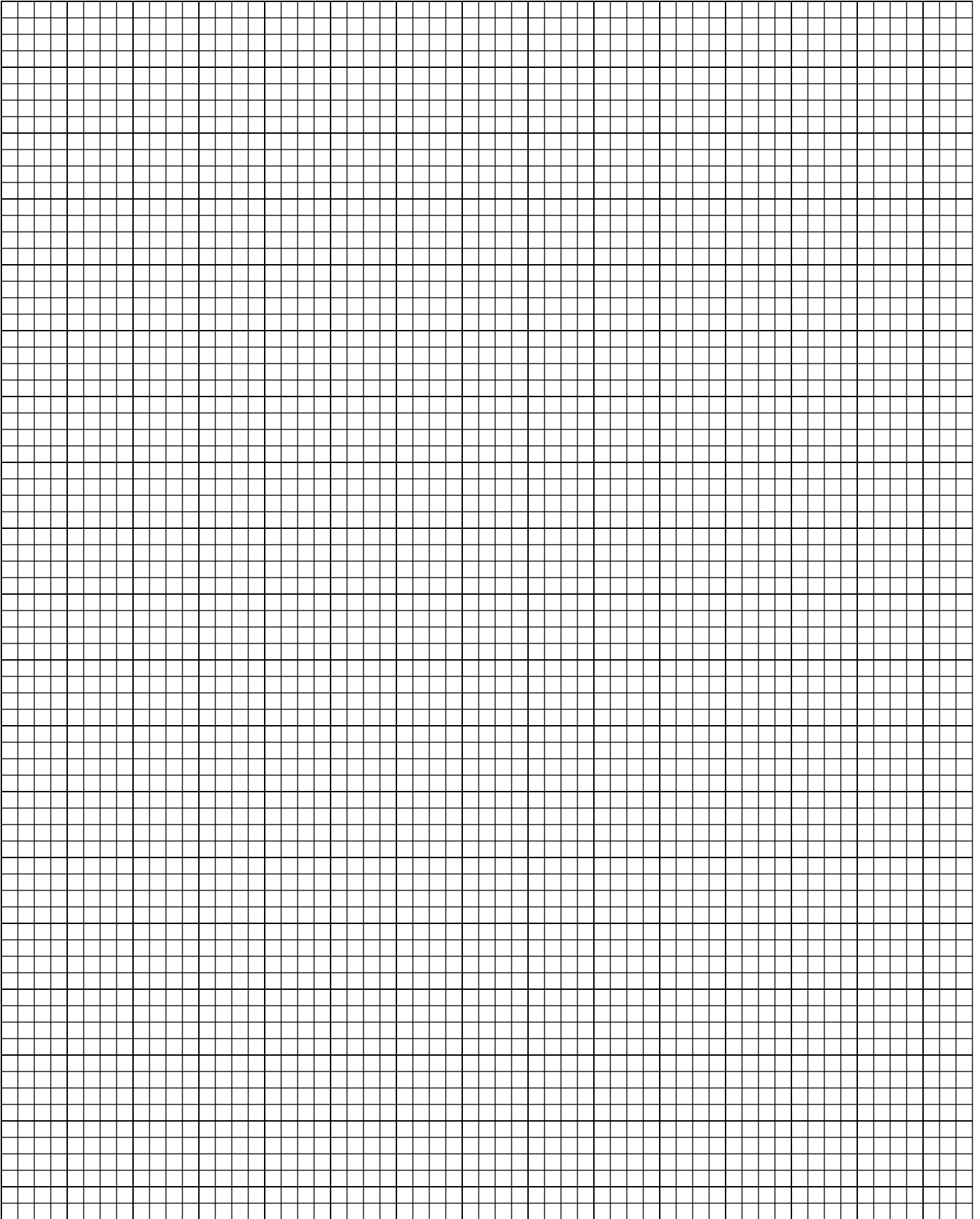




The Versiform forming system is the solution for large concrete structures where high production gangforming is required.

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I. INTRODUCTION

A. Versiform® components and accessories illustrated herein have been designed with safety and performance in mind to help achieve a safe and productive forming operation. It is recommended that all construction personnel thoroughly familiarize themselves and comply with the applicable industry standards and safe practices established by the American Concrete Institute, the Occupational Safety and Health Administration and the Scaffold, Shoring and Forming Institute.

B. All Versiform components and accessories must be inspected regularly for damage or excessive wear. Equipment found to be in these conditions must be replaced immediately and not reused.

C. The procedures outlined in this Application Guide describe standard application procedures for the Versiform Forming System. Since field conditions vary and are beyond the control of Dayton Superior, safe and proper use of this equipment is the responsibility of the user.

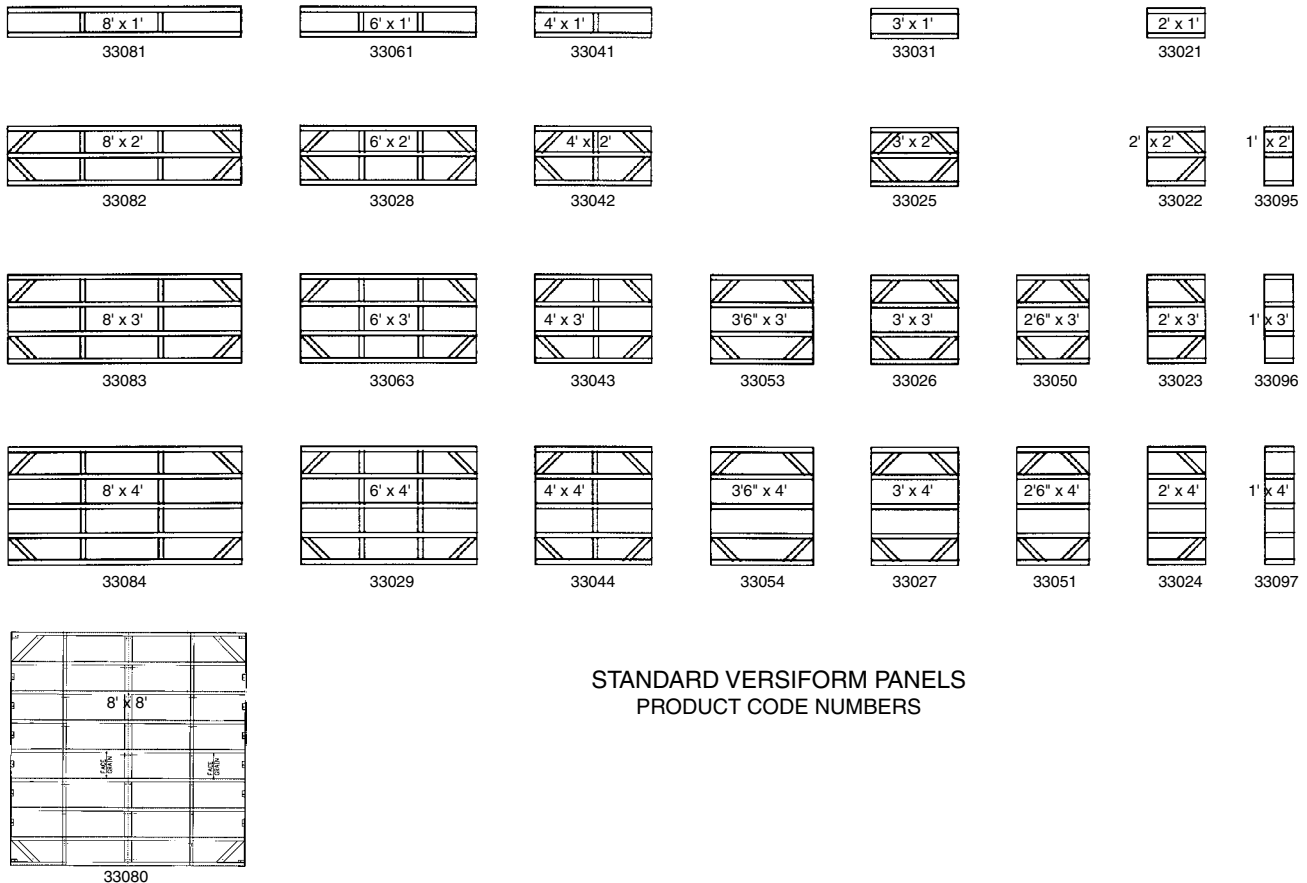
D. Versiform is a 3/4" Plywood faced steel frame modular panel system. Versiform capacity is dependent on

the type of plywood specified and deflection limitations. Typical capacities range from 450 to 1000 psf. The modular panels are available in a wide assortment of sizes for makeup of optimum size gang forms. Crane handled Versiform gang forms facilitate a versatile, efficient solution of forming the more massive concrete structures.

II. BASIC ELEMENTS TO FABRICATE TYPICAL GANGS

A. Standard Panels

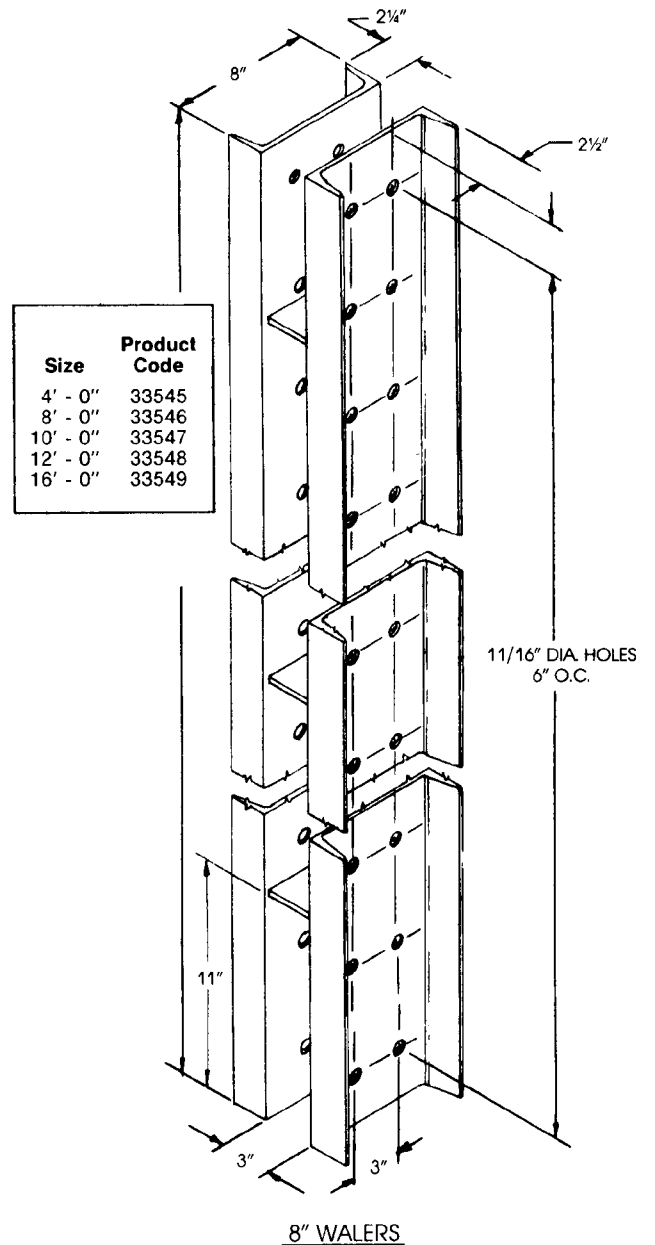
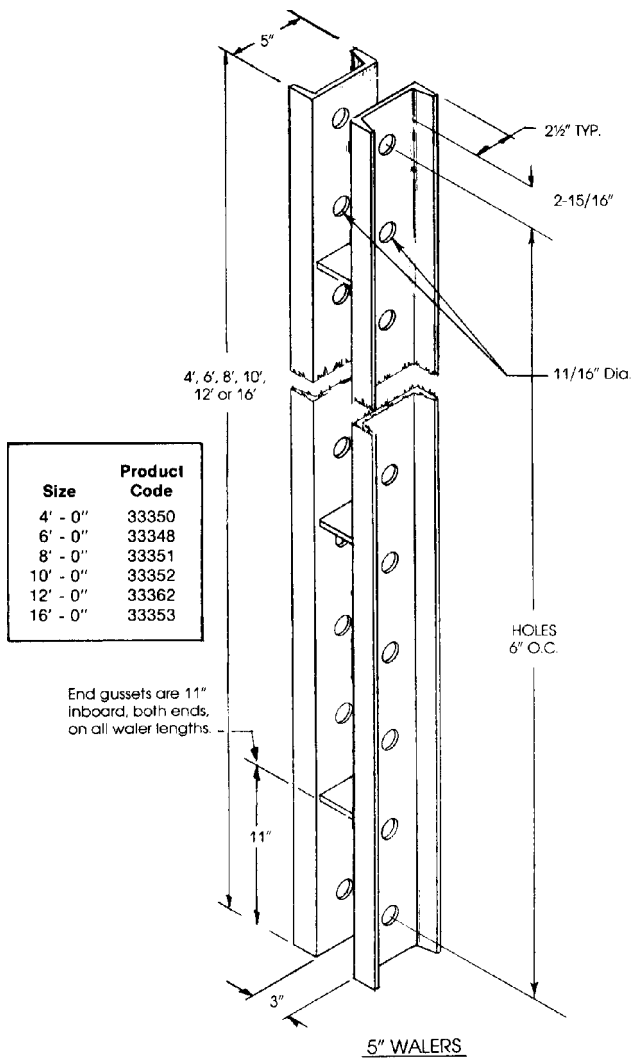
1. Except for special applications, panels are always installed with their 3" steel channel crossmembers running the horizontal direction. The length of these crossmembers always designates the panel's width dimension.
2. Panel siderails are 3/8" thick x 3" steel bars which serve as vertical joint connecting siderails. Their length always designates the panel's height dimension.
3. With 3/4" thick plywood, the overall form thickness is 3 3/4".
4. Following are the standard available Versiform panel sizes with identifying Product Code numbers:



STANDARD VERSIFORM PANELS
PRODUCT CODE NUMBERS

B. Walers

1. Standard 5" Versiform Walers are double 5" steel channels that are welded together through integral plate gussets which space them back-to-back 3" apart. Walers are positioned vertically, gathering form load from the Versiform panel horizontal crossmembers, and transferring it to the wall ties. Walers also function to align and stiffen the gang form vertically. 5" walers are available in standard lengths.

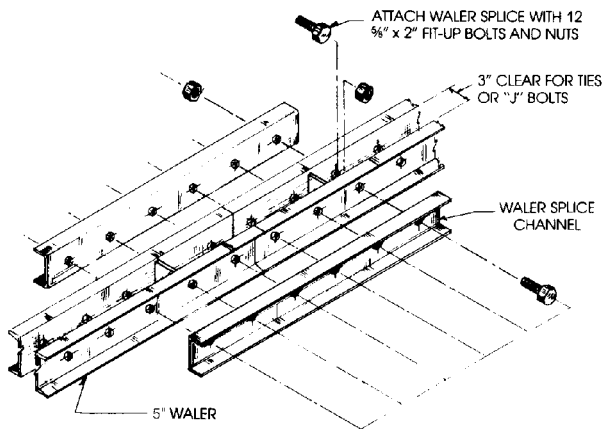


2. Standard 8" Versiform Walers are double 8" channels welded together through integral plate gussets which also space them 3" apart. The function of 8" walers is similar to 5" walers, but they add significantly to the weight and cost of the gang. They offer the capability of gathering more form load through increased vertical span between high capacity ties. 8" walers are available in several standard lengths.

3. Waler Splice Channels

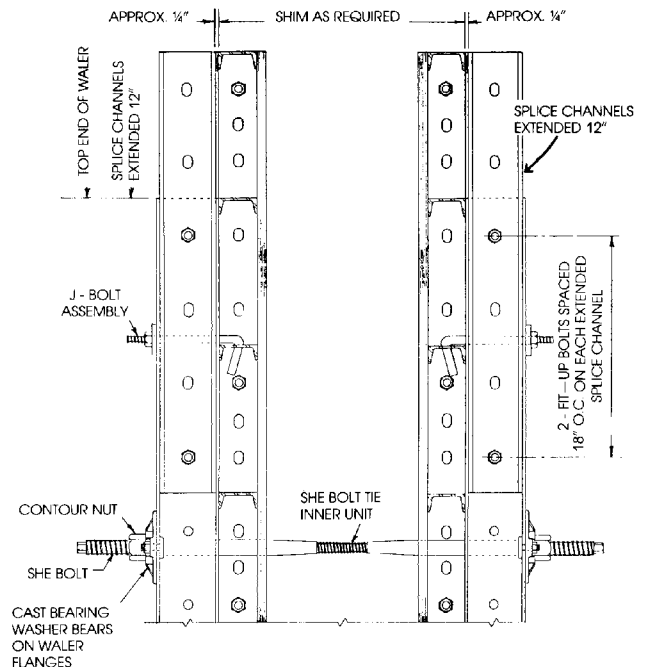
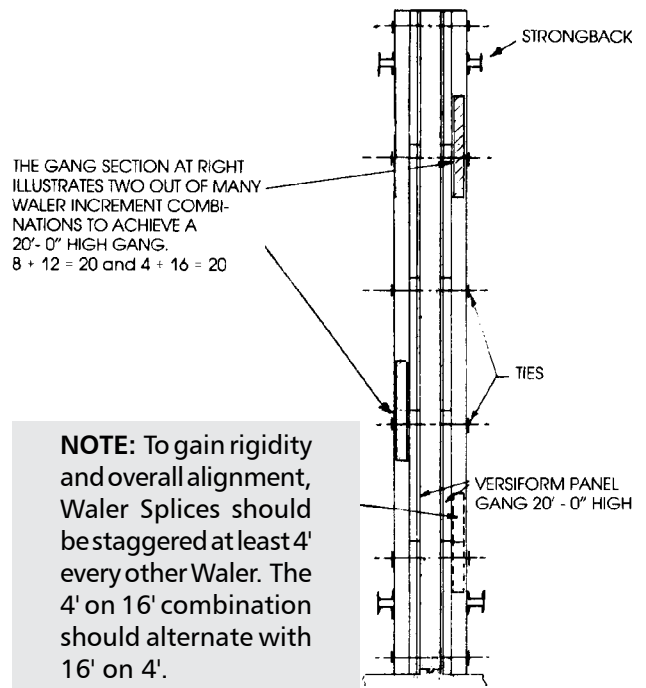
- a. Walers, longer than 16'-0", are created by installing the Waler Splice Channels at the adjoining ends of standard waler lengths. Twelve Fit-Up Bolts are required for a connection of 5" walers. Twenty-four Fit-Up Bolts are required for a connection of 8" walers. Care should be taken to align abutting walers prior to tightening the Fit-Up Bolts.
- b. Waler Splice Sets can function as 1'-0" extensions to standard, even-foot waler lengths.
- c. Splice channels have a lesser depth dimension than waler channels; therefore, approximate 1/4" thick spacers must be installed to provide bearing between the splice channels and the form.

Caution: Do not use Waler Lift Bracket on splice channels used as extensions.



ONE FOOT WALER EXTENSION NOTES

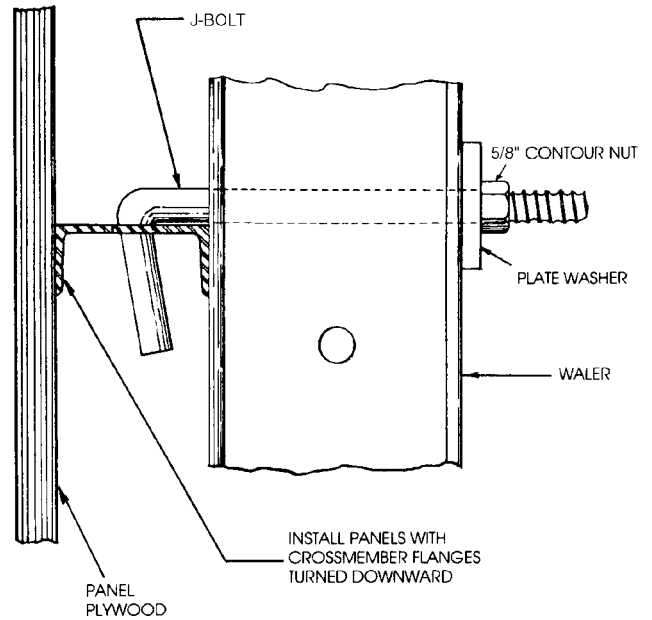
- UPPER WALL TIE LOAD SHOULD BEAR ON WALER CHANNEL FLANGES NOT SPLICE CHANNEL FLANGES
- ANY TYPE APPROPRIATE CAPACITY TIE WITH PROPER WALER BEARING HARDWARE CAN BE UTILIZED



4. J-Bolts

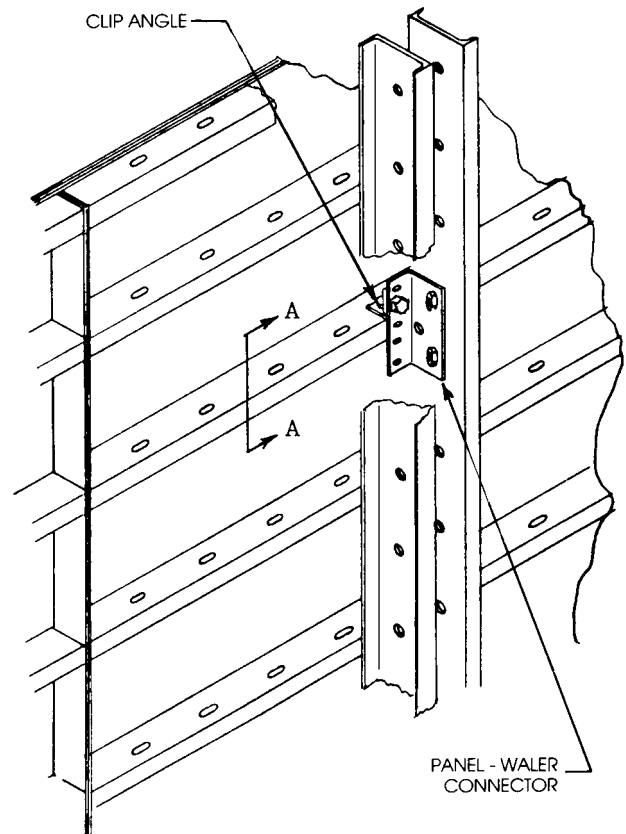
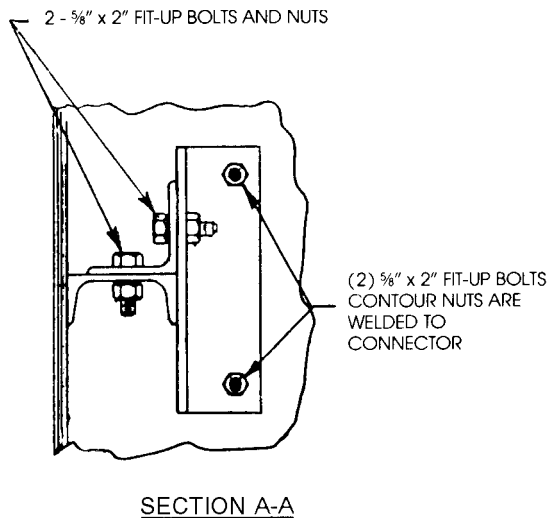
- a. Panels should be installed with crossmember flanges turned down to prevent accumulation of concrete over-spill in the crossmembers, and for easier gravity hook-on connection of J-Bolts.
- b. Walers attach to panels using the J-Bolt connector assembly. Normally, the waler-to-form J-Bolt connection should occur at the lower crossmember (12" up from the bottom rail crossmember) of each stacked panel. When an 8' x 4' panel is at the top of the gang, a J-Bolt connection should also be made to the upper inboard crossmember of that panel.

