



2020 DIGITAL: SAFETY, INNOVATION
& SUSTAINABILITY CONFERENCE

CONSTRUCTION SAFETY: CODE REVIEW & CASE STUDIES

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PRESENTATION DESCRIPTION

This presentation provides an overview of NYC Building Code Requirements as it relates to:

1. Demolition
2. Cold-formed steel
3. Sidewalk Sheds and Scaffolding
4. Construction material handling equipment.

Case studies will be utilized to demonstrate lessons learned and the importance of Code compliance.



Demolition

NOTABLE CODE SECTIONS & CASE STUDY

DEMOLITION: NOTABLE CODE SECTIONS

■ §3306.5.1

— Construction documents to include:

- Plans
- Sections
- Details
- Bracing/shoring as necessary through all operations
- Description of compliance with §3306.9 (Safeguards)
- Mechanical demolition has additional requirements

DEMOLITION: NOTABLE CODE SECTIONS

Demolition of Weakened Structures §3306.7

- What structural assessment has been done?
- Shoring and bracing shall be provided as required to ensure safe demolition without collapse.
- Has a minimum structural stability inspection schedule been identified? §1704.20.1
 - Required for mechanical demolition and structural stability existing buildings
 - If not required by Code, do you want to specify more stringent requirements?

DEMOLITION: NOTABLE CODE SECTIONS

Wall bracing relates to demolition sequence and permanent structure:

- §3306.8.2

- Simply supported, does not apply to cantilevers
- Effective thickness
- Further guidance in ACI 530 and OSHA

Headers and trimmers are often overlooked:

- §3306.9.10.1

- Headers shall be carefully examined and shored as required.
- No bearing partitions shall be removed until floor framing above is removed.

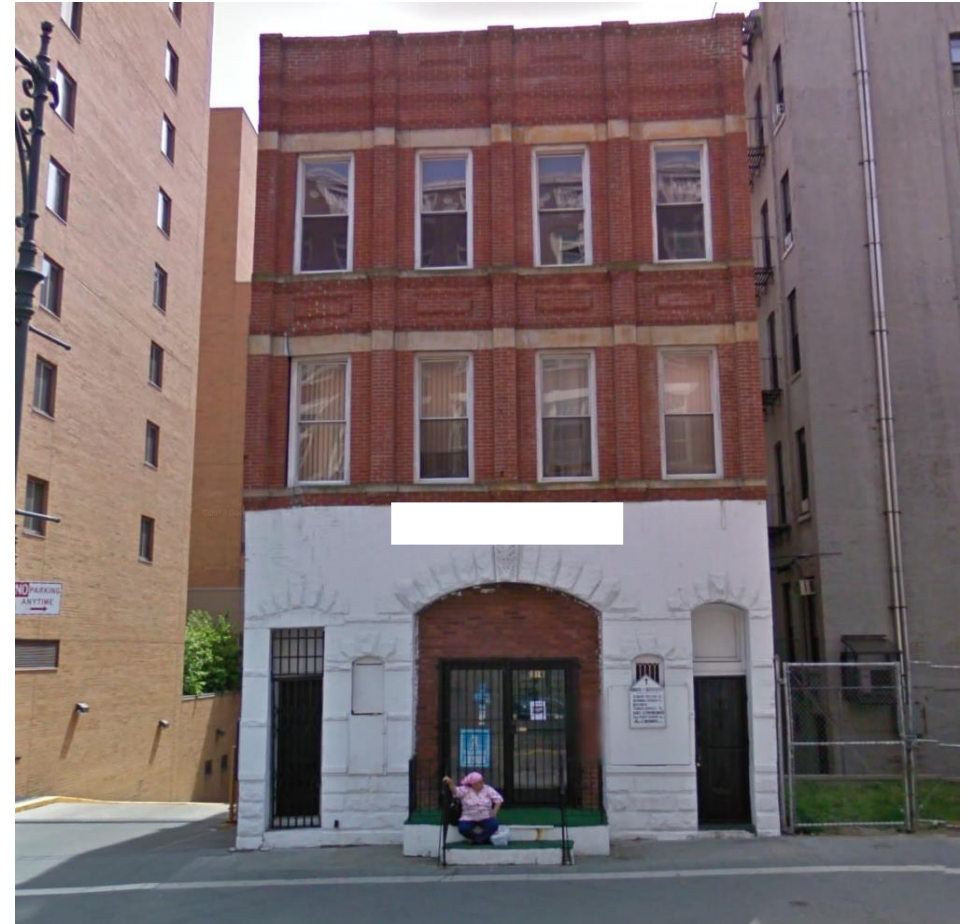
CASE STUDY 1: DEMOLITION COLLAPSE



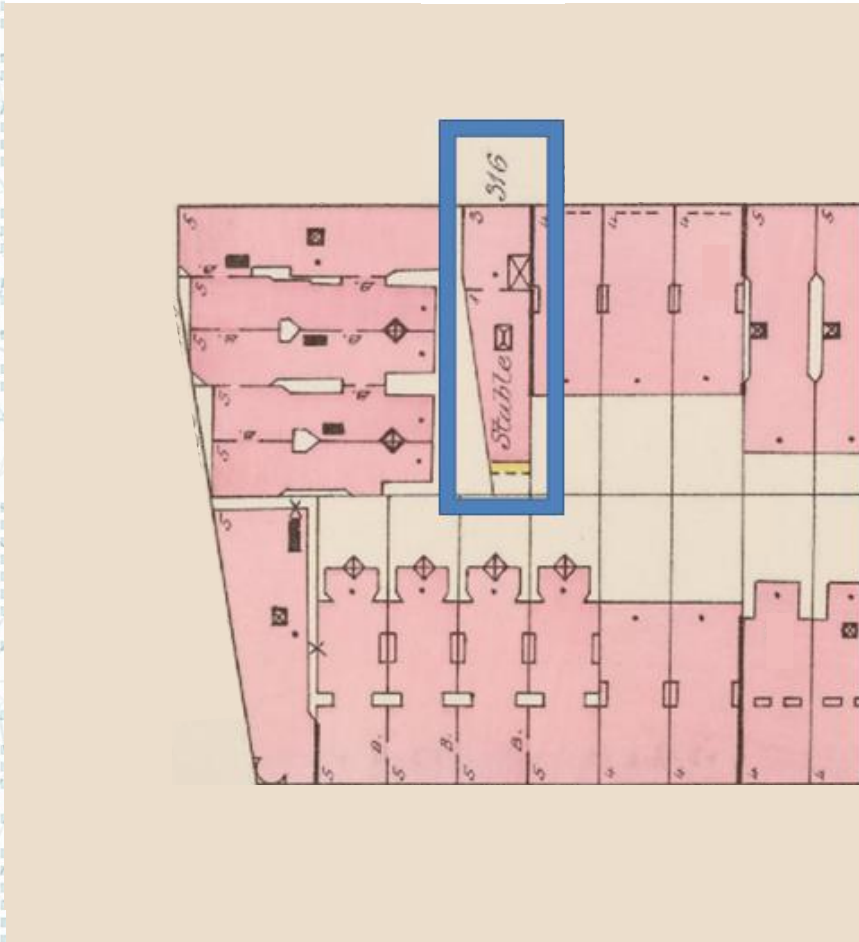
CASE STUDY 1: DEMOLITION COLLAPSE

Exposure 1 – Prior To Incident

- April 2009 courtesy of Google Street View
- Exposure 1 façade cracking is present



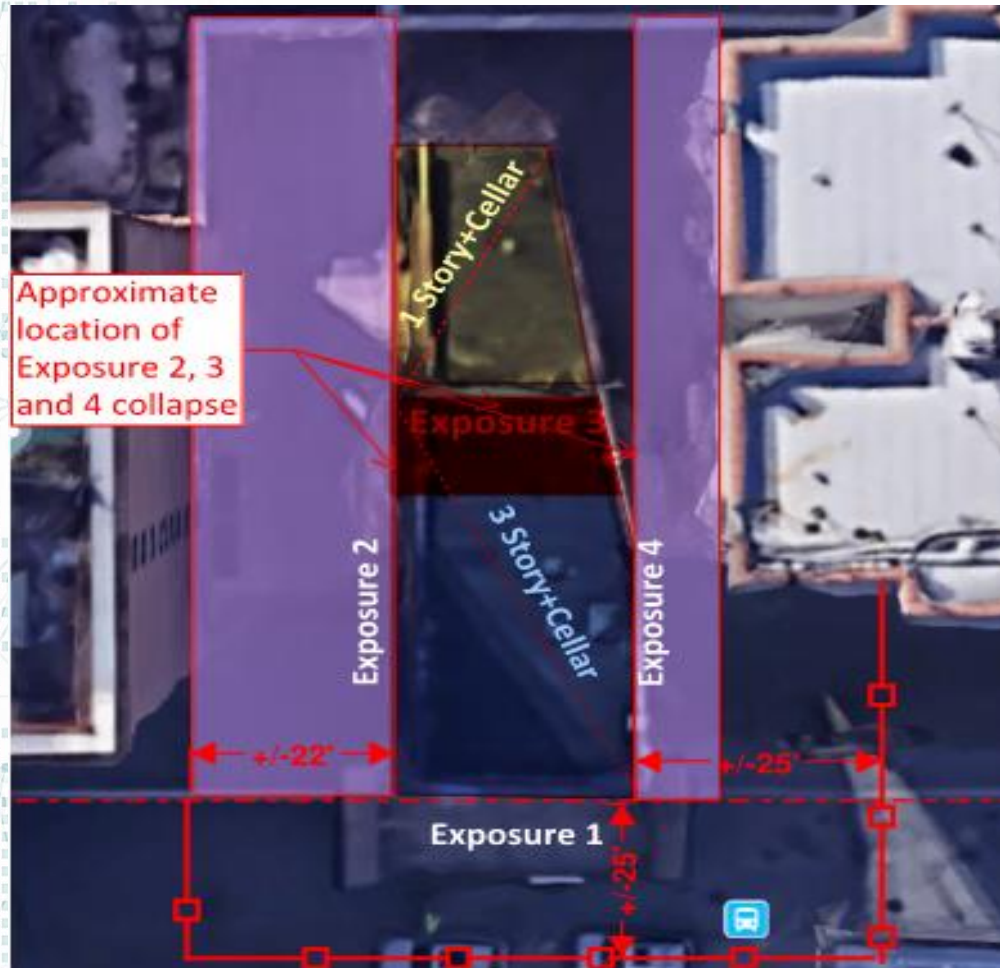
CASE STUDY 1: DEMOLITION COLLAPSE



Tax Map

- 1893 Tax Map – NYPL
- 3-story building was in-place including 1-story stable extension

CASE STUDY 1: DEMOLITION COLLAPSE



Incident Site Plan

-  Safety zone imposed by construction fence
-  Partial vacate order required
-  3 Story + Cellar Building
-  1 Story + Cellar Building
-  Approximate location of Exposure 2, 3 & 4 collapse

CASE STUDY 1: DEMOLITION COLLAPSE

Incident Site Plan Considerations

- Adjoining building at Exposure 2 has an occupied driveway and parking garage.
- Adjoining buildings at Exposure 4 are occupied multiple dwelling with fire escapes.
 - Secondary emergency egress directly adjoining the structurally compromised building.

CASE STUDY 1: DEMOLITION COLLAPSE



Emergency Declaration

- Exposure 1
- Prior to demolition, sidewalk shed in place
- Vertical crack at corner of Exposure 1 and Exposure 2 observed

CASE STUDY 1: DEMOLITION COLLAPSE



Emergency Declaration

- Exposure 2
 - Prior to demolition, curvature of the wall observed
 - Visibly out-of-plumb
- Diagonal stress cracking at Exposure 3
 - Eccentric load from fire escape

CASE STUDY 1: DEMOLITION COLLAPSE



Emergency Declaration

- Exposure 3
 - +/-1 year later
- Deterioration is advancing.
- Stucco failure
- Additional water infiltration

CASE STUDY 1: DEMOLITION COLLAPSE

Emergency Declaration

Summary of initially identified structural deficiencies

- Severe cracking and separation at Exposure 1 adjoining Exposure 2
- Entire east load bearing wall warping (Exposure 2)
- South façade of 3 story severely cracked up to 3" wide
- Roofing compromised – water infiltration

Remedy

- Full Demolition, backfill and grade

CASE STUDY 1: PLAN SUBMISSION

- Weakened structure identified §3306.7
- Hand demolition specified
- No bracing or shoring identified

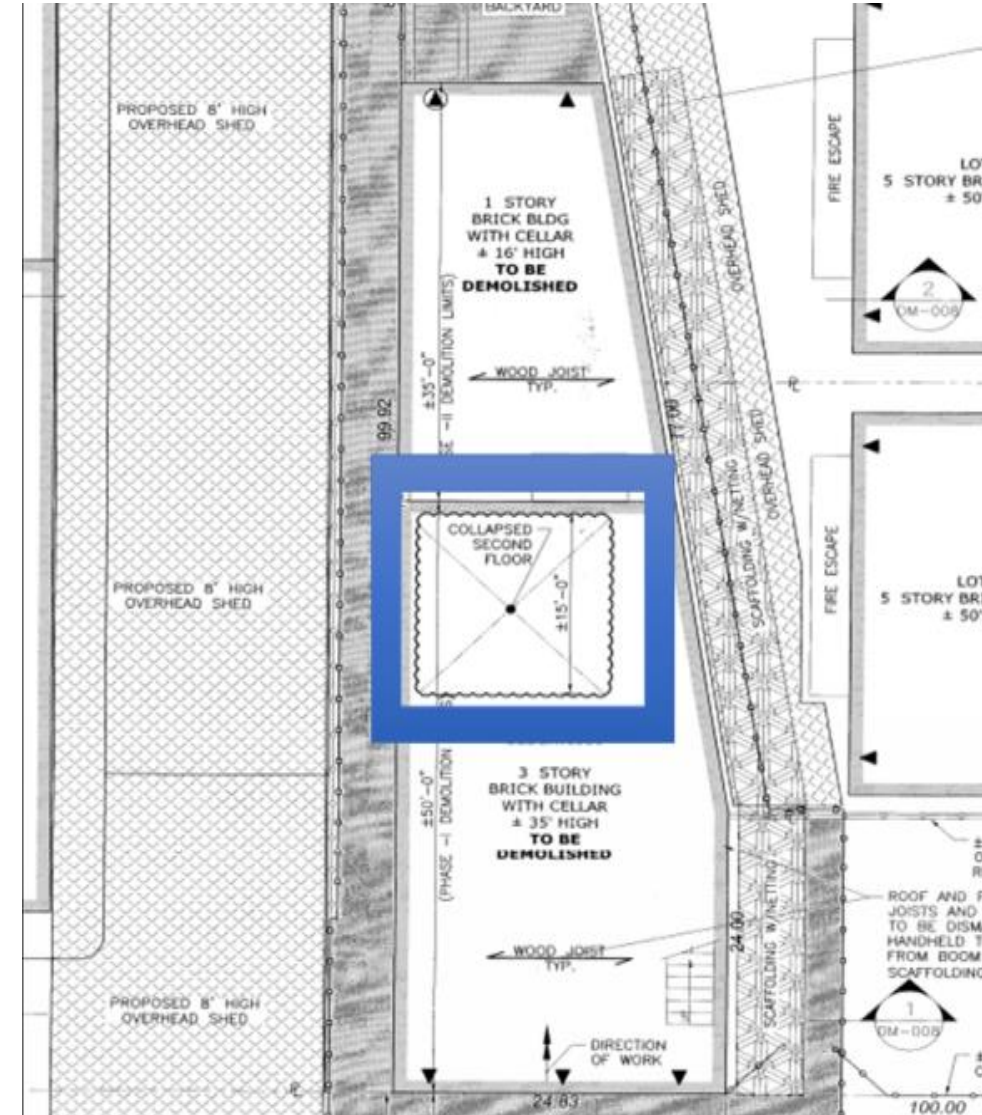
DEMOLITION MEANS AND METHOD NOTES:

GENERAL:

1. THESE PLANS ADDRESS THE MEANS AND METHODS OF STRUCTURAL DEMOLITION OF A 3 STORY 24.80FT W x 50.00FT LG. BUILDING AND ONE STORY 20.00FT W x 33.00FT LG. REAR EXTENSION WITH TIMBER FRAMED FLOOR JOISTS ON MASONRY BEARING WALLS AT
2. BUILDING HAS BEEN ASSESSED AND DETERMINED TO BE WEAKENED AND IN ADVANCED STATE OF DETERIORATION. DEMOLITION TO BE DONE WORKING FROM BOOM LIFT & EXTERIOR SCAFFOLDING.

