Insulated Suspended Structural Slab

Residential
Commercial

- Floor
- Deck
- Roof
- Green Roof

Superior strength, flexibility, safety and value.

www.beaverplastics.com
DISCLAIMER
By using the FORTRUSS Product Manual, in part or in whole, the user accepts the following terms and conditions.

The FORTRUSS Product Manual shall be used for the sole purpose of estimating, design or construction of the FORTRUSS Floor System used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

Beaver Plastics Ltd. reserves the right to make changes to the information provided herein without notice and assumes no liability in connection with the use of this manual including modification, copying or distribution.

The user shall check to ensure that any construction projects utilizing the FORTRUSS Product Manual includes the latest updates/amendments (related to the version of the FORTRUSS Product Manual being used at the time of the construction project). Contact your local Fortruss representative for updates/amendments to the FORTRUSS Product Manual.
TABLE OF CONTENTS

1.1 – INTRODUCING THE FORTRUSS FLOOR SYSTEM . P. 1-5
1.2 – FORTRUSS FLOOR COMPONENTS ....................... P. 1-7
1.3 – APPLICATIONS ...................................................... P. 1-9
1.4 – STRUCTURAL REQUIREMENTS......................... P. 1-11
1.1 – INTRODUCING THE FORTRUSS SYSTEM

Fortruss is a stay-in-place concrete forming system used to create suspended concrete floor and roof slabs for all types of structures, while providing excellent insulation value.

Two components make up the Fortruss; Floor Panels and Beam Forms. The Floor Panels are manufactured with EPS (expanded polystyrene). The Beam Forms are also manufactured with EPS, but wrapped with a sheet metal cladding. This metal cladding provides rigidity to the form system during installation and concrete placement, as well as providing plenty of attachment surfaces for utility installation and underside finishes.

The Floor Panels bridge the gap between the Beam Forms, which are typically spaced at 24 inches on center, and span in one direction.

When assembled the Floor Panels and Beam Forms provide the form work for a suspended insulated concrete slab. The components remain in place to provide superior insulation with a 100 percent thermal break.

The components are available in several size variations allowing engineers and designers the freedom to choose the configuration that best suits their application of various spans and loading conditions.
The structural capabilities when using Fortruss are not provided by the form system. But rather, the concrete and reinforcement placed on the form work becomes a structural one way slab with integral beams.

Some other applications and key features of Fortruss include:

- Compatible with insulated concrete forms, cast-in-place concrete, precast concrete, structural steel, masonry and wood-framed walls.
- Provides a safe working deck for utility and rebar placement prior to concrete placement.
- The Floor Panels and Beam Forms provide excellent insulation, which is ideal for slabs with radiant heat.
- Designed to be light weight, quick and easy to install without the need for heavy equipment or tools, saving costs in labor and construction time.
- Creates a reinforced concrete joist and deck that’s familiar to construction trades, which reduces the learning curve for new installers.
- Contributes to a healthy environment and energy efficient building by providing excellent insulation; EPS and concrete are nontoxic, does not off gas, and provides no nutrient source for mold or pests.

For more information contact techsupport@beaverplastics.com.
There are two principle components to the Fortruss; the Beam and Panel. Both components are available in various sizes allowing a wide range of slab thicknesses and beam depths. (See Section 3, CAD Drawings for Fortruss floor sizes). When assembled the Beam Forms create a floor system with beams spaced at 24 inches on center.

**BEAM COMPONENT**

The Beam Form is available in two depths, 5¾ inches and 11¾ inches, each with 3 inches of EPS thickness in the form bottom.

Five inches of EPS in the Beam Form bottom are also available for the 11¾ inch Beam Forms. Besides adding insulation value, the additional foam thickness below the beam allows for pipe or duct work installations larger than 3 inches to cross the underside of the beams without the need for ceiling drops.
PANEL COMPONENT

The Panel is the second component and is available in four depths and two configurations; the Standard Panel and the Blockout Panel.

The Blockout Panels have additional EPS, which is flush with the bottom of the Beam Form, and can be used for the entire floor, or just at the ends of each beam to close the space between the beam ends and the interior face of the walls. The Blockout Panel also prevents concrete from spilling out between Beam Forms at slab edges.
Another key feature of the Fortruss is having the choice to place concrete in the beam and slab at the same time (monolithic pour) or in two separate operations (two-pour system).

In many cases it’s advantageous to conduct a two-pour system. The first pour consists of filling the Beam Forms up to the top of the Floor Panel. With the structural reinforcement contained primarily in the beam voids it is possible to pour the structural portion of the floor without the slab portion. This allows projects to maintain tight schedules by grouping all work for each trade to a single site visit.

Fortruss installed with ICF or cast-in-place concrete wall systems can benefit from placing concrete in both the wall and floor forms at the same time.

When only the beams need to be placed for structural integrity, projects are not delayed while waiting to schedule trades for rough-in work before concrete placement can be carried out. The EPS deck can be used as a work platform to proceed with building construction once the concrete has been placed in the Beam Forms. This allows multiple floors to be built without subtrades required to rough-in prior to progressing to the next level.

Even with concrete block, precast, steel and wood frame wall systems it can be advantageous to delay concrete placement between the beam and slab. Most suspended concrete slabs have additional floor
coverings such as carpet, tile, hardwood, etc. However, Fortruss is especially suited for decorative concrete finishes. Slabs requiring special finishes can now be placed inside, sheltered from the environment, after subtrade rough-in reducing both placement difficulties and subtrade damage.
1.4 – STRUCTURAL REQUIREMENTS

Engineering is to be reviewed by the project engineer or a third party engineer, including shoring requirements.

Fortruss is a forming system not a structural system. Fortruss provides standard details for reinforcement placement as well as design tables for span limitations at various design loads. Detail drawings for connection of the Fortruss to various wall or support systems are also provided to aid in the installation.

It is the responsibility of the project engineer to decide which details are applicable for each project or provide specific details for each installation. Various drawings are provided in this guide to aid in the design and installation process. Every project must have a licensed engineer design the structural concrete slab and support wall based system on the loads and forces which will be imposed upon it in its end use. Although Fortruss provides generic span tables and connection details it is still the responsibility of the builder to make sure each application has been reviewed and approved by a structural engineer licensed to practice in the jurisdiction of the project.
TABLE OF CONTENTS

2.0 – INSTALLATION GUIDE ........................................... P. 2-3
  2.1 – USEFUL TOOLS & MATERIALS ......................... P. 2-4
  2.2 – PRODUCT HANDLING & PLACEMENT ............. P. 2-5
  2.3 – INSTALLATION ........................................ P. 2-7
  2.3.1 – SHORING ............................................. P. 2-8
  2.3.2 – BEAM FORMS & FLOOR PANELS .......... P. 2-10
    2.3.2.1 – SPLICE CONNECTIONS ................. P. 2-11
  2.3.3 – ICF WALLS .......................................... P. 2-12
    2.3.3.1 – ICF INTERIOR BEARING WALLS ... P. 2-16
  2.3.4 – CAST-IN-PLACE CONCRETE WALLS P. 2-19
  2.3.5 – CONCRETE BLOCK WALLS ................. P. 2-24
  2.3.6 – WOOD AND STEEL STUD WALLS ........ P. 2-28
  2.3.7 – STEEL BEAMS .................................... P. 2-29
  2.3.8 – CONCRETE BEAMS ......................... P. 2-30
  2.3.9 – WOOD BEARING BEAMS ..................... P. 2-32
  2.3.10 – UTILITIES ......................................... P. 2-33
    2.3.10.1 – SERVICE PENETRATIONS .......... P. 2-34
    2.3.10.2 – SERVICE ATTACHMENTS ............ P. 2-35
  2.3.11 – WATERPROOFING ............................ P. 2-36
DISCLAIMER
By using the FORTRUSS Product Manual, in part or in whole, the user accepts the following terms and conditions.

The FORTRUSS Product Manual shall be used for the sole purpose of estimating, design or construction of the FORTRUSS Floor System used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

Beaver Plastics Ltd. reserves the right to make changes to the information provided herein without notice and assumes no liability in connection with the use of this manual including modification, copying or distribution.

The user shall check to ensure that any construction projects utilizing the FORTRUSS Product Manual includes the latest updates/amendments (related to the version of the FORTRUSS Product Manual being used at the time of the construction project). Contact your local Fortruss representative for updates/amendments to the FORTRUSS Product Manual.
The simple design and efficiency of Fortruss offers a number of ways the system can be installed for any type of building. This section outlines recommended basic installation instructions.

Always consult a local licensed engineer to review and approve the design and construction of the Fortruss system.
2.1 – USEFUL TOOLS & MATERIALS

- Drill
- Electric and hand saw
- Screws
- Hot knife
- Step ladder
- Rebar bender/cutter
- Internal vibrator
- Contractor-grade foam gun
- Sheet metal pliers
- Low expansion foam adhesive
- Approved scaffold planks
- Transit or laser
- 48” (1220mm) level
- Bolt cutters
- String line
- Chalk line
- Temporary shoring (safety compliant)
- Rebar chairs and tie wire
2.2 – PRODUCT HANDLING & PLACEMENT

Fortruss is extremely light weight making it easy to handle and place. The thick Panels and metal clad Beam Forms minimizes damage from handling.

Fortruss components are shipped to the building site directly from the factory, or through your local distributor.

Fortruss components arrive on site with:

- Drawing layouts showing component placement
- Engineering details for rebar placement
- Shoring requirements and concrete mix design (shoring requirements should be reviewed and approved by a locally licensed engineer)

In addition, the Beam Forms arrive on site stacked, bundled and wrapped for easy handling.

Unloading Fortruss components can be accomplished by manual lifting or using alternate lifting equipment. The Floor Panels and Beam Forms can be unloaded with 2 people. A 3 person crew is recommended for unloading longer beam lengths of 15 to 20 feet.
When handling Fortruss, it is a good idea to also keep the following in mind:

- Lay the Panels and Beam Forms flat when transporting the floor system components.
- Tie the Fortruss components down during transport to ensure the components are well secured, and avoid damage from strap materials.
- Randomly check the dimensions of a few Panels and beam parts when the components arrive on site. This helps to ensure it meets the required dimensions. However, in the unlikely event that floor components are out of spec, please contact your local Beaver Plastics representative immediately.

Beam Forms are available in common length increments. Refer to the layout provided as multiple short Beam Forms are often cut from longer lengths. Beam Forms can be trimmed to length on site. The use of a thin cut metal abrasive wheel in a hand held angle grinder, or a gas powered abrasive wheel cut off saw are also commonly used. A small framers square and permanent marker is handy for marking beams to be cut.
Installation of Fortruss follows six basic steps:

**STEP 1**: Prepare the wall and/or beams that will be supporting the Fortruss floor.
**STEP 2**: Erect shoring to support the Beam Form.
**STEP 3**: Install the Fortruss Beam Forms.
**STEP 4**: Install the Fortruss Panels.
**STEP 5**: Place reinforcement
**STEP 6**: Pour the concrete

The steps outlined above will vary slightly depending on the structural support system used for Fortruss (i.e., ICF, CMU, convention concrete wall, etc), which is addressed in the following sections of this guide.
2.3.1 – SHORING

The amount of shoring required will depend on the floor span, floor depth, and loading conditions. In general, the following guidelines should be followed.

- Use shoring supports that extend the full width of the Beam Forms. 2 x 6 planks, or wider, are recommended to bear the floor system during the concrete pour.
- When the concrete pour includes both the beam forms and slab, erect shoring at rows not more than 6 feet on center.
- When the concrete pour consists of only the beam forms, erect shoring at rows not more than 12 feet on center.
- Shoring should also be placed where ever Beam Form intersections are located.
- Shoring should remain in place, in most cases, for at least 1 week after concrete curing begins.
- Crews can work on an assembled Fortruss deck before placing concrete, and without shoring, provided the spans are less than 10 feet. Longer spans require temporary shoring in place before crews are allowed to work on the deck.

The shoring pattern used to support Fortruss should be reviewed and approved by a locally licensed engineer.

When only the beams are poured shoring will normally not be required again when the slabs are placed provided the beams have cured fully. This allows plumbers, electricians, mechanical contractors and other subtrades the freedom to do all the rough-in work throughout the
entire building without conflicting with the pour schedule.

