



CALCULATIONS

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

**FINAL DESIGN ISSUE
SEPTEMBER 4, 2009**

US DEPARTMENT OF THE NAVY – NAVFAC SOUTHEAST

Prepared by:
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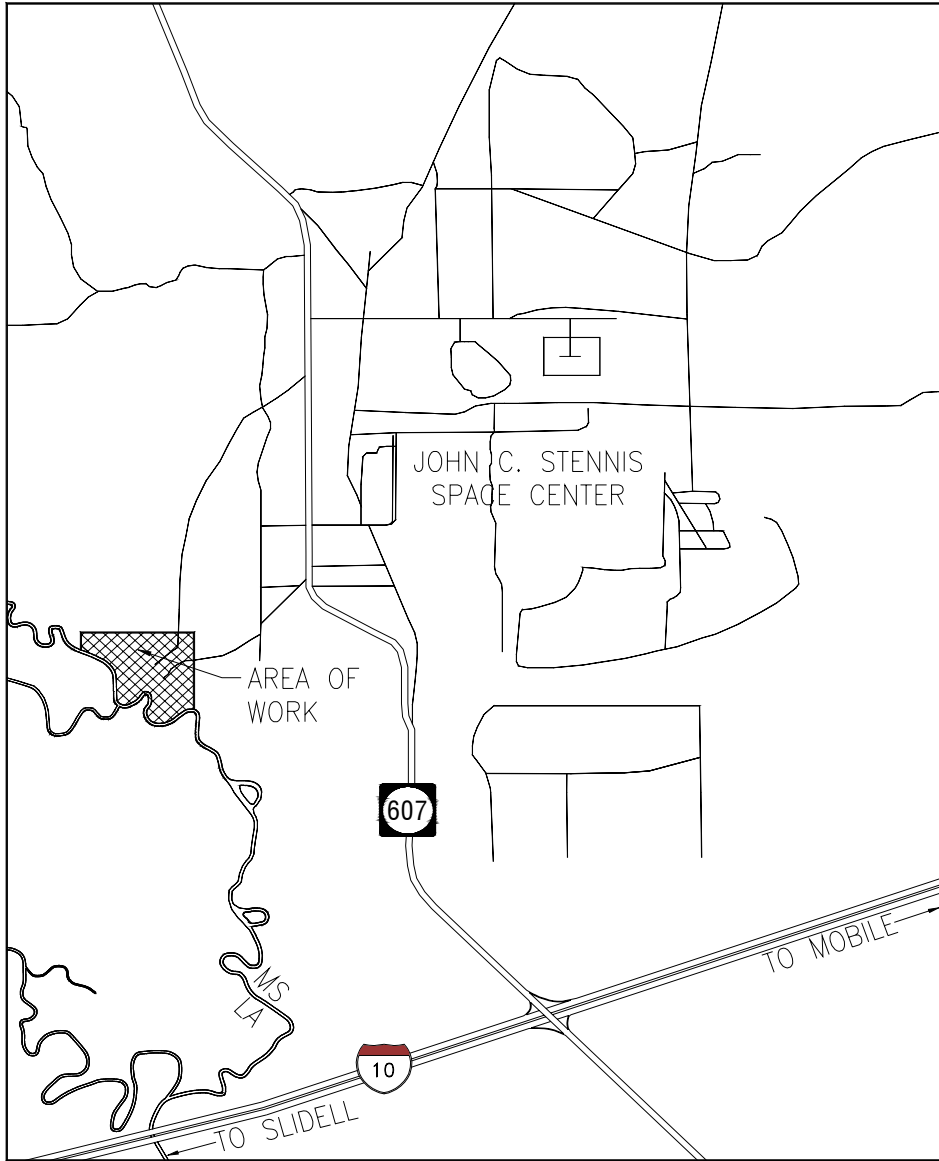
SOV RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

***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 15"RCP which is connected to

the site swale that discharges into the East Pearl River Canal. Based on the survey received, the area of offsite ponding used for calculations is 0.569 acres.

SUMMARY OF CALCULATIONS

Existing grounds area = 8.749 acres, C=0.15 Tc=75.12 min.

Post-Development Area into swale:

Parking lot, Buildings= 2.495 acres, C=0.90 Tc=31.80 min.

Green space= 2.087 acres, C=0.15 Tc=31.80 min.

Offsite Ponding= 0.569 acres, C=0.15 Tc=19.04 min.

Note: Remaining 4.167 acres sheet flows into existing drainage pattern which discharges into the East Pearl River Canal.

OVERALL SITE CALCULATIONS

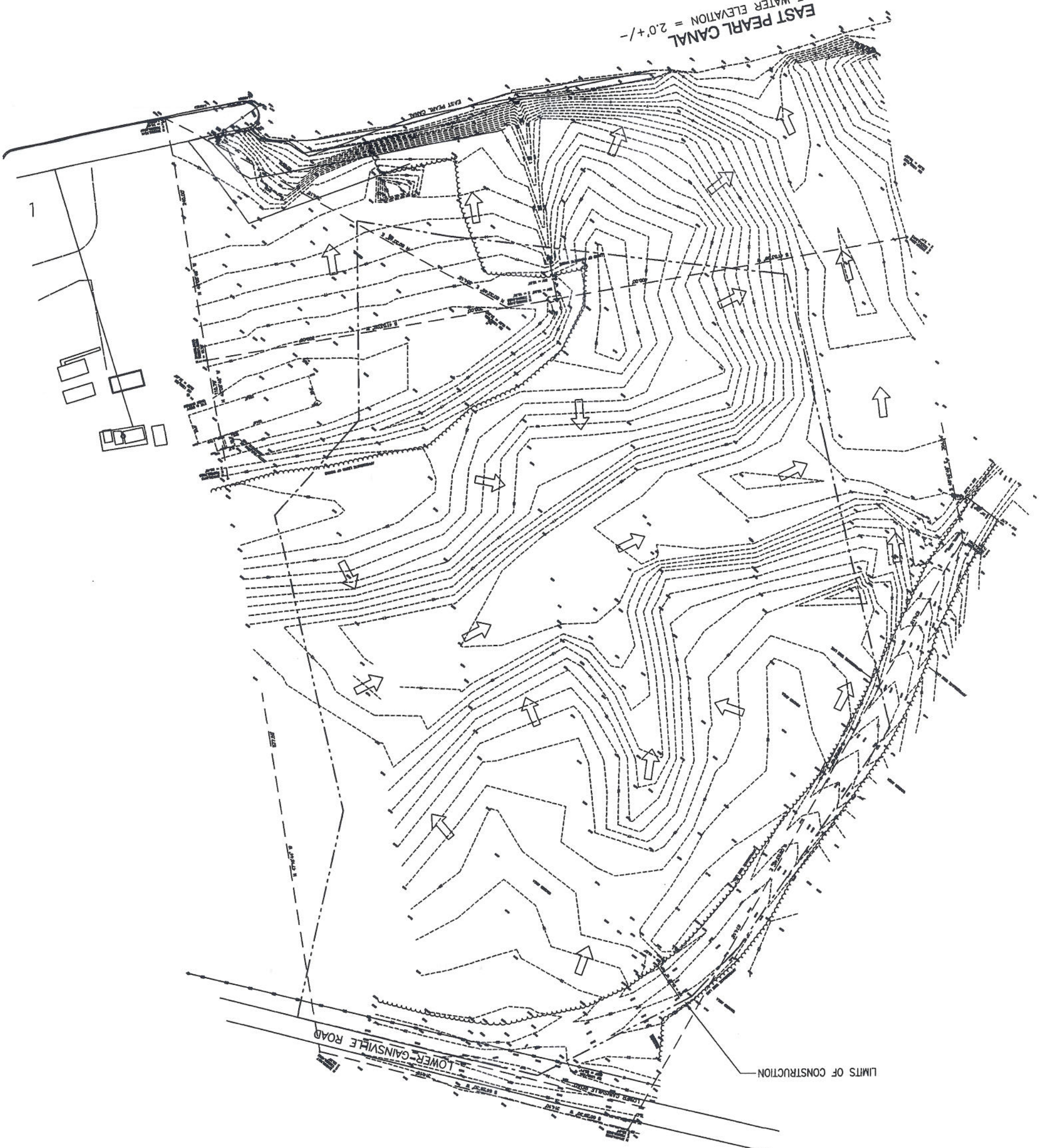
PROJECT:	STENNIS RIVERINE		
	STORMWATER RUN-OFF CALCULATIONS		
Formulas used:			
[1] RATIONAL METHOD: Q=Aci			
where:	Q=	Peak discharge of watershed in cubic feet per second (cfs) due to maximum storm assumed.	
	A=	Area of watershed in acres.	
	c=	Coefficient of run-off [2].	
	i=	Intensity of rainfall in inches per hour based on concentration time. [3]	
[4] TC= $\frac{(L^{0.8}(\frac{1000}{c} - 9)^{0.7})}{(1140(s^{0.5}))}$			
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			
Q₁ = 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	
	Q₁ =	4.206 cfs	
AREA OF WORK - POST DEVELOPMENT 10 Year Frequency			
Q₂ = 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	
	Q₂ =	11.278 cfs	
References:			
1. Chen, W.F. <u>The Civil Engineering Handbook</u> . 1995. Eq.# 31.1, pg. 1036			
2. Seelye, Elwyn E. <u>Data Book for Civil Engineers</u> . Vol.1 1960. Tbl. B, pg. 18-02			
3. Seelye, Elwyn E. <u>Data Book for Civil Engineers</u> . Vol.1 1960. Fig.B, pg. 18-01			
4. Chen, W.F. <u>The Civil Engineering Handbook</u> . 1995. Tbl. 31.2 Regan Equation (n=0.013)			
5. Chen, W.F. <u>The Civil Engineering Handbook</u> . 1995. Eq.# 28.32, pg. 969			



PRIOR-DEVELOPMENT

8.79 ACRES

EAST PEARL CANAL
AVERAGE WATER ELEVATION = 2.0' +/-







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]	
	[4] TC= $\frac{(L^{0.8} (\frac{1000}{c} - 9)^{0.7})}{(1140(s^{0.5}))}$		
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.	
WATERSHED SERVICED BY DRAINAGE SWALE - POST DEVELOPMENT			
10 Year Frequency			
Q₁ = 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	
	Q₁ = 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			
	[5] A= $\frac{Q}{(c\sqrt{(2gh)})}$		
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			

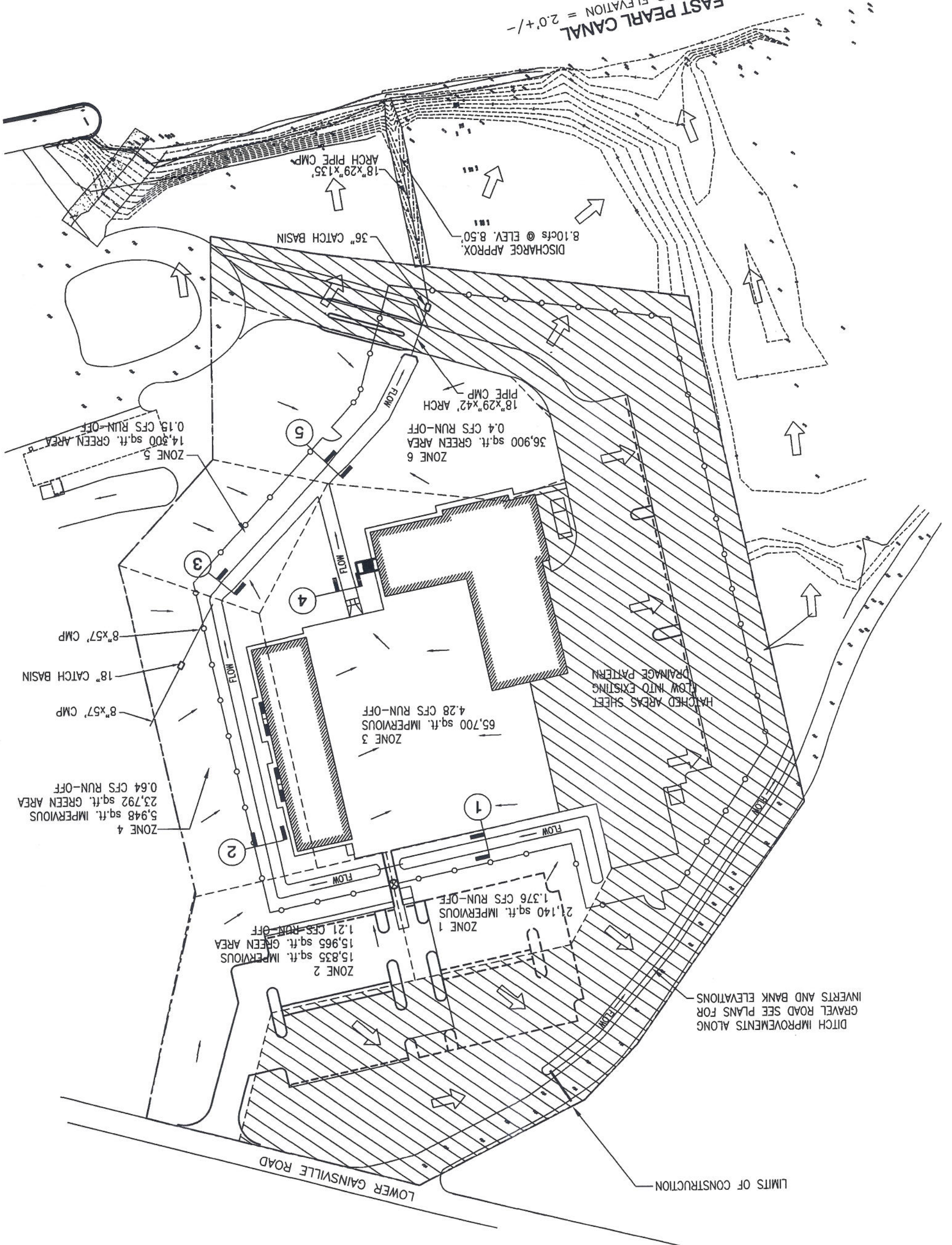


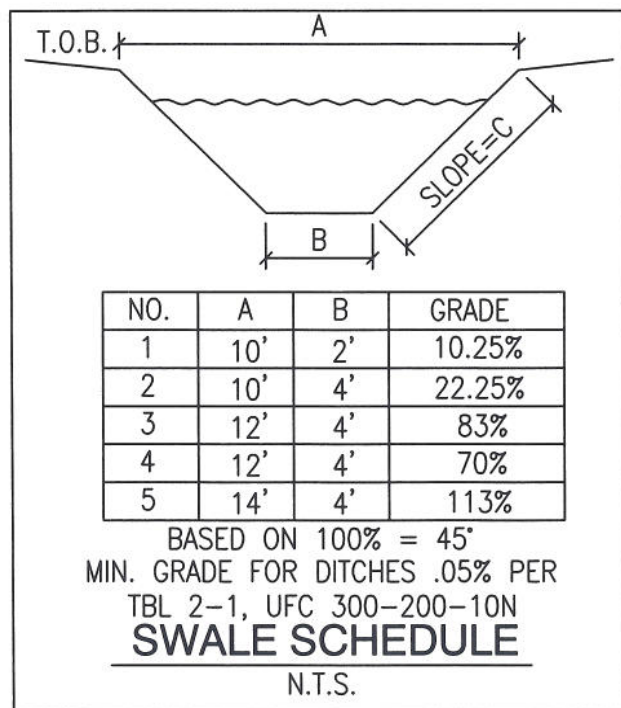
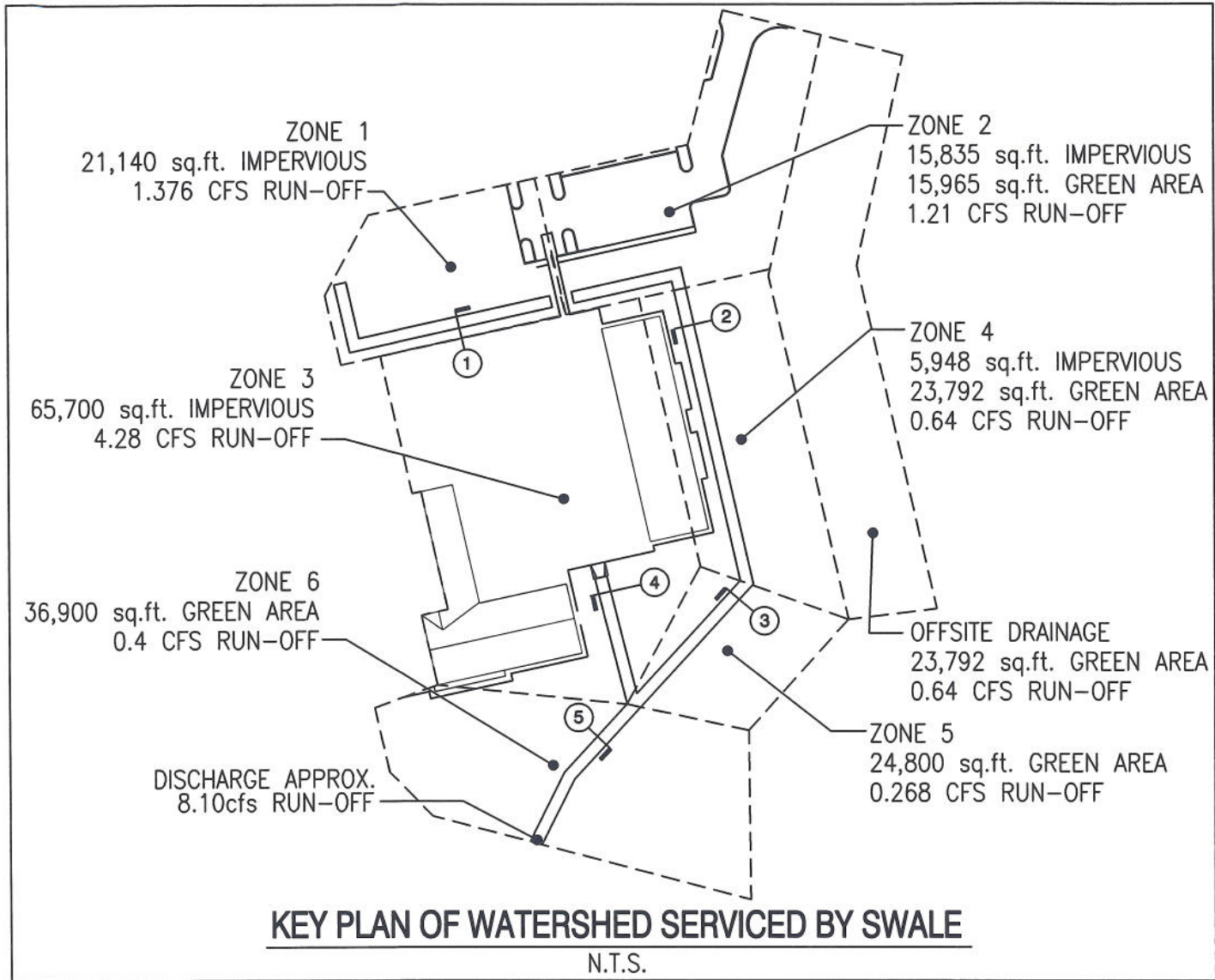


POST-DEVELOPMENT

8.79 ACRES

EAST PEARL CANAL
AVERAGE WATER ELEVATION = 2.0' +/-









OFFSITE PONDING CALCULATIONS

PROJECT:	STENNIS RIVERINE - OFFSITE PONDING		
	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= $\frac{(L^{0.8}(\frac{1000}{s} - 9)^{0.7})}{(1140(s^{0.5}))}$			
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	
OFFSITE WATERSHED SERVICED BY DRAINAGE SWALE - POST DEVELOPMENT			
10 Year Frequency			
Q₁ = Aci			
Watertight Surfaces		0	sqft = 0.000 Acres
c(1) =	0.9		
Gravel Surface		0	sqft = 0.000 Acres
c(2) =	0.25		
Green Space		24700	sqft = 0.567 Acres
c(3) =	0.15		
Summary		24700	sqft = 0.567 Acres
c =	0.15		
Duration (D) = Time of concentration (TC)			
where	L = 50	run-off length ft	Elev diff = 2
	c = 0.15	run-off coef	
	S = 4.0000	percent slope	
therefore	TC = D = 19.04	minutes	
Expected rainfall intensity	i = 3.15	in/hr	
Q ₁ =	0.268	cfs	
DISCHARGE END AREA REQUIREMENTS			
10 Year Frequency			
Area requirements for pipe servicing the offsite ponding Northeast of property.			
[5] A= $\frac{Q}{(c\sqrt{2gh})}$			
where:	A=	Discharge Area required	
	g=	Acceleration of gravity	
	c=	Discharge coefficient	
	h=	Hydraulic head	
	Q=	Flow volume from run-off	
Pipe Servicing Offsite Drainage			
Q =	0.268	cfs	H = 3.80 feet
c =	0.62	coefficient	A = 0.03 sqft
g =	32.16	ft/ft/sec	
REQUIRED CONDUIT = 2.25 inch diameter			

***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

Prepared by:
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60% DESIGN BUDG 2441/2440

CONVENTIONAL SLAB ON GRADE

MODULUS OF SUBGRADE REACTION

TABLE 4-1 $k = \text{in}/\text{lb}/\text{in}^3 = k = 300$ ϕ
TM 5-804-1

ALL SUBGRADE SHALL BE SELECT GRANULAR MATERIAL COMPACTED TO 95% STANDARD PROCTOR DENSITY

SOIL BEAR CAPACITY 2000 PSIF

ASSUME NO ADVERSE SOIL CONDITIONS
ASSUME NO HEAVY DISTRIBUTED LOADS

MATERIAL PROPERTIES

$f'_c = 4000 \text{ psi}$

$f_y = 60 \text{ ksi}$

CONCRETE FLEXURAL STRENGTH

$$9\sqrt{f'_c} = 9\sqrt{4000} = 569.2 \text{ SAY } \underline{\underline{570}} \phi$$

TYPE TRAFFIC	TABLE	S-1		
FORK LIFT	# AXLES	AVG DV	MAX OPD	DESIGN VALUE
10K	1	50	50	<u>8</u>

TABLE S-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

$$1.7 \times 972 = 1652.4 \text{ SAY } 1650 \text{ lb/ft}^2$$

ASSUME MAX STATIONARY LOAD = 1200 lb/ft²

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

CHECK THICKED SLAB FOR EXTENSION WALL

6" REINFORCED BLOCK

$$63 \text{ lb/ft}^2 \times 25 = 1575$$

4" BRICK VENEER

$$42 \text{ lb/ft}^2 \times 6 = 252$$

$$\underline{\underline{1827 \text{ lb}}}$$

$$P = 9.93 \sqrt{F'_c} t_2^2 \sqrt{\frac{K}{19,000 \sqrt{F'_c} t_2}}$$

$$t_2 = 24$$

$$T_c = 7$$

$$\sqrt{F'_c} = 63.2$$

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

PERCENT STEEL TABLE F-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/in ³							
	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.

