

MUNICIPALITY OF ANCHORAGE

DEVELOPMENT SERVICES DEPARTMENT



DATE: Tuesday, February 2, 2021

TO: Three-Member Panel Hearing
Building Board of Regulations Examiners and Appeals
Appellant – Franklin & Associates

FROM: Robert Doehl, Building Official *Robert A. K. Doehl*

SUBJECT: BCA-01-2021

Synopsis:

Appellant has appealed to the Building Official for exception to one of the many minimum top of car clearance requirements for a new elevator, which is a clearance requirement for the safety of elevator and other personnel. The new elevator is being installed in the Alaska USA Federal Credit Union (Ak. USA) at 4220 B St. The vertical clearance above the hydraulic jacks is approximately 1.25" to the sheet rock ceiling of the elevator hoistway / elevator shaft (see attached photo-1), when the car reaches its maximum upward movement. The elevator code requires a minimum of 4" vertical clearance above the hydraulic jacks, and also within a certain area adjacent to the hydraulic jacks in case personnel have their arm over the jacks and the elevator either intentionally or unintentionally moves up to its maximum upward movement while they are on top performing work.

Background:

The Safety Code for Elevators and Escalators – A17.1-2016, Sections 3.4.5, 2.4.7 & 3.4.8 (see copies attached), have minimum top of car clearance requirements for elevators, to provide for protection of elevator equipment and for the safety of personnel working on elevator car tops. Elevator personnel work on top of elevator cars throughout hoistways, performing maintenance, repairs, replacements, modernizations, inspections, testing, etc. They also provide other trades access to car tops to perform work in hoistways. Elevator car tops and the tops of hoistways have a variety of objects that can and have caused injury and death due to crushing, pinching, and shearing hazards. Elevator code editions over the decades have included a series of clearance requirements to prevent against injury and death. The language for the requirements has evolved through the various code editions, but the requirements are present in the code books for the safety of personnel.

When elevators are being built, the elevator layout drawings from the manufacturer indicate the minimum clearances that need to be met for code compliance. Evidently the minimum clearances per the Otis Elevator layout drawings were not provided when the general contractor constructed the new elevator hoistway in the Alaska USA project, so now a code violation was created. When coordination between an elevator contractor and architect, structural engineer and general contractor occur, elevator contractors usually help all parties understand and ensure that the minimum required clearances are met prior to mobilizing to a job site and installing the elevator.

Sometimes new buildings have a roof line that only allows for less than the minimum required clearances of an elevator, so a raised area is constructed to provide for the clearances (see attached photos 2 -5 of raised areas above roofs created to provide for the clearances for safety of personnel). When new hoistways are constructed within existing buildings, it is very common to see a raised area created, or in many cases, the existing overhead structure is modified to provide for the required clearances and also maintain required structural, snow load and seismic requirements without having to create a raised area, depending on the vertical dimensions.

Summary of MOA Position:

It is the department's position that the code requirement should not be waived, because this project consists of a new hoistway for a new elevator, and all of the requirements were able to be discussed and planned for properly up front on this project. Following is some data considered when making this decision:

- The Appellant indicated on the Appeals to the Three-Member Panel document ("appeal") that there is a discrepancy between the IBC-2012 and the current elevator code, but the building code does not prescribe elevator clearances. Only the elevator code does that, so there is no discrepancy.
- The appeal indicates that since the building is existing there is a practical difficulty in meeting the current 4" clearance requirement. This is not true, because once again, this is always discussed and planned for up front during elevator installation projects, and somehow ended up an issue on this particular project.
- The appeal indicates that the supplier and installer (Otis Elevator) has indicated that the installation is safe, and Otis has indicated that the car top inspection operation has an additional limit on the travel in the up direction, which is not an alternative in the code to providing for all of the car top clearance requirements.
- The letter from the Appellant to the Building Official dated 12-28-20 indicates in the first paragraph that the available height for installation was very limited, but the height requirement provided by Otis was met. This is not true, as the height requirement is less than the final layout drawings from Otis. Also – the elevator drawing included by the Appellant in the Appeals packet does not match the layout drawings for this particular elevator.
- In the same letter to the building official in the Code References section, it indicates that the applicable building code is the 2012 IBC, which references the A17.1-2007 edition of the elevator code. The MOA and State of Alaska have the A17.1-2016 elevator codes adopted and effective, so the reference from the 2012 IBC is not applicable. It is important to note that the A17.1-2007 actually required a minimum of 6" of clearance above the hydraulic jack and attachments, so if the Appellant wanted to apply that code book, it is actually more restrictive than the newer elevator code books.
- In the same letter on page 2, 5th paragraph, it indicates that the reasoning for this additional clearance is not apparent, but Chalon Rein explained the reasons to the Appellant in a conversation, but he wanted to move forward with the appeal anyway.
- In response to the bulleted item portion at the end of the same letter, the following responses to some of the items are important: The modification does not meet the intent of the 2012 IBC, as it does not apply. No conflict exists between the 2012 IBC and the current elevator code. The practical difficulties in meeting the 4" clearance requirement should have been planned and budgeted for, as occurs with all elevator projects when discussing minimum clearance requirements. Although the area would be accessed by trained elevator personnel, the code does not allow for the deletion of the clearances – Trained personnel are the ones who have been injured and killed due to the lack of proper clearances above elevator equipment. The claims that to provide the 4" clearance will damage structural elements and weaken the roof diaphragm is not valid, as proper design and reinforcement is performed often for elevator installations to be completed in a code compliant and safe manner. And finally, the claim that lessening the clearance does not lessen health or life is simply not true, as the codes are written for exactly that purpose.

