



Cranes & Mast Climbers Safety

Ashraf Omran, P.E.

Executive Engineer, Crane Operations

Acting Executive Director, Cranes & Derricks

2015 BUILD SAFE | LIVE SAFE
CONFERENCE

NYC
Buildings

American Institute of Architects Continuing Education System

The NYC Department of Buildings is a registered Provider with The American Institute of Architects Continuing Education Systems (AIA/ CES). Credit earned on completion of this program will be reported to AIA/CES for AIA members. Certificates of Completion for both members and non-AIA members are available upon request.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or constructed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

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



Course Description

During this course participants will learn about various types of Cranes and Mast Climbers, how they will be designed, setup, inspected and utilized on the job site.

Additionally, attendees will learn safety requirements for installing, using, operating and removing Cranes and Mast Climbers to avoid potential safety hazards and Rigging requirements in the 2014 Building Code and Rule.

Learning Objectives

At the end of the this course, participants will be able to:

1. Participants will be familiarized with the different types of Cranes, Mast Climbers and be able to describe their distinctive functions.
2. Participants will examine the requirements for Cranes, Mast Climbers and apply these provisions to their design, installation and inspection.
3. Participants will review examples of Cranes and Mast Climber safety hazards to identify potential safety issues and strategies for prevention.
4. Participants will review the Cranes and Mast Climber rule in order to mitigate risk.
5. Participants will review the Rigging requirements in the 2014 Building Code and Rule.

Types of Cranes - Tower Cranes



Types of Cranes - Tower Crane



Types of Cranes - Tower Cranes



Types of Cranes - Crawler Crane



Types of Cranes - Mobile Crane



Derrick




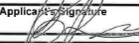

Pile Driver



Certificate of Approval - aka Prototype - CD1

- Certification from the engineer
- Affidavit of compliance from the manufacturer
- Operator's manual showing all configurations
- Load rating chart
- An advertising brochure or drawing
- Any supporting data, drawings, or calculations upon request.

Certificate of Operation - aka CD-2, CD, TCAO

		Crane / Derrick / Mobile Work Platform Approval and Operation Application / Certificate <small>Please File 2 Copies Application Must Be Typewritten</small>		For Internal Use Only CD Number: 4321 Date Received: 3/25/15 Fee Paid: \$1,000 Invoice No: 12345678	
1. Application Type <input checked="" type="checkbox"/> Original <input type="checkbox"/> Renewal <input type="checkbox"/> Change Equipment Type: <input checked="" type="checkbox"/> Mobile Crane <input type="checkbox"/> Fix / Climber Tower Crane <input type="checkbox"/> Derrick <input type="checkbox"/> Work Platform				2 CD Number 4321	
3. Applicant Send correspondence to: <input type="checkbox"/> Applicant <input checked="" type="checkbox"/> Owner Name: BARNEY RUBBLE Title: PRESIDENT E-mail: INFO@BRCRANES.COM Company: BR CRANES INC. Address: 1234 MAIN STREET City: ANYWHERE State: NY Zip: 12345 Telephone: 212-555-0001 Fax: 212-555-1234				Owner Name: BARNEY RUBBLE Title: PRESIDENT E-mail: INFO@BRCRANES.COM Company: BR CRANES INC. Address: 1234 MAIN STREET City: ANYWHERE State: NY Zip: 12345 Telephone: 212-555-0001 Fax: 212-555-1234	
4. Crane / Derrick / Work Platform Information					
Prototype No.: P-603 Manufacturer: ACME Model: GR-1000XL-2 Model Year: 2014 Serial Number: 123456		Drums Number of Drums: 2 No. Wire Rope Size: 1 3/4 in.		Work Platform Information Platform Type: Single Mast Free Standing <input checked="" type="checkbox"/> Twin Mast <input type="checkbox"/> Free Standing <input type="checkbox"/> Platforms I.D.'s:	
Transmission: <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Mechanical Power: <input type="checkbox"/> Gas <input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Electric Capacity:		1 1 3/4 in. 2 1 3/4 in. 3 in. 4 in.			
5. Tower / Boom / Jib Section Information					
Maximum Configuration: Tower Crane: Tower: Boom: Jib: Total: Lift Crane: Boom: Jib: Total:					
Tower/Mast Section I.D. <input type="checkbox"/> Latticed <input type="checkbox"/> Solid					
Boom Section I.D. <input checked="" type="checkbox"/> X 1234G1-23', 1234G2-34'					
Jib / Sill / Leg Section I.D. <input checked="" type="checkbox"/> X					
6. Equipment Dimension					
Overall Carrier Length 47' 1" ft Width 10' 10" ft Width With Outriggers Extended 23' 11" ft Tailswing 13' 8" ft		Tower / Mast Property Tower/Mast Depth ft Tower/Mast Width ft Tower/Mast Height ft		Derrick Information Type Chicago Boom Guy Derrick <input type="checkbox"/> Stiffing Derrick <input type="checkbox"/> Gin Pole <input type="checkbox"/>	
7. Statement and Signatures <small>The Owner certifies that he will comply with the requirements of § 15.0 of Reference Standards RS 19-2 of the Building Code regarding "Inspection Required by Owner for Cranes & Derricks." <small>Falsification of any statement is a misdemeanor under § 26-124 of the Administrative Code and is punishable by a fine or imprisonment, or both. <small>Falsification of any statement is a misdemeanor under § 26-124 of the Administrative Code and is punishable by a fine or imprisonment, or both.</small> </small> </small>					
Applicant's Signature  Date 3-20-2015		Owner's Signature  Date 3-20-2015			
For Internal Use Only				TCAO Issued For: 12345678 = 212 Total <input type="checkbox"/> This Site Only Expiration Date: 6/25/15 PS Issued by: ID 1234 Approved by Cranes & Derricks: John Doe Authorized Signature: 3/25/15	
CD-2 REV 08/15/05					

Certificate of Operation - aka CD-2, CD, TCAO


For Internal Use Only			
<div>Not Approved unless stamped</div>		TCAO Issued For:	
		<input type="checkbox"/> This Site Only	
		Expiration Date	
Issued by:	Date	Approved by Cranes & Derricks	Authorized Signature
		Date	

Site Address If Site Specific (points to the 'This Site Only' checkbox)

Maximum Configuration (points to the 'TCAO Issued For:' label)

Expiration Date (points to the 'Expiration Date' text)

Certificate of Operation - CD-3


		Crane Approval and Operation Application / Certificate For truck cranes with telescopic, hydraulic or folding booms, over 90 feet and not more than 135 feet with a maximum capacity of 3 tons or less. Please File 2 Copies Application Must Be Typewritten		For Internal Use Only CD Number <u>4321</u> Date Received <u>3/25/15</u> Fee Paid <u>\$200</u> Invoice No. <u>24688642</u>	
1. Application Type Original <input checked="" type="checkbox"/> Renewal <input type="checkbox"/> Change <input type="checkbox"/> Boom / Jib Type: <input checked="" type="checkbox"/> Telescopic <input type="checkbox"/> Laced <input type="checkbox"/> Folding <input type="checkbox"/>				2 CD Number <u>4321</u>	
3. Applicant Send correspondence to: <input checked="" type="checkbox"/> Applicant <input type="checkbox"/> Owner				Owner	
Name: <u>BARNEY RUBBLE</u>		Name: <u>BARNEY RUBBLE</u>			
Title: <u>PRESIDENT</u>		Title: <u>PRESIDENT</u>			
Company: <u>BR CRANES INC.</u>		Company: <u>BR CRANES INC.</u>			
Address: <u>1234 MAIN STREET</u>		Address: <u>1234 MAIN STREET</u>			
City: <u>ANYWHERE</u> State: <u>NY</u> Zip: <u>12345</u>		City: <u>ANYWHERE</u> State: <u>NY</u> Zip: <u>12345</u>			
Telephone: <u>212-555-0001</u> Fax: <u>212-555-1234</u>		Telephone: <u>212-555-0001</u> Fax: <u>212-555-1234</u>			
4. Crane Information					
Manufacturer: <u>INTERSTATE</u>		Drums		Carrier Information	
Model: <u>G85R-MHA HI-REACH</u>		Number of Drums: <u>1</u>		Length: <u>30</u> ft	
Model Year: <u>2007</u>		Wire Rope Size: <u>3/4</u> in.		Width: <u>8</u> ft	
Serial Number: <u>FS-3899</u>				Width with Outriggers Extended: <u>18</u> ft	
Transmission: <input checked="" type="checkbox"/> Hydraulic <input type="checkbox"/> Gas <input type="checkbox"/> Diesel <input type="checkbox"/> Electric		Max. Capacity: <u>5900</u>		Overall Weight: <u>15,000</u> lb	
				Make & Model of Carrier: <u>BICOASTAL 5200</u>	
5. Boom / Jib Section Information					
Maximum Configuration: Boom: <u>85</u> ft Jib: <u>0</u> ft Total: <u>85</u> ft				How is boom extended?	
Boom Section I.D.:				<input checked="" type="checkbox"/> Cable extension	
Jib Section I.D.:				<input checked="" type="checkbox"/> Hydraulic piston	
Manually extended & pinned					
6. Statement and Signatures * The Owner certifies that he will comply with the requirements of Section 15.0 of Reference Standards RS 10-2 of the Building Code regarding "Inspection Required by Owner for Cranes and Derricks." * Falsification of any statement is a misdemeanor under section 20-124 of the Administrative Code and is punishable by a fine or imprisonment, or both. * Bribery is a crime. A person who gives or offers a bribe to any employee of the City of New York or an employee who takes or solicits a bribe, is guilty of a felony punishable by imprisonment or fine, or both.					
Applicant's Signature: <u>[Signature]</u>		Date: <u>3-20-2015</u>		Owner's Signature: <u>[Signature]</u>	
				Date: <u>3-20-2015</u>	
For Internal Use Only				TCO Issued For: <u>85' Tek Boom Total</u> Expiration Date: <u>3/9/16</u> <u>PS</u> Issued by: <u>[Signature]</u> Date: <u>3/25/15</u>	
<div style="border: 1px solid black; padding: 5px; text-align: center;"> TEMPORARY CERTIFICATE OF APPROVAL TEMPORARY CERTIFICATE OF OPERATION THIS CERTIFICATE SHALL BE KEPT ON MACHINE AT ALL TIMES </div>					
NO CERT. OF ON-SITE INSP. REQ'D. REF. 27-1057 [(a) (3)]					
Approved by Cranes & Derricks <u>JD 1234</u>		Authorized Signature <u>[Signature]</u>		Date: <u>3/25/15</u>	

Certificate of Operation - CD-3

Mobile cranes, including jibs and any other extensions, exceeding 50 feet but not exceeding 135 feet in length, and with a manufacturer's rated capacity of 3 tons or less.

For Internal Use Only		
<div>Not Approved unless stamped</div>	TCO Issued For:	
	Expiration Date	
	Issued by:	Date
Approved by Cranes & Derricks	Authorized Signature	Date

Certificate of On-site Inspection - CN- CD-4



CD4: Tower & Mobile Crane / Derrick / Mast Climber / Pile Driver
On-Site Inspection Application / Certificate
File 4 copies / Application must be typewritten

CN Number: **CN#0012/34**

1A Application Type

☒ New ☐ Renewal ☐ Amendment

2 Location Information

Borough: **BROOKLYN** Block: **350** Lot: **56**
Address: **180 LIVINGSTON STREET** Job Number: **421151656**

3A Crane / Derrick / Mast Climber / Pile Driver Information

	CD Number	Serial Number	Expiration Date
1	1234	F012-3456	7/24/15
2	5678	F078-9123	10/16/15
3	5023	F042-2693	9/16/15
4			
5			
6			

4 Applicant Information

Name: **WILLIAM C. NOONAN** E-Mail: **BSAFE@cityengineers.com**
Title: **P.E.** Lic # **000000**
Business Name: **CITY ENGINEERS, P.C.**
Address: **3333 BUILDING DRIVE**
City: **YOUR CITY** State: **NY** Zip: **07759**
Phone: **212-555-4444** Fax: **212-555-5555**

1B Equipment Type

☒ Mobile Crane ☐ Mobile Tower Crane ☐ Fix / Climber Tower Crane ☐ Derrick ☐ Mast Climber ☐ Pile Driver

3B Configuration / Phase Information

	Mast (ft)	Boom (ft)	Jib (ft)	Total (ft)
1	N/A	221	72	293
2	N/A	221	72	293
3	N/A	221	72	293
4	N/A			
5	N/A			
6	N/A			

5 Equipment User Information

Name: **DERRICK CRANE** E-Mail: **dcrane@mywayrigs.com**
Title: **PROJECT MANAGER**
Company: **MY-WAY RIGGING, INC.**
Address: **1664 HARNESS DRIVE**
City: **BOOMTOWN** State: **NY** Zip: **11119**
Phone: **212-555-1800** Fax: **212-555-1801**

6 Statement and Signature

This On-Site Inspection Certificate is required for the tower & mobile crane / derrick / mast climber / pile driver at the above mentioned site and conforms with approved plans.
Falsification of any information on this form is punishable by a fine or imprisonment, or both. It is unlawful to give to a city employee, or for a city employee to accept, any benefit, monetary or otherwise, for performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine or both. I understand that if I am found after the fact to have knowingly or negligently falsified or allowed to be falsified any certificate form, signed statement, application, report or other document required under the provisions of this code or of a rule of any agency, I may be barred from filing further applications or documents with the Department of Buildings.