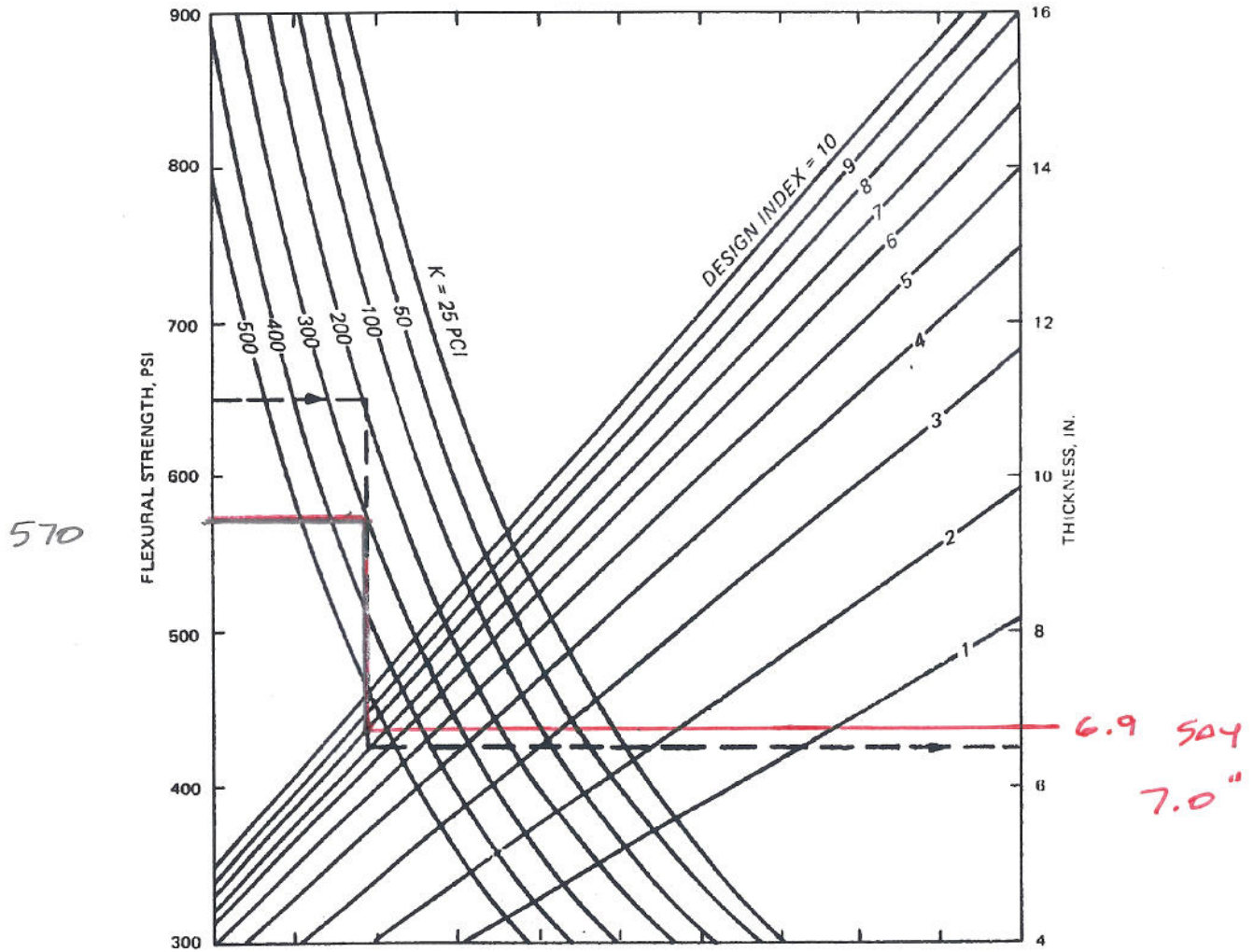
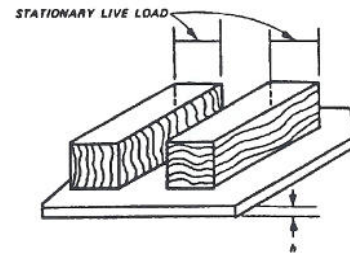


Figure 5-1. Design curves for concrete floor slabs by design index.

Table 3-1. Maximum allowable stationary live load

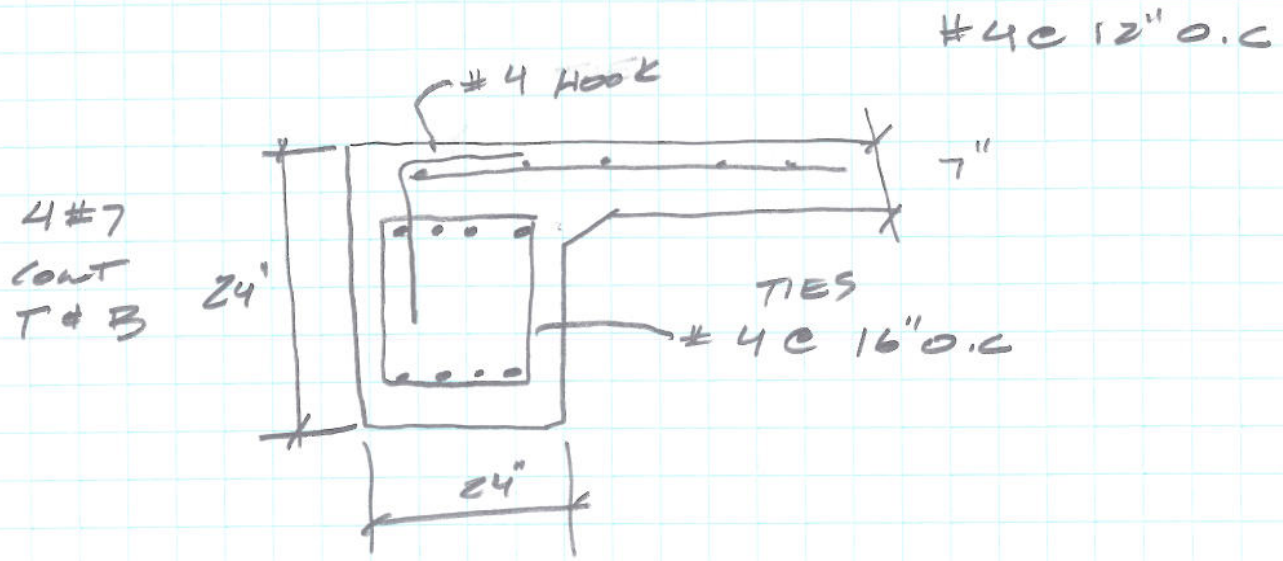
Slab Thickness inches h	Stationary Live Load w in lb/ft ² for These Flexural Strengths of Concrete			
	550 lb in ²	600 lb in ²	650 lb in ²	700 lb in ²
6	868	947	1,026	1,105
7	938	1,023	1,109	1,194
8	1,003	1,094	1,185	1,276
9	1,064	1,160	1,257	1,354
10	1,121	1,223	1,325	1,427
11	1,176	1,283	1,390	1,497
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



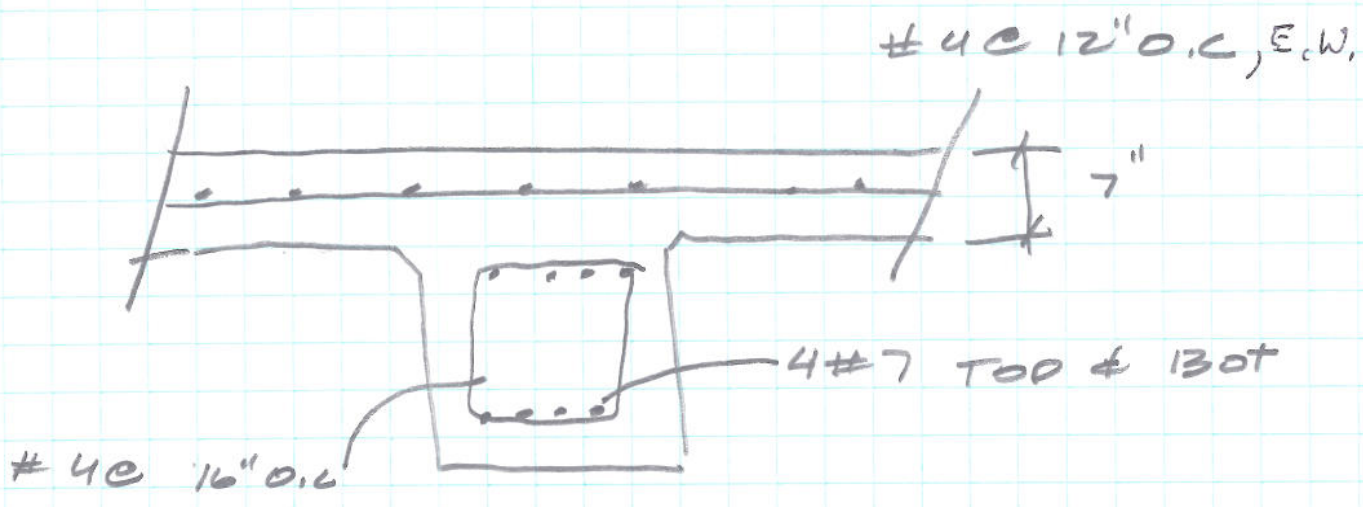
NOTE: Stationary live loads tabulated above are based on a modulus of subgrade reaction (k) of 100 lb/in³. Maximum allowable stationary live loads for other moduli of subgrade reaction will be computed by multiplying the above-tabulated loads by a constant factor. Constants for other subgrade moduli 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
 $f_y = 60 \text{ ksi}$

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***BLDG. 2442
CONVENTIONAL
FOUNDATION DESIGN***

January 16, 2009

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BUILDING DESIGN BUILDING 244Z

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 - 2000 PSF
ASSUMPTIONS:

1. NO ADVERSE SOIL CONDITIONS
2. NO HEAVY DISTRIBUTED LOADS

PROPERTIES OF MATERIALS

$f_c = 4000 \text{ PSI}$

$f_s = 60 \text{ KSI}$

CONCRETE FLEXURAL STRENGTH:

$9\sqrt{f_c} = 9\sqrt{4000} = 569.2 \text{ SAY } 570 -$

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

$b = 8"$

$FLEX ST = 570$

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

$K = 300 \times 1.7 \text{ (FACTOR)}$

$1.7 \times 1031 = 1753 \text{ SAY } 1750 \text{ lbs/ft}^2$

ASSUME MAX STA. LOAD = 1200 lbs/SF

$1750 > 1200 \text{ OK}$

TITLE

**DAMMON ENGINEERING
ARCHITECTS / ENGINEERS**

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SLIDELL, LA. 70459
(504) 641-5950

SCALE

DATE

ENGR

DG NO.

RE

(2)

CHECK SLABS THICKNESS ON EXT WALL

THIS BLDG HAS A 6' HIGH CMU WALL SURROUND
 8" CMU (REINFORCED) $63 \text{ lb/ft}^2 \times 6 = 378$
 4" BRICK VENEER $42 \text{ lb/ft}^2 \times 6 = 252$ $= 630 \text{ LB/FT}$

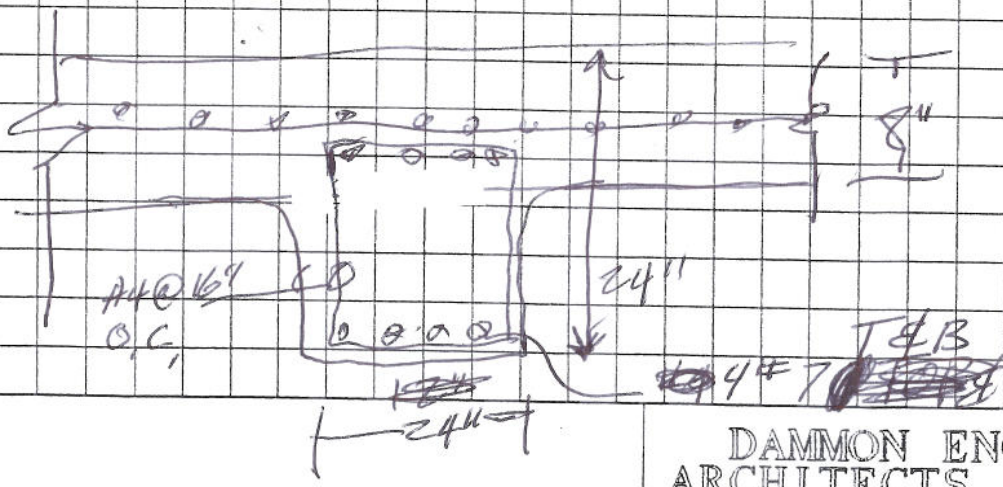
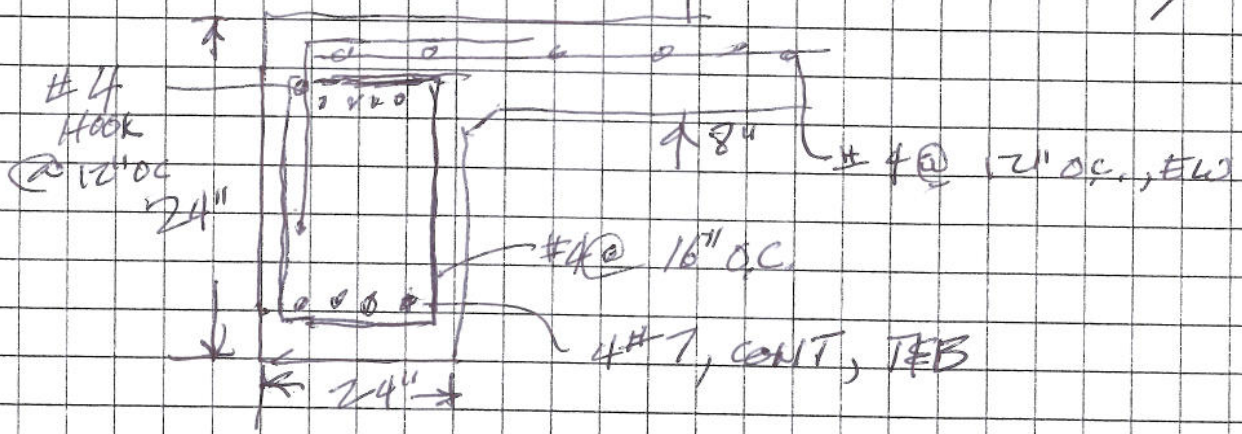
TABLE 3-3

P = FROM TABLE 3-3 FOR $630 \text{ LB/FT} = \dots$
 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 = $196 \text{ IN}^2 > .076 \text{ OK}$



TITLE				
SCALE	DATE	ENGR	DG NO.	RE

DAMMON ENGINEERING ARCHITECTS / ENGINEERS
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 (504) 649-5832 (504) 641-5950

h_r
THICKNESS OF
REINFORCED
CONCRETE
PAVEMENT, IN.

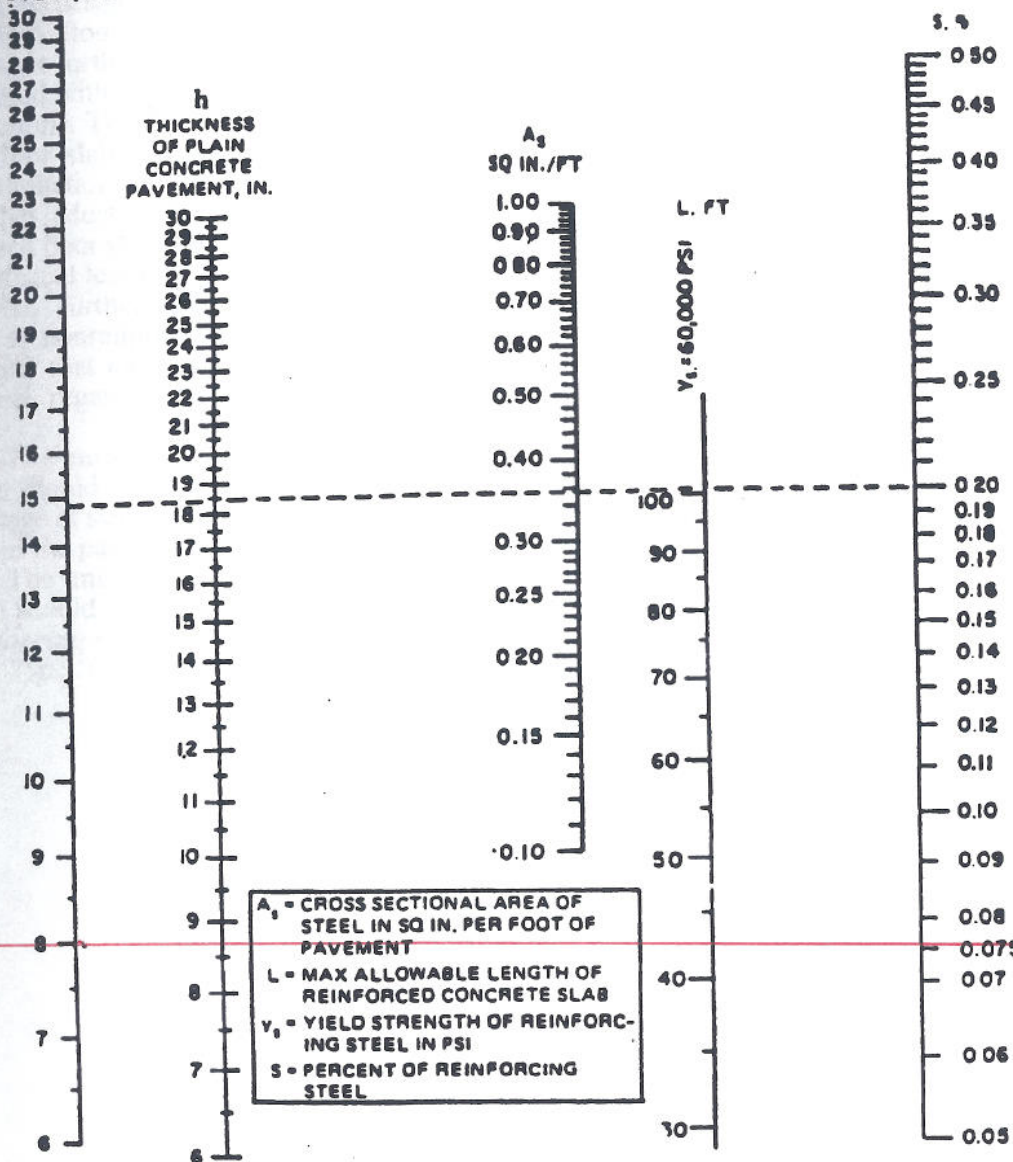
h
THICKNESS
OF PLAIN
CONCRETE
PAVEMENT, IN.

A_s
SQ IN./FT

L, FT

$v_s = 60,000$ PSI

S, %



A_s - CROSS SECTIONAL AREA OF STEEL IN SQ IN. PER FOOT OF PAVEMENT
 L - MAX ALLOWABLE LENGTH OF REINFORCED CONCRETE SLAB
 v_s - YIELD STRENGTH OF REINFORCING STEEL IN PSI
 S - PERCENT OF REINFORCING STEEL

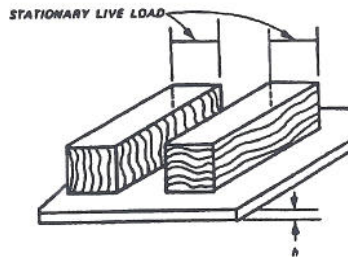
REINFORCED CONCRETE PAVEMENT DESIGN

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 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/in³. 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 $\sqrt{k/100}$.

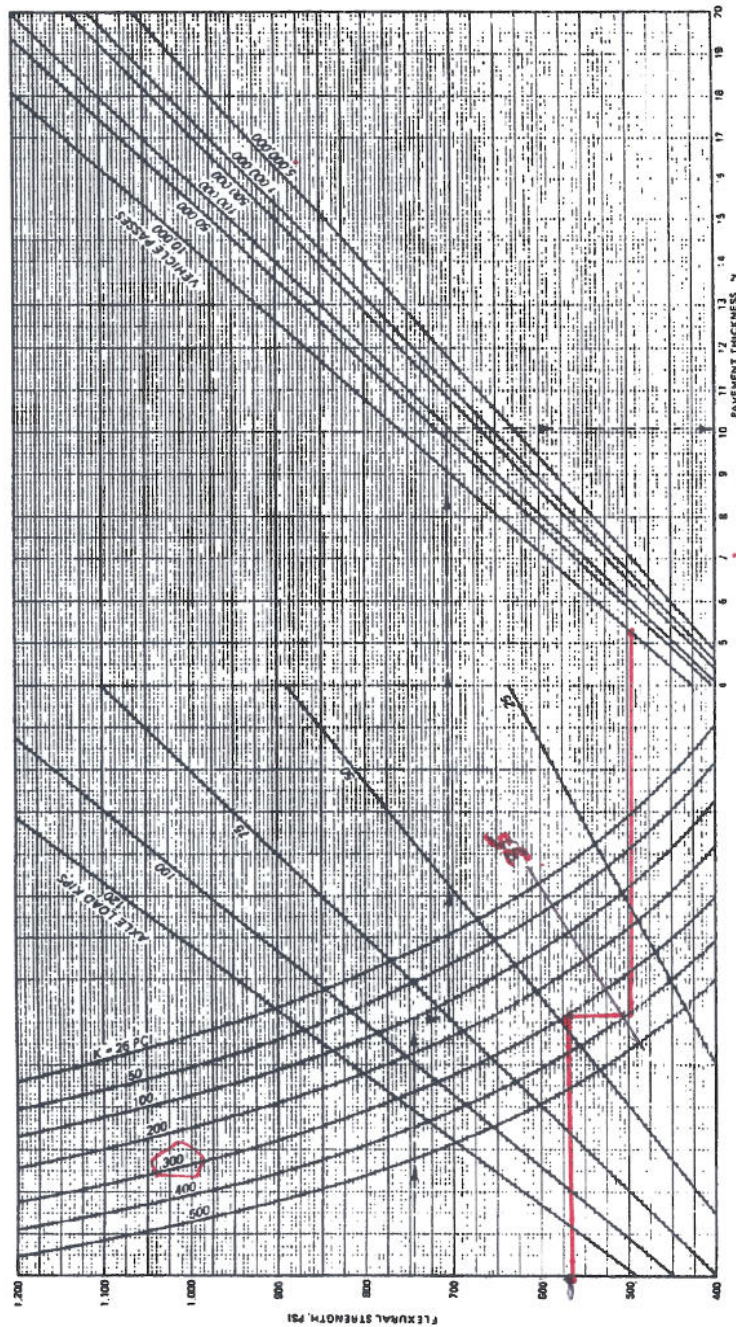


Figure 5-2. Design curves for concrete floor slabs for heavy forklifts.

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

*Located at
John C. Stennis Space Center
Hancock County Mississippi*

***ASPHALT ROADS AND
PARKING DESIGN***

January 16, 2009

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

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



product **Mirafi® X-Series Woven Polypropylene Geotextiles**
for Sedimentation Control, Soil Separation, and Road Base Stabilization

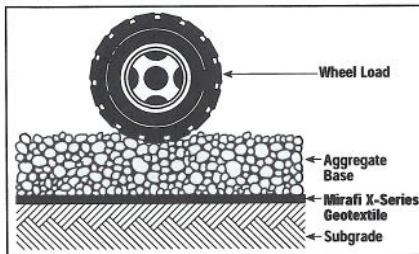
Mirafi® X-Series Technical Data

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

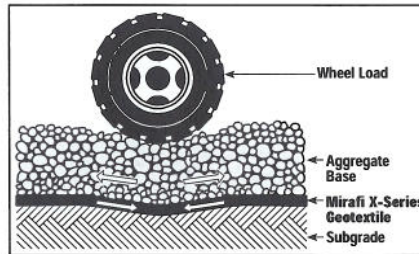
¹ Values apply to both machine and cross-machine directions

Packaging							
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)

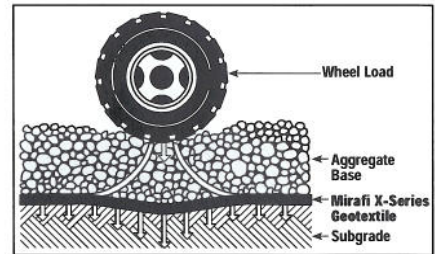
Subgrade/Aggregate Separation



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





TC Mirafi

TECHNICAL DATA SHEET

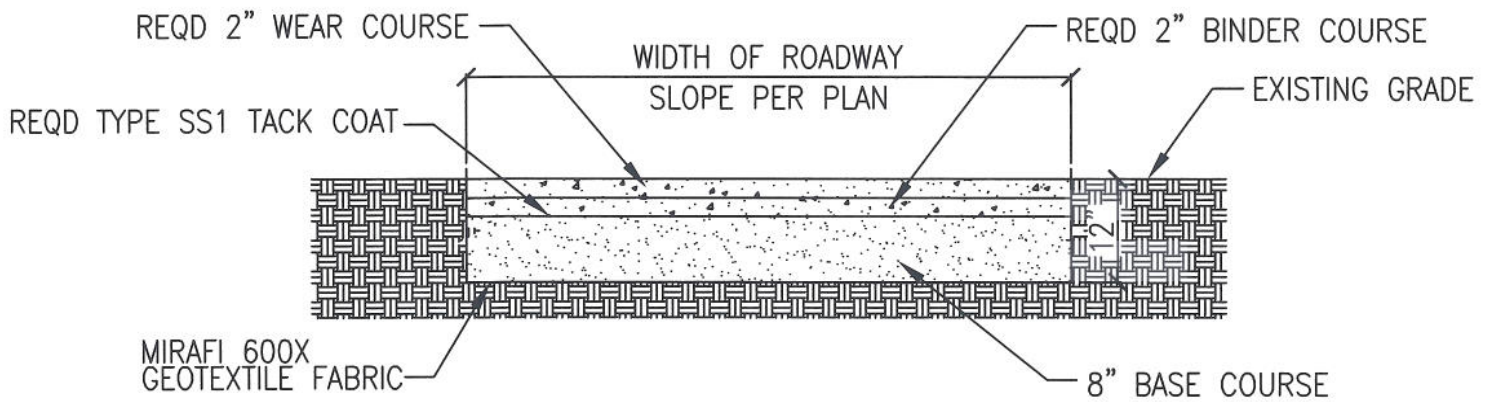
Mirafi 600X

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)
Grab Tensile 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.



