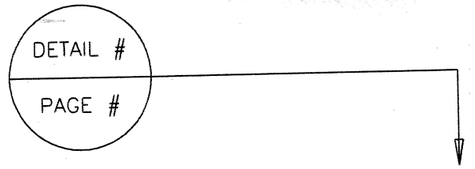
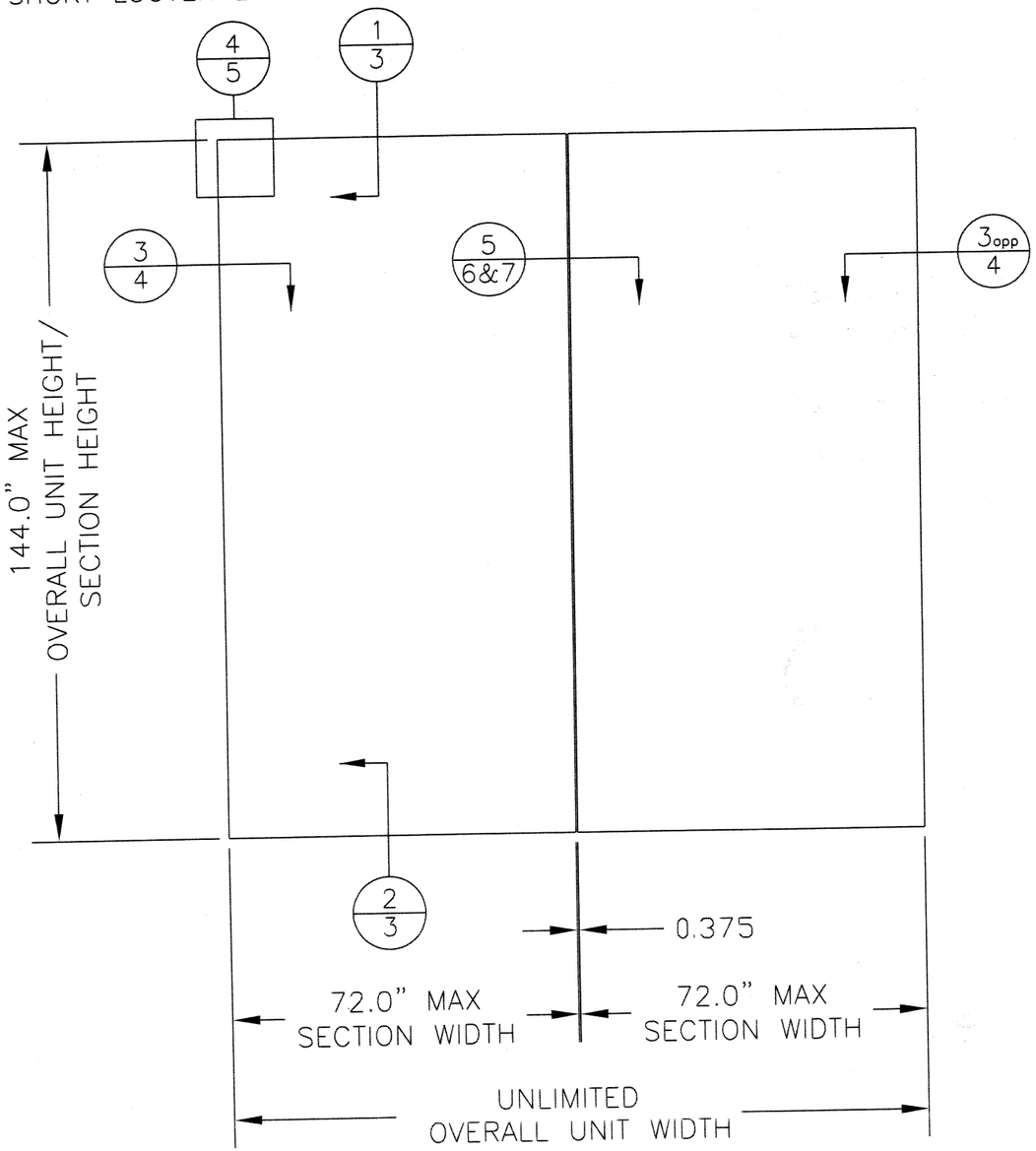


DETAIL CALLOUT (TYPICAL)

1 LOUVER ELEV.
SHORT LOUVER LAYOUT

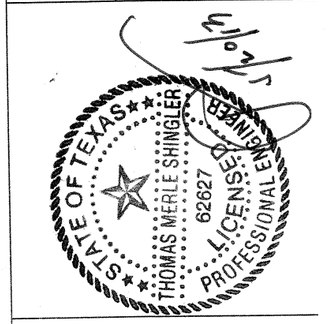


NOTE: MULLION REQUIRED ONLY IF BOTH OF THE FOLLOWING ARE TRUE: OVERALL UNIT WIDTH IS >72", AND SECTION HEIGHT IS >72".

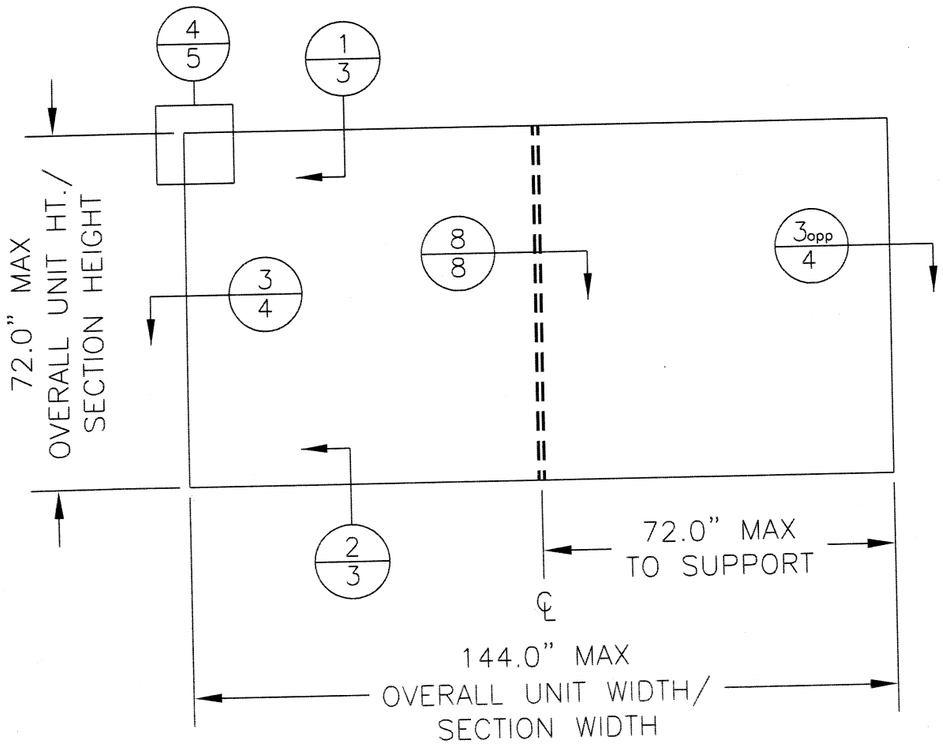
DRAWN BY M STEELE
DATE 4/27/09
SCALE 3/8":1'
SHEET NO. 1 OF 16
CAD DRAWING NO. ESS-502D

GREENHECK
P.O.BOX 410 SCHOFIELD, WISCONSIN 54476-0410

TITLE
ESS-502D LOUVER
SHORT LOUVER LAYOUT
ELEVATION CONFIGURATION

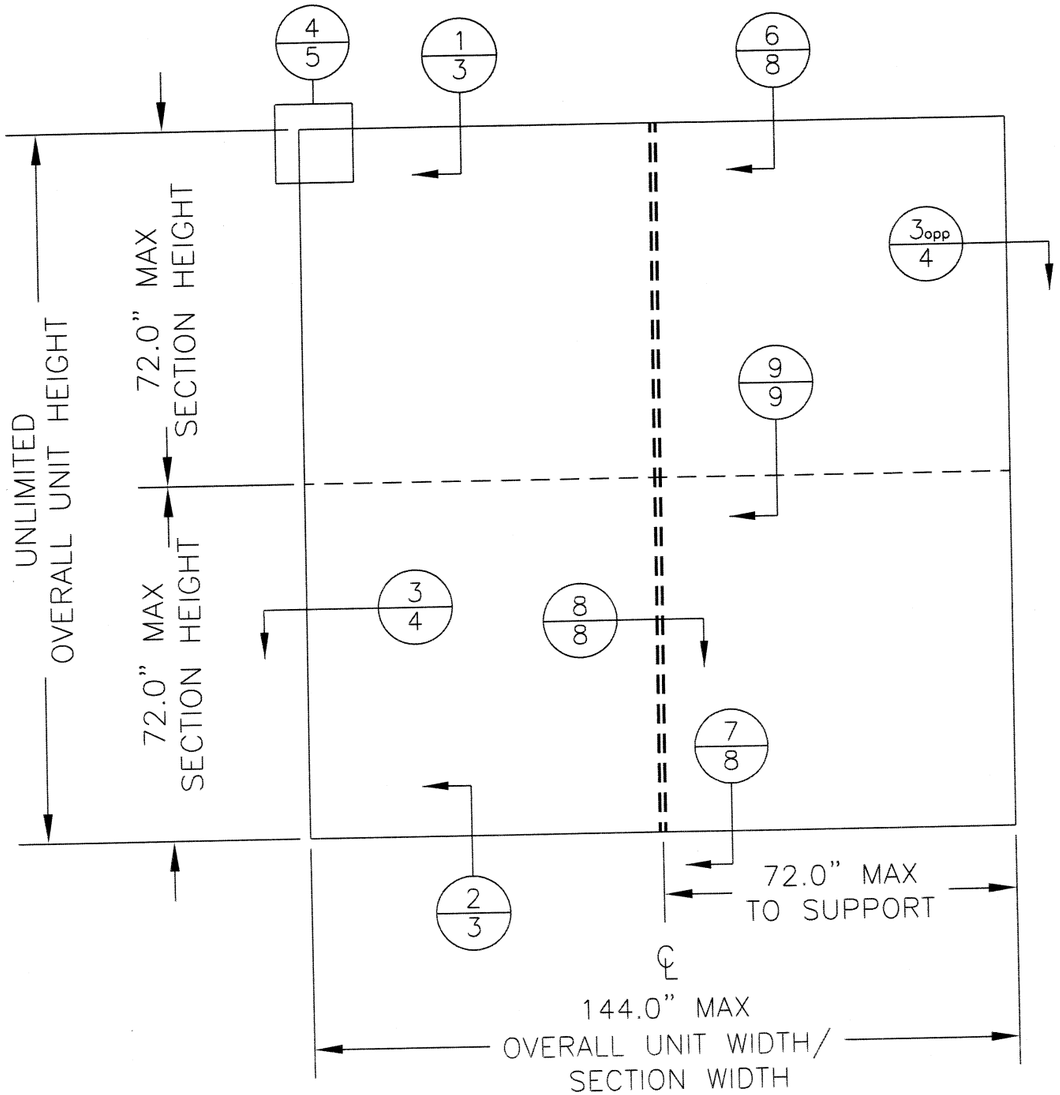


2 LOUVER ELEV.
LONG LOUVER LAYOUT



NOTE: BLADE SUPPORT REQUIRED ONLY IF SECTION WIDTH IS >72".

3 LOUVER ELEV.
LONG LOUVER LAYOUT, SPLICED JAMBS & BLADE SUPPORT



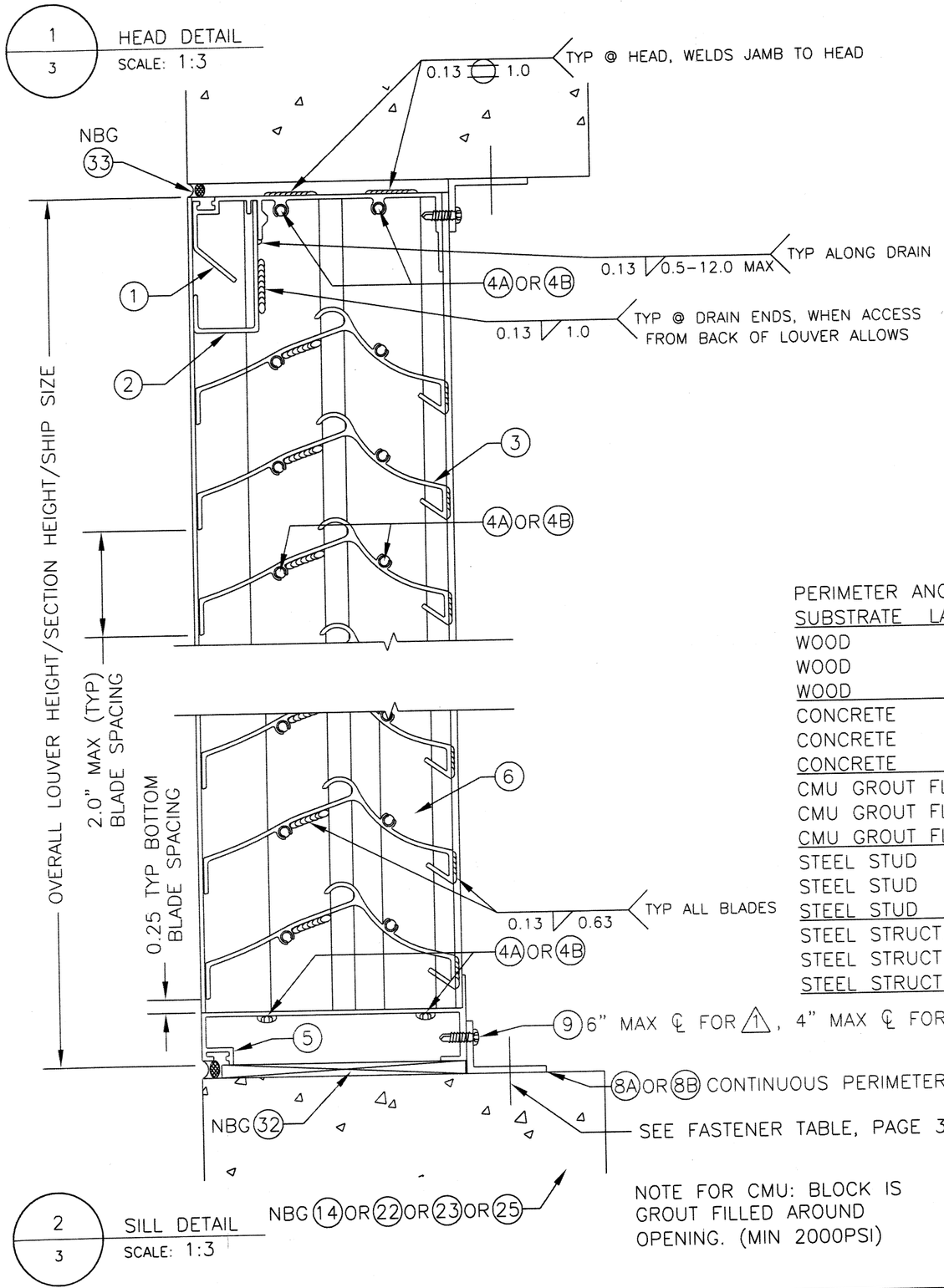
NOTE: BLADE SUPPORT REQUIRED ONLY IF SECTION WIDTH IS >72".