Once subtrades complete rough-ins, the slabs can be placed and finished inside where protected from potential weather complications.

Commercially manufactured shoring is available for purchase or rent from most rental outlets, or temporary framed beams and walls can be constructed and dismantled for each project.
2.3.2 – BEAM FORMS & PANELS

Installation of Beam Forms and Panels along the edge of the floor will vary depending on the wall type supporting Fortruss, which is discussed in further sections of this manual.

The following guidelines are common to all construction types using Fortruss.

- Panels sections less than 2 feet should be glued to adjacent Beam Forms and Floor Panels.
- Rain water buildup in Beam Forms can be drained by drilling 1/4 inch holes at 2 feet on center along the under side of Beam Forms.
- Attachments to the underside of the Beam Forms before concrete is placed and set should be avoided to prevent sagging of the beam jackets. Instead, attach to the sides of the Beam Forms if possible, or support the Beam Forms to prevent sagging.
2.3.2.1 – SPLICE CONNECTIONS

Beams forms typically arrive on the job site in 15 to 20 feet lengths. In order for Beam Forms to span longer lengths splice connections are required.

**STEP 1:** Create the splice using the 18 inch long splice connector.

**STEP 2:** Secure the splice connector by fastening screws to the sides of adjoining Beam Form ends. To avoid interference with shoring support and ceiling finishes, avoid fastening screws at the underside of the Beam Forms.
2.3.3 – ICF WALLS

ICF WALLS
Regardless of the ICF system being used, the installation procedure will be the same.

STEP 1: WALL PREPARATION
Preparing the ICF wall will depend on whether the wall terminates or continues above Fortruss

- Cut out sections of the ICF wall where the Beam Forms will sit.

The shape of the removed ICF sections should match the Beam Form to ensure that the Beam Forms fit snugly into the ICF wall. This will help keep the Beam Forms in place, minimize distortion of the ICF, and minimize concrete bleeding between the ICF and Beam Forms during the pour.

Since the beams are spaced at 24 inches on center, it is possible to pre-cut the ICF forms before placing on the wall.

Depending on the building section additional preparation may be required, as noted below.

ICF Walls Continuous above the Slab Level
- Build the ICF wall to a height just above the top of slab. This will help maintain a continuous top edge of both the inside and outside panels of the ICF wall system, which will facilitate building up the ICF after the slab has been poured.
Transition to Different Wall Type
In applications where the walls continue above the floor system into a different wall type (i.e., framed wall on top of slab)

- Trim the ICF interior wall panels down to the level of the Floor Panels to allow the concrete slab to be integral with the ICF wall.
- Use a Taper Top form for the top course to provide additional bearing support for top plate installation.

Roof Deck
In applications where the Fortruss will form a roof deck

- Trim both the interior and exterior ICF panels down to the level of the Floor Panels.

This allows the slab to cover the top of the wall system, and is usually formed with an overhang and drip ledge beyond the finished exterior face of the wall.

STEP 2: BEAM INSTALLATION

- Begin by cutting the beam to length. The total length of the Beam Form is calculated by measuring the clear span from inside face to inside face of concrete wall, and adding an additional 2 inches (the ends of the Beam Forms should sit on the full thickness of the ICF form panels and extend an additional one inch into the concrete wall face).
After the Beam Forms are cut to length, remove the EPS foam in the Beam Form ends that will connect to the ICF wall. Remove at least 1 inch of the EPS from the end of the metal jacket. (The face of the EPS in the Beam Form should be flush with the inside face of the ICF form panels).

Snip the bottom two corners of the beam jacket back 1 inch and bend the cut piece of the metal jacket down to form a lip that will hook on the inside of the ICF EPS form.

This should result with the EPS foam in the Beam Form being flush with the inside of the ICF form panel, and each side of the metal beam jacket projecting 1 inch into the concrete wall cavity.

The bottom of the metal jacket should hook over the ICF form panel preventing concrete from leaking out under the form as well as keeping the Beam Form stable on the ICF wall.

**STEP 3: SHORING INSTALLATION**
See Section 2.3.1 for shoring installation.

**STEP 4: PANEL INSTALLATION**
- Place the Panels between the Beam Forms.

This will create the deck on which the concrete will be placed forming the slab.
STEP 5: REBAR PLACEMENT

- Place the reinforcement for beam and slabs, as required by design.

- Place 90 degree bent bars in the wall system to tie into Fortruss either by wet-setting, or drill and epoxy if dry-setting.

Reinforcement for Fortruss should be reviewed and approved by a locally licensed engineer.

STEP 6: CONCRETE PLACEMENT

Placing concrete can be done Monolithic with the floor beams and slabs, or done as two separate pours.

Depending on the pour sequence, the amount of shoring and rebar must be checked by a locally licensed engineer to ensure adequate shoring and dowels are used.

Slabs in areas where potential water seepage to the space below is a concern will need to be water proofed. Several methods of creating a water barrier are discussed in Section 2.3.11.
STEP 1: WALL PREPARATION

Install Fortruss as described in the previous section.

Interior ICF bearing walls can be built to support Fortruss from both sides of the wall.

If the bearing wall does not continue above Fortruss, the ICF bearing wall can be formed to the height of the bottom of the Beam Forms. This minimizes the amount of cutting in the ICF wall.

STEP 2: BEAM INSTALLATION

- Cut the beam to length and prepare each end by removing the EPS in the beam back 1 inch from the end of the metal jacket.
- Snip the bottom two corners of the beam jacket back 1 inch and bend the cut piece of the metal jacket down to form a lip that will hook on the inside of the ICF EPS form.

This should result with the EPS foam in the Beam Form being flush with the inside of the ICF form panel, and each side of the metal beam jacket projecting 1 inch into the concrete wall cavity.

The bottom of the metal jacket should hook over the ICF form panel preventing concrete from leaking out under the form as well as keeping the Beam Form stable on the ICF wall.

- Place the Beam Forms such that the Beam Forms will sit in line on both sides of the ICF wall. This will allow the steel and panels to ‘run through’ over the wall.
STEP 3: SHORING INSTALLATION
See Section 2.3.1 for shoring installation.

STEP 4: FLOOR PANEL INSTALLATION
- Place the Floor Panels between the Beam Forms.

This will create the deck on which the concrete will be placed forming the slab.

If the top of the ICF wall is flush with the underside of the Beam Forms then the Floor Panels can be conveniently installed directly on the ICF bearing wall.

STEP 5: REBAR PLACEMENT
- Place the reinforcement for beam and slabs, as required by design.
- Place 90 degree bent bars in the wall system to tie into Fortruss either by tying, wet-setting, or drill and epoxy if dry-setting.

Reinforcement for Fortruss should be reviewed and approved by a locally licensed engineer.

STEP 6: CONCRETE PLACEMENT
Placing concrete can be done Monolithic with the floor beams and slabs, or done as two separate pours.

Depending on the pour sequence, the amount of shoring and rebar must be checked by a locally licensed engineer to ensure adequate shoring is used.
From the top of the floor deck the bearing wall will be open through the space between the beam ends for 10” wide by the core width of the wall. When placing concrete pour though each space until concrete is up to the next beam opening this will eliminate any possible concrete voids between the beams at the top of the ICF bearing wall.

Prior to placing concrete install sleeves through the ICF wall between the Beam Forms to accommodate mechanical or electrical runs.
Fortruss can be used with conventional cast-in-place concrete walls. Installation of Fortruss will depend whether the walls will be poured monolithically with Fortruss, or as two separate pours. And if the walls will terminate or continue above Fortruss.

**STEP 1: WALL PREPARATION**

**Walls Poured Monolithic with Fortruss**

Typically, the ends of the Beam Forms are supported on top of one side of the wall form. As a result, the side of the wall form that supports the Beam Forms will be shorter than the opposite side of the wall form by at least the depth of the Fortruss form work and slab thickness.

- Provide a lumber ledger along the top edge of the form work to provide addition bearing support for the Beam Forms.

This is typically required if plywood wall forms are used. Forms with edge frames require no additional bearing support for the Beam Forms to rest on.

The exterior wall form must be rigid enough to prevent excessive deflection during concrete placement. Bracing can be added to prevent this from happening.

**Walls Poured Prior to Fortruss Installation**

When cast-in-place walls are completed before Fortruss is installed, the Fortruss will need to sit on top of the concrete wall, or into a ledge formed in the concrete wall.
Fortruss Installed on Ledge Formed in Concrete Wall

- Create a ledge or corbel in the concrete wall to support the Fortruss beam ends.

A minimum 3 inch bearing ledge is required, but will depend upon the span and the loads imposed upon the slab. However, a 4 inch ledge is easier to work with and will take greater loads from the connected slab.

Fortruss installed on Top of Wall

- Install temporary forms around the exterior perimeter of the walls. This will act as formwork for the edge of the slab.

Walls Continuous above the Slab Level
in cases where the concrete wall above and below the floor depth is the same width, and Fortruss is installed into a blocked out ledge, the height of the block out should be a minimum of 6 inches for the Beam Forms to fit without modification, and a maximum height equal to the total depth of the beams, Panels and slab.

Walls Continuous above the Slab Level
If the concrete wall is to continue above the Fortruss deck then both sides of the wall form will be in place as below the Fortruss forms minimizing top of wall deflection.
STEP 2: BEAM INSTALLATION
Installing the Beam Forms will depend on whether the walls will be poured monolithically with Fortruss, or as two separate pours.

Walls Poured Monolithic with Fortruss
- Install the beams as outlined in Step 2 for ICF wall installation.

Walls Poured Prior to Fortruss Installation
If the walls are prepared such that a concrete ledge in the wall is provided to bear the beam ends

- cut the beam end to fit snug against walls on top of the ledge.
- remove the EPS and metal jacket along the bottom of the beam to provide full bearing contact between the ledge and underside of the beam. Be sure to cut back the EPS at a 45 degree angle.

STEP 3: SHORING INSTALLATION
See Section 2.3.1 for shoring installation.

STEP 4: PANEL INSTALLATION
- Place the Panels between the Beam Forms. This will create the deck on which the concrete will be placed forming the slab.
- Install Panel Blockouts or glue in blockouts where the wall meets the floor, if the walls are poured Monolithic with Fortruss. This will block out the area between the Beam Forms and the underside of the Panels.
2.3.4 – CAST-IN-PLACE CONCRETE WALLS
CONTINUED

Walls Poured Prior to Fortruss Installation
If the walls are prepared such that a concrete ledge in the wall is provided to bear the beam ends, Panel Blockouts are not required.

STEP 5: REBAR PLACEMENT
• Place the reinforcement for beam and slabs, as required by design.
• Place 90 degree bent bars in the wall system to tie into Fortruss either by wet-setting, or drill and epoxy if dry-setting.

Reinforcement for Fortruss should be reviewed and approved by a locally licensed engineer.

STEP 6: CONCRETE PLACEMENT
Placing concrete can be done monolithic with the walls, floor beams and slabs, or done as separate pours.

Depending on the pour sequence, the amount of shoring and rebar must be checked by a locally licensed engineer to ensure adequate shoring and dowels are used.

When concrete is placed, the wall forms should be filled to the top first allowing concrete to run into the beam ends before the beams voids are filled. This will minimize the pressure against the wall forms when the beams are poured.
ADDITIONAL NOTES
The following additional notes should be considered during installation:

- Minimum spacing of 4 inches between the end of Fortruss and the exterior wall will help prevent the beam or Panel components from breaking through the exterior wall surface and becoming exposed.

- When Blockout Panels are used chamfer the Panels back at 45 degrees to provide better load distribution from the floor to the wall.

- Vertical rebar dowels placed when the walls were poured, or drilled into the top of the wall, and bent into Fortruss is required to tie the wall to the floor system.
Fortruss can be used with concrete block walls. Installation of Fortruss will depend whether the walls will be poured monolithically with Fortruss, or as two separate pours. And if the walls will terminate or continue above Fortruss.

**STEP 1: WALL PREPARATION**

**Block Walls Poured Monolithic with Fortruss**

Fortruss Beam Forms are normally set into pockets cut in the concrete block. This works especially well when the block is to continue above the top of the Fortruss slab.

**Fortruss installed on top of Wall**

When concrete block walls are completed before Fortruss is installed Fortruss will need to sit on top of the concrete block.

