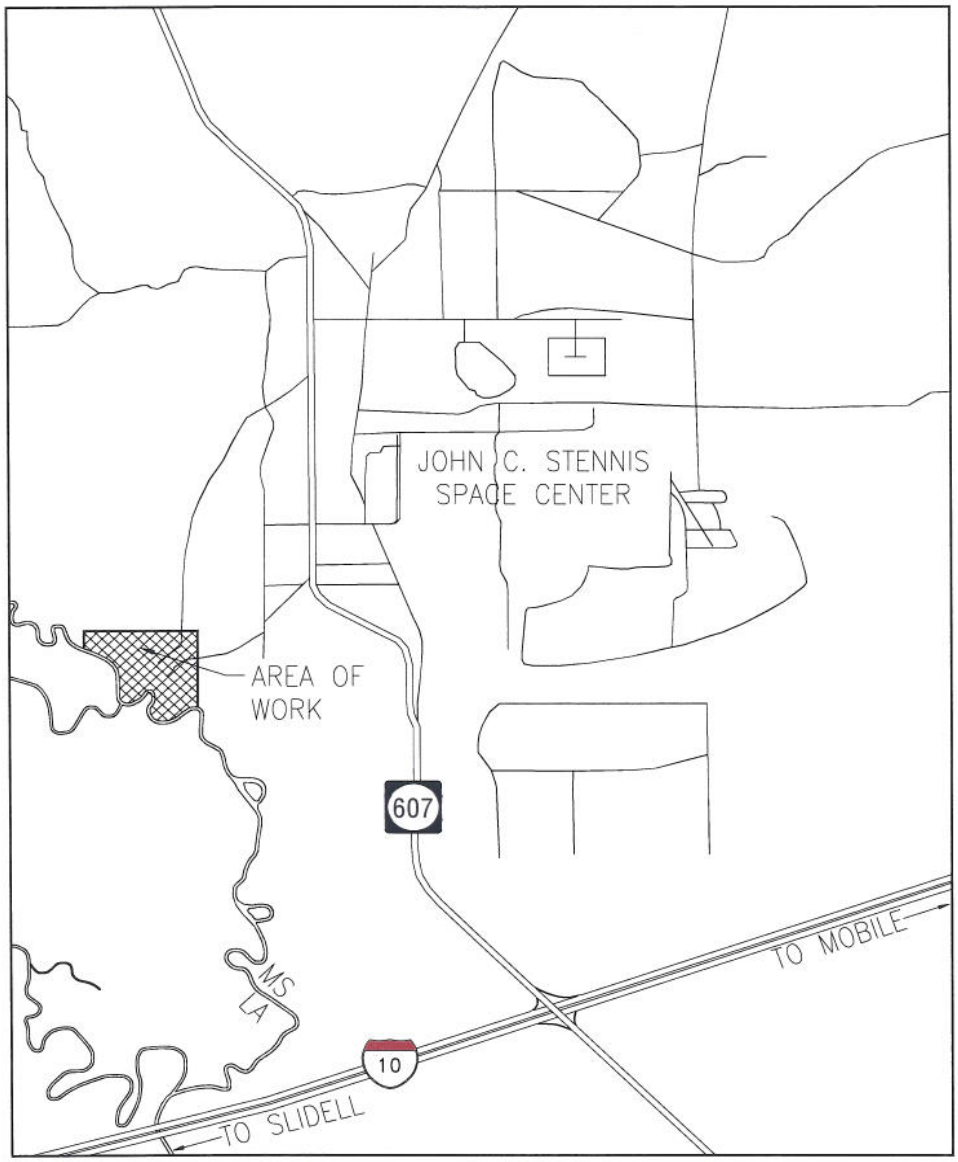
SOV RIVERINE AND COMBATANT CRAFT OPERATIONS FACILITY

Located at
John C. Stennis Space Center
Hancock County Mississippi

BDLG. 2440 / 2441 MASONRY DESIGN CALCULATIONS

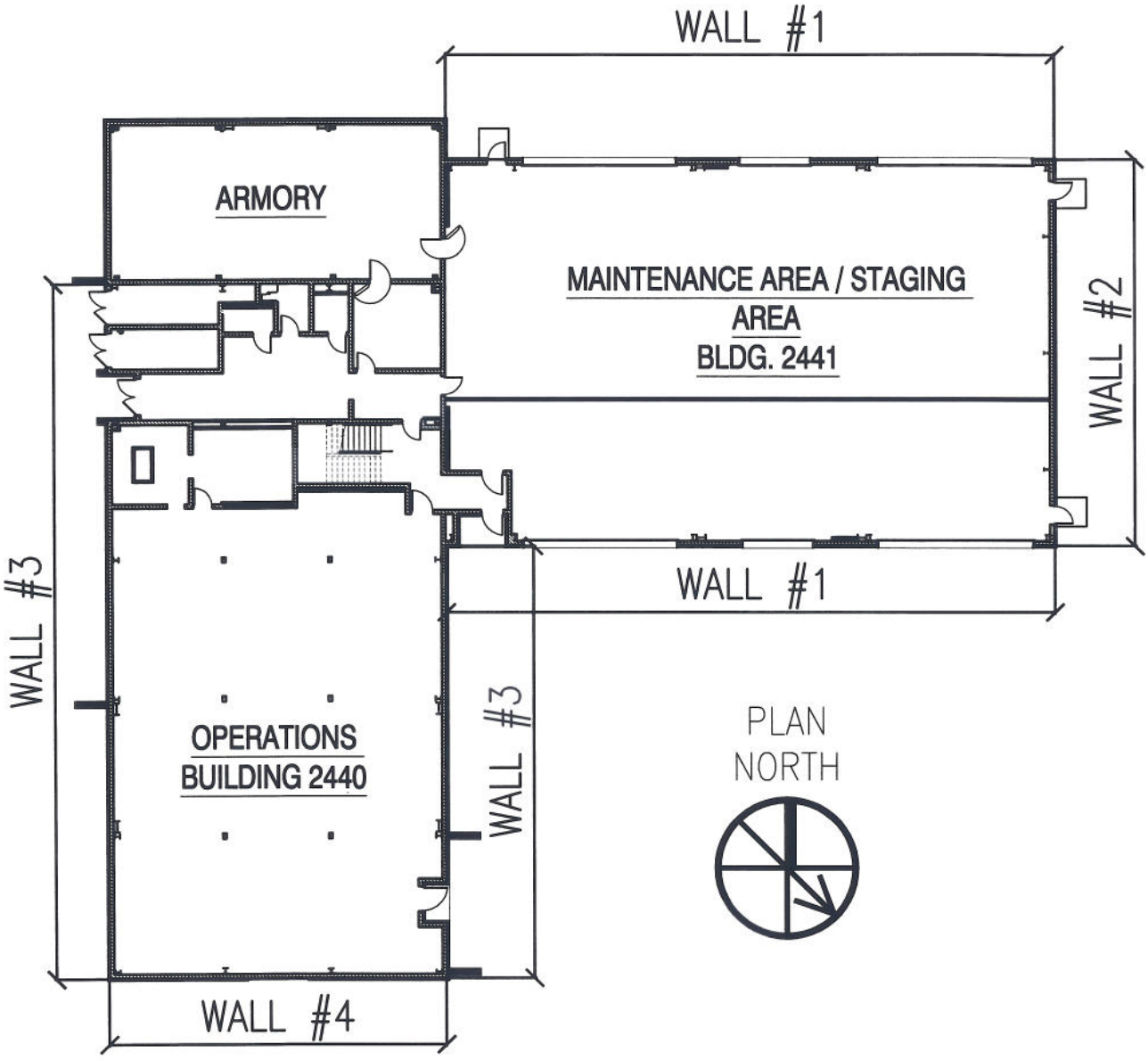
April 30, 2009

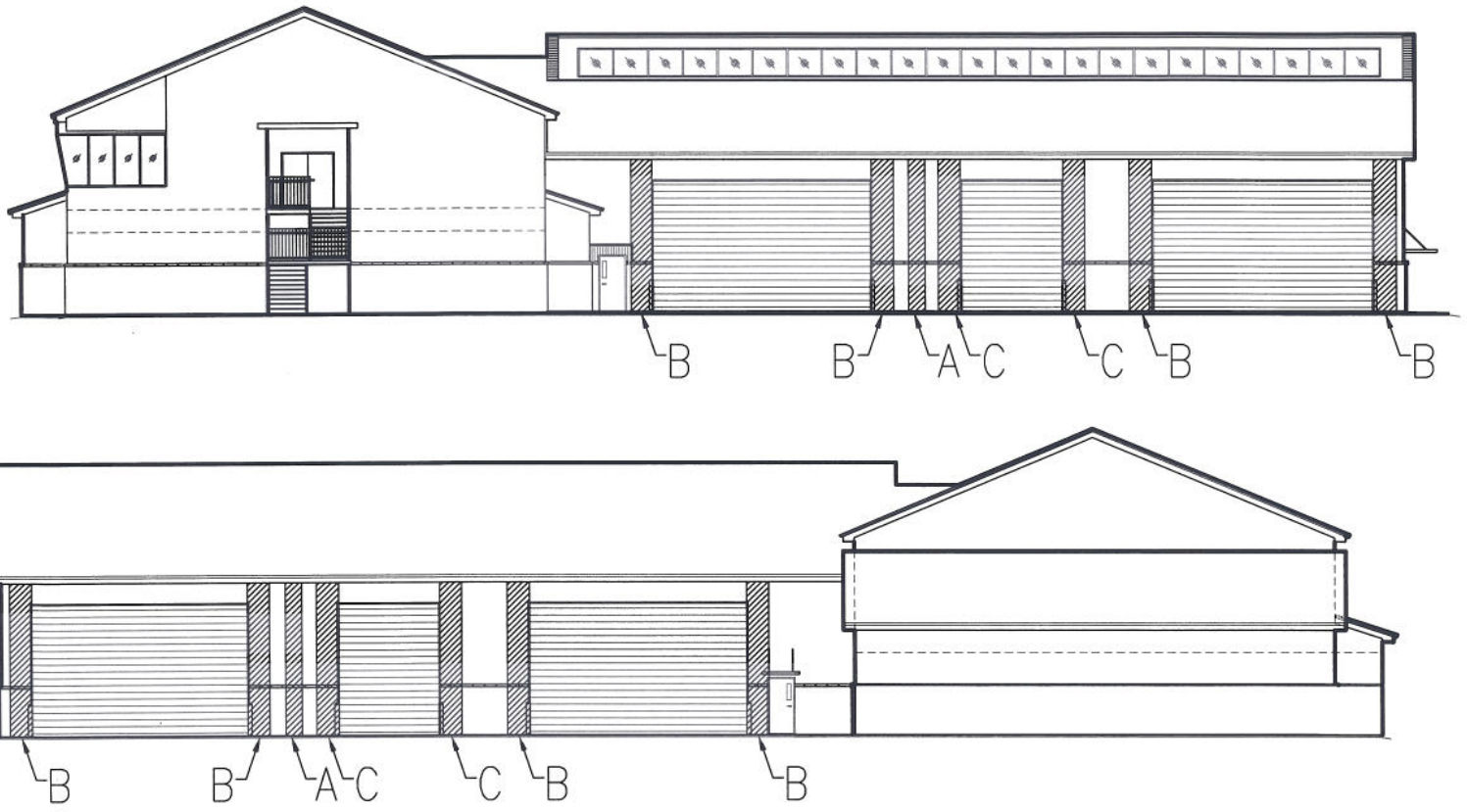
Prepared by:
Dammon Engineering
1095 Florida Avenue
Slidell, La. 70458
985-649-5832
dammonengineering.com



VICINITY MAP

N. T. S.


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



WALL #1 ELEMENTS

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

STENNIS RIVERINE

DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE

BLDG 2441 — WALL #1 ELEMENT A

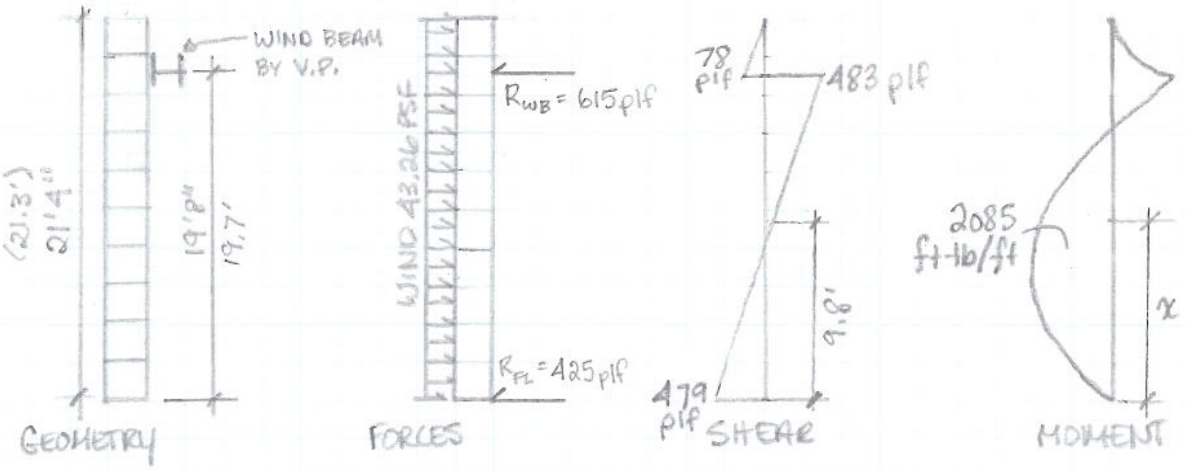
MATERIALS:

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

LOADING:

WIND 130 MPH = 43.26 psf

NEGLECT SELF WEIGHT



REACTIONS:

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

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

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

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

ESTIMATE REINFORCEMENTS:

TRY 8" CMU, ASSUME STEEL @ MID DEPTH $\quad d = \dfrac{7.625''}{2} = 3.8''$

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

USE 1/3 ALLOWABLE SAFETY FACTOR

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

DESIGN STRENGTH

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

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

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

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

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

ALLOWABLE CAPACITY IN TENSION

TRY #4 @ 12" O.C

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

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

TRY #5 @ 8" O.C.