It is also important to consider that the Municipality of Anchorage Elevator Inspection Section has a memorandum of understanding (MOU) with the State of Alaska Mechanical Inspection Section, and that MOU requires that the MOA is as strict but not less strict than the SOA with regard to the codes and standards that we adopted and enforce. Please see the attached e-mail from the State of Alaska Chief of Mechanical Inspections, Will Harlan, in which he indicates that the State of Alaska would not approve the variance request and appeal to this safety code.

photo - 1



with the car, including a plunger-follower guide, if provided, shall strike any part of the pit or any equipment mounted therein.

3.4.1.6 Where the vertical clearance outside the refuge space is less than 600 mm (24 in.), that area shall be clearly marked on the pit floor. Markings shall not be required in the area under the apron and guiding means. The marking shall consist of alternating 100 mm (4 in.) diagonal red and white stripes. In addition, a sign with the words "DANGER LOW CLEARANCE" in a minimum 50 mm (2 in.) high letters shall be prominently posted on the hoistway enclosure and shall be visible from within the pit and at the entrance to the pit. The sign shall conform to ANSI Z535.2 and ANSI Z535.4, or CAN/CSA-Z321, whichever is applicable (see Part 9). The sign shall be made of a durable material and shall be securely fastened. The letters and figures shall remain permanently and readily legible.

3.4.2 Minimum Bottom and Top Car Runby

3.4.2.1 Bottom Car Runby. The bottom car runby shall be

- (a) not less than 75 mm (3 in.) for operating speed(s) in the down direction up to 0.50 m/s (100 ft/min)
- (b) increased from 75 mm (3 in.) to 150 mm (6 in.) in proportion to the increase in operating speed(s) in the down direction from 0.50 m/s (100 ft/min) to 1 m/s (200 ft/min)
- (c) a minimum of 150 mm (6 in.) for operating speed(s) in the down direction exceeding 1 m/s (200 ft/min)

3.4.2.2 Car Top Minimum Runby. The top runby of the car shall be

- (a) not less than 75 mm (3 in.) for rated speeds up to 0.50 m/s (100 ft/min)
- (b) increased from 75 mm (3 in.) to 150 mm (6 in.) in proportion to the increase in rated speed from 0.50 m/s (100 ft/min) to 1 m/s (200 ft/min)
- (c) a minimum of 150 mm (6 in.) for rated speeds exceeding 1 m/s (200 ft/min)

3.4.3 Car Top and Bottom Maximum Runby

Neither the top nor the bottom runby of the car shall be more than 600 mm (24 in.).

3.4.4 Maximum Upward Movement

The maximum upward movement shall be the distance the car sill is above the top landing when the plunger stop (3.18.4) is engaged.

3.4.5 Top-of-Car Clearances

The top-of-car clearances shall conform to 2.4.7 except as specified in 3.4.8.

NOTE (3.4.5): See Nonmandatory Appendix G.

3.4.6 Top Clearance and Bottom Runby of Counterweight

Where a counterweight is provided, the top clearance and the bottom runby of the counterweight shall conform to 3.4.6.1 and 3.4.6.2.

3.4.6.1 Top Clearance. The top clearance shall be not less than the sum of the following:

- (a) the bottom car runby
- (b) the stroke of the car buffers used
- (c) 150 mm (6 in.)

3.4.6.2 Bottom Runby. The bottom runby shall be not less than the sum of the following:

- (a) the distance the car can travel above its top terminal landing until the plunger strikes its mechanical stop
- (b) 150 mm (6 in.)

The minimum runby specified shall not be reduced by rope stretch (see 3.22.2 prohibiting counterweight buffers).

3.4.7 Equipment on Top of Car Not Permitted to Strike Overhead Structure

Equipment on top of the car shall conform to the requirements in 2.4.9.

3.4.8 Clearances Above Hydraulic Jack Projecting Above the Car

When the car has reached its maximum upward movement, a vertical clearance of 100 mm (4 in.) shall be provided from a hydraulic jack attached to the car and the jacks' attachment means to the horizontal plane described by the lowest part of the overhead structure or other obstruction adjacent to the car enclosure top within the vertical projection of the hydraulic jack and its attachment means. Additionally a horizontal clearance in the direction of the centerline of the car top of at least 300 mm (12 in.) shall be provided from the top of the hydraulic jack to any object creating a shearing hazard.

NOTE (3.4.8): See Nonmandatory Appendix G, Fig. G-5.

SECTION 3.5 HORIZONTAL CAR AND COUNTERWEIGHT CLEARANCES

The horizontal car and counterweight clearances shall conform to Section 2.5.

SECTION 3.6 PROTECTION OF SPACES BELOW HOISTWAY

Section 2.6 does not apply to hydraulic elevators.

Where there is space below the hoistway that is accessible to persons, requirements of 3.6.1 through 3.6.4 shall be conformed to.

(16) **Table 2.4.2.2 Minimum Bottom Runby for Counterweight Elevators With Spring Buffers, Elastomeric Buffers, or Solid Bumpers and Rheostatic Control or Single-Speed AC Control**

Rated Speed, m/s (ft/min)	Runby, mm (in.)
Not over 0.13 (not over 25)	75 (3)
Over 0.13 to 0.25 (over 25 to 50)	150 (6)
Over 0.25 to 0.50 (over 50 to 100)	225 (9)
Over 0.50 to 1.0 (over 100 to 200)	300 (12)

obtain the runby specified, it shall be permitted to be reduced

(b) where spring-return-type oil buffers are used, the runby shall be permitted to be eliminated so that the buffers are compressed by amounts not exceeding those permitted by 2.22.4.8, when the car floor is level with the terminal landings

- (16) **2.4.2.2** Where spring buffers, elastomeric buffers, or solid bumpers are used, the bottom runby shall be not less than 150 mm (6 in.), except for rheostatic and single-speed AC control, not less than shown in Table 2.4.2.2.

