1575
4" BRICK VENEER	42 lb/FT^2 x 6 = 252
	1827 lb

$$P = 9.93\sqrt{F'c}\, t_2^{\,2} \sqrt[4]{\frac{K}{19{,}000\sqrt{F'c}\, t^3}}$$

$te = 24$

$Tc = 7$

$\sqrt{F'c} = 63.2$

$P = 3129.5 >> 1827$ $\underline{\underline{\text{OK}}}$

PERCENT STEEL TABLE 5-4 = .062

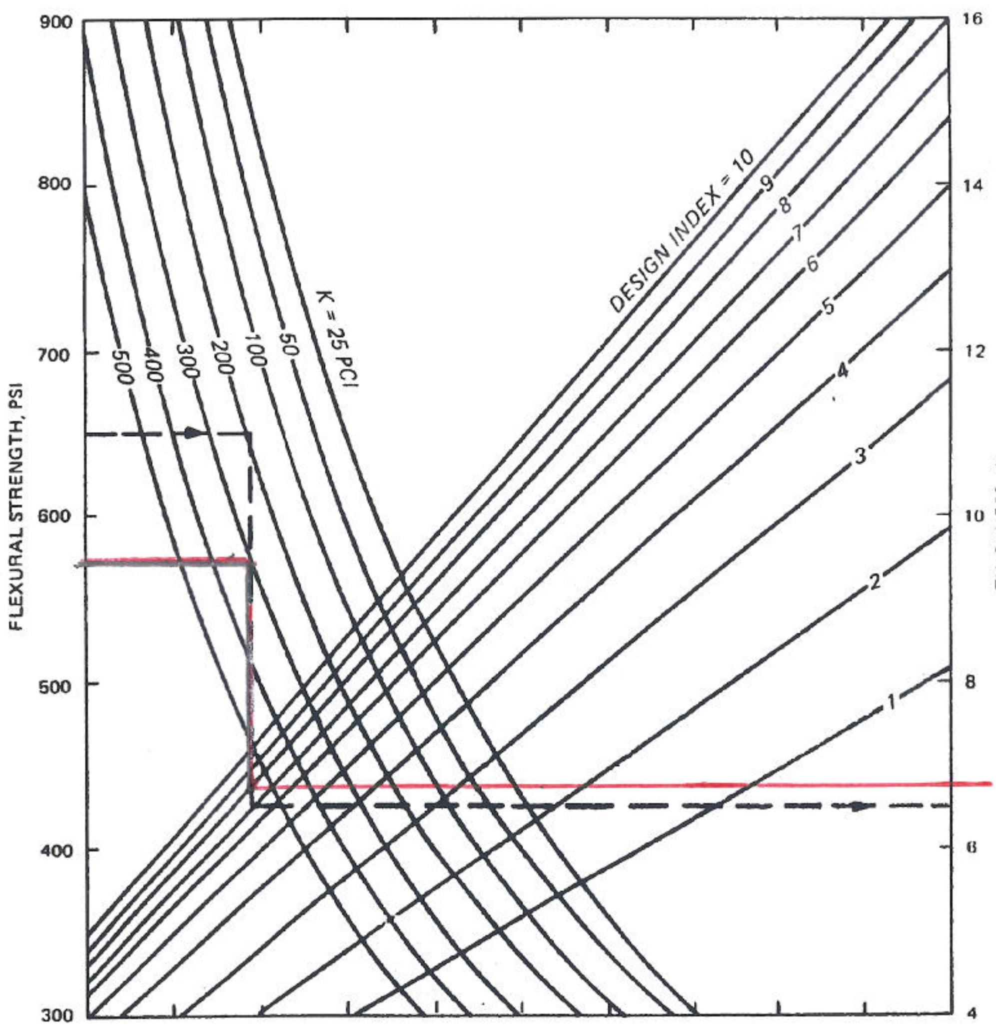
ASSUME #4 @ 12" O.C = .2 > .062 OK

Table 4-1. Typical values of modulus of subgrade reaction

Types of Materials	Modulus of Subgrade Reaction, k, in lb/in³ for Moisture Contents of							
	1 to 4%	5 to 8%	9 to 12%	13 to 16%	17 to 20%	21 to 24%	25 to 28%	Over 29%
Silts and clays Liquid limit > 50 (OH, CH, MH)	--	175	150	125	100	75	50	25
Silts and clays Liquid limit < 50 (OL, CL, ML)	--	200	175	150	125	100	75	50
Silty and clayey sands (SM & SC)	300	250	225	200	150	–	–	--
Gravelly sands (SW & SP)	300+	300	250	–	–	–	–	--
Silty and clayey gravels (GM & GC)	300+	300+	300	250	–	–	–	--
Gravel and sandy gravels (GW & GP)	300+	300+	–	–	–	–	–	--

NOTE: k values shown are typical for materials having dry densities equal to 90 to 95 percent of the maximum CE 55 density. For materials having dry densities less than 90 percent of maximum CE 55 density, values should be reduced by 50 lb/in³, except that a k of 25 lb/in³ will be the minimum used for design.

570

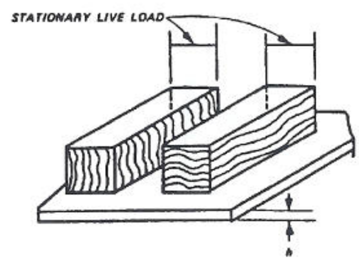


6.9 say 7.0"

Figure 5-1. Design curves for concrete floor slabs by design index.

Table 3-1. Maximum allowable stationary live load

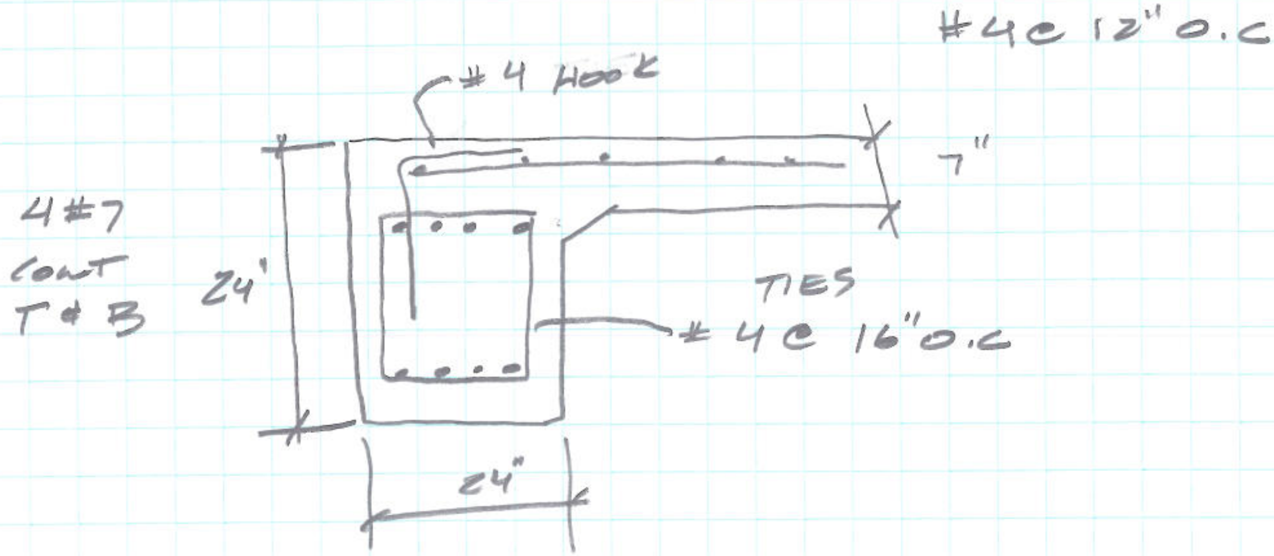
Slab Thickness inches h	Stationary Live Load w in lb/ft^2 for These Flexural Strengths of Concrete 550 lb in^2	600 lb in^2	650 lb in^2	700 lb in^2
6	868	947	1,026	1,105
7	938	1,023	1,109	1,194
8	1,003	1,094	1,185	1,276
9	1,064	1,160	1,257	1,354
10	1,121	1,223	1,325	1,427
11	1,176	1,283	1,390	1,497
12	1,228	1,340	1,452	1,563
14	1,326	1,447	1,568	1,689
16	1,418	1,547	1,676	1,805
18	1,504	1,641	1,778	1,915
20	1,586	1,730	1,874	2,018



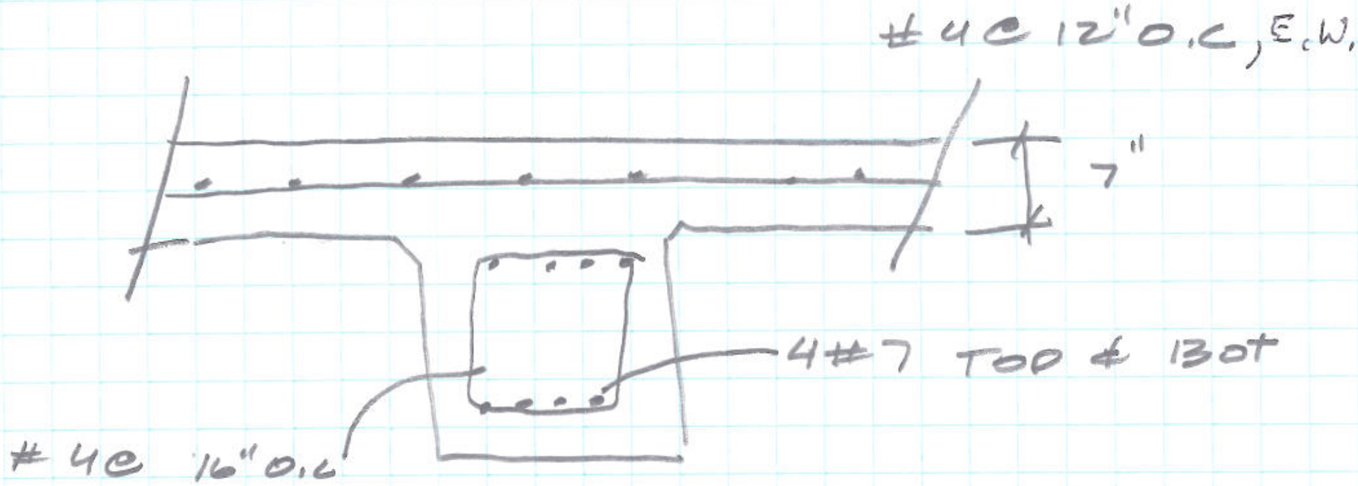
NOTE: Stationary live loads tabulated above are based on a modulus of subgrade reaction (k) of 100 lb/in^3. Maximum allowable stationary live loads for other moduli of subgrade reaction will be computed by multiplying the above-tabulated loads by a constant factor. Constants for other subgrade moduli are tabulated below.

Modulus of Subgrade reaction	25	50	100	200	300
Constant factor	0.5	0.7	1.0	1.4	1.7

For other modulus of subgrade reaction values, the constant values may be found from the expression $\sqrt{k/100}$.



EXTERIOR WALL



4000 psi

f_y = 60 ksi

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BLDG. 2442
CONVENTIONAL FOUNDATION DESIGN

January 16, 2009

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BUILDING DESIGN
BUILDING 2442

1

CONVENTIONAL - SLAB ON GRADE
USING TM 5-809-
MODULUS OF SUBGRADE REACTION K = 300
USE SELECT GRANULAR MATERIAL
COMPACTED TO 95% STANDARD PROCTOR DENSITY
FROM SOILS REPORT - SOIL BEARING CAP = 2200 PSF
ASSUMPTION
1. NO ADVERSE SOIL CONDITIONS
2. NO HEAVY DISTRIBUTED LOADS
PROPERTIES OF MATERIALS
$f_c = 4000$ PSI
$f_s = 60$ KSI

CONCRETE FLEXURAL STRENGTH:
$9\sqrt{f_c} = 9\sqrt{4000} = 569.2$ SAY 570 -

USE TRAFFIC TABLE 5-1 W/ DESIGN INDEX 10 (SEVERE)
THIS BUILDING SLAB TO SUPPORT 32 KIP AXLE LOAD
AS REQUIRED BY G201003 - PAVED SURFACES
SLAB THICKNES = 7.4" - USE 8" SLAB
CHECK 8" SLAB FOR STATIONARY LOAD
TABLE 3-1
h = 8" FLEX ST = 570

$$1003 + \frac{\overset{20}{570 - 550}}{\underset{50}{600 - 550}} \times (1094 - 1003) = 1031.4$$

K = 300 × 1.7 (FACTOR)
1.7 × 1031 = 1753 SAY 1750 lbs/FT²
ASSUME MAX STA. LOAD = 1200 lbs/SF
1750 > 1200 OK

TITLE

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ARCHITECTS / ENGINEERS
P.O. BOX 2830 SLIDELL, LA. 70459
(504) 649-5832 (504) 641-5950

SCALE	DATE	ENGR	DG NO.	RE

2

CHECK SLAB THICKNESS ON EXT WALL

THIS BLDG HAS A 6' HIGH CMU WALL SURROUND

8" CMU (REINFORCED) 63 lb/FT² x 6 = 378

4" BRICK VENEER 42 lb/FT² x 6 252 = 630 #/LIN FT

TABLE 3-3

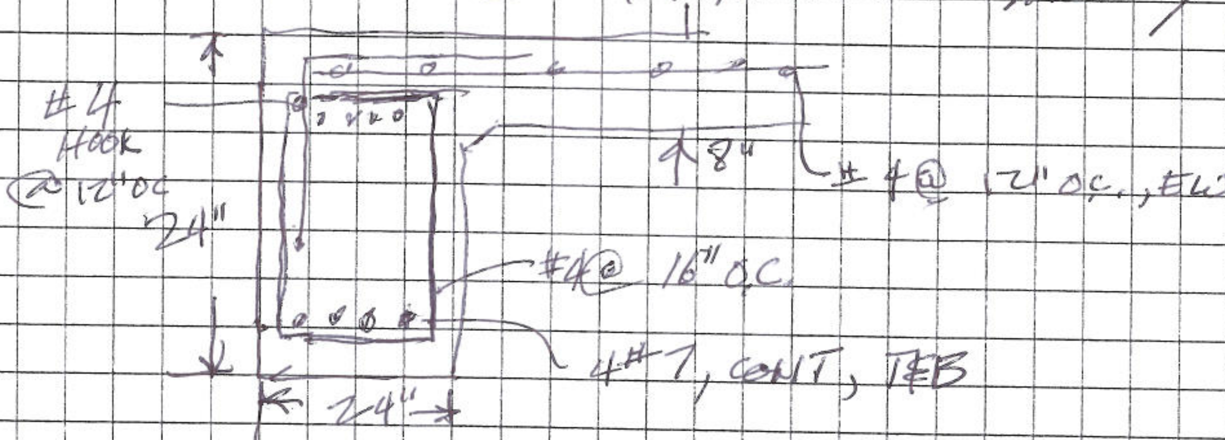
P = FROM TABLE 3-3 FOR 630 lbs/LIN FT =

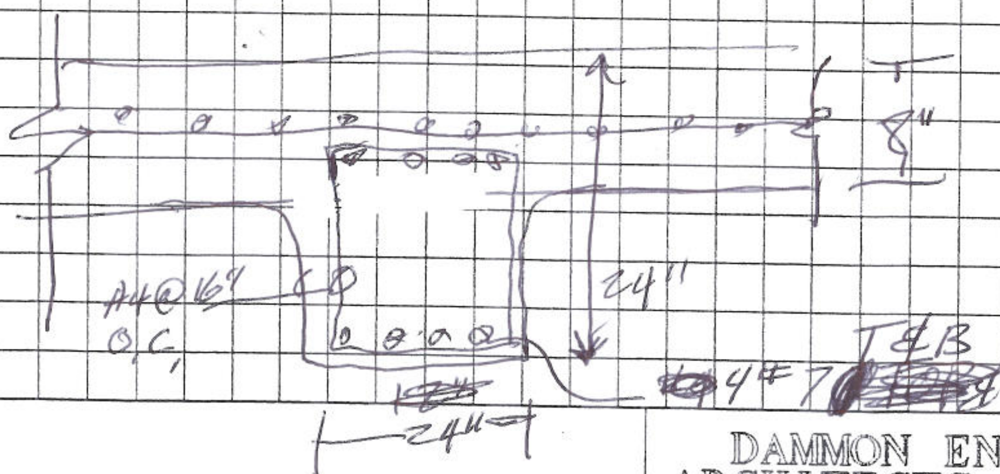
FOR FLEX STRENGTH = 570 > 550 SO THAT 6" WOULD BE SUFFICIENT, WE HAVE 24"

THE ABOVE NEGLECTS COLUMN LOADS WHICH ARE SEPARATE

PERCENT STEEL (TABLE 5-4 = .076)

ASSUME #4 @ 12" O.C. AREA OF #4 = .196 in² > .076 OK





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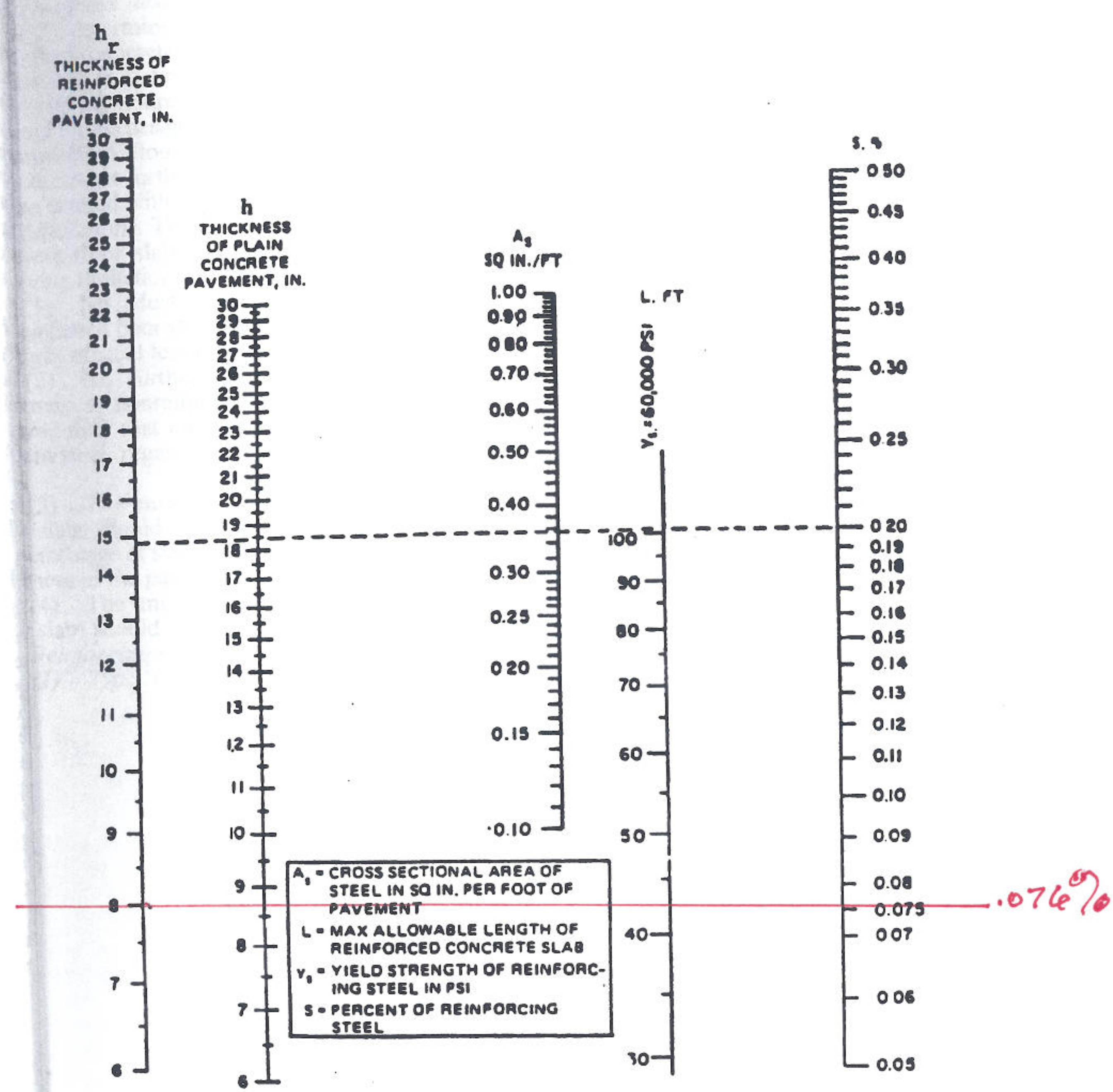
SCALE	DATE	ENGR	DG NO.	RE	



REINFORCED CONCRETE PAVEMENT DESIGN

NOTE: MINIMUM THICKNESS OF REINFORCED CONCRETE FLOOR SLABS WILL BE 6 IN.

Figure 5-4. Design thickness for reinforced floor slabs.

Table 3-1. Maximum allowable stationary live load

Slab Thickness	Stationary Live Load w in lb/ft^2 for These Flexural Strengths of Concrete			
inches h	550 lb in^2	600 lb in^2	650 lb in^2	700 lb in^2
6	868	947	1,026	1,105
7	938	1,023	1,109	1,194
8	1,003	1,094	1,185	1,276
9	1,064	1,160	1,257	1,354
10	1,121	1,223	1,325	1,427
11	1,176	1,283	1,390	1,497
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14	1,326	1,447	1,568	1,689
16	1,418	1,547	1,676	1,805
18	1,504	1,641	1,778	1,915
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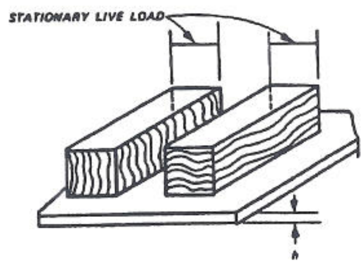

NOTE: Stationary live loads tabulated above are based on a modulus of subgrade reaction (k) of 100 lb/in^3. Maximum allowable stationary live loads for other moduli of subgrade reaction will be computed by multiplying the above-tabulated loads by a constant factor. Constants for other subgrade moduli are tabulated below.

Modulus of Subgrade reaction	25	50	100	200	300
Constant factor	0.5	0.7	1.0	1.4	1.7

For other modulus of subgrade reaction values, the constant values may be found from the expression $\sqrt{k/100}$.

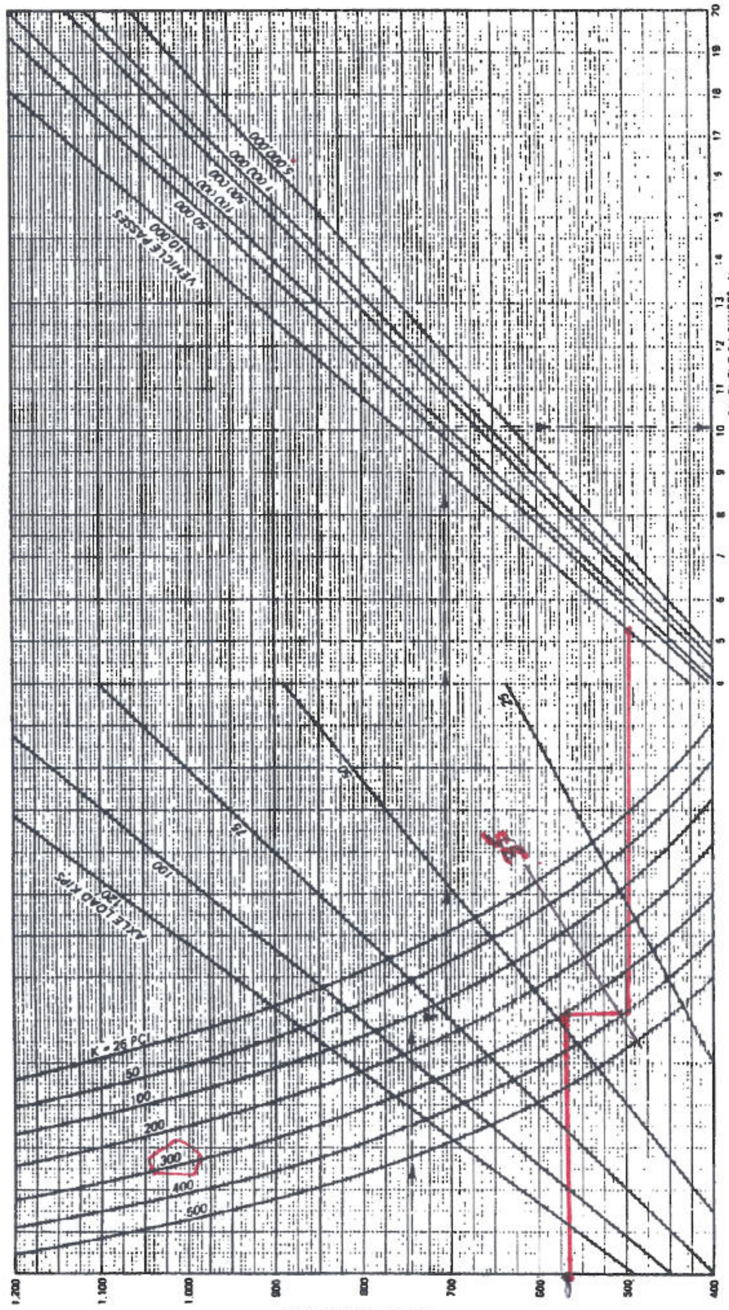

Figure 5-2. Design curves for concrete floor slabs for heavy forklifts.

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Located at
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ASPHALT ROADS AND PARKING DESIGN

January 16, 2009

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CALCULATIONS

DESIGN OF ASPHALT RDS & PARKING
TRAFFIC CLASS III, CBR 9-10, (SEE CONCRETE DESIGN)
BASE 4"
SURFACE 1.5"
RFP MIN
8" BASE
2" ASPHALT

ASPHALT INSTITUTE "THICKNESS DESIGN MANUAL"

Table 4-4. Thickness Design: Low Volume Secondary and Rural Roads / PARKING

A. For Asphalt Concrete Base Pavements

Design Criteria*			Thickness in Inches Asphalt Concrete		
Traffic Class (ADT)	Subgrade Class	CBR	Base	Surface	Total
II (50-200 ADT)	Good	9	4.0	1.0	5.0
	Moderate	6	5.0	1.0	6.0
	Poor	3	5.5	1.5	7.0
III (201-700 ADT)	Good	9	4.0	1.5	5.5
	Moderate	6	5.0	1.5	6.5
	Poor	3	6.0	1.5	7.5
IV (1,501-4,500 ADT)	Good	9	5.5	2.0	7.5
	Moderate	6	6.5	2.0	8.5
	Poor	3	7.5	2.0	9.5

B. For Untreated Aggregate Base Pavements

Design Criteria*			Thickness in Inches			
Traffic Class (ADT)	Subgrade Class	CBR	Untreated Aggregate Base	Asphalt Concrete Base	Asphalt Concrete Surface	Total
II (50-200 ADT)	Good	9	5.0	.0	3.0	8.0
	Moderate	6	8.0	.0	3.0	11.0
	Poor	3	8.0	2.0	2.0	12.0
III (201-700 ADT)	Good	9	7.0	.0	3.0	10.0
	Moderate	6	8.0	2.0	2.0	12.0
	Poor	3	8.0	3.0	2.0	13.0
IV (1,500-4,500 ADT)	Good	9	8.0	3.0	2.0	13.0
	Moderate	6	8.0	3.5	2.0	13.5
	Poor	3	8.0	4.5	2.0	14.5

**See chapter 3 for traffic and soil class details* product

Mirafi® X-Series Woven Polypropylene Geotextiles

for Sediment Control, Soil Separation, and Road Base Stabilization

PRODUCT DESCRIPTION

Mirafi® X-Series products are woven geotextiles comprised of UV stabilized polypropylene slit film. Mirafi® X-Series Woven Polypropylene Geotextiles provide excellent puncture and tear resistant properties in addition to high tensile strengths.

