OCCUPATIONAL SAFETY AND HEALTH
STANDARD BOARD

PETITION FILE NO. 585

Petitioner: Maria “Reese” Fortin, Area Health and Safety Manager of Sundt Construction

BOARD STAFF EVALUATION

Submitted by: Maryrose Chan, Senior Safety Engineer

Date: July 29, 2020

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INTRODUCTION

On May 29, 2020, Maria "Reese" Fortin, Area Health and Safety Manager of Sundt Construction filed a petition by a letter with supporting documents, which was designated as Petition No. 585.

The Petition seeks to amend Section 1711(e)(3) of the Construction Safety Orders regarding guying or bracing of reinforcing steel for walls, piers, columns, prefabricated reinforcing steel assemblies, and similar structures.

REQUESTED ACTION

The Petitioner is asking for Section 1711(e)(3) to be amended in the following manner:

(e) Stability Requirements for Vertical and Horizontal Columns, Walls, and Other Reinforcing Assemblies.
(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 an external guy or brace. Reinforcing steel used for internal bracing must be designed by a Registered Professional Engineer using the Load and Resistance Factor Design. Calculations must include wind and person-on-the-cage loads.

PETITIONER'S ASSERTIONS

The Petitioner asserts that if a contractor erected a column rebar cage that was designed by a qualified, Registered Professional Engineer (RPE) to have internal bracing consisting of rebar X-braces, it would be considered an illegal practice by Cal/OSHA (despite the statement in the standard "*Systems for guying, bracing, or supports shall be designed by a qualified person*"). If designed by a qualified RPE, the Petitioner asks "why can't rebar be used as an internal brace—especially if multiple analyses show that it will create safer conditions in the field?"

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Relevant Standards

California Standards

§1711. Reinforcing Steel and Post-Tensioning in Concrete Construction.
(e) Stability Requirements for Vertical and Horizontal Columns, Walls, and Other Reinforcing Assemblies.
(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.
(5) The controlling contractor shall prohibit other construction processes below or near the erection of reinforcement assemblies until they are adequately supported and/or secured to prevent structural collapse.
(6) The reinforcing steel contractor shall flag specific areas of the erection level for their work activity. The guying and/or bracing shall be in place before the release of the reinforcing assembly from the hoist rigging.

Federal Standards

§1926.703(d)
Reinforcing steel.
§1926.703(d)(1)
Reinforcing steel for walls, piers, columns, and similar vertical structures shall be adequately supported to prevent overturning and to prevent collapse.

Consensus Standards

ANSI/ASSE A10.9-2013, Safety Requirements for Concrete and Masonry Work
5.4 Prohibited Uses of Reinforcing Steel
5.4.1 Reinforcing steel shall not be used as guy/bracing attachments anchorage points.
5.4.2 Reinforcing steel shall not be used as hoisting/lifting inserts/plates unless approved by an engineer.

10.3.3 Stability Requirements for Vertical and Horizontal Columns, Walls and Other Reinforcing Assemblies
10.3.3.1 Structural stability of vertical and horizontal reinforcing steel assemblies shall be maintained at all times.
10.3.3.2 Vertical and horizontal column, caissons, walls, drilled piers, top mat and other reinforcing steel assemblies shall be guyed, braced or supported to prevent structural collapse.

10.3.3.3 Guying, bracing or supports shall be installed only with the approval of a competent person.
10.3.3.4 Guying, bracing or supports shall be removed only with the approval of a competent person.
10.3.3.5. The project constructor shall bar other construction processes below or near the erection of the reinforcement assemblies until they are adequately supported and/or secured to prevent structural collapse.
10.3.3.6. Prefabricated walls, caissons, drilled piers and other modular reinforcing steel assemblies that are free-standing shall be guyed, braced or supported under the direction of a competent person.
10.3.3.7 Systems for guying, bracing, or supports shall be designed by a qualified person of the project constructor, and removed only with the approval of a competent person.