2.4.3 Minimum Bottom Runby for Uncounterweighted Elevators

The bottom runby of uncounterweighted elevators shall be not less than

- (a) 75 mm (3 in.) where the rated speed does not exceed 0.15 m/s (30 ft/min)
 (b) 150 mm (6 in.) where the rated speed exceeds 0.15 m/s (30 ft/min)

2.4.4 Maximum Bottom Runby

In no case shall the maximum bottom runby exceed

- (a) 600 mm (24 in.) for cars
 (b) 900 mm (35 in.) for counterweights

2.4.5 Counterweight Runby Data Plate

A data plate permanently and securely attached shall be provided in the pit, in the vicinity of the counterweight buffer, indicating the maximum designed counterweight runby. The data plate shall conform to 2.16.3.3, except that the letters shall be not less than 25 mm (1 in.) in height.

2.4.6 Maximum Upward Movement of the Car

2.4.6.1 Counterweighted Elevators. The maximum upward movement of a counterweighted elevator above the top landing shall be no more than the sum of either of the following:

- (a) for elevators without tie-down compensation, dimensions specified in 2.4.6.1.1(a) through (c)

(b) for elevators with tie-down compensation, dimensions specified in 2.4.6.1.1(a), (b), and (d)

2.4.6.1.1 The following shall be used when calculating the maximum upward movement of a counterweighted elevator:

(a) the designed maximum bottom counterweight runby [see 2.4.4(b)]

(b) the stroke of the counterweight buffer, determined as follows:

(1) for full-stroke buffers, the stroke of the buffer used, or the remaining stroke when the buffer is compressed with the car at the top terminal landing (see 2.4.2 and 2.22.4.8); or

(2) for reduced-stroke oil buffers (see 2.22.4.1.2), the stroke of the buffer used.

(c) one-half of the gravity stopping distance, based on

(1) 115% of the rated speed where oil buffers are used, or 115% of the reduced striking speed when emergency terminal speed-limiting devices meeting the requirements of 2.25.4 are used and no compensating-rope tie-down device in conformance with 2.21.4.2 is provided (see 8.2.4 for gravity stopping distances); or

(2) the governor tripping speed where spring buffers or elastomeric buffers are used.

(d) the distance to which the compensating-rope tie-down device, if provided (see 2.21.4.2), limits the jump of the car when the counterweight strikes the buffers at speeds specified in 2.4.6.1.1(c) plus the distance to account for the amount of compensation rope stretch.

2.4.6.2 Uncounterweighted Elevators. The maximum upward movement of an uncounterweighted elevator above the top landing shall be no more than the distance from the top landing to the point

(a) where the driving machine operates the final terminal stopping switch (2.25.3.3.2) for a winding-drum machine; or

(b) where the car operates the upper final terminal stopping device (2.25.3.3.1) plus gravity stopping distance based on 115% of the rated speed for a traction machine.

2.4.7 Top-of-Car Clearances

2.4.7.1 When the car has reached its maximum upward movement, the clearance above the car top, measured vertically up to the horizontal plane described by the lowest part of the overhead structure or other obstruction and measured within the projection of the car enclosure top exclusive of the area outside the standard railing (2.10.2) where provided, shall be not less than 1 100 mm (43 in.). In no case shall the following additional clearances be less than:

- (a) 600 mm (24 in.) above the car crosshead assembly except as permitted in 2.4.7.1(b) when the crosshead is located over the car enclosure top or the distance

(16)

which any sheave assembly mounted in or on the crosshead projects above the top of the car crosshead, whichever is greater, but in no case shall there be less than 150 mm (6 in.) clearance above the sheave assembly.

(b) 300 mm (12 in.) above the car crosshead assembly where the crosshead is adjacent to the car enclosure top. The crosshead shall not overlap the car enclosure top by more than 100 mm (4 in.) horizontally.

(c) 600 mm (24 in.) above equipment attached to and projecting above the car enclosure top, exclusive of

(1) standard railings (see also 2.14.1.7.2)

(2) areas outside of the standard railing, the vertical clearance shall be not less than 100 mm (4 in.)

(3) roller and sliding guide assemblies (see also 2.4.9)

(4) gatepost(s) for vertically sliding gates (see also 2.4.9). Spreader bars between gateposts with horizontal and vertical clearances not in compliance with 2.14.1.7.2 shall have yellow and black diagonal stripes of not less than 25 mm (1 in.) wide along the length of the spreader bar, mounted at a location visible from the car top

2.4.7.2 Any horizontal area above the car enclosure top and within the railing if supplied which could contain a circle with a diameter of equal to or greater than 350 mm (14 in.) that does not have a vertical clearance of 1 100 mm (43 in.) when the car has reached its maximum upward movement shall be clearly marked. The marking shall consist of alternating 50 mm (2 in.) diagonal red and white stripes. In addition, when markings are provided, sign(s) with the words "DANGER LOW CLEARANCE" shall be prominently posted on the crosshead and be visible from the hoistway entrance(s). The sign(s) shall

(a) conform to the requirements of ANSI Z535.4 or CAN/CSA-Z321 (see Part 9)

(b) be made of durable material and shall be securely fastened

NOTE (2.4.7): See Nonmandatory Appendix G.

(16) 2.4.8 Top of Counterweight Clearances

The top of counterweight clearance shall be not less than the sum of the following items:

(a) the bottom car runby (see 2.4.2)

(b) the stroke of the car buffer used, or the remaining stroke when the buffer is compressed with the car at the bottom terminal landing (see 2.4.2 and 2.22.4.8)

(c) 150 mm (6 in.)

(d) one-half of the gravity stopping distance based on

(1) 115% of the rated speed where oil buffers are used, or 115% of the reduced striking speed when emergency terminal speed-limiting devices meeting the requirements of 2.25.4 are used and no provision is made to prevent the jump of the car at counterweight buffer engagement; or

(2) the governor tripping speed where spring buffers or elastomeric buffers are used (see 8.2.5 for gravity stopping distances)

(e) the distance to which the compensating-rope tie-down device, if provided (see 2.21.4.2), limits the jump of the counterweight when the car strikes the buffers at speeds specified in 2.4.8(d) plus the distance to account for the amount of compensation rope stretch

2.4.9 Equipment on Top of Car Not Permitted to Strike Overhead Structure

When the car has reached its maximum upward movement (2.4.6), roller and sliding guide assemblies and gateposts for vertically sliding gates shall not strike any part of the overhead structure or the equipment located in the hoistway.