GREENHECK
P.O.BOX 410 SCHOFIELD,
WISCONSIN 54476-0410

DRAWN BY	M STEELE
DATE	4/27/09
SCALE	3/8":1'
SHEET NO.	2 OF 16
CAD DRAWING NO.	ESS-502D

TITLE: ESS-502D LOUVER
LONG LOUVER LAYOUT
ELEVATION CONFIGURATIONS

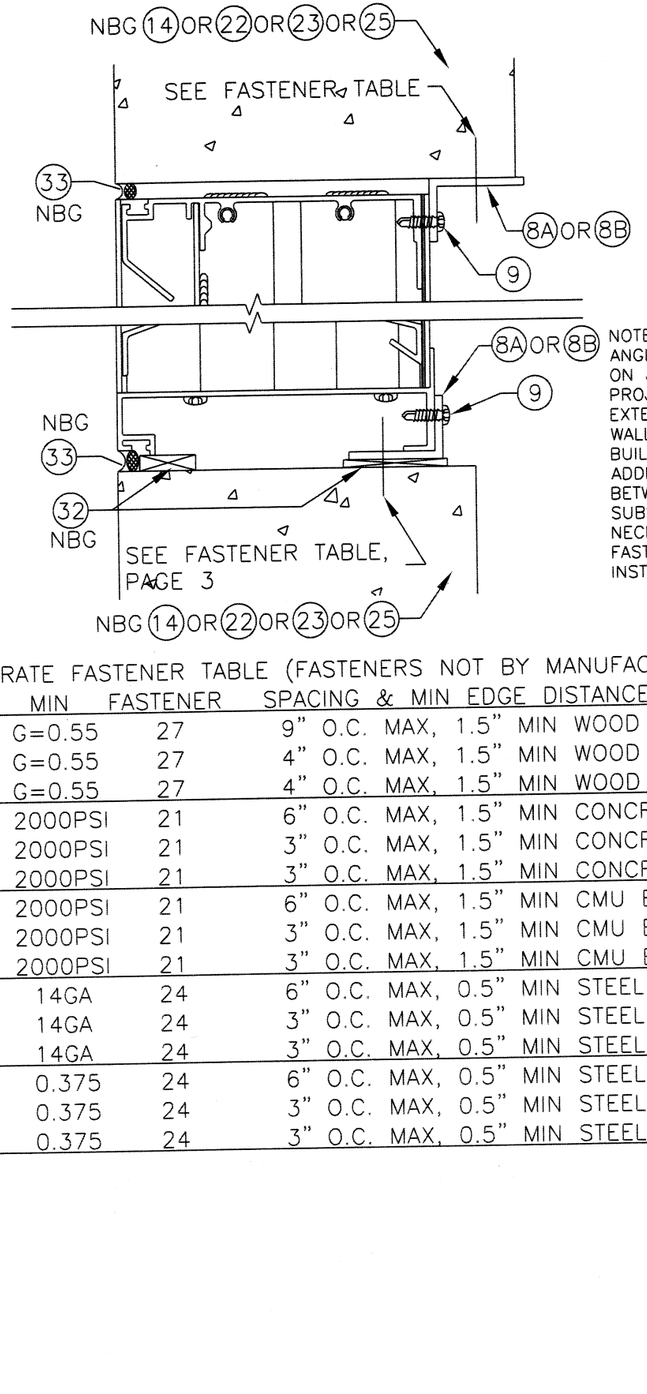
STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED
PROFESSIONAL ENGINEER



NOTE FOR CMU: BLOCK IS GROUT FILLED AROUND OPENING. (MIN 2000PSI)

NBG=NOT BY MANUFACTURER

OPTIONAL CONTINUOUS ANGLE CONFIGURATION, FOR THIS PAGE ONLY



NOTE: CONTINUOS PERIMETER ANGLE MAY BE POSITIONED ON JAMBS WITH ANGLE LEG PROJECTED TOWARD EXTERIOR OR INTERIOR OF WALL. VALID FOR ALL BUILDING SUBSTRATE TYPES. ADDITIONAL SPACING BETWEEN LOUVER AND SUBSTRATE MAY BE NECESSARY DUE TO FASTENER HEAD-LOUVER INSTALLATION CLEARANCE.

PERIMETER ANGLE SUBSTRATE FASTENER TABLE (FASTENERS NOT BY MANUFACTURER):

SUBSTRATE	LAYOUT "Δ"	MIN	FASTENER	SPACING & MIN EDGE DISTANCE
WOOD	1	G=0.55	27	9" O.C. MAX, 1.5" MIN WOOD EDGE DISTANCE
WOOD	2	G=0.55	27	4" O.C. MAX, 1.5" MIN WOOD EDGE DISTANCE
WOOD	3	G=0.55	27	4" O.C. MAX, 1.5" MIN WOOD EDGE DISTANCE
CONCRETE	1	2000PSI	21	6" O.C. MAX, 1.5" MIN CONCRETE EDGE DISTANCE
CONCRETE	2	2000PSI	21	3" O.C. MAX, 1.5" MIN CONCRETE EDGE DISTANCE
CONCRETE	3	2000PSI	21	3" O.C. MAX, 1.5" MIN CONCRETE EDGE DISTANCE
CMU GROUT FLD.	1	2000PSI	21	6" O.C. MAX, 1.5" MIN CMU EDGE DISTANCE
CMU GROUT FLD.	2	2000PSI	21	3" O.C. MAX, 1.5" MIN CMU EDGE DISTANCE
CMU GROUT FLD.	3	2000PSI	21	3" O.C. MAX, 1.5" MIN CMU EDGE DISTANCE
STEEL STUD	1	14GA	24	6" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE
STEEL STUD	2	14GA	24	3" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE
STEEL STUD	3	14GA	24	3" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE
STEEL STRUCT.	1	0.375	24	6" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE
STEEL STRUCT.	2	0.375	24	3" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE
STEEL STRUCT.	3	0.375	24	3" O.C. MAX, 0.5" MIN STEEL EDGE DISTANCE

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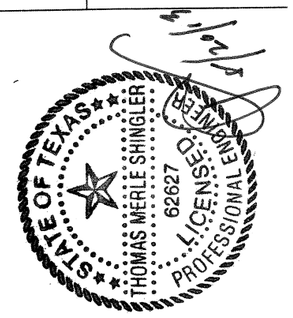
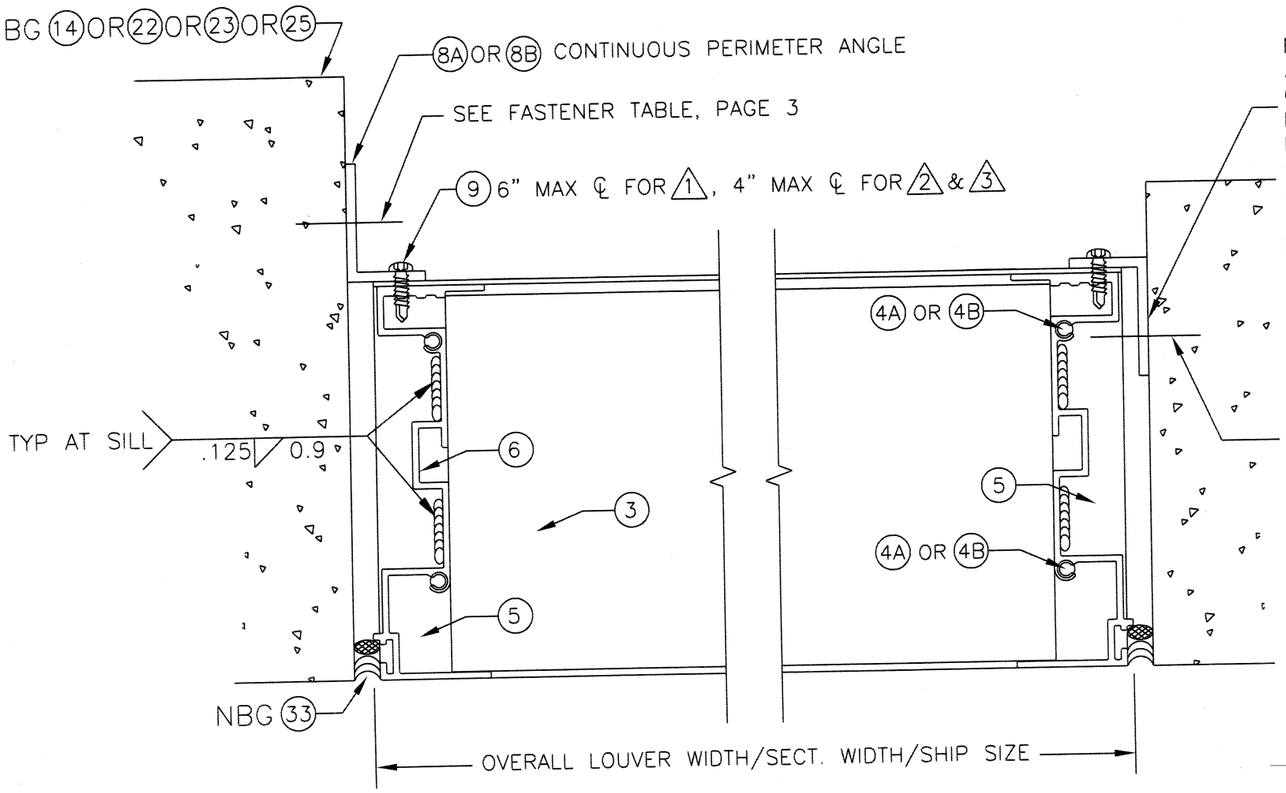
SCALE 1:2.5
SHEET NO. 3 OF 16
CAD DRAWING NO. ESS-502D

TITLE ESS-502D LOUVER DETAILS - HEAD/SILL





NOTE: CONTINUOS PERIMETER ANGLE MAY BE POSITIONED ON JAMBS WITH ANGLE LEG PROJECTED TOWARD EXTERIOR OR INTERIOR OF WALL. VALID FOR ALL BUILDING SUBSTRATE TYPES. ADDITIONAL SPACING BETWEEN LOUVER AND SUBSTRATE MAY BE NECESSARY DUE TO FASTENER HEAD–LOUVER INSTALLATION CLEARANCE.