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
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CONCRETE ROADS

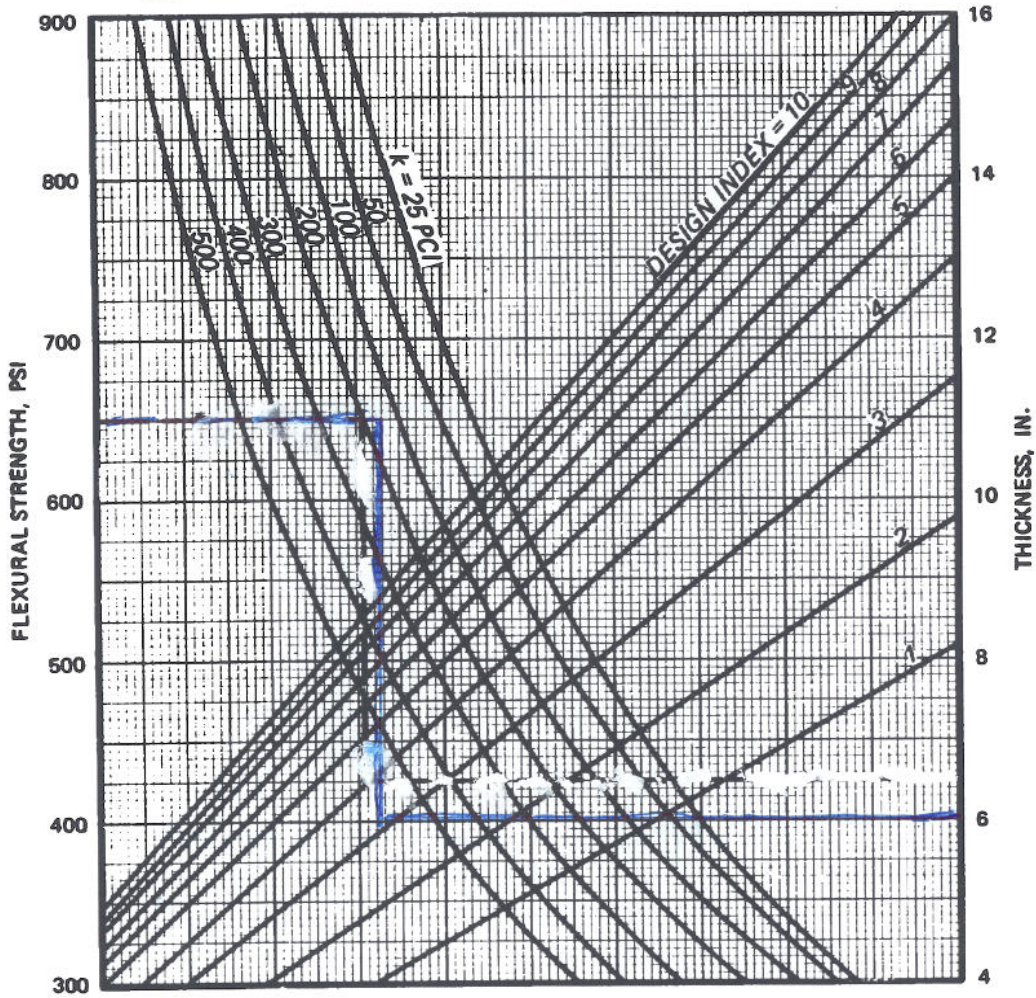


Figure 12-1. Design Curves for Plain Concrete Roads and Streets, and RCCP.

USING CBR (CALIF. BEARING RATIO)

CBR = 10 AVE K = 180 (SUBGRADE MOD.)

CLASS E EFFECTIVE DHV (EQ PASSENGER

CARS PER HR. 18 MPH TRAFFIC

CAT. III 15% TRUCKS

TRAFFIC CAT III DESIGN INDEX "3"

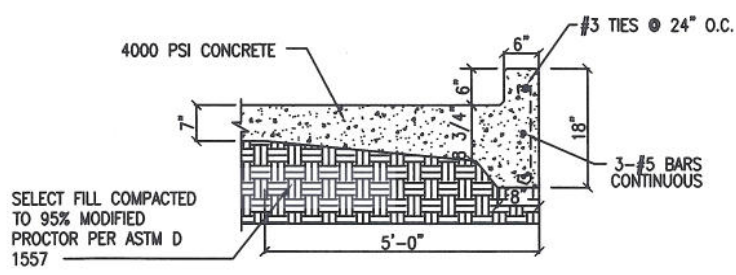
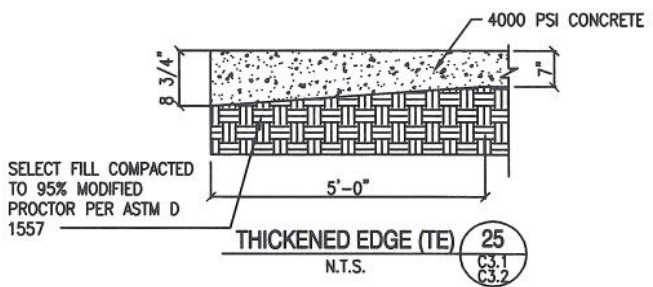
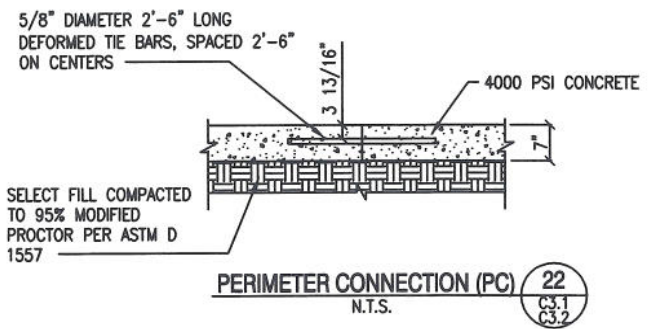
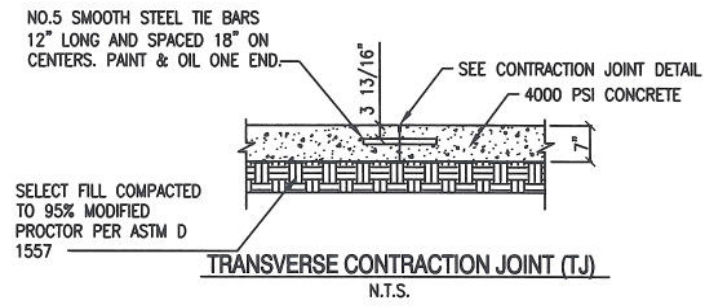
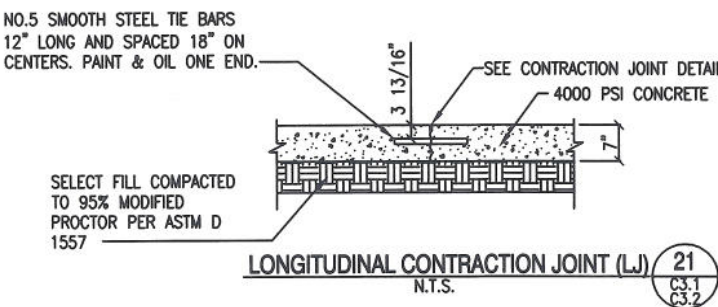
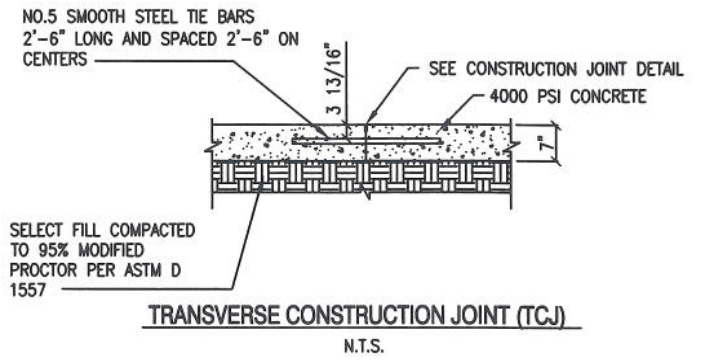
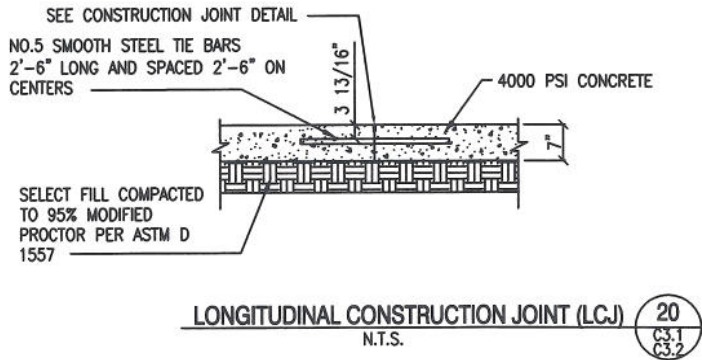
RESULTS

FLEX. STRENGTH 650 PSI

K = 180

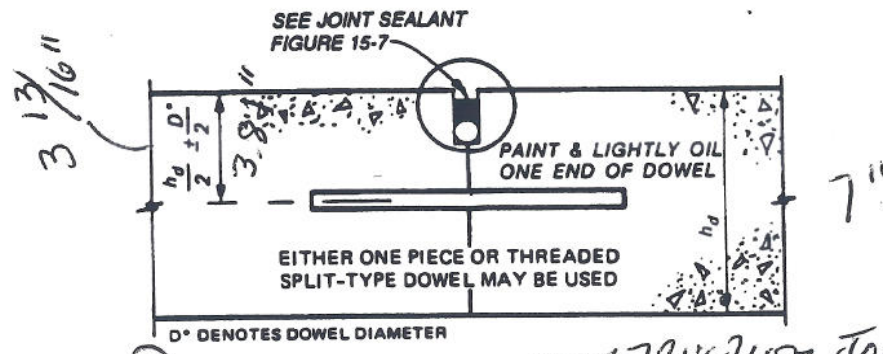
DESIGN INDEX = 3

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



CURB DETAIL (31)
C3.1 C3.2

3.5 ± 0.3125



①

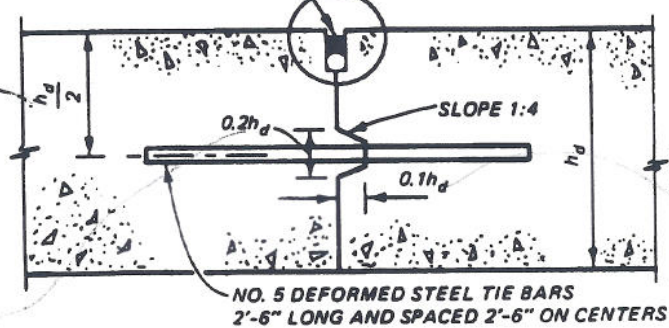
a. DOWELED TRANSVERSE OR LONGITUDINAL

CONSTRUCTION JOINT

TCS

3 13/16"
3.81"
1 1/2"

SEE JOINT SEALANT
FIGURE 15-7



3/4"
0.118 = 0.118

NOTES: TO BE USED ONLY WHEN SLAB THICKNESS IS 9 INCHES OR MORE
A TOLERANCE OF ± 1/16" MAY BE ALLOWED FOR KEY DIMENSIONS AND LOCATION
VERTICAL TOLERANCE OF ± 1/4" ALLOWED FOR PLACEMENT OF TIE BAR
TIED JOINTS IN PAVEMENT WIDTH > 75 FT IS NOT RECOMMENDED.

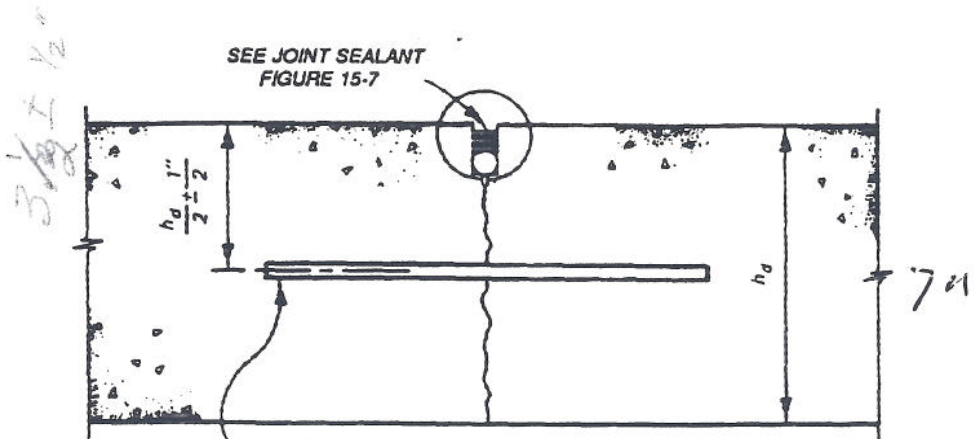
②

b. KEYED AND TIED LONGITUDINAL

A

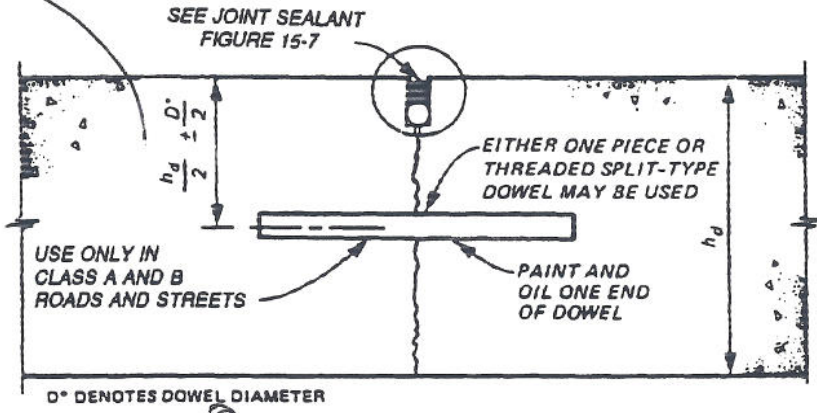
CONSTRUCTION JOINT

Figure 15-4. Construction Joints for Plain Concrete Pavements. (Sheet 1 of 4)



NO. 5 DEFORMED STEEL TIE BARS 2'-6" LONG AND SPACED 2'-6" ON CENTERS, USED ONLY IN JOINTS 15 FEET OR LESS FROM FREE EDGES OF PAVED AREAS GREATER THAN 100 FEET IN WIDTH.

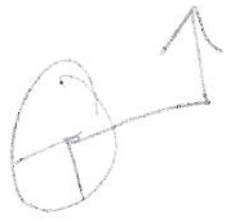
3) a. LONGITUDINAL CONTRACTION JOINT



D^o DENOTES DOWEL DIAMETER

4) b. TRANSVERSE CONTRACTION JOINT

Figure 15-3. Contraction Joints for Plain Concrete Pavements.



***SOV RIVERINE AND COMBATANT
CRAFT OPERATIONS FACILITY***

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

Sanitary Sewer Pumping Station

July 27, 2009

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

Sanitary Sewer Pumping Station

Occupant load estimated @ 269 X 20 gal/day
equals 3.736 gal/min Flow.

Maintenance oil/water separator with a
flow rate of 30 gal/min.

$$f_{\text{HEAD LOSS}} = \text{HAZEN WILLIAM FORMULA} = 0.2083 \left(\frac{100}{C}\right)^{1.852} \left(\frac{Q^{1.852}}{D^{4.8655}}\right)$$

$$Q = V \cdot A \quad \frac{34 \text{ gpm} \left(\frac{1}{60 \text{ sec}}\right)}{V} = \pi \left(\frac{1.75}{12}\right)^2$$

$$V = 6.174 \text{ fps}$$

Reynolds Number

$$Re = \frac{V \left(\frac{1.75}{12}\right)}{(1.2 \times 10^{-5})} = 64,312 \text{ Turbulent Flow}$$

$$\text{Head loss per } 100' = 0.2083 \left(\frac{100}{130}\right)^{1.852} \times \left(\frac{34^{1.852}}{1.5^{4.8655}}\right) = 12.22'$$

550' pipe ÷ 21' ≈ 26 couplings

1.5' head loss equivalent per coupling x 26 = 39'

550' + 39' (equivalent) = 589'

$\frac{589}{100} \times 14.91 = 87.8'$ w/26 couplings

$$h_v = \frac{V^2}{2(\text{gravity})} = \frac{(6.174)^2}{2(32.2)} = 0.59$$

Sanitary Sewer Pumping Station
cont.

Total Head

$$87.8' + 0.59' + 2' = 90.4'$$

Velocity = 6.174 Fps

Flow = 34 gpm

Hydraulic Horsepower $\frac{(90.4)(34)(1.1)}{3956} = 0.85 \text{ hp}$
 minimum 1.07 hp

SOV RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

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

Light Pole Foundation Design

Aug. 25, 2009

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

Calculate Minimum Foundation Exterior Light Pole

REF. ASCE 7-05 & IBC 2006

$$V = 140 \text{ mph}$$

Exposure: C ($K_z = 1.04$)

Importance factor: I

Topographic Factor: $K_{zt} = 1$

Wind Directionality: $K_d = 0.95$

$$\begin{aligned} q_z &= 0.00256 K_z K_{zt} K_d V^2 I \text{ (lb/ft}^2\text{)} \\ &= 0.00256 (1.04) (1) (0.95) (140^2) (1) \\ &= 49.57 \text{ psf} \end{aligned}$$

Light Fixture Surface Area = .5' x 2.5'

Pole = 41.5' x .67' ϕ

$$\begin{aligned} & (LH \times LW \times q_z \times 1.4 (.5LH + PH)) + (PH \times PW \times q_z \times .66 \times .5PH) \\ & (0.5 \times 2.5 \times 49.57 \times 1.4 (.5(.5) + 41.5)) + (41.5 \times 0.67 \times 49.57 \times .66 \times .5(41.5)) \end{aligned}$$

$$-(GD \times GW \times SP \times .5GD \times .66) = 0$$

$$-(7.784 \times 1.5 \times 750 \times .5(7.784) \times .66) = 0$$

Assumed Soil pressure < 750 psf

Foundation below surface < 7.784'

Foundation footprint 1.5' diameter ϕ

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

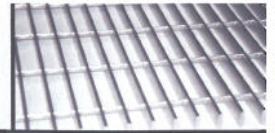
*Located at
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***BLDG. 2442
CATWALK
FRAMING DESIGN***

January 16, 2009

Prepared by:
Dammon Engineering
1095 Florida Avenue
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BAR GRATING



TiteWeld™ 7-TW-4 Welded Steel

NEW!

IN STOCK!!



Load Tables 7-TW-4 TiteWeld

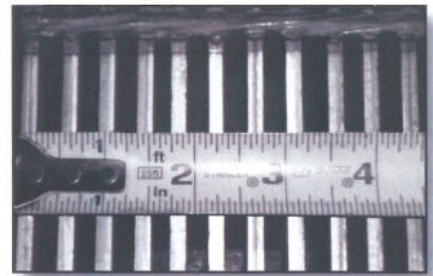
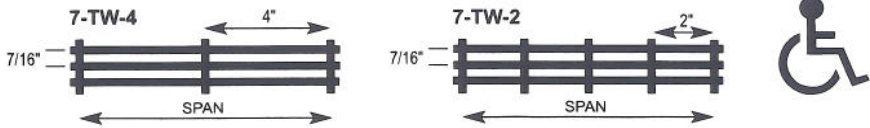
Bearing Bar (Inches)	Wt. Lbs. Sq. Ft.	Sect. Prop. Ft. of Width*	ClearSpan															
			2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	8'-0"				
3/4	13.73	Sx=.482 1x=.181	U	1446	926	643	472	362	286	231	191	151	111	71	31	11	U - Safe uniform load in lbs./sq.ft.	
			D	.099	.155	.223	.304	.398	.503	.620	.751	.897	1.058	1.235	1.428	1.637	1.862	C - Safe concentrated load in lbs./ft.
			C	1446	1157	964	827	723	643	579	524	474	429	389	353	321	291	grating width.
			D	.079	.124	.179	.243	.318	.402	.497	.602	.727	.872	1.037	1.222	1.427	1.652	D - Deflection in inches.
1	18.09	Sx=.857 1x=.429	U	2571	1646	1143	840	643	508	411	340	286	241	201	161	121	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.074	.116	.168	.228	.298	.377	.465	.563	.671	.790	.929	1.087	1.264		
			C	2571	2057	1714	1469	1286	1143	1029	935	857	793	739	694	659		624
			D	.060	.093	.134	.182	.238	.302	.373	.451	.536	.627	.724	.827	.936		1.051
1-1/4	22.45	Sx=1.339 1x=.837	U	4018	2571	1786	1312	1004	794	643	531	446	380	328	281	239	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.060	.093	.134	.182	.238	.302	.372	.450	.536	.629	.730	.839	.953		
			C	4018	3214	2679	2296	2009	1786	1607	1461	1339	1236	1148	1064	994		934
			D	.048	.074	.107	.146	.191	.241	.298	.360	.429	.503	.584	.672	.776		.896
1-1/2	26.81	Sx=1.929 1x=1.446	U	5786	3703	2571	1889	1446	1143	926	765	643	548	472	412	362	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.050	.078	.112	.152	.199	.251	.310	.375	.447	.525	.608	.705	.816		
			C	5786	4629	3857	3306	2893	2571	2314	2104	1929	1780	1653	1546	1446		
			D	.040	.062	.089	.122	.159	.201	.248	.300	.358	.420	.487	.560	.639		.724
1-3/4	31.20	Sx=2.625 1x=2.297	U	7875	5040	3500	2571	1969	1556	1260	1041	875	746	643	562	492	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.043	.067	.096	.130	.170	.216	.266	.322	.383	.450	.521	.601	.681		
			C	7875	6300	5250	4500	3938	3500	3150	2864	2625	2423	2250	2099	1969		
			D	.034	.053	.077	.104	.136	.172	.213	.258	.306	.360	.420	.487	.560		.639
2	35.59	Sx=3.429 1x=3.429	U	10286	6583	4572	3359	2571	2032	1646	1360	1143	974	840	743	663	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.037	.058	.084	.114	.149	.189	.233	.282	.335	.393	.456	.526	.601		
			C	10286	8229	6857	5878	5143	4572	4114	3740	3429	3165	2939	2711	2511		
			D	.030	.047	.067	.091	.119	.151	.186	.225	.268	.315	.365	.417	.472		
2-1/4	36.92	Sx=4.339 1x=4.882	U	13018	8332	5786	4251	3255	2571	2083	1721	1446	1232	1063	914	794	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.033	.052	.074	.101	.132	.168	.210	.250	.298	.350	.406	.466	.530		
			C	13018	10414	8679	7439	6509	5786	5207	4734	4339	4006	3719	3255	2855		
			D	.026	.041	.060	.081	.106	.134	.166	.200	.238	.280	.324	.374	.424		
2-1/2	44.31	Sx=5.357 1x=6.697	U	16072	10286	7143	5248	4018	3175	2571	2125	1786	1522	1312	1104	943	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.	
			D	.030	.047	.067	.091	.119	.151	.186	.225	.268	.315	.365	.417	.472		
			C	16072	12857	10714	9184	8036	7143	6429	5844	5357	4945	4592	4251	3911		
			D	.030	.037	.054	.073	.095	.121	.149	.180	.215	.252	.292	.331	.371		

* 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.