- Place temporary forms around the exterior perimeter of the walls to increase the wall height to the top of the floor slab and maintain concrete on the exterior face of the wall.

**Roof Deck**

In applications where Fortruss will form a roof deck the slab will extend to the outside perimeter of the block walls.
STEP 2: BEAM INSTALLATION

Fortruss Installed on Top of Wall

- Place the Beam Form component on the concrete block wall at least the required bearing width.
- Chamfer the EPS material in the bottom of the beam end at 45 degrees to provide proper bearing on the wall.
- Provide a minimum 4 inch space between the end of the beams and the exterior face of wall. This will prevent the Beam Forms or Floor Panels from breaking through the exterior wall surface and becoming exposed.

Walls Continuous above the Slab Level

The inside face of the concrete block is only removed where the Beam Forms will connect to the wall.

- Cut the beam to length adding the thickness of the concrete block wall plus 1 inch.
- Snip the bottom two corners of the beam jacket back 1 inch and bend the cut piece of the metal jacket down to form a lip that will hook on the inside of the block wall.

This should result with the EPS foam in the beam form being flush with the inside face of the block wall, or chamfered, and each side of the metal beam jacket projecting 1 inch into the block wall cavity.

The bottom of the metal jacket should hook over the block wall preventing concrete from leaking out under the form as well as keeping the Beam Form stable on the wall.
STEP 3: SHORING INSTALLATION
Shoring requirements will differ depending if Fortruss will be poured together with the block walls or after the block walls are poured and set.

- Place additional shoring close to the concrete block walls to prevent the weight of the concrete in the beams from breaking portions of the concrete block.
- The shoring adjacent to the concrete block walls can be removed within 24 hours once the concrete between the block cores and Beam Forms has set.
- Maintain intermediate shoring until sufficient strength has developed.

See Section 2.3.1 for shoring installation.

STEP 4: PANEL INSTALLATION
- Place the Panels between the Beam Forms.

This will create the deck on which the concrete will be placed forming the slab.

Walls Continuous above the Slab Level
Place the Panels tight to the inside face of the concrete block when the concrete block wall continues up above the top of slab.

Fortruss Installed on Top of Wall
Blockout Panels are best used at the beam ends to close the space between beams below the Panels.
When Blockout Panels are used chamfer the Panels back at 45 degrees to provide better load distribution from the floor to the wall.

**STEP 5: REBAR PLACEMENT**

- Place the reinforcement for beam and slabs, as required by design.
- Place 90 degree bent bars in the wall system to tie into Fortruss either by wet-setting, or drill and epoxy if dry-setting.

Reinforcement for Fortruss should be reviewed and approved by a locally licensed engineer.

**STEP 6: CONCRETE PLACEMENT**

Placing concrete can be done Monolithic with the walls, floor beams and slabs, or done as separate pours.

Depending on the pour sequence, the amount of shoring and rebar must be checked by a locally licensed engineer to ensure adequate shoring and dowels are used.

- When concrete is placed, the concrete block wall cavities should be filled to the top first allowing concrete to run into the beam ends before the Beam Form voids are filled.

Slabs in areas where potential water seepage to the space below is a concern will need to be water proofed. Several methods of creating a water barrier are discussed in Section 2.3.11.
2.3.6 – WOOD AND STEEL STUD WALLS

Although, wood and steel stud framed walls can be designed to support a suspended slab, they offer little in way of fire resistance contributing to premature structural failure in the event of a fire.

Wood or steel stud framed walls are best used only as partition of curtain walls not required to carry structural loads.

When wood stud frame wall systems are used concrete must not come in direct contact with wood. Whether stud frame walls are used as a mid-span support where the Fortruss beams and Floor Panels run through unbroken above or for perimeter bearing walls, the only requirement is to remove the EPS in the bottom of the beam for the width of the bearing surface sloping up away from bearing at 45 degrees. EPS must be removed to transfer loads from the floor system to the beam.

The use of a wood is subject to dimensional shrinkage and decay is not recommended for permanent support of a suspended concrete slab.
2.3.7 – STEEL BEAMS

Many different steel sections and connection details can be used with Fortruss, and will depend on the design and construction.

Steel beam sections should be designed and approved by a locally licensed structural engineer.

**FORTRUS BEARING ON TOP OF STEEL BEAM**

When the Fortruss beams are continuous over the steel beam support shoring and the Fortruss floor components are installed as normal.

- In the bearing area of the steel beam remove the EPS in the bottom of the Beam Forms to provide a proper bearing surface.

**Flush Beams**

Where the steel beam is installed as a flush beam at the edge of the slab, around a slab opening, or to eliminate a dropped beam below the slab, steel profiles with a vertical web and flanges are used.

- Install the Fortruss beams such that the beam end is fit snug and flush against the steel beam.
Using traditional formwork, cast-in-place concrete beams can be built to support Fortruss floors with long spans, or where edge beams are required.

Cast-in-place beams built flush to the underside of the Beam Forms will maintain a constant ceiling height. In this case, cast-in-place beams will be deeper than the Fortruss beams 3 or 5 inches depending on the thickness of the underside of the Beam Forms. As a result, steel conflict between the floor and edge beams will be minimal.

However, the size of the cast-in-place beam can vary depending on the floor spans, and loading conditions. Below are typical installation methods.

**CAST-IN-PLACE EDGE BEAMS**

- Form the underside of the edge beam with lengths of 2x8 or 2x10 lumber.
- Rest the ends of the Fortruss Beam Forms on the lumber and screw the lumber to the Fortruss Beam Form to keep it in place.

This will make the underside of both the edge beam and Fortruss Beam Forms flush. A screw is installed up through the lumber form into the metal jacket of the Beam Form to hold it in place. Use a screw at least 2.5 inches long to ensure it penetrates into the Beam Form by at least 1 inch.

- Use ply form, or Blockout Panels, to fill the space between the Fortruss Beam Forms.
- Use ply form to form the opposite side of edge beams. The ply form must be braced for added support.
If the slab is placed at the same time as the beams it is easy to form an offset in the outside ply form to create an overhanging slab and drip ledge. This can also be formed onto the concrete edge beam after temporary forms have been removed before the slab is placed. The same temporary form work can be constructed around openings or cantilevers to support and strengthen the suspended slab.

**FLUSH BEAMS WITHIN FLOOR SPAN**

- Use a 2 x 8, 2 x 10, or 2 x 12 length of lumber (depending on the size of the beam) to form the under side of the flush beam.
- Rest the ends of the Fortruss Beam Form on opposite sides of the both sides of the lumber, and screw the lumber to the underside of the Fortruss Beam Forms to hold it in place.
- Install the Floor Panels flush with the Beam Form ends.
- Use ply form, or Blockout Panels, to fill the space between the Fortruss Beam Form components.
- Install the reinforcement for the edge and floor beams, as required by design.

Sleeves can be installed to allow pentrations through flush beams where mechanical or electrical runs may be required. The sleeves should be located at mid-hieght of flush beams, and should only be placed based on engineering review and approval.
The use of treated lumber or engineered wood beams for mid-span support is possible. However, wood beams should not come in direct contact with concrete, or where moisture can be trapped between the wood and concrete.

In most applications, wood beams would be used only to support Fortruss floors with long spans, and where the Fortruss beams are bearing on the wood beam.

- Remove the EPS in the bottom of the beam component to provide a proper bearing surface.
Service penetrations and attachments can be easily accommodated.

Typically, the foam thickness of the Beam Forms and Floor Panels are thick enough to accommodate service penetrations and attachments that won’t run through the concrete itself, or compromise floor to ceiling clearances.
2.3.10.1 – SERVICE PENETRATIONS

Penetrations can be created using a hole saw to cut through the metal jacket. A plumbing pipe used as a hand drill can be used to cut a hole through the foam material.

- When making a penetration through the Beam Forms, cut a hole slightly larger than the hole cut through the foam material. This will prevent the metal jacket from damaging pipes.
- Beam Forms with thicker form bottoms can be used to accommodate larger service penetrations.
The metal jacket of the Beam Forms provide ample attachment for drywall, lighting and other fixtures.

- The space between the Beam Forms provide ample clearance for service utilities without compromising ceiling height. Shallow light fixtures can also be installed to the underside of the Beam Forms.
- Fixtures can be mounted directly to the Beam Forms.
- Air vents and other service pipes can be strapped directly to the Beam Forms.
- Wiring can be stapled directly to the underside of the Floor Panels with EPS pex staples.
- Metal wall studs cut to size, can bridge across Beam Forms to help support service pipes.
Waterproofing may be required for slabs exposed to potentially wet conditions such as suspended garage slabs.

A waterproof sealer is a common approach to treating suspended slabs. There are many products that can do the job, and application of the sealer should be based on the manufacturer’s instructions.

Generally, the surface of the concrete slab must be clean and free of debris before applying the sealer. In addition, the slab should be sloped, and drainage installed to direct water away.

For more information contact your local Beave Plastics representative.
TABLE OF CONTENTS

3.1 – FORTRUSS COMPONENTS ..................................................... P. 3-3
  3.1.1 - BEAM FORMS ............................................................ P. 3-3
  3.1.2 - FLOOR PANELS ......................................................... P. 3-4
  3.1.3 - TRIPLE CHAIR STIRRUP ............................................ P. 3-5
3.2 - FORTRUSS FLOOR SECTIONS ........................................... P. 3-7
3.3 - INSULATING CONCRETE FORM WALLS ............................ P. 3-14
3.4 - CAST-IN-PLACE BEAMS .................................................. P. 3-17
3.5 - STEEL BEAM ................................................................. P. 3-20
3.6 - ENGINEERED WOOD BEAM .......................................... P. 3-23
**DISCLAIMER**

By using the FORTRUSS Product Manual, in part or in whole, the user accepts the following terms and conditions.

The FORTRUSS Product Manual shall be used for the sole purpose of estimating, design or construction of the FORTRUSS System used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

Beaver Plastics Ltd. reserves the right to make changes to the information provided herein without notice and assumes no liability in connection with the use of this manual including modification, copying or distribution.

The user shall check to ensure that any construction projects utilizing the FORTRUSS Product Manual includes the latest updates/amendments (related to the version of the FORTRUSS Product Manual being used at the time of the construction project). Contact your local Fortruss representative for updates/amendments to the FORTRUSS Product Manual.
3.1 – FORTRUSS COMPONENTS
3.1.1 - BEAM FORMS

STANDARD BEAM

DEEP BEAM & THICK BOTTOM DEEP BEAM
3.1.2 - FORTRUSS PANELS

PANEL TYPE A

PANEL TYPE B

PANEL TYPE C

PANEL TYPE D

BLOCKOUT PANELS

Type A - Standard

Type B - Standard

Type C - Standard

Type D - Standard

Standard Blockout

Deep Blockout
3.1.3 - TRIPLE CHAIR STIRRUP

Patent Pending

TRIPLE STIRRUP CHAIR
See next page for dimensions

Rebar

Beam Form

Triple Chair Stirrup
The Fortruss Triple Chair has been designed to be used with the Fortruss forming system. Sizes are available for each panel and beam combination. The Triple Chair is used to support bottom and top bar reinforcement and maintain proper reinforcement clearance and concrete cover. The top bar when in place also provides support for slab reinforcement.

Designs where shear reinforcement is required the Triple Chair provides this required reinforcement. Each size is made to self space to the code required spacing by butting the base legs together in the beam form. This spacing is max 1/2 the depth of the beam from the top of the slab to the center of the bottom bar. As the beam depths increase the base legs get longer to space the Triple Chairs further apart.

The Triple Chair also provides extended top bar hooks which provide the required mechanical lock between beam and slab when engineered as a composite slab. The spacing of the Triple Chair shall be determined by the project engineer when used for composite slab interlock.

The Triple chair is not to be used where form work is to be removed. The base legs rely on the stay in place form work of the Fortruss system to provide minimum protection from environmental exposure.

The bottom bar chairs meet the code requirements of a hook to contain the bottom bars when tension forces are transferred to the shear reinforcement. The top bar chair does not require a hook as forces in the beam cannot cause upward tension on this bar. However the top legs of the Triple Chair do have hooks to keep the legs from pulling free of the concrete when in tension.

Contact Fortruss for available Triple Chair sizes or additional information.

This product has been designed to meet or exceed requirements of the following codes;

- AC1318-08
- CSA A23.3-04
- AS 3600
The following table lists the various depths achievable using Fortruss, along with corresponding floor sections.