Caution: Care should be taken not to overtighten J-Bolt Hex Nut. The hook end and the bearing plate can be damaged.



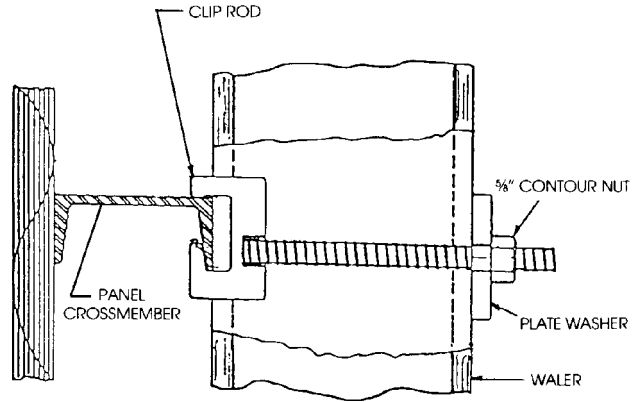
5. Panel-Waler Connector with Clip Angle

- a. Securing walers to panels using J-Bolts is a labor saving convenience, but they do not resist waler vertical slippage. Therefore, at least one Panel-Waler Connector with Clip Angle should be installed in lieu of one of the J-Bolt positions on each waler to prevent vertical slippage of the waler. If the Clip Angle cannot be bolted to the panel crossmember because the waler is not at a crossmember bolt hole, then two Panel-Waler Connectors, back to back, should be used in lieu of the Clip Angle. A connector and Clip Angle are also required when using the Clip Rods shown on the following page.



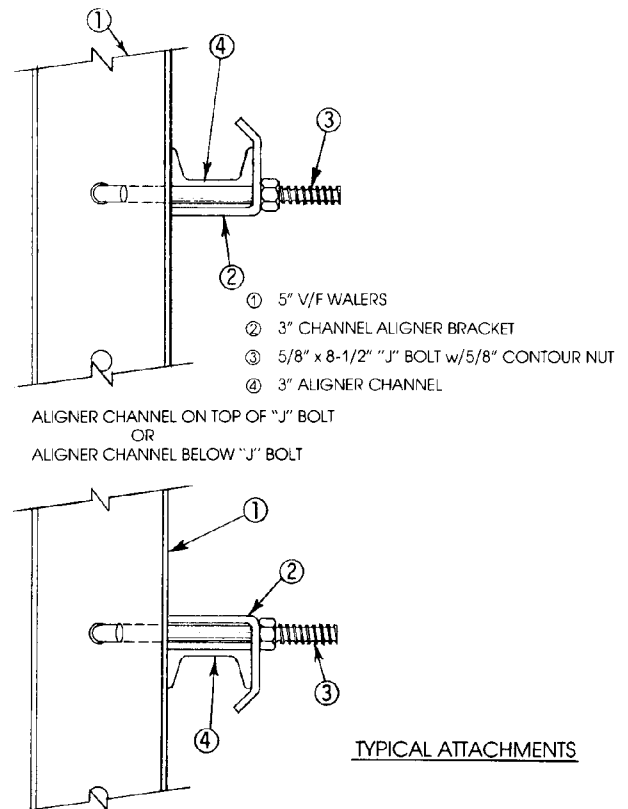
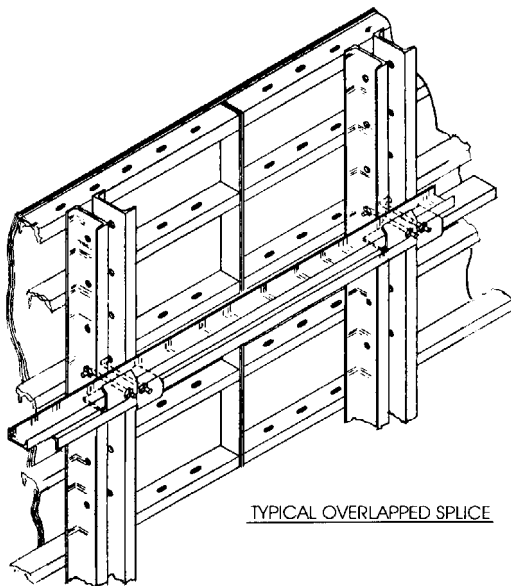
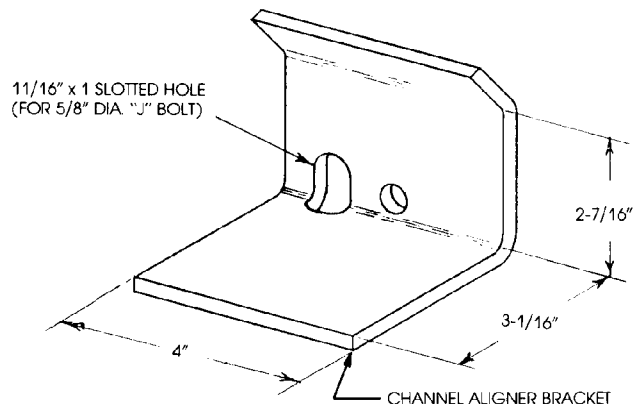
6. Clip Rod

The Clip Rod may be used as an alternate device to the J-Bolt for attaching walers to panels. The J-Bolt attaches to the panel at 6" increments through holes in the panel crossmembers. The Clip Rod may be attached to the crossmember flange at any point. This permits placement of walers opposite each other on opposing sides of a wall without relying on in-line location of crossmember holes in opposing panels. See page 5 for panel waler connector.



C. Strongbacks

1. In the majority of applications, strongbacks install horizontally behind load bearing vertical walers. They function to stiffen and align the gang horizontally.
2. Depending upon the amount of stiffness required, either 5" walers, 8" walers or 3" aligner channels may be utilized as strongbacks.
3. For most applications, 3" channels provide the least expensive proper gang alignment.
4. 5" (waler) strongbacks, or on occasion even 8" (waler) strongbacks may be required if bending moments are to be encountered. The need for the heavier, more expensive 5" or 8" strongbacks is generally limited to handling stresses encountered when laying down or picking up large gangs wherein more bending resistance is required than 3" channels will provide.



5. The number of horizontal strongbacks recommended to align and stiffen vertical waler gangs is:

a. Gang forms up to 20' high require only two strongbacks.

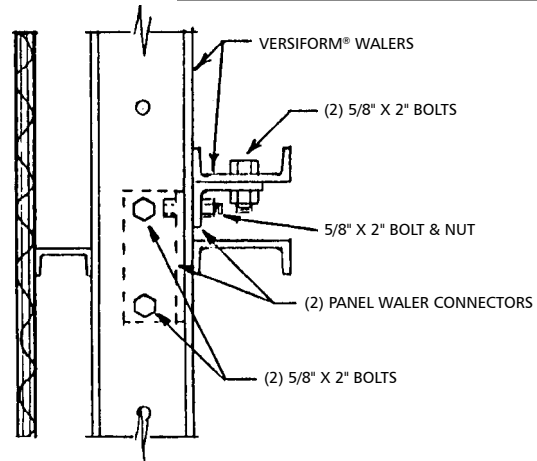
- The upper strongback should be installed from 1' to 3' from top of gang form.
- The lower strongback should be installed from 1' to 3' from bottom of gang form.
- The distance between the upper and lower strongbacks should be at least $\frac{2}{3}$ of the gang form height to effect optimum pour alignment.
- The elevations at which strongbacks are attached must provide clear access to install and remove wall ties.

b. Gang forms 20' or higher require three strongbacks for optimum alignment of the staggered-splice vertical walers.

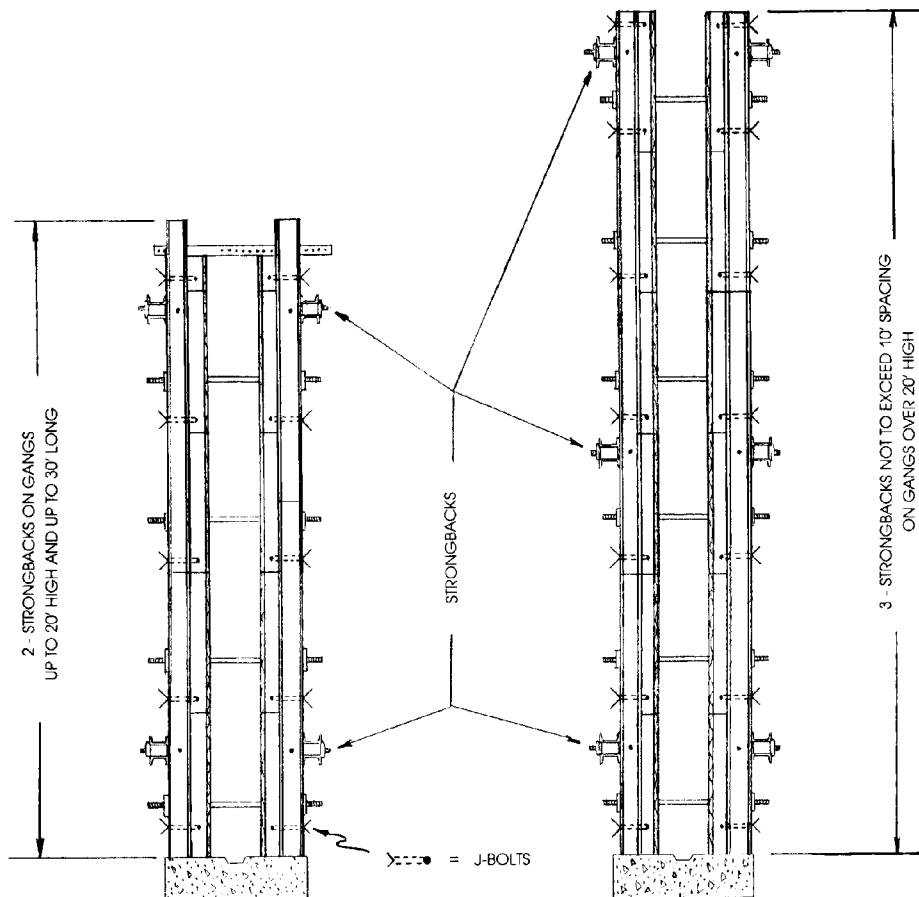
c. Gang forms 12' or higher that are 30' or longer should contain three horizontal strongbacks.

- Standard Versiform® walers and splice channels should be used for long strongbacks.

USE TWO PANEL WALER CONNECTORS AT TWO LOCATIONS PER HORIZONTAL STRONGBACK. ALL OTHER CONNECTIONS MAY USE THE J-BOLT, PLATE WASHER AND 5/8" NUT.

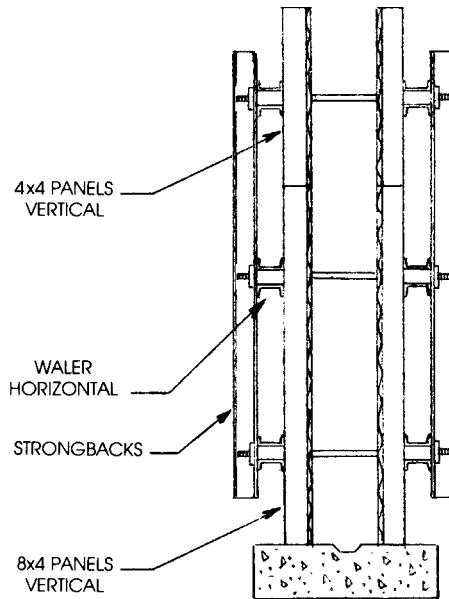


PANEL WALER CONNECTION



6. The use of vertical strongbacks, horizontal waler and panels with crossmembers vertical is an exception to normal Versiform Forming System application. One reason for constructing gangs in this configuration is to utilize long waler lengths on low wall gang forms, such as 16' walers on a 10' or 12' form height or utilizing 8' or 10' walers on a 12' form height.

Caution: When Versiform panels are installed with crossmembers vertical, the outside crossmembers then assume a siderail connection function. The Versiform panel's outside crossmembers are not structured to resist high tension siderail loads such as outside corner loads, bullnose end pull, or bulkhead loads. Refer to Bullnose Form Applications in Section VI.



TYPICAL VERTICAL STRONGBACK
WALL SECTION

III. ASSEMBLING GANGS

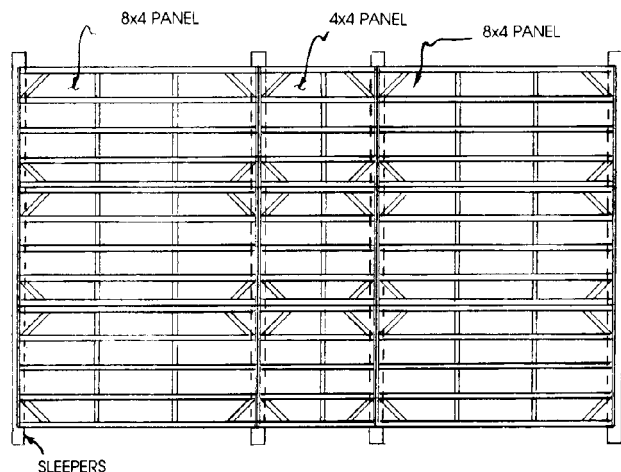
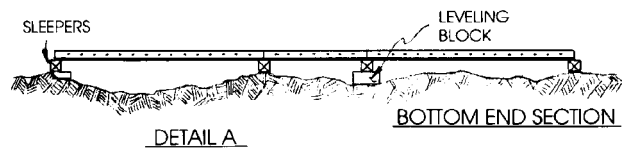
A. Selecting Gang Assembling Site

The following points should be considered regarding the selection of the assembling site:

- Selection should be made prior to delivery of Versiform Forming Equipment.
- Site should be within the boom swing reach of the truck unloading crane.
- Site should be in close proximity to initial group setup positions (when practical).
- Surface should be reasonably flat and level.

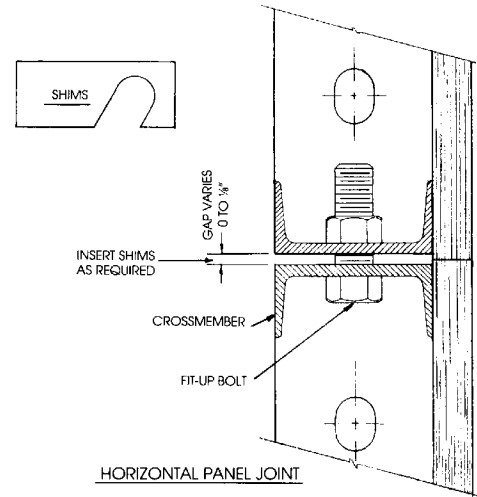
B. Assembling Surface Preparation

1. Lay down flat 2" x 6" or 2" x 8" lumber sleepers to support Versiform panels at their connecting end rails, as well as the panel ends at the overall gang width. The plates supporting 8' x 4' panels would normally be 8' apart. The purpose of plates is to correct the uneven ground surface to a flat plane, as well as to provide a common bearing surface to align two adjoining panels. (See Detail A).
2. Since gangs are always assembled face down, sleepers are beneficial for protecting the plywood. Therefore, sleepers should also be used to prevent scuffing of the plywood when the assembling surface is concrete or blacktop. After the sleepers are in position and level, the appropriate size flat panels should be laid in position.



C. Assembling Gang

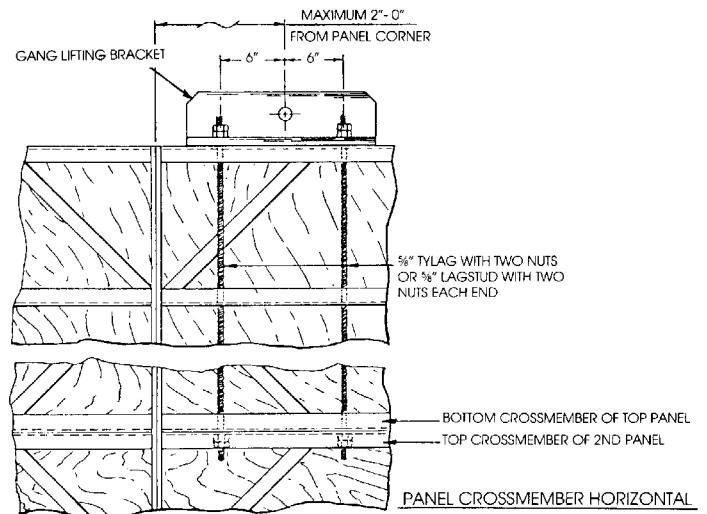
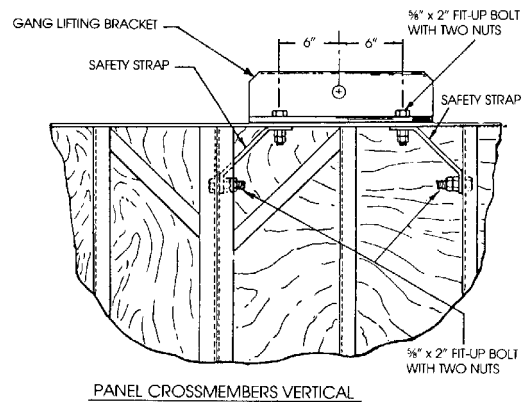
1. Place all panels so that the open "C" side of the channel crossmembers is facing down, toward the bottom of the gang.
2. Install Fit-Up Bolts through the appropriate panel-to-panel connecting slots as indicated in Section II A. The Fit-Up Bolt panel-to-panel connections, as prescribed, are considered minimum for fabricating gangs for use on typical continuous wall structures.
3. First, tighten the Fit-Up Bolt nuts nearest each panel corner on the siderails and the endrails until the adjoining panel rails, insert "Forming Shims" at each bolt location and then run all nuts up tight.
4. Install walers and strongbacks as discussed and illustrated in Section II B and II C.



IV. ACCESSORY INSTALLATION

A. Gang Lifting Brackets

1. Gang lifting brackets used as attachment points for crane lift rigging must be properly spaced and securely attached as illustrated, for either vertical or horizontal panel crossmember attachment.
2. The safe load rating of Gang Lifting Bracket is 2,000 lbs. and should always be installed within 2' from a panel frame corner as illustrated. The number of Gang Lifting Brackets required shall be determined by the contractor based upon the weight of the gang to be lifted.
3. The rigging must be designed by the contractor to assure that any one Gang Lifting Bracket is not overloaded. Load equalizer beams are recommended for all but simple two point lifts.
4. A minimum of two tag lines must be used to control movement of the gang form. Do not allow personnel on or directly under any gang form while it is being moved or suspended in air.
5. Gang form should be adequately braced, re-anchored, or otherwise secured prior to releasing lifting mechanism.



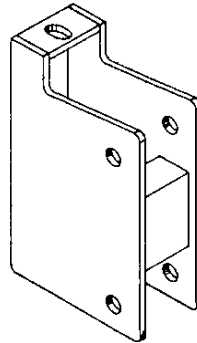
Caution: Do not initiate breaking a gang form loose from concrete by lifting or tugging backward through the Gang Lifting Bracket.

B. Waler Lifting Brackets

1. Two Waler Connectors are required per lifting waler when load on Waler Lift Bracket exceeds 2000 pounds. One Waler Connector is required per lifting waler when load on Waler Lift Bracket is 2000 pounds or less.
2. The upper Waler Connector is located under the "double" crossmembers of two Versiform panels. The lower Waler Connector is located approximately at mid-depth of the gang under the "double" crossmember of two Versiform panels. This is also the desired location when only one Waler Connector is required per lifting waler. DO NOT connect the Waler Connector at a double crossmember location which included either a one foot high panel or any length or a one foot long panel of any height.
3. Use form shims if a gap exists between one of the Waler Connectors and "double" crossmembers on a two Waler Connector lifting waler.
4. Panel Waler Connectors are not needed on lifting walers because of the Waler Connectors, but are still required on non-lifting walers.
5. A minimum of two tag lines must be used to control movement of the gang form. Do not allow personnel on or directly under any gang form while it is being moved or suspended in air.
6. Gang form should be adequately braced, re-anchored or otherwise secured prior to releasing lifting mechanism.

Waler Connector

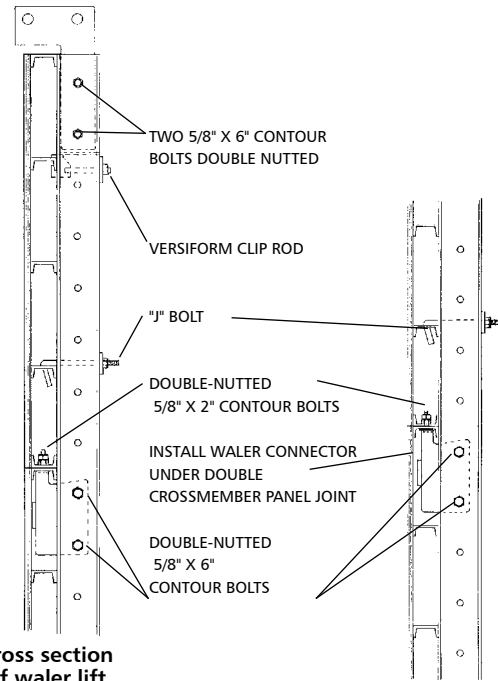
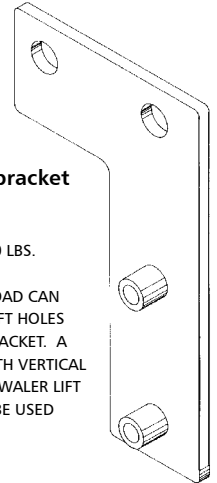
SAFE LOAD
CAPACITY = 2,000 LBS.
TWO REQUIRED FOR
4,000 LB. LIFT



Waler lift bracket

SAFE LOAD
CAPACITY = 4,000 LBS.