SECTION 2.5 HORIZONTAL CAR AND COUNTERWEIGHT CLEARANCES

2.5.1 Clearances Between Cars, Counterweights, and Hoistway Enclosures

2.5.1.1 Between Car and Hoistway Enclosures. The clearance between the car and the hoistway enclosure shall be not less than 20 mm (0.8 in.), except on the sides used for loading and unloading.

2.5.1.2 Between Car and Counterweight and Counterweight Guard. The clearance between the car and the counterweight shall be not less than 25 mm (1 in.). The clearance between the car and the counterweight guard, counterweight and the counterweight guard, and between the counterweight and the hoistway enclosure shall be not less than 20 mm (0.8 in.).

2.5.1.3 Between Cars in Multiple Hoistways. The running clearance between the cars and any equipment attached thereto, of elevators operating in a multiple hoistway, shall be not less than 50 mm (2 in.).

2.5.1.4 Between Car and Landing Sills. The clearance between the car platform sill and the hoistway edge of any landing sill, or the hoistway side of any vertically sliding counterweighted or counterbalanced hoistway door, or of any vertically sliding counterbalanced biparting hoistway door, shall be not less than

(a) where car side guides are used

(1) 13 mm (0.5 in.) for all elevators except freight elevators

(2) 20 mm (0.8 in.) for freight elevators

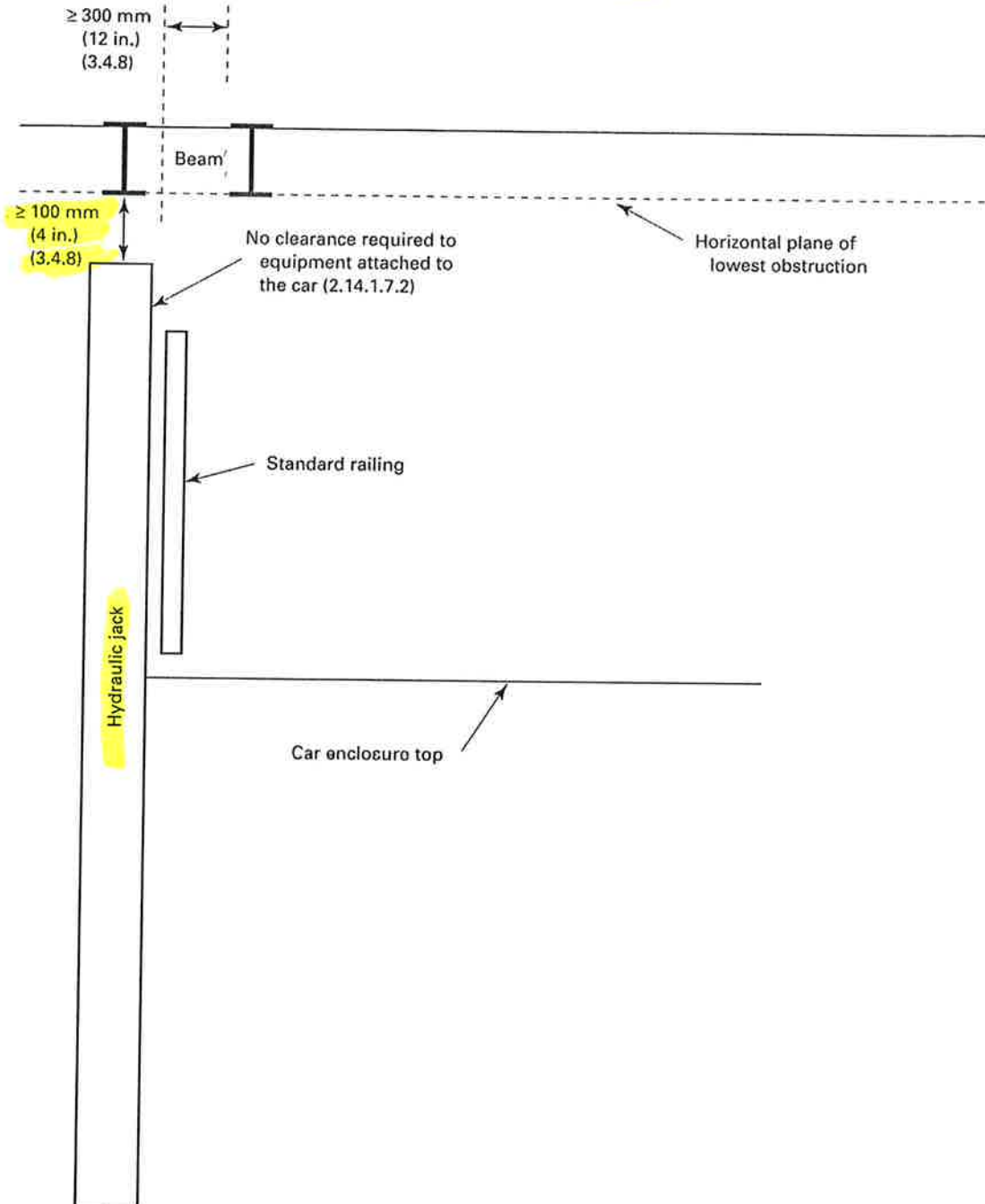
(b) where car corner guides are used, 20 mm (0.8 in.)

The maximum clearance shall be not more than 32 mm (1.25 in.).

2.5.1.5 Clearance Between Loading Side of Car Platforms and Hoistway Enclosures

2.5.1.5.1 The clearance between the edge of the car platform sill and the hoistway enclosure or fascia

Fig. G-5 Additional Top-of-Car Clearance Requirements



NONMANDATORY APPENDIX G TOP-OF-CAR CLEARANCE

(16)

Fig. G-1 Top-of-Car Clearance Requirements (2.4.7.1 and 2.14.1.7.2)

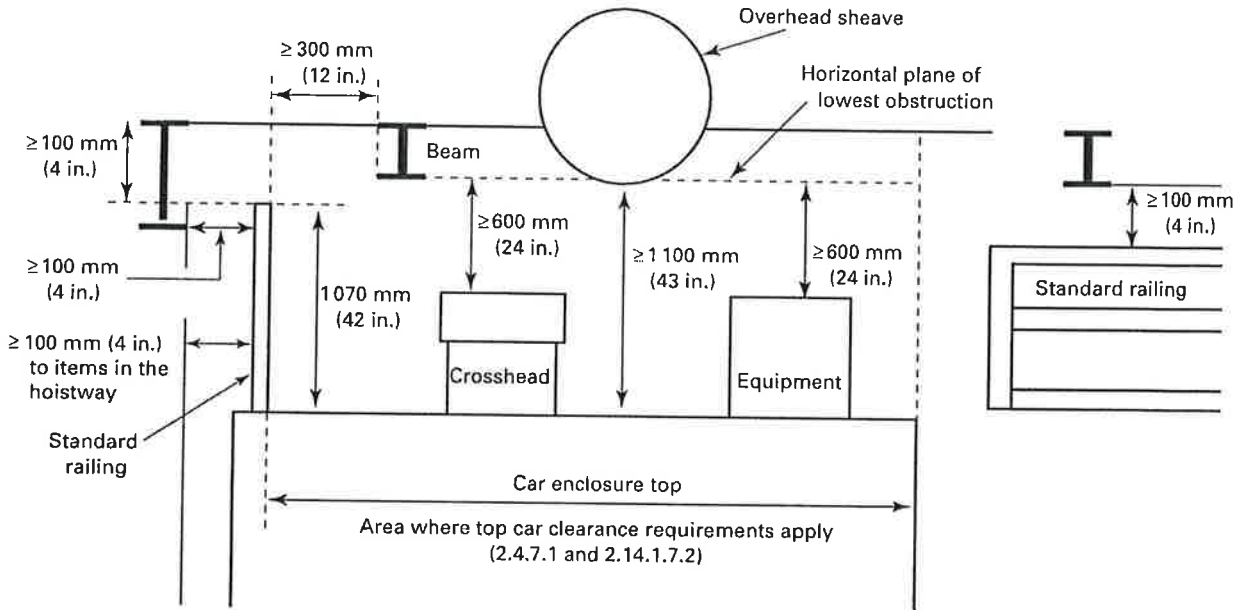


Fig. G-2 Additional Top-of-Car Clearance Requirements (2.4.7.1)

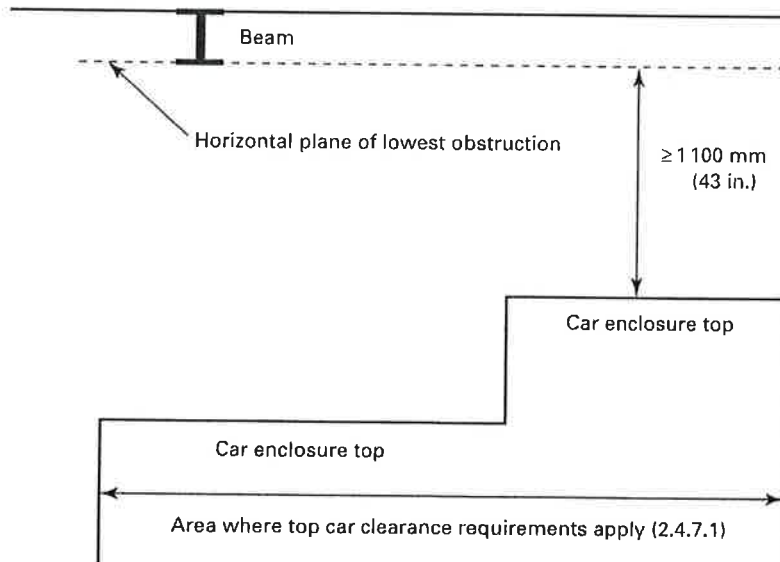


Fig. G-3 Top-of-Car Marking Requirements (2.4.7.2)