FEATURES AND BENEFITS

- **Construction.** Woven construction offers excellent resistance to installation abuse.
- **Strength.** High modulus provide outstanding performance in a wide range of applications.
- **Flow.** Uniform openings provide excellent filtration and flow characteristics.
- **Fabrication.** Mirafi® Silt Fence is prefabricated using Mirafi® 100X geotextile and 3.2 cm (1.25") nominal square hardwood posts. Mirafi® Silt Fence is available with 2.5 m (8.3') or 3 m (10') post spacings.

  Mirafi® Envirofence is prefabricated using Mirafi® 100X, 3.2 cm (1.25") nominal square hardwood posts, and a net backing for additional support. Mirafi® Envirofence is available with 2.5 m (8.3') post spacings. All Mirafi® prefabricated silt fence products are ready for immediate installation upon delivery.
- **Cost.** Mirafi® 500X/600X geotextiles were developed to improve the economics and performance of roadway systems by reducing the amount of aggregate required, increasing the design life and reducing the maintenance cost, preventing periodic overstressing of the subgrade, and eliminating costly project delays by allowing all-weather construction.

  In addition, panels can be sewn together in the factory or in the field, providing cross-roll direction strength to facilitate installation, and providing reinforcement strength.

APPLICATIONS

Mirafi® 100X and 100CX

Mirafi® 100X and 100CX are predominantly used for sediment control applications. Controlling the run-off is advantageous to owners, contractors, and engineers who face the economic costs associated with site sediment loss. Installed correctly, these sediment control geotextiles in silt fence structures function as a filter and a run-off flow velocity check. Fine-grained sediment is trapped by the geotextile while storm water run-off passes through the geotextile at a moderate rate.

Mirafi® 500X

Mirafi® 500X applications include separation under parking lots, residential streets, and roadways. Mirafi® 500X is used over good to moderate strength subgrades for separation and confinement of base materials. Mirafi® 500X is also utilized over moderate to poor subgrades for separation, confinement, and stabilization of base material. Mirafi® 500X meets AASHTO M288-96 Specifications for Stabilization and Separation - Class 3.

Mirafi® 600X

Mirafi® 600X is used for separation and stabilization over very weak subgrades; and separation, confinement, and reinforcement for critical roadways and site construction where very coarse, angular, and abrasive base material is required. Mirafi® 600X provides stabilization and reinforcement when heavy loads are expected. Mirafi® 600X is effective in the construction of low embankments over weak subgrades, eliminating the need for costly excavation and replacement with expensive fill. Mirafi® 600X meets AASHTO M288-96 Specifications for Stabilization and Separation - Class 1.

Mirafi® Silt Fence with posts used for sedimentation control

Mirafi® 500X used for separation under residential street

Mirafi® 600X used for stabilization in roadway repair

Ten Cate Nicolon

Technical Data	MIRAFI®

Engineered Solutions for an Innovative World

product

Mirafi® X-Series Woven Polypropylene Geotextiles

for Sedimentation Control, Soil Separation, and Road Base Stabilization

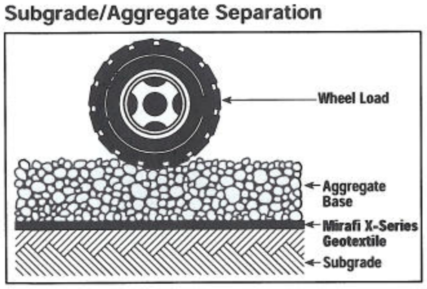
Mirafi® X-Series Technical Data

Property	Test Method	Units	100CX	100X	500XL	500X	600X
Grab Tensile Strength[1]	ASTM D 4632	kN (lbs)	0.40 (90)	0.55 (124)	0.62 (140)	0.90 (200)	1.40 (315)
Grab Tensile Elongation	ASTM D 4632	% MD / CD	15 / 15	15 / 15	15 / 10	15 / 10	15 / 10
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.22 (50)	0.29 (65)	0.20 (45)	0.33 (75)	0.53 (120)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	1376 (200)	2060 (300)	2240 (325)	2756 (400)	4134 (600)
Puncture Strength	ASTM D 4833	kN (lbs)	0.22 (50)	0.27 (60)	0.29 (65)	0.40 (90)	0.53 (120)
UV Resistant after 500 hours	ASTM D 4355	% Strength	70	70	70	70	70
Apparent Opening Size	ASTM D 4751	mm (US Sieve)	0.60 (30)	0.60 (30)	0.60 (30)	0.30 (50)	0.425 (40)
Permittivity	ASTM D 4491	sec^{-1}	0.1	0.1	0.05	0.05	0.05

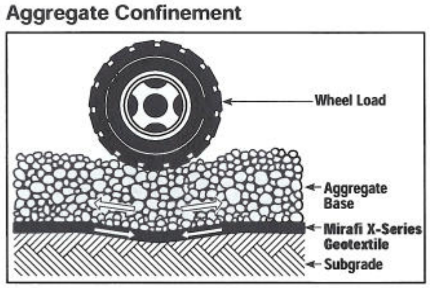
[1] *Values apply to both machine and cross-machine directions*

Packaging		Units	100CX	100X	500XL	500X	600X
Roll Width		m (ft)	0.9 (3)	0.9 (3)	3.8 (12.5)	3.8 (12.5) 5.3 (17.5)	3.8 (12.5) 5.3 (17.5)
Roll Length		m (ft)	various	100 (330)	154 (504)	132 (432) 94.2 (309)	110 (360) 78.7 (258)
Est. Gross Weight		kg (lbs)	various	12 (26)	95 (190)	95 (210)	109 (240)
Roll Area		m^2 (yd^2)	various	92 (110)	585 (700)	502 (600)	418 (500)

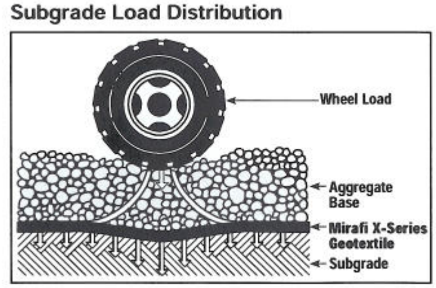
Subgrade/Aggregate Separation



Aggregate Confinement



Subgrade Load Distribution



www.mirafi.com

TECHNICAL SERVICES

Complete technical assistance is available from Ten Cate Nicolon and its sales representatives. Service include assistance during design and specification stages as well as initial stages of installation.

WARRANTY

Ten Cate Nicolon warrants that the product that it sells will conform to the specifications published in this literature. For information on limitations to this warranty, contact Ten Cate Nicolon.

CORPORATE OFFICE

365 South Holland Drive • Pendergrass, GA 30567
(888) 795-0808 • (706) 693-2226 • Fax (706) 693-4400

Ten Cate Nicolon

LT.PDS.X.0603

TC Mirafi **_TECHNICAL DATA SHEET_**

Mirafi 600X

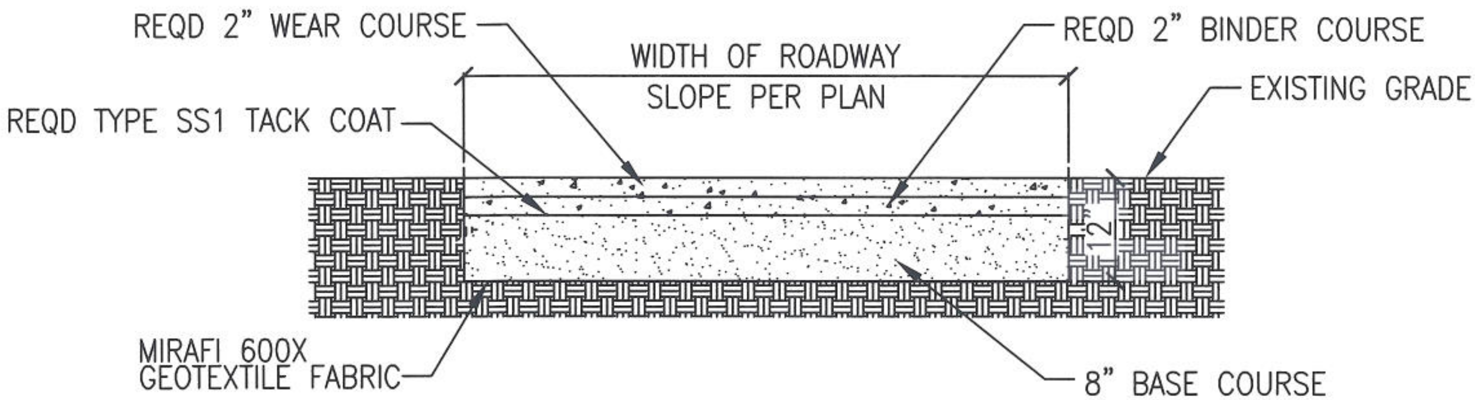
Mirafi 600X is composed of high-tenacity polypropylene yarns, which are woven into a stable network such that the yarns retain their relative position. 600X is inert to biological degradation and resistant to naturally encountered chemicals, alkalis, and acids.

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			MD	CD
Wide Width Tensile Strength	ASTM D 4595	kN/m (lbs/in)	30.6 (175)	30.6 (175)
GrabTensile Strength	ASTM D 4632	kN (lbs)	1.40 (315)	1.40 (315)
Grab Tensile Elongation	ASTM D 4632	%	15	10
Trapezoid Tear Strength	ASTM D 4533	kN (lbs)	0.53 (120)	0.53 (120)
Mullen Burst Strength	ASTM D 3786	kPa (psi)	4134 (600)	
Puncture Strength	ASTM D 4833	kN (lbs)	0.53 (120)	
Percent Open Area	COE-02215-86	%	1	
Apparent Opening Size (AOS)	ASTM D 4751	mm (U.S. Sieve)	0.425 (40)	
Permittivity	ASTM D 4491	sec^{-1}	0.05	
Flow Rate	ASTM D 4491	$l/min/m^2$ ($gal/min/ft^2$)	163 (4.0)	
UV Resistance (at 500 hours)	ASTM D 4355	% strength retained	70	

Physical Properties	Test Method	Unit	Typical Value	
Weight	ASTM D 5261	g/m^2 (oz/yd^2)	203 (6.0)	
Thickness	ASTM D 5199	mm (mils)	0.64 (25)	
Roll Dimensions (width x length)	--	m (ft)	3.8 x 110 (12.5 x 360)	5.5 x 76 (18 x 250)
Roll Area	--	m^2 (yd^2)	418 (500)	418 (500)
Estimated Roll Weight	--	kg (lb)	109 (240)	109 (240)

DISCLAIMER: TC Mirafi warrants our products to be free from defects in material and workmanship when delivered to TC Mirafi's customers and that our products meet our published specifications. Contact your local TC Mirafi Representative for detailed product specification and warranty information.

600X.DOC
Revision: 2
Date: Jan. 1, 1999



ASPHALT ROADWAY PAVEMENT SECTION

N.T.S.

26
C3.1
C3.2

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

CONCRETE ROADS AND PARKING DESIGN

January 16, 2009

Prepared by:
Dammon Engineering
1095 Florida Avenue
Slidell, La. 70458
985-649-5832
dammonengineering.com

CONCRETE ROADS

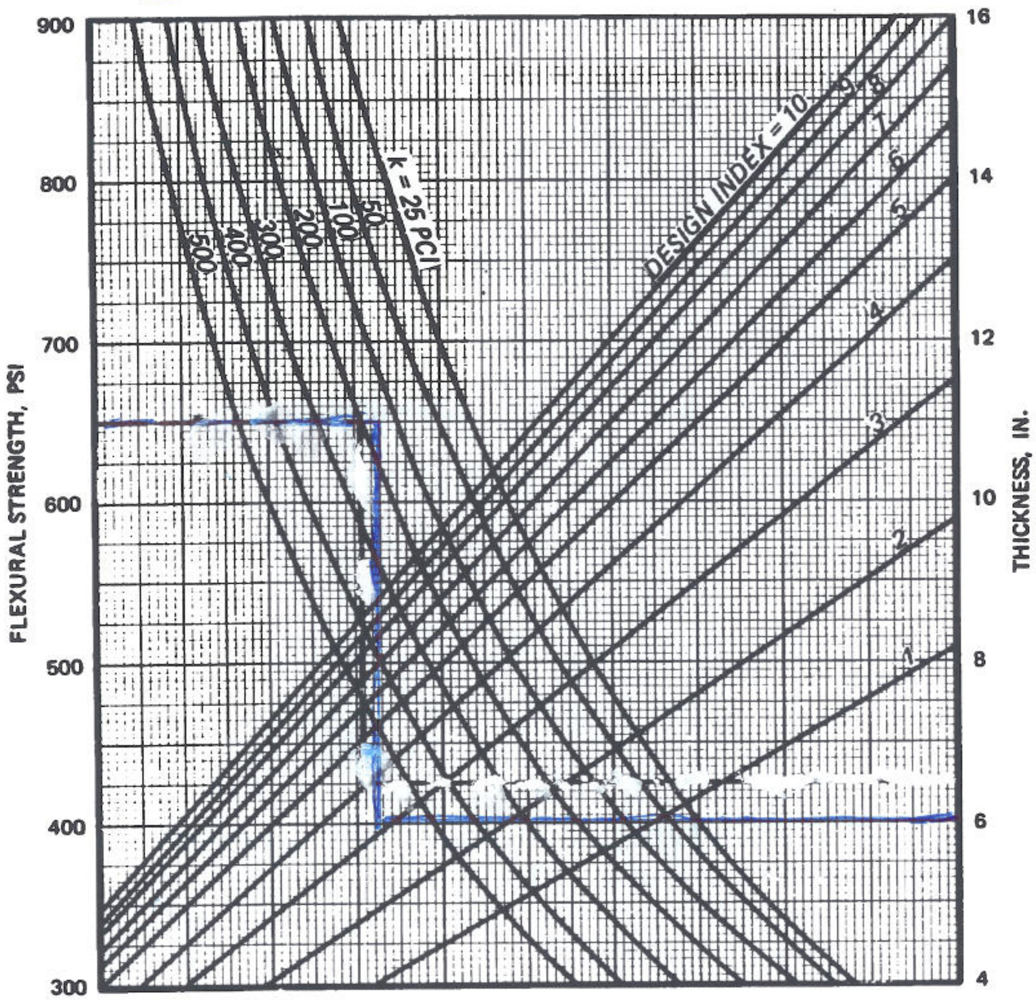


Figure 12-1. Design Curves for Plain Concrete Roads and Streets, and RCCP.

USING CBR (CALIF. BEARING RATIO)

CBR = 10 AVE K = 180 (SUBGRADE MOD.

CLASS E EFFECTIVE DHV (EQ PASSENGER

CARS PER HR. 15 MPH TRAFFIC

CAT. III 15% TRUCKS

TRAFFIC CAT III DESIGN INDEX "3"

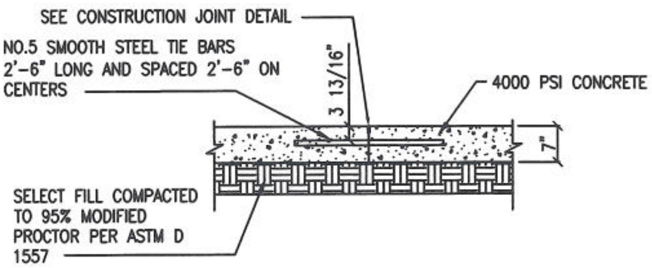
RESULTS

FLEX. STRENGTH 650 PSI

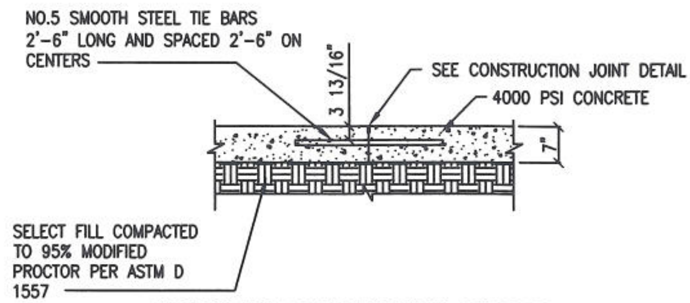
K = 180

DESIGN INDEX = 3

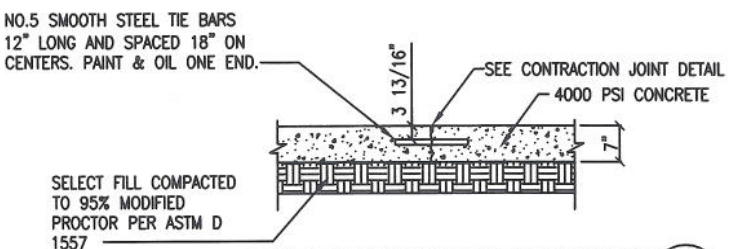
SLAB THICKNESS = 6" PROJ. MIN = 7" OK



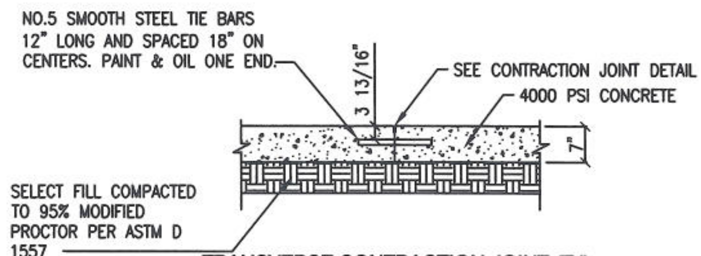
LONGITUDINAL CONSTRUCTION JOINT (LCJ) 20 C3.1 C3.2
N.T.S.



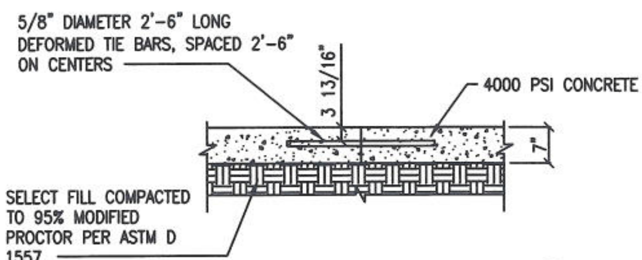
TRANSVERSE CONSTRUCTION JOINT (TCJ)
N.T.S.



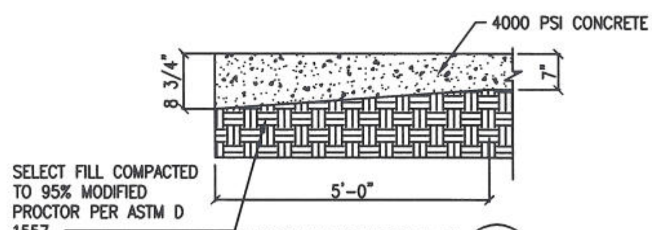
LONGITUDINAL CONTRACTION JOINT (LJ) 21 C3.1 C3.2
N.T.S.



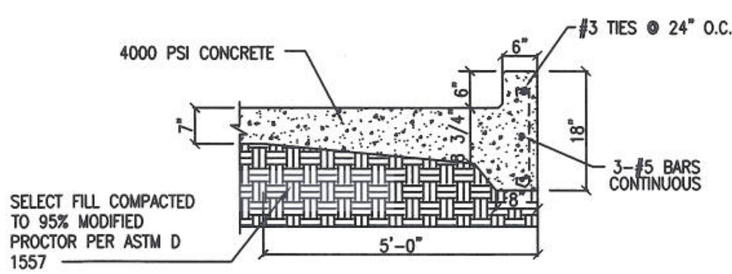
TRANSVERSE CONTRACTION JOINT (TJ)
N.T.S.



PERIMETER CONNECTION (PC) 22 C3.1 C3.2
N.T.S.



THICKENED EDGE (TE) 25 C3.1 C3.2
N.T.S.



CURB DETAIL 31 C3.1 C3.2

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BLDG. 2442
CATWALK
FRAMING DESIGN

January 16, 2009

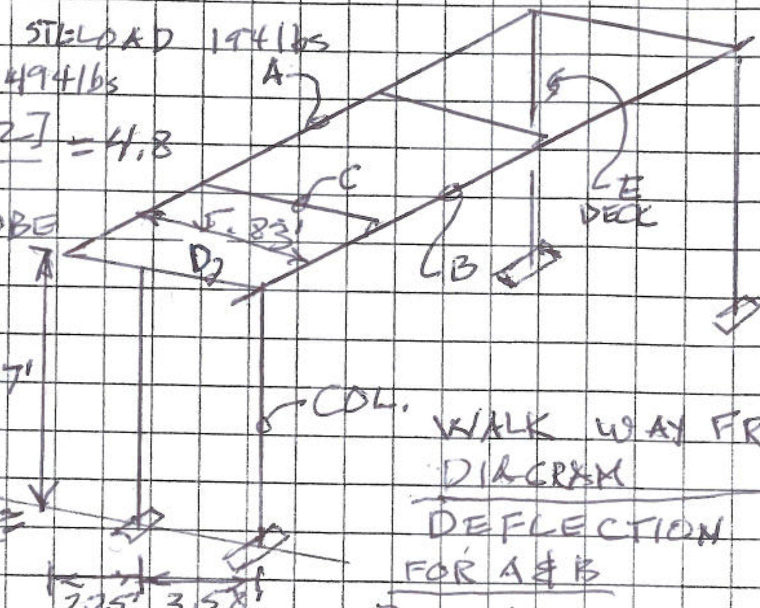
Prepared by:
Dammon Engineering
1095 Florida Avenue
Slidell, La. 70458
985-649-5832
dammonengineering.com

LL 125 lb/ft² EQ LOAD 300 lbs STL LOAD 194 lbs

① A&B $L = 14'$ EQ + STL LOAD = 494 lbs

$$S = \frac{\left[14 \times \frac{5.83}{2}^{2.91} \times 125\right] + 494\,[14 \times 12]}{24000 \times 8} = 4.8$$

SELECT 6"x4"x5/16 RECT TUBE



② (C) $L = 5.83'$ DL = 375 lbs/'

LL = 125 lb/ft²

$$S = \frac{[5.83 \times 14 \times 125] + 375\text{ lbs }[5.83 \times 12]}{24000 \times 8} =$$

S = 3.8

SELECT 6x4x5/16 ANGLE

WALK WAY FRAME DIAGRAM

DEFLECTION FOR A&B

$$D_{MAX} = \frac{L}{240} = \frac{14 \times 12}{240} = .7''$$

$$D = \frac{.013 \times 14 \times 2.915 \times 125 + 300\,(14 \times 12)^3}{29000 \times 17.4 \times 10^4} = .0639'' \quad \text{O.K.}$$

(D) COLUMN (USE FRONT COL.)

CAL MAX LOAD = 14 x 4.5 x 125 + 690 = 8,565 lbs SAY 9 KIPS

TRY 4"x4"x1/4" SQ TUBE COL.

$$\frac{KL}{r} = \frac{1 \times 7}{1.51} = 4.6 \qquad F_a\ COL = 32$$

$$P = A \times F_a = 3.59 \times 9 = 32.31$$

MAX AXIAL LOAD FOR 4x4x1/4" = 87.2 KIPS

LOAD ON COL = 9 KIPS

FLOOR GRATING

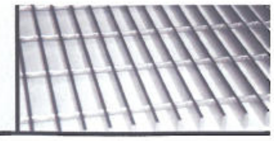
LIGH DUTY WELDED STL "SA RATED" BAR GRATING

SPAN - MAX 6 FT

1 1/4 x 1/8 WT 6.02 lbs/FT²

~~UNIFORM~~ CONC. LOAD 409 lbs   UNIFORM LOAD = 172 lb/SF

TITLE					DAMMON ENGINEERING ARCHITECTS / ENGINEERS
SCALE	DATE	ENGR	DG NO.	RE	P.O. BOX 2830 SLIDELL, LA. 70459 (504) 649-5832 (504) 641-5950



TiteWeld™ 7-TW-4 Welded Steel

7-TW-4

Load Tables 7-TW-4 TiteWeld

Bearing Bar (Inches)	Wt.* Lbs. Sq. Ft.	Sect. Prop. Ft. of Width*		ClearSpan 2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	8'-0"
3/4	13.73	Sx=.482	U	1446	926	643	472	362	286	231					
			D	.099	.155	.223	.304	.398	.503	.620					
		1x=.181	C	1446	1157	964	827	723	643	579					
			D	.079	.124	.179	.243	.318	.402	.497					
1	18.09	Sx=.857	U	2571	1646	1143	840	643	508	411	340	286			
			D	.074	.116	.168	.228	.298	.377	.465	.563	.671			
		1x=.429	C	2571	2057	1714	1469	1286	1143	1029	935	857			
			D	.060	.093	.134	.182	.238	.302	.373	.451	.536			
1-1/4	22.45	Sx=1.339	U	4018	2571	1786	1312	1004	794	643	531	446	380	328	251
			D	.060	.093	.134	.182	.238	.302	.372	.450	.536	.629	.730	.953
		1x=.837	C	4018	3214	2679	2296	2009	1786	1607	1461	1339	1236	1148	1004
			D	.048	.074	.107	.146	.191	.241	.298	.360	.429	.503	.584	.762
1-1/2	26.81	Sx=1.929	U	5786	3703	2571	1889	1446	1143	926	765	643	548	472	362
			D	.050	.078	.112	.152	.199	.251	.310	.375	.447	.525	.608	.795
		1x=1.446	C	5786	4629	3857	3306	2893	2571	2314	2104	1929	1780	1653	1446
			D	.040	.062	.089	.122	.159	.201	.248	.300	.358	.420	.487	.635
1-3/4	31.20	Sx=2.625	U	7875	5040	3500	2571	1969	1556	1260	1041	875	746	643	492
			D	.043	.067	.096	.130	.170	.216	.266	.322	.383	.450	.521	.681
		1x=2.297	C	7875	6300	5250	4500	3938	3500	3150	2864	2625	2423	2250	1969
			D	.034	.053	.077	.104	.136	.172	.213	.258	.306	.360	.417	.545
2	35.59	Sx=3.429	U	10286	6583	4572	3359	2571	2032	1646	1360	1143	974	840	643
			D	.037	.058	.084	.114	.149	.189	.233	.282	.335	.393	.456	.596
		1x=3.429	C	10286	8229	6857	5878	5143	4572	4114	3740	3429	3165	2939	2571
			D	.030	.047	.067	.091	.119	.151	.186	.225	.268	.315	.365	.477
2-1/4	36.92	Sx=4.339	U	13018	8332	5786	4251	3255	2571	2083	1721	1446	1232	1063	814
			D	.033	.052	.074	.101	.132	.168	.270	.250	.298	.350	.406	.530
		1x=4.882	C	13018	10414	8679	7439	6509	5786	5207	4734	4339	4006	3719	3255
			D	.026	.041	.060	.081	.106	.134	.166	.200	.238	.280	.324	.424
2-1/2	44.31	Sx=5.357	U	16072	10286	7143	5248	4018	3175	2571	2125	1786	1522	1312	1004
			D	.030	.047	.067	.091	.119	.151	.186	.225	.268	.315	.365	.476
		1x=6.697	C	16072	12857	10714	9184	8036	7143	6429	5844	5357	4945	4592	4018
			D	.030	.037	.054	.073	.095	.121	.149	.180	.215	.252	.292	.381

U - Safe uniform load in lbs./sq.ft.
C - Safe concentrated load in lbs./ft. grating width.
D - Deflection in inches.

Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.

* Based on 27.429 bars / ft. of grating width. Bearing bars 7/16" c.c. Add .6 lbs./sq. ft for 7-TW-2. 1/8" bearing bars available upon inquiry.

NOTE: Grating for spans to the left of the heavy line have a deflection less than 1/4" for uniform loads of 100 lbs./sq. ft. This is a maximum deflection to afford pedestrian comfort and can be exceeded for other types of load at the discretion of the engineer. The actual "Ped (pedestrian) Span" under this condition is shown above for each size of grating. When serrated grating is specified, the depth of grating required for a specific load will be 1/4" greater than that shown in these tables. 3/4" x 3/16" serrated grating is NOT available.

Introducing our **ALL NEW TiteWeld™ super narrow welded grating** - ideal for those very tight spacing requirements when you need maximum "roll-a-bility."

TiteWeld™ satisfies both AASHTO loading strength & ADA comfort requirements for wheel chairs and walking pedestrians.

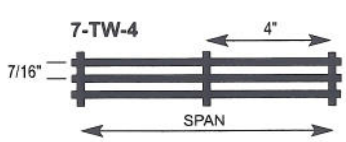
TiteWeld™ is IN STOCK and ready to ship.

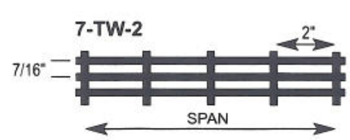
Panel Width Chart (in.) 7-TW-4 TiteWeld

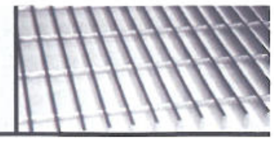
Dimensions Are Out-to-Out of Bearing Bars**

No. of Bars	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3/16" Bars	5/8	1-1/16	1-1/2	1-15/16	2-3/8	2-13/16	3-1/4	3-11/16	4-1/8	4-9/16	5	5-7/16	5-7/8	6-5/16	6-3/4
No. of Bars	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3/16" Bars	7-3/16	7-5/8	8-1/16	8-1/2	8-15/16	9-3/8	9-13/16	10-1/4	10-11/16	11-1/8	11-9/16	12	12-7/16	12-7/8	**13-5/16**
No. of Bars	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46
3/16" Bars	13-3/4	14-3/16	14-5/8	15-1/16	**15-1/2**	15-15/16	16-3/8	16-13/16	17-1/4	17-11/16	18-1/8	18-9/16	19	19-7/16	19-7/8
No. of Bars	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
3/16" Bars	20-5/16	20-3/4	21-3/16	21-5/8	22-1/16	22-1/2	22-15/16	23-3/8	**23-13/16**	24-1/4	24-11/16	25-1/8	25-9/16	26	26-7/16
No. of Bars	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
3/16" Bars	26-7/8	27-5/16	27-3/4	28-3/16	28-5/8	29-1/16	29-1/2	29-15/16	30-3/8	30-13/16	31-1/4	31-11/16	32-1/8	32-9/16	33
No. of Bars	77	78	79	80	81	82	83								
3/16" Bars	33-7/16	33-7/8	34-5/16	34-3/4	35-3/16	35-5/8	**36-1/16**								

** Add 1/4" for extended cross bars. Deduct 1/16" for 1/8" bearing bars. **Standard panel widths indicated in bold.**

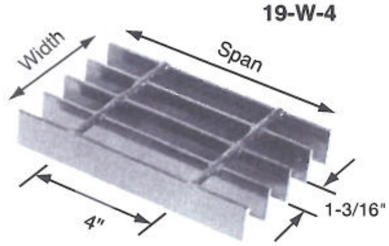




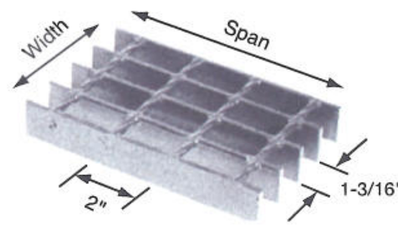


Light Duty Welded Steel 19-W-4/19-W-2

19-W-4



19-W-2



Load Table 19-W-4/19-W-2

Bar Size Inches	Wt.* Lbs. Sq. Ft.	Sect. Prop. Ft. of Width*		Clear Span 2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	8'-0"
3/4 x 3/16	5.67	Sx=.194	U	581	372	258	190	145	115						
			D	.096	.150	.216	.294	.382	.485						
		1x=.073	C	581	465	387	332	290	258						
			D	.077	.120	.173	.235	.307	.388						
1 x 1/8	5.15	Sx=.228	U	686	439	305	224	172	136	110	91	76			
			D	.072	.112	.162	.220	.289	.365	.451	.545	.646			
		1x=.114	C	686	549	458	392	343	305	274	250	229			
			D	.058	.090	.130	.176	.230	.292	.360	.436	.519			
1 x 3/16	7.35	Sx=.344	U	1030	659	458	336	257	203	165	136	114			
			D	.072	.112	.162	.220	.289	.365	.451	.545	.646			
		1x=.171	C	1030	824	686	588	515	458	412	374	343			
			D	.058	.090	.130	.176	.230	.292	.360	.436	.519			
1-1/4 x 1/8	6.20	Sx=.358	U	1072	686	477	350	268	212	172	142	119	102	88	
			D	.058	.090	.130	.176	.230	.292	.360	.435	.516	.607	.704	
		1x=.223	C	1072	858	715	613	536	477	429	390	358	330	306	
			D	.046	.072	.104	.141	.184	.233	.288	.348	.415	.486	.562	
1-1/4 x 3/16	9.03	Sx=.536	U	1610	1031	716	526	403	318	258	213	179	152	131	
			D	.058	.090	.130	.176	.230	.292	.360	.435	.516	.607	.704	
		1x=.335	C	1610	1288	1074	920	805	716	644	586	537	496	406	
			D	.046	.072	.104	.141	.184	.233	.288	.348	.415	.486	.562	
1-1/2 x 1/8	7.35	Sx=.515	U	1544	988	686	504	386	305	247	204	172	146	126	96
			D	.048	.075	.108	.147	.192	.243	.300	.363	.432	.506	.587	.765
		1x=.387	C	1544	1236	1030	882	772	686	618	562	515	475	441	386
			D	.038	.060	.086	.118	.154	.194	.240	.291	.346	.405	.470	.614
1-1/2 x 3/16	10.94	Sx=773	U	2320	1485	1031	758	580	458	371	307	258	220	189	145
			D	.048	.075	.108	.147	.192	.243	.300	.363	.432	.506	.587	.765
		1x=.579	C	2320	1856	1547	1326	1160	1031	928	844	773	714	663	580
			D	.038	.060	.086	.118	.154	.194	.240	.291	.346	.405	.470	.614
1-3/4 x 3/16	12.62	Sx=1.052	U	3158	2021	1404	1031	790	624	505	418	351	299	258	197
			D	.041	.064	.093	.126	.165	.208	.257	.312	.370	.435	.505	.657
		1x=.902	C	3158	2526	2105	1805	1579	1404	1263	1148	1053	972	902	790
			D	.033	.051	.074	.101	.132	.167	.206	.249	.296	.348	.403	.527
2 x 3/16	14.30	Sx=1.375	U	4125	2640	1833	1347	1031	815	660	545	458	390	337	258
			D	.036	.056	.081	.110	.144	.182	.225	.272	.324	.380	.441	.576
		1x=1.375	C	4125	3300	2750	2357	2062	1833	1650	1500	1375	1269	1178	1031
			D	.029	.045	.065	.088	.115	.146	.180	.218	.259	.304	.353	.461
2-1/4 x 3/16	15.87	Sx=1.740	U	5221	3341	2340	1704	1305	1031	835	690	580	494	426	326
			D	.032	.050	.072	.098	.128	.162	.200	.242	.288	.338	.392	.512
		1x=1.958	C	5221	4176	3480	2983	2610	2320	2088	1898	1740	1606	1492	1305
			D	.026	.040	.058	.078	.102	.130	.160	.194	.230	.270	.314	.410
2-1/2 x 3/16	17.55	Sx=2.148	U	6445	4125	2864	2104	1611	1273	1031	852	716	610	526	403
			D	.029	.045	.065	.088	.115	.146	.180	.218	.259	.304	.353	.461
		1x=2.685	C	6445	5156	4297	3683	3222	2864	2578	2344	2148	1983	1841	1611
			D	.023	.036	.052	.070	.092	.117	.144	.174	.207	.243	.282	.369

U – Safe uniform load in pounds/sq. ft.
C – Safe concentrated load in pounds/ft. grating width
D – Deflection in inches

Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.

*Based on 11 bars/ft. of grating width. Bearing bars 1-3/16" c.c. Add .8 lbs./sq. ft. for 19-W-2.

NOTE: Grating for spans to the left of the heavy line have a deflection less than 1/4" for uniform loads of 100 lbs./sq. ft. This is the maximum deflection to afford pedestrian comfort and can be exceeded for other types of load at the descretion of the engineer. When serrated grating is specified, the depth of grating required for a specified load will be 1/4" greater than that shown in these tables.

19-W-4/19-W-2 Panel Width Chart (in.)

Dimensions Are Out-to-Out of Bearing Bars**

No. of Bars	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
3/16" Bar	1-3/8	2-9/16	3-3/4	4-15/16	6-1/8	7-5/16	8-1/2	9-11/16	10-7/8	12-1/16	13-1/4	14-7/16	15-5/8	16-13/16	18

No. of Bars	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
3/16" Bar	19-3/16	20-3/8	21-9/16	22-3/4	23-15/16	25-1/8	26-5/16	27-1/2	28-11/16	29-7/8	31-1/16	32-1/4	33-7/16	34-5/8	35-13/16

**Deduct 1/16" for 1/8" bearing bars. Standard panel widths indicated with white numbers.

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BLDG. 2440
ARMORY CEILING
SYSTEM DESIGN

March 30, 2009

Prepared by:
Dammon Engineering
1095 Florida Avenue
Slidell, La. 70458
985-649-5832
dammonengineering.com

BLDG 2440 ARMORY CEILING DESIGN

GIVEN - NO KNOWN LL. NON OCCUPIED SPACE ABOVE.

ASSUME - 1.5VL METAL DECK
4-1/2" NORMAL WEIGHT CONC.
#4 REBAR - 9x9 GRID IN SLAB
} 65 PSF

(POSSIBLE FUTURE LOADS) -	CEILING BELOW	3	14 PSF	65+14 = 79 PSF
	MECH/ELEC	5		
	MISC	6		

LRFD FACTOR LOAD

DESIGN LOAD = 1.2D + 1.6L = 1.2(65+14) + 0 = 94.8 (95) PSF

$95 \times \underbrace{1.5}_{\text{SPACING}} = 142.5$ PLF

TABLE, OPEN WEB STEEL JOIST - K SERIES

DESIGN SPAN 20'

12K1 TOTAL-241 LIVE-142

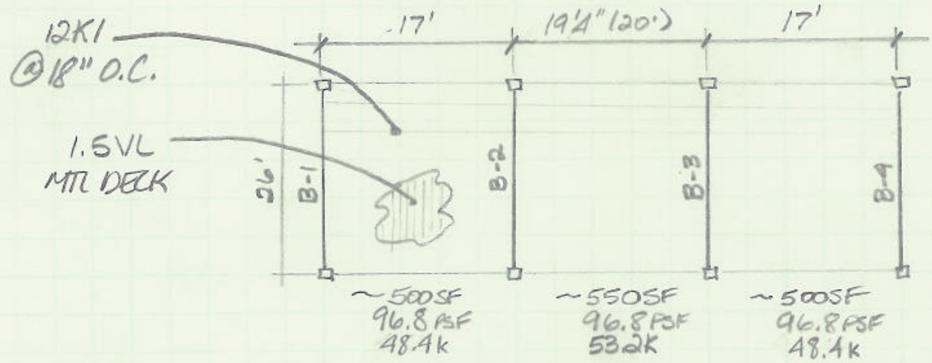
142.5 PLF > 241 OK

USE 12K1 JOIST @ 18" O.C.

WEIGHT OF JOISTS WORST CASE

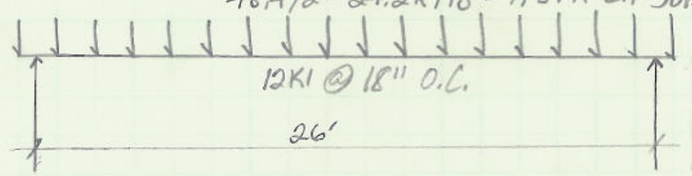
20' × 5 lb = 100 lb EA.

18 × 100 lb = 1800 lbs.



B-1 AND B-4

48.4/2 = 24.2k / 18 = 1.34k EA JOIST ⇒ 930.7 PLF



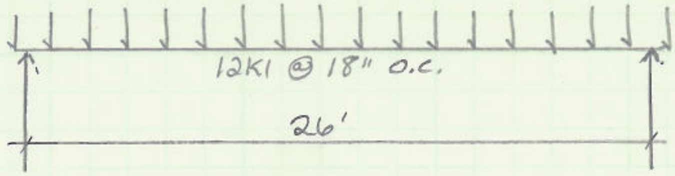
$M_{max} = (24.2k \cdot 26)/6 = 104.9k$

$S = 12(104.9k)/22k = 57.2$

USE W18×35 (6×17-3/4")

B-2 AND B-3

$(48.2/2) + (53.2/2) = 50.8/18 = 2.82k$ EA JOIST ⇒ 1954 PLF



$M_{max} = (50.8k \cdot 26)/6 = 220.1k$

$S = 12(220.1k)/22k = 109.1$

USE <u>W24x55</u> (7 x 23-5/8")

WORST CASE COLUMN LOAD

B-2/B-3 EFFECTIVE LENGTH = KL = 11'

12.1k + 13.3k = 25.4k DESIGN STRENGTH

ALLOWABLE 5x5x1/4 86 KIPS

USE 5x5x1/4 SQ. STRUCTURAL TUBING

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BLDG. 2440/2441
EXTERIOR WALL
THERMAL RESISTANCE
REPORT

March 13, 2009

Prepared by:
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SOV RIVERINE AND COMBATANT
CRAFT OPERATIONS FACILITY
Located at
John C. Stennis Space Center
Hancock County Mississippi

CLIMATE ZONE AND MINIMUM INSULATION REQUIREMENTS

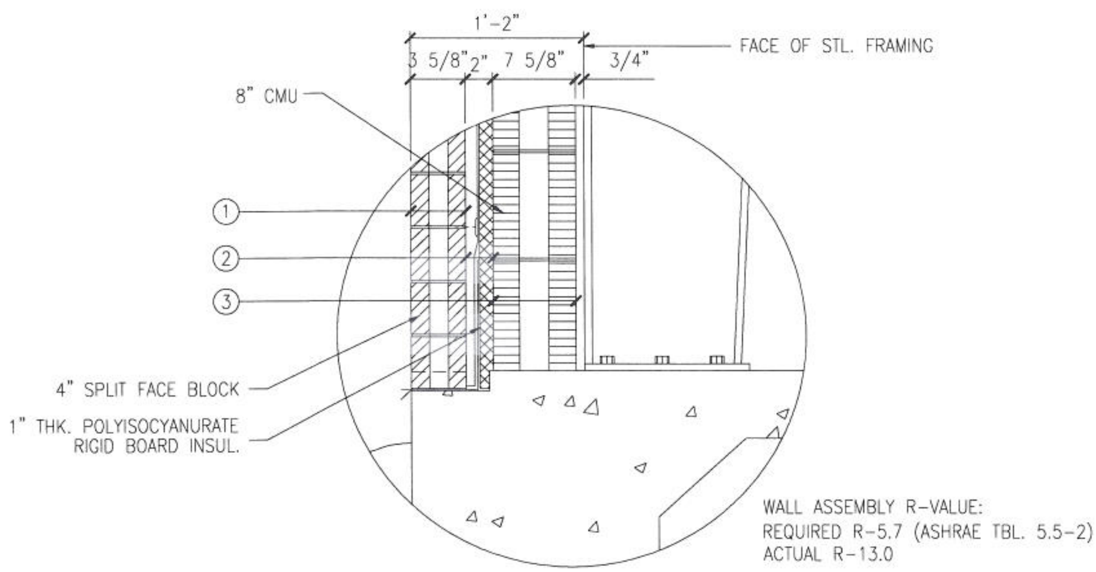
Project is located in Hancock County, Mississippi. Climate Zone **2A**, minimum insulation value for mass walls above-grade **R-5.7**, maximum U-factor **U-0.151**.

DESCRIPTION OF EXTERIOR WALL COMPONENTS

Bldg. 2440 Operation Facility / 2441 Maintenance:

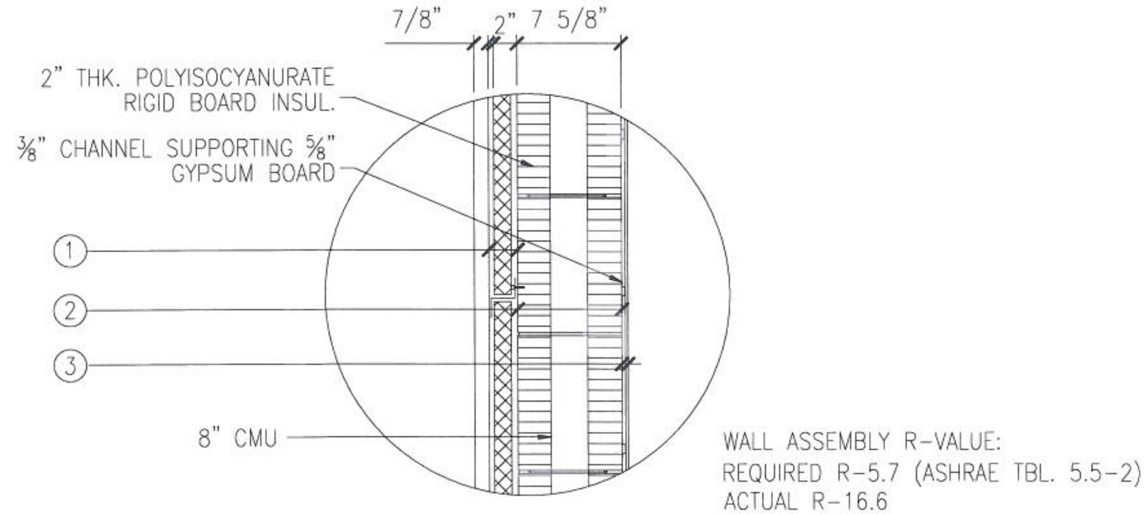
Exterior walls are continuous 8" concrete block masonry from first floor to eave height, top of masonry = 24.0'. The perimeter of the building shall have a 4" spilt-face concrete block veneer 6' in height.

A wall system of low-density CMU blocks, polyisocyanurate rigid board insulation, and air spaces are used to achieve the required assembly minimum thermal resistance. See details below.



SPLIT-FACE VENEER DETAIL
N.T.S.

1. **R-1.3:** Medium density (115 lb./ft^3), 4" Split-face concrete block veneer. Includes standard air film resistances. (*ASHRAE 90.1-2007 TBL. A3.1B*)
2. **R-9.3:** 1" thick Dyplast Shield™ Cavity Wall Insulation with reflective surface and 1" dead air space. (*http://www.dyplastproducts.com*)
3. **R-2.4:** Low density (85 lb./ft.^3), 8" CMU wall grouted at vertical and horizontal reinforcement, remaining cells empty. (*ASHRAE 90.1-2007 TBL. A3.1C*)



CMU WALL DETAIL

N.T.S.

1. **R-12.8:** 2" thick Dyplast Shield™ Insulation with reflective surface. (*http://www.dyplastproducts.com*)
2. **R-2.4:** Low density (85 lb./ft.^3), 8" CMU wall grouted at vertical and horizontal reinforcement, remaining cells empty. (*ASHRAE 90.1-2007 TBL. A3.1C*)
3. **R-1.4:** 3/8" channel (R-0.82) fastened to CMU wall, 5/8" gyp. board (R-0.56) fastened to channels. (*Values for air space created by channel and gypsum board taken from ASHRAE 90.1-2007 TBL. A9.8A and TBL. A9.4D respectively*)

SUMMARY

Minimum insulation value, and maximum U-Factor value requirements for exterior above-grade walls have been met and exceeded.

8" CMU wall with 4" split-face veneer:

Minimum: R-5.7	Provided: R-13
Maximum: U-0.151	Provided: U-0.08

8" CMU wall with metal panel exterior finish and gypsum board interior finish:

Minimum: R-5.7	Provided: R-16.6
Maximum: U-0.151	Provided: U-0.06

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N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BDLG. 2440 / 2441
MASONRY DESIGN