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

5640 > 4170 ft-lb/ft. ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

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

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

1916 < 4170 ft-lb/ft DOES NOT WORK

ASSUME NEW f'_m

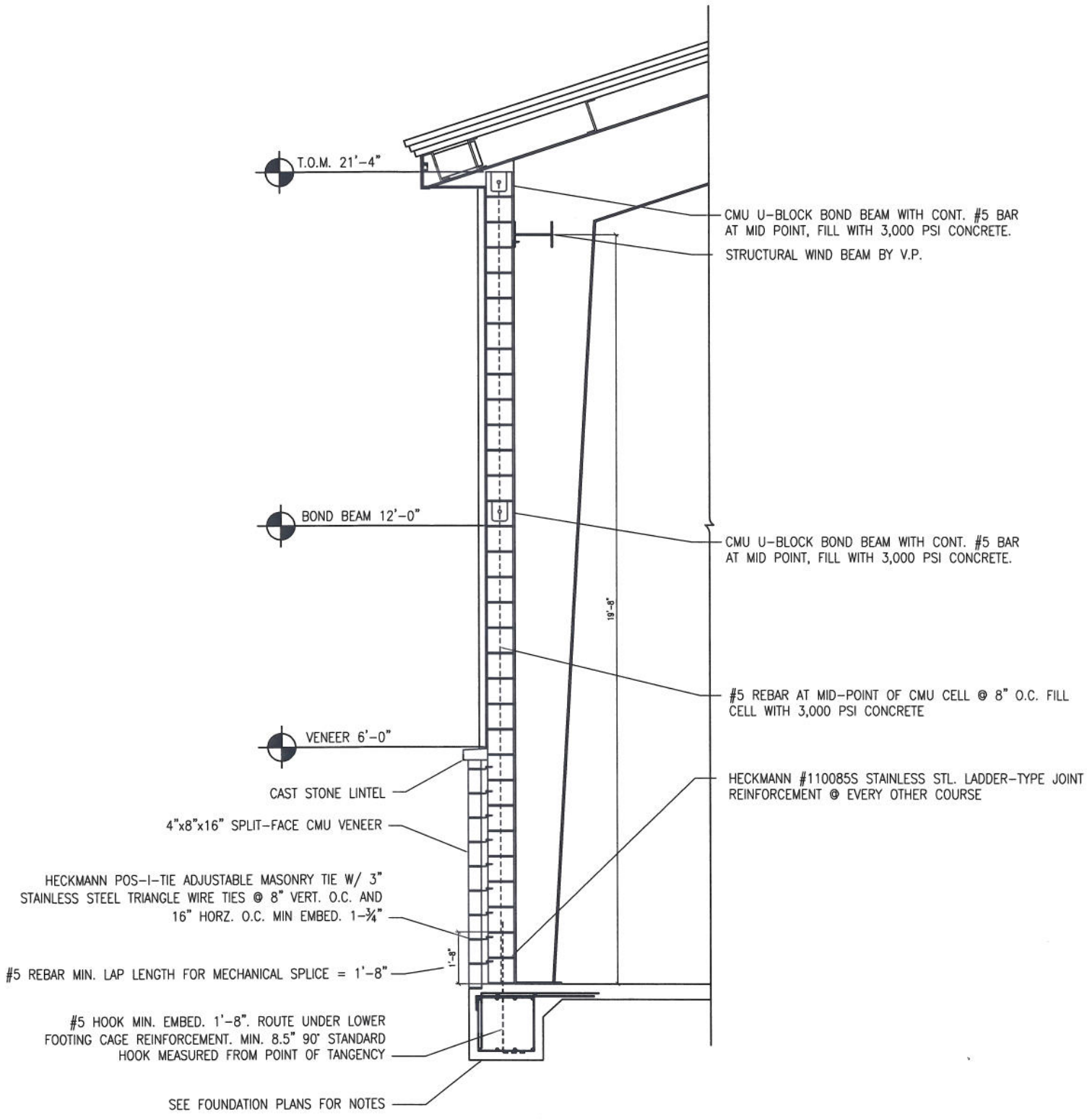
ESTIMATE REQ'D STRENGTH: $\frac{4170}{1916} \cdot 1500 psi = 3265$ psi UNIT STRENGTH

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

F_b = 1795 psi

M_m = 5170 ft-lb/ft ∴ OK

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



WALL#1 ELEMENT A DETAIL

N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

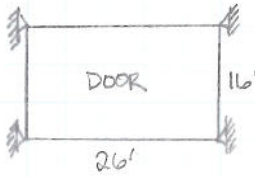
STENNIS RIVERINE

DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2441 ELEMENT B (DESIGN FOR 26'x16' OPENING)

MATERIALS:

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

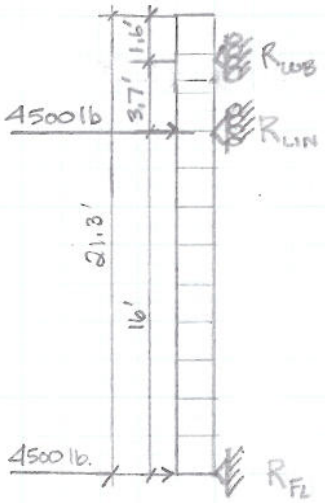
LOADING:
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



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

$R = 4500$ lbs

REACTIONS @ LINTEL AND FLOOR FROM DOOR



$R_{LIN} = \left(\frac{4500\text{lbs} \cdot 16'}{16'}\right) = 4500$ lbs. $= 846$ plf

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

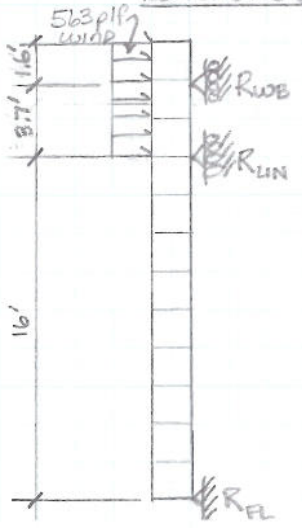
TOTAL = 9000lbs.

ACTUAL: [43.3psf · (13'·16') = 9006]

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

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

REACTIONS @ WIND BEAM AND LINTEL FROM AREA ABOVE DOOR:



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

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

2983 lbs

ACTUAL = [43.3psf (5.3'·13') = 2983]

∴ OK

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

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

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

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

DESIGN MOMENT

ASSUME 32" JAMB

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

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS ENGINEERS
CONSULTING DESIGN STUDIES EXPERT WITNESS
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

ESTIMATE REINFORCEMENT:

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

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

TRY (8) #4 REBAR PER FOOT

ALLOWABLE CAPACITY IN TENSION

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

M_t > REQ. M: 13,088 ft-lb. ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