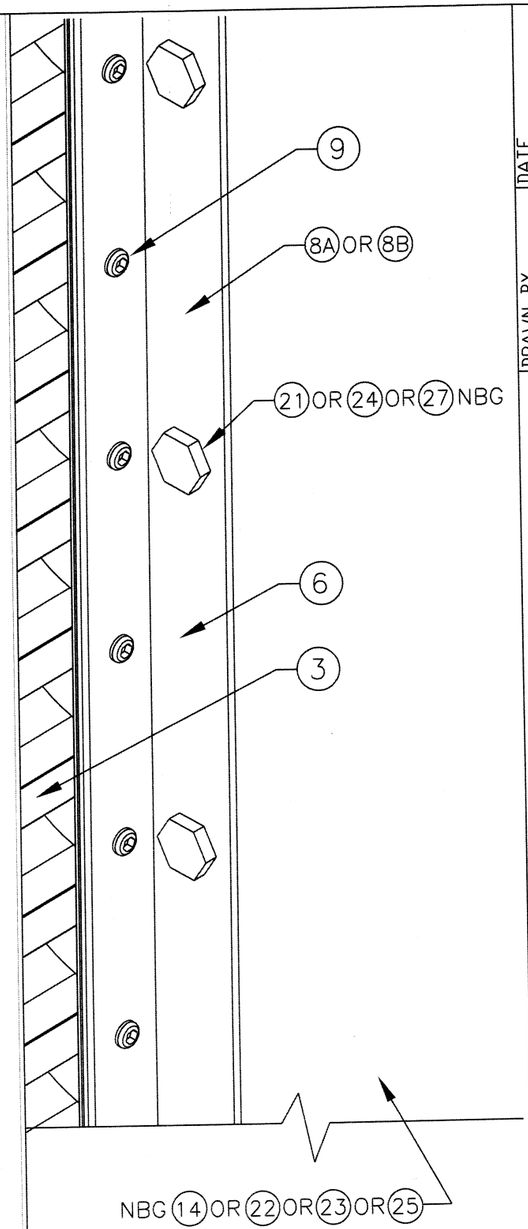
SEE FASTENER TABLE, PAGE 3

NOTE FOR CMU: BLOCK IS GROUT FILLED AROUND OPENING. (MIN 2000PSI)

NBG=NOT BY MANUFACTURER

3 / 4 JAMB DETAIL
SCALE: 1:2
SEE "3 ISO" FOR ISOMETRIC DETAIL

3opp / 4 JAMB DETAIL
SCALE: 1:2



3 ISO / 4 JAMB DETAIL
SCALE: 1:2

DRAWN BY M STEELE
DATE 4/27/09
SCALE 1:2
SHEET NO. 4 OF 16
CAD DRAWING NO. ESS-502D

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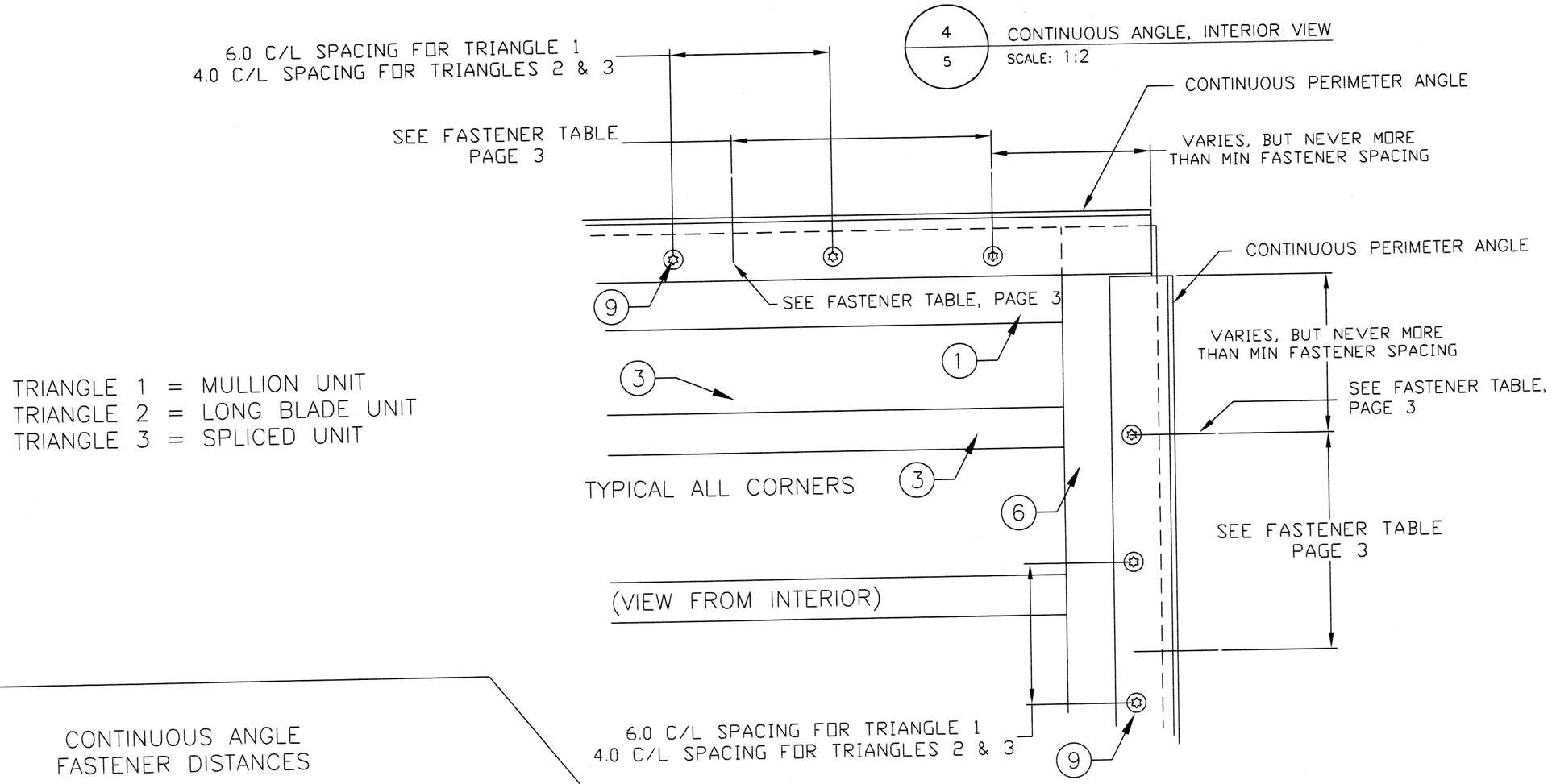
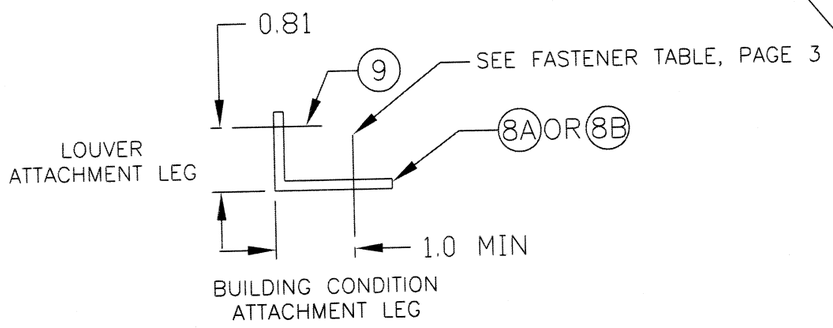
TITLE ESS-502D LOUVER DETAILS – JAMBS

STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED PROFESSIONAL ENGINEER
4/27/09



CONTINUOUS ANGLE FASTENER DISTANCES



(BUILDING CONDITION NOT SHOWN)

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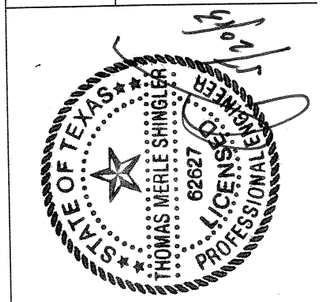
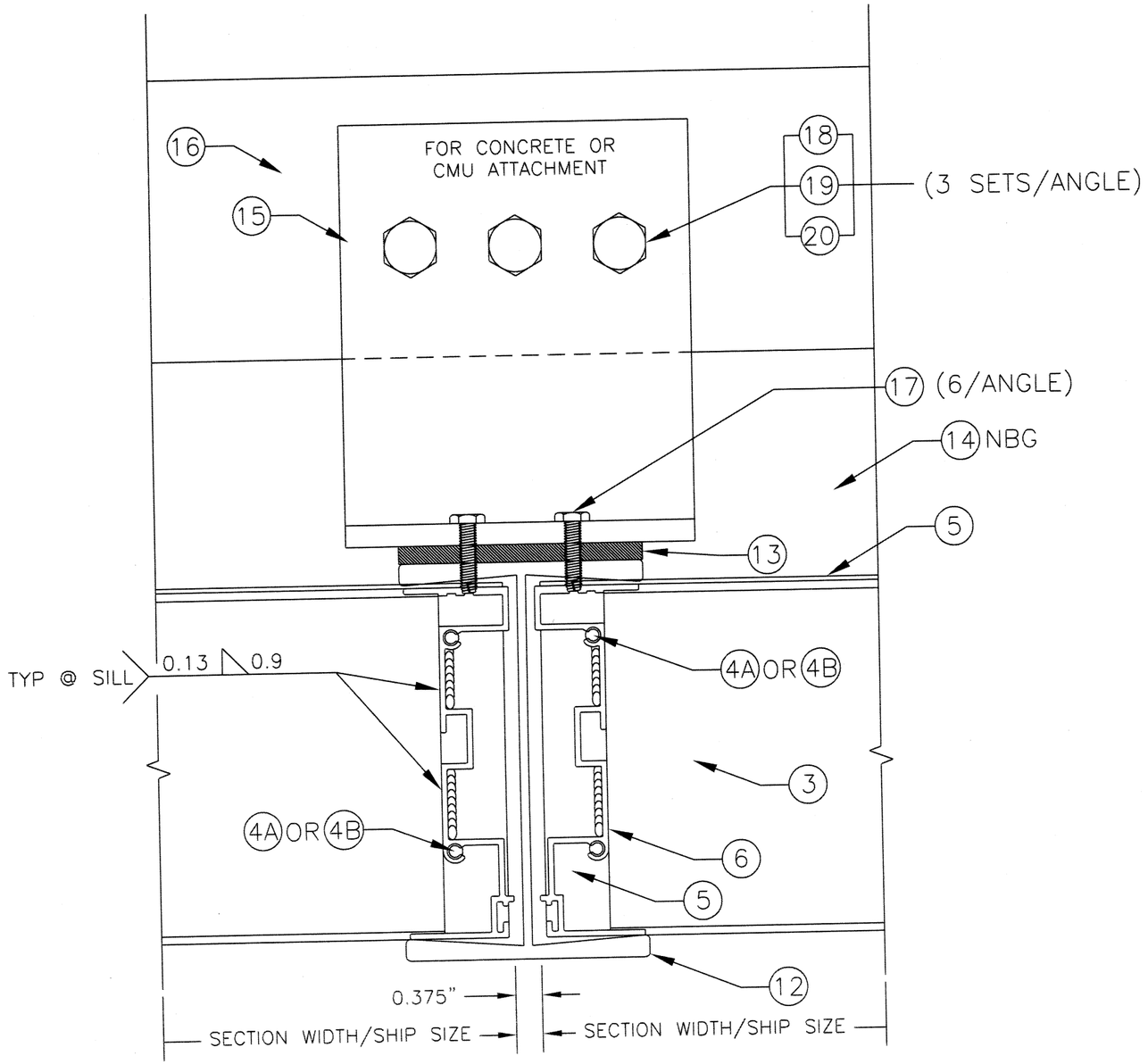
DRAWN BY	M STEELE
DATE	4/27/09
SCALE	1:2
SHEET NO.	5 OF 16
CAD DRAWING NO.	ESS-501D

TITLE: ESS-502D LOUVER DETAILS - CONTINIOUS ANGLE

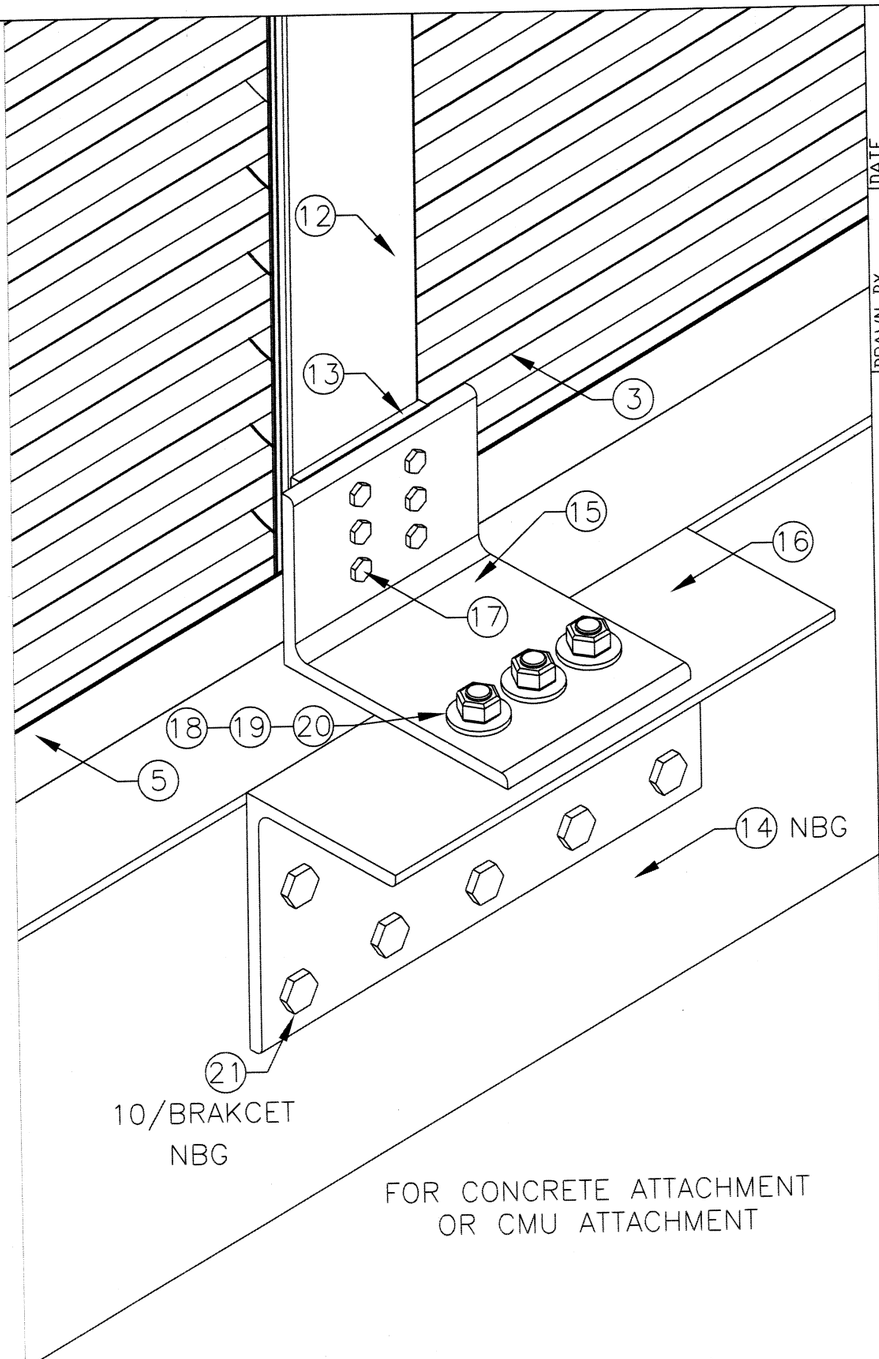




5A / 6 "I" MULLION DETAIL
SCALE: 1:2
SEE "5 ISO" FOR ISOMETRIC DETAIL

NBG=NOT BY MANUFACTURER

NOTE: CONTINUOUS PERIMETER
ANGLE NOT SHOWN ON THIS PAGE.