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

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								

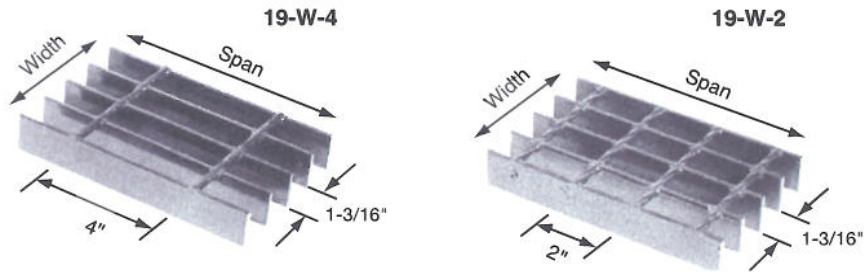
** Add 1/4" for extended cross bars. Deduct 1/16" for 1/8" bearing bars. Standard panel widths indicated in bold.



BAR GRATING



Light Duty Welded Steel 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	U - Safe uniform load in pounds/sq. ft.						
			D	.096	.150	.216	.294	.382	.485	C - Safe concentrated load in pounds/ft.						
		1x=.073	C	581	465	387	332	290	258	grating width						
			D	.077	.120	.173	.235	.307	.388	D - Deflection in inches						
1 x 1/8	5.15	Sx=.228	U	686	439	305	224	172	136	110	91	76	Loads and deflections given in this table are theoretical, and are based on a unit stress of 18,000 psi.			
			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	

*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 discretion 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 ARMOR/CEILING DESIGN

GIVEN - NO KNOWN LL. NON OCCUPIED SPACE ABOVE.

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

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

LRFD FACTOR LOAD
 DESIGN LOAD = $1.2D + 1.6L = 1.2(65 + 14) + 0 = 94.8 (95) \text{ PSF}$
 $95 \times 1.5 = 142.5 \text{ PLF}$

TABLE OPEN WEB STEEL JOIST - K SERIES
 DESIGN SPAN 20'

12K1 TOTAL-241 LIVE-142

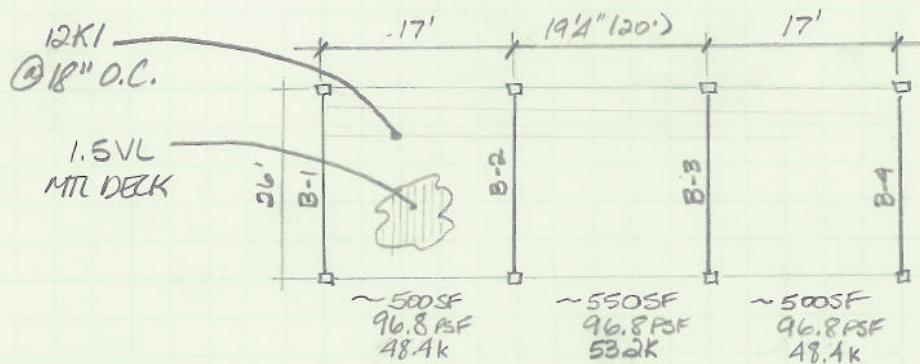
$142.5 \text{ PLF} > 241 \text{ OK}$

USE 12K1 JOIST @ 18" O.C.

WEIGHT OF JOISTS WORST CASE

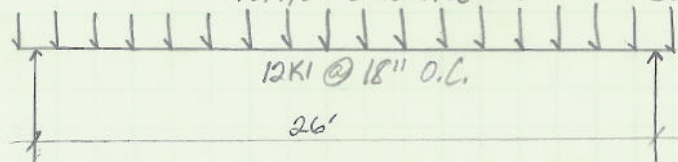
$20' \times 51\text{b} = 1001\text{b EA.}$

$18 \times 1001\text{b} = 1800\text{lbs.}$



B-1 AND B-4

$484/2 = 24.2\text{k}/18 = 1.34\text{k EA JOIST} \Rightarrow 930.7 \text{ PLF}$

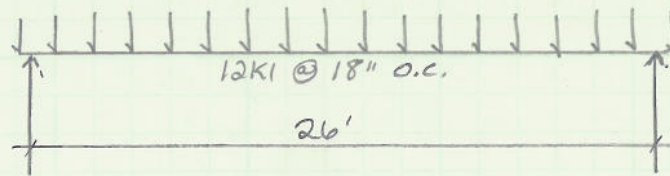


$$M_{max} = (24.2\text{k} \cdot 26) / 6 = 104.9\text{k}$$

$$S = 12(104.9\text{k}) / 22\text{k} = 57.2$$

USE W18x35 (6x17-3/4")

B-2 AND B-3
 $(48.2/2) + (53.2/2) = 50.8/18 = 2.82k \text{ EA JOIST} \Rightarrow 1954 \text{ PLF}$



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

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

USE W24x55 (7x23-5/8")

WORST CASE COLUMN LOAD

B-2/B-3 EFFECTIVE LENGTH = $KL = 11'$
 $12.1k + 13.3k = 25.4k$ DESIGN STRENGTH

ALLOWABLE $5 \times 5 \times 1/4$ 86 KIPS

USE $5 \times 5 \times 1/4$ 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:
Dammon Engineering
1095 Florida Avenue
Slidell, La. 70458
985-649-5832
dammonengineering.com

SOV RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

CLIMATE ZONE AND MINIMUM INSULATION REQUIREMENTS

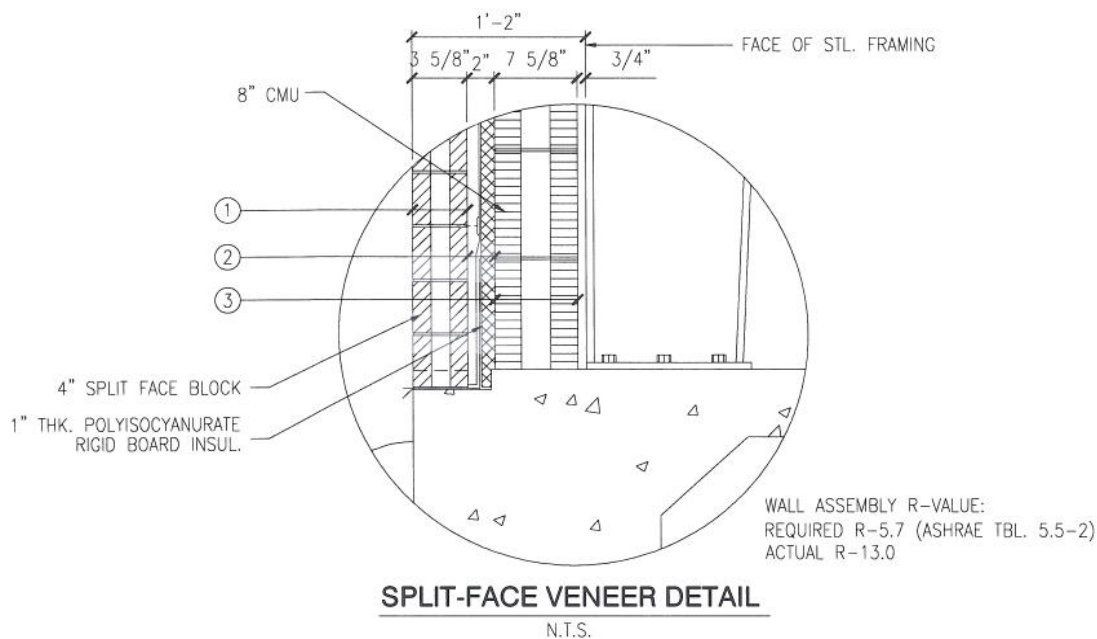
Project is located in Hancock County, Mississippi. Climate Zone 2A, minimum insulation value for mass walls above-grade **R-5.7**, maximum U-factor **U-0.151**.

DESCRIPTION OF EXTERIOR WALL COMPONENTS

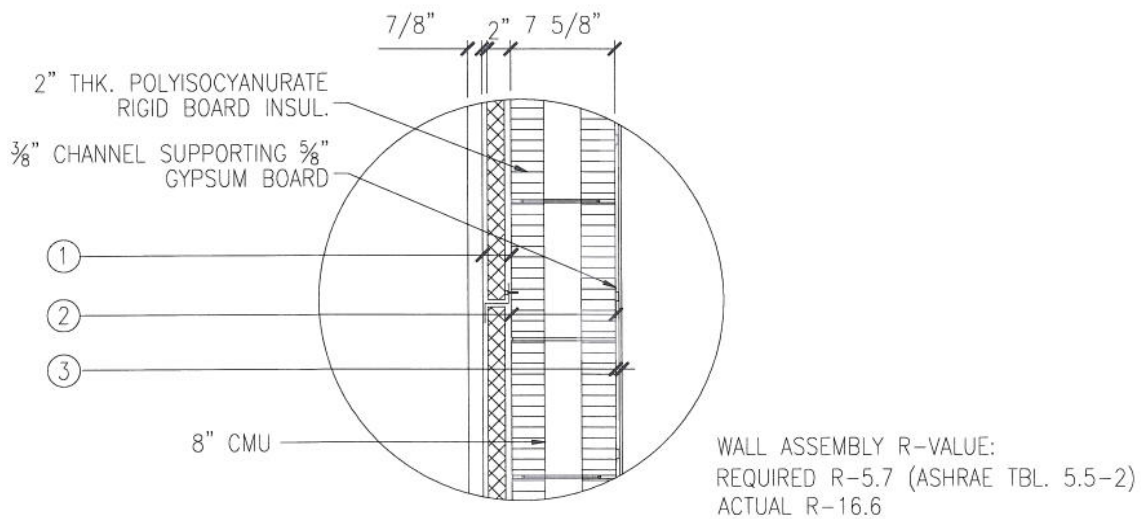
Bldg. 2440 Operation Facility / 2441 Maintenance:

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" split-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.



1. **R-1.3:** Medium density (115 lb./ft³), 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

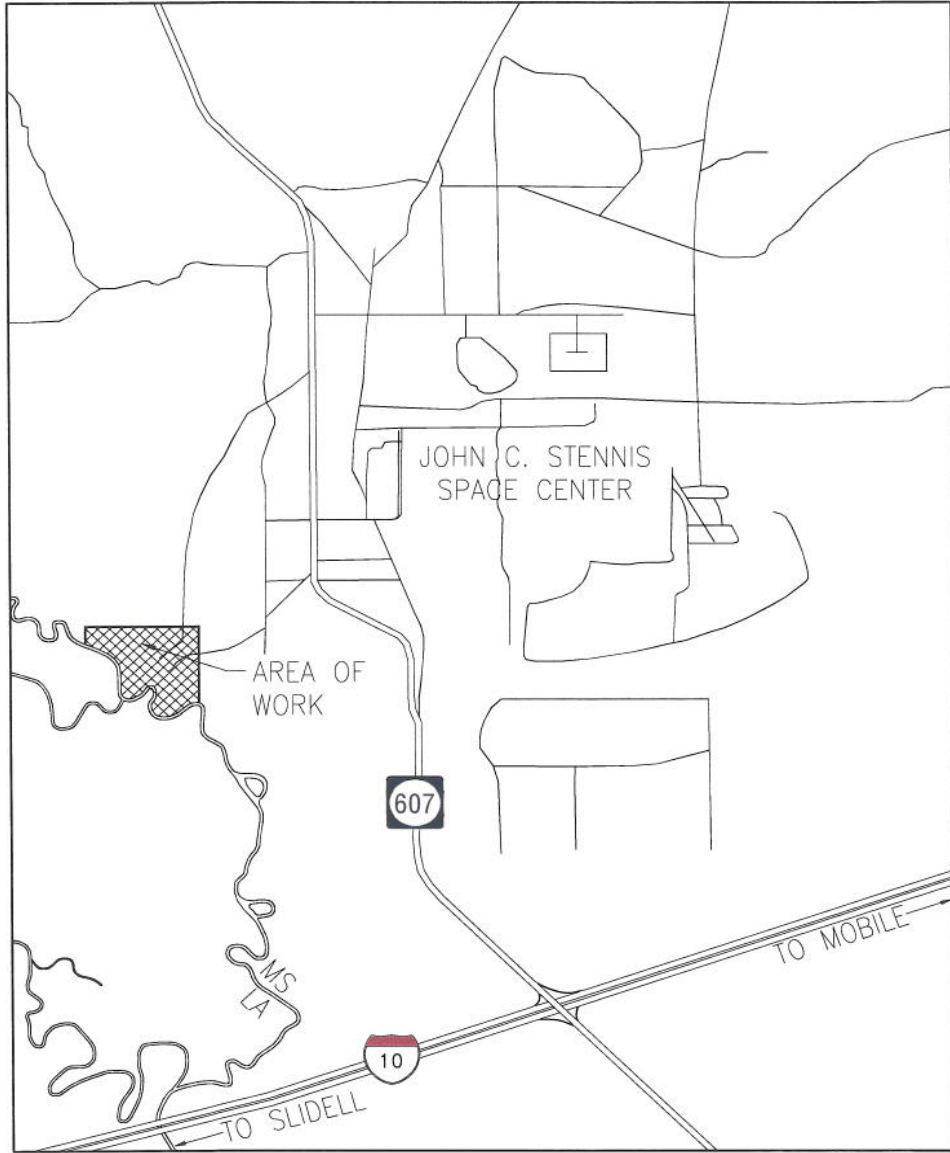
***FY2008 MILCON P-210
N4412
SOF RIVERINE AND COMBATANT
CRAFT OPERATIONS FACILITY***

*Located at
John C. Stennis Space Center
Hancock County Mississippi*

***BDLG. 2440 / 2441
MASONRY DESIGN***

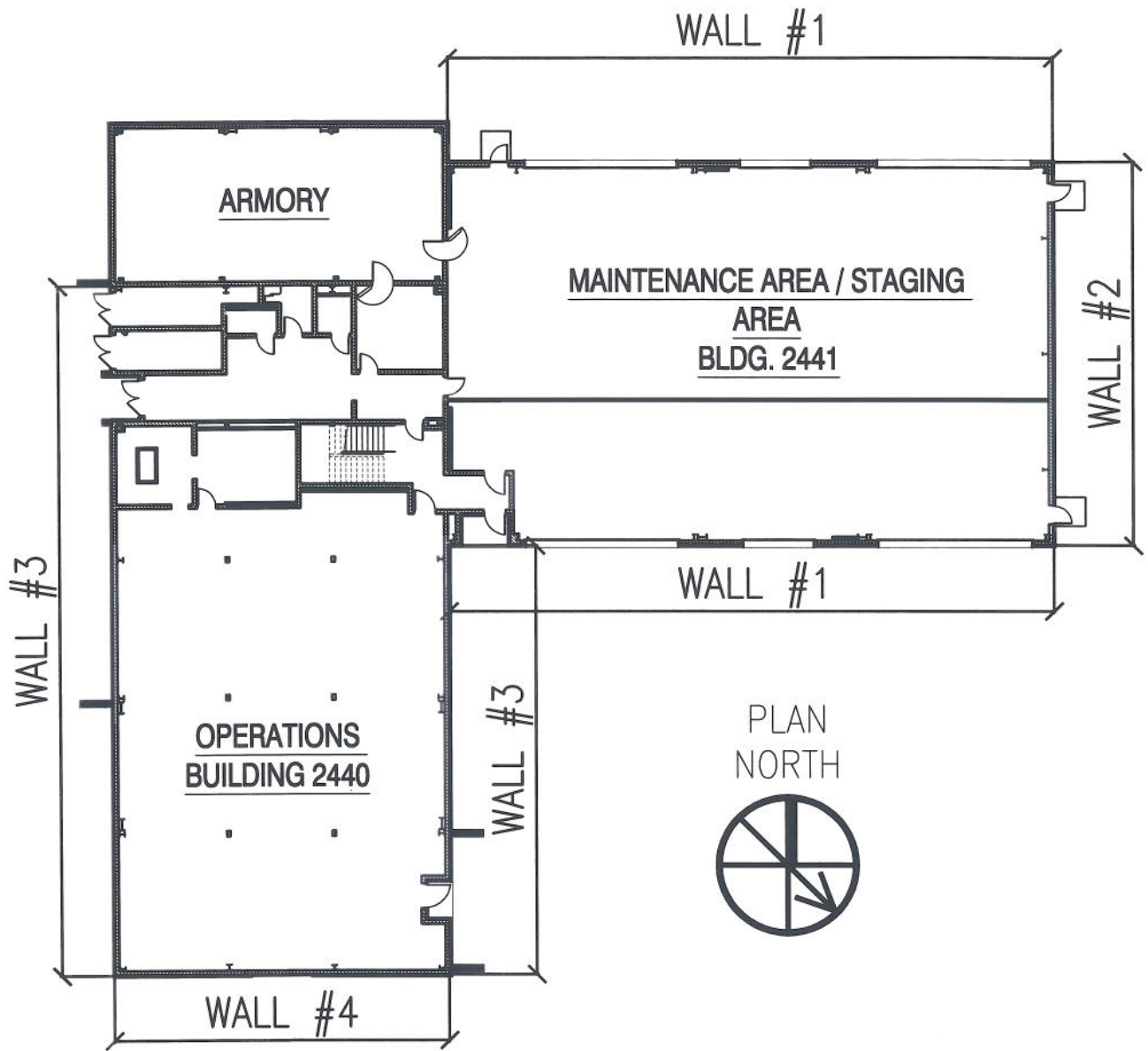
April 30, 2009

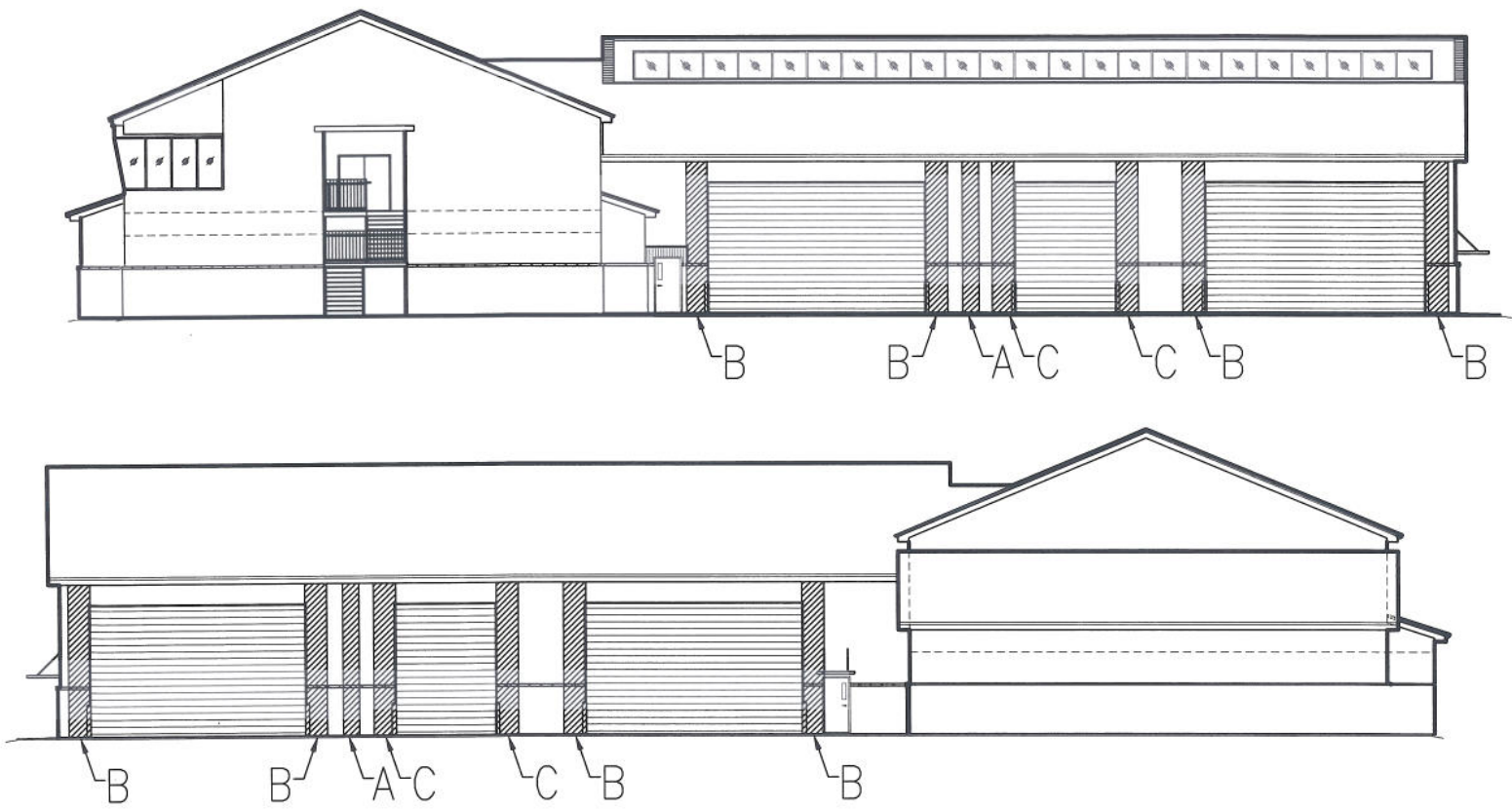
Prepared by:
Dammon Engineering
1095 Florida Avenue
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985-649-5832
dammonengineering.com



VICINITY MAP

N. T. S.





WALL #1 ELEMENTS

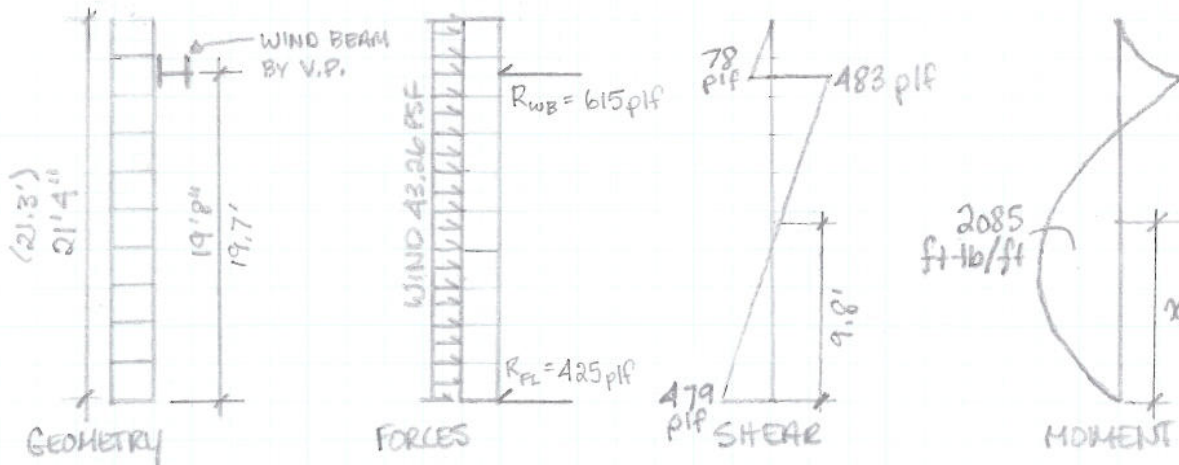
STENNIS RIVERINE DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE BLDG 2441 — WALL #1 ELEMENT A

MATERIALS:

UNIT STRENGTH	4050 psi
MORTAR	TYPE N
f'_m	3500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

LOADING:

WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



REACTIONS:

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

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

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

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

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

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

DESIGN STRENGTH

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

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

$$K^2 + 2\rho n K - 2\rho n = 0$$

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

$$j = 1 - \frac{K}{3} = 0.928$$

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

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

ALLOWABLE CAPACITY IN TENSION

TRY #4 @ 12" O.C

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

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

TRY #5 @ 8" O.C.