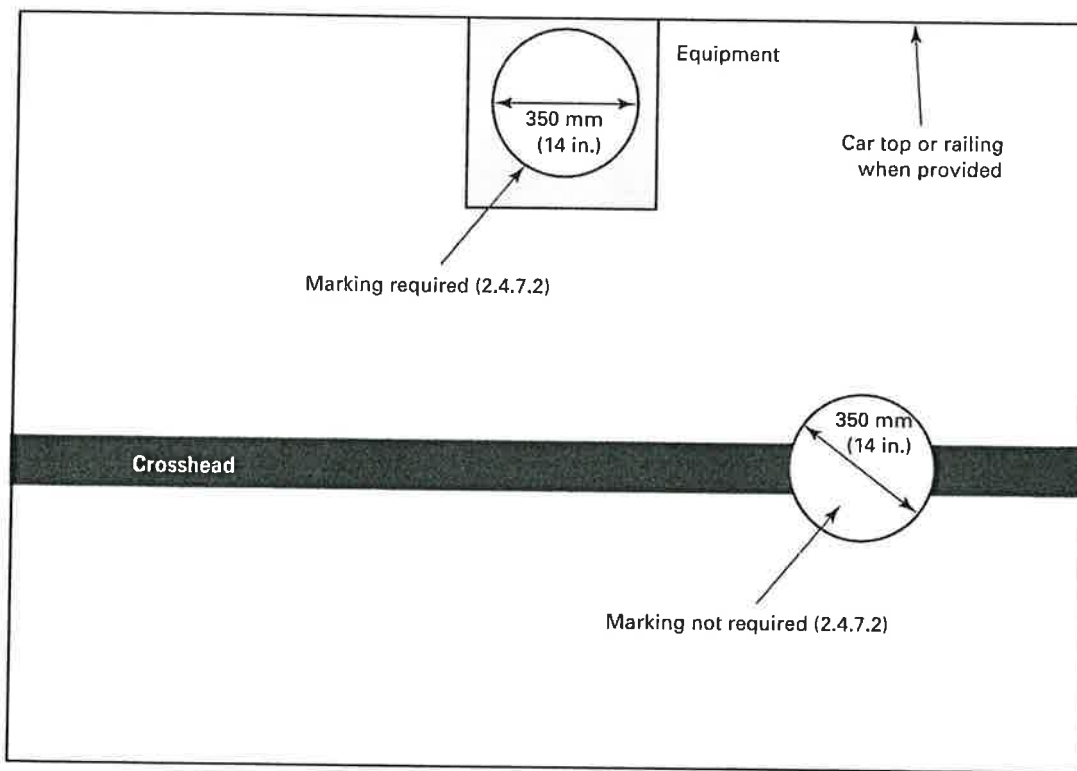


Fig. G-4 Additional Top-of-Car Marking Requirements (2.4.7.2)