5A ISO / 6 ISOMETRIC (MULLION DETAIL)
(TYPICAL @HEAD AND SILL)
SCALE: 1:3

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WISCONSIN 54476-0410

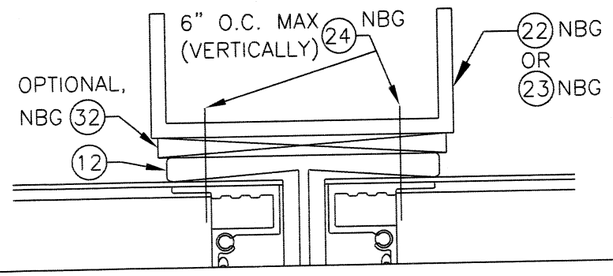
DRAWN BY M STEELE
DATE 4/27/09
SCALE VARIES
SHEET NO. 6 OF 16
CAD DRAWING NO. ESS-502D

TITLE ESS-502D LOUVER DETAILS - CMU & CONCRETE MULLION SUPPORT

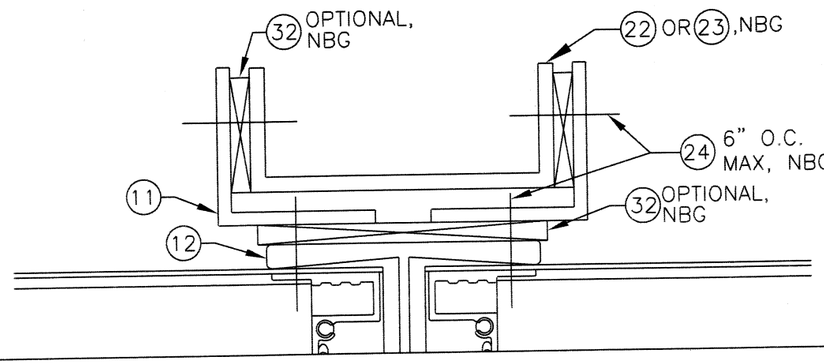
STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED PROFESSIONAL ENGINEER

5 B / 7 — STEEL MULLION ATTACHMENT 1
SCALE: 1:2

FOR STRUCTURAL STEEL OR STEEL STUD ATTACHMENT
OPTION ONE



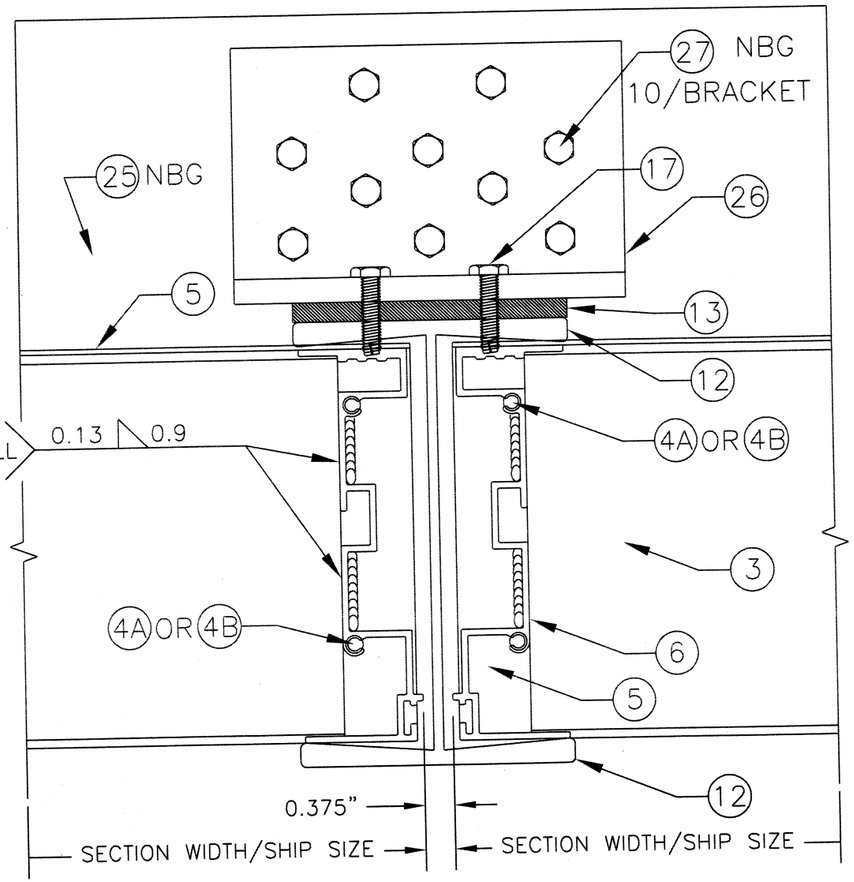
FOR STRUCTURAL STEEL OR STEEL STUD ATTACHMENT
OPTION TWO



5 C / 7 — STEEL MULLION ATTACHMENT 2
SCALE: 1:2

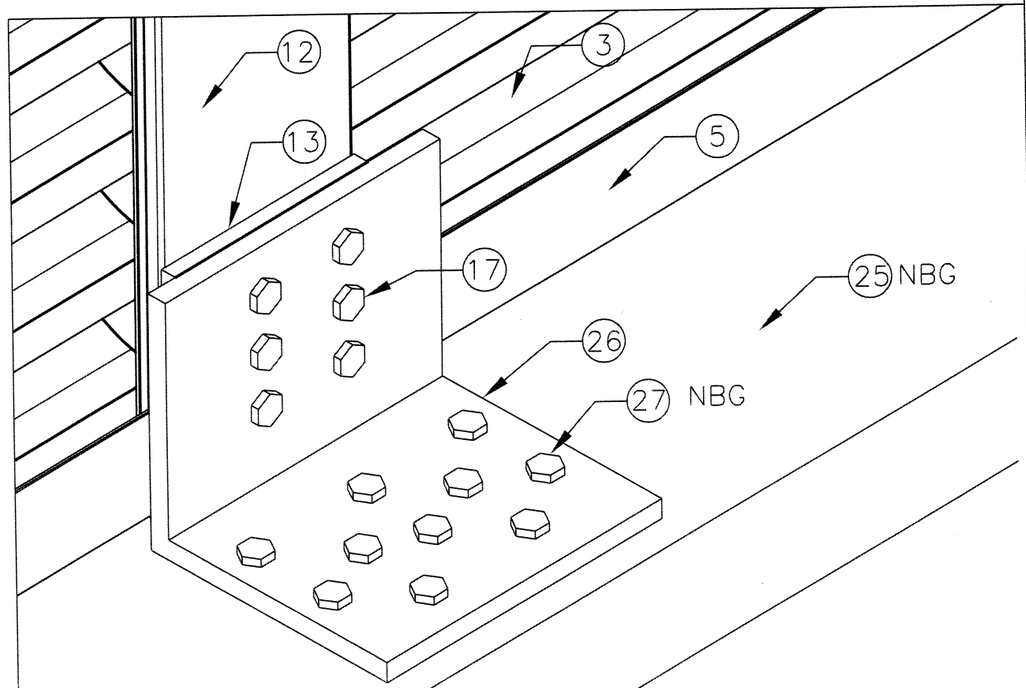
NOTE: STRUCTURAL STEEL AND STEEL STUD MULLION SUPPORT TYPES (NOT BY GREENHECK) MUST BE CAPABLE OF WITHSTANDING ALL LOADS TRANSFERRED BY THE LOUVER SECTIONS AT THE TOP AND BOTTOM OF THE VERTICAL MULLION CONDITION(S). THE FORMULA TO DETERMINE THE TRANSFERRED POINT LOAD IN POUNDS IS (SECTION WIDTH FEET X SECTION HEIGHT FEET X 110 PSF)/2.

5 D / 7 — WOOD MULLION ATTACHMENT
SCALE: 1:2
SEE "5 D ISO" FOR ISOMETRIC DETAIL



NOTE: CONTINUOUS PERIMETER ANGLE NOT SHOWN ON THIS PAGE.

NBG=NOT BY MANUFACTURER



5 D ISO / 7 — WOOD MULLION ATTACHMENT
SCALE: 1:2

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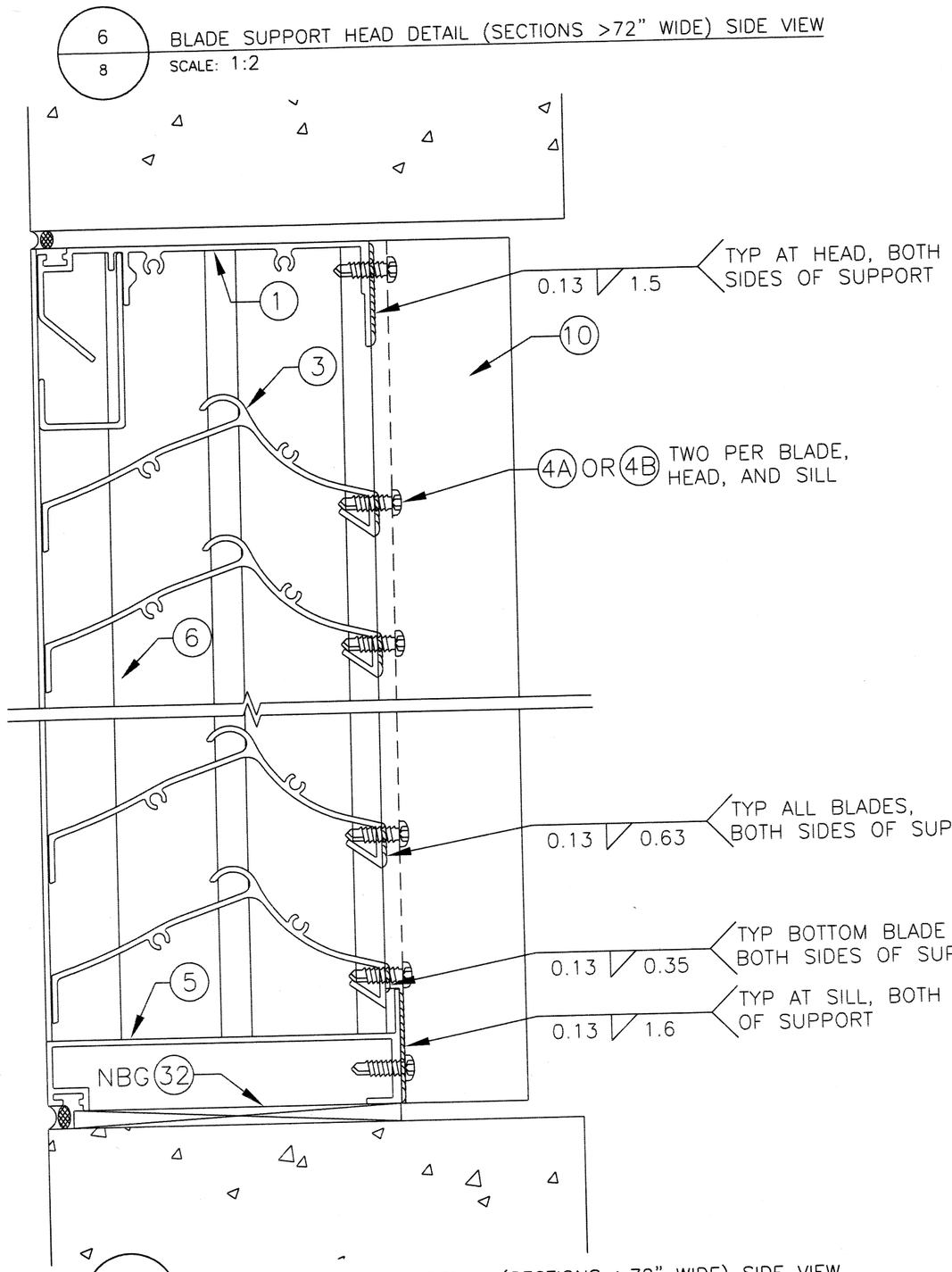
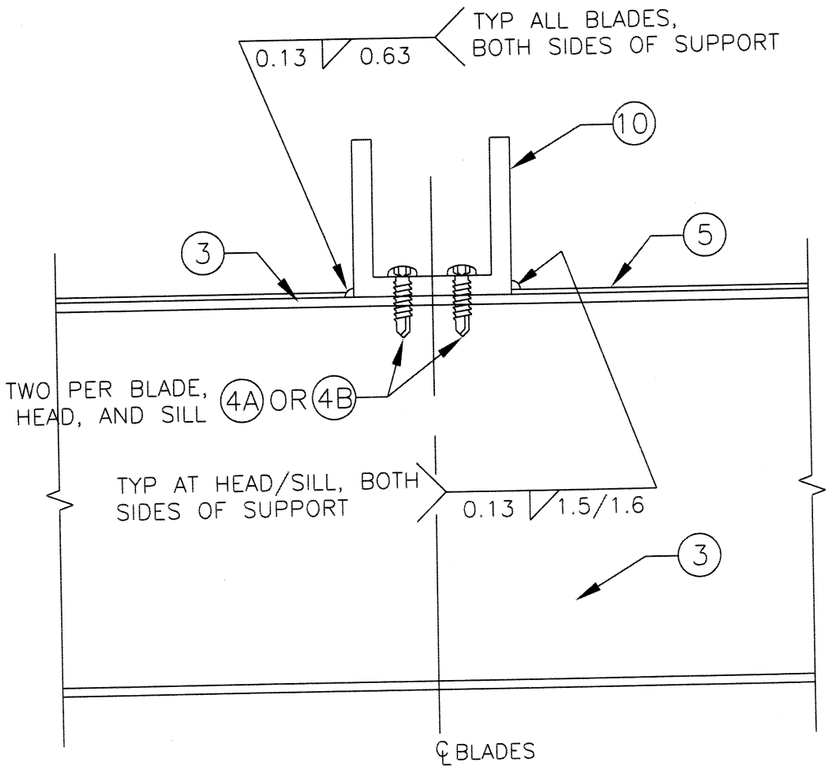
DRAWN BY M STEELE | DATE 4/27/09
SCALE 1:2 | SHEET NO. 7 OF 16
CAD DRAWING NO. ESS-502D