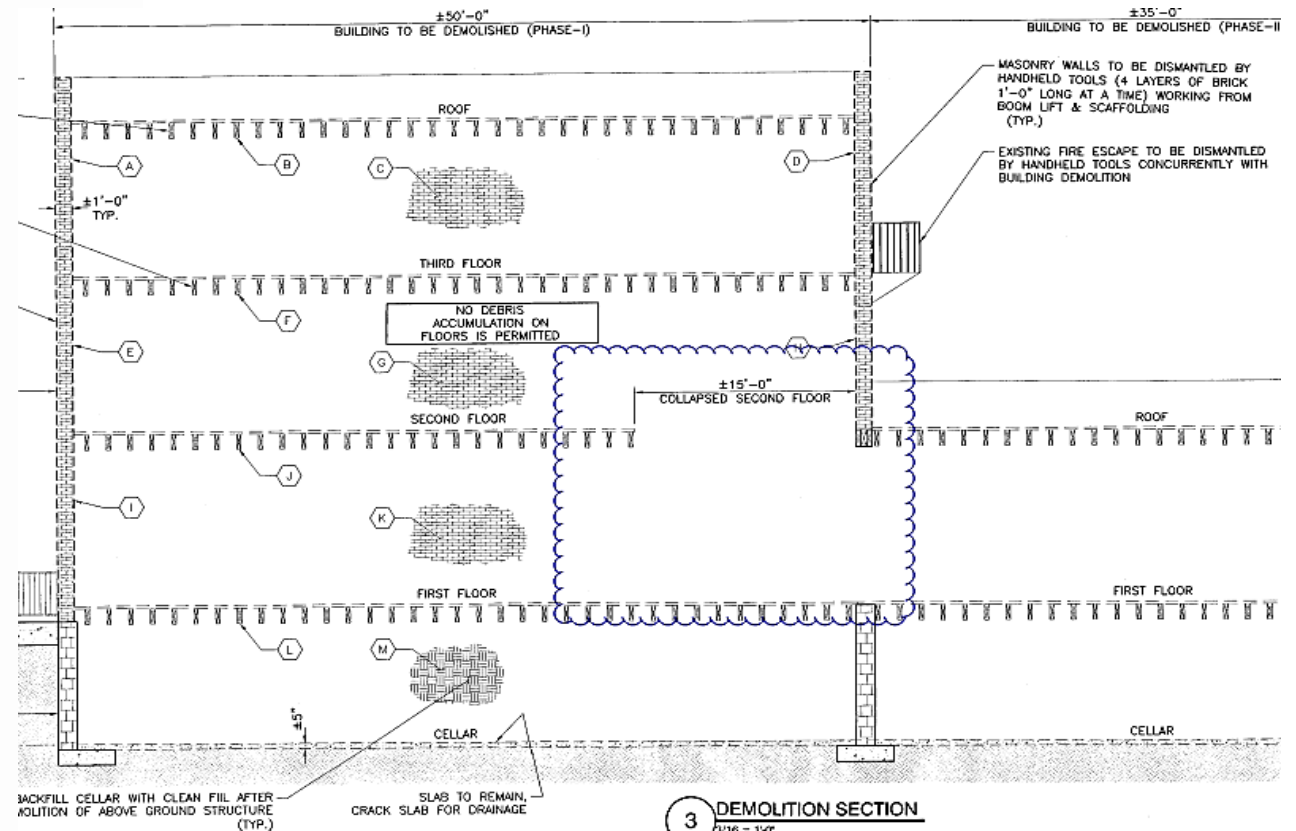
CASE STUDY 1: PLAN SUBMISSION

- Plans indicated a collapse section of the second floor framing
- No additional shoring or bracing indicated



CASE STUDY 1: PLAN SUBMISSION

- Elevation indicated a collapse section of the second floor framing
- No additional shoring or bracing indicated



CASE STUDY 1: PLAN SUBMISSION

- Demolition proposal summary:
 - Remove Exposure 1 between Roof and Third Floor.
 - Start at the front (Exposure 1) of the roof and work back in 3'-0" sections.
- No specific provisions were provided for how to control the demolition at headers and trimmers. §3306.9.10.1
- No bracing or shoring was specified. §3306.5.1; §3306.7

CASE STUDY 1: DOCUMENTATION IMMEDIATELY PRIOR TO THE FAILURE

- Screen clip documenting Exposure 1 condition.



CASE STUDY 1: DOCUMENTATION IMMEDIATELY PRIOR TO THE FAILURE

- Screen clip documenting Exposure 3 wall for 3 story section with compromised vertical support condition.



CASE STUDY 1: DOCUMENTATION IMMEDIATELY PRIOR TO THE FAILURE

- Screen clip documenting Exposure 3 wall for 3 story building section.
- Photo taken from the 2nd floor framing.
- Compromised vertical and lateral support between the 1st floor and the roof



CASE STUDY 1: DOCUMENTATION IMMEDIATELY PRIOR TO THE FAILURE

- Photo documenting Exposure 3 wall for 3-story building section with significant cracking, and stucco loss.
- The demolition was progressing generally pursuant to the plans removing the framing from the front to the back.



CASE STUDY 1: DEMOLITION FAILURE



CASE STUDY 1: DEMOLITION FAILURE



CASE STUDY 1: DEMOLITION FAILURE



CASE STUDY 1: DEMOLITION FAILURE

Conclusions – Drawing/Design

- The applicant did not adequately address the items in the Emergency Declaration (basis of design).
- A deficient investigation led to deficient drawings. §3306.5.1
 - The applicant did not review the interior of the structure.
 - They did not have requirements in their sequence, mandating a structural review.

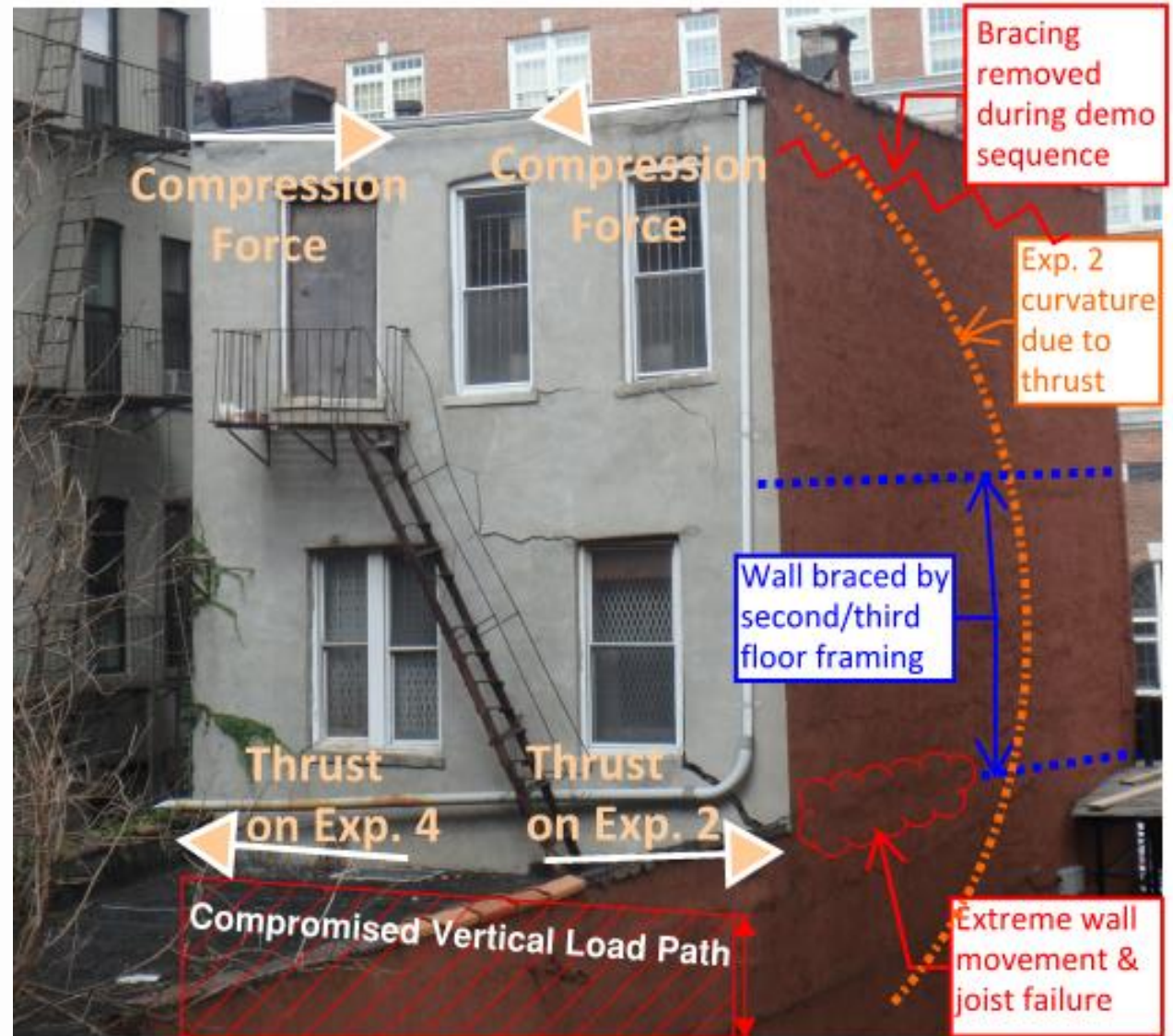
CASE STUDY 1: DEMOLITION FAILURE

Conclusions - Drawings/Design *(continued)*

- Weakened structure was noted but not accounted for:
 - No bracing was provided to account for the existing bulge at Exposure 2. §3306.7
 - The drawings did not indicate the missing vertical support at the Exposure 3 wall. No bracing was provided. §3306.7
- The drawings did not have sufficient provisions to support header beams. §3306.9.10.1

CASE STUDY 1: DEMOLITION FAILURE

Conclusions – Design (continued)



CASE STUDY 1: DEMOLITION FAILURE

Conclusions – Permit Holder

- The permit holder generally implemented the sequence
- The permit holder worked contrary to permit.

§28-105.12.2

- Provided additional undocumented bracing
 - They failed to notify the applicant of the requested deviation. §1704.1

CASE STUDY 1:

DEMOLITION FAILURE DISCUSSION

- Weakened buildings
 - Is 100% hand demolition from the outside without shoring the safest means?
- If an applicant cannot fully assess a structure at the time of submission, they should consider:
 - Adding additional inspections into their demolition sequence.
- Drawings must be revised and amended for deviating conditions §1704.1.1



Sidewalk Shed

NOTABLE CODE SECTIONS & CASE STUDY

SIDEWALK SHED NOTABLE CODE SECTIONS

§3307.6.4 Design and construction of sidewalk sheds

Sidewalk sheds shall be designed and constructed in accordance with the requirements of Section 3307.6.4.1 through Section 3307.6.4.11

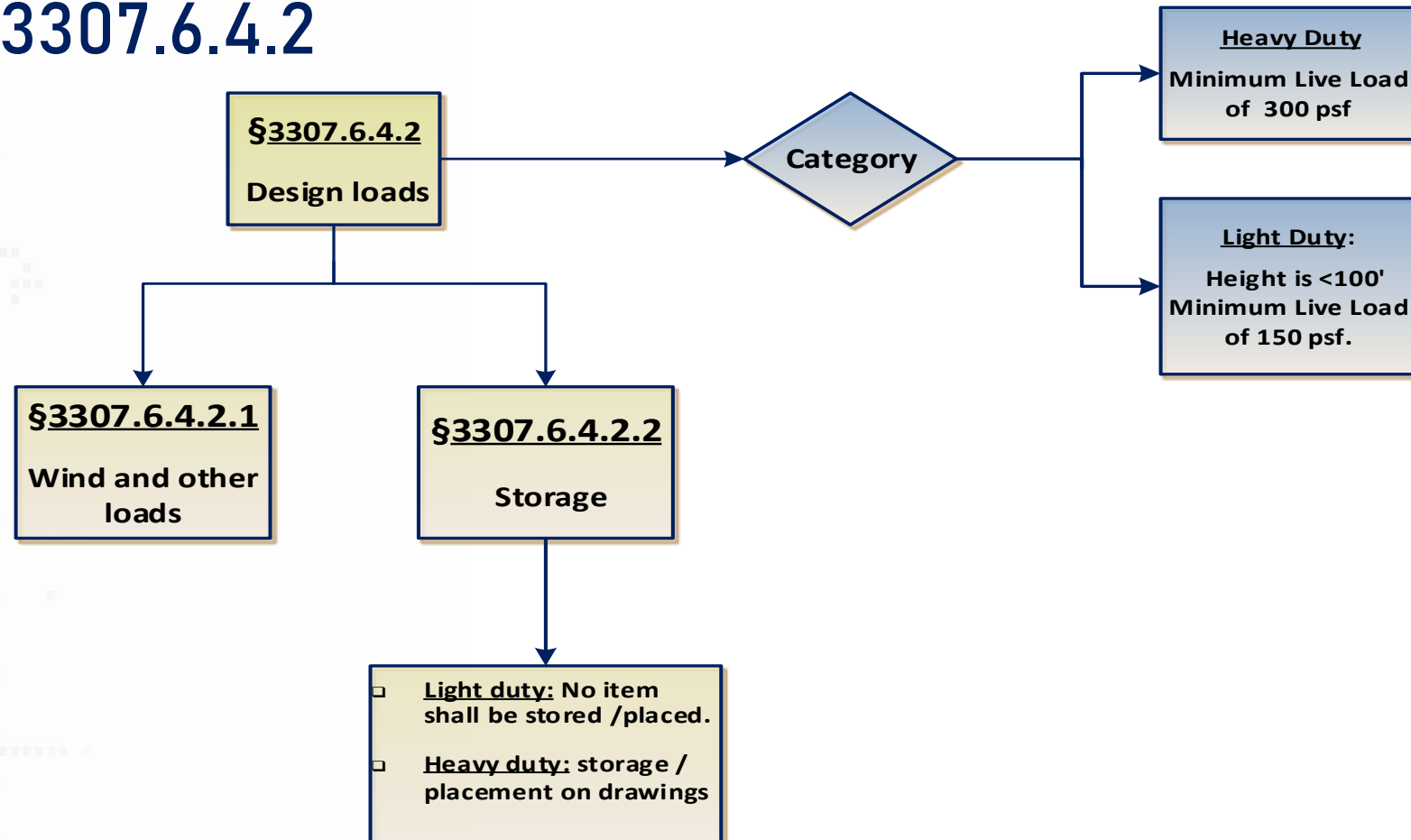
§3307.6.4.1 Designer

All sidewalk sheds shall be designed by a registered design professional.