<table>
<thead>
<tr>
<th>BEAM DEPTH, in</th>
<th>FLOOR DEPTH (minus slab thickness), in</th>
<th>BEAM FORM TYPE</th>
<th>FLOOR PANEL TYPE</th>
<th>SEE FIGURE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>11.5</td>
<td>Standard</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>9.875</td>
<td>12.875</td>
<td>Standard</td>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>12.25</td>
<td>15.25</td>
<td>Standard</td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>12.5</td>
<td>17.5</td>
<td>Deep Thick Bottom</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>13.875</td>
<td>18.875</td>
<td>Deep Thick Bottom</td>
<td>B</td>
<td>5</td>
</tr>
<tr>
<td>14.5</td>
<td>17.5</td>
<td>Deep</td>
<td>A</td>
<td>6</td>
</tr>
<tr>
<td>15.875</td>
<td>18.875</td>
<td>Deep</td>
<td>B</td>
<td>7</td>
</tr>
<tr>
<td>16.25</td>
<td>21.25</td>
<td>Deep Thick Bottom</td>
<td>C</td>
<td>8</td>
</tr>
<tr>
<td>17</td>
<td>20</td>
<td>Standard</td>
<td>D</td>
<td>9</td>
</tr>
<tr>
<td>18.25</td>
<td>21.25</td>
<td>Deep</td>
<td>C</td>
<td>10</td>
</tr>
<tr>
<td>21</td>
<td>26</td>
<td>Deep Thick Bottom</td>
<td>D</td>
<td>11</td>
</tr>
<tr>
<td>23</td>
<td>26</td>
<td>Deep</td>
<td>D</td>
<td>12</td>
</tr>
</tbody>
</table>
Beam Form Type: STANDARD
Floor Panel Type: A

FIGURE 1

Beam Form Type: STANDARD
Floor Panel Type: B

FIGURE 2
Beam Form Type: STANDARD
Floor Panel Type: C

FIGURE 3

Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: A

FIGURE 4
3.2 - FORTRUSS SECTIONS CONTINUED

Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: B

FIGURE 5

Beam Form Type: DEEP
Floor Panel Type: A

FIGURE 6
3.2 - FORTRUSS SECTIONS CONTINUED

Beam Form Type: DEEP
Floor Panel Type: B

FIGURE 7

Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: C

FIGURE 8
Beam Form Type: STANDARD
Floor Panel Type: D

FIGURE 9

Beam Form Type: DEEP
Floor Panel Type: C

FIGURE 10
Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: D

FIGURE 11

Beam Form Type: DEEP
Floor Panel Type: D

FIGURE 12
3.3 - INSULATING CONCRETE FORM WALLS

SECTION THROUGH BEAM & FLOOR PANELS
(NON-BEARING END):

SECTION THROUGH BEAM (BEARING END):

SECTION THROUGH FLOOR PANEL (BEARING END):

NOTES:
1. ICF wall panels can be left in place at slab level, or removed to make slab integral with wall.
2. Cut into ICF wall panels to accommodate beam depth and beam form. ICF wall panels can remain in place at slab level.
3. Keep webs intact whenever possible.
4. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.3 - INSULATING CONCRETE FORM WALLS

CONTINUED

SECTION THROUGH BEAM & FLOOR PANELS

(NON-BEARING END)

SECTION THROUGH BEAM (BEARING END)

SECTION THROUGH FLOOR PANEL (BEARING END)

NOTES:
1. Keep webs intact whenever possible.
2. Cut into ICF wall panels to accommodate beam depth and beam form. ICF wall panels can remain in place at slab level.
3. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.3 - INSULATING CONCRETE FORM WALLS
CONTINUED

SECTION THROUGH BEAM & FLOOR PANELS (NON-BEARING END)

SECTION THROUGH BEAM (BEARING END)

SECTION THROUGH FLOOR PANEL (BEARING END)

NOTES:
1. Keep webs intact whenever possible.
2. Cut into ICF wall panels to accommodate beam depth and beam form. ICF wall panels can remain in place at slab level.
3. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.4 - CAST-IN-PLACE BEAMS

SECTION THROUGH BEAM & FLOOR PANELS
(NON-BEARING END)

SECTION THROUGH BEAM (BEARING END)

SECTION THROUGH FLOOR PANEL (BEARING END)

NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.4 - CAST-IN-PLACE BEAMS CONTINUED

SECTION THROUGH BEAM (BEARING END)

SECTION THROUGH FLOOR PANELS (BEARING END)

NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer’s specifications.
NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.5 - STEEL BEAM CONTINUED

SECTION THROUGH BEAM (BEARING END):

3" or 5" foam thickness at bottom of beam form

SECTION THROUGH FLOOR PANELS (BEARING END):

3" or 5" foam thickness at bottom of beam form

NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.10 - ICF INTERIOR WALL (NON-BEARING END)

**FLOOR PANEL SUPPORTED ON ICF WALL**

**FLOOR PANEL BUTTING AGAINST ICF WALL**

**NOTES:**

1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer’s specifications.
3.12 - CMU CONTINUOUS ABOVE FORTRUSS

SECTION THROUGH BEAM & FLOOR PANEL (NON-BEARING END)

SECTION THROUGH BEAM (BEARING END)

SECTION THROUGH FLOOR PANEL (BEARING END)

NOTES:
1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
3.13 - CMU INTERIOR WALL

INTERIOR CMU - NON-BEARING END

SECTION THROUGH FLOOR PANEL (BEARING END)

SECTION THROUGH BEAM (BEARING END)

NOTES:

1. Reinforcement for ICF walls and Fortruss Floor system to follow engineer's specifications.
TABLE OF CONTENTS

4.1 – FORTRUSS COMPONENTS................................. P. 4-3
  4.1.1 - BEAM FORMS .......................................... P. 4-3
  4.1.2 - PANELS .................................................. P. 4-4
  4.1.3 - TRIPLE CHAIR STIRRUP ................................ P. 4-5
4.2 - FORTRUSS SECTIONS ................................. P. 4-7
  TABLE 1: FORTRUSS FLOOR SIZES ......................... P. 4-7
4.3 - SPAN TABLES - U.S.A........................................ P. 4-15
  TABLE 2: BUILDING USE FOR SPAN TABLES.......... P. 4-15
  4.3.1 - TABLE 3 ................................................. P. 4-18
  4.3.2 - TABLE 4 ................................................ P. 4-19
  4.3.3 - TABLE 5 ................................................ P. 4-20
  4.3.4 - TABLE 6 ................................................ P. 4-21
  4.3.5 - NOTES FOR SPAN TABLES ...................... P. 4-22
  4.3.6 - SECTION PROPERTIES .......................... P. 4-23
  4.3.7 - TABLE 7: STEEL REINFORCEMENT
            INFORMATION ........................................ P. 4-24
4.4 - SPAN TABLES - CANADA.............................. P. 4-25
  TABLE 8: BUILDING USE FOR SPAN TABLES.......... P. 4-25
  4.4.1 - TABLE 9 ................................................. P. 4-27
  4.4.2 - TABLE 10 ............................................. P. 4-28
  4.4.3 - TABLE 11 ............................................. P. 4-29
  4.4.4 - TABLE 12 ............................................. P. 4-30
  4.4.5 - NOTES FOR SPAN TABLES ...................... P. 4-31
  4.4.6 - SECTION PROPERTIES .......................... P. 4-32
  4.4.7 - TABLE 13: STEEL REINFORCEMENT
            INFORMATION ........................................ P. 4-33
DISCLAIMER
By using the FORTRUSS Product Manual, in part or in whole, the user accepts the following terms and conditions.

The FORTRUSS Product Manual shall be used for the sole purpose of estimating, design or construction of the FORTRUSS System used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

Beaver Plastics Ltd. reserves the right to make changes to the information provided herein without notice and assumes no liability in connection with the use of this manual including modification, copying or distribution.

The user shall check to ensure that any construction projects utilizing the FORTRUSS Product Manual includes the latest updates/amendments (related to the version of the FORTRUSS Product Manual being used at the time of the construction project). Contact your local Fortruss representative for updates/amendments to the FORTRUSS Product Manual.
4.1 – FORTRUSS COMPONENTS
4.1.1 - BEAM FORMS

STANDARD BEAM

DEEP BEAM & THICK BOTTOM DEEP BEAM
### PANEL TYPE A

- Standard Blockout

### PANEL TYPE B

- Standard Blockout

### PANEL TYPE C

- Standard Blockout

### PANEL TYPE D

- Standard Blockout

### BLOCKOUT PANELS

- Standard Blockout
- Deep Blockout
4.1.3 - TRIPLE CHAIR STIRRUP

TRIPLE STIRRUP CHAIR
See next page for dimensions

Rebar

Beam Form

Triple Chair Stirrup

Fortruss. Performance forming with EPS

www.beaverplastics.com
The Fortruss Triple Chair has been designed to be used with the Fortruss forming system. Sizes are available for each panel and beam combination. The Triple Chair is used to support bottom and top bar reinforcement and maintain proper reinforcement clearance and concrete cover. The top bar when in place also provides support for slab reinforcement.

Designs where shear reinforcement is required the Triple Chair provides this required reinforcement. Each size is made to self space to the code required spacing by butting the base legs together in the beam form. This spacing is max 1/2 the depth of the beam from the top of the slab to the center of the bottom bar. As the beam depths increase the base legs get longer to space the Triple Chairs further apart.

The Triple Chair also provides extended top bar hooks which provide the required mechanical lock between beam and slab when engineered as a composite slab. The spacing of the Triple Chair shall be determined by the project engineer when used for composite slab interlock.

The Triple chair is not to be used where form work is to be removed. The base legs rely on the stay in place form work of the Fortruss system to provide minimum protection from environmental exposure.

The bottom bar chairs meet the code requirements of a hook to contain the bottom bars when tension forces are transferred to the shear reinforcement. The top bar chair does not require a hook as forces in the beam cannot cause upward tension on this bar. However the top legs of the Triple Chair do have hooks to keep the legs from pulling free of the concrete when in tension.

Contact Fortruss for available Triple Chair sizes or additional information.

This product has been designed to meet or exceed requirements of the following codes;

AC1318-08
CSA A23.3-04
AS 3600
The following table lists the various depths achievable using Fortruss, along with corresponding floor sections.

### TABLE 1: FORTRUSS FLOOR SIZES

<table>
<thead>
<tr>
<th>JOIST DEPTH, in</th>
<th>FLOOR DEPTH (minus slab thickness), in</th>
<th>BEAM FORM TYPE</th>
<th>FLOOR PANEL TYPE</th>
<th>SEE FIGURE NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>11.5</td>
<td>Standard</td>
<td>A</td>
<td>1</td>
</tr>
<tr>
<td>9.875</td>
<td>12.875</td>
<td>Standard</td>
<td>B</td>
<td>2</td>
</tr>
<tr>
<td>12.25</td>
<td>15.25</td>
<td>Standard</td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>12.5</td>
<td>17.5</td>
<td>Deep Thick Bottom</td>
<td>A</td>
<td>4</td>
</tr>
<tr>
<td>13.875</td>
<td>18.875</td>
<td>Deep Thick Bottom</td>
<td>B</td>
<td>5</td>
</tr>
<tr>
<td>14.5</td>
<td>17.5</td>
<td>Deep</td>
<td>A</td>
<td>6</td>
</tr>
<tr>
<td>15.875</td>
<td>18.875</td>
<td>Deep</td>
<td>B</td>
<td>7</td>
</tr>
<tr>
<td>16.25</td>
<td>21.25</td>
<td>Deep Thick Bottom</td>
<td>C</td>
<td>8</td>
</tr>
<tr>
<td>17</td>
<td>20</td>
<td>Standard</td>
<td>D</td>
<td>9</td>
</tr>
<tr>
<td>18.25</td>
<td>21.25</td>
<td>Deep</td>
<td>C</td>
<td>10</td>
</tr>
<tr>
<td>21</td>
<td>26</td>
<td>Deep Thick Bottom</td>
<td>D</td>
<td>11</td>
</tr>
<tr>
<td>23</td>
<td>26</td>
<td>Deep</td>
<td>D</td>
<td>12</td>
</tr>
</tbody>
</table>
Beam Form Type: STANDARD
Floor Panel Type: A

FIGURE 1

Beam Form Type: STANDARD
Floor Panel Type: B

FIGURE 2
Beam Form Type: STANDARD
Floor Panel Type: C

FIGURE 3

Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: A

FIGURE 4
Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: B

FIGURE 5

Beam Form Type: DEEP
Floor Panel Type: A

FIGURE 6
Beam Form Type: DEEP
Floor Panel Type: B

FIGURE 7

Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: C

FIGURE 8
4.2 - FORTRUSS SECTIONS CONTINUED

Beam Form Type: STANDARD
Floor Panel Type: D

FIGURE 9

Beam Form Type: DEEP
Floor Panel Type: C

FIGURE 10
Beam Form Type: DEEP THICK BOTTOM
Floor Panel Type: D

Figure 11

Beam Form Type: DEEP
Floor Panel Type: D

Figure 12
The following span tables are grouped into loading conditions suitable for certain building use, and are based on the loads provided in Table R301.5 of the International Residential Code 2006.