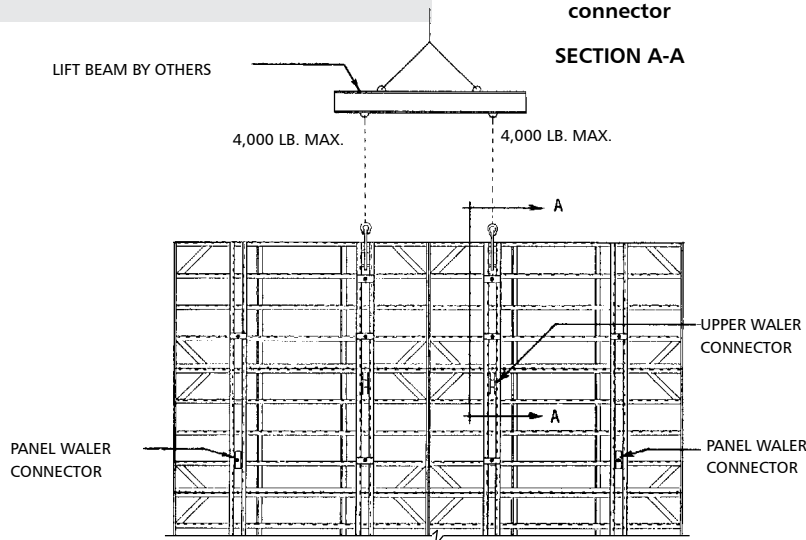
ONLY VERTICAL LOAD CAN
BE IMPOSED AT LIFT HOLES
OF WALER LIFT BRACKET. A
LIFTING BEAM WITH VERTICAL
"DROP LINES" TO WALER LIFT
BRACKETS MUST BE USED



Cross section of waler lift bracket and upper waler connector

Cross section of lower waler connector

SECTION A-A

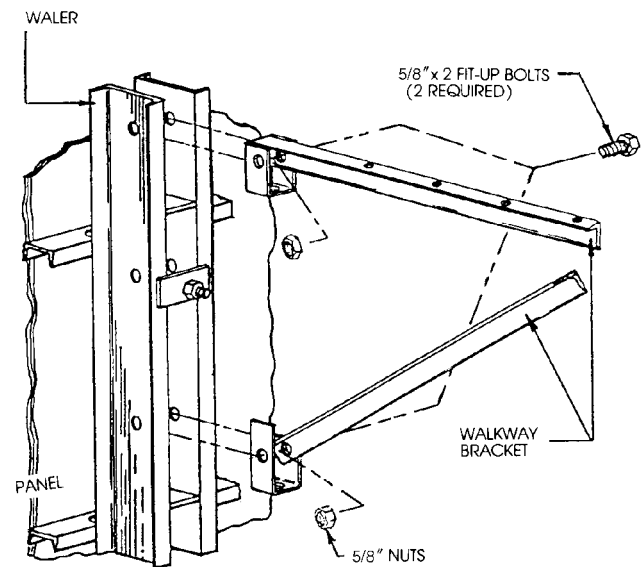
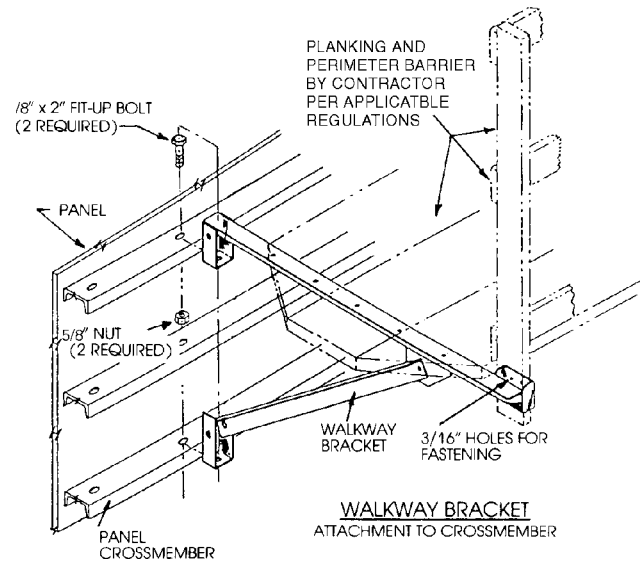


Caution: Do not initiate breaking a gang form loose from concrete by lifting or tugging backward through the Waler Lift Bracket.

C. Walkway Bracket

1. A work platform supported by Walkway Brackets is the recommended method of providing safe access for working on the forms when pouring concrete, and installing or stripping wall ties. The work platform should be erected in accordance with applicable industry regulations and be equipped with guardrails, midrails and toeboards along all open sides and ends.
2. Walkway Brackets shall not be utilized to support cantilevered concrete soffit forms, or for temporary storage of construction equipment, or materials, such as bundles of re-bar.
3. Walkway Brackets shall be secured to either Versiform panel crossmembers or vertical walers, as shown in the details to the right.
4. Application Notes:
 - Safe Load of Walkway Bracket is 750 lbs.
 - Attach upper and lower legs using $\frac{5}{8}$ " x 2" Fit-Up Bolts with nuts.
 - One or more work platforms are required for personnel safety wherever access to forming components or concrete placement necessitates work above grade or deck levels.
 - Brackets should be spaced no more than 8' apart.

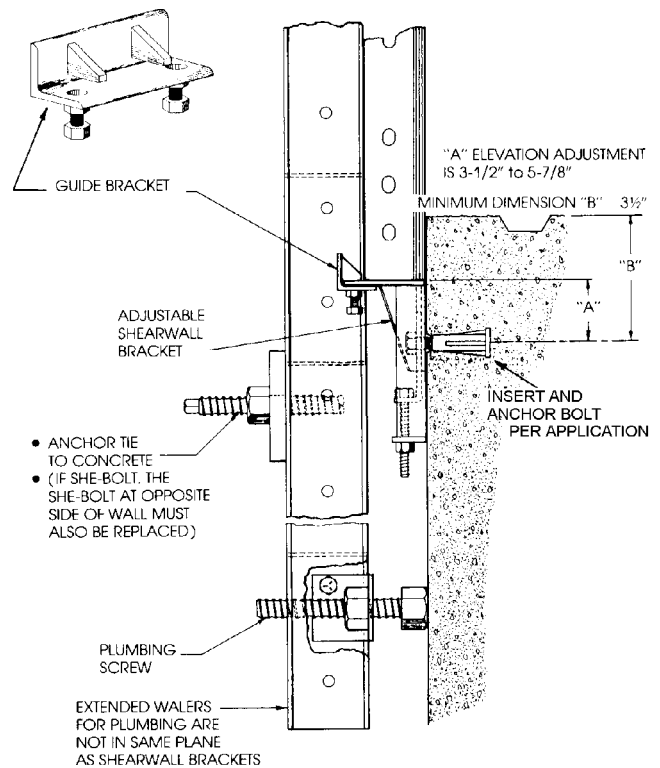
NOTE: WHEN ATTACHING WALKWAY BRACKET TO CROSS MEMBERS, A $\frac{5}{8}$ " BOLT AND NUT ARE REQUIRED ON BOTH UPPER AND LOWER LEGS.



D. Support of Multi-Lift Gang Forms

1. Adjustable Shear Wall Bracket

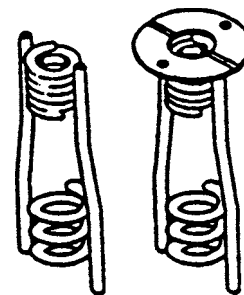
- a. Adjustable Shear Wall Brackets are utilized to support gang form weight at subsequent pour elevations. Their anchorage should not be subjected to tension loads.
- b. Adjustable Shear Wall Brackets safe load rating is 3,000 lbs. when properly mounted in 2,000 psi concrete as prescribed below:
 - The shear wall bracket elevation adjustment range is $2\frac{3}{8}$ " or from $3\frac{1}{2}$ " to $5\frac{7}{8}$ " at dimension "A". Dimension "B" usually included a desired amount of previous pour overlap, but never less than the minimum 6" dimension at "A".
 - The Guide Bracket has a 45° slope that helps guide the ganged form into aligned position with the previous pour.
 - Anchor bolts are designed per job requirements.



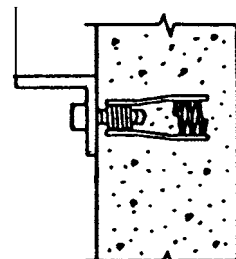
Expanded Coil Inserts are coil or closed ferrule structural connection inserts available in two, four or six strut versions. Available in $\frac{3}{4}$ " through $1\frac{1}{2}$ " diameters, with or without nailing washer.

Caution: Make sure that the insert alignment perpendicular to the form face is not disturbed during concrete placement.

Recommendation for insert based on specific application.



Expanded Coil Inserts (Typical)



Typical Coil Insert Application
(varies by application)

2. Plumbing gang form with plumbing screws, as shown on previous page.

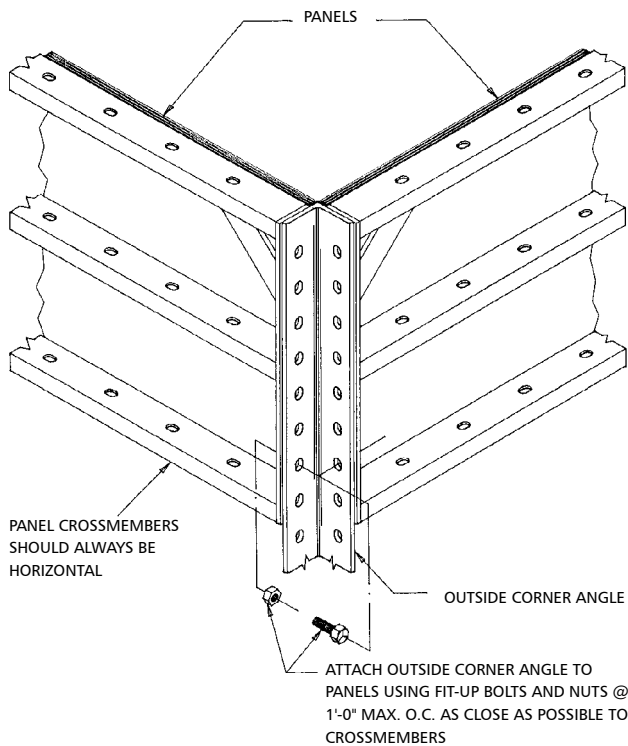
- a. The plumbing screw performs as an adjustable compression strut against the previous pour. The compression force exerted by the plumbing screw, plus additional outward forces, such as wind loads to the face of the gang, must be resisted by a tension tie installed for that purpose.
- b. The plumbing screws are installed at the bottom end of the walers which extend below the bottom of the gang.

E. Outside Corner Angles

Attach outside corner angle to panels using Fit-Up Bolts and nuts at 1'-0" maximum on center spacing.

Install Fit-Up Bolts as close as possible to all cross-member channels.

Refer to Section VI for outside corner angle column applications.

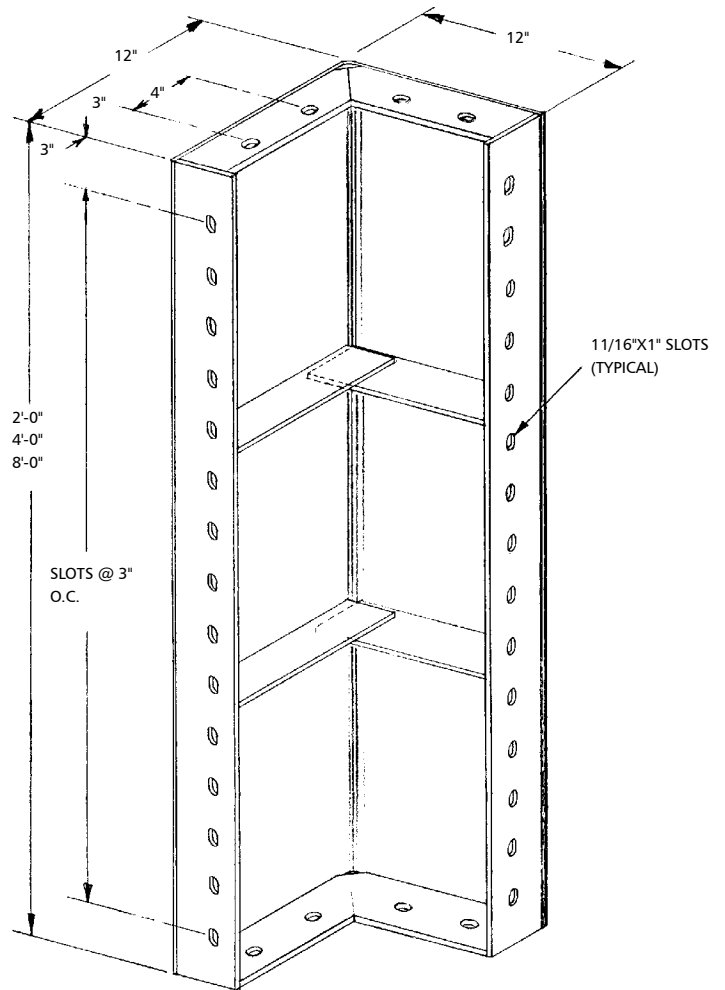


Typical Application of Outside Corner Angles

F. Rigid Inside Corners

Inside Corner siderails contain Fit-Up Bolt slots every 3".

- Attach outside corners to panels using Fit-Up Bolts and nuts at 1.0" maximum o.c. and as close as possible to crossmember channels.

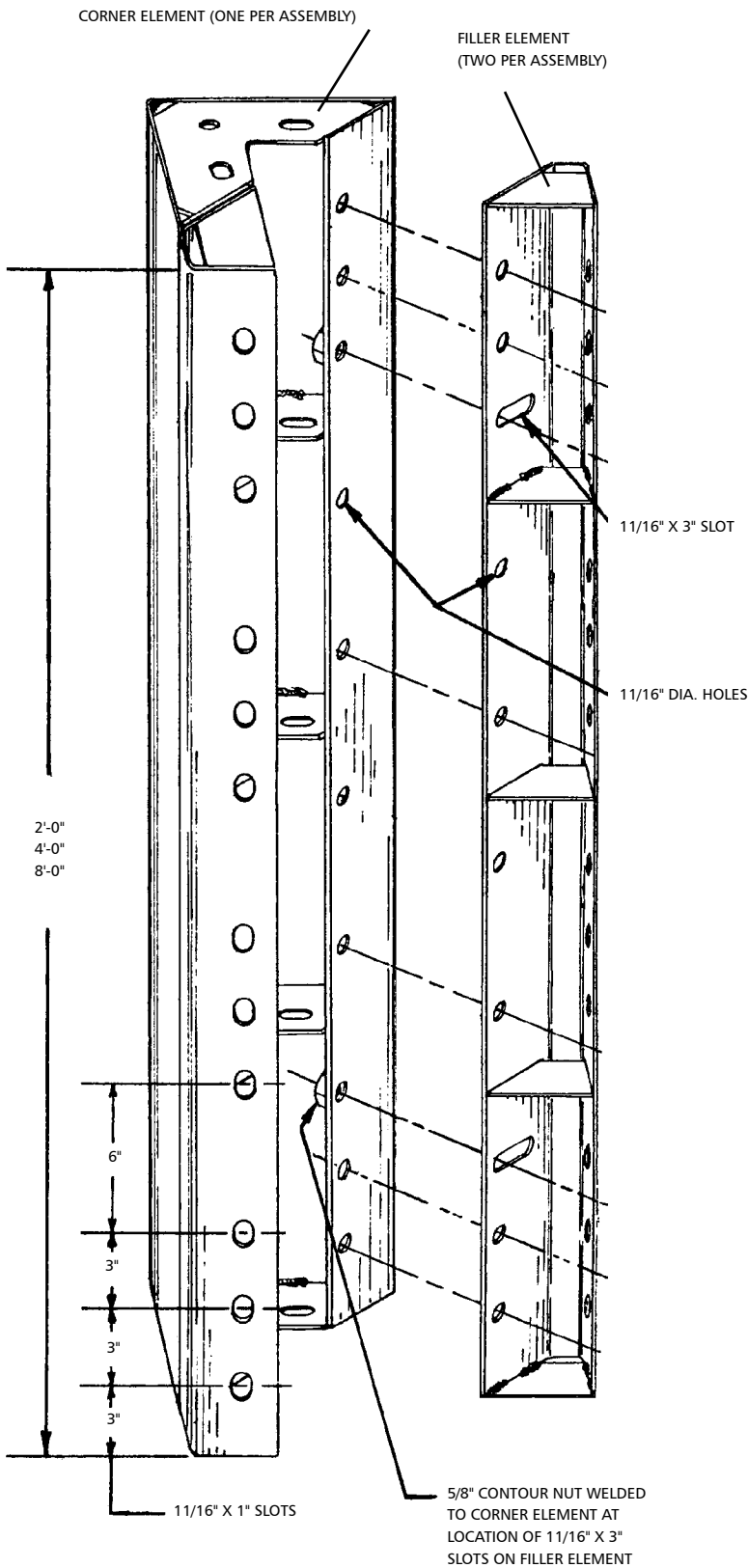


Steel Rigid Corner

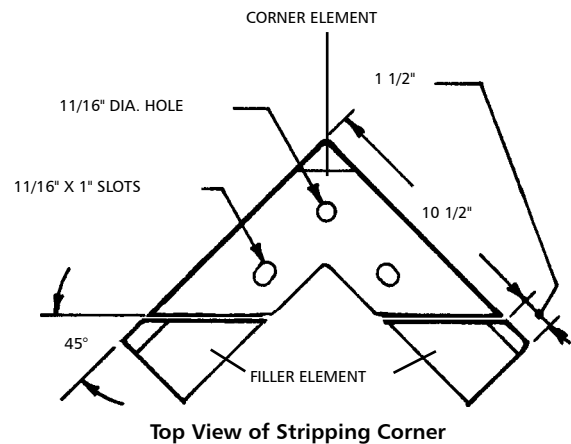
G. Stripping Corner

Stripping Corners consist of three elements which bolt together through side flanges that are canted 45° relative to the form face. When gangs are confined between intersecting walls or pilasters, stripping relief is facilitated by removing all Fit-Up Bolts at the appropriate 45° flanges and stripping the still-attached (at the slots) strippable filler elements with the gang.

- Attach filler elements to corner elements with Fit-Up Bolts and nuts at 1'-0" max. o.c. as close as possible to the gussets.
- Attach stripping corners to adjoining panels with Fit-Up Bolts and nuts at 1'-0" max. o.c. and as close as possible to panel crossmembers.



Full View of Stripping Corner

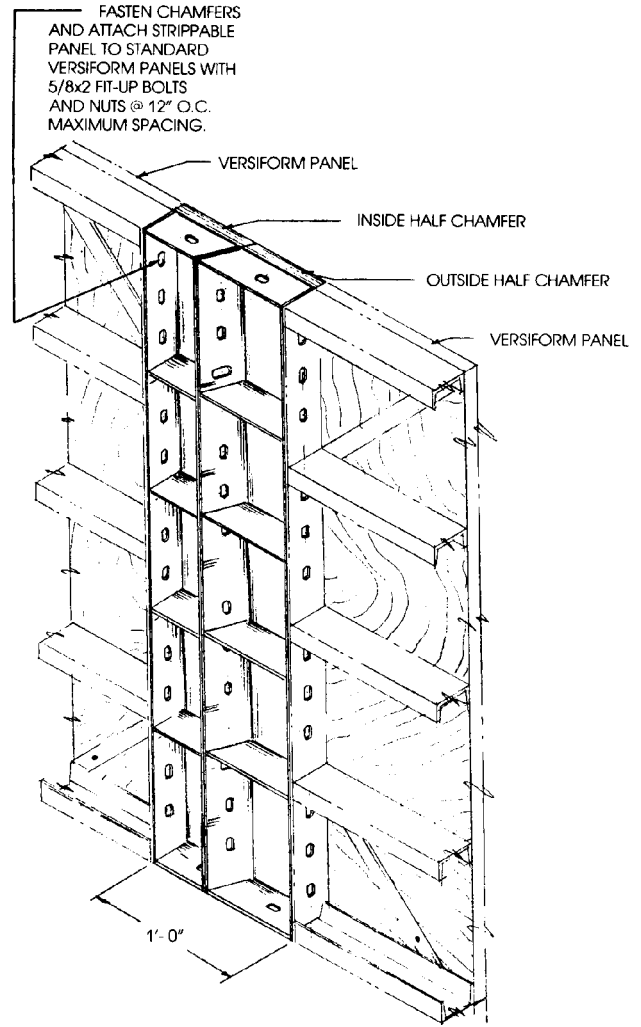


H. Stripping Panel

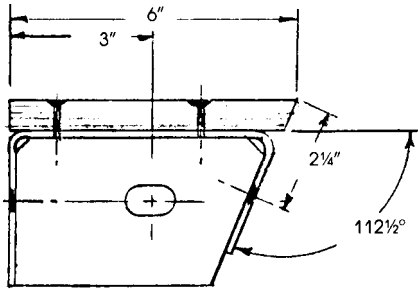
1. Stripping Panels consist of two unlike elements which, when bolted together, mate at $67\frac{1}{2}^\circ$ angle relative to the 12" face plywood. Stripping Panels facilitate release of gangs confined between intersecting walls or pilasters — details that do not contain a stripping inside corner.
2. The two elements that combine to form a stripping Panel are identified as Inside Half Chamfer and Outside Half Chamfer. The Outside Half Chamfer strips away from the Inside Half Chamfer.

Attach the two half Chamfers with $\frac{5}{8}$ " x 2" Fit-Up Bolts and nuts at 1'-0" o.c. as close as possible to each gusset.

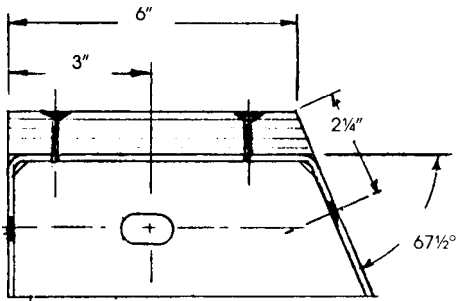
Attach stripping panel to adjoining panels with Fit-Up Bolts at 1'-0" o.c. at slots as close as possible to panel crossmembers.