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

5640 > 4170 ft-lb/ft. ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

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

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

1916 < 4170 ft-lb/ft DOES NOT WORK

ASSUME NEW f'_m

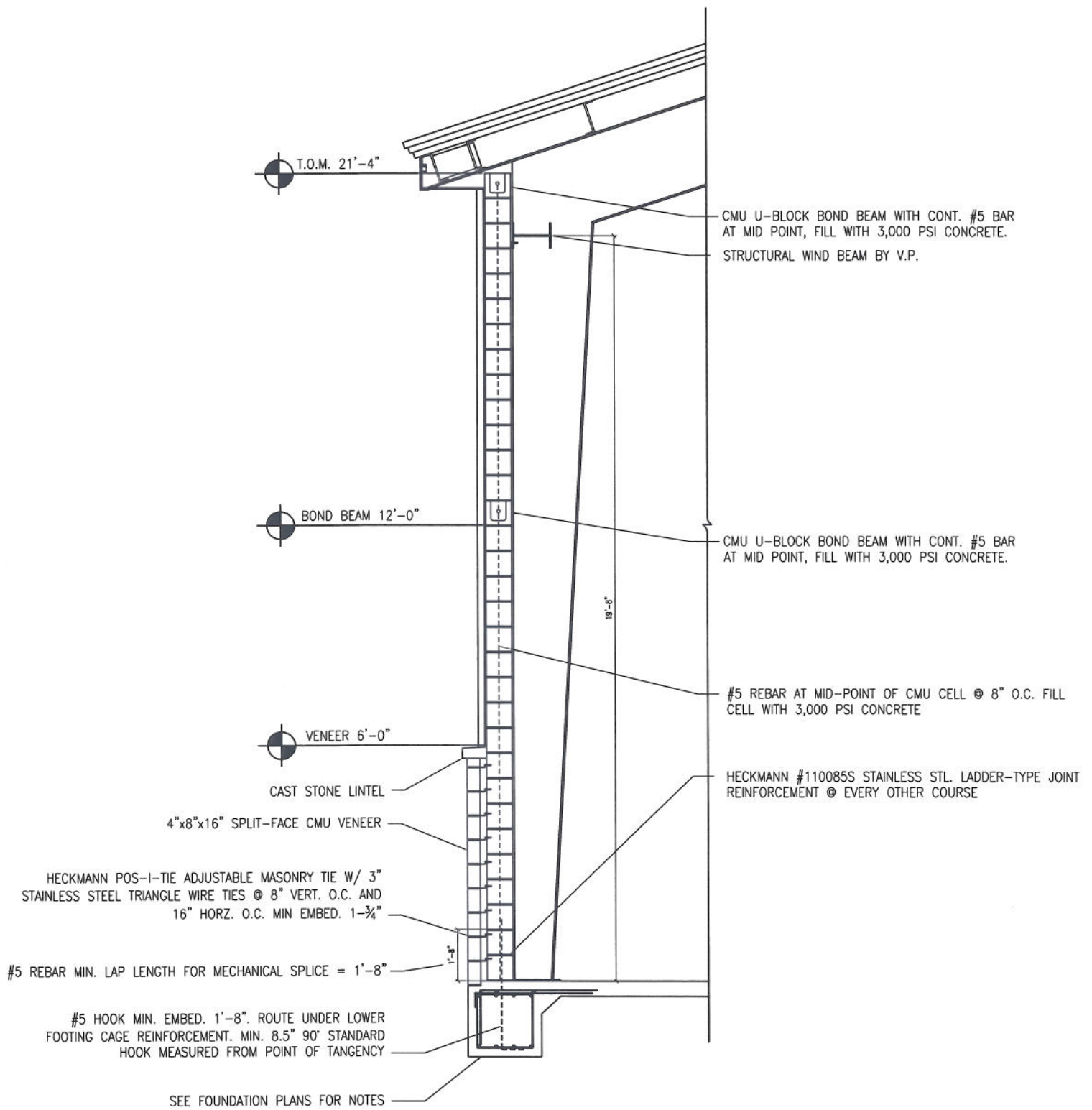
ESTIMATE REQ'D STRENGTH: $\frac{4170}{1916} \cdot 1500 \text{ psi} = 3265 \text{ psi}$ UNIT STRENGTH

NEW $f'_m = 2500 \text{ psi}$ - TYPE N MORTAR ⇒ 4,050 psi UNIT STRENGTH

$$F_b = 1795 \text{ psi}$$

$$M_m = 5170 \text{ ft-lb/ft} \quad \therefore \text{OK}$$

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



WALL#1 ELEMENT A DETAIL
N.T.S.

STENNIS RIVERINE

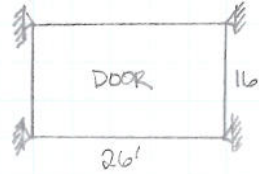
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE BLDG 2441 ELEMENT B (DESIGN FOR 26' x 16' OPENING)

MATERIALS:

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

LOADING:

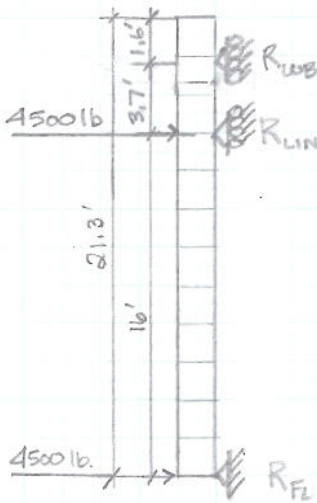
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



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

$$R = 4500 \text{ lbs}$$

REACTIONS @ LINTEL AND FLOOR FROM DOOR



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

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

$$\text{TOTAL} = 9000 \text{ lbs.}$$

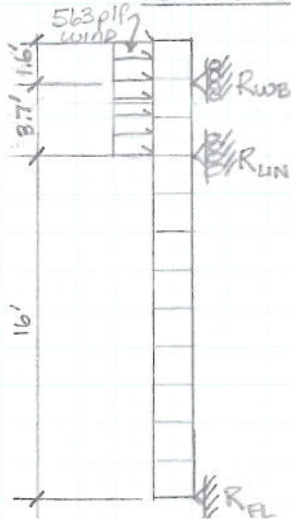
$$\text{ACTUAL: } [43.3 \text{ psf} \cdot (13' \cdot 16')] = 9006$$

$$\text{MAXIMUM MOMENT} = 0 \text{ lbs} \cdot 16' = 0 \text{ ft-lb/ft}$$

∴ OK

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

REACTIONS @ WIND BEAM AND LINTEL FROM AREA ABOVE DOOR:



$$R_{WB} = \left(\frac{43.3 \cdot (5.3)^2 / 2'}{3.7'} \right) = 164.1 \text{ plf} (13') = 2136 \text{ lbs}$$

$$R_{LIN} = \left[43.3 \left(\frac{3.7^2}{2} - \frac{16^2}{2} \right) \right] / 3.7' = 65.1 \text{ plf} (13') = 847 \text{ lbs}$$

$$\text{TOTAL} = 2983 \text{ lbs}$$

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

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

∴ OK

$$\text{MAX MOMENT} = (164.1 - 65.1) \left(\frac{1.5}{2} \right) = 74.8 \text{ ft-lb/ft}$$

1095 Florida Ave.
Slidell, LA 70458P.O. Box 2830
Slidell, LA 70459985-649-5832
FAX 985-641-5950MOMENT @ HEAD LOCATION FROM UNIFORM WIND ON WALL ELEM. B

$$\text{MAX MOMENT} = 425 \text{ plf} \cdot 21.3' - 43.3 \text{ psf} \left(\frac{116^2}{2} \right) = 1260 \text{ ft-lb/ft.}$$

DESIGN MOMENT

ASSUME 32" JAMB

$$\begin{aligned} \text{MAX MOMENT} &= (74.8 \text{ ft-lb/ft} \cdot 13') + (1260 \text{ ft-lb/ft} \cdot 2.67') \\ &= (9724 \text{ ft-lb.} + 3364 \text{ ft-lb.}) = 13,088 \text{ ft-lb.} \end{aligned}$$

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

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

$M_t > \text{REQ. } M: 13,088 \text{ ft-lb.} \therefore \text{OK}$

ALLOWABLE CAPACITY IN COMPRESSION

$$p = \frac{(1.6)^2}{32 \text{ in} \cdot 3.8"} = 0.02 \quad n_p = 12.89 \cdot 0.02 = 0.2578$$

$$K = \frac{-0.5 \pm \sqrt{0.5^2 - 4 \cdot 1 \cdot (-0.5)}}{2}$$

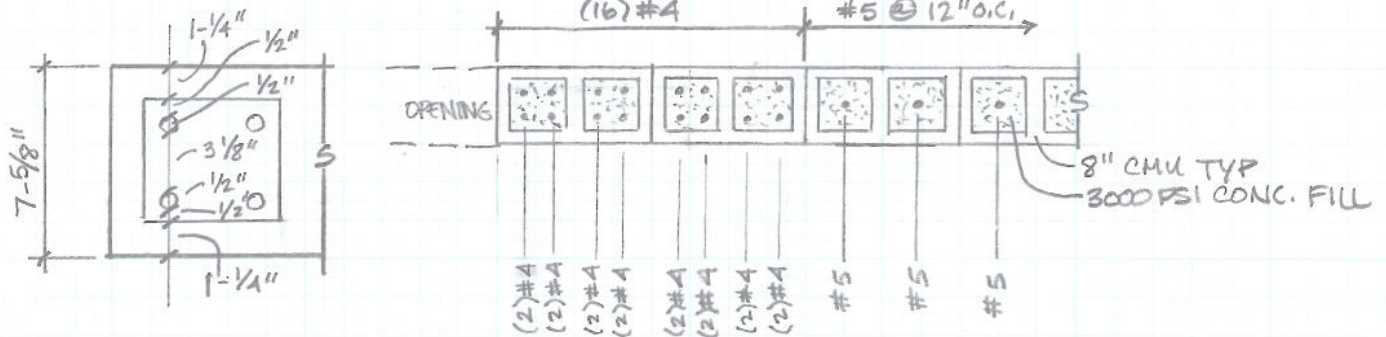
$$j = \left(1 - \frac{K}{3}\right) = \left(1 - \frac{0.5}{3}\right) = 0.83$$

$$K = \frac{-0.5 \pm 1.5}{2} = 0.5$$

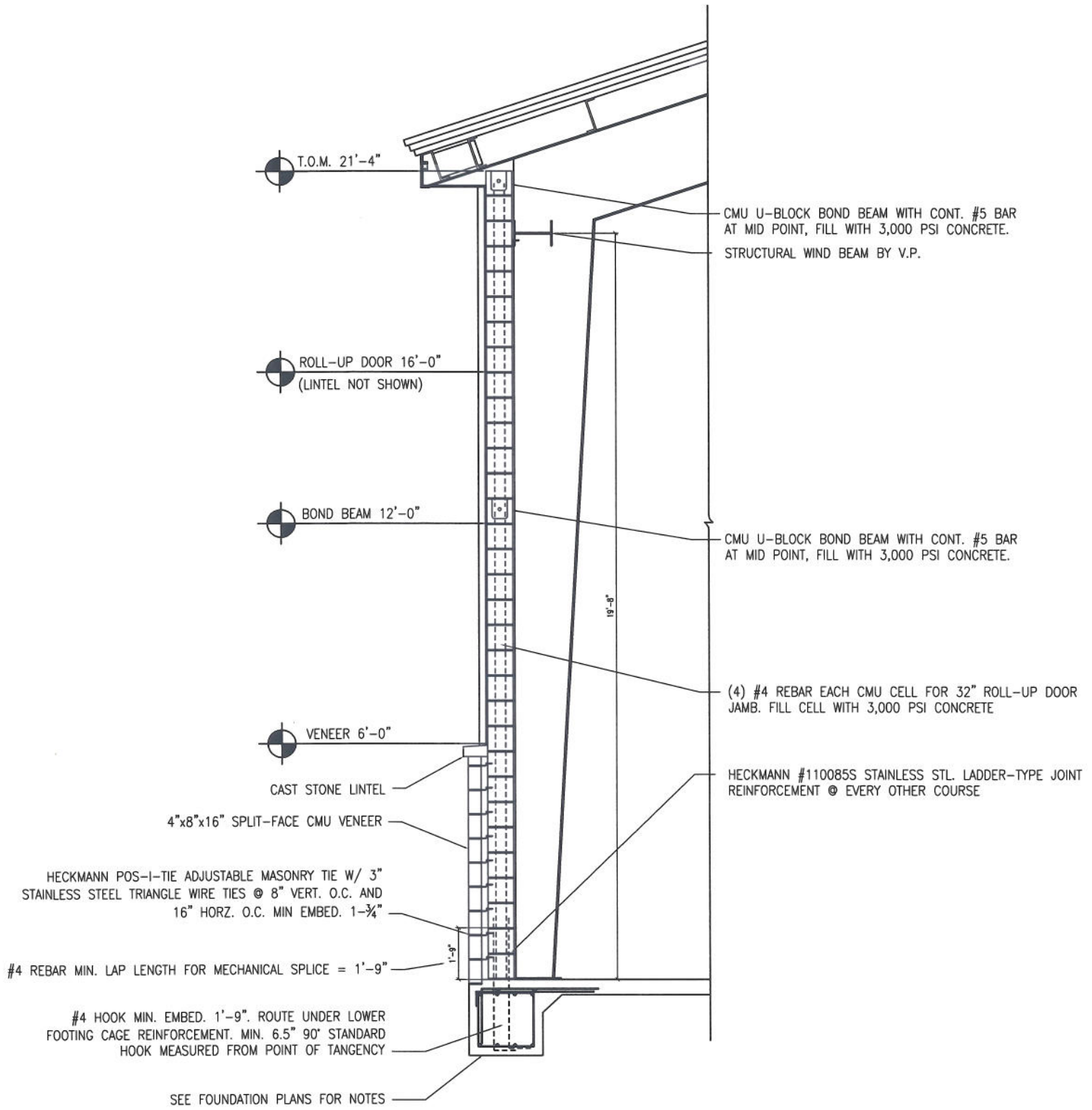
$$M_m = \frac{b d^2}{2} \cdot K \cdot j \cdot F_b = \frac{32 \text{ in} \cdot 3.8^2}{2} (0.5)(0.83) \frac{1795 \text{ psi}}{12} = 14342 \text{ ft-lb.}$$

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

$M_m > \text{REQ. } M: 13,088 \text{ ft-lb.} \therefore \text{OK}$



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



CMU U-BLOCK BOND BEAM WITH CONT. #5 BAR AT MID POINT, FILL WITH 3,000 PSI CONCRETE.
 STRUCTURAL WIND BEAM BY V.P.

CMU U-BLOCK BOND BEAM WITH CONT. #5 BAR AT MID POINT, FILL WITH 3,000 PSI CONCRETE.

(4) #4 REBAR EACH CMU CELL FOR 32" ROLL-UP DOOR JAMB. FILL CELL WITH 3,000 PSI CONCRETE

HECKMANN #110085S STAINLESS STL. LADDER-TYPE JOINT REINFORCEMENT @ EVERY OTHER COURSE

T.O.M. 21'-4"

ROLL-UP DOOR 16'-0"
 (LINTEL NOT SHOWN)

BOND BEAM 12'-0"

VENEER 6'-0"

CAST STONE LINTEL

4"x8"x16" SPLIT-FACE CMU VENEER

HECKMANN POS-I-TIE ADJUSTABLE MASONRY TIE W/ 3" STAINLESS STEEL TRIANGLE WIRE TIES @ 8" VERT. O.C. AND 16" HORZ. O.C. MIN EMBED. 1-3/4"

#4 REBAR MIN. LAP LENGTH FOR MECHANICAL SPLICE = 1'-9"

#4 HOOK MIN. EMBED. 1'-9". ROUTE UNDER LOWER FOOTING CAGE REINFORCEMENT. MIN. 6.5" 90° STANDARD HOOK MEASURED FROM POINT OF TANGENCY

SEE FOUNDATION PLANS FOR NOTES

WALL#1 ELEMENT B DETAIL
 N.T.S.

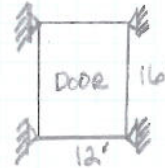
STENNIS RIVERINE DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE BLDG 2441 — WALL #1 ELEMENT C

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:

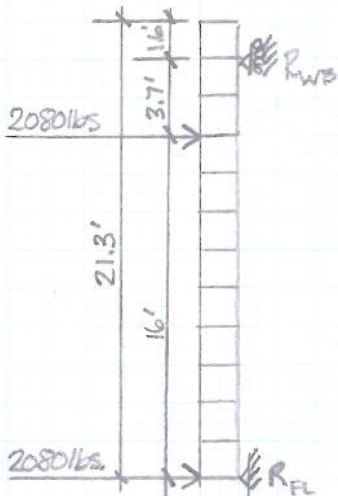
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



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

$$R = 2080 \text{ lbs.}$$

REACTIONS @ UNTEL AND FLOOR FROM DOOR:



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

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

$$\left. \begin{array}{l} R_{WB} \\ R_{FL} \end{array} \right\} \text{TOTAL} = 4160 \text{ lbs.}$$

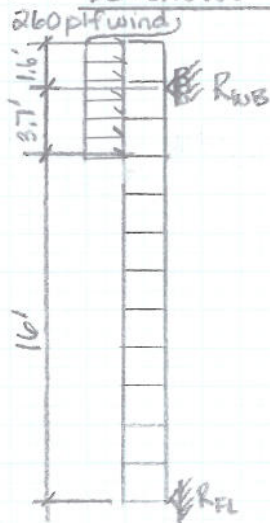
$$[\text{ACTUAL} = 43.3 \cdot (16 \cdot 12) / 2 = 4157]$$

∴ O.K.

$$\text{MAX MOMENT} = 780 \text{ lbs} \cdot 16' = 12480 \text{ ft-lb}$$

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

REACTIONS @ WIND BEAM AND FLOOR FROM AREA ABOVE DOOR:



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

$$R_{FL} = 260 \text{ plf} \cdot \left(\frac{5.3^2}{2} - \frac{1.6^2}{2} \right) \frac{1}{19.7'} = 170 \text{ lbs}$$

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

$$\text{MOMENT} = 170 \text{ lbs} \cdot 16' = 2720 \text{ ft-lb.}$$

1095 Florida Ave.
Slidell, LA 70458P.O. Box 2830
Slidell, LA 70459985-649-5832
FAX 985-641-5950MOMENT @ HEAD LOCATION FROM UNIFORM WIND ON WALL ELEM. C:

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

DESIGN MOMENT

ASSUME 32" JAMB

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

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:

$$M_t = 14555 \text{ ft-lb} \quad (\text{SEE CALCULATIONS FOR WALL ELEM. B})$$

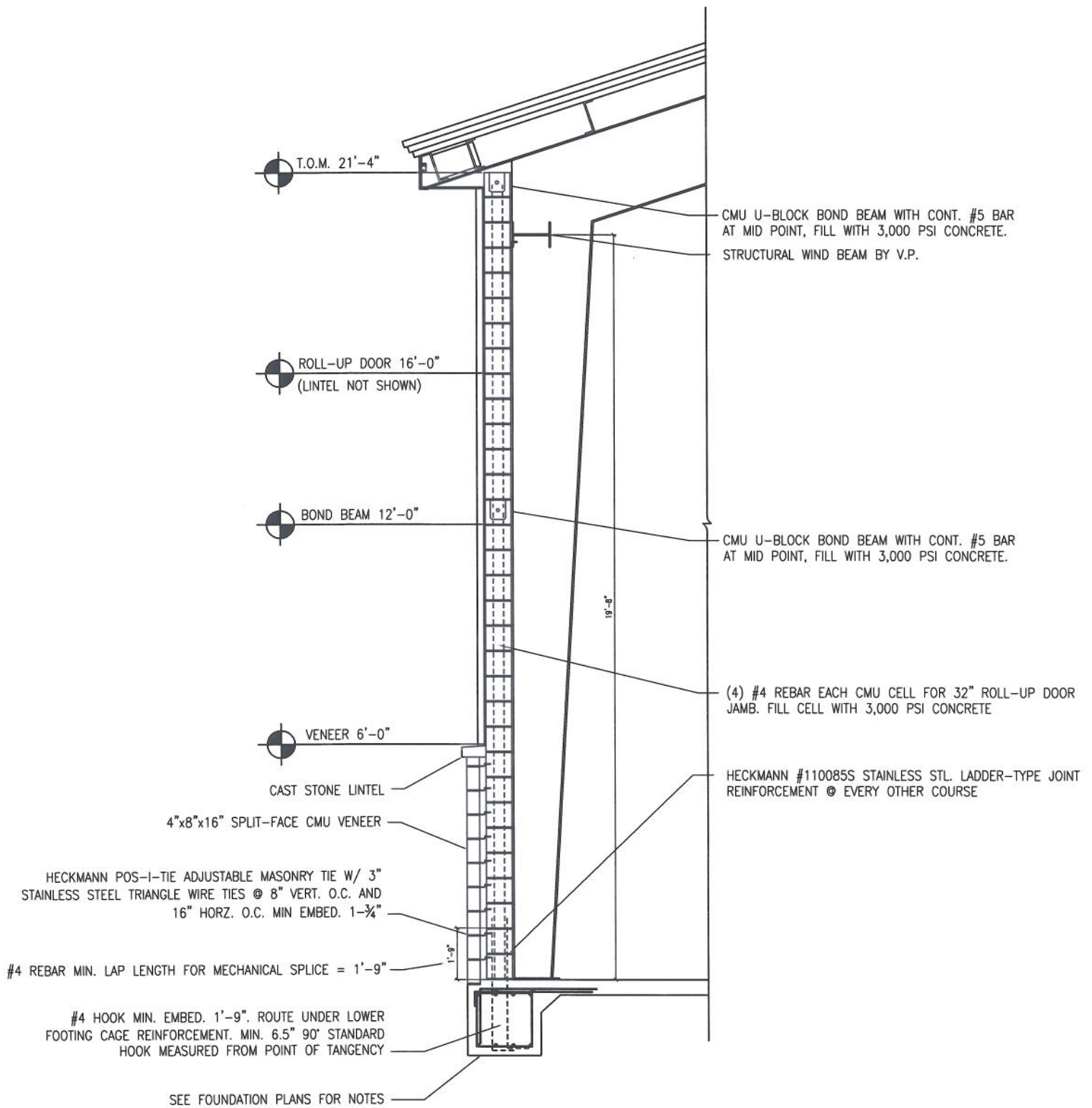
$$M_t > 10765 \text{ ft-lb.} \quad \therefore \text{OK}$$

ALLOWABLE CAPACITY IN COMPRESSION

$$M_m = 14342 \text{ ft-lb} \quad (\text{SEE ELEMENT B})$$

$$M_m > 10765 \text{ ft-lb} \quad \therefore \text{OK}$$

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



WALL #1 ELEMENT C DETAIL
N.T.S.

