PROPOSED STATE STANDARD,
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DRAFT

Construction Safety Orders
Article 29. Erection and Construction

Amend Section 1711 to read as follows:

Section 1711. ~~Oiling Forms~~ Reinforcing Steel and Post-Tensioning in Concrete Construction.

~~The oiling of floor panels that are in place shall not be done until the carpentry work on the form has been completed.~~ *[moved to Section 1713(d)]*

(a) Scope and Application.

(1) This section sets forth the requirements for the protection of employees associated with the use of reinforcing steel assemblies used in the construction of concrete and masonry structures including post-tensioning operations.

(2) The duties of controlling contractors under this section include the duties specified in Section 1711(c), (d), (e)(5), (f), (g)(6), (h)(1), (4), and (5), and Section 1717(f).

Note 1: Additional requirements for reinforcing steel and concrete construction are contained in Article 20 and Article 29 of these Orders.

Note 2: Other relevant provisions in the GISO and CSO may apply to concrete and masonry construction operations.

(b) Definitions.

Competent Person. One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

Controlling contractor. Means a prime contractor, general contractor, construction manager or any other legal entity which has the overall responsibility for the construction of the project - its planning, quality and completion.

Dead Load. Means a constant load, without load factors, due to the mass (weight) of members, the supported structure and permanent attachments or accessories.
(Definition from DOSH-see subsection (h)(10)

Falsework. Means formwork to support concrete and placing operations for supported slabs of concrete structures, including all supporting members, hardware and bracing.
(Definition for proposal from DOSH)

Formwork. Means the total system of support for freshly placed or partially cured concrete, including the mold or sheathing (form) that is in contact with the concrete as well as all

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supporting members including shores, reshores, hardware, braces, and related hardware. *[From federal definition – 1926.700(b), also see ANSI A10.9, Section 3.12]*

Flying Deck Forms. Means a prefabricated formwork system for floor slabs incorporating support that is moved in large sections by mechanical equipment (crane, forklift, etc.). *(ANSI A10.9-2013, Section 3.11)*

Stressing Jacks. Means portable hydraulic devices that pull the tendons associated with post-tensioning concrete to create a permanent tension load. *(DOSH Recommended)*

Post-tensioning operations. Means a method of stressing reinforced concrete in which tendons running through the concrete are tensioned after the concrete has hardened. *(DOSH recommended)*

Qualified Person, Attendant or Operator. A person designated by the employer who by reason of training, experience or instruction has demonstrated the ability to safely perform all assigned duties and, when required, is properly licensed in accordance with federal, state, or local laws and regulations.

Qualified rigger is a rigger who meets the criteria for a qualified person.

Reshores. Means the temporary vertical supporting members that are placed or left in place when the original supporting shores or posts for the formwork are removed. The reshores are used to support partially cured concrete and other construction loads. *(See ANSI A10.9, Section 3.18)*

Reinforcing Ironworker. A worker primarily engaged in the hoisting, rigging, field fabrication, moving, and installation of reinforcing steel assemblies, members, and post-tensioning cables and related equipment. Reinforcing steel activities include but are not limited to: off-loading and material handling of reinforcing components; fabrication, pre-assembly, and placement of reinforcing steel columns, beams, joists, mats, welded wire mesh, curtain-walls, and the placement of post-tensioning cables.

Reinforcing Steel Assemblies. Means vertical and horizontal columns, caissons, walls, drilled piers, mats, and other similar structures. For purposes of this standard, reinforcing steel includes rods, bars, or mesh made from composite and/or other materials. *[From Petition III. (1) and AC discussion]*

Reinforced Concrete. Means a composite material in which the concrete provides the material's compressive strength, while the reinforcing in the form of additional embedded material provides the tensile strength and/or ductility. *[AC drafted this definition]*

Tendon. Means a metal element, usually of steel such as wire, stranded components (such as wires), bars or rods used in prestressing or post-tensioning concrete. *[See ANSI Section 3.26]*

Slip Form. Means a form that is moved as concrete is placed; slides without being detached to form walls or other concrete structures.