**TABLE 2: BUILDING USE FOR SPAN TABLES**

<table>
<thead>
<tr>
<th>Table</th>
<th>Live Load, psf</th>
<th>Building Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>20</td>
<td>Attics with storage</td>
</tr>
<tr>
<td>4</td>
<td>40</td>
<td>Decks</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sleeping room</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rooms other than sleeping rooms</td>
</tr>
<tr>
<td>5</td>
<td>60</td>
<td>Exterior balconies</td>
</tr>
<tr>
<td>6</td>
<td>50 + 2000 lb point load</td>
<td>Passenger vehicle garages</td>
</tr>
</tbody>
</table>

Dead loads are based on self weight plus a superimposed dead load of 10 psf.

Slab thicknesses for the span tables include 2.5, 3, 3.5 and 4 inches. Due to the heavier loading conditions, the table for passenger vehicle garages, Table 5, only considers 4 inch slabs.

**USING THE SPAN TABLES**
The span tables provide minimum area of reinforcement for the bottom beam steel for various span and loading conditions. The span tables are grouped into the following categories:

- Depth of Concrete Section - main span table listing area of reinforcement for bottom beam (or joist) steel for various concrete beam sizes, span and loading conditions
- Fortruss Corresponding Components - lists Floor Panel and Beam Form types required for given Depth of Concrete Section.
- Depth of Floor Section - lists the total Fortruss floor depth (Depth of Concrete Section plus the thickness of foam below the concrete joist).
- Slab Reinforcement - lists the slab reinforcement for the given slab thickness.
- Stirrups - lists the stirrup requirements for the given slab thickness. The stirrups
act as ties required to make the slab and joist integral. Unless otherwise noted, the stirrups are not required if the slab and joist are poured monolithic.

Section properties are also provided in Section 4.3.6. For estimating the Fortruss components, concrete and reinforcement see Section 5.

The combination of Floor Panel and Beam Form sizes offer 12 different possible floor sizes, as shown in Table 1, and depicted in Figures 1 to 12. The span tables list the spans in the far left column. The remaining column headings contain the joist depth resulting from the 12 Fortruss floor sizes, with the smallest size starting from the left, and increasing to the right. This offers the user the flexibility to choose the most suitable beam size.

To use the span tables, an example is provided below.

EXAMPLE:

• Building use - suspended slab garage
• Floor span - 25 ft
• Floor Area - 500 ft²

DEPTH OF CONCRETE SECTION - BEAM SELECTION

• Use Table 6 based on the building use (passenger vehicle garage).
• Under the Span column move across the row with span equal to 25 ft. The cells with “-” denotes floor sizes that are not practical, or require further engineering, for the span and loading conditions chosen. Cells showing a value, indicates the minimum area of reinforcement for the bottom joist steel.
• The smallest joist size available requires a steel area of 1.58 in². Under the column headings the corresponding depth of joist is 9.875 inches with a 4 inch thick slab. The total depth of concrete section is then 13.875 inches.
FORTRUSS CORRESPONDING COMPONENTS
• For quick reference the corresponding Fortruss components (Floor Panel and Beam Form type) that make up the depth of concrete of 13.875 inches is shown just below the span table. In this example the Fortruss components required are Floor Panel type “B”, and Beam Form type “Standard”.

DEPTH OF FLOOR SECTION
• The total depth of the floor section includes the Depth of Concrete Section plus the Fortruss (the thickness of foam under the joist). In this example, the total floor depth is 16.875 inches.

REINFORCEMENT SELECTION
• As determined from the span table the minimum area of reinforcement required for the bottom steel in the joist is 1.58 in². To determine the rebar required reference is made to Table 7, which lists various bar sizes and no of bars required for a give steel area.
• In this case, 2 - #8 bars would be required, or bundled bars, as shown.

NOTE: As seen in the span table other floor sizes are also available for this span. However, the size chosen in this example offers the shallowest and most economical floor size.

The span tables were developed based on the concrete section that includes the slab and joist. Therefore, the concrete must be poured monolithic with the slab and joist, or integral if poured separately. Where the slab is poured after the joists have set, the stirrups noted under the span tables are required. In cases where the joist is poured monolithic, stirrups may not be required unless the bottom rebar chosen in the span table is shaded grey, as noted under the span tables.

The span tables are provided as an aid for preliminary design and estimating. Final design should be conducted by a local licensed professional engineer.
# PRODUCT MANUAL

## 4.3.1 - TABLE 3 - U.S.A.

(Refer to Table 2 for building use description and Table 7 for rebar requirements)

NOTE: Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

### DEPTH OF CONCRETE SECTION (Slab + Joist Depth), in

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>2.5 to 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>9.875</td>
</tr>
<tr>
<td>10</td>
<td>12.5</td>
</tr>
<tr>
<td>14.5</td>
<td>15.875</td>
</tr>
<tr>
<td>16.25</td>
<td>18.5</td>
</tr>
<tr>
<td>21</td>
<td>23</td>
</tr>
</tbody>
</table>

### FORTRUSS CORRESPONDING COMPONENTS (Floor Panel & Beam Form Type)

<table>
<thead>
<tr>
<th>Beam Form Type</th>
<th>Standard</th>
<th>Standard</th>
<th>Deep Thick</th>
<th>Deep Thick</th>
<th>Deep</th>
<th>Deep</th>
<th>Deep Thick</th>
<th>Deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fig.8</td>
<td>Fig.1</td>
<td>Fig.2</td>
<td>Fig.3</td>
<td>Fig.4</td>
<td>Fig.5</td>
<td>Fig.6</td>
<td>Fig.7</td>
<td>Fig.8</td>
</tr>
<tr>
<td>Fig.9</td>
<td>Fig.10</td>
<td>Fig.11</td>
<td>Fig.12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### DEPTH OF FLOOR SECTION (Slab + Joist + Depth of Foam under Joist), in

<table>
<thead>
<tr>
<th>Slab Thickness, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3.5</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

### SLAB REINFORCEMENT

<table>
<thead>
<tr>
<th>Slab Thickness, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3.5</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Option 1: #3 @ 12.5m. o/c e/w</th>
<th>Option 1: #3 @ 15m. o/c e/w</th>
<th>Option 1: #3 @ 17.5m. o/c e/w</th>
<th>Option 1: #3 @ 19m. o/c e/w</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 2: #4 @ 12.5m. o/c e/w</td>
<td>Option 2: #4 @ 15m. o/c e/w</td>
<td>Option 2: #4 @ 17.5m. o/c e/w</td>
<td>Option 2: #4 @ 18m. o/c e/w</td>
</tr>
<tr>
<td>Option 3: #5 @ 12.5m. o/c e/w</td>
<td>Option 3: #5 @ 15m. o/c e/w</td>
<td>Option 3: #5 @ 17.5m. o/c e/w</td>
<td>Option 3: #5 @ 18m. o/c e/w</td>
</tr>
</tbody>
</table>

### STIRRUPS

<table>
<thead>
<tr>
<th>Slab Thickness, in</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5</td>
</tr>
<tr>
<td>3</td>
</tr>
<tr>
<td>3.5</td>
</tr>
<tr>
<td>4</td>
</tr>
</tbody>
</table>

1. Rebar requirements for corresponding reinforcement area can be found in Table 7.
2. Unless otherwise noted, place stirrups along full length of beam. Stirrups are not required if concrete is placed monolithic with joist and slab.
3. Use Fortruss Triple Chair Stirrup at same stirrup spacing, in lieu of #3 stirrups or ties.
# PRODUCT MANUAL  4.3.2 - TABLE 4 - U.S.A.

(Refer to Table 2 for building use description and Table 7 for rebar requirements)

NOTE: Span tables are to be used in conjunction with the Notes located at end of span tables. Circed numbers reference the floor drawing shown in the Notes section.

---

## Vertical Loads
- Service live load: 40psf
- Concentrated load: 0lb
- Superimposed dead load: 10psf
- Self weight of joist and slab included

### Required Minimum Area of Reinforcement, in²

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>2.5 to 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>0.31</td>
</tr>
<tr>
<td>9.875</td>
<td>0.31</td>
</tr>
<tr>
<td>12.25</td>
<td>0.31</td>
</tr>
<tr>
<td>12.5</td>
<td>0.31</td>
</tr>
<tr>
<td>12.5</td>
<td>0.31</td>
</tr>
<tr>
<td>13.875</td>
<td>0.31</td>
</tr>
<tr>
<td>14.5</td>
<td>0.31</td>
</tr>
<tr>
<td>14.5</td>
<td>0.31</td>
</tr>
<tr>
<td>15.875</td>
<td>0.31</td>
</tr>
<tr>
<td>16.25</td>
<td>0.31</td>
</tr>
<tr>
<td>17</td>
<td>0.31</td>
</tr>
<tr>
<td>18.25</td>
<td>0.31</td>
</tr>
<tr>
<td>21</td>
<td>0.31</td>
</tr>
<tr>
<td>23</td>
<td>0.31</td>
</tr>
</tbody>
</table>

## Concrete Section
- Depth of floor section (Slab + Joist + Depth of Foam under Joist), in
- Depth of concrete section (Slab + Joist), in

### Slab Reinforcement

<table>
<thead>
<tr>
<th>Slab Thickness, in</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1: #3 @ 12.5in. o/c e/w</td>
<td>Option 1: #3 @ 15in. o/c e/w</td>
<td>Option 1: #3 @ 17.5in. o/c e/w</td>
<td>Option 1: #3 @ 15.5in. o/c e/w</td>
<td></td>
</tr>
<tr>
<td>Option 2: #4 @ 12.5in. o/c e/w</td>
<td>Option 2: #4 @ 15in. o/c e/w</td>
<td>Option 2: #4 @ 17.5in. o/c e/w</td>
<td>Option 2: #4 @ 16in. o/c e/w</td>
<td></td>
</tr>
<tr>
<td>Option 3: 12x12 - W6 x W6: 0.06 in²/ft</td>
<td>Option 3: 12x12 - W8 x W8: 0.08 in²/ft</td>
<td>Option 3: 12x12 - W9 x W9: 0.09 in²/ft</td>
<td>Option 3: 12x12 - W9 x W9: 0.09 in²/ft</td>
<td></td>
</tr>
</tbody>
</table>

## Stirrups

<table>
<thead>
<tr>
<th>Stirrup Type</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3 - 1 leg @ 10 in</td>
<td>#3 - 1 leg @ 12 in</td>
<td>#3 - 1 leg @ 14 in</td>
<td>#3 - 1 leg @ 16 in</td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
1. Rebar requirements for corresponding reinforcement area can be found in Table 7.
2. Unless otherwise noted, place stirrups along full length of beam. Stirrups are not required if concrete is placed monolithic with joist and slab.
3. Use Fortruss Triple Chair Stirrup at same stirrup spacing, in lieu of #3 stirrups or ties.

