March 26, 2009

ARCHITECTURAL WALL SYSTEMS, INC.

Precision Wall Systems
1821 Levee Street
Dallas, TX 75207

Attn: Stephen Loyd

RE: Rutgers / Livingston Student Center
84 Joyce Kilmer Avenue
Piscataway, New Jersey 08854-8036

Letter of Compliance:

Per your request, we have reviewed the referenced project's design parameters for the 2" Arriscraft Calcium Silica units. Be advised that this structural review was performed to determine the integrity of the specified stone material and the specific requirements and/or deviations to the standard installation requirements for the Gridworx Anchoring System.

Design Wind and Seismic Pressures have been evaluated and determined in accordance with the 2006 International Building Code and ASCE 7-05. Interpretation of the Building Code for the project location, the maximum building height, and site specific parameters for Components and Cladding, with tributary areas of 10 square feet, yields critical design pressures as follows:

Typical Wind Zone regions as +23.33 psf / -25.31 psf
Corner Wind Zone regions as +23.33 psf / -31.24 psf

Corner zones for this building structure are defined by the code as 10% of the least building width or 0.4h whichever is smaller, but not less than 4% of the least width or 3 feet.

Specific site parameters for the project have been interpreted as:

Basic Wind Speed	=	100 mph
Mean Roof Height	=	45' – 0" (conservative)
Exposure	=	B
Category	=	III
Importance Factor	=	1.15 wind
Least Building Width	=	100' (assumed)

Specific Requirements and Materials identified for compliance are as follows:

Stone Material	=	Arriscraft Calcium Silica Units	
		Min MOD Rupture	= 800 psi (Georgia material)
		Min FLEX Strength	= NA
		Density	= 120 pcf
		Weight	= 16.0 psf
Nominal thickness	=	2.0" (+ / - 1/16")	
Gage from face	=	1.250" (+ / - 1/16") & 0.500" (+/- 1/16")	
Kerf width	=	0.188" (+ / - 1/16")	
Kerf depth	=	0.500" (+ 1/8 - 1/16")	

10999 PETAL STREET, SUITE 100, DALLAS, TX 75238 • (214) 217-2400 • FAX (214) 217-2439

Stone Strength	=	*SAFETY FACTOR > 12.0 AGAINST BREAKAGE*
Aluminum Extrusions	=	6005 – T5 continuous provided in 12'-0" lengths. Top of stone L Bracket Anchors – (2) per panel -3" long @ ¼ points of panel width; or (1) per panel 6" long @ center of panel center.
Elco Dril-Flex Fasteners	=	# 12 x 2" Self Drilling Structural fasteners – SAE J 429 / Grade 5 with Stalgard Coating – 16" o.c. into Light Gage studs (18 gage minimum).
Masonry Fasteners If Applicable	=	Elco Construction Products 1/4" x 2 1/4" 300 Series Stainless Steel Bi-Metal Concrete Anchors – 16"centers.
Silicone	=	Low modulus product used for top kerf application at Anchor L Brackets.
Recommended Joint Sealant	=	Dow Corning 790 Silicone or equal with 3/8" open cell backer rod.

Cantilevered extrusions bypassing the substrate or attachment are acceptable for distances equal to half the typical supported span. The stone panels are to be supported for wind and deadload at each course and not to be hard stacked to a specific level or starter extrusion.

Inter-story liveload displacements are an important design consideration. The stone veneer usually accommodates this displacement at each floor level and within a stone to stone horizontal joint. The limitations of the typical stone joint may not accommodate defined displacements and a larger joint required at each floor. Consideration of the inter-story liveload displacements with proper sizing and location of the required expansion joint details is the responsibility of the stone detailer.

The intent of this letter is to provide confirmation that a structural review has been completed to confirm that specified stone cladding material and the appropriate structural properties per ASTM test results meet the spans identified in project documents. It verifies that imposed loading does not jeopardize the deflection and stress capacities of the lineal aluminum extrusions, as well as pull out and shear capacities of the specified substrate fasteners. This review has not provided additional engineering, detailing, trade coordination or consideration of non-typical details and transition areas. The intent is to assure the client that the system can perform to the specified criteria and to identify areas of concern that may require further study and consideration by the architect, contractor and stone detailer.

Kevin J. McClintick, P.E.
President
KM:ko

3-26-2009

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www.arcwallsys.com

GRIDWORX™

1821 Levee Street
Dallas, TX 75207
(214) 774-4502

Rutgers / Livingston Student Center

84 Joyce Kilmer Avenue
Piscataway, New Jersey

SUPPLEMENTARY CALCULATIONS & DETAILS
March 26, 2009

JOB		DATE
LIVINGSTON STUDENT CTR	Architectural Wall System	3/26/2009

LOCATION	BY	CKD. BY	
PISCATAWAY, NJ	KJM		10:36:52 AM Version 3 . 0

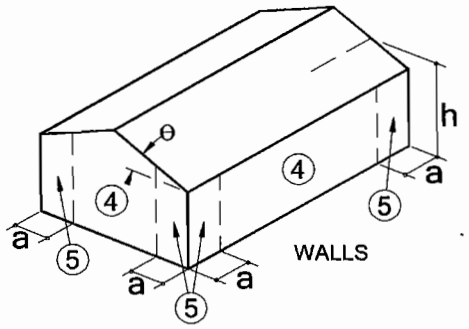
ASCE 7-05 for Elements and Components - WALL

Mean Roof Height (h):	45.00 ft.	
Basic Wind Speed:	100.00 mph	
Exposure:	B	
Category:	III	Enclosed Building
Importance Factor I (Table 6-1):	1.15	
Wind Directionality Factor Kd:	0.85	
Velocity Pressure Exposure Coeff. Kz for h (Table 6-3):		0.79
Velocity Pressure at Max. Height qz = 0.00256KzKd IV^2:		19.770 psf Equation(6-15)
Internal Pressure Coeffients GCpi (Fig 6-5):		+ 0.18
		- 0.18

Design Windloads for Components and Cladding of Buildings using h<=60' Equation

Design Wind Pressure, p=q[(GCp) - (GCpi)] (Equation(6-22))

	Zone 4: Typical				Zone 5: Corner			
Area (SF)	GCp(+)	PSF	GCp(-)	PSF	GCp(+)	PSF	GCp(-)	PSF
10	1.00	23.33	-1.10	-25.31	1.00	23.33	-1.40	-31.24
20	0.95	22.28	-1.05	-24.25	0.95	22.28	-1.29	-29.13
50	0.88	20.89	-0.98	-22.87	0.88	20.89	-1.15	-26.36
100	0.82	19.84	-0.92	-21.81	0.82	19.84	-1.05	-24.25



Building least horizontal dimension = 100.00 feet.
Width of Pressure Coefficient Zone (a) = 10 ft.

Notes:
ASCE7-05: 6.5.4.4: The Wind Directionality Factor, Kd = 0.85, was used in determining wind pressures.
Plus (+) and Minus (-) signs signify pressures acting toward and away from the surfaces, respectively.
Each component shall be designed for maximum positive and negative pressures.
a= 10% of least horizontal dimension or 0.4h, whichever is smaller, but not less than 4% of least horizontal dimension or 3 feet.
h= mean roof height in feet, except eave height shall be used for $\theta \leq 10$ deg.
θ = Angle of plane of roof from horizontal, in degrees.

SEISMIC ANALYSIS PER ASCE 7-05

Each element or component and its connections to the structure shall be designed to resist a total lateral seismic force, Fp, as provided by the following ASCE 7-05 equation (13.3-1 pg. 144):

$$F_p := \frac{0.4a_p \cdot S_{ds} \cdot W_p}{\left(\frac{R_p}{I_p}\right)} \cdot \left(1 + 2 \cdot \frac{z}{h}\right)$$

Coefficient Values for Input:

$S_s \equiv 0.355$	(Figure 22-2, pg. 212,213)
$F_a \equiv 1.0$	(Table 11.4-1, pg. 115)
$S_{ms} \equiv F_a \cdot S_s$	(Equation 11.4-1, pg. 115)
$S_{ds} \equiv \frac{2}{3} \cdot S_{ms}$	(Equation 11.4-3, pg. 115)
$I_p \equiv 1.0$	(Section 13.1.3, pg. 143)
$h \equiv 45.0 \cdot ft$	(Structure Roof Height)
$z \equiv 30.0 \cdot ft$	(Worst Case Height of Component Attachment)
$W_p \equiv 26.5 \cdot psf$	(Weight of 2" Arriscraft + Misc. Framing)

Due to the continuity of the curtainwall system and a series of lateral load resisting anchors, applied seismic loading can be modified as a uniformly distributed load proportionate to the mass distribution over the height. Therefore, the computed magnitude of the seismic load can be compared to the windload pressure to determine the governing normal design load for anchoring components. In-plane requirements must be independently investigated utilizing the computed seismic requirements and continuity developed by the applicable element.

Per section 9.6.2.4 Exterior Elements:

1. Bodies of the connection shall be designed for the force determined by Equation (9.6.1.3-1) where:

$R_{p\_Body} := 2.5$ and $a_{p\_Body} := 1.0$ (Values from Table 9.6.2.2 pg. 162)

Therefore, $$F_{p\_Body} := \frac{0.4a_{p\_Body} \cdot S_{ds} \cdot W_p}{\frac{R_{p\_Body}}{I_p}} \cdot \left(1 + 2 \cdot \frac{z}{h}\right)$$ $\boxed{F_{p\_Body} = 2.341 \cdot psf}$

2. All Fasteners in the connecting system such as bolts, inserts, weld and dowels, shall be designed for the forces determined by Equation (9.6.1.3-1) where:

$R_{p\_Connection} := 1.0$ and $a_{p\_Connection} := 1.25$ (Values from Table 9.6.2.2 pg. 162)

Therefore, $$F_{p\_Connection} := \frac{0.4a_{p\_Connection} \cdot S_{ds} \cdot W_p}{\frac{R_{p\_Connection}}{I_p}} \cdot \left(1 + 2 \cdot \frac{z}{h}\right)$$ $\boxed{F_{p\_Connection} = 7.317 \cdot psf}$

Note: The above values for Fp are derived using a factored load method. For use with allowable stress design methods (ASD), these values can be multiplied by the seismic load factor of **0.7** per ASCE 7-05 Section 2.4 pg. 5.

