Department of Health Care Access and Information

Advisory Guide Series

A18

Early Installation of Cast-In-Place Concrete Inserts and Secondary Steel Framing

FOR
ALL BUILDINGS UNDER
OSHPD JURISDICTION

Office of Statewide Hospital Planning and Development

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INTRODUCTION

This guide is for early installation of cast-in-place (CIP) concrete inserts such as specialty inserts, embedded plates, or other embedded elements supporting MEP and secondary steel framing for gravity supports and lateral bracing of overhead MEP distribution lines and equipment. Other secondary steel framing supports not related to overhead MEP distribution lines and equipment are not included in this guide.

The installation of gravity supports and lateral bracing for overhead MEP components typically makes use of CIP concrete inserts and secondary steel framing. The design of these is reactive to the design of the MEP systems, thus being normally performed once routing of distribution lines and location of equipment have been finalized. In turn, the final location of gravity supports and lateral bracing necessitates re-evaluation of the structure to ensure that resulting reactions from all load effects (gravity loads, seismic loads, wind loads, loads from thermal stresses, etc.) do not exceed the local capacity of the structure.

New hospital construction projects are frequently delivered following HCAI's Incremental Project Review process, which allows for separate permitting for different portions of the project. The main benefit of this process is that it shortens project timelines by enabling an early start of construction while portions that will be built later are still being reviewed. Although the Incremental Project Review process adds significant value, it also requires early commitment and increased efforts from all stakeholders.

Within the context of the Incremental Project Review process, construction of the building structure ahead of the approval of MEP systems challenges the conventional design sequence of gravity supports and lateral bracing for overhead MEP components. This is given CIP concrete inserts must be placed prior to concrete pours and secondary steel framing is preferably installed along with the primary structure. While alternate solutions exist, these often have an adverse impact on construction schedule and cost.

Department of Health Care Access and Information (HCAI)
Office of Statewide Hospital Planning and Development (OSHPD)

TABLE OF CONTENTS

INTRODUCTION i

TABLE OF CONTENTS ii

SECTION I Implementation 1

SECTION 2 Code References 11

SECTION 3 Acronyms and Definitions 12

SECTION 1
IMPLEMENTATION

HCAI recommends the following process for early installation of cast-in-place(CIP) concrete inserts and secondary steel framing. While this represents a formalized framework intended to aid construction, it is not an all-inclusive solution, and adjustments may have to be made to adapt to project-specific circumstances. As with any construction where portions of components are erected prior to the finalization of the component's design, the Owner assumes all risks associated with this work sequencing; such risks may include rework, replacement of installed elements, schedule impact, etc.

1. Structural Building Documentation by the SEOR:

    A. The structural permit drawings for the building shall document the loads for which the structure has been designed for, both globally and locally for conformance with CBC 1603A.1. It is recommended to include:

        i. Loading plans documenting dead and live loads for which floor and roof plates were designed. Such plans typically show magnitude and location of these load effects in terms of area loads (psf) and line loads (plf).

        ii. Loading plans documenting the reserve capacity that floor and roof plates must locally accommodate point loads stemming from overhead MEP components. These plans should indicate reserve capacities in terms of maximum loads for various scenarios as appropriate: single point load or cluster of point loads within the middle third of a span, single point loads or cluster of point loads at third spans, etc. Such loads are typically indicated for defined slab strip widths (1 ft or other depending on slab type and load sharing between adjacent strips).

    B. The structural permit drawings shall clearly define the process implemented to allow for the SEOR's verification of gravity and lateral load effects stemming from overhead MEP distribution lines and equipment. This should include notes defining deliverables required from the General Contractor (these deliverables typically consist of plans or data files consolidating location and magnitude of all loads applied to the structure by all systems), notes addressing resubmittal of loading information when there are changes during permitting or construction, etc.

2. Early Design Development and Construction Planning: Successful implementation of the process presented in this Advisory Guide depends primarily on early engagement of stakeholders as described below.

    A. AOR and MEP Design Consultants:

i. Architectural and MEP drawings must be sufficiently developed to define final routing of overhead MEP distribution lines and locate both ceiling-hung and heavy floor-supported equipment.

ii. It is highly recommended to increase expected equipment weights by a reasonable percentage to mitigate the potential impact stemming from changes in final equipment selection at later stages.

iii. Sufficient Architectural and MEP information must be provided to the SEOR during design for development of the loading plans described in item 1.A above.

B. General Contractor: The general contractor shall retain trade subcontractors early enough so that the following can be performed prior to steel erection and concrete pours.

i. Confirmation of final routing of overhead MEP distribution lines and equipment proposed by the design team.

ii. Design of gravity supports and lateral bracing for overhead MEP components.

iii. BIM clash detection capturing the structure, relevant architectural components (partitions, ceilings, etc.), overhead MEP distribution lines and equipment, as well as related gravity supports and lateral bracing.

iv. Preparation of loading plans (see Figure 1) or data files by the general contractor consolidating the information provided by the various trade subcontractors for the SEOR's verification as described in item 1.B above. Note that provision of this information and load verification by the SEOR need to occur sufficiently in advance to allow for re-evaluation of gravity supports and/or lateral bracing in problem areas and related revisions to BIM clash detection models.

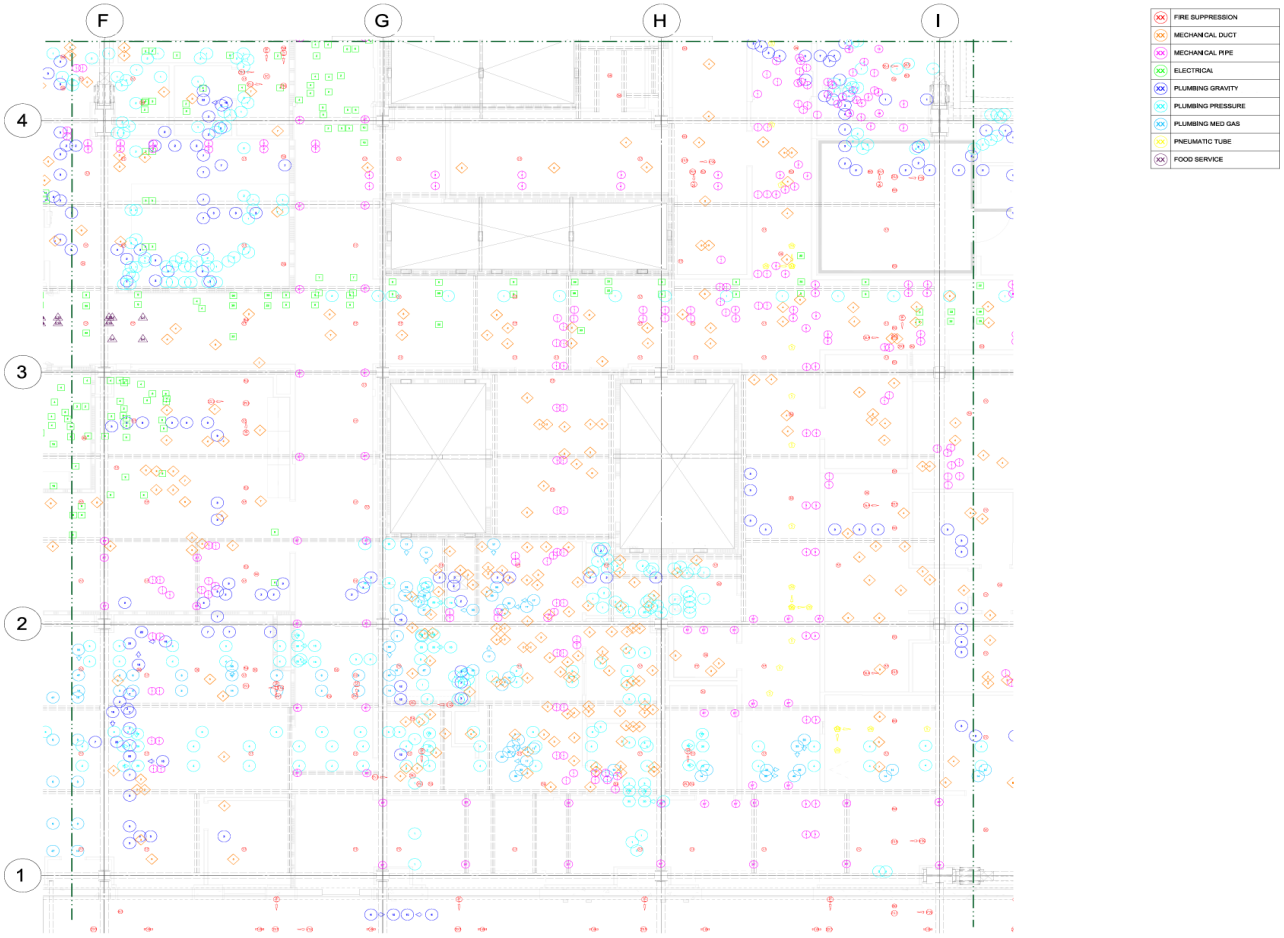


Figure 1: Sample point load map

v. Coordination with subcontractors on the inserts to be used to prevent each trade from using different inserts (see 3.E.ii.(b))

3. Permitting and Construction:

A. Incremental Project Review: The incremental project review and approval is not modified by the process proposed in this Advisory Guide. The key difference is a higher early level of development in the design and increased planning efforts by the general contractor.

B. Incremental Project Setup:

i. To fully realize the benefits from incremental project reviews, it is recommended to separate permitting of the structure from that of later construction phases (exterior envelope, interior AMEP buildout, lateral bracing, equipment anchorage, etc.).

ii. Even though gravity supports and lateral bracing for overhead MEP components can be separated into different increments, their design is often performed at the same time and by the same consultants. Furthermore, both are needed simultaneously to complete BIM clash detection efforts. Therefore, the preference is details for both gravity supports and lateral bracing be provided in the same increment. This facilitates plan review when gravity supports and lateral bracing share elements or occur near each other.

iii. Level of Detail: Both gravity support and lateral bracing must be fully detailed in the construction documents, thus completely describing all elements of the support or bracing assemblies. Performance specifications for gravity supports are insufficient for construction purposes.

C. Nonstructural Component Load Verification: It is the SEOR's responsibility to confirm the adequacy of the structure when subjected to all load effects from overhead MEP components and floor-mounted equipment. Thus:

a. SEOR is to review the loading plans prepared by the general contractor (or other consultants) described in 2.B.(iv) above. Once all conflicts have been resolved and structural adequacy has been confirmed, SEOR is to submit the final loading plans as part of the calculations including spot-checks of the deck and structure that illustrate that both are within capacity, to HCAI for review and acceptance.

b. During HCAI's review of the loading plans, additional checks (including hand calculation checks where an automated procedure is used, see Figure 2 below) may be requested from SEOR prior to HCAI giving acceptance.

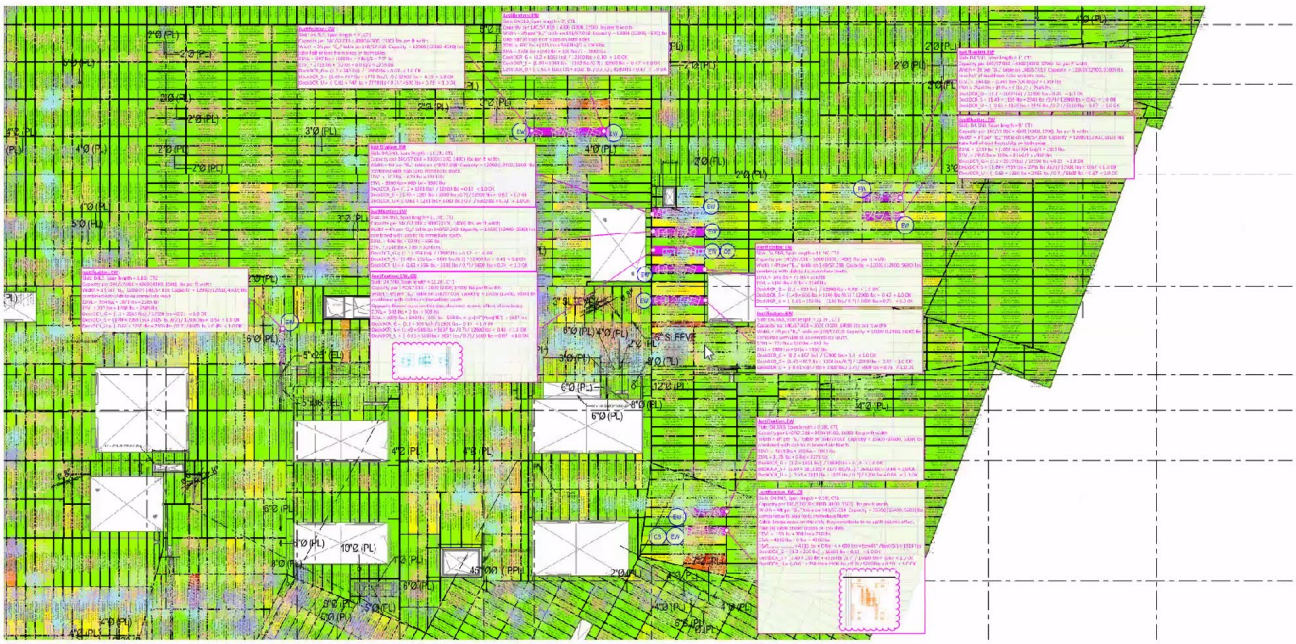


Figure 2: Example of automated load verification with hand calculations for problem strips

c. The point load review and HCAI acceptance are to occur prior to concrete being placed.

d. For projects with limited MEP scope, the point load review may be waived with HCAI agreement.

D. Early Installation: CIP concrete inserts and steel supports may be installed prior to the approval of the increments covering gravity support and lateral bracing of overhead MEP components provided the following is observed:

i. Required Documentation: CIP concrete inserts and secondary steel framing shall be submitted to HCAI via a Deferred Submittal Item (DSI) post-approval document as described in CAC 7-126. The DSI shall thoroughly detail the CIP concrete inserts or secondary steel framing that are to be installed.

The DSI cannot be broken one for each trade or multiple for portions of the building, e.g. floors 1 through 4 through 6, 7 through roof. The DSI shall be submitted to allow for expected review times and to allow sufficient time for backchecks.

The DSI shall be submitted for review and approval by HCAI prior to the corresponding work being performed. Supporting calculations

(including loading plans and deck verification as described in 3.D) shall be prepared in conformance with CBC Section 1603A.3.

The DSI must include appropriate performance specification information for the scope of work.

ii. See Figure 3 below for a typical incremental project timeline with the DSI for early installation of CIP concrete inserts and/or secondary steel framing issued prior to approval of the increment for MEP gravity supports and seismic bracing. Approval of the DSI is required before deck concrete placement.

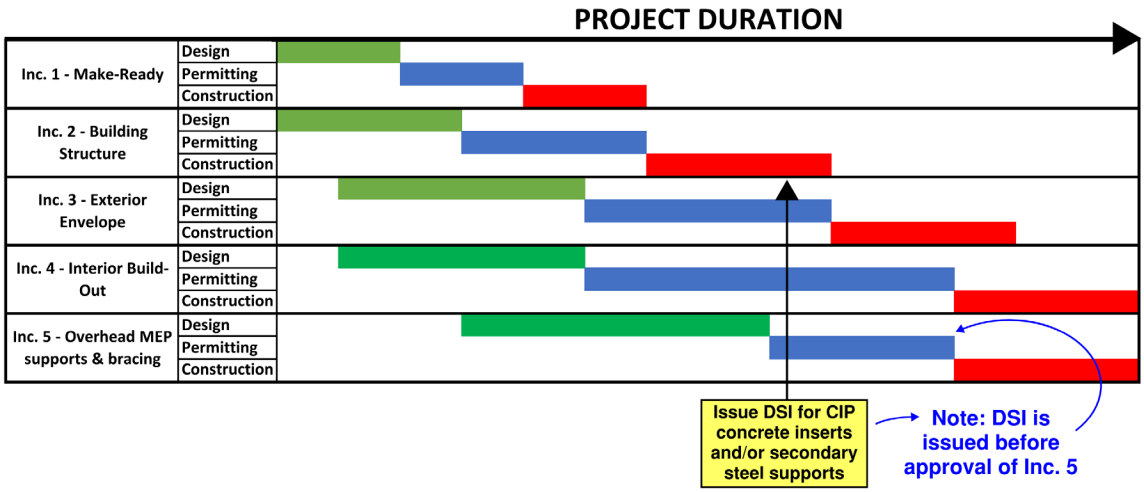


Figure 3: Typical Incremental Project Timeline

iii. CIP Concrete Inserts: Insert capacities shall be shown on the corresponding DSI details. Additionally, the insert details must also specify minimum spacings required between each insert and reference structural drawings for any additional minimum spacing requirements based on the structural deck loading criteria. Inserts for lateral bracing assemblies (this includes both the brace and the vertical hanger at the brace location) and the gravity hanger must be located and referenced on layout plans which are to be submitted along with the insert details.

The following is a list of recommendations:

a. Use of OSHPD Preapproval of Manufacturer's Certification (OPMs) is strongly encouraged.

b. The exact coordinates of the inserts do not be included in the submittal; however, this information will need to be transmitted to the installers and inspectors.

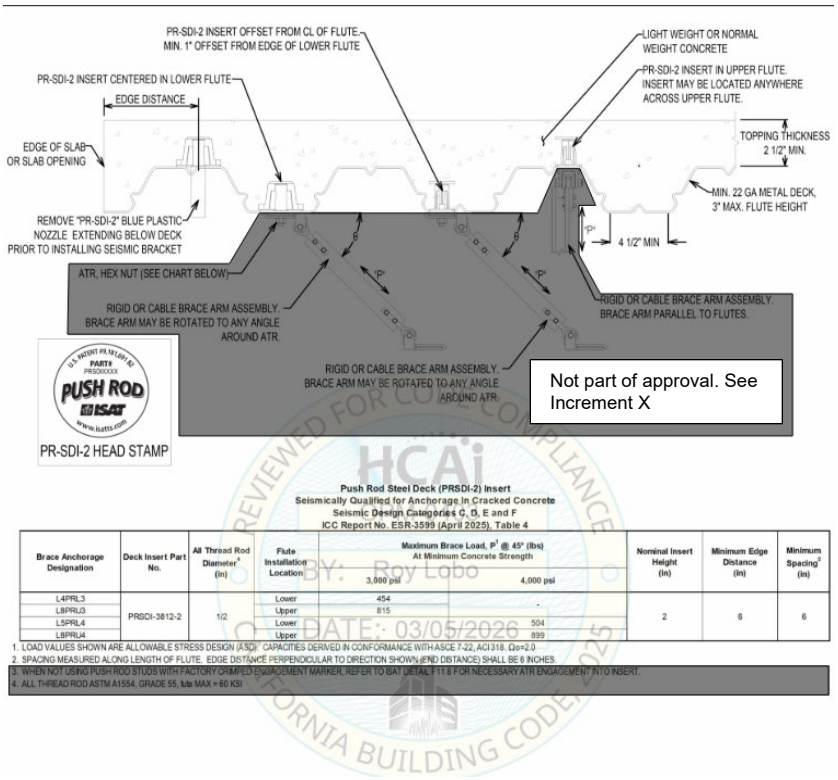
c. The design team should limit the number of concrete insert types that are used on a project to reduce the complexity and possibility of construction errors. It is also recommended that the design team limit the number of different sizes for the same concrete insert types as well.

d. Information not related to the inserts such as channels and hangers below the inserts should be screened and identified as belonging to the increments containing hanger and seismic bracing information. See Figure 4 below

e. Contractor options or substitutions of inserts from one insert type/size to another insert type/sizes or from one manufacture to another manufacture is not permitted to be shown on the DSI .

f. A table showing spacing requirements between similar and dissimilar anchors should be included. Conflicting information on spacing in details or other tables should be coordinated or removed. See Figure 5 below for an example of such a table.

g. Minimum spacing between dissimilar anchors may be taken as the average of the minimum spacings (Min A+ Min B)/2.



Push Rod Steel Deck (PRSDI-2) Insert
Seismically Qualified for Anchorage in Cracked Concrete
Seismic Design Categories C, D, E and F
ICC Report No. ESR-3599 (April 2025), Table 4

Brace Anchorage Designation	Deck Insert Part No.	All Thread Rod Diameter[4] (in)	Flute Installation Location	Maximum Brace Load, P[1] @ 45° (lbs) At Minimum Concrete Strength 3,000 psi	4,000 psi	Nominal Insert Height (in)	Minimum Edge Distance (in)	Minimum Spacing[2] (in)
L4PRL3	PRSDI-3812-2	1/2	Lower	454	-	2	6	6
L8PRL3			Upper	815	-			
L5PRL4			Lower	-	504			
L8PRL4			Upper	-	899			

1. LOAD VALUES SHOWN ARE ALLOWABLE STRESS DESIGN (ASD). CAPACITIES DERIVED IN CONFORMANCE WITH ASCE 7-22, ACI 318. Ω0=2.0
2. SPACING MEASURED ALONG LENGTH OF FLUTE. EDGE DISTANCE PERPENDICULAR TO DIRECTION SHOWN (END DISTANCE) SHALL BE 6 INCHES.
3. WHEN NOT USING PUSH ROD STUDS WITH FACTORY CRIMPED ENGAGEMENT MARKER, REFER TO ISAT DETAIL F11.6 FOR NECESSARY ATR ENGAGEMENT INTO INSERT.
4. ALL THREAD ROD ASTM A1554, GRADE 55, futa MAX = 60 KSI

HCAi
REVIEWED FOR CODE COMPLIANCE
CALIFORNIA BUILDING CODE
SCANNED BY: Roy Lobo
ON DATE: 03/05/2026

Figure 4: Screening out information that is not in scope of early CIP Insert DSI

INSERT SPACING CHART				
INSERT INFORMATION		CENTER-TO-CENTER SPACING (IN)		
INSERT TYPE	EMBEDMENT (IN)	PRODUCT #1 DETAIL 1/S701	PRODUCT #2 DETAIL 2/S701	PRODUCT #3 DETAIL 3/S701
PRODUCT #1 DETAIL 1/S701	1.75	5.25	6.375	7.125
PRODUCT #2 DETAIL 2/S701	2.5	6.375	7.5	8.25
PRODUCT #3 DETAIL 3/S701	3	7.125	8.25	9

= S_E = SAME TYPE MIN. SPACING

= S_D = DIFFERENT TYPE MIN. SPACING

$\frac{(5.25"+9")}{2} = 7.125"$

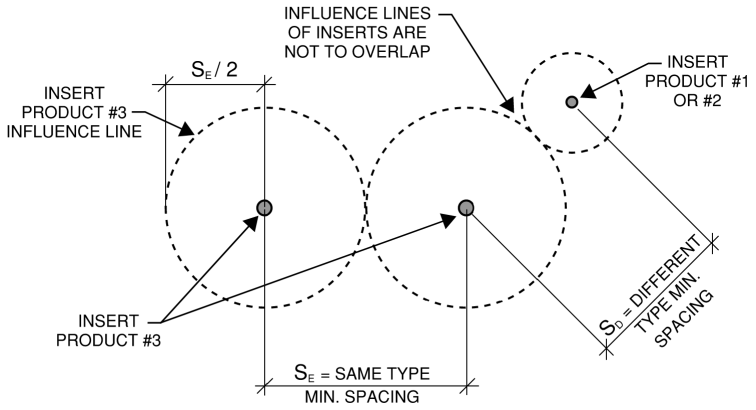


Figure 5: Example for Insert Spacing Guidance

iv. Secondary Steel: The DSI shall fully detail the secondary steel framing and indicate the loading for which it was designed. Loading information shall indicate load location, magnitude, direction, and load level (ASD or LRFD). Secondary steel framing must be located and referenced on layout plans which are to be submitted along with the steel support details.

E. Design Reconciliation:

i. Required Documentation: The increments covering gravity supports and lateral bracing shall clearly detail all such elements and include layout plans locating and referencing all lateral bracing details. These increments shall further document the reactions that will be exerted on the CIP concrete inserts and secondary steel framing covered by the DSI described in item 3.E above and clearly describe the connections to these elements. The building SEOR shall review these increments prior to their submission to HCAI to confirm adequacy of loads imposed onto the structure.

ii. Compatibility Verification: Once the increments covering gravity supports and lateral bracing of overhead MEP components have been approved, the responsible Engineers of Record (EORs) shall compare the details and reactions against what is documented in the DSI. described in item 3.D to confirm that reactions and connections match.

iii. Design Revisions: Amended Construction Documents (ACDs) shall be submitted to revise the DSI described above as necessary due to changes introduced by the HCAI approved increment that covers gravity supports and lateral bracing.

F. For projects reviewed under the standard (non-incremental) OSHPD/HCAI process, the sequence of approval differs from that described in Items 3.A and 3.B. However, the expectations for documentation remain the same as outlined in Items 3.B (Level of Detail) and 3.C (Nonstructural Component Load Verification). Alternatively, this documentation (items 3.C through 3.E) may be submitted as a Deferred Submittal Item (DSI) immediately following project approval.

Designers and contractors are further encouraged to identify and coordinate all embedded items within the concrete deck at the earliest stages of the project, including drains, embedded plates, and cast-in-place anchors. Embeds including several cast-in-place firestopping devices that require through-penetrations in the concrete deck shall utilize listed assemblies and shall not rely on engineering judgments.

SECTION 2
CODE REFERENCES

Access is provided to the codes promulgated by OSHPD through the California Building Standards Commission website (https://www.dgs.ca.gov/en/BSC/Codes) with active links to each publisher's website for read-only public access versions of the codes.

Part 1, California Administrative Code

Part 2, California Building Code, Volumes 1 and 2

Part 3, California Electrical Code (Note: Accessed through the National Fire Protection Association (NFPA), however, requires the creation of a user account to view the Free Access - NFPA 70: 2022 California Electrical Code - NFPA 70 (2020 NEC®)

Part 4, California Mechanical Code

Part 5, California Plumbing Code

Part 6, California Energy Code

Part 9, California Fire Code

Part 10, California Existing Building Code

SECTION 3
ACRONYMS AND DEFINITIONS

Acronyms and Definitions assist the user in recognizing and identifying various acronyms and terms generally used in OSHPD documents. Please refer to the Master Glossary of Acronyms and Definitions on the HCAI website at https://hcai.ca.gov/document/master-glossary-of-acronyms-and-definitions/.

Other definitions may also be found in the Title 24, California Code of Regulations, California Building Standards Code.