---

**FORTRUSS PERFORMANCE FORMING WITH EPS**

**www.beaverplastics.com**

**Fortruss. Performance forming with EPS**

**R2010 October 2010**
### Vertical Loads
- Service live load: 60psf
- Concentrated load: 10lb
- Superimposed dead load: 10psf
- Self weight of joist and slab included

### Required Minimum Area of Reinforcement

#### Depth of Concrete Section (Slab + Joist Depth), in

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>2.5 to 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.5</td>
<td>9.875</td>
</tr>
<tr>
<td>12.25</td>
<td>12.5</td>
</tr>
<tr>
<td>12.5</td>
<td>13.875</td>
</tr>
<tr>
<td>14.5</td>
<td>15.875</td>
</tr>
<tr>
<td>16.25</td>
<td>17</td>
</tr>
<tr>
<td>18.25</td>
<td>20</td>
</tr>
<tr>
<td>21</td>
<td>23</td>
</tr>
</tbody>
</table>

### Concentrated Load: 10lb

| Service live load: 60psf |

### Notes Section

1. Rebar requirements for corresponding reinforcement area can be found in Table 7.
2. Unless otherwise noted, place stirrups along full length of beam. Stirrups are not required if concrete is placed monolithic with joist and slab.
3. Use Fortruss Triple Chair Stirrup at same stirrup spacing, in lieu of #3 stirrups or ties.

---

**Product Manual 4.3.3 - Table 5 - U.S.A.**

(Refer to Table 2 for building use description and Table 7 for rebar requirements)

**Notes:** Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

---

### Fortruss Corresponding Components (Floor Panel & Beam Form Type)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>Option 1: #6 @ 15.0in. o/c ew</td>
<td>Option 1: #6 @ 15.0in. o/c ew</td>
<td>Option 1: #6 @ 17.5in. o/c ew</td>
<td>Option 1: #6 @ 17.5in. o/c ew</td>
<td>Option 1: #6 @ 17.5in. o/c ew</td>
<td>Option 1: #6 @ 17.5in. o/c ew</td>
<td>Option 1: #6 @ 17.5in. o/c ew</td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>Option 2: #8 @ 12.5in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td>Option 2: #8 @ 15.0in. o/c ew</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>Option 3: #10 @ 12.0in. o/c ew</td>
<td>Option 3: #10 @ 12.0in. o/c ew</td>
<td>Option 3: #10 @ 15.0in. o/c ew</td>
<td>Option 3: #10 @ 15.0in. o/c ew</td>
<td>Option 3: #10 @ 15.0in. o/c ew</td>
<td>Option 3: #10 @ 15.0in. o/c ew</td>
<td>Option 3: #10 @ 15.0in. o/c ew</td>
<td></td>
</tr>
<tr>
<td>3.5</td>
<td>Option 4: #12 @ 12.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td>Option 4: #12 @ 15.0in. o/c ew</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>Option 5: #14 @ 12.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td>Option 5: #14 @ 15.0in. o/c ew</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Rebar requirements for corresponding reinforcement area can be found in Table 7.
2. Unless otherwise noted, place stirrups along full length of beam. Stirrups are not required if concrete is placed monolithic with joist and slab.
3. Use Fortruss Triple Chair Stirrup at same stirrup spacing, in lieu of #3 stirrups or ties.
### Stone Reinforcement:

- **Option 1:** #3 @ 15.5 in o/c e/w
- **Option 2:** #4 @ 18 in o/c e/w
- **Option 3:** 12x12 - W9 x W9: 0.09 in²/ft

**Superimposed dead load:** 10 psf

**Self weight of slab and joist included**

### Beam Stirrups:

- **#3 - 1 leg @ 16 in (place stirrups along full length of beam)**
- **No stirrups req'd if slab and joist poured monolithic**
- **Exception:** Shaded regions require the following stirrups:
  - #3 - 1 leg @ 5 in o/c
  - Max. no stirrup distance = 6 ft

### Required Minimum Area of Reinforcement, in²

<table>
<thead>
<tr>
<th>Slab Reinforcement</th>
<th>Beam Stirrups:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Option 1: #3 @ 15.5 in o/c e/w</td>
<td>#3 - 1 leg @ 16 in (place stirrups along full length of beam)</td>
</tr>
<tr>
<td>Option 2: #4 @ 18 in o/c e/w</td>
<td>No stirrups req'd if slab and joist poured monolithic</td>
</tr>
<tr>
<td><strong>Option 3:</strong> 12x12 - W9 x W9: 0.09 in²/ft</td>
<td><strong>Exception:</strong> Shaded regions require the following stirrups:</td>
</tr>
<tr>
<td>#3 - 1 leg @ 5 in o/c</td>
<td>Max. no stirrup distance = 6 ft</td>
</tr>
</tbody>
</table>

### Depth of Concrete Section (Slab + Joist Depth), in

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>11</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
<td>0.31</td>
</tr>
<tr>
<td>12</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>13</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>14</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>15</td>
<td>0.60</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>16</td>
<td>0.60</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>17</td>
<td>0.60</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>18</td>
<td>0.60</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
<td>0.44</td>
</tr>
<tr>
<td>19</td>
<td>0.79</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>20</td>
<td>1.00</td>
<td>0.79</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>21</td>
<td>1.20</td>
<td>0.79</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>22</td>
<td>1.20</td>
<td>1.00</td>
<td>0.79</td>
<td>0.79</td>
<td>0.60</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>23</td>
<td>1.58</td>
<td>1.00</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.60</td>
<td>0.60</td>
</tr>
<tr>
<td>24</td>
<td>-</td>
<td>1.20</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.60</td>
</tr>
<tr>
<td>25</td>
<td>-</td>
<td>1.58</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>26</td>
<td>-</td>
<td>1.58</td>
<td>1.00</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
<td>0.79</td>
</tr>
<tr>
<td>27</td>
<td>-</td>
<td>-</td>
<td>1.20</td>
<td>1.20</td>
<td>1.00</td>
<td>1.00</td>
<td>0.79</td>
</tr>
<tr>
<td>28</td>
<td>-</td>
<td>-</td>
<td>1.20</td>
<td>1.20</td>
<td>1.00</td>
<td>1.00</td>
<td>0.79</td>
</tr>
<tr>
<td>29</td>
<td>-</td>
<td>-</td>
<td>1.58</td>
<td>1.58</td>
<td>1.20</td>
<td>1.20</td>
<td>1.00</td>
</tr>
<tr>
<td>30</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.58</td>
<td>1.58</td>
<td>1.20</td>
</tr>
<tr>
<td>31</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.58</td>
<td>1.58</td>
</tr>
<tr>
<td>32</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1.58</td>
</tr>
<tr>
<td>33</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>34</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>36</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>38</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>39</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>40</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Depth of Floor Section (Slab + Joist + Depth of Foam under Joist), in

<table>
<thead>
<tr>
<th>Depth of foam under joint</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
<th>Plate</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
<td>15.5</td>
</tr>
<tr>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
<td>21.5</td>
</tr>
<tr>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
<td>22.875</td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

**Notes:**
1. Rebar requirements for corresponding reinforcement area can be found in Table 7.
2. Use Fortruss Triple Chair Stirrups at same stirrup spacing, in lieu of #5 stirrups or ties.
1. It is the responsibility of the builder/owner to ensure any building projects using these span tables are reviewed and approved by a local licensed engineer.
2. Tables developed, as per ACI 318-05. Live loads, as per IRC 2003.
3. Load Factors:
   - Dead load = 1.2
   - Live load = 1.6
4. Min. 28day concrete compressive strength, f'c = 3000psi
5. Steel yield strength, fy = 60ksi (60,000psi)
6. Min. concrete cover:
   - Beam = 1.5"
   - Slab = reinf. assumed centered in slab
7. Short term deflections considered. Deflection limits based on L/360
8. Does not include bent 90degree rebar for floor wall connection.
9. Concrete joist and slab to be poured monolithically, unless stirrups are used. Stirrups must extend at least mid depth of slab thickness.
10. Where spaces contain ‘-’ consult a local engineer for site specific design.
11. Rebar requirements for corresponding required reinforcement area can be found in Table 7.
12. Add additional top steel over bearing walls. Minimum #4 @ 12” o/c, extend min. 24” beyond bearing wall.
13. Tables developed as simple spans. Longer spans than those limited in these tables can be achieved in multispan, or single span, floor systems with the addition of shear and top steel reinforcement at beam ends (fixed end connections).

Although the tables and drawings represented herein are believed to be accurate and conforming to current design and construction practices, the tables and drawings should be used as a reference guide only. The user shall check to ensure the drawing meets local building codes, design and construction practices by consulting local building officials and professionals, including any additional requirements. Beaver Plastic reserves the right to make changes to the tables and drawings without notice and assumes no liability in connection with the use of the tables and drawings including modification, copying or distribution.
The section properties cross sectional area, moment of inertia, and the centroid of the section taken from bottom of beam are listed. The section is based on a T-beam consisting of a 2 ft wide slab, as illustrated.

<table>
<thead>
<tr>
<th>Slab Thickness, in</th>
<th>2.5</th>
<th>3</th>
<th>3.5</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of beam</td>
<td>8.5</td>
<td>9.875</td>
<td>12.25</td>
<td>12.5</td>
</tr>
<tr>
<td>Floor Panel Type</td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>A</td>
</tr>
<tr>
<td>Beam Form Type</td>
<td>Standard</td>
<td>Standard</td>
<td>Standard</td>
<td>Deep Thick Bottom</td>
</tr>
<tr>
<td>CROSS SECTIONAL AREA, in^2</td>
<td>107.8</td>
<td>115.3</td>
<td>128.4</td>
<td>129.8</td>
</tr>
<tr>
<td></td>
<td>137.3</td>
<td>140.8</td>
<td>148.3</td>
<td>150.4</td>
</tr>
<tr>
<td></td>
<td>154.5</td>
<td>161.4</td>
<td>176.5</td>
<td>187.5</td>
</tr>
<tr>
<td></td>
<td>188.5</td>
<td>199.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slab Thickness, in</td>
<td>2.5</td>
<td>3</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Slab Thickness, in</td>
<td>2.5</td>
<td>3</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>Y bottom, in</td>
<td>7.35</td>
<td>8.20</td>
<td>9.62</td>
<td>9.76</td>
</tr>
<tr>
<td></td>
<td>10.56</td>
<td>10.92</td>
<td>11.71</td>
<td>11.92</td>
</tr>
<tr>
<td></td>
<td>12.34</td>
<td>13.04</td>
<td>14.55</td>
<td>15.64</td>
</tr>
<tr>
<td></td>
<td>14.55</td>
<td>15.64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beam depth</td>
<td></td>
<td>24&quot;</td>
<td>5.5&quot;</td>
<td></td>
</tr>
<tr>
<td>Slab thickness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The following table is provided to aide in determining the rebar requirements from the span tables. The table lists the area of steel, in the left-hand column, followed by the corresponding bar sizes and number of bars required to meet the area of steel.

<table>
<thead>
<tr>
<th>Steel Area, in$^2$</th>
<th>#3</th>
<th>#4</th>
<th>#5</th>
<th>#6</th>
<th>#7</th>
<th>#8</th>
<th>#9</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.11</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.20</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.22</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.31</td>
<td>3*</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.40</td>
<td>4*</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.44</td>
<td>4*</td>
<td>3*</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.60</td>
<td>-</td>
<td>3*</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.62</td>
<td>-</td>
<td>4*</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.79</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>0.88</td>
<td>-</td>
<td>-</td>
<td>3*</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.00</td>
<td>-</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>1.20</td>
<td>-</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2</td>
<td>2</td>
<td>2*</td>
</tr>
<tr>
<td>1.58</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2</td>
<td>2*</td>
</tr>
<tr>
<td>2.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2*</td>
</tr>
</tbody>
</table>

**NOTES:**
1. ‘*’ denotes bundled bars, as per ACI 318-05.
2. ‘-’ denotes not applicable for the given bar size.
The following span tables are grouped into loading conditions suitable for certain building use, and are based on the loads provided in Table 4.1.5.3 of the National Building Code of Canada 2005.

### TABLE 8: BUILDING USE FOR SPAN TABLES

<table>
<thead>
<tr>
<th>Liive Load, kPa (psf)</th>
<th>Building Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 9</td>
<td>1.4 (29) Attics</td>
</tr>
<tr>
<td>Table 10</td>
<td>1.9 (40) Residential areas including sleeping and living quarters</td>
</tr>
<tr>
<td>Table 11</td>
<td>4.8 (100) Assembly areas including exterior balconies, storage areas</td>
</tr>
<tr>
<td>Table 12</td>
<td>2.4 + 11kN point load (50 + 2473 lb) Passenger vehicle garages</td>
</tr>
</tbody>
</table>

Dead loads are based on self weight plus a superimposed dead load of 0.48 kPa (10 psf).