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

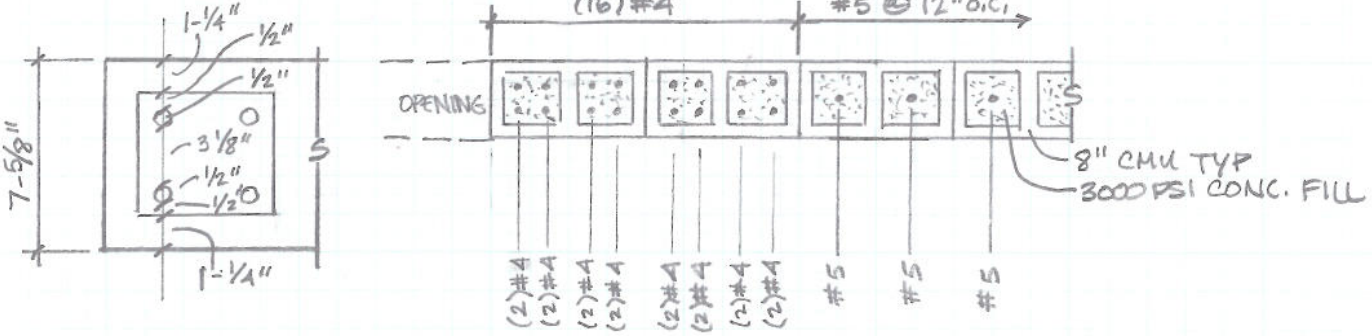
$$K = \frac{-0.5 \pm \sqrt{0.5^2 - 4 \cdot 1 \cdot (-0.5)}}{2}$$

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

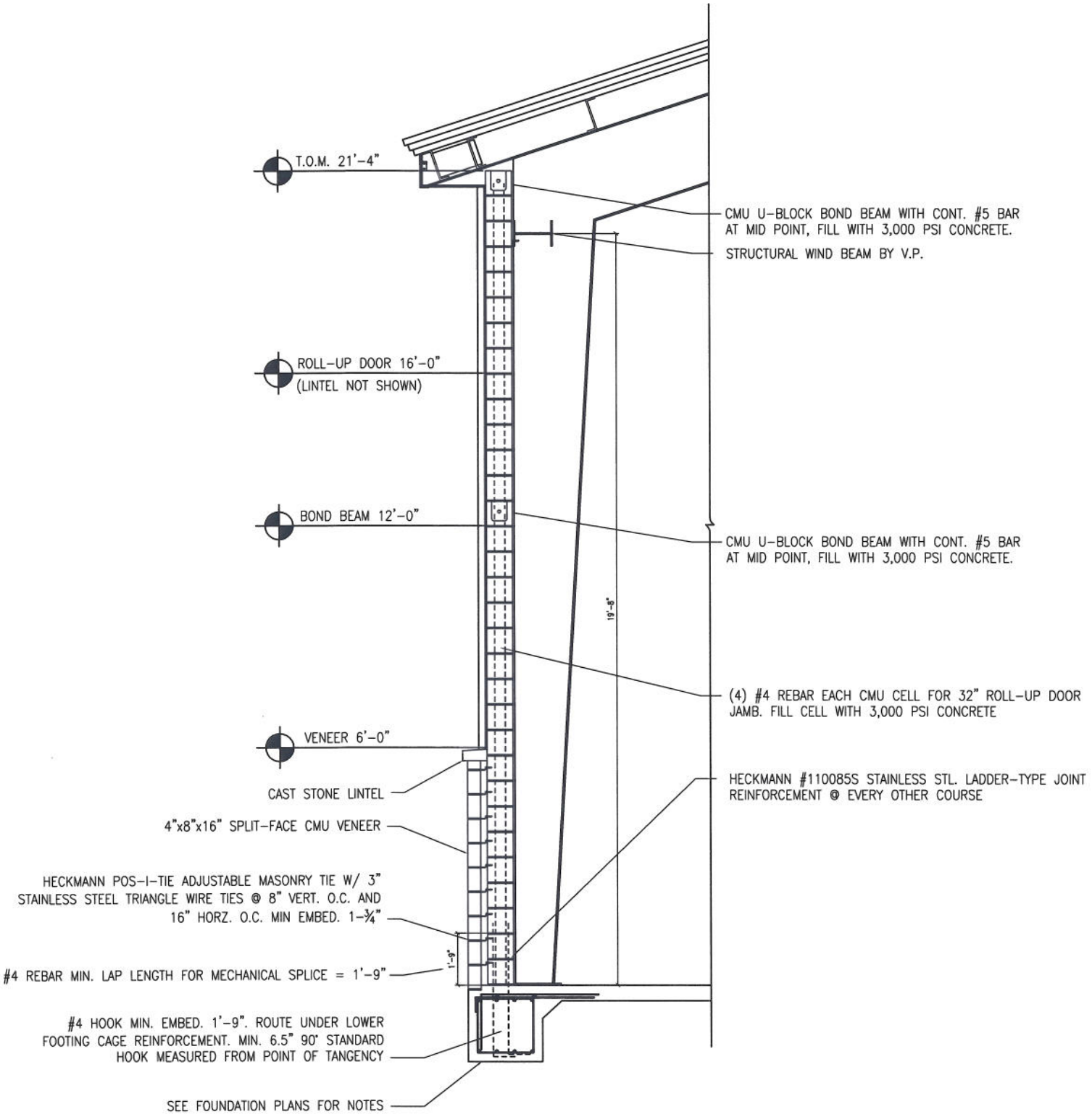
$$M_m = \frac{bd^2}{2} \cdot K \cdot j \cdot F_b = \frac{32\,IN \cdot 3.8^2}{2}(0.5)(0.83)\frac{1795 psi}{12} = 14342\ ft\text{-}lb.$$

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

M_m > REQ M: 13,088 ft-lb. ∴ OK



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



WALL#1 ELEMENT B DETAIL

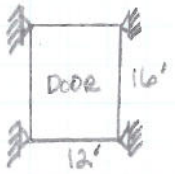
N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

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

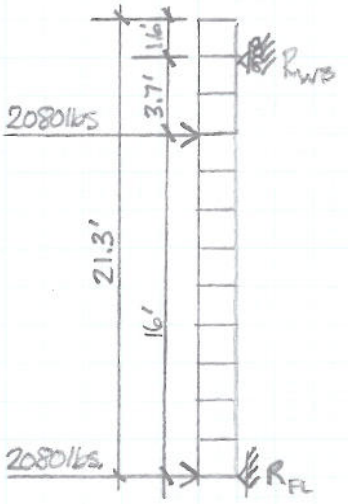
LOADING:
WIND 130 MPH = 43.26 psf
NEGLECT SELF WEIGHT



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

$R = 2080$ lbs.

REACTIONS @ LINTEL AND FLOOR FROM DOOR:



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

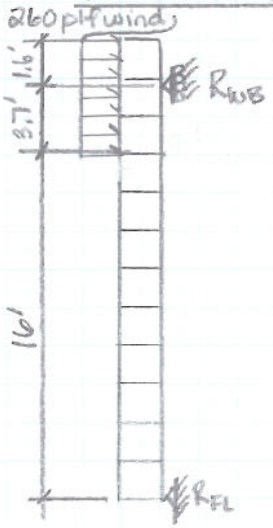
$R_{FL} = \frac{2080\text{lbs} \cdot 3.7'}{19.7'} + 2080\text{lbs.} = 2470$ lbs.