6A Applicant's Statement

The applicant, having been authorized by the owner of the building, building or structure, hereby makes application for the use of the tower & mobile crane / derrick / mast climber / pile driver at the above mentioned site in accordance with the accompanying plans and specifications.
Name (please print): **WILLIAM C. NOONAN**
Signature: *[Signature]* Date: **4/27/15**
Seal (apply seal, then sign and date over seal)

6C Crane Safety Coordinator's Statement

As a Professional Engineer or a person having at least five years of construction experience, I hereby certify that I will act as the designated safety coordinator and shall be responsible for the control of pedestrian and vehicular traffic within the designated host areas. I shall also supervise compliance with this On-Site Inspection Certificate and its drawings.
Name: **JOHN SAFETY** License Number: **000000**
Address: **1664 HARNESS DRIVE**
City: **BOOMTOWN** State: **NY** Zip: **11120**
Phone: **212-555-1111** City: **212-555-1112**
Signature: *[Signature]* Date: **4-27-15**

6B Equipment User's Statement

I hereby state that the above equipment will not be used until a valid On-Site Inspection is obtained.
Signature: *[Signature]* Date: **4/27/15**

6D Mast Climber Supervisor's Statement

I am a Professional Engineer or an experienced person qualified for the installation, dismantling, operation and maintenance of the equipment listed in section 3A above. I am aware that this equipment shall not be used as a personnel or material hoist. I will supervise the mast climber installation and operation for this project in accordance with NYC approved drawings, Manufacturer's recommendations and all applicable Federal, State and City laws, rules and regulations.
Name: **APPROVED** License Number: **000000**
Address: **APPROVED** City: **APPROVED** State: **APPROVED** Zip: **APPROVED**
Phone: **APPROVED**
Signature: **THE CITY OF NEW YORK** Date: **APR 00 2015**
DEPARTMENT OF BUILDINGS
DIVISION OF CRANES AND DERRICKS
Additional Information:

Internal Use Only

Date Received: 1/30/15	Invoice/Receipt Number	Fee Paid: \$250
Examiner's Name (please print)	Inspector's Name (please print)	
Signature	Signature	Date
Expiration date: 04/00/16	Badge Number	

Certificate of On-site Inspection - CN- CD-4

3A	Crane / Derrick / Mast Climber / Pile Driver Information		
	CD Number	Serial Number	Expiration Date
1			
2			
3			
4			
5			
6			

Internal Use Only			
Date Received		Invoice/Receipt Number	
Examiner's Name (please print)		Inspector's Name (please print)	
Signature		(Issuance) Date	
Expiration date		Badge Number	

CN – Technical Report - Statement of Responsibility

NYC
Buildings

CD8: Technical Report: Statement of Responsibility
File 2 copies / Application must be typewritten

CN Number **CN#0012/34**

1 Filing Status
☒ Identification of Responsibilities ☐ Certification of Completed Inspections / Tests ☐ Withdrawal of Responsibility ☐ Directive 14 Inspection Request

2 Location Information
House No(s) 180 Street Name LIVINGSTON STREET
Borough BROOKLYN Block 350 Lot 56 BIN 5038192 Job Number 421151656

3 Applicant Information
Last Name NOONAN First Name WILLIAM M.I. C.
Business Name CITY ENGINEERS, P.C. PE License # 000000
Address 3333 BUILDING DRIVE
City YOUR CITY State NY Zip 07759
Phone 212-555-4444 Fax 212-555-5555 E-mail BSAFE@cityengineers.com

4 Crane Information This application can only be used for ONE crane

CD Number	Manufacturer	Model	Boom Length	Jib Length	Total
1234	WAIST-KING	F012-3456	221	72	293
5678	WAIST-KING	F078-9123	221	72	293
5023	WAIST-KING	F042-2693	221	72	293

5 Applicant's Statement
Falsification of any statement is a misdemeanor under 28-211 of the Administrative Code and is punishable by a fine or imprisonment, or both. It is unlawful to give to a city employee, or for a city employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine or both. I understand that if I am found after hearing to have knowingly or negligently made a false statement or to have knowingly or negligently falsified or allowed to be falsified any certificate, form, signed statement, application, report or certification of the correction of a violation required under the provisions of this code or of a rule of any agency, I may be barred from filing further applications or documents with the Department.

5A Applicant's Statement of Responsibility (10F)
As a licensed Professional Engineer representing the owner or contractor, I hereby state that I designed the foundation for the above crane(s) and will be on-site to inspect the said equipment and support before the commencement of work. All inspection and test reports will be signed by me and filed with the Department promptly.

Name _____
Signature _____ Date _____
Seal (apply seal, then sign and date over seal)
Note: 1) If the field condition or actual setup differs from approved plans and the structural integrity of the foundation cannot be readily proven in the field, applicant may not sign off 10E until amendment on the alternate founding design is first submitted to and approved by Cranes & Derricks Division.
2) For other minor deviations to approved plans, applicants may amend founding design in the field and leave 10E on site. The amended setup must be submitted with 10E to the Cranes and Derricks Division

5B Applicant's Statement of Crane Foundation Inspection (10E)
As a licensed Professional Engineer representing the owner or contractor, I hereby state that I have completed the foundation inspection on 2215 NEW and found that it conforms with all approved plans and specifications and no hazardous condition existed within the scope of the examination.

CD# used _____
Amendment Submitted? ☒ Yes ☐ No
Name _____
Signature _____ Date 4/27/15
Seal (apply seal, then sign and date over seal)

12/14

CN – Technical Report - Statement of Responsibility

4 Crane Information <i>This application can only be used for ONE crane</i>					
CD Number	Manufacturer	Model	Boom Length	Jib Length	Total

5 Applicant's Statement	
<p>Falsification of any statement is a misdemeanor under 28-211 of the Administrative Code and is punishable by a fine or imprisonment, or both. It is unlawful to give to a city employee, or for a city employee to accept, any benefit, monetary or otherwise, either as a gratuity for properly performing the job or in exchange for special consideration. Violation is punishable by imprisonment or fine or both. I understand that if I am found after hearing to have knowingly or negligently made a false statement or to have knowingly or negligently falsified or allowed to be falsified any certificate, form, signed statement, application, report or certification of the correction of a violation required under the provisions of this code or of a rule of any agency, I may be barred from filing further applications or documents with the Department.</p>	

5A Applicant's Statement of Responsibility (10F)
<p>As a licensed Professional Engineer representing the owner or contractor, I hereby state that I designed the foundation for the above crane(s) and will be on-site to inspect the said equipment and support before the commencement of work. All inspection and test reports will be signed by me and filed with the Department promptly.</p>
<p>Name _____</p> <p>Signature _____ Date _____</p> <p>Seal (apply seal, then sign and date over seal)</p>

Note: 1) If the field condition or actual setup differs from approved plans and the structural integrity of the foundation cannot be readily proven in the field, applicant may not sign off 10E until amendment on the alternate founding design is first submitted to and approved by Cranes & Derricks Division.
 2) For other minor deviations to approved plans, applicants may amend founding design in the field and leave 10E on site. The amended setup must be submitted with 10E to the Cranes and Derricks Division

5B Applicant's Statement of Crane Foundation Inspection (10E)
<p>As a licensed Professional Engineer representing the owner or contractor, I hereby state that I have completed the foundation inspection on _____ and found that it conforms with all approved drawings (see note). I also found no hazardous condition existed within the scope of this examination.</p>
<p>CD# used _____</p> <p>Amendment Submitted? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>Name _____</p> <p>Signature _____ Date _____</p> <p>Seal (apply seal, then sign and date over seal)</p>

Certificate of On-site Inspection - CN - CD-4

DOB Inspection

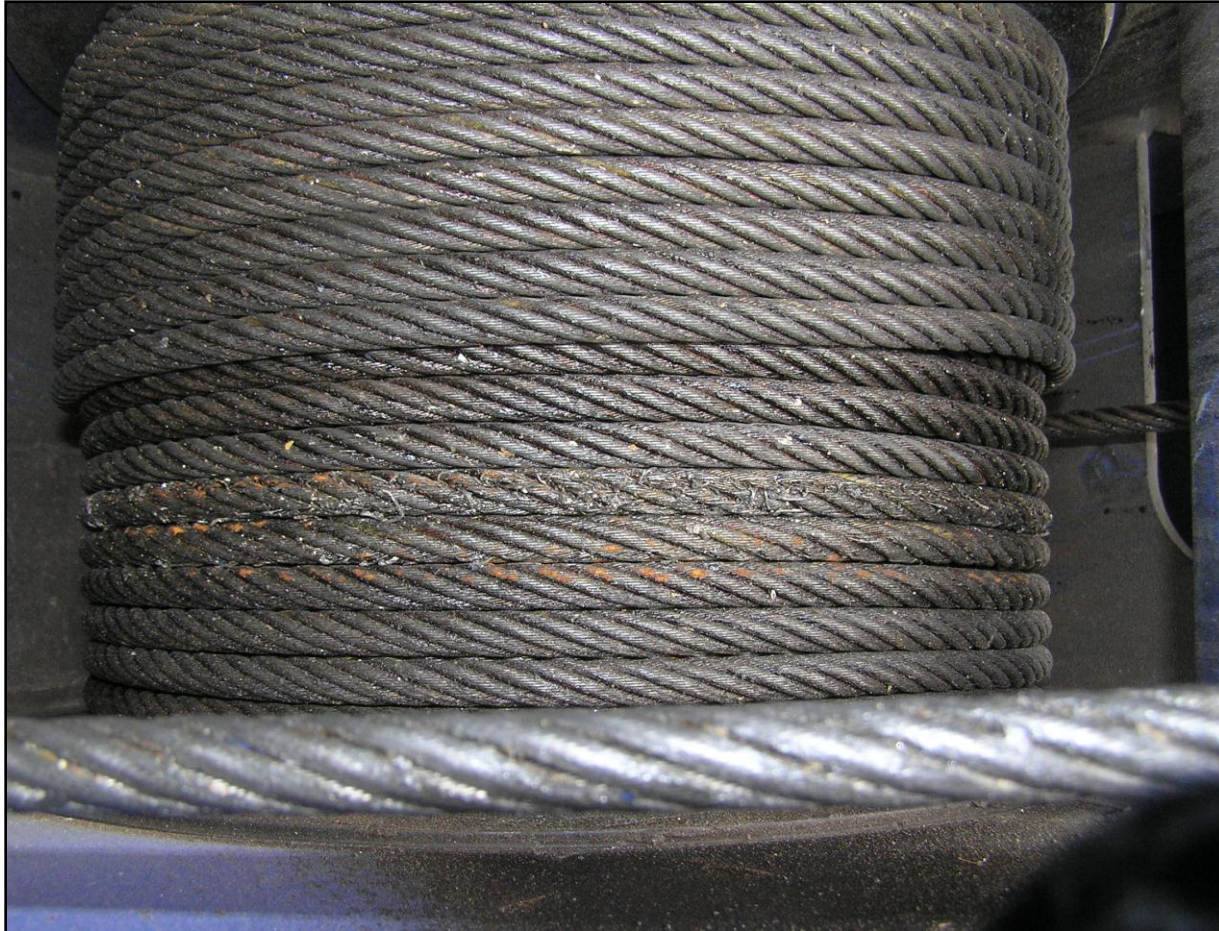
- Tower Cranes
- Derricks
- Mobile Cranes over 250 feet