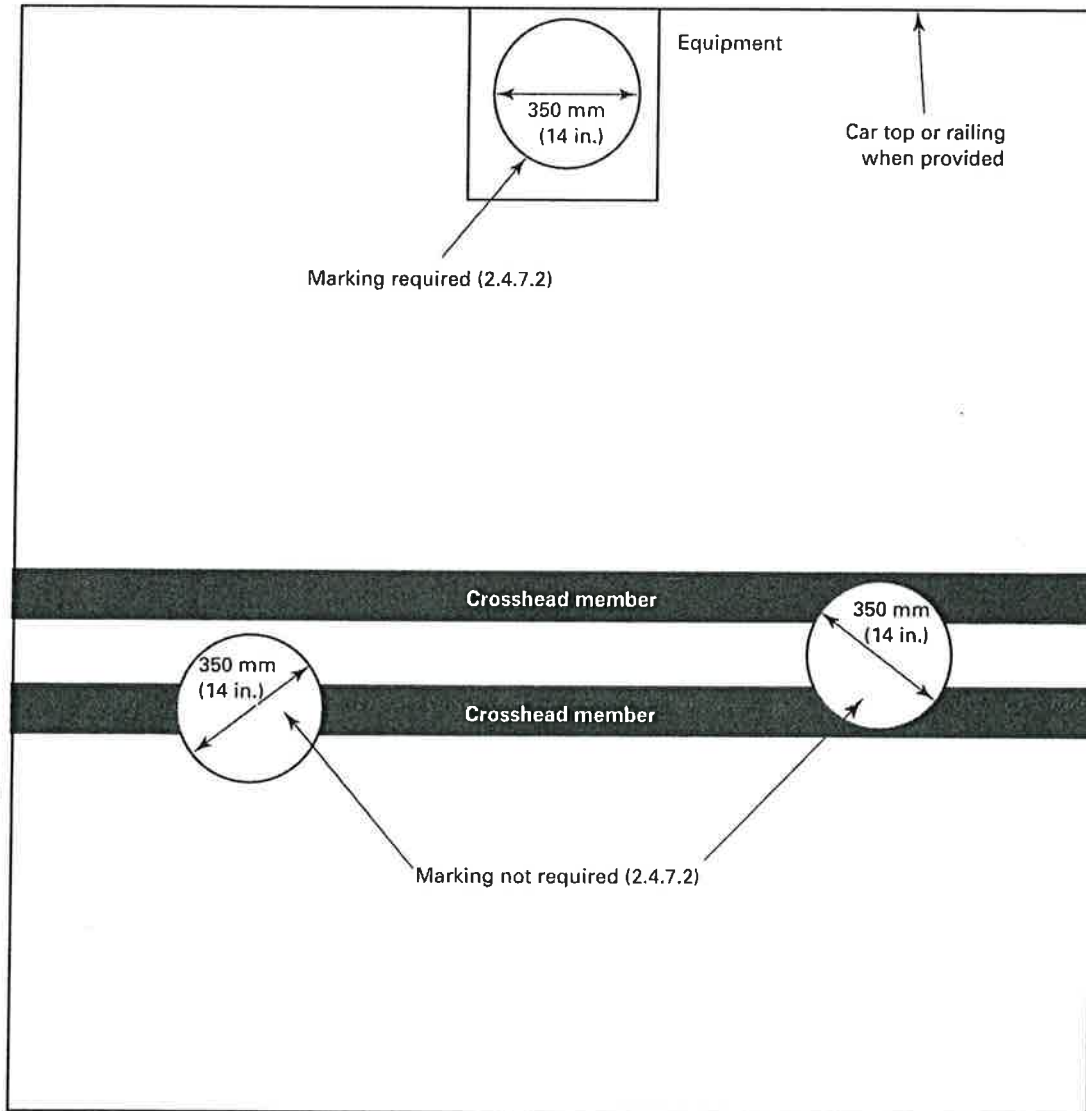
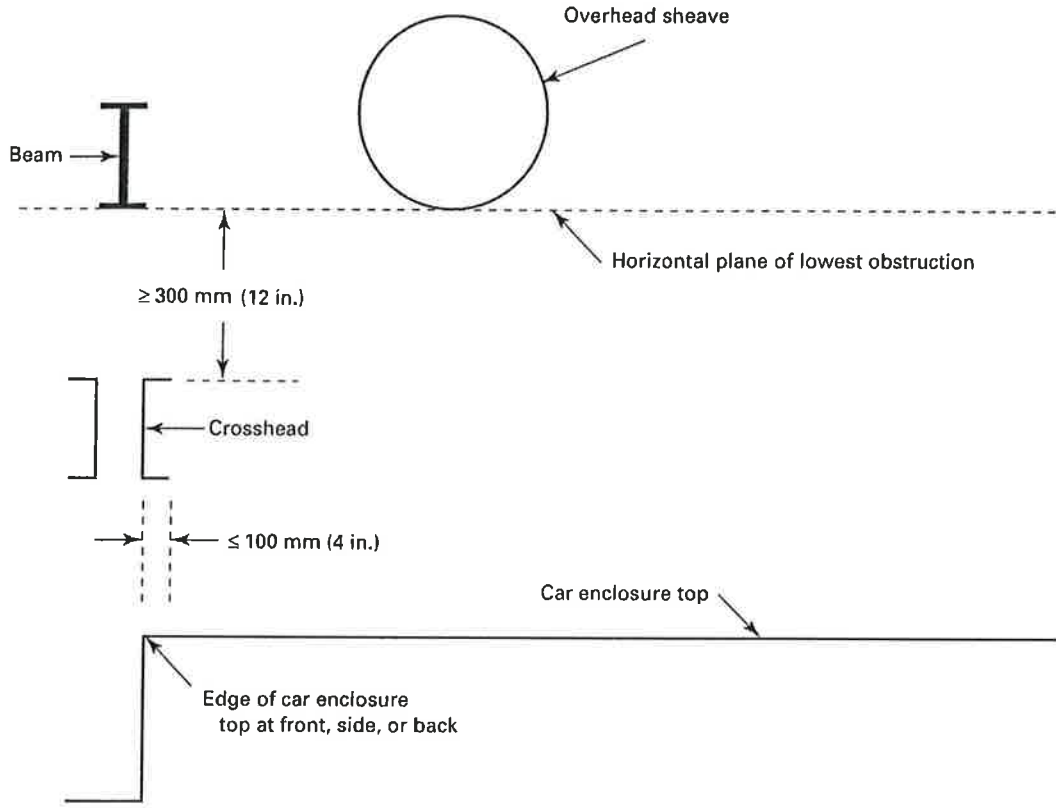