Stripping Panel



Inside Half Chamfer



Outside Half Chamfer

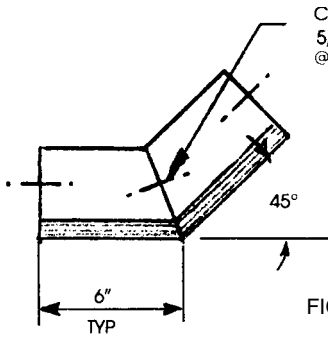


FIGURE A

CONNECT CHAMFER PANELS WITH 5/8x2 FIT-UP BOLTS AND NUTS @ 12" C/C MAXIMUM SPACING.

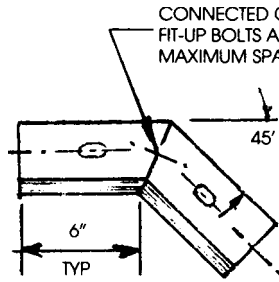


FIGURE B

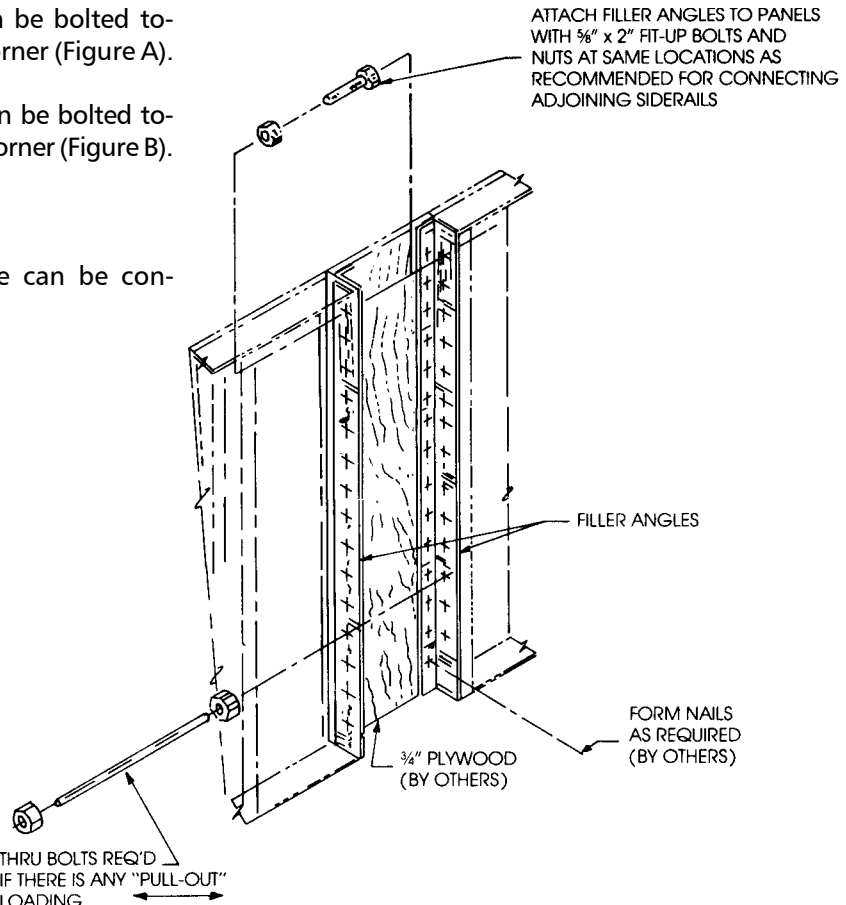
CONNECTED CHAMFER PANELS WITH 5/8x2 FIT-UP BOLTS AND NUTS @ 12" C/C MAXIMUM SPACING.

3. Two Inside Half Chamfers can be bolted together to form a 135° inside corner (Figure A).

4. Two Outside Half Chamfers can be bolted together to form a 135° outside corner (Figure B).

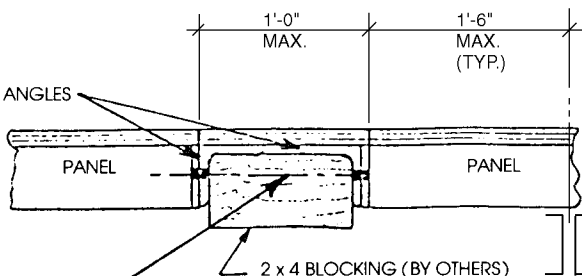
I. Filler Angles

Job-Built fillers up to 12" wide can be constructed as shown on the right.



ATTACH FILLER ANGLES TO PANELS WITH 5/8" x 2" FIT-UP BOLTS AND NUTS AT SAME LOCATIONS AS RECOMMENDED FOR CONNECTING ADJOINING SIDERAILS

THRU BOLTS REQ'D IF THERE IS ANY "PULL-OUT" LOADING
SPACING SHALL BE DETERMINED BY A QUALIFIED FORM DESIGNER



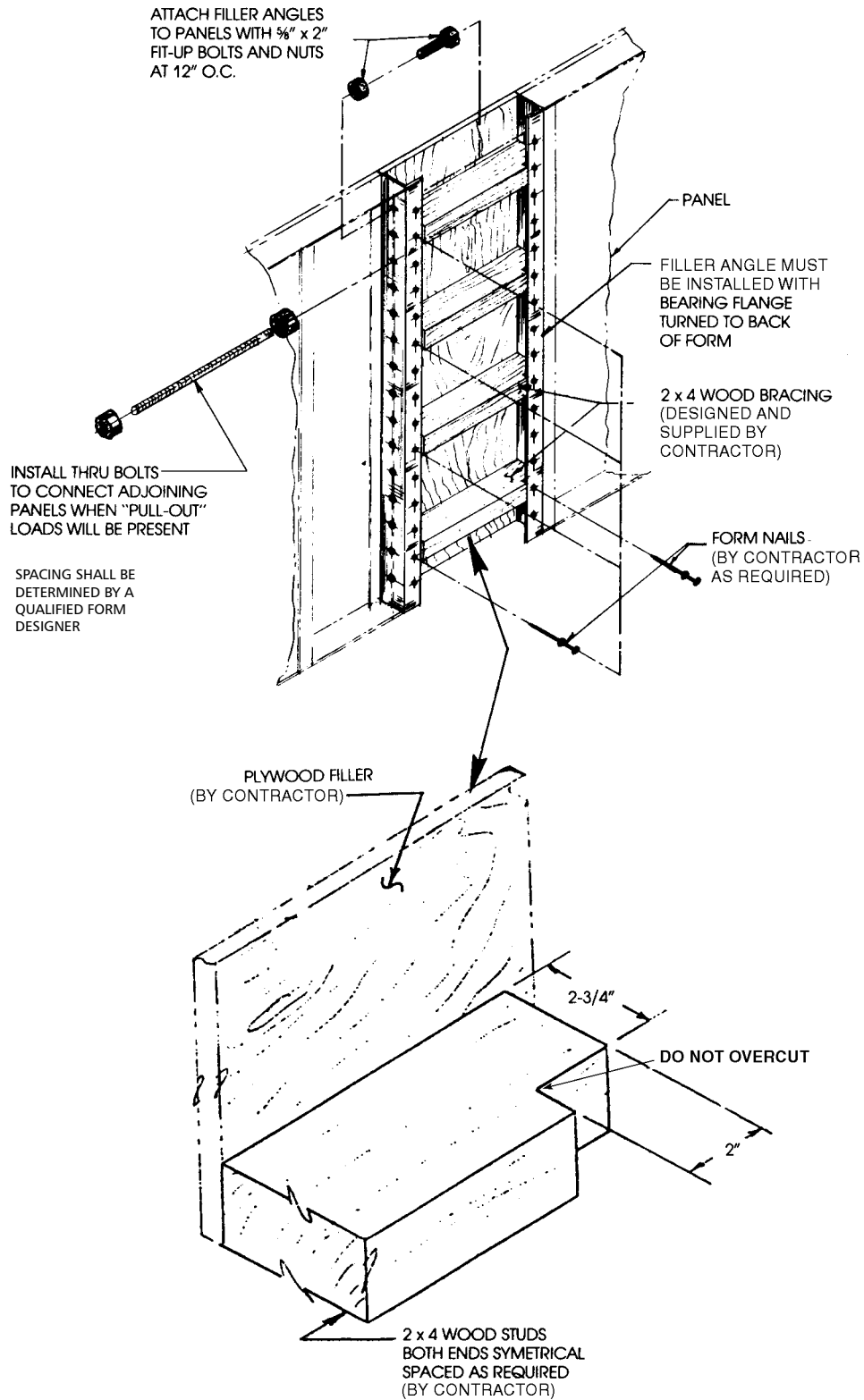
2 x 4 BLOCKING (BY OTHERS) IS REQUIRED IN APPLICATIONS WHERE COMPRESSION LOADS ARE PRESENT

NOTE: THRU BOLTS CONNECTING ADJOINING PANELS WHEN PULL-OUT LOADS ARE PRESENT

TOP VIEW

Job-built fillers over 12" and up to 24" must be constructed as shown below.

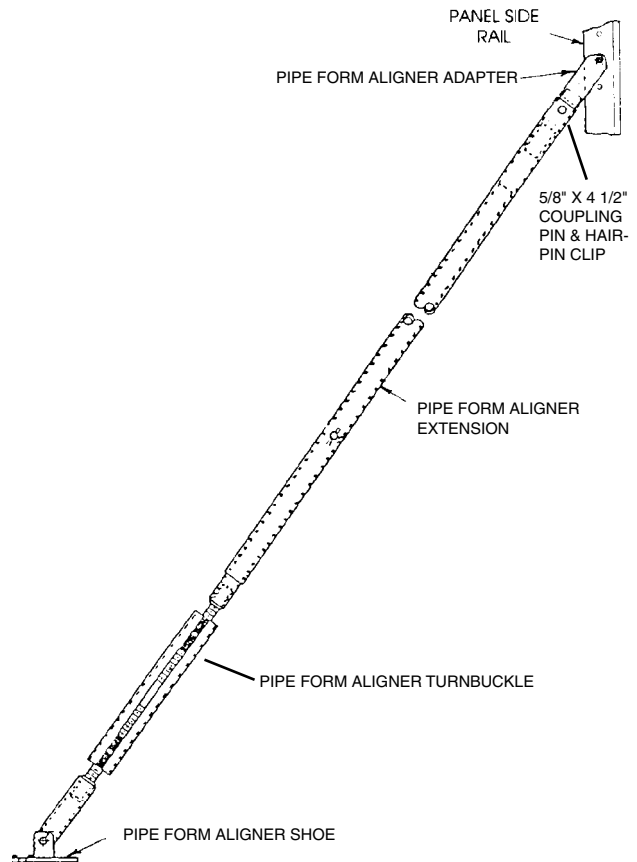
INSTALLATION OF JOB BUILT FILLER (1'- 0" TO 2'- 0" WIDE)
WITH FILLER ANGLE BEARING FLANGES TURNED TO BACK OF FORM



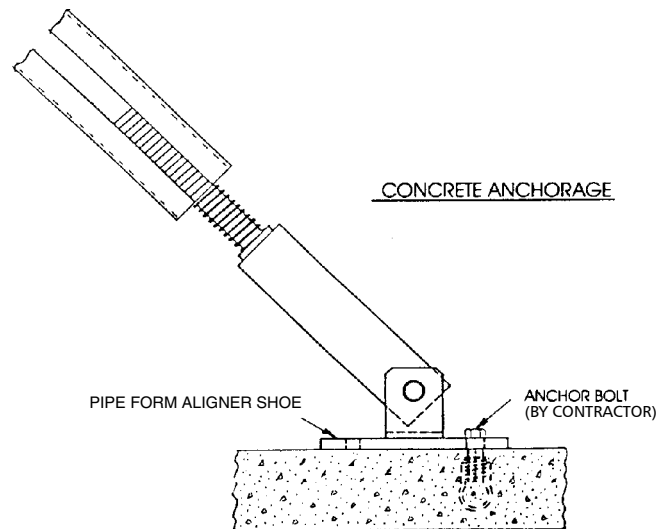
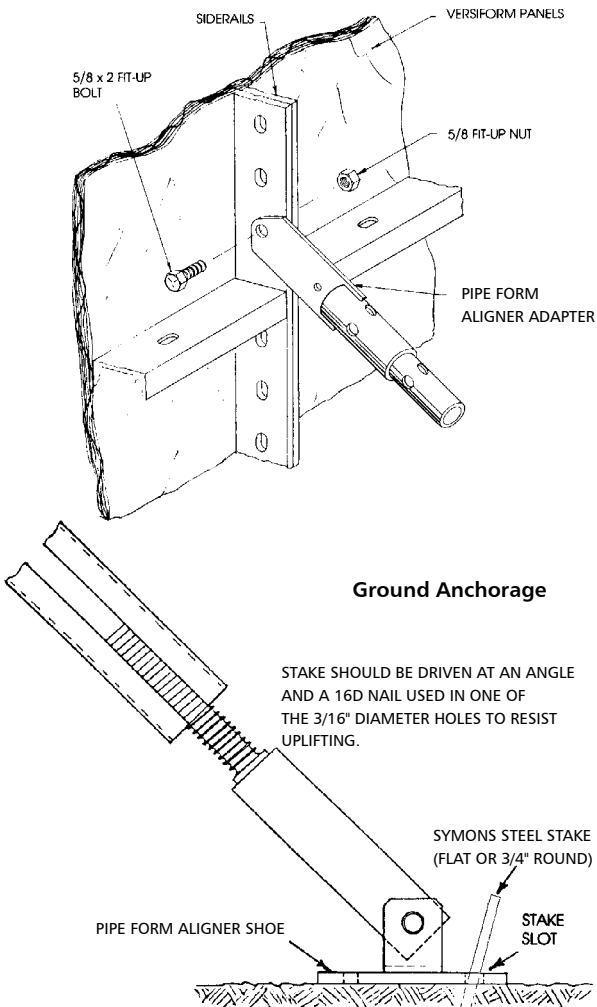
J. Pipe Form Aligner

1. The Symons Pipe Form Aligner is adjustable from 11'-7" up to 20'-0". Its purpose is to position forms straight and plumb and is not intended to act as a brace.
2. The Pipe Form Aligner may be connected to panel siderails by utilizing the Pipe Form Aligner Adapter.

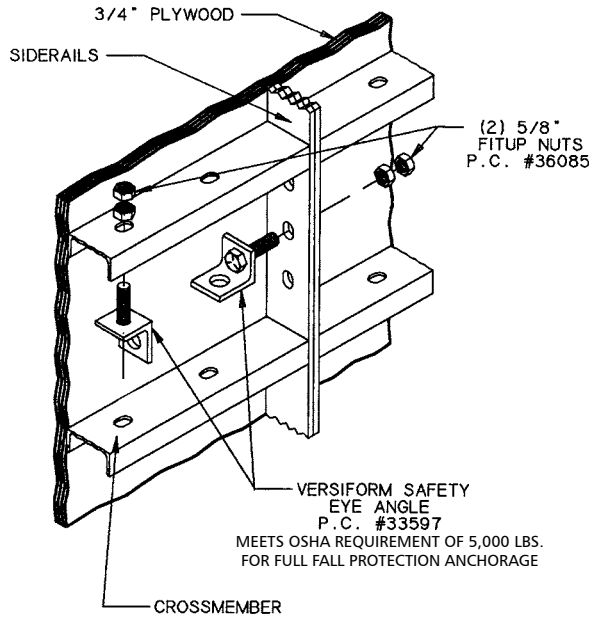
Caution: Wall and column forms must be adequately braced to safely support all foreseeable lateral loads associated with wind, eccentric loading, etc. The materials, quantities, locations and methods of attachment and anchorage of the bracing design shall be the responsibility of the contractor based on job site conditions and applicable industry standards.



Pipe Form Aligner Adapter Attachment to Versiform® Panels



3. A Pipe Form Aligner Shoe is utilized at the lower end of the Pipe Form Aligner. It has a $\frac{13}{16}$ " diameter hole for anchoring with a $\frac{3}{4}$ " diameter concrete anchor bolt, and a rectangular slot for anchoring with a Symons steel stake driven into the ground.
4. The tubular end of the Pipe Form Aligner may be connected between the double 5" or 8" vertical waler channels with a $\frac{5}{8}$ " x 6" Fit-Up Bolt.



Typical Safety Eye Installations

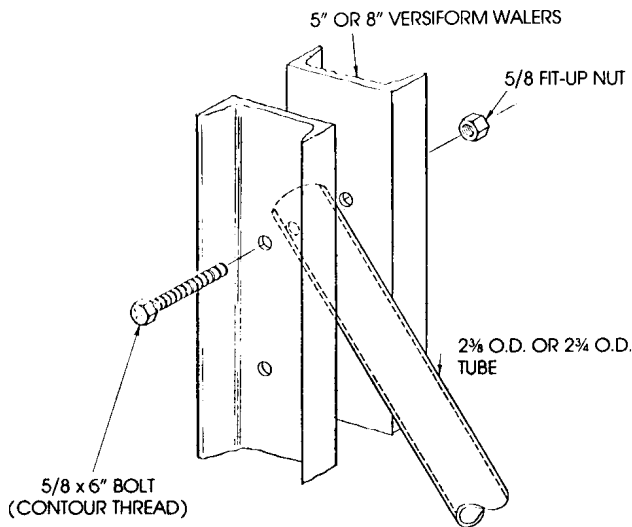
K. Safety Eye Angle for Safety-Belt Attachment

1. The installation of Safety Eye Angles on Versiform Panels allows easy attachment of personal fall protection equipment while working on forms; although, the installation of work platforms is recommended and normally provides a more efficient work method.
2. The Safety Eye Angle for belt attachment should be spaced per job requirements and attached to side rails or crossmembers as shown.

Caution: Do not attempt to install Safety-Hooks through the round holes in Versiform Waler Channels.

Do not use Safety Eye angle as a Lifting Bracket. Use for attaching Safety Belt hook only.

Check that bolts and nuts are tight before hooking to Safety Eye Angle. Bolts must be double nutted.



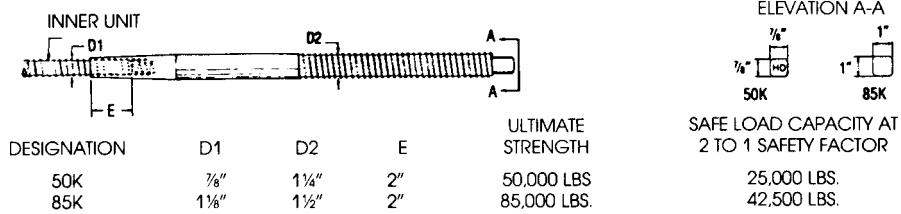
Waler Anchorage

V. WALL TIES

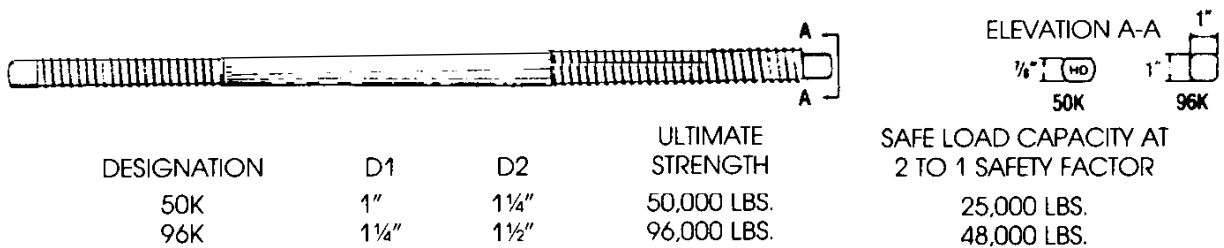
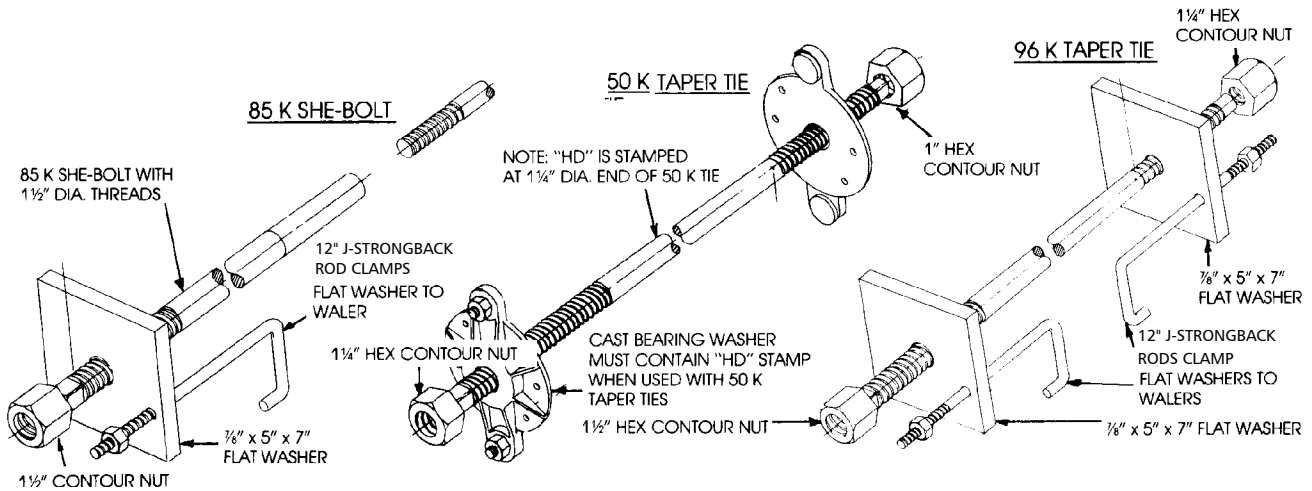
A. Wall Ties must be in compliance with industry standards and safe practices established by the American Concrete Institute, The American National Standards Institute, The Occupational Safety and Health Administration, and the Scaffolding, Shoring and Forming Institute. Illustrations and capacities of Symons Taper Ties and She-Bolt Ties are shown below.

B. Symons application drawings indicate safe load capacities of taper ties and she-bolt assemblies, when both outer unit and inner ties are supplied by Symons.

C. It is the contractor's responsibility to control concrete mix and placement procedures to assure that the maximum formwork design pressure is not exceeded.