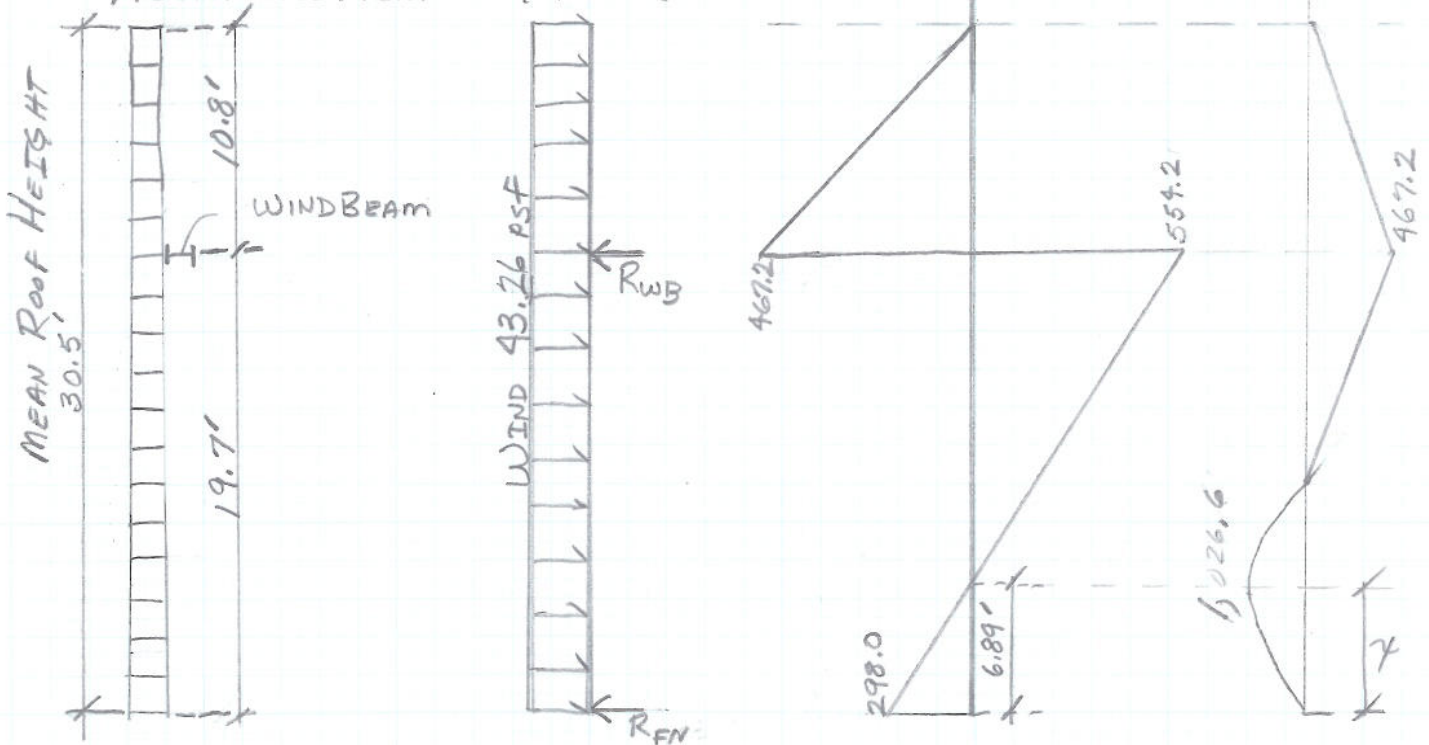
S TENNIS RIVERINE
DESIGN OF REINFORCED CMU NON-LOADBEARING WALL
FOR FLEXURE BLDG 2441 WALL # 2

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:

$$R_{WB} = \frac{(43.26 \text{ psf} \times (30.5)^2)}{2 \times 19.7} = 1,021.4 \text{ PIF}$$

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

$$x = \frac{298 \text{ PIF}}{43.26 \text{ psf}} = 6.89 \text{ FT}$$

BLDG 2441 WALL #2 Cont.

ESTIMATE REINFORCEMENT

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

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

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

DESIGN STRENGTH

USE 2.0 FT wide STRIP

DESIGN MOMENT = $1026.6 \text{ Ft}\cdot\text{lb}/\text{ft} = 2,053.2 \text{ Ft}\cdot\text{lb}/\text{ft}$

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

$$np = 0.0438$$

$$k^2 + 2pnk - 2pn = 0$$

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

ALLOWABLE CAPACITY IN TENSION

#5 @ 24" O.C.

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

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

ALLOWABLE CAPACITY IN COMPRESSION

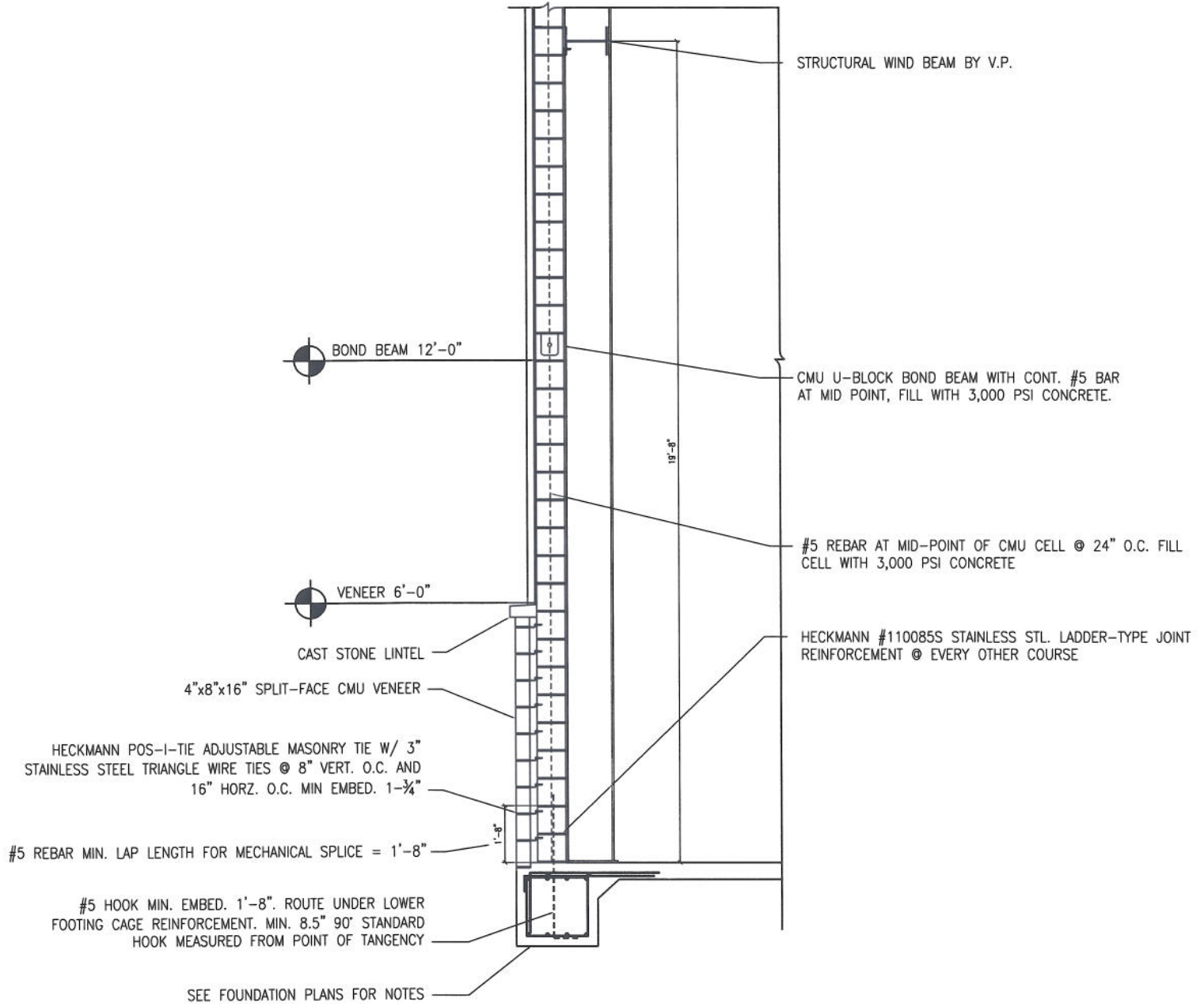
$$M_m = \left(\frac{bd^2}{2}\right) k j F_b =$$

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

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

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

T.O.M. HEIGHT VARIES AT ENDWALL
 MEAN ROOF HEIGHT = 30'-6"



WALL#2 TYPICAL DETAIL
 N.T.S.

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

MATERIALS:

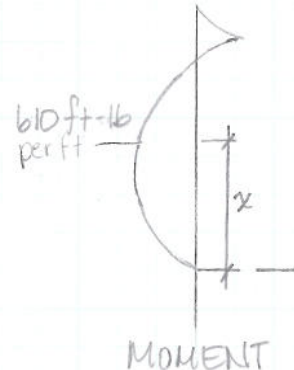
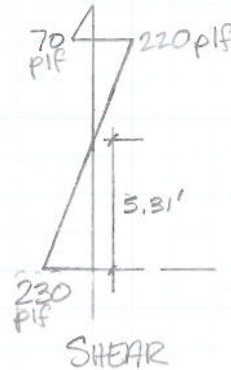
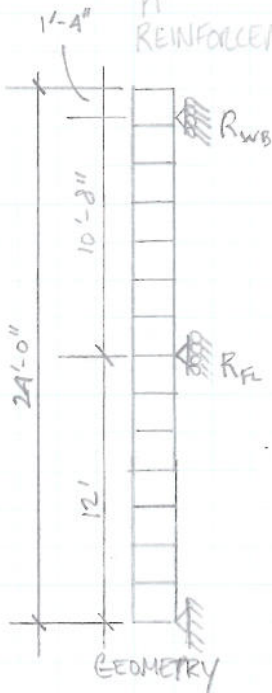
UNIT STRENGTH	2150 psi
MORTAR	TYPE 'N'
f'_m	1500 psi
E_m	2.25×10^6
n	12.89
REINFORCEMENT	GRADE 60

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:

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

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

$$R_F = 43.3 \left[\frac{\left(\frac{10.67}{2} - \frac{12^2}{2} \right)}{10.67'} \right] = 230 \text{ plf}$$

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

ESTIMATE REINFORCEMENT:

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

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

DESIGN STRENGTH

USING 24" WIDE STRIP

DESIGN MOMENT = $610 \text{ ft-lb} \cdot 2 = 1220 \text{ ft-lb}$.

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

$$pn = 0.03$$

$$K = 0.28$$

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

ALLOWABLE CAPACITY IN TENSIONTRY #4 @ 16" o.c. $A_s = 0.15$

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

$$1410 > 1220 \therefore \text{OK}$$

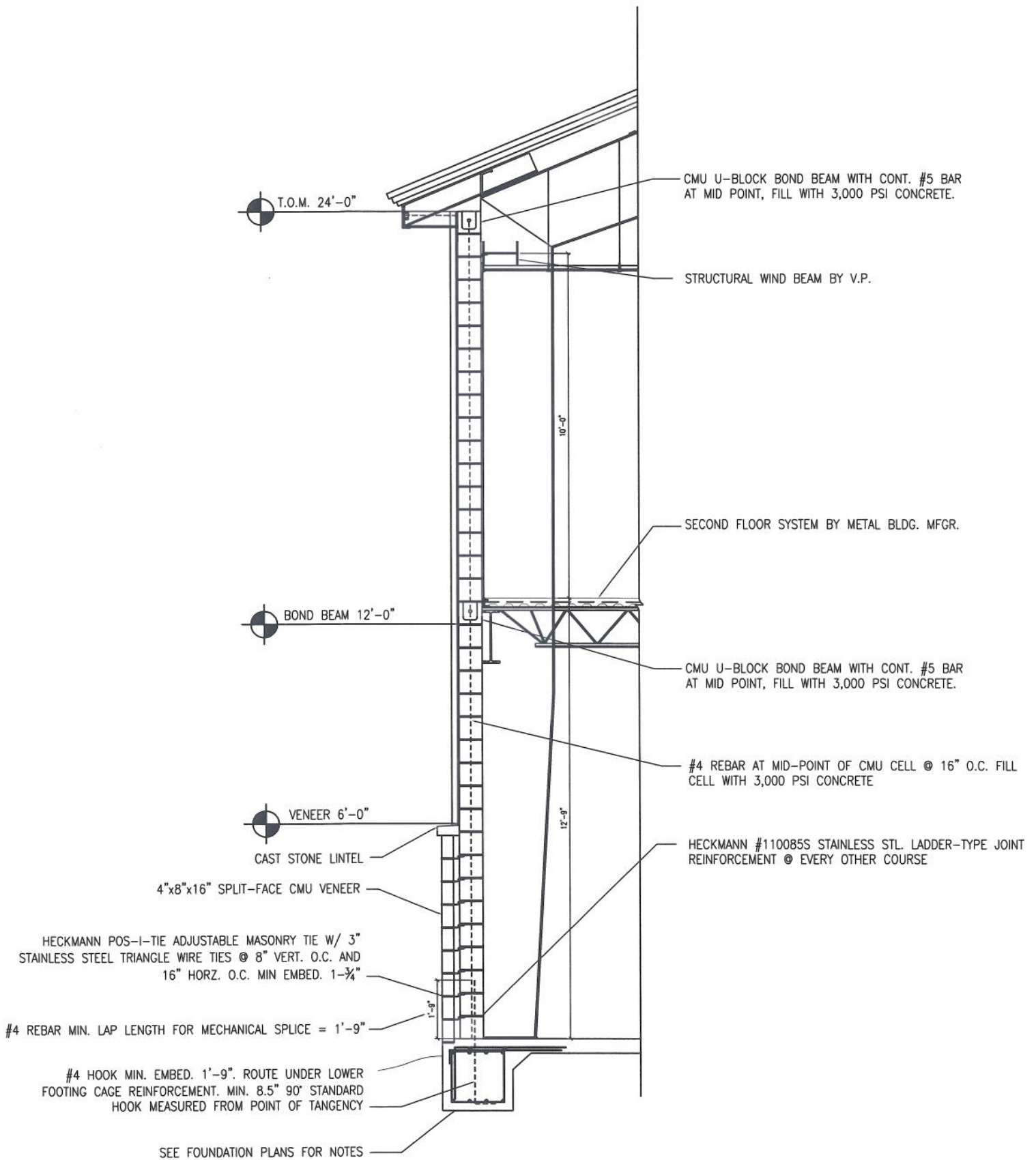
ALLOWABLE CAPACITY IN COMPRESSION

$$F_b = 665 \text{ psi}$$

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

$$2446 > 1220 \therefore \text{OK}$$

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



WALL#3 TYPICAL DETAIL
N.T.S.

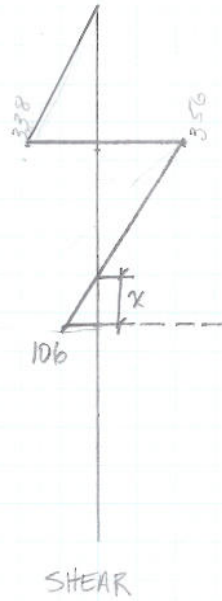
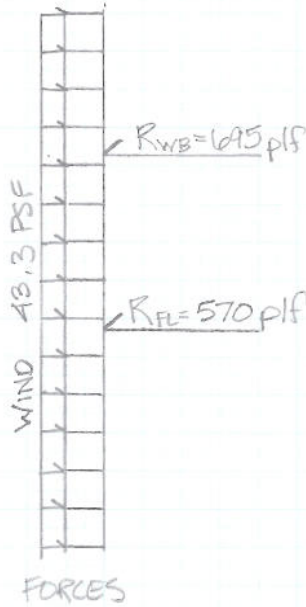
STENNIS RIVERINE DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE BLDG 2440 WALL #4

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



REACTIONS:

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

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

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

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

ESTIMATE REINFORCEMENT:

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

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

1095 Florida Ave.
Slidell, LA 70458P.O. Box 2830
Slidell, LA 70459985-649-5832
FAX 985-641-5950DESIGN STRENGTH:

USE 24" WIDE STRIP

$$\text{DESIGN MOMENT} = 133.3 \text{ ft-lb/ft} \times 2 = 270 \text{ ft-lb}$$

$$p = 0.005 \quad \rho_n = 0.06 \quad K = 0.28 \quad j = 0.98$$

ALLOWABLE CAPACITY IN TENSION

TRY #5 @ 16" O.C.

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

$$3070 > 270 \text{ ft-lb} \therefore \text{OK}$$

ALLOWABLE CAPACITY IN COMPRESSION

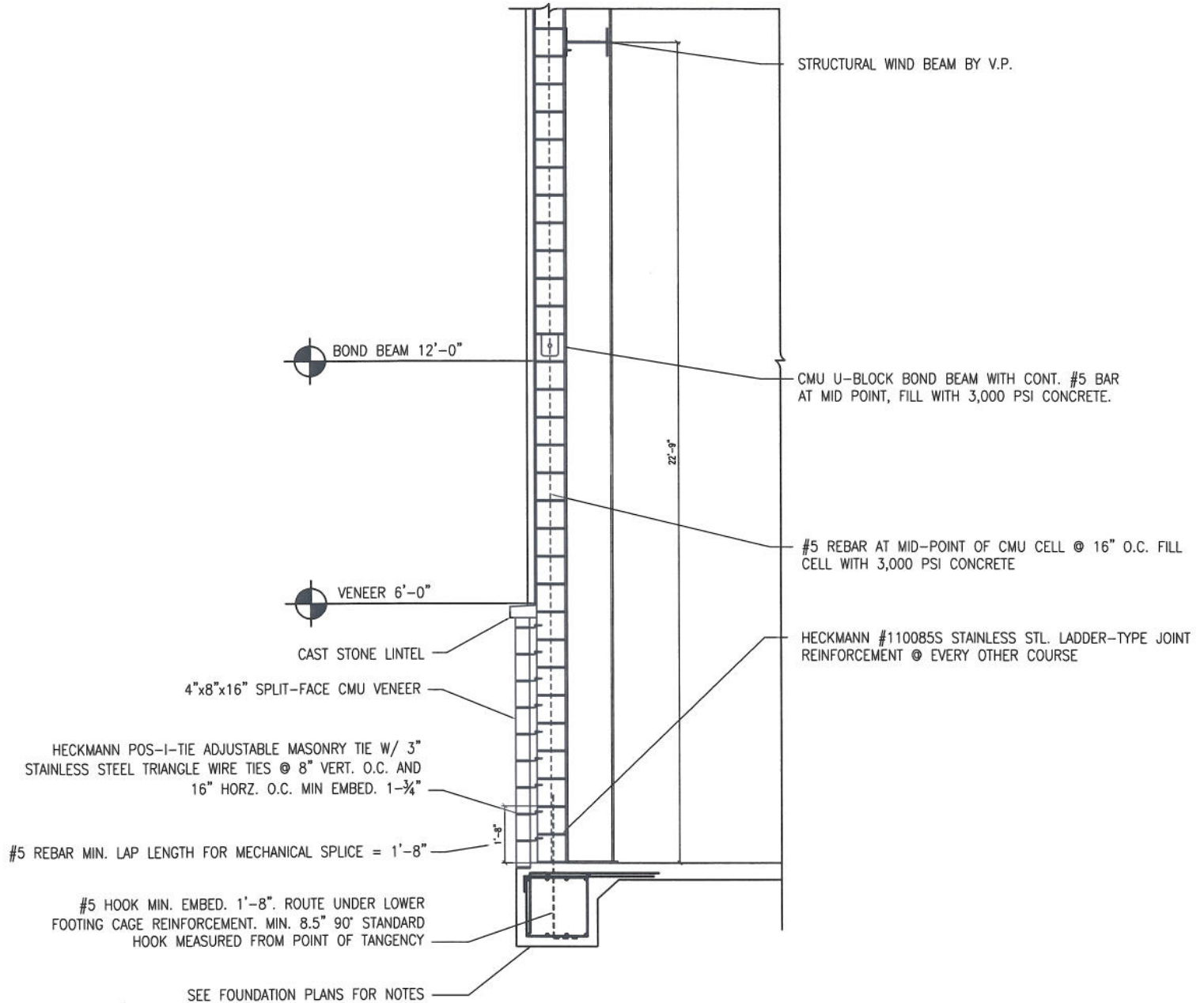
$$F_b = \frac{1}{3}(f'_m)1.33 = \frac{1}{3}(1500)1.33 = 665 \text{ psi}$$

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

$$2635 > 270 \therefore \text{OK}$$

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

T.O.M. HEIGHT VARIES AT ENDWALL
MEAN ROOF HEIGHT = 30'-6"



WALL#4 TYPICAL DETAIL
N.T.S.

TYPICAL ANCHORAGE AND SPLICE FOR #5 REBAR

USE #5 REBAR FOR HOOK, GRADE 60

 l_d = REQ'D DEVELOPMENT LENGTH

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

$$l_e = 13d_b = 8.125"$$

VENEER WALL CONNECTION

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

HORIZ. JOINT REINFORCEMENT

USE HELKMANN #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 60

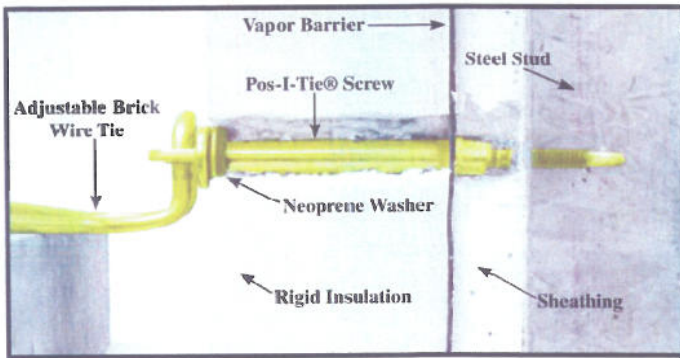
$$l_d = 20.1"$$

$$l_e = 6.5"$$

ARCHITECTURAL SPECIFICATION INFORMATION

THE ORIGINAL Pos-I-Tie®

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



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



Single Wire Tie

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

Special Lengths available.

CMU ANCHOR TO WIND BEAM



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

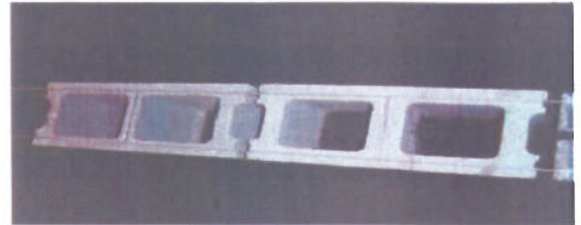
Special sizes and lengths are available.

- 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/ ft²)(0.46kg/m²)

Mill Galvanized:

Wire: ASTM A 641 (0.1 oz/ ft².)