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

MAX MOMENT = 7801bs · 6' = 4680 ft-lb

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

REACTIONS @ WIND BEAM AND FLOOR FROM AREA ABOVE DOOR:



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

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

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

MOMENT = 170lbs · 16' = 2720 ft-lb.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

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

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

DESIGN MOMENT

ASSUME 32" JAMB

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

ESTIMATE REINFORCEMENT:

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

$$A_s = \frac{M}{F_s j d} = \frac{10765 \text{ ft-lb.} \cdot 12 \text{ in/ft}}{24000 \text{psi} \cdot 0.9 \cdot 1.33 \cdot 3.8"} = 1.2 \text{ in}^2/\text{ft}$$

TRY (8) #4 REBAR PER FOOT

ALLOWABLE CAPACITY IN TENSION:

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

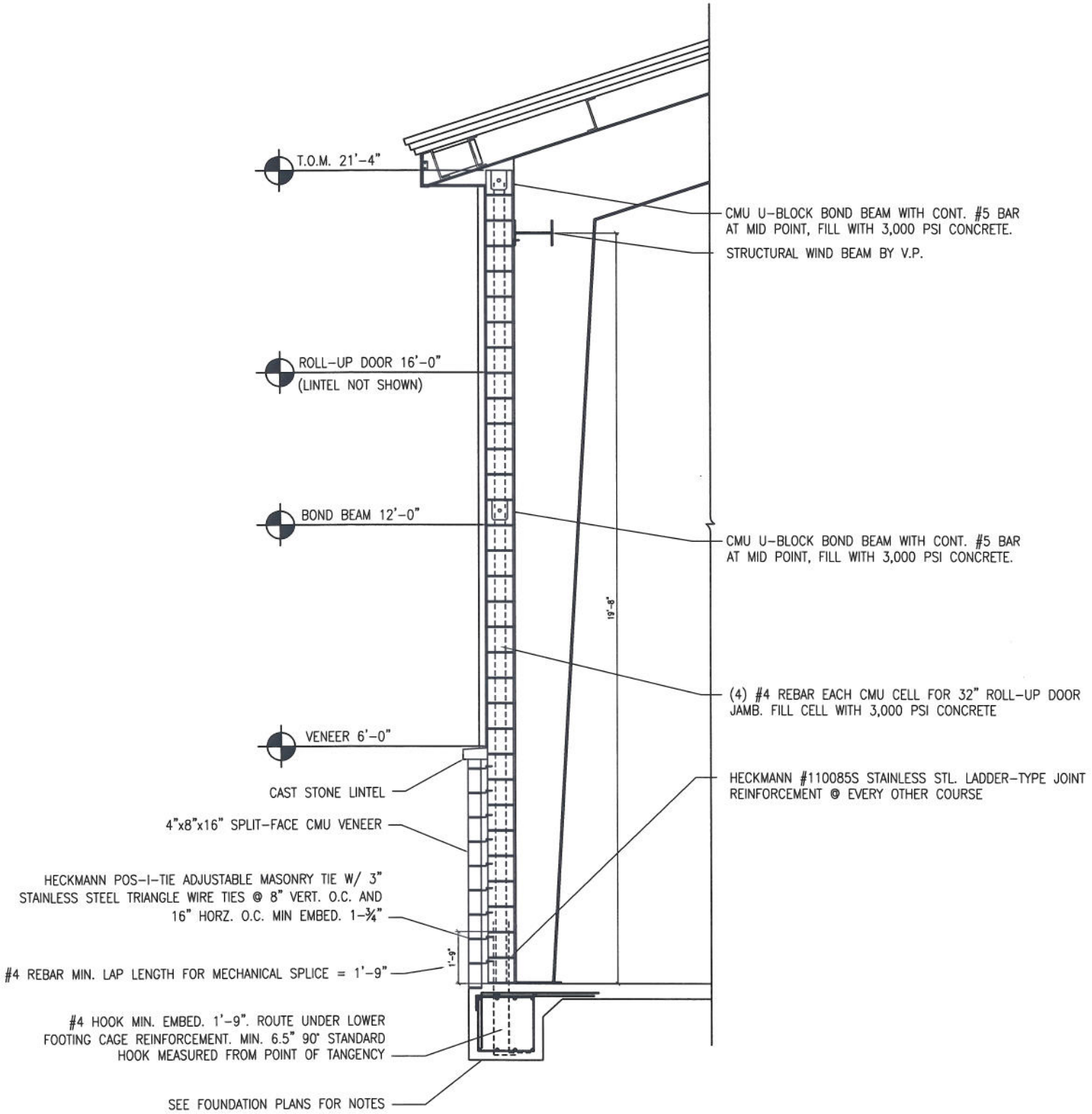
$M_t > 10765$ ft-lb. $\therefore$ OK

ALLOWABLE CAPACITY IN COMPRESSION

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

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

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



WALL#1 ELEMENT C DETAIL

N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

S TENNIS RIVERINE

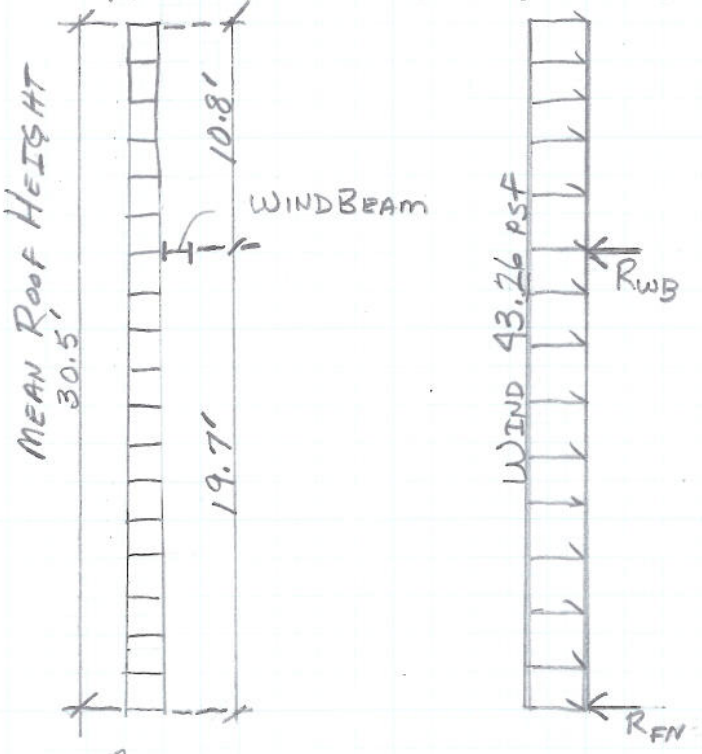
DESIGN OF REINFORCED CMU NON-LOADBEARING WALL FOR FLEXURE BLDG 2441 WALL #2

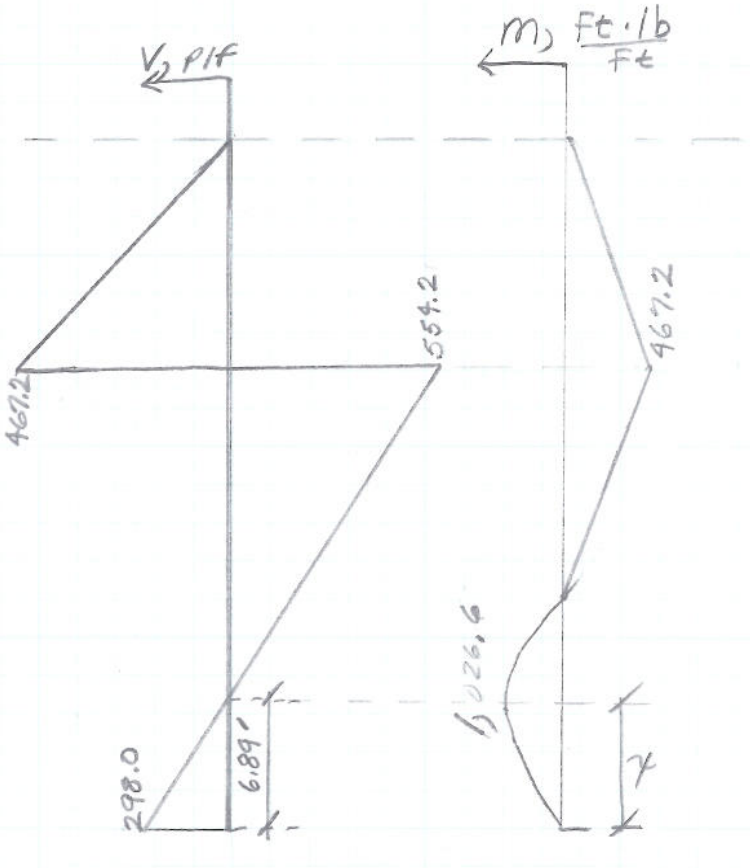
MATERIALS:

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:

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

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

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS ENGINEERS
CONSULTING DESIGN STUDIES EXPERT WITNESS
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

BLDG 2441 WALL #2 Cont.

ESTIMATE REINFORCEMENT

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

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

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

DESIGN STRENGTH

USE 2.0 ft wide STRIP

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

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

$np = 0.0438$ $\quad k^2 + 2pnk - 2pn = 0$

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

ALLOWABLE CAPACITY IN TENSION

#5 @ 24" O.C.

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

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

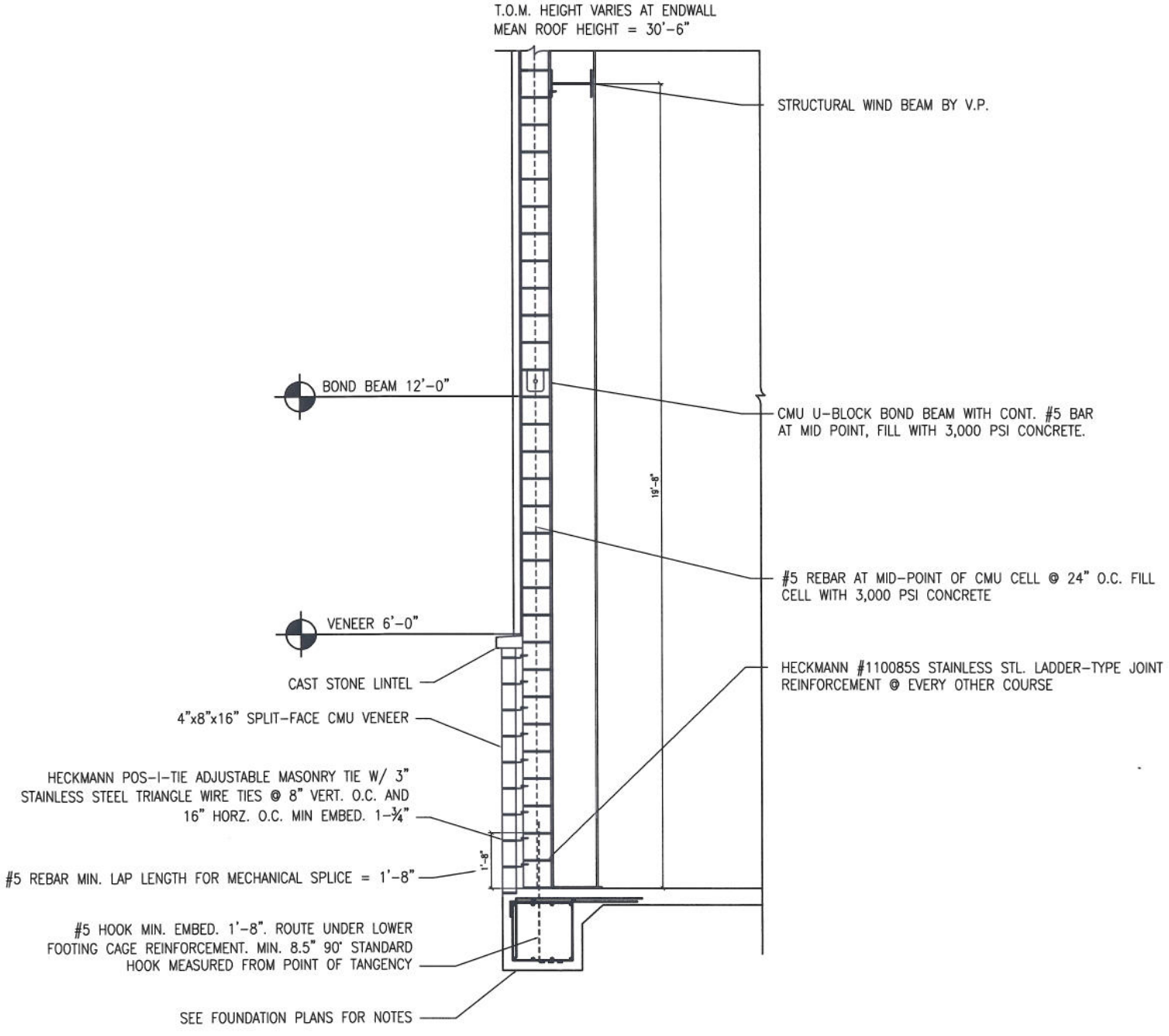
ALLOWABLE CAPACITY IN COMPRESSION

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

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

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

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



WALL#2 TYPICAL DETAIL

N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

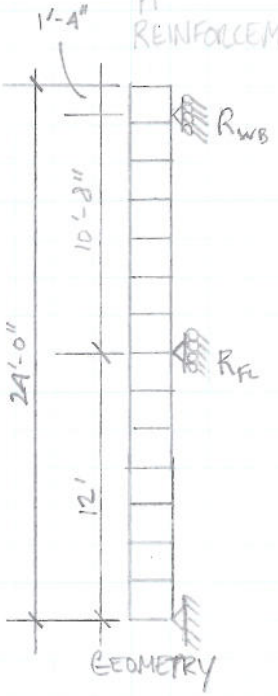
STENNIS RIVERINE
DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE
BLDG 2440 WALL #3

MATERIALS:

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

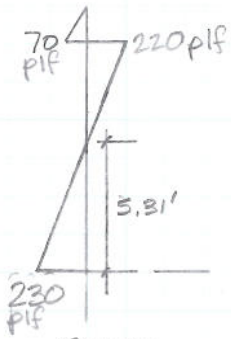
LOADING:
WIND 130 mph = 43.3 psf
NEGLECT SELF WEIGHT

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

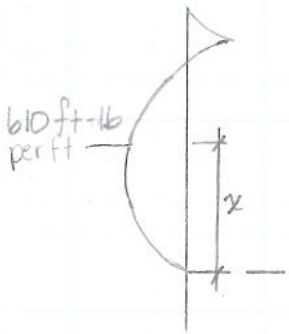


GEOMETRY

FORCES



SHEAR



MOMENT

REACTIONS:

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

$$R_{FL} = 43.3\left[\frac{\left(\frac{10.67}{2} - \frac{1.33^2}{2}\right)}{10.67'}\right] = 230 \text{ plf}$$

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

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

ESTIMATE REINFORCEMENT:

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

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

DESIGN STRENGTH

USING 24" WIDE STRIP

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

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

$pn = 0.03$

$K = 0.28$

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

ALLOWABLE CAPACITY IN TENSION

TRY #4 @ 16" O.C. $A_s = 0.15$

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

1410 > 1220 ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

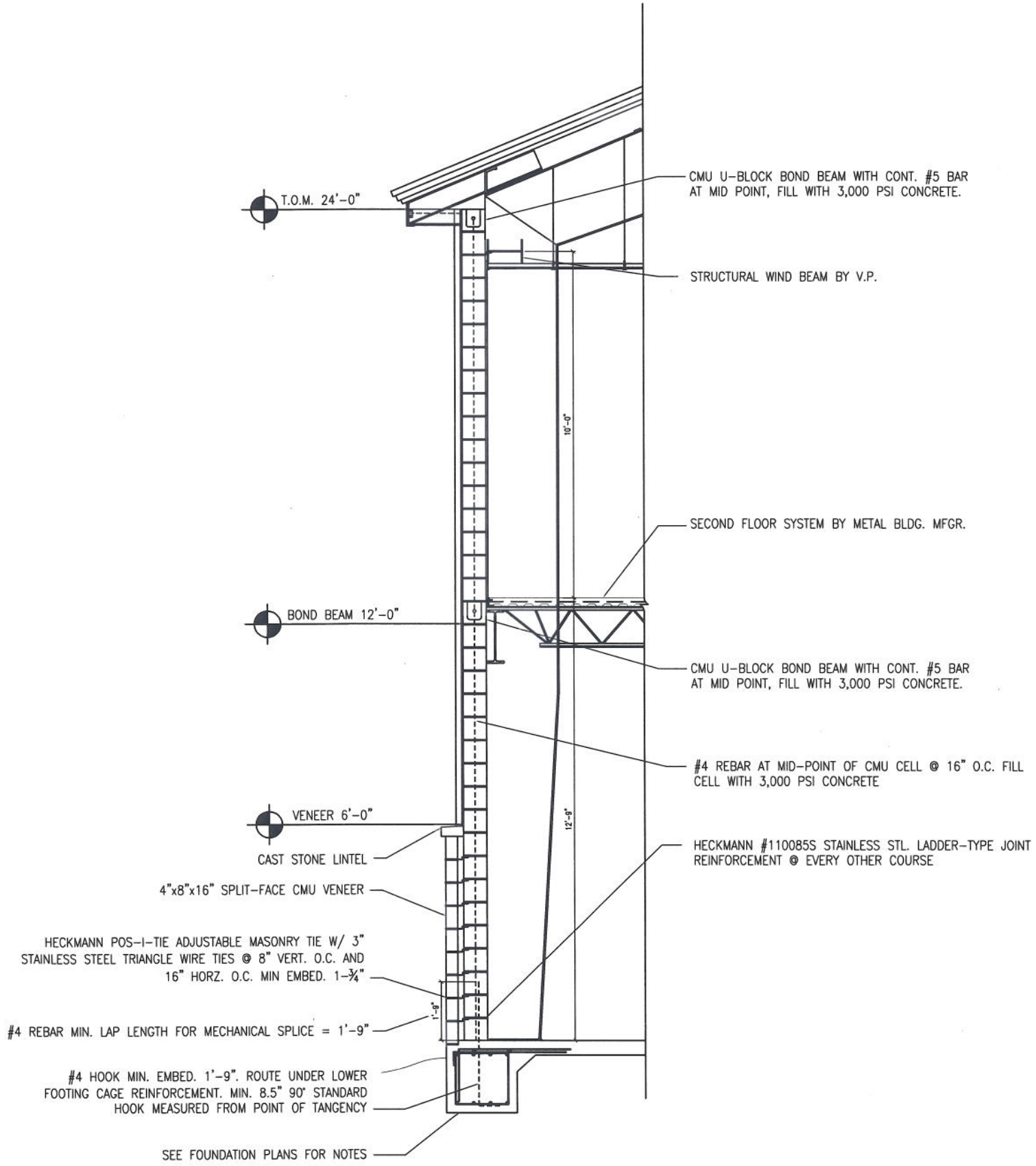
$F_b = 665$ psi

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

2446 > 1220 ∴ OK

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

BLDG 2440 - WALL #3



WALL#3 TYPICAL DETAIL

N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

STENNIS RIVERINE

DESIGN OF REINFORCED CMU NONLOADBEARING WALL FOR FLEXURE

BLDG 2440 WALL #4

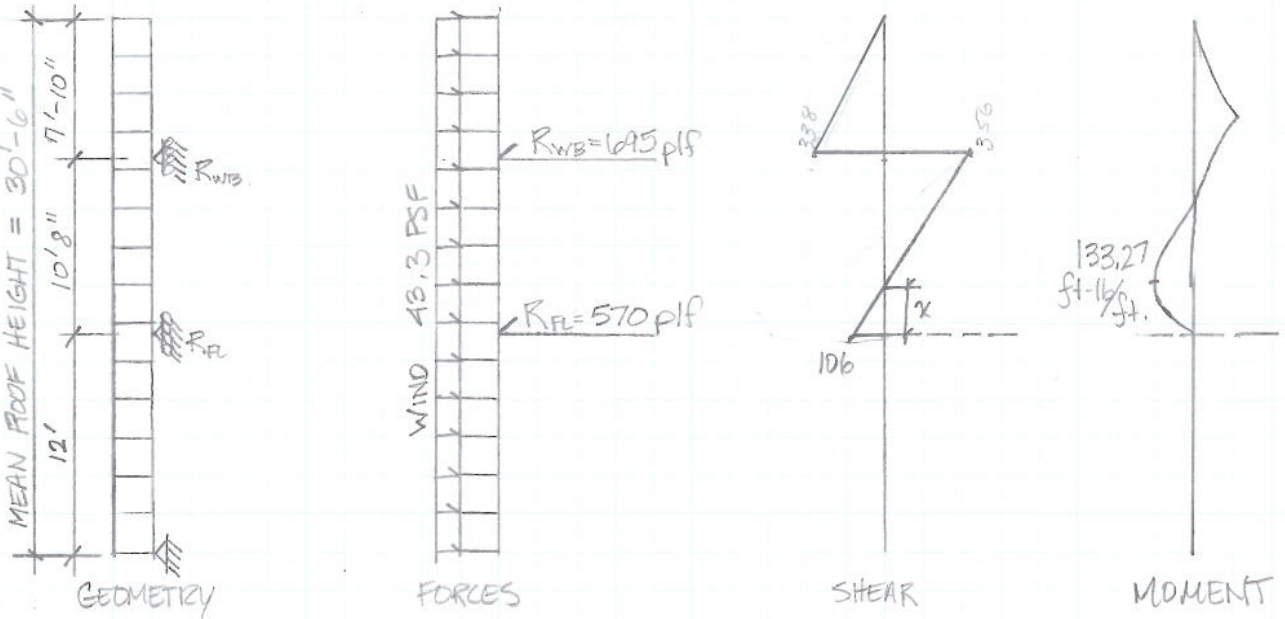
MATERIALS:

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:

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

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

$$x = \frac{106.6_{T}}{43.3} = 2.5'$$

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

ESTIMATE REINFORCEMENT:

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

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

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

DESIGN STRENGTH:

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

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

ALLOWABLE CAPACITY IN TENSION

TRY #5 @ 16" O.C.