SHE-BOLT CAPACITIES AND THREAD DIMENSIONS



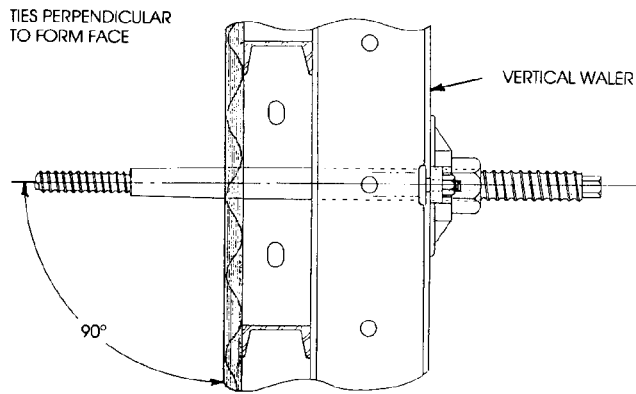
TAPER TIE CAPACITIES AND THREAD DIMENSIONS

D. Tie Installation precautions:

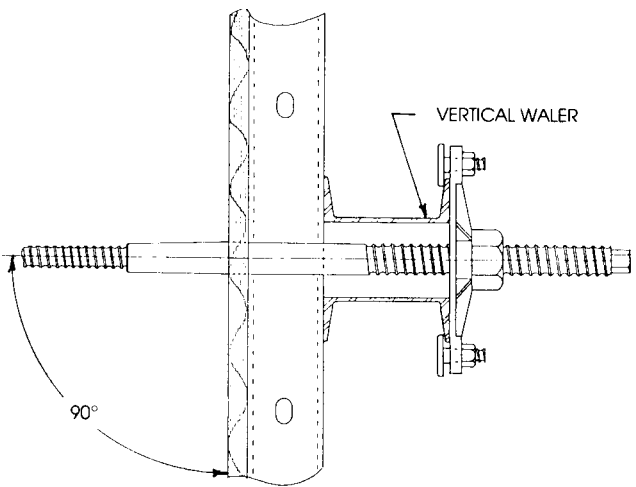
1. Be sure that the correct thread size hex nut, cast washer nut or cast contour nut is mated to all taper tie or she-bolt out-unit threads.
2. Be sure that inner ties engage full thread depth in all she-bolts. Full thread engagement is noted as dimension "E" on illustration of she-bolt capacities and thread dimensions.
3. Be sure that all ties using cast washer nuts, hex nuts with cast bearing washers, or flat washers, are installed perpendicular to both form faces. Hex nuts and cast washer nuts installed on ties not perpendicular to the form face are subjected to eccentric loading that can cause tie failure.

E. The Spreader Clip can be used with 50K taper ties or she-bolts. It is a U-shaped plate that fits over the cast bearing washer and hex nut, thereby preventing any inward movement of the forms. A tie with spreader clips near the bottom of the forms and one tie with clips near the top of the form, will maintain the desired wall thickness.

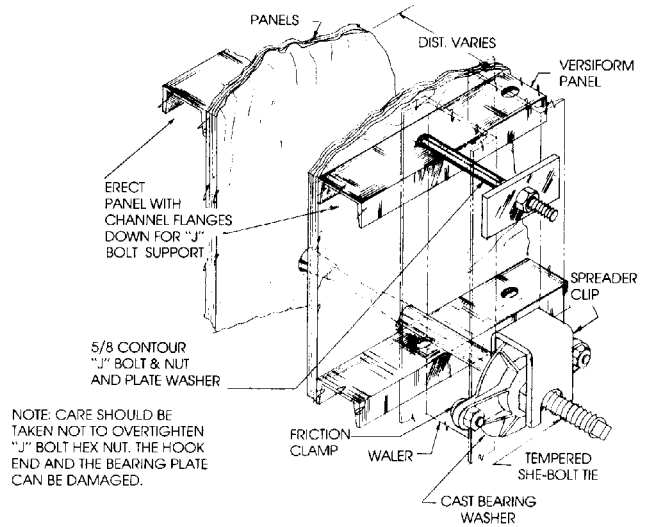
F. Where walers extend above the form height, the top tie can go over the top of the forms. The adjustable top tie can be used instead of a taper tie or she-bolt tie. This unit acts as both a tie and a spreader. By merely loosening the outer nuts one turn, the unit can be lifted out of the open-slotted brackets attached to the extended Versiform waler. When installing, the unit dropped into the slotted brackets, and the outer nuts are tightened.



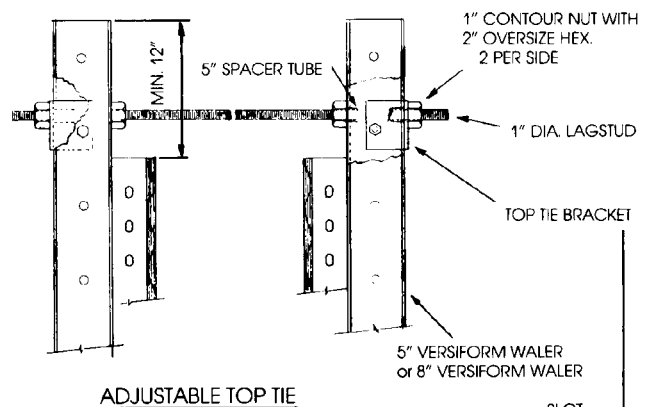
VERTICAL WALL SECTION



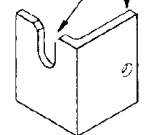
PLAN WALL VIEW



INSTALLATION OF WALERS TO PANELS
"J" BOLT & SPREADER CLIP



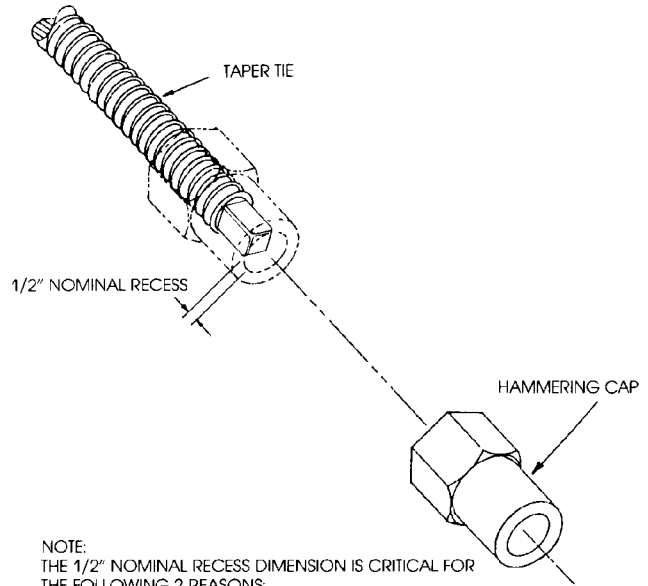
ADJUSTABLE TOP TIE



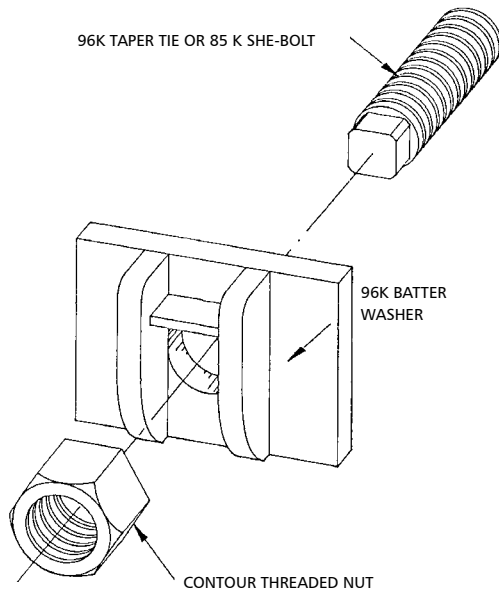
G. Batter Plate castings, with mating cast-contour nuts, should be installed to support ties that are not perpendicular to the form face.

H. The 96K Batter Washer is used with the 85K She-Bolts or 96K Taper Ties.

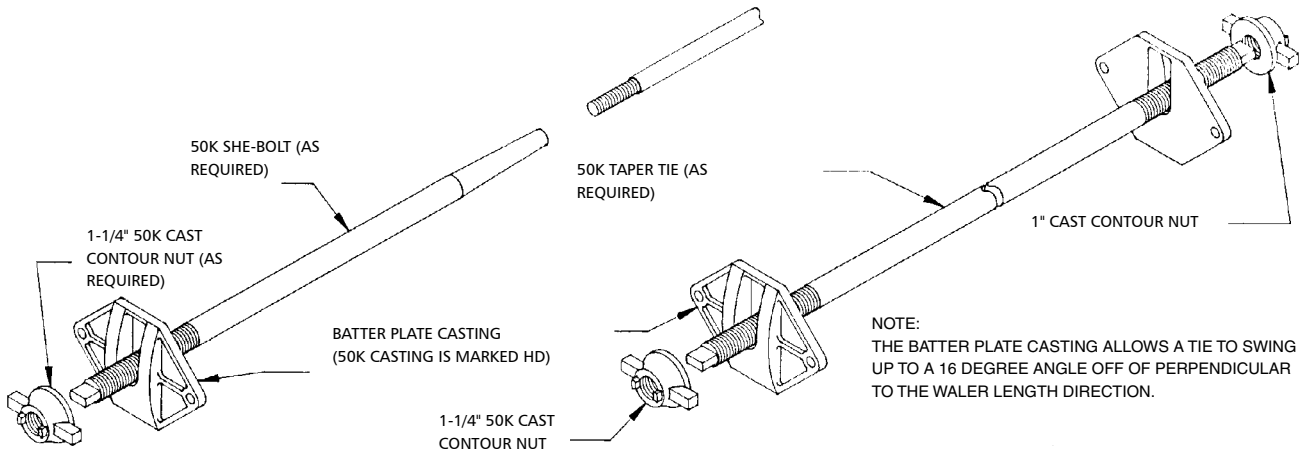
1. Taper Tie Hammering Caps are available in two sizes, 1" contour thread or 1 1/4" contour thread.
2. The correct diameter and thread-type Hammering Cap must be utilized during initial impact releases of embedded Taper Ties.
3. The Hammering Cap is positioned at the smaller diameter end of the taper tie. The protruding end of the Hammering Cap is then struck with an 8 lb. or heavier sledgehammer. All mushrooming type impact damage is accumulated at the end of the Hammering Cap, rather than the butt end of the Taper Tie so as not to damage tie threads.



NOTE:
THE 1/2" NOMINAL RECESS DIMENSION IS CRITICAL FOR THE FOLLOWING 2 REASONS:
 • IT ASSURES THAT ALL OF THE THREADS OF THE NUT PORTION OF THE HAMMERING CAP ARE IN MESH TO WITHSTAND THE TRANSFER OF SLEDGE-HAMMER IMPACT TO THE TAPER TIE.
 • IT PROVIDES A SAFE CLEARANCE BETWEEN THE BUTT END OF THE TAPER TIE AND THE STRIKING SLEDGE-HAMMER.



NOTE:
THE 96K BATTER WASHER ALLOWS FOR A TIE SWING UP TO A 14 DEGREE ANGLE OFF OF PERPENDICULAR TO THE WALER LENGTH DIRECTION.



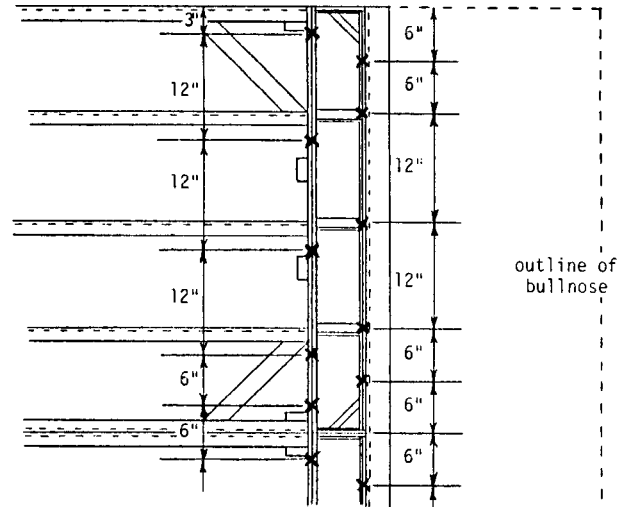
NOTE:
THE BATTER PLATE CASTING ALLOWS A TIE TO SWING UP TO A 16 DEGREE ANGLE OFF OF PERPENDICULAR TO THE WALER LENGTH DIRECTION.

VI.APPLICATIONS

A. Bullnose Forms

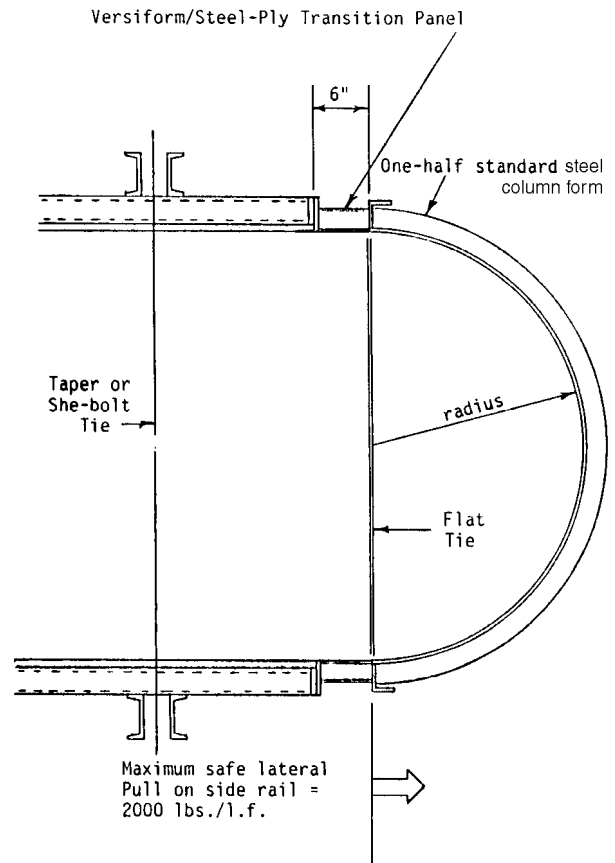
1. Attach one-half of the steel column form to Steel-Ply® transition filler with wedge bolts located at each crossmember and a 6" from each end rail as shown in Figure 1.
2. A vertical row of flat ties is required at the connection between transition panel and bullnose
3. Allowable concrete pressure is governed by a maximum safe end-pull load of 2000 lbs. per linear foot on the transition panel siderail.

This form design is practical for walls up to 3'-4" thick, with pressure at 800 psf. Pressure should be reduced for thicker walls to maintain the maximum 2000 lbs. per linear foot siderail loading.



Wedge bolt locations on siderail. If column form stiffener falls at wedge bolt location place wedge bolts 6" above and 6" below stiffener.

Figure 1

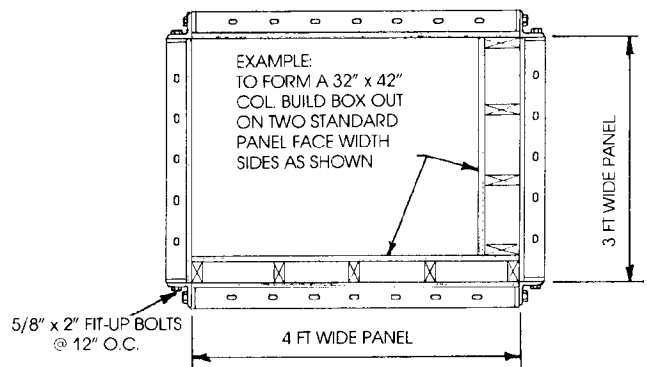
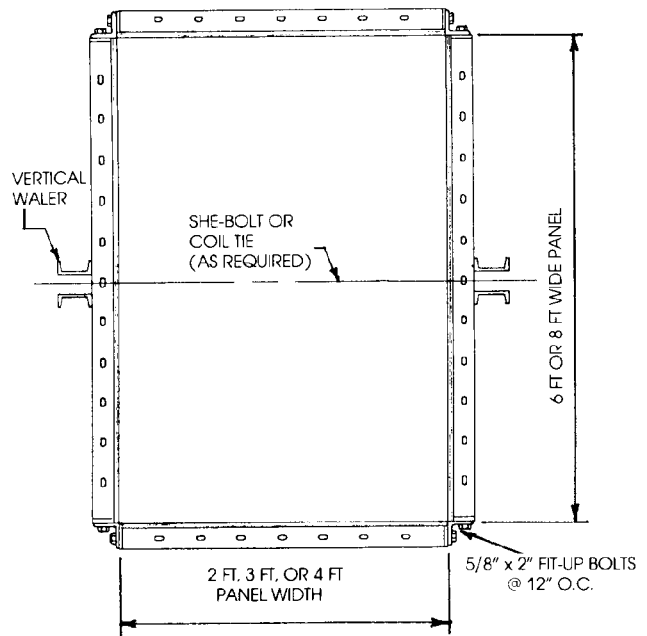
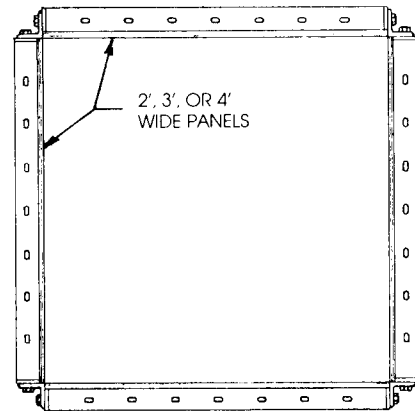
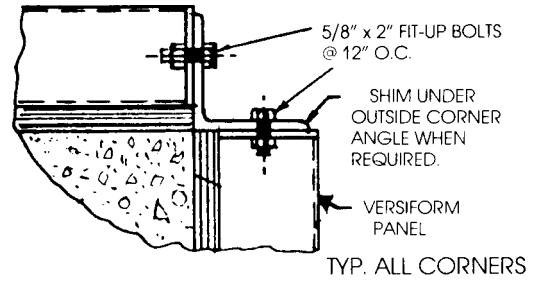


Maximum safe lateral Pull on side rail = 2000 lbs./l.f.

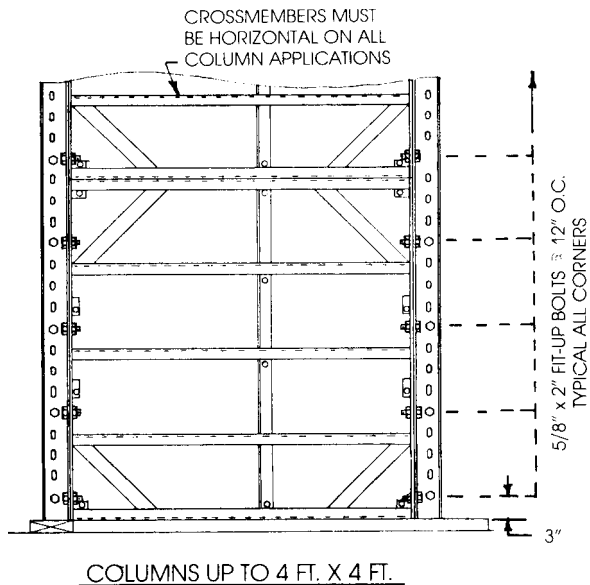
Figure 2

B. Column Forming

1. Higher pressures due to a faster liquid-head rise are inherent to pouring concrete within the confined lateral dimensions of typical-sized columns. Also, unlike straight-wall panel-to-panel connections, most column forms incorporate outside corner angles, thus each panel siderail must resist the resultant lateral side pull load from adjacent panels.
2. The rate of concrete placement must be controlled within the safe, allowable concrete pressure, relative to job conditions and formwork design.
3. Columns up to 4' x 4' can be poured utilizing four outside corners.
4. It is recommended that a vertical waler and ties be installed midway between outside corners when column-faced widths are greater than 4' up to 8'.
5. For columns with dimensions that are not in even foot increments, such as 32" x 42", it is recommended that 3' and 4' wide panels serve as the support structure. Box out on two face sides to create the exact column size.

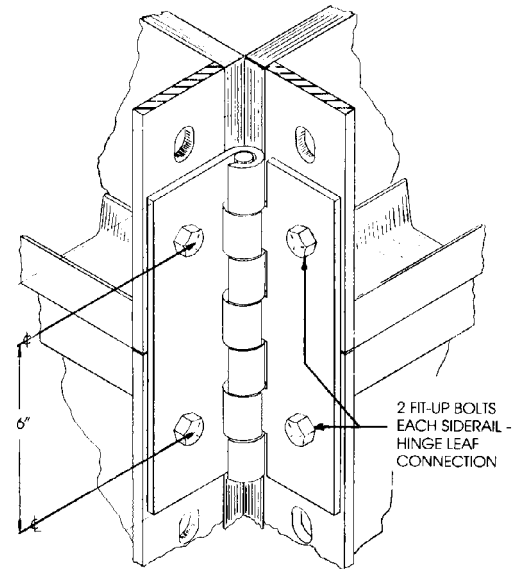
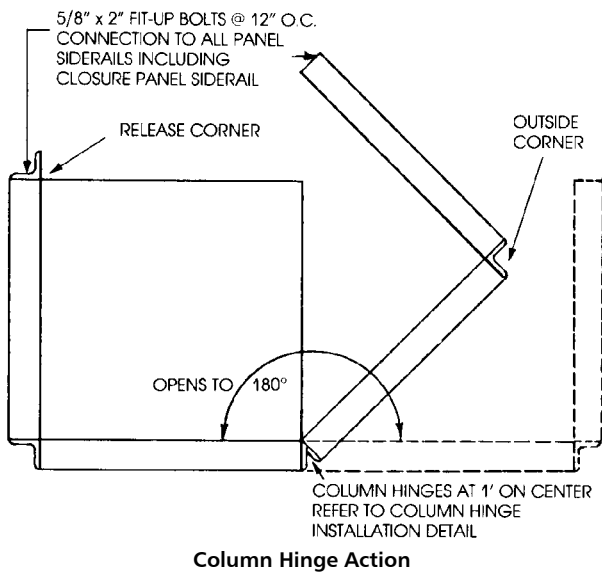


Caution: Versiform panels must be installed with crossmembers horizontal in column forming.