EXCEPTION: Sidewalk sheds that conform to a design approved by the commissioner or the Board of Standards and Appeals, provided the shed is installed at the site in accordance with the standard design.

SIDEWALK SHED NOTABLE CODE SECTIONS

Design Loads §3307.6.4.2



SIDEWALK SHED NOTABLE CODE SECTIONS

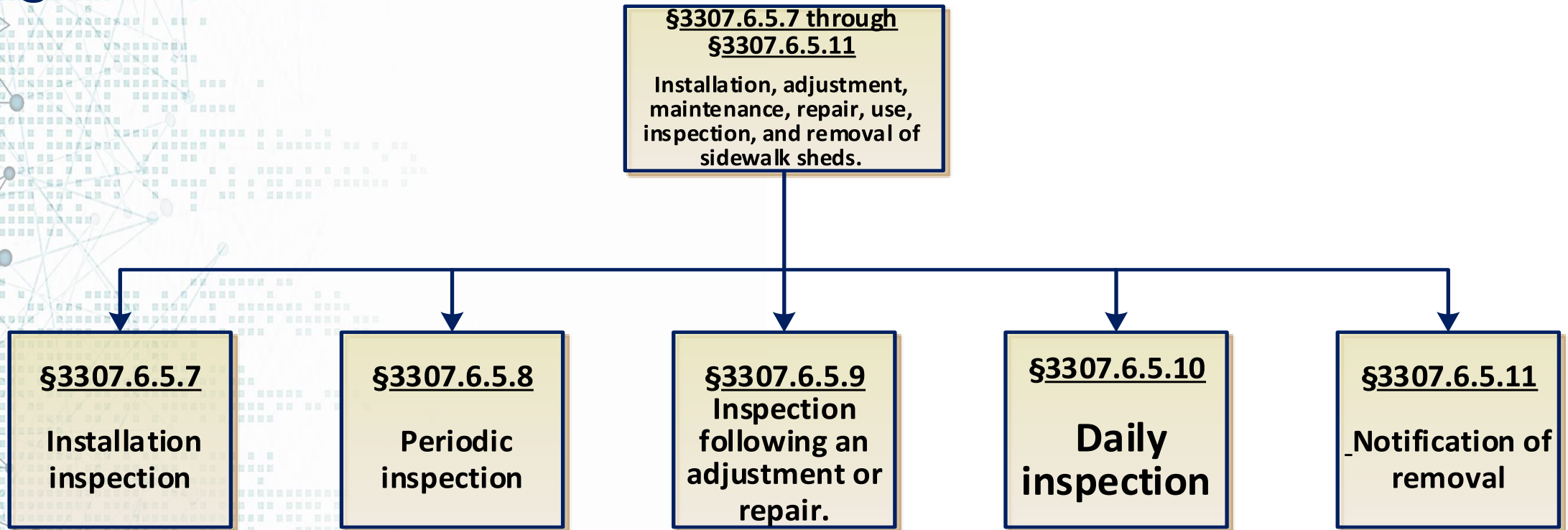
§3307.6.4.2 Design Loads

All sidewalk sheds shall be designed as a heavy duty sidewalk shed to carry a live load of at least 300 pounds per square foot.

However, where the shed is installed to protect from work performed at a height of less than 100 feet above the ground, the sidewalk shed may be designed as a light duty sidewalk shed to carry a live load of at least 150 pounds per square foot, provided that no item is stored or placed upon the shed.

SIDEWALK SHED NOTABLE CODE SECTIONS

§3307.6.5



CASE STUDY 2: SIDEWALK SHED COLLAPSE



CASE STUDY 2: SIDEWALK SHED COLLAPSE



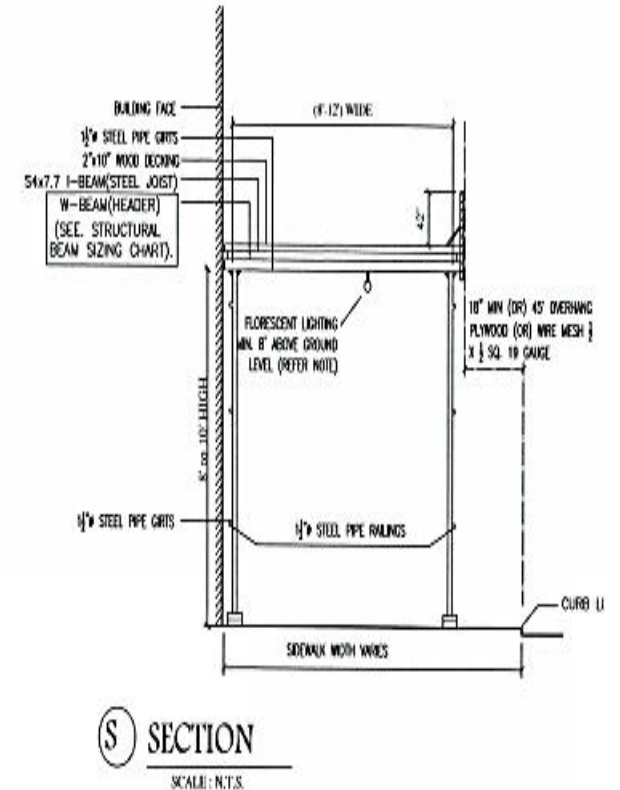
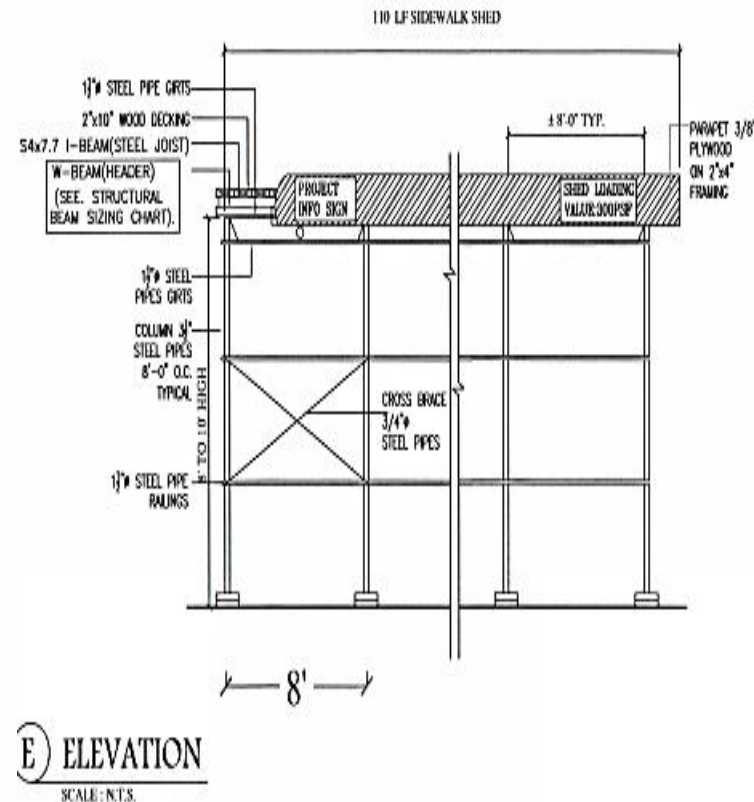
CASE STUDY 2: SIDEWALK SHED COLLAPSE



CASE STUDY 2: SIDEWALK SHED

Plan Submission

- Professionally certified
- 8'-12' main beam span
 - Generic not project specific
- Heavy duty shed (300 psf live load)
§ 3307.6.4.2



CASE STUDY 2: SIDEWALK SHED

Plan Submission

- Main beam:
W10x19, 50 ksi steel
indicated for the maximum
span, 12 feet
- Sizes were generic and not
project specific

HEAVY DUTY (300 PSF)

STRUCTURAL BEAM SIZING			
SHED SPAN	MAIN BEAM SIZE (F _y = 50)	SECONDARY BEAM SIZE & SPACING (F _y = 36)	
6'	W8x10	S 4x7.7	@ 24" O.C.
8'	W8x13	S 4x7.7	@ 24" O.C.
10'	W10x15	S 4x7.7	@ 24" O.C.
12'	W10x19	S 4x7.7	@ 24" O.C.

CASE STUDY 2: SIDEWALK SHED

Sidewalk Shed Installation Inspection Report

- Indicated general conformance with construction drawings

Dob Build

The inspection of the Sidewalk Shed was performed at the above location on [redacted]. No critical deficiencies were found during this inspection. Construction of the Sidewalk Shed confirm to the design drawings that was approved by the NYC DOB NOW BUILD. Base on the design drawings and field inspection, the Sidewalk Shed was determined to be structurally sound and fit for regular use as specified under applicable Codes and Regulations. Although we report non- structural deficiencies as observed during the inspection, the strict preview of our inspection is the structural soundness of the Sidewalk Shed. The conclusion herein reflects the conditions at the time of the inspection and may be invalidated by structural alterations or degradations occurring thereafter.

Respectfully,

CASE STUDY 2: SIDEWALK SHED

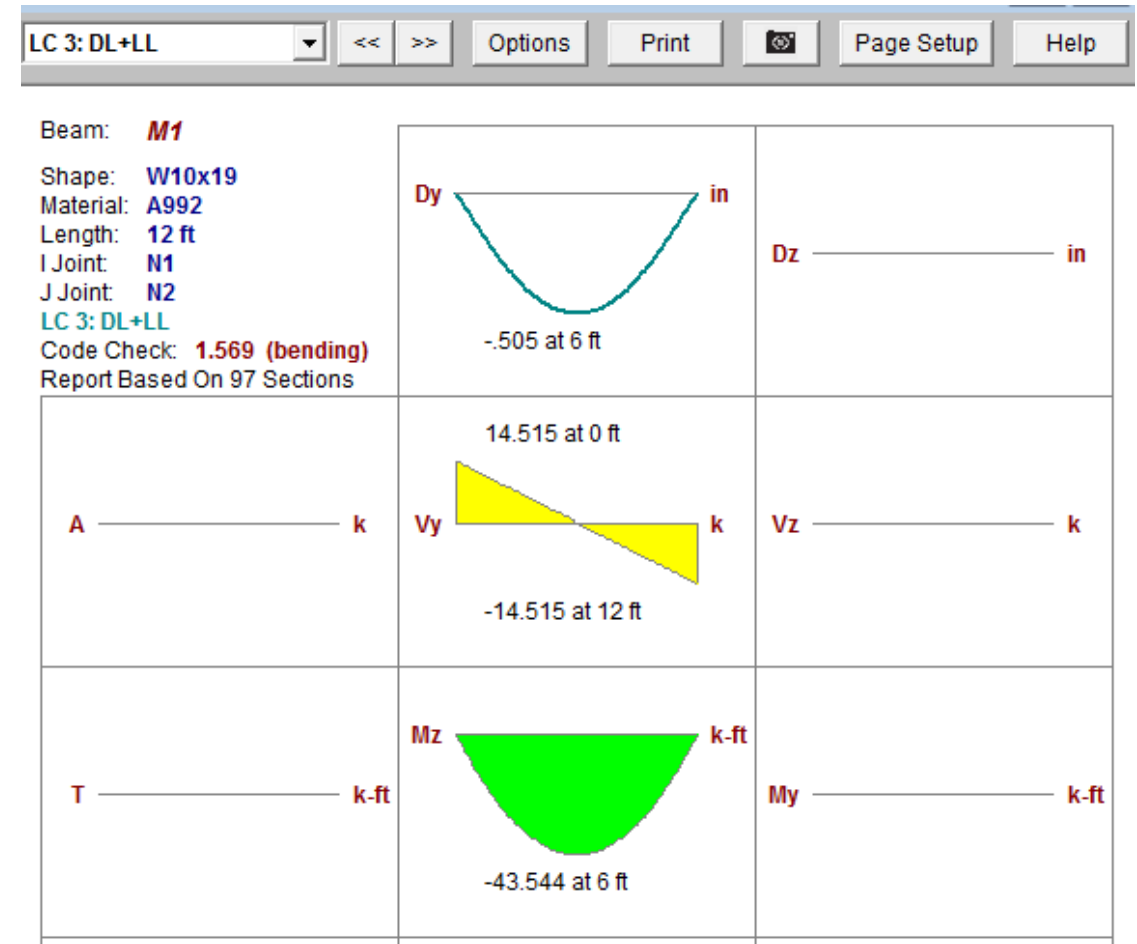
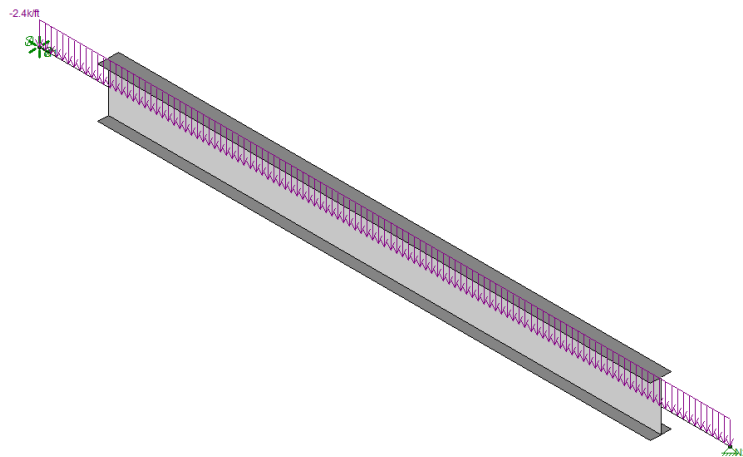
Field/Site Observations

- In conformance: Main beams located at 8 feet on center, perpendicular to the junior beams.
- In conformance: Junior beam sizes.
- **Non-conformance:** 15'-4" between column supports for the main beams in lieu of 12 feet.
- **Non-conformance:** 8" deep by 4" wide beams were installed for the main beams in lieu of a W10x19.
- **Non-conformance:** 2'-4" spacing between junior beams in lieu of 2 feet.

CASE STUDY 2: SIDEWALK SHED

Deficient Design Analysis

- Assuming a W10x19 was installed with a 12ft length, it would have still been overstressed with a bending stress ratio of **1.569**.



CASE STUDY 2: SIDEWALK SHED

Failure Conclusions: Sidewalk Shed Applicant

- The sidewalk shed applicant failed to account for the field dimensions. §28-104.7.1
 - Adequate driveway protection was not specified
 - Drawings were not project specific
- The sidewalk shed applicant's design for the main beams was deficient regardless of the installation. §1604.2

CASE STUDY 2: SIDEWALK SHED

Failure Conclusions: Sidewalk Shed Permit Holder

- The permit holder worked contrary to the design drawings. **§28-105.12.2**
- The permit holder submitted a material false statement to the Department.
 - False certification of compliance on the Installation Inspection Report. **§28-211.1**

CASE STUDY 2: SIDEWALK SHED

Failure Discussion

- The demolition design is only as good as the design of the public protections.
- Public protection design and compliance is critical



Cold-formed Steel

NOTABLE CODE SECTIONS & CASE STUDIES

COLD-FORMED STEEL

Potential Design Deficiencies

- Failing to locate/specify blocking, bridging & strapping §107.7.3
- Failing to specify and detail web stiffeners (if required) §107.7.3
- Inadequate bearing design or inadequate distribution member §1604.2
- Failing to specify loads - §1603.1
 - Including allowable loading during construction (see BB2019-011)
- Failing to specify temporary bracing/shoring (if required)

COLD-FORMED STEEL

Potential Special Inspection Failures

- Failing to note non-conformances §1704.1.2
 - Missing/improperly located blocking/bridging/strapping/stiffeners
 - Joists not in-line with studs (In-line track failure)
 - Using different materials than those specified on drawing
 - Different connection detail than specified on drawings
 - Verifying that punched holes are free from notches and burred edges
- Failing to note hazardous conditions §1704.1.2
 - Excessive load on deck
 - Missing shoring or temporary bracing

COLD-FORMED STEEL

Potential Permit Holder Failures

- Not installing blocking/bridging/strapping/web stiffeners §28-105.12.2
- Misalignment of joists and studs without a distribution member (in-line framing failure) §28-105.12.2
- Overloading deck and/or *loading deck before it's finished* (Failure to Safeguard) §3301.2
- Unapproved field modifications §28-105.12.2
- Failing to provide shoring (if required) §28-105.12.2

COLD FORMED STEEL RESOURCES

Recent Related Department Resources

- Cold-Formed Steel Service Notice December 2019
https://www1.nyc.gov/assets/buildings/pdf/cold_form_steel_sn.pdf
- Cold-Formed Steel Building Bulletin 2019-011
https://www1.nyc.gov/assets/buildings/bldgs_bulletins/bb_2019-011.pdf

COLD-FORMED STEEL

Service Notice December 2019

Big Picture Theme(s)

- Improper construction implementation is *still* occurring.
 - Loading prior to being fully set
 - Overloading framing
 - Unapproved structural modifications
 - Fall protection deficiencies

https://www1.nyc.gov/assets/buildings/pdf/cold_form_steel_sn.pdf

SERVICE NOTICE

Overloading and Improper Installation of Cold-Formed Steel (Light-Frame Construction) Can Result in Injury and Property Damage



Overloading and improper installation of cold-formed steel including joists, rafters, trusses, and structural wall studs, etc., can result in injury and property damage.

Materials and equipment may only be placed on finished decking where directed by your supervisor. No placed load should exceed the capacity of the framing/decking.

Cranes (or similar) should not be allowed to deposit material or equipment on a deck without permission from the construction superintendent.

Do not remove bracing or shoring unless directed by your supervisor. (see *Figure A*)

Do not go onto any section of deck that is being formed unless you are experienced with laying deck and have discussed the operation with the construction superintendent before beginning the work.

Your employer is required to provide fall protection. Do not go near any uncovered holes or unprotected edges unless you are wearing a harness and tied off to a lifeline.

Do not cut or drill through cold-formed steel, run all utilities through provided openings. (see *Figure B*)



Figure A



Figure B

For more information, please see [Buildings Bulletin 2019-011](#).

POST UNTIL: December 31, 2019

Melanie E. La Rocca, Commissioner
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nyc.gov/buildings

COLD-FORMED STEEL

Material Loading Failure

- Cold-formed steel framing is particularly susceptible to material loading failures during construction.
- End restraint, bridging, strapping, and blocking are critical prior to the installation of the subfloor/diaphragm.
- These critical stability items must be identified on the design drawings to facilitate proper special inspections.

COLD-FORMED STEEL

Material Loading Failure Case Study 1



COLD-FORMED STEEL

Material Loading Failure Case Study 2



COLD-FORMED STEEL

In-line Framing

2210.1 General. The design and installation of structural members and nonstructural members utilized in cold-formed steel light-frame construction where the specified minimum base steel thickness is between 0.0179 inches (0.455 mm) and 0.1180 inches (2.997 mm) shall be in accordance with AISI S200 and Sections 2210.2 through 2210.7, as applicable.

- AISI 200-07 (North American Standard for Cold-Formed Steel Framing – General Provisions)
 - NYC Building Code Chapter 35 Reference Standard
 - Required through §2210.1

COLD-FORM STEEL

In-line Framing

■ AISI 200-07

(North American Standard for Cold-Formed Steel Framing – General Provisions)

C1 In-Line Framing

Each joist, rafter, truss, and structural wall stud (above or beneath) shall be aligned vertically according to the limits depicted in Figure C1-1. The alignment tolerance shall not be required when a structural load distribution member is specified in accordance with an approved design or approved design standard.

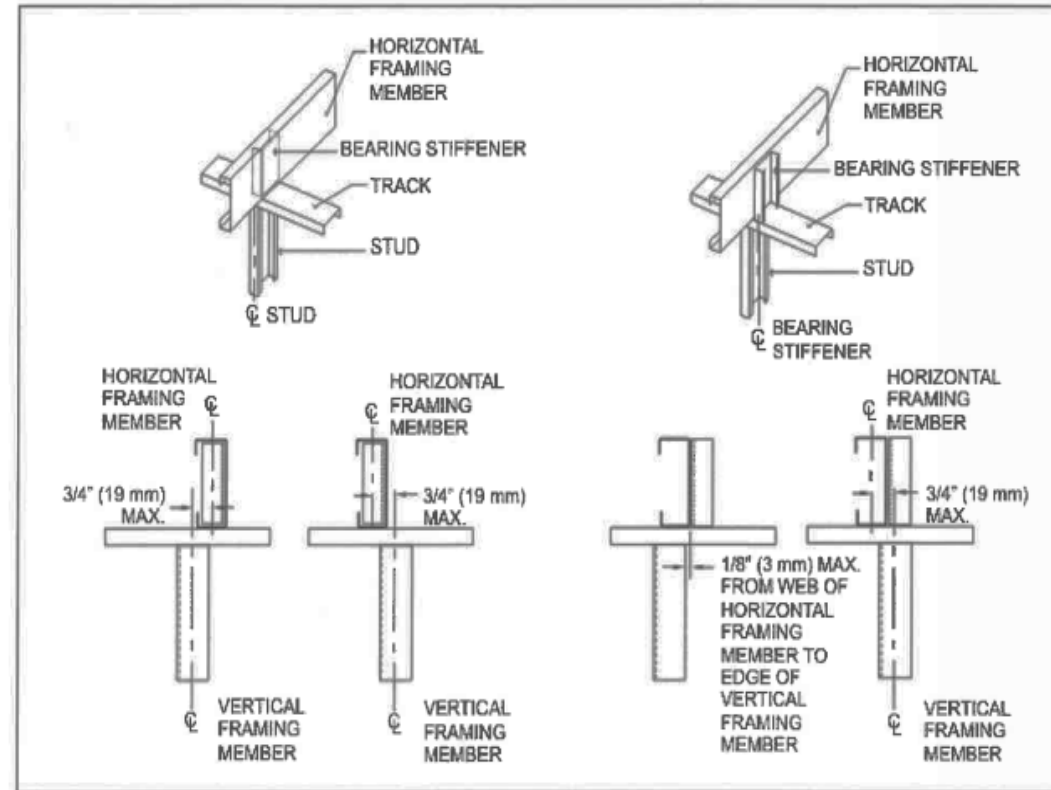


Figure C1-1 In-Line Framing

COLD-FORM STEEL

Building Bulletin 2019-011(BB 2019-011)

https://www1.nyc.gov/assets/buildings/bldgs_bulletins/bb_2019-011.pdf



NYC Buildings Department
280 Broadway, New York, NY 10007

Melanie E. La Rocca, Commissioner



BUILDINGS BULLETIN 2019-011 Technical

Issuer: Gus Sirakis, P.E. *Gus Sirakis*
First Deputy Commissioner

Issuance Date: December 2, 2019

Purpose: This bulletin highlights cold-formed steel light-frame construction requirements for special inspectors, construction superintendents, design professionals, and permit holders.

Related Code/Zoning Section(s):	BC 1702 BC 2210.3.2 BC 3301.4	BC 1704.1 BC 2210.1 thru 2210.7 BC 3305	BC 1704.3.4 BC 3301.7 AC 28-116.1	BC 2210 BC 3301.13
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Subject(s): Cold-formed steel light-frame construction; Cold-formed steel light-frame bracing and assembly; Cold-formed steel light-frame design; Cold-formed steel light-frame special inspection; Documentation required on site; Construction superintendent; Registered General Contractor; Special inspector.

I. Background

This bulletin highlights requirements specific to the erection of cold-formed steel light-frame construction for special inspectors, construction superintendents, general contractors, design professionals, and permit holders.

COLD-FORMED STEEL

BB2019-011: Background

- Highlights requirements for erection of cold-formed steel light-frame construction.
- Reviews requirements for:
 - permit holders,
 - construction superintendents,
 - special inspectors, and
 - design professionals.

COLD-FORMED STEEL

BB2019-011: Requirements for Permit Holders

- Permit holders must ensure structural capacity of the cold-formed steel prior to loading.
- Inform designer of anticipated construction loading.
- No loading without special inspection.
- Scheduling of special inspections for work. §28-116.3.1; §1704.1.3
- Work to remain accessible and exposed. §1704.1.3
- Where there is a construction superintendent, the permit holder is to ensure that they are performing their duties. §3301.13

COLD-FORMED STEEL

BB2019-011: Requirements for Construction Superintendents

- Construction superintendents are required to perform duties in accordance to §3301.13
- Comply with approved documents & manufacturer specifications. §28-105.12.2; §3301.1.3
 - All members are braced and shored as indicated in approved documents.
 - Materials and equipment are placed as indicated in approved documents.
 - No materials or equipment are to be placed until framing is accepted in special inspection.

COLD-FORMED STEEL

BB2019-011: Requirements for Construction Superintendents (*continued*)

- Ensure that no placed materials exceed load capacity
- Masonry walls are properly braced. §2104.6; BB2017-003
- Proper fall protection
- Inspections to verify compliance with construction documents.
- Log all special inspections, work floors, and deliveries to site

COLD-FORMED STEEL

BB2019-011: Requirements for Special Inspectors

- Periodic inspections are required §1704.3.4
 - Minimum: prior to floor loading
- Coordinate special inspections with permit holders and Construction Superintendent §1704.1.2
- Record all special inspections and maintain records §1704.1.2

COLD-FORMED STEEL

BB2019-011: Requirements for Special Inspectors *(continued)*

■ Scope of Special Inspection §1704.3.4

- Verify materials comply with approved documents
- Verify in-line framing/distribution track in accordance to approved documents
- Verify installation of members in accordance to approved documents
- Verify temporary shoring and bracing

■ Notify DOB of all incomplete hazardous installations or defects §1704.1.2

COLD-FORMED STEEL

Required Verification & Inspection Items

TABLE 1704.3.4
REQUIRED VERIFICATION AND INSPECTION OF
COLD-FORMED STEEL LIGHT-FRAME CONSTRUCTION

Verification and inspection	Continuous	Periodic	Referenced Standard	Code Reference
1. Material Verification:				
a. Verify that identification markings conform to AISI S200 and as specified in the approved construction documents.		X	AISI 200, Section A5.4	
b. Verify that material is clean, straight and undamaged.		X		
2. Inspection of general framing:				
a. Verify that member sizes conform to the approved construction documents.		X		
b. Verify that member layout conforms to the approved construction documents.		X		
c. Verify that proper bearing lengths are provided in accordance with approved construction documents.		X		
d. Verify that punched holes and sheared or flame cut edges of material in members are clean and free from notches and burred edges.		X		

COLD-FORMED STEEL

Required Verification & Inspection Items

3. Inspection of framing connections and anchorages:				
a. Verify that screws, bolts, and other fasteners conform to approved construction document requirements for diameter, length, quantity, spacing, edge distance, and location.		X	AISI S200, Section D	
b. Verify that manufactured connectors, such as joist hangers, caps, straps, clips, ties, hold-downs, and anchors conform to approved construction document requirements for manufacturer, type, gauge, and fastener requirements.		X	AISI S200, Section D	
4. Inspection of welding:				
a. Inspect welds in accordance with Table 1704.3.		X	AWS D1.3	
5. Bracing:				
a. Verify that temporary bracing, shoring, jacks, etc., are installed, and not removed until no longer necessary, in accordance with the approved construction documents and approved erection drawings.		X		
b. Verify that permanent bracing, web stiffeners, bridging, blocking, wind bracing, etc, are installed in accordance with the approved construction documents and approved erection drawings.		X		
c. Where a cold-formed steel truss clear span is 60 feet (18 288 mm) or greater, the special inspector shall verify that the temporary installation restraint/bracing and the permanent individual truss member restraint/bracing are installed in accordance with the approved truss submittal package.		X		2210.3.4

COLD-FORMED STEEL

Required Verification & Inspection Items

Excerpt from Table 1704.3, Items 5.a.6 and 5.a.7:

**TABLE 1704.3
REQUIRED VERIFICATION AND INSPECTION OF STEEL CONSTRUCTION**

VERIFICATION AND INSPECTION	CONTINUOUS	PERIODIC	REFERENCED STANDARD ^a	BC REFERENCE
5. Inspection of welding: a. Structural steel, cold-formed steel and cold-formed steel deck:	—	—	—	—
6) Floor and roof deck welds.	—	X	AWS D1.3	—
7) Cold-formed steel welds.	—	X	AWS D1.3	—

COLD-FORMED STEEL

BB2019-011: Construction Document Requirements

- Drawing minimum requirements:
 - Permanent / temporary decking material §107.7.3; §28-104.7.1
 - Members, fasteners §107.7.3; §28-104.7.1
 - Shoring / bracing through all phases
 - Specify the requirements prior to shoring/bracing removal

COLD-FORMED STEEL

BB2019-011: Construction Document Requirements *(continued)*

- Drawing minimum requirements (continued):
 - Account for loads during construction.
 - Continued coordination with the permit holder is needed.
 - Including loads for material delivery and movement of material and equipment.
 - If temporary storage and other construction loads are not included in the design, the construction drawings shall indicate such restrictions.
 - Designated temporary loading areas with maximum loading
 - Maximum live and construction loads outside temporary loading areas
 - Minimum deck screws/diaphragm engagement prior to loading

COLD-FORMED STEEL

BB2019-011: Construction Document Requirements *(continued)*

- Required design details §3301.7
 - Must be maintained on-site.
 - Located on construction documents; or erection drawings (if applicable)
- Deviations from approved documents must be verified by the registered design professional. §1704.1.1
 - The design professional's responsibility continues through construction loading

SUSPENDED SCAFFOLDING CORNICE HOOKS (C-HOOKS)



CORNICE HOOKS (C-HOOKS)

- Chapter 33 Code Requirements Located in BC 3314
- No permit required, but notification to the Department is required
- Design can be performed by a Licensed Rigger
- The capacity of the scaffold system and the supporting surface must be checked for code requirements!