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

$3070 > 270$ ft-lb ∴ OK

ALLOWABLE CAPACITY IN COMPRESSION

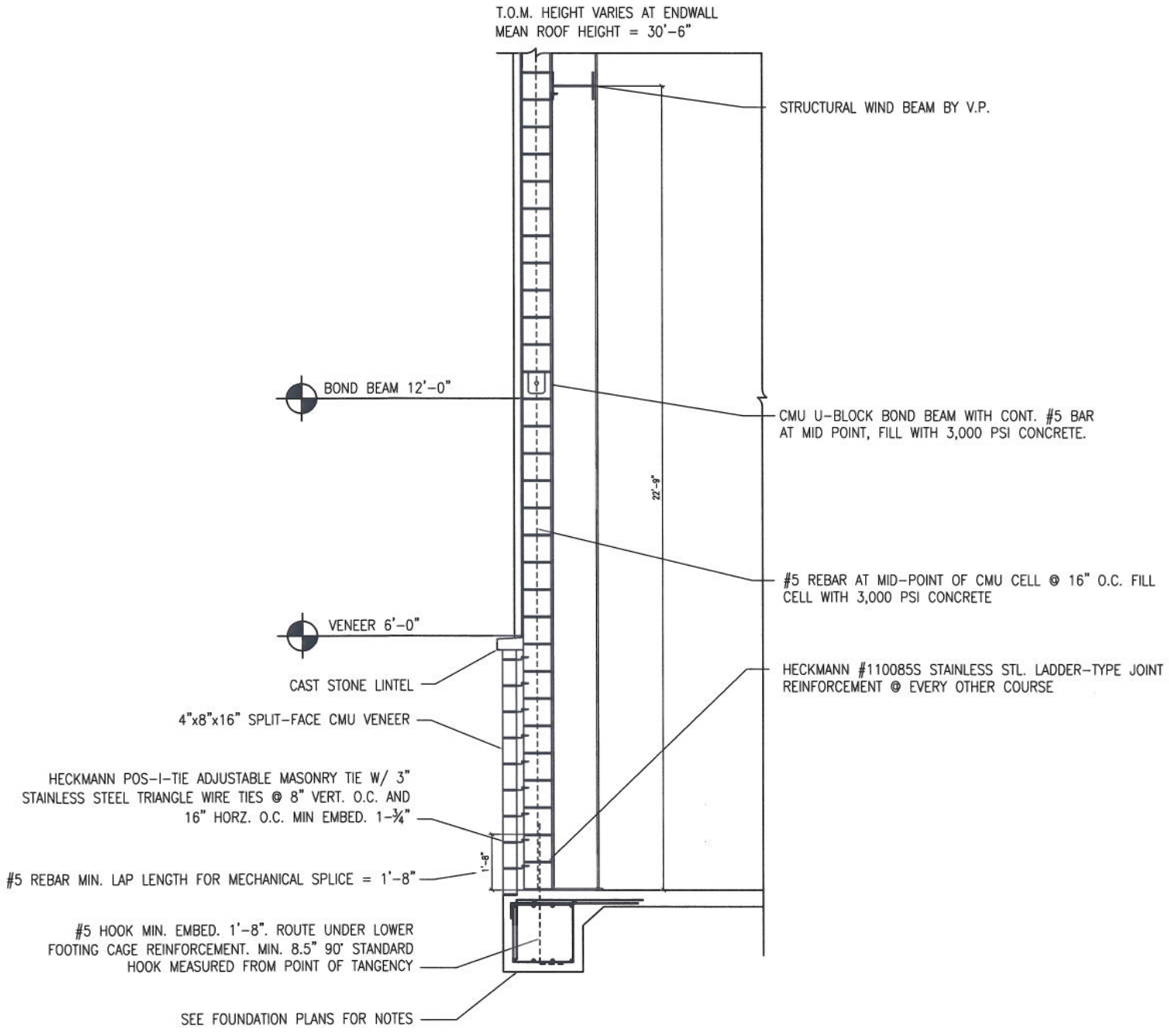
$$F_b = \frac{1}{3}(f'_m)1.33 = \frac{1}{3}(1500)1.33 = 665 \text{ psi}$$

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

$2635 > 270$ ∴ OK

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

BLDG 2440 - WALL #4



WALL#4 TYPICAL DETAIL

N.T.S.

DAMMON ENGINEERING, INC.
dammonengineering.com
ARCHITECTS *ENGINEERS*
CONSULTING *DESIGN* *STUDIES* *EXPERT WITNESS*
1095 Florida Ave. P.O. Box 2830 985-649-5832
Slidell, LA 70458 Slidell, LA 70459 FAX 985-641-5950

TYPICAL ANCHORAGE AND SPLICE FOR #5 REBAR

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

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

$l_e = 13 d_b = 8.125''$

VENEER WALL CONNECTION

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

HORZ. JOINT REINFORCEMENT

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

TYPICAL ANCHORAGE AND SPLICE FOR #4 REBAR

USE #4 REBAR FOR HOOK, GRADE 60

$l_d = 20.1''$

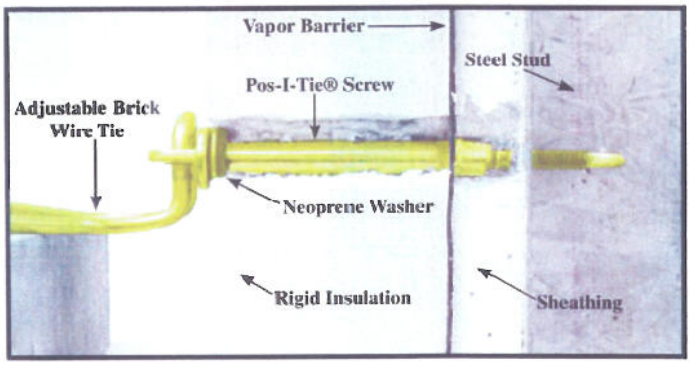
$l_e = 6.5''$

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

ARCHITECTURAL SPECIFICATION INFORMATION

THE ORIGINAL Pos-I-Tie®

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

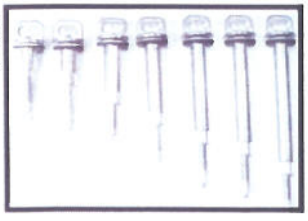


Self Drilling Screw for Brick Veneer to Steel Studs

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

Dril-It® Screw for Brick Veneer to Steel Beam

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



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

NO. 75 POS-I-TIE® ADVANTAGES

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

Test Data Available Upon Request

WIRE TIES

Ties are 3.416" 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.)

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.

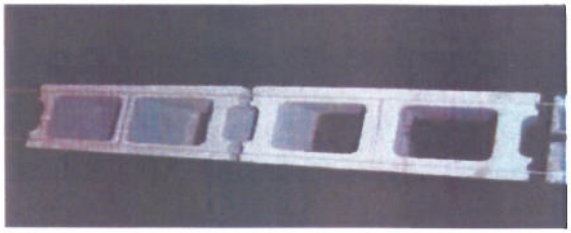
Packaged in 50 pc (500 lin ft) bundles

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/ ft^2.)(0.46kg/m^2)

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

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

Approvals:

Comments: