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Elevator + Hoist Safety
Under the 2014 Codes

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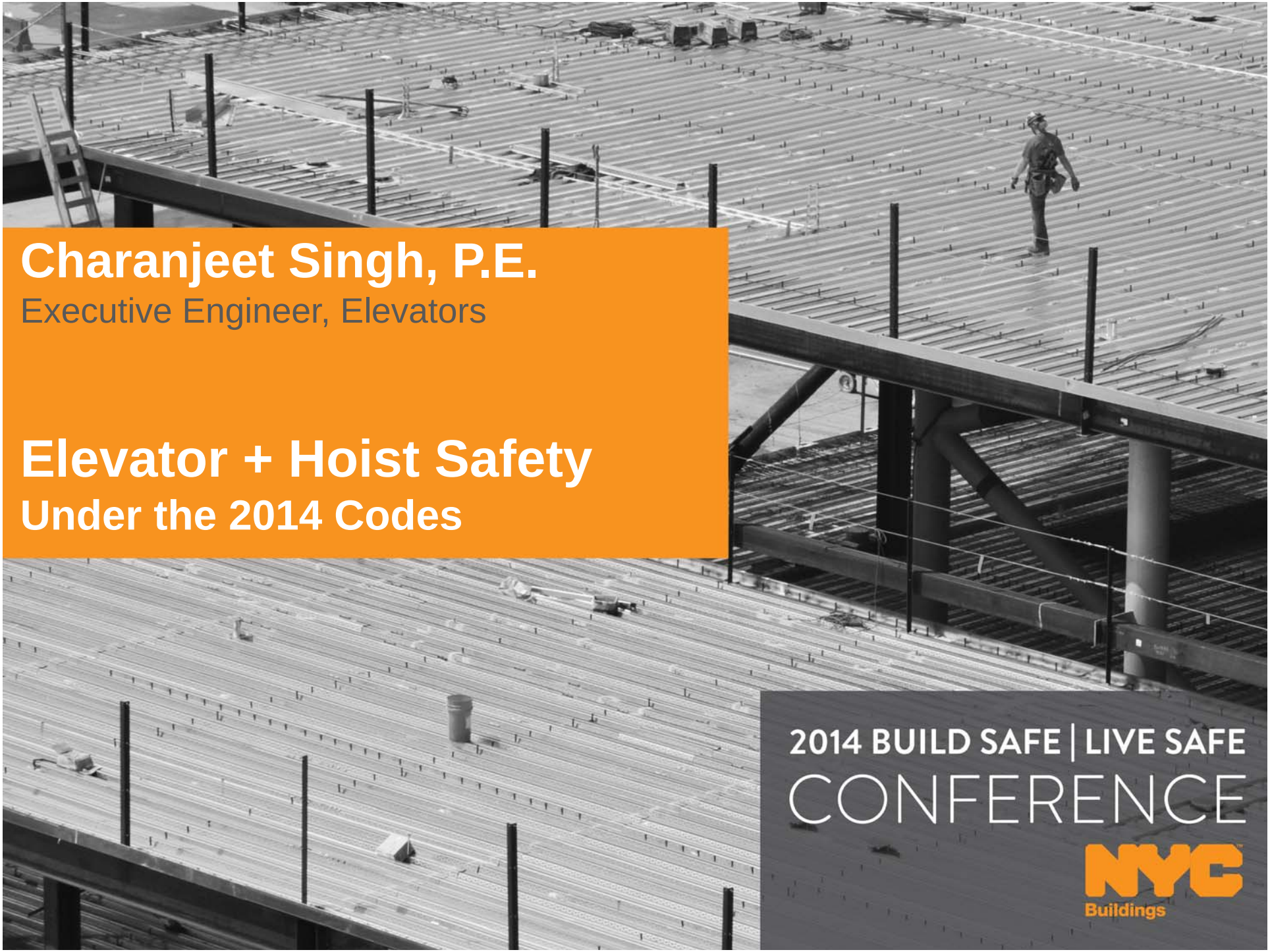

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American Institute of Architects Continuing Education System

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Course Description

Discuss 2014 NYC elevator and hoist code revisions and address safety concerns faced by the elevator industry.

This course will also discuss how these code updates affect property owners and building maintenance personnel.

Learning Objectives

Review major 2014 code updates related to the elevator industry.

Discuss new emergency and standby power requirements.

Participants will learn about Personnel Hoist installation and safety issues to maintain code compliance with manufacturer and NYC Building Code requirements.

Discuss access door requirements for Machine Roomless elevators.

Discuss safety and maintenance issues faced by the elevator industry.

Navigating to Local Laws

Code Changes

Chapter 30.

NYC-specific Building Code requirements

Appendix K.

Modifications to ASME A17.1-2000 with supplements A17.1a-2002 and A17.1b-2003

Chapter K2.

Modifications to ASME B20.1-2006 for Conveyors and related equipment

Code Changes

Chapter K3.

Modifications to ASME A17.3-2002 Safety code for existing elevators and escalators

Chapter K4.

Modifications to ASME A17.1S-2005 Safety code for MRL elevators

Code Changes

Chapter 30 – Major Code Changes

Code Changes

Stringent accessibility and conformance to ICC A117.1 code. The following must conform:

- Passenger elevators required to be accessible by chapter 11 of the NYC Building Code
- Limited Use Limited Application (LULA) installed on accessible route
- Platform lift on an accessible route
- Private Residence Elevator in Group R2 and R3 occupancies on an accessible route

Code Changes

ICC A117.1 – International Code Council (ICC) standard for **Accessible and Usable Buildings and Facilities**

ACCESSIBLE ROUTE. A continuous, unobstructed path that complies with Section 1104 of the NYC Building Code.

Occupancy Groups

Occupancy Group R1. Occupied for a *period less than one month* (i.e. Hotels, Motels, College dormitories, homeless shelters)

Occupancy Group R2. Occupied for a *month or more at a time* (i.e. Apartment houses, Apartment hotels)

Occupancy Group R3. 1- and 2-family dwellings

Occupancy Group B. Business group

Occupancy Group E. Educational group

FDNY Requirements – Sign on All Floors

Language:

IN FIRE EMERGENCY, DO NOT USE ELEVATOR

USE THE EXIT STAIRS

FDNY Requirements- Identification

Each stair and each elevator bank must be identified by:

- An alphabetical letter
- Elevator bank alphabetic
- Elevators alphanumeric (NYC Fire Code-Chapter 4, § 404.3.1.)

Exception: Occupant Evacuation Elevators

Buildings Five Stories or More – Stretchers

Must have at least one elevator accessible to all floors

Must have an elevator that can accommodate a stretcher:

- 24-inch x 84-inch with not less than 5-inch radius corners
- Standby power required
- Exception: Private-residence elevators
  LULA

Non-compliant Building

Daily News

Spanish skyscraper missing elevators in monster goof: 'Standard for the Future' or sign of current decline?

HEINO KALIS/REUTERS

Standby Power Requirements for Elevators

High-rise buildings other than R2 occupancy, per § 403.1

High-rise buildings with R2 occupancy and more than 125 feet high

Underground buildings

Elevators in Group B, E and R1 occupancies

Elevators serving as accessible means of egress

Exceptions: LULA, elevator serving not more than one dwelling unit

Emergency Power

Occupancy group other than R2

- Car lighting
- Emergency voice/alarm communications system

Standby Power vs. Emergency Power

Emergency Power Requirements:

NEC Article 700

Kicks in within 10 seconds

Standby Power Requirements:

Legally Required Standby Power NEC Article 701

Kicks in within 60 seconds

Both capable of serving full-demand load for six hours

Natural gas allowed in R-2 occupancies as sole fuel source

Hoistway Venting

Required vent area need not be permanently open when:

- Vent opens automatically upon detection of smoke in the elevator lobbies or hoist way
- Upon power failure (except when standby power provided)
- Upon activation of manual override control

Fire Service Access Elevator

In buildings with an occupied floor more than 120 feet above the lowest level of Fire Department vehicle access, a minimum of one fire service access elevator shall be required, which shall serve every floor of the building.

This access elevator shall comply with sections 3007.1 through 3007.8.

Fire Service Access Elevator

Comply with sections 3007.1-3007.8:

- Serve every floor;
- Automatic sprinkler systems;
- Water protection;
- Fire rating of shaft;
- Hoistway lighting;
- Lobby requirements (120 square feet);
- Signage; and
- Power requirements.

Occupant Evacuation Elevators

In buildings higher than 420 feet, designated elevators permitted to be used in case of fire.

These special occupant self-evacuation elevators must comply with sections 3008.1 through 3008.11.

Occupant Evacuation Elevators

Section 3008.1 – 3008.11			
Additional exit stairways: not required	Approved fire-safety and emergency-action plans	Emergency voice/ alarm communication system	Structural integrity of the hoistway
Operation	Sprinklers	Water protection	Lobby Requirements
Vision panel	Signage	Two-way communication	Power Requirements
Notification appliance	Hazardous material areas		

Elevator – Repair, Inspection, Test

Must use caution tape when elevator is being serviced, repaired or tested *or* use OSHA-approved elevator barricades.

Major Code Changes

Chapter K

New + Revised Definitions

New Definitions

- Elevator Classification – Passenger or Freight
- Patient Elevator
- Sky Lobby
- Smoke Hole
- Zero Clearance Vestibule

Revised Definitions

- Designated Level
- Hospital Emergency Service

Elevator Landing

Elevator landing on floors other than designated level provided with a vestibule:

Red telephone installed in the vestibule near elevator doors

“In case of fire or other emergency, use this phone to contact lobby or building manager or central service station”

The locking devices on the vestibule door leading to exit are released upon activation of signal device or power failure

At least one exit stair is located within the vestibule

Parking Devices

Elevators that are operated from within the car only and have manual operated doors that can be opened with a common tool shall have elevator parking devices installed at that landing.

Interior Car Lighting

Car interior light shall not be extinguished.

Escalators Safety Issues

Service ports used for diagnostic purposes or for resetting faults shall be placed in a location accessible only to elevator personnel.

Escalators with AC power supply shall be provided with means to remove power from the drive motor and brakes if there is a phase reversal or power failure.

Escalator Signs and Graphics

Step-riser signs or graphics, and handrail signs or graphics are not permitted.

Identification

City ID to be applied on the right-hand side facing the newel at the top and bottom of the escalator and:

- The driving machine;
- Controller; and
- Main line disconnect switch.

Each escalator shall be assigned a unique alphabetical or numerical identification which shall be applied on the exterior, clearly visible at the top and bottom of the escalator.

Updated Table N1

TABLE N1

REQUIRED INSPECTION AND TEST INTERVALS IN "MONTHS"

		Periodic Inspection By Department		Periodic Test on Behalf of Owner (4)									
				Category 1 (2)		Category 3 (Unexposed Pistons of Roped Water Hydraulic elevators and Pressure Vessels)		Category 5 (5)		Noti-fica-tions (1)(3)	Filing (1)(3)	Perfor-ming (1)(3)	Witness-ing Agency (1)(3)
Reference Code	Equipment Type	Require-ment	Interval	Require-ment	Interval	Require-ment	Interval	Require-ment	Inter-val				
ASME A17.1	Electric Elevators	8.11.2.1	1-1 to 12-31	8.11.2..2	1-1 to 12-31	N/A	N/A	8.11.2.3	60	Yes (Cat. 5)	Yes	Yes	Yes
ASME A17.1	Hydraulic Elevators	8.11.3.1	1-1 to 12-31	8.11.3.2	1-1 to 12-31	8.11.3.3	36	Roped 8.11.3.4	60	Yes (Cat. 3,5)	Yes	Yes	Yes

Major Code Changes

Chapter K2 – Major Changes

Vertical Reciprocating Conveyors

The conveyor housing shall be equipped with doors or equivalent means at each manual landing and unloading section equipped with interlocks so the door does not open when carrier is not present at that landing.

Periodic Inspection Requirements – Table N1

TABLE N1

REQUIRED INSPECTION AND TEST INTERVALS IN "MONTHS"

		Periodic Inspection By Department		Periodic Test on Behalf of Owner (4)									
				Category 1 (2)		Category 3 (Unexposed Pistons of Roped Water Hydraulic elevators and Pressure Vessels)		Category 5 (5)		Noti-fica-tions (1)(3)	Filing (1)(3)	Perfor-ming (1)(3)	Witness-ing Agency (1)(3)
ASME B20.1	Vertical and Inclined Reciproca-ting	N/A	N/A	Appendix K2, § 6.21.3 (b)	1-1 to 12-31	N/A	N/A	Appendix K2, § 6.21.3 (b)	60	No	No	No	No

Major Code Changes

Chapter K3 – Major Code Changes

Elevator Parking Device

Elevators that are operated from within the car and only have manual operated doors that can be opened with a common tool shall have elevator parking device installed at every landing with unlocking device.

Single-Plunger Brake

All existing traction elevators with single-plunger brakes must comply with either of the following by January 1, 2027:

1. Alteration of single plunger assemblies with dual plunger

   or

2. Compliance with unintended car movement as per ASME A17.1 section 2.19.2

Permit from the Department required to do this work.

Door Contact Circuits

All automatic passenger and freight elevators shall provide systems to monitor and prevent automatic operation of elevators with faulty door contact circuits by January 1, 2020.

Major Code Changes

Chapter K4 – Major Code Changes

Controller Location

Machinery space in hoistways may not contain a motion controller, a motor controller or an operation controller.

Control of Hot Gases

Hoistways must be provided with means to prevent the accumulation of smoke and hot gases when required by the New York City Building Code.

Sump Pump in the Pit

Elevators with sprinklers in the shaftway must be provided with a drain or sump pump.

Pit Door

Access must be by means of the lowest hoist way door or by means of a separate pit access door, located at the level of the pit floor.

Pit doors must be labeled “DANGER: ELEVATOR PIT” with letters not less than 51mm (2 in) high.

Working Clearances

Control space must be located where working clearances will not impede up on the path of travel in unrestricted areas.

Working Clearances

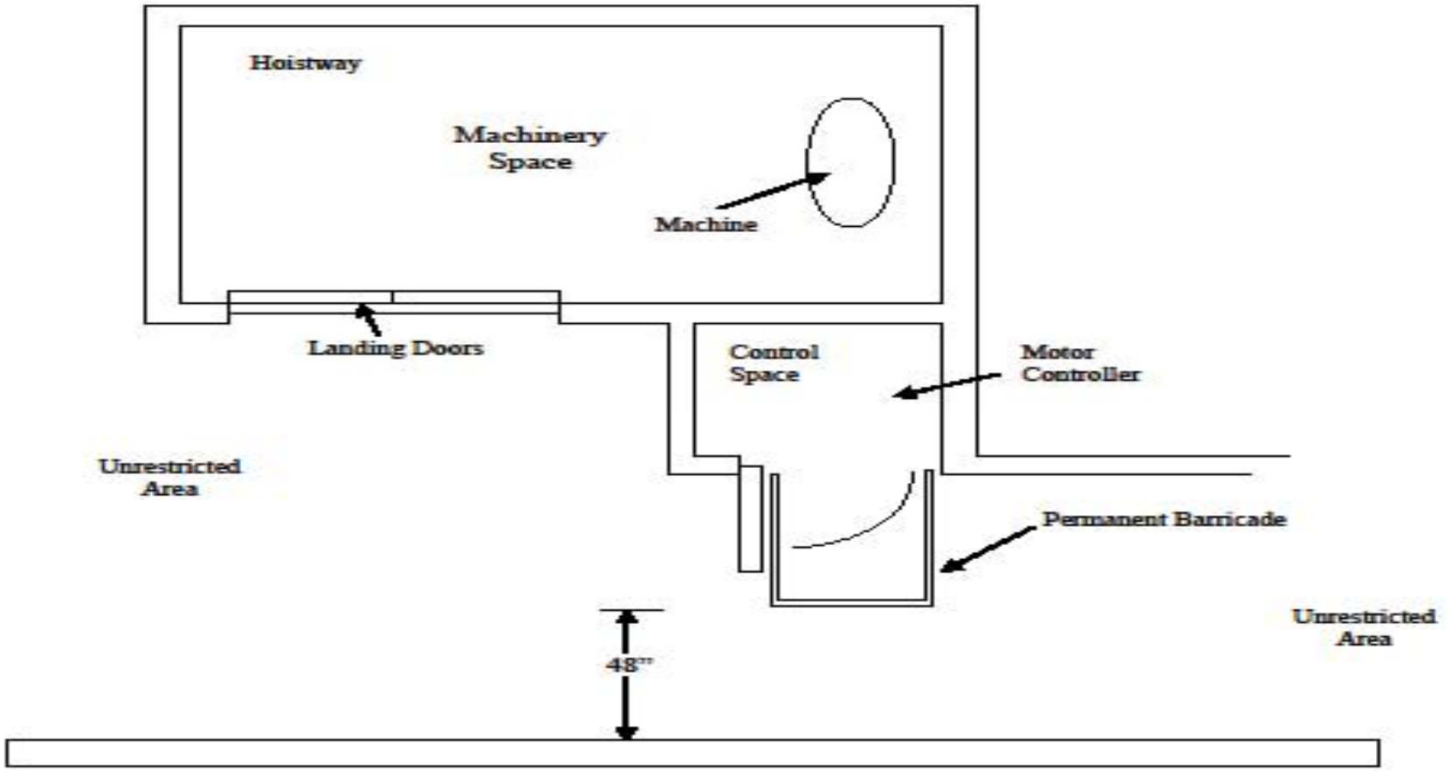

Figure Q-2

Access Door

Access doors to machine rooms, control rooms and control spaces must be provided.

An access door is required when the governor is installed at the top of the hoistway for access to reset switches by elevator personnel.

Bottom Guides

The bottom of each panel must be guided by two or more bottom guides (door gibbs).

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Operational Safety Issues

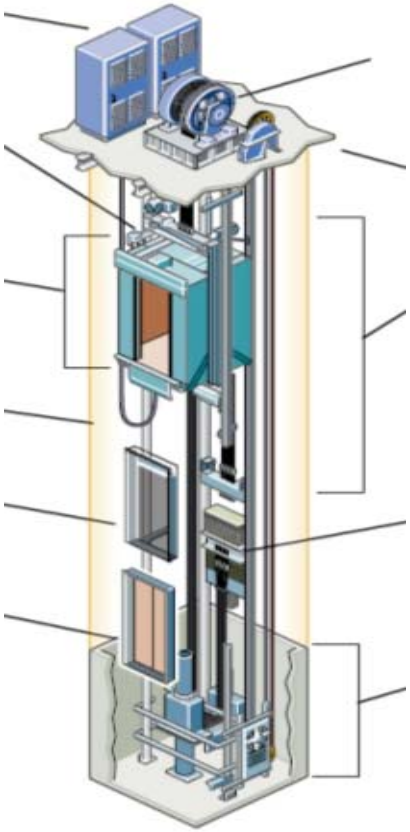
Elevator Safety

Escalator Safety

Hoist Safety

Training

Overview of NYC Elevator Safety Inspections: Maintenance and Repairs



Elevators in New York City

Dumbwaiter (D)	941
Escalator (E)	2407
Freight (F)	3633
Handicap Lift (H)	209
Manlift (M)	52
Passenger Elevator (P)	58036
Permanent Amusement Ride (A)	135
Private Elevator (T)	7
Public Elevator (L)	23
Sidewalk (S)	480
Various (V) - Conveyer, hoist, material lift, inclined wheelchair, Floor Casket	769
Wheelchair (W)	2503
Grand Total	**69195**

One Elevator Day in NYC

64,076 Passenger elevators, escalators, moving walks and freight elevators

500 Trips an average elevator makes per day

30 Million Trips made citywide everyday

11% Percent of all elevators and **4.6%** escalators in the United States are in New York City

Elevator Safety

The Public

Elevator Personnel

Authorized Personnel

Emergency Responders

Codes and Standards

ASME A 17.1/2003 and ANSI/ASSE A10.4 (Personnel Hoist)

ASME A 17.3/2002 (Existing Elevators and Escalators as modified by Chapter K3)

NYC Building Code 2008 (Appendix K, Chapter 30)

Device Types

Elevators

Escalators

Man lifts

Conveyors

Personnel hoists

Wheelchair lifts

The Elevator Unit's Mission

The Elevator Unit promotes the operational safety, reliable service and lawful use of elevators, escalators, amusement rides and other related devices throughout New York City by performing inspections and testing.

The unit enhances compliant development and safety awareness through the Department's various outreach programs and supports development by permitting new technologies under pilot programs.

Elevator Applications

New installations

Alterations (speed, capacity, rise, structural, location)

Replacement and modification (replacement/modification of controller, machine, governor, safety etc.)

Elevator use for construction use (new or amendment on existing application)

Removal + dismantle

Electrical permit must be filed for electrical work performed on device

Note: An acceptance test is required for items # 1-5 types of applications, and NYC Buildings inspectors shall perform the necessary test and inspection.

Types of Inspection

Acceptance Tests - Permitted Application (new and modernized devices)

Complaint Inspections (received through311)

Incidents/Accidents and Emergency Response (24/7)

Survey Inspections

Periodic Inspections

Violation Re-Inspections

Amusement Ride Inspections

Personnel Hoist Inspections (Construction Sites)

Quality Assurance Inspection

Hoist Permit Process

Construction, Electrical Applications and Permits:
Issued by respective borough

Material Handling Plan: Submitted to BEST for approval on high-rise jobs. For low rise buildings, EOR to maintain plan at site for review

Elevators Unit application process:

Four Elev-1 Forms; 1 original, 1 duplicate and 2 copies

Affidavits signed sealed by PE/RA

Two sets of drawing showing the following:

- Type of hoist: (dual hoist)
- Total rise
- Ties to building
- Cab and mass structure
- Run by clearance
- Reaction of all ties and pit

Enforcement

ECB Violations

PVT/DOB Violations

Aggravated I and II

Criminal Court summons (under major offenders program)

Work-Without Permit Violation

Elevator Maintenance + Repair

Maintenance Control Program

Maintenance Log

Repair

Maintenance and Repair – Contract

NYC Administrative Code 28-304.7 – Required Contract

Owner of New and existing passenger elevators shall have contract with an approved agency to perform elevator repair work and maintenance as defined by ASME A 17.1 – Section 8.6.

The name, address and telephone number of approved agency under contract shall be maintained at each premises, on the elevator mainline disconnect switch and in a location readily accessible to employees of the department, building maintenance and custodian staff at the premises.

Maintenance, Repairs + Replacement

Shall confirm following code requirements:

Code at the time of the installation

Code requirements at the time of any alteration/modernization

ASME A 17.3-2002 as modified by NYC Building Code Appendix K

ASME A 17.1b-2003, Section 8.6

Maintenance Control Program

MCP shall be in compliance with ASME A 17.1b-2003 section 8.6.1.2:

Examination, maintenance and tests at schedule interval;

Equipment age, condition, and accumulated wear;

Design and inherent quality of the equipment;

Usage, Environmental condition;

Maintenance Control Program (Continued)

Improved technology;

Cleaning, lubricating and adjusting applicable components at regular intervals;

Repair or replace all worn or defective component where necessary to maintain installation as per codes and manufacturer requirements;

Available at site to elevator personnel; and

As required by manufacturer manual.

Maintenance Records

Maintenance records shall be in compliance with ASME A 17.1b-2003 Section 8.6.1.4:

Description of maintenance task performed and dates;

Description and dates of examinations, tests, adjustments, repairs and replacements;

Description and dates of call backs (trouble calls), including corrective action taken;

Written record of the findings on the firefighter service; and

Available at the site for elevator personal.

Advantages of Maintenance – Per MCP

Enhance safety

Improve service reliability

Increase life span of equipment

Enhance efficiency of vertical system transportation

Avoid costly repairs

Avoid violations and penalties

Elevator Safety

Worker Safety – OSHA safety regulation

Fall Protection – Personal fall-arrest system, guardrail system, barricades

Electrical Safety – Personal protective equipment, safety checklist

Proper Use of Jumpers – Use extreme caution; only use on inspection and ensure jumpers removed before placing equipment back in service

Lockout and Tag out

Use of Caution Tape When Elevators are Serviced – NYC Building Code Section BC-3009

Elevator Safety – General Public

Caution Tape

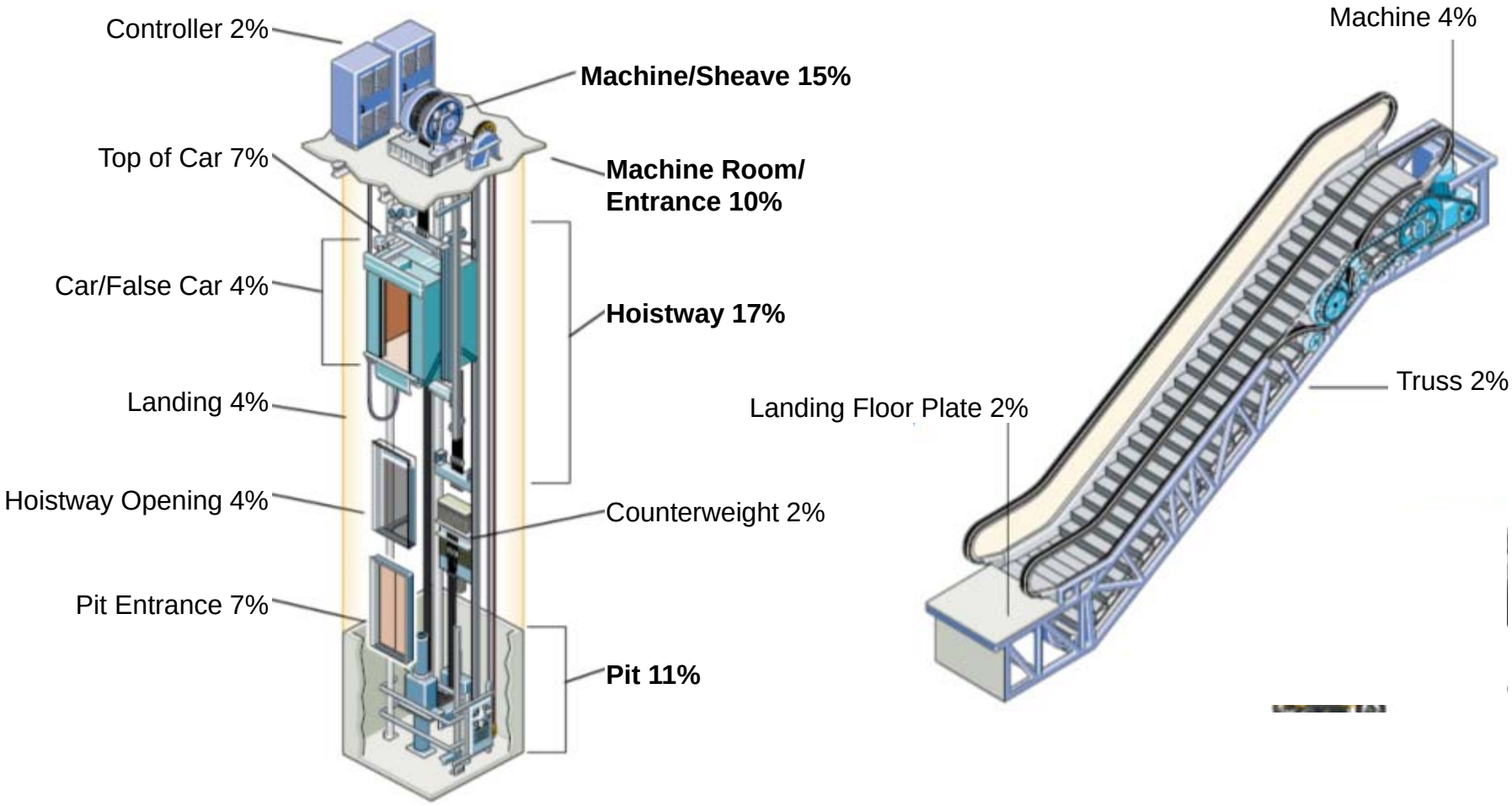
3” yellow caution safety tape installed at 18” and 54” on the inside car door threshold when working on the elevator

Use tape when elevator is removed from normal service and a mechanic is not working in front of the entrance of the device

Prevents unintended public entrance

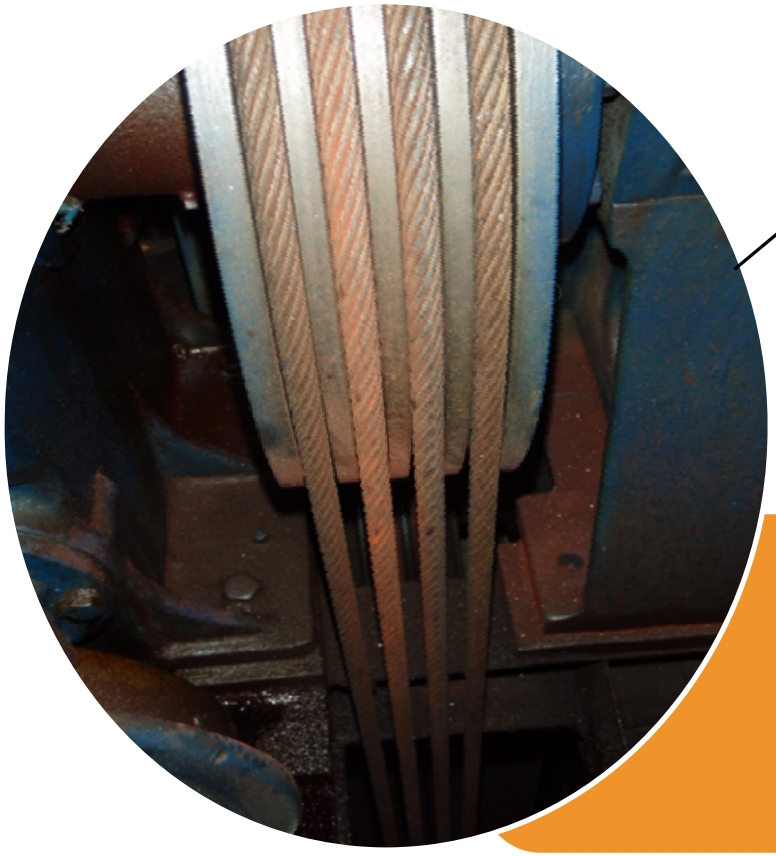
Lights out/doors open communicates that the car is out of service

Elevator Safety – Elevator Mechanic Serious Injury Risk Areas



Elevator Safety – Elevator Mechanic
Serious Injury Risk Areas (Continued)

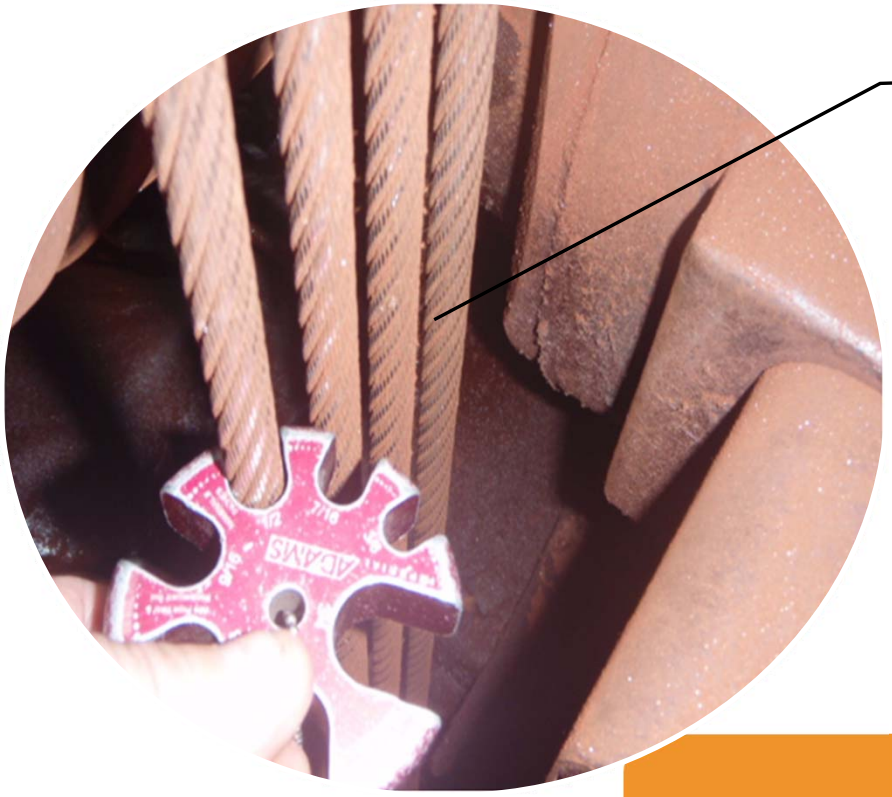
Maintenance Issues



Rouge on ropes:
lack of maintenance

Hoist cables

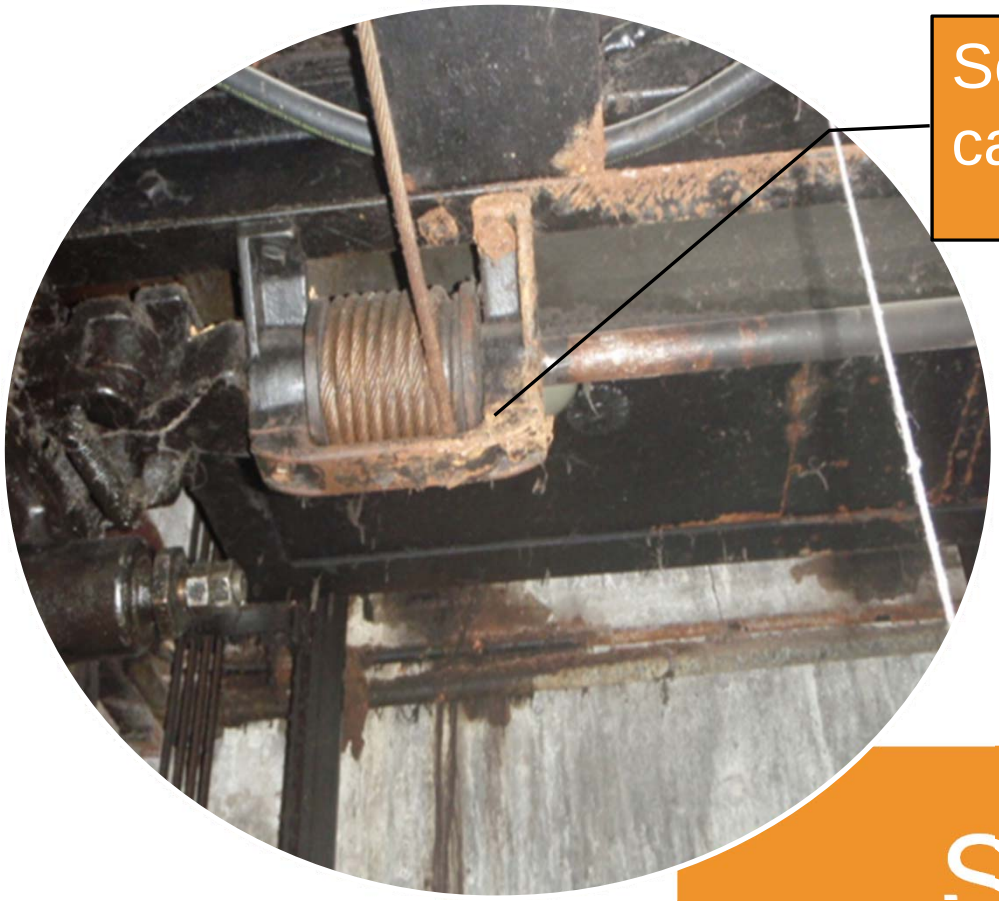
Maintenance Issues



Undersized ropes

Hoist cables

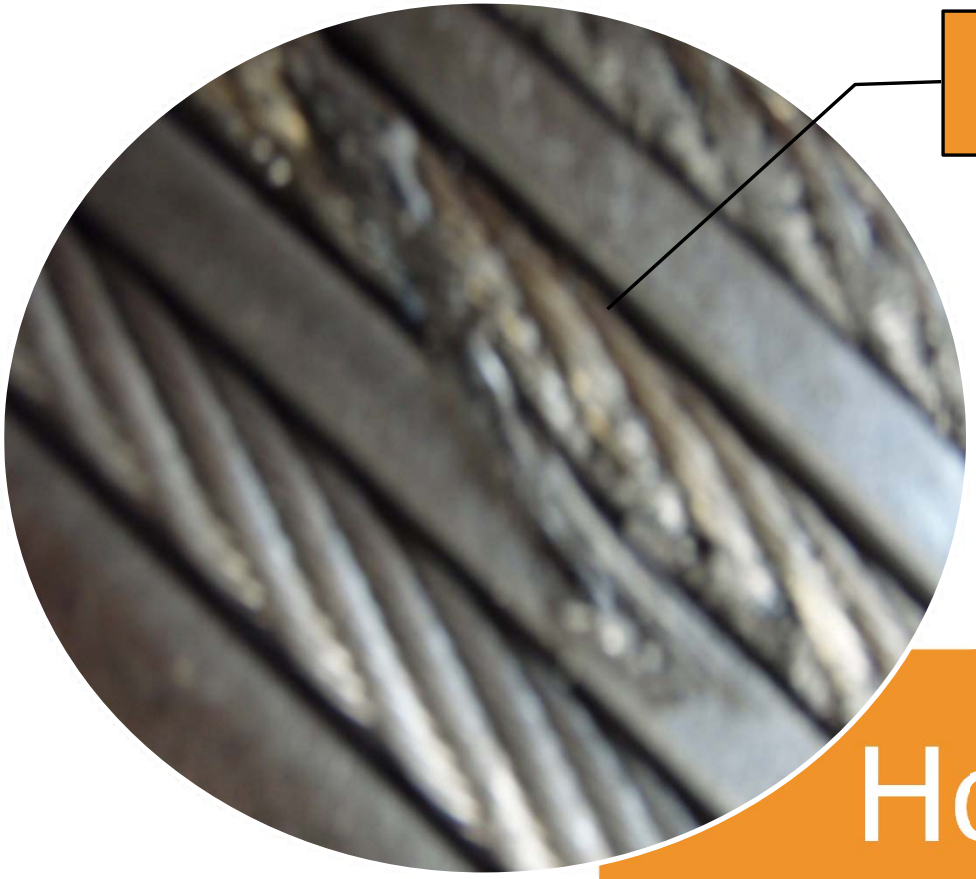
Maintenance Issues



Severe rust on safety cable drum

Safety rope

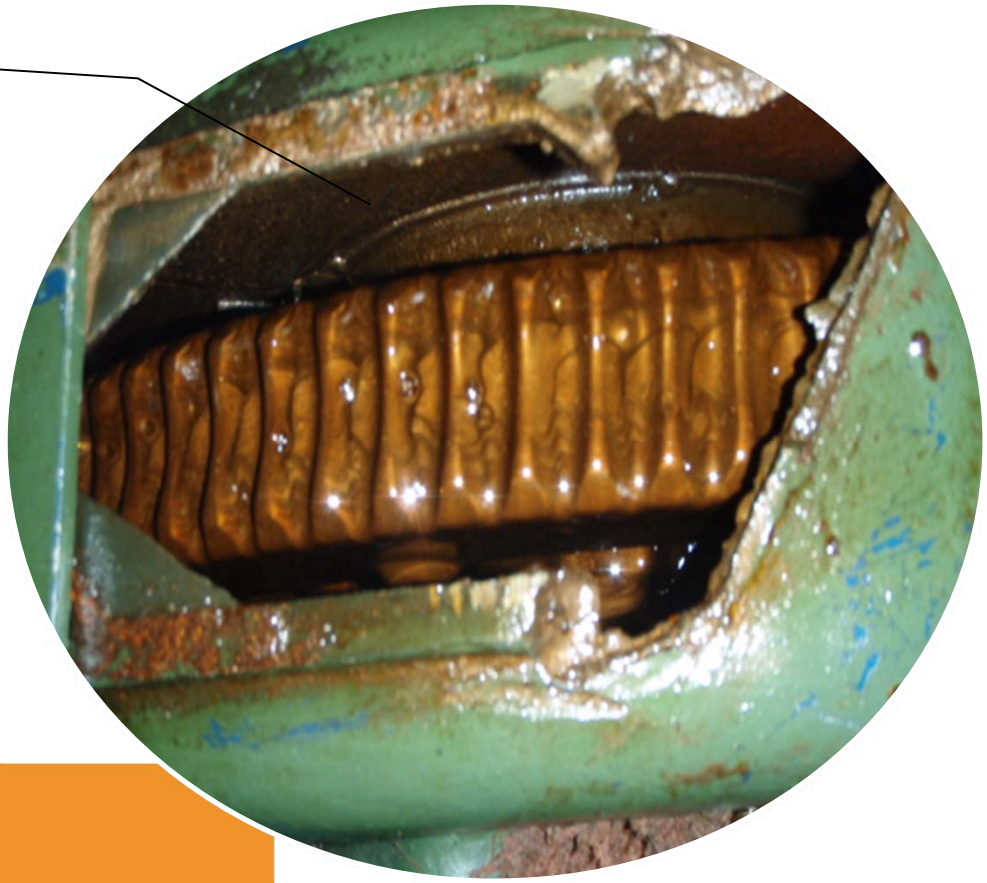
Maintenance Issues



Hoist cables

Maintenance Issues

Lack of oil change



Hoist machine

Maintenance Issues

Oil leak on machine

Hoist machine

Maintenance Issues

Electrical

Jumped Fuses

Maintenance Issues

Electrical

Exposed wiring

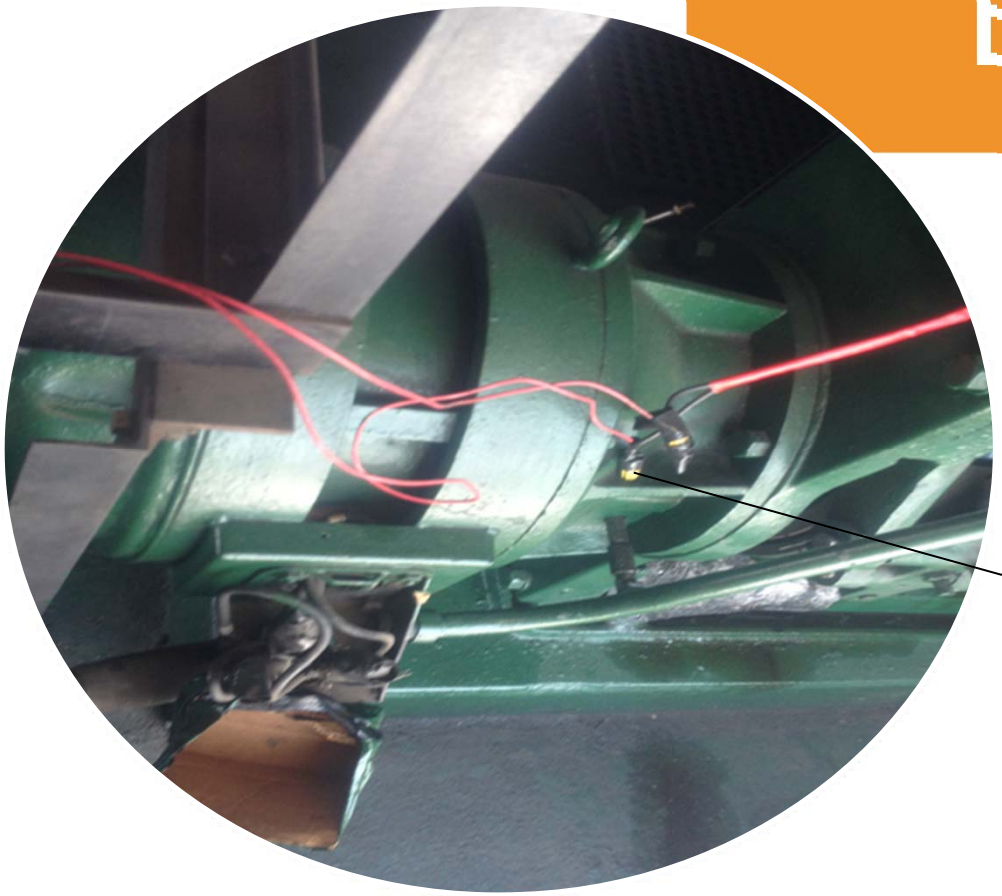
Maintenance Issues

Safety

Governor switch blocked

Maintenance Issues

Electrical



Exposed Wiring

Maintenance Issues

Housekeeping

Dirty pit: fire hazard

Maintenance Issues

Safety

Brake sleeve defective

Hoist Applications

New Installations

Electrical permit must be filed for electrical work

As per the 2008 NYC Building Code (section 3318.4), upon completion of the installation of the personnel hoist and/or its runback structure, an inspection report verifying that the hoist has been installed in accordance with the design drawings, construction documents and specifications shall be prepared by the designer, installer or third party designated by both the designer and installer and acceptable to the commissioner. This inspection report must be submitted by professional engineer to the department of buildings.

Construction application must be filed at the borough office for ties to the building structure and for back structure installation

Note: All hoists must be tested by the department after installation and inspection upon removal of the hoist.

Hoist Plan Review

Foundation

Attachment of slabs to mast

Mast and tie reaction forces calculation

Types of tie:

- Type – I, II a, II, 1V, V, etc.
- All ties are positive (no epoxy)

Ties in schedule shall not exceed 30 feet

Hoist cab structure and safety devices

Hoist Inspection Requirements

Acceptance Inspection and Test – Department:

Cathead/Tower Raise – approved agency inspectors (Requires 3-day notification)

90 Day Inspection – approved agency inspectors (requires full load test)

Inspections required as per manufacturer's manual

Audit inspection – Department

Hoist removal – Department

New Technology

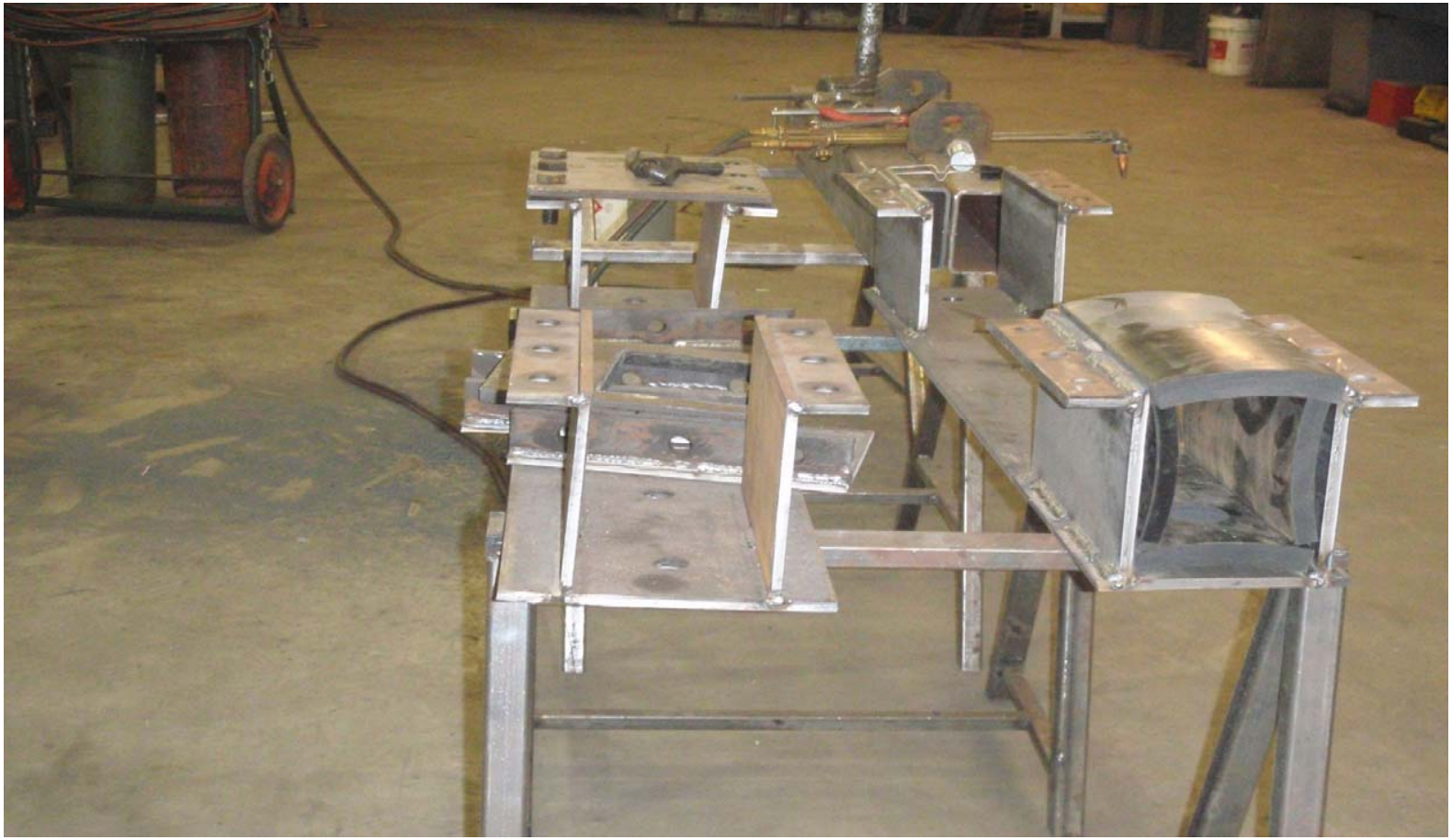
Power-operated Equipment Restriction

Close Proximity of Equipment

Material Handling Plan Needed

Maintenance Failure

Good Practice: Isolation Bracket for Noise + Vibration



Hoist Maintenance Issue

Hoist Maintenance Issue

Questions?

This concludes the American Institute of Architects Continuing Education Systems Course.

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