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(c) Site Access and Layout. The controlling contractor shall ensure that the following is provided and maintained:
(1) Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, and the material to be erected and means and methods for pedestrian and vehicular control.
EXCEPTON: this requirement does not apply to roads outside of the construction site.
(2) A firm, properly graded, drained area, readily accessible to the work with adequate space for the safe assembly, rigging and storage of reinforcing and post-tensioning materials and the safe operation of the reinforcing contractors equipment.
(3) Adequate exterior platform for landing materials on the floors of multi-tiered buildings.
Exception 1. Where, the design, structure, or space constraint precludes the installation of exterior platforms.
Exception 2. Where the design of the structure allows for the safe landing of materials without the exterior platform.
(4) Adequate benching and/or shoring in accordance with the provisions of Sections 1541and 1541.1 of these Orders prior to the commencement of reinforcing operations in excavations and/or trenches.
(d) Written Notifications Prior to Commencement of Reinforcing Steel Activities.
Approval to begin reinforcing steel installation. Before authorizing the commencement of reinforcing steel activities, the controlling contractor shall ensure that the reinforcing steel contractor on the project is provided with the following written notifications:
(1) Formwork and falsework have been inspected to meet the design requirements by a competent person of the installing formwork/falsework contractor prior to, during, and immediately after the installation of reinforcing steel and placement of the concrete.
(2) The structural stability of vertical formwork, elevated decks, and other working/walking surfaces are adequately braced, guyed, or supported in accordance with Sections 1713 and 1717 to allow safe access of reinforcing employees, materials, and equipment.
(3) The benching and/or shoring for excavations have been inspected by a competent person.
(e) Stability Requirements for Vertical and Horizontal Columns, Walls, and Other Reinforcing Assemblies. *[Committee note: subsections (e)(1), (2) and (4) are relocated from Section 1712(f) with edits]*
(1) Reinforcing steel for walls, piers, columns, prefabricated reinforcing steel assemblies and similar vertical structures shall be guyed, braced or supported to prevent collapse.
(2)(A) Systems for guying, bracing, or supports shall be designed by a qualified person.
(B) Guys, braces, and supports shall be installed and removed as directed by a competent person.
(3) Reinforcing steel shall not be used as a guy or brace.
(4) Wire mesh rolls shall be secured to prevent dangerous recoiling action.

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(5) The controlling contractor shall bar other construction processes below or near the erection of reinforcement assemblies until they are adequately supported and/or secured to prevent structural collapse.
(f) Requirements for Impalement Protection and Custody of Protective Covers.
(1) Employees shall be protected from the hazards of working around or over exposed, projecting reinforcing steel or other similar projections in accordance with the provisions of Section 1712.
(2) When protective covers are provided by the reinforcing steel contractor, they shall remain in place after reinforcing steel activities have been completed, to protect workers from other trades, only if the controlling contractor or its authorized representative:
(A) Has directed the reinforcing steel contractor to leave the protective covers in place; and
(B) Has inspected and accepted control and responsibility for the protective covers; or
(C) Has placed control and responsibility for the protective covers on another contractor other than the reinforcing steel contractor.
NOTE to subsection (f)(2)(A) through (C): The responsibilities of the controlling contractor related to accepting the control and custody of protective covers does not relieve the individual employer or subcontractor from protecting their employees from impalement hazards in accordance with the provisions of Section 1712(c) of these Orders.
(g) Requirements for Hoisting and Rigging Reinforcement Assemblies.
(1) A qualified rigger (a rigger who is also a qualified person) shall inspect the rigging prior to each shift and the handling of loads shall be in accordance with GISO Section 4999.
(2) Routes for suspended loads shall be pre-planned to ensure that no employee is required to work directly below a suspended load except for:
(A) Employees engaged in the placing or initial connection of the reinforcement assemblies; or
(B) Employees necessary for the hooking or unhooking of the load.
(3) When working under suspended loads, the following criteria shall be met:
(A) Materials being hoisted shall be rigged to prevent unintentional displacement;
(B) Hooks with self-closing safety latches or their equivalent shall be used to prevent components from slipping out of the hook; and
(4) All loads shall be rigged by a qualified rigger.
(5) All lifting devices below the hook such as spreader bars used for hoisting pre-assembled cages, walls, columns, beams and other structures shall be designed, load rated and fabricated under the direction of a California registered professional engineer.
(6) The controlling contractor shall bar all activities under or in the hazard area of hoisting operations including unloading and staging areas for reinforcement assemblies.

(h) Post-Tensioning Operations.
(1) No stressing operations shall commence prior to the controlling contractor providing written

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documentation to the company performing the stressing operation that the minimum specified initial concrete compressive strength has been achieved.
(2) No employees (except those essential to the post-tensioning operations) shall be permitted to be behind the jack or the fixed end anchorage during tensioning operations. No employees shall be permitted above or alongside the full length of the tendons during tensioning operations.
(3) Signs and barricades shall be erected to limit access into the stressing area only to personnel engaged in stressing or de-tensioning operations.
(4) The controlling contractor shall bar other construction trades from working in the barricaded area during stressing operations.
(5) Where tensioning operations are above grade, the controlling contractor shall ensure there is an adequate safe work platform of a minimum of three feet measured from the end of the floor slab to the platform toeboard, such as an extension of the formwork, for stressing tendons, cutting tendon tails, and grouting.
Exception. Where the adjoining structure or other structural space constraint precludes the installation of exterior platforms.
(6) The work platform required in subsection (g)(5) shall include guardrails and toeboards meeting the requirements of Section 1620, and shall be kept clear of any debris or materials not related to the stressing or de-tensioning operation.
(7) During operation, stressing equipment shall be secured to prevent accidental displacement.
(8) Stressing equipment calibrations per contract specifications shall be available on site. Prior to stressing, a competent person shall verify the adequacy of the stressing equipment calibrations.
(9) A competent person shall inspect the stressing equipment for damage or defects before stressing operations begin, and periodically during the stressing operations. The use of stressing equipment shall conform to the manufacturer's instructions and recommendations.
(10) Methods shall be employed to insure that supporting forms, falsework or shoring does not fall due to cambering of the concrete during the stressing operations. Dead loads and construction loads (including those due to stressing) shall be considered in the design of the forms, falsework and shoring. *[Proposal note: Subsection (h)(1) – (10) for post-tensioning operations is similar to the Petitioner's Section VI with some edits developed with the assistance of the committee.]*

Existing Section 1712(e). is relocated here as sub-section (i) with edits to the exception for clarity.