TITLE
ESS-502D LOUVER
DETAILS - STEEL STUD,
STRUCTURAL STEEL, &
WOOD MULLION SUPPORT

STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED
PROFESSIONAL ENGINEER





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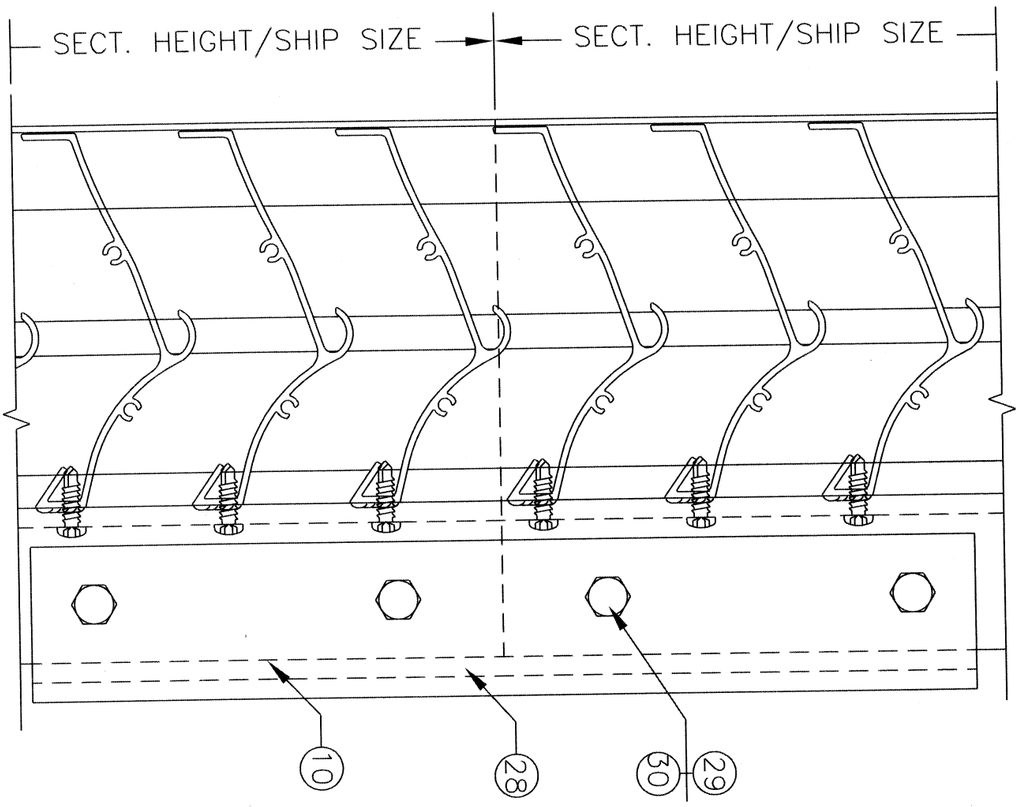
WISCONSIN 54476-0410

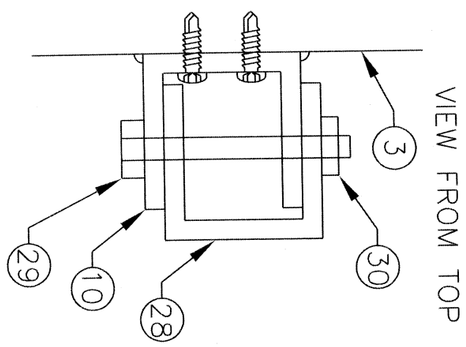
DRAWN BY	M STEELE
DATE	4/27/09
SCALE	1:2
SHEET NO.	8 OF 16
CAD DRAWING NO.	ESS-502D

TITLE: ESS-502D LOUVER DETAILS - BLADE SUPPORT

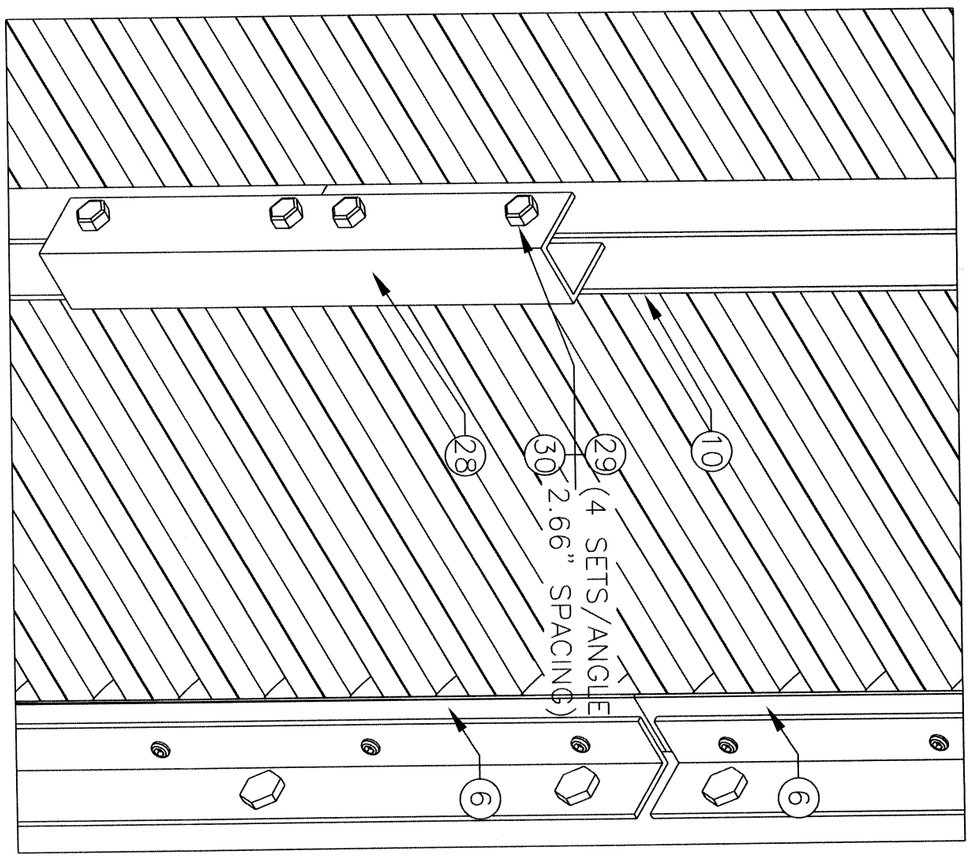
STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED
PROFESSIONAL ENGINEER
4/27/09



9/9 VERTICAL SPLICE/STACK DETAIL
SCALE: 1:2
SEE "9 ISO" FOR ISOMETRIC DETAIL



VIEW FROM TOP



9 ISO/9 ISOMETRIC (SPLICE/STACK DETAIL)
SCALE: 1:3

STATE OF TEXAS
THOMAS MERLE SHINGLER
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PROFESSIONAL ENGINEER
5/20/13

GREENHECK
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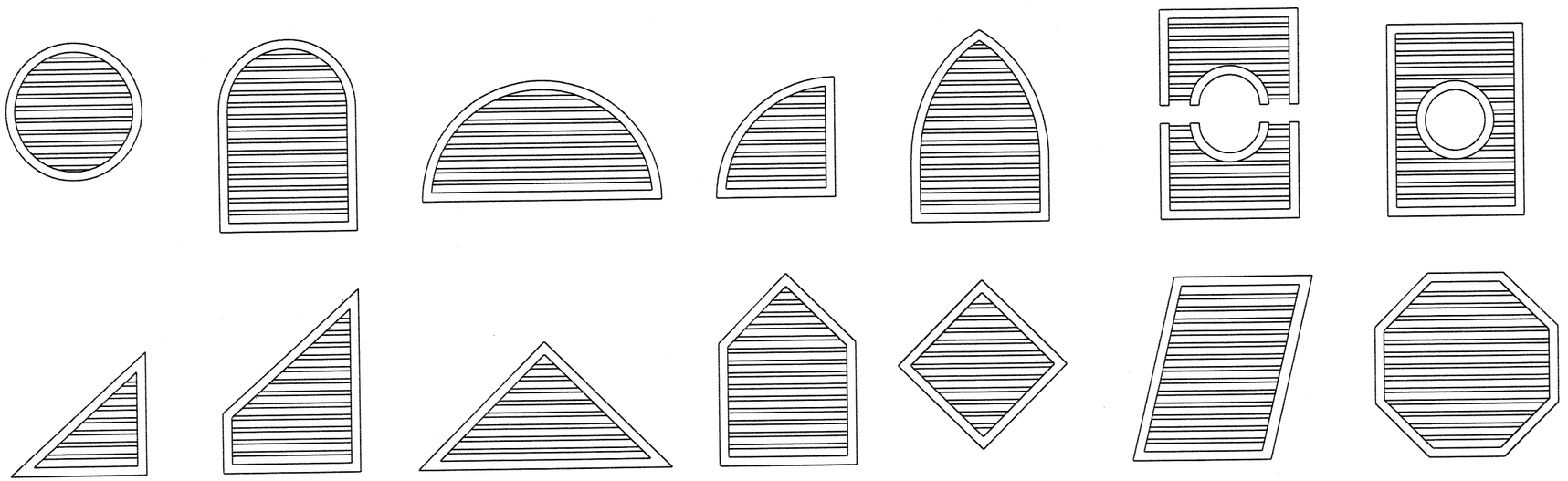
WISCONSIN 54476-0410

DRAWN BY: M STEELE	DATE: 4/27/09
SCALE: VARIES	
SHEET NO.: 9 OF 16	
CAD DRAWING NO.: ESS-502D	

TITLE
ESS-502D LOUVER

DETAILS - SPLICED BLADE SUPPORT

BELOW ARE THE SHAPE UNITS THAT THE NOA WILL ALLOW



NOTES:

1. OTHER SHAPES MAY APPLY PROVIDING THEY ARE SIMILAR TO THOSE SHOWN AND HAVE CONSTRUCTION AS DESCRIBED IN THIS PACKET.

2. ALL SHAPE LOUVERS ARE TO HAVE THE SAME WIDTH, HEIGHT, AND PRESSURE RESTRICTIONS AS RECTANGULAR LOUVERS, AND MAY BE SPLICED/STACKED VERTICALLY AND HORIZONTALLY (MULLED UNITS) IN THE SAME MANNER AS RECTANGULAR LOUVERS.

3. IF THE SHAPE LOUVER SECTION WIDTH EXCEEDS 72", A BLADE SUPPORT IS REQUIRED.

4. A MULLION REQUIRED FOR SHAPE LOUVERS ONLY IF BOTH OF THE FOLLOWING ARE TRUE: OVERALL UNIT WIDTH IS >72", AND SECTION HEIGHT IS >72".