Staff Analysis

On a rulemaking publicly heard December 15, 2016, Section 1711(e)(3) was added as a result of rulemaking entitled: Reinforcing Steel Concrete Construction and Post-Tensioning Operations. The standard became effective January 1, 2018. According to the initial statement of reasons, the standards in Section 1711(e) came from existing standards and Section 10.3.3 of ANSI 10.9-2013, Safety Requirement for Concrete and Masonry Work.

Subsection (e) consist of a of list required work practices to prevent the collapse of vertical and horizontal columns and other reinforcing assemblies during the process of erecting the structure of the building. The intent of subsection (e) is to prevent these vertical reinforcing steel structures from falling or collapsing during the construction process. Rebar cannot be used as an external brace due to its tendency to buckle when loaded at the tip.

Neither the ANSI A10.9-2013 nor the federal standard specifically prohibit reinforcing steel from being used as an internal brace. The 2016 rulemaking did not intend to make internal bracing illegal. The use of internal bracing does not eliminate the use of external brace or guy in all cases. See ANSI 10.3.3.6 above.

The federal standard and ANSI require that vertical and horizontal column, caissons, walls, drilled piers, top mat and other reinforcing steel assemblies shall be guyed, braced or supported to prevent structural collapse. In working to brace, guy, and support these structures, ANSI prohibits reinforcing steel from being used as an attachment anchorage point and prohibits reinforcing steel from being used as hoisting/lifting inserts/plates unless approved by an engineer.

Board staff reviewed the rulemaking file to determine the rationale for the addition of Section 1711(e)(3). Unfortunately, rulemaking documents do not specifically name the source of Section 1711(e)(3). The advisory committee members did not ponder the use of rebar for internal bracing. Board staff can only surmise that the intent of Subsection (e)(3) is to prohibit reinforcing steel from being used as external brace based on the October 27 and 28, 2014 advisory committee meeting.

> *"The committee discussed that appropriate guys or bracing (e.g. steel cables) are sometimes attached directly to vertical columns/plates of reinforcing steel which is an acceptable practice when it is part of the engineered plan. Therefore, similar language to the aforementioned Section 1713(c) is also proposed in Section 1711(e)(3) to prohibit reinforcing wall or other reinforcing steel assemblies….." [page 14, paragraph 5]*

The Petitioner's proposed amendment in Section 1711(e)(3) "Reinforcing steel used for internal bracing must be designed by a Registered Professional Engineer using the Load and Resistance Factor Design. Calculations must include wind and person-on-the-cage loads." is not necessary because of the current requirement that states that systems for guying, bracing, or supports shall be designed by a qualified person.

Board staff does not agree with the amended language specifying how reinforcing steel must be designed by the structural engineer as proposed by the applicant, because the registered engineer as a competent and a qualified person must not be restricted to a certain calculation rubric or method in designing load requirements for the internal bracing to ensure structural stability. There is no need to prescribe the type of analysis. Furthermore, internal bracing of vertical and horizontal columns, walls, and other reinforcing assemblies must not preclude the judgement of the competent person on-site in determining whether additional external guy or brace is needed for structural stability.

STAFF RECOMMENDATION

Board staff recommends that Petition No. 585 be DENIED. However it is Board staff's considered opinion that there is merit to having the Board direct staff to consider an amendment of CSO Section 1711(e) to clarify the following:

- Internal bracing is not illegal.
- Internal bracing must be designed by a registered engineer.
- Internal bracing does not automatically exempt vertical and horizontal columns, walls, and other reinforcing assemblies from external bracing.
- Clarify safe practices listed under Prohibited Use of Reinforcing Steel in ANSI ANSI/ASSE A10.9-2013, Safety Requirements for Concrete and Masonry Work.

Board staff will consult with subject matter experts and select a small group of stakeholders in the preparation of the proposed language. Given the narrow scope of the proposed amendment, Board staff does not anticipate the need for a formal advisory committee.