CORNICE HOOKS: CODE REQUIREMENTS

Permit:

3314.2 Permit. Prior to the installation and use of a scaffold, the contractor or licensee who is to install the scaffold, or a designated representative of the installer, shall obtain a permit for such scaffold.

Exceptions:

1. A permit is not required for a two-point suspended scaffold suspended from a parapet using C-hooks.

Design:

3314.3.2 Suspended scaffolds. Suspended scaffolds shall be designed by a registered design professional.

Exceptions:

1. Design is not required for a single tier nonadjustable suspended scaffold whose platform is 40 square feet (12 192 mm) or less in size.
2. In lieu of a registered design professional, a two-point, single tier, suspended scaffold may be designed by a licensed rigger provided:
 - 2.1. The scaffold or scaffold outrigger beam or suspension member support structure is not anchored to the building or structure, other than tiebacks; and
 - 2.2. The scaffold will not be loaded, or designed to be loaded, in excess of 75 pounds per square foot (366.15 kg/m²); and either
 - 2.2.1. The scaffold utilizes c-hooks; or
 - 2.2.2. The distance from floor or roof on which the support structure is located to the top of the outrigger beam or suspension member support structure is less than 15 feet (4572 mm).

CORNICE HOOKS: CODE REQUIREMENTS

Notification:

3314.4.1.5 Notification of adjustable suspended scaffold installation and removal. Prior to the initial installation of the adjustable suspended scaffold at a site, and prior to the final removal of the adjustable suspended scaffold at a site, the department shall be notified at least 24 hours, but not more than 48 hours, prior to such installation or removal. Such notification:

1. Where the installation or removal occurs under the direct and continuing supervision of a licensed rigger or sign hanger, shall be made by such licensee; or
2. Where the installation or removal does not occur under the direct and continuing supervision of a licensed rigger or sign hanger, shall be made by the designer of the scaffold.

Supervision:

3314.4.1.3 Supervisor to be present at the site. The licensee or competent person supervising the installation or removal of a scaffold shall be present at the site during all installation and removal work and shall have the ability to communicate with all individuals involved in the installation or removal work. Where only one person is installing or removing a scaffold, such person shall be deemed to be the supervisor present at the site and must have the qualifications and training required by this chapter to serve as a supervisor for such work.

Exception: The licensed rigger or sign hanger does not have to be present at the site, provided a suspended scaffold foreman is present at the site during all installation and removal work and provided such suspended scaffold foreman has the ability to communicate with all individuals involved in the installation or removal work.

CORNICE HOOKS: CODE REQUIREMENTS

Safeguards:

3314.4.4 Safeguards. The safeguards required by Sections 3314.4.4.1 through 3314.4.4.8 shall be observed at all times.

3314.4.4.1 Safe working order. Scaffolds, all components of and attachments to the scaffold, and all supports and anchorages of the scaffold shall be provided to the site in a safe working order by their respective owner, with no known hazardous conditions, defective repairs, or maintenance problems that could compromise the safety of the public and property.

3314.4.4.2 Loads. At no time shall a scaffold be loaded beyond the capacity of the scaffold or the ground or structure upon which it rests or is supported. Loads shall not be concentrated so as to cause stresses in excess of the allowable values designated for the applicable material described in this code.

Capacity:

3314.4.4.3 Capacity. Each scaffold, and its components, shall be capable of supporting, without failure, its own weight and at least four times the maximum intended load applied or transmitted to it. Where applicable, scaffolds and their connections to the building or structure shall be designed to meet the anticipated loads during construction or demolition work, including wind loads as prescribed in Chapter 16. Each suspension rope, including connecting hardware, used on nonadjustable suspended scaffolds shall be capable of supporting, without failure, at least six times the maximum intended load applied or transmitted to the rope.

Support:

3314.10.2 Support. All suspended scaffold support devices, such as outrigger beams, C-hooks, parapet clamps, and similar devices shall be supported by surfaces capable of supporting at least 4 times the load imposed on them by the scaffold operating at the rated load of the hoist. The support shall be inspected prior to installation in accordance with the requirements of Section 3314.4.3.1.

CORNICE HOOKS: CODE REQUIREMENTS

Inspection: 3314.4.3 **Inspections.** Scaffolds shall be inspected in accordance with the requirements of Sections 3314.4.3.1 through 3314.4.3.6.

3314.4.3.1 Inspection prior to the installation of a suspended scaffold. Prior to the installation of a suspended scaffold, all suspended scaffold support devices, including but not limited to outrigger beams and C-hooks, along with the support surface upon which they rest, shall be inspected by a qualified person. The qualified person shall:

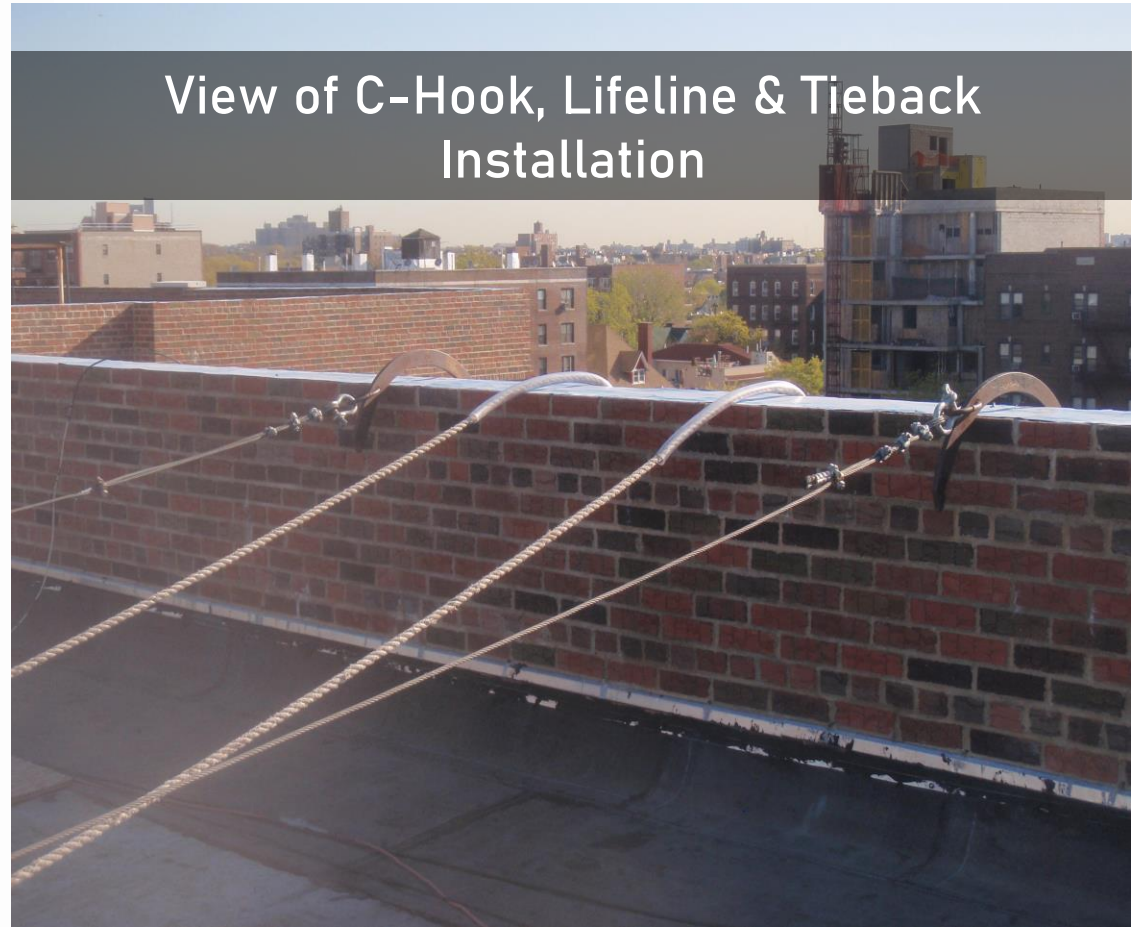
1. Where the installation or removal occurs under the direct and continuing supervision of a licensed rigger or sign hanger, be designated by such licensee; or
2. Where the installation or removal does not occur under the direct and continuing supervision of a licensed rigger or sign hanger, be designated by the designer of the scaffold.

CORNICE HOOKS (C-HOOKS)

Standard C-Hook
Installation Setup



View of C-Hook, Lifeline & Tieback
Installation



CORNICE HOOK: SUPPORT SURFACE

- Installation of c-hook on concrete parapet
- Does this support surface have the Code required capacity?
- What about other types of building construction (CMU, unreinforced masonry, terra cotta)?
- The specific construction material for the support surface must always be evaluated including the existing condition of the material



TIEBACKS CODE REQUIREMENTS

3314.10.9 Horizontal tieback location. Horizontal tiebacks shall be installed perpendicular to the face of the building or structure, or opposing angle tiebacks shall be installed. Single tiebacks installed at an angle are prohibited.

3314.10.10 Support devices. Suspended scaffold support devices, such as C-hooks, cornice hooks, roof hooks, roof irons, parapet clamps or other similar devices shall meet the following requirements:

1. Support devices shall be made of steel, wrought iron or materials of equivalent strength.
2. Such devices shall be supported by bearing blocks.
3. Support devices shall be secured against movement by tiebacks installed perpendicular to the face of the building or structure or by opposing angle tiebacks installed and secured to a structurally sound point of anchorage as prescribed in Section 3314.6.
4. Tieback rope shall be at least equal in strength to the suspension rope.

3314.6 Footings and anchorage. The footings and anchorage for every scaffold shall be sound and rigid, capable of carrying the maximum load without excessive settlement or deformation and secure against movement in any direction. Supports such as barrels, boxes, loose brick, loose stone, or other unstable materials shall not be used.

3314.6.1 Safe points of anchorage. Safe points of anchorage include structural members of a building. Window washing anchors, window frames, mullions, handrails, standpipes, vents and other piping systems, electrical conduit, counterweights or similar elements shall not be used as anchors or braceback points.

3314.6.3 Lifelines and suspension ropes. Lifelines, tiebacks, and suspension ropes shall each be attached to a different point of anchorage.

TIEBACKS



- Installation of tiebacks for C-hook supported scaffold
- Any tieback issues/hazards in the referenced photos?

PARAPET CLAMPS

3314.4.3.1.1 Special provision for parapet clamps. Where parapet clamps are to be utilized, the qualified person who inspects the support surface as required by Section 3314.4.3.1 shall be a registered design professional.



- Commonly used for lifeline and tieback support

SUSPENDED SCAFFOLD SPECIAL RIGGER LOAD LIMITS

- BC 3316 Hoisting Equipment
- Supervision covered in BC3316.9.1 . This section specifically indicates that the hoisting or lowering of any article on the outside of any building must be performed by or under the direct and continuing supervision of a licensed rigger
- 2,000 lb. limit for Special Riggers. Do not exceed this limit when removing construction/building materials
- Exceeding this limit could cause a failure of the supporting surface



§28-404.2 Classification. Rigger licenses shall be classified as follows:

1. **Master rigger license.** Authorizes the holder thereof to install or use a suspended scaffold, or to hoist or lower any article with a hoisting machine, irrespective of weight, on the outside of any building.
2. **Special rigger license.** Authorizes the holder thereof to:
 - 2.1. Install or use a suspended scaffold; and
 - 2.2. Hoist or lower any article not exceeding 2,000 pounds (907 kg) in weight on the outside of any building with a hoisting machine, provided the manufacturer rated capacity of such hoisting machine does not exceed 2,000 pounds (907 kg).

SUSPENDED SCAFFOLD CODE SECTIONS

3301.1.3 Manufacturer specifications. All equipment shall be used in accordance with the specifications of the manufacturer, where such specifications exist, and the requirements of this code. Where there is a discrepancy, the stricter requirement shall apply.

SUSPENDED SCAFFOLD

C-Hook & Stand-off Bracket Assemblies

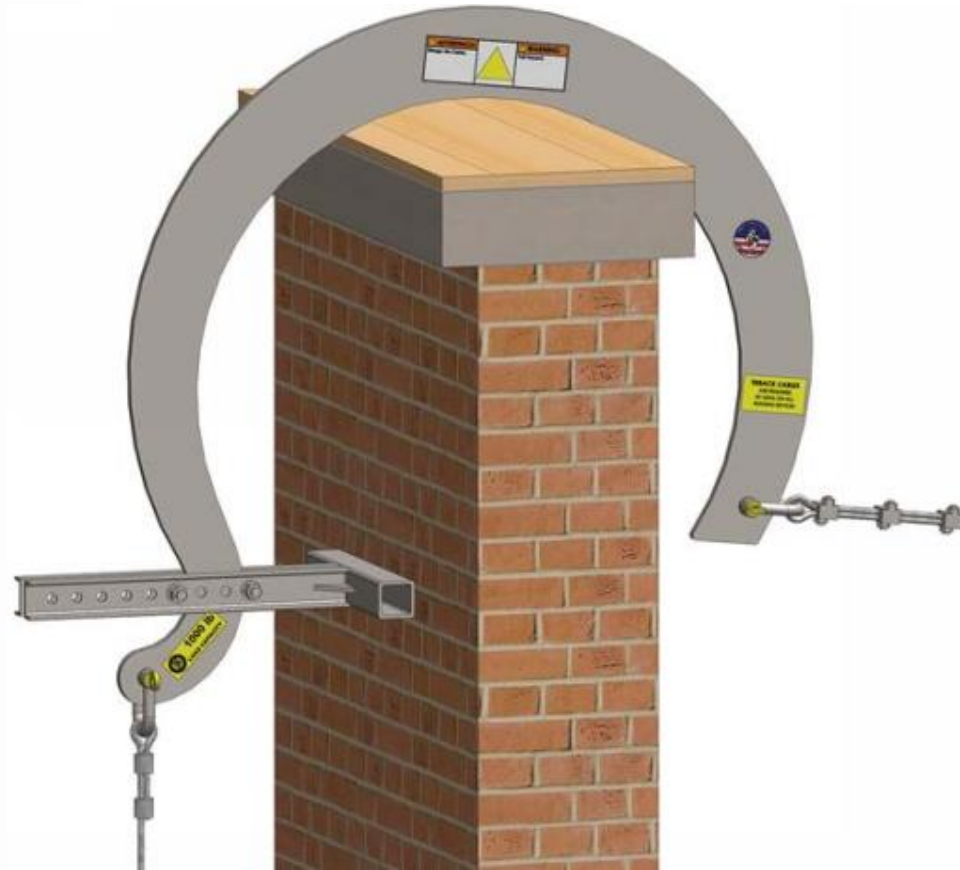


Photo Source: Bee Access Products www.beeaccess.com

SUSPENDED SCAFFOLDING

Stand-off Bracket Assembly Manufacturer's Specifications

Stand-off Bracket for Cornice Hooks

Installation Instructions

Tools Required:

- Torque wrench with 3/4" deep socket
- 3/4" or adj. wrench

NOTE:

1. Assembly and installation must be performed or supervised by a trained and competent person. Read and fully understand these instructions before proceeding with assembly/installation.
2. Inspect all lock nuts to make sure the locking part is still functional.

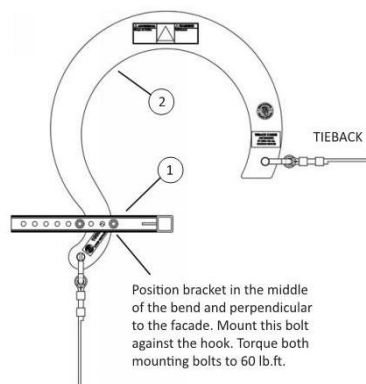
Installation Instructions:

1. Determine the outreach desired, this bracket is capable of 12 to 17" outreach. Verify that the hook size/parapet width combination is properly matched. Review figures 4 to 10 on pages 8 and 9 for samples of approved applications. Make sure the suspension point is well below the horizontal line of the tieback hole. DO NOT let the rear point of the hook touch the wall. Make sure the hook makes load bearing contact with the top rear of the parapet. Contact the factory for approval of applications that are different than shown.
2. Cribbing on top is optional and MUST NOT interfere with the top rear load bearing point of the hook onto the parapet wall and be securely fastened so no loose parts can fall off the parapet. Cribbing at the top rear (such as 3/4" plywood pieces screwed to a 2x6 in an L-shape - see figure 2), is recommended to better distribute the point loads on the parapet.
3. Verify the parapet load bearing points and the hook reaction load "R" will support the working loads plus a 4:1 safety factor.
4. Attach the stand-off bracket (Item #1) to the hook (Item #2) on the roof at the desired distance (figure 1). DO NOT attempt to attach bracket with the hook installed on the parapet! Fasten to hook using (2) 1/2" grade 5 bolts. Position the bracket in the lower bend of the hook and make sure the mounting bolt closest to the facade touches the point of the hook bend closest to the facade. Fasten each bolt tightly and torque to 60 lb.ft.

WARNING:

- Any installation of this equipment other than in strict accordance with these instructions shall be at the Operator's risk and may result in death or serious injury.
- It is the user's responsibility to ensure that the parapet on which the hook is mounted will support the load capacities as listed in the manual.
- Do not alter the product and never use it for purposes in which it was not intended.
- Inspect all equipment before use.
- Never use damaged equipment.

Figure 1



⚠ WARNING:

- Any installation of this equipment other than in strict accordance with these instructions shall be at the Operator's risk and may result in death or serious injury.
 - It is the user's responsibility to ensure that the parapet on which the hook is mounted will support the load capacities as listed in the manual.
 - Do not alter the product and never use it for purposes in which it was not intended.
 - Inspect all equipment before use.
 - Never use damaged equipment.
4. Attach the stand-off bracket (Item #1) to the hook (Item #2) on the roof at the desired distance (figure 1). DO NOT attempt to attach bracket with the hook installed on the parapet! Fasten to hook using (2) 1/2" grade 5 bolts. Position the bracket in the lower bend of the hook and make sure the mounting bolt closest to the facade touches the point of the hook bend closest to the facade. Fasten each bolt tightly and torque to 60 lb.ft.

STAND-OFF BRACKETS PROHIBITED

Buildings Bulletin 2019-006

Subject to multiple recent safety issues in NYC:

- Improper use & not following the manufacturer's recommendations
- Improper installation not following the manufacturer's specifications
- Many parapet and coping stone assemblies in NYC (i.e. URM & terra cotta) do not have sufficient capacity for the loads imposed. The projection/ distance created by the use of the stand-off bracket develops an eccentricity and moment/ torque on the supporting assembly
- That said these brackets can work if the supporting surface is correctly checked for the loads imposed.



NYC Buildings Department
280 Broadway, New York, NY 10007
Melanie E. La Rocca, Commissioner



BUILDINGS BULLETIN 2019-006 Technical

Supersedes:	None
Issuer:	Gus Sirakis, P.E. <i>Chairman</i> First Deputy Commissioner
Issuance Date:	September 25, 2019
Purpose:	This document prohibits the use of stand-off brackets attached to a cornice hook (c-hook).
Related Code/Zoning Section(s):	AC 28-113.1
Subject(s):	Stand-off bracket; standoff bracket; stand off bracket; suspended scaffold; C-hook; cornice hook; parapet; suspended scaffold

I. Scope

A stand-off bracket is a rigid member that extends an assembly. This bulletin applies to the installation or use of a stand-off bracket attached to a cornice hook (C-hook) in order to provide a suspended scaffold additional outreach from the face of a parapet or wall. See Figure 1.

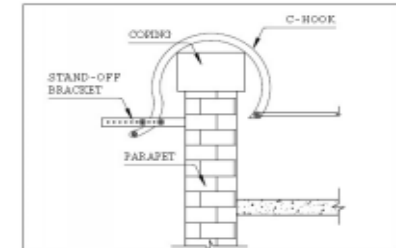


Figure 1: C-hook with stand-off bracket

II. Background

The Department has identified the use of a stand-off bracket as a contributing factor in recent suspended scaffolding incidents.

III. Prohibition

In accordance with §28-113.1, until such time as the Department is able to further study the utilization of stand-off brackets and promulgate regulations to ensure their safe installation and use, the installation or use of a stand-off bracket attached to a cornice hook (C-hook) to provide a suspended scaffold additional outreach from the face of a parapet or wall is hereby prohibited.



STAND-OFF BRACKET RESOURCES

Recent Department Resources

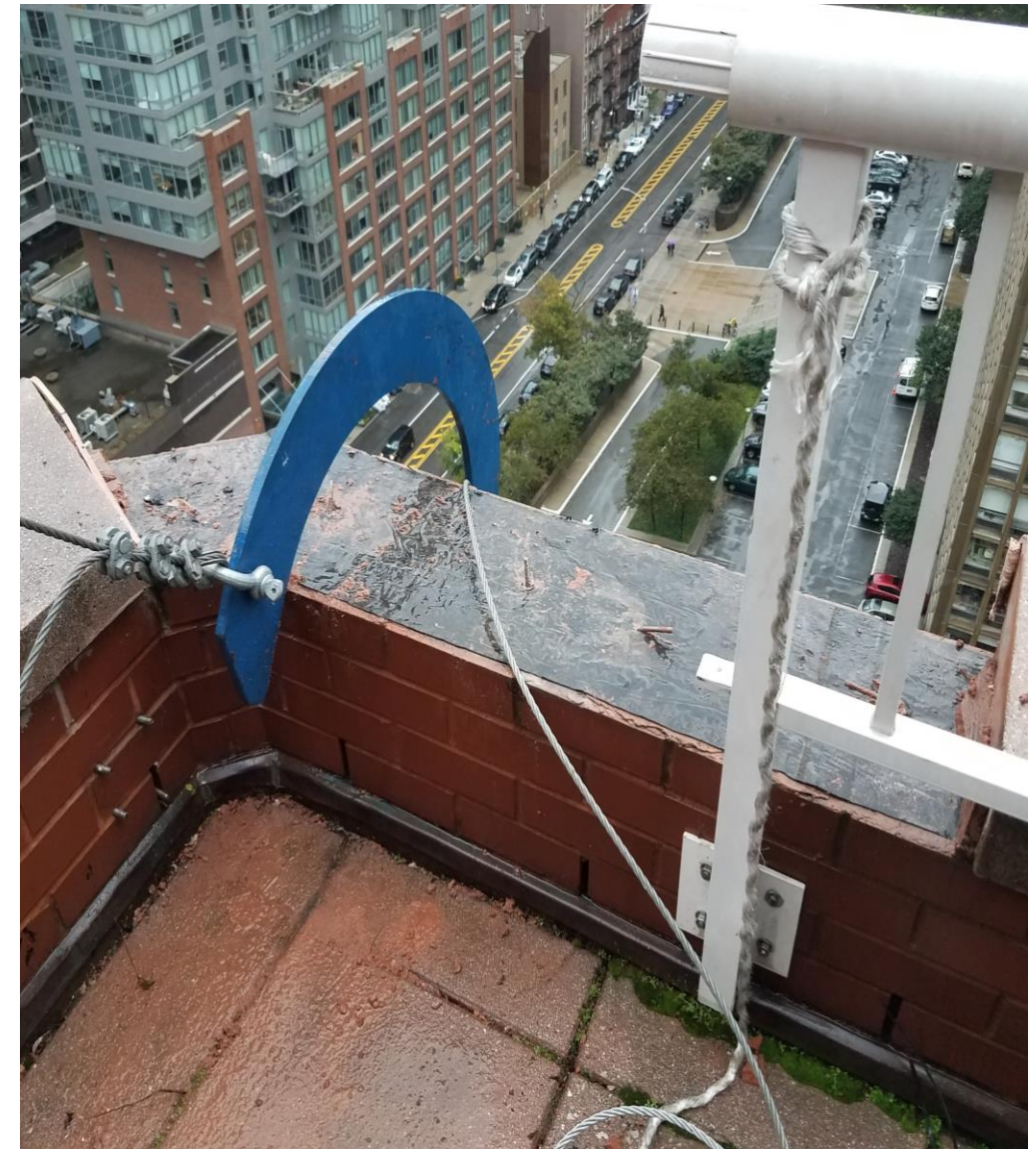
Buildings Bulletin 2019-006

C-Hook Standoff Bracket Currently Prohibited

https://www1.nyc.gov/assets/buildings/bldgs_bulletins/bb_2019-006.pdf

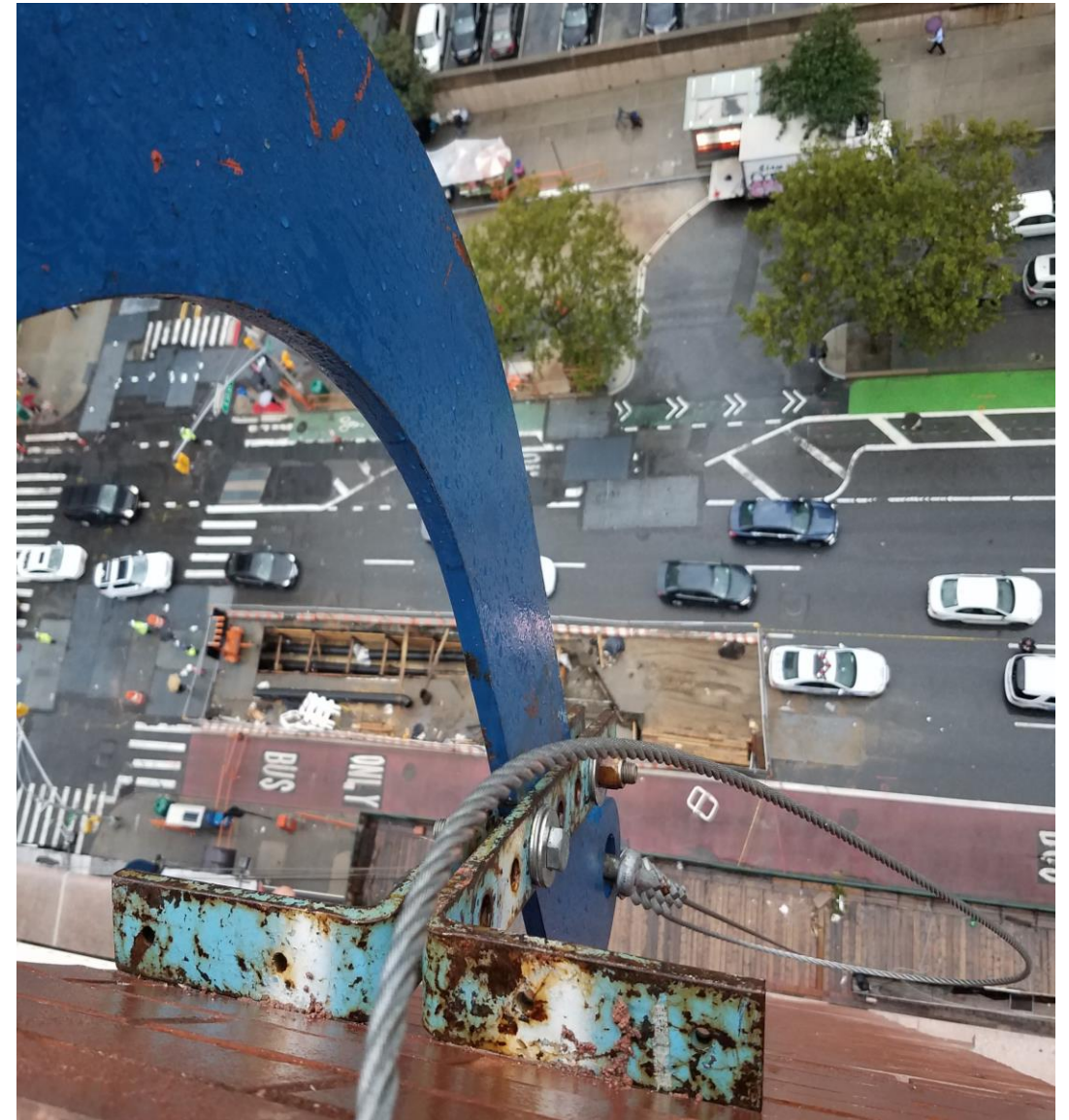
STAND-OFF BRACKET & C-HOOK FAILURE CASE STUDY 1

- C-hook and stand-off bracket support assembly
- Coping stone on unreinforced masonry parapet wall. Small pins/dowels used to secure the stone in place to the parapet. Not intended to support additional load
- Failure occurred at the joint between the coping stone and the top of the parapet
- The forces and stresses from the c-hook assembly must be checked to confirm that the supporting surface can resist at least four times the anticipated load (i.e. 1,000 lbs. x 4 = 4,000 lbs. vertical load)



STAND-OFF BRACKET & C-HOOK FAILURE CASE STUDY 1

- Bolts can loosen overtime and were to be checked as per the pre-shift inspection checklist and based on the manufacturer's requirements (approximately 60 ft.-lbs.)
- The system hinged at the connection between the stand-off bracket and c-hook and dropped when in use
- The tieback prevented a full failure of the support system
- This incident occurred prior to the NYC stand-off bracket prohibition



STAND-OFF BRACKET & C-HOOK FAILURE

Case Study 1

Errors & Omissions

- The capacity of supporting surface must be capable of resisting four (4) times the maximum intended load applied or transmitted to the surface
 - BC 3314.10.2 & BC 3314.4.4.3
- Pre-shift inspection for a suspended scaffold including checklist - BC 3314.4.3.4
- Pre-shift inspection checklist contents based on the manufacturer's requirements - BC 3314.4.3.4.2

STAND-OFF BRACKET & C-HOOK INSTALLATION CASE STUDY 2

- Standoff bracket installation contrary to manufacturer's specifications (The stand-off bracket was installed at an angle. Must be perpendicular to the face of the wall).
- Prior to the NYC ban Stand-off brackets were to be installed perpendicular to the face of the support as per the manufacturer's specifications and requirements



Experience and opinion do not override the manufacturer's requirements (not a suggestion).