Engineer Inspection

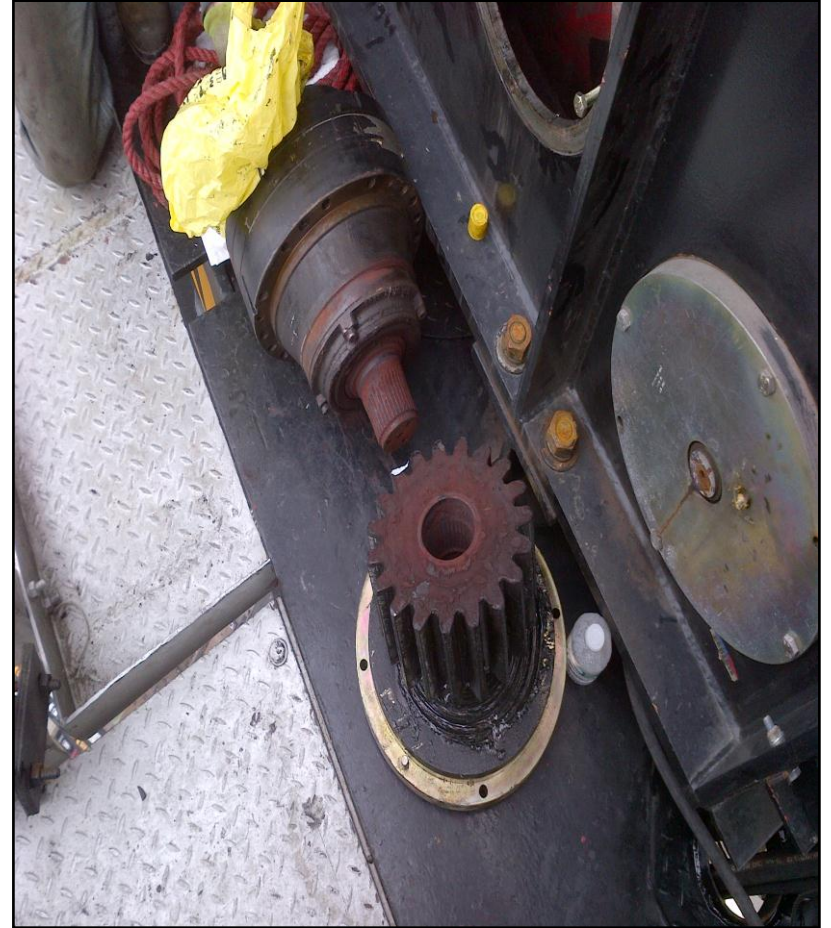
- Mobile Cranes up to 250 feet

Cranes Safety Hazards

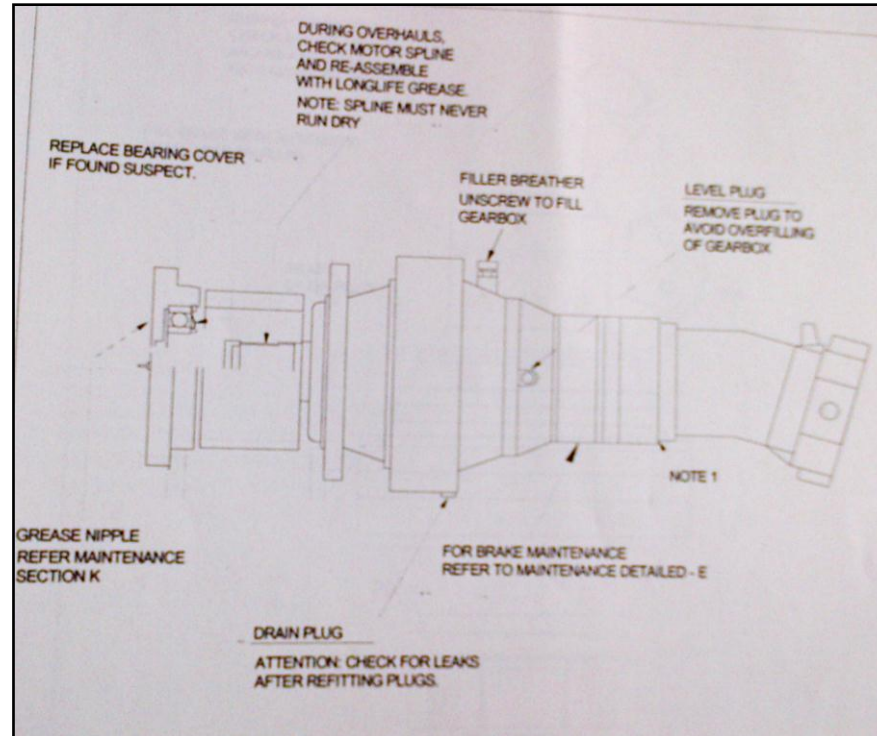
Cranes Safety Hazards - Damaged Wire Rope



Cranes Safety Hazards - Failed Pinion Spline



Cranes Safety Hazards - Pinion Spline Manual



- Spline must be greased
- Spline is never allowed to run dry

Cranes Safety Hazards - Insufficient Clearance



Cranes Safety Hazards - Failure to Repair



Cranes Safety Hazards - Loose Bolt



Cranes Safety Hazards - Improper Setup



Cranes Safety Hazards - Improper Setup



Cranes Safety Hazards - Improper Setup



Crane Risk Mitigation

Crane Risk Mitigation

Certificate of On-site Inspection - CN- CD-4

A plan examiner reviews the plans submitted by the applicant for compliance with Code.

- Technical checks
 - Scope of work
 - Transit Authority structures
 - Utility vaults reflected on drawings
 - Any existing sheeting or retaining walls
 - Allowable bearing pressure on a road, sidewalk or soils.

Crane Risk Mitigation

Certificate of On-site Inspection - CN- CD-4 (continued)

- Drawings additionally checked for:
 - Signed and sealed
 - Site plan gives outline of building, cellars and setbacks
 - Location/ width of streets, sidewalks, traffic lanes, sidewalk bridges, designated DOT barriers and flagmen
 - Adjacent buildings noted
 - Location of crane and distance from face of building under construction noted
 - Roof protection and swing plan
 - Reeving information (number of parts & cable size)

Crane Risk Mitigation

Certificate of On-site Inspection - CN- CD-4 (continued)

- Further details include:
 - Maximum pick (weight of load)
 - Maximum radius
 - Maximum wind speeds and securing methods
 - Maximum configuration of crane
 - Boom length and angle
 - Jib length and angle
 - Outrigger spread

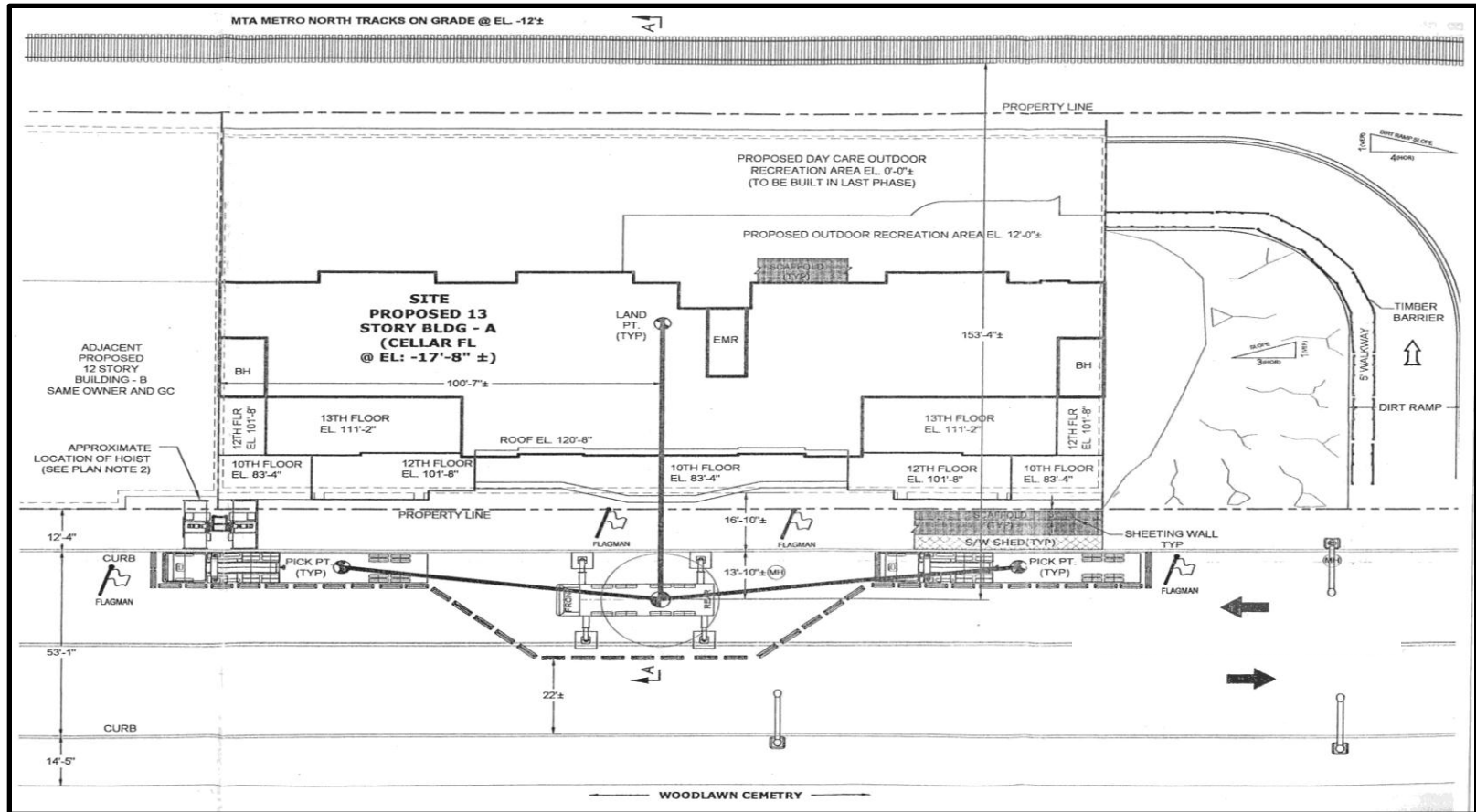
Crane Risk Mitigation

Certificate of On-site Inspection - CN - CD-4 (continued)

Plan Review – Tower Cranes

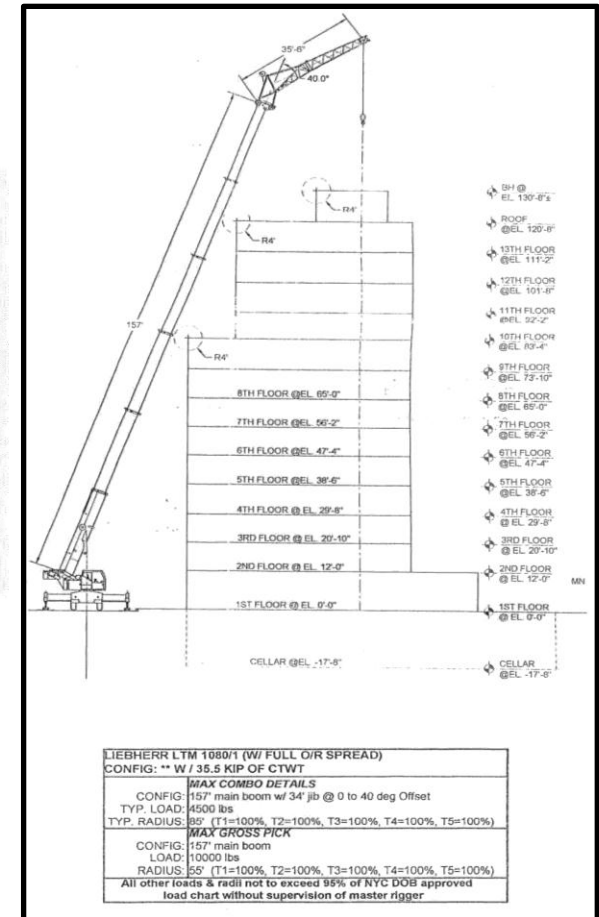
- Technical Review of:
 - Location and method of tie-ins
 - Tie-in calculations:
 - concrete building
 - steel building
 - Foundation of the crane