April 30, 2009

Prepared by:
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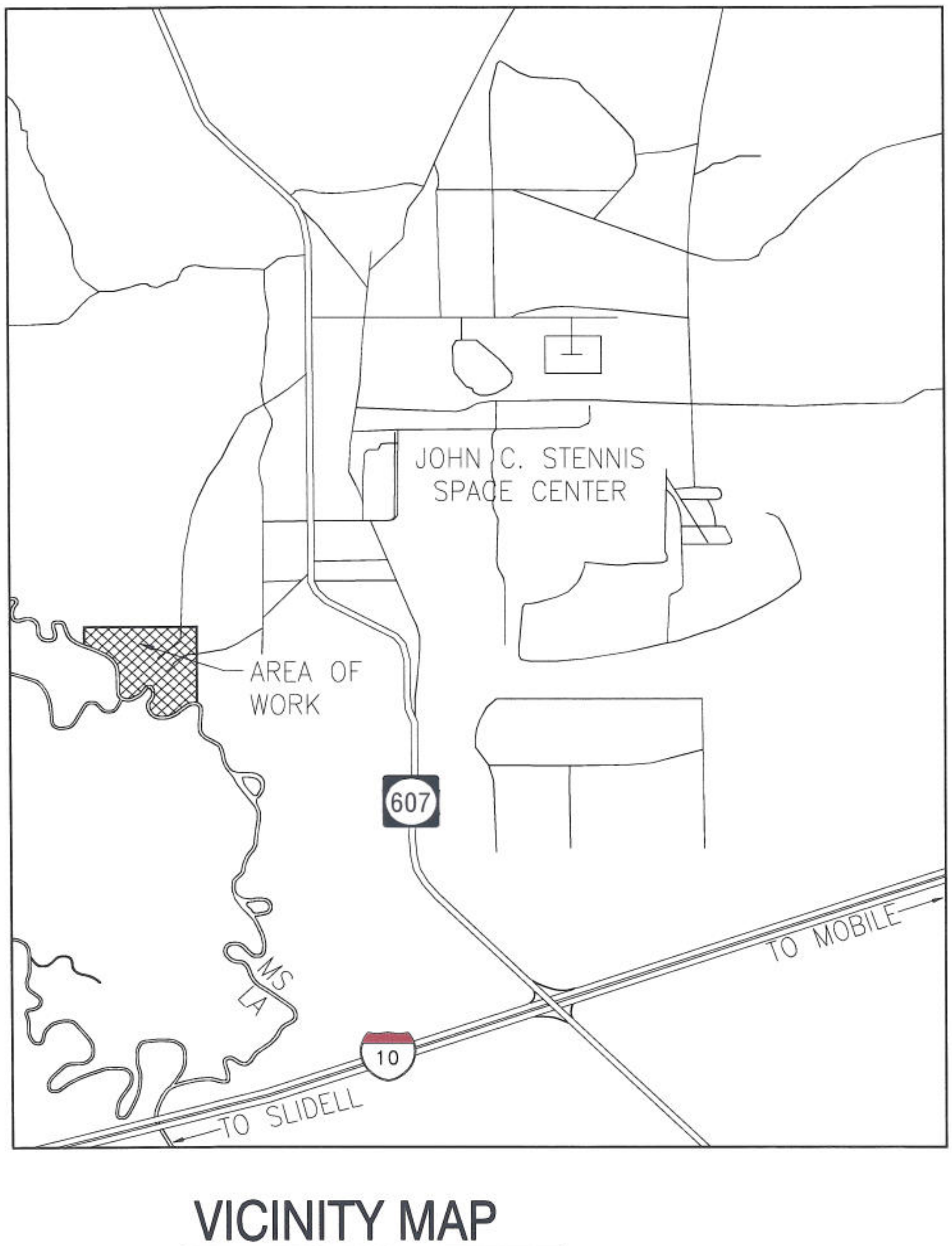
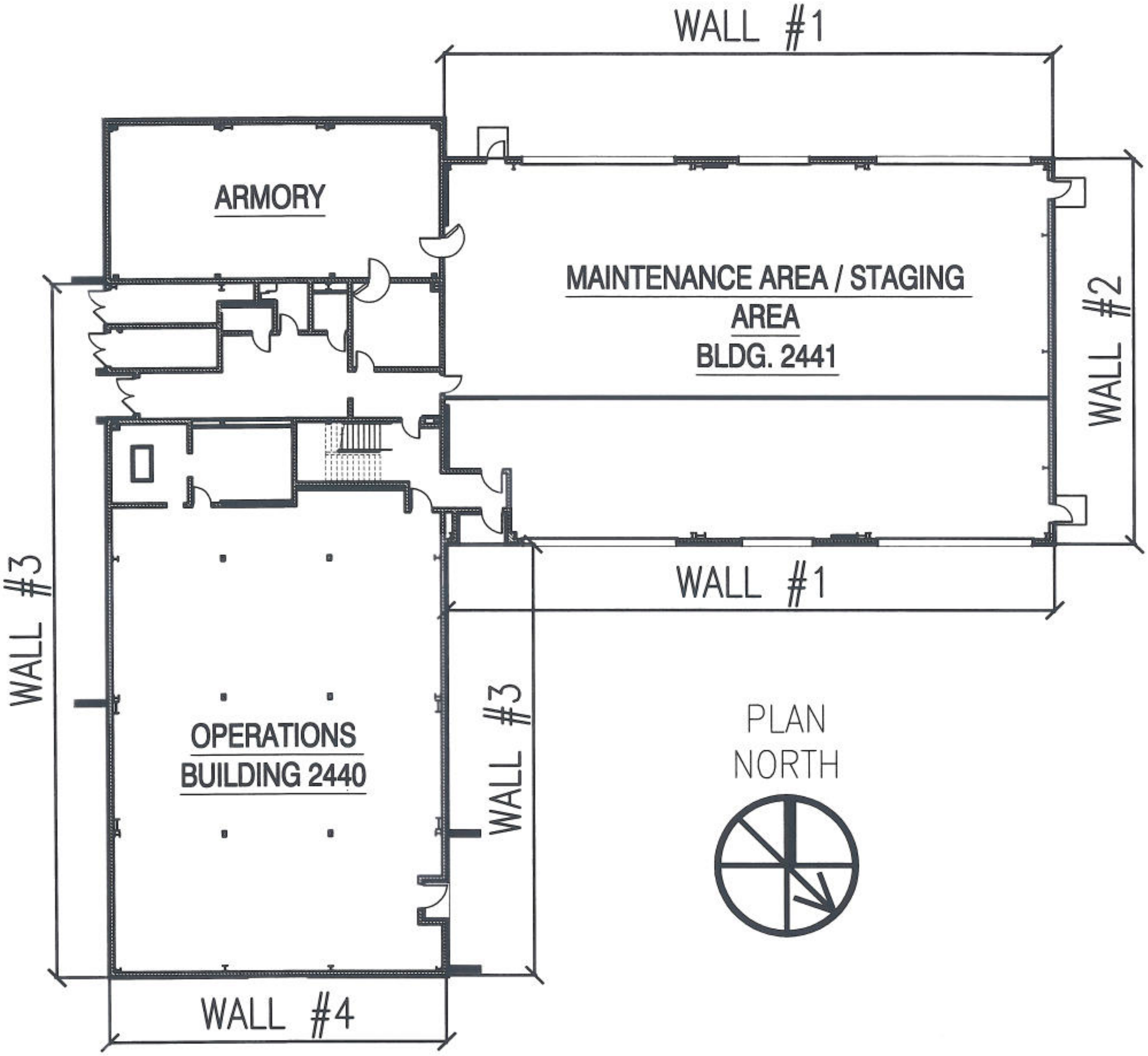
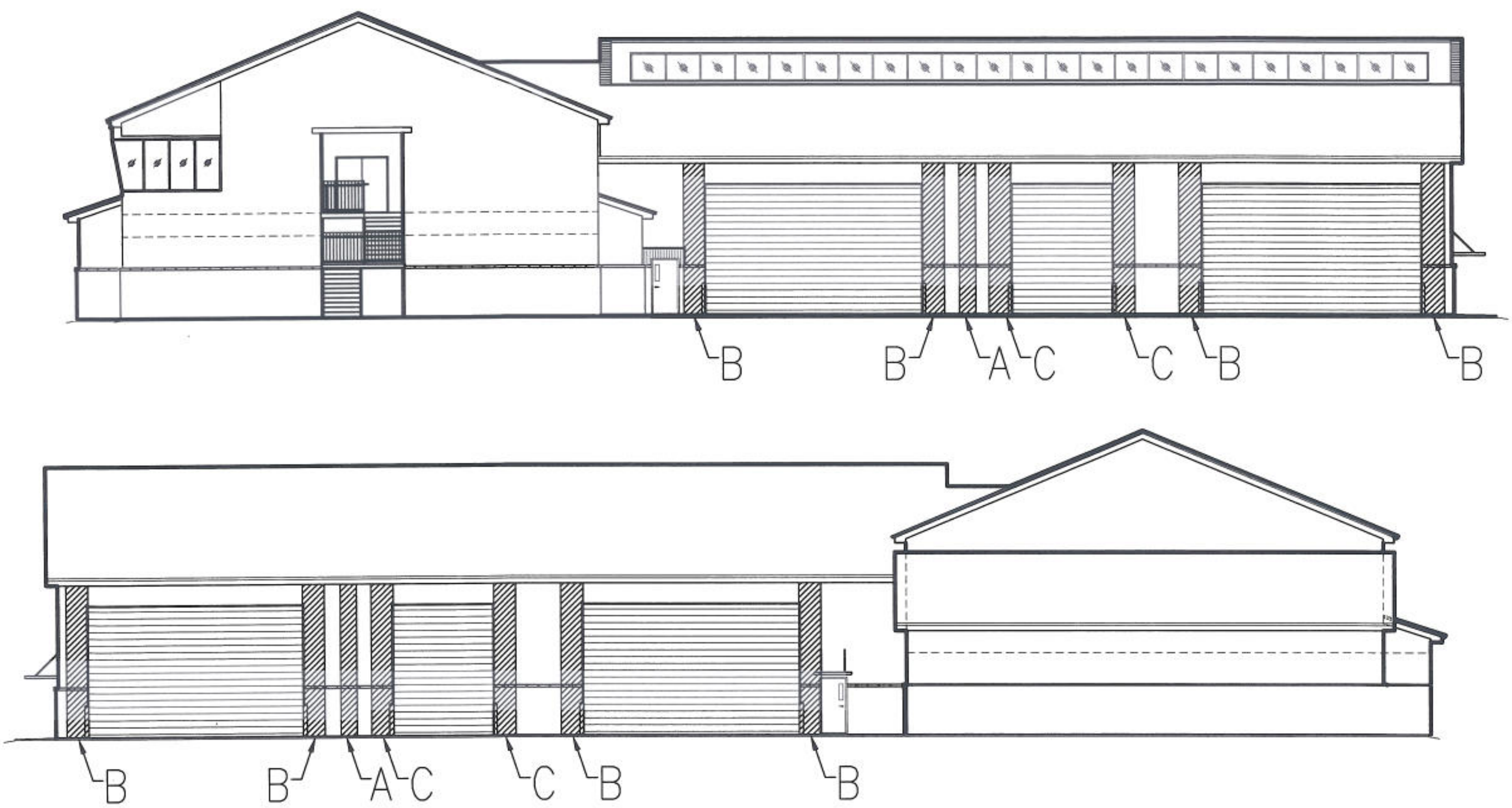


VICINITY MAP

N. T. S.


WALL #1
ARMORY
MAINTENANCE AREA / STAGING AREA
BLDG. 2441
WALL #2
WALL #3
WALL #1
OPERATIONS BUILDING 2440
WALL #3
PLAN NORTH
WALL #4



WALL #1 ELEMENTS

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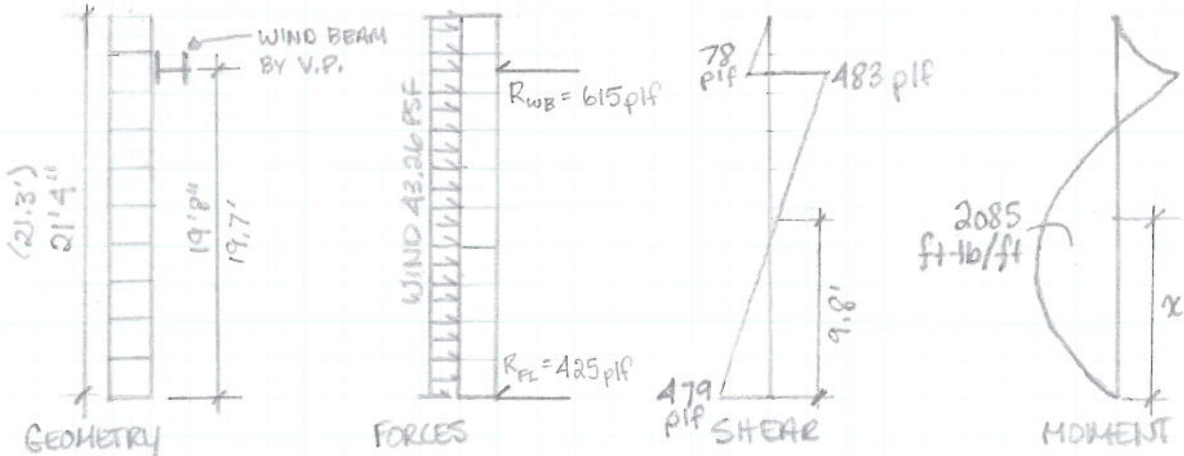
STENNIS RIVERINE
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2441 — WALL #1 ELEMENT A

MATERIALS:

UNIT STRENGTH	4050 psi
MORTAR	TYPE N
f'_m	2500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

LOADING:
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



REACTIONS:

$$R_{WB} = \text{REACTION @ WIND BEAM} = \frac{\left(\frac{43.3 \cdot (21.3')^2}{2}\right)}{16} = 615 \text{ plf}$$

$$R_{FL} = \text{REACTION @ FLOOR} = \frac{43.3 \cdot \left(\frac{(19.7)^2}{2} - \frac{(1.6)^2}{2}\right)}{19.7'} = 425 \text{ plf}$$

$$x = \frac{425}{43.3} = 9.8'$$

$$M = 425 \text{ plf} \cdot \left(\frac{9.8'}{2}\right) = 2085 \text{ ft-lb./ft.}$$

ESTIMATE REINFORCEMENTS:
TRY 8" CMU, ASSUME STEEL @ MID DEPTH

$$d = \frac{7.625''}{2} = 3.8''$$

$$A_s = \frac{M}{F_s j d} = \frac{2085 \text{ ft-lb} \cdot 12}{24000 \text{psi} \cdot 0.9 \cdot 3.8} = 0.3 \text{ in}^2$$

USE 1/3 ALLOWABLE SAFETY FACTOR

$$A_s = \frac{2085 \text{ ft-lb.} \cdot 12}{24000 \text{ psi} \cdot 0.9 \cdot 1.33 \cdot 3.8} = 0.2 \text{ in}^2$$

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DESIGN STRENGTH

USING 24" WIDE STRIP DESIGN MOMENT = 2085 ft-lb · 2 = 4170 ft-lb.

$p = \frac{A_s}{b \cdot d} = \frac{0.20 in^2}{24 \cdot 3.8} = 0.002$ $pn = 0.002 \cdot 15.26 = 0.03$

$K^2 + 2pnK - 2pn = 0$ $K^2 + 0.06K - 0.06 = 0$

$j = 1 - \frac{K}{3} = 0.928$ $K = \frac{-0.06 \pm \sqrt{(0.06)^2 - 4(1)(-0.06)}}{2}$

$K = \frac{-0.06 \pm 0.49}{2} = 0.215"$

ALLOWABLE CAPACITY IN TENSION

TRY #4 @ 12" O.C

$M_t = A_s\, j\, d\, F_s = 0.4 in^2 \cdot 0.9 \cdot 3.8" \cdot 24000 psi \cdot \frac{1.33}{12} = 3640$ ft-lb/ft.

3640 < 4170 ft-lb/ft. DOES NOT WORK

TRY #5 @ 8" O.C.

$M_t = 0.62 in^2 \cdot 0.9 \cdot 3.8" \cdot 24000 psi \cdot \frac{1.33}{12} = 5640$ ft-lb/ft.

5640 > 4170 ft-lb/ft. ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

$F_b = \frac{1}{3} f'm \cdot 1.33 = \frac{1}{3}(1500) \cdot 1.33 = 665 psi$

$M_m = \frac{bd^2}{2} \cdot K \cdot j \cdot F_b = \frac{24" \cdot 3.8^2}{2}(0.215)(0.928)\frac{665 psi}{12} = 1916$ ft-lb

1916 < 4170 ft-lb/ft DOES NOT WORK

ASSUME NEW f'_m

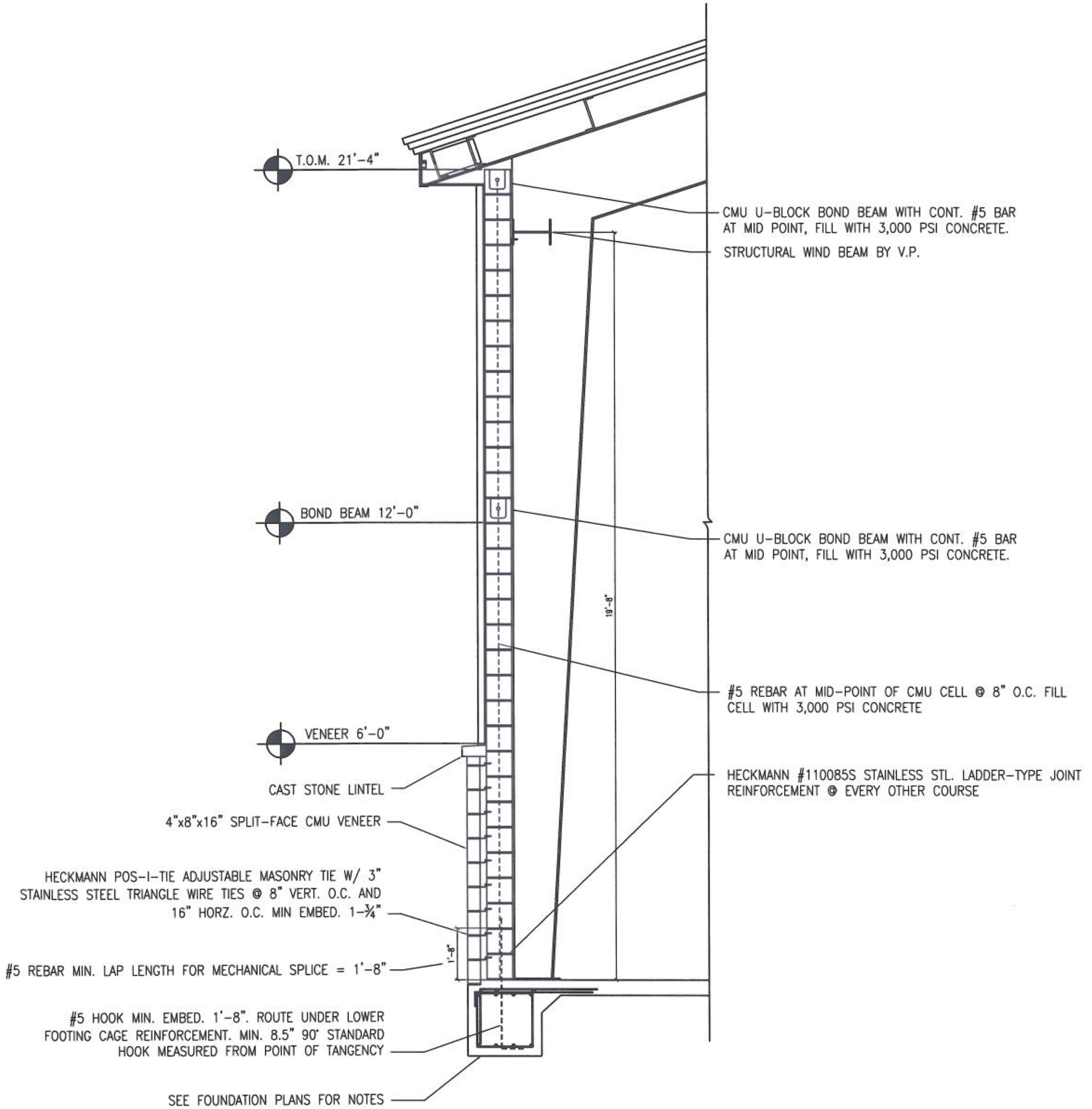
ESTIMATE REQ'D STRENGTH: $\frac{4170}{1916} \cdot 1500 psi = 3265 psi$ UNIT STRENGTH

NEW $f'_m = 2500 psi$ – TYPE N MORTAR ⇒ 4,050 psi UNIT STRENGTH

$F_b = 1795$ psi

$M_M = 5170$ ft-lb/ft ∴ OK

USE #5 @ 8" O.C, w/ 8" CMU (2500psi) TYPE N MORTAR



WALL#1 ELEMENT A DETAIL

N.T.S.

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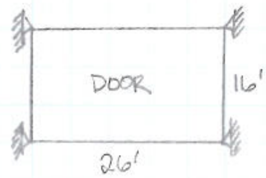
STENNIS RIVERINE

DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2441 ELEMENT B (DESIGN FOR 26'x 16' OPENING)

MATERIALS:

UNIT STRENGTH	4050 psi
MORTAR	TYPE N
f'_m	2500 psi
E_m	2.25×10^6 psi
n	12.89
REINFORCEMENT	GRADE 60

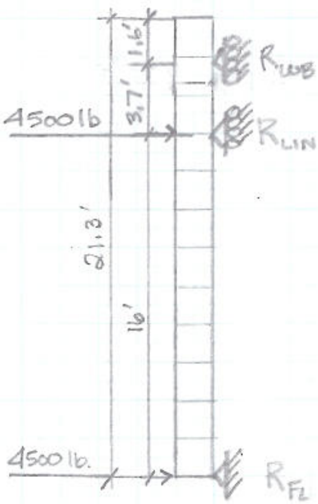
LOADING:
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



$R = \frac{(16 \cdot 26 \cdot 43.3)}{4}$

$R = 4500$ lbs

REACTIONS @ LINTEL AND FLOOR FROM DOOR



$R_{LIN} = \left(\frac{4500\text{lbs} \cdot 16'}{16'}\right) = 4500$ lbs. = 346 plf

$R_{FL} = \left(\frac{4500\text{lbs} \cdot 0'}{16'}\right) + 4500\text{lbs} = 4500$ lbs.

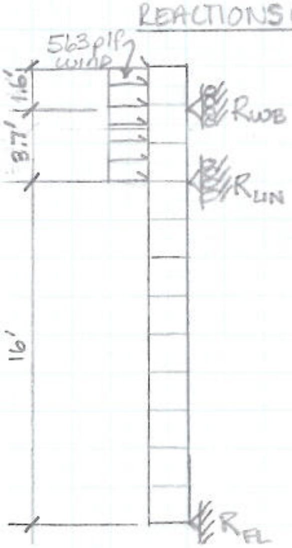
TOTAL = 9000 lbs.

ACTUAL: $[43.3\text{psf} \cdot (13' \cdot 16') = 9006]$
∴ OK

MAXIMUM MOMENT = 0 lbs · 16' = 0 ft-lb/ft

WIND LOAD = $W = \frac{(26' \cdot 43.3\text{ psf})}{2} = 563$ plf

REACTIONS @ WIND BEAM AND LINTEL FROM AREA ABOVE DOOR:



$R_{WB} = \left(\frac{43.3 \cdot (5.3)^2/2'}{3.7'}\right) = 164.4$ plf $(13') = 2136$ lbs

$R_{LIN} = \left[43.3\left(\frac{3.7^2}{2} - \frac{1.6^2}{2}\right)\right] / 3.7' = 65.1\text{plf}\,(13') = 847$ lbs.

2983 lbs

$x = \frac{65.1}{43.3} = 1.5'$

ACTUAL = $[43.3\text{psf}\,(5.3' \cdot 13') = 2983$
∴ OK

MAX MOMENT = $(164.4 - 65.1)\left(\frac{1.5}{2}\right) = 74.8$ ft-lb/ft

BLDG 2441 - WALL 1 - B

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MOMENT @ HEAD LOCATION FROM UNIFORM WIND ON WALL ELEM. B

MAX MOMENT $= 425\text{ plf} \cdot 21.3' - 43.3\text{ psf}\left(\frac{16^2}{2}\right) = 1260\text{ ft.-lb/ft.}$

DESIGN MOMENT

ASSUME 32" JAMB

MAX MOMENT $= (74.8\text{ ft-lb/ft} \cdot 13') + (1260\text{ ft-lb./ft} \cdot 2.67')$

$(9724\text{ ft-lb.} + 3364\text{ ft-lb}) = 13{,}088\text{ ft-lb.}$

BLDG 2441 - WALL 1 - B

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ESTIMATE REINFORCEMENT:

8" CMU ASSUME J = 0.9 FOR ESTIMATE $d = 3.8''$

$$A_s = \frac{M}{F_s J d} = \frac{13088 \text{ ft-lb} \cdot 12 \text{ in/ft}}{24000\text{psi} \cdot 0.9 \cdot 1.33 \cdot 3.8''} = 1.4 \text{ in}^2/\text{ft.}$$

TRY (8) #4 REBAR PER FOOT

ALLOWABLE CAPACITY IN TENSION

$$M_t = A_s \cdot j \cdot d \cdot F_s = 1.6 \text{in}^2 \cdot 0.9 \cdot 3.8'' \cdot 24000\text{psi} \cdot \frac{1.33}{12} = 14555 \text{ ft-lb.}$$

$M_t >$ REQ. M: 13,088 ft-lb. ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

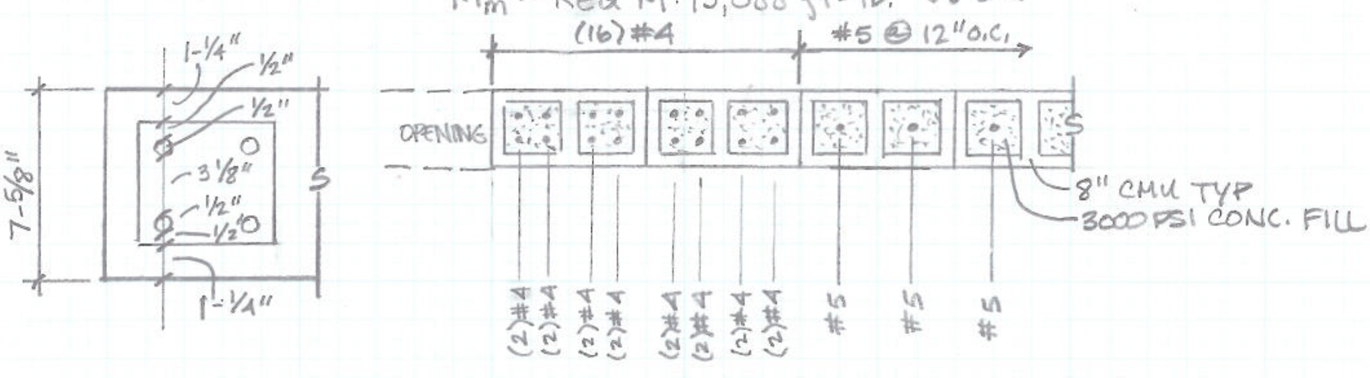
$$p = \frac{(1.6)^2}{32\text{in} \cdot 3.8''} = 0.02 \qquad np = 12.89 \cdot 0.02 = 0.2578 \qquad K = \frac{-0.5 \pm \sqrt{0.5^2 - 4 \cdot 1 \cdot (-0.5)}}{2}$$

$$j = \left(1 - \frac{K}{3}\right) = \left(1 - \frac{0.5}{3}\right) = 0.83 \qquad K = \frac{-0.5 \pm 1.5}{2} = 0.5$$

$$M_m = \frac{bd^2}{2} \cdot K \cdot j \cdot F_b = \frac{32\text{ IN} \cdot 3.8^2}{2}(0.5)(0.83)\frac{1795\text{psi}}{12} = 14342 \text{ ft-lb.}$$

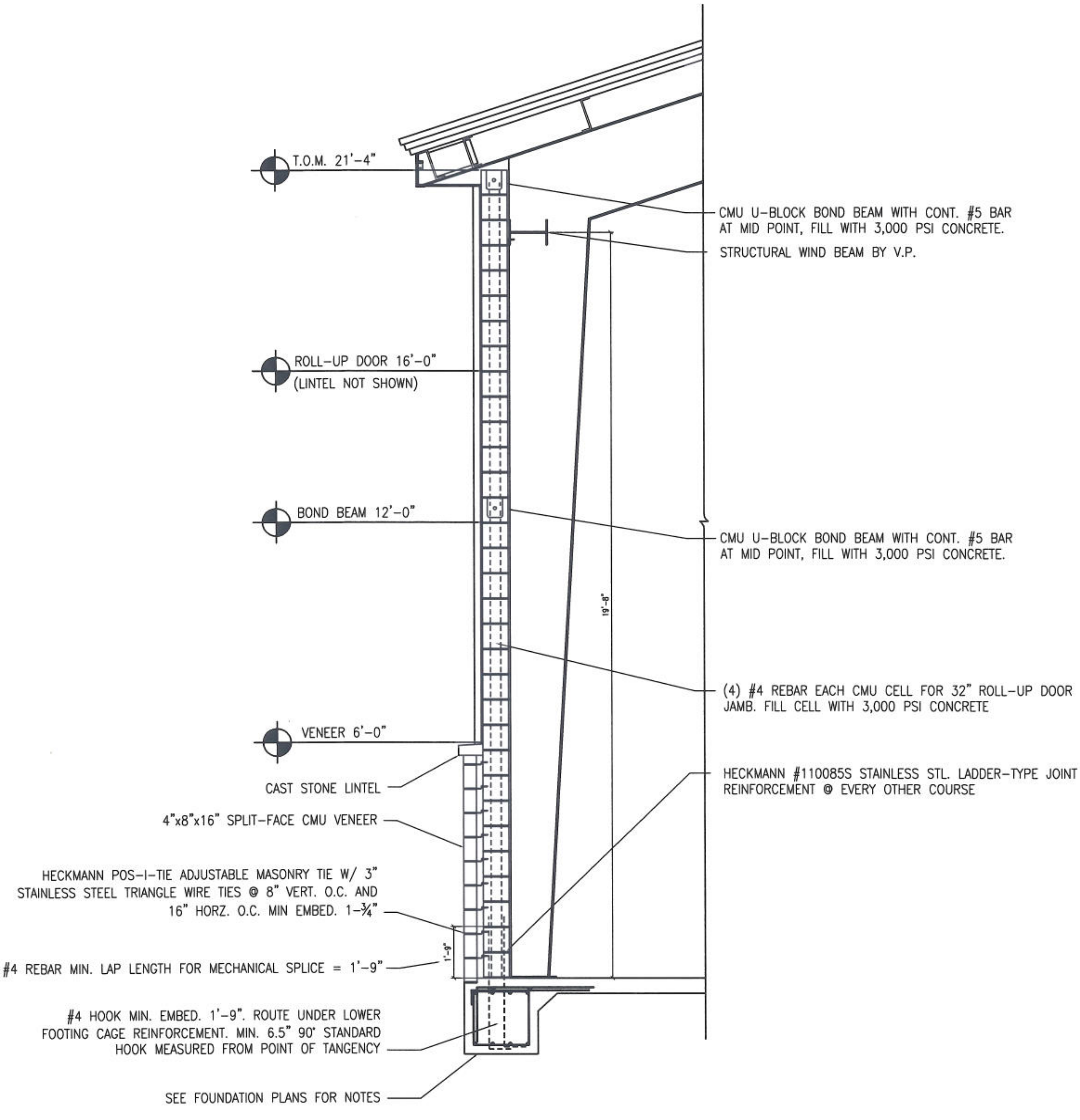
$$F_b = \frac{1}{3}(4050) \cdot 1.33 = 1795 \text{ psi}$$

$M_m >$ REQ M: 13,088 ft-lb. ∴ OK



USE (8)#4 REBAR PER FOOT AS SHOWN ABOVE.