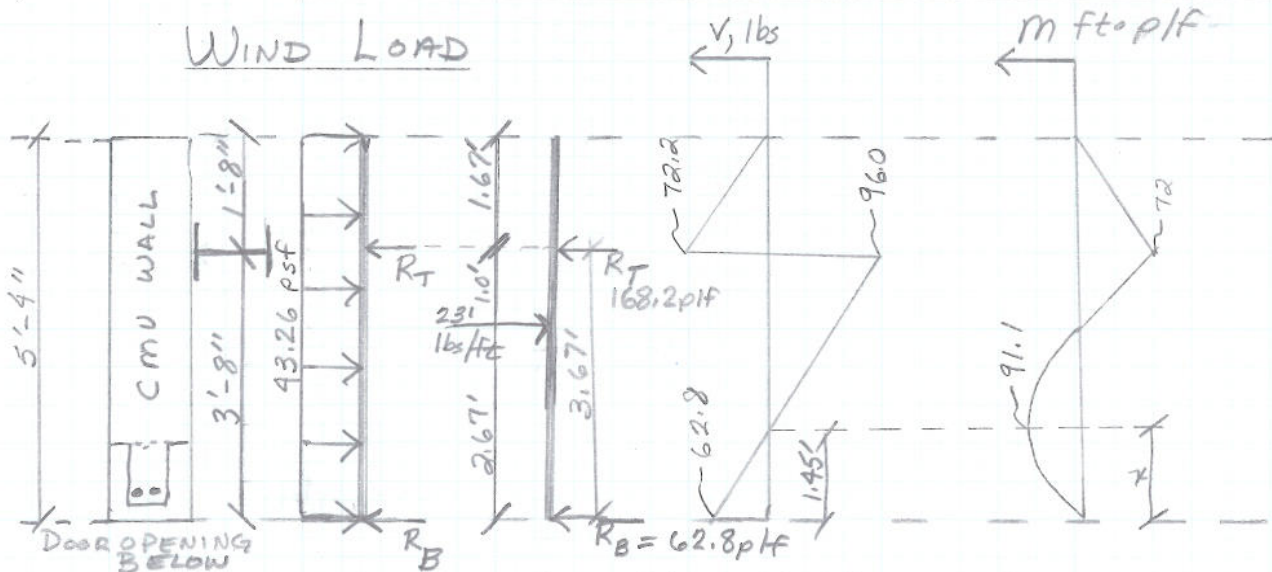
Conforms to requirements of ASCE / ACI 530 / TMS402 Building Code requirements for masonry structures.

Approvals:

Comments:

BLDG 2441 12 Ft Door Lintel Calculation

WIND LOAD



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

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

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

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

USE 8" cmu

$$d = \frac{7.63}{2} = 3.8''$$

$$A_s = \frac{M}{F_s j d}$$

Assume $j = 0.9$ for initial estimate.

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

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

USE #4 @ 24" o.c.

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

(2)

BLDG 2441 12 FT Door Lintel Calc.
WIND LOAD (CONT)

Try #4 @ 24" O.C.

CHECK STRENGTH

USE 2.0' WIDE STRIP TO TEST

$$\therefore \text{DESIGN MOMENT} = 91.1 \text{ ft}\cdot\text{plf} \times 2 = 182.2 \text{ ft}\cdot\text{plf}$$

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

$$np = 16.1 \times 0.002 = 0.0322$$

$$k^2 + 2npk - 2np = 0 \Rightarrow k^2 = 0.064k - 0.064 = 0$$

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

ALLOWABLE TENSION FLEXURAL CAPACITY

$$M_T = A_s j d F_s = 0.20 \text{ in}^2 \times 0.927 \times 3.8 \text{ in} \times 24000 \text{ psi}$$

$$\Rightarrow M_T = 1874 \text{ ft}\cdot\text{plf} > 182.2 \text{ ft}\cdot\text{plf} \times \frac{1.33}{12 \text{ in/ft}}$$

ALLOWABLE COMPRESSION FLEXURAL CAPACITY

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

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

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

$$\Rightarrow M_c = 1958 \text{ ft}\cdot\text{plf} > 182.2 \text{ ft}\cdot\text{plf}$$

Use #4 @ 24" O.C.

BLDG 2441 12 FT DOOR LINTEL CALC (3)

WEIGHT LOAD

CALCULATE LINTEL TO SUPPORT WEIGHT

WEIGHTS:

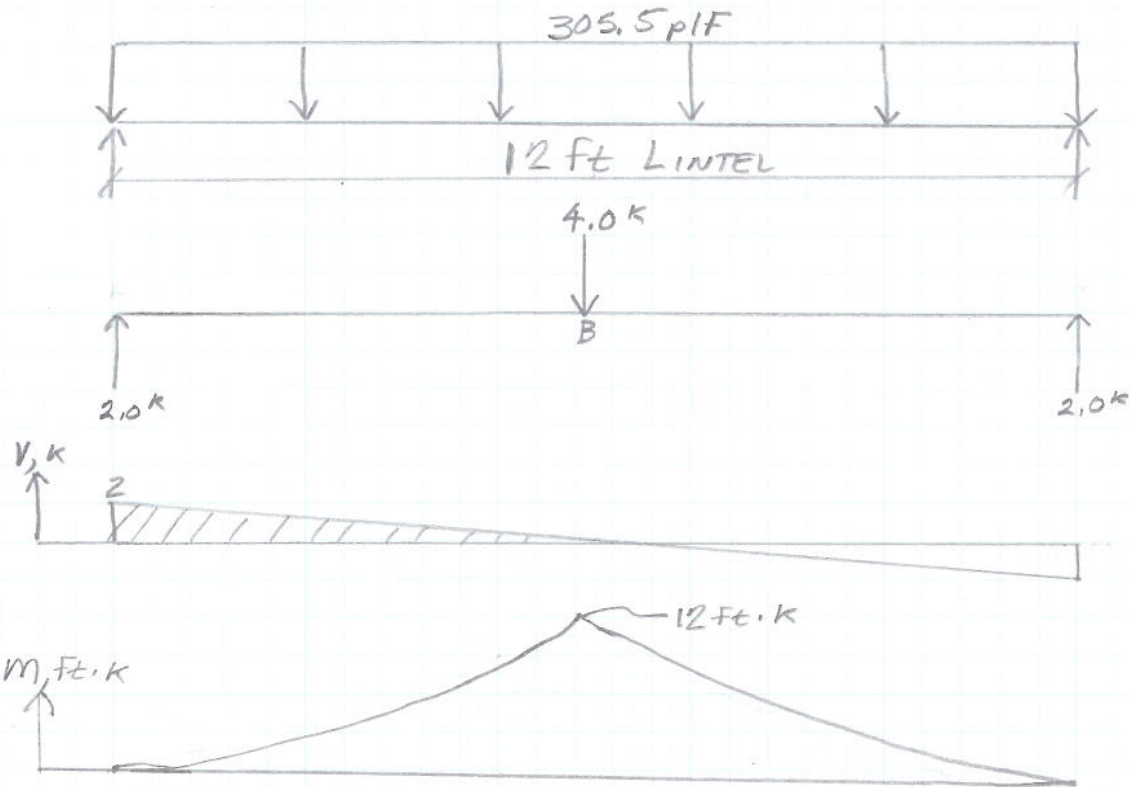
- HOLLOW CORE CMU: 55 pcf
- MORTAR, MASONRY: 116 pcf
- CONCRETE: 150 pcf
- STEEL: 489 pcf

[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 p/f



Bldg 2441 12FT DOOR LINTEL CALC

WEIGHT LOAD (CONT)

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

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

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

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

ASSUME $b = 7.63 \text{ in.}$

$E_s = 29 \times 10^6 \text{ psi}$

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:

$$F_s = 24,000 \text{ psi}$$

REQUIRED: DETERMINE MOMENT CAPACITY OF SECTION FOR BALANCED CONDITION

$$k_b = \frac{n}{n + F_s/F_b} = \frac{12.9}{12.9 + (24 \text{ ksi} / 0.8 \text{ ksi})} = 0.301$$

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

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

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

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 in²)

REQUIRED: DETERMINE COMPRESSION STEEL AREA
 $f'_s = n F_b = 12.9 (833.3 \text{ psi}) = 10,749 \text{ psi} < F_s = 24,000 \text{ psi}$

$$A'_s = \frac{m}{f'_s (d) \left(\frac{n-1}{n}\right)} = \frac{145.5 \text{ in-kips}}{(10,749 \text{ psi})(13 \text{ in}) \left(\frac{12.9-1}{12.9}\right)} = 0.00113$$

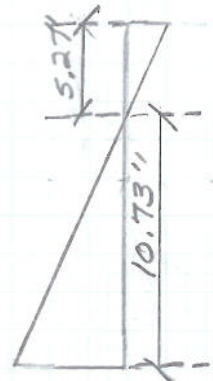
USE 1 #4 BAR (A'_s PROVIDED = 0.196 in²)

REVISE K AND CHECK ADEQUACY OF SECTION:

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

$$np = 12.9 \times 0.008912 = 0.1150$$

$$p' = \frac{A'_s}{bd} = \frac{0.196 \text{ in}^2}{(7.63 \text{ in})(13 \text{ in})} = 0.00198$$



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

$$(np + (n-1)p')^2 = 0.1150 + (12.9-1)0.00198 = 0.01920$$

$$2(np + (n-1)p') = 2(0.1150 + (12.9-1)0.00198) = 0.2771$$

$$np + (n-1)p' = 0.1150 + (12.9-1)0.00198 = 0.1386$$

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

$$kd = 5.27 \text{ inches}$$

6

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

Assume MASONRY COMPRESSION STRESS = 883.3 psi
AND NEGLECTING HOLE EFFECT

$$f_s = (12.9)(883 \text{ psi}) \left(\frac{10.73''}{5.27} \right) = 21,887 \text{ psi} < F_s$$

MASONRY CONTROLS

$$M = \frac{883.3 \text{ psi}}{2} (7.63 \text{ in})(5.27 \text{ in}) \left[13 \text{ in} - \frac{5.27}{3} \right] = 188,3365 \text{ in}\cdot\text{lb}$$

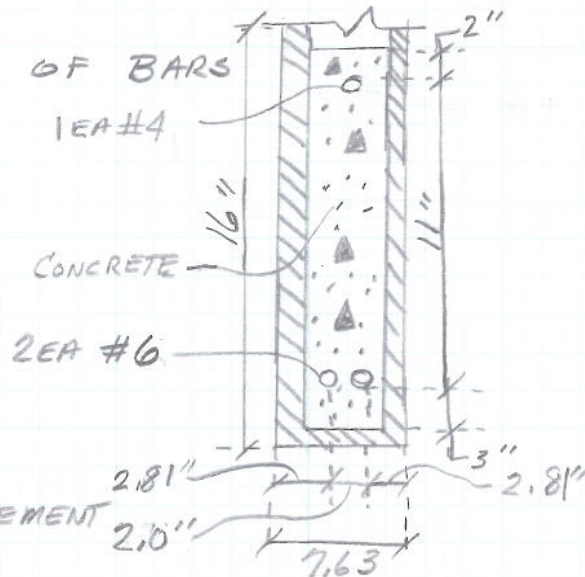
$$= 15.7 \text{ Ft}\cdot\text{kips} > 12 \text{ Ft}\cdot\text{kips} \therefore \text{OK}$$

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 MINIMUM CLEARANCE COVER OVER REINFORCEMENT NOT LESS THAN 2".



CHECK DEFLECTION:

$$I_{cr} = b k^3 \frac{d^3}{3} + n A_s (d - kd)^2 + (n-1) A'_s (kd - d')^2$$

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

$$+ (12.9 - 1)(0.196 \text{ in}^2)(5.27 \text{ in} - 13 \text{ in})^2$$

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

SHORT TERM DEFLECTION:

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

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

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

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

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

SHORT TERM DEFLECTION

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

$$\Delta = \frac{5 (20.3 \text{ in-k})(12.3 \text{ ft} \cdot 12 \text{ in/ft})^2}{48 (2.6 \times 10^3 \text{ ksi})(2604 \text{ in}^4)} + \frac{5 (535 \text{ in-kips} - 20.3 \text{ in-k})(12.3 \text{ ft} \times 12 \text{ in/ft})^2}{48 (2.6 \times 10^3 \text{ ksi})(1,193.8 \text{ in}^4)}$$

$$\Delta = 0.0068043 \text{ in} + 0.0376567 \text{ in}$$

$$\Delta = 0.04446$$

LONG TERM DEFLECTION

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

$$\text{TOTAL DEFLECTION} = 0.04446 \text{ in} + 1.8198(0.04446) = 0.1253$$

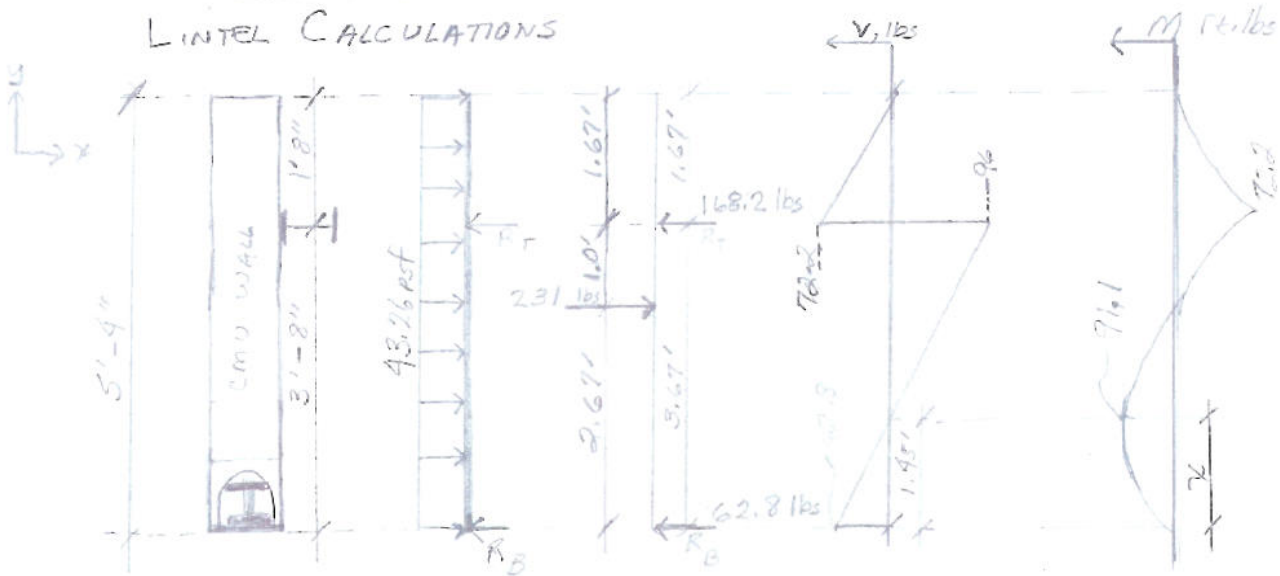
$$\Delta_{\text{ALLOWED}} = \frac{J}{600} \leq 0.3$$

$$= \frac{(12.33 \text{ ft}) 12 \text{ in/ft}}{600}$$

$$= 0.2466 \text{ in} > 0.1253 \text{ in} \therefore \text{OK}$$

BUILDING 2441 LINTEL & WIND BEAM CALCULATIONS

LINTEL CALCULATIONS



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

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

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

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

Use 8" CMU

$$d = \frac{7.63''}{2} = 3.8''$$

$$A_s = \frac{M}{F_s j d}$$

Assume $j = 0.9$ for initial estimate

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

$$A_{s \text{ required}} = \frac{91.1 \text{ ft-lbs} \times 12 \frac{\text{in}}{\text{ft}}}{24,000 \text{ psi} \times 1.33 \times 0.9 \times 3.8''} = 0.107 \text{ in}^2$$

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 \therefore Design moment = $91.1 \text{ ft-lbs} \times 2 = 182.2 \text{ ft-lbs}$

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

$$np = 0.0322$$

$$k^2 + 0.064k - 0.064 = 0$$

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

DAMMON ENGINEERING, INC.

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#2

1095 Florida Ave.
Slidell, LA 70458

P.O. Box 2830
Slidell, LA 70459

985-649-5832

FAX 985-641-5950

Brig 2441

26 ft Door Lintel Weight (cont.)

Allowable Tension Flexural capacity

$$M_T = A_s j d F_s = 0. \text{ in}^2 \times 0.927 \times 3.8 \text{ in} \times 24,000 \text{ psi} \times \frac{1.33}{12 \text{ in/ft}}$$
$$\Rightarrow M_T = 1874 \text{ ft-lbs} > 182.2 \text{ ft-lbs} \therefore \text{OK}$$

Allowable Compression Flexural capacity

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

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

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

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

USE #4 24" O.C.

Calculate beam to support weight

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

1 ea. solid filled CMU w/ 2 bars = 1806.7 lbs
6 courses hollow CMU = 5,720.0 lbs
mortar = 1,508.0 lbs
vertical #4 @ 24oc = 43.6 lbs
vertical concrete = 2,520.0 lbs
Total weight = 11,598.3 lbs
weight/ft = 446.1 pft

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#3

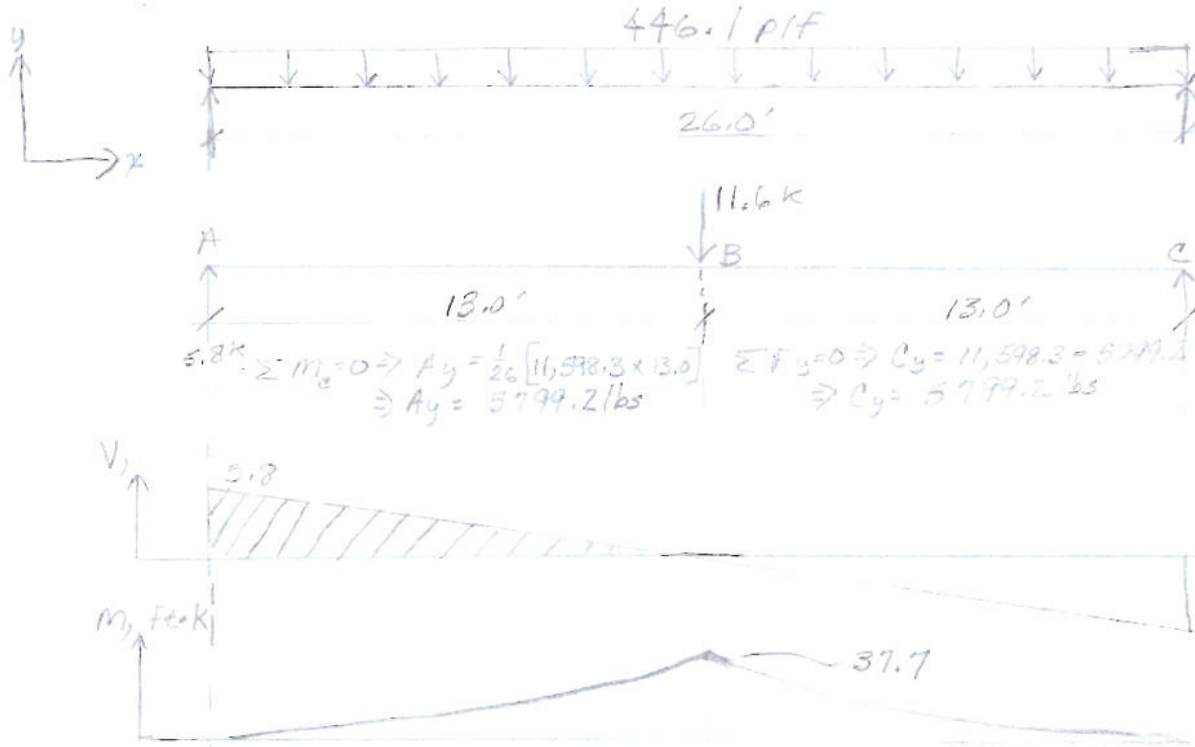
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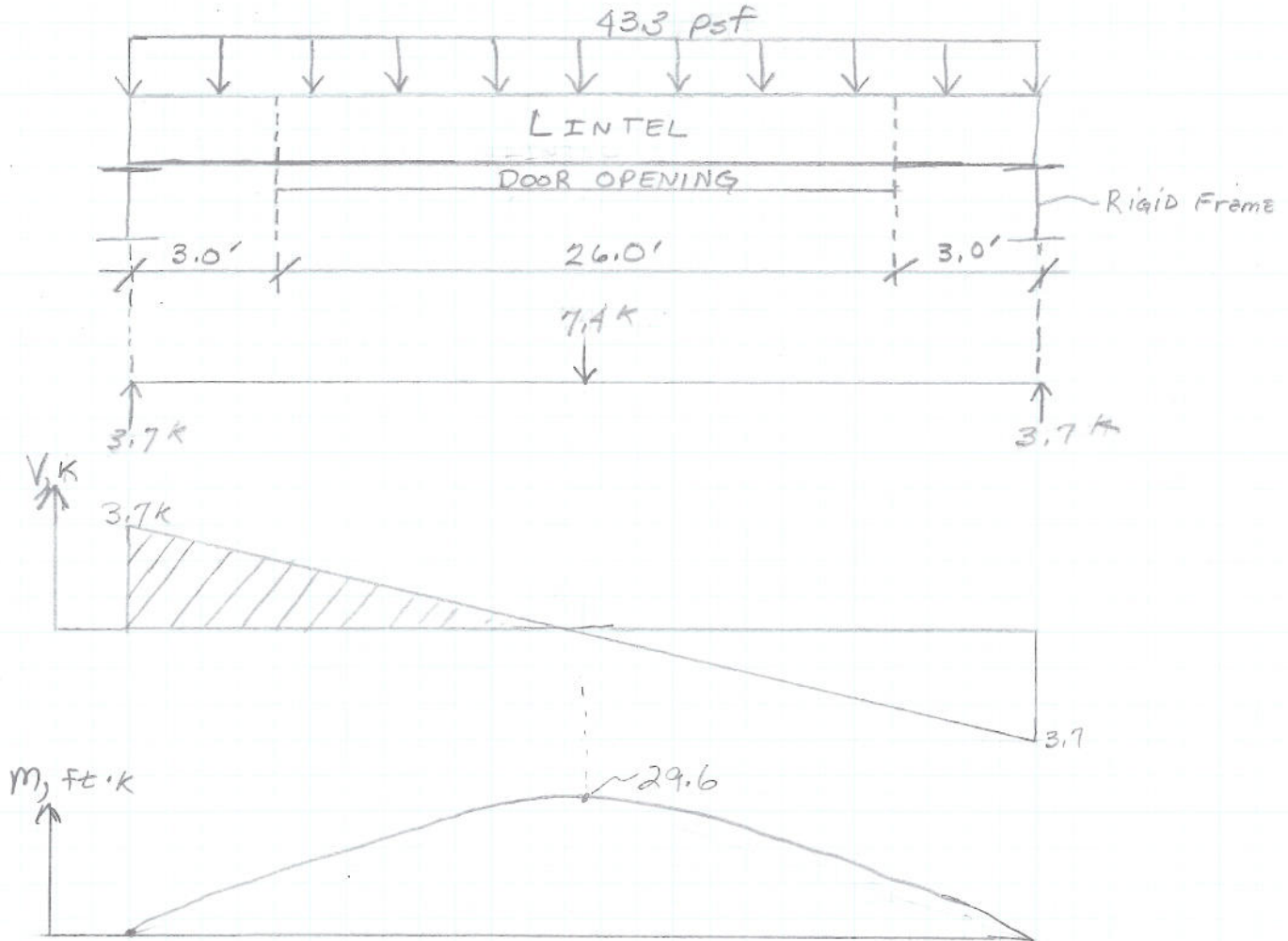
BLDG 2441

26 ft Door Lintel Weight Calc (cont.)