5. FOLLOW THE SAME GUIDELINES AS NON-SHPAED UNITS FOR FASTENING OF SHAPE UNITS TO THE BUILDING CONDITION.

DRAWN BY M STEELE | DATE 4/27/09
SCALE 0.5":1' | SHEET NO. 10 OF 16
CAD DRAWING NO. ESS-502D

GREENHECK
P.O.BOX 410 SCHOFIELD,
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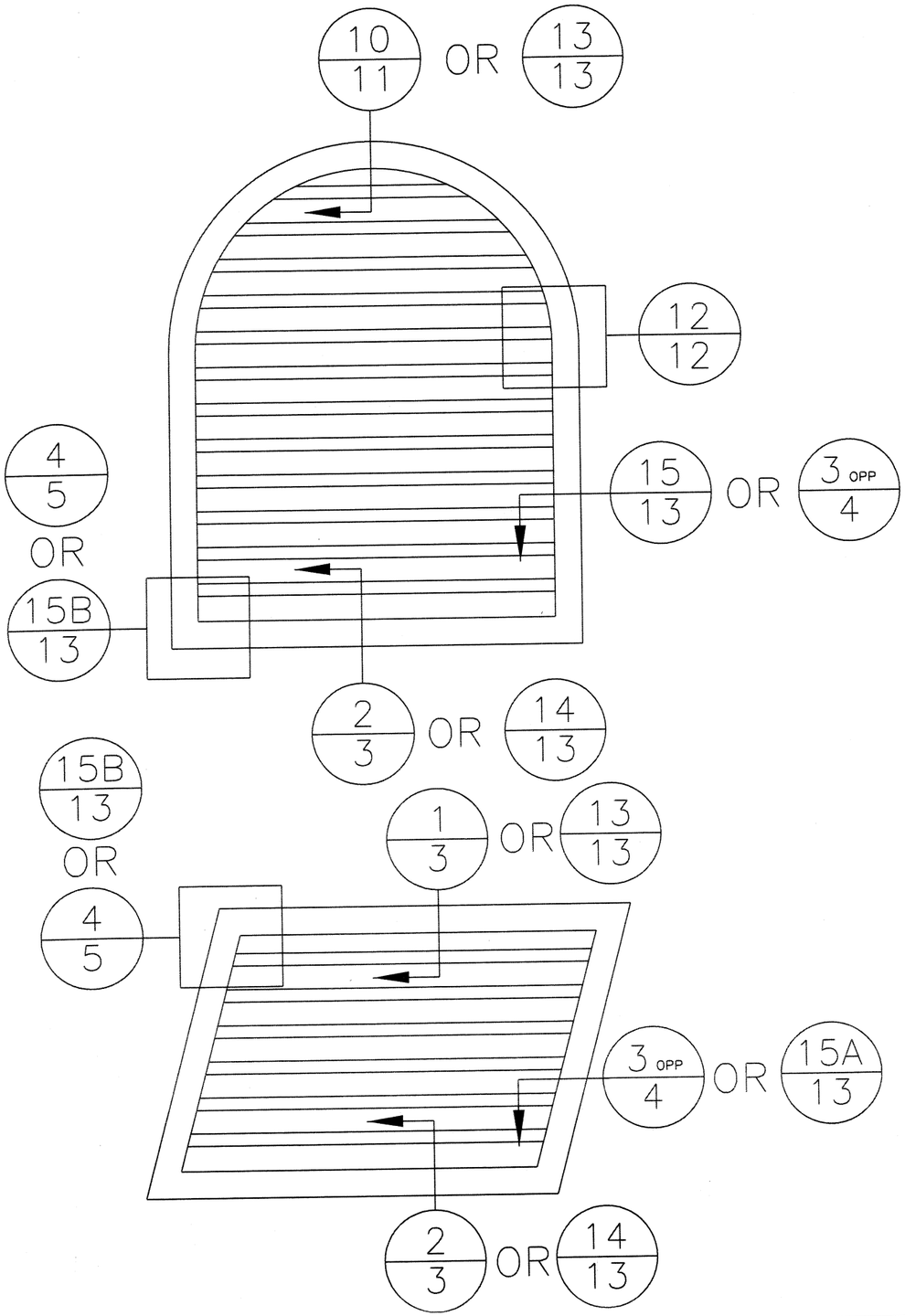
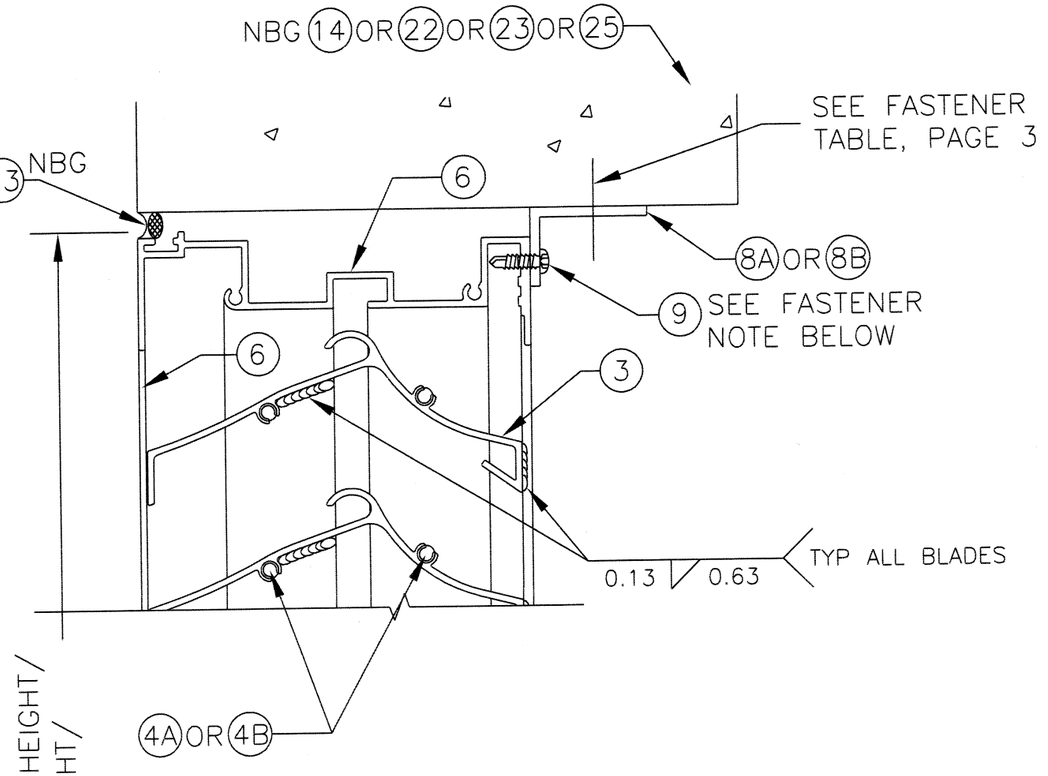
TITLE ESS-502D LOUVER
SHAPE STYLES,
ELEVATION CONFIGURATIONS

STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED
PROFESSIONAL ENGINEER

4 TYPICAL SHAPE LOUVER CALLOUTS





FASTENER NOTES FOR (9):

6" MAX ℄ FOR △1, 4" MAX ℄ FOR △2 & △3

10/11 SHAPES HEAD DETAIL
SCALE: 1:2

NBG=NOT BY MANUFACTURER

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DRAWN BY M STEELE | DATE 4/27/09
SCALE VARIES | SHEET NO. 11 OF 16
CAD DRAWING NO. ESS-502D

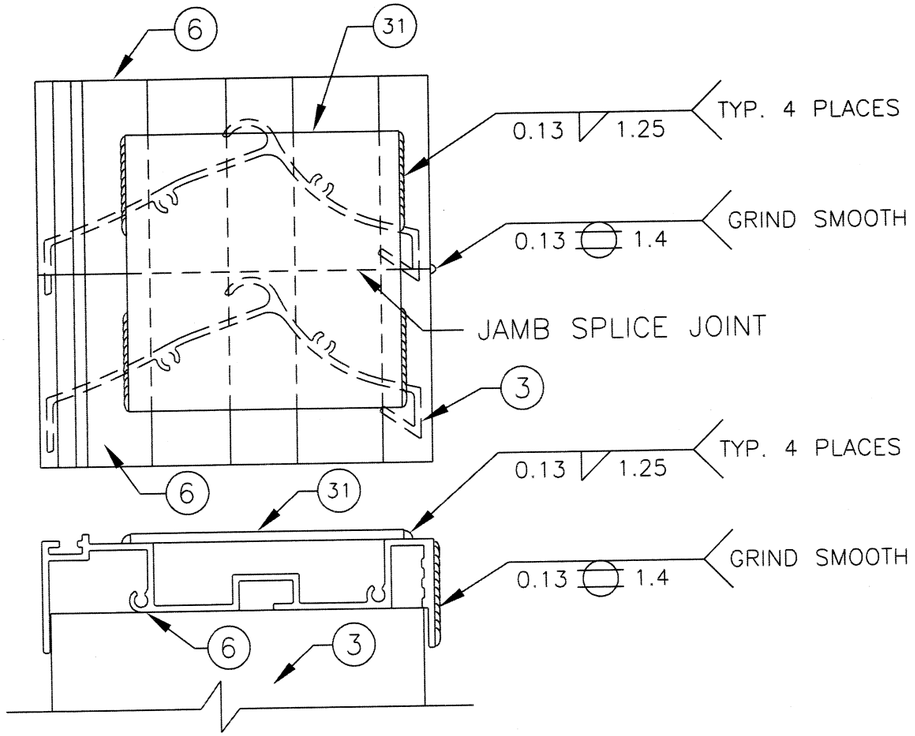
ESS-502D LOUVER

SHAPE ELEVATIONS, DETAILS - SHAPE

TITLE

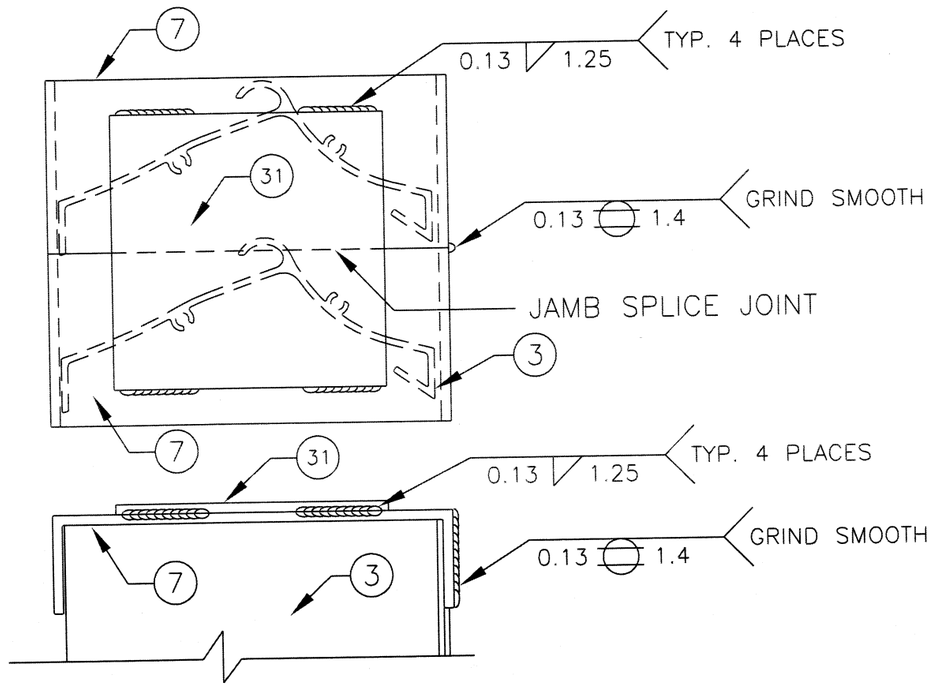
STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED PROFESSIONAL ENGINEER
4/27/09

12 A / 12 JAMB SPLICE DETAIL
SCALE: 1:2



THIS IS ONLY ON SHAPE UNITS WHEN A CURVED EXTRUDED JAMB MEETS A STRAIGHT JAMB (THIS IS NOT FOR A "SPLICED" UNIT WHERE ONE LOUVER SIT ON TOP OF ANOTHER).

12 B / 12 CHANNEL JAMB SPLICE DETAIL
SCALE: 1:2



THIS IS ONLY ON SHAPE UNITS WHEN A CURVED C-CHANNEL JAMB MEETS A STRAIGHT JAMB (THIS IS NOT FOR A "SPLICED" UNIT WHERE ONE LOUVER SIT ON TOP OF ANOTHER).

DRAWN BY M STEELE | DATE 4/27/09
SCALE 1:2 | SHEET NO. 12 OF 16
CAD DRAWING NO. ESS-502D

GREENHECK
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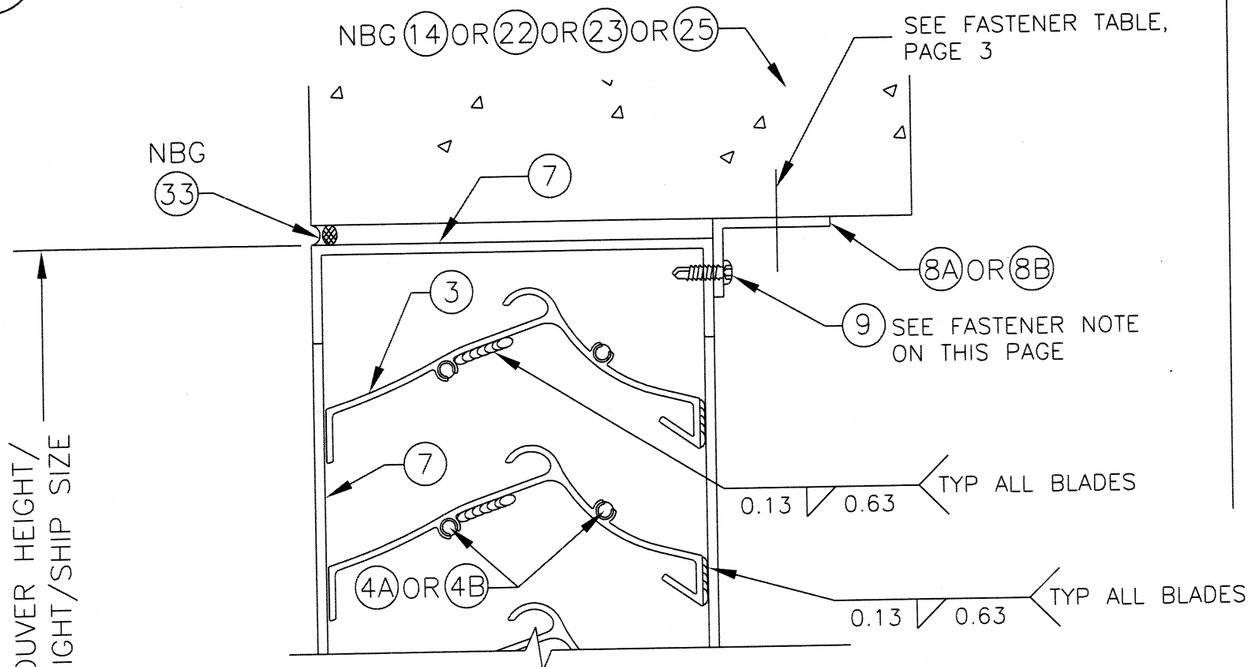
TITLE
ESS-502D LOUVER
SHAPE LOUVERS,
DETAILS - SPLICED JAMBS

