

# ELEMATIC<sup>®</sup> Hollow-core Plank

2014 Technical Data Guide for Precast,  
Prestressed Concrete Hollow-core Plank

 **Oldcastle Precast**<sup>®</sup>  
Building Systems







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## Introduction

The purpose of this product manual is to provide assistance in selecting and detailing precast concrete hollow-core plank manufactured by Oldcastle Precast, Inc.

The load tables presented herein are intended as a guide only. Final design is determined by our engineering department based on information presented in the final plans and specifications. Loading information including SDL, LL, snow drift, and non-uniform concentrated & line loads more than 1.0 kip or 0.100 klf should be stated by the project structural engineer of record (SER). Lateral loading requirements from wind and seismic analysis can be specified in the form of including our standard connection details, or by stating floor diaphragm shear forces in klf on the structural plans. For additional design assistance, please contact us at 800-523-3747 and ask for our engineering dept.

Although care has been taken to provide the most accurate data possible, **Oldcastle Precast, Inc.** does not assume responsibility for errors and omissions.

## Manufacturing Process

Elematic® is a machine extruded, precast, prestressed hollow-core plank. The planks are manufactured on 500-foot-long steel beds in standard widths of 48 inches and thickness of: 8, 10, 12 and 16 inches. High strength prestressing strands are cast into the planks at the spacing and location required for the given span, loading and fire cover conditions. Oldcastle plants are capable of extruding up to 12,000 SF of precast plank every day to meet project schedules. The planks are cut to length for each project using a diamond-blade saw. After the planks are cut, they are removed from the casting beds and placed into storage, and ready for shipment.

All Elematic materials equal or exceed the requirements of applicable ASTM specifications. Our concrete mix is designed to have release strengths of 3,000 psi or 3,500 psi, and a 28-day compressive strength of 5,000 psi. For sustainability, our concrete mix has been finely tuned to use less cement to lower our carbon footprint, but fly ash is not added.

The prestressing strands are uncoated, seven wire, low relaxation with a minimum ultimate strength of 270 ksi.

Our manufacturing capabilities also include: longitudinal and skew cuts to fit any building shape, adding top strands for cantilever designs, cast-in bottom 6"x4" embed plates for welded connections to steel structures, cast-in top plates for curtain wall and relieving angle attachments, column notches, side grout pockets for rebar connections to shear walls, top slots for field grouting of hollow-cores needed for rebar connections and additional shear capacity, and plant cast weep holes.

Be sure to discuss your project scope with your Oldcastle sales representative in detail as each project should decide which details are required for design and constructability.

## Delivery & Installation

Oldcastle hollow-core plants are located in Selkirk, NY (near Albany, NY) and in Edgewood, MD (near Baltimore, MD). Our precast hollow-core planks are shipped by truck/trailer to the crane on site (generally less 300 miles from our plants). Oldcastle's project team will coordinate overall schedule, erection sequence, safety plans, and other project parameters with each customer to ensure on-time delivery.

Our project scope can include installation and grouting by Oldcastle's experienced and PCI certified field crews; or FOB delivery only for installation by the general contractor and his/her erector. The erector will install the precast planks in accordance with PCI tolerances which include occasional cutting and trimming of the concrete to adjust for product and field tolerances, and interference with steel connections not shown on contract & shop drawings. However, it is the responsibility of the project design team and general contractor to provide information to Oldcastle Precast to have as many factory cuts and notches as possible. Grouting material consists of 1:3 cement-sand grout with a minimum 28-day strength of 2,500 psi placed in all plank joints, and sometimes also at perimeter joints. Higher grout strengths of 4,000 psi is used on CFS load bearing metal stud and Girder-Slab shallow steel beam structures. Field grout is delivered by ready mix truck and placed by crane bucket and grout brooms, or by grout pump. Pre-packaged non-shrink grout is not used in hollow-core plank grouting.

## Load Table Design Criteria

The tables herein list allowable live loads in pounds per square foot (PSF) for uniformly distributed loading. Non-uniform loading conditions resulting from point loads, line loads, openings and cantilevers require special design consideration. The SER should specify the required uniform and special loading on the structural drawings. Oldcastle engineering will perform all engineering analysis and submit PE stamped calculations to the GC/Architect/SER for review and approval prior to fabrication.

Load Table values are calculated in accordance with ACI 318-11 design standard and comply with L/360 deflection limits.

Load tables are based on a plank concrete strength of 5,000 psi. Tables for topped sections are based on a topping strength of 3,500 psi and minimum thickness of 2 inches

Plank self-weight and 2" concrete composite topping are both included, and do not need to be added to your design loads to compare to these load tables.

See "Notes" section in the load tables for other helpful design tips on using our load tables. It is possible to exceed the values in these load

tables by approximately 10% if the area in question is adjacent to side wall or beam support, or shorter spans.

For initial design, the following span to depth ratios (L/D) can be used to determine maximum spans and hollow-core plank thickness:

Maximum Span to Depth Ratio	
Residential Loading of 20 SDL + 40 LL	48
Residential Loading with masonry partitions	35
Common/Assembly Loading of 10 SDL + 100 LL	42

## Plank Design Considerations

The following items will affect the selection of appropriate plank sizes and should be carefully reviewed by the Architect/Engineer (SER = structural engineer of record) while developing the plans and specifications for a project:

### Loading Conditions

- Specify all uniform loading requirements on structural drawings.
- Specify snow drift loads per ASCE-7 on the roof plan.
- The SER should specify plank connection details and/or diaphragm shear forces resulting from wind and seismic lateral analysis; and retained earth if present.
- Identify line and point loads resulting from masonry partition walls, face brick, posts, mansards, RTUs, mechanical equipment, etc.
- In general, the plank floor system can be designed for MEP openings and small skylights less than 4'-0" wide.
- Larger openings such as elevator shafts, stair shafts, and MEP shafts larger than 4'-0" wide will require additional structural support for the precast planks.

### Topping

- Specify whether or not concrete topping is to be composite. Composite action requires the topping to be bonded to the top surface of the plank. Oldcastle Precast's standard is to provide a longitudinal machine drag rake finish on the top of the precast planks to provide an intentionally roughened finish for improved bonding with the composite topping.
- "Topped" load tables are calculated with a maximum horizontal shear stress of 80 psi between the top of the precast plank and the bottom of the topping.
- Topping separated by a vapor barrier or insulation is non-composite and must be considered a superimposed dead load.
- Large cambers resulting from heavy loads will affect the quantity of topping, assuming a level floor is required. 1-1/2" of composite topping at mid span is minimal, and additional thickness at the ends of the plank may be required to maintain level floor elevations.

## Camber

- Camber is inherent in all prestressed products. It is the result of the eccentric prestress force required to resist design loads, and cannot be designed in, out, or to an exact number. The amount of camber will depend upon the design loads, span and thickness of plank. Planks stored in the yard for more than 4 weeks, usually due to construction schedule changes, will experience more camber growth.
- Adjacent plank of dissimilar length or dissimilar strand pattern will have inherent camber differences.
- Camber can be approximated as 0.3% of the span and must be taken into account when specifying concrete topping thickness. For example, if 2-1/2" concrete topping thickness is specified, a minimum topping thickness of 1-1/2" is still achieved with a maximum plank camber of 1" at mid-span.
- The approximate short term camber loss from 30 psf live load is 1/4". This value can be used as a guide for curtain wall connection design to the perimeter edge of the precast plank. The precast plank will revert back to full camber once the live load is gone.
- The approximate long term camber loss from material shrinkage & creep is 1/8" in 5 years and 1/4" in 20 years.

## Fire Rating

Fire rating specifications are as important as all other design parameters. Plank rating requirements are determined by the Architect or Structural Engineer of Record (SER), who is also responsible for establishing the fire rating criteria for the total project.

Four methods generally used for determining precast hollow core plank fire-resistant ratings are:

1. 2012 ICC International Building Code
2. Underwriters Laboratories Fire Resistance Ratings
3. NYC OTCR approved product & manufacturer certification (New York City only)
4. Rational analysis as defined by PCI MNL 124, "Design for Fire Resistance of Precast Concrete"

### International Building Code "IBC" Fire Ratings

The ICC-IBC code prescribes fire ratings to any precast hollow-core plank section. Since 2000, the ICC-IBC code has replaced the BOCA, SBC and UBC model codes in all 50 states. The two criteria that are measured to determine the fire rating are:

1. Equivalent concrete thickness – 4.6" is required for 2 hrs
2. Bottom strand cover – 3/4" cover is required for 2 hrs (restrained condition)

### Underwriters Laboratories Fire Resistance Ratings

Prior to codes including prescriptive fire-endurance rating methods, fire tests provided the primary source of ratings classifications. While some plank sections were fire tested, others can be evaluated by UL from similar existing UL ratings.

The table below lists the UL ratings available with Elematic plank. Note that these ratings are dependent upon whether or not the ends of the planks are restrained. Determination of the restraint must be made by the Architect or the Structural Engineer of Record (SER), as it is primarily a function of the support structure.

UL Number	Rating (Hour)		Plank Thickness (inch)	Topping Thickness (inch)
	Restrained	Unrestrained		
J994	1½	1½	8,10,12	0
J994	2	1½	8,10,12	½ Gypcrete
J994	3	1½	8,10,12	2⅝ Topping
J994	4	1½	8,10,12	3⅝ Topping
J995	2	2	8,10,12	0
J995	3	2	8,10,12	1½ Topping
J995	4	2	8,10,12	2⅝ Topping

### New York City OTCR Product Approval

For projects within New York City, the NYC Dept. of Building requires the precast hollow-core manufacturing plant to be pre-approved by the Office of Technical Certification & Research (OTCR). Historically, this certification was known as the MEA certification (Material & Equipment Acceptance) prior to the 2008 NYC Building Code. Oldcastle Precast has been a NYC approved precast hollow-core plank manufacturer since the early 1970s.

### Fire Ratings by Rational Analysis

PCI MNL 124 defines the "rational analysis" method for determining the fire resistance rating of precast/ prestressed members. It is useful to use when a fire resistance rating cannot be obtained by any of the three previous methods. Actual practice has shown that this method is very conservative and that the span of the hollow-core plank will have to be reduced (approx. 10% to 20%) to achieve the same fire resistance rating from both IBC and UL.

In using this method, the reduced strength of the prestressed strands at elevated temperatures is determined and the resulting moment capacities are compared to that required for service loads. Strand temperatures are based on the amount of concrete cover and the standard fire exposure as defined by the time-temperature relationship specified in ASTM E119. Fire ratings will also be improved if the plank assembly is restrained against thermal expansion. It should be noted that the only universally accepted definition of full restraint is an interior bay of a multi-bay building.

## Thermal "R" Values

Concrete is a dense material, and as a result, is not a good insulating material. On occasion, a designer who needs the thermal "R" value of precast concrete hollow-core planks, can reference the table below.

Although there is some improvement for filling the plank hollow-cores with foam insulation, the losses from thermal bridging of the concrete webs greatly reduces the effectiveness of the added insulation. There is also a cost premium and longer lead time associated with adding foam insulation. A much more economical design option is to specify 1'-3" of batt insulation (widely available in 15" rolls) installed into the cores at areas of high potential heat loss, in the field by the general contractor.

Thermal "R" Values	
8" Elematic®	1.34
8" Elematic® with foam insulation in cores	3.14
H8" Heavy Elematic®	1.43
H8" Heavy Elematic® with foam insulation in cores	2.72
H10" Heavy Elematic®	1.73
H10" Heavy Elematic® with foam insulation in cores	4.05
12" Elematic®	1.91
12" Elematic® with foam insulation in cores	5.01
16" Elematic®	2.28
16" Elematic® with foam insulation in cores	7.48
2" concrete topping	+0.15
3" concrete topping	+0.23
2" lightweight concrete roof topping (110 pcf)	+0.35
4" lightweight concrete roof topping (110 pcf)	+0.70
6" lightweight concrete roof topping (110 pcf)	+1.05

## Sound Ratings

The following tables contain values for the Sound Transmission Class (STC) and the Impact Insulations Class (IIC) of various floor systems utilizing Elematic precast hollow-core plank.

### Sound Transmission Class (STC)

The values for the Sound Transmission Class were determined by testing in accordance with ASTM E90. The STC is a measure (in decibels) of the ease at which air-borne sound is transmitted through a floor system. The density and mass of precast concrete planks is ideal for achieving larger STC values, which indicate greater sound insulation.

Sound Transmission Class (STC)	
8" Elematic®	51
8" Elematic® + 2" Topping	54
H8" Heavy Elematic®	51
H8" Heavy Elematic® + 2" Topping	55
H10" Heavy Elematic®	53
H10" Heavy Elematic® + 2" Topping	56
12" Elematic®	54
12" Elematic® + 2" Topping	57
16" Elematic®	56
16" Elematic® + 2" Topping	59

### Impact Insulation Class (IIC)

The values for the Impact Insulation Class (IIC) were determined by tests which were in accordance with ASTM ES492. Impact Insulation Class is the resistance to impact noise transmission and is mostly influenced by the finish material applied on top of the precast planks. A soft material such as carpeting will achieve the best IIC ratings. As with STC, the higher IIC values are more desirable. Note that IIC testing is typically done by the finish material manufacturer on 6" solid concrete slabs. These test values can be used on other slab thickness and precast hollow-core planks since the effect of the mass of the underlying slab is negligible for impact noise absorption.

Impact Insulation Class (IIC)	
Types of Floor Systems	Rating
8" Hollow-core Plank	28
8" Hollow-core Plank + ½" wood block flooring adhered directly	47
8" Hollow-core Plank + VCT, (ex. Armstrong)	47-56
8" Hollow-core Plank + quarry tile w/reinforced mortar bed with 0.4" nylon & carbon black spinneret matting	54
8" Hollow-core Plank + pad & carpet	73
Add Acoustical Ceiling	+6

## Sustainability

It is recognized that the production of cement is a high contributor of CO2 in industry. In 2013, a joint LCA study conducted by the Precast Concrete Institute (PCI), Canadian Prestressed Concrete Institute (CPCI), and the National Precast Concrete Association (NPCA) confirmed this and also gave our industry a benchmark for future improvements. The following sustainable practices are already in place to manufacture, deliver and install our Elematic® hollow-core planks:

- Use the lowest cement content in manufacturing while still achieving consistent concrete strengths.
- Although fly ash can be added to divert the fly ash waste from landfills, we cannot replace any more cement from our optimized concrete mix.
- Advance machine extrusion technology casts Elematic® hollow-core planks with 44%-52% less concrete compared to the equivalent thickness solid concrete slab.
- Proven prestressing technology since the 1960s with ASTM A416 steel strands with 270 ksi yield strength (4.5X stronger than conventional rebar) increases our maximum span by approx. 75% more than continuous design CIP solid concrete slabs of the same thickness which results in less framing elements such as columns, beams, and bearing walls.
- Steel casting beds provide the most consistent smooth bottom finish without any other additional forming waste (ie. no wood).
- Both radiant heating in our casting beds and natural curing are used depending on the season to achieve proper curing with the lowest energy use. Steam curing is not used.
- All our concrete constituent materials including cement, limestone aggregates, and sand; are extracted from nearby sources well within the 500 miles LEED criteria.
- All water is pumped from on site wells, reducing the demand on the local municipal water supply.
- Waste precast hollow-core plank in our yard is crushed and separated in our yard. The crushed concrete is used for clean fill material by local road contractors and land owners. All scrap steel is delivered to recycling centers.
- On the job site, multiple planks can sometimes be picked to reduce the overall erection time to shorten the overall construction schedule and minimize noise pollution. Up to 10,000 sf of Elematic® hollow-core planks can be installed in a single day.

Oldcastle Precast continues to search for more future sustainable practices.



## SPECIFICATIONS FOR PRECAST, PRESTRESSED HOLLOW-CORE PLANK SECTION 03400

### 1. GENERAL

#### 1.01 Description

A. Work Included:

1. These specifications cover manufacture, transportation and erection of precast, prestressed, concrete, hollow-core plank, including grouting of joints between adjacent units.

B. Related Work Specified Elsewhere:

2. Cast-in-Place Concrete: Section \_\_\_\_\_
3. Architectural Precast Concrete: Section \_\_\_\_\_
4. Precast Structural Concrete: Section \_\_\_\_\_
5. Underlayments (Floor and/or Roof Leveling): Section \_\_\_\_\_
6. Caulking and Sealants: Section \_\_\_\_\_
7. Small Holes for Mechanical/Plumbing: Section \_\_\_\_\_
8. Cast-in-Place Embedments: Section \_\_\_\_\_
9. Steel Bearing Lintels: Section \_\_\_\_\_
10. Insulation in Plank Cores: Section \_\_\_\_\_

#### 1.02 Quality Assurance

- A. Manufacturer Qualifications: The precast concrete manufacturing plant shall be certified by the Prestressed Concrete Institute (PCI) Plant Certification Program prior to the start of production. Manufacturer shall be certified in category C2. The manufacturer shall retain a registered structural engineer to certify that manufacturing is in accordance with design requirements; or

The manufacturer shall, at his expense, meet the following requirements:

1. The basis of inspection shall be the Prestressed Concrete Institute's "*Manual for Quality Control for Plants and Production of Precast and Prestressed Concrete Products*", MNL-116, and the criteria for acceptance shall be the same as the Plant Certification Program.

- B. Erector Qualifications: PCI Qualified and regularly engaged for at least 5 years in the erection of precast structural concrete similar to the requirements of this project. Retain a registered structural engineer to certify that erection is in accordance with design requirements.

- C. Welder Qualifications: In accordance with AWS D1.1.

- D. Testing: In general compliance with applicable provisions of Prestressed Concrete Institute MNL-116, "*Manual for Quality Control for Plants and Production of Precast Prestressed Concrete Products*".

- E. Requirements of Regulatory Agencies: All local codes plus the following specifications, standards and codes are a part of these specifications:

1. ACI 318 – Building Code Requirements for Reinforced Concrete;
2. AWS D1.1 – Structural Welding Code-Steel;
3. AWS D1.4 – Structural Welding Code-Reinforcing Steel;
4. ASTM Specifications – As referred to in Part 2-Products, of this Specification.

## 1.03 Submittals and Design

### A. Shop Drawings:

#### 1. Erection Drawings

Plans locating and defining all hollow-core planks furnished by the manufacturer, with all major openings shown.

- a. Sections and details showing connections, weld plates, edge conditions and support conditions of the hollow-core plank units.
- b. All dead, live and other applicable loads used in the design.
- c. Fire rating.

### B. Approvals:

1. Submit \_\_\_\_\_ copies of erection drawings for approval prior to fabrication. Fabrication not to proceed prior to receipt of approved drawings.

### C. Product Design Criteria:

#### 1. Loadings for design

- a. Initial handling and erection stresses.
- b. All dead and live loads as specified on the contract documents.
- c. All other loads specified for hollow-core plank where applicable.

#### 2. Fire rating shall be \_\_\_\_\_ hour(s).

3. Design steel plank support headers when such headers are determined necessary by the manufacturer's engineer.
4. Design calculations shall be performed by an engineer, registered in the state that the project is located in, and experienced in precast prestressed concrete design. Design calculations to be submitted for approval upon request.
5. Design shall be in accordance with ACI 318 and applicable codes.

### D. Permissible Design Deviations:

1. Design deviations will be permitted only after the Architect/Engineer's written approval of the manufacturer's proposed design supported by complete design calculations and drawings.
2. Design deviations shall provide an installation equivalent to the basic intent without incurring additional cost to the owner.

### E. Test Reports: Test reports on concrete and other materials shall be submitted upon request.

## 2. PRODUCTS

### 2.01 Materials

#### A. Portland Cement:

1. ASTM C150 – Type I or III.

#### B. Admixtures:

1. Water Reducing, Retarding, Accelerating, High-Range Water Reducing Admixtures: ASTM C494

#### C. Aggregates:

1. ASTM C33 or C330

#### D. Water: Potable or free from foreign materials in amounts harmful to concrete and embedded steel.

#### E. Reinforcing Steel:

##### 1. Bars:

Deformed Billet Steel: ASTM A615  
Deformed Rail Steel: ASTM A616  
Deformed Axle Steel: ASTM A617  
Deformed Low Alloy Steel: ASTM A706

2. Wire: Cold Drawn Steel: ASTM A82.

#### F. Prestressing Strand:

1. Uncoated, 7-Wire, Low Lax strand: ASTM A416 (including supplement) – Grade 250K or 270K.

- G. Welded Studs: In accordance with AWS D1.1.
- H. Structural Steel Plates and Shapes: ASTM A36.
- I. Grout:
  - 1. Cement grout: Grout shall be a mixture of not less than one part portland cement to three parts fine sand, and the consistency shall be such that joints can be completely filled but without seepage over adjacent surfaces. The grout shall achieve a minimum 28-day compressive strength of 2,000 psi. Any grout that seeps from the joint shall be completely removed before it hardens.
- J. Bearings Strips:
  - 1. Plastic: Multi-monomer plastic strips shall be non-leaching and support construction loads with no visible overall expansion.

## 2.02 Concrete Mixes

- A. 28-day compressive strength: Minimum of 5,000 psi
- B. Release strength: Minimum of 3,000 psi
- C. Use of calcium chloride or admixtures containing chlorides is not permitted.

## 2.03 Manufacture

- A. Hollow-core plank shall be machine cast in 48-inch widths under the trade name Elematic® as manufactured by Old-castle Precast Building Systems.
- B. Manufacturing procedures and tolerances shall be in general compliance with PCI MNL 116.
- C. Openings: Manufacturer shall provide for rectangular openings 10 inches or larger on all sides and as clearly shown on the architectural and structural drawings. They shall be located by the trade requiring them and then field cut. Round and small openings (less than 10 inches) shall be drilled or cut by the respective trades after grouting. Openings requiring cutting of prestressing strand shall be approved by the precast plank manufacturer before drilling or cutting.
- D. Finishes: Bottom surface shall be flat and uniform as resulting from an extrusion process, without major chips, spalls and imperfections. Top surface shall be machine troweled.
- E. Patching: Will be acceptable providing the structural adequacy of the hollow core unit is not impaired.

# 3. EXECUTION

## 3.01 Product Delivery, Storage and Handling

- A. Delivery and Handling:
  - 1. Hollow-core plank shall be lifted and supported during manufacturing, stockpiling, transporting and erection operations only at the lifting or supporting points designated by the manufacturer.
  - 2. Transportation, site handling and erection shall be performed by qualified personnel with acceptable equipment and methods.
- B. Storage:
  - 1. Store all units off ground on firm, level surfaces with dunnage placed at bearing points.
  - 2. Place stored units so that identification marks are discernible.
  - 3. Separate stacked units by dunnage across full width of each plank.

## 3.02 Erection

- A. Site Access: Erection access suitable for cranes and trucks to move unassisted from public roads to all crane working areas as required by erector, or otherwise indicated herein, will be provided and maintained by the general contractor. Obstructing wires shall be shielded or removed and, when applicable, snow removal and winter heat will be provided by the general contractor.
- B. Preparation: The general contractor shall be responsible for:
  - 1. Providing true, level, bearing surfaces on all field-placed bearing walls and other fieldplaced supporting members. Masonry wall bearing surfaces shall be bond beams with properly filled and cured concrete.
  - 2. All pipes, stacks, conduits and other such items shall be stubbed off at a level lower than the bearing plane until after the plank are set. Masonry, concrete or steel shall not be installed above plank-bearing surface until after the plank is in place.
- C. Installation: Installation of hollow-core slab units shall be performed by the manufacturer. Members shall be lifted with slings at points determined by the manufacturer. Bearing strips shall be set where required. Grout keys shall be filled.

Openings shall be field cut only after grout has cured, unless authorized by the manufacturer's engineer.

- D. Alignment: Members shall be properly aligned. Variations between adjacent members shall be reasonably leveled out by jacking, bolting or any other feasible method as recommended by the manufacturer.

### **3.03 Field Welding**

- A. Field welding is to be done by qualified welders using equipment and materials compatible to the base material.

### **3.04 Attachments and Small Holes**

- A. Subject to approval of the Architect/Engineer, hollow-core plank units may be drilled or "shot" provided no contact is made with the prestressing steel. Round holes and those less than 8 inches on any side shall be drilled or cut by the respective trades. Should spalling occur, it shall be repaired by the trade doing the drilling, shooting or cutting.

### **3.05 Clean up**

- A. Remove rubbish and debris resulting from hollow-core plank work from premises upon completion.

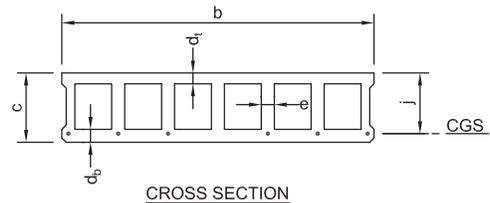
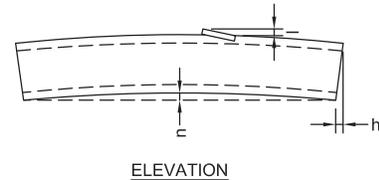
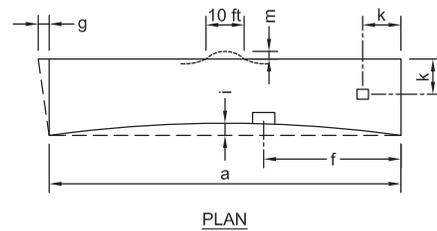
### **3.06 Safety**

- A. The general contractor will provide and maintain all safety barricades, rebar caps and opening covers required for plank in accordance with current industry safety standards.

# Production & Erection Tolerances:

## Product Tolerances: Hollow-core Slabs

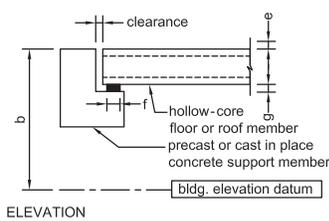
- a = Length .....  $\pm \frac{1}{2}$  in.
  - b = Width .....  $\pm \frac{1}{4}$  in.
  - c = Depth .....  $\pm \frac{1}{4}$  in.
  - $d_t$  = Top flange thickness  
Top flange area defined by the actual measured values of average  $d_t \times b$  shall not be less than 85% of the nominal area calculated by  $d_t$  nominal  $\times$  b nominal.
  - $d_b$  = Bottom flange thickness  
Bottom flange area defined by the actual measured values of average  $d_b \times b$  shall not be less than 85% of the nominal area calculated by  $d_b$  nominal  $\times$  b nominal.
  - e = Web thickness  
The total cumulative web thickness defined by the actual measured value  $\Sigma e$  shall not be less than 85% of the nominal cumulative width calculated by  $\Sigma e$  nominal.
  - f = Blockout location .....  $\pm 2$  in.
  - g = Flange angle .....  $\frac{1}{4}$  in. per 12 in.,  $\frac{1}{2}$  in. max.
  - h = Variation from specified end squareness or skew .....  $\pm \frac{1}{2}$  in.
  - i = Sweep (variation from straight line parallel to centerline of member) .....  $\pm \frac{3}{8}$  in.
  - j = Center of gravity of strand group  
The CG of the strand group relative to the top of the plank shall be within  $\pm \frac{1}{4}$  in. of the nominal strand group CG. The position of any individual strand shall be with  $\pm \frac{1}{2}$  in. of nominal vertical position and  $\pm \frac{3}{4}$  in. of nominal horizontal position and shall have a minimum cover of  $\pm \frac{3}{4}$  in.
  - k = Position of plates .....  $\pm 2$  in.
  - l = Tipping and flushness of plates .....  $\pm \frac{1}{4}$  in.
  - m = Local smoothness .....  $\pm \frac{1}{4}$  in. in 10 ft.  
(does not apply to top deck surface left rough to receive a topping or to visually concealed surfaces)
- Plank weight: Excess concrete material in the plank internal features is within tolerance as long as the measured weight of the individual plank does not exceed 110% of the nominal published unit weight used in the load capacity calculation.
- n = Applications requiring close control of differential camber between adjacent members of the same design should be discussed in detail with the producer to determine applicable tolerances.



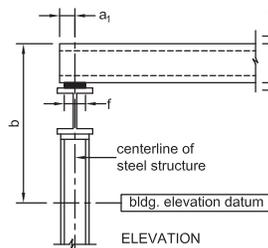
## Erection Tolerances: Hollow-core Floor & Roof Members

- a = Plan location from building grid datum .....  $\pm 1$  in.
- $a_1$  = Plan location from centerline of steel<sup>1</sup> .....  $\pm 1$  in.
- b = Top elevation from nominal elevation at member ends  
Covered with topping .....  $\pm \frac{3}{4}$  in.  
Untopped floor .....  $\pm \frac{1}{4}$  in.  
Untopped roof .....  $\pm \frac{3}{4}$  in.
- c = Maximum jog in alignment of matching edges (both topped and untopped construction) .....  $\pm 1$  in.
- d = Joint width  
0 to 40 ft. member length .....  $\pm \frac{1}{2}$  in.  
41 to 60 ft. member length .....  $\pm \frac{3}{4}$  in.  
61 ft. plus .....  $\pm 1$  in.
- e = Differential top elevation as erected  
Covered with topping .....  $\frac{3}{4}$  in.  
Untopped floor .....  $\frac{1}{4}$  in.  
Untopped roof<sup>2</sup> .....  $\frac{3}{4}$  in.
- f = Bearing length<sup>3</sup> (span direction) .....  $\pm \frac{3}{4}$  in.
- g = Differential bottom elevation of exposed hollow-core slabs<sup>4</sup> .....  $\frac{1}{4}$  in.

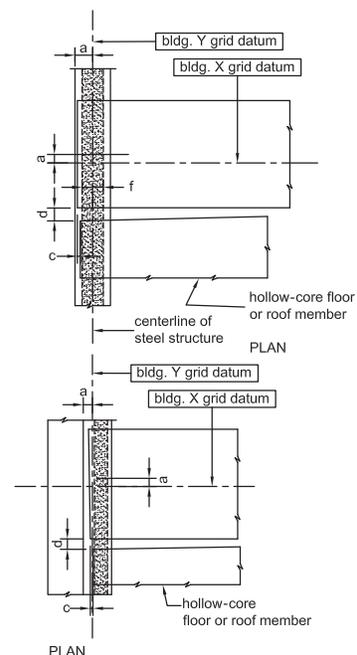
<sup>1</sup> For precast concrete erected on a steel frame building, this tolerance takes precedence over tolerance on dimension "a".  
<sup>2</sup> It may be necessary to fatter the edges to  $\pm \frac{1}{4}$  in. to properly apply some roof membranes.  
<sup>3</sup> This is a setting tolerance and should not be confused with structural performance requirements set by the architect/engineer.  
<sup>4</sup> Untopped installation will require a larger tolerance here.



Precast element to precast or cast-in-place concrete or masonry



Precast element to structural steel

















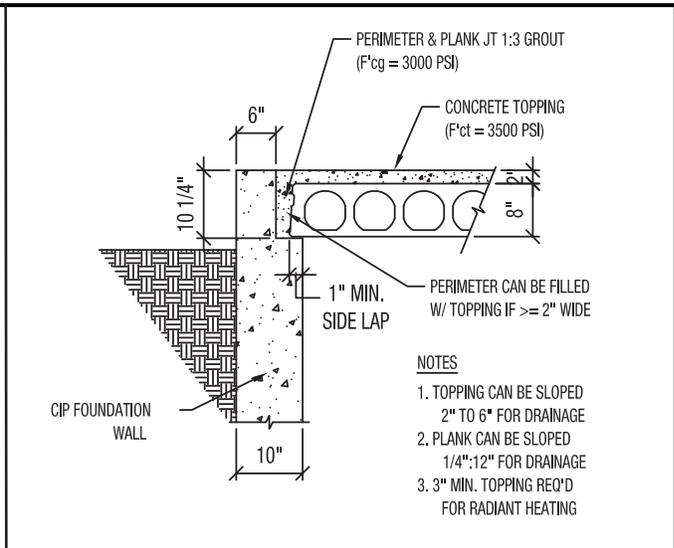
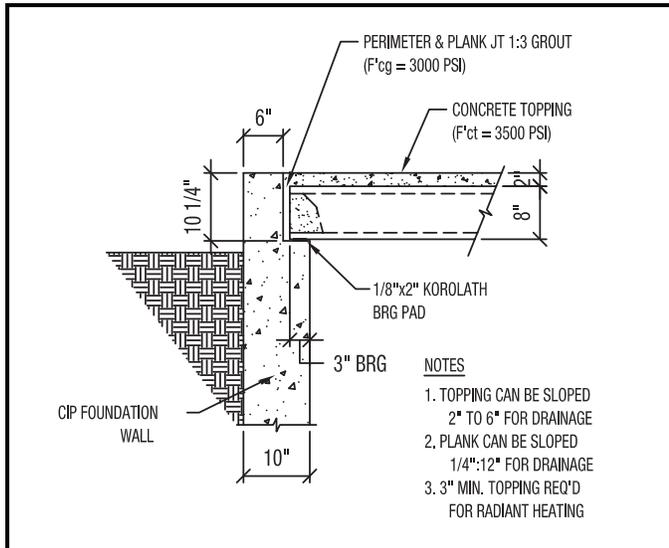






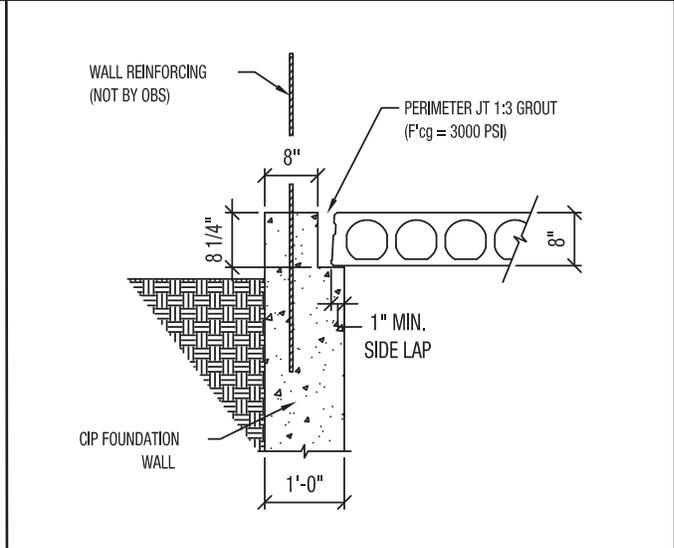
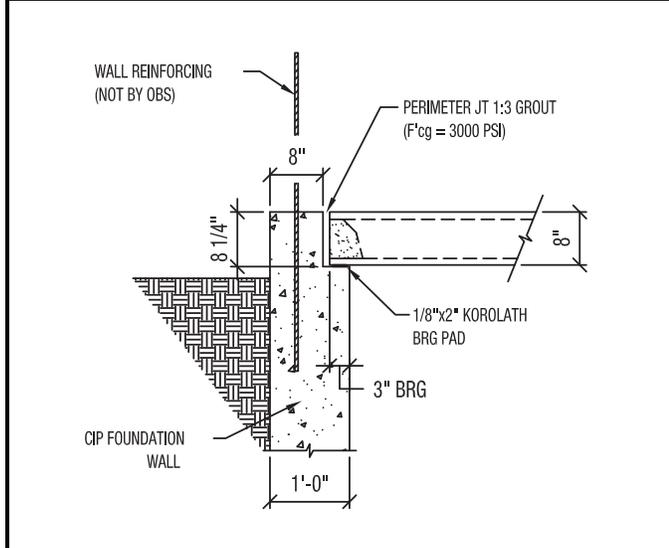


# Elematic® Hollow-core Plank Details



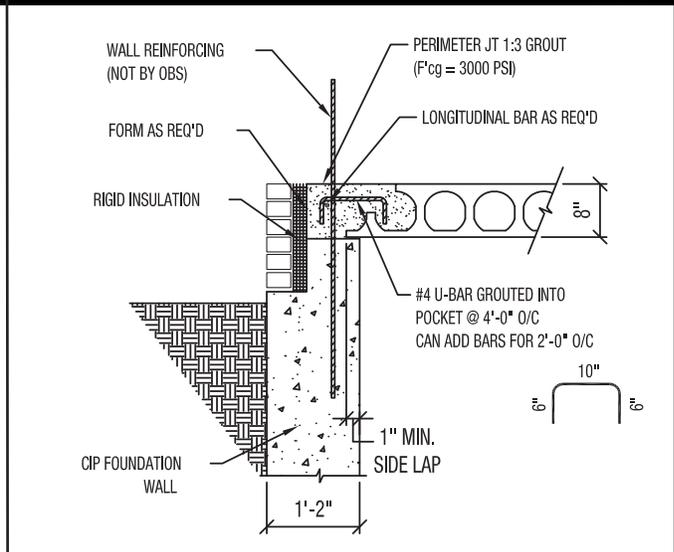
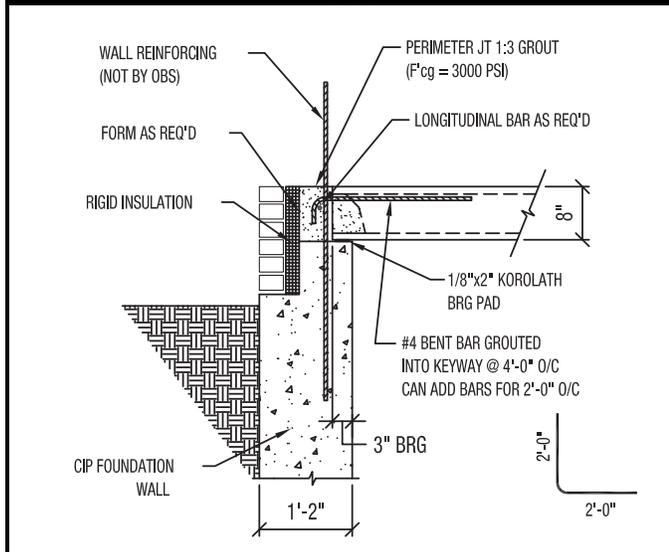
**E1.0 Foundation Bearing (Residential)**

**E2.0 Foundation Side Lap (Residential)**



**E3.0 Foundation Bearing (1)**

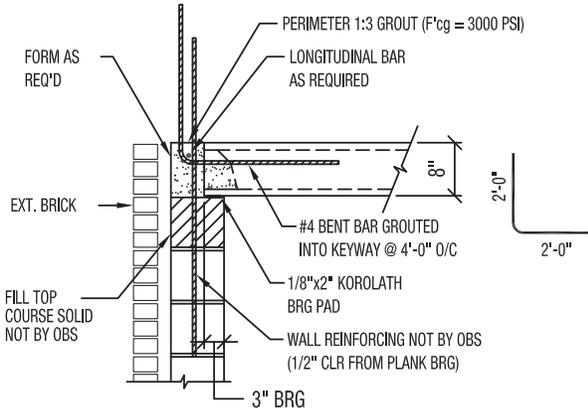
**E4.0 Foundation Side Lap (1)**



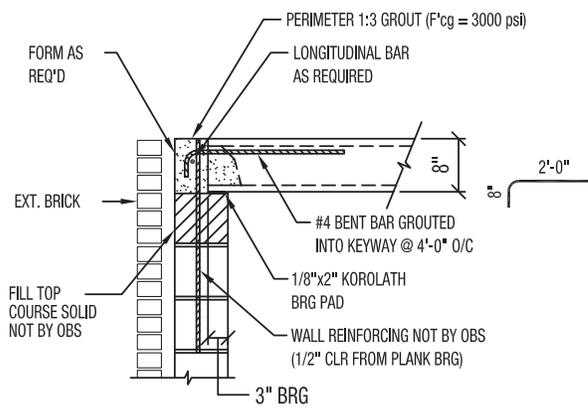
**E5.0 Foundation Bearing (2)**

**E6.0 Foundation Side Lap (2)**

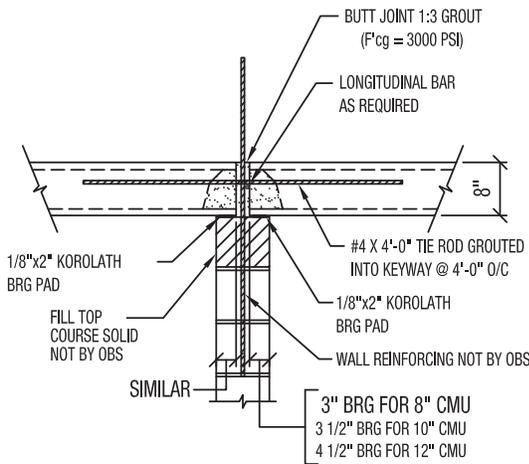
# Elematic® Hollow-core Plank Details



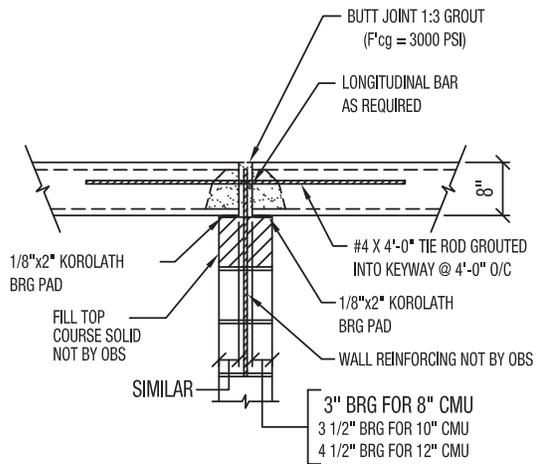
**E7.0 Exterior Bearing (Typ. Flr.)**



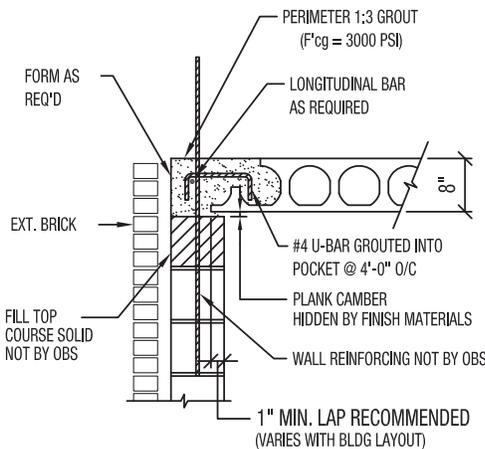
**E8.0 Exterior Bearing (Roof)**



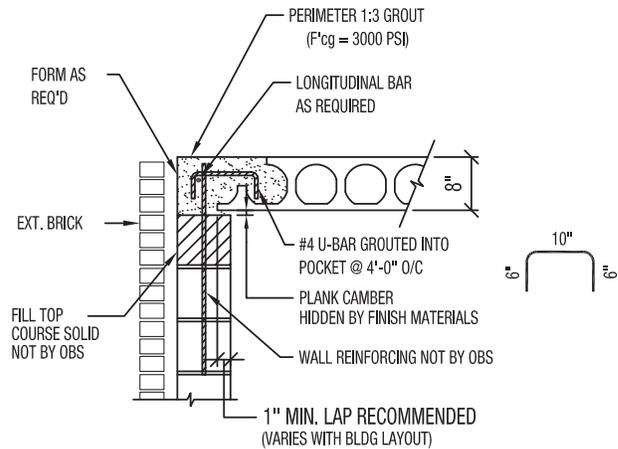
**E9.0 Interior Bearing**



**E10.0 Interior Bearing (Roof)**

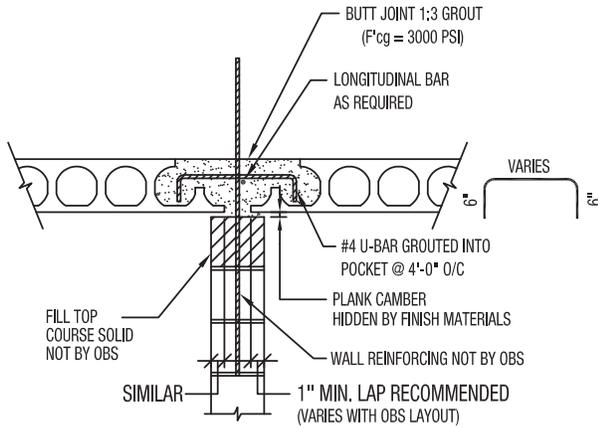


**E11.0 Exterior Side Lap**

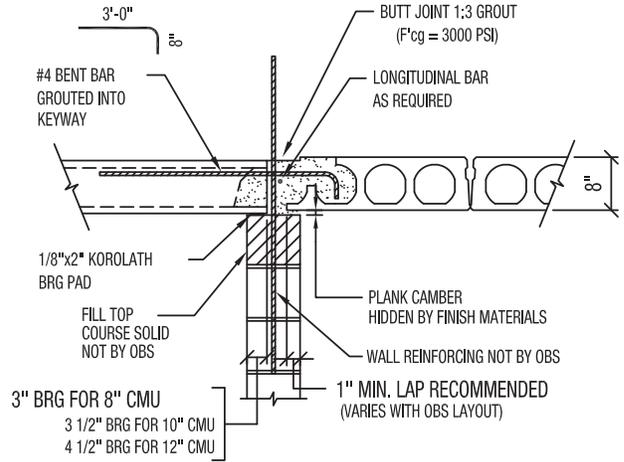


**E12.0 Exterior Side Lap (Roof)**

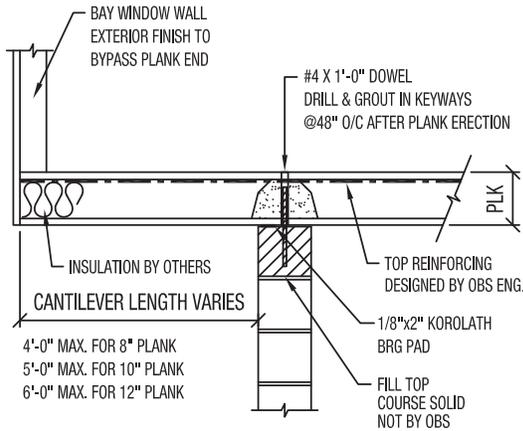
# Elematic® Hollow-core Plank Details



**E13.0 Interior Shear Wall**

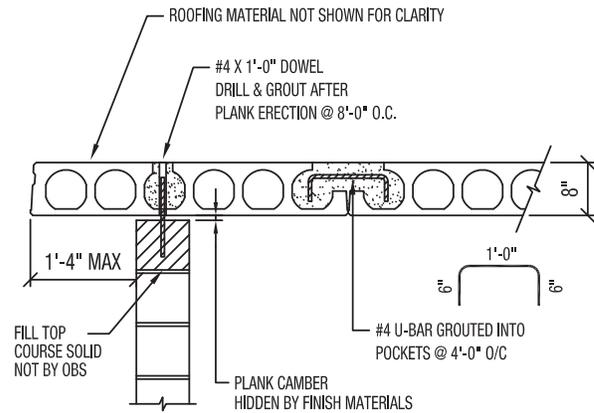


**E14.0 Interior Change of Direction**

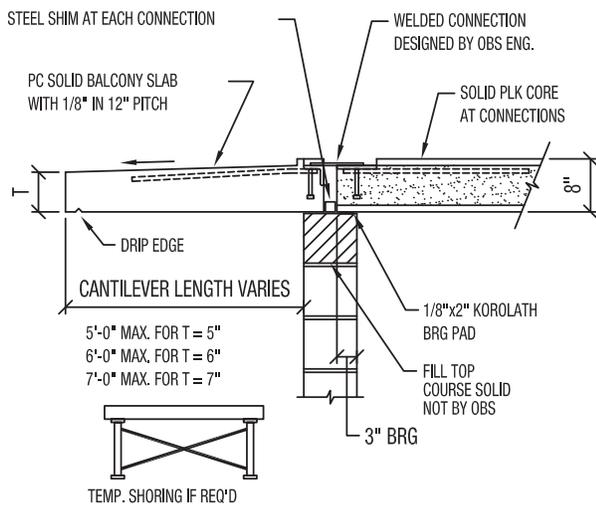


(PLANK NOT EXPOSED TO WEATHER)

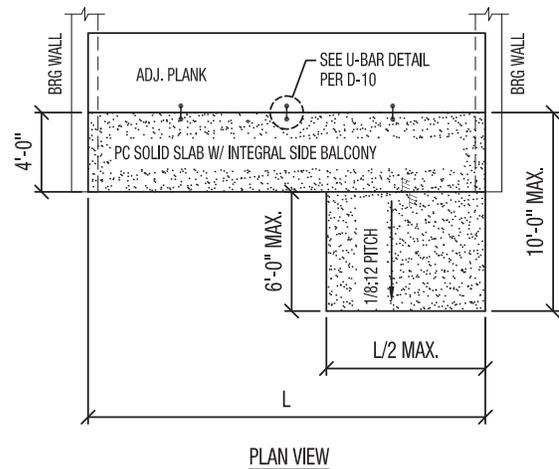
**E15.0 Cantilever Plank for Bay Windows**



**E16.0 Small Side Plank Roof Overhang**

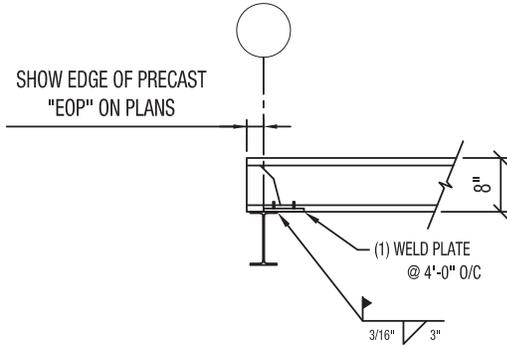


**E17.0 Cantilever Solid Slab Balconies at Plank End**



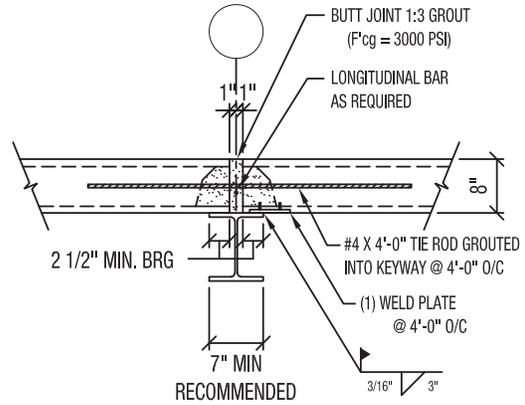
**E18.0 Integral Side Cantilever Balconies**

# Elematic® Hollow-core Plank Details



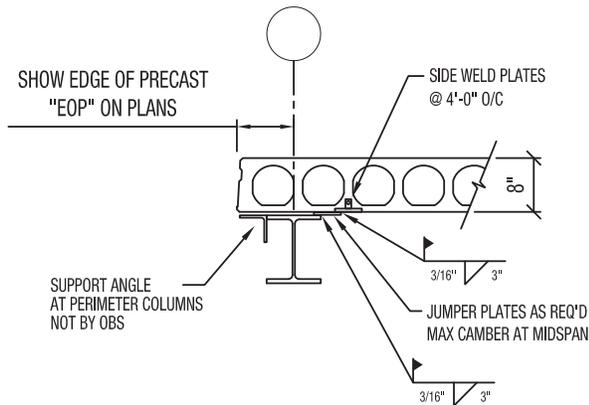
NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK IF RESTRAINT IS EXCESSIVE. WELDING ALTERNATING PLANKS WILL STILL PROVIDE LATERAL BEAM BRACING.

**E19.0 End Bearing on Steel**

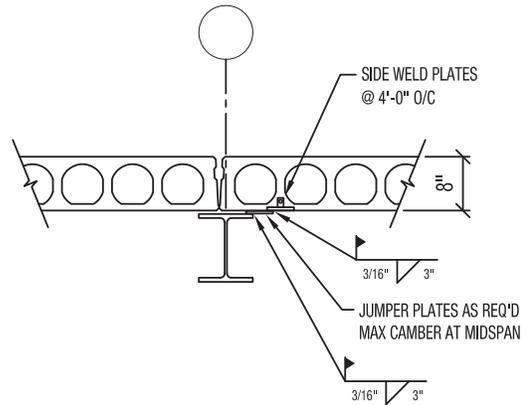


NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK IF RESTRAINT IS EXCESSIVE. WELDING ALTERNATING PLANKS WILL STILL PROVIDE LATERAL BEAM BRACING.

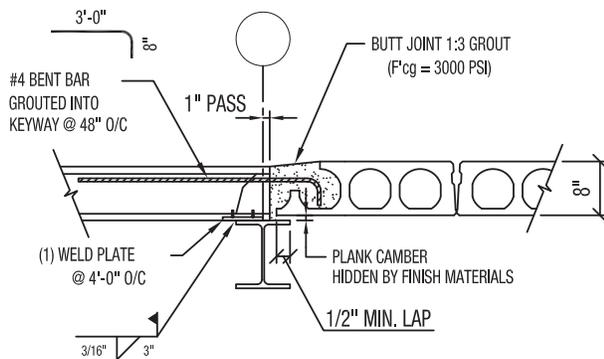
**E20.0 Interior Bearing on Steel**



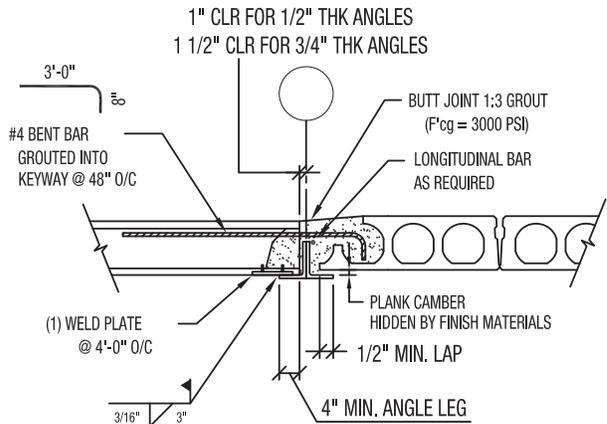
**E21.0 Exterior Side Lap on Steel**



**E22.0 Interior Side Lap on Steel**

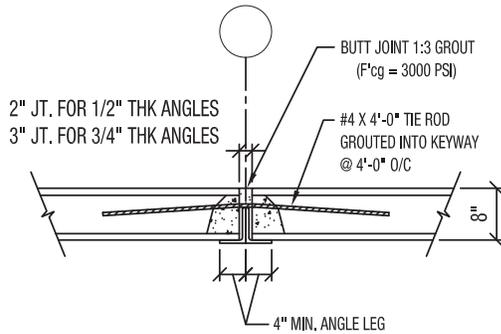


**E23.0 Interior Change of Direction on WF**

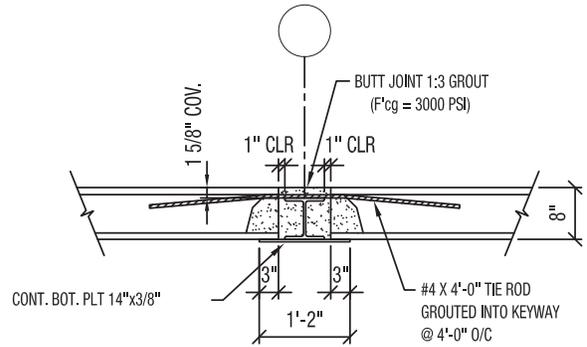


**E24.0 Change of Direction on Angles**

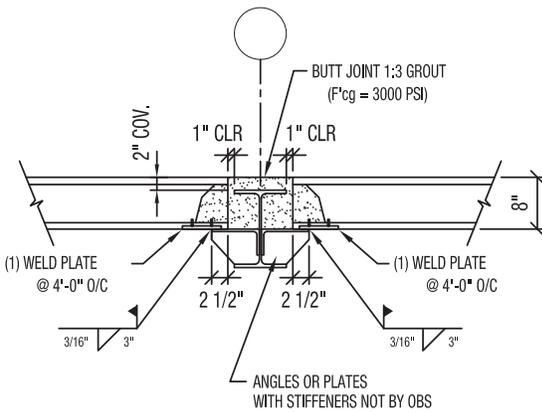
# Elematic® Hollow-core Plank Details



**E25.0 Angle Support at Corridors < 7'-0" Wide**

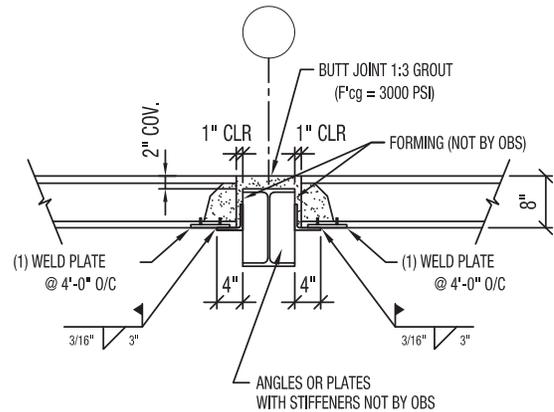


**E26.0 Interior Bearing on Upset Steel (3)**



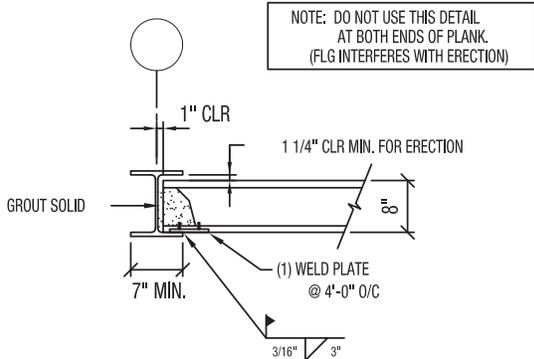
NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK  
IF RESTRAINT IS EXCESSIVE. WELDING ALTERNATING  
PLANKS WILL STILL PROVIDE LATERAL BEAM BRACING.

**E27.0 Interior Bearing on Upset Steel (1)**



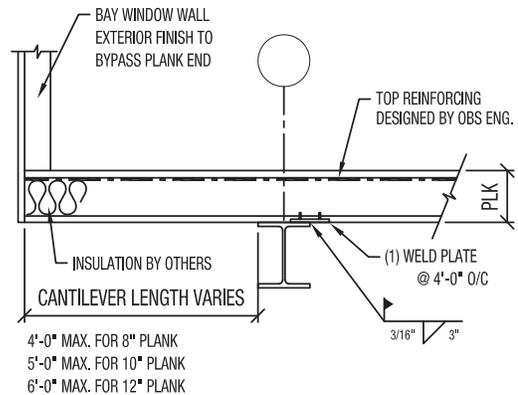
NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK  
IF RESTRAINT IS EXCESSIVE. WELDING ALTERNATING  
PLANKS WILL STILL PROVIDE LATERAL BEAM BRACING.

**E28.0 Interior Bearing on Upset Steel (2)**



NOTE: DO NOT WELD BOTH ENDS OF THE SAME PLANK  
IF RESTRAINT IS EXCESSIVE. WELDING ALTERNATING  
PLANKS WILL STILL PROVIDE LATERAL BEAM BRACING.

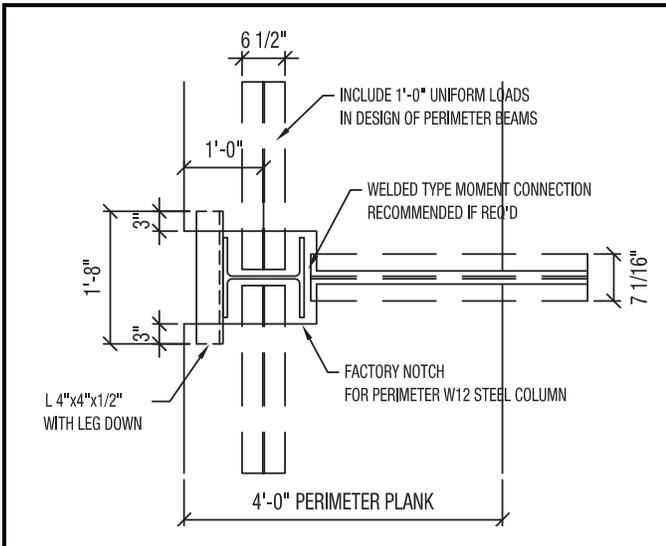
**E29.0 End Bearing on Upset Steel**



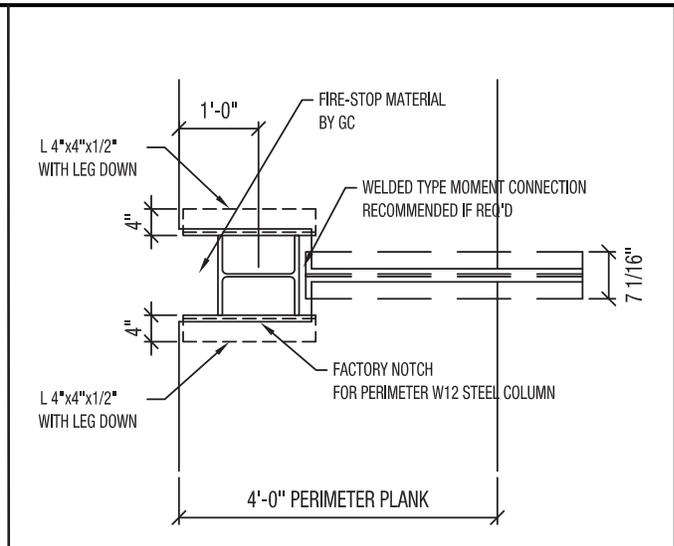
(PLANK NOT EXPOSED TO WEATHER)

**E30.0 Cantilever Plank for Bay Windows**

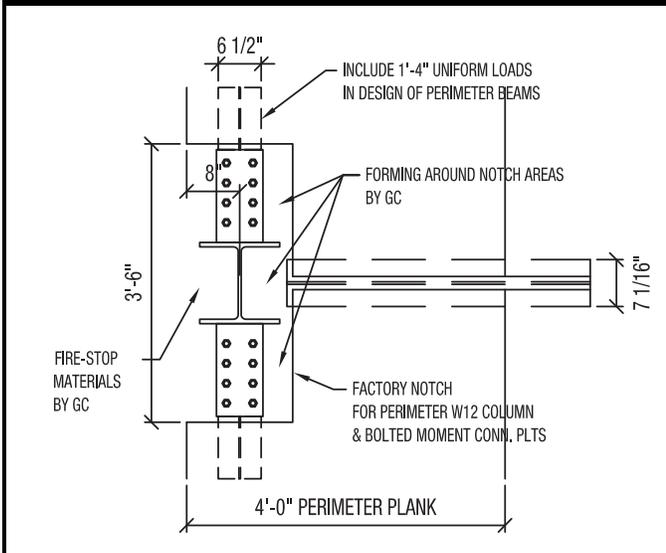
# Elematic® Hollow-core Plank Details



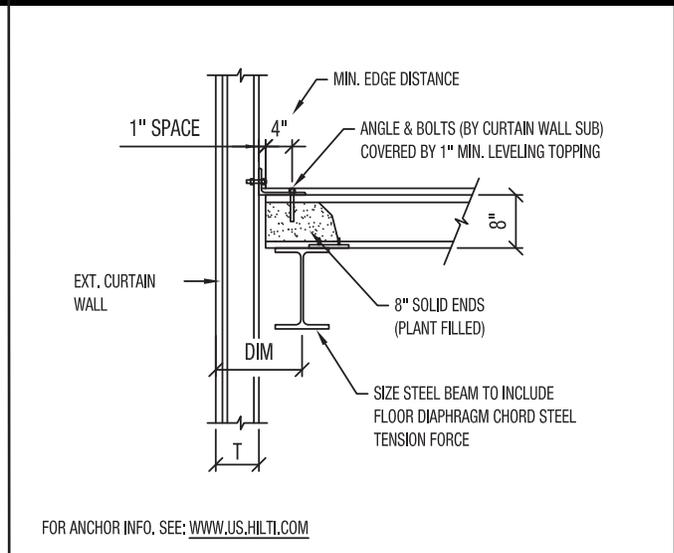
**E31.0 Perimeter Steel Column w/ Beams**



**E32.0 Perimeter Steel Column w/o Beams**

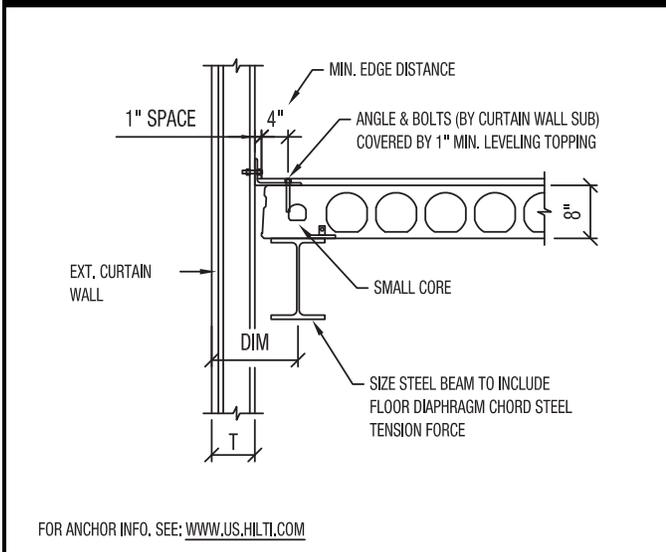


**E33.0 Perimeter Steel Column w/ Bolted Plt.**



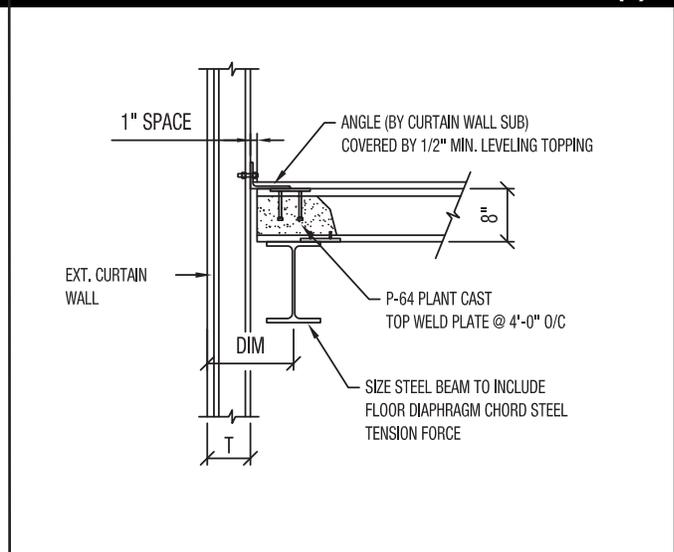
FOR ANCHOR INFO, SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

**E34.0 Ext. Curtain Wall to End of Plank (1)**



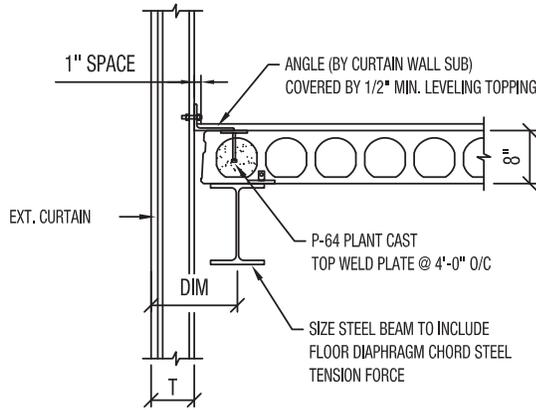
FOR ANCHOR INFO, SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

**E35.0 Ext. Curtain Wall to Side of Plank (1)**

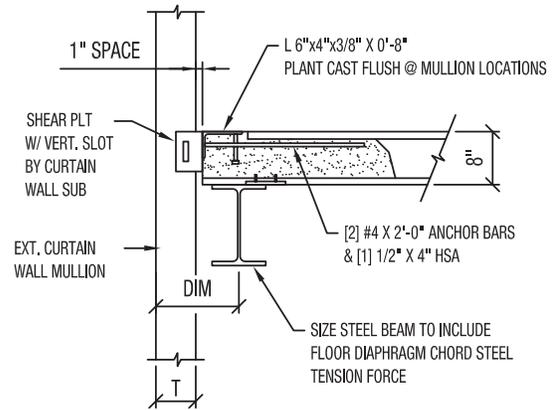


**E36.0 Ext. Curtain Wall to End of Plank (2)**

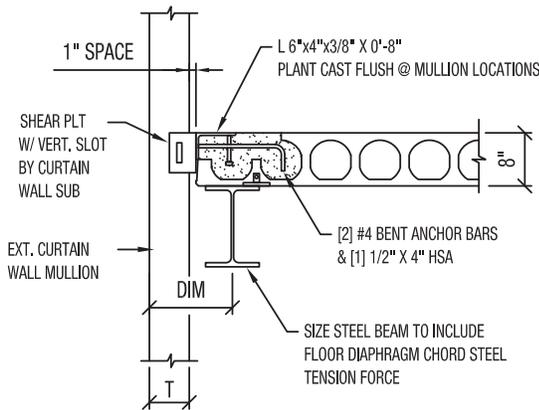
# Elematic® Hollow-core Plank Details



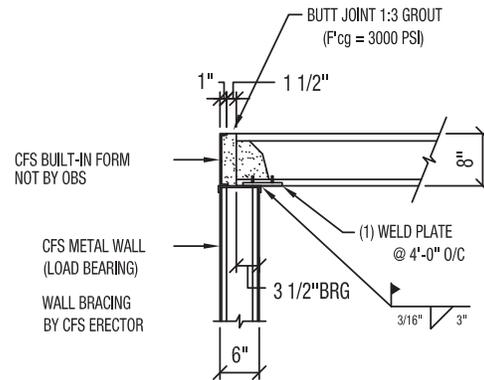
**E37.0 Ext. Curtain Wall to Side of Plank (2)**



**E38.0 Ext. Curtain Wall to End of Plank (3)**

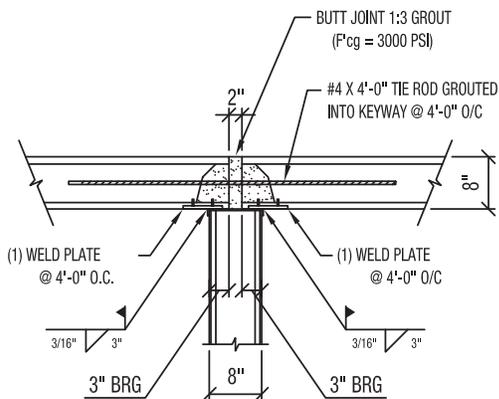


**E39.0 Ext. Curtain Wall to Side of Plank (3)**



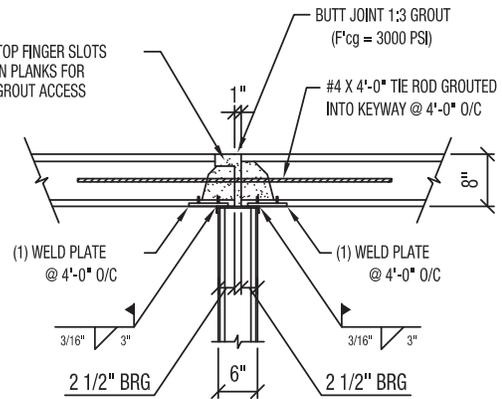
FOR MORE INFO. SEE: [WWW.STEELNETWORK.COM](http://WWW.STEELNETWORK.COM)

**E40.0 Exterior Bearing on Metal Stud**



FOR MORE INFO. SEE: [WWW.STEELNETWORK.COM](http://WWW.STEELNETWORK.COM)

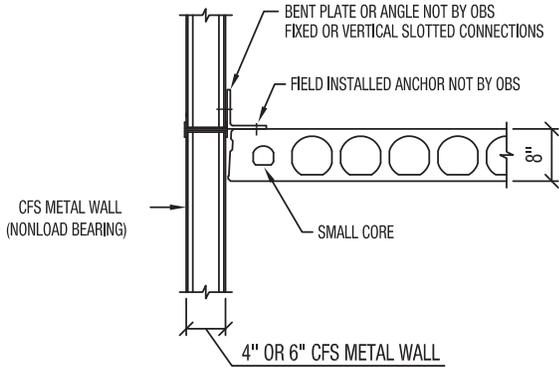
**E41.0 Interior Bearing on 8" Metal Wall**



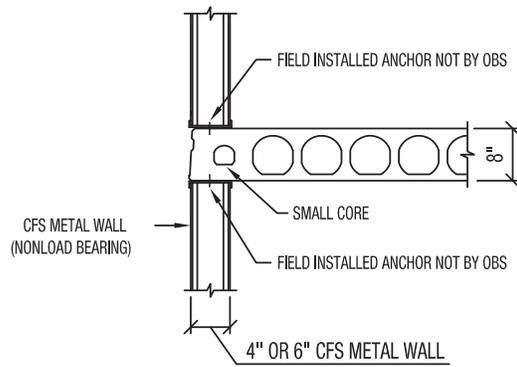
FOR MORE INFO. SEE: [WWW.STEELNETWORK.COM](http://WWW.STEELNETWORK.COM)

**E42.0 Interior Bearing on 6" Metal Wall**

# Elematic® Hollow-core Plank Details



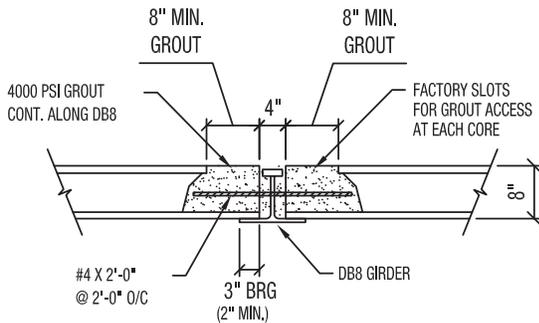
FOR MORE INFO. SEE: [WWW.STEELNETWORK.COM](http://WWW.STEELNETWORK.COM)



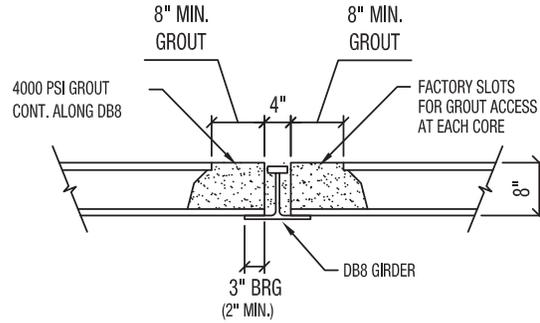
FOR MORE INFO. SEE: [WWW.STEELNETWORK.COM](http://WWW.STEELNETWORK.COM)

## E43.0 Exterior Bypass Side on Metal Stud

## E44.0 Exterior Side Lap on Metal Stud



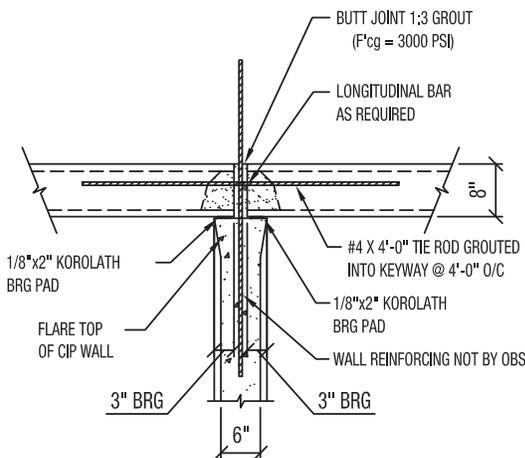
FOR MORE INFO. SEE: [WWW.GIRDER-SLAB.COM](http://WWW.GIRDER-SLAB.COM)



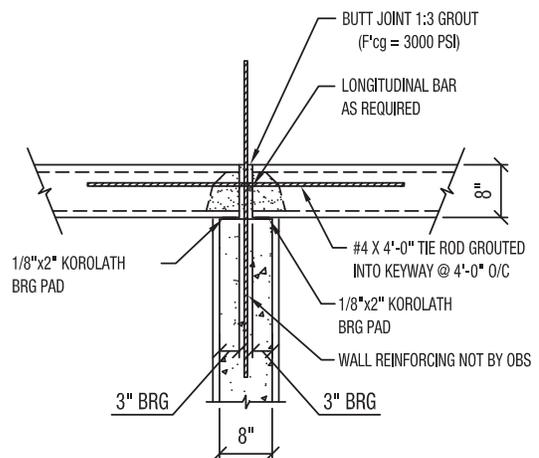
FOR MORE INFO. SEE: [WWW.GIRDER-SLAB.COM](http://WWW.GIRDER-SLAB.COM)

## E45.0 Girder-Slab System (Reinforced Core)

## E46.0 Girder-Slab System (Un-reinforced Core)



(PLANK CANNOT BEAR ON EPS INSULATION)

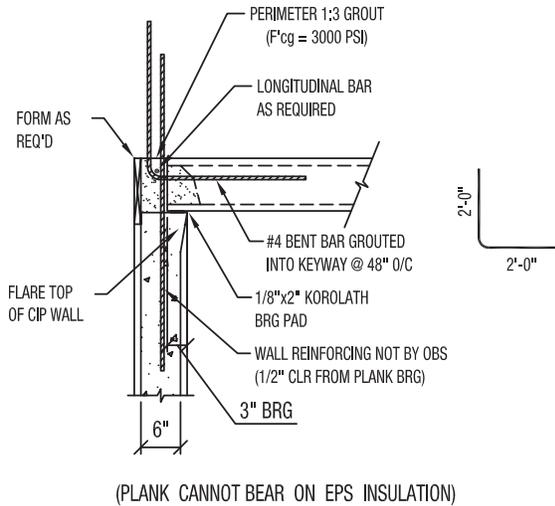


(PLANK CANNOT BEAR ON EPS INSULATION)

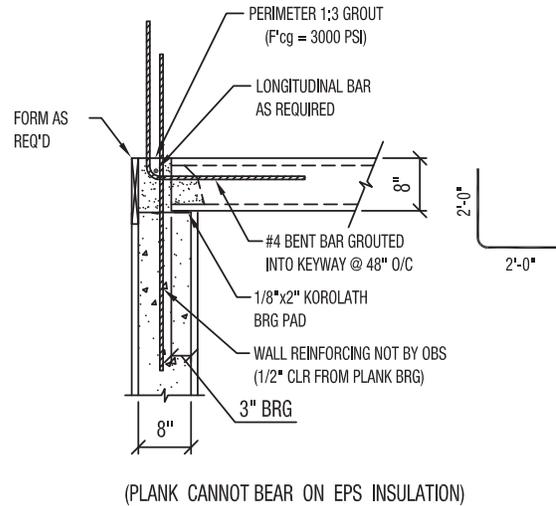
## E47.0 Interior Bearing on 6\"/>

## E48.0 Interior Bearing on 8\"/>

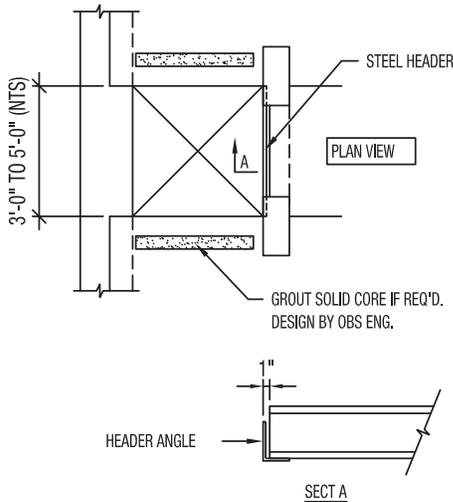
# Elematic® Hollow-core Plank Details



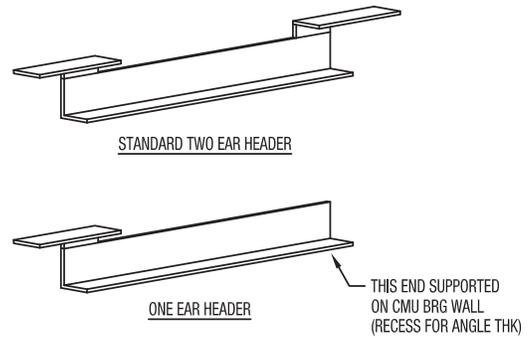
**E49.0 Exterior Bearing on 6" ICF Wall**



**E50.0 Exterior Bearing on 8" ICF Wall**

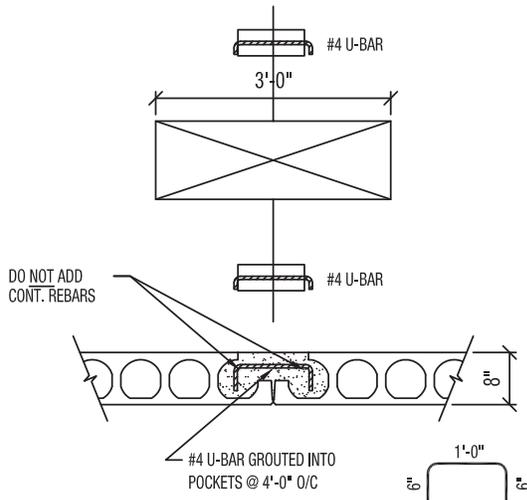


**E51.0 Header Support at Large Opening**

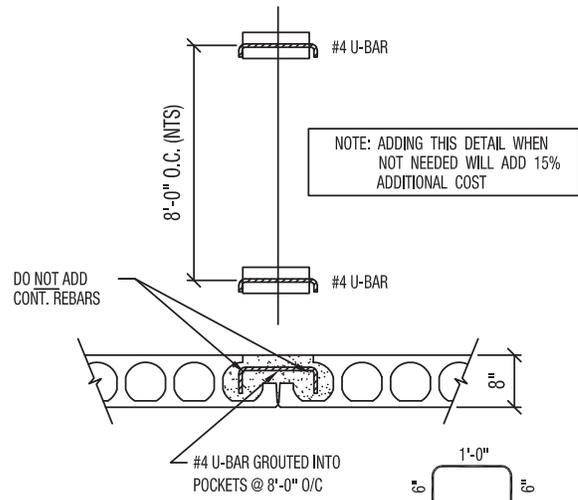


PLANK THK	HEADER ANGLE	EAR PLATE
ELEMATIC 8"	L 6"x4"x3/8"	PLT 4"x1/2" X 1'-1"
ELEMATIC 10"	L 7"x4"x1/2"	PLT 4"x5/8" X 1'-1"
ELEMATIC 12"	L 8"x4"x1/2"	PLT 4"x3/4" X 1'-1"
ELEMATIC 16"	L 8"x6"x1/2"	PLT 6"x3/4" X 1'-1"

**E52.0 Plank Header Types**

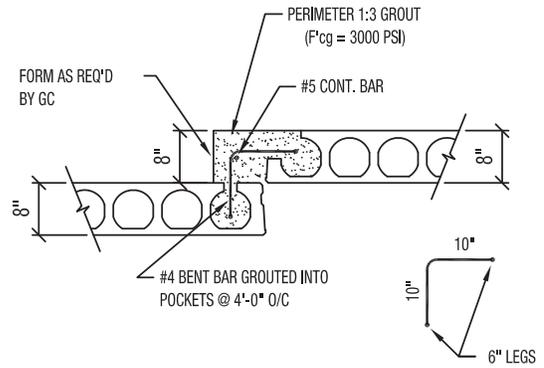
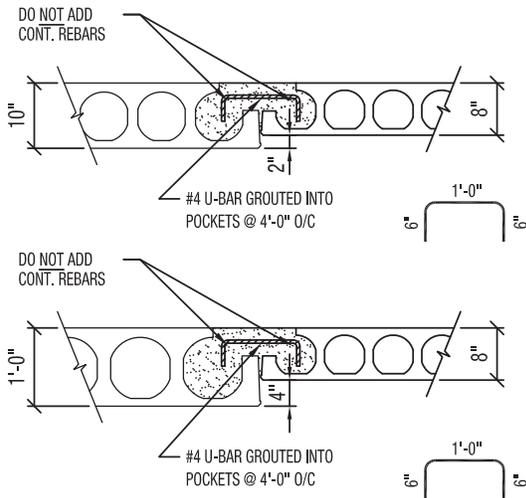


**E53.0 Field Saw Cut Openings > 3'-0"**



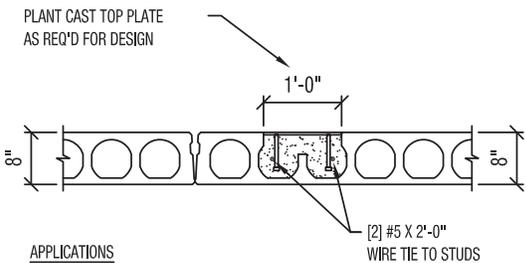
**E54.0 Rigid Diaphragm w/ Long Shear > 2.88 KLF**

# Elematic® Hollow-core Plank Details



**E55.0 #4 U-Bars at Different Plank Thk**

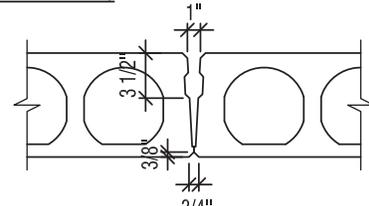
**E56.0 #4 U-Bars at Elevation Step**



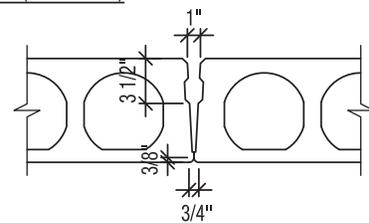
**APPLICATIONS**

1. FENCING POSTS
2. LARGE MANSARD POSTS > 6 FT TALL
3. SOLAR PANEL ARRAY TIE DOWN
4. TEMP. FALL ARREST POSTS

**SELKIRK PLANT (CHAMFER JT)**

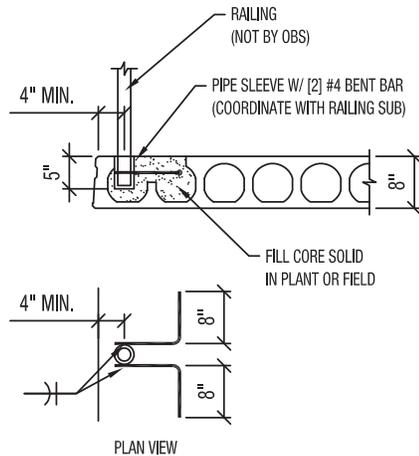
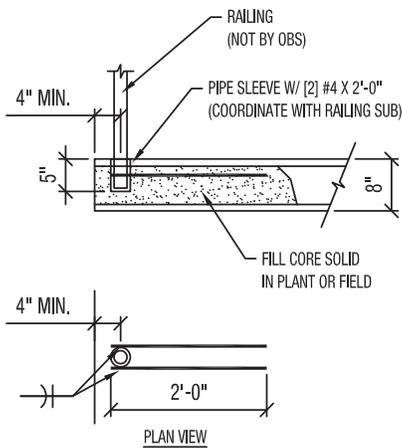


**EDGEWOOD PLANT (RADIUS JT)**



**E57.0 Roof Plank w/ Large Top Plates**

**E58.0 Variations by Manufacturing Location**

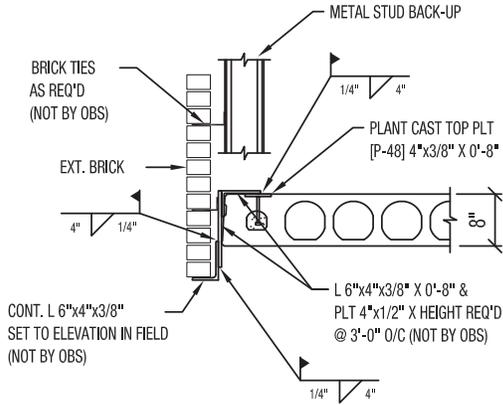


**E59.0 Railing Post Attachment at Plank End**

**E60.0 Railing Post Attachment at Plank Side**

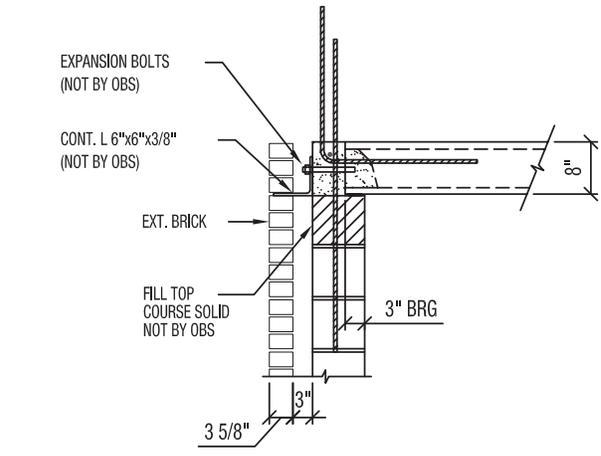
# Elematic® Hollow-core Plank Details

ENG. OF RECORD TO PROVIDE FINAL DESIGN



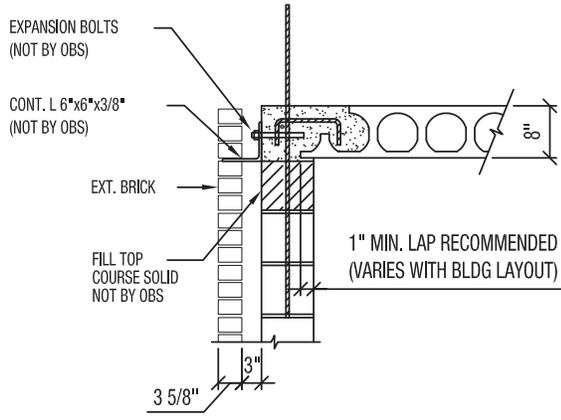
**NOTE:**

8" PLK CAN SUPPORT 350 PLF UP TO 20'-0" SPAN  
 10" PLK CAN SUPPORT 350 PLF UP TO 22'-6" SPAN  
 12" PLK CAN SUPPORT 350 PLF UP TO 25'-0" SPAN



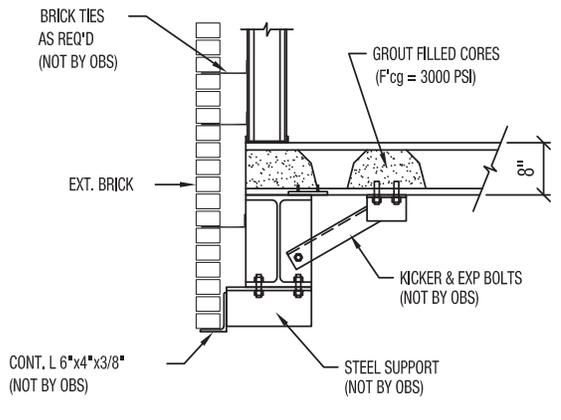
FOR ANCHOR INFO. SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

## E61.0 Sample Brick Relieving Angle (Plank Side)



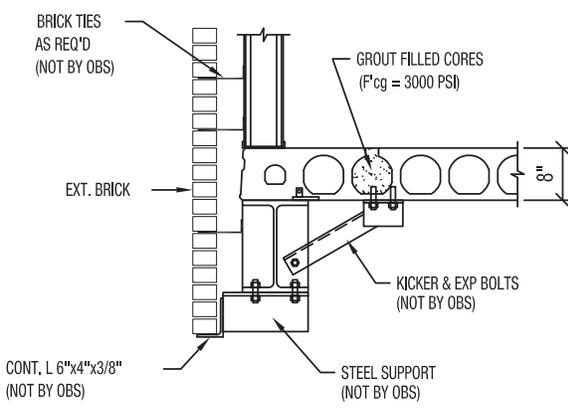
FOR ANCHOR INFO. SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

## E62.0 Brick Relieving Angle (Mason. Plank End)



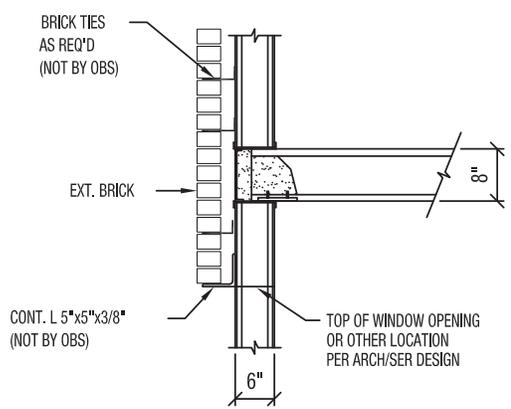
FOR ANCHOR INFO. SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

## E63.0 Brick Relieving Angle (Mason. Plank Side)



FOR ANCHOR INFO. SEE: [WWW.US.HILTI.COM](http://WWW.US.HILTI.COM)

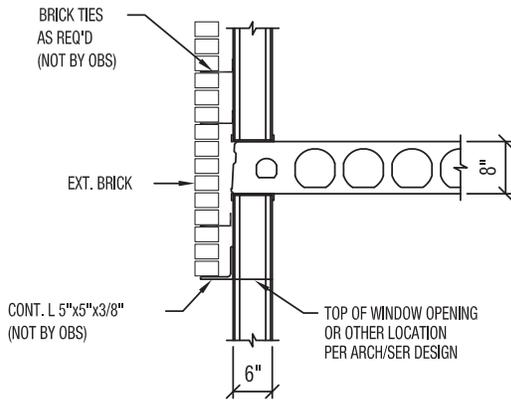
## E64.0 Brick Relieving Angle (Steel Plank End)



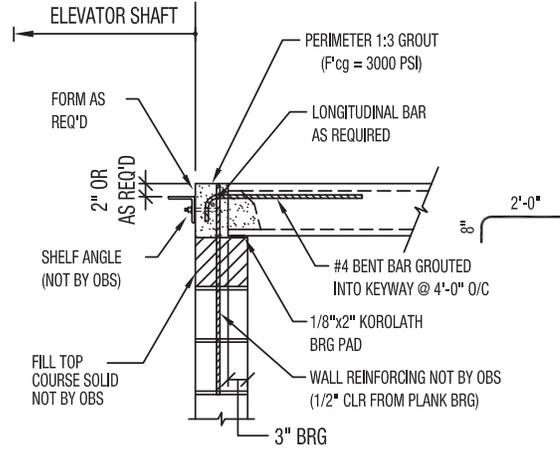
## E65.0 Brick Relieving Angle (Steel Plank Side)

## E66.0 Brick Relieving Angle (Met. Stud Plank End)

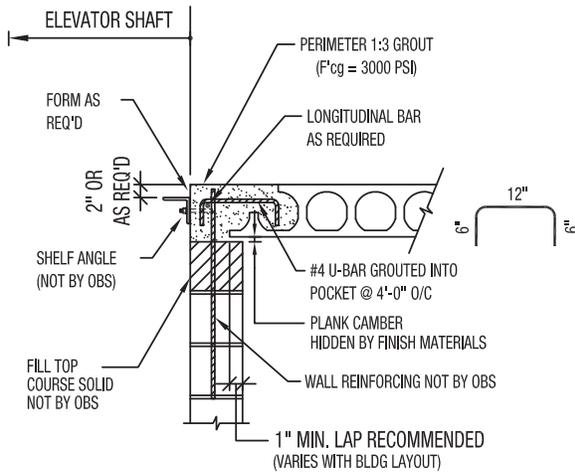
# Elematic® Hollow-core Plank Details



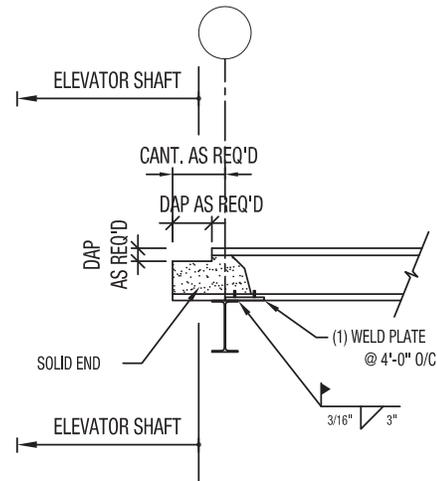
**E67.0 Brick Relieving Angle (Met. Stud Plank Side)**



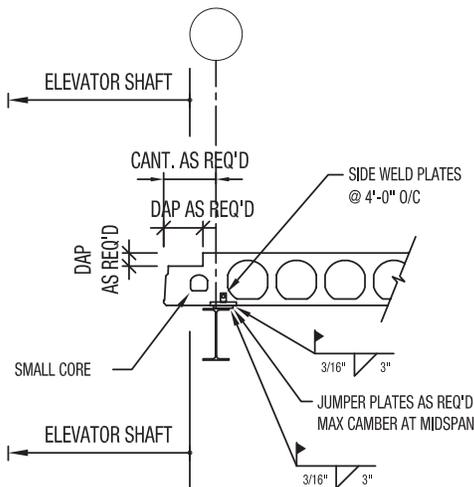
**E68.0 Elevator Door Support Detail (1)**



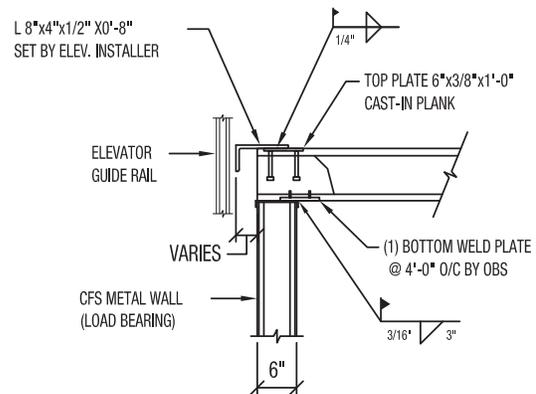
**E69.0 Elevator Door Support Detail (2)**



**E70.0 Elevator Door Support Detail (3)**

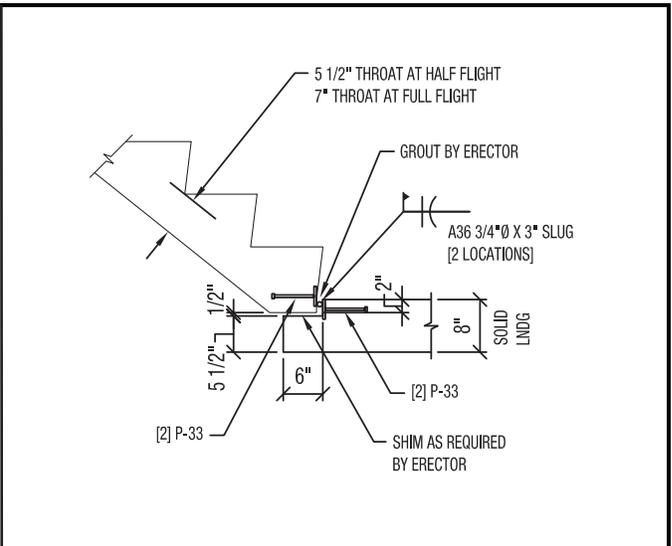
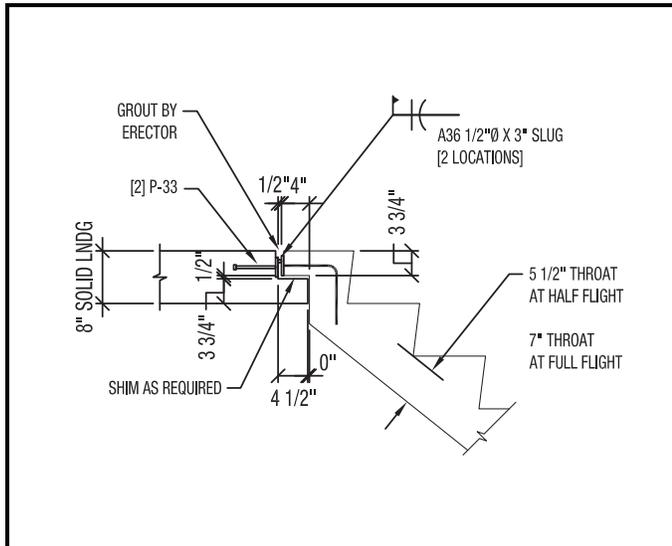


**E71.0 Elevator Door Support Detail (4)**



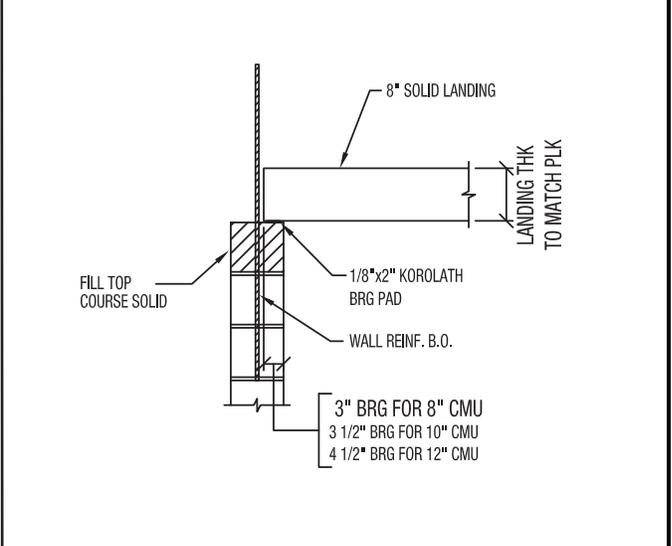
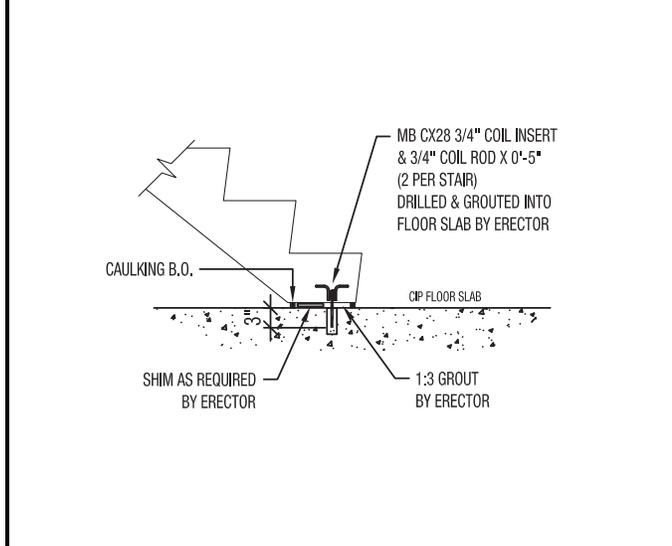
**E72.0 Metal Stud & Plank at Elevator Wall**

# Elematic® Hollow-core Plank Details



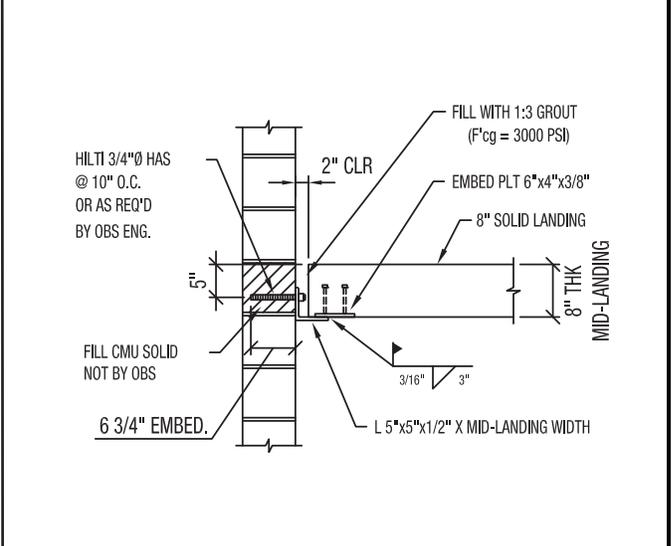
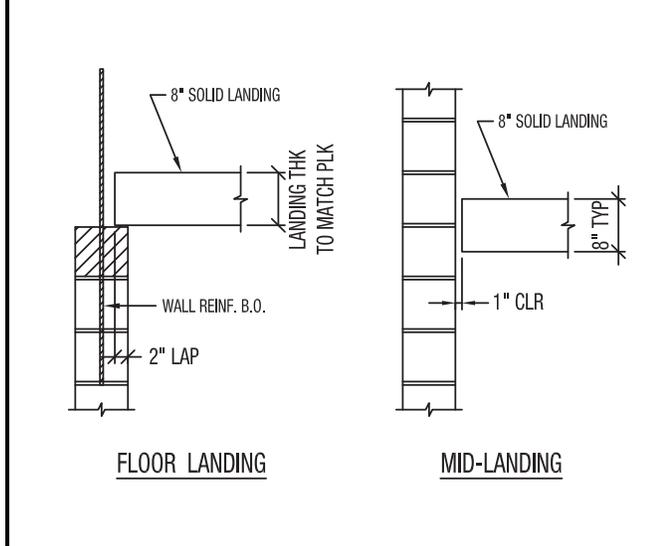
**E73.0 Top of Precast Stair at PC Landing**

**E74.0 Bottom of Precast Stair at PC Landing**



**E75.0 Precast Stair at Ground Slab**

**E76.0 Floor Landing End Bearing**



**E77.0 Floor & Mid-Landing Back Side Lap**

**E78.0 Mid-Landing Support Angle**

## Market Segments

Oldcastle Precast Building Systems' product offering has grown tremendously since the company was founded more than 50 years ago. Now you'll find precast homes that look no different than brick buildings from the turn-of-the-century. There are smart classrooms that make learning much easier, thanks to the quiet acoustics, pest and chemical resistance of precast concrete. And in every market segment we serve, new ideas are becoming a reality all the time.

### ***Multi-family residential***

- Apartments
- Assisted Living
- College Dormitories
- Condominiums
- Military Barracks/Quarters
- Mixed Use
- Nursing Homes

### ***Hospitality***

- Hotels/Motel(s)

### ***Educations***

- Academic Institutions
- Classroom Buildings

### ***Industrial***

- Warehouse / Distribution Centers

## Precast University

We developed our Lunch and Learn seminars to create an opportunity for architects, engineers and students to learn more about precast concrete principles and usage, earn accredited AIA/CES learning units and enjoy a complimentary lunch along with a plant tour. For schedule information, please visit [oldcastleprecast.com/buildingsystems](http://oldcastleprecast.com/buildingsystems)

## Committed to the Environment

The products that we manufacture are inherently durable and we're committed to focusing on innovations that make them even more so. In addition to creating products that last, we challenge ourselves to develop innovative strategies for improving environmental performance.

We're particularly proud to be involved with numerous LEED-certified projects and look forward to many more to come. We are one of the few precast companies in the U.S. with a LEED-accredited professional on staff to assist customers with their green building designs.

## Committed to the Environment

With four locations across the Northeast and Mid-Atlantic regions, we're able to support a wide variety of groups in our community. In addition to financial contributions, we volunteer our time building homes for those in need through Habitat for Humanity and by giving the students of West Point Engineering Program the opportunity to have their bridge designs manufactured for a national competition.

### ***We Proudly Support***

- American Cancer Society®
- Boy Scouts of America
- Civil Air Patrol
- Emergency Medical Technician Volunteers
- Habitat for Humanity®
- Regional Food Bank
- Special Olympics
- West Point Engineering Program

### *Oldcastle Precast*

A division of CRH and Oldcastle, Oldcastle Precast is the leading manufacturer of precast concrete and composites in the U.S. With more than 5,000 employees at over 80 locations nationwide, our work has won awards for safety, quality and customer service.

### *Ordering Information*

For specific product information please visit **[oldcastleprecast.com/buildingsystems](http://oldcastleprecast.com/buildingsystems)** or call (800) 523-3747 to reach our team of experts.

### *Manufacturing Locations*

> Baltimore, MD  
> South Bethlehem, NY  
Serving the Northeast to Mid-Atlantic regions.

### *Contact Information*

#### **Main office**

Oldcastle Precast Building Systems  
123 CR 101  
South Bethlehem, NY 12158  
Phone: (800) 523-9144  
Fax: (518) 767-9390

[oldcastleprecast.com/buildingsystems](http://oldcastleprecast.com/buildingsystems)

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