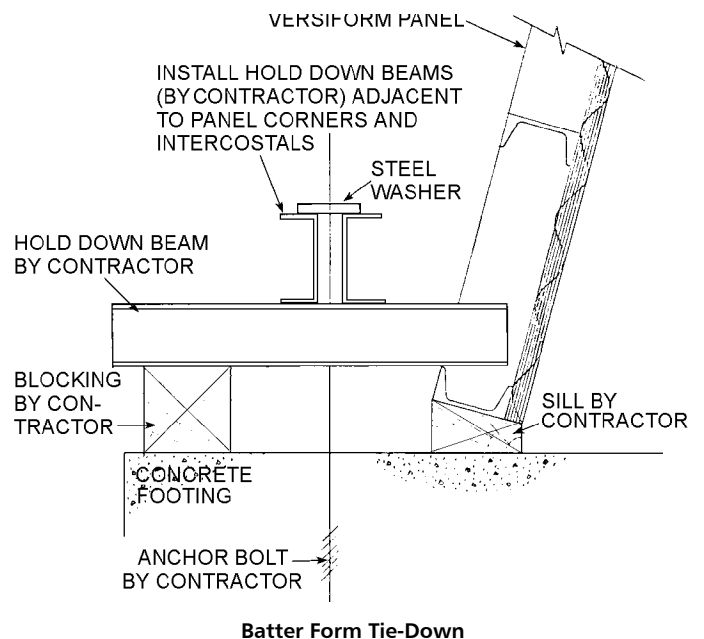
6. Versiform Column Hinges facilitate crane recycling of ganged forms. Rectangular or square columns with up to 48" wide faces can be gang formed:
 - Use Column Hinges to connect adjacent panels at one corner.
 - Use Outside Corner Angles to secure adjacent panel siderails at the other three corners.
 - Disconnect the Outside Corner Angle that is diagonally opposite the hinged corner, at one adjacent panel side only, to initiate the stripping cycle.

4. 96K Taper Ties or 85K She-Bolts are used with the 96K Batter Washers and Hex Nuts. (See section V.)
5. The maximum batter that can be achieved with 96K Batter Washers at both form sides is 6:12.
6. For walls with batters greater than 8:12, consult a Symons representative for possible solutions utilizing other Symons equipment.



C. Battered Walls

1. Battered forms are subjected to a vertical component of pressure. The amount of up-lift force will depend on the degree of batter, height of wall and anticipated maximum concrete placement pressure. A reasonable estimate of up-lift pressure must be made, so that necessary resistance to up-lift can be installed; such as adding weight or tying down to the footing.
2. Since ties will not be perpendicular to both form faces, taper ties or she-bolts with Batter Plate Castings and Cast Contour Nuts must be used to secure all ties not installed perpendicular to the form face. (See section V.)
3. The maximum batter that can be achieved with Batter Plate Castings and Cast contour nuts at both form sides is 8:12.



D. Waler Tie Down Bracket Installation

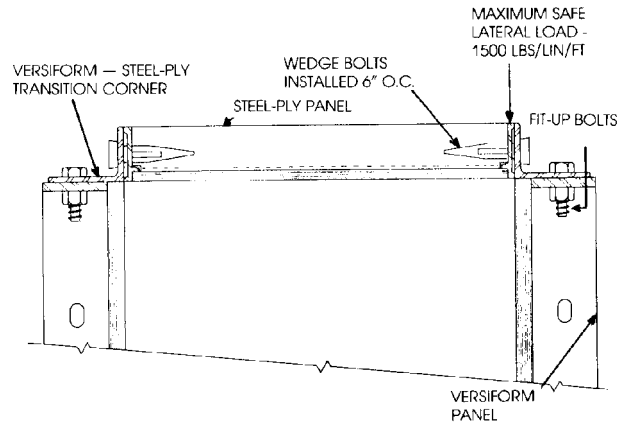
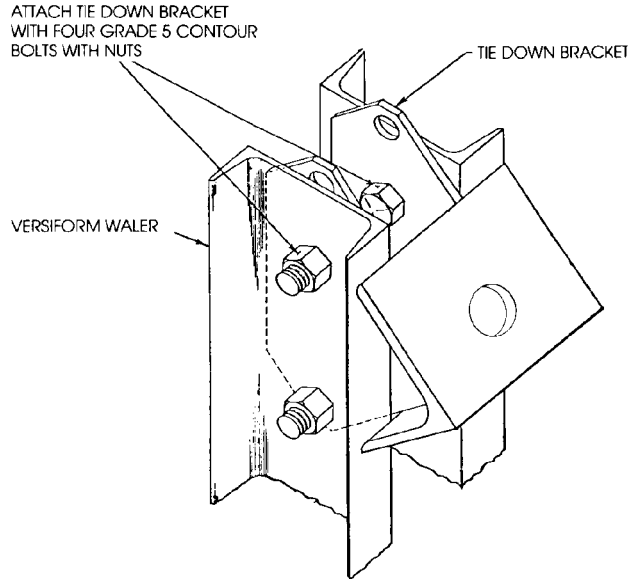
In the installation of a Waler Tie Down Bracket, be sure to use four Versiform Fit-Up Bolts in attaching it to the waler.

E. Versiform/Steel Ply® Transitions

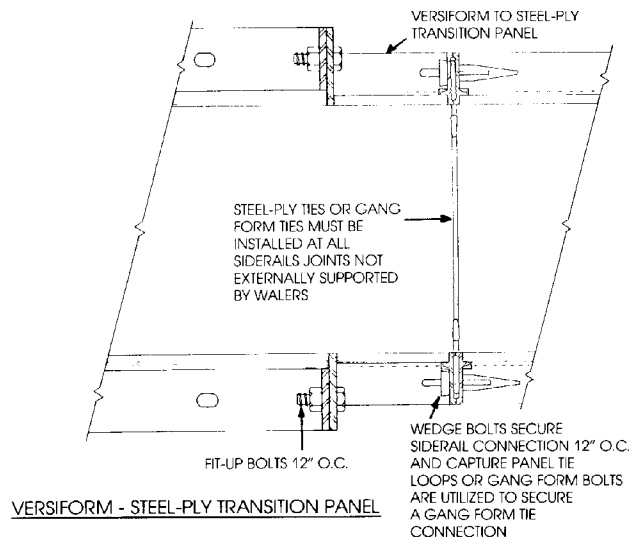
1. The Versiform/Steel Ply Transition Corner provides a convenient connection between Versiform siderails and Steel-Ply siderails at right angle outside form corners.
2. Typical Transition Corner applications include column forming, pilaster forming, wall outside corners and other possible applications wherein the ability to interject Steel-Ply dimensional versatility offers advantage.
3. When loads on adjacent corner forms are not supported by walers and ties, the adjoining siderails can be subjected to extremely high tension load.

Caution: Allowable concrete pressure is governed by a maximum safe lateral load of 2000 lbs/linear ft. on the Steel-Ply siderail, and a minimum safe lateral load of 3000 lbs./linear ft. on the Versiform ($\frac{3}{8}$ " x 3" plate) siderail.

4. Transition to Steel-Ply can also be accomplished by utilizing the Versiform/Steel-Ply siderail of the transition panels. The lateral load on the siderail is limited to 1500 lbs./linear ft.
5. When Versiform is used in conjunction with Steel-Ply, the maximum allowable pressure of the system will generally be governed by the Steel-Ply capacity.



VERSIFORM - STEEL-PLY TRANSITION CORNER



VERSIFORM - STEEL-PLY TRANSITION PANEL

F. Corewall Gangs (Utilizing Double Hinge Corners)

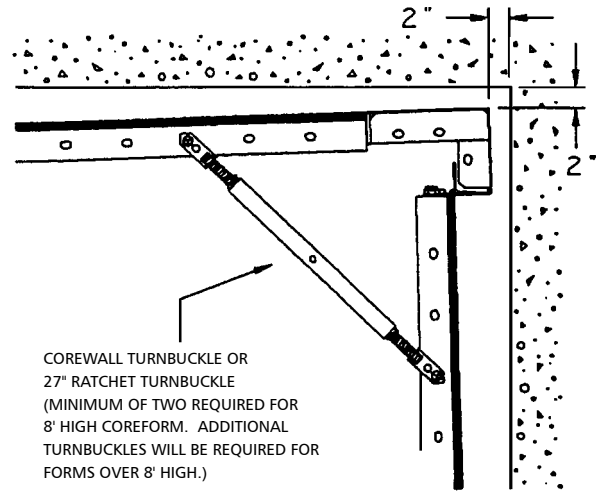
1. Double Hinge Corners function to provide coreform stripping clearance. Hinge Corners connect to adjoining Versiform panels at specific Fit-Up Bolt slots, designed to permit hinge function. Additional slots are available through which Fit-Up Bolts will lock out hinge action, when required, such as during concrete placement.

2. Corewall Gang Stripping and Support Procedure

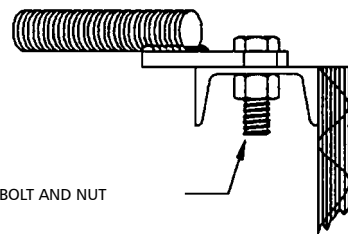
Step 1

Initiate release of coreform gang

Remove Fit-Up Bolts that lock out hinge action at each Double Hinge Corner siderail connection. Precaution should be taken to assure that only the specific Fit-Up Bolts gripping the Double Hinge Corner Locking Angle are removed. Therefore, it is recommended that the Fit-Up Bolts that grip only the hinging siderail be double-nutted as a safeguard against inadvertent removal.



COREWALL TURNBUCKLE OR 27" RATCHET TURNBUCKLE (MINIMUM OF TWO REQUIRED FOR 8' HIGH COREFORM. ADDITIONAL TURNBUCKLES WILL BE REQUIRED FOR FORMS OVER 8' HIGH.)



FIT-UP BOLT AND NUT

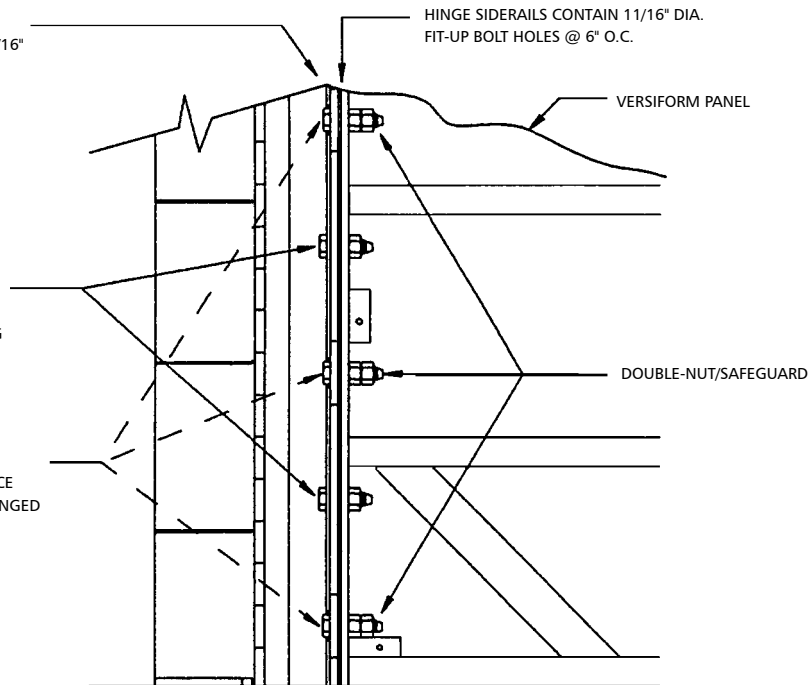
Horizontal Crossmember

LOCKING ANGLES CONTAIN LARGE 1-3/8" WIDE SLOTS @ 12" O.C. PLUS INTERIM 11/16" DIA. FIT-UP BOLT HOLES @ 12" O.C.

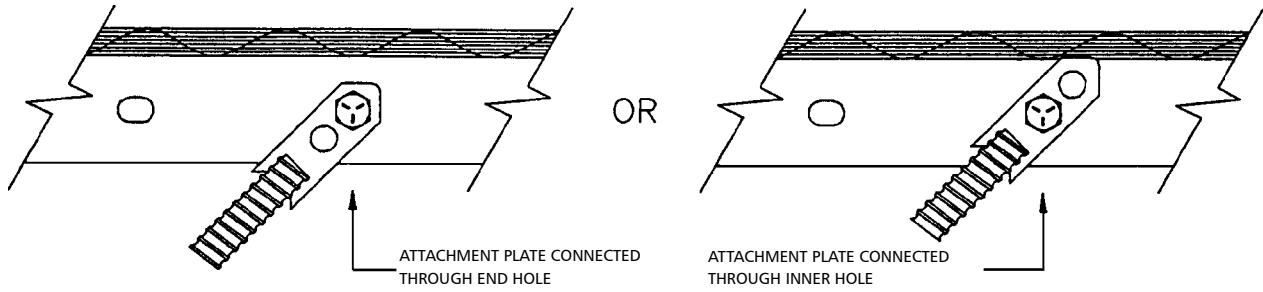
HINGE SIDERAILS CONTAIN 11/16" DIA. FIT-UP BOLT HOLES @ 6" O.C.

DURING POURING SEQUENCE, ADDITIONAL FIT-UP BOLTS LOCK OUT HINGE ACTION BY GRIPPING THE LOCKING ANGLE VIA 11/16" DIA. HOLE POSITIONS

THE LARGE 1-3/8" WIDE SLOTS IDENTIFY LOCATION AND PROVIDE HEAD CLEARANCE FOR THE FIT-UP BOLTS THAT GRIP ONLY HINGED SIDERAILS TO GANG ENDRAILS.



Fit-Up Bolt Connection Detail



Step 2

Retract the turnbuckle until each Double Hinge Corner folds to a rigid, fully retracted position.

- The effective stripping range of the Corewall Turnbuckle is predicated on its connection at Fit-Up Bolt slot positions 18 inches either side of the Double Hinge Corner connection.
- The effective stripping range of the 27" Ratchet Turnbuckle is predicated on its connection at Fit-Up Bolt slot positions 6 inches either side of the Double Hinge Corner connection
- Typical coreforms up to 12 feet high function with 2 Turnbuckles at each corner.

Corewall Turnbuckle attachment plates contain two 3/4" diameter holes. The second or inner hole position is required for certain Steel-Ply coreform applications. Either hole position can be used for Versiform.

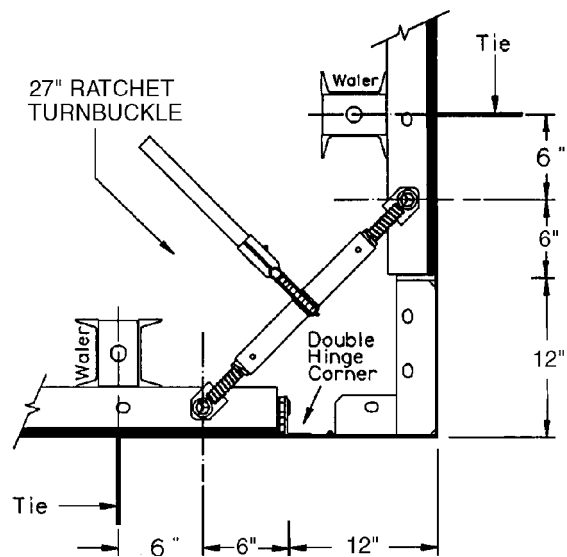
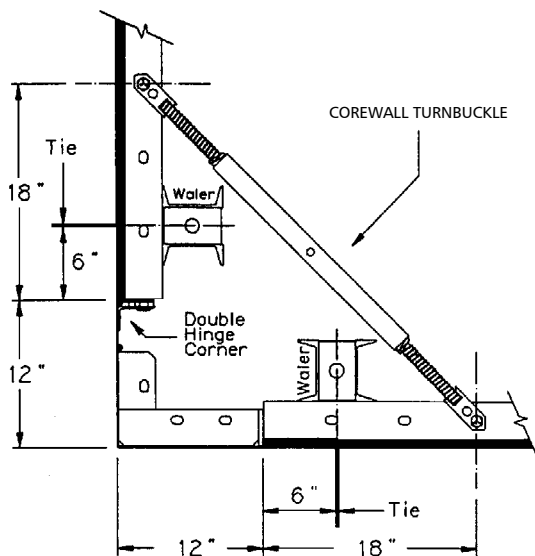
The Corewall Turnbuckle always attaches to horizontal crossmembers through the Fit-Up Bolts slots spaced 18" from the panel end bar connection to the Double Hinge Corner.

This positioning is critical so that the available adjustment range of the turnbuckle will completely fold the Double Hinge Corners.

On most applications safe panel crossmember loading requires that end walers of each wall face gang be installed inside the Corewall Turnbuckle triangle area.

Actual location of the end walers must provide necessary clearance to permit full inward travel of adjacent wall face gangs during the stripping cycle.

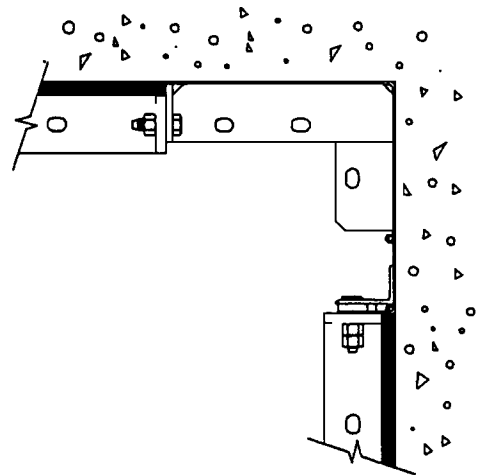
As the Double Hinge Corners flex to full fold position, the corners draw inward 2" from each wall face, and the overall corner-to-corner length of each wall gang foreshortens 4".



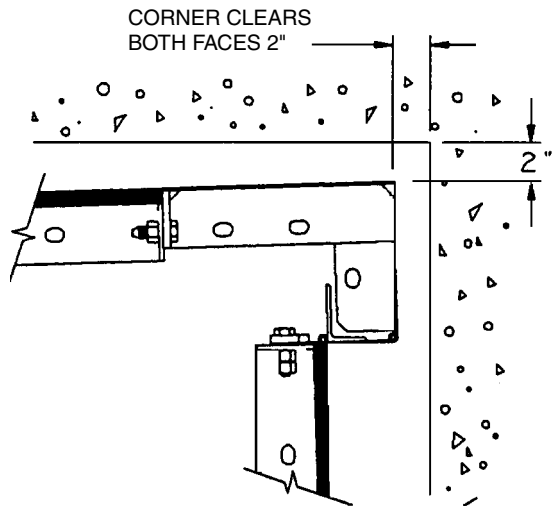
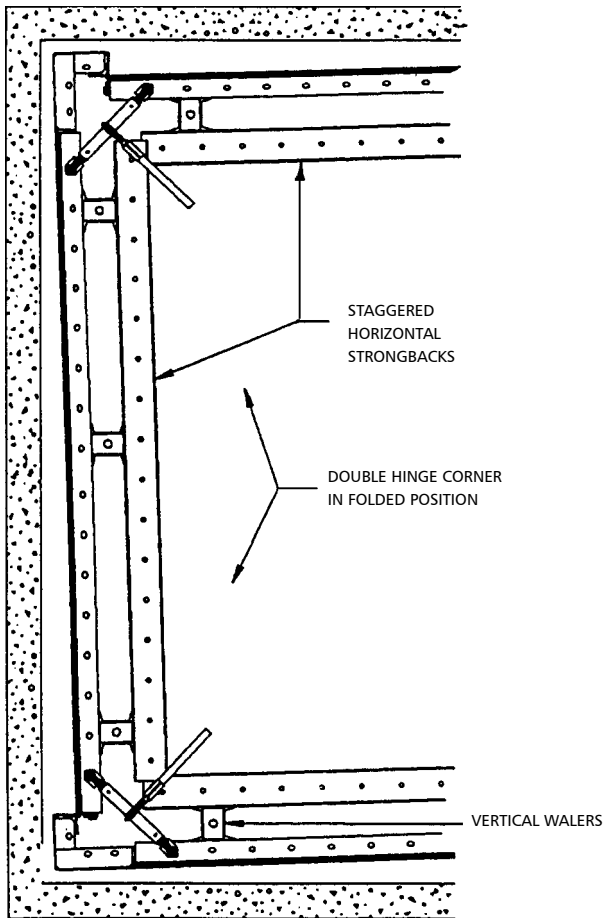
With all corners fully contracted the coreform retains the structural advantages of a rigid box.

Typical structured Versiform gangs utilizing vertical walers alleviate any concern for water interference as the Double Hinge Corners assume full fold position and adjacent gangs retract to close proximity of each other. Prior consideration must be given so that vertical walers are not positioned in the same vertical line as the Turnbuckles.

When adjacent wall faces require horizontal strongbacks, they must be staggered in order to avoid interference for the retracting ends of each other.



Double Hinge Corner in Pouring Position



Double Hinge Corner in Folded Position

Step 3

Attach a sling line hook to each of the Gang Lifting Brackets. Do not lift coreform through sling lines attached to walers.

The Gang Lifting Brackets should be mounted on the 2 longer, opposite, wall gangs.

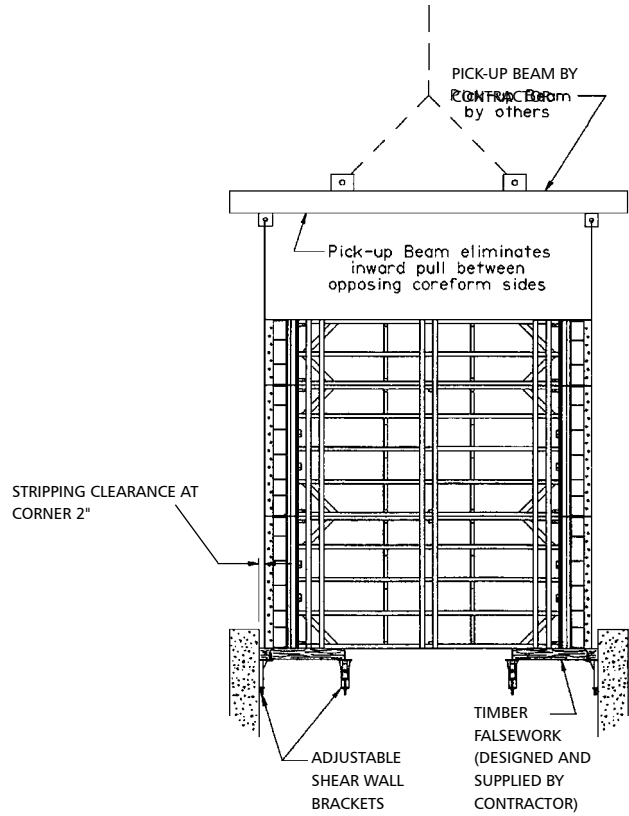
Sling lines should not angle inward between opposite wall Gang Lifting Brackets.

Utilize a pick-up beam to position sling lines so up pull approximates plumb relative to the gang panels to which they are attached.

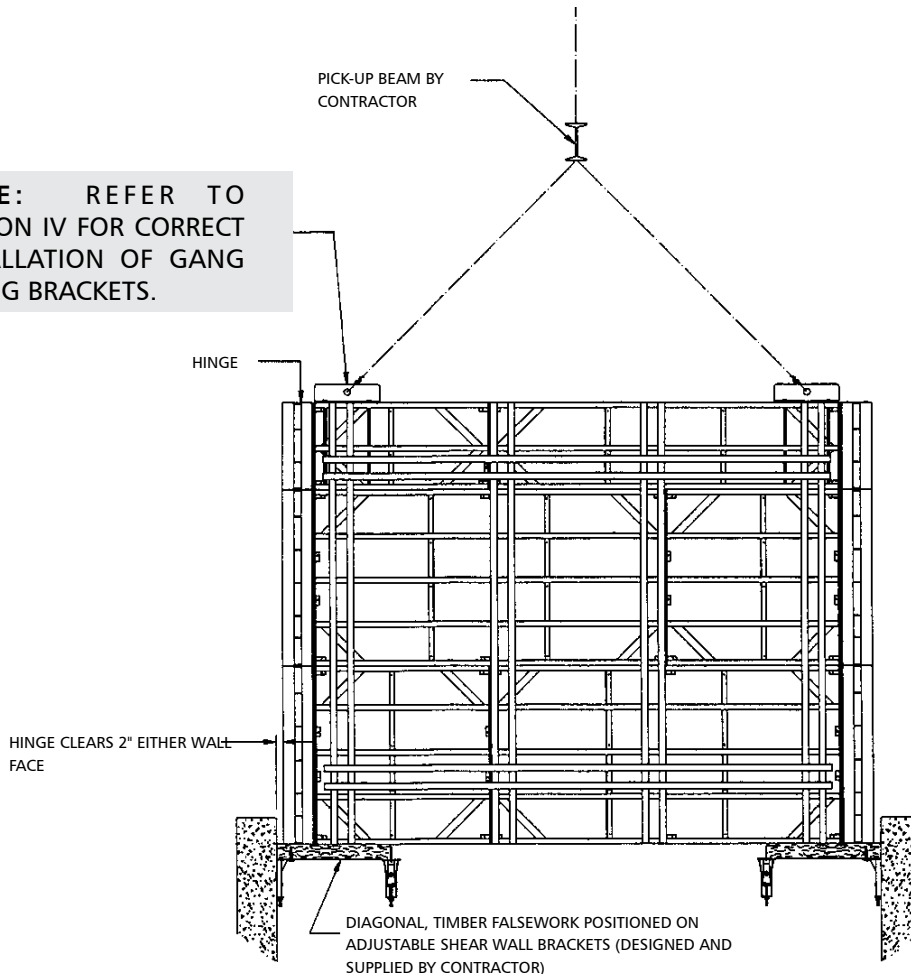
Pick up beam positions opposite wall sling lines so that pull is vertical to both form faces.

Step 4

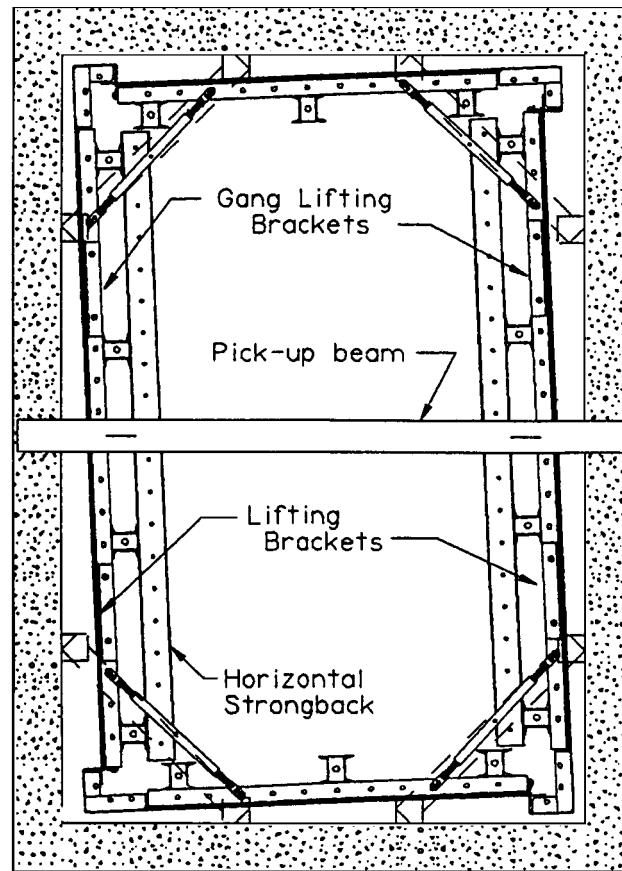
Lift the "rigid box" coreform to approximately one foot above top of previous pour.



NOTE: REFER TO SECTION IV FOR CORRECT INSTALLATION OF GANG LIFTING BRACKETS.



Double Hinge Corners in Folded Position



Double Hinge Corners in Folded Position

Step 5

Place 4 x 4's (or heavier timber as required) across the corners at top of the corewall concrete. Each end of the timber should bear on the wall between 2½ to 3½ ft. out of the corner. Set the coreform on the temporary positioned falsework.

With the coreform sitting in this out-of-the-way, yet close at hand storage place, the new position shearwall brackets and diagonal falsework can be installed, re-bar erected, inserts attached, and the form cleaned and oiled

Dayton/Richmond Expanded Coil Inserts are coil or closed ferrule structural connection inserts available in two, four or six strut versions. Available in ¾" through 1½" diameters, with or without nailing washer.

Recommendation for insert based on specific application.

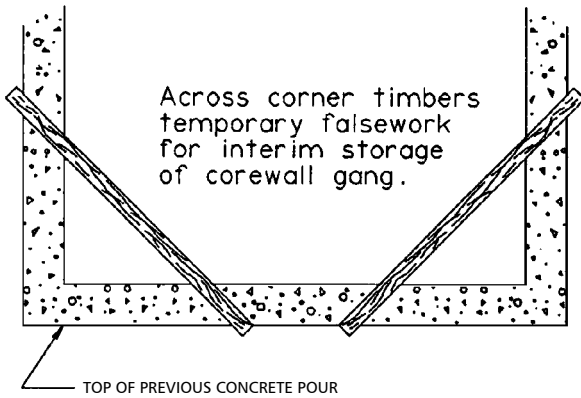
Step 6

Install Adjustable Shear Wall Brackets and appropriate size timber falsework.

The elevation adjustment range of the Adjustable Shear Wall Bracket is 2⅜" as indicated.

The criteria for positioning anchor bolt inserts at the appropriate elevation should include a median "A" dimension of 4½" for optimum bracket adjustment.

Use a ¾"-10 x 3" zinc-plated, grade 5 anchor bolt with extended length threads. Safe load rating for the Adjustable Shear Wall Bracket when properly mounted on the prescribed anchor bolt is 3,000 lbs. in 2,000 psi concrete.

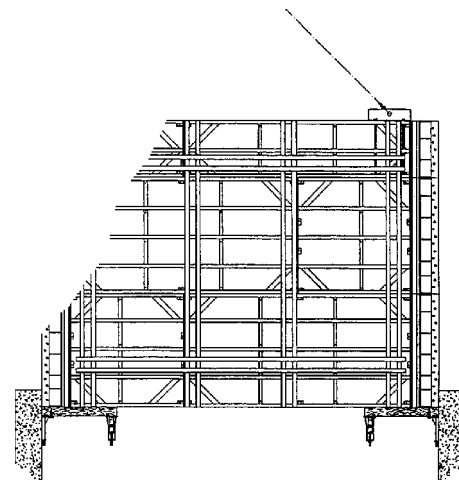
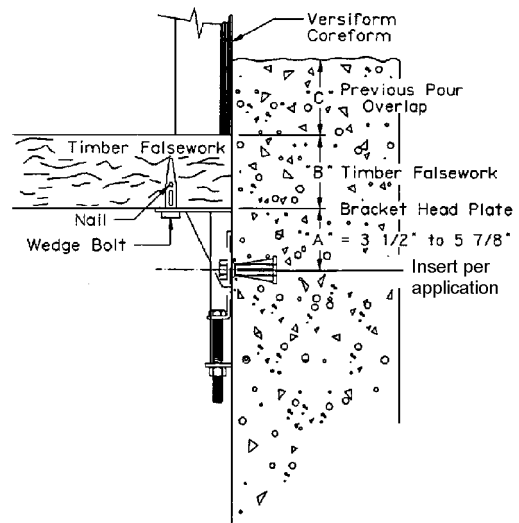
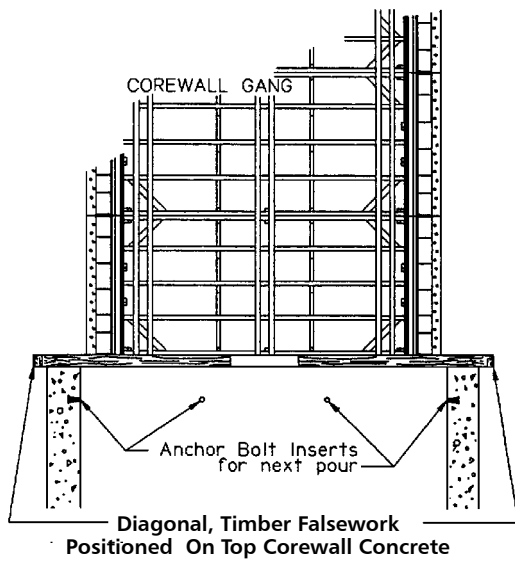


Step 7

Have crane lift coreform enough to permit removal of temporary timber falsework from across corners at top of corewall concrete.

The coreform is then lowered down onto the Adjustable Shear Wall Brackets and support falsework installed for the next pour.

Crane time is again momentary because expanding the Double Hinge Corners back to full coreform pour position is accomplished after the crane is released.



Coreform Expanded

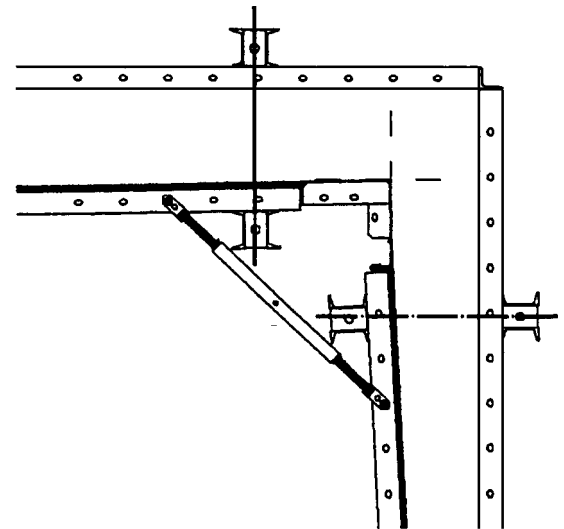
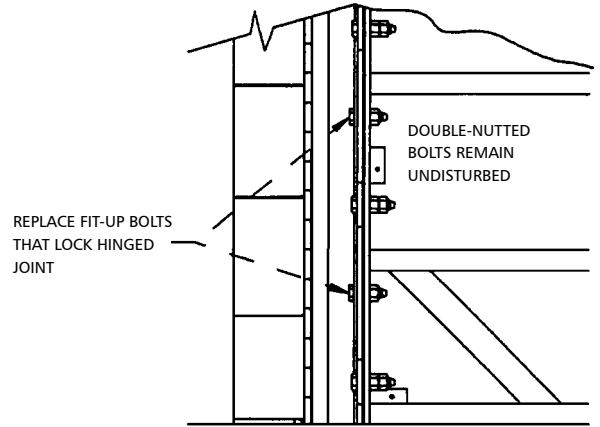
Step 8

Expand coreform back to pour position by turning Turnbuckle outward until each Double Hinge Corner returns to exactly 90°, and then reinstall Fit-Up Bolts to lock out hinge action.

Caution: It is vital that alignment between the Double Hinge Corner and adjoining form faces not be forcibly bent toward the wall thickness. When this condition is permitted to exist, it wedge-locks the stripping hinge action at the corners.

This problem will always result from misalignment or dimensional errors occurring elsewhere in either the inside or outside coreform. Such as:

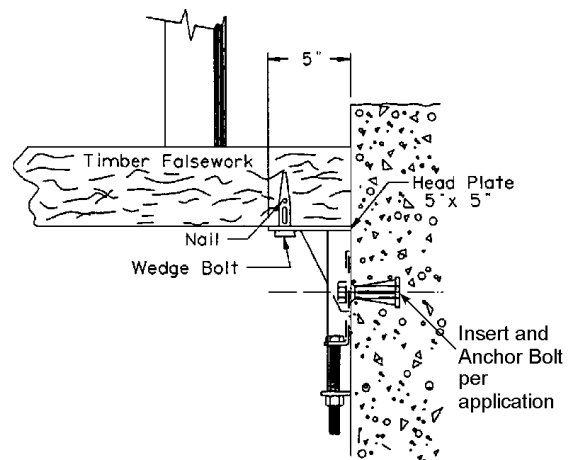
- An inside coreform wall length plus wall thickness does not add up to the outside coreform size.
- Taper Ties or She-Bolts may draw forms to undersize wall thickness.
- The outside coreform may not have adequate horizontal strongbacking to stay aligned between outside corners and adjoining wall ties.



G. Timber Falsework

The timber falsework is an essential component to the functional support of the Versiform Coreform System. Since coreform walls move inward, the timber provides a stable extension platform to the 5" x 5" head plate of the Adjustable Shearwall Bracket.

The timbers are secured to the bracket head plates by inserting a wedge-bolt through the appropriate 13/16" diameter hole and locking via a 16d nail driven into the timber.



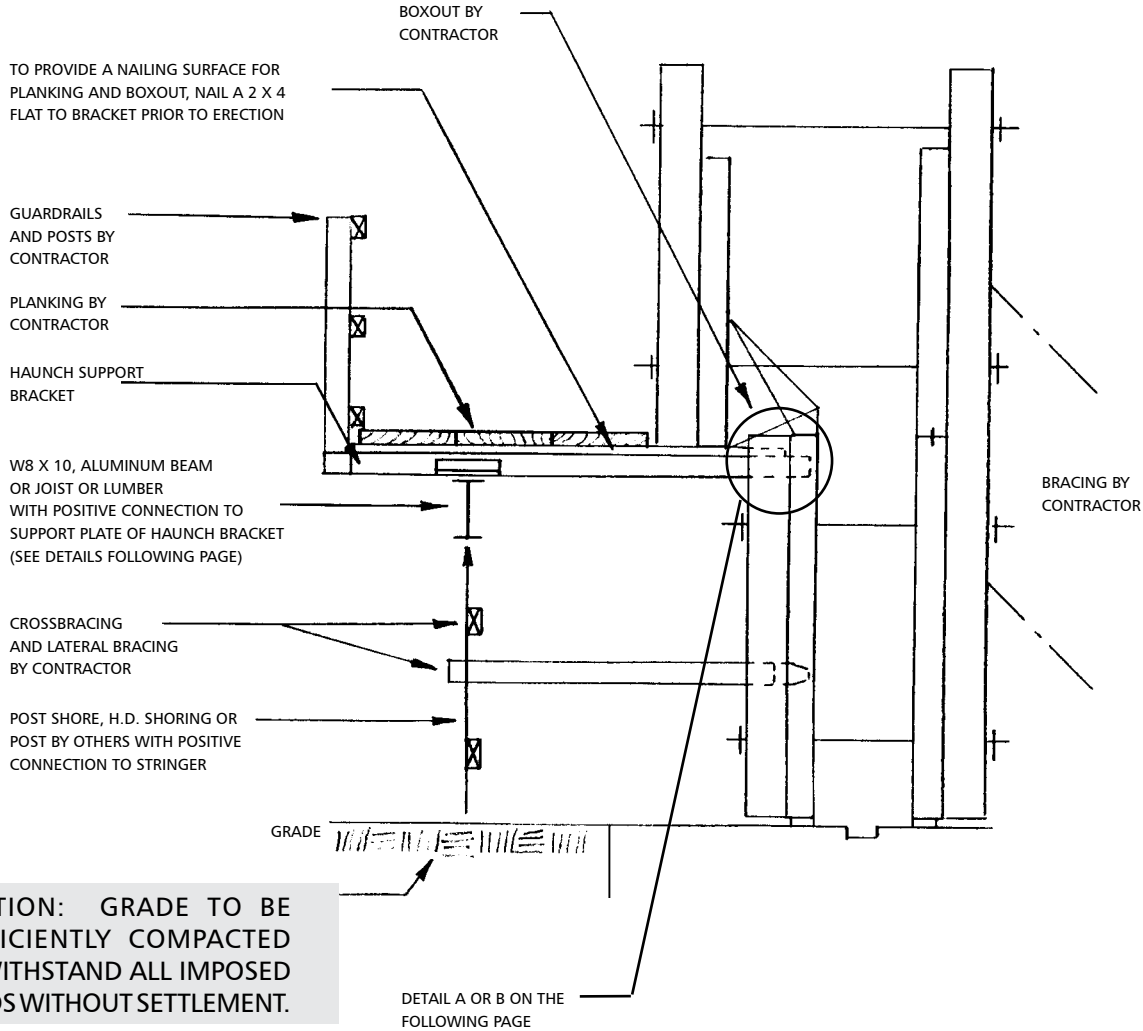
H. Haunch Support Bracket

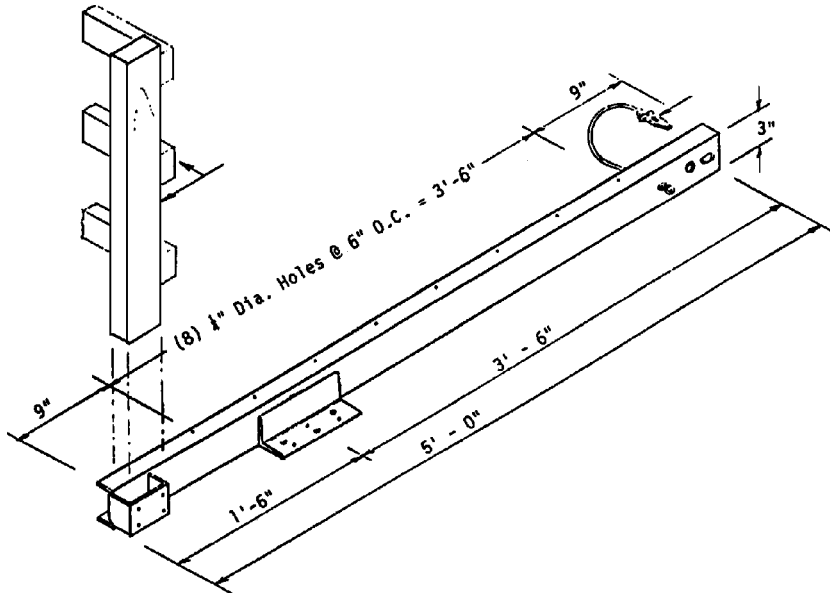
- Maximum load - 1825 lbs. at 4:1 safety factor
- Maximum spacing - 8'0"

All supporting members, i.e. posts, joists, beams, stringers and planking must be designed for a 4:1 factor of safety.

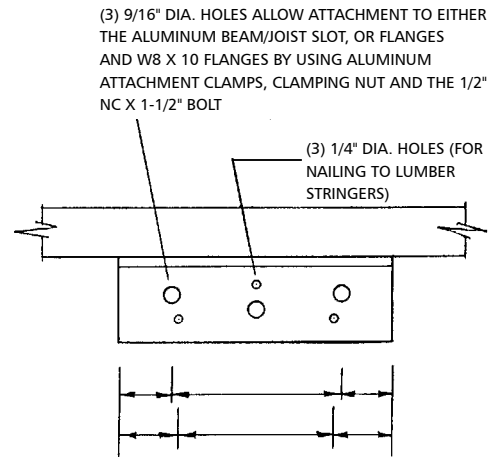
Formwork, stringers and posts must be in place and braced prior to placing any formwork or planking on Haunch Support Brackets.

Loading is to be calculated using 25 psf. (live load) over entire decked area plus form weight plus concrete weight.

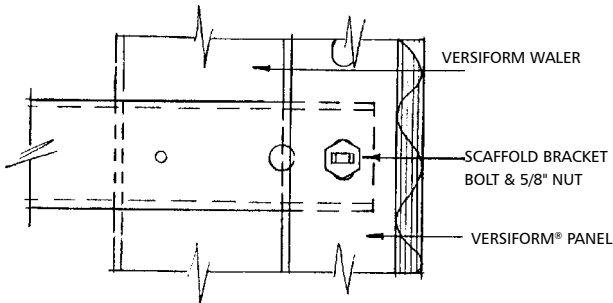




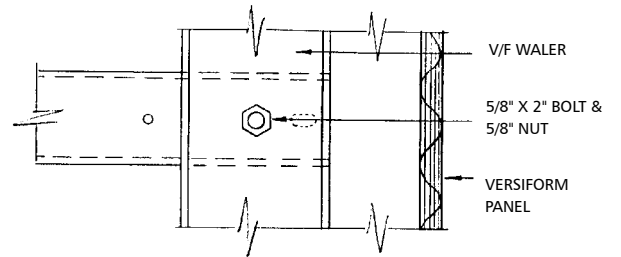
Haunch Support Bracket



Angle Support Detail



Attachment to Versiform Siderail
DETAIL A



Attachment to Versiform Waler
DETAIL B
(See Detail C also)

I. One Sided Wall Forming

The one sided wall forming components are designed to fit-up with 5" or 8" Versiform Walers (See Section II) used with most of Symons forming systems. Some of the systems require the use of a 2X sill (1½") to allow for a positive connection of walers to formwork.

1. Systems that require a 1½" sill:*

- a. Versiform when lifted from the Walers (see lifting info in section IV);
- b. Max-A-Form® when stiffeners are used vertically;
- c. Flex-Form®.

* If the Waler assembly and the forms are to be lifted separately a positive connection, i.e. Panel Waler Connector or Waler Connector, is not necessary, and the sill may be eliminated.

2. Systems that do not require a sill:**

- a. Versiform when lifting from the forms (see lifting info in section IV);
- b. Mini/Maxi Waler™ when lifted from the forms;
- c. Horizontal Steel-Ply;
- d. Max-A-Form when stiffeners are used horizontally.