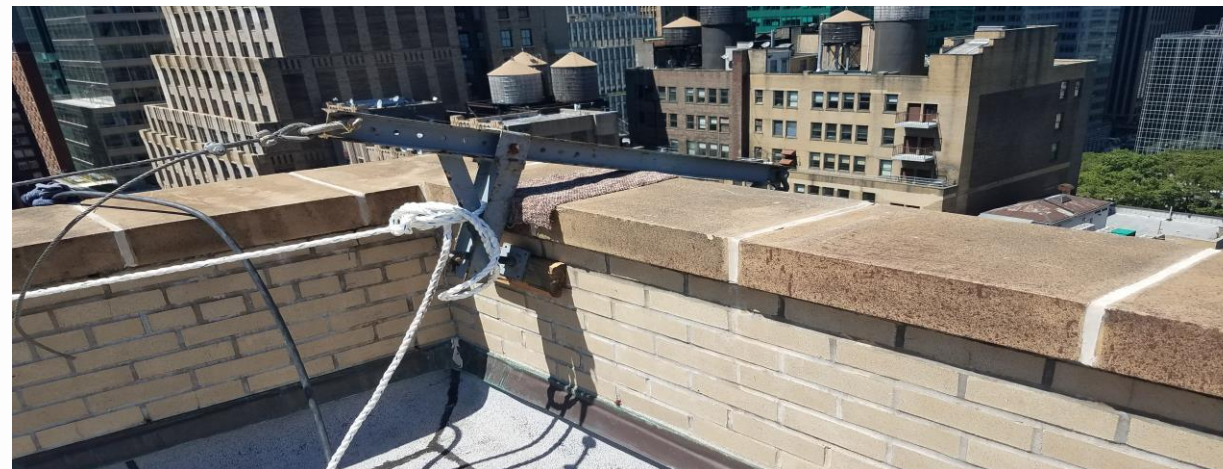
FAILURE OF SCAFFOLD SUPPORTING SURFACE



Case Study 3

- Note C-Hook system assembly includes a standoff bracket
- Failure of terra cotta coping stone on unreinforced masonry parapet
- Complete failure of scaffolding saved by the engagement of the supplemental tieback support

FAILURE OF SCAFFOLD SUPPORTING SURFACE



Case Study 3

- Terra cotta coping stone fell to the sidewalk shed and street level below fragmenting on impact
- Tieback support included a parapet clamp. Note the rotation of the clamp after engagement. A secondary tieback was installed to support the first tieback

SUSPENDED SCAFFOLD

Common Violating Conditions: Permit Holder/Owner

1. Work contrary to approved plans – AC 28-105.12.2
2. Inadequate anchor points being used (plumbing/exhaust vents) – BC 3314.6 & BC 3314.6.1
3. Horizontal tiebacks at angles without opposing lines – BC 3314.10.9
4. Stirrups installed at wrong locations on the platform (contrary to manufacturer specifications) – BC 3314.15.2
5. Failure to adequately clear and lower/secure – BC3314.10.11

SUSPENDED SCAFFOLD

Common Violating Conditions: Design Professional

1. Plans are not project specific and do not account for exact building geometry – AC 28-104.7.1
2. Deficient Drawings – BC 3314.3.3
 - a. Structural modifications to the base structure not indicated or contrary to that shown on the drawings (anchorage support, tiebacks, etc.)
 - b. Connections and attachments to the base structure not sufficiently detailed (schematic and general)
 - c. Method of securement while work is not being performed for all scaffolds not lowered to the deck of the sidewalk shed not specified
3. Anchorage testing not specified in compliance with – BC 1704.32; BB2016-005

MATERIAL HANDLING EQUIPMENT



MATERIAL HANDLING EQUIPMENT

NYC Building Code Chapter 33 Section 3320

SECTION BC 3320 MATERIAL HANDLING EQUIPMENT

3320.1 Scope. Material handling equipment shall meet and be used in accordance with the requirements of this section.

3320.2 Requirements. Material handling equipment shall be installed, operated, and maintained to eliminate hazard to the public or to property. It shall be unlawful to operate any such equipment that is not provided with a positive means for preventing the unauthorized operation of such machine. The means whereby such machines may be made inoperative shall be acceptable to the commissioner.

3320.3 Operation. Only operators designated by the person causing such machinery to be used shall operate material handling machinery. Operators and signalmen/signalwoman shall be experienced at the operation they perform. The operator shall be responsible for making the machine inoperative before he or she leaves the machine.

3320.3.1 Loading. Loading of material handling equipment shall be conducted in accordance with the following requirements:

1. Material handling equipment shall not be loaded in excess of the rated load specified by the manufacturer. When necessary, manufacturer load ratings shall be reduced to take into account effects of wind, ground condition and operating speed.
2. Rated load capacities and required charts shall be conspicuously posted on all material handling equipment or on the job site and shall be available to the commissioner at all times.
3. All loads shall be properly trimmed to prevent the dislodgment of any part during raising, lowering, swinging or transit.
4. Suspended loads shall be securely slung and properly balanced before they are set in motion.

MATERIAL HANDLING EQUIPMENT

NYC Building Code Chapter 33 Section 3320

3320.8 Lift and fork trucks. Lift and fork trucks shall meet the requirements of Sections 3320.8.1 through 3320.8.4.

3320.8.1 Load capacity. A metal plate with readily legible etched or stamped figures giving the capacity rating in pounds shall be attached to every lift or fork truck.

3320.8.2 Maintenance. All parts and accessories of lift or fork trucks shall be kept in repair and with brakes adequate to maintain the fully loaded vehicle on any grade that may be encountered on the job.

3320.8.3 Loading. No lift or fork truck shall be loaded beyond its capacity rating. No hand-operated pallet truck loaded so that any point on the load is at a greater height than 4 feet 6 inches (114 mm) above the floor shall be moved by pushing unless handled by two persons.

3320.8.4 Prohibited use. No lift or fork truck shall be in motion when the loaded forks are elevated higher than necessary to clear obstructions, except as may be required for positioning, picking up, or depositing the load.

OSHA REQUIREMENTS CFR 1910.178

SUBPART N - POWERED INDUSTRIAL TRUCKS



UNITED STATES
DEPARTMENT OF LABOR



Occupational Safety and Health Administration

OSHA ▾

STANDARDS ▾

TOPICS ▾

HELP AND RESOURCES ▾

[By Standard Number](#) / 1910.178 - Powered industrial trucks.

- **Part Number:** 1910
- **Part Number Title:** Occupational Safety and Health Standards
- **Subpart:** 1910 Subpart N
- **Subpart Title:** Materials Handling and Storage
- **Standard Number:** [1910.178](#)
- **Title:** Powered industrial trucks.
- **Appendix:** [A](#)
- **GPO Source:** [e-CFR](#)

OSHA REQUIREMENTS CFR 1910.178

SUBPART N - POWERED INDUSTRIAL TRUCKS

Important OSHA Code of Federal Regulations (CFR) Sections:

1910.178(a)

General requirements.

1910.178(a)(1)

This section contains safety requirements relating to fire protection, design, maintenance, and use of fork trucks, tractors, platform lift trucks, motorized hand trucks, and other specialized industrial trucks powered by electric motors or internal combustion engines. This section does not apply to compressed air or nonflammable compressed gas-operated industrial trucks, nor to farm vehicles, nor to vehicles intended primarily for earth moving or over-the-road hauling.

1910.178(a)(4)

Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.

1910.178(a)(5)

If the truck is equipped with front-end attachments other than factory installed attachments, the user shall request that the truck be marked to identify the attachments and show the approximate weight of the truck and attachment combination at maximum elevation with load laterally centered.

1910.178(a)(6)

The user shall see that all nameplates and markings are in place and are maintained in a legible condition.

OSHA REQUIREMENTS 1910.178

SUBPART N - POWERED INDUSTRIAL TRUCKS



UNITED STATES
DEPARTMENT OF LABOR



Occupational Safety and Health Administration

OSHA ▾ STANDARDS ▾ TOPICS ▾ HELP AND RESOURCES ▾



Materials Handling and Storage

U.S. Department of Labor
Elaine L. Chao, Secretary

Occupational Safety and Health Administration
John L. Henshaw, Assistant Secretary

OSHA 2236 Publication

<https://www.osha.gov/Publications/osh2236.pdf>

OSHA REQUIREMENTS 1910.178 SUBPART N POWERED INDUSTRIAL TRUCKS

Training and Education from OSHA Publication 2236

Training and Education

OSHA recommends that employers establish a formal training program to teach workers how to recognize and avoid materials handling hazards. Instructors should be well-versed in safety engineering and materials handling and storing. The training should reduce workplace hazards by emphasizing the following factors:

- Dangers of lifting without proper training.
- Avoidance of unnecessary physical stress and strain.
- Awareness of what a worker can comfortably handle without undue strain.
- Use of equipment properly.
- Recognition of potential hazards and how to prevent or correct them.

MANUFACTURER'S SPECIFICATIONS MATERIAL HANDLING EQUIPMENT



Telehandler
GTH™-636

Specifications

Model	GTH-636	
Measurements	US	Metric
Maximum lift height	36 ft	10.97 m
Maximum forward reach	21 ft 11 in	6.68 m
Reach at maximum height	1 ft 10 in	0.56 m
▲ Height, stowed	7 ft 10 in	2.39 m
▲ Length, stowed (without forks)	17 ft 10 in	5.44 m
Width	7 ft 11 in	2.41 m
▲ Wheelbase	10 ft 11 in	3.33 m
▲ Ground clearance, center	1 ft 3 in	0.38 m
▲ Ground clearance, axle	1 ft 5 in	0.43 m
Fork cross section	2 x 4 in	51 x 101 mm

Productivity

Maximum lift capacity	6,000 lbs	2,722 kg
Lift capacity at maximum height	5,000 lbs	2,268 kg
Lift capacity at maximum reach	1,500 lbs	680 kg
Drive speed	16 mph	26 km/h
Boom up/down	10/8 sec	10/8 sec
Boom extend/retract	11/9 sec	11/9 sec
Draw bar pull	15100 lbs	6849 kg
Turning radius, outside (4WS)	13 ft 4 in	4.06 m
Auxiliary hydraulic flow	2-15 gpm	7.57-56.8 lpm
Auxiliary hydraulic pressure	3,000 psi	206.8 bar
Tires, standard size	13 x 28 in, 12 ply	

Power

Power source	Deutz TD 2.9 I.4 turbo charged diesel, Tier 4f 74 hp (55.2 kW)	
Electrical system	System voltage 12 volt Alternator 95 amp 1000 CCA at 0°F (-18°C)	
Hydraulic tank capacity	34.0 gal	128.7 L
Hydraulic system capacity (w/tank)	46.5 gal	176.0 L
Fuel tank capacity	27.0 gal	102.2 L

Weight*

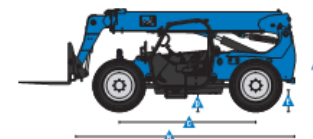
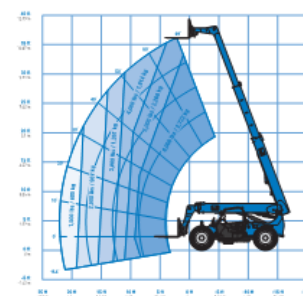
	17,600 lbs	7,983 kg
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Standards Compliance

	ANSI/ISO B56.6, CSA B335
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* Weight will vary depending on options and/or country standards.
** Load ratings vary depending on attachment.

Load Chart GTH™-636**



- Manufacturer's specifications and load table/chart for a specific piece of material handling equipment
- A data/name/load plate will be installed on the specific piece of material handling equipment with the manufacturer's specifications and instructions including allowable lifting capacities and configurations

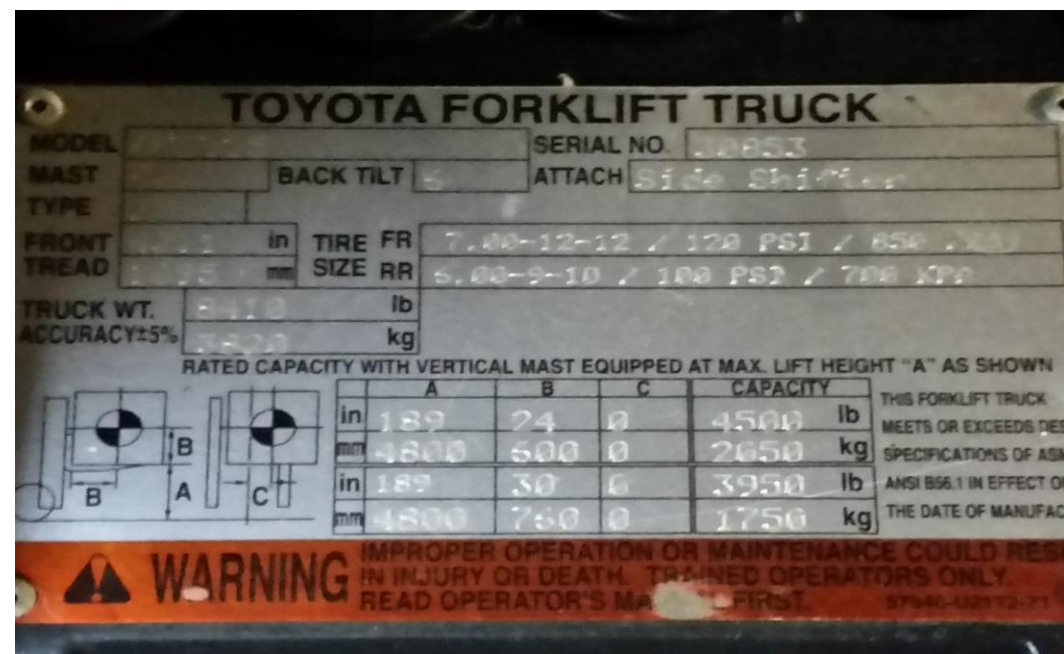
MATERIAL HANDLING EQUIPMENT INSTRUCTION AND DATA LOAD PLATES

What are the safety requirements for modification?