STATE OF TEXAS
THOMAS MERLE SHINGLER
82627
LICENSED PROFESSIONAL ENGINEER

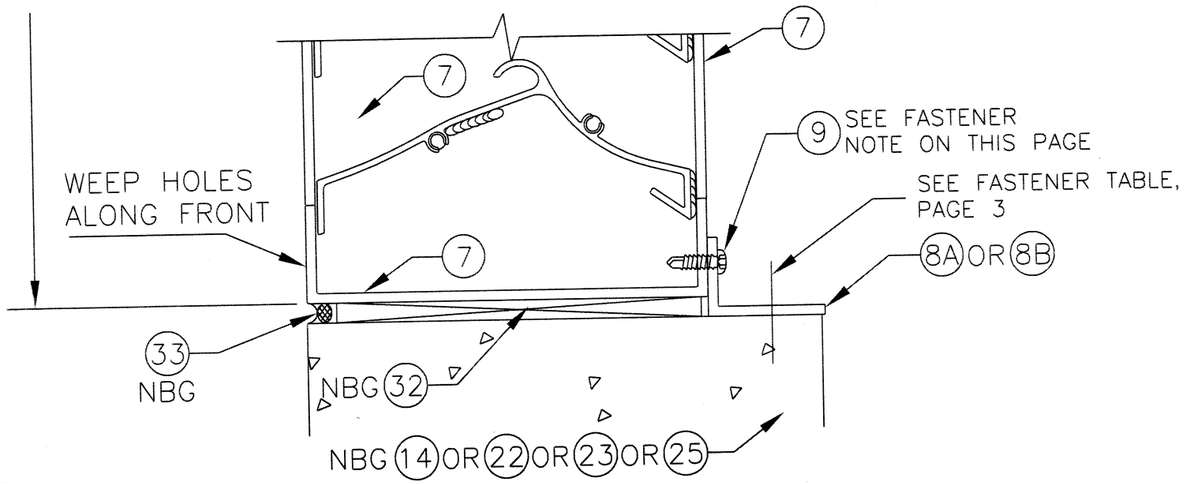
13/13 SHAPES HEAD DETAIL – CHANNEL FRAME
SCALE: 1:2

SETUP FOR OPTIONAL CHANNEL FRAME



FASTENER NOTES FOR (9):

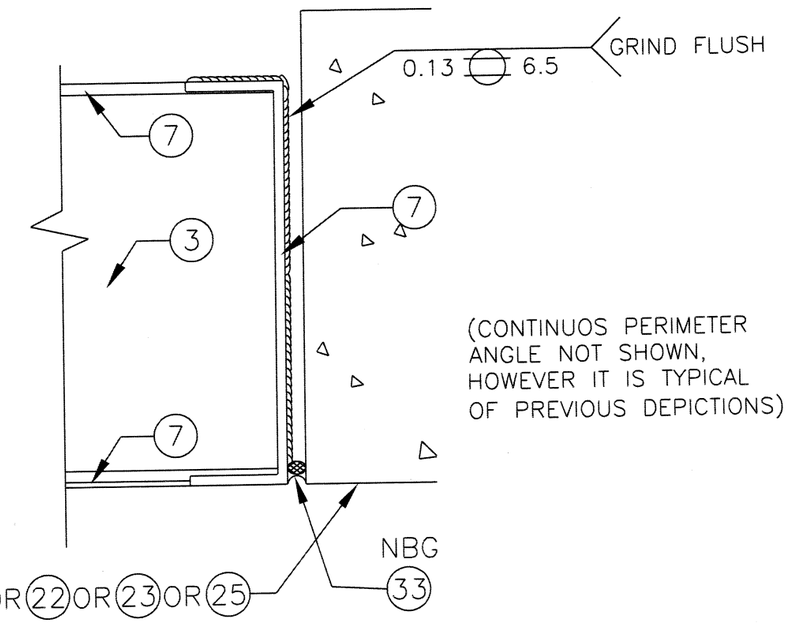
6" MAX ℄ FOR 1, 4" MAX ℄ FOR 2 & 3



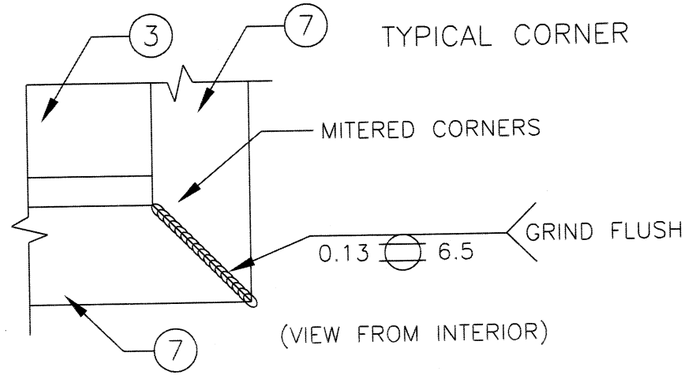
14/13 SHAPES SILL DETAIL – CHANNEL JAMB
SCALE: 1:2

NBG=NOT BY MANUFACTURER

15 A/13 SHAPES CHANNEL JAMB DETAIL
SCALE: 1:2



(CONTINUOS PERIMETER ANGLE NOT SHOWN, HOWEVER IT IS TYPICAL OF PREVIOUS DEPICTIONS)



(CONTINUOS PERIMETER ANGLE & WALL CONDITION NOT SHOWN, HOWEVER IT IS TYPICAL OF PREVIOUS DEPICTIONS)

15 B/13 SHAPES SILL DETAIL – CHANNEL JAMB INTERIOR
SCALE: 1:2

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SCALE 1:2 | SHEET NO. 13 OF 16
CAD DRAWING NO. ESS-502D

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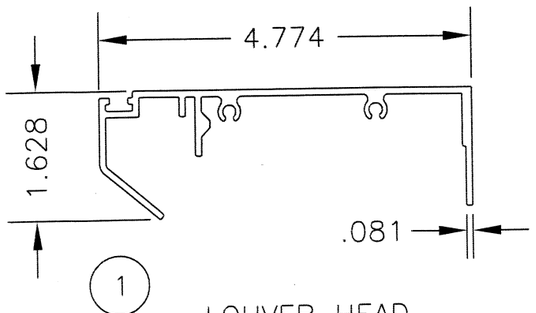
P.O.BOX 410 SCHOFIELD, WISCONSIN 54476-0410

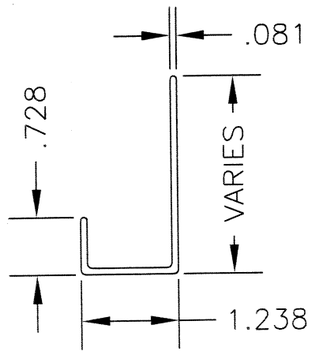
TITLE ESS-502D LOUVER

SHAPE LOUVERS, DETAILS – CHANNEL FRAME

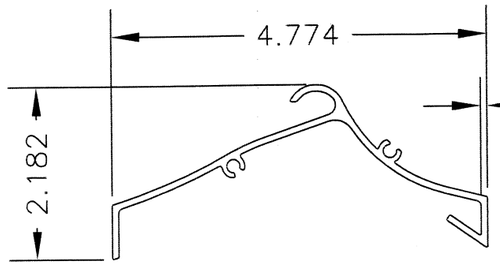
STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED PROFESSIONAL ENGINEER



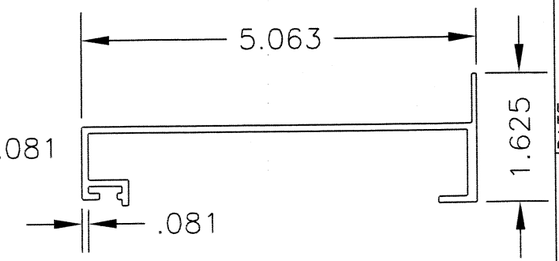
1 LOUVER HEAD
6063-T5 OR 6105-T5 ALUMINUM



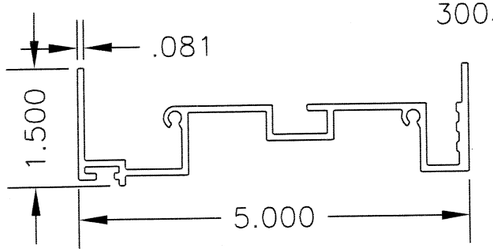
2 LOUVER HEAD DRAIN
3003-H14, 5052-H32, OR 6063-T5 ALUMINUM



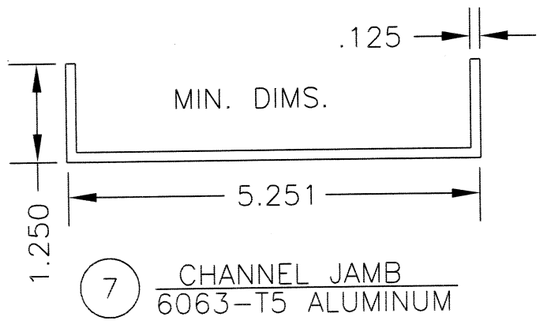
3 LOUVER BLADE
6105-T5 ALUMINUM



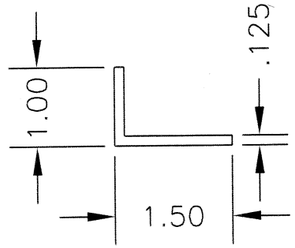
5 LOUVER SILL
6063-T5 OR 6105-T5 ALUMINUM



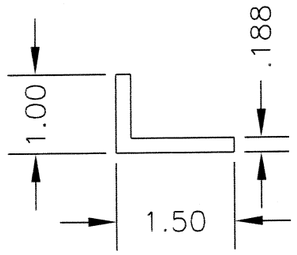
6 LOUVER JAMB
6105-T5 ALUMINUM



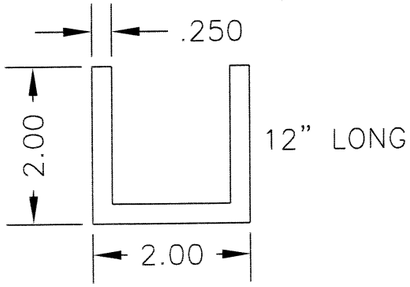
7 CHANNEL JAMB
6063-T5 ALUMINUM



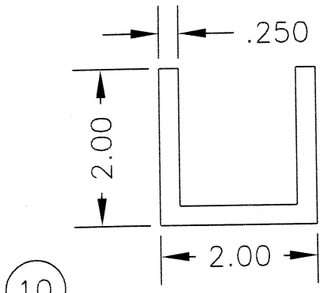
8A CONT. PERIMETER ANGLE
6061-T6 ALUMINUM



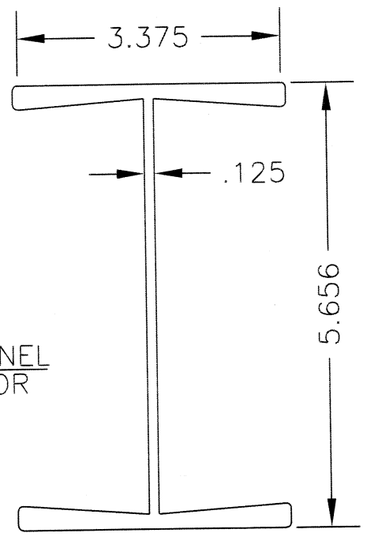
8B CONT. PERIMETER ANGLE
6063-T5 ALUMINUM



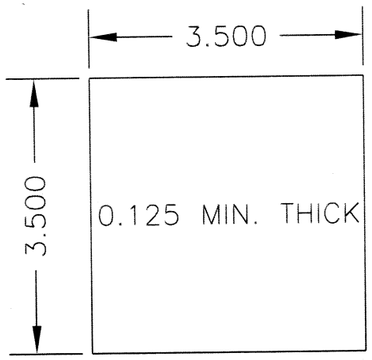
28 SPLICE CHANNEL
6061-T6, 6005-T5, OR
6105-T5 ALUMINUM



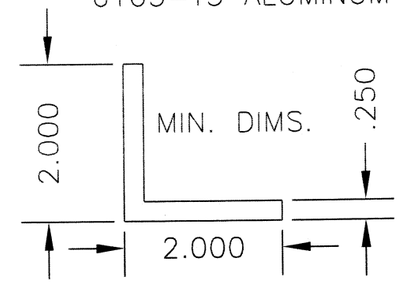
10 BLADE SUPPORT CHANNEL
6061-T6, 6005-T5, OR
6105-T5 ALUMINUM



12 "SLIP I-MULLION"
6105-T5 OR 6061-T6 ALUMINUM



31 SPLICE PLATE
3003-H14 OR 5052-H32 ALUMINUM



11 OPTIONAL MULLION SUPPORT
6063-T5 ALUMINUM MIN

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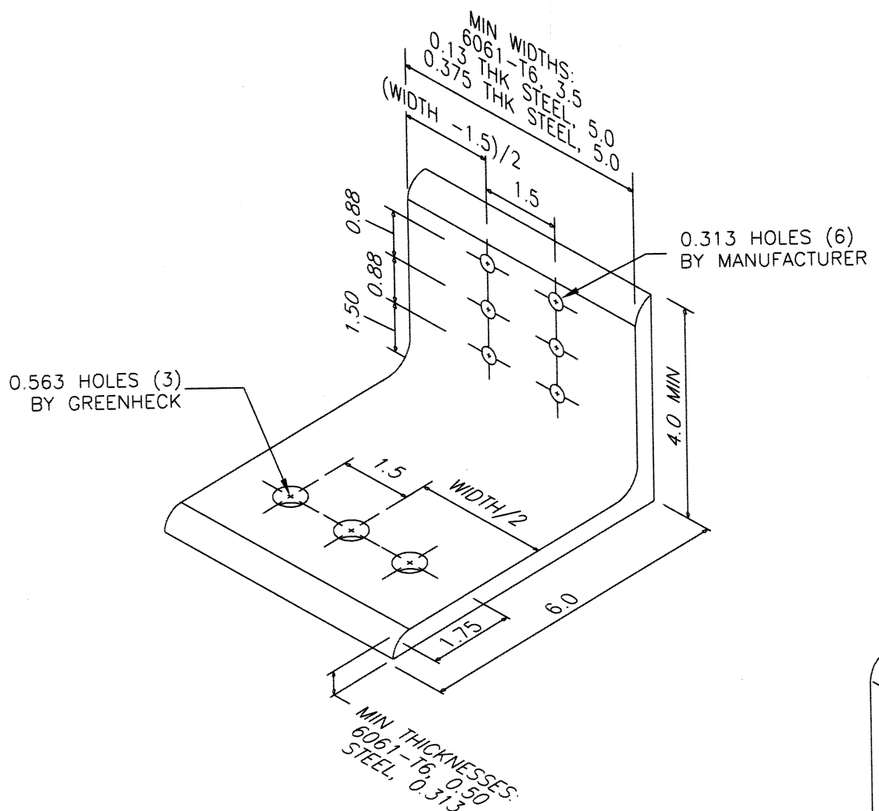
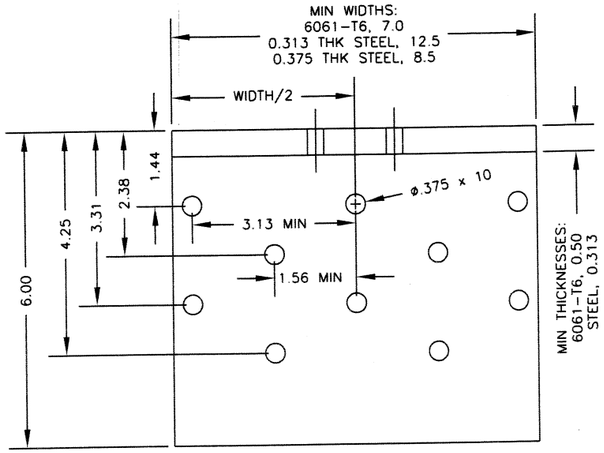
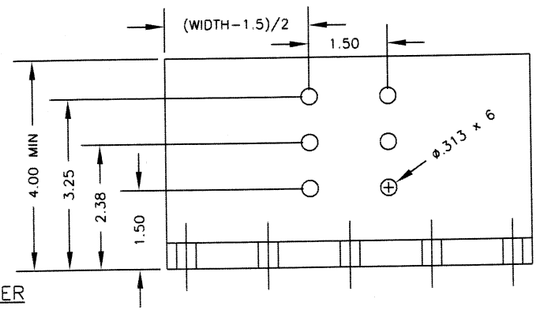
DATE 4/27/09
SCALE 1:2
SHEET NO. 14 OF 16
CAD DRAWING NO. ESS-502D

TITLE ESS-502D LOUVER DETAILS - PART DETAILS

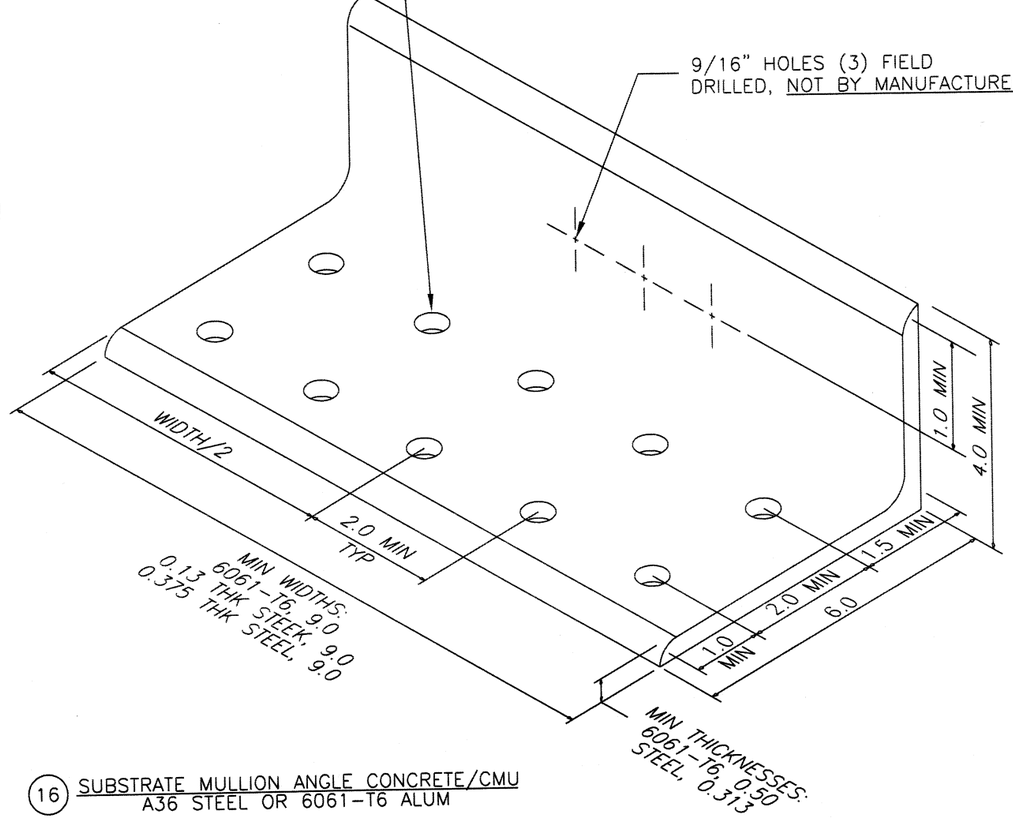


(15) LOUVER MULLION ANGLE CONCRETE/CMU
A36 STEEL OR 6061-T6 ALUM





(26) MULLION SUPPORT, WOOD
6061-T6 ALUMINUM,
OR A36 STEEL



(16) SUBSTRATE MULLION ANGLE CONCRETE/CMU
A36 STEEL OR 6061-T6 ALUM

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SCALE 1:2
SHEET NO. 15 OF 16
CAD DRAWING NO. ESS-502D

TITLE ESS-502D LOUVER DETAILS - PART DETAILS

STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
LICENSED PROFESSIONAL ENGINEER

ITEM	DESCRIPTION	MATERIAL	NOTES
1	LOUVER HEAD	ALUM	
2	LOUVER HEAD DRAIN	ALUM	
3	LOUVER BLADE	ALUM	
4A	#10 x 0.5 MIN THREAD, SCREW, 7075-T6 ALUM	ALUM	USED ON ANODIZED UNITS
4B	#10 OR #12 x 0.5 MIN THREAD, SCREW, STAINLESS	SS	TYPICALLY USED
5	LOUVER SILL	ALUM	
6	LOUVER JAMB	ALUM	
7	OPTIONAL C-CHANNEL JAMB	ALUM	OPTIONAL FOR SHAPE UNITS
8A	CONTINUOUS MTG ANGLE, 1.0x1.5x0.125 MIN, 6061-T6	ALUM	
8B	CONTINUOUS MTG ANGLE, 1.0x1.5x0.188 MIN, 6063-T5	ALUM	
9	#10-24 OR #12-24 x 0.5 MIN THREAD, SCREW	SS	
10	BLADE SUPPORT CHANNEL, 2x2x2x0.25	ALUM	
11	OPTIONAL ADDITIONAL MULLION SUPPORT ANGLE	ALUM	OPTIONAL
12	SLIP "I" MULLION	ALUM	
13	GASKET, 3.5x4x0.25 MIN (BY MANUFACTURER)	VARIES	RUBBER/NEOPRENE LIKE
14	CONCRETE OR GROUT FILLED CMU, 2000 PSI MIN	VARIES	NOT BY MANUFACTURER
15	LOUVER MULLION ANGLE FOR CONCRETE/CMU	STEEL/ALUM	
16	SUBSTRATE MULLION ANGLE FOR CONCRETE/CMU	STEEL/ALUM	
17	0.25-20x1 MIN, SCREW (BY MANUFACTURER)	SS	
18	BOLT, 0.5-13x1 MIN (BY MANUFACTURER)	SS	
19	NUT, 0.5-13 MIN (BY MANUFACTURER)	SS	
20	WASHER, 0.5 MIN (BY MANUFACTURER)	SS	
21	0.25 DIA. ITW BUILDEX TAPCON w/ ADV. THREADFORM, 1.75 MIN EMBEDMENT	SS/STEEL	NOT BY MANUFACTURER
22	STRUCTURAL STEEL, 0.075 MIN THICKNESS	SS/STEEL	NOT BY MANUFACTURER
23	STEEL STUD, 14GA MIN	SS/STEEL	NOT BY MANUFACTURER
24	0.25 DIAMETER SCREW, MUST FULLY ENGAGE STEEL	SS/STEEL	NOT BY MANUFACTURER
25	WOOD SUBSTRATE, G=0.55 MIN DENSITY	WOOD	NOT BY MANUFACTURER
26	MULLION ANGLE FOR WOOD	STEEL/ALUM	
27	0.375 DIA. LAG SCREW, 3.0 MIN EMBEDMENT	SS/STEEL	NOT BY MANUFACTURER
28	SPLICE CHANNEL, 2x2x2x0.25, 12" LONG	ALUM	
29	BOLT, 0.313x2.5 MIN (BY MANUFACTURER)	SS	
30	NUT, 0.313(5X16) (BY MANUFACTURER)	SS	
31	SPLICE PLATE	ALUM	
32	SHIMS, OPTIONAL, AS REQUIRED, INCOMPRESSABLE	VARIES	NOT BY MANUFACTURER
33	SEALANT AND BACKER ROD	VARIES	NOT BY MANUFACTURER

GENERAL NOTES:

1. IT SHALL BE THE RESPONSIBILITY OF THE PERMIT HOLDER TO VERIFY THE STRUCTURAL INTEGRITY OF THE EXISTING STRUCTURE TO SUPPORT THE LOADS IMPOSED BY THE PENTHOUSE ASSEMBLY.

2. THE ESS-502D HAS BEEN DESIGNED AND QUALIFIED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE (FBC) AND TEST PROTOCOLS TAS-201 (IMPACT), TAS-202 (UNIFORM STATIC PRESSURE), AND TAS-203 (CYCLIC FATIGUE) TO A MAXIMUM DESIGN LOAD OF +/- 110 PSF.

3. THE MAXIMUM UNSUPPORTED BLADE LENGTH SHALL NOT EXCEED 72" WITHOUT STIFFENER AND 144" WITH STIFFENER.

4. THE MAXIMUM OVERALL UNIT HEIGHT IS UNLIMITED BY MEANS OF STACKING AND USE OF SPLICED BLADE SUPPORTS. THE MAXIMUM OVERALL UNIT WIDTH IS UNLIMITED BY USE OF MULLIONS WITH A MAXIMUM SPACING OF 72".

5. LOUVER CONSTRUCTION: HEAD, SILL, JAMBS, AND BLADES ARE SQUARE CUT AT BOTH ENDS. BLADE SPACING IS 2" MAX. EACH JAMB IS SECURED TO THE SILL WITH (2) SCREWS AND WELDED. BLADES AND HEADS ARE SECURED TO JAMBS WITH (2) SCREWS AND WELDED.

6. ALL WOOD SUBSTRATE SHALL BE G = 0.55 DENSITY OR BETTER.

7. ALL STEEL STUD SUBSTRATE SHALL BE MIN. 14 GA. FY = 50 KSI.

8. ALL STRUCTURAL STEEL SUBSTRATE SHALL BE MIN. 0.075" THICK FY = 36 KSI.

9. ALL CONCRETE SUBSTRATE SHALL BE MIN. 2000 PSI.

10. CONCRETE MASONRY SHALL BE ASTM C90, TYPE II, MIN. 2000 PSI GROUT-FILLED.

11. THE LOUVER MANUFACTURER DOES NOT DETERMINE THE STRUCTURAL INTEGRITY OF THE SUBSTRATE STRUCTURE.

12. THE SYSTEM SHALL ONLY BE INSTALLED IN A LOCATION WHERE THE ENCLOSED AREA/ROOM BEHIND THE LOUVER IS DESIGNED TO DRAIN WATER PENETRATING INTO THE AREA/ROOM, AND THE AREA/ROOM WILL HOUSE WATER RESISTANT/PROOF EQUIPMENT, COMPONENTS, AND/OR SUPPLIES.

13. INSTALLER TO PROVIDE SEPARATION OF DISSIMILAR MATERIALS AS REQUIRED.

GREENHECK
P.O.BOX 410 SCHOFIELD,
WISCONSIN 54476-0410

DRAWN BY M STEELE | DATE 4/27/09
SCALE NA | SHEET NO. 16 OF 16
CAD DRAWING NO. ESS-502D

TITLE ESS-502D LOUVER ITEMIZED PART LISTING & GENERAL NOTES

STATE OF TEXAS
THOMAS MERLE SHINGLER
62627
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5/12/11