BLDG 2441 - WALL 1 - B



WALL#1 ELEMENT B DETAIL

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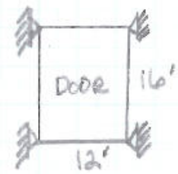
STENNIS RIVERINE
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2441 — WALL #1 ELEMENT C

MATERIALS
UNIT STRENGTH 4050 psi
MORTAR TYPE N
f'_m 2500 psi
E_m 2.25×10^6
n 12.89
REINFORCEMENT GRADE 60

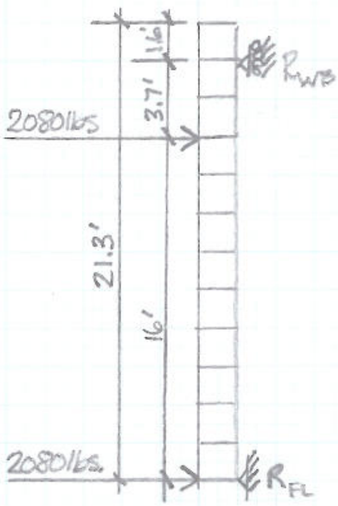
LOADING:
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



$R = \dfrac{(16 \cdot 12 \cdot 43.3\text{psf})}{4}$

R = 2080 lbs.

REACTIONS @ LINTEL AND FLOOR FROM DOOR:



$R_{WB} = \dfrac{2080\text{lbs} \cdot 16'}{19.7'} = 1690 \text{ lbs.}$

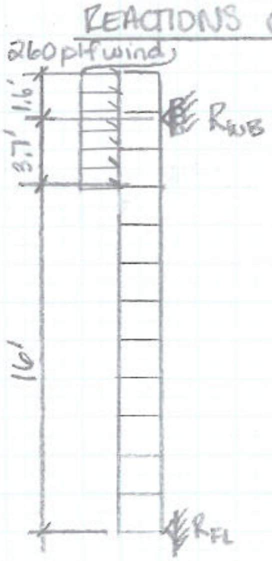
$R_{FL} = \dfrac{2080\text{lbs} \cdot 3.7'}{19.7'} + 2080 \text{ lbs.} = 2470 \text{ lbs.}$

TOTAL = 4160 lbs.
[ACTUAL = 43.3·(16·12)/2 = 4157]
∴ O.K.

MAX MOMENT = 780 lbs · 6' = 4680 ft-lb

WIND LOAD = $\left(\dfrac{12' \cdot 43.3\text{psf}}{2}\right) = 260 \text{ plf}$

REACTIONS @ WIND BEAM AND FLOOR FROM AREA ABOVE DOOR:



$R_{WB} = \dfrac{260\text{plf} \cdot 5.3' \cdot 18.65'}{19.7'} = 1305 \text{ lbs.}$

$R_{FL} = 260\text{plf} \cdot \left(\dfrac{\frac{5.3^2}{2} - \frac{1.6^2}{2}}{19.7'}\right) = 170 \text{ lbs}$

$x = \dfrac{65.1}{43.3} = 1.5'$

MOMENT = 170 lbs · 16' = 2720 ft-lb.

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MOMENT @ HEAD LOCATION FROM UNIFORM WIND ON WALL ELEM. C:

MAX MOMENT = $425 plf \cdot 16' - 43.3 psf\left(\frac{16^2}{2}\right) = 1260$ ft-lb/ft.

DESIGN MOMENT

ASSUME 32" JAMB

MAX MOMENT = $(1260$ ft-lb/ft. $\cdot$ 2.67 + 2720 ft-lb. + 4680 ft-lb$) = 10765$ ft-lb.

BLDG 2441-WALL 1-C

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ESTIMATE REINFORCEMENT:

8" CMU ASSUME J=0.9 FOR ESTIMATE $d = 3.8''$

$$A_S = \frac{M}{F_S\, j\, d} = \frac{10765 \text{ ft-lb.} \cdot 12 \text{ in/ft}}{24000\text{psi} \cdot 0.9 \cdot 1.33 \cdot 3.8''} = 1.2 \text{ in}^2/\text{ft}$$

TRY (8) #4 REBAR PER FOOT

ALLOWABLE CAPACITY IN TENSION:

$M_t = 14555$ ft-lb (SEE CALCULATIONS FOR WALL ELEM. B)

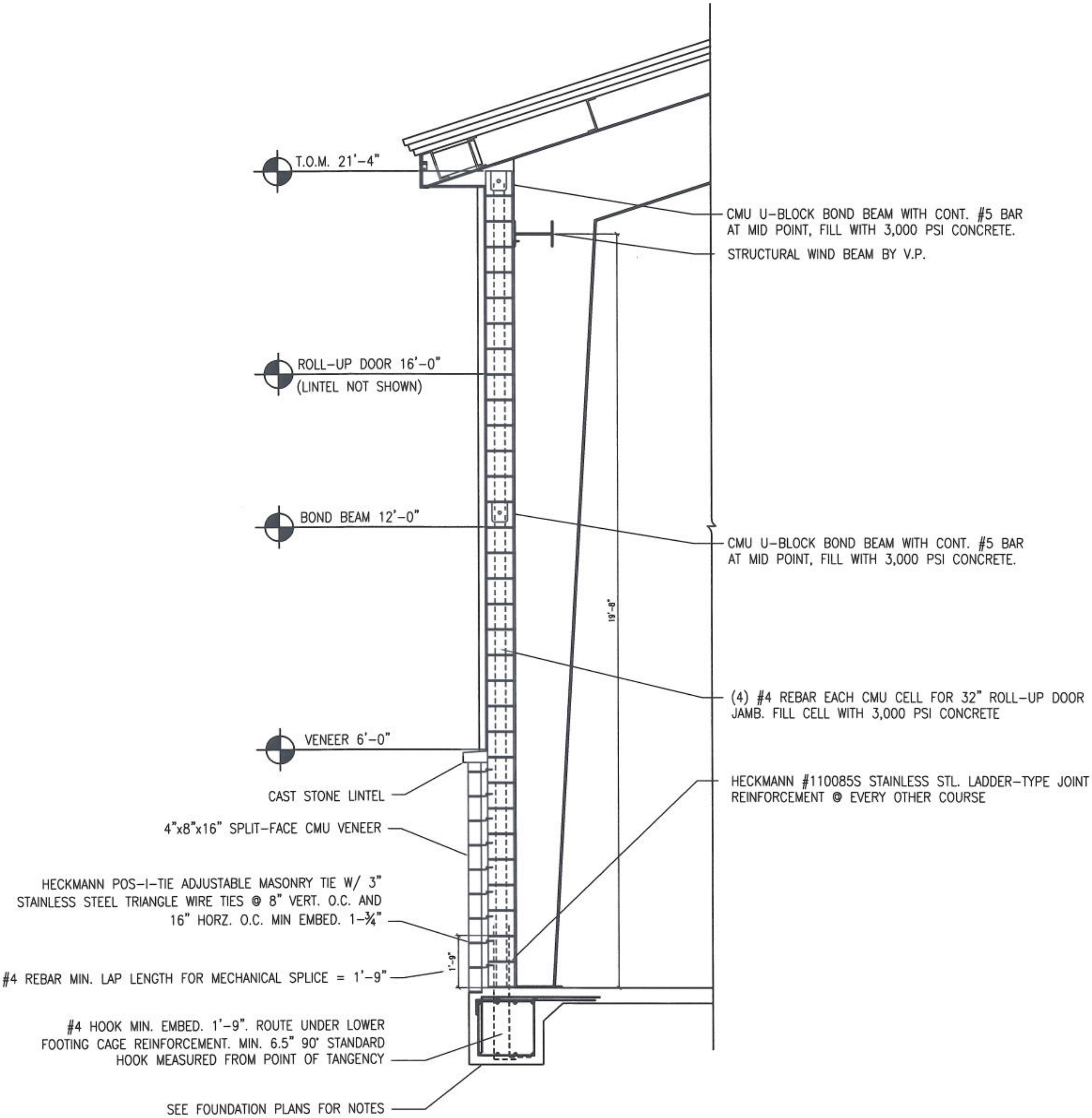
$M_t > 10765$ ft-lb. $\therefore$ OK

ALLOWABLE CAPACITY IN COMPRESSION

$M_m = 14342$ ft-lb (SEE ELEMENT B)

$M_m > 10765$ ft-lb $\therefore$ OK

USE (8) #4 REBAR PER FOOT AS SHOWN ON ELEM. B.



WALL#1 ELEMENT C DETAIL

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STENNIS RIVERINE

DESIGN OF REINFORCED CMU NON-LOADBEARING WALL FOR FLEXURE BLDG 2441 WALL #2

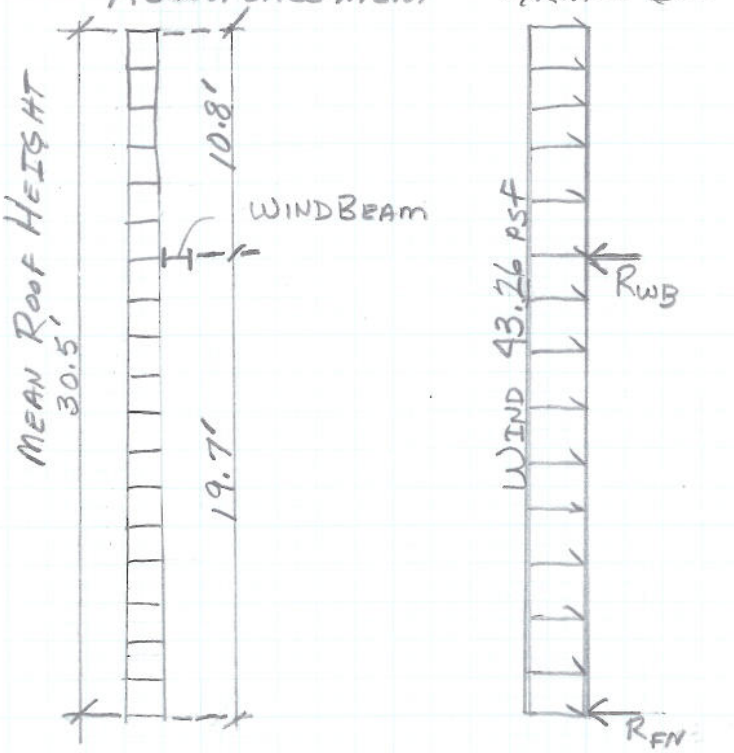
MATERIALS:

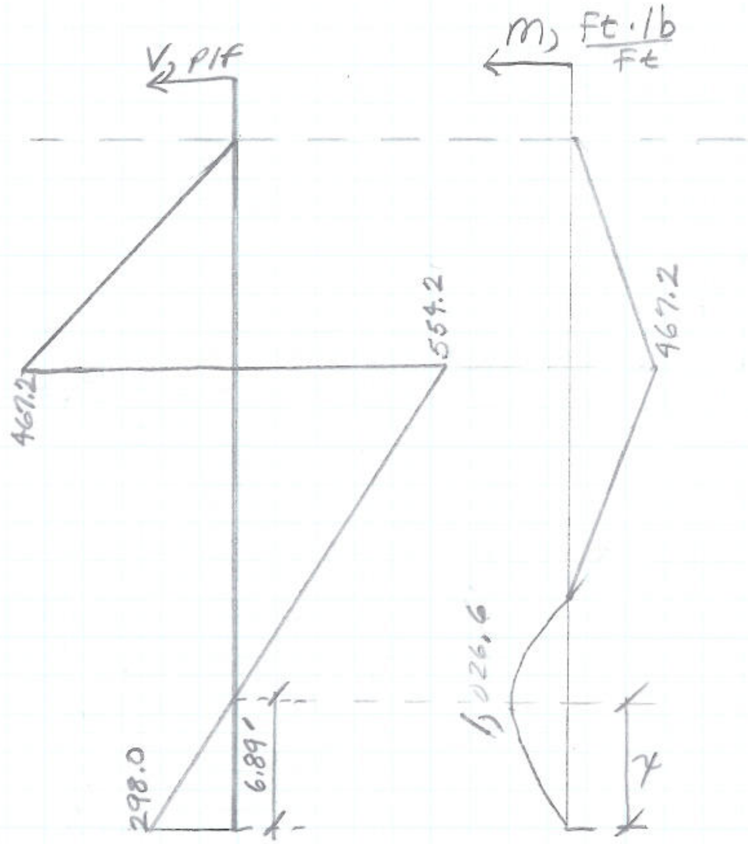
UNIT STRENGTH	4050 psi
MORTAR	TYPE N
f'_m	2500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

LOADING:

WIND 130 MPH = 43.26 psf

NEGLECT SELF WEIGHT





REACTIONS:

$$R_{WB} = \frac{\left(\frac{43.26\,psf \times (30.5')^2}{2}\right)}{19.7'} = 1{,}021.4\ plf$$

$$R_{FN} = 43.26\,psf \frac{\left(\frac{(19.7')^2}{2} - \frac{(10.8')^2}{2}\right)}{19.7'} = 298.0\ plf$$

$$x = \frac{298\ plf}{43.26\ psf} = 6.89\ Ft$$

BLDG 2441-WALL 2

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BLDG 2441 WALL #2 Cont.

ESTIMATE REINFORCEMENT

8" CMU, ASSUME STEEL MID-DEPTH $d = \frac{7.625''}{2} = 3.8''$

$$A_s = \frac{M}{F_s j d} = \frac{(1026.6\ ft \cdot lb)(12\ in/ft)}{(24{,}000\ psi)(1.33)(0.9)(3.8'')} = 0.113\ in^2/ft$$

TRY #5 @ 24" O.C. ($A_s = 0.31 \times \frac{12}{24} = 0.155\ in^2/ft$)

DESIGN STRENGTH

USE 2.0 FT WIDE STRIP

DESIGN MOMENT = 1026.6 ft·lb/ft = 2,053.2 ft·lb/ft

$$\rho = \frac{A_s}{bd} = \frac{0.31\ in^2}{24\ in \times 3.8\ in} = 0.00339$$

$n\rho = 0.0438$ $\quad k^2 + 2\rho n k - 2\rho n = 0$

$k = 0.335$ $\quad j = 1 - \frac{k}{3} = 0.889$

ALLOWABLE CAPACITY IN TENSION

#5 @ 24" O.C.

$M_t = A_s j d F_s = 0.31 \times 0.889 \times 3.8 \times 24{,}000 \cdot \frac{1.33}{12} =$

$M_t = 2{,}785.7\ ft \cdot lb/ft > 2{,}053.2\ ft \cdot lb/ft$

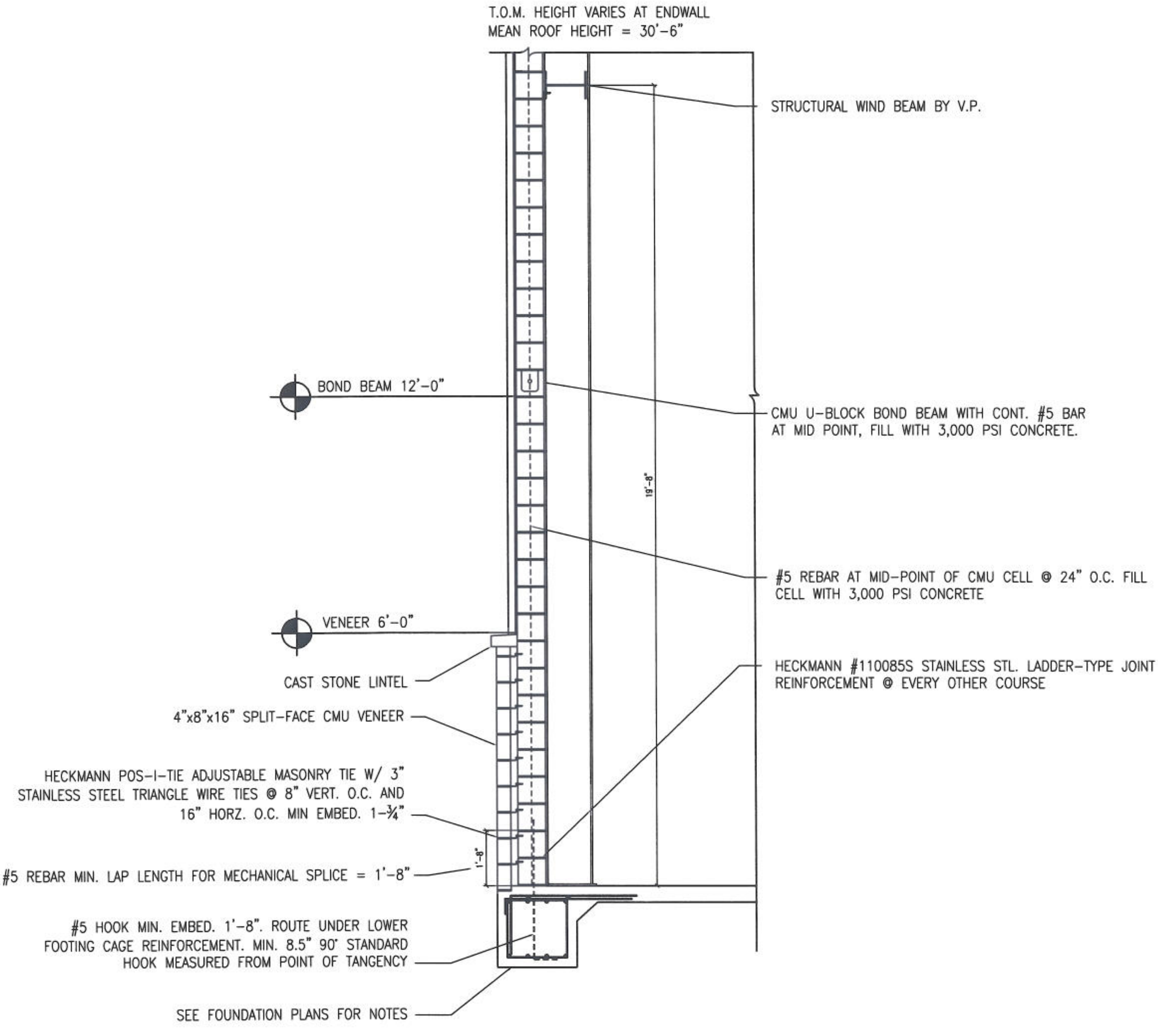
ALLOWABLE CAPACITY IN COMPRESSION

$M_m = \left(\frac{bd^2}{2}\right) k j F_b =$

$F_b = \frac{1}{3} f'_m \times 1.33 = \frac{1}{3}(4{,}050\ psi)\ 1.33 = 1795\ psi$

$M_m = \left(\frac{24'' \times 3.8^2}{2}\right) 0.335 \times 0.889 \times \frac{1795\ psi}{12\ in/ft} = 7{,}719.3\ \frac{ft \cdot lb}{ft}$

USE #5 @ 24" O.C. 8" CMU TYPE N MORTAR



WALL#2 TYPICAL DETAIL

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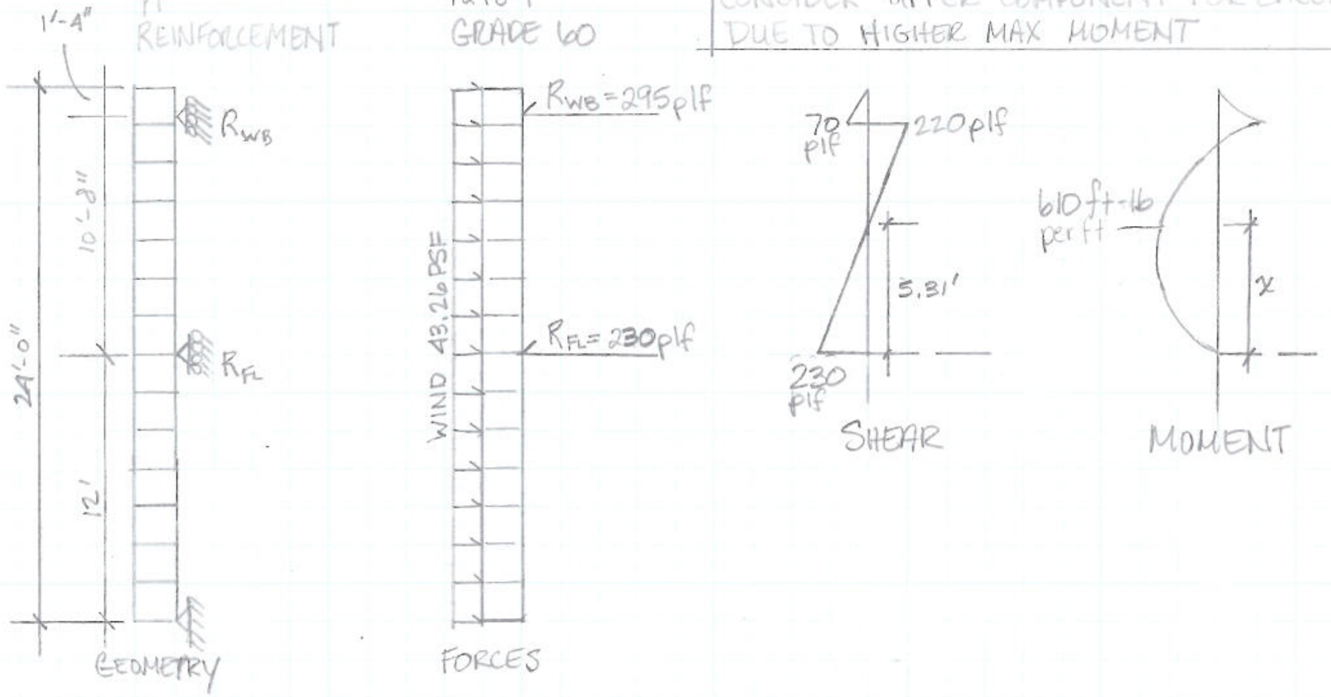
STENNIS RIVERINE
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2440 WALL #3

MATERIALS:	
UNIT STRENGTH	2150 psi
MORTAR	TYPE N
f'_m	1500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

LOADING:
WIND 130 mph = 43.3 psf
NEGLECT SELF WEIGHT

NOTE
CONTINUOUS LATERAL SUPPORT @ 12.0'
CONSIDER UPPER COMPONENT FOR CALCULATIONS
DUE TO HIGHER MAX MOMENT



REACTIONS:

$$R_{WB} = \left[\frac{43.3 \cdot (12')^2}{2}\right] / 10.67' = 292.2 \text{ plf}$$

$$x = \frac{230 \text{ plf}}{43.3} = 5.31'$$

$$R_{FL} = 43.3\left[\frac{\left(\frac{10.67}{2} - \frac{1.3^2}{2}\right)}{10.67'}\right] = 230 \text{ plf}$$

$$M = 230 \text{ plf}\left(\frac{5.31'}{2}\right) = 610 \text{ ft-lb/ft}$$

ESTIMATE REINFORCEMENT:

TRY 8" CMU, STEEL @ MID DEPTH $d = 3.8''$

$$A_s = \frac{M}{F_s \cdot j \cdot d} = \frac{610 \text{ ft-lb} \cdot 12}{24000 \text{psi} \cdot 0.9 \cdot 3.8} = 0.09 \text{ in}^2/\text{ft}.$$

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DESIGN STRENGTH

USING 24" WIDE STRIP

DESIGN MOMENT = 610 ft-lb • 2 = 1220 ft-lb.

$p = \frac{A_s}{bd} = \frac{0.20}{24 \cdot 3.8} = 0.002$

$pn = 0.03$

$K = 0.28$

$j = \left(1 - \frac{K}{3}\right) = 0.91$

ALLOWABLE CAPACITY IN TENSION

TRY #4 @ 16" o.c. $A_s = 0.15$

$M_t = A_s j d F_s = 0.15 in^2 (0.93)(3.8)(24000)\frac{1.33}{12} = 1410$ ft-lb./ft

$1410 > 1220 \therefore OK$

ALLOWABLE CAPACITY IN COMPRESSION

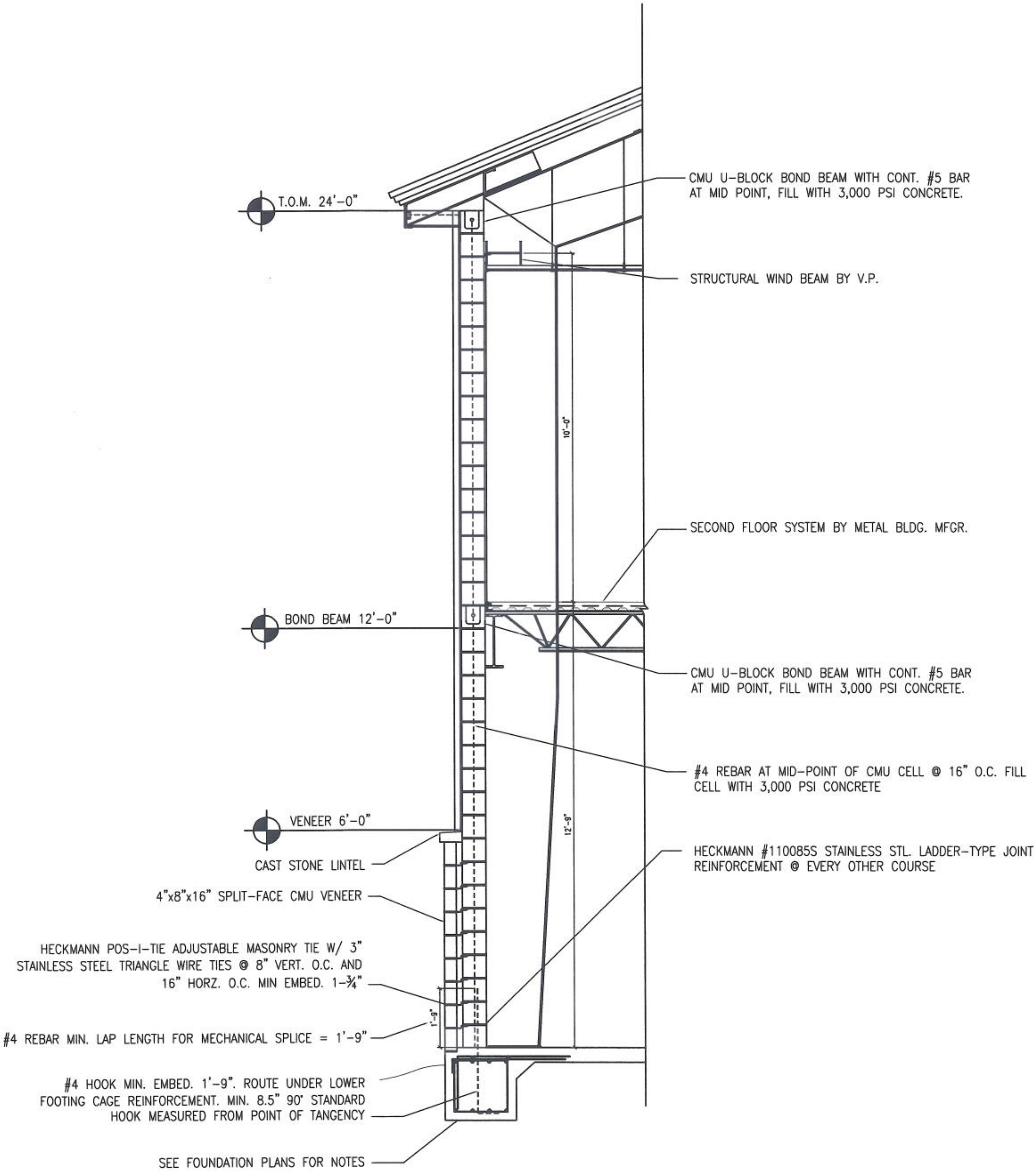
$F_b = 665 psi$

$M_m = \frac{bd^2}{2} K j F_b = \frac{24'' \cdot 3.8''^2}{2}(0.28)(0.91)\left(\frac{665psi}{12}\right) = 2446$ ft-lb.