(i) Fall Protection.
Employees shall not be permitted to place or tie reinforcing steel in walls, piers, columns, etc., more than 6 feet above an adjacent surface, unless a personal fall protection system is used in accordance with Section 1670 or other method affording equivalent protection from the hazard of falls from elevated surfaces.
Exception: *Reinforcing ironworkers may travel* point-to-point horizontally or vertically on reinforcing steel up to 24 feet above the surface below providing there are no impalement hazards.

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(j) Formwork and falsework stability shall be provided in accordance with Sections 1713 and 1717 of these Orders.
(k) Training Requirements. In addition to the training requirements of Section 1509, the Injury and Illness Prevention Program, employers shall ensure that each employee who performs reinforcing steel and/or post-tensioning activities has been provided training in the following areas for the activities in which they are engaged in:
(1) The hazards associated with reinforcing steel and post-tensioning activities and;
(2) The proper procedures and equipment to perform reinforcing steel and post-tensioning activities and;
(3) Employees involved in reinforcing bar and post-tensioning stressing operations shall be trained by a qualified person.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

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Amend Section 1712 to read as follows;

§1712. ~~Reinforcing Steel and Other Similar Projections~~. Requirements for Impalement Protection.

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Section 1712(e) is moved to proposed Section 1711(i) with edits to the exception for clarity.

~~(e) Fall Protection.~~

~~Employees shall not be permitted to place or tie reinforcing steel in walls, piers, columns, etc., more than 6 feet above an adjacent surface, unless a personal fall protection system is used in accordance with Section 1670 or other method affording equivalent protection from the hazard of falls from elevated surfaces.~~
~~Exception: Point-to-point horizontal or vertical travel on reinforcing steel up to 24 feet above the surface below providing there are no impalement hazards.~~

Section 1712(f) is moved to Section 1711(e).

~~(f) Securing Reinforcing Steel.~~
~~(1) Reinforcing steel for walls, piers, columns, and similar vertical structures shall be guyed and supported to prevent collapse.~~
~~(A) Guys, supports, and braces shall be installed and removed as directed by a qualified person.~~
~~(2) Wire mesh rolls shall be secured to prevent dangerous recoiling action.~~
NOTE : Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

Amend Section 1713 to read as follows:

Section 1713. ~~Framing~~ Framed Panels and Concrete Forms.

(a) Framed panels for structures shall be securely anchored, guyed, or braced to prevent them from falling.
(b) Form panels for concrete structures shall be securely anchored, guyed, or braced to prevent them from falling or collapsing.
(1) Panels and forms exceeding 500 pounds shall have lifting attachments with a safety factor of 4.
(2) Nailed lifting attachments shall not be used.
(c) Reinforcing steel shall not be used as a guy, or brace to support framed panels or concrete forms from falling. ~~attachments.~~
(d) The application of form release or oil to horizontal form work shall not be done until the carpentry work on the form has been completed. *[Proposal note: Subsection (d) is relocated from existing Section 1711 with edits developed by the advisory committee].*

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

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Amend Section 1717 to read as follows:

Section 1717. Falsework and Vertical Shoring.

(a) Design Loads.

(1) Formwork and falsework or shoring for the support of concrete or other materials shall be designed, erected, supported, braced and maintained so as to assure its ability to safely withstand all intended loads during erection, construction, usage and removal.

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(e) Removal.
(1) Formwork and shores (except those used for slabs on grade and slip forms) shall not be removed until the employer determines that the concrete has gained sufficient strength to support its weight and superimposed loads. Such determination shall be based on compliance with the stipulated conditions for removal of forms and shores indicated in the plans and specifications.
(2) Reshoring shall not be removed until the concrete being supported has attained the strength to support its weight and all loads placed upon it.

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(f) The controlling contractor shall prohibit employee access to the bridge decks during the jacking and grading operations.
NOTE: For regulations relating to permits for falsework, see Section 1503.

NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.

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Amend Section 1721 to read as follows:

~~Section 1721. Post-Tensioning Operations.~~

Section 1721 is relocated to 1711(h) with edits.

~~(a) No employee (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations.~~
~~(b) Signs and barriers shall be erected to limit employee access to the post-tensioning area during tensioning operations.~~
NOTE: Authority cited: Section 142.3, Labor Code. Reference: Section 142.3, Labor Code.