## Healthcare Facilities Management Society of New Jersey

## **ELEVATOR SAFETY & CODE COMPLIANCE**

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## **AGENDA**

INTRODUCTION

#### Part 1 – ELEVATOR 101

- OVERVIEW MAIN TYPES OF ELEVATORS
- MODERNIZATION / ALTERATION OF ELEVATORS SAFETY UPGRADE

#### Part 2 – ELEVATOR SAFETY CODE COMPLIANCE

- OVERVIEW OF NEW JERSEY ELEVATOR SAFETY CODE
- ELEVATOR MAINTENANCE CODE REQUIREMENTS
- ELEVATOR INSPECTION FEES OVERVIEW





- Since 1980, VDA specializes in providing Vertical Transportation Consulting Services for New and Existing Buildings
  - Elevators
  - Escalators
  - Dumbwaiters
  - Lift Systems, Moving Walks, Materials Handling, etc.
- Licensed Elevator Agency & Licensed Inspectors
- QEI "Qualified Elevator Inspector" National Licensing
- Completely <u>Independent</u> & <u>Not</u> Affiliated with Any Contractors or Suppliers



## <u>PART 1 – ELEVATOR 101</u>

- OVERVIEW MAIN TYPES OF ELEVATORS
- MODERNIZATION / ALTERATION OF ELEVATORS

> SAFETY UPGRADES

> RELIABILITY

> PERFORMANCE & EFFICIENCY



## **OVERVIEW – ELEVATOR TYPES**

- Winding Drum (Oldest Type)
  - Overhead Configuration
  - Basement
- Traction Machines (Most Common)
  - Geared Traction Basement or Overhead
  - Gearless
  - MRL AC Gearless (Machine Room-less)
- Hydraulic Systems (Simplest Low Rise)
  - Direct Plunger
  - Hole-Less
  - Roped

#### **1:1 Double-Wrap Traction Overhead-Type Elevator**

The mary

Ropes -

## A Traction Elevator is a "Counterweighted Device"





## **OVERVIEW – ELEVATOR TYPES**



- Winding Drum Machine
  - Basement or Overhead
  - Cables Wind and Un-Wind Onto a Drum
  - Should Budget for Replacement



## **OVERVIEW – ELEVATOR TYPES**



- Geared Traction
  - Basement or Overhead (shown)
  - Typical in Low and Mid Rise Buildings
  - 30 to 50 Year Typical Life-Span



#### The Elevator System



Building Transportation Systems Consultants

## **Overhead Geared Traction**

- Car and Counterweight Connected by Hoist Ropes forming a "Balanced" System.
- Relatively Unchanged Since Late 1800's.
- Speeds Up To 450 fpm
- Most Common in Lower to Mid-Rise Buildings.

## **Gearless Hoist Machine**





## **OVERVIEW – ELEVATOR TYPES**



Gearless Traction

- Overhead Location (typical)
- DC or AC Driven
- Typical in Mid to High Rise Buildings
- Indeterminate Life-Span, Depending Upon Type & Manufacture
- Direct Drive (no gearing)
- Higher Speeds (450 FPM to 2,000 fpm+)





## **Recent Technology**

## **Traction MRL Elevator**

- Machine can fit in overhead space ("Machine Room-Less")
- Highly efficient AC Gearless

Machinery

- "Green" Technology
- Smooth and Quiet Ride



## Elevator Wire Ropes Extra High Strength Traction Steel



- 8 x 19 Seale 8 Strands, 19 Wires per Strand
  - Typically 5 to 8 Hoist Ropes are Used One (1) Can Support the Equipment Expected Life of 10 to 25 Years



## Hydraulic Elevators

## **Direct Plunger Hydraulic**

# Least Expensive to Build & Maintain

- Slow Speed Low Rise (2-5 Story)
- Requires Drilling for Cylinder
- Contamination Issues
- > Pre-1972 Will Require New Cylinder





## Hydraulic Elevators



- Dual Plunger
- > Telescoping
- Roped
  - Averts Drilling Jack Hole
  - Contains Fluid Above-Ground
  - Environmentally Friendly
  - Higher Cost









## **Roped Hydraulic**

- "Pulling" Roped Hydraulic Elevator
  - Counterweighted
    - Cab is Heavier Than Counterweight
  - Uses Less Energy
  - Makes Less Noise
  - Exudes Less Odor
  - ➤ Serves a Higher Rise (up to ~90')
  - Slightly Higher Cost
  - Effective Replacement of Drum Cars



## **Modernization / Alteration of Elevators**

## Safety Upgrade



## WHEN IS ELEVATOR MODERNIZATION REQUIRED?

- Typically, Once An Elevator System Is About 20 to 25 Years Old - At or Near The End of Efficient Life-Span
- Although It Can Probably Still Operate For Several More Years, There Are Various Factors Which Need To Be Considered In Order To Make <u>A Financially Responsible Decision</u>





## The Need For Improvement In The Following Areas May Trigger Performance of a Modernization:

## SAFETY

- Improved Stopping Accuracy & Leveling
- Enhanced Passenger Door Operation / Protection
- Upgrade of Emergency Signaling & Operating Devices
- Revised Codes & Local Laws Retroactive Requirements



## > RELIABILITY

- System Failures Due To Normal Aging or Wear
- Excessive Number Of Shut-Downs & Passenger Entrapments
- Extended Out Of Service Times For Repairs
- Component Design Obsolescence
  - Drum Machines
  - Motor-Generators
  - DC Motors
  - Relay Logic Controls



## PERFORMANCE / EFFICIENCY

- Reduced Traffic Handling Due To Inefficient Operation
- Excessive Passenger Waiting Times
- Poor Ride Quality / Rough Operation
  - Poor Speed Transitions
  - Harsh Stopping
  - Excessive Cab Vibration
  - Door Noise & Slow Doors
  - Operating Noise & Cab Interior Noise



## > AESTHETICS / MODERN FEATURES

Outdated Or Worn Cab Interior

> Aged Or Outdated Fixtures

- Advanced Communications
- Improved Door Finishes, Flooring, etc.



## Modernization Can Be A Complex Process, But Can be Divided into Three (3) Main Levels of Modernization / Upgrading:

- 1. Basic Modernization
- 2. Complete Modernization
- 3. Conversion from Manual to Automatic Operation

<u>Note</u>: It Is Very Important To Understand That There Are <u>Many</u> <u>Different Kinds And Levels Of Modernization</u> Which Can Be Performed. In Order To Determine The Best Course Of Action For A Specific Elevator, A <u>Complete</u> Survey and Evaluation Must Be Performed!



1. Basic Modernization

The following would be installed:

- Solid-State Controller & Leveling System
- > Modern Drive Unit
- Car Door Operating Equipment / Safety Edge
- Car & Hall Fixtures, Signals & Indicators
- Cab Interior Remodeling
- Communications
- > Overhaul of Machinery, New Wire Ropes, Wiring, Hardware, etc.



2. Complete Modernization

In Addition To The "Basic" Modernization, the following would be replaced as well:

- Machine Assemblies
- Hoistway Door Equipment
- Related Equipment



- 3. Conversion From Manual To Automatic Operation
  - Replacement of Manual Car Switch with Automatic Push Buttons

> Automatic Door Operating Equipment



Summary of Miscellaneous "Building" Items That May Be Required:

- Machine Room Air Conditioning / Ventilation
- Hoistway Ventilation / Smoke Relief
- Smoke Detection & Fire Safety Systems:
  - Machine Room
  - Hoistway
  - Lobby Landings
- Main Electrical System Upgrades
- Final Painting / Decorating of Lobbies
- Architectural / Structural Services, If Needed

(<u>Note:</u> These are <u>Not</u> Included by Elevator Contractor)



## **NEW JERSEY**

## ELEVATOR SAFETY CODE COMPLIANCE



## **OVERVIEW OF NJ ELEVATOR SAFETY CODE**

- The Following Codes Apply to Elevators in the State of New Jersey:
  - International Building Code (IBC) NJ Edition, 2009
  - ASME A17.1 / CSA B44 2007, Safety Code for Elevators & Escalators
  - NJ Administrative Code Title 5 Chapter 23 Subchapter 12 "Elevator Safety Subcode" & Subchapter 12A "Optional Elevator Inspection Program"
  - National Electrical Code, 2011
  - > NJ Barrier-Free Subcode 5:23-7
  - > ASME A18.1, 2005 Standard for Platform Lifts & Stairway Chairlifts
  - > ASME B20.1, 2006 Standard for Conveyors & Related Equipment



## **OVERVIEW OF NJ ELEVATOR SAFETY CODE**

### > International Building Code (IBC) – NJ Edition, 2009

- Chapter 30 Elevators & Conveying Systems
- Section 3001 <u>General</u>
  - Scope: This Chapter shall govern the design, construction, installation, alteration and repair of elevators and conveying systems and their components
  - Except as otherwise provided for in this code, the design, construction, installation, alteration and repair of elevators and conveying systems and their components shall conform to ASME A17.1 (Safety Code for Elevators & Escalators)



### Chapter 30 – Elevators & Conveying Systems

#### 3002.4 - Elevator Car to Accommodate Ambulance Stretcher

- Where elevators are provided in buildings 4 or more stories above or below, grade plane
  - At least 1-Elevator shall be provided for F.D. emergency access to all floors
  - The elevator car shall accommodate an ambulance stretcher 24" by 84" with not less than 5" radius corners, in the horizontal, open position
  - Shall be identified by the international symbol for emergency medical services (star of life); the symbol shall not be less than 3" high and placed inside on both sides of hoistway door frame



Chapter 30 – Elevators & Conveying Systems

3002.4.1 – Elevators in newly constructed multiple dwellings

 When an elevator is installed in any newly constructed multiple dwelling regardless of height, the elevator shall meet the dimensional requirements above



### Chapter 30 – Elevators & Conveying Systems

#### 3002.6 – Prohibited Doors

 Doors, other than hoistway doors and the elevator car door, shall be prohibited at the point of access to an elevator car unless such doors are readily openable from the car side without a key, tool, special knowledge or effort



Chapter 30 – Elevators & Conveying Systems

#### 3002.7 – <u>Common Enclosure with Stairway</u>

- Elevators shall not be in a common shaft enclosure with a stairway.
  - Exception: Open Parking Garages



### Chapter 30 – Elevators & Conveying Systems

#### 3002.3 – Emergency Signs

- An approved pictorial sign of a standardized design shall be posted adjacent to each elevator call station on all floors instructing occupants to use the exit stairways and not to use the elevators in case of fire.
- The sign shall read: IN FIRE EMERGENCY, DO NOT USE ELEVATOR. USE EXIT STAIRS.



### Chapter 30 – Elevators & Conveying Systems

#### 3003.2 – Fire-fighters' Emergency Operation

 Elevators shall be provided with Phase I emergency recall operation and Phase II emergency in-car operation in accordance with ASME A17.1.

#### 3003.3 - Standardized Fire Service Keys

• All new elevators shall be equipped to operate with a standardized fire service key.



- Chapter 30 Elevators & Conveying Systems
  - 3004.1 <u>Hoistway Vents Required</u>. Hoistways of elevators and dumbwaiters penetrating more than 3stories shall be provided with a means for venting smoke and hot gases to the outer air in case of fire.
  - Exceptions: In occupancies <u>other</u> than Groups R-1, R-2, I-1, I-2 and similar occupancies with overnight sleeping units, venting of hoistways is not required where the building is equipped throughout with an approved automatic sprinkler system installed.
    - Elevators contained within and serving open parking garages only



> Chapter 30 – Elevators & Conveying Systems

3005.3 – <u>Conveyors</u>

 Conveyors and related equipment connecting successive floors or levels shall be enclosed with shaft enclosures complying with Section 708



Chapter 30 – Elevators & Conveying Systems

#### **Section 3006 – Machine Rooms**

- 3006.1 <u>Access</u>: An approved means of access shall be provided to elevators machine rooms and overhead machinery spaces
- 3006.2 <u>Venting:</u> Elevator machine rooms that contain solid state equipment for elevator operation shall be provided with an independent ventilation or AC system to protect against overheating of the electrical equipment. (Maintain temps within the range established for the elevator equipment)



Chapter 30 – Elevators & Conveying Systems

**Section 3007 – Fire Service Access Elevator** 

3007.1 – <u>General</u>

• Where required by Section 403.6.1, every floor of the building shall be served by a fire service access elevator.

#### 3007.2 – Hoistway Enclosures Protection

• The fire service access elevator shall be located in a shaft enclosure complying with Section 708



Subchapter 12 – Elevator Safety Subcode

5:23-12.1 – Title; Scope; Intent

- (c) This subchapter shall control all matters relating to administration of tests and inspections of elevator devices
- (d) It is the purpose of this subchapter to enhance the public safety, health and welfare by ensuring that elevator devices as defined in this subchapter are periodically inspected and maintained in accordance with nationally recognized, referenced standards



Subchapter 12 – Elevator Safety Subcode

5:23-12.2 – Referenced Standards

(a) Periodic, routine and acceptance tests and inspections, if applicable, shall be required on all new, altered and existing power elevators, escalators, dumbwaiters, moving walks, wheelchair lifts and stairway chairlifts in accordance with the most recent edition of ASME A17.1, A18.1 or A90.1 referenced in the building subcode.



- Subchapter 12 Elevator Safety Subcode
  - 5:23-12.2 Referenced Standards
  - (b) All operating and electrical parts and accessory equipment for elevator devices shall be maintained in safe operating condition. The elevator devices shall be maintained to conform to the applicable safety standard at the time of the installation and/or alteration.
  - (e) Inspection and testing procedures for equipment within the scope of the ASME A17.1 Safety Code shall be performed in accordance with the latest edition of ASME A17.2 (Guide for Inspection of Elevators & Escalators)



Subchapter 12 – Elevator Safety Subcode

#### 5:23-12.2 – Inspection and Test Schedule

1. Routine and Periodic Inspections shall be made at intervals not exceeding those set forth in Appendix N-1 of ASME A17.1 referenced in the most recent edition of the building subcode for elevators, escalators, dumbwaiters, and moving walks.

Stairway chairlifts and wheelchair lifts shall be inspected at intervals not exceeding one year.



Subchapter 12 – Elevator Safety Subcode

5:23-12.2 – Inspection and Test Schedule

3. Routine and Periodic Inspections, including any applicable acceptance inspections, shall be made by the elevator subcode official or elevator inspector.

Routine tests shall be made and periodic tests, including any applicable acceptance tests, shall be witnessed by the elevator subcode official or elevator inspector.



- Subchapter 12 Elevator Safety Subcode
  - 5:23-12.2 Inspection and Test Schedule
  - 4. Each building containing devices covered by this subchapter shall have an inspection cycle established by the enforcing agency. This cycle shall be consistent with the routine and periodic inspection and test intervals required in this section.

Once this cycle is established, all such devices in the building shall be subject to inspections and tests, except as exempted by this section.



Subchapter 12 – Elevator Safety Subcode

5:23-12.5 – Registration Fee

The initial registration fee for each elevator device in any structure that is not of Group R-3, R-4 or R-5, or that is not an exempted structure of Group R-2, shall be \$68.00.

A re-registration fee of \$68.00 shall be required for each structure containing one or more elevator devices, upon change of ownership.



- 5:23-12.6 Test & Inspection Fees
- (a) The Departmental fees for witnessing acceptance tests and performing inspections on new and altered elevator devices shall be as follows:
  - i. Traction& Winding Drum Elevators:

	1. One to 10 Floors:	\$306.00	
	2. Over 10 Floors:	\$510.00	
ii.	Hydraulic Elevators:		\$272.00
iii.	Roped Hydraulic Elevators:		\$306.00
iv.	Escalators, Moving Walks:		\$272.00
v.	Dumbwaiters:		\$ 68.00
vi.	Stair Lifts, W/C Lifts & Manlifts	5	\$ 68.00



#### 5:23-12.6 – Test & Inspection Fees

2. Additional charges for devices equipped with the following features shall be as follows:

i.	Oil Buffers (charge per buffer):	\$ 54.00
ii.	Cwt. Governor & Safeties:	\$136.00
iii.	Auxiliary Power Generator:	\$102.00

4. The fee for performing inspections of minor work shall be \$68.00.



#### 5:23-12.6 – Test & Inspection Fees

- 1. The fee for the <u>Six Month Routine Inspection</u> of elevator devices shall be as follows:
  - i. Traction& Winding Drum Elevators:
    - 1. One to 10 Floors: \$190.00
    - 2. Over 10 Floors: \$244.00
  - ii. Hydraulic Elevators:\$136.00iii. Roped Hydraulic Elevators:\$190.00
  - iv. Escalators, Moving Walks: \$190.00



#### 5:23-12.6 – Test & Inspection Fees

- The fee for the One Year Periodic Inspection of elevator 2. devices shall be as follows:
  - i. Traction& Winding Drum Elevators:
    - 1. One to 10 Floors: \$272.00
    - 2. Over 10 Floors: \$326.00
  - \$204.00 ii. Hydraulic Elevators: iii. Roped Hydraulic Elevators: \$272.00

  - iv. Escalators, Moving Walks: \$436.00 \$108.00
  - v. Dumbwaiters:
  - vi. Stair Lifts, W/C Lifts & Manlifts: \$164.00



5:23-12.6 – Test & Inspection Fees

- 3. Additional yearly Periodic Inspection Charges for elevator devices equipped with the following features shall be as follows:
  - i. Oil Buffers (charge per buffer): \$ 54.00
    ii. Cwt. Governor & Safeties: \$108.00
    iii. Auxiliary Power Generator: \$ 68.00



- 5:23-12.6 Test & Inspection Fees
- 4. The fee for the <u>Three-Year or Five-Year Inspection</u> of elevator devices shall be as follows:

#### i. Traction & Winding Drum Elevators:

- 1. One to 10 Floors (5-Year): \$462.00
- 2. Over 10 Floors (5-Year): \$582.00

### ii. Hydraulic & Roped Hydraulic Elevators:

- 1. Three-Year Inspection: \$340.00
- 2. Five-Year Inspection: \$204.00



- 5:23-12.7 Licensing
- (a) All Elevator Subcode Officials shall be licensed according to N.J.A.C. 5:23-5.5
- (b) Any person aggrieved by any decision of the Department under these rules shall be entitled to a hearing pursuant to N.J.A.C. 5:23-5.2



5:23-12.9 – Certificate of Compliance Requirements

(a) A device shall be granted a certificate of compliance by the construction official for the time period specified, based upon N.J.A.C. 5:23-12.3

No device shall be operated unless a valid certificate of compliance has been issued except for the initial period after work under a permit has been completed as per (f) below.

Any violation shall be corrected before a new certificate of compliance may be issued.



5:23-12.9 – Certificate of Compliance Requirements

(b) A temporary certificate of compliance may be issued by the construction official for a device in order to keep the device in operation on which work, as a result of violations, is being diligently performed, if the elevator subcode official finds that no hazard to the public is thereby created.

A temporary certificate of compliance may be issued for no longer than 180 days, even if the device is inspected on an annual basis.



**5:23-12.11 – Notice Concerning Accidents** 

(a) Following an accident involving an elevator device, the owner of the building shall immediately notify the construction official, who shall immediately notify the elevator subcode official and the Department, when the accident meets at least one of the following conditions:

1. An accident involving an elevator devise resulting in death or personal injury requiring medical treatment by a physician other than first aid.



5:23-12.11 – Notice Concerning Accidents (a) cont'd

2. An accident involving an elevator device in which the device is damaged as either a result or cause of the accident and which affects the future safe operation of the elevator device.

(b) It shall be unlawful to use an elevator device involved in an accident under (a) 1 or 2 above, until after an examination by the elevator subcode official has been made and approval of the equipment for continued use has been granted.



## **OVERVIEW OF NJ ELEVATOR SAFETY CODE**

- Over 150,000 VT Units in NY / NJ!
- Safety of the Riding Public is our #1 Priority!
- Elevators Are the <u>Safest Mode of Transportation</u> in the World!
- Routine Preventive Maintenance, Inspections/Testing & Modernization/Alteration, When Needed, Must be Performed in order to Maximize Safety & Efficiency!!!



# **Questions and Answers**

# **THANK YOU!**