$2446 > 1220 \therefore OK$

USE #4 REBAR @ 16" O.C. w/ 8" CMU (1500psi) TYPE N MORTAR

BLDG 2440 - WALL #3



WALL#3 TYPICAL DETAIL

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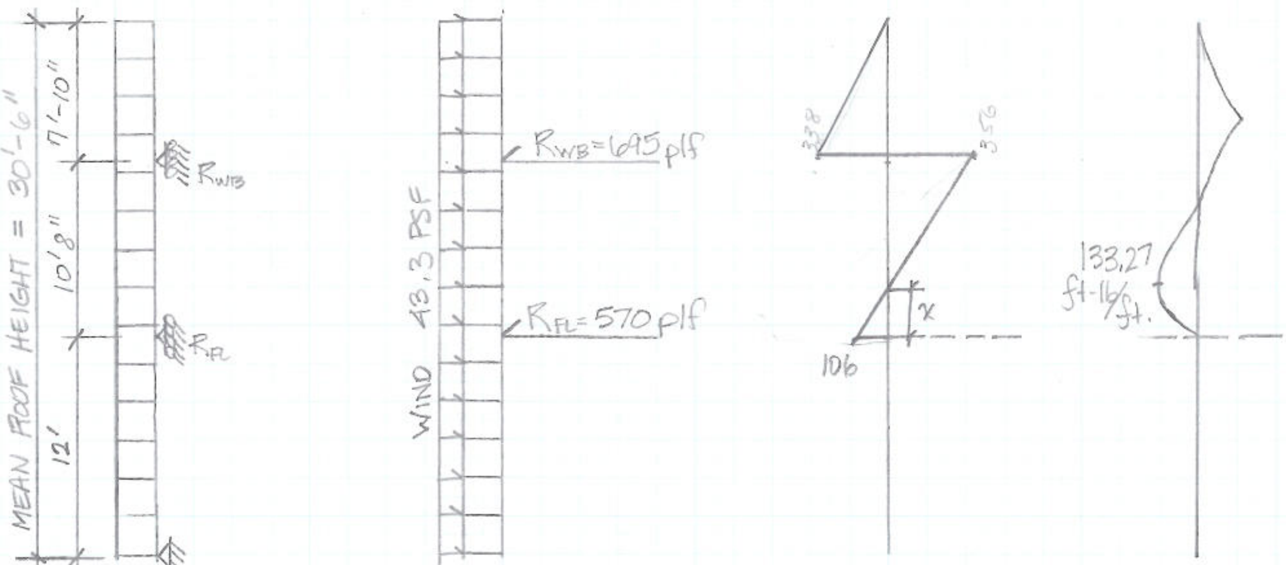
STENNIS RIVERINE
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2440 WALL #4

MATERIALS:

UNIT STRENGTH	2150 psi
MORTAR	TYPE N
f'_m	1500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

LOADING:
WIND 130 MPH = 43.3 psf
NEGLECT SELF WEIGHT



GEOMETRY FORCES SHEAR MOMENT

REACTIONS:

$$R_{WB} = \left[\frac{43.3(18.5')^2}{2}\right] / 10.67' = 695 \text{ plf}$$

$$x = \frac{106.6}{43.3} = 2.5'$$

$$R_{FL} = 43.3\left[\frac{\frac{(10.67)^2}{2} - \frac{7.83^2}{2}}{10.67'}\right] = 106.6 \text{ plf}$$

$$M = 106.6 \text{ plf}\left(\frac{2.5}{2}\right) = 133.27 \text{ ft-lb/ft}$$

ESTIMATE REINFORCEMENT:

TRY 8" CMU, STEEL @ MID DEPTH $d = 3.8''$

$$A_s = \frac{M}{F_s \, j \, d} = \frac{135 \text{ ft-lb/ft} \cdot 12}{24000\text{psi}(0.9)(3.8'')(1.33)} = 0.02 \text{in}^2/\text{ft.}$$

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DESIGN STRENGTH:

USE 24" WIDE STRIP DESIGN MOMENT = 133.3 ft-lb/ft × 2 = 270 ft-lb

$p = 0.005$ $pn = 0.06$ $K = 0.28$ $j = 0.98$

ALLOWABLE CAPACITY IN TENSION

TRY #5 @ 16" O.C.

$$M_t = A_s\,(0.98)(3.8)(24000)\,\frac{1.33}{12} = 3070 \text{ ft-lb}$$

3070 > 270 ft-lb ∴ OK

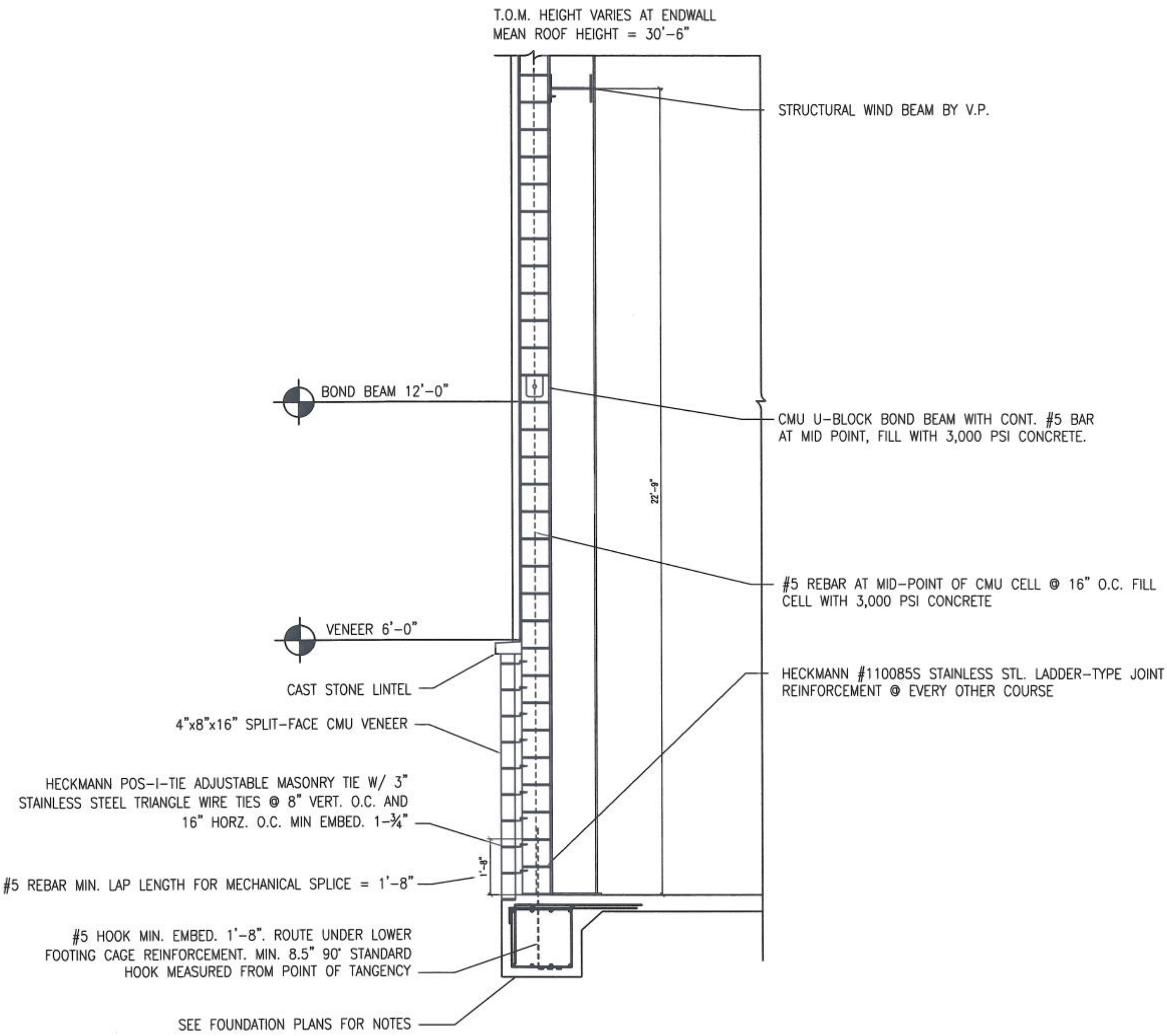
ALLOWABLE CAPACITY IN COMPRESSION

$$F_b = \frac{1}{3}(f'_m)\,1.33 = \frac{1}{3}(1500)\,1.33 = 665 \text{ psi}$$

$$M_m = \left(\frac{24 \cdot 3.8^2}{2}\right)(0.28)(0.98)\left(\frac{665}{12}\right)1.33 = 2635 \text{ ft-lb}$$

2635 > 270 ∴ OK

USE #5 @ 16" O.C. 8" CMU TYPE N MORTAR



WALL#4 TYPICAL DETAIL

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TYPICAL ANCHORAGE AND SPLICE FOR #5 REBAR

USE #5 REBAR FOR HOOK, GRADE 60 l_d = REQ'D DEVELOPMENT LENGTH

$$l_d = \frac{0.13 \cdot d_b{}^2 \cdot f \cdot y \cdot \gamma}{K \cdot \sqrt{f'_m}} = \frac{0.13 \cdot (0.625)^2 \cdot 60000 \cdot 1}{5 \cdot (0.625) \cdot \sqrt{2500}} = 19.5''$$

$l_e = 13db = 8.125''$

VENEER WALL CONNECTION

USE "POS-I-TIE" TAPCON SCREW FOR CMU EMBED @ 8" VERTICAL O.C. AND 16" HORZ. O.C., MIN EMBED. LENGTH 1-3/4". USE 3/16"Ø x 3" S.S. TRIANGLE WIRE TIES @ EA. CONNECTION. SEE ATTACHED PRODUCT SHEET.

HORZ. JOINT REINFORCEMENT

USE HECKMANN #110085 S.S. LADDER-TYPE MASONRY WALL REINFORCEMENT @ EVERY OTHER COURSE. SEE ATTACHED PRODUCT SHEET.

TYPICAL ANCHORAGE AND SPLICE FOR #4 REBAR

USE #4 REBAR FOR HOOK, GRADE 40

$l_d = 20.1''$

$l_e = 6.5''$

HECKMANN Building Products, Inc.

1501 N. 31st Avenue
Melrose Park, IL 60160-2911
800 621-4140 or 708 865 2403
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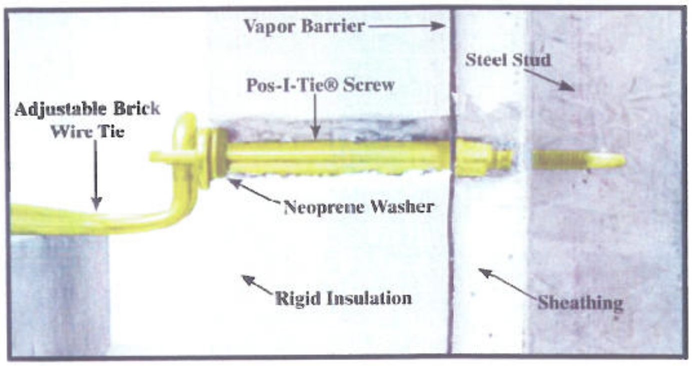
www.heckmannanchors.com
Email: info@heckmannbuildingprods.com

ARCHITECTURAL SPECIFICATION INFORMATION

THE ORIGINAL Pos-I-Tie®

U.S. Patent# 4473984 & 4764069 **Canada Patent#**1224344



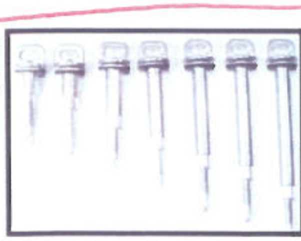
Self Drilling Screw for Brick Veneer to Steel Studs

CMU/Concrete Screw for Brick Veneer to Concrete, CMU, or Wood

Dril-It® Screw for Brick Veneer to Steel Beam

CMU ANCHOR TO WIND BEAM

Seven Barrel lengths available for Insulation/gypsum board sizes and combinations: 1/2"& 5/8", 1", 1-1/2", 2", 2-1/2", 3", and 3-1/2"



The Pos-I-Tie® conforms with the Energy Conservation Requirements of the Massachusetts State Building Code (780 CMR 13 Envelope)

NO. 75 POS-I-TIE® ADVANTAGES

1. Pos-I-Tie® system fully complies with the ACI 530 Code. The Barrel Screw is one piece. No more plates, screws and gaskets. Installs in seconds.
2. Uses consistent screw. Screw is provided as a part of the Pos-I-Tie® System. - No inferior screws can be substituted.
3. Provides positive connections. The Barrel Section actually penetrates sheathing and makes a Positive Lateral Connection with the backup for transfer of compression and tension loads to structural backup.
4. Enables speedy cost-saving installation. Only one screw needs to be placed, rather than two screws.
5. Corrosion Resistant. Pos-I-Tie® seals the hole it makes when it seats itself in the backup. Barrel section is made of ZAMAC 3, a 92% zinc alloy. Screws are Zinc electro plated.
6. Slotted Barrel allows for differential movement due to temperature variations. Tie design provides for allowable ACI 530 code vertical adjustment.
7. Allows for use of 4' x 8' insulation sheets. The Pos-I-Tie® holds the insulation in place!

Test Data Available Upon Request

WIRE TIES

Ties are 3/16" diameter x 3", 3 1/2", 4", or 5" Long in Hotdip Galvanized, Mill Galvanized and Stainless Steel.

Triangular Wire Tie

Seismic Wire Tie

Special Lengths available.

Single Wire Tie
(Check for local code acceptance of single wire tie.)

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Melrose Park, IL 60160-2911
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www.heckmannbuildingprods.com

. SUBMITTAL SHEET:

#1100 Ladder-Type Masonry Wall Reinforcement.

Manufactured from 9 Gage wire, 10' 8" long with butt-welded perpendicular cross wires welded 16" on center to avoid interference with reinforcement in block cores.

Wire is deformed for maximum bonding in mortar joints.

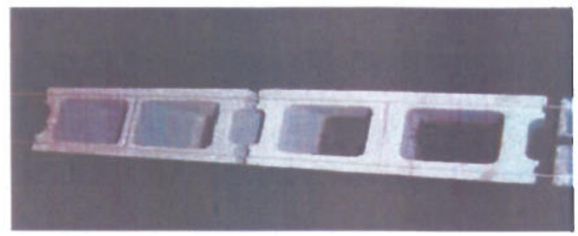
Packaged in 50 pc (500 lin ft) bundles

Special sizes and lengths are available.

- Reduces Cracking.
- Increases lateral flexural strength.
- Increases ductility and elasticity.

Standard Catalog Numbers Size

Mill Galv	Hotdip Galv	Stainless Steel	Width	Wall Size
11006G	11006H	11006S	4	6
11008G	11008H	11008S	6	8
110010G	110010H	110010S	8	10
110012G	110012H	110012S	10	12



ASTM A82 cold drawn steel wire.
Tensile Strength 80,000 PSI
Yield Point 70,000 PSI minimum
Reduction of Area 30%

Finishes:
Stainless Steel:
ASTM A 580 Type 304.

Hotdip Galvanized:
ASTM A 153 Class B-2: (1.50 oz/ ft^2.)(0.46kg/m^2)

Mill Galvanized:
Wire: ASTM A 641 (0.1 oz/ ft^2.)

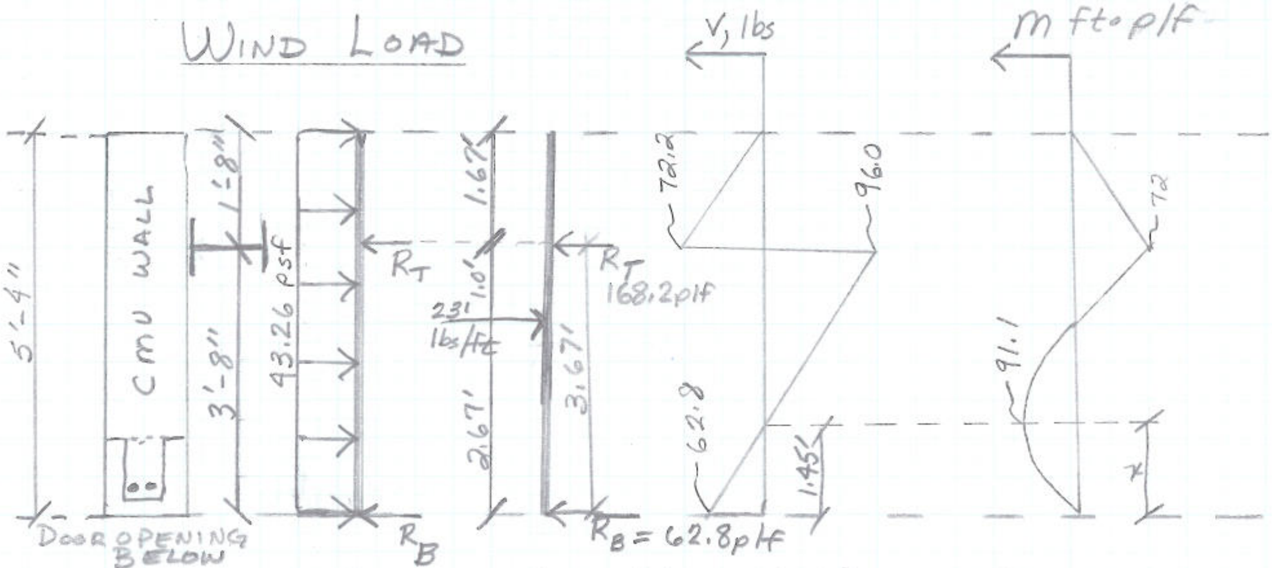
Conforms to requirements of ASCE / ACI 530 / TMS402 Building Code requirements for masonry structures.

Approvals:

Comments:

BLDG 2441 12 Ft Door Lintel CALCULATION

WIND LOAD



$\Sigma M_{RT} = 0 \Rightarrow R_B = \frac{1}{3.67'}(231 \text{ lb/ft} \times 1.0\text{ft}) = 62.8 \text{ plf}$

$\Sigma F_x = 0 \Rightarrow R_T = 231 \text{ plf} - 62.8 \text{ plf} = 168.2 \text{ plf}$

$x = \frac{62.8}{43.26} = 1.45'$

$M_{max} = \frac{1}{2}\left[1.45' \times 62.8 \text{ plf}\right] = 91.1 \text{ Ft·plf}$

USE 8" CMU

$d = \frac{7.63}{2} = 3.8"$ $\qquad A_s = \frac{M}{F_s j d}$

ASSUME $j = 0.9$ for initial estimate.

ALLOW $\frac{1}{3}$ stress increase for wind load.

$$A_{s\,required} = \frac{91.1 \text{ Ft·plf} \times 12 \text{ in/Ft}}{24{,}000 \text{ psi} \times 1.33 \times 0.9 \times 3.8"} = 0.100 \text{ in}^2$$

USE #4 @ 24" o.c.

$A_s = 0.20 \ \frac{12}{24} = 0.10 \text{ in}^2$

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BLDG 2441 12FT DOOR LINTEL CALC.
WIND LOAD (CONT)

TRY #4 @ 24" O.C.

CHECK STRENGTH

USE 2.0' WIDE STRIP TO TEST

$\therefore$ DESIGN MOMENT = 91.1 ft·plf × 2 = 182.2 ft·plf

$$\rho = \frac{A_s}{bd} = \frac{0.20\ in^2}{24'' \times 3.8''} = 0.002$$

$$n\rho = 16.1 \times 0.002 = 0.0322$$

$$k^2 + 2n\rho k - 2n\rho = 0 \Rightarrow k^2 = 0.064k - 0.064 = 0$$

$$k = 0.220 \qquad j = \left(1 - \frac{k}{3}\right) = 1 - \frac{0.220}{3} = 0.927$$

ALLOWABLE TENSION FLEXURAL CAPACITY

$$M_T = A_s j d F_s = 0.20\ in^2 \times 0.927 \times 3.8\ in \times 24000\ psi \times \frac{1.33}{12\ in/ft}$$

$$\Rightarrow M_T = 1874\ ft\ plf > 182.2\ ft \cdot plf$$

ALLOWABLE COMPRESSION FLEXURAL CAPACITY

$$F_b = \frac{1}{3} f'_m \times 1.33 = \frac{1}{3}[1500 psi] \times 1.33 = 665\ psi$$

$$M_c = \frac{bd^2}{2} k j F_b$$

$$= \frac{24'' \times (3.8'')^2}{2} \times 0.220 \times 0.927 \times \frac{665\ psi}{12\ in/ft}$$

$$\Rightarrow M_c = 1958\ ft \cdot plf > 182.2\ ft \cdot plf$$

USE #4 @ 24" O.C.

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BLDG 2441 12 FT DOOR LINTEL CALC ③

WEIGHT LOAD

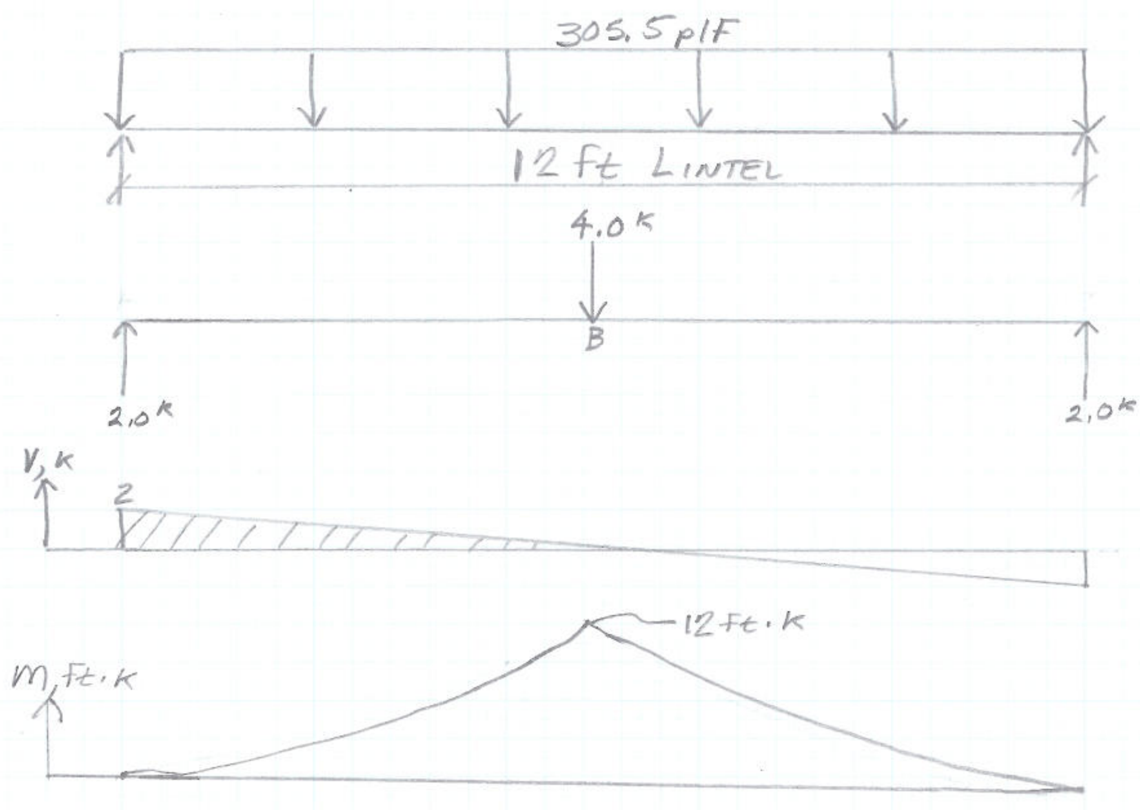
CALCULATE LINTEL to SUPPORT WEIGHT

WEIGHTS:

Hollow Core Cmu: 55 psf
Mortar, Masonry: 116 psf
Concrete : 150 pcf
Steel : 489 pcf

[1 ea Solid Filled Cmu w/1 bar] x LENGTH = 207.9 lbs/COURSE
6 COURSES = 1247.4 lbs
1 EA U-Shaped Block SOLID FILLED W/1 BAR 2418.95 lbs
TOTAL WEIGHT 3666.35 lb

WEIGHT PER LINEAR FOOT = 305.5 plf



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BLDG 2441 12FT DOOR LINTEL CALC

WEIGHT LOAD (CONT)

MORTAR TYPE N
$f'_m = 2500$ psi
$E_m = 2.25 \times 10^6$ psi
CMU STRENGTH = 4050 psi
REINFORCEMENT = GRADE 60, $E = 29 \times 10^6$ psi

REQUIRED: DETERMINE EFFECTIVE DEPTH, MODULAR RATIO, & ALLOWABLE STRESSES

ASSUME TOTAL DEPTH TO BE SOLIDLY GROUTED & CONSIDERED FOR LINTEL DEPTH IS LIMITED TO $h = 24$ in.

ASSUME COVER TO CENTROID OF TENSION STEEL = 3.0in
THEN $d = 16\text{ in.} - 3.0\text{in} = 13\text{ in.}$

ASSUME $b = 7.63$ in.

$E_s = 29 \times 10^6$ psi

MODULAR RATIO $n = \frac{E_s}{E_m} = \frac{29 \times 10^6 \text{ psi}}{2.25 \times 10^6 \text{ psi}} = 12.9$

THE ALLOWABLE COMPRESSIVE MASONRY STRESS:

$F_b = \left(\frac{1}{3}\right) f'_m = \left(\frac{1}{3}\right) 2500 \text{ psi} = 833.3 \text{ psi}$

THE ALLOWABLE TENSIL STEEL STRESS:

$F_s = 24{,}000$ psi

REQUIRED: DETERMINE MOMENT CAPACITY OF SECTION FOR BALANCED CONDITION

$$K_b = \frac{n}{n + F_s/F_b} = \frac{12.9}{12.9 + (24\text{ ksi}/.8\text{ ksi})} = 0.301$$

$$j_b = 1 - \frac{k_b}{3} = 0.900$$

$$M_b = \frac{F_b k_b j_b bd^2}{2} = \frac{(833\text{ psi})(0.301)(0.900)(7.63'')(13\text{in})^2}{2}$$

$$\Rightarrow M_b = 145.5 \text{ in·kips} = 12.1 \text{ ft-kips} \therefore OK$$

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BLDG 2441 12 FT DOOR LINTEL CALC
WEIGHT LOAD (CONT)

REQUIRED: DETERMINE TENSION STEEL AREA:

$$A_s = \frac{M_b}{F_s j_b d} = \frac{145.5 \text{ in-kips}}{(24 \text{ ksi})(0.900)(13 \text{ in})} = 0.518 \text{ in}^2$$

Use 2 #6 bars (A_s provided = 0.884 in^2)

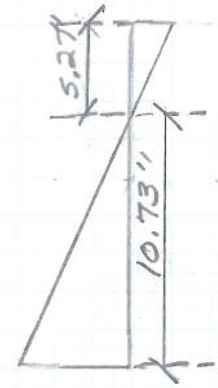
REQUIRED: DETERMINE compression STEEL AREA

$$f_s' = n F_b = 12.9(833.3 \text{ psi}) = 10,749 \text{ psi} < F_s = 24,000 \text{ psi}$$

$$A_s' = \frac{M}{f_s'(d)\left(\frac{n-1}{n}\right)} = \frac{145.5 \text{ in-kips}}{(10,749 \text{ psi})(13'')\left(\frac{12.9-1}{12.9}\right)} = 0.00113$$

USE 1 #4 bar (A_s' provided = 0.196 in^2)

REVISE k AND CHECK ADEQUACY OF SECTION:



$$\rho = \frac{A_s}{bd} = \frac{0.884 \text{ in}^2}{(7.63 \text{ in})(13 \text{ in})} = 0.008912$$

$$n\rho = 12.9 \times 0.008912 = 0.1150$$

$$\rho' = \frac{A_s'}{bd} = \frac{(0.196 \text{ in}^2)}{(7.63 \text{ in})(13 \text{ in})} = 0.00198$$

$$k = \left[(n\rho + (n-1)\rho')^2 + 2(n\rho + (n-1)\rho')\right]^{1/2} - \left[n\rho + (n-1)\rho'\right]$$

$$(n\rho + (n-1)\rho')^2 = (0.1150 + (12.9-1)0.00198)^2 = 0.01920$$

$$2(n\rho + (n-1))\rho' = 2(0.1150 + (12.9-1)0.00198) = 0.2771$$

$$n\rho + (n-1)\rho' = 0.1150 + (12.9-1)\,0.00198 = 0.1386$$

$$k = [0.01920 + 0.2771]^{1/2} - 0.1386 = 0.4057$$

$$kd = 5.27''$$

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BLDG 2441 12 FT Door LINTEL CALC.
Weight LOAD (CONT.)

ASSUME MASONRY compression stress = 883.3 psi
AND NEGLECTING HOLE EFFECT

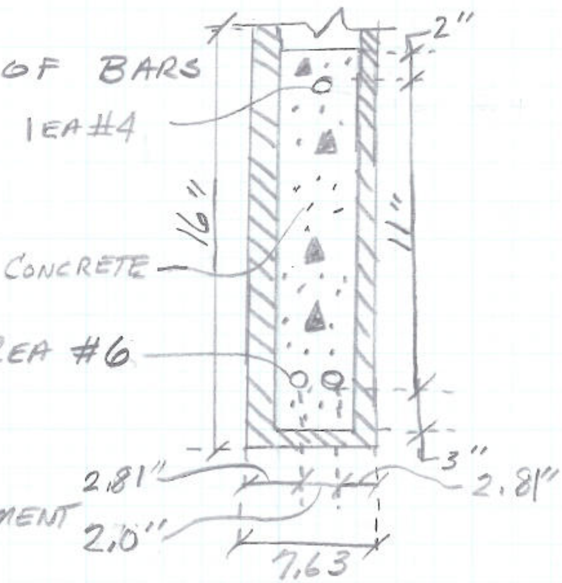
$$f_s = (12.9)(833\ psi)\left(\frac{10.73''}{5.27}\right) = 21{,}887\ psi < F_s$$

MASONRY CONTROLS

$$M = \frac{833.3\ psi}{2}(7.63 in)(5.27 in)\left[13 in - \frac{5.27}{3}\right] = 188{,}3365\ in \cdot lb$$

$$= 15.7\ ft \cdot kips > 12\ ft \cdot kips \ \therefore OK$$

CHECK PLACEMENT OF BARS



① CLEARANCE BETWEEN PARALLEL BARS NOT LESS THAN 1IN.

② CLEARANCE BETWEEN BARS AND CMU WALL NOT LESS THAN 1/2".

③ MINMUM CLEARANCE COVER OVER REINFOREMENT NOT LESS THAN 2".

CHECK DEFLECTION:

$$I_{CR} = bk^3\frac{d^3}{3} + nA_s(d-kd)^2 + (n-1)A'_s(kd-d')^2$$

$$(7.63 in)(0.4057)^3\frac{13^3}{3} + (12.9)(0.884 in^2)(13 in - 5.27 in)^2$$

$$+(12.9-1)(0.196 in^2)(5.27 in - 13 in)^2$$

$$= 1{,}193.8\ in^4$$

SHORT TERM DEFLECTION:

$$f_r = 2.5\sqrt{f'_m} = 2.5\sqrt{2500\ psi} = 125\ psi$$

$$I_g = (7.63 in)\frac{(16 in)^3}{12} = 2{,}604\ in^4$$

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BLDG 2441 12 FT DOOR LINTEL CALC (7)
WEIGHT LOAD (CONT.)

$$M_{CR} = \frac{f_r I_g}{y_t} = \frac{(125\,psi)(2604\ in^4)}{16\ in} = 20.3\,in\text{-}kips$$

$$M_a = 535\ in\text{-}kips$$

SHORT TERM DEFLECTION

$$\Delta = \frac{5 M_{cr} L^2}{48 E_m I_g} + \frac{5(M_a - M_{cr}) L^2}{48 E_m I_{CR}}$$

$$\Delta = \frac{5(20.3\,in\cdot k)(12.3\,Ft \cdot 12^{in}/_{Ft})^2}{48(2.6\times10^3 ksi)(2604\,in^4)}$$

$$+ \frac{5(535\,in\text{-}kips - 20.3\,in\cdot k)(12.3\,ft \times 12^{in}/_{ft})^2}{48(2.6\times10^3\,ksi)(1,193.8\,in^4)}$$

$$\Delta = 0.0068043\,in + 0.0376567\,in$$

$$\Delta = 0.04446$$

LONG TERM DEFLECTION

$$\lambda = \frac{\xi}{1+50p'} = \frac{2}{1+(50)(0.00198)} = 1.8198$$

TOTAL DEFLECTION = 0.04446 " + 1.8198(0.04446)
= 0.1253

$$\Delta_{ALLOWED} = \frac{L}{600} \leq 0.3$$

$$= \frac{(12.33\ ft)\ 12\ ^{IN}/_{ft}}{600}$$

$$= 0.2466\,in > 0.1253\ in \ \therefore OK$$

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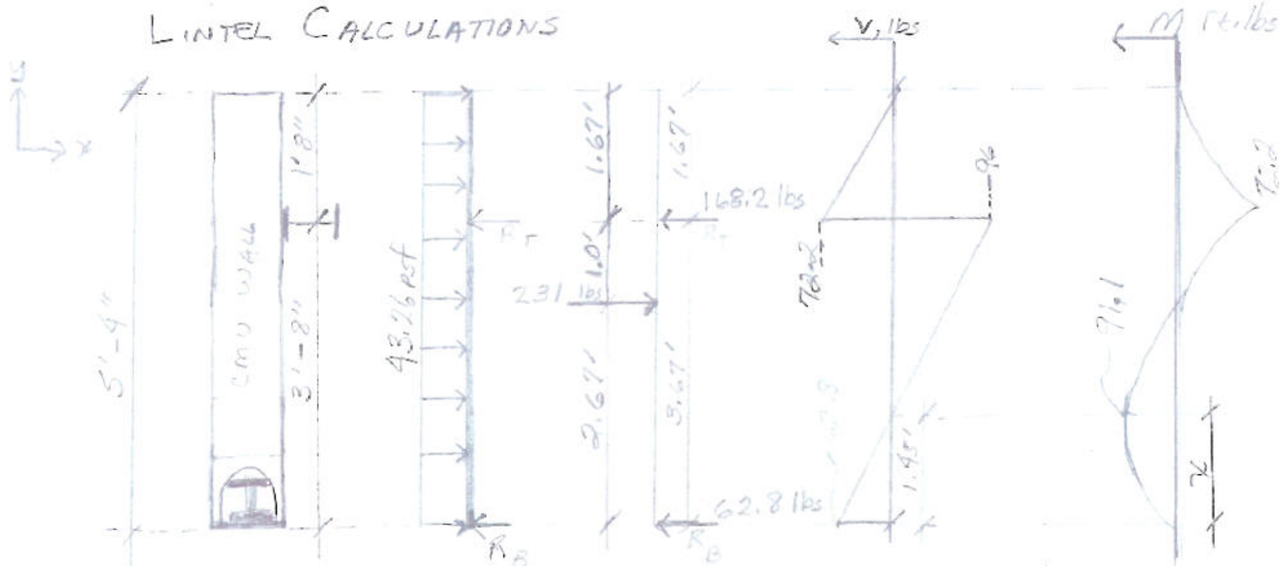
#1

BUILDING 2441 LINTEL & WIND BEAM CALCULATIONS

LINTEL CALCULATIONS



$\Sigma M_{R_T} = 0 \Rightarrow R_B = \frac{1}{3.67'}\left[231\text{ lbs} \times 1.0'\right] = 62.8\text{ lbs}$

$\Sigma F_x = 0 \Rightarrow R_T = 231 - 62.8\text{ lbs} = 168.2\text{ lbs}$

$x = \frac{62.8}{43.26} = 1.45'$

$M_{max} = \frac{1}{2}\left[1.45' \times 62.8\text{ lbs}\right] = 91.1\text{ ft-lbs}$

Use 8" CMU

$d = \frac{7.63"}{2} = 3.8"$ $\qquad A_s = \frac{M}{F_s\, j\, d}$

Assume $j = 0.9$ for initial estimate

Allow $\frac{1}{3}$ stress increase for wind load

$A_{s_{required}} = \frac{91.1\text{ ft}\cdot\text{lbs} \times 12\frac{\text{in}}{\text{ft}}}{24{,}000\text{ psi} \times 1.33 \times 0.9 \times 3.8"} = 0.100\text{ in}^2$

Use #4 @ 24 in o.c. ($A_s = 0.20\ \frac{12}{24} = 0.10\text{ in}^2$)

check strength

Use 2.0' wide strip ∴ Design moment = 91.1 ft-lbs × 2 = 182.2 ft-lbs

$\rho = \frac{A_s}{bd} = \frac{0.20\text{ in}^2}{24 \times 3.8\text{ in}} = 0.002$

$n\rho = 0.0322$ $\qquad k^2 + 0.064k - 0.064 = 0$

$k = 0.220$ $\qquad j = \left(1 - \frac{k}{3}\right) = \left(1 - \frac{0.22}{3}\right) = 0.927$

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#2

BLDG 2441 26 ft DOOR LINTEL Weight (cont.)

Allowable Tension Flexural capacity

$M_T = A_s j d F_s = 0.\ \ in^2 \times 0.927 \times 3.8\ in \times 24{,}000\ psi \times \frac{1.33}{12\ in/ft}$

$\Rightarrow M_T = 1874\ ft\text{-}lbs > 182.2\ ft\text{-}lbs \quad \therefore OK$

Allowable Compression Flexural capacity

$F_b = \frac{1}{3} f'_m \times 1.33 = \frac{1}{3}(1500\ psi) \times 1.33 = 665\ psi$

$M_c = \frac{b d^2}{2} k j F_b$

$M_c = \frac{24 \times (3.8\ in)^2}{2} \times 0.220 \times 0.927 \times \frac{665\ psi}{12\ in/ft}$

$M_c = 1958\ ft\text{-}lbs > 182.2\ ft\text{-}lbs \quad \therefore OK$

USE #4 24" O.C.

Calculate beam to support weight

CMU, hollow core = 55 psf
Mortar, masonry = 116 pcf
Concrete = 150 pcf
Steel = 489 pcf

1ea. solid filled CMU w/2 bars = 1,806.7 lbs
6 courses hollow CMU = 5,720.0 lbs
mortar = 1,508.0 lbs
vertical #4 @ 24 oc = 43.6 lbs
vertical concrete = 2,520.0 lbs
Total weight = 11,598.3 lbs
weight/LF = 446.1 plf

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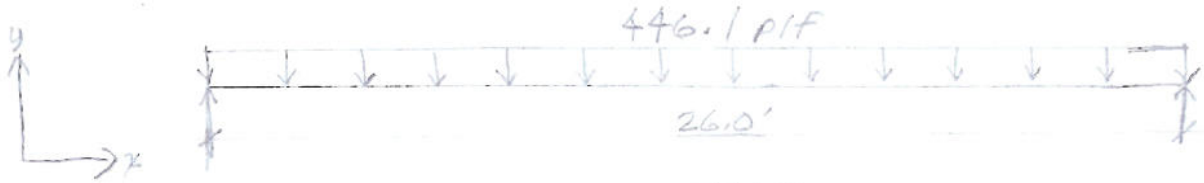
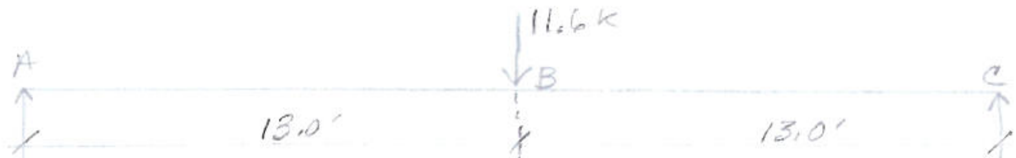
#3

BLDG 2441 26 ft Door Lintel Weight Calc (cont.)





$\Sigma M_c = 0 \Rightarrow A_y = \frac{1}{26}[11{,}598.3 \times 13.0]$ $\Rightarrow A_y = 5799.2\text{ lbs}$

$\Sigma F_y = 0 \Rightarrow C_y = 11{,}598.3 - 5799.2$ $\Rightarrow C_y = 5799.2\text{ lbs}$

Section modulus $S = \frac{M \times 12''/ft}{24{,}000\ psi} = \frac{37.7K \times 12\ in/ft}{24\ k \cdot lb/in^2} = 18.9\ in^3\ x\text{-}x$

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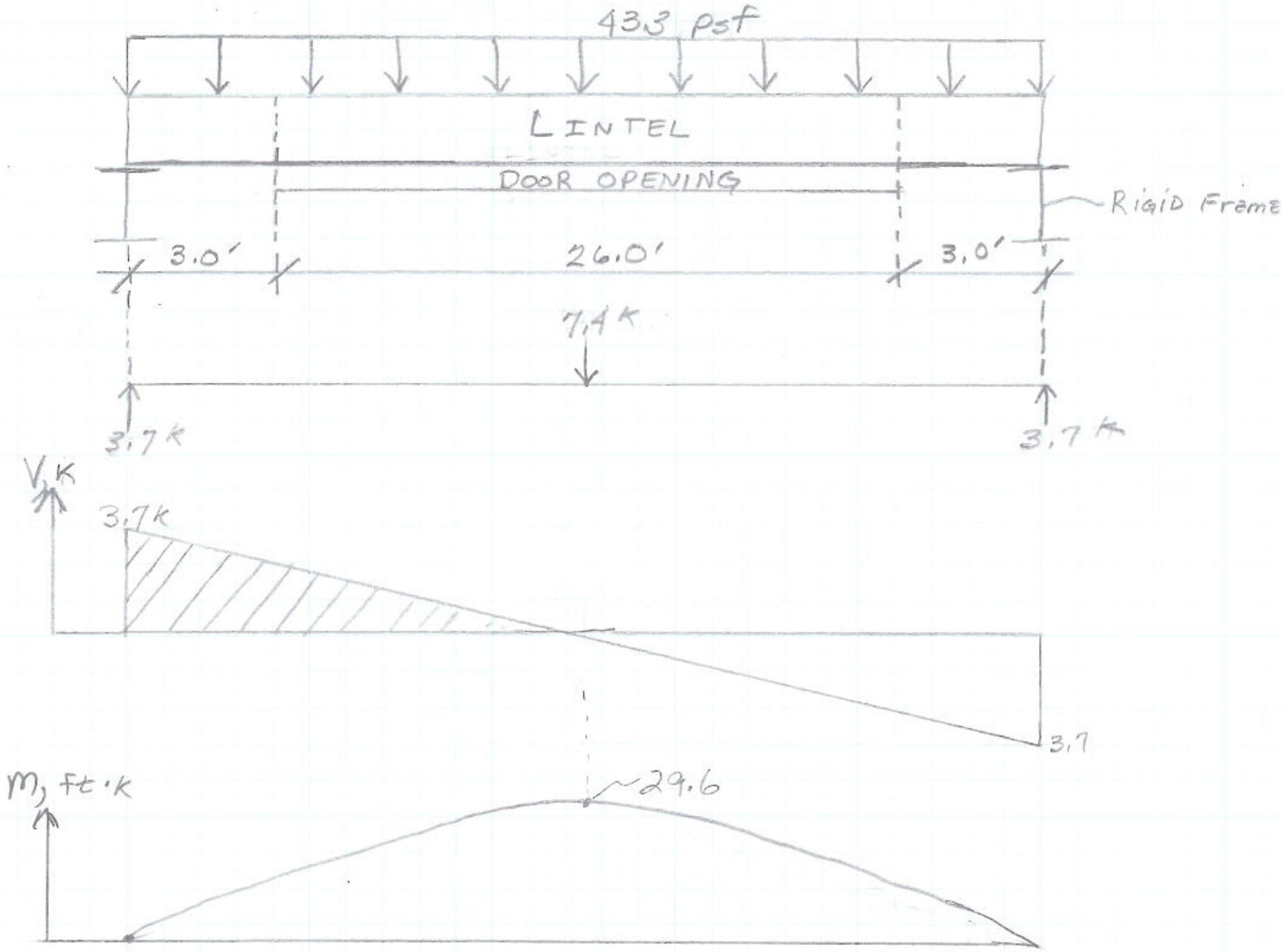
Bldg 2441 WIND BEAM CALCULATIONS



BEAM SELECTION

Section modulus $S_{yy} = \frac{M \times 12\ in/ft}{24{,}000\ psi} = \frac{29.6\ ft \cdot k \times 12\ in/ft}{24\ ksi} = 14.8\ in^3$

$S_{xx} = 18.9\ in^3$

	Depth	S, X-X	I, x-x	S, Y-Y
W 14×22	13.7	29.0	199	2.80
(2) 3/4" × 7" PLATE	.75			12.25
	14.45			

BEAM DEFLECTION

$$\Delta = \frac{5 W L^3}{384 EI} = \frac{5(0.6k + 0.5k + 0.5k)(312'')^3}{384(29{,}000\ ksi)(199\ in^4)}$$

$$\Rightarrow \Delta = 1.126 \times 10^{-6}\ in$$

$$\text{ALLOWED } \Delta = \frac{1}{360} \times L = \frac{1}{360} \times 312''$$

FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BDLG. 2442
MASONRY DESIGN

April 15, 2009

Prepared by:
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STENNIS RIVERINE

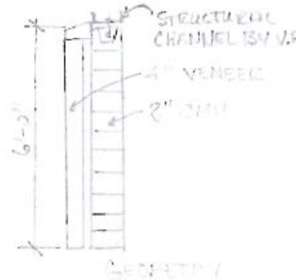
DESIGN OF REINFORCED CMU NON LOADBEARING WALL FOR FLEXURE
BLDG 2A42 ALL EXTERIOR MASONRY WALLS

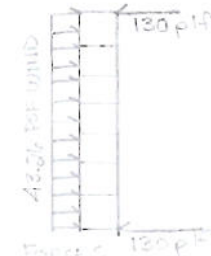
MATERIALS:

UNIT STRENGTH	2,150 psi
MORTAR	TYPE N
f'_m	1,500 psi
E_m	1.9×10^6 psi
n (modular ratio)	15.26
REINFORCEMENT	GRADE 60

LOADING:

WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT

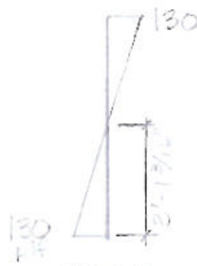


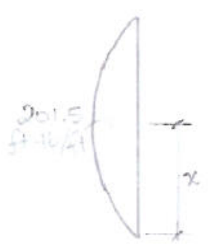


REACTIONS:

R_1 = REACTION @ [illegible] = $\frac{\left(\frac{43.3 \cdot [illegible]}{2}\right)}{6ft}$ = 129.9 plf

R_2 = REACTION @ [illegible] = $\frac{\left(\frac{43.3 \text{ psf} \cdot (6ft)^2}{2}\right)}{6ft}$ = 129.9 plf





$x = \frac{130 \text{ plf}}{43.3 \text{ psf}} = 3.1' = 3'\text{-}1\tfrac{3}{16}"$

$M = 130 \text{ plf} \cdot \left(\frac{3.1'}{2}\right) = \underline{201.5}$ ft·lb/ft

ESTIMATE REINFORCEMENTS:

TRY 8" CMU, ASSUME STEEL @ [illegible] DEPTH

d = CENTROID OF STEEL = 3.8", ASSUME $j = 1$ FOR INITIAL ESTIMATE

$A_s = \frac{M}{F_s \cdot j \cdot d} = \frac{201.5 \text{ ft·lb} \cdot 12 \text{ in/ft}}{24000 \text{ psi} \cdot 1 \cdot 1.33 \cdot 3.8"} = 0.02 \text{ in}^2/\text{ft}$

TRY #4 @ 32" O.C.

$A_{s\,provided} = 0.20 \cdot \frac{12}{32} = 0.075$ (REDUCE)

TRY #4 @ 40" O.C.

$A_{s\,prov} = 0.20 \cdot \left(\frac{12}{40}\right) = 0.06$ (REDUCE)

TRY #4 @ 48" O.C.

$A_{s\,prov.} = 0.20 \cdot \left(\frac{12}{48}\right) = 0.05 \text{ in}^2/\text{ft}$

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CHECK STRENGTH: (USING 24' WIDE STRIP)

DESIGN MOMENT = $201.5 \cdot 2' = 403$ ft-lb/ft

$p = \frac{A_s}{bd} = \frac{0.20 \text{ in}^2/\text{ft}}{24\text{in} \cdot 3.8\text{in}} = 0.002$ $\quad np = 15.26 \cdot 0.002 = 0.03$

$K^2 + 2pnK - 2pn = 0 \Rightarrow K^2 + 2(0.03)K - 2(0.03) = 0 \Rightarrow K^2 + 0.06K - 0.06$

$\frac{-0.06 \pm \sqrt{(0.06)^2 - 4(1)(-0.06)}}{2} = \frac{-0.06 \pm 0.49}{2} = 0.215 = K$ $\quad$ Now $j = \left(1 - \frac{K}{3}\right) = 0.928$

ALLOWABLE TENSION FLEXURAL CAPACITY:

$M_t = A_s \cdot j \cdot d \cdot F_s = (0.05 \text{ in}^2/\text{ft}) \cdot 0.928 \cdot 3.8 \cdot 24000 \text{ psi} \cdot \frac{1.33}{12 \text{ in/ft}} = 469$ ft-lb/ft.

469 ft-lb/ft > 201.5 ft-lb/ft. OK

ALLOWABLE COMPRESSION FLEXURAL CAPACITY:

$F_b = \frac{1}{3} f'_m \cdot \ldots = 665$ psi

$M_m = \frac{b \cdot d^2}{2} \cdot K \cdot j \cdot F_b = \frac{24" \cdot (3.8)^2}{2} \cdot 0.215 \cdot 0.928 \cdot \frac{665 \text{ psi}}{12 \text{ in/ft.}} = 1916$ ft-lb/ft.

1916 ft-lb/ft > 201.5 ft-lb/ft. OK

USE #4 REBAR @ 48" o.c.

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ANCHORAGE

USE #4 DOWEL, GRADE 60 l_d = REQ'D DEVELOPMENT LENGTH

$$l_d = \frac{0.13 \cdot d_b^2 \cdot f \cdot y \cdot \gamma}{K \cdot \sqrt{f'_m}} = \frac{0.13 \cdot 0.5^2 \cdot 60{,}000 \cdot 1}{5(0.5) \cdot \sqrt{1500}} = 20.1'' = 20-3/32''$$

$l_e = 13\,d_b = 6.5''$

SPLICES

THE MINIMUM LENGTH OF LAP FOR SPLICES SHALL BE EQUAL TO $l_d = 20.1''$

VENEER WALL CONNECTION

USE "POS-I-TIE" TAPCON SCREW FOR CMU EMBED. @ 8" VERTICAL O.C. AND 16" HORZ. ON CENTER. MIN. EMBEDMENT LENGTH 1-3/4".

USE 3/16"Ø x 3" STAINLESS STEEL TRIANGLE WIRE TIES @ EA CONNECTION SEE ATTACHED PRODUCT SHEET.

HORIZONTAL JOINT REINFORCEMENT

USE HECKMANN #110085 STAINLESS STEEL LADDER-TYPE MASONRY WALL REINFORCEMENT @ EVERY OTHER COURSE, SEE ATTACHED PRODUCT SHEET.

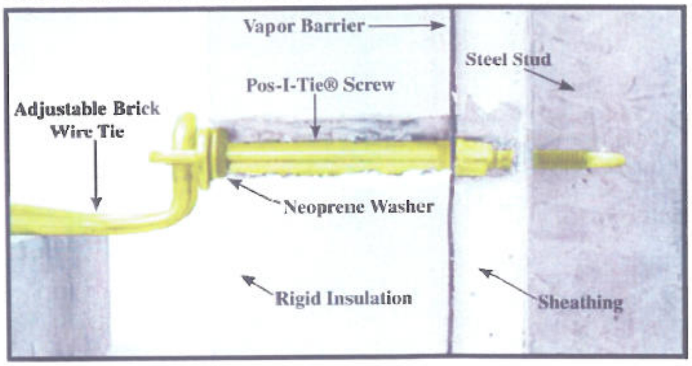
HECKMANN Building Products, Inc.

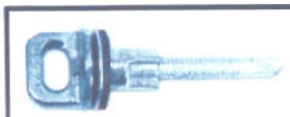
1501 N. 31st Avenue
Melrose Park, IL 60160-2911
800 621-4140 or 708 865 2403
FAX: 708-865-2640
www.heckmannanchors.com
Email: info@heckmannbuildingprods.com

ARCHITECTURAL SPECIFICATION INFORMATION

THE ORIGINAL Pos-I-Tie®

U.S. Patent# 4473984 & 4764069 **Canada Patent#**1224344



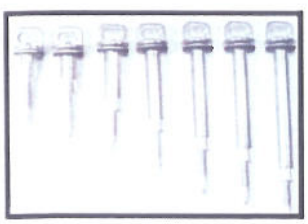


Self Drilling Screw for Brick Veneer to Steel Studs

CMU/Concrete Screw for Brick Veneer to Concrete, CMU, or Wood

Dril-It® Screw for Brick Veneer to Steel Beam

Seven Barrel lengths available for Insulation/gypsum board sizes and combinations: 1/2"& 5/8", 1", 1-1/2", 2", 2-1/2", 3", and 3-1/2"



The Pos-I-Tie® conforms with the Energy Conservation Requirements of the Massachusetts State Building Code (780 CMR 13 Envelope)

NO. 75 POS-I-TIE® ADVANTAGES

1. Pos-I-Tie® system fully complies with the ACI 530 Code. The Barrel Screw is one piece. No more plates, screws and gaskets. Installs in seconds.
2. Uses consistent screw. Screw is provided as a part of the Pos-I-Tie® System. - No inferior screws can be substituted.
3. Provides positive connections. The Barrel Section actually penetrates sheathing and makes a Positive Lateral Connection with the backup for transfer of compression and tension loads to structural backup.
4. Enables speedy cost-saving installation. Only one screw needs to be placed, rather than two screws.
5. Corrosion Resistant. Pos-I-Tie® seals the hole it makes when it seats itself in the backup. Barrel section is made of ZAMAC 3, a 92% zinc alloy. Screws are Zinc electro plated.
6. Slotted Barrel allows for differential movement due to temperature variations. Tie design provides for allowable ACI 530 code vertical adjustment.
7. Allows for use of 4' x 8' insulation sheets. The Pos-I-Tie® holds the insulation in place!