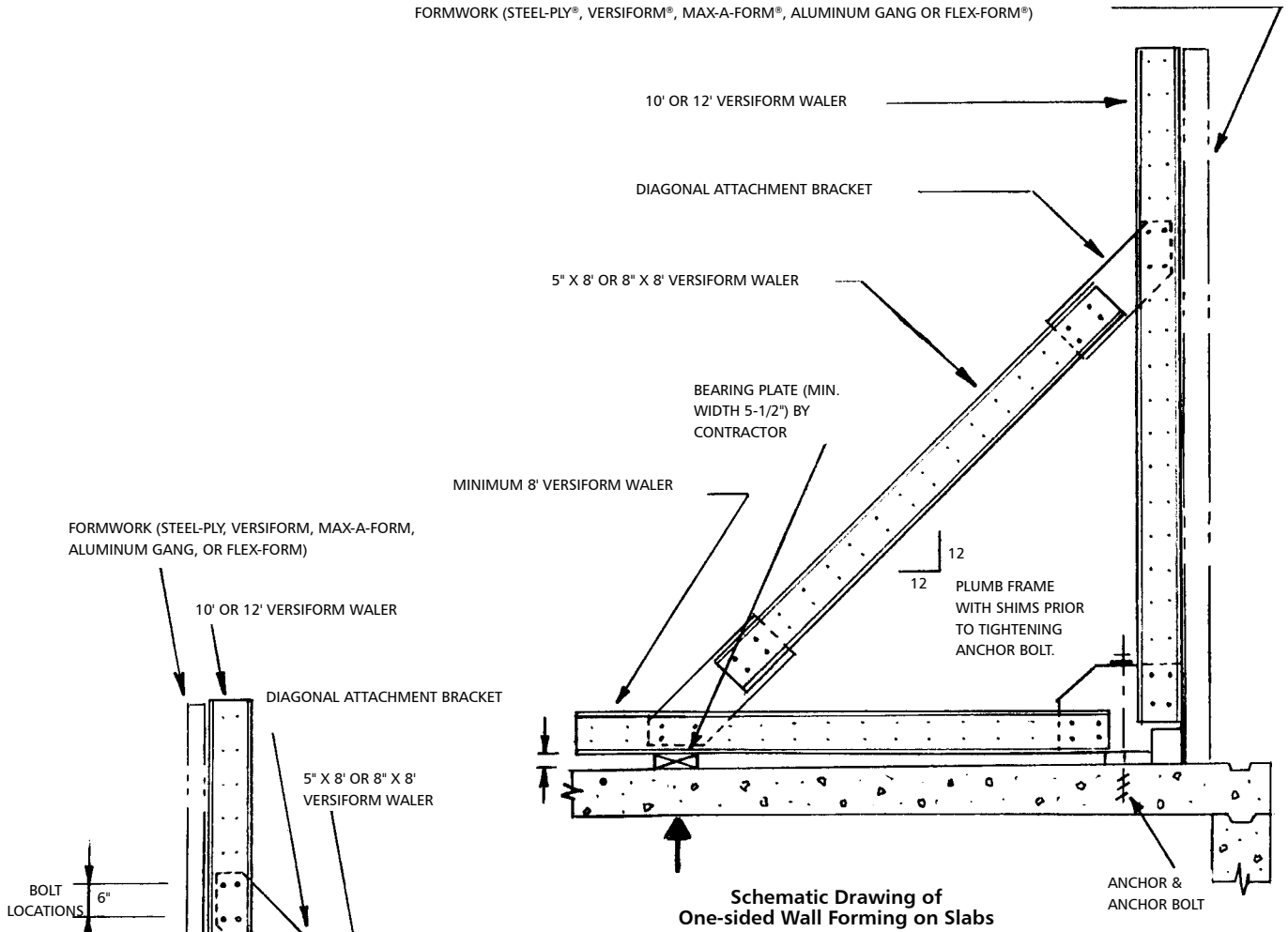
** A ½" sill may be used if desired.

ANCHOR LOADS AND REQUIRED WALERS

		REQUIRED WALER SIZES				RESULTING ANCHOR LOADS (KIPs)			
POUR HEIGHT	POUR PRESSURE	HORIZONTAL WALER SPACING		VERTICAL WALER SPACING		3' WALER SPACING		4' WALER SPACING	
(FT)	P.S.F.	3'-0"	4'-0"	3'-0"	4'-0"	TENSION	SHEAR	TENSION	SHEAR
8'-0"	600	5" X 8'	5" X 8'	8" X 10'	8" X 10'	5.2	10.8	6.9	14.4
	750	"	8" X 8'	"	"	5.7	12.4	7.5	16.5
	1200	"	"	"	"	6.0	14.4	7.9	19.2
10'-0"	600	5" X 8'	8" X 8'	8" X 10'	8" X 10'	9.1	14.4	12.1	19.2
	750	"	"	"	"	10.2	16.9	13.5	22.5
12'-0"	600	8" X 8'	8" X 8'	8" X 12'	8" X 12'	14.1	18.0	18.8	24.0
	750	"	"	"	"	16.1	21.4		

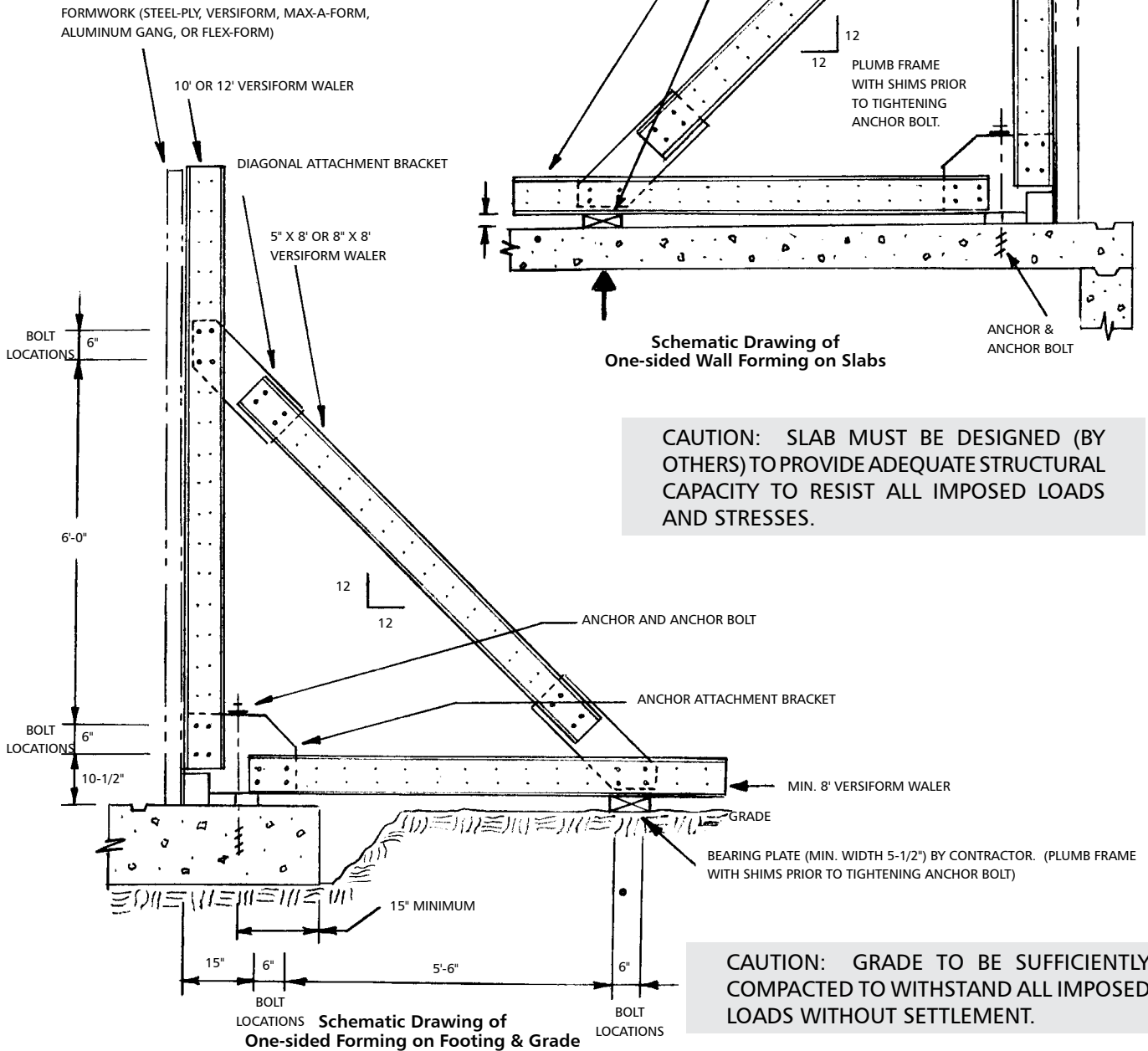
- The load on the bearing plate under the Diagonal Attachment Bracket is equal to the tension load on the anchor.
- The diagonal Waler may be either a 5" or 8" Waler by 8' long in any of the chart applications.

FORMWORK (STEEL-PLY®, VERSIFORM®, MAX-A-FORM®, ALUMINUM GANG OR FLEX-FORM®)



Schematic Drawing of One-sided Wall Forming on Slabs

CAUTION: SLAB MUST BE DESIGNED (BY OTHERS) TO PROVIDE ADEQUATE STRUCTURAL CAPACITY TO RESIST ALL IMPOSED LOADS AND STRESSES.

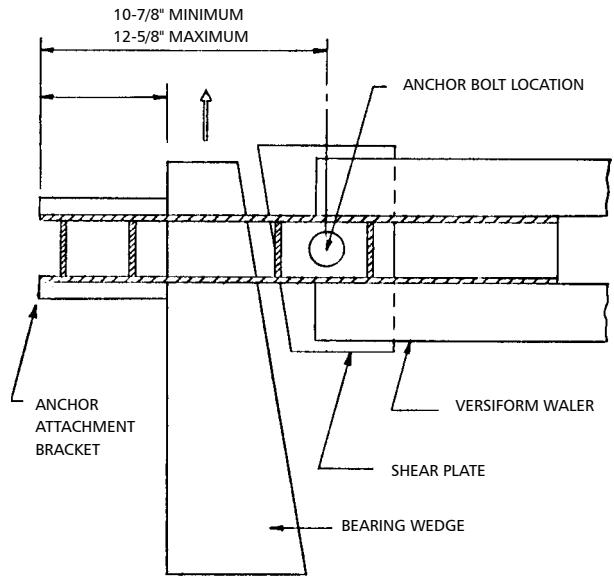
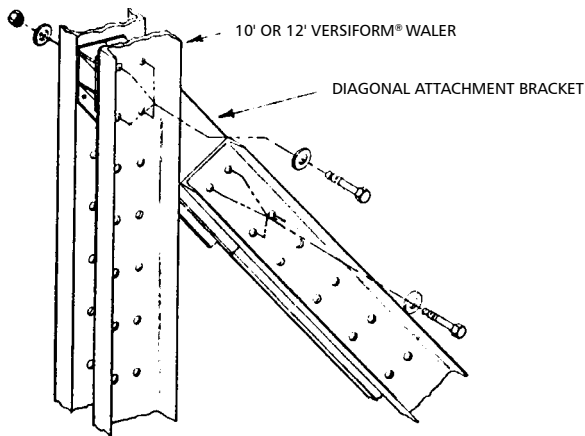


Schematic Drawing of One-sided Forming on Footing & Grade

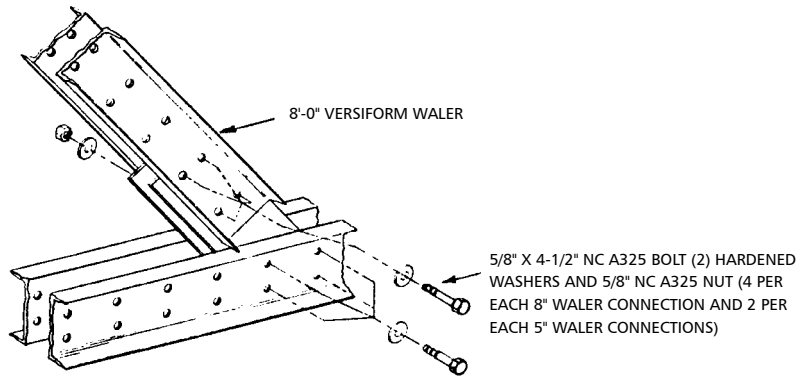
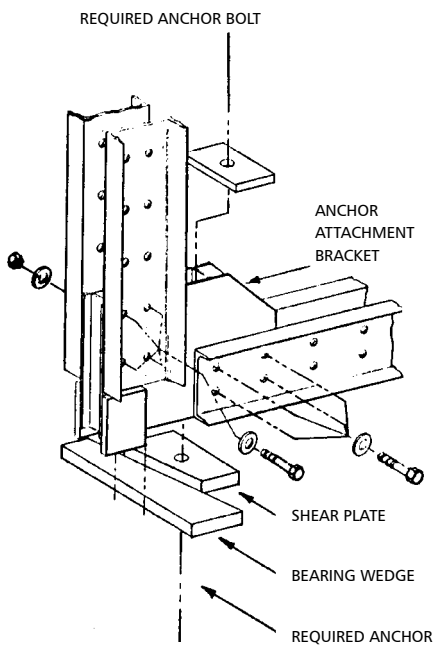
CAUTION: GRADE TO BE SUFFICIENTLY COMPACTED TO WITHSTAND ALL IMPOSED LOADS WITHOUT SETTLEMENT.

(One Sided Wall Forming, continued)

Caution: Align forms with wedges prior to tightening anchor bolts.

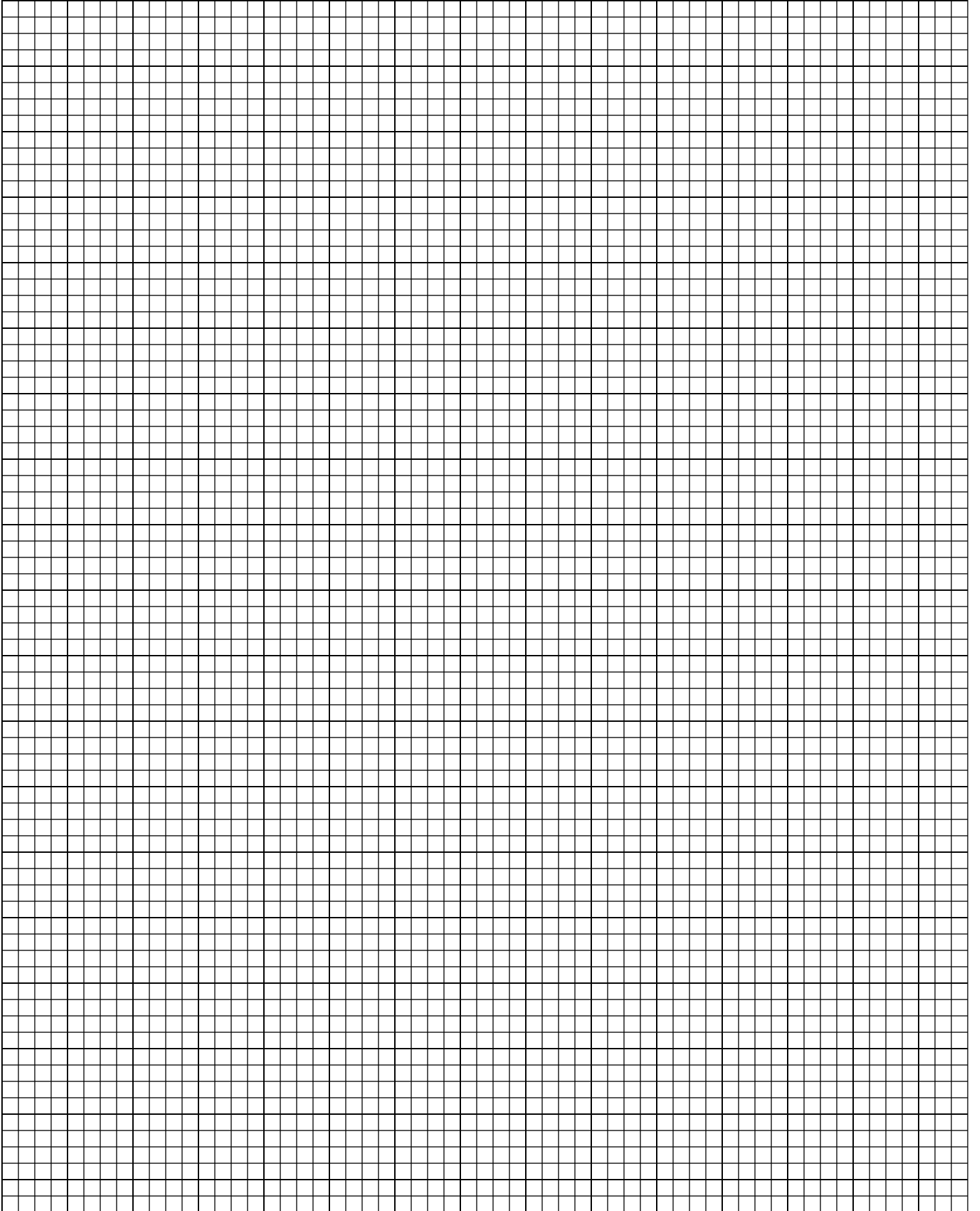


Wedge and Plate Detail



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	<div data-bbox="662 233 1333 327"> WARNING</div> <div data-bbox="586 354 1412 434"><h3>Improper Use of Concrete Accessories Can Cause Severe Injury or Death</h3></div> <div data-bbox="574 436 1427 575"><p>Read, understand and follow the information and instructions in this publication before using any of the Dayton Superior concrete accessories displayed herein. When in doubt about the proper use or installation of any Dayton Superior concrete accessory, immediately contact the nearest Dayton Superior Service Center or Technical Service Department for clarification. See back cover for your nearest location.</p></div>
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Dayton Superior products are intended for use by trained, qualified and experienced workmen only. Misuse or lack of supervision and/or inspection can contribute to serious accidents or deaths. Any application other than those shown in this publication should be carefully tested before use.

The user of Dayton Superior products must evaluate the product application, determine the safe working load and control all field conditions to prevent applications of loads in excess of a product's safe working load. Safety factors shown in this publication are approximate minimum values. The data used to develop safe working loads for products displayed in this publication are a combination of actual testing and/or other industry sources. Recommended safe working loads given for the products in this publication must never be exceeded.

Worn Working Parts

For safety, concrete accessories must be properly used and maintained. Concrete accessories shown in this publication may be subject to wear, overloading, corrosion, deformation, intentional alteration and other factors that may affect the device's performance. All reusable accessories must be inspected regularly by the user to determine if they may be used at the rated safe working load or should be removed from service. The frequency of inspections depends upon factors such as (but not limited to) the amount of use, period of service and environment. It is the responsibility of the user to schedule accessory hardware inspections for wear and remove the hardware from service when wear is noted.

Shop or Field Modification

Welding can compromise a product's safe working load value and cause hazardous situations. Knowledge of materials, heat treating and welding procedures is necessary for proper welding. Consult a local welding supply dealer for assistance in determining required welding procedures.

Since Dayton Superior cannot control workmanship or conditions in which modifications are done, Dayton Superior cannot be responsible for any product altered in the field.

Interchangeability

Many concrete accessory products that Dayton Superior manufactures are designed as part of a system. Dayton Superior strongly discourages efforts to interchange products supplied by other manufacturers with components supplied by Dayton Superior. When used properly, and in accordance with published instructions, Dayton Superior products have proven to be among the best designed and safest in the industry. Used improperly or with incompatible components supplied by other manufacturers, Dayton Superior products or systems may be rendered unsafe.

Installation

WARNING

1. Dayton Superior Corporation products shall be installed and used only as indicated on the Dayton Superior Corporation installation guidelines and training materials.
2. Dayton Superior Corporation products must never be used for a purpose other than the purpose for which they were designed or in a manner that exceeds specific load ratings.
3. All instructions are to be completely followed to ensure proper and safe installation and performance.
4. Any improper misuse, misapplication, installation, or other failure to follow Dayton Superior Corporation's instruction may cause product malfunction, property damage, serious bodily injury and death.

THE CUSTOMER IS RESPONSIBLE FOR THE FOLLOWING:

1. Conformance to all governing codes
2. Use of appropriate industry standard hardware
3. The integrity of structures to which the products are attached, including their capability to safely accept the loads imposed, as evaluated by a qualified engineer.

SAFETY INSTRUCTIONS:

All governing codes and regulations and those required by the job site must be observed. Always use appropriate safety equipment

Design Changes

Dayton Superior reserves the right to change product designs, rated loads and product dimensions at any time without prior notice.

Note: See Safety Notes and Safety Factor Information.



DAYTON SUPERIOR BRANDS

CONCRETE ACCESSORIES

Accubrace®
Aztec®
Bar Lock®
Corewall®
Fleet-Lift™
Swift Lift®
Taper-Lock®

CONSTRUCTION CHEMICALS

Unitex®

FORMING PRODUCTS

Symons®
Max-A-Form®
Steel-Ply®
Sym-Ply®

DAYTON SUPERIOR PRODUCTS

BRIDGE DECK FORMING

Adjustable Joist Hangers
Bridge Overhang Brackets
Haunch and Fillet Forming
Pres-Steel, Coil Rod and Con-Beam
Hangers
Screed Supports

CHEMICALS

Bond Breakers
Cleaners / Strippers
Concrete Repair/Restoration
Curing Compounds / Sealers
Epoxies
Floor Levelers
Form Release Agents
Grout
Hardeners / Industrial Toppings
Liquid Densifiers
Surface Retarders

FORMING AND SHORING

Aluminum Shoring
Ganged Formwork
Garage Beam System
Handset Formwork
Highway Forms
Jump Forms
Modular Deck Shoring
One Sided Frames
Self Spanning Forms
Steel Frame Shoring

FORMLINERS

ABS Plastic
Polystyrene Plastic

PAVING

Dowel Bar Expansion Caps
Dowel Bar Retrofit System
Elastomeric and Hot Pour Joint Seal
Metal Keyway Form Systems
Tie Bar Assemblies
Transverse Bar Assemblies
Welded Dowel Assemblies
Wire Baskets without Dowels

PRECAST

Anchors and Lift Systems
Coil / Ferrule Inserts
Core Plugs
Magnets
Precast Forms
Rustications/Chamfers
Sandwich Panel Connector
Shear Connectors
Slotted Inserts

REBAR SPLICING

Forged Dowel Bar Couplers
Lockshear Bolt Couplers
Shear Resistance Products
Straight Thread Couplers
Taper Thread Couplers

REBAR SUPPORTS

Concrete Dobies
Continuous Plastic and Steel
Bar Supports
Individual Plastic and Steel
Bar Supports
Mesh Chairs
Paving Chairs
Side Form Spacers

TIES AND ACCESSORIES

Modular Form Ties
Single Waler System
Ties and Accessories

TILT-UP

Braces and Brace Anchors
Helical Ground Anchors
Setting Plugs
Strongback System
Tilt-Up Anchors and Lifting Systems

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