Crane Risk Mitigation

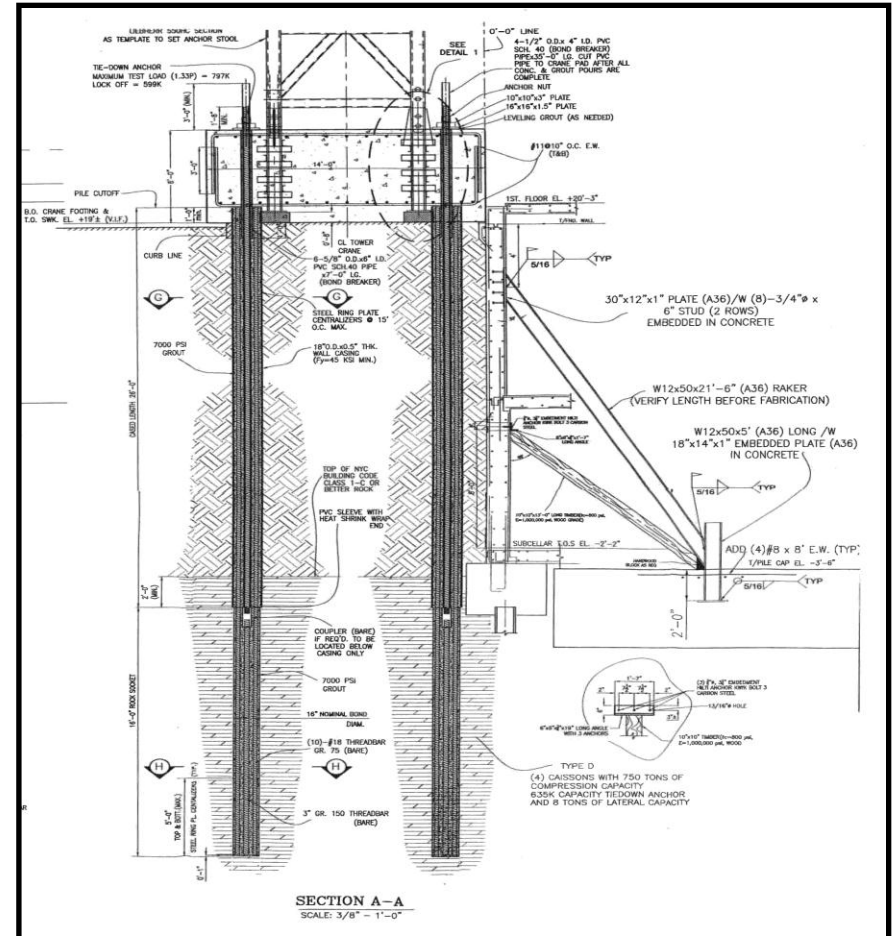


Crane Risk Mitigation

LIEBHERR LTM 1080/1 (W/ FULL O/R SPREAD)	
CONFIG: ** W / 35.5 KIP OF CTWT	
	MAX COMBO DETAILS
CONFIG:	157' main boom w/ 34' jib @ 0 to 40 deg Offset
TYP. LOAD:	4500 lbs
TYP. RADIUS:	85' (T1=100%, T2=100%, T3=100%, T4=100%, T5=100%)
	MAX GROSS PICK
CONFIG:	157' main boom
LOAD:	10000 lbs
RADIUS:	55' (T1=100%, T2=100%, T3=100%, T4=100%, T5=100%)
All other loads & radii not to exceed 95% of NYC DOB approved load chart without supervision of master rigger	



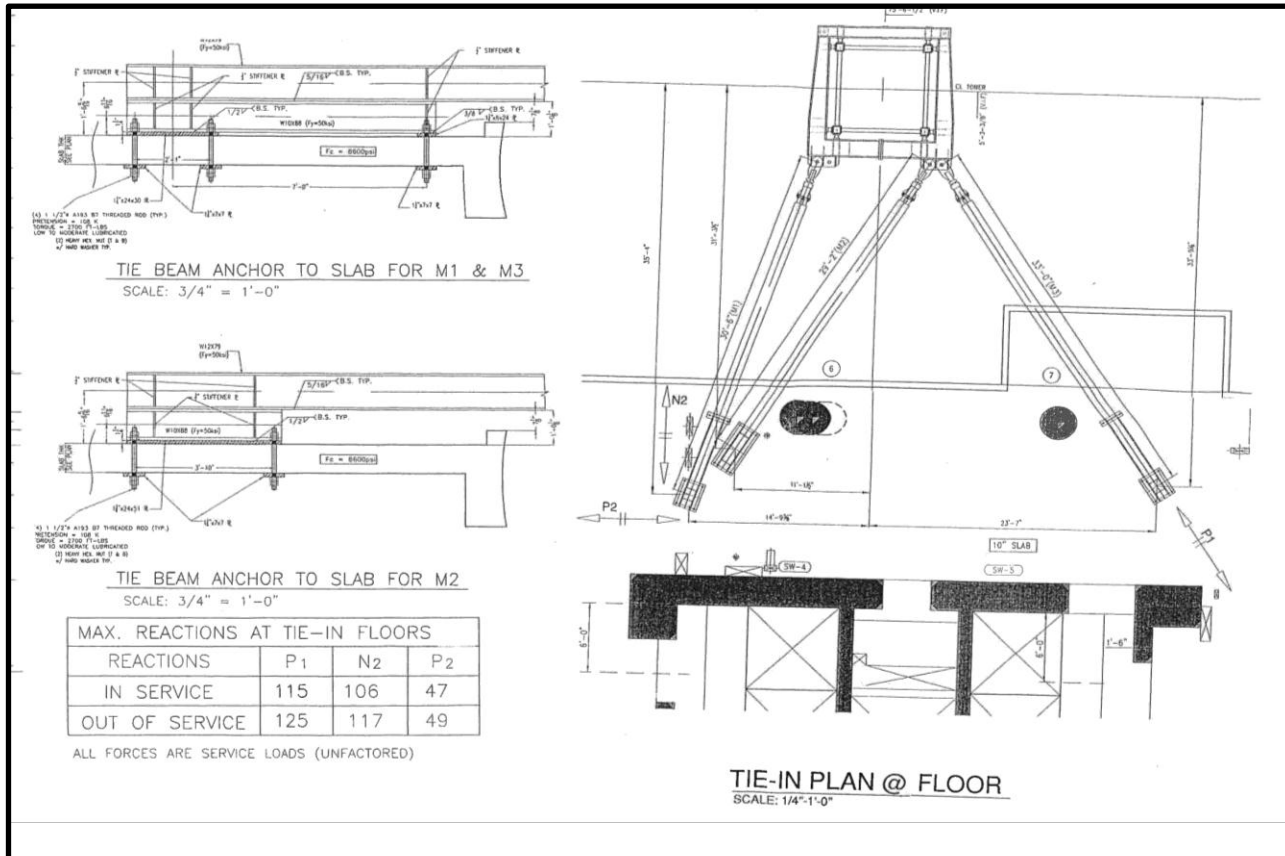
Tower Crane – Foundation Design



Tower Crane Design-Tie-in Phases

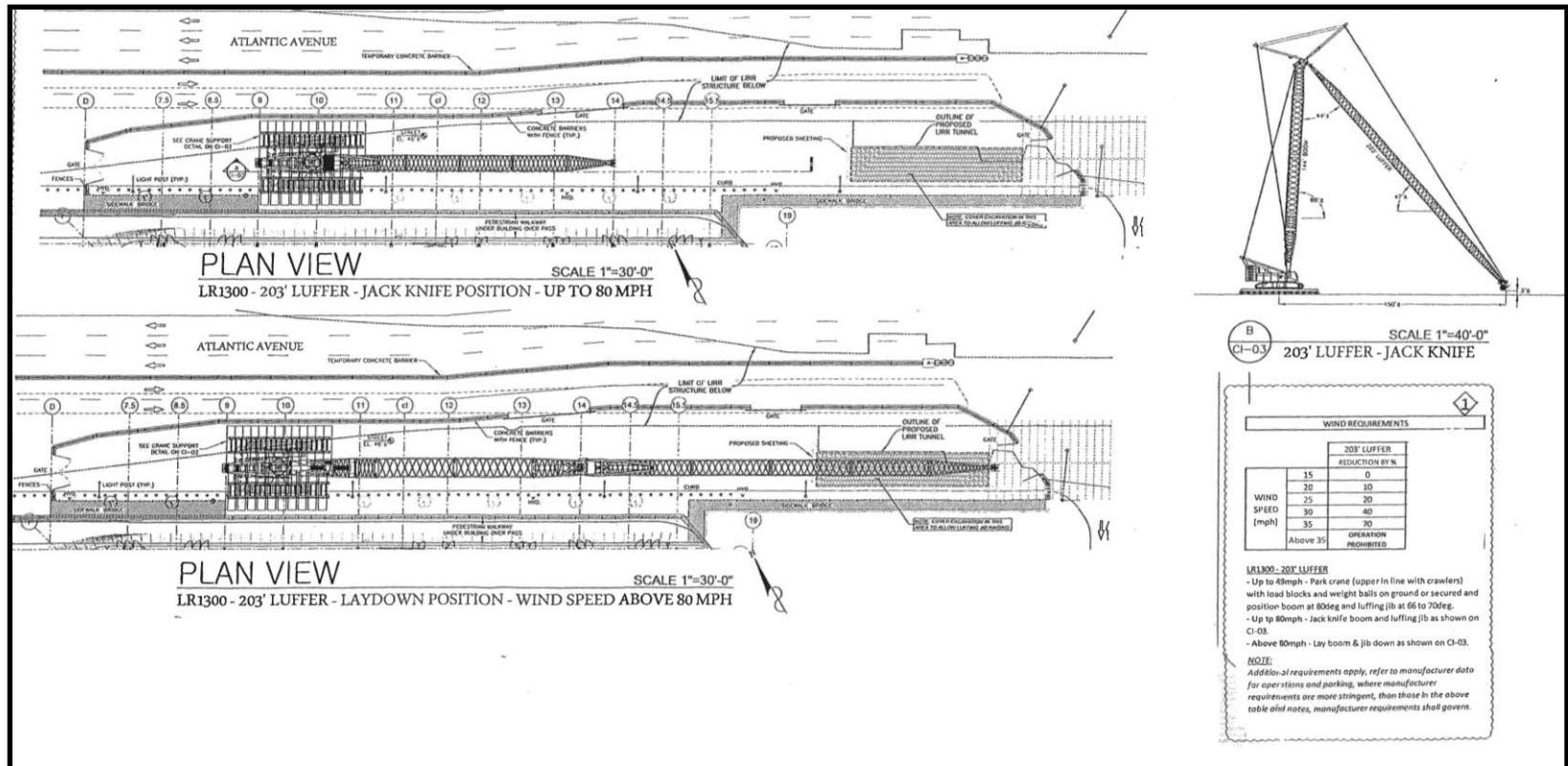


Crane Risk Mitigation



Tower Crane Design- Tie-in Connections

Action Plan



Action Plan

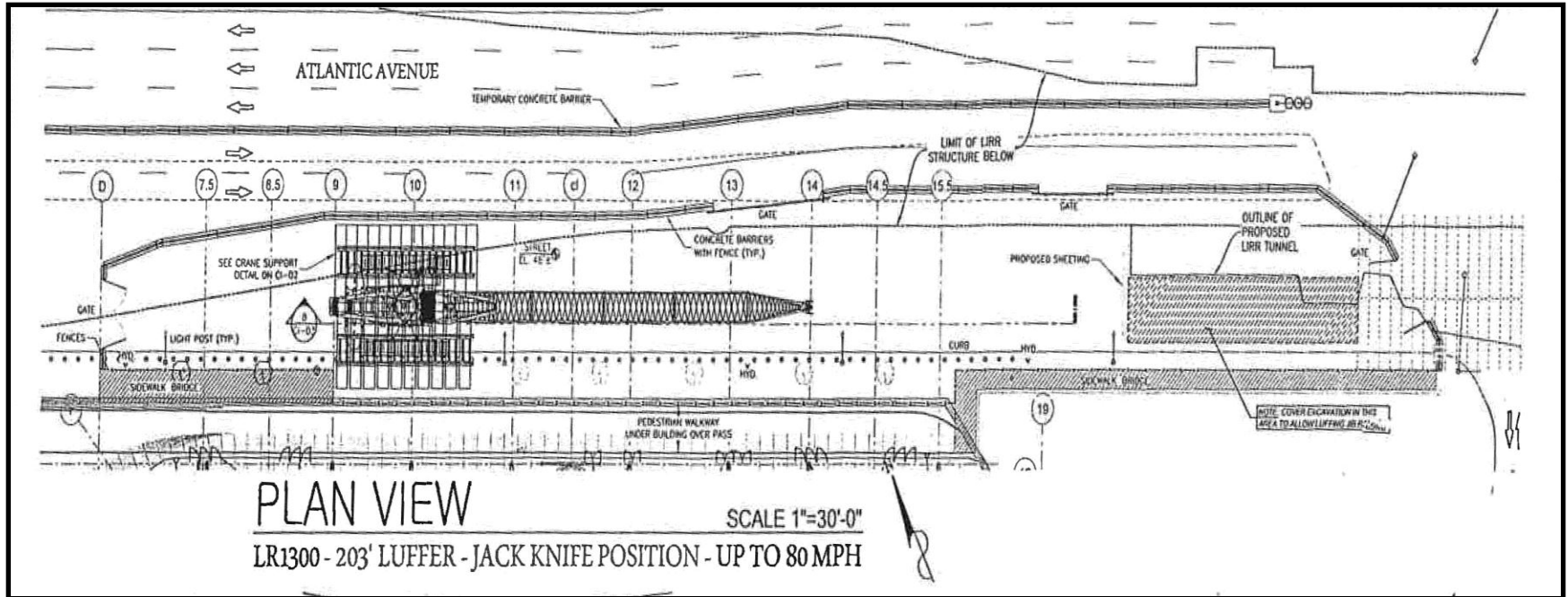
1		
WIND REQUIREMENTS		
WIND SPEED (mph)	203' LUFFER	
	REDUCTION BY %	
	15	0
	20	10
	25	20
	30	40
	35	70
	Above 35	OPERATION PROHIBITED

LR1300 - 203' LUFFER

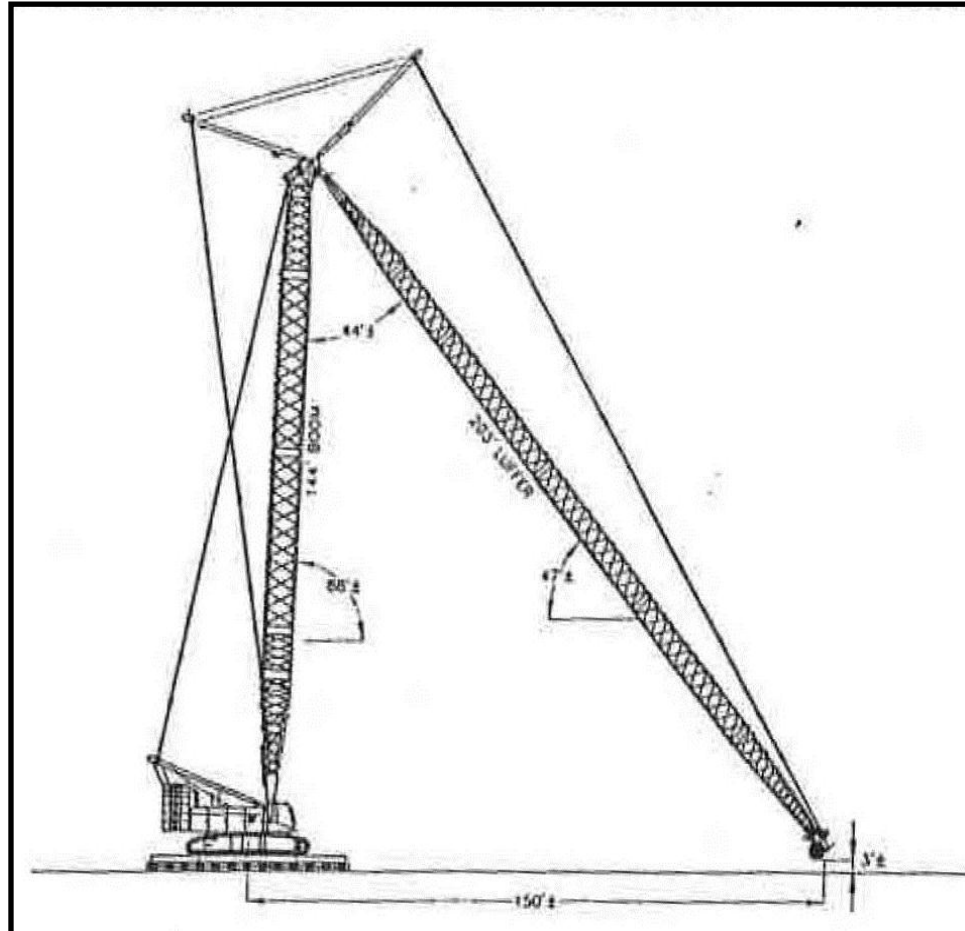
- Up to 49mph - Park crane (upper in line with crawlers) with load blocks and weight balls on ground or secured and position boom at 80deg and luffing jib at 66 to 70deg.
- Up to 80mph - Jack knife boom and luffing jib as shown on CI-03.
- Above 80mph - Lay boom & jib down as shown on CI-03.

NOTE:
Additional requirements apply, refer to manufacturer data for operations and parking, where manufacturer requirements are more stringent, than those in the above table and notes, manufacturer requirements shall govern.

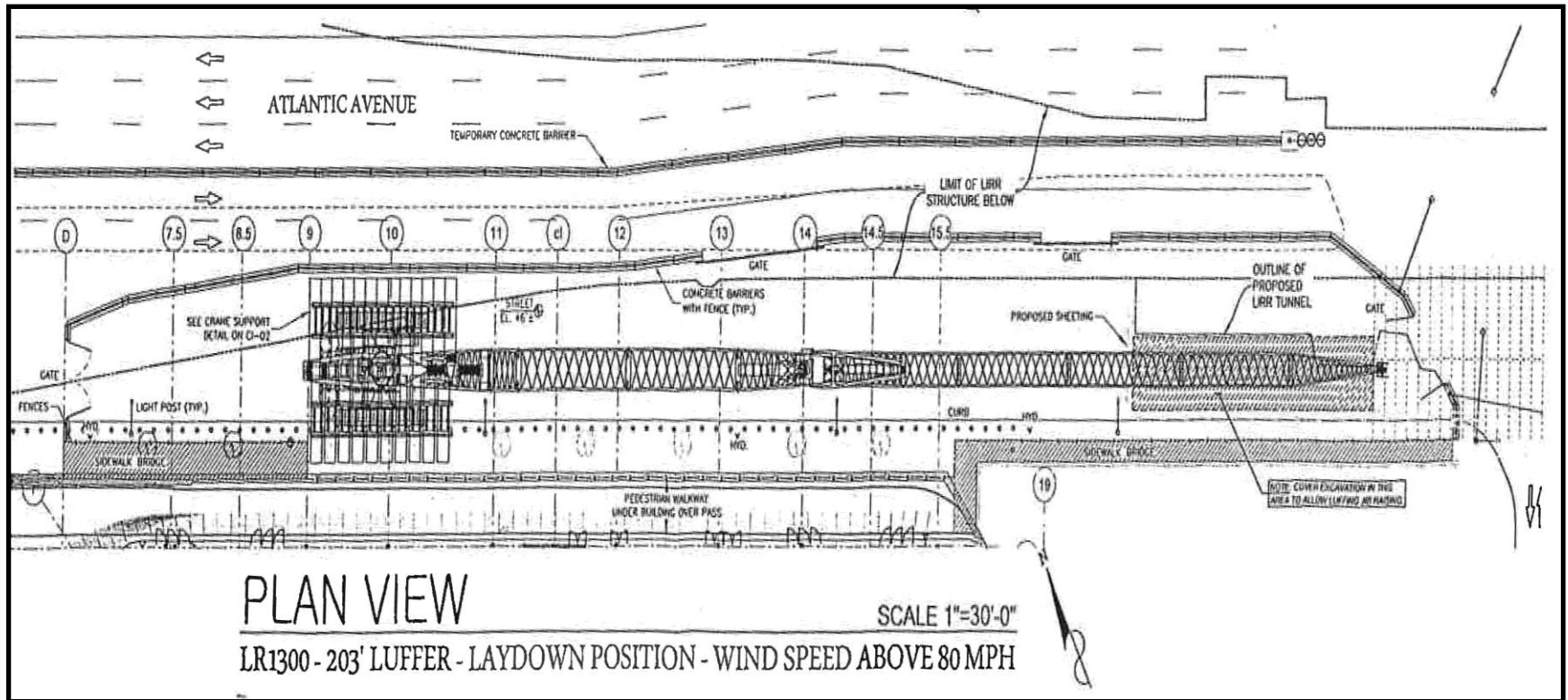
Action Plan



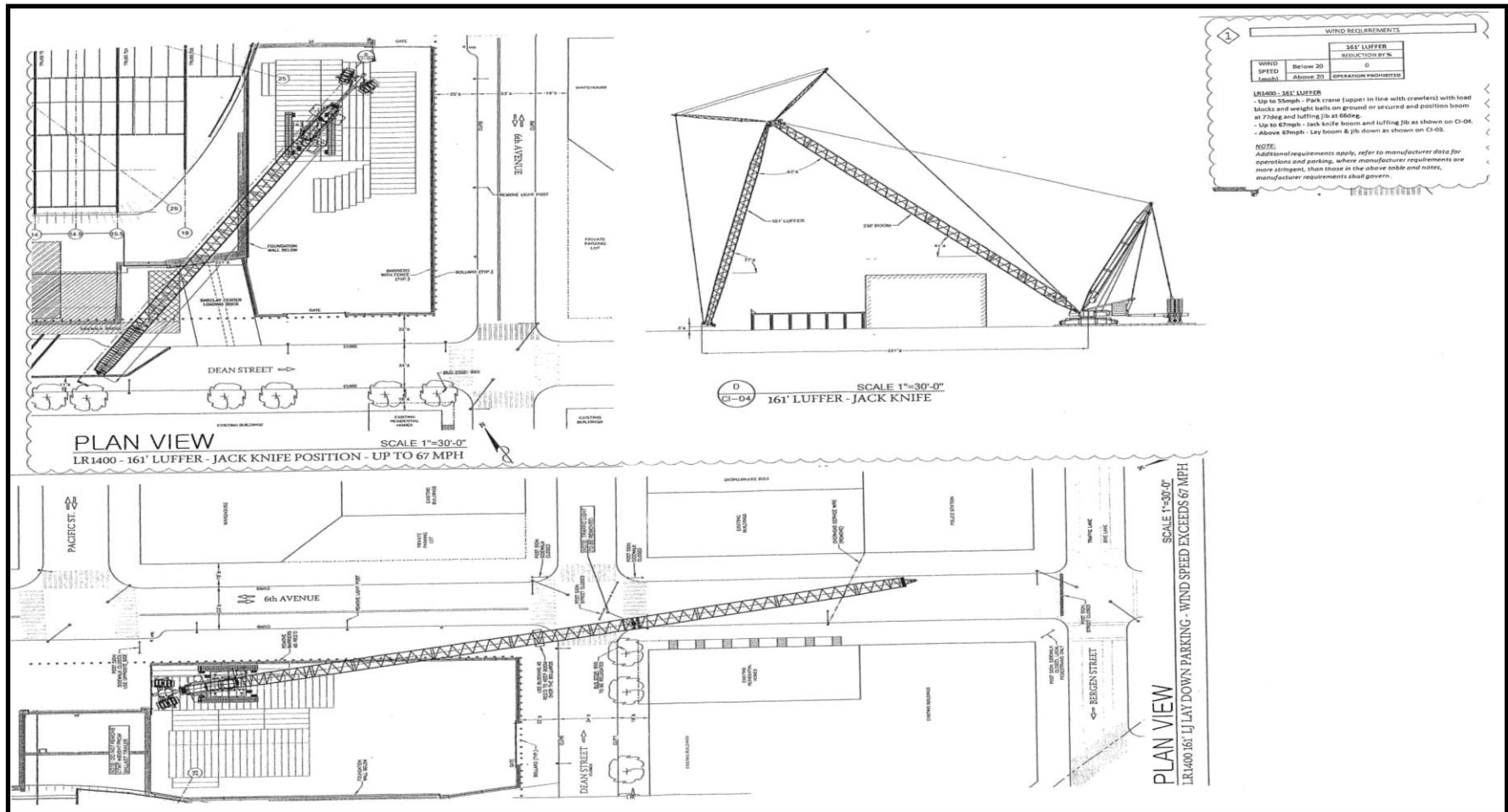
Action Plan



Action Plan



Action Plan



Action Plan

1

WIND REQUIREMENTS

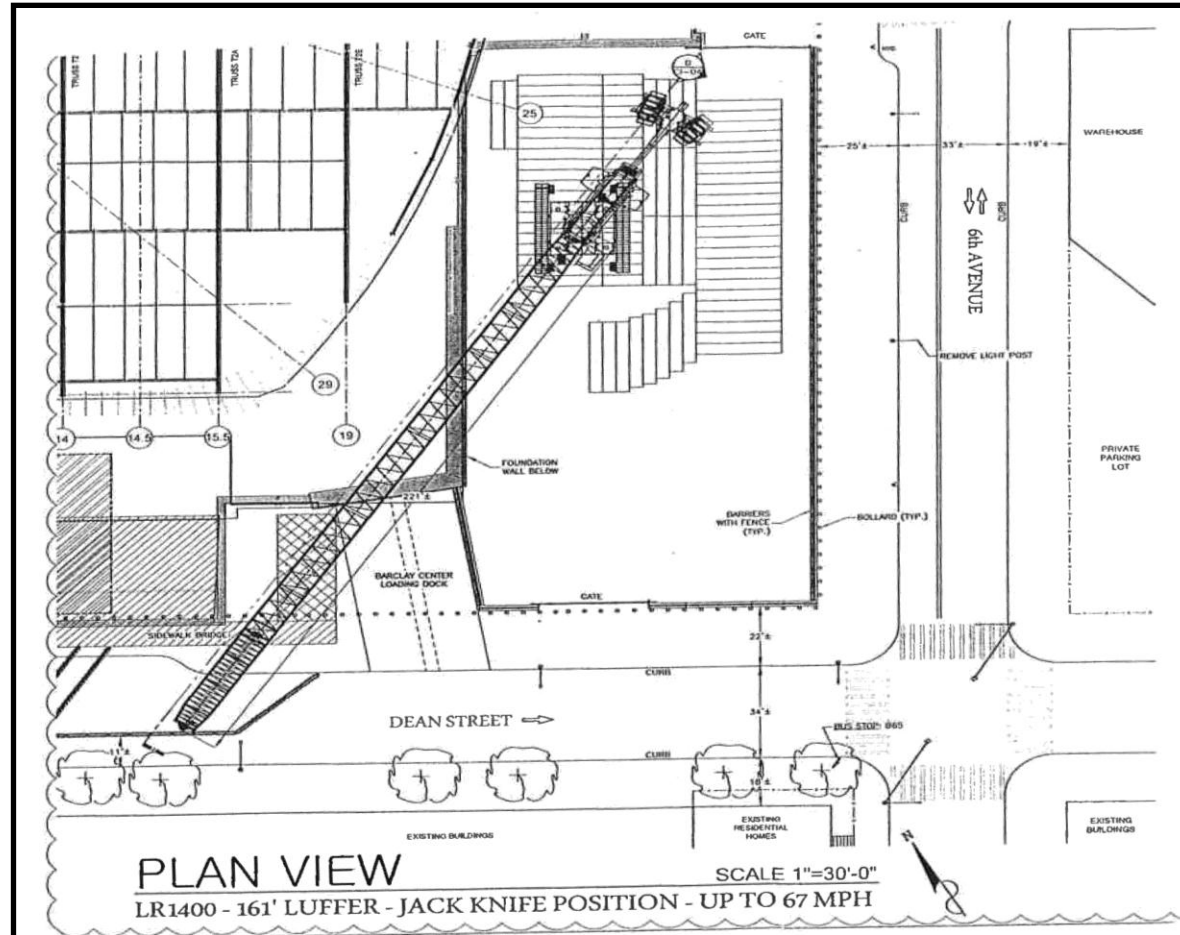
		161' LUFFER
		REDUCTION BY %
WIND SPEED (mph)	Below 20	0
	Above 20	OPERATION PROHIBITED

LR1400 - 161' LUFFER

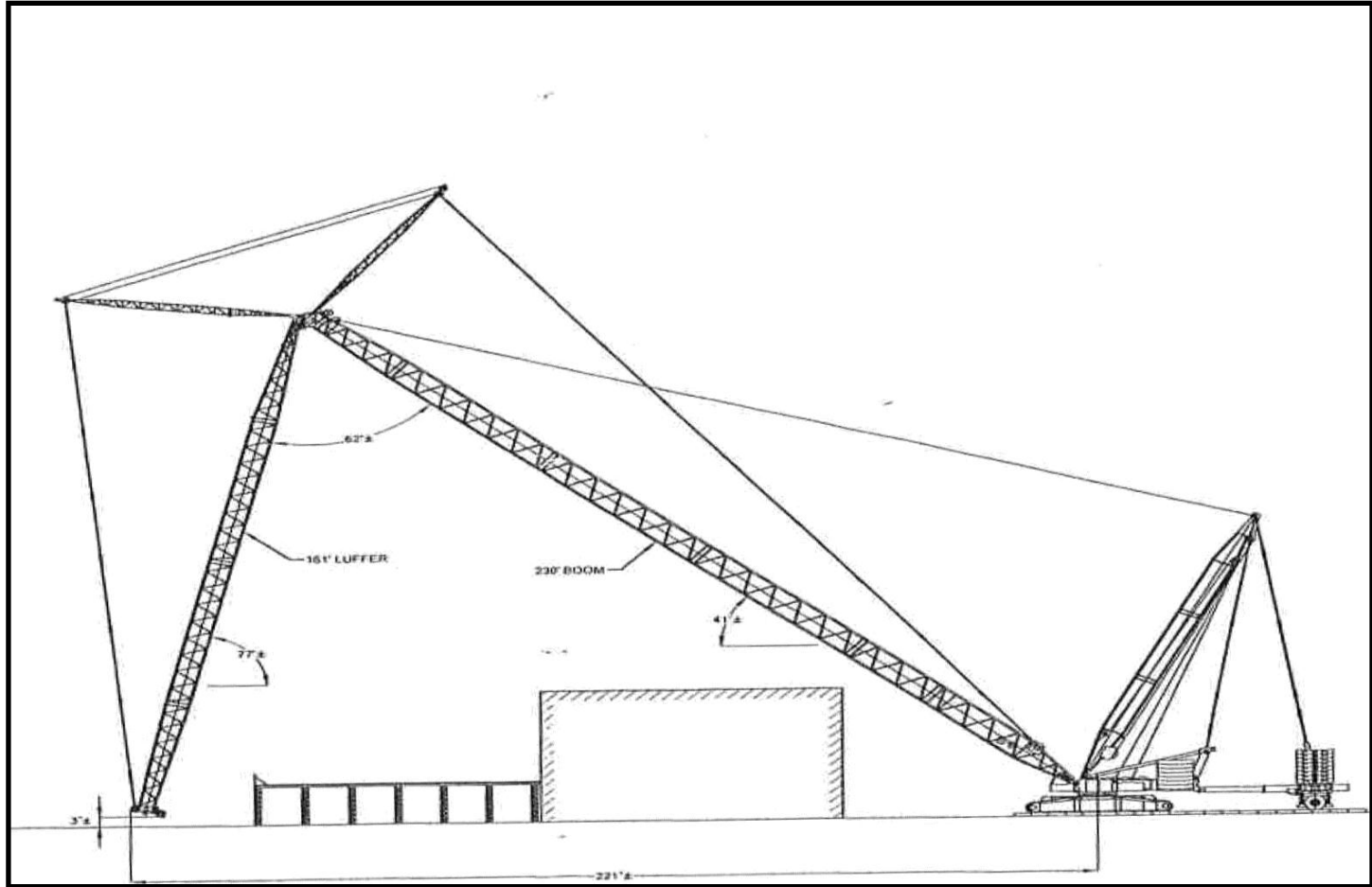
- Up to 55mph - Park crane (upper in line with crawlers) with load blocks and weight balls on ground or secured and position boom at 77deg and luffing jib at 66deg.
- Up to 67mph - Jack knlfe boom and luffing jib as shown on CI-04.
- Above 67mph - Lay boom & jib down as shown on CI-03.

NOTE:
Additional requirements apply, refer to manufacturer data for operations and parking, where manufacturer requirements are more stringent, than those in the above table and notes, manufacturer requirements shall govern.

Action Plan



Action Plan



[illegible]

Crane Risk Mitigation

Rope Inspection:

Frequent Inspection:

- All ropes in continuous service shall be visually inspected once every working day

Periodic Inspection:

- The inspection frequency shall be determined by a qualified person

Mast Climbers

What is a Mast Climber?

Mast climbers consist of a mast and a platform that can ride up and down the mast.



Types of Mast Climbers

Single Mast Climber



Types of Mast Climbers

Twin Mast



Mast Climber Purposes

Construction, Demolition and Renovation:

- Façade Work
- Curtain Walls / Glazers
- Masonry
- Water Proofing
- EIFS “Exterior Insulation Finishing System”
- Metal Framing

Requirements for Using Mast Climbers in NYC:

- Certificate of Approval (Prototype)
- Certificate of Operation
- Certificate of On-Site Inspection

Certificate of Approval (Prototype): MC-1

- Owner's Manual
- Operator's Manual
- Capacity Chart(s)
- Annual Inspection Checklist
- Advertising Brochure
- Free Standing Height Information
- Wind Speed Information
- Listing of Safety Devices
- Additional Points of Contact

Certificate of Operation: MC-2

- Inspection Checklist
- List of Critical Components
- Photos
- Disclosure of History
- Letter Identifying Service Support Contact
- Letter Identifying Technical Support Contact

Mast Climber Notice: MC-4

A professional engineer shall file a Mast Climber Notice application with the Department.

The application shall contain the following information:

- Ground and Subsurface Conditions
- Footings, Foundations and Structures
- Setup Plan
- Pull Out Test When Applicable

Mast Climber Design

Mast Climber Design

Ground and Subsurface Conditions:

- Identification of All Pertinent Ground and Subsurface Conditions
- Certification From The Engineer
- Plans

Mast Climber Design

Footings, Foundations and Structures:

- Ground Anchorage, Outriggers, or Dunnage
- Plans Showing Support Connection of the Mast Climber to the Foundation
- Plans Showing the Tie-in Connection of the Mast Climber to the Structure
- Loads Imposed:
 - Under Construction
 - Existing Structure
- Wind Loading for In-Service and Out-of-Service Conditions
- Engineer Certification and Calculations

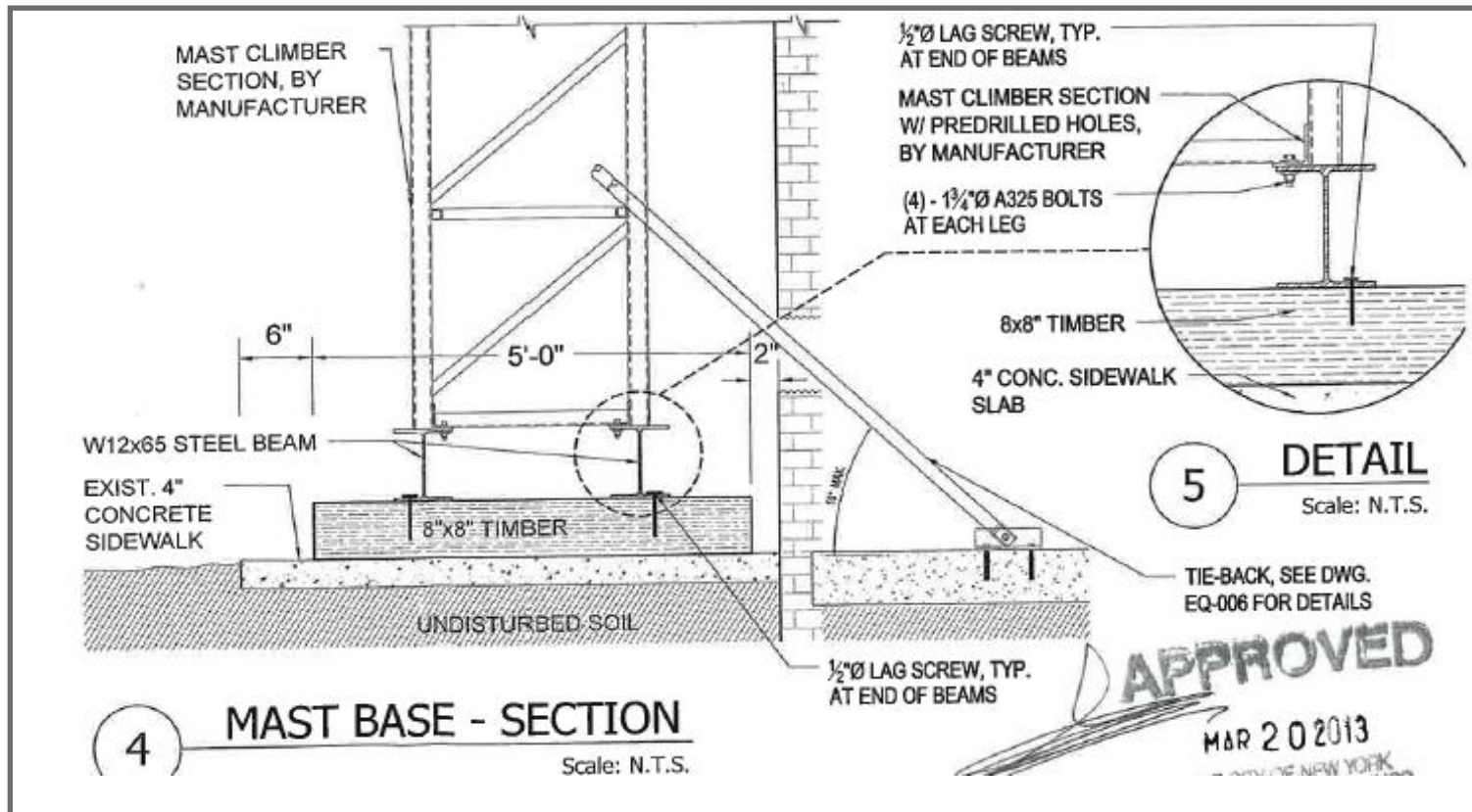
Mast Climber Design

Setup Plan:

- Location, Site and Elevation Plans
- Configuration Including Dimensions and Weight
- All Phases
- Details of Installation and Removal
- Platform Location for Out-of-Service
- Final Height and Tie-in Spacing
- Bolt Grade and Torque Values
- Netting, Weather Protection, or Overhead Protection
- All Attachments

Mast Climber Design: Foundation

A mast climber base supported on a sidewalk:

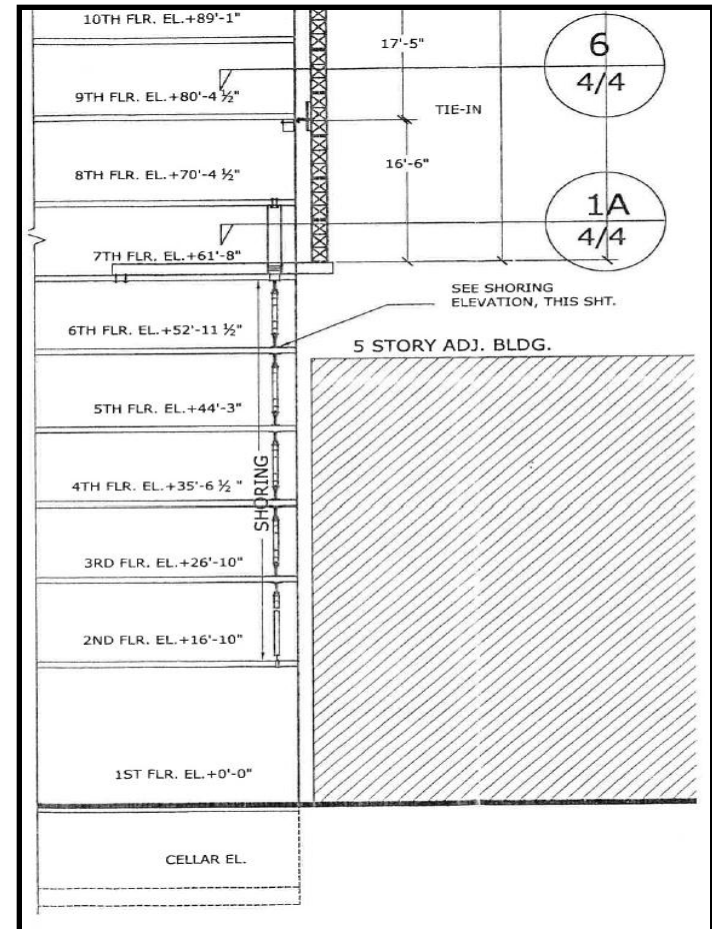


**Mast climber base supported on a braced frame
“bracket” cantilevering from the building structure:**



Mast Climber Design: Foundation

Mast climber base supported on outrigger beams and anchored and shored to slabs



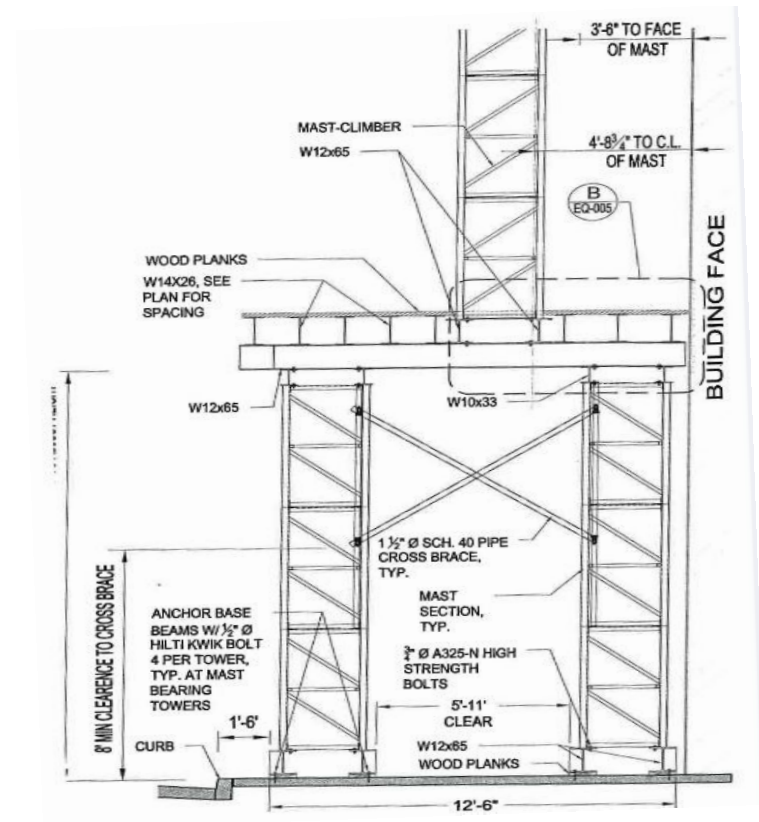
Mast Climber Design: Foundation

This mast climber base is supported on outrigger beams and is anchored and shored to slabs.



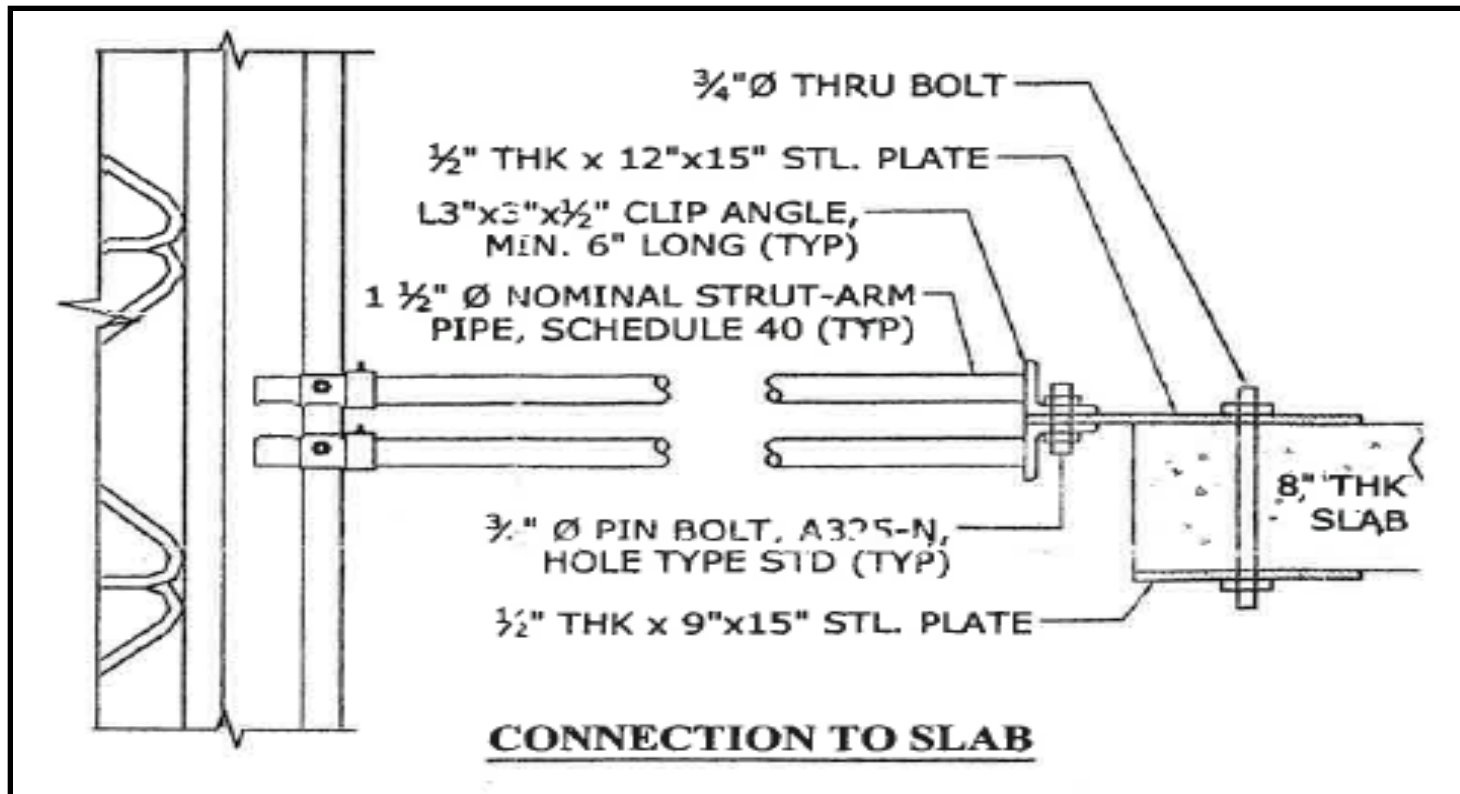
Mast Climber Design: Foundation

Mast climber base erected on a platform that is supported by two braced frames:



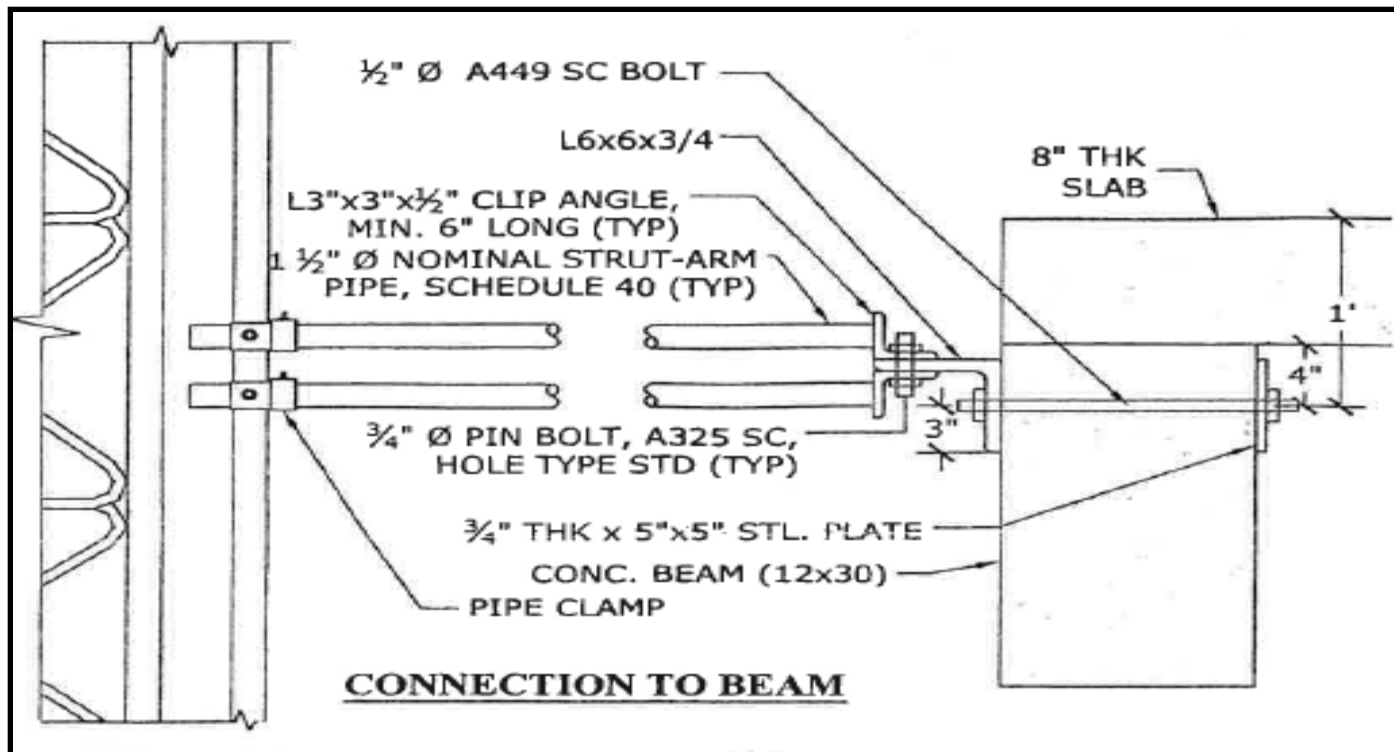
Mast Climber Design: Tie-in Connections

Tie-in connection attached to the slab:



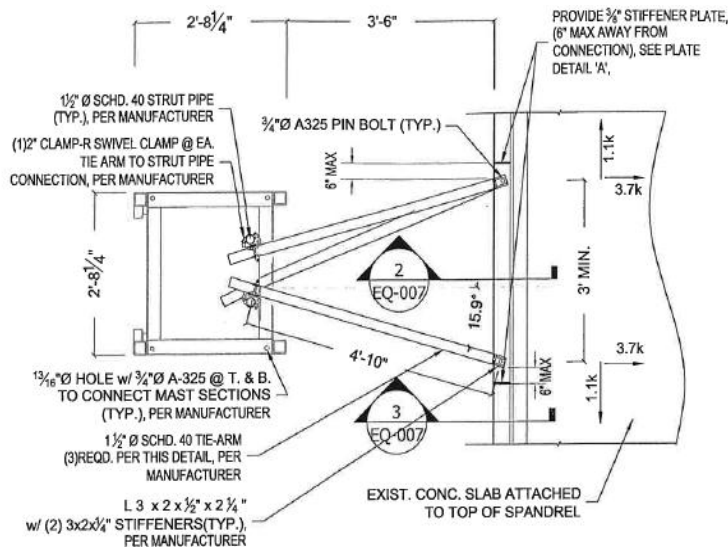
Mast Climber Design: Tie-in Connections

Tie-in connection attached to concrete spandrel beam:

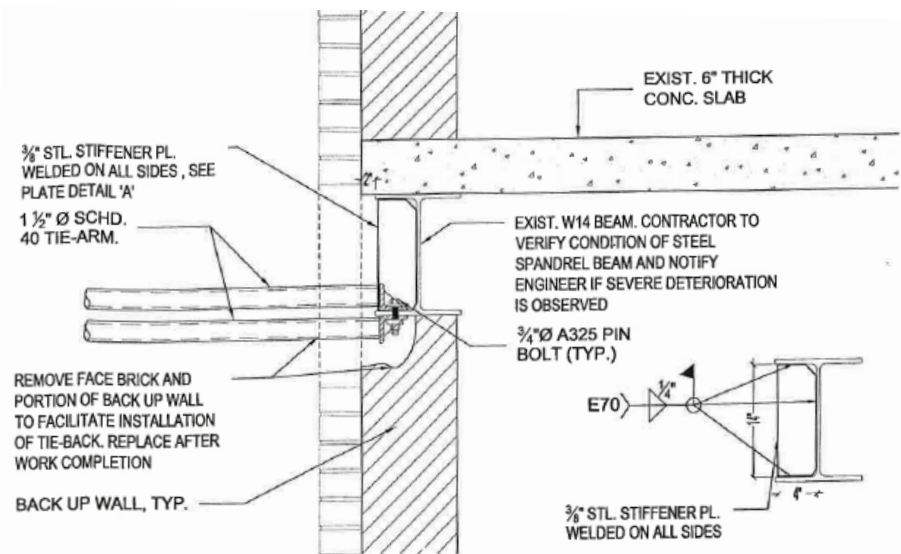


Mast Climber Design: Tie-in Connections

Tie-in connection attached to steel spandrel beam:



1 TIE-BACK CONNECTION DETAIL - PLAN
Scale: N.T.S.



2 SECTION AT TIE-IN CONNECTION
Scale: 1"=1'-0"

Mast Climber Safety Hazards

Safety Hazards

- Installation
- Operation/ Moving
- Removal
- Fall Protection
- Wind and Out-of-Service

Safety Hazards: Installation

Out of plumbness:



Safety Hazards: Installation

Improper Footing / Foundation



Safety Hazards: Operation/ Moving

During climbing, one side of the climbing apparatus did not properly engage the rung and slipped off.



Safety Hazards: Removal

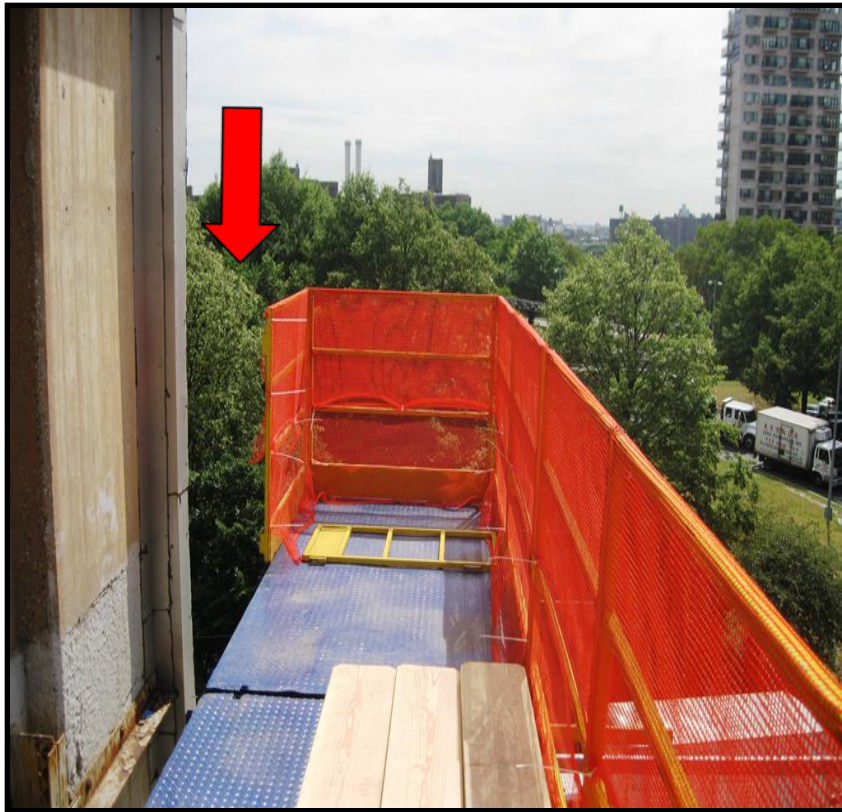
This accident occurred during dismantling.

When the second tie was removed, the imbalanced tower pivoted on the remaining tie and the bottom kicked out.



Safety Hazards: Fall Protection

Missing Fall Protection:



Mast Climber Risk Mitigation

Mast Climber Risk Mitigation

1. Manufacturers Safety Bulletins, Recall Notices & Updates
2. Engineer's Inspection - MC-5
3. Owner's Inspection - MC-5
4. Mast Climber Training Requirements:
 - Installation or Removal
 - Operation or Use
 - Approved Training Providers
5. Mast Climbers Installer or Remover - MC-3
6. Safety Meetings & Safety Talks
7. Safety Notes
8. Repairs, Adjustments and Maintenance
9. Logs

Mast Climber Risk Mitigation

1. Manufacturers' Safety Bulletins, Recall Notices and Updates

Manufacturers shall provide the following to the Department:

- All Safety Bulletins and Recall Notices Within Five (5) Business Days of Issuance
- All Updated Manufacturer's Owner's and Operator's Manual(s) Within Thirty (30) Business Days of Issuance
- All Updated Points of Contacts for Technical and/or Service Questions Within Five (5) Business Days of the Change

Mast Climber Risk Mitigation

Engineer's Inspection Certificate of On-Site Inspection - MC5

- Installed in accordance with approved plans
- Tie-in Connections
- Anchorages
- Ground Conditions/ Footing/ Foundations
- Structural Support(s)
- Pull out Test(s)
- Plumb Check
- Photographs

Reports shall be submitted within two business days.

Mast Climber Risk Mitigation

Engineer's Inspection Certificate of On-Site Inspection - MC5

8 Engineer's Inspection Checklist					
ITEM	PASS	FAIL	N/A	Attachments Included?	
Installed in Accordance with Approved Plans	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Survey for Plumbness	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Tie-in Connections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Torque Report(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Anchorage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Pullout Test Report(s)	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Ground Conditions/Footing/Foundation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Photographs	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A
Structural Support(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Pull out Test(s)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Plumbness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Mast Climber Risk Mitigation

2. Engineer's Inspection "Foundation"

Mast climber base is supported on a cantilever steel bracket tied to existing steel structure.



Mast Climber Risk Mitigation

2. Engineer's Inspection "Foundation Anchorage"



Mast Climber Risk Mitigation

2. Engineer's Inspection – Plumb Check



Mast Climber Risk Mitigation

2. Engineer's Inspection - Pull-Out-Test



Mast Climber Risk Mitigation