You and your employees must not make modifications and additions affecting capacity and safe operation of the trucks without the manufacturer's prior written approval. In these cases, you must change capacity, operation, and maintenance instruction plates and tags or decals to reflect the new information. If the truck is equipped with front-end attachments that are not factory installed, the user must request that the truck be marked to identify these attachments and show the truck's approximate weight—including the installed attachment—when it is at maximum elevation with its load laterally centered.

CFR OSHA 1910.178(a)(4)

Modifications and additions which affect capacity and safe operation shall not be performed by the customer or user without manufacturers prior written approval. Capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.



MANUFACTURER'S SPECIFICATIONS MATERIAL HANDLING EQUIPMENT



Star Industries Work Platform Attachment page 1 of 2

June 15th, 2015

Subject: Star Industries Work Platform on Genie branded telehandlers.

Subject to the terms and conditions of this letter, Genie Industries Inc. authorizes the owners of a Genie branded 636, 644, 844, 1056, 1256, or 1544 telehandler to use the Star Industries Work Platform, Models 1204G, 1206G, 1208G, and 1210G, based on the requirements hereinafter. The Genie GTH-5519 is only authorized to use Star Industries Work Platform Models 1204G and 1206G, based on the requirements hereinafter. This letter supersedes all previous versions.



Warning:

Failure to comply with all restrictions, instructions and warnings contained in this letter, in all Operators' Manuals and Safety Manual could result in death or serious injury.

Approved Serial range

The following models are approved based on the serial range as follows:

- GTH5519 – From GTH5514B-101
- GTH636 – From GTH0614H-10000
- GTH644/844 – From GTH0813-16606
- GTH1056 – From GTH1012-16292
- GTH1256 – From GTH1215M-101
- GTH1544 – From GTH1514B-22830

Owner/Employer/Operator Requirements

- 1) The owner, employer and the operator shall comply with all applicable jobsite, local, state, country, employer, manufacturer rules, regulations, and standards (e.g. ANSI/ITSDF B56.6) related to the use of the equipment with the work platform attachment.
- 2) A copy of this letter, and the Star Industries Work Platform Safety Manual, must accompany the telehandler operator and safety manuals at all times in the weather resistant storage compartment located on the equipment. Read, understand and follow the proper installation and operating instructions of the attachment.
- 3) Operators must be trained and qualified on how to safely operate the equipment and be familiar with the specific model of Genie equipment, and attachment, as follows:
 - a) Be familiar, and comply, with all equipment operating and safety manuals.
 - b) Understand all control functions, decals and warnings.
 - c) Be aware of and understand all safety devices specific to the equipment being used.
 - d) Be instructed regarding the specific hazards associated with using the Genie telehandler with the attachment and utilize all means, including those provided by the user or employer, to avoid them.
- 4) Prior to use, both the telehandler and the work platform must be in proper working condition and configuration.
- 5) The combined weight of the work platform, occupants, tools and materials shall not exceed one-third the maximum allowable load capacity, at the related load center position (e.g. 24 inches), within any

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■ A manufacturers written approval and requirements for the use of an aftermarket work platform attachment

■ Note the loading requirements are reduced to 1/3 of the published values in the material handling equipment specifications for the use of this specific piece of aftermarket equipment



Star Industries Work Platform Attachment page 2 of 2

load zone on the applicable load chart. Example: If the standard load capacity, within a particular zone, allows 8,000 lbs. of capacity, the new maximum load capacity is $8,000/3 = 2,667$ lbs.

Specific Training

- 1) The employer shall provide any additional training to the operator, and other personnel, that's deemed necessary to safely operate the Genie telehandler with the attachment.
- 2) A competent person shall supervise the operation and make a determination regarding load position, boom location, ground support, travel route, overhead obstructions, and speed of movement necessary to ensure safety.

Use Requirements/Considerations

- 1) This approval only applies for the primary intended purpose and use of the Genie telehandler, as defined by ANSI/ITSDF B56.6 and CSA B335.
- 2) Star Industries is responsible for the attachment:
 - a) Design
 - b) Fabrication
 - c) Workmanship
 - d) Structural integrity
 - e) Fit and function
 - f) Overall quality
 - g) Any operating and safety instructions specific to the attachment
 - h) Clearly marking the attachment in accordance with ANSI/ITSDF B56.6

In consideration for Genie's authorization herein, the equipment owner hereby agrees to indemnify and hold harmless Genie Industries Inc. and its parent and affiliated companies against any and all liability, claims, suits, losses, costs and legal fees caused by, arising out of, or resulting from the approved modification/application of the Genie equipment; any negligent act in the operation of the equipment by the owner, user and/or operator; the failure to comply with the criteria set forth in this letter related to the modification/application; the design, manufacture and installation of any modification; the safety rules and operating instructions in the Operator's Manual; the design and placement of any safety decals; the operation of the equipment by the owner, user and/or operator; and any negligent act or omission related to the equipment, its use or its modification.

BY PROCEEDING WITH THE MODIFICATION/APPLICATION AUTHORIZED HEREIN, YOU AGREE TO THE CONTENTS OF THIS LETTER AND ITS CONDITIONS. IF YOU DO NOT AGREE, DO NOT PROCEED WITH THE PROPOSED MODIFICATION/APPLICATION.

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MANUFACTURER'S SPECIFICATIONS MATERIAL HANDLING EQUIPMENT

- 5) The combined weight of the work platform, occupants, tools and materials shall not exceed one-third the maximum allowable load capacity, at the related load center position (e.g. 24 inches), within any load zone on the applicable load chart. Example: If the standard load capacity, within a particular zone, allows 8,000 lbs. of capacity, the new maximum load capacity is $8,000/3 = 2,667$ lbs.



Warning:

Failure to comply with all restrictions, instructions and warnings contained in this letter, in all Operators' Manuals and Safety Manual could result in death or serious injury.

MANUFACTURES SPECIFICATIONS AFTERMARKET EQUIPMENT



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May 10, 2011

MODELS 1204G, 1206G, 1208G, & 1210G UNIVERSAL – FIT “SLIP ON FORKS” SAFETY WORK PLATFORM SPECIFICATIONS

Star Industries Safety Work Platforms are constructed with a full perimeter guard rail system constructed of 1½” square steel tubing & consisting of a 42” high top rail, a mid rail, and 5½” high integral toe boards. Self closing access gates with spring hinges and spring actuated latches are provided at each end of the platform. The Guard Rail System is shipped packed inside the base platform for protection during shipping and to facilitate a lower cost of transportation.

The base assembly consists of a strong but lightweight engineered steel frame with an expanded metal deck. Fork tubes are welded to the underside of the platform and incorporate a positive pin locking system with convenient pin storage to secure the platform to forklift. Forks of the telehandler are inserted into the steel fork tubes and are secured with two heavy duty steel pins behind the heel of each fork. The fork tubes are designed for use with a 48” or wider carriage and 48” long forks up to 7” wide and 2¼” thick. Forks longer than 48” can be used, however, they will extend out past the front of the platform.

Fork Loops are also provided at each end of the platform to permit handling, and loading from either end. These loops make it easy to load a platform crosswise on a trailer or longwise into a van. However they are not intended to be used to elevate personnel. **Personnel must never be allowed on the platform when handling it from the end.** It is not permitted by OSHA/ANSI and further more is very unsafe.

All Models are rated at 1,000 lbs. load capacity and have been engineered to a 3 to 1 factor of Safety. Please note, capacity rating applies to platform only and does not reflect capacity of forklift. Star Industries Safety Work Platforms conform to the requirements of ANSI/ITSDF B56.6-2005 Safety Standard for Rough Terrain Forklift Trucks. The operation and use of this platform must also conform to this same safety standard. In addition Star Industries recommends the user obtain approval from forklift manufacturer and conform to any additional safety requirements or limitations they may require.

- Approval letter from the manufacturer of the worker platform. These specifications and requirements indicate the allowable limits of the platform and need to be coordinated with the material handling equipment it is being attached to.

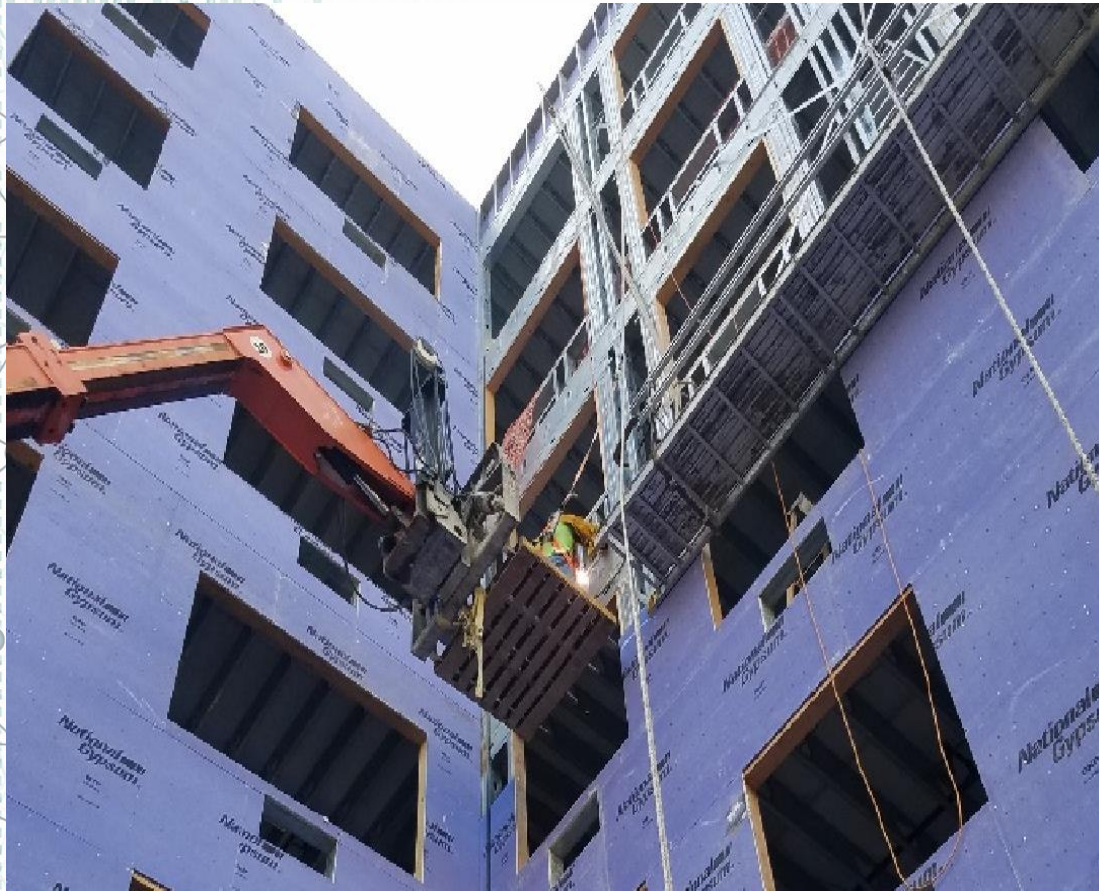
MATERIAL HANDLING EQUIPMENT TELESCOPIC HANDLER (TELEHANDLER)

CASE STUDY 1

- Telehandler being used as a modified work platform for exterior building work



MATERIAL HANDLING EQUIPMENT TELESCOPIC HANDLER (TELEHANDLER)



Case Study 1

- Wood pallet attached to the forks of the telehandler and used as a working platform.
- What are the capacity limitations of this system? Revised load chart and data plate available for the modified use?
- No guardrails provided for worker
- The manufacturer of the telehandler would need to provide written approval of this application and would need to provide revised load tables and specifications

MATERIAL HANDLING EQUIPMENT

ELECTRIC PALLET REACH STACKERS



Photo Source: www.crown.com

MATERIAL HANDLING EQUIPMENT ELECTRIC PALLET REACH STACKER



Case Study 2

- Pallet stacker used for the erection of prefabricated wall panels
- Windy day and HMO indicated no operation of the on-site crane was allowed
- Reach stacker was being used to erect a 10.5 ft x 16ft solid enclosed panel weighing approximately 1,000 lbs.
- Wind gust caused the reach stacker to overturn landing on a worker

MATERIAL HANDLING EQUIPMENT ELECTRIC PALLET REACH STACKER



Case Study 2

- Aftermarket boom extension attached to the forks of the reach stacker
- This type of attachment changes the center of gravity of the system due to the projection of the load away from the material handler and must be checked
- This overturning moment from the weight of the panel/load is in addition to the overturning moment from the lateral loads (wind) acting on the panel (large sail)

MATERIAL HANDLING EQUIPMENT ELECTRIC PALLET REACH STACKER



Case Study 2

- Written approval required from the manufacturer to use the after market attachment (29 CFR 1910.178 (a)(4))
- New markings and load table that identify the piece of equipment being attached and provide new limits for the use of the material handling equipment required (29 CFR 1910.178 (a)(5))
- DO NOT USE the attachment until the material handling equipment manufacturer provides corrected maximum rated load tags for the material handling equipment

MATERIAL HANDLING EQUIPMENT FORKLIFT



Case Study 3

- Use of a forklift to store materials on a construction site. Site was storing materials in an previously used parking garage
- Note the width of the entrance and height limitations

MATERIAL HANDLING EQUIPMENT FORKLIFT



Case Study 3

- Due to the size of the load the crate was rotated 90 degree to fit it through the entrance (long side parallel to forklift).
- This caused the forklift to be unbalanced and not used within the manufacturer's loading requirements.
- A worker was riding on the back of the forklift to help counter balance the load (also not allowed per the manufacturer's specs).
- The forklift was moving backwards up a parking ramp since the load was dragging on the ground.
- The worker on the back hit a concrete beam as the forklift was moving up the ramp.



THANK YOU!