Fig. G-6 Additional Top-of-Car Clearance [2.4.7.1(b)]



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photo-2

photo-3



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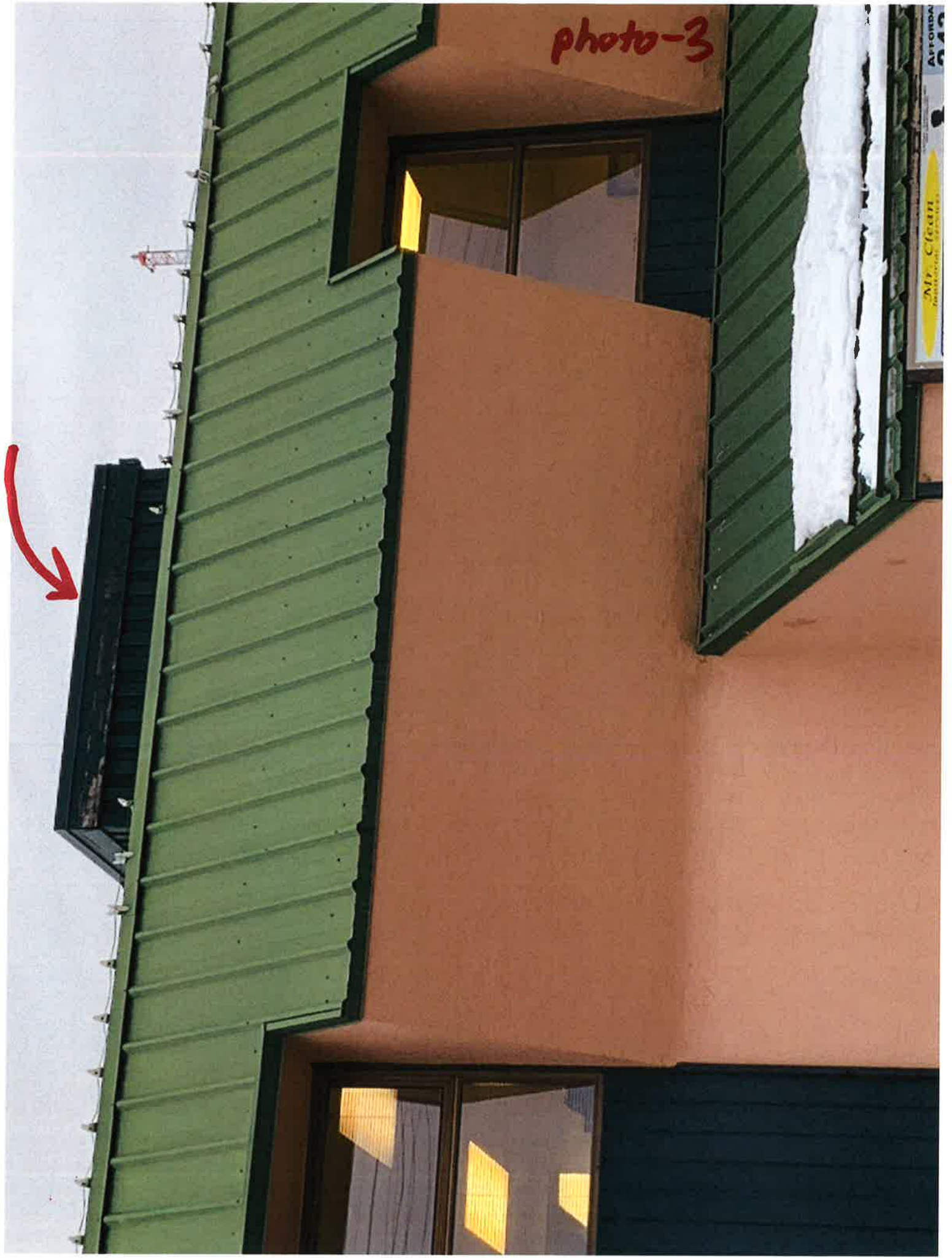
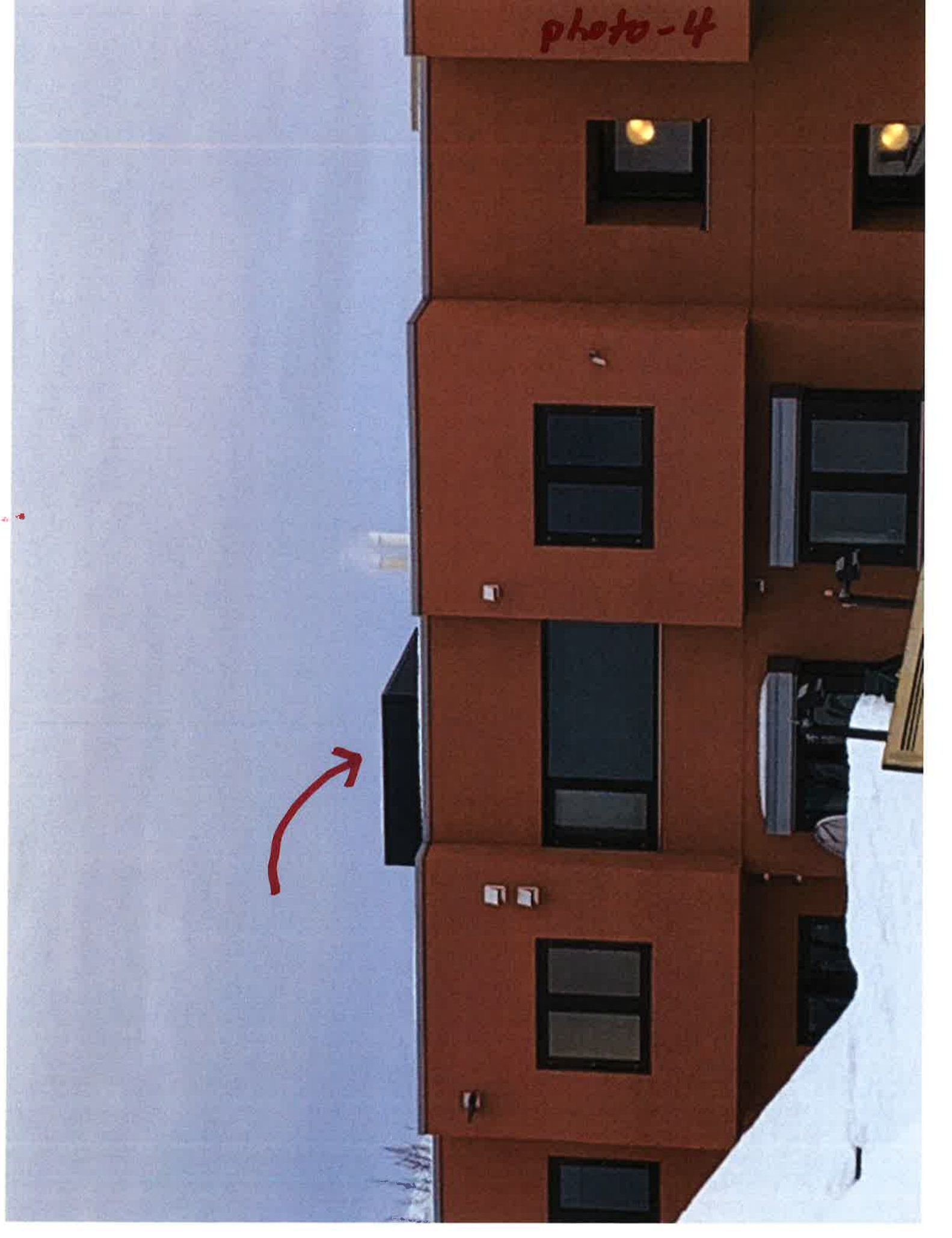


photo-4





12

photo-5

Rein, Chalon M.

From: Fosberg, Victor B.
Sent: Tuesday, February 2, 2021 7:30 AM
To: Rein, Chalon M.; Burnett, Brice A.; Burgoyne, Curt L.
Subject: FW: Building Board/3Member Panel Hearing Appeal

FYA

Victor Fosberg
Chief Electrical and Elevator Inspector
Development Services Department
Municipality of Anchorage
4700 Elmore Road, Anchorage, AK 99507
Phone (907) 343-8316

From: Hile, Gary A. <gary.hile@anchorageak.gov>
Sent: Friday, January 29, 2021 8:34 AM
To: Fosberg, Victor B. <victor.fosberg@anchorageak.gov>
Subject: FW: Building Board/3Member Panel Hearing Appeal

FYA

From: Harlan, William C (DOL) <william.harlan@alaska.gov>
Sent: Wednesday, January 27, 2021 12:20 PM
To: Hile, Gary A. <gary.hile@anchorageak.gov>
Subject: RE: Building Board/3Member Panel Hearing Appeal

[EXTERNAL EMAIL]

Hi Gary,

We have reviewed the packet and your agency findings on this, and we concur with your analysis.

It is safe for you to assume that we would not approve a variance of ASME 17.1 based on this request. We cannot evaluate the IBC elements of the request as those are not jurisdictional to us, but we would hold firm on the requirements of 17.1 in this case.

Let me know if you need additional information, analysis, or discussion.

Will

Respectfully,

Will Harlan
Chief, Mechanical Inspection
Labor Standards and Safety Division