Slab thicknesses for the span tables include 2.5, 3, 3.5 and 4 inches. Due to the heavier loading conditions, the table for passenger vehicle garages, Table 12, only considers 4 inch slabs.

### USING THE SPAN TABLES

The span tables provide minimum area of reinforcement for the bottom beam steel for various span and loading conditions. The span tables are grouped into the following categories:

- Depth of Concrete Section - main span table listing area of reinforcement for bottom beam (or joist) steel for various concrete beam sizes, span and loading conditions
- Fortruss Corresponding Components - lists Floor Panel and Beam Form types required for given Depth of Concrete Section.
- Depth of Floor Section - lists the total Fortruss floor depth (Depth of Concrete Section plus the thickness of foam below the concrete joist).
- Slab Reinforcement - lists the slab reinforcement for the given slab thickness.
• Stirrups - lists the stirrup requirements for the given slab thickness. The stirrups act as ties required to make the slab and joist integral. Unless otherwise noted, the stirrups are not required if the slab and joist are poured monolithically.

Section properties are also provided in Section 4.4.6. For estimating the Fortruss components, concrete and reinforcement see Section 5.

The combination of Floor Panel and Beam Form sizes offer 12 different possible floor sizes, as shown in Table 1, and depicted in Figures 1 to 12. The span tables list the spans in the far left column. The remaining column headings contain the joist depth resulting from the 12 Fortruss floor sizes, with the smallest size starting from the left, and increasing to the right. This offers the user the flexibility to choose the most suitable beam size.

To use the span tables, see the example provided in Section 4.3, Span Tables - U.S.A
(Refer to Table 8 for building use description and Table 13 for rebar requirements)

**NOTE:** Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

### Vertical Loads
- Service live load: 1.4kPa (29 psf)
- Concentrated load: 0kN (0 lb)
- Superimposed dead load: 0.48kPa (10 psf)
- Self weight of joist and slab included

#### REQUIRED MINIMUM AREA OF REINFORCEMENT, mm²

<table>
<thead>
<tr>
<th>Depth of Concrete Section (Slab + Joist Depth), mm (in)</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab Thickness, mm (in)</td>
<td>64 to 102 (2.5 to 4)</td>
</tr>
</tbody>
</table>

#### DEPTH OF CONCRETE SECTION

<table>
<thead>
<tr>
<th>Slab Thickness, mm (in)</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
<tr>
<td>102</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
</tbody>
</table>

#### SUPERIMPOSED DEAD LOAD

- 0.48kPa (10 psf)

#### CONCENTRATED LOAD

- 0kN (0 lb)

### FORTRUSS CORRESPONDING COMPONENTS (Floor Panel & Beam Form Type)

<table>
<thead>
<tr>
<th>Floor Panel Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab Thickness, mm (in)</td>
<td>64 to 102 (2.5 to 4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### DEPTH OF FLOOR SECTION (Slab + Beam + Depth of Foam under Beam), mm (in)

<table>
<thead>
<tr>
<th>Depth of Foam under joint</th>
<th>7.925 (30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.925 (30)</td>
<td>500 500 500 300 300 300 300 300 300 300 300 300 300 300 300 300</td>
</tr>
</tbody>
</table>

#### SLAB REINFORCEMENT

<table>
<thead>
<tr>
<th>Slab Thickness, mm (in)</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
<tr>
<td>102</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
</tbody>
</table>

#### STIRRUPS

<table>
<thead>
<tr>
<th>Slab Thickness, mm (in)</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
<tr>
<td>102</td>
<td>200 200 200 200 200 200 200 200 200 200 200 200 200 300 300 300</td>
</tr>
</tbody>
</table>

**NOTES:**
1. Rebar requirements for corresponding reinforcement area can be found in Table 13.
2. Unless otherwise noted, place stirrups along full length of beam. Stirrups are not required if concrete is placed monolithic with joist and slab.
3. Use Fortruss Triple Chair Stirrups at same stirrup spacing, in lieu of 10M stirrups or ties.
PRODUCT MANUAL  4.4.2 - TABLE 10 – CANADA

NOTE: Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

Vertical Loads:
Service live load: 1.9kPa (40 psf)
Concentrated load: 9kN (6 lb)
Superimposed dead load: 0.48kPa (10 psf)
Self weight of joist and slab included

REQUIRED MINIMUM AREA OF REINFORCEMENT*, mm²
DEPTH OF CONCRETE SECTION (Slab + Joist Depth), mm (in)

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>215.9</td>
<td>200</td>
</tr>
<tr>
<td>250.825</td>
<td>200</td>
</tr>
<tr>
<td>311.15</td>
<td>200</td>
</tr>
<tr>
<td>317.5</td>
<td>200</td>
</tr>
<tr>
<td>352.425</td>
<td>200</td>
</tr>
<tr>
<td>368.3</td>
<td>200</td>
</tr>
<tr>
<td>403.225</td>
<td>200</td>
</tr>
<tr>
<td>412.75</td>
<td>200</td>
</tr>
<tr>
<td>431.8</td>
<td>200</td>
</tr>
<tr>
<td>463.55</td>
<td>200</td>
</tr>
<tr>
<td>533.4</td>
<td>200</td>
</tr>
<tr>
<td>584.2</td>
<td>200</td>
</tr>
</tbody>
</table>

FORTRUSSED CAD DRAWINGS
### PRODUCT MANUAL  4.4.3 - TABLE 11 – CANADA
(Refer to Table 8 for building use description and Table 13 for rebar requirements)

**NOTE:** Span tables are to be used in conjunction with the Notes located at end of span tables. Circed numbers reference the floor drawing shown in the Notes section.

#### Vertical Loads
- Service live load: 4.03kPa (100 psf)
- Concentrated load: 60N (9 lb)
- Superimposed dead load: 0.48kPa (10 psf)
- Self weight of joist and slab included

#### REINFORCEMENT REQUIREMENTS, mm²/2

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>64 to 102 (2.5 to 4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab + Joist Depth</td>
<td>219.8</td>
</tr>
</tbody>
</table>

#### DEPTH OF CONCRETE SECTION

<table>
<thead>
<tr>
<th>Span, m (ft)</th>
<th>3.048 (10)</th>
<th>3.363 (11)</th>
<th>3.688 (12)</th>
<th>3.962 (13)</th>
<th>4.267 (14)</th>
<th>4.572 (15)</th>
<th>4.977 (16)</th>
<th>5.182 (17)</th>
<th>5.486 (18)</th>
<th>5.791 (19)</th>
<th>6.096 (20)</th>
<th>6.401 (21)</th>
<th>6.706 (22)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 (6.5)</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>300 (9.875)</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>500 (16.5)</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>700 (22.875)</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
<td>700</td>
</tr>
<tr>
<td>900 (29.5)</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
<td>900</td>
</tr>
<tr>
<td>1100 (36.5)</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
<td>1100</td>
</tr>
<tr>
<td>1300 (43)</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
<td>1300</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
#### Fortruss. Performance forming with EPS

| www.beaverplastics.com | 4 – 2.9 |

**R2010**

**October 2010**
**PRODUCT MANUAL  4.4.4 - TABLE 12 – CANADA**

(Refer to Table 8 for building use description and Table 13 for rebar requirements)

**NOTE:** Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

### Slab Reinforcement

<table>
<thead>
<tr>
<th>Service live load: 2.4kPa (50 psf)</th>
<th>Concentrated load: 11kN (2473 lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superimposed dead load: 4.8kPa (10 psf)</td>
<td>Self weight of joist and slab included</td>
</tr>
</tbody>
</table>

### Beam Stair

Option 1: 10M @ 487 (19in) o/c e/w
Option 2: 152 X 152 MW 34.9 X MW 34.9

No stirrup req'd if slab and joist poured monolithic

**Exception:** Shaded regions require the following stirrups:

10M - 1 leg @ 114 (4.5 in) o/c

Max. no stirrup distance = 1524 (60 in)

---

**REQUIRED MINIMUM AREA OF REINFORCEMENT**

<table>
<thead>
<tr>
<th>Depth of slab</th>
<th>Depth of joist</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>101.6 (4)</td>
<td>215.9 (8.5)</td>
<td>317.5 (12.5)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>311.5 (12.5)</td>
<td>412.75 (16.25)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>352.425 (13.875)</td>
<td>454.025 (17.875)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>368.3 (14.5)</td>
<td>469.9 (18.5)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>403.225 (15.875)</td>
<td>504.825 (19.875)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>419.1 (16.5)</td>
<td>514.35 (20.23)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>431.8 (17.25)</td>
<td>533.4 (21.25)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>454.025 (18.25)</td>
<td>553.65 (22.25)</td>
</tr>
<tr>
<td>101.6 (4)</td>
<td>469.9 (19.25)</td>
<td>658.5 (27)</td>
</tr>
</tbody>
</table>

---

**FORTRESS CORRESPONDING COMPONENTS**

(Floor Panel & Beam Form Type)

### Floor Panel Type

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>C</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
</table>

### Beam Form Type

<table>
<thead>
<tr>
<th>Standard</th>
<th>Standard</th>
<th>Standard</th>
</tr>
</thead>
</table>

### DEPTH OF FLOOR SECTION (Slab + Joist + Depth of Foam under Beam), mm (in)

<table>
<thead>
<tr>
<th>Depth of foam under joist</th>
<th>Tu Flr Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>76.2 (3)</td>
<td>393.7 (15.5)</td>
</tr>
<tr>
<td>76.2 (3)</td>
<td>428.625 (16.875)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>488.95 (19.25)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>546.1 (21.5)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>581.025 (22.875)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>641.35 (25.25)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>690.6 (29)</td>
</tr>
<tr>
<td>76.2 (5)</td>
<td>762 (30)</td>
</tr>
</tbody>
</table>

**NOTES:**

1. Rebar requirements for corresponding reinforcement area can be found in Table 13.
2. Use Fortress Triple Chair Stirrups at same stirrup spacing, in lieu of 10M stirrups or ties.
NOTE: Span tables are to be used in conjunction with the Notes located at end of span tables. Circled numbers reference the floor drawing shown in the Notes section.

1. It is the responsibility of the builder/owner to ensure any building projects using these span tables are reviewed and approved by a local licensed engineer.
2. Tables developed, as per CSA A23.2-04. Live loads, as per NBCC 2005.
3. Load Factors:
   - Dead load = 1.25
   - Live load = 1.5
4. Min. 28 day concrete compressive strength, fc = 25 MPa
5. Steel yield strength, fy = 400 MPa
6. Min. concrete cover:
   - Beam = 30mm
   - Slab = reinf. assumed centered in slab
7. Short term deflections considered. Deflection limits based on L/360
8. Does not include bent 90degree rebar for floor wall connection.
9. Concrete joist and slab to be poured monolithically, unless stirrups are used. Stirrups must extend at least mid depth of slab thickness.
10. Does not include bent 90degree rebar for floor wall connection.
11. Where spaces contain '-' consult a local engineer for site specific design.
12. Add additional top steel over bearing walls. Minimum 10M @ 305 (12") o/c, extend min. 610 (24") beyond bearing wall.
13. Tables developed as simple spans. Longer spans than those limited in these tables can be achieved in multispans, or single span, floor systems with the addition of shear and top steel reinforcement at beam ends (fixed end connections).

Although the tables and drawings represented herein are believed to be accurate and conforming to current design and construction practices, the tables and drawings should be used as a reference guide only. The user shall check to ensure the drawing meets local building codes, design and construction practices by consulting local building officials and professionals, including any additional requirements. Beaver Plastic reserves the right to make changes to the tables and drawings without notice and assumes no liability in connection with the use of the tables and drawings including modification, copying or distribution.
The section properties cross sectional area, moment of inertia, and the centroid of the section taken from bottom of beam are listed. The section is based on a T-beam consisting of a 610 mm (2 ft) wide slab, as illustrated.