Test Data Available Upon Request

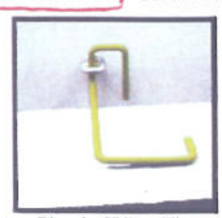
WIRE TIES

Ties are 3/16" diameter x 3", 3 1/2", 4", or 5" Long in Hotdip Galvanized, Mill Galvanized and Stainless Steel.

Special Lengths available.

Triangular Wire Tie

Seismic Wire Tie



Single Wire Tie
(Check for local code acceptance of single wire tie.)

Heckmann Building Products Inc.

1501 N. 31st Avenue
Melrose Park, IL 60160-2911
800-621-4140 or 708-865-2403 Fax: 708-865-2640
www.heckmannbuildingprods.com

. SUBMITTAL SHEET:
#1100 Ladder-Type Masonry Wall Reinforcement.

Manufactured from 9 Gage wire, 10' 8" long with butt-welded perpendicular cross wires welded 16" on center to avoid interference with reinforcement in block cores.

Wire is deformed for maximum bonding in mortar joints.

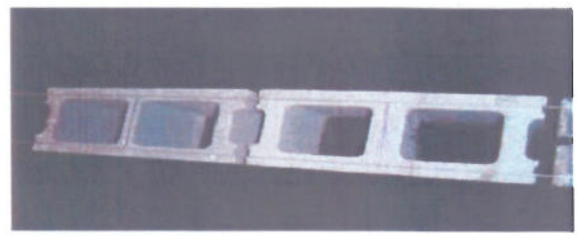
Packaged in 50 pc (500 lin ft) bundles

Special sizes and lengths are available.

- Reduces Cracking.
- Increases lateral flexural strength.
- Increases ductility and elasticity.

Standard Catalog Numbers   Size

Mill Galv	Hotdip Galv	Stainless Steel	Width	Wall Size
11006G	11006H	11006S	4	6
11008G	11008H	11008S	6	8
110010G	110010H	110010S	8	10
110012G	110012H	110012S	10	12



ASTM A82 cold drawn steel wire.
Tensile Strength 80,000 PSI
Yield Point 70,000 PSI minimum
Reduction of Area 30%

Finishes:
Stainless Steel:
ASTM A 580 Type 304.

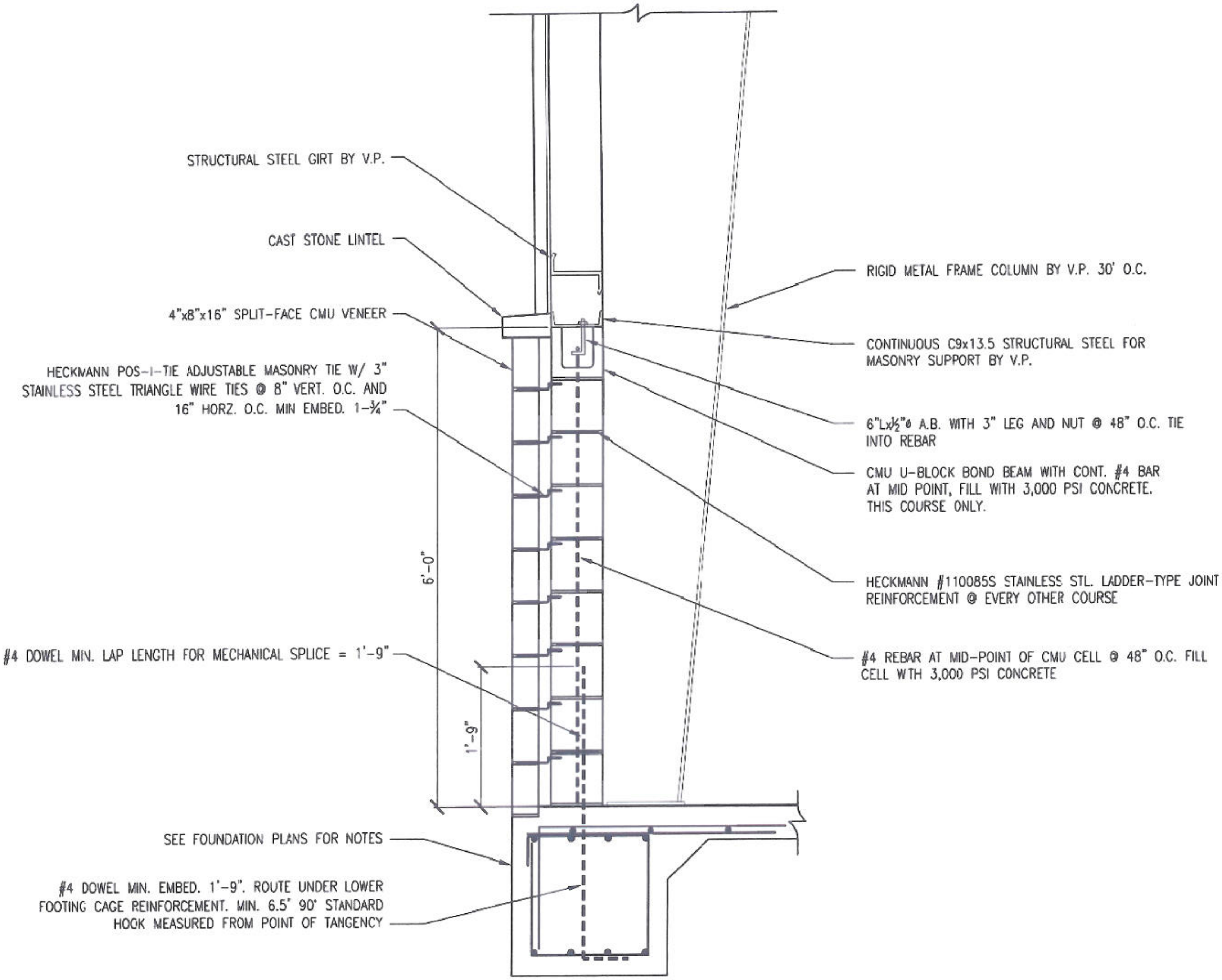
Hotdip Galvanized:
ASTM A 153 Class B-2: (1.50 oz/ ft^2.)(0.46kg/m^2)

Mill Galvanized:
Wire: ASTM A 641 (0.1 oz/ ft^2.)

Conforms to requirements of ASCE / ACI 530 / TMS402 Building Code requirements for masonry structures.

Approvals:

Comments:



8" CMU WALL WITH 4" CMU VENEER DETAIL
N.T.S.

TRACE® Load 700
version 3.0

By Professional Engineering Services

STATE OF LOUISIANA
DAMIEN W. SERAUSKAS
REG. NO. 28519
REGISTERED PROFESSIONAL ENGINEER
IN
MECHANICAL ENGINEERING
5.5.09

Project Name: SBT 22 Riverine Operations and Training Facility
Dataset Name: C:\CDS\LOAD32\PROJECTS\Stennis Riverine FINAL.LDS
Location: Stennis Space Center, MS
Building Owner: NAVFAC / NASA / SPECWAR
Program User: Damien W. Serauskas, P.E.
Company: Professional Engineering Services
Comments:

Location:	Keesler AFB, Mississippi		
Latitude:	30.0 deg		
Longitude:	89.0 deg	Summer Design Dry Bulb:	92 °F
Time Zone:	6	Summer Design Wet Bulb:	82 °F
Elevation:	26 ft	Winter Design Dry Bulb:	31 °F
Barometric Pressure:	29.9 in. Hg		
		Summer Clearness Number:	0.90
Air Density:	0.0760 lb/cu ft	Winter Clearness Number:	0.90
Air Specific Heat:	0.2444 Btu/lb·°F		
Density-Specific Heat Product:	1.1144 Btu/h·cfm·°F	Summer Ground Reflectance:	0.20
Latent Heat Factor:	4,905.3 Btu·min/h·cu ft	Winter Ground Reflectance:	0.20
Enthalpy Factor:	4.5588 lb·min/hr·cu ft		

Design Simulation Period: January through December
Cooling Load Methodology: TETD-TA1
Heating Load Methodology: UATD

System Checksums

By Professional Engineering Services

Stennis 1st Fl Cages **Single Zone**

	COOLING COIL PEAK					CLG SPACE PEAK		HEATING COIL PEAK		
Peaked at Time:			Mo/Hr: 8 / 17			Mo/Hr: 7 / 24		Mo/Hr: 13 / 1		
Outside Air:			OADB/WB/HR: 91 / 81 / 147			OADB: 82		OADB: 31		
	Space Sens. + Lat. Btu/h	Plenum Sensible Btu/h	Plenum Latent Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads										
Skylite Solr	0	0		0	0.00	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	0	0.00	0	0	0.00
Roof Cond	0	0		0	0.00	0	0.00	0	0	0.00
Glass Solar	0	0		0	0.00	0	0.00	0	0	0.00
Glass Cond	0	0		0	0.00	0	0.00	0	0	0.00
Wall Cond	3,587	973		4,560	4.32	4,698	13.09	-6,529	-8,300	10.78
Partition	1,131			1,131	1.07	816	2.27	-2,750	-2,750	3.57
Exposed Floor	0			0	0.00	0	0.00	0	0	0.00
Infiltration	0			0	0.00	0	0.00	0	0	0.00
Sub Total ==>	4,718	973		5,691	5.39	5,515	15.36	-9,279	-11,050	14.35
Internal Loads										
Lights	28,505	0		28,505	26.99	28,505	79.40	0	0	0.00
People	2,500			2,500	2.37	1,250	3.48	0	0	0.00
Misc	0	0	0	0	0.00	0	0.00	0	0	0.00
Sub Total ==>	31,005	0	0	31,005	29.36	29,755	82.88	0	0	0.00
Ceiling Load	482	-482		0	0.00	632	1.76	-878	0	0.00
Outside Air	0	0	0	68,469	64.83	0	0.00	0	-37,108	48.20
Sup. Fan Heat				716	0.68		0.00		0	0.00
Ret. Fan Heat		0		0	0.00		0.00		0	0.00
Duct Heat Pkup		0		0	0.00		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	0	0.00	-29,335	-29,335	38.10
Exhaust Heat		-274	0	-274	-0.26		0.00		499	-0.65
Terminal Bypass		0	0	0	0.00		0.00		0	0.00
Grand Total ==>	36,206	217	0	105,608	100.00	35,902	100.00	-39,492	-76,994	100.00

TEMPERATURES

	Clg	Htg
SADB	55.0	90.0
Plenum	75.3	67.5
Return	75.3	67.5
Ret/OA	84.1	47.1
Fn MtrTD	0.0	0.0
Fn BldTD	0.1	0.0
Fn Frict	0.3	0.0

AIRFLOWS

	Cooling	Heating
Vent	900	900
Infil	0	0
Supply	1,611	1,611
Mincfm	0	0
Return	1,611	1,611
Exhaust	900	900
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	55.9	55.9
cfm/ft²	0.29	0.29
cfm/ton	183.04	
ft²/ton	632.68	
Btu/hr·ft²	18.97	-13.83
No. People	5	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airfl cfm	Enter DB/WB/HR °F	Enter °F	Enter gr/lb	Leave DB/WB/HR °F	Leave °F	Leave gr/lb
Main Clg	8.8	105.6	52.0	1,611	84.1	73.9	110.4	54.6	54.6	63.6
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	8.8	105.6								

AREAS

	Gross Total	Glass ft²	(%)
Floor	5,568		
Part	252		
ExFlr	0		
Roof	0	0	0
Wall	2,754	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airfl cfm	Ent °F	Lvg °F
Main Htg	-77.0	1,611	47.1	90.0
Aux Htg	0.0	0	0.0	0.0
Preheat	-13.5	1,611	47.1	54.6
Reheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-77.0			

System Checksums

By Professional Engineering Services

Stennis 2nd Floor VAV | **Variable Volume Reheat (30% Min Flow Default)**

	COOLING COIL PEAK					CLG SPACE PEAK		HEATING COIL PEAK		
Peaked at Time:			Mo/Hr:	8 / 16		Mo/Hr: 8 / 16		Mo/Hr: 13 / 1		
Outside Air:			OADB/WB/HR:	92 / 81 / 145		OADB: 92		OADB: 31		
	Space Sens. + Lat. Btu/h	Plenum Sensible Btu/h	Plenum Latent Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads										
Skylite Solr	0	0		0	0.00	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	0	0.00	0	0	0.00
Roof Cond	0	43,661		43,661	15.64	0	0.00	0	-18,792	20.63
Glass Solar	30,786	0		30,786	11.03	30,786	24.43	0	0	0.00
Glass Cond	6,457	0		6,457	2.31	6,457	5.12	-15,488	-15,488	17.00
Wall Cond	3,630	592		4,223	1.51	3,630	2.88	-5,957	-7,227	7.93
Partition	1,838			1,838	0.66	1,838	1.46	-4,726	-4,726	5.19
Exposed Floor	0			0	0.00	0	0.00	0	0	0.00
Infiltration	0			0	0.00	0	0.00	-1	-1	0.00
Sub Total ==>	42,711	44,253		86,964	31.15	42,711	33.89	-26,172	-46,233	50.75
Internal Loads										
Lights	24,481	16,389		40,870	14.64	24,481	19.43	0	0	0.00
People	65,000			65,000	23.28	32,500	25.79	0	0	0.00
Misc	9,015	0	0	9,015	3.23	9,015	7.15	0	0	0.00
Sub Total ==>	98,495	16,389	0	114,885	41.15	65,995	52.37	0	0	0.00
Ceiling Load	16,445	-16,445		0	0.00	17,316	13.74	-11,174	0	0.00
Outside Air	0	0	0	80,559	28.85	0	0.00	0	-42,354	46.49
Sup. Fan Heat				4,991	1.79		0.00		0	0.00
Ret. Fan Heat		0		0	0.00		0.00		0	0.00
Duct Heat Pkup		0		0	0.00		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	0	0.00	-7,545	-7,545	8.28
Exhaust Heat		-8,190	0	-8,190	-2.93		0.00		5,025	-5.52
Terminal Bypass		0	0	0	0.00		0.00		0	0.00
Grand Total ==>	157,651	36,007	0	279,210	100.00	126,023	100.00	-44,892	-91,108	100.00

TEMPERATURES

	Clg	Htg
SADB	55.0	90.0
Plenum	81.5	63.6
Return	81.5	63.6
Ret/OA	83.6	45.3
Fn MtrTD	0.1	0.0
Fn BldTD	0.2	0.0
Fn Frict	0.5	0.0

AIRFLOWS

	Cooling	Heating
Vent	1,131	1,027
Infil	0	0
Supply	5,655	1,831
Mincfm	1,831	1,831
Return	5,655	1,831
Exhaust	1,131	1,027
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	20.0	56.1
cfm/ft²	0.71	0.23
cfm/ton	243.02	
ft²/ton	343.10	
Btu/hr·ft²	34.97	-12.75
No. People	130	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airfl cfm	Enter DB/WB/HR °F	Enter °F	Enter gr/lb	Leave DB/WB/HR °F	Leave °F	Leave gr/lb
Main Clg	23.3	279.2	187.4	5,615	83.6	69.4	85.2	54.2	53.8	61.3
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	23.3	279.2								

AREAS

	Gross Total	Glass ft²	(%)
Floor	7,983		
Part	433		
ExFlr	0		
Roof	6,949	0	0
Wall	3,560	364	10

HEATING COIL SELECTION

	Capacity MBh	Coil Airfl cfm	Ent °F	Lvg °F
Main Htg	-72.6	1,831	54.4	90.0
Aux Htg	0.0	0	0.0	0.0
Preheat	-29.2	1,131	31.0	54.2
Reheat	-26.5	1,831	55.0	68.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-101.8			

System Checksums

By Professional Engineering Services

2441 Boat Staging | **Unit Heaters**

	COOLING COIL PEAK					CLG SPACE PEAK		HEATING COIL PEAK		
	Peaked at Time: Mo/Hr: 0 / 0					Mo/Hr: 0 / 0		Mo/Hr: 13 / 1		
	Outside Air: OADB/WB/HR: 0 / 0 / 0					OADB: 0		OADB: 31		
	Space Sens. + Lat. Btu/h	Plenum Sensible Btu/h	Plenum Latent Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads										
Skylite Solr	0	0		0	0.00	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	0	0.00	0	0	0.00
Roof Cond	0	0		0	0.00	0	0.00	0	-4,901	11.90
Glass Solar	0	0		0	0.00	0	0.00	0	0	0.00
Glass Cond	0	0		0	0.00	0	0.00	0	0	0.00
Wall Cond	0	0		0	0.00	0	0.00	-6,052	-7,041	17.11
Partition	0			0	0.00	0	0.00	0	0	0.00
Exposed Floor	0			0	0.00	0	0.00	0	0	0.00
Infiltration	0			0	0.00	0	0.00	-29,223	-29,223	70.99
Sub Total ==>	0	0		0	0.00	0	0.00	-35,274	-41,165	100.00
Internal Loads										
Lights	0	0		0	0.00	0	0.00	0	0	0.00
People	0			0	0.00	0	0.00	0	0	0.00
Misc	0	0	0	0	0.00	0	0.00	0	0	0.00
Sub Total ==>	0	0	0	0	0.00	0	0.00	0	0	0.00
Ceiling Load	0	0		0	0.00	0	0.00	-5,890	0	0.00
Outside Air	0	0	0	0	0.00	0	0.00	0	0	0.00
Sup. Fan Heat				0	0.00		0.00		0	0.00
Ret. Fan Heat		0		0	0.00		0.00		0	0.00
Duct Heat Pkup		0		0	0.00		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	0	0.00	0	0	0.00
Exhaust Heat		0	0	0	0.00		0.00		0	0.00
Terminal Bypass		0	0	0	0.00		0.00		0	0.00
Grand Total ==>	0	0	0	0	100.00	0	100.00	-41,165	-41,165	100.00

TEMPERATURES

	Clg	Htg
SADB	0.0	95.0
Plenum	0.0	52.3
Return	0.0	55.0
Ret/OA	0.0	55.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.1	0.1
Fn Frict	0.3	0.2

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	1,093
Supply	0	924
Mincfm	0	0
Return	0	2,016
Exhaust	0	1,093
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.13
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-5.97
No. People	6	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airfl cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	6,901		
Part	0		
ExFlr	0		
Roof	6,901	0	0
Wall	5,460	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airfl cfm	Ent °F	Lvg °F
Main Htg	-41.2	924	55.0	95.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Reheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-41.2			

System Checksums

By Professional Engineering Services

2442 Boat Storage | **Unit Heaters**

	COOLING COIL PEAK					CLG SPACE PEAK		HEATING COIL PEAK		
Peaked at Time:			Mo/Hr: 0 / 0			Mo/Hr: 0 / 0		Mo/Hr: 13 / 1		
Outside Air:			OADB/WB/HR: 0 / 0 / 0			OADB: 0		OADB: 31		
	Space Sens. + Lat. Btu/h	Plenum Sensible Btu/h	Plenum Latent Btu/h	Net Total Btu/h	Percent Of Total (%)	Space Sensible Btu/h	Percent Of Total (%)	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads										
Skylite Solr	0	0		0	0.00	0	0.00	0	0	0.00
Skylite Cond	0	0		0	0.00	0	0.00	0	0	0.00
Roof Cond	0	0		0	0.00	0	0.00	0	-6.010	10.74
Glass Solar	0	0		0	0.00	0	0.00	0	0	0.00
Glass Cond	0	0		0	0.00	0	0.00	0	0	0.00
Wall Cond	0	0		0	0.00	0	0.00	-11.791	-13.699	24.49
Partition	0			0	0.00	0	0.00	0	0	0.00
Exposed Floor	0			0	0.00	0	0.00	0	0	0.00
Infiltration	0			0	0.00	0	0.00	-36.222	-36.222	64.76
Sub Total ==>	0	0		0	0.00	0	0.00	-48.014	-55.931	100.00
Internal Loads										
Lights	0	0		0	0.00	0	0.00	0	0	0.00
People	0			0	0.00	0	0.00	0	0	0.00
Misc	0	0	0	0	0.00	0	0.00	0	0	0.00
Sub Total ==>	0	0	0	0	0.00	0	0.00	0	0	0.00
Ceiling Load	0	0		0	0.00	0	0.00	-7.917	0	0.00
Outside Air	0	0	0	0	0.00	0	0.00	0	0	0.00
Sup. Fan Heat				0	0.00		0.00		0	0.00
Ret. Fan Heat		0		0	0.00		0.00		0	0.00
Duct Heat Pkup		0		0	0.00		0.00		0	0.00
OV/UNDR Sizing	0			0	0.00	0	0.00	0	0	0.00
Exhaust Heat		0	0	0	0.00		0.00		0	0.00
Terminal Bypass		0	0	0	0.00		0.00		0	0.00
Grand Total ==>	0	0	0	0	100.00	0	100.00	-55.931	-55.931	100.00

TEMPERATURES

	Clg	Htg
SADB	0.0	95.0
Plenum	0.0	52.1
Return	0.0	55.0
Ret/OA	0.0	55.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.1	0.1
Fn Frict	0.3	0.2

AIRFLOWS

	Cooling	Heating
Vent	0	0
Infil	0	1.354
Supply	0	1.255
Mincfm	0	0
Return	0	2.609
Exhaust	0	1.354
Rm Exh	0	0
Auxil	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.00	0.15
cfm/ton	0.00	
ft²/ton	0.00	
Btu/hr·ft²	0.00	-6.54
No. People	0	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airfl cfm	Enter DB/WB/HR °F	Enter DB/WB/HR °F	Enter DB/WB/HR gr/lb	Leave DB/WB/HR °F	Leave DB/WB/HR °F	Leave DB/WB/HR gr/lb
Main Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.0	0.0								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	8.554		
Part	0		
ExFlr	0		
Roof	8.554	0	0
Wall	9.160	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airfl cfm	Ent °F	Lvg °F
Main Htg	-55.9	1.255	55.0	95.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Reheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-55.9			

DAMIEN W. SERAUSKAS, P.E.
PROFESSIONAL ENGINEERING SERVICES

Plumbing Calculations
16-Mar-09

PUBLIC OR NONPUBLIC? ***PUBLIC***
DWSPE NO. 08-128 ***Stennis Riverine ROF***
DO YOU WANT TO USE THE(PRIVATE, RESIDENTIAL)TABLE ? **NO** (YES OR NO)
SYSTEM TYPE: 1
FLUSH VALVE = 1
FLUSH TANK = 2

		FIXTURE UNITS PER FIXTURE			TOTAL FIXTURE UNITS PER FIXTURE		
FIXTURES	**QTY**	**HOT**	**COLD**	**TOTAL**	**HOT**	**COLD**	**TOTAL**
BATHROOM GROUP	**0**	3	6	8	0	0	0
BATHTUB	**0**	3	3	4	0	0	0
CLOTHES WASHER	**3**	2.25	2.25	3	6.75	6.75	9
DISHWASHING MACHINE	**0**	1.4	2.25	1.4	0	0	0
DRINKING FOUNTAIN	**3**	0	0.25	0.25	0	0.75	0.75
KITCHEN SINK	**1**	3	3	4	3	3	4
LAUNDRY TRAY	**0**	1	1	1.4	0	0	0
LAVATORY	**12**	1.5	1.5	2	18	18	24
HOSE BIBB OR HYDRANT	**6**	0	4	4	0	24	24
RESTAURANT SINK	**0**	3	3	4	0	0	0
SERVICE SINK	**3**	2.25	2.25	4	6.75	6.75	12
SHOWER HEAD	**11**	3	3	4	33	33	44
STALL OR WALL URINAL	**4**	0	5	5	16	20	20
WATER CLOSET TANK	**0**	0	5	5	0	0	0
WATER CLOSET VALVE	**8**	0	5	5	0	40	40
TOTAL F.U. DEMAND					83.5	152.25	177.75
SUBTOTAL GPM DEMAND........................					40	81	98
MISC. GPM DEMAND........................					**0**	**0**	**0**
TOTAL GPM DEMAND........................					40	81	98

PRESSURE AVAILABLE	**42**	**PSI**
PRESSURE REQUIRED	**25**	**PSI**
PRESSURE LOSS THROUGH METER SIZ **3.00** INCHES	2.5	**PSI**
STATIC LOSS STATIC LIFT (FT) = **14** FEET	6.06	**PSI**
LOSS THROUGH SPECIAL DEVICES	**3**	**PSI**
DISTANCE FROM MAIN TO BUILDING	**120**	**FEET**
PRESSURE LOSS FROM MAIN TO BUILDING	3.64	**PSI**
PRESSURE AVAILABLE FOR SYSTEM	1.80	**PSI**
TOTAL EQUIVALENT LENGTH (WITHIN BUILDING)	**60**	**FEET**
DESIRED MAX. VELOCITY IN FPS	**8**	**FPS**
PRESSURE LOSS PER 100' AVAILABLE FOR SYSTEM DESIG	2.99	**PSI/100'**
COPPER (C) OR STEEL (S) PIPE	**C**	
BUILDING WATER SUPPLY PIPE SIZE (INCHES)	2 1/2	INCHES (BUILDING MAIN)
	1 1/2	INCHES (HOT)
NOTES:	2 1/2	INCHES (COLD)

DWSPE NO. 08-128 Stennis Riverine ROF

WASTE PIPE CALCULATIONS

16-Mar-09

FIXTURES	QTY	DFU	TOTAL
BATHROOM GROUP	0	6	0
BATHTUB	0	2	0
CLOTHES WASHER	3	3	9
DISHWASHING MACHINE	0	2	0
DRINKING FOUNTAIN	3	0.5	1.5
KITCHEN SINK	1	2	2
LAUNDRY TRAY	0	2	0
LAVATORY	12	1	12
HOSE BIBB OR HYDRANT	6	0	0
RESTAURANT SINK	0	4	0
SERVICE SINK	3	3	9
SHOWER HEAD	11	2	22
STALL OR WALL URINAL	4	8	32
WATER CLOSET FT	0	4	0
WATER CLOSET FV	8	6	48
2" FLOOR DRAINS	2	1	2
3" FLOOR DRAINS	14	1	14
4" FLOOR DRAINS	2	1	2
MISC. GPM FLOW.......................			0
TOTAL DRAINAGE FIXTURE UNITS....................			153.5
BUILDING WASTE SIZE LEAVING........................			4"

NOTE: ALL CALCULATIONS BASED ON INTERNATIONAL PLUMBING CODE WITH LA AMENDMENTS, 2000