Section modulus $S = \frac{M \times 12^3 \text{ ft}^3}{24,000 \text{ psi}} = \frac{37.7 \text{ K} \times 12^3 \text{ in}^3/\text{ft}^3}{24 \text{ K} \cdot \text{lb}/\text{in}^2} = 18.7 \text{ in}^3 \text{ x-x}$

BLDG 2441 WIND BEAM CALCULATIONS



BEAM SELECTION

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

$$S_{xz} = 18.9 \text{ in}^3$$

W 14 x 22	Depth 13.7	S_{xx} 29.0	I_{xx} 199	S_{yy} 2.80
(2) 3/4" x 7" PLATE	.75			12.25
	<u>14.45</u>			

BEAM DEFLECTION

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

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

$$\text{ALLOWED } \Delta = \frac{1}{360} \times L = \frac{1}{360} \times 312' = 0.8667''$$

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

STENOIS RIVERLINE

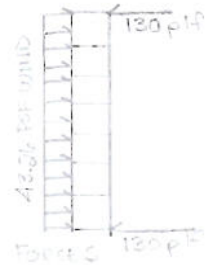
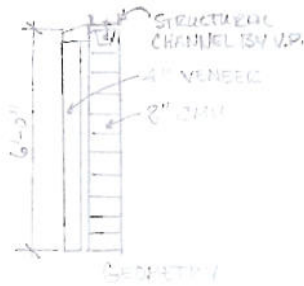
DESIGN OF REINFORCED CMU (130) LOADBEARING WALL FOR FLEXURE
BLDG 2A42 ALL EXTERIOR MASONRY WALLS

MATERIALS:

UNIT STRENGTH 2,150 psi
MORTAR TYPE M
 f_m 1,500 psi
 E_m 1.9×10^6 psi
 n (modular ratio) 15.2
REINFORCEMENT Grade 60

LOADING:

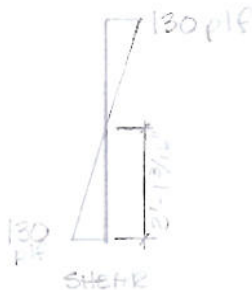
WIND 130 MPH = 43.3 psf
NEGLECT SELF WEIGHT



REACTIONS:

$$R_r = \text{Reaction} = \frac{(43.3 \text{ psf} \cdot 6 \text{ ft}^2)}{6 \text{ ft}} = 129.9 \text{ plf}$$

$$R_{\text{reaction @ base}} = \frac{(43.3 \text{ psf} \cdot (6 \text{ ft})^2)}{2} = 159.9 \text{ plf}$$



$$x = \frac{130 \text{ plf} \cdot 6 \text{ ft}}{43.3 \text{ psf}} = 3.1 = 3' - 1 \frac{3}{8}"$$

$$M = 130 \text{ plf} \cdot \left(\frac{3.1 \text{ ft}}{2}\right) = 201.5 \text{ ft-k/ft}$$

ESTIMATE REINFORCEMENTS:

TRY 8" CMU, ASSUME STEEL @ 1/4" DEPTH

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

$$A_s = \frac{M}{F_s \cdot \phi \cdot d} = \frac{201.5 \text{ ft-k/ft} \cdot 12 \text{ in/ft}}{24000 \text{ psi} \cdot 1 \cdot 1.13 \cdot 3.8 \text{ in}} = 0.02 \text{ in}^2/\text{ft}$$

TRY #4 @ 30" o.c.

$$A_{s \text{ provided}} = 0.20 \cdot \frac{12}{30} = 0.075 \text{ (REDUCE)}$$

TRY #4 @ 40" o.c.

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

TRY #4 @ 48" o.c.

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

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CHECK STRENGTH: (USING 24" WIDE STRIP)

$$\text{DESIGN MOMENT} = 201.5 \cdot 2' = 403 \text{ ft}\cdot\text{lb}/\text{ft}$$

$$p = \frac{A_s}{bd} = \frac{0.20 \text{ in}^2/\text{ft}}{24 \text{ in} \cdot 2.8 \text{ in}} = 0.002 \quad np = 15.26 \cdot 0.002 = 0.03$$

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

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

ALLOWABLE TENSION FLEXURAL CAPACITY:

$$M_t = A_s \cdot j \cdot d \cdot F_s = (0.05 \text{ ft}) \cdot 0.928 \cdot 3.8 \cdot 31000 \text{ psi} \cdot \frac{1.33}{12 \text{ in}/\text{ft}} = 469 \text{ ft}\cdot\text{lb}/\text{ft}$$

$$469 \text{ ft}\cdot\text{lb}/\text{ft} > 201.5 \text{ ft}\cdot\text{lb}/\text{ft} \quad \text{OK}$$

ALLOWABLE COMPRESSION FLEXURAL CAPACITY:

$$F_b = \frac{1}{3} f'_m = \frac{1}{3} \cdot 2000 \text{ psi} = 665 \text{ psi}$$

$$M_m = \frac{b \cdot d^2}{6} \cdot K \cdot j \cdot F_c = \frac{24 \text{ in} \cdot (3.8 \text{ in})^2}{6} \cdot 0.215 \cdot 0.928 \cdot \frac{665 \text{ psi}}{12 \text{ in}/\text{ft}} = 1916 \text{ ft}\cdot\text{lb}/\text{ft}$$

$$1916 \text{ ft}\cdot\text{lb}/\text{ft} > 201.5 \text{ ft}\cdot\text{lb}/\text{ft} \quad \text{OK}$$

USE #4 REBAR @ 12" o.c.

ANCHORAGEUSE #4 POWER, GRADE 60 l_d = REQUIRED DEVELOPMENT LENGTH

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

$$l_e = 13 d_b = 6.5"$$

SPLICESTHE MINIMUM LENGTH OF LAP FOR SPLICES SHALL BE EQUAL TO $l_d = 20.1"$ VENEER WALL CONNECTION

USE "POC-1-TIE" TAPCON SCREW FOR LATH ANCHOR. @ 8" VERTICAL O.C. AND 16" HORIZ. ON CENTER. MIN. EMBEDMENT LENGTH 1-3/4".

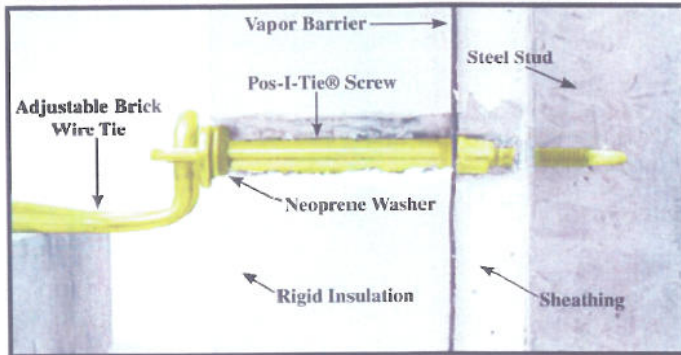
USE 3/16" x 3" STAINLESS STEEL TRIANGLE WIRE TIES @ EA CONNECTION
SEE ATTACHED PRODUCT SHEET.HORIZONTAL JOINT REINFORCEMENT

USE HECKMANN #1100RS STAINLESS STEEL LADDER-TYPE MASONRY WALL REINFORCEMENT @ EVERY OTHER COURSE, SEE ATTACHED PRODUCT SHEET.

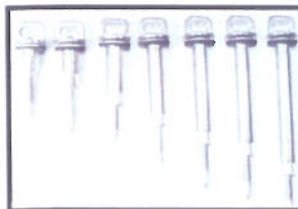
ARCHITECTURAL SPECIFICATION INFORMATION

THE ORIGINAL POS-I-TIE®

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



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)

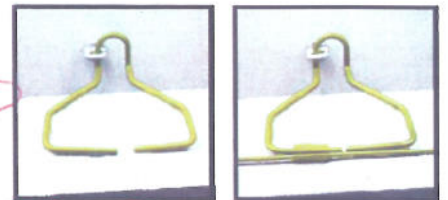
NO. 75 POS-I-TIE® ADVANTAGES

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.)



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

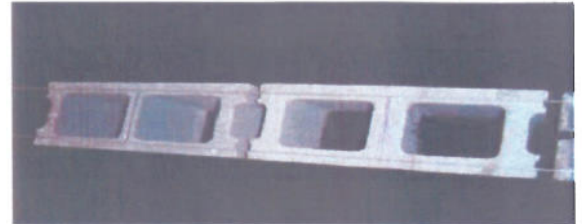
Special sizes and lengths are available.

- 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/ ft²).(0.46kg/m²)

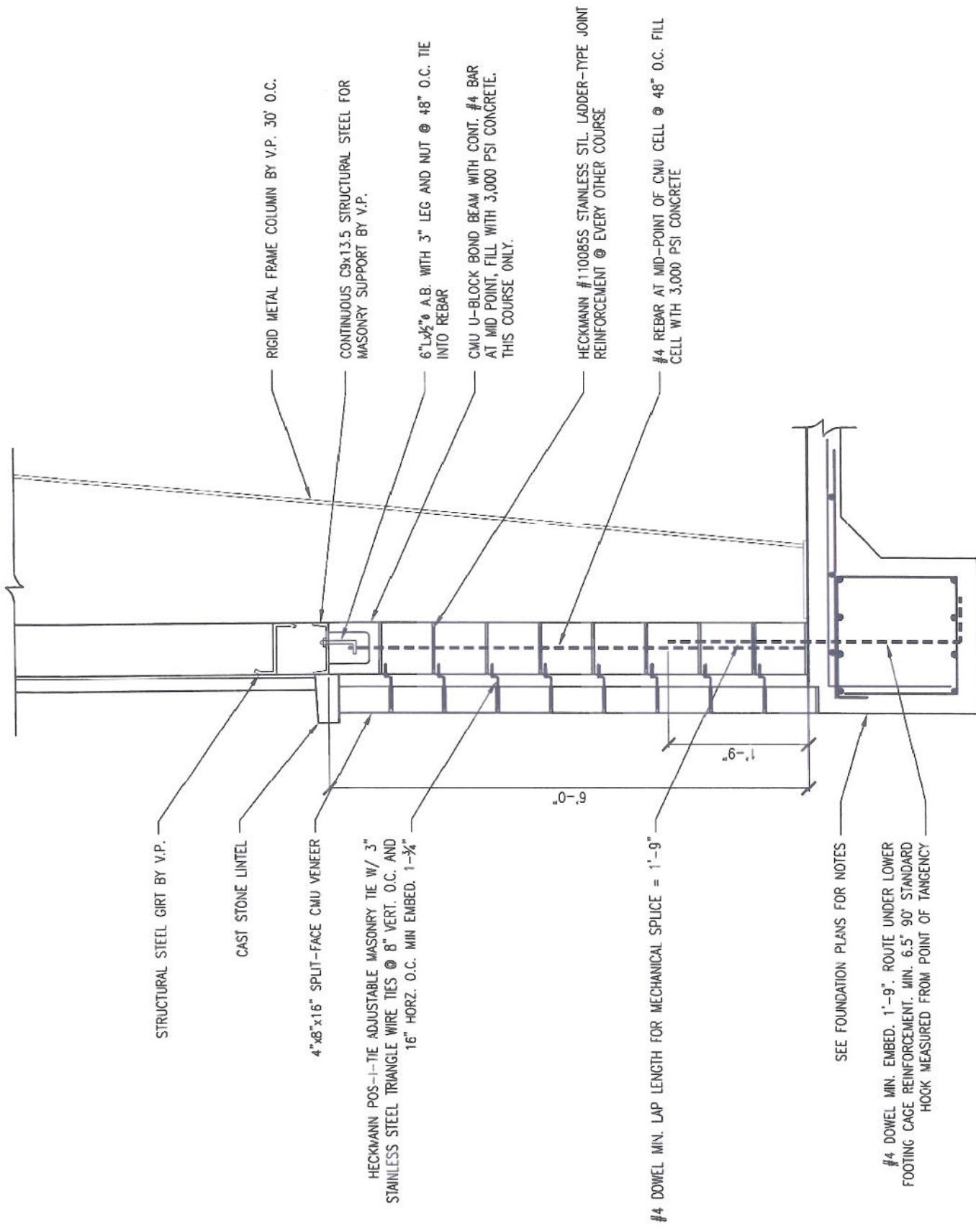
Mill Galvanized:

Wire: ASTM A 641 (0.1 oz/ ft².)

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

Approvals:

Comments:



STRUCTURAL STEEL GIRT BY V.P.

CAST STONE LINTEL

4"x8"x16" SPLIT-FACE CMU VENEER

HECKMANN POS-1-TIE ADJUSTABLE MASONRY TIE W/ 3" STAINLESS STEEL TRIANGLE WIRE TIES @ 8" VERT. O.C. AND 16" HORZ. O.C. MIN EMBED. 1-3/4"

1'-9"

#4 DOWEL MIN. LAP LENGTH FOR MECHANICAL SPLICE = 1'-9"

SEE FOUNDATION PLANS FOR NOTES

#4 DOWEL MIN. EMBED. 1'-9". ROUTE UNDER LOWER FOOTING CAGE REINFORCEMENT. MIN. 6.5' 90° STANDARD HOOK MEASURED FROM POINT OF TANGENCY

RIGID METAL FRAME COLUMN BY V.P. 30' O.C.

CONTINUOUS C9x13.5 STRUCTURAL STEEL FOR MASONRY SUPPORT BY V.P.

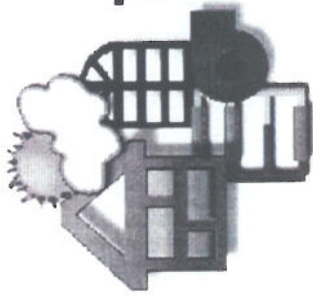
6"x2" A.B. WITH 3" LEG AND NUT @ 48" O.C. TIE INTO REBAR

CMU U-BLOCK BOND BEAM WITH CONT. #4 BAR AT MID POINT. FILL WITH 3,000 PSI CONCRETE. THIS COURSE ONLY.

HECKMANN #110085S STAINLESS STL. LADDER-TYPE JOINT REINFORCEMENT @ EVERY OTHER COURSE

#4 REBAR AT MID-POINT OF CMU CELL @ 48" O.C. FILL CELL WITH 3,000 PSI CONCRETE

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



TRACE® Load 700 version 3.0

By Professional Engineering Services



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

Time Zone: 6

Elevation: 26 ft

Barometric Pressure: 29.9 in. Hg

Air Density: 0.0760 lb/cu ft

Air Specific Heat: 0.2444 Btu/lb·°F

Density-Specific Heat Product: 1.1144 Btu/h·cfm·°F

Latent Heat Factor: 4,905.3 Btu·min/h·cu ft

Enthalpy Factor: 4.5588 lb·min/hr·cu ft

Summer Design Dry Bulb: 92 °F

Summer Design Wet Bulb: 82 °F

Winter Design Dry Bulb: 31 °F

Summer Clearness Number: 0.90

Winter Clearness Number: 0.90

Summer Ground Reflectance: 0.20

Winter Ground Reflectance: 0.20

Design Simulation Period: January through December

Cooling Load Methodology: TETD-TA1

Heating Load Methodology: UATD

Project Name: SBT 22 Riverine Operations and Training Facility

Dataset Name: C:\CDS\LOAD32\PROJECTS\Stennis Riverine FINAL.LDS

TRACE® Load 700 v3.0 calculated at 11:15 AM on 04/15/2009

System Checksums

By Professional Engineering Services

Stennis 1st FI Cages

Single Zone

	COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				
	Space Sens. + Lat.	Plenum Sensible	Plenum Latent	Net Total	Space Sensible	Space Latent	Net Total	Space Sensible	Space Latent	Net Total	Coil Sens	Coil Latent	Net Total
	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h	Btu/h
Envelope Loads													
Skyllite Solr	0	0	0	0	0	0	0	0	0	0	0	0	0
Skyllite Cond	0	0	0	0	0	0	0	0	0	0	0	0	0
Roof Cond	0	0	0	0	0	0	0	0	0	0	0	0	0
Glass Solar	0	0	0	0	0	0	0	0	0	0	0	0	0
Glass Cond	0	0	0	0	0	0	0	0	0	0	0	0	0
Wall Cond	3,587	973	0	4,560	4,698	0	4,698	0	0	0	0	0	0
Partition	1,131	0	0	1,131	816	0	816	0	0	0	0	0	0
Exposed Floor	0	0	0	0	0	0	0	0	0	0	0	0	0
Infiltration	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total ==>	4,718	973	0	5,691	5,515	0	5,515	0	0	0	0	0	0
Internal Loads													
Lights	28,505	0	0	28,505	28,505	0	28,505	0	0	0	0	0	0
People	2,500	0	0	2,500	1,250	0	1,250	0	0	0	0	0	0
Misc	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total ==>	31,005	0	0	31,005	29,755	0	29,755	0	0	0	0	0	0
Ceiling Load	482	-482	0	0	632	0	632	-878	0	0	0	0	0
Outside Air	0	0	0	68,469	64,83	0	64,83	0	0	0	-37,108	0	0
Sup. Fan Heat	0	0	0	716	0.68	0	0.68	0	0	0	0	0	0
Ret. Fan Heat	0	0	0	0	0	0	0	0	0	0	0	0	0
Duct Heat PkUp	0	0	0	0	0	0	0	0	0	0	0	0	0
OV/UNDR Sizing	0	-274	0	-274	-0.26	0	-0.26	-29,335	0	0	-29,335	0	0
Exhaust Heat	0	0	0	0	0	0	0	499	0	0	499	0	0
Terminal Bypass	0	0	0	0	0	0	0	0	0	0	0	0	0
Grand Total ==>	36,206	217	0	105,608	100.00	0	35,902	-39,492	-76,994	100.00	-76,994	100.00	100.00

COOLING COIL SELECTION		HEATING COIL SELECTION	
Total Capacity	Sens Cap.	Coil Airflr	Coil Airflr
ton	MBh	cfm	cfm
8.8	105.6	1,611	1,611
0.0	0.0	0	0
0.0	0.0	0	0
0.0	0.0	0	0
Total	8.8	1,611	1,611

AREAS		GLASS	
Gross Total	Net Total	ft²	(%)
5,568	252	0	0
0	0	0	0
0	0	0	0
2,754	0	0	0

AIRFLOWS		TEMPERATURES	
Vent	Supply	Clq	Htg
cfm	cfm	°F	°F
900	1,611	55.0	90.0
0	0	75.3	67.5
1,611	1,611	75.3	67.5
0	0	84.1	47.1
1,611	1,611	0.0	0.0
900	900	0.1	0.0
0	0	0.3	0.0

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

System Checksums

By Professional Engineering Services

Variable Volume Reheat (30% Min Flow Default)

Stennis 2nd Floor VAV

	COOLING COIL PEAK				CLG SPACE PEAK				HEATING COIL PEAK				
	Space Sensible Btu/h	Plenum Sensible Btu/h	Plenum Latent Btu/h	Mo/Hr	Total Btu/h	Space Sensible Btu/h	Space Percent (%)	Space Sens Btu/h	Mo/Hr	Total Btu/h	Coil Peak Tot Sens Btu/h	Coil Peak Percent (%)	Mo/Hr
Peaked at Time:	8 / 16				8 / 16				13 / 1				
Outside Air:	OADB/WB/HR: 92 / 81 / 145				OADB: 92				OADB: 31				
Envelope Loads	0	0	0	0	0	0	0	0	0	0	0	0	0
Skyliite Solr	0	0	0	0	0	0	0	0	0	0	0	0	0
Skyliite Cond	0	0	0	0	0	0	0	0	0	0	0	0	0
Roof Cond	0	43.661	0	43.661	15.64	0.00	0	0	18.792	20.63	0.00	0	0
Glass Solar	30.786	0	0	30.786	11.03	24.43	0	0	0	0	0.00	0	0
Glass Cond	6.457	0	0	6.457	2.31	5.12	-15.488	17.00	-15.488	17.00	0.00	0	0
Wall Cond	3.630	592	0	4.223	1.51	2.88	-5.957	7.93	-7.227	7.93	0.00	0	0
Partition	1.838	0	0	1.838	0.66	1.46	-4.726	5.19	-4.726	5.19	0.00	0	0
Exposed Floor	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0	0
Infiltration	0	0	0	0	0.00	0.00	-1	0.00	-1	0.00	0.00	0	0
Sub Total ==>	42.711	44.253	0	86.964	31.15	33.89	-26.172	50.75	-46.233	50.75	0.00	0	0
Internal Loads													
Lights	24.481	16.389	0	40.870	14.64	19.43	0	0	0	0	0.00	0	0
People	65.000	0	0	65.000	23.28	25.79	0	0	0	0	0.00	0	0
Misc	9.015	0	0	9.015	3.23	7.15	0	0	0	0	0.00	0	0
Sub Total ==>	98.495	16.389	0	114.885	41.15	52.37	0	0	0	0	0.00	0	0
Ceiling Load	16.445	-16.445	0	0	0.00	13.74	-11.174	0	-42.354	46.49	0.00	0	0
Outside Air	0	0	0	80.559	28.85	0.00	0	0	-44.892	100.00	0.00	0	0
Sup. Fan Heat	0	0	0	4.991	1.79	0.00	0	0	0	0	0.00	0	0
Ret. Fan Heat	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0	0
Duct Heat Pkup	0	0	0	0	0.00	0.00	-7.545	0	-7.545	0	0.00	0	0
OV/UNDR Sizing	0	0	0	0	0.00	0.00	0	0	5.025	-5.52	0.00	0	0
Exhaust Heat	0	-8.190	0	-8.190	-2.93	0.00	0	0	0	0	0.00	0	0
Terminal Bypass	0	0	0	0	0.00	0.00	0	0	0	0	0.00	0	0
Grand Total ==>	157.651	36.007	0	279.210	100.00	126.023	-44.892	100.00	-91.108	100.00	0.00	0	0

TEMPERATURES

SADB	Clq	Hta
Plenum	55.0	90.0
Return	81.5	63.6
Ret/OA	81.5	63.6
Fn MtrTD	83.6	45.3
Fn BltdTD	0.1	0.0
Fn Frict	0.2	0.0
	0.5	0.0

AIRFLOWS

Vent	Cooling	Heating
Infil	1.131	1.027
Supply	0	0
Mincfm	5.655	1.831
Return	1.831	1.831
Exhaust	5.655	1.831
Rm Exh	1.131	1.027
Auxil	0	0

ENGINEERING CKS

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

HEATING COIL SELECTION

Capacity MBh	Coil Airfl cfm	Ent °F	Lvg °F
Main Hta	-72.6	1.831	54.4
Aux Hta	0.0	0	0.0
Preheat	-29.2	1.131	31.0
Reheat	-26.5	1.831	55.0
Humidif	0.0	0	0.0
Opt Vent	0.0	0	0.0
Total	-101.8		

AREAS

Gross Total	Glass ft² (%)
Floor	7.983
Part	433
ExFlr	0
Roof	6.949
Wall	3.560
	364
	10

COOLING COIL SELECTION

Total Capacity ton	Sens Cap. MBh	Coil Airfl cfm	Enter DB/WB/HR °F	Leave DB/WB/HR °F	qr/lb
Main Clq	23.3	279.2	187.4	56.15	83.6
Aux Clq	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0.0	0.0
Total	23.3	279.2	187.4	56.15	83.6

System Checksums

By Professional Engineering Services

2442 Boat Storage

Unit Heaters

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

TEMPERATURES			
SADB	Clq	Htg	
Plenum	0.0	95.0	
Return	0.0	52.1	
Ret/OA	0.0	55.0	
Fn MtrTD	0.0	55.0	
Fn BidTD	0.1	0.1	
Fn Frict	0.3	0.2	

AIRFLOWS			
	Cooling	Heating	
Vent	0	0	
Infil	0	1.354	
Supply	0	1.255	
Miscfm	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	0.00	
ft²/ton	0.00	0.00	
Btu/hr-ft²	0.00	-6.54	
No. People	0	0	

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

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

COOLING COIL SELECTION			
Total Capacity ton	Sens Cap. MBh	Coil Airfl cfm	Enter DB/WB/HR °F
Main Clq	0.0	0	0.0
Aux Clq	0.0	0	0.0
Opt Vent	0.0	0	0.0
Total	0.0	0	0.0

COOLING COIL SELECTION			
Leave DB/WB/HR °F	Leave DB/WB/HR °F	ar/lb	ar/lb
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0
0.0	0.0	0.0	0.0

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? YES NO (YES OR NO)
 SYSTEM TYPE:
 FLUSH VALVE = 1
 FLUSH TANK = 2

FIXTURES	QTY	FIXTURE UNITS PER FIXTURE			TOTAL FIXTURE UNITS PER FIXTURE		
		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 DESIGN				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)
				2 1/2			INCHES (COLD)

NOTES:

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