<table>
<thead>
<tr>
<th>Floor Panel Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>C</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab Thickness, mm</td>
<td>64</td>
<td>6.95E+04</td>
<td>7.44E+04</td>
<td>8.28E+04</td>
<td>8.37E+04</td>
<td>8.86E+04</td>
<td>9.08E+04</td>
<td>9.57E+04</td>
<td>9.70E+04</td>
<td>9.97E+04</td>
<td>1.04E+05</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>76</td>
<td>7.73E+04</td>
<td>8.21E+04</td>
<td>9.06E+04</td>
<td>9.15E+04</td>
<td>9.63E+04</td>
<td>9.85E+04</td>
<td>1.03E+05</td>
<td>1.05E+05</td>
<td>1.07E+05</td>
<td>1.12E+05</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>89</td>
<td>8.50E+04</td>
<td>8.99E+04</td>
<td>9.83E+04</td>
<td>9.92E+04</td>
<td>1.04E+05</td>
<td>1.06E+05</td>
<td>1.11E+05</td>
<td>1.12E+05</td>
<td>1.15E+05</td>
<td>1.20E+05</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>102</td>
<td>9.27E+04</td>
<td>9.76E+04</td>
<td>1.06E+05</td>
<td>1.07E+05</td>
<td>1.12E+05</td>
<td>1.14E+05</td>
<td>1.19E+05</td>
<td>1.20E+05</td>
<td>1.23E+05</td>
<td>1.27E+05</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Floor Panel Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>C</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slab Thickness, mm</td>
<td>64</td>
<td>4.61E+08</td>
<td>6.52E+08</td>
<td>1.08E+09</td>
<td>1.14E+09</td>
<td>1.46E+09</td>
<td>1.63E+09</td>
<td>2.03E+09</td>
<td>2.15E+09</td>
<td>2.40E+09</td>
<td>2.87E+09</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>76</td>
<td>5.30E+08</td>
<td>7.41E+08</td>
<td>1.22E+09</td>
<td>1.28E+09</td>
<td>1.63E+09</td>
<td>1.81E+09</td>
<td>2.25E+09</td>
<td>2.38E+09</td>
<td>2.66E+09</td>
<td>3.18E+09</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>89</td>
<td>6.03E+08</td>
<td>8.34E+08</td>
<td>1.35E+09</td>
<td>1.42E+09</td>
<td>1.80E+09</td>
<td>2.00E+09</td>
<td>2.47E+09</td>
<td>2.62E+09</td>
<td>2.91E+09</td>
<td>3.45E+09</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>102</td>
<td>6.82E+08</td>
<td>9.32E+08</td>
<td>1.49E+09</td>
<td>1.56E+09</td>
<td>1.98E+09</td>
<td>2.19E+09</td>
<td>2.70E+09</td>
<td>2.85E+09</td>
<td>3.17E+09</td>
<td>3.75E+09</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Floor Panel Type</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>C</th>
<th>D</th>
<th>D</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y bottom, mm</td>
<td>64</td>
<td>186.66</td>
<td>208.20</td>
<td>244.27</td>
<td>248.00</td>
<td>268.31</td>
<td>277.43</td>
<td>297.32</td>
<td>302.70</td>
<td>313.42</td>
<td>331.14</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>76</td>
<td>196.59</td>
<td>218.60</td>
<td>255.96</td>
<td>259.80</td>
<td>290.68</td>
<td>290.06</td>
<td>310.48</td>
<td>316.00</td>
<td>326.98</td>
<td>345.14</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>89</td>
<td>205.87</td>
<td>228.67</td>
<td>266.81</td>
<td>270.74</td>
<td>292.16</td>
<td>301.77</td>
<td>322.69</td>
<td>328.34</td>
<td>339.58</td>
<td>358.15</td>
</tr>
<tr>
<td>Slab Thickness, mm</td>
<td>102</td>
<td>214.66</td>
<td>237.98</td>
<td>277.00</td>
<td>281.03</td>
<td>302.93</td>
<td>312.75</td>
<td>334.13</td>
<td>339.91</td>
<td>351.39</td>
<td>370.35</td>
</tr>
</tbody>
</table>
The following table is provided to aide in determining the rebar requirements from the span tables. The table lists the area of steel, in the left-hand column, followed by the corresponding bar sizes and number of bars required to meet the area of steel.

<table>
<thead>
<tr>
<th>Steel Area, mm²</th>
<th>10M</th>
<th>15M</th>
<th>20M</th>
<th>25M</th>
<th>30M</th>
<th>35M</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>200</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>300</td>
<td>3*</td>
<td>2*</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>500</td>
<td>-</td>
<td>3*</td>
<td>2*</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>700</td>
<td>-</td>
<td>4*</td>
<td>3*</td>
<td>2*</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1000</td>
<td>-</td>
<td>-</td>
<td>4*</td>
<td>2*</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

NOTES:
1. '*' denotes bundled bars, as per ACI 318-05.
2. '-' denotes not applicable for the given bar size.
5.0 – ESTIMATING

TABLE OF CONTENTS

5.1 - ESTIMATING ..................................................... P. 5-3
5.1.1 - FLOOR COMPONENTS .............................. P. 5-4
5.1.2 - CONCRETE VOLUME ............................. P. 5-5
5.1.3 - SLAB REINFORCEMENT ....................... P. 5-6
5.1.4 - BEAM REINFORCEMENT ....................... P. 5-7
DISCLAIMER
By using the FORTRUSS Product Manual, in part or in whole, the user accepts the following terms and conditions.

The FORTRUSS Product Manual shall be used for the sole purpose of estimating, design or construction of the FORTRUSS System used in residential, commercial or industrial structures.

The information represented herein is to be used as a reference guide only. The user shall check to ensure the information provided in this manual, including updates and amendments, meets local building codes and construction practices by consulting local building officials, construction and design professionals, including any additional requirements.

Beaver Plastics Ltd. reserves the right to make changes to the information provided herein without notice and assumes no liability in connection with the use of this manual including modification, copying or distribution.

The user shall check to ensure that any construction projects utilizing the FORTRUSS Product Manual includes the latest updates/amendments (related to the version of the FORTRUSS Product Manual being used at the time of the construction project). Contact your local Fortruss representative for updates/amendments to the FORTRUSS Product Manual.
A methodology for calculating estimates of the Fortruss components, concrete and reinforcement are provided. The estimates are determined based on the square footage of the floor area that Fortruss will be built on.

The unit section of floor area 2 feet wide and 1 ft long is used to determine the estimates. This section includes a 2 feet wide by 1 ft long concrete slab and a 1 ft long concrete beam section. Since the spacing of the beams are at 2 feet on center. This section also includes one full width of Floor Panel, and Beam Form. The unit area then becomes 2 feet wide by 1 feet long - 2ft². Determining quantities within this unit area results in quantities only within this area (or quantities per unit area). Multiplying the quantity determined per unit area by the total floor area yields the total estimate.
To estimate the total length of Floor Panels and Beam Forms:

**STEP 1:** Determine the square footage of floor, (A)

**STEP 2:** To estimate total length, in feet, of Floor Panel, (B):

\[(B) = 0.50 \times (A)\]

**STEP 3:** To estimate total length, in feet, of Beam Forms, (C):

\[(C) = 0.50 \times (A)\]

Make sure the units used for (A) are in feet squared.

The above formula is derived below.

For a unit length of span (ie, 1 ft) there is a 1 ft length of Form Panel and Beam Form.

A 2 ft beam spacing provides one whole section of Floor Panel and Beam Form. Therefore, for every 1 ft length of span the floor area

\[= 2 \text{ ft}^2 (2 \text{ ft} \times 1 \text{ ft}). \text{ Or } (1 \text{ ft length}) / (2 \text{ ft}^2) = 0.5 \text{ ft/ft}^2\]

(0.5 ft of Floor Panel or Beam Form for every square foot of area)

Multiplying 0.5 ft/ft² by the floor area will give the total length of Floor Panel or Beam Forms.
To calculate the total volume:

**STEP 1:** Determine square footage of floor area, \((A)\).

**STEP 2:** Determine slab thickness, in inches, \((D)\).

**STEP 3:** Determine concrete beam depth, in inches, \((E)\).

**STEP 4:** Estimate the slab volume, in cubic feet \((F)\).
\[
(F) = \frac{(24 \text{ in} \times 12 \text{ in}) \times (D)}{1728}
\]

**STEP 5:** Estimate the concrete beam volume, in cubic feet \((G)\).
\[
(G) = \frac{(5.5 \text{ in} \times 12 \text{ in}) \times (E)}{1728}
\]

**STEP 6:** Estimate total volume of the slab, \((H)\), by multiply by the floor area \((A)\)
\[
(H) = (G) \times (A)
\]

Estimating the total volume of the slab and concrete beam can be done together or separately following the above step. The total volume will be in cubic feet. To convert to cubic yard divide \((H)\) by 27. To convert to cubic metres multiply \((H)\) by 0.0283.
The span tables in Section 4 list the slab reinforcement. For builder/designer preference and availability, two or three different options are provided for slab reinforcement. In this example, the options are:

To calculate the total longitudinal reinforcement (slab reinforcement parallel to beams):

**STEP 1:** Determine square footage of floor area, \( A \).

**STEP 2:** Determine bar spacing, in inches, \( I \).

**STEP 3:** Determine number of longitudinal bars per unit area (2 ft\(^2\)), \( J \).

\[ J = \frac{24 \text{ in}}{I} \]

**STEP 4:** Estimate the length per unit area of 2 ft\(^2\), \( K \)

\[ K = J \times 1 \text{ ft} \]  \( K \) will be units of feet.

**STEP 5:** Estimate the total length, \( L \), by multiplying by the floor area, \( A \)

\[ L = K \times A \]  The total length will be in units of feet.

To estimate the total length of rebar in the transvers direction (slab reinforcement normal to beam span) follow Step 1, 2 and 5. In Step 3 replace 24 inches with 12 inches. And in Step 4 replace 1 ft with 2 ft.
The total length of longitudinal beam reinforcement will be the same as the total length of Beam Forms estimated in Section 5.1.1.

**STEP 1:** Determine the square footage of floor, (A)

**STEP 2:** To estimate total length, in feet, of reinforcement, (M):

\[(M) = 0.50 \times (A)\]

If there are more than one longitudinal bar in the beams multiply (M) by the number of bars in a beam.

**STIRRUPS**

Stirrup spacing = 16 in (from span table)

Number of stirrups per unit length of span of 1 ft (12 in):

\[(12 \text{ in}) / (16 \text{ in}) = 0.75 \text{ stirrups}\]

Therefore, based on a total length of beam = 250 ft:

\[0.75 \text{ stirrups} \times 250 \text{ ft} = 188 \text{ stirrups}\]

**STIRRUPS**

To estimate the total number of stirrups:

**STEP 1:** Determine the square footage of floor, (A)

**STEP 2:** Determine the stirrup spacing, (N)

**STEP 3:** Determine the number of stirrups per unit length of beam (1 ft), (O)

\[(O) = 12 \text{ in} / (N)\]
STEP 4: To estimate the total number of stirrups in a beam, \((P)\), multiply by the length of stirrup region, \((Q)\), required in the beam.

\[ (P) = (Q) \times (N) \]

NOTES: Rebar estimates do not include provisions for splices and should be considered when estimating rebar.
RESIDENTIAL • COMMERCIAL
Floor • Deck • Roof • Green Roof

Fortruss Performance Value:
- Superior Structure
- Durable
- Safe
- Healthy
- Fire Rated
- Energy Efficient
- Sustainable
- Green Building

CROSS SECTION OF FORTRUSS AND Poured CONCRETE

Fortruss
PERFORMANCE FORMING WITH EPS

Beaver Plastics
INNOVATIVE AND QUALITY PRODUCTS IN EXPANDED POLYSTYRENE

Construction
- LOGIX ICF
- FORTRUSS FORMING
- INSULWORKS
- INSULWALL
- FROSTCUSHION
- TERRAFOAM
- DYNAVOID
- G-TEC
- TERMINATOR
- GEOFOAM

Grower Products
- HORTICULTURE
- SILVICULTURE
- APICULTURE
- PRODUCE BOXES
- ROOTRAINER
- GREEN ROOF

Custom Packaging Products
- FABRICATED
- MOLDED
- PRECIOUS CARGO SHIPPER

Beaver Plastics Ltd Head Office:
7-26318-TWP RD 531A
Acheson, Alberta
Canada T7X 5A3

Branch Plant Locations:
Chilliwack, British Columbia, Canada
Contact us today for more information.
Toll Free: 1-888-453-5961
E-mail: info@beaverplastics.com

www.beaverplastics.com