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APPEAL SUMMARY

Status: Decision Rendered

Appeal ID: 14750	Project Address: 485 NW Glisan St
Hearing Date: 3/8/17	Appellant Name: Amy Perenchio
Case No.: B-016	Appellant Phone: 5038632463
Appeal Type: Building	Plans Examiner/Inspector: Amit Kumar, Larry Wright
Project Type: commercial	Stories: 11 Occupancy: A-2, A-3, B, R-1, S-1 Construction Type: I-B
Building/Business Name: Canopy Hotel	Fire Sprinklers: Yes - Throughout
Appeal Involves: Erection of a new structure	LUR or Permit Application No.: 15-265536-CO
Plan Submitted Option: pdf [File 1]	Proposed use: Hotel

APPEAL INFORMATION SHEET

Appeal item 1

Code Section ACI 318-11, Section 21.1.5.2

Requires Deformed reinforcement resisting earthquake-induced flexure, axial force, or both, shall comply with ASTM A706, Grade 60. ASTM A615 Grades 40 and 60 reinforcement shall be permitted if: (a) The actual yield strength based on mill tests does not exceed f_y by more than 18,000 psi.

Proposed Design The gravity force-resisting system consists of post-tensioned concrete slabs and reinforced concrete columns. The lateral force-resisting system consists of special reinforced concrete shear walls that form a core around the elevators, and an additional planar shear wall in the northeast corner of the building. The building is supported by a continuous mat foundation at the basement.

Vertical reinforcing that does not conform to ASTM A706, or ASTM A615 with ACI 318-11 Section 21.1.5.2 limitations, was installed in the shear walls. The mill certificates for the reinforcing in question indicate that the yield strength is 86 ksi and the tensile strength is 123 ksi. Therefore, while Section 21.1.5.2.b is met by a comfortable margin ($\text{tensile}/\text{yield}=1.43$), Section 21.1.5.2.a is exceeded (86 ksi actual versus 78 ksi allowable). The placement of this reinforcing was limited to the vertical "field" reinforcing between the confined boundary elements and between the basement level and ground floor level. The reinforcing in the boundary elements and the reinforcing above the ground level does conform to ASTM A706 and/or ACI Section 21.1.5.2.

Based on the Commentary in ACI 318-11 and our conversation with Dr. Andrew Taylor (Chair of ACI 318 Subcommittee H on Seismic Provisions), the intent of the upper limit on yield strength in Section 21.1.5.2.a is to ensure that the actual flexural capacity of the shear wall is not significantly greater than what is calculated based on nominal properties. Furthermore, the intent of limiting the flexural capacity of the hear wall is to encourage flexural yielding of the wall prior to a shear

mechanism forming. that is, a much greater wall flexural capacity could lead to an increased wall shear demand because the limiting mechanism (flexural yielding) had become stronger.

Reason for alternative We believe that the high yield strength reinforcing that was placed on this project does not alter the intended behavior required by the building code. Below the ground floor level, the flexural demand (bending moment) on the shear walls reduces due to the "back-stay" effect created by the ground floor diaphragm distributing load to the perimeter basement walls. Therefore, we would still expect the plastic hinge zone to form above the ground floor level where the reinforcing does conform to ACI requirements. Reference the attached sketch (dated 3-2-2017) for an illustration of this point. Therefore, the use of reinforcing that does not conform to Section 21.1.5.2.a below the ground floor does not alter the expected flexural hinge capacity or location and thus would not change the resulting shear demand as compared to the original design.

Based on the discussion above regarding the intent of the code, the placement of the reinforcing in question, and the expected behavior of the shear walls, we would recommend that no corrective actions are required for this specific instance of the reinforcing being outside of the limit of Section 21.1.5.2.a from ACI 318-11.

APPEAL DECISION

Allowance of non-conforming reinforcing, using higher yield strength than specified in basement level shear walls: Granted as proposed.

The Administrative Appeal Board finds that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 180 calendar days of the date this decision is published. For information on the appeals process and costs, including forms, appeal fee, payment methods and fee waivers, go to www.portlandoregon.gov/bds/appealsinfo, call (503) 823-7300 or come in to the Development Services Center.



March 2, 2017

Ms. Amy Perenchio
ZGF Architects
1223 SW Washington Street, Suite 200
Portland, OR 97205

Re: Pearl Canopy Hotel—Non-Conforming Reinforcing Appeal

Dear Amy:

This letter is to provide background information to support the appeal regarding the non-conforming reinforcing that was placed in the basement level shear walls.

General Building Description

The Pearl Canopy Hotel is a one-quarter block, 11-Story building with one basement level located at the corner of NW 9th Avenue and NW Glisan Street in Portland, Oregon. The building is currently under construction under permit number 15-265536-000-00-CO. The gravity force-resisting system consists of post-tensioned concrete slabs and reinforced concrete columns. The lateral force-resisting system consists of special reinforced concrete shear walls that form a core around the elevators, and an additional planar shear wall in the northeast corner of the building. The building is supported by a continuous mat foundation at the basement level.

Non-Conforming Item

Vertical reinforcing that does not conform to ASTM A706, or ASTM A615 with ACI 318-11 Section 21.1.5.2 limitations, was installed in the shear walls. The mill certificates for the reinforcing in question indicate that the yield strength is 86 ksi and the tensile strength is 123 ksi. Therefore, while Section 21.1.5.2.b is met by a comfortable margin (tensile/yield = 1.43), Section 21.1.5.2.a is exceeded (86 ksi actual versus 78 ksi allowable). The placement of this reinforcing was limited to the vertical “field” reinforcing between the confined boundary elements and between the basement level and the ground floor level. The reinforcing in the boundary elements and the reinforcing above the ground floor level does conform to ASTM A706 and/or ACI Section 21.1.5.2.

Background and Discussion

Based on the Commentary in ACI 318-11 and our conversation with Dr. Andrew Taylor (Chair of ACI 318 Subcommittee H on Seismic Provisions), the intent of the upper limit on yield strength in Section 21.1.5.2.a is to ensure that the actual flexural capacity of the shear wall is not significantly greater

than what is calculated based on nominal properties. Furthermore, the intent of limiting the flexural capacity of the shear wall is to encourage flexural yielding of the wall prior to a shear mechanism forming. That is, a much greater wall flexural capacity could lead to an increased wall shear demand because the limiting mechanism (flexural yielding) had become stronger.

We believe that the high yield strength reinforcing that was placed on this project does not alter the intended behavior required by the building code. Below the ground floor level, the flexural demand (bending moment) on the shear walls reduces due to the "back-stay" effect created by the ground floor diaphragm distributing load to the perimeter basement walls. Therefore, we would still expect the plastic hinge zone to form above the ground floor level where the reinforcing does conform to ACI requirements. Reference the attached sketch (dated 3-2-2017) for an illustration of this point. Therefore, the use of reinforcing that does not conform to Section 21.1.5.2.a below the ground floor does not alter the expected flexural hinge capacity or location and thus would not change the resulting shear demand as compare to the original design.

Recommendation

Based on the discussion above regarding the intent of the code, the placement of the reinforcing in question, and the expected behavior of the shear walls, we would recommend that no corrective actions are required for this specific instance of the reinforcing being outside of the limit of Section 21.1.5.2.a from ACI 318-11.

If you have any questions or need further information, please feel free to call.

Sincerely,



Mark Tobin, S.E.
Associate

MT/bd

Attachment Sketch



BASIC GEOMETRY

MOMENT DIAGRAM