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March 9, 2009

Mr. Bryan Bermudez
Consolidated Brick and Building Supplies, Inc.
127 West 24th Street
NEW YORK, NY 10011-1914

PHONE: (212) 645-6700

Dear Mr. Bermudez:

WEIGHT OF THE STONE AND CHANNELS FOR THE RUTGERS UNIVERSITY LIVINGSTON HALL, IN NEW JERSEY

We understand that you wish to have a better understanding of the weight of the ARRIS•clip units and the Gridworx™ channels for the Rutgers University Livingston Hall. On this particular project we understand that there is the intent to use 2" thick x 11-5/8" wide x 23-5/8" tall Calcium Silicate ARRIS•clip units that are to be hung on the Gridworx™ channels. With this in mind:

The 2" thick ARRIS•clip units will weigh:	20.5 lbs/sq. ft. (this is the dry weight of the stone)
The Gridworx™ channels weigh:	1.0 lbs/sq.ft.

In addition you have screws, the foam tape, "L" brackets, backer rod and sealant which add an additional 1.0 lbs/sq. ft.

Also keep in mind that if the ARRIS•clip units were to become wet they have an absorption level of 10.5%. As noted above the dry weight of the ARRIS•clip units will be 20.5 lbs./sq. ft. with the additional weight of the moisture when saturated this would increase to 24 lbs. sq.ft.

As such, the design weight for the system we recommend in this particular case would be 26 lbs/sq. ft.

We trust the above information will be of assistance during the design and construction of this project. If you have any questions please do not hesitate to contact us.

Yours truly,

Craig Swirzon, B. Tech. (Arch.), MAATO, BSSO, CSI
Architectural Technologist

c.:

P.O. Box 3190, 875 Speedsville Rd., Cambridge, Ontario Canada N3H 4S8 • solutions@arriscraft.com
Tel: 519 653 3275 • 1 800 265 8123 • Fax: 519 653 1337 • www.arriscraft.com

4.0

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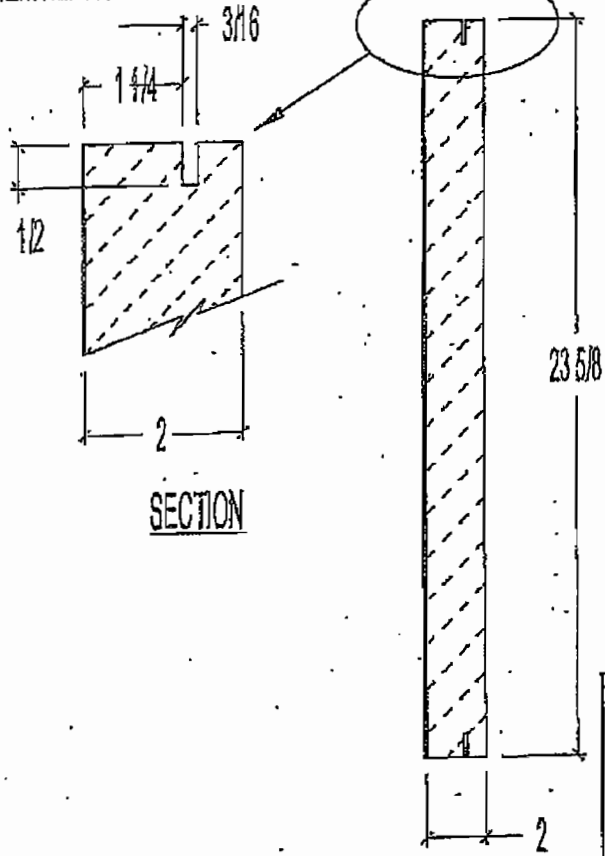
1. HEAVY LINES INDICATE FINISHED FACES



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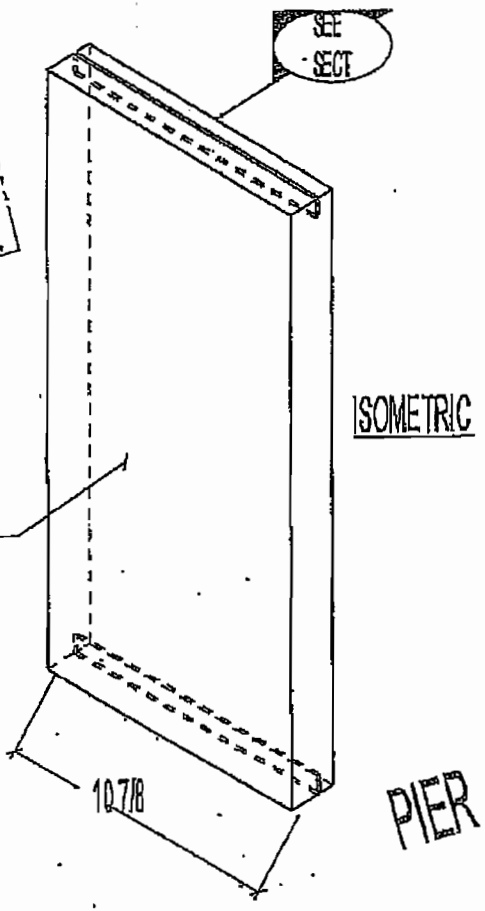

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MATERIAL: ARRIS-clip RENAISSANCE COLOR: CARAMEL | TEXTURE: SMOOTH
DESCRIPTION: TYPE 'C' | QTY REQ'D: 172

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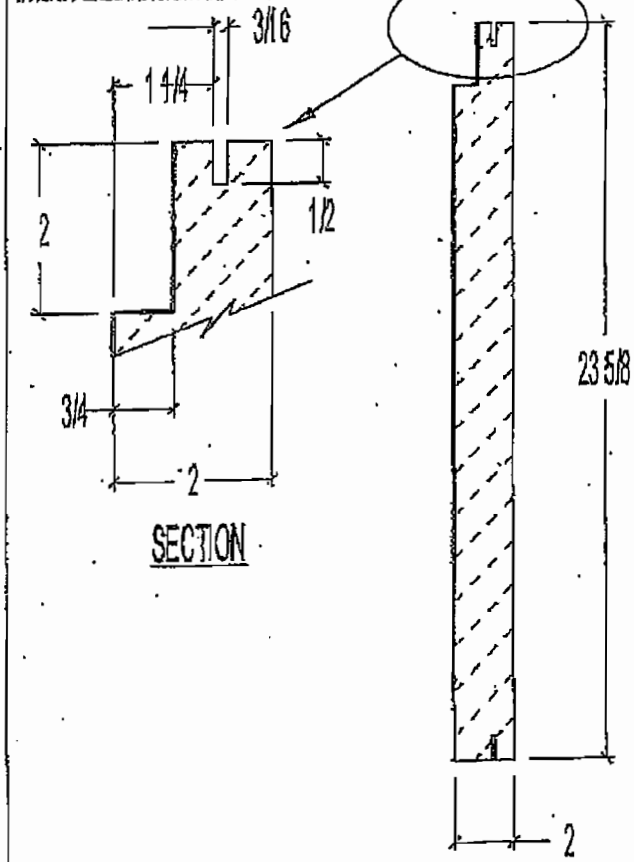

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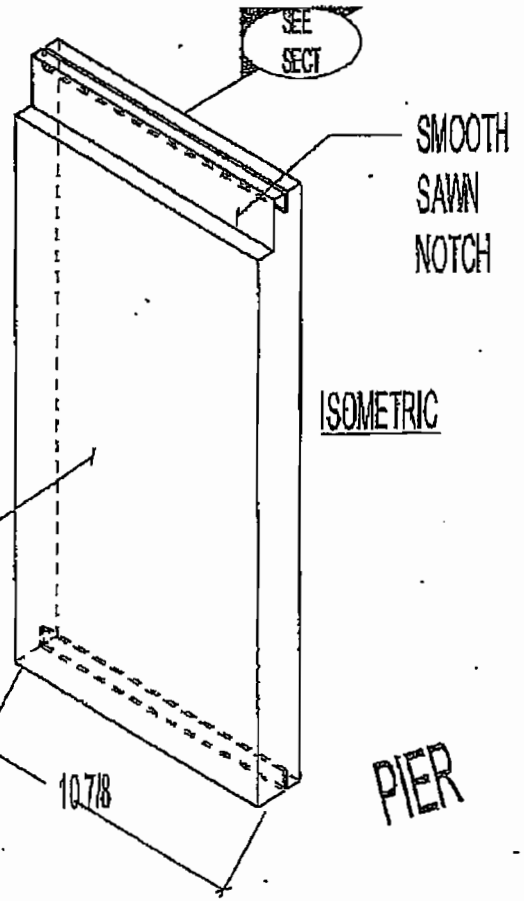

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PROJECT: RUTGERS UNIVERSITY | ARRISCRAFT ORDER #:
MATERIAL: ARRIS-clip RENAISSANCE COLOR: CARAMEL | TEXTURE: SMOOTH
DESCRIPTION: TYPE 'D' | QTY REQD: 130

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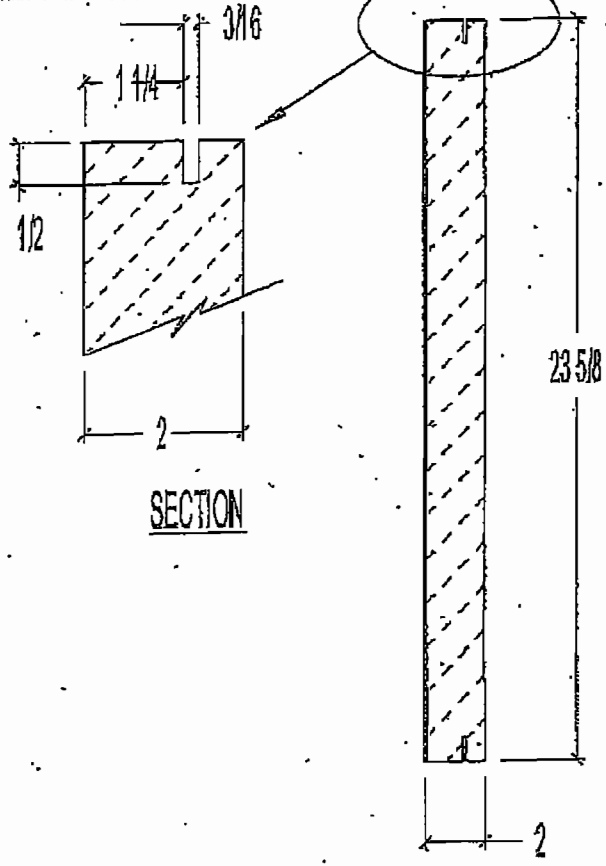

SECTION

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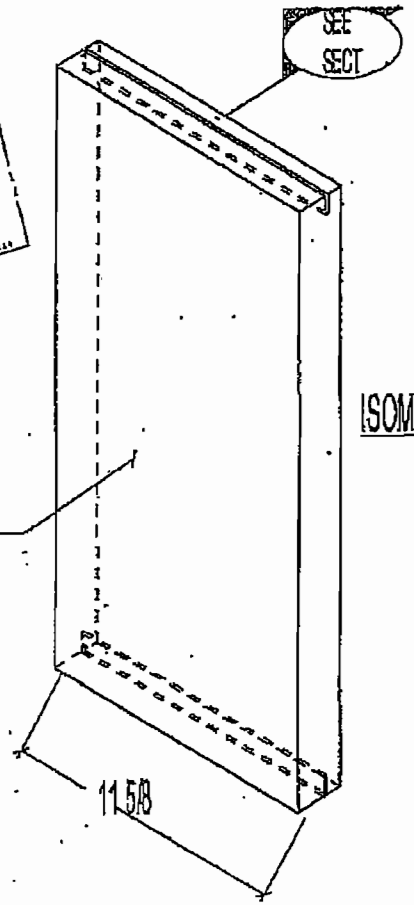

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FINISHED FACE

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	MATERIAL: ARRIS-clip RENAISSANCE COLOR: CARAMEL	TEXTURE: SMOOTH
	DESCRIPTION: TYPE 'G'	QTY REQ'D: 4800

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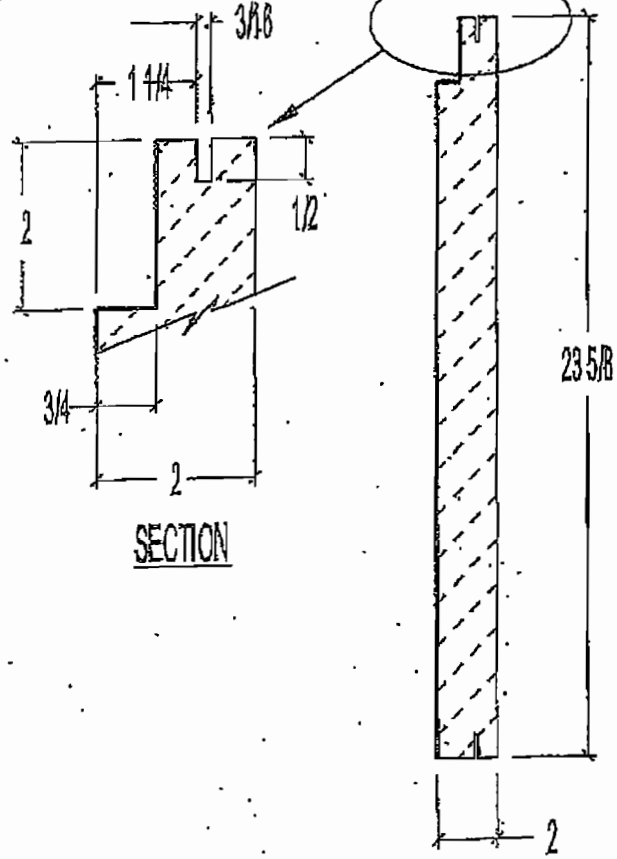

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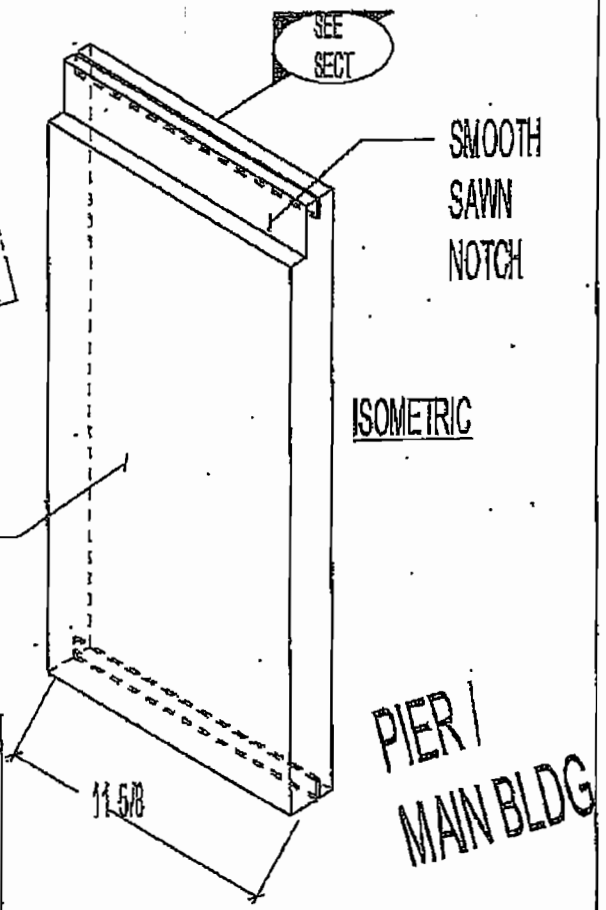

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PROJECT: RUTGERS UNIVERSITY	ARRISCRAFT ORDER #:
MATERIAL: ARRIS-clip RENAISSANCE COLOR: CARAMEL	TEXTURE: SMOOTH
DESCRIPTION: TYPE 'H'	QTY REQ'D: 4850

4.4

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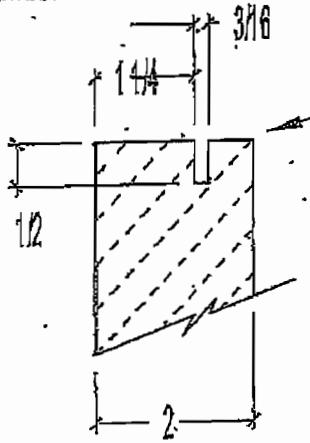
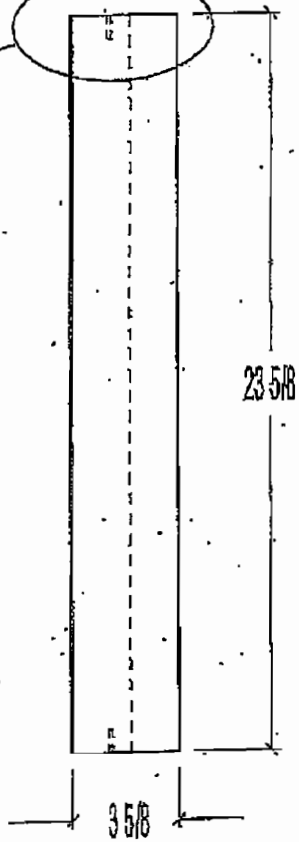


ANCHOR SLOT DETAIL



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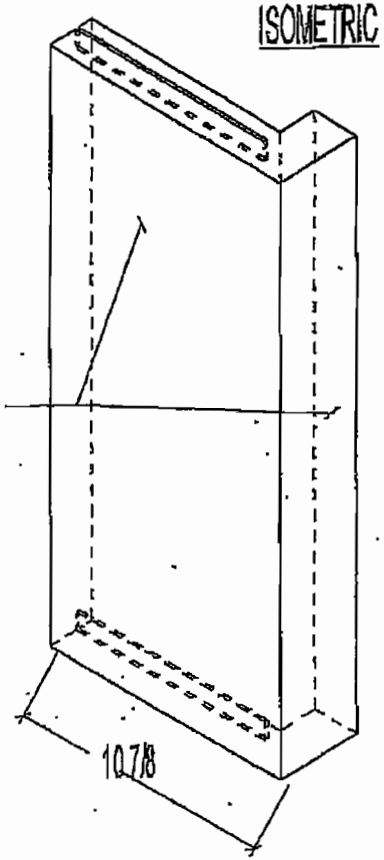

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PROJECT: RUTGERS UNIVERSITY | ARRISCRAFT ORDER #:

MATERIAL: ARRIS-clip RENAISSANCE | COLOR: CARAMEL | TEXTURE: SMOOTH

DESCRIPTION: TYPE 'G' RETURN | QTY REQ'D: 165

5.4

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NOTES:
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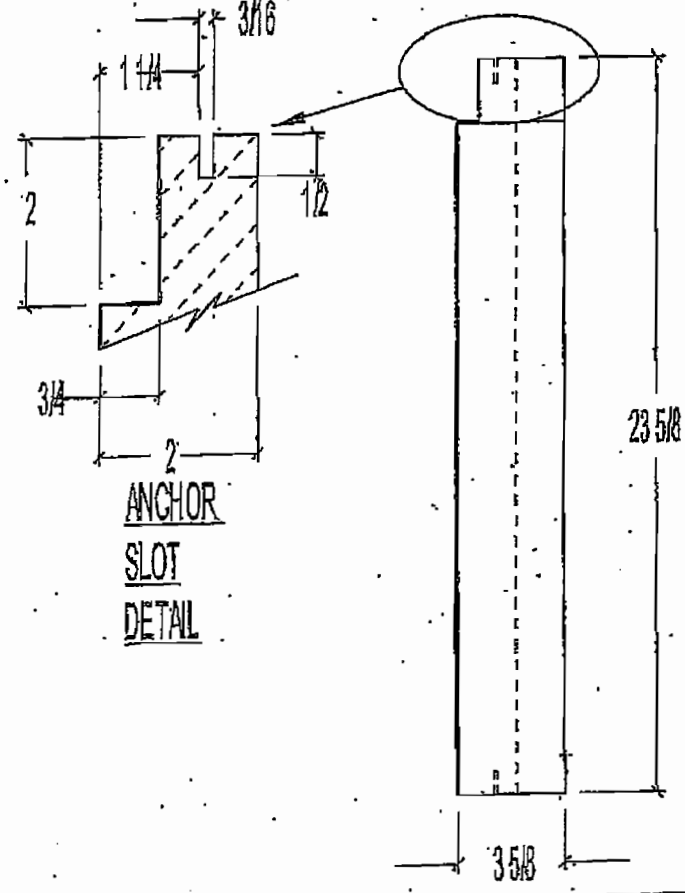

ANCHOR SLOT DETAIL

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'H-R' - RIGHT RETURN SHOWN
'H-L' - LEFT RETURN OPPOSITE

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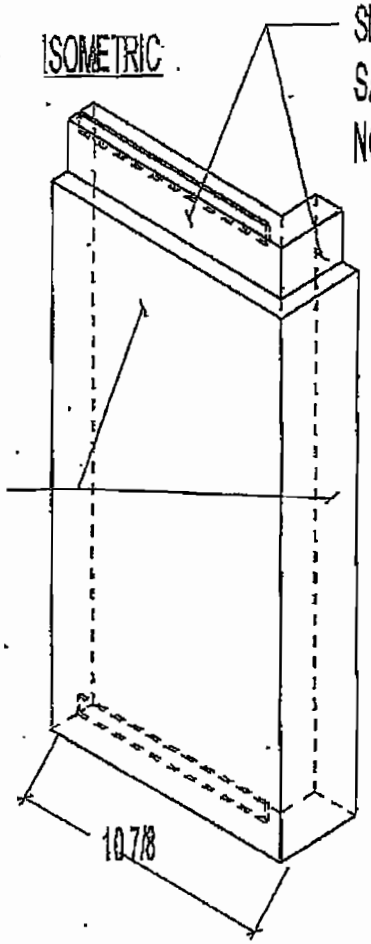

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PROJECT: RUTGERS UNIVERSITY | ARRISCRAFT ORDER #:

MATERIAL: ARRIS-clip RENAISSANCE COLOR: CARAMEL | TEXTURE: SMOOTH

DESCRIPTION: TYPE 'H' RETURN | QTY REQ'D:

90 Right
90 Left

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DESIGN OF THIN-CLAD...ARRISCRAFT CALCIUM SILICATE UNITS

Design Data:	Material Type:	**Arriscraft**	Safety Factor / Span =	**8**	
ASTM C99	MOR =	**800** (psi)	Safety Factor / Anchor =	**12**	
ASTM C880	FLEX =	**NA** (psi)	Kerf Gage, kg =	**1.25** (in)	
ASTM C97	Density =	**120** (pcf)	Kerf Thickness, kt =	**0.188** (in)	
Nominal Thickness, t =		**2** (in)	Kerf Depth, kd =	**0.625** (in)	
Tolerance, e1 (thickness) =		**0.0625** (in)	Tolerance, e2 (kerf) =	**0.0625** (in)	

Design Loads:	(+WL) =	**23.33** (psf)	Seismic =	**6.212** (psf)
	(-WL) =	**31.24** (psf)		

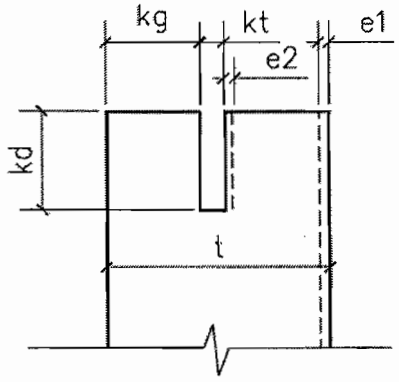
MATERIAL SPECIFICATIONS

AVERAGE RUPTURE STRENGTH (MOR)	=	800 psi
AVERAGE FLEXURAL STRENGTH (FLEX)	= NA	psi
ALLOWABLE SPAN STRESS, Fb_{span} (Min AVG / S.F.)	=	100 psi
ALLOWABLE ANCHOR STRESS, Fb_{anchor} (Min AVG / S.F.)	=	67 psi

PANEL WIDTH, W (in.)	PANEL HEIGHT, H (in.)	A(G) GROSS AREA ($ft.^2$)	PANEL WEIGHT (lb.)	NOM. THICKNESS STRENGTH RATIO (fb_n / Fb_{span})	MIN. THICKNESS STRENGTH RATIO (fb_{min} / Fb_{span})	KERF CAPACITY (FRONT) (fb_{Kf} / Fb_{anchor})	KERF CAPACITY (BACK) (fb_{Kb} / Fb_{anchor})
10.8750	23.6250	1.784	36.80	**0.227**	**0.242**	**0.038**	**0.377**
11.6250	23.6250	1.907	39.34	**0.227**	**0.242**	**0.038**	**0.377**

MINIMUM THICKNESS CHECK

PANEL WIDTH, W (in.)	PANEL HEIGHT, H (in.)	MIN. THICKNESS REQUIRED (in.)	CONTROLLING FACTOR
10.8750	23.6250	**1.0155**	**Nom. Thickness**
11.6250	23.6250	**1.0155**	**Nom. Thickness**



NOTES:

ALLOWABLE STRESSES AND DESIGN PROCEDURES FOR STONE STRENGTH USE AVERAGE TEST VALUES PER ASTM C99 "MODULUS OF RUPTURE" AND ASTM C880 "FLEXURAL STENGTH - MODIFIED" COMPARED TO SPECIFIED AND /OR INDUSTRY STANDARD SAFETY FACTORS.

DESIGN THICKNESS = "Nominal - Tolerance @ Thickness (e1)".
KERF GAGE = "kg" is defined as the nominal dimesion for kerf location off stone face.
KERF THICKNESS = "kt" is defined as the dimesion for kerf fabrication width.
KERF DEPTH = "kd" is defined as the dimesion for kerf fabrication depth into edge of stone.
KERF TOLERANCE = "e2" is defined as the dimesion tolerance for kerf location off stone face.

ALL DESIGN STRESSES AND DESIGN VALUES ACCOUNT FOR NOMINAL DIMENSIONS AND THE APPROPRIATE TOLERANCES.

ARCHITECTURAL WALL SYSTEMS, INC.
www.arcwallsys.com

DESIGN OF THIN-CLAD...ARRISCRAFT CALCIUM SILICATE UNITS

Design Data:	Material Type:	**Arriscraft**	Safety Factor / Span =	**8**	
ASTM C99	MOR =	**800** (psi)	Safety Factor / Anchor =	**12**	
ASTM C880	FLEX =	**NA** (psi)	Kerf Gage, kg =	**0.5** (in)	
ASTM C97	Density =	**120** (pcf)	Kerf Thickness, kt =	**0.188** (in)	
	Nominal Thickness, t =	**1.25** (in)	Kerf Depth, kd =	**0.625** (in)	
	Tolerance, e1 (thickness) =	**0.0625** (in)	Tolerance, e2 (kerf) =	**0.0625** (in)	

Design Loads:	(+WL) =	**23.33** (psf)	Seismic =	**6.212** (psf)
	(-WL) =	**31.24** (psf)		

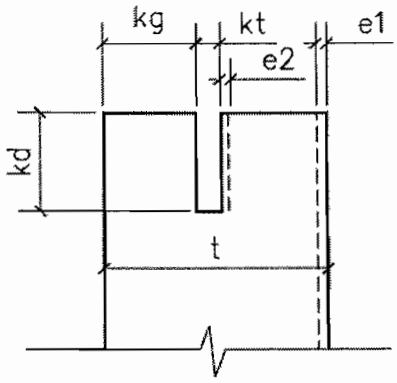
MATERIAL SPECIFICATIONS

AVERAGE RUPTURE STRENGTH (MOR)	=	800 psi
AVERAGE FLEXURAL STRENGTH (FLEX)	= NA	psi
ALLOWABLE SPAN STRESS, Fb_{span} (Min AVG / S.F.)	=	100 psi
ALLOWABLE ANCHOR STRESS, Fb_{anchor} (Min AVG / S.F.)	=	67 psi

PANEL WIDTH, W (in.)	PANEL HEIGHT, H (in.)	A(G) GROSS AREA ($ft.^2$)	PANEL WEIGHT (lb.)	NOM. THICKNESS STRENGTH RATIO (fb_n / Fb_{span})	MIN. THICKNESS STRENGTH RATIO (fb_{min} / Fb_{span})	KERF CAPACITY (FRONT) (fb_{Kf} / Fb_{anchor})	KERF CAPACITY (BACK) (fb_{Kb} / Fb_{anchor})
10.8750	23.6250	1.784	23.42	**0.581**	**0.644**	**0.281**	**0.377**
11.6250	23.6250	1.907	25.03	**0.581**	**0.644**	**0.281**	**0.377**

MINIMUM THICKNESS CHECK

PANEL WIDTH, W (in.)	PANEL HEIGHT, H (in.)	MIN. THICKNESS REQUIRED (in.)	CONTROLLING FACTOR
10.8750	23.6250	**1.0155**	**Nom. Thickness**
11.6250	23.6250	**1.0155**	**Nom. Thickness**



NOTES:

ALLOWABLE STRESSES AND DESIGN PROCEDURES FOR STONE STRENGTH USE AVERAGE TEST VALUES PER ASTM C99 "MODULUS OF RUPTURE" AND ASTM C880 "FLEXURAL STENGTH - MODIFIED" COMPARED TO SPECIFIED AND /OR INDUSTRY STANDARD SAFETY FACTORS.

DESIGN THICKNESS = "Nominal - Tolerance @ Thickness (e1)".
KERF GAGE = "kg" is defined as the nominal dimesion for kerf location off stone face.
KERF THICKNESS = "kt" is defined as the dimesion for kerf fabrication width.
KERF DEPTH = "kd" is defined as the dimesion for kerf fabrication depth into edge of stone.
KERF TOLERANCE = "e2" is defined as the dimesion tolerance for kerf location off stone face.

ALL DESIGN STRESSES AND DESIGN VALUES ACCOUNT FOR NOMINAL DIMENSIONS AND THE APPROPRIATE TOLERANCES.

TYPICAL SECTION

12" WIDE x 24" TALL ARRIS CLIP UNITS

GRIDWORX™

ASSUME CRITICAL DESIGN PRESSURES
WL = +23 PSF / −31 PSF

Clip unit thickness = 2.000" (120pcf)

DEADLOAD / MATL = 20.0 PSF

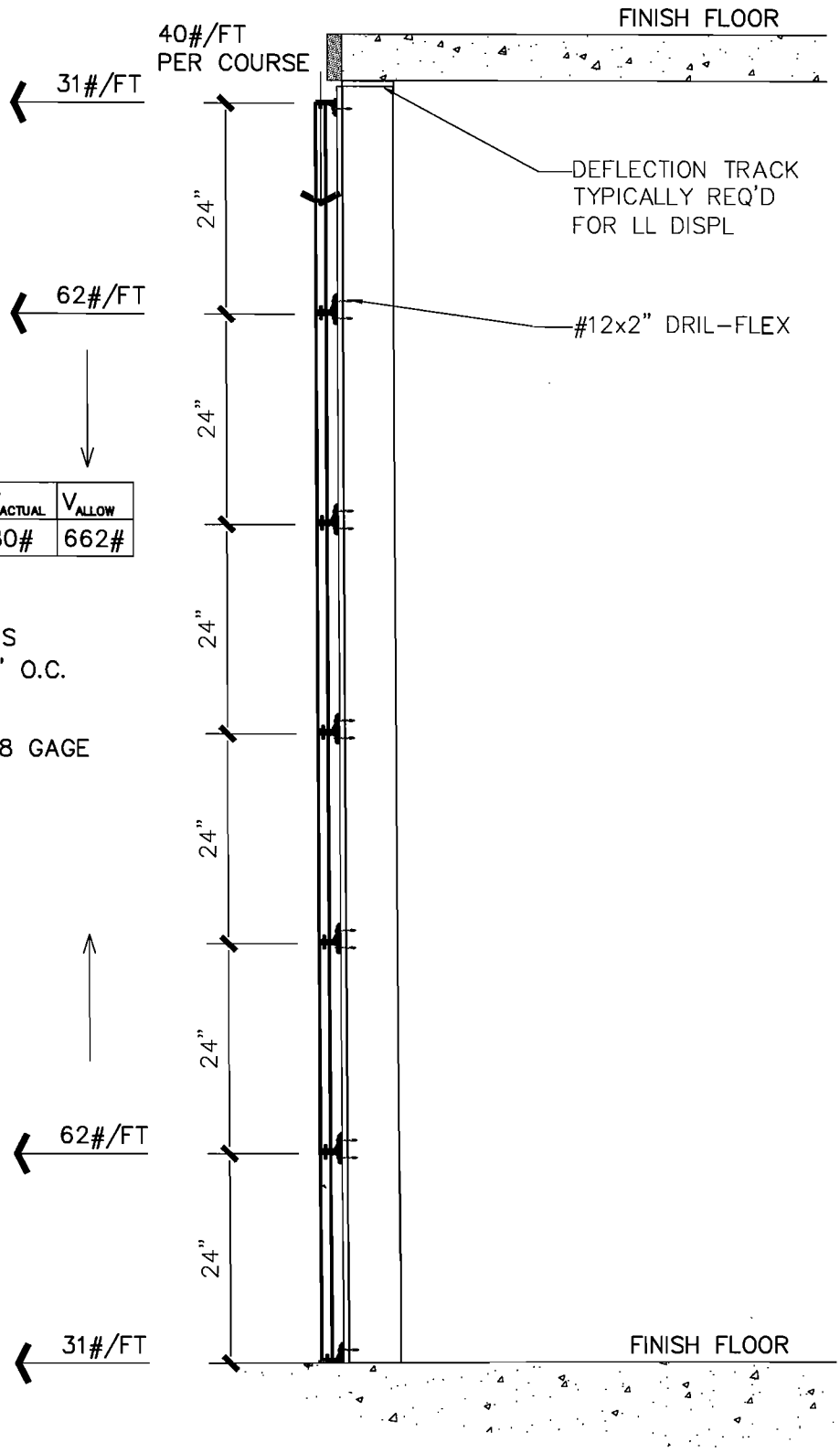
THEREFORE, BASED ON 2'−0" HEIGHT
WINDLOAD = 62 PLF
DEADLOAD = 40 PLF

FASTENER	T_{ACTUAL}	T_{ALLOW}	V_{ACTUAL}	V_{ALLOW}
#12 DRIL−FLEX (33 KSI)	129#	145#	80#	662#

LOADS BASED UPON GRIDWORX EXTRUSIONS AND FASTENERS FOR SAME SPACED @ 16" O.C.

MINIMUM GAGE MATERIAL: METAL STUDS 18 GAGE

FASTENER ALLOWABLES CAN BE FOUND IN THE MANUFACTURER'S DATA AND/OR ESS EVALUATION REPORTS.

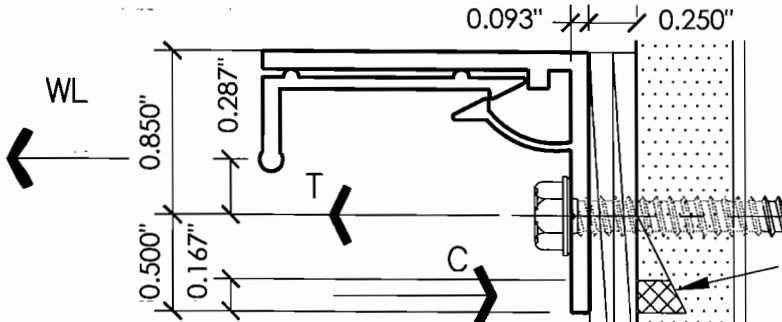


REV	CUST	PRECISION WALL SYSTEMS
REV	JOB	RUTGERS
DATE	BY	CCO
	PAGE	7.0

10999 PETAL ST. SUITE 100, DALLAS, TX. (214) 217-2400 (214) 217-2439 FAX

Fastener Loads: (-WL + DL) & (DL ONLY)

GRIDWORX™

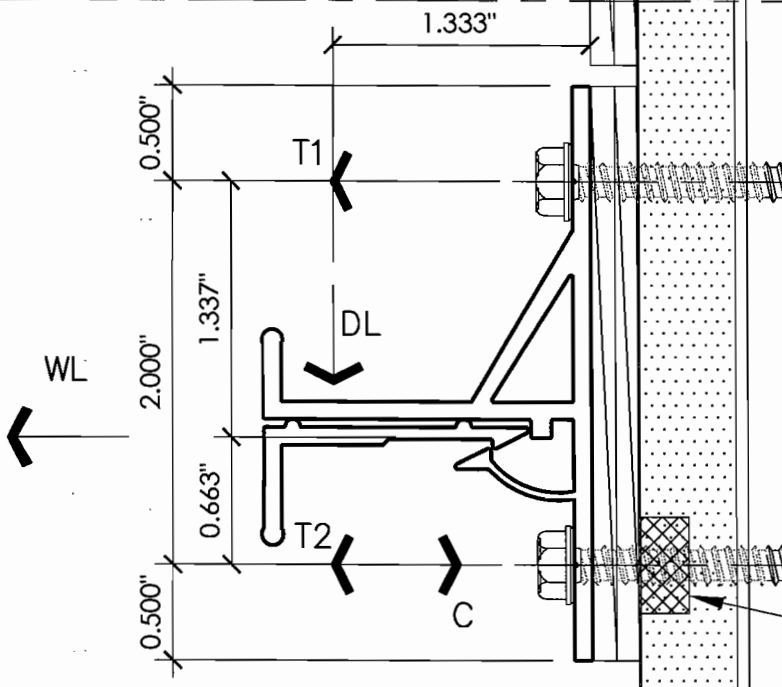


TENSION = WL + WL x 0.287" / (2/3 x 0.500")
. = 1. 860 x WL

COMPRESSION = 1.860 x WL - WL
. = 0.860 x WL

BEARING AREA = 1/3 x 0.500" x 1.625" = 0.271 in²

fp = C/A = 0.860 x WL / A



-WL & DL:
TENSION (1) = WL x 0.663" / 2.0" + DL x 1.333" / 2.0"
= 0.332 x WL + 0.670 x DL

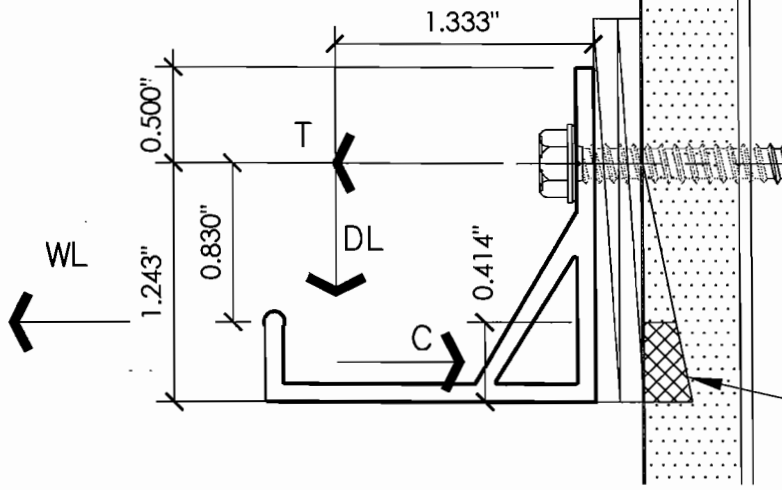
TENSION (2) = WL x 1.337" / 2.0" - DL x 1.333" / 2.0"
. = 0.670 x WL - 0.670 x DL

SHEAR = DL / 2

DL ONLY:
COMPRESSION = DL x 1.333" / 2.0" = 0.670 x DL

BEARING AREA = 0.500" x 1.625" = 0.813 in²

fp = C/A = 0.670 x DL /A



-WL & DL:
DEADLOAD ONLY IS CRITICAL FOR
DESIGN WINDLOADS < 50 PSF

TENSION = DL X 1.333" / (2/3 x 1.243")
. = 1.610 x DL
SHEAR = DL

COMPRESSION = 1.610 X DL
.
BEARING AREA = 1/3 x 1.243" x 1.625" = 0.673 in²

fp = C/A = 1.610 X DL / A

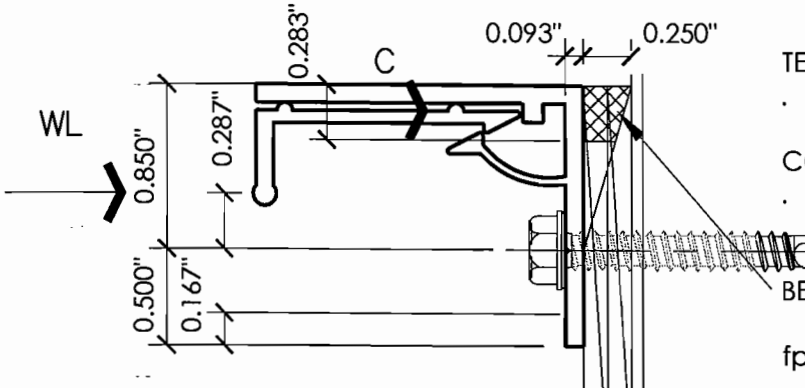
FASTENER LOADS

SCALE: FULL

REV		CUST	PRECISION WALL SYSTEMS
REV		JOB	RUTGERS
DATE		BY	KJM

Fastener Loads: (+WL + DL)

GRIDWORX™

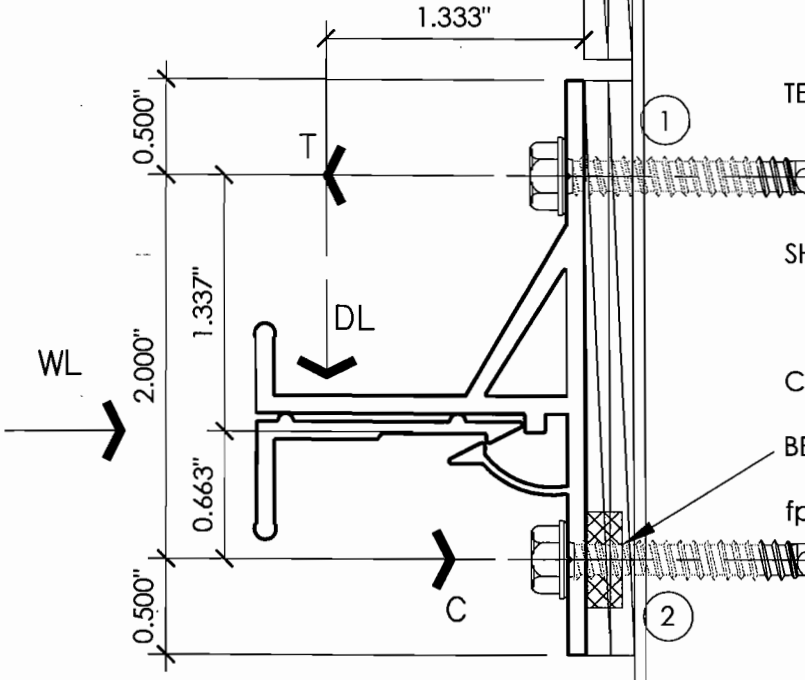


TENSION = WL x (2/3 x 0.850" - 0.287") / (2/3 x 0.850")
. = (0.494)WL

COMPRESSION = WL - (0.494)WL
. = (0.506)WL

BEARING AREA = 1/3 x 0.850" x 1.625" = 0.460 in²

fp = C/A



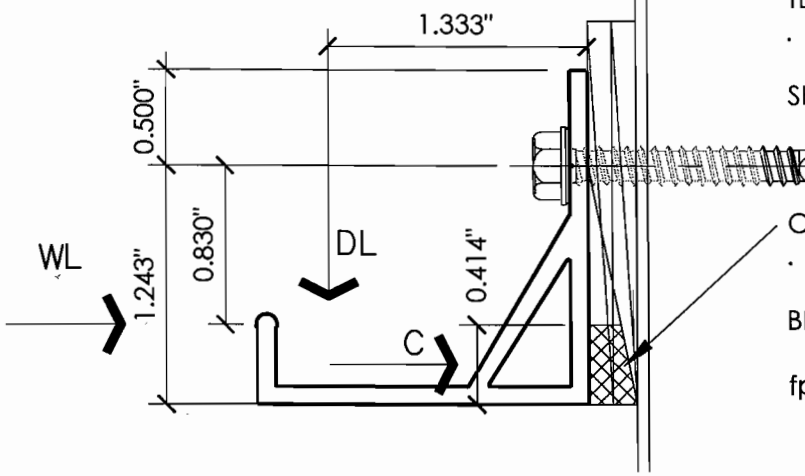
TENSION = DL x 1.333" / 2.0"
= 0.670 x DL
WL TAKEN DIRECTLY INTO BEARING

SHEAR = DL / 2

COMPRESSION = 0.670 x WL + 0.670 x DL

BEARING AREA = 0.500" x 1.625" = 0.813 in²

fp = C/A = 0.670 X (WL + DL) / A



TENSION = DL x 1.333" / (2/3 x 1.243")
. = 1.610 X DL

SHEAR = DL

COMPRESSION = WL + TENSION
. = WL + 1.610 X DL

BEARING AREA = 1/3 x 1.243" x 1.625" = 0.673 in²

fp = C/A = WL + 1.610 X DL / A

FASTENER LOADS

SCALE: FULL

REV		CUST	PRECISION WALL SYSTEMS
REV		JOB	RUTGERS
DATE		BY	KJM

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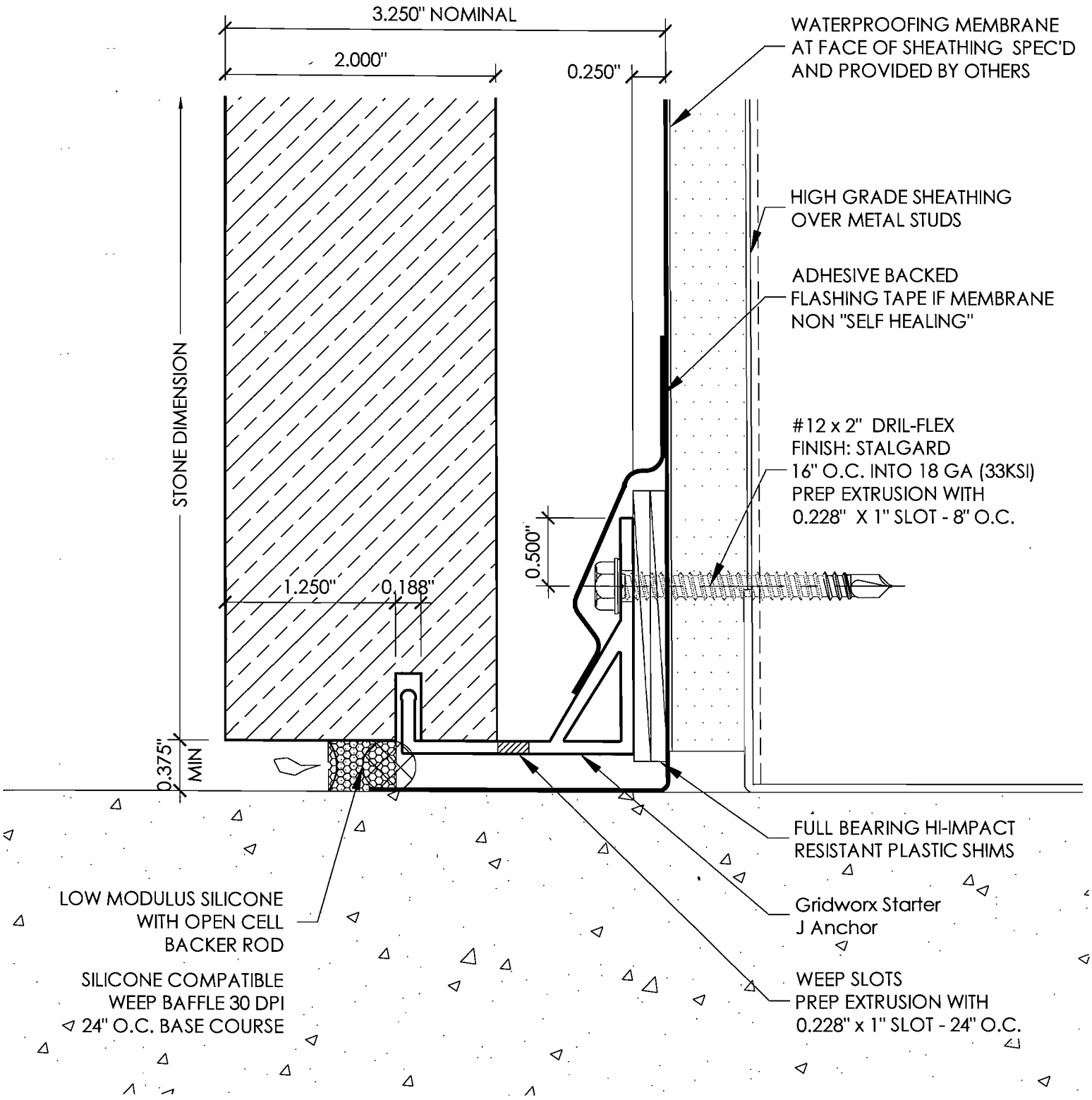
Starter J Anchor

GRIDWORX™



STARTER J ANCHOR

3/8" JOINTS - STEEL FRAMING

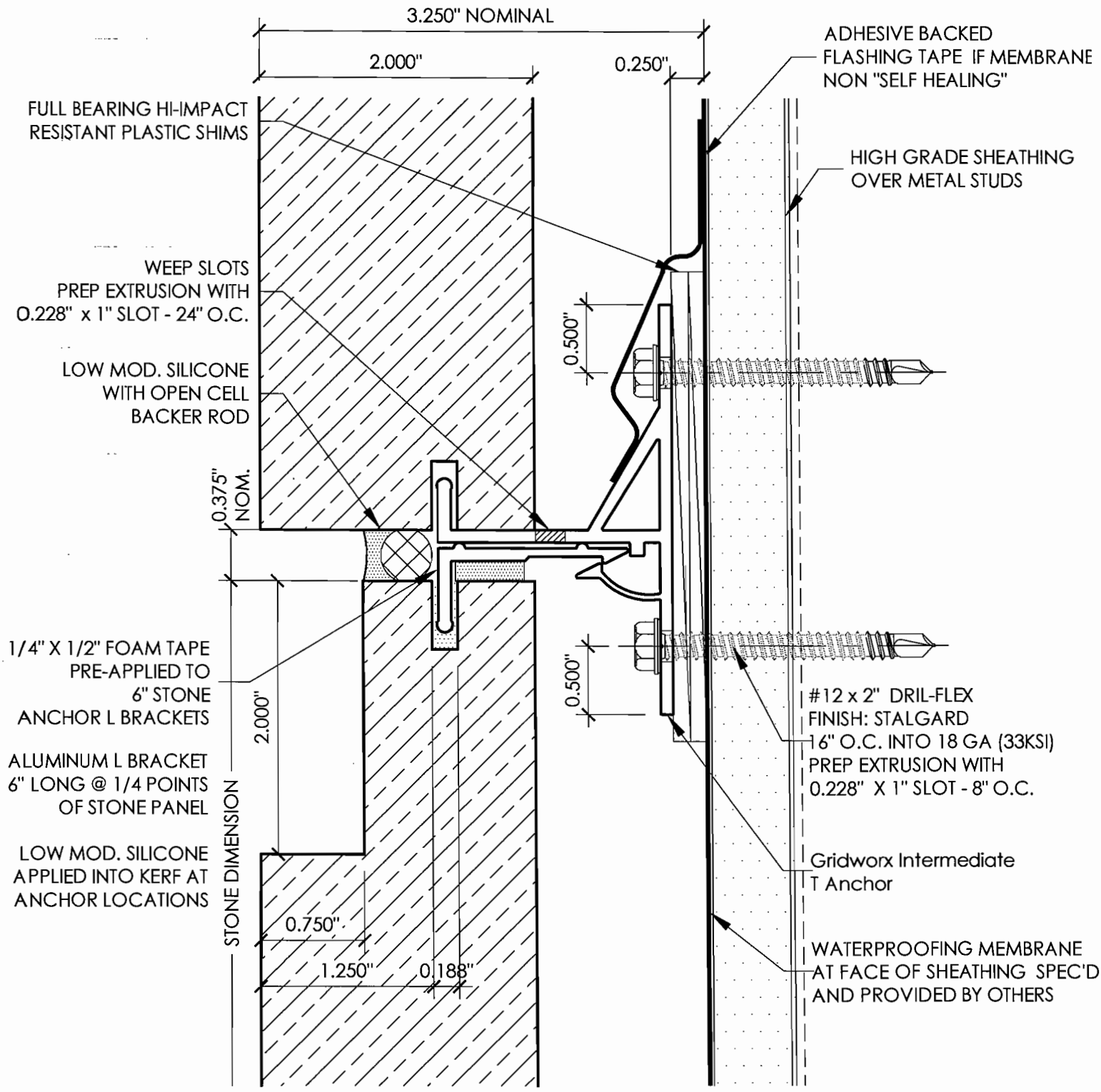
SCALE: FULL

REV		CUST	PRECISION WALL SYSTEMS
REV		JOB	RUTGERS
DATE		BY	CCO

PAGE 10.0

Intermediate T Anchor

GRIDWORX™



INTERMEDIATE T ANCHOR

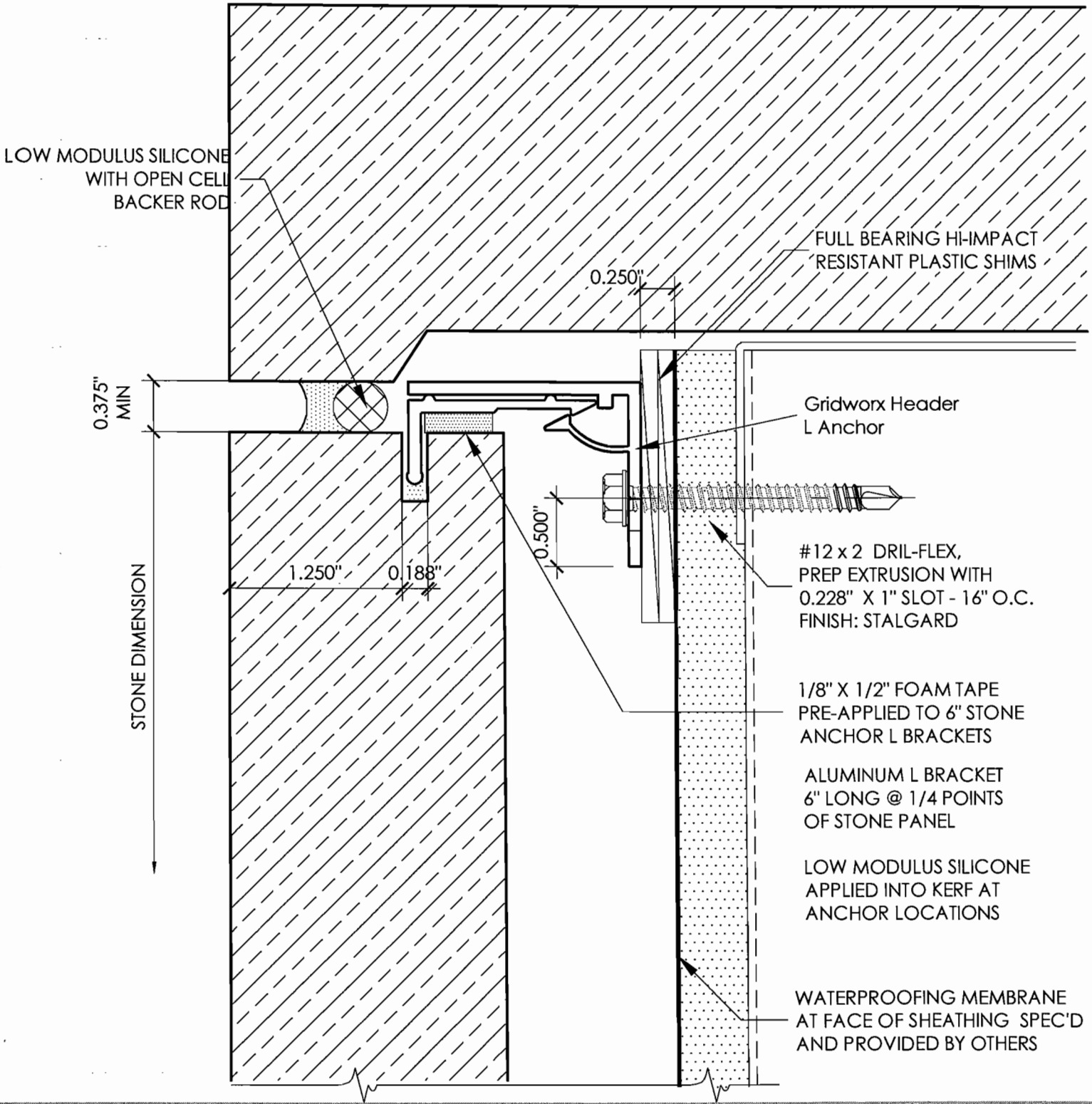
3/8" JOINTS - STEEL FRAMING

SCALE: FULL

REV		CUST	PRECISION WALL SYSTEMS
REV		JOB	RUTGERS
DATE		BY	CCO

Top J Anchor

GRIDWORX™



TOP J ANCHOR

3/8" JOINTS - STEEL FRAMING

SCALE: FULL

REV		CUST	PRECISION WALL SYSTEMS
REV		JOB	RUTGERS
DATE		BY	KJM

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09300 - Thin Calcium Silicate Masonry Units

Thin Renaissance® Masonry Units.

ARRISCRAFT™ INTERNATIONAL

PRODUCT DESCRIPTION

BASIC USE A calcium silicate masonry unit used for thin-bed adhered masonry veneer construction.

For use in vertical wall applications only, for both interior and exterior wall systems.

Veneer applications include either thinset mortar-bed or adhesive applied thin-bed installations, or traditional full-bed masonry installations. For full-bed masonry veneer installations refer to ARRISCRAFT•DATA – 04230.

For residential, commercial and institutional applications.

COMPOSITION AND MATERIALS Thin Renaissance® Masonry Units are manufactured calcium silicate masonry units, containing no Portland cement. They are pressure formed and autoclave cured, resulting in high-density, severe weathering modular masonry units, with one or more finished faces. They are then cut to the desired thickness to produce the thin units. Refer to ARRISCRAFT•NOTE – Calcium Silicate Masonry Units for further information.

They may be site cut, trimmed and finished to custom lengths, shapes or sizes, as necessitated by site conditions.

SHAPES AND SIZES Thin Renaissance® Masonry Units are available in a variety of imperial standard sizes. (Metric sizes are also available from the Cambridge, Ontario manufacturing facility. Ask your local representative for details).

CODE	HEIGHT	LENGTH	BED
RS358T	**3-5/8"**	**23-5/8"**	**3-5/8"**
RS758T	**7-5/8"**	**23-5/8"**	**3-5/8"**
RS115T	**11-5/8"**	**23-5/8"**	**3-5/8"**

Thin Renaissance® Masonry Units are also available in custom shapes and sizes, up to a maximum length of 23-5/8" and face rise of 11-5/8". Due to the weight of the units when applying them in a thin-bed application, the thickness of the units is limited to a maximum of ¾" with rocked faced finishes and 1-1/4" with smooth and dressed faced finishes.

Contact your local Arriscraft representative or dealer for additional information.

TOLERANCES Thin Renaissance® Masonry Units are fabricated to the following tolerances:

- Unit Length: ± 1/16"
- Unit Height: ± 1/16"
- Deviation from square, with the measurement taken using the longest edge as the base will be ± 1/16"
- Bed Depth Thickness: ± 1/8"
- Custom Unit Dimensions: ± 1/8".

Thin Renaissance® Masonry Units are shop inspected to be sound and free of cracks, chips or other defects that would either affect the serviceability or strength of the unit, or become exposed once installed and visible when viewed from a distance of not less than 10 ft. under diffused light. Units being provided with rusticated faces are inspected for cracks and blemishes only, as chippage considerations do not apply when the desired surface texture and unit shape is intended to be uneven.

LIMITATIONS In comparison to a full-bed masonry wall system with a drainage cavity, thin-bed adhered masonry walls are a barrier wall system. Barrier wall systems do not have a drainage cavity to drain moisture from the wall system, and as a result moisture that may penetrate the wall system may over time affect the integrity of the system. The designer must consider climatic conditions. As such, it is extremely critical in a northern environment when using a barrier wall system that the system be designed to preclude moisture from the wall system.

Manufactured masonry products are generally intended for above grade installations. Manufactured masonry units, regardless of their composition, are inherently absorptive, and as such, are not intended for use below grade. Units installed below grade will wick moisture from the soil that is in contact with the masonry units effectively creating a condition known as "rising damp" in the masonry veneer.

In colder climates, masonry walls at grade may also become exposed to de-icing compounds. As with other types of manufactured masonry units, calcium silicate masonry units should not be installed where they will be directly exposed to de-icing compounds used to melt snow and ice from pavements.

The function of caps and copings is to prevent moisture from entering the building envelope through the top of the wall. As most manufactured masonry units are produced in relatively short lengths, when they are used as a cap or coping material more mortar joints are required. These horizontal mortar joints are the most likely entry point for moisture to infiltrate the building envelope. As such, it is generally recommended within the industry that longer components such as quarried stone or metal parapet cap flashing be used to reduce the number of joints thereby limiting the areas that may allow moisture infiltration of the building envelope.

COLORS AND FINISHES Thin Renaissance® Masonry Units are available from our Fort Valley, Georgia, United States of America manufacturing facility in the standard colors and finishes listed in Table 09300.3.A.

Standard Finishes and Colors
Table 09300.3.A

Colors	Finish	
	Smooth	Rocked
Oyster	●	●
Tan	●	●
Cotton	●	●
Cream	●	●
Titanium*	●	●
Pecan*	●	●
Verde*	●	●
Sundance**	●	●
Caramel*	●	●
Hazel*	●	●

* Striated colors are a multi-tone blend. Refer to actual color samples.

Renaissance® Masonry Units are also available from our Cambridge, Ontario, Canada manufacturing facility in the standard colors and finishes listed in Table 09300.3.B.

Standard Finishes and Colors
Table 09300.3.B

Colors	Finish	
	Dressed	Rocked
White	●	●
Wheat	●	●
Driftwood**	●	●
Nutmeg*	●	●
Sandrift**	●	●
Adobe**	●	●
Aurora*	●	●
Olive*	●	●
Sage*	●	●
Birchbark**	●	●

* Striated colors are a multi-tone blend. Refer to actual color samples.

** These units consist of a range of colors. The distribution of colors within each unit will vary.

These standard finishes are described below:

- Dressed Finish: achieved by honing the surface with a mechanical, fine abrasive head in a wide, circular motion. This will expose any inherent mottled coloring of the unit. Visible honing marks are considered acceptable.
- Smooth Finish: Similar to dressed, achieved by lightly honing the surface with a mechanical, fine abrasive head in a wide, circular motion.
- Rocked Finish: a surface finish resulting from mechanical splitting and hand-chiselling of the masonry unit to a set depth, to achieve a bold rustic appearance.

Profiles such as margins, chamfers, notches and bullnoses are available at a premium price; however, special consideration may be required with regard to their method of attachment if the units exceed the thicknesses noted above. Custom colors are also available on a minimum order basis.

As a manufactured product, Thin Renaissance® Masonry Units are monitored for color consistency. Slight variations between batches may occur, and it is recommended that the installer mix units from different skids during installation. Consultants should review samples prior to selecting a particular color and finish.

TECHNICAL DATA

APPLICABLE STANDARDS Required properties for calcium silicate masonry units are described in ASTM C73-99a, Standard Specification for Calcium Silicate Face Brick (Sand-Lime Brick) for the United States.

This standard classifies calcium silicate products as either moderate-weathering or severe-weathering depending on the material's tested physical properties of compressive strength and 24-hour absorption.

Thin Renaissance® Masonry Units meet and exceed the requirements necessary to comply with the severe-weathering classification. They have been extensively tested using standardized test methods, and their typical physical properties are outlined below in Table 09300.4.A.

Typical Physical Properties
Table 09300.4.A

Property	Test Method*	Georgia Material	Cambridge Material
Compressive Strength	ASTM C67	8845 psi	8500 psi
	ASTM C170	6815 psi	6600 psi
Absorption	ASTM C97	10.3%	8.8%
Density	ASTM C97	120 lbs/ft^3	129 lbs/ft^3
Modulus of Rupture	ASTM C99	800 psi	770 psi
Freeze-Thaw Durability	ASTM C67	Condition Excellent, No Observable Distress	

*Independent test reports available upon request

INSTALLATION

DELIVERY Thin Renaissance® Masonry Units are delivered to the site in protective packaging.

HANDLING Lift skids with proper and sufficiently long slings or forks with protection to prevent damage to units. Protect edges and corners.

STORAGE Store Thin Renaissance® Masonry Units in a manner designed to prevent damage and staining of units. Stack units on timbers or platforms at least 3" above grade. Place polyethylene or other plastic film between wood and other finished surfaces of units when stored for extended periods of time.

Stored units should be covered if exposed to extreme weather conditions.

Do not use de-icing compounds to remove ice from masonry surfaces.

PREPARATORY WORK Extreme weather conditions may require preparatory work of all materials.

INSTALLATION Thin Renaissance® Masonry Units must be installed using approved materials and techniques for each specific installation.

Construct thin masonry veneer with an adequate number of elastic movement joints, properly located to accommodate differential movement. Refer to ARRISCRAFT•NOTE – Building Movement Joints for further information.

Construct thin masonry veneer in accordance with ACI 530-02/ASCE 5-02/TMS 402-02, Building Code Requirements for Masonry Structures in the United States, and any local requirements stipulated by the authorities having jurisdiction.

Installation should be over a suitable solid substrate. Designers should conform to the relevant design details contained in the latest edition of the Tile Council of America's (TCA), Handbook for Ceramic Tile Installation for the proper installation. The TCA design details outline the recommended setting materials and installation procedures specific to a particular set of design conditions. The only deviation from these guidelines would be with respect to the filling of joints between pieces. Whereas the TCA design details describe filling these joints with tile grout, we recommend filling the joints with a pointing mortar applied using a grout bag. The joints should then be tooled just as with a masonry application. Copies of the current TCA Handbook may be purchased by visiting their website at www.tileusa.com

Mortar joints between units in any direction should be 3/8" thick.

The pointing mortar to fill the joints between the thin Renaissance® Masonry Units should be a Type N Portland cement-lime mix, proportioned to a 1:1:6 ratio. This ratio refers to:

- 1 part Portland cement (ASTM C150, Type I)
- 1 part hydrated lime (ASTM C207, Type S); and
- 6 parts masonry sand (ASTM C144).

INSTALLATION - CONTINUED

When properly combined with the appropriate quantity of water, it will produce a general-purpose mortar, exhibiting good workability and board life in its plastic state, and good durability and flexibility in its hardened state; and conforming to ASTM C270-03; Standard Specification for Mortar for Unit Masonry.

For further information, refer to ARRISCRAFT•NOTE – Mortar for Masonry Veneer.

AVAILABILITY AND COST

AVAILABILTY Thin Renaissance® Masonry Units are available worldwide, both as adhesive applied thin-bed masonry units and full-bed masonry units.

Delivery times for orders will vary based on the complexity of what is required.

Arriscraft International cannot be responsible for delays due to fire, acts of God, or any other cause beyond its control or which could not be reasonably foreseen.

Contact Arriscraft International for a list of dealers in your area.

COST Quoted on a project basis for job-specific manufacturing to project requirements.

WARRANTY

Arriscraft International warrants its products against deterioration for the life of the building, provided the products have been erected and used according to accepted masonry standards, within the guidelines of local building codes and as recommended by the manufacturer.

Complete warranty information is outlined on the Arriscraft International standard form of Product Warranty.

Other proprietary thin bed installation systems are available. The designer must contact the manufacturer's representatives of these other systems for application details and warranty information with regard to the system as a whole including the thin masonry units.

MAINTENANCE

Thin Renaissance® Masonry Units should have excess mortar removed from their faces by brushing as they are placed within the wall at the point of tooling.

Clean Thin Renaissance® Masonry Units in accordance with the cleaning guidelines in ARRISCRAFT•CARE. Various masonry detergents and cleaning systems can change the colour of masonry products. Acid-based cleaning agents will darken the colour of the masonry units.

Always pre-test cleaning agents and methods on the job-site mock-up panel or a small inconspicuous area of the wall. The Consultant and/or Owner should approve the test area prior to the start of full-scale cleaning operations.

Refer to ARRISCRAFT•CARE – Cleaning Guidelines and ARRISCRAFT•NOTE – Cleaning Masonry for further information.

Arriscraft International does not recommend the application of water repellent or graffiti-proofing sealers to its masonry products.

TECHNICAL SERVICES

Arriscraft International offers consultation services to assist with the preparation of details, specifications and with pricing. Enquiries are attended to promptly and without obligation.

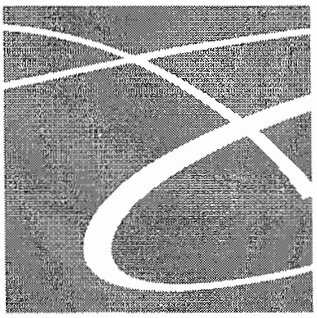
RELATED REFERENCES

Arriscraft International distributes an integrated technical information system, comprised of the following components:

- ARRISCRAFT•DATA are product data sheets
- ARRISCRAFT•NOTE are technical discussions with respect to building construction issues

Copies of ARRISCRAFT•CADD and ARRISCRAFT•SPEC are available in soft-copy only either downloadable from the Arriscraft International web site, or by requesting a CD-ROM. ARRISCRAFT•DATA and ARRISCRAFT•NOTE are available in hard-copy, and may also be found on the Arriscraft International web site www.arriscraft.com.

Arriscraft International also makes available samples for colour and finish, coursing charts, and copies of test reports upon request.



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