

GENERAL ASSEMBLY CONSIDERATIONS FOR TERRAN SACON BUILDINGS AND STRUCTURES



This document should not be considered specifications. Each project has site specific requirements and should develop individual engineered drawings and specifications based on intended use, available space, building configurations and local building codes.

This document outlines general principles and guidelines for assembling TERRAN SACON structures, including buildings, walls and backstops. It is intended as information for planning purposes only.

Prepared by: Terran Corporation

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GENERAL ASSEMBLY CONSIDERATIONS FOR TERRAN SACON BUILDINGS AND STRUCTURES

Shock absorbing concrete (SACON) is a construction material system designed for constructing bullet traps and live-fire facilities. The design concept of SACON is its unique air void structure within a portland cement concrete matrix that allows projectiles, small-arms rounds and hand grenade fragments to penetrate the surface of the SACON and become embedded or trapped within the concrete matrix. TERRAN SACON panels and blocks can be assembled into walls, backstops and buildings. Standard panels can be made to interlock or overlap to prevent the passage of bullets at seams. Specialty panels can be made to accommodate doors, windows or stairs and even ceiling and floor panels can be made with SACON coating.

Terran Corporation is well qualified and experienced in the design and construction of SACON structures. For over a decade, Terran Corporation has designed, manufactured, and installed SACON products both nationally and internationally. As co-inventors with the Army Corps of Engineers (Patent No. US 6,620,236) of the currently used and trademarked Shock Absorbing Concrete (SACON[®]) formulation, Terran Corporation is a licensed manufacturer and constructs SACON structures of all types for governmental, commercial and private clients. These have consisted of target protectors; small-arms shoot houses, bullet backstops, grenade houses and MOUT facilities. The complexity of these structures has caused Terran professionals to develop many unique designs and methods for manufacturing and assembling Terran SACON blocks and panels.

The purpose of SACON structures is to trap or contain live fire training rounds or even grenade shrapnel. The nature and function of the structures is such that the SACON structure elements will be consumed and will eventually require replacement or repairs. Re-configurability is also a requirement at many locations. Therefore, the appearance of SACON structures is not the first consideration. The structures will have visible joints and some rough surfaces. Due to the foamed nature of the TERRAN SACON, the surface of one face of each block or panel (top-most surface of the cast form) cannot be smooth-finished. A smoothed, or glazed surface would increase the risk of ricochets and reduce the bullet absorbing ability of the material. This leaves a rough surface on one side that cannot be helped. **The overriding criteria for SACON structures are the containment of munitions and the safety of the personnel using the structure for training.**

1.0 FOUNDATION REQUIREMENTS

Due to panel thickness (usually ≥ 24 inches), TERRAN SACON walls and structures are typically assembled free-standing. They can be placed on compacted earth pads or constructed footers. The panels and blocks do not need to be fastened to the footers. Larger structures are typically fastened together at the top of the structures to help meet wind load requirements. A local geotechnical consultant can prepare the

foundation prior to structure erection. Please contact TERRAN if there are any questions regarding foundations. As with any building, a proper foundation is the key to a well built SACON structure.

1.1 Sub-grade

The supporting ground for SACON panels, blocks or walls should be compacted to within 95% maximum density for long-term stability of the structures. Compacted crushed limestone with fines (chips and dust) makes an acceptable base for SACON walls.



Compacting Earth Pad for SACON Structure

1.2 Level and Flatness

The grade shall be compacted and level.

1.3 Ground Pressures

Due to the thickness of TERRAN SACON walls, the ground pressures are quite low, typically 800 psf for 8 ½ foot tall walls. If two-story buildings are to be erected, the soil pressures can be as high as 4000 psf, depending on ceiling span. If TERRAN SACON panels or blocks are used for multi-story buildings, a structural engineer should be consulted for ground pressure requirements.

1.4 Concrete Footers or Pads

Concrete footers or pads can be used. Since the ground pressures are low, the footers or pad do not need to be highly engineered. A qualified structural engineer can easily design the appropriate footer or pad for this purpose. No anchors or fasteners to connect the TERRAN SACON panels to the footer are required.

2.0 TERRAN SACON BLOCKS AND PANEL HANDLING

SACON panels manufactured by Terran typically measure 3-feet wide by 2-feet thick and either 8 or 8.5-feet tall and weigh around 2 tons. They are made of foamed concrete that is about 60% the weight of normal concrete and are therefore softer than

normal concrete. They must be handled with care to minimize nicks and other damage that might impact the performance and appearance of the finished product.

2.1 Construction Equipment

Walls and structures are typically assembled using an all-terrain fork lift capable of handling the panels when extended. A skid-steer excavator is also recommended to handle loose material as needed for leveling in earth or compacted footers. If SACON coated ceiling/floor panels are used in multi-story structures, a properly sized crane is needed with experienced operators and riggers. All rigging equipment should be specified by a structural or rigging engineer and inspected regularly while in use.

2.2 Panels Weights

Wall panels can weigh between 2400 and 6200 pounds. Detailed dimensions and specifications for each type block are shown in Appendix A.

2.3 Lifting Straps

All TERRAN SACON panels have a nylon sling strap embedded within the block with the two loops protruding out the top. The strap and loops are sized to safely lift the block using both loops. Typically, the strap loops are placed over 2-inch hooks connected to a lifting bar with the proper spread mounted on the all-terrain fork lift. The blocks and panels can also be lifted and placed using a self-leveling choker set and pulley. Using the lift forks should be avoided as the sharp edges of the forks can cut the lifting straps.



Lifting Straps on Finished T Panel

2.4 Panel Handling

TERRAN SACON panels are soft by design. Unless placing the panels upright, it is best to handle the panels and blocks horizontally across the forks with the aid of cribbing. After casting, the panels are typically lifted horizontally off the ground and stacked using cribbing. They are also transported on flatbed trucks laying on cribbing. The cribbing is typically 8-foot long 4x4 timbers and at least 2 timbers are needed under each block. At the erection site, the panels are offloaded from

the flatbed trucks using an all-terrain fork lift and stacked near the building site. Once actual building erection begins, the blocks are then lifted vertically using the lifting strap loops and set in place with lifting hooks.



Stacked and Cribbed T Panels

2.5 Panel Placement

TERRAN SACON panels are placed in the proper location, starting from one corner or end of the structure. The adjacent blocks are then set in place by setting the bottom first up against the existing block and slowly lower the lift and allow the block being set to rest against the existing block, making sure the inner and outer wall faces are flat with each other. Panels are checked for level and shimmed if necessary before placing the next panel. Continue this process for the entire wall, making sure the blocks are snug and the overall wall length remains within tolerance (if matching ceiling panels are to be used). The overall length of free standing walls is normally not critical unless the wall length exceeds the footer or compacted pad. When using keyed panels or blocks, gaps between panels should not exceed ½-inch. Once assembled, steel banding can be bolted to the panel tops for extra stability if required.

3.0 OVERLAPS AND CONNECTIONS

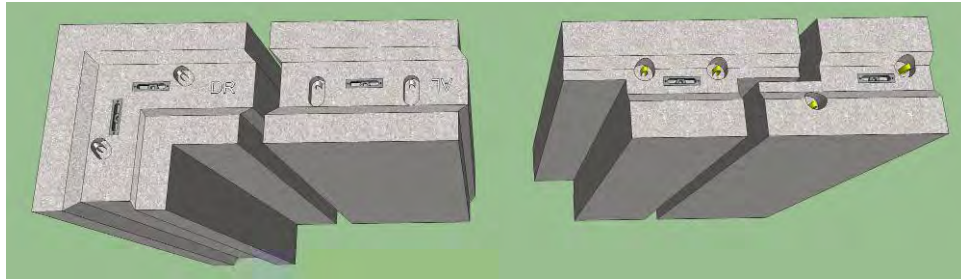
TERRAN manufactures two styles of blocks/panels for creating live fire structures. The first style consists of overlapping T shaped blocks with L shaped blocks to complete wall ends. The T blocks are alternated in/out so the wings of the Ts overlap approximately 11 inches. This insures complete containment by the wall. The second type is keyed blocks and panels. Each unit contains a 2-inch by 9-inch wide beveled key on each side of the block, one side male, the other side female. This key system allows containment at each joint. All TERRAN panels have a wide groove cast in the top large enough to allow steel banding to be used if the blocks require fastening together.

Terran's SACON building systems are designed for easy assembly and complete bullet containment. The modular aspect of the basic design of TERRAN SACON structures allow for easy replacement of spent panels. The designs also allow for reconfiguring, as

required in many situations. Although most panels are cast to be 24-inches thick, the keyed style blocks can be up to 36-inches thick.

3.1 Panel Overlap for Containment

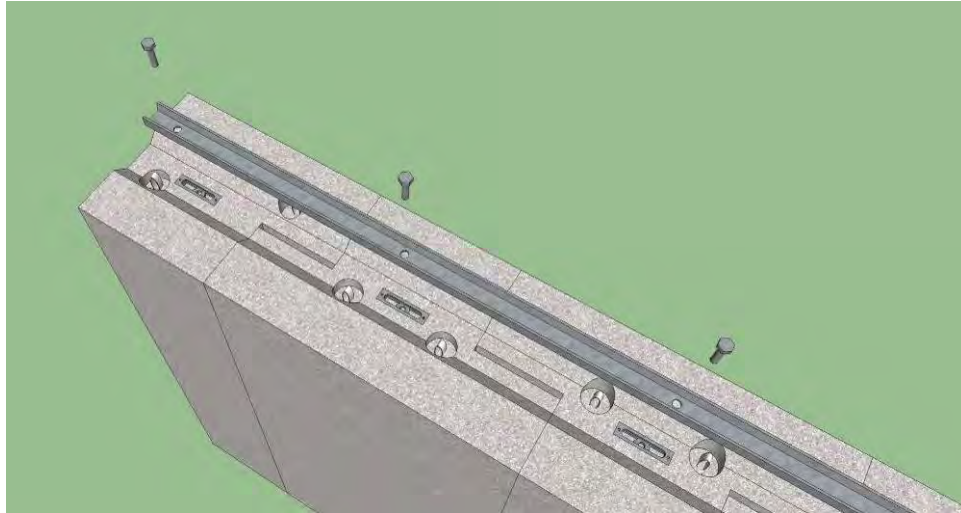
To maintain complete bullet capture, SACON panels by Terran have either an overlap key or overlapping wings formed by alternating T shaped panels (looking down from top). There should be no problem fitting the blocks close enough to eliminate possible passage rounds.



Keyed Blocks and T and L-Panel Overlap

3.2 T and L Panels

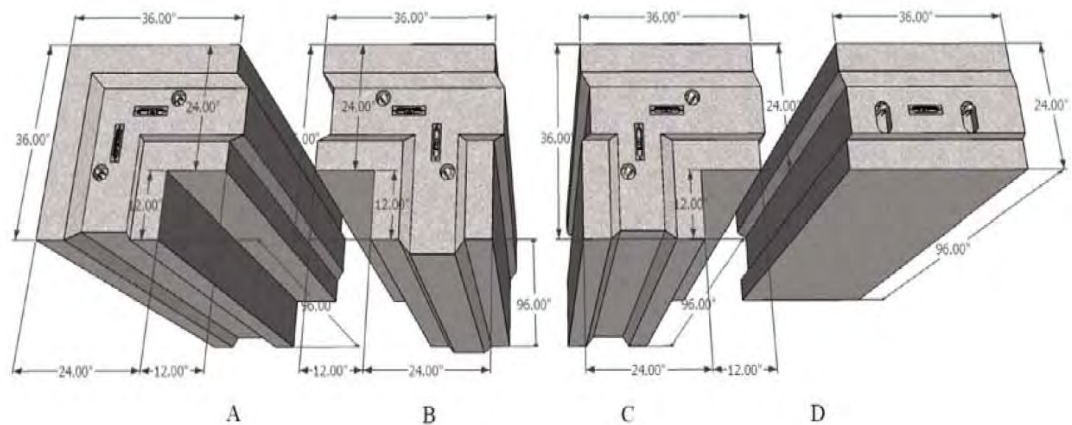
T and L-panels are made to overlap at least 11 inches to prevent bullet escape through cracks. Each panel has a groove cast in the top that will receive steel banding. Also, there is an embed (Dayton Superior P-38 Corewall slotted insert) with a slide nut that can be bolted to the steel banding at the top of each panel. The steel banding can then be used to connect the panels together as a complete wall. The slide nut ($\frac{3}{4}$ - 10) has a 3-inch groove, and with a corresponding 3-inch by 1-inch oval slot in the steel band, provides plenty of tolerance for fastening. Typically, the steel banding is pre-manufactured, punched and galvanized prior to shipping to the erection site. L shaped panels are used at wall ends or doorway openings where the flat side is at the opening and the lip edge has the same overlap feature as the T-panels. The L-panels are basically a T-panel with one side or lip removed to make a solid ending edge.



T and L Panels Connected Using Steel Banding

3.3 *Keyed Blocks*

Some TERRAN SACON panels have a 2-inch by 9-inch beveled key cast in the sides of the blocks to serve as an alignment guide and prevent bullet escape. In this case, each block will have a male key on one side and female key on the other. As with the T and L-panels, the top of each panel has a groove or channel that will receive steel banding to tie the structure together along the top edge and a slide nut, or two depending on configuration. The figure below shows 3-dimensional sketches of the basic key-panel shapes.



Basic Keyed Style Panel Shapes

3.4 *Floor/Ceiling Panels*

TERRAN Combination floor and ceiling panels with SACON coating top and bottom of structural concrete are used to construct multi-story buildings that require full 360-degree bullet containment. These are custom designed and cast specifically for each project.

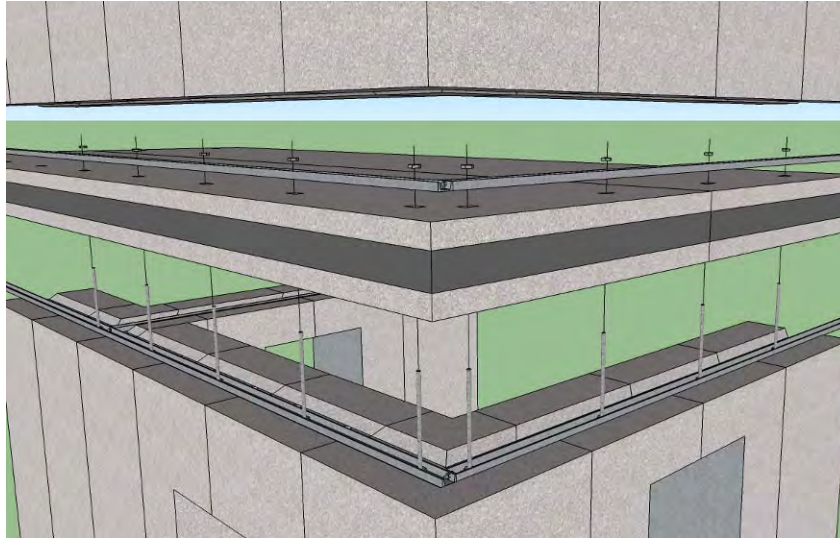
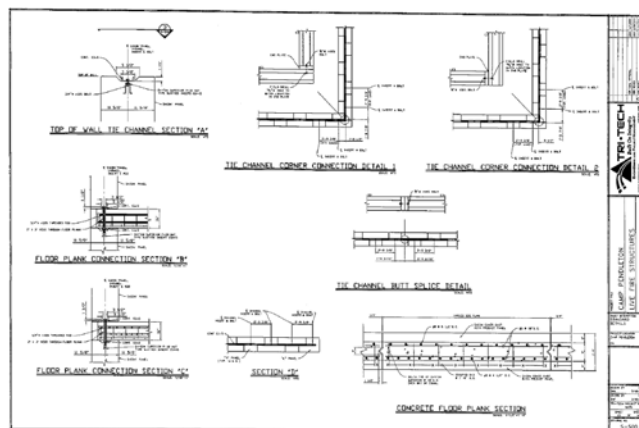


Diagram of Floor/Ceiling Panel Connections

4.0 *SHOP/ENGINEERING AND STAMPED DRAWINGS*

Fully engineered and stamped drawings can be produced for Terran structures, if required. Drawings are prepared for specific building designs and requirements and may be dependent on local codes and site specifications. Extra charges will apply for stamped engineered drawings.



Example of Shop Drawing

5.0 MATERIAL SPECIFICATIONS AND CUT SHEETS

TERRAN SACON buildings and structures are designed to assemble easily and safely. Many standard parts and supplies are used. Cut sheets and details are presented in Appendix B for the most commonly used parts and accessories.

5.1 Slide-bolt Embeds

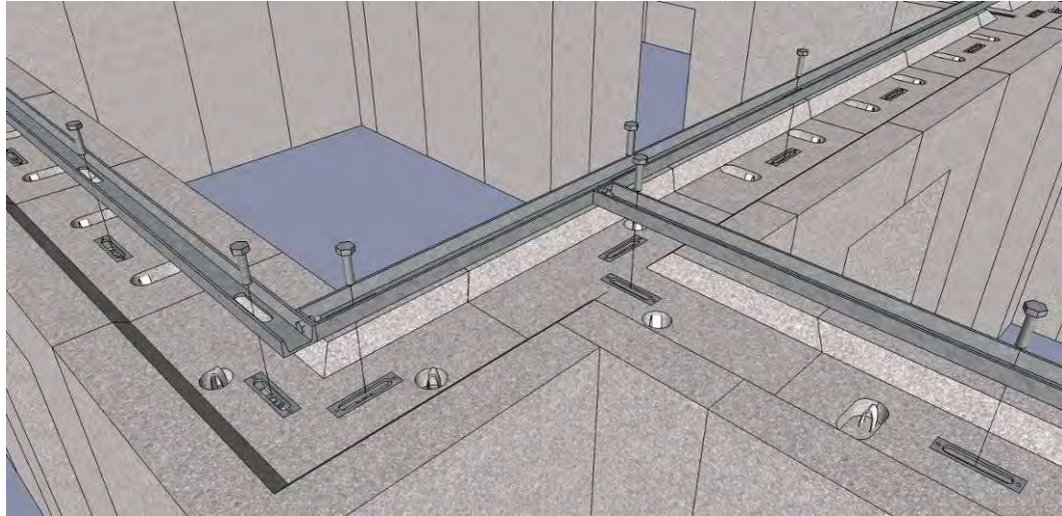
Embeds used for fastening to steel banding or ceiling panels are typically Corewall® Slotted Insert II, 4" x 4 ½", or equivalent. These embeds are bolted inside the top of each form at the appropriate location and become cast in the TERRAN SACON. When the form is separated from the poured panel, the locator bolt is first removed.



Slide Nut Embedded in Top of Panel

5.2 Steel Banding

The steel banding that is used to tie TERRAN SACON panels and blocks together is typically 1" by 3" C channel with 3" long by 1" wide oval punch-outs at appropriate locations for attaching to the tops of panels. The steel should be galvanized coated prior to installation to minimize corrosion.



Schematic of Steel Banding Connecting Keyed Blocks

5.3 *Fastening Bolts*

To fasten the steel banding to the top of the TERRAN SACON panels, 1-inch long $\frac{3}{4}$ -10 hardened steel bolts are used.



Picture of Steel Banding at Top of Keyed Panels

5.3 *Lifting Straps*

Each panel has a lifting strap embedded for the purpose of lifting and handling during erection. The straps are nylon and rated in exceedance of the block weights. The lifting loops fit easily over 2-inch or larger hooks rated for the block weight. When using the straps for lifting, care must be taken to not cut the nylon with sharp edges on hooks or forks.



Lifting Sling Straps at Top of T Panel

6.0 FINISHING AND INSPECTIONS

As with any structural project, some finish details may need addressing and a final inspection should be performed. Extreme care must be taken to eliminate any ricochet potentials. Appendix C contains some pictures of completed TERRAN SACON structures, including a few that have been shot at.

6.1 Intended Use

Remember, TERRAN SACON structures are used for live-fire training and will be shot with many thousands of rounds. These structures are not intended to look or perform like ordinary tilt-up concrete structures. Once the structure is assembled, there will be joints showing and rough surfaces.



Picture of Overlapping T-Panels Joints and Surfaces

6.2 *Joints and Cracks*

TERRAN SACON structures are designed with overlap at each joint to prevent accidental escape of bullets or shrapnel. Typically adjacent blocks or panels fit against each other and joint cracks are negligible. Sometimes, surface gaps between panels can exceed ¼ inch. However, the block overlap or key is more than adequate to contain bullets. If there are gaps larger than 1-inch, the blocks should be re-set or even replaced for better fit. If larger gaps remain due to block imperfections, “high points” can be easily ground off with electric surface grinders. **The joint cracks between panels or blocks should not be filled.** Normally, the only critical dimension tolerances are the overall wall lengths of a building, so the whole building fits together properly and remains square.



Grinding a Panel for Better Fit

6.3 *Patching*

If there are any large chips or pieces of TERRAN SACON panels missing due to handling that need repairing, patching can be done at the site. However, extreme care must be taken and the patch material **MUST BE SACON**. Do not attempt to patch panels with standard cement or grout. SACON is a ballistic material designed and manufactured to absorb bullets. Patching with anything other than SACON will increase the risk of ricochet and could cause harm or death.

6.4 *Steel Banding*

The steel banding that is used to tie TERRAN SACON panels and blocks together, as well as the bolts must be completely recessed in the top channel and not visible from the ground.

6.5 *Footers*

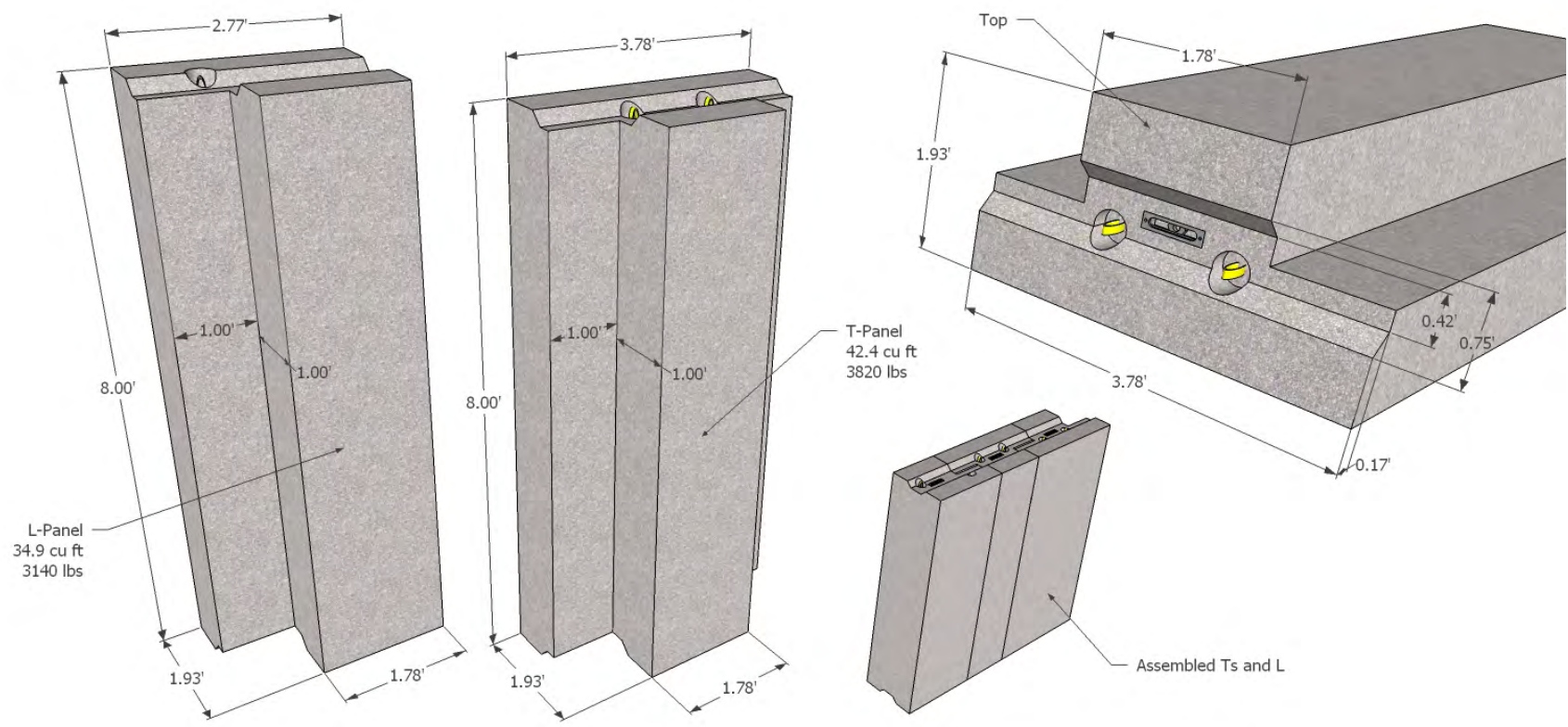
Any concrete or stone base should be completely covered with sand or SACON to avoid ricochet potentials. Typically, if a concrete footer is used, it is covered by at least 6-inches of sand or the shoot-side edge is completely covered by SACON panels or blocks.

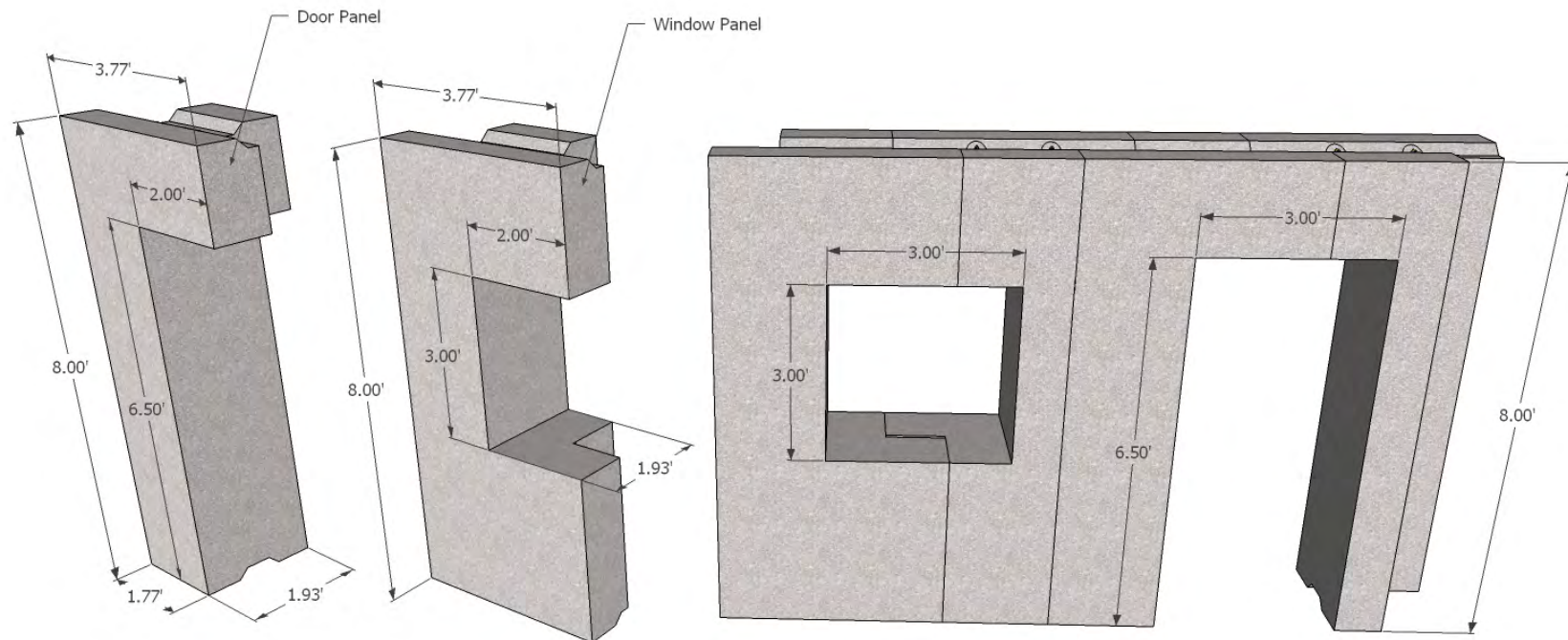
6.6 *Maintenance*

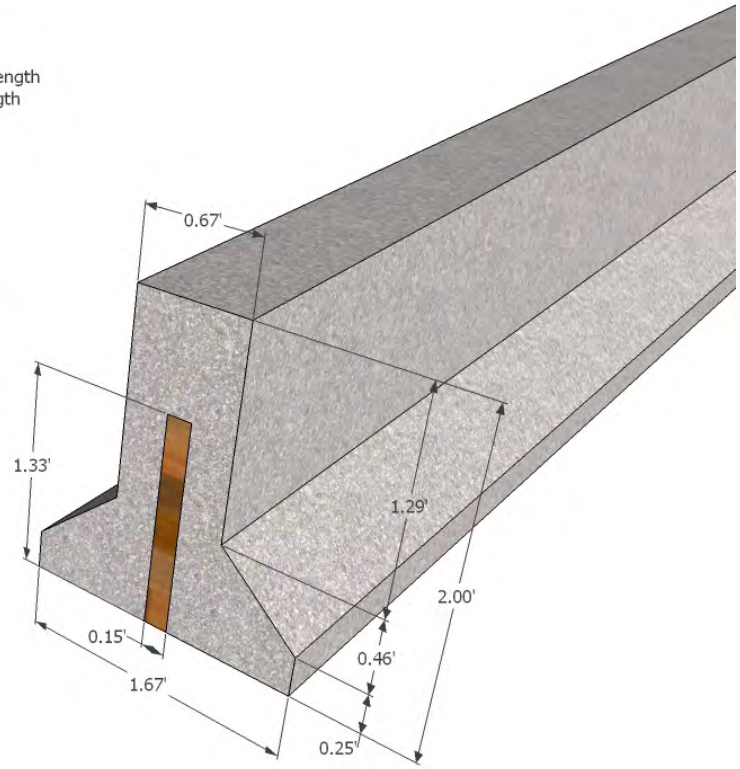
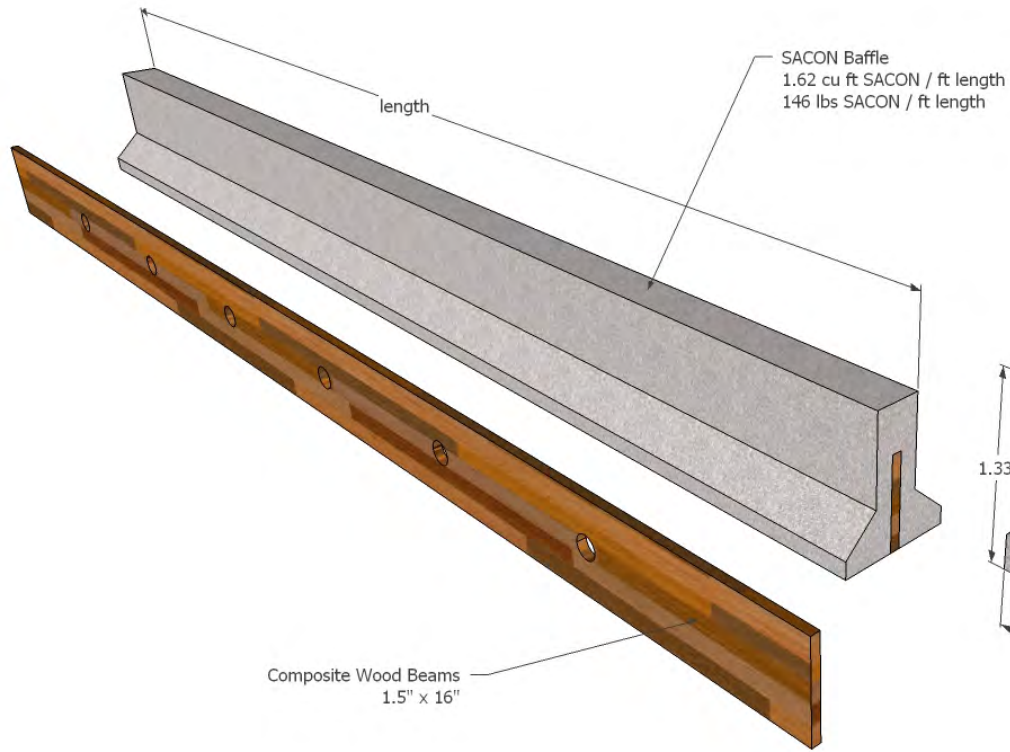
After many thousands of rounds, some of the SACON panels will eventual become expended. Once a hole or divot penetrates $\frac{2}{3}$ the overall depth of the panel or block, the item should be replaced or patched. Patching can be done in the field, but only with more SACON material. Always make sure the material can be certified as SACON. Otherwise, the material may cause ricochets resulting in harm or death.

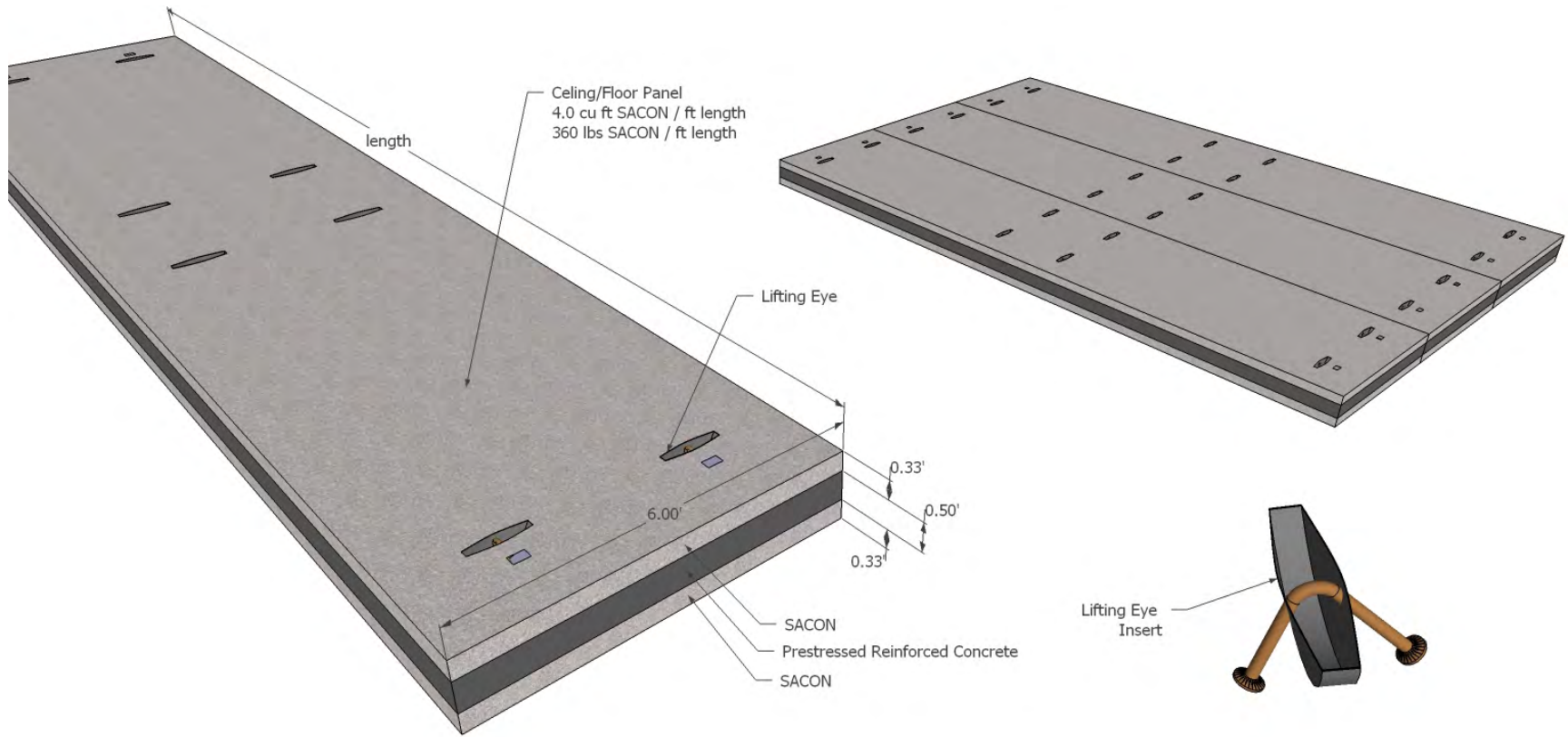
APPENDIX A
PANEL SPECIFICATIONS

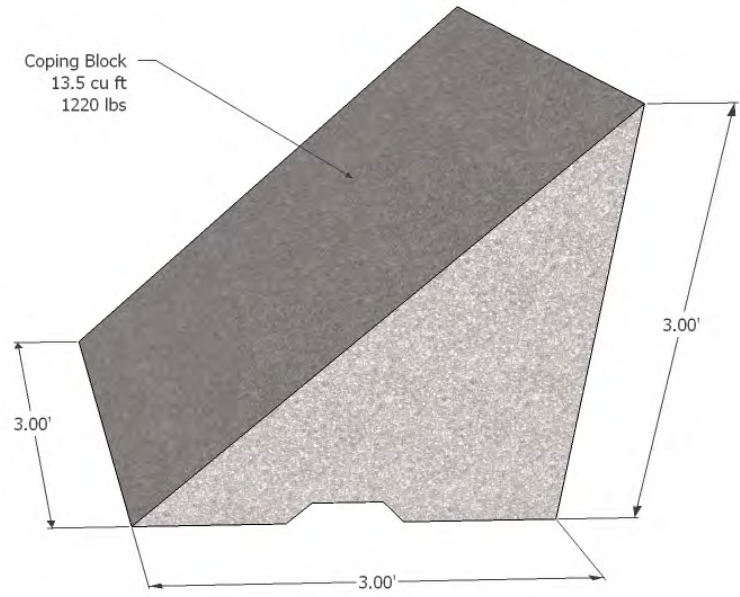
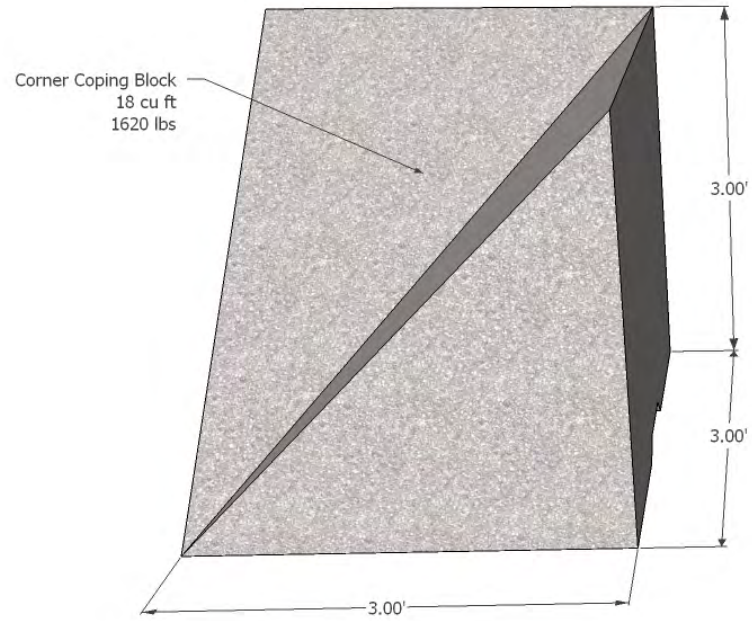
| Panel/Block Type | Overlap/key | Height (ft.) | Volume (cu.ft.) | Weight (lbs) |
|--------------------------------|--------------------|---------------------|------------------------|---------------------|
| T panel | Overlap | 8 | 44.6 | 4020 |
| T panel | Overlap | 8.5 | 47.4 | 4265 |
| L panel | Overlap | 8 | 36.6 | 3300 |
| L panel | Overlap | 8.5 | 38.9 | 3500 |
| Standard 3' wall panel | Keyed | 8 | 48 | 4320 |
| Standard 3' wall panel | Keyed | 8.5 | 51 | 4590 |
| Corner wall panel | Keyed | 8 | 64 | 5760 |
| Corner wall panel | Keyed | 8.5 | 68 | 6120 |
| Inside wall/intersection panel | Keyed | 8 | 64 | 5760 |
| Inside wall/intersection panel | Keyed | 8.5 | 68 | 6120 |
| 36" cubic block | Keyed | 3 | 27 | 2430 |
| | | | | |
| | | | | |

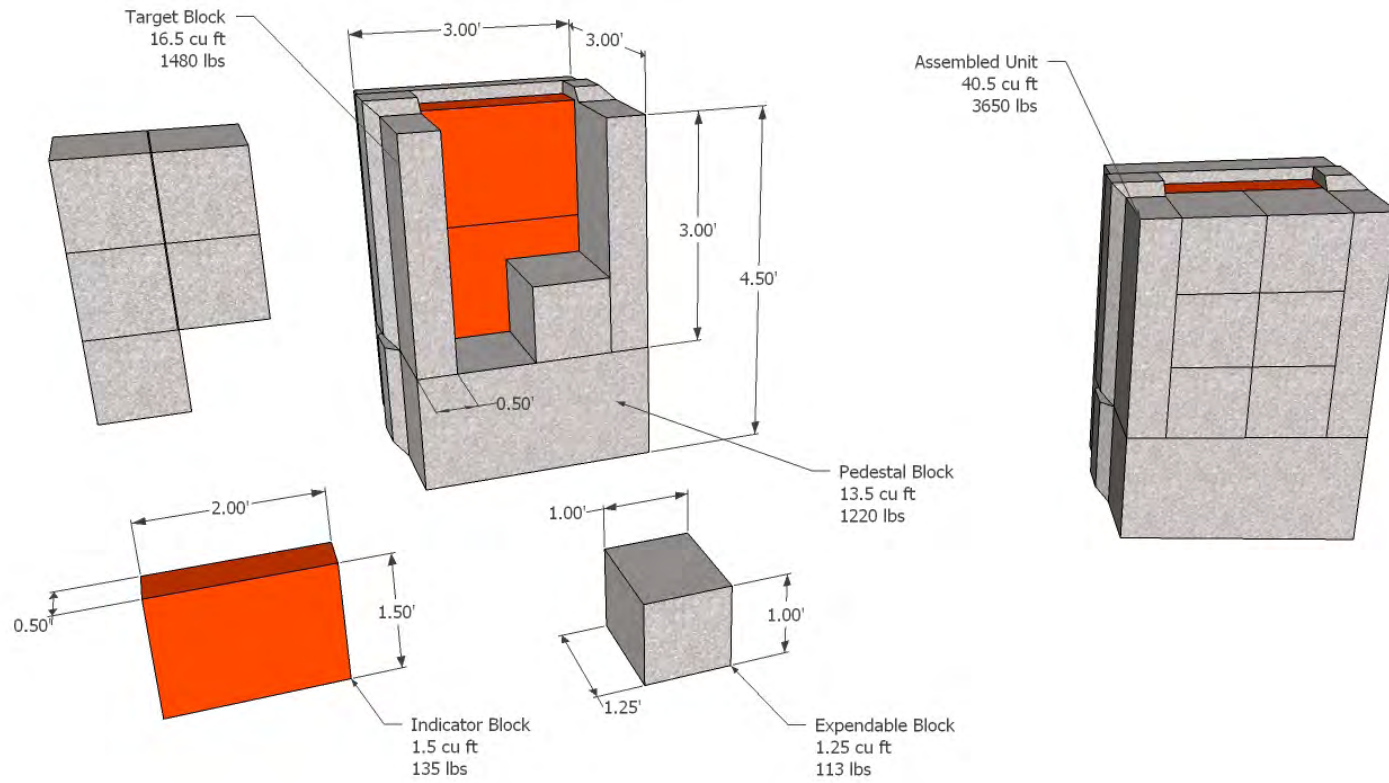


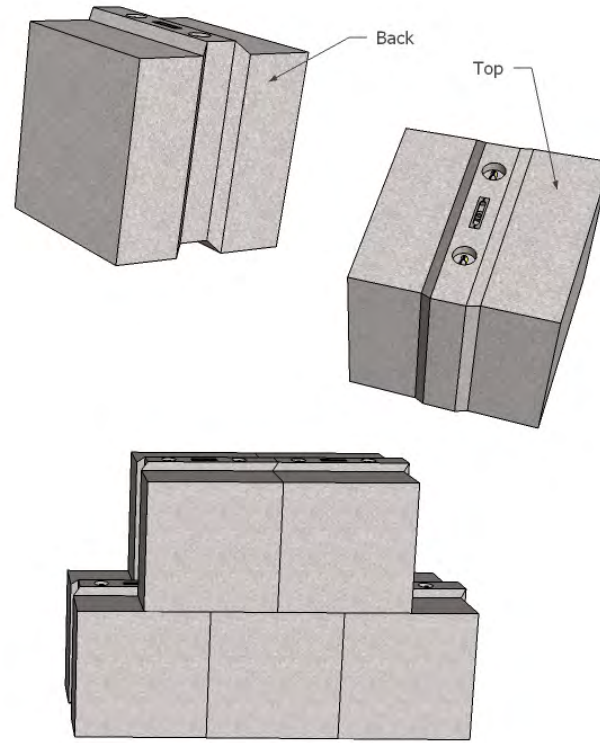
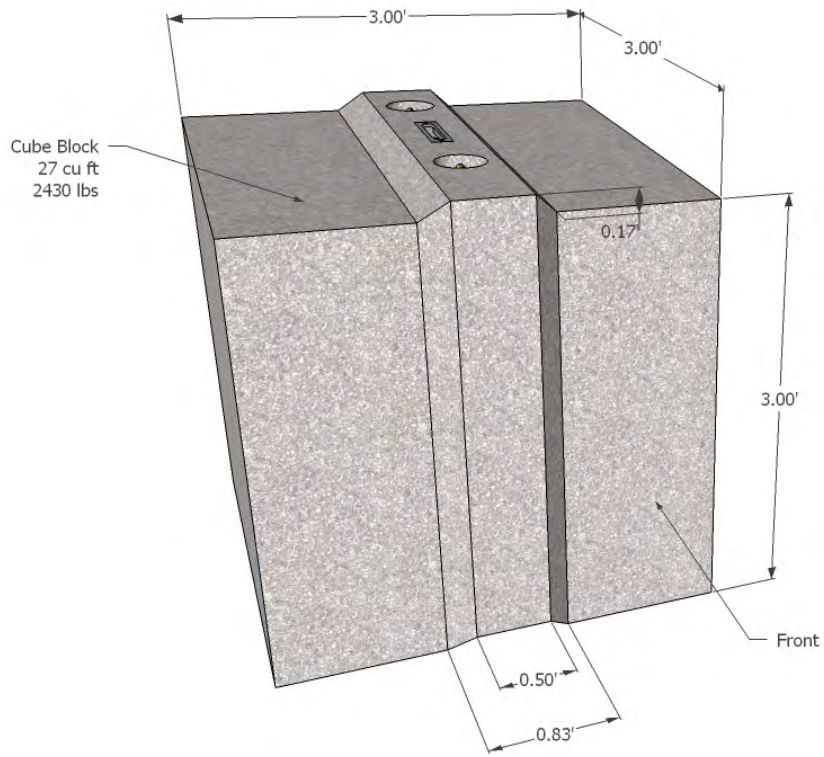


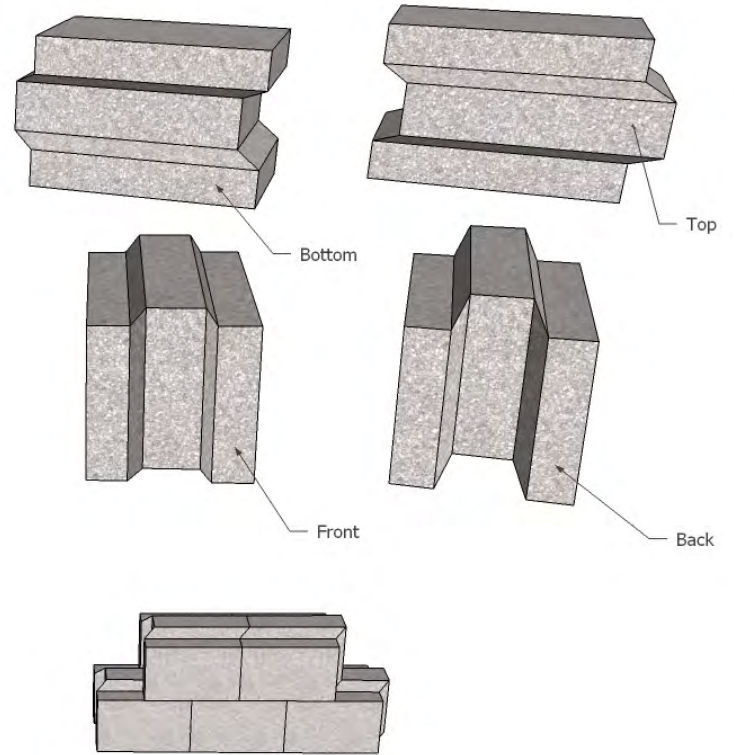
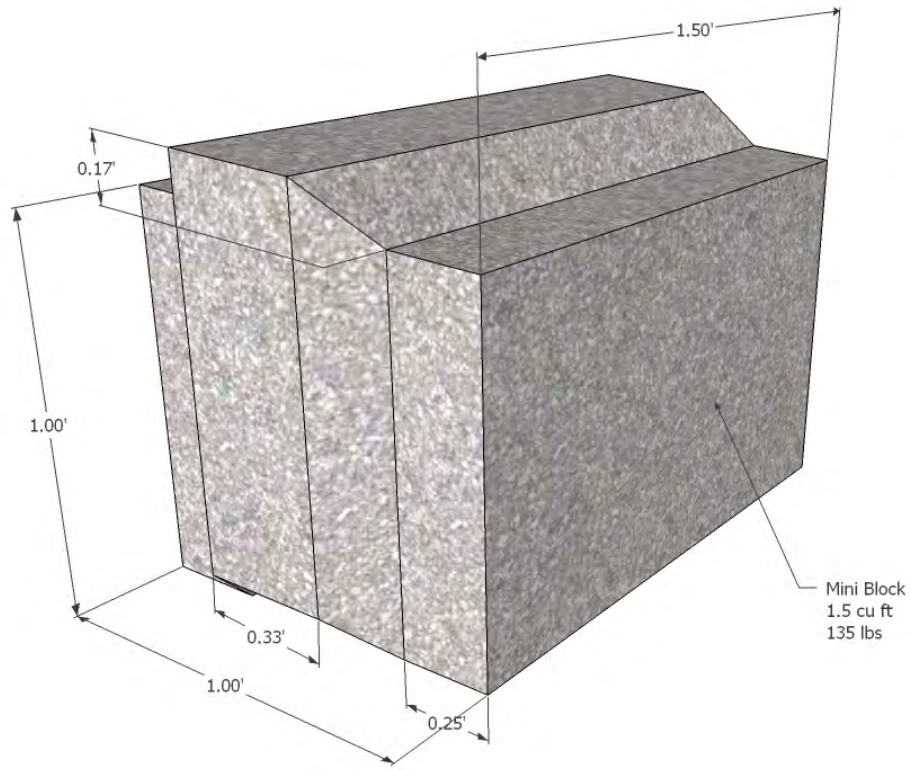


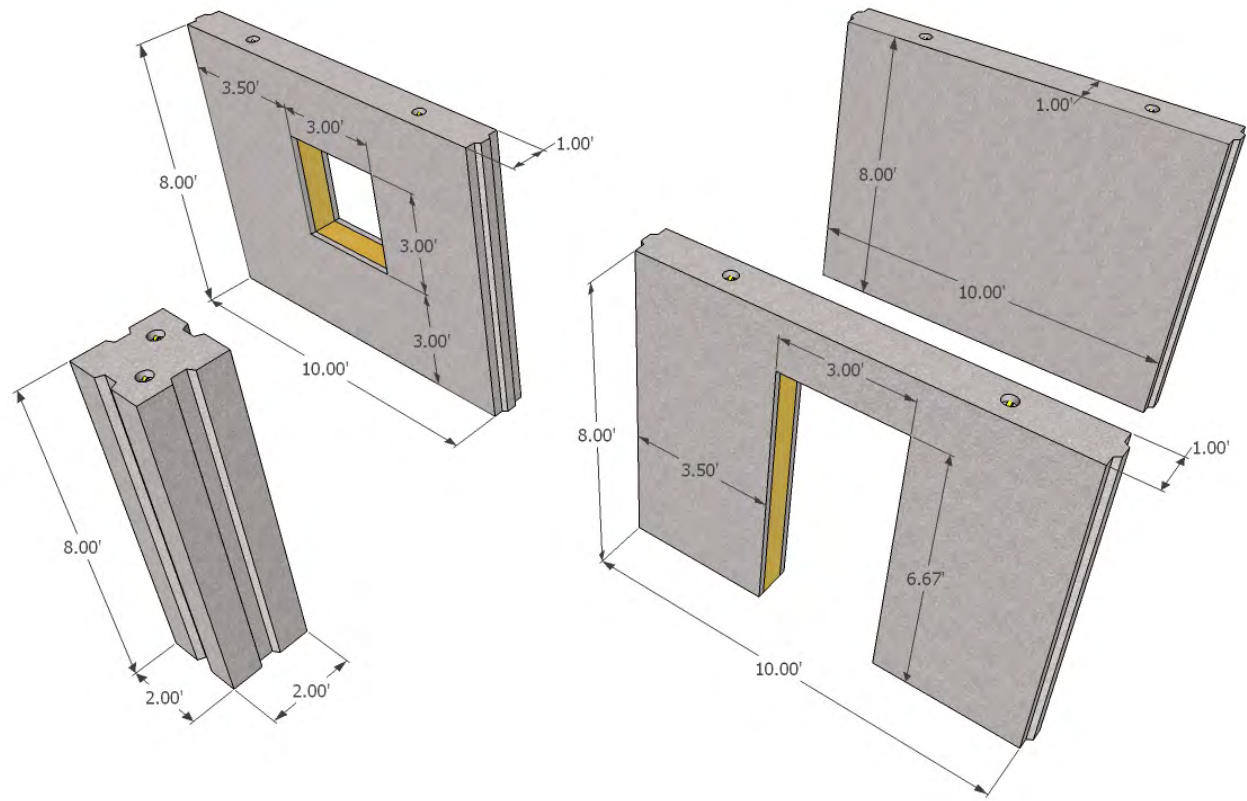


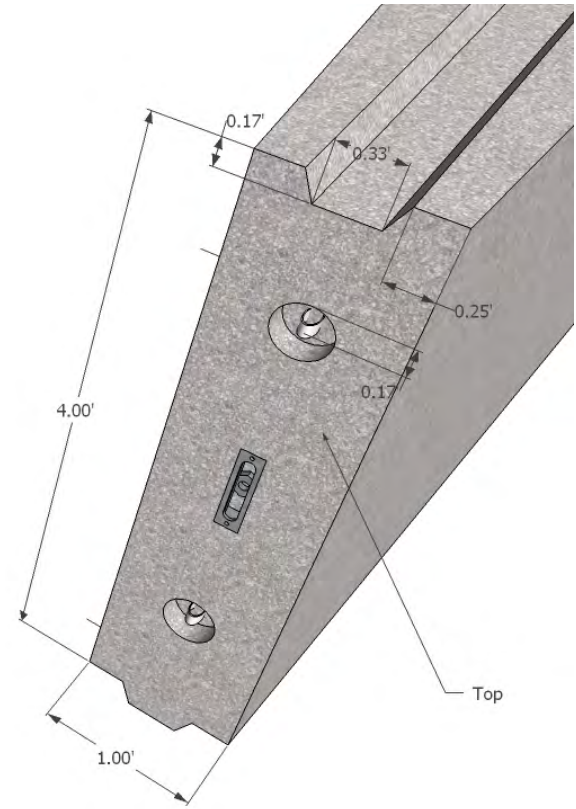
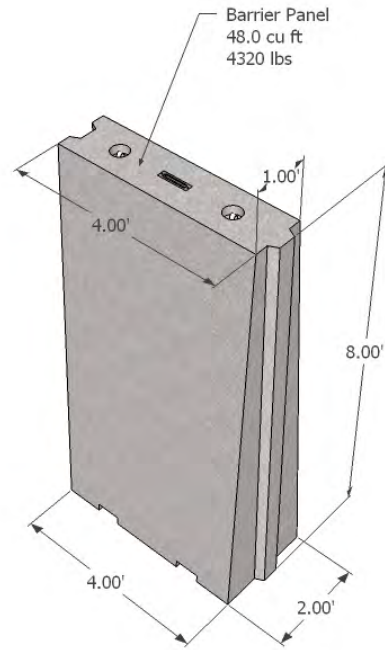
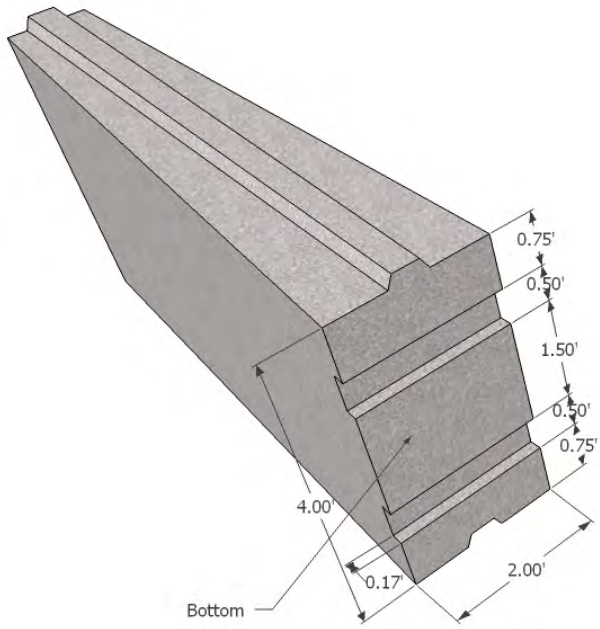












APPENDIX B
MATERIALS CUT SHEETS

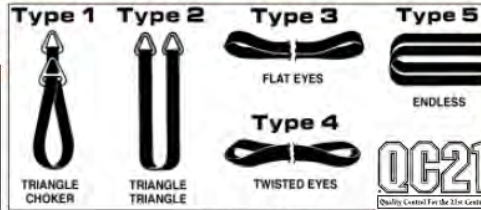
QC21 SYNTHETIC WEB SLINGS

(AVAILABLE IN NYLON OR POLYESTER)

Quality Control For the Industry

WARNING

- Do not exceed the Working Load Limits (WLL) as stated.
- Do not use in contact with object, or at temperatures in excess of 194°F (90°C) or below -40°F (-40°C).
- Ultraviolet light (sunlight) can affect the strength of synthetic webbing in varying degrees, ranging from slight to total degradation. The degradation is also cumulative.
- Working Load Limits based on design factor of 5-1.
- Chemically active environments, such as acids and caustics, can affect the strength of slings. Your F&M Maico Representatives should be consulted before slings are used in chemically active environments.



1-Ply, Type 1, 2, 3 or 4

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM1-61T | 1100 | 880 | 2200 |
| 1 | FM1-91T | 1600 | 1280 | 3200 |
| 2 | FM1-62T | 2200 | 1760 | 4400 |
| 2 | FM1-92T | 3100 | 2480 | 6200 |
| 3 | FM1-63T | 3300 | 2640 | 6600 |
| 3 | FM1-93T | 4700 | 3760 | 9400 |
| 4 | FM1-64T | 4400 | 3520 | 8800 |
| 4 | FM1-94T | 6200 | 4960 | 12400 |
| 5 | FM1-65T | 5500 | 4400 | 11000 |
| 5 | FM1-95T | 7800 | 6240 | 15600 |
| 6 | FM1-66T | 6600 | 5280 | 13200 |
| 6 | FM1-96T | 9300 | 7440 | 18600 |
| 8 | FM1-98T | 11750 | 9400 | 23500 |
| 10 | FM1-910T | 14700 | 11760 | 29400 |
| 12 | FM1-912T | 17650 | 14120 | 35300 |

2-Ply, Type 1, 2, 3 or 4

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM2-61T | 2200 | 1760 | 4400 |
| 1 | FM2-91T | 3100 | 2480 | 6200 |
| 2 | FM2-62T | 4400 | 3520 | 8800 |
| 2 | FM2-92T | 6200 | 4960 | 12400 |
| 3 | FM2-63T | 6600 | 5280 | 13200 |
| 3 | FM2-93T | 8800 | 7040 | 17600 |
| 4 | FM2-64T | 8200 | 6560 | 16400 |
| 4 | FM2-94T | 11000 | 8800 | 22000 |
| 5 | FM2-65T | 10200 | 8160 | 20400 |
| 5 | FM2-95T | 13700 | 10960 | 27400 |
| 6 | FM2-66T | 12300 | 9840 | 24600 |
| 6 | FM2-96T | 16500 | 13200 | 33000 |
| 8 | FM2-98T | 22750 | 18300 | 45500 |
| 10 | FM2-910T | 28400 | 22720 | 56800 |
| 12 | FM2-912T | 34100 | 27280 | 69200 |

4-Ply, Type 3 or 4

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM4-61T | 3800 | 3040 | 7600 |
| 1 | FM4-91T | 5300 | 4400 | 11000 |
| 2 | FM4-62T | 7000 | 5680 | 15200 |
| 2 | FM4-92T | 11000 | 8900 | 22000 |
| 3 | FM4-63T | 11400 | 9120 | 22800 |
| 3 | FM4-93T | 16450 | 13160 | 32900 |
| 4 | FM4-64T | 14150 | 11320 | 28300 |
| 4 | FM4-94T | 20400 | 16320 | 40800 |
| 5 | FM4-65T | 17700 | 14160 | 35400 |
| 5 | FM4-95T | 25300 | 20400 | 51000 |
| 6 | FM4-66T | 21200 | 16960 | 42400 |
| 6 | FM4-96T | 30600 | 24480 | 61200 |

Type 3, 2 Ply, Basket

1-Ply, Type 5

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM1-61T5 | 2200 | 1760 | 4400 |
| 1 | FM1-91T5 | 3200 | 2592 | 6400 |
| 2 | FM1-62T5 | 4400 | 3520 | 8800 |
| 2 | FM1-92T5 | 6200 | 4960 | 12400 |
| 3 | FM1-63T5 | 6600 | 5280 | 13200 |
| 3 | FM1-93T5 | 9400 | 7520 | 18800 |
| 4 | FM1-64T5 | 8800 | 7040 | 17600 |
| 4 | FM1-94T5 | 12400 | 9920 | 24800 |
| 5 | FM1-65T5 | 11000 | 8800 | 22000 |
| 5 | FM1-95T5 | 15600 | 12480 | 31200 |
| 6 | FM1-66T5 | 13200 | 10560 | 26400 |
| 6 | FM1-96T5 | 18600 | 14880 | 37200 |
| 8 | FM1-98T5 | 21150 | 16920 | 42300 |
| 10 | FM1-910T5 | 26450 | 21160 | 52900 |
| 12 | FM1-912T5 | 31750 | 25400 | 63500 |

2-Ply, Type 5

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM2-61T5 | 4400 | 3520 | 8800 |
| 1 | FM2-91T5 | 6200 | 4960 | 12400 |
| 2 | FM2-62T5 | 8800 | 7040 | 17600 |
| 2 | FM2-92T5 | 12400 | 9920 | 24800 |
| 3 | FM2-63T5 | 13200 | 10560 | 26400 |
| 3 | FM2-93T5 | 17600 | 14080 | 35200 |
| 4 | FM2-64T5 | 16400 | 13120 | 32800 |
| 4 | FM2-94T5 | 22000 | 17600 | 44000 |
| 5 | FM2-65T5 | 20400 | 16320 | 40800 |
| 5 | FM2-95T5 | 27400 | 21920 | 54800 |
| 6 | FM2-66T5 | 24600 | 19680 | 49200 |
| 6 | FM2-96T5 | 33000 | 26400 | 66000 |
| 8 | FM2-98T5 | 42350 | 33880 | 84700 |
| 10 | FM2-910T5 | 52900 | 42320 | 105800 |
| 12 | FM2-912T5 | 63500 | 50800 | 127000 |

3-Ply, Type 5

WORKING LOAD LIMIT IN LBS.

| Width (Inches) | Code Type | Vertical | Choker | Vertical Basket |
|----------------|-----------|----------|--------|-----------------|
| 1 | FM3-61T5 | 5900 | 4400 | 11000 |
| 1 | FM3-91T5 | 7900 | 6320 | 15800 |
| 2 | FM3-62T5 | 11000 | 8900 | 22000 |
| 2 | FM3-92T5 | 15950 | 12080 | 31700 |
| 3 | FM3-63T5 | 15800 | 12720 | 31800 |
| 3 | FM3-93T5 | 22950 | 18360 | 45900 |
| 4 | FM3-64T5 | 21200 | 16080 | 42400 |
| 4 | FM3-94T5 | 30600 | 24480 | 61200 |
| 5 | FM3-65T5 | 26500 | 21200 | 53000 |
| 5 | FM3-95T5 | 38200 | 30560 | 76400 |
| 6 | FM3-66T5 | 31800 | 25440 | 63600 |
| 6 | FM3-96T5 | 43850 | 36680 | 91700 |

Information on additional Types available upon request.
 Type 6 - Reversed Eye Type 9 - Load Balancer Basket
 Type 7 - Reversed Flat Eye Type 10 - Multi-Leg Bridles
 Type 8 - Wide Body Basket

SYNTHETIC WEB SLING CODE:

FM1-91T

- Type of Sling - 1, 2, 3, 4 or 5 (as shown above)
- Width of Webbing - 1, 2, 3, 4, 5, 6, 8, 10 or 12
- Grade of Webbing - 6800 lb/in width or 9800 lb/in width
- Number of Plies - 1, 2, 3 or 4

INSPECTION/REMOVAL - QC21 SYNTHETIC WEB SLINGS

- Acid or caustic burns
- Melting or charring of any part of the sling
- Holes, tears, cuts, or snags
- Broken or worn stitching in load bearing splices
- Excessive abrasive wear
- Knots in any part of the sling
- Excessive pilling or corrosion, or cracked, distorted, or broken fittings
- Other visible damage that causes doubt as to the strength of the sling
- Missing or illegible sling identification

WEBMASTER 1600 SLINGS

TYPE 3 AND 4 EYE AND EYE SLINGS (Flat or Twisted)



Type 3 (EE) Flat

Type 3 (EE) - Flat Eye slings are very popular and can be used in all three types of hitches. They are easier to remove from beneath the load than sling Types 1, 2 and 4. Unless Type 4 is requested, Type 3 will be supplied as the standard EE sling.

Elasticity - The stretch characteristics of web slings depends on the type of yarn and the web finish. Approximate stretch at RATED SLING CAPACITY is:

Tuff-Tag and Warning Sheet



OSHA requires all web slings to show rated capacities and type of material. The Lift-All Tuff-Tag is made from an abrasion resistant polymer that will remain legible far longer than any leather or vinyl tags. In fact, a Tuff-Tag will consistently outlast the useful life of a sling.

| NYLON | | POLYESTER | |
|-----------|-----|-----------|----|
| Treated | 10% | Treated | 7% |
| Untreated | 6% | Untreated | 3% |

A Warning Sheet is included with every web sling order. The sheet lists inspection information and operating practices applying to synthetic web slings.



Tuflex is an Alternative...

For three and four ply slings wider than 6", *Tuflex* Roundslings should be seriously considered. *Tuflex* offers increased flexibility, ease of use and lower cost.

Effect of Angle of Lift on a Sling's Rated Capacity

DEFINITION



serves to alert users to potentially hazardous situations which often occur in the use of these products. Failure to read, understand and follow the accompanying instructions on how to avoid these situations could result in death or serious injury.

MISC. INSERTS**COREWALL® SLOTTED INSERT II**

Brand:
DS Concrete Accessories

Product Number:
P38



[Click Image to View Full Size](#)

Description:

The Corewall Slotted Insert II is the next generation product in the Corewall legacy. The design has been improved to create a higher load capacity and greater ease to install the product. With six different product options, the Corewall Slotted Insert II will meet any application. This product is an addition to the Corewall Slotted Inserts P30 & P31 which have been specified and used by precasters for over 20 years.

| Features: | Benefits: |
|---|-------------------------------|
| Easy installation | Easy to use |
| Load capacities up to 26,000#, ultimate in tension using 5,000 psi concrete | High-strength |
| Six product options and 2 finish options | Versatile |
| Open leg design | Easy positioning around steel |
| 3/4"-10 special nut creates load capacities | Reliable |
| Plastic void former w/removable cap | Saves time and labor |
| 3 insert heights to accommodate any panel thickness | Versatile |

Features:

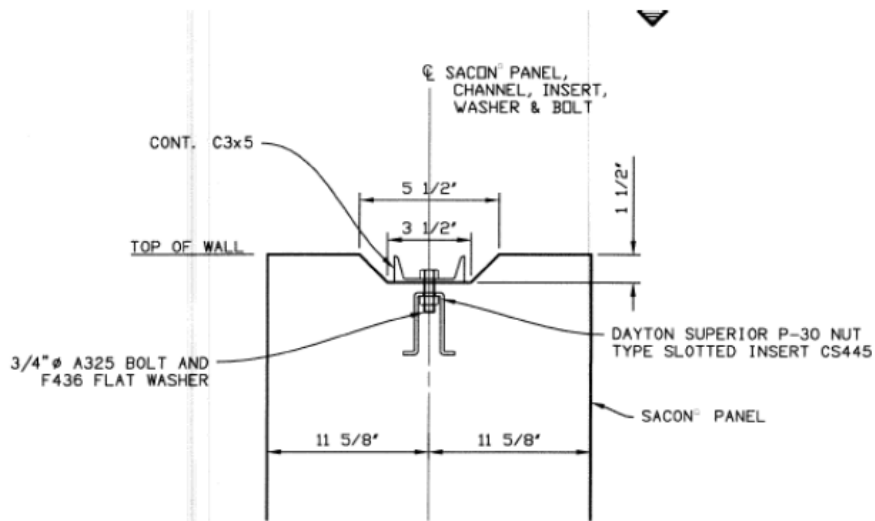
- One piece steel tapered body - utilizes concrete strength and eliminates pullout possibility
- Open leg design - easy to position around steel during installation after concrete is in place
- 3/4"-10 Special Nut - bears on top and sides of body creating stronger load capacities
- Load capacities up to 26,000# Ultimate in tension using 5,000 psi concrete - providing the strength needed to attach your panels to the building frame
- Plastic void former with removable cap - no removing of foam or concrete from void saving time and labor
- J-Coat finish - economical choice to fit the project needs
- 3 Insert Heights - a product to fit any panel thickness
- 3 Insert Lengths - 2.5" to 6.5" of connection adjustment during panel erection

How to Order:**Specify:**

1. Quantity
2. Name
3. Part Number
4. Description

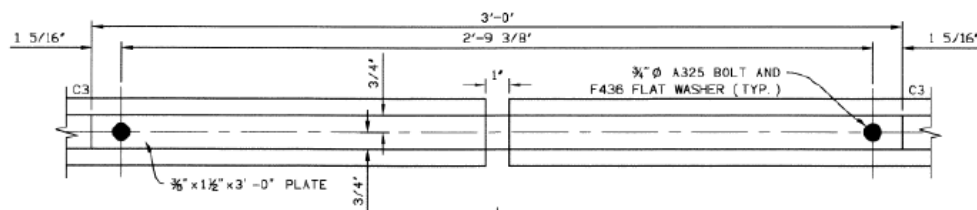
Use:

- 7 gauge one piece steel tapered body
- One piece plastic void former and removable plastic cap
- 3/4" - 10 Special design nut
- 3 Insert heights - 2.5", 3.5", and 4.5"
- 3 Insert lengths - 4", 5", and 6"
- Threaded strap anchor for attachment to building frame



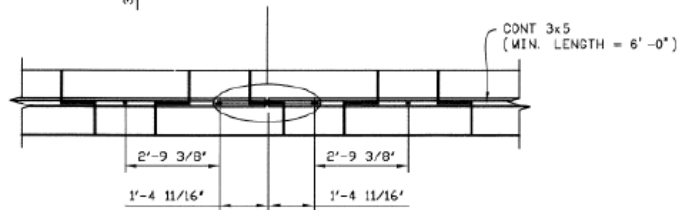
TOP OF WALL TIE CHANNEL SECTION "A"

SCALE: NTS



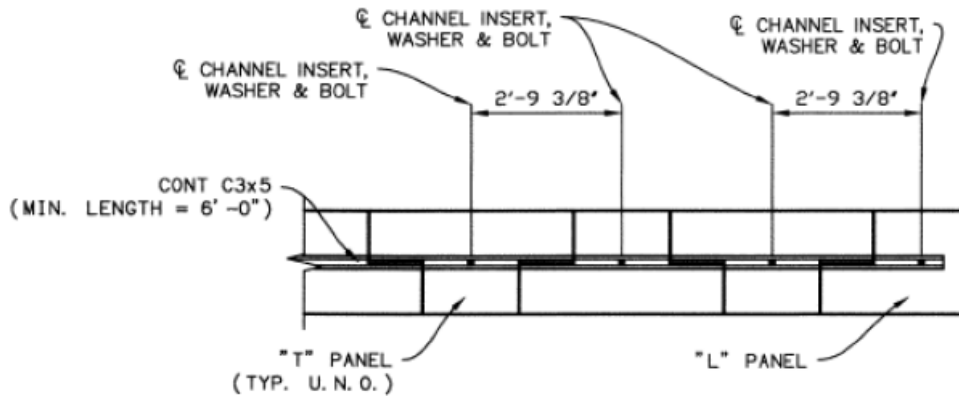
P-30 NUT
ERT CS445

ON "B"
SCALE: 1/16"=1"



TIE CHANNEL BUTT SPLICE DETAIL

SCALE: NTS



SECTION "D"

SCALE: NTS

1/1

STRUCTURAL STEEL NOTES:

1. THE FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO ALL REQUIREMENTS OF THE CURRENT AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL BUILDINGS", AND "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", WITH THE FOLLOWING SUPPLEMENTAL REQUIREMENTS:
2. UNLESS OTHERWISE NOTED: W AND WT SHAPES SHALL CONFORM TO ASTM A992 WITH A MINIMUM YIELD STRESS (F_y) OF 50,000 PSI. OTHER ROLLED SHAPES, PLATES AND BARS SHALL CONFORM TO ASTM A36 WITH A MINIMUM YIELD STRESS (F_y) OF 36,000 PSI. HOLLOW STRUCTURAL SECTIONS SHALL CONFORM TO ASTM GRADE A500 GRADE B WITH A MINIMUM YIELD STRESS (F_y) OF 46,000 PSI FOR SQUARE AND RECTANGULAR SHAPES AND A MINIMUM YIELD STRESS (F_y) OF 42,000 PSI FOR ROUND SHAPES.
3. STRUCTURAL STEEL SHALL BE NEW AND MADE FREE OF RUST, SCALE, ETC. STEEL SHALL BE PRIMED, AND PAINTED WITH AN OIL BASED INDUSTRIAL ENAMEL BY SHERWIN WILLIAMS OR APPROVED EQUAL MANUFACTURER.

APPENDIX C
EXAMPLE PICTURES













