

SPI STRUCTURAL
PRESTRESSED
INDUSTRIES, INC.

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Did you choose the right flooring and roof system for your upcoming project?

Allow Structural Prestressed Industries, Inc. (S.P.I.) to provide budget pricing for your upcoming projects at no cost, helping ensure the most efficient and economical prestressed concrete system is selected for your project.



About us

Structural Prestressed Industries, Inc. (S.P.I.) provides a wide range of concrete construction solutions to the building industry. S.P.I. has become a leading supplier of prestressed and precast concrete products for the commercial and residential construction markets in Florida.

While S.P.I. offers a variety of products, including Hollowcore Planks and Double Tees, the cornerstone of our business is the prestressed concrete Soffit Beam and Keystone Joist floor and roof system. This composite structural system provides an efficient solution that combines the speed of construction with the capacity required for heavily loaded superimposed load (S.I.L.) decks.

Since 1965, the system has been utilized in a wide variety of structures, including parking garages, office buildings, schools, residential developments, and many other types of construction. The prestressed soffit beams and keystone joists are manufactured at S.P.I.'s production facility and are compatible with a wide range of structural systems, including tilt-up wall, masonry, and cast-in-place concrete construction.

One of the many benefits of the prestressed system is its ability to achieve long spans while reducing shoring requirements during construction. Combined with poured-in-place concrete decks, the system forms a monolithic structural unit that is lightweight, efficient, and economical. In addition, it provides the flexibility of cast-in-place concrete construction while achieving a 2-hour fire rating when used with a 4³/₄-inch composite concrete topping. S.P.I. operates its own fabrication and carpentry facility, where project-specific forms are produced. The company also maintains a large inventory of forming materials and shoring components to support project requirements.

We offer complete support to the design community, from conceptual framing and structural calculations to cost studies. From design and manufacturing through delivery and installation, S.P.I. is committed to providing quality, reliability, and dependable service on every project.

Key advantages of working with S.P.I. include:

- Experienced prestressed concrete contractor.
- Value engineering expertise.
- In-house form fabrication shop.
- Design, manufacturing, delivery, and installation services.
- Installation of prestressed joists and soffit beams, hollowcore planks, and double tees.

Structural Prestressed Industries has established a proven track record as a reputable organization committed to delivering high-quality concrete structures throughout the State of Florida.

For your next project, let our professionally trained staff and supervisory personnel—each with more than 30 years of experience in the structural prestressed concrete industry—help you save both time and money.



Precast/ Prestressed Joist Features

The ease of incorporation into the structural concept maintains creativity in design

- The joist system is not tied to specific component width, depth or spacing.
- The concrete joist system with the self-supporting deck slab formwork and soffit beams reduces the construction schedule by decreasing the amount of shoring and framework required, when compared to a complete cast-in-place or post tension system. The reduced shoring is ideal for use in areas requiring minimal shoring with long spans.
- When incorporated with cast in place slabs, soffit beams, and columns the joist system provides the advantages of monolithic connections and reduces the amount of welded or bolted connections and minimizing additional building maintenance concerns.
- Concrete joist can be utilized with tilt-up wall precast, cast in place, and masonry construction.
- Smaller and round columns can be used, creating a more open structure while reducing the need for interior or exterior bearing walls.
- Floor openings can be achieved between joists.
- Depth of framing is a function of spans and loads:
 - Additional joist(s) can be added and the floor thickness adjusted for special loading conditions.
 - Dapped Ends (Bottom Notches) decreases total depth heights.
 - Joist is cast integral with the beam as opposed to bearing on top of the beam, reducing height requirements.
 - Double Joists (side-by-side) can support masonry walls above.
- Joints are minimized in a joist floor system, requiring less waterproof joint sealants than a prestressed double tee system. Also, reducing maintenance concerns.
- The Thump-Thump sound associated with the joints of prestressed members is reduced.
- Differential camber which can occur between adjacent prestressed floor components and affecting the floor surface uniformity is reduced with the joist and composite slab system.
- A concrete joist system incorporated with a cast in place slab can reduce differential flexure during dynamic loadings.
- The merging of the joist system with cast in place slabs, beams, and columns improves site congestion by reducing the number of trucks bringing components to the project site.
- Concrete joist and decks can provide less vibration and flexural movements than steel joists with metal decks.
- Concrete joists with a 4³/₄" concrete deck will provide a 2 hour fire rating without additional work.
- Over 50 years of successful market existence.



Sequence of Installation



- 1** Shoring is set between columns to Support the precast Soffit Beams.



- 2** Soffit Beams are lowered into place, and shoring or scaffolding is erected to receive the precast/ prestressed joists.



- 3** Slotted Soffit Beam side forms are attached and joists are then lowered into the slots in the beam form.



- 4** Steel pins are inserted in joists and angles are attached to support deck formwork. This hardware may be installed before the joist is set to further facilitate erection.

Sequence of Installation



- 5** Slab formwork material consisting of purlins and plywood decking are placed on these angles.



- 6** Field-placed reinforcing steel is installed.

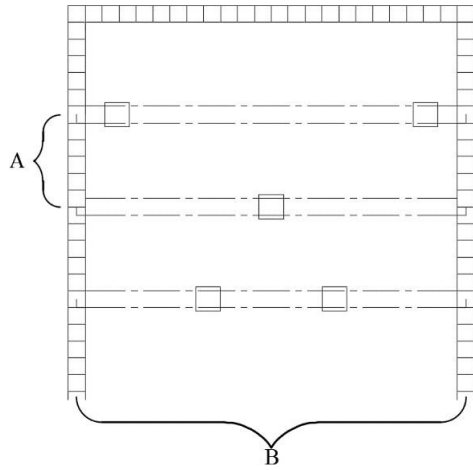


- 7** Concrete is poured, screeded, floated, and troweled to the required finish.



- 8** After concrete has cured sufficiently, pins, angles, purlins and plywood sheets are removed from the underside of the composite slab system.

Typical Joist and Tie Beam Coordination



POST SHORE

End Shore

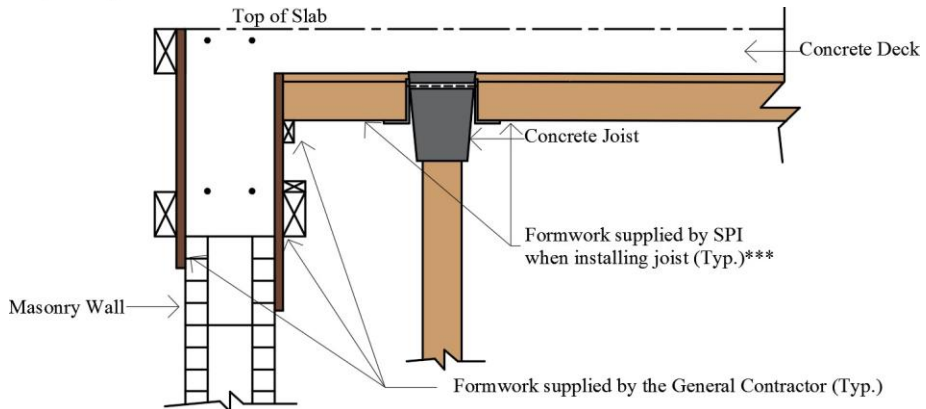
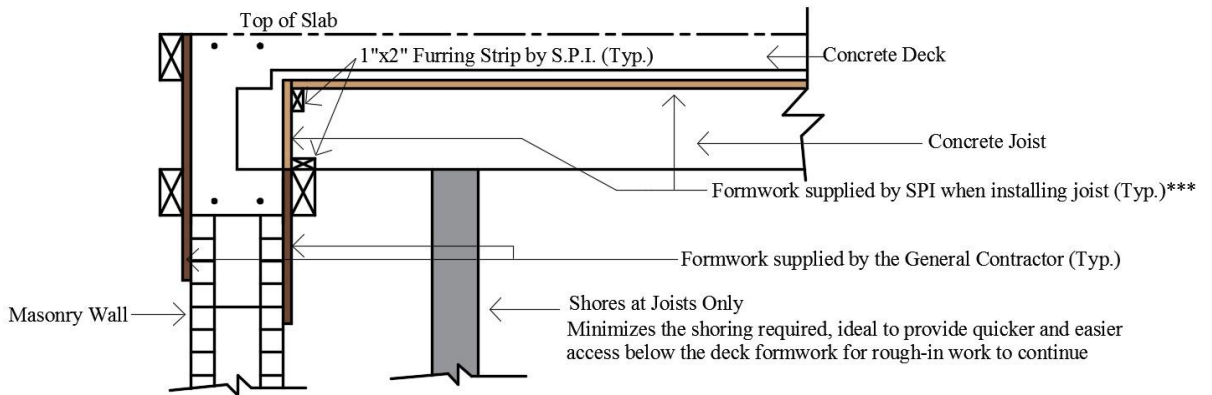
Or

Center Shore

Or

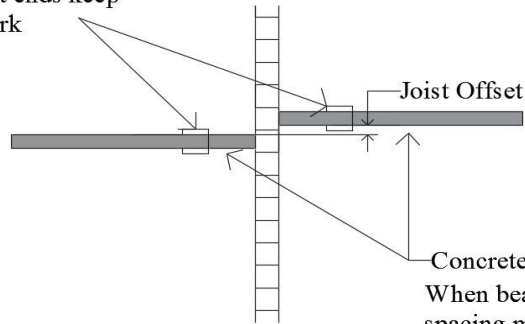
$\frac{1}{3}$ Point Shore

A & B For joist spacing up to 6'-6"
And clear span up to 50'-0"
minimal shoring is required

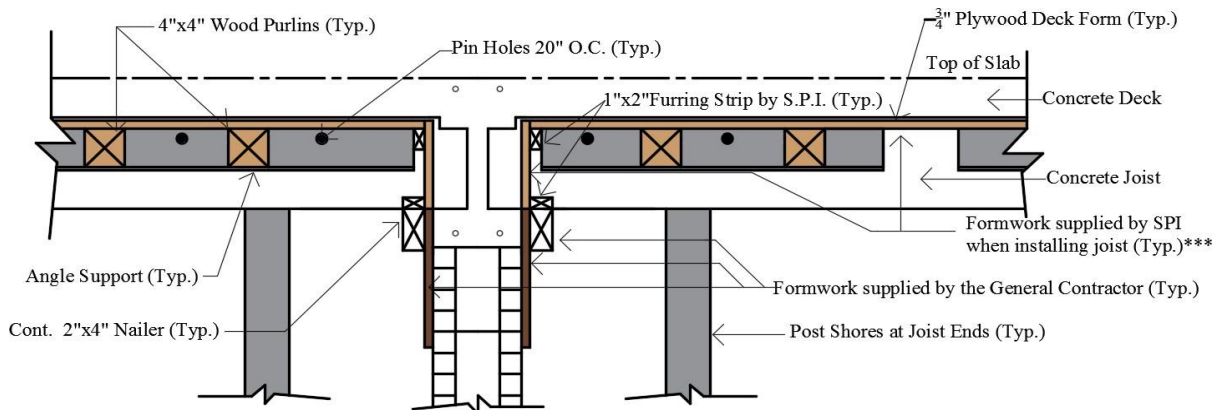


Typical Joist and Tie Beam Coordination

Post Shores at joist ends keep loads off beam work



When bearing on $7\frac{5}{8}$ " & 8", or less, widths, the joist spacing must be offset providing 4" bearing with easy erection.



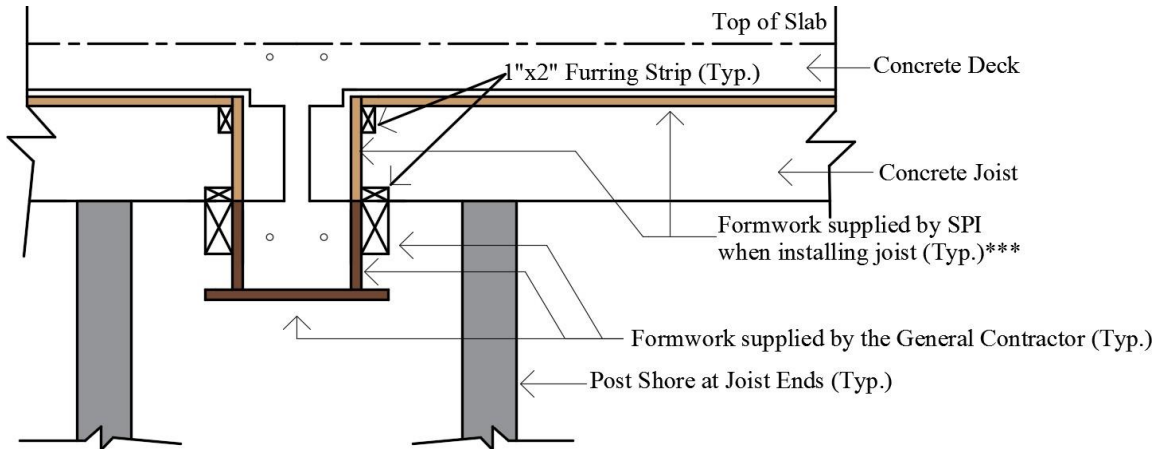
With the shoring at the joist only, there will be less congestion in the work area, allowing the follow up trades early access to work areas.

The joist can be also be lowered or raised to accommodate slab steps and or different slab thicknesses.

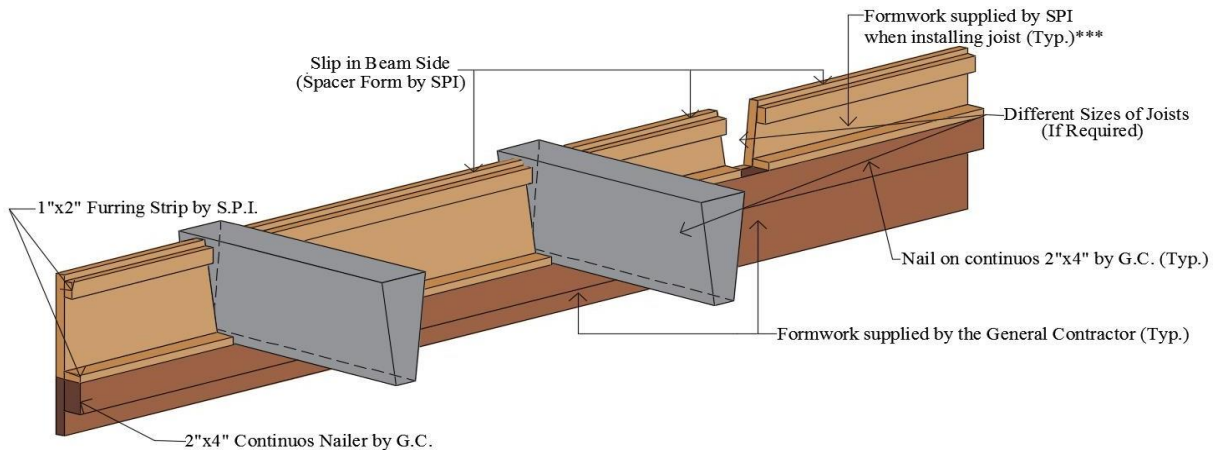
*** Formwork and hardware – All formwork and hardware is by the General Contractor if S.P.I. is supplying the joist to the jobsite and installation is by others.



Typical Joist and Tie Beam Coordination

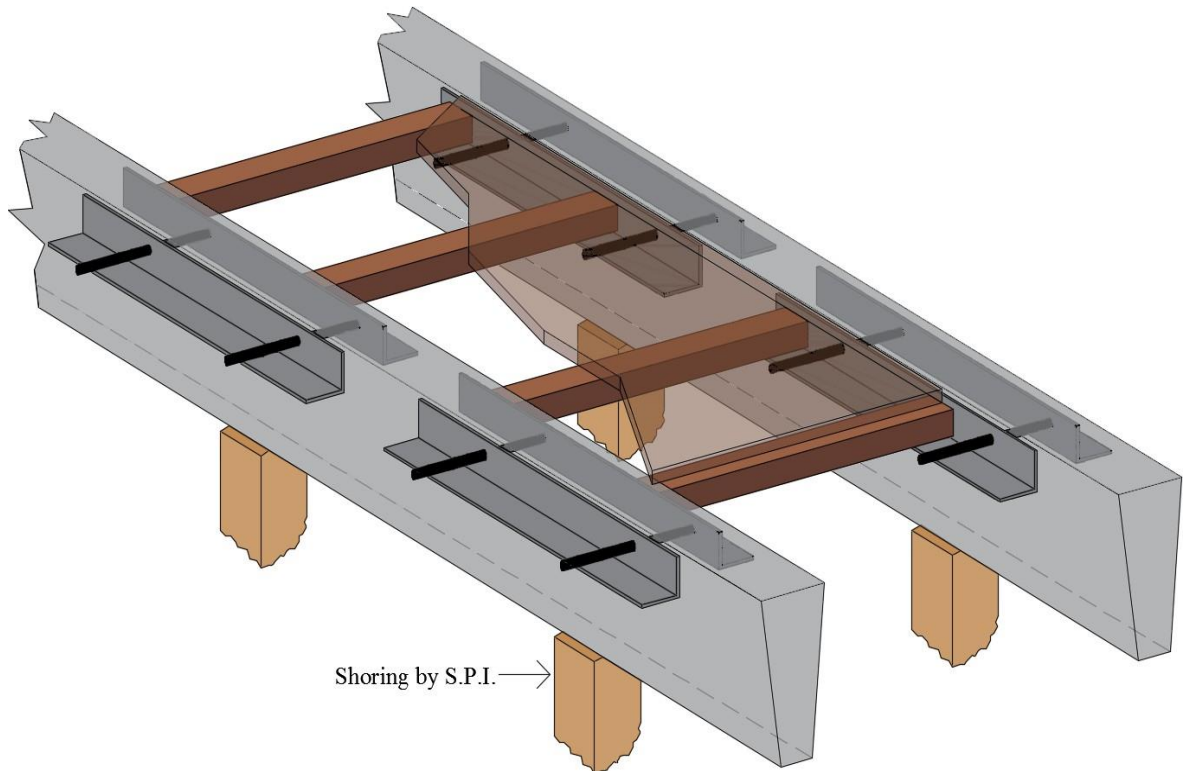


Joist can be used with cast in place beams or with prestressed soffit beams. Soffit beams can add even greater construction efficiencies by further reducing the formwork and shoring required.



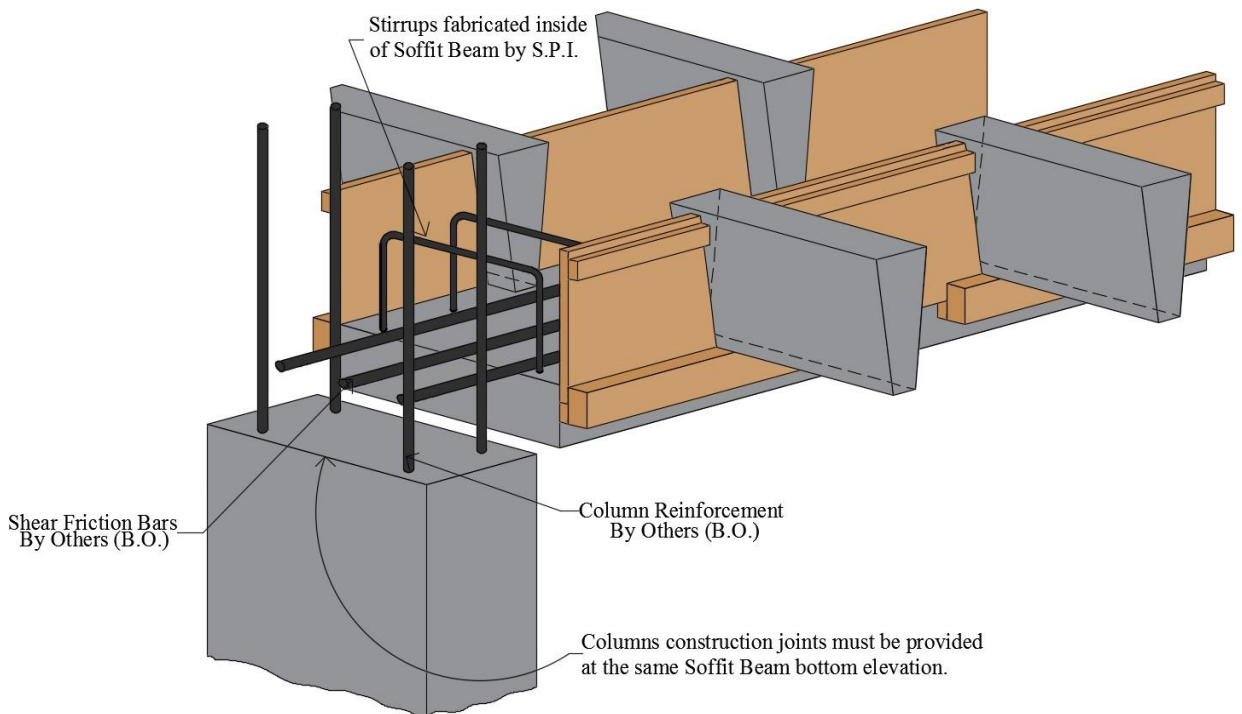
*** Formwork and hardware – All formwork and hardware is by the General Contractor if S.P.I. is supplying the joist to the jobsite and installation is by others.

Typical Joist and Decking Formwork



*** As noted, the joist support the deck formwork, with less shoring than a cast-in-place or post-tensioned structure, this speeds up the construction schedule while providing long spans with cost competitiveness. The reshores to the deck below are also minimal, thereby providing access.

Typical Joist and Soffit Beam Formwork



Just like a cast in place beam the soffit beam is poured with the column providing continuity between the beam, and the slab. Beam Stirrups are cast into the Soffit Beam by S.P.I. and the longitudinal reinforcing is placed on the field by others.

Superimposed Load Capacity 2Hr. (Fire Rating)

FIRE		SUPERIMPOSED LOAD CAPACITY																				SYSTEM WEIGHT PSF	
		DECK	JOIST SPACING	SPAN																68			
				36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66				
2 HOURS		4.75"	4'-8"	290	250	220	185	165	150	130	120	105	90	80							91		
			5'-8"	230	200	175	150	130	120	105	90	80	70	60								85	
			6'-8"	190	170	145	125	110	95	85	75	65	55										81
			7'-8"	165	140	120	100	90	80	65	55	50											78
			8'-8"	150	130	110	95	80	70	60	55												76
		6'-8"			265	240	225	195	180	145	125	105	95	80	70	65							85
		8'-8"				200	165	135	125	110	100	90	80	70	60	55	50						80
		10'-8"				120	105	95	85	80	75	70	60	55	50								76
		8'-8"											125	105	85	75	65	60	55	50			84
		10'-8"											100	90	80	70	60	50					79

Notes: -Spans shown are clear spans (Face-to-face of supports).

-For Design conditions not addressed, contact S.P.I.

-Designer can use 8", 12", and 16" joists for 2 hour fire rating. Contact S.P.I for load tables.

The information presented is meant to assist the user in the preliminary determination of the approximate size, spacing, and connection of the elements in floors and roofs. The data is illustrative and does not reflect individual consideration for unusual loadings and stresses. It is assumed that those using the tables and details have the ability and understanding to properly design for specific moments, shears, reinforcing and connections.



Typical Loading Conditions

TYPICAL LOADING CONDITIONS		ECONOMY										
OCCUPANCY OR USE	S.I. LOADS (PSF)		JOIST SPAN									
	TOTAL	LIVE DEAD	18'	24'	30'	36'	42'	48'	54'	60'	FIRE	
ROOF	40	20	12J @ 6'-6"	16J @ 6'-6"	4'-6"	N/A	1					
ROOF	50	20	12J @ 6'-6"	16J @ 6'-6"	4'-6"	N/A	1					
PARKING	50	--	12J @ 6'-6"	16J @ 6'-6"	4'-6"	24J @ 8'-8"	2					
APARTMENT/ CLASSROOM	60	20	8J/12J @ 4'-6"	16J @ 4'-6"	N/A	1						
OFFICE (MINIMUM)	70	2	12J @ 4'-6"	16J @ 4'-6"	4'-6"	2						
OFFICE (NOMINAL)	80	3	12J @ 4'-6"	16J @ 4'-6"	3'-6"	24J @ 8'-8"	2					
OFFICE (HEAVY)	10	20	12J @ 4'-6"	16J @ 4'-6"	3'-6"	N/A	1					
CORRIDOR	10	20	12J @ 6'-6"	16J @ 6'-6"	4'-6"	24J @ 6'-8"	2					
	0	0	SAME AS OFFICE (HEAVY)									
PUBLIC AREA/ FILES	12	20	12J @ 6'-6"	16J @ 6'-6"	24J @ 6'-8"	24J @ 4'-8"	2					
LIBRARY/ KITCHEN	14	15	12J @ 6'-6"	16J @ 6'-6"	24J @ 6'-8"	24J @ 4'-8"	2					
MECHANICAL	16	10	12J @ 6'-6"	16J @ 6'-6"	24J @ 6'-8"	24J @ 4'-8"	2					
PLANTER	20	--	12J @ 4'-6"	16J @ 4'-6"	24J @ 4'-8"	28J @ 4'-8"	2					

Notes: Verify Joist sizes and spacings meet project loading requirements (See Joist Load Tables). Verify deck capacity is adequate for load and spacing selected.

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Design/ Quality Assurance

All units shall be designed in accordance with ACI 318 and applicable building codes to provide a composite structural floor and/or roof system capable of supporting the specified design loads. Concrete shall attain a compressive strength of 6000 psi in 28 days. Producer shall be certified by the Precast/ Prestressed Concrete Institute (PCI) plant certification program in the category C4 at the time of bidding.

Shop Drawings

Shop Drawings shall be prepared under the direction of a Registered Professional Engineer and shall include a layout plan with member identification marks, fabrication details, estimated camber, connection and anchorage details, installation details, and procedures. Signed and sealed calculations shall also be submitted for approval.

Manufacture

All units are to be cast in steel forms per approved shop drawings. Manufacturing procedures shall be in general compliance with the PCI manual. Any tolerances exceeding these limits shall be clearly marked on shop drawings for approval by Architect-Engineer. Prior to the transfer of prestress, the concrete shall attain adequate strength to control stresses at release.

Storage, Delivery, and Handling

Precast/ prestressed concrete members shall be lifted and supported during manufacturing and erection only at the lifting or supporting points as shown on the approved shop drawings

Installation

Installation of precast/ prestressed concrete joists, soffit beams, and slab form shall be performed by a qualified erector. Shoring and bracing shall be designed by a registered Professional Engineer. The shoring and bracing forms may be removed when the field-placed concrete achieves seventy-five percent (75%) of design strength, unless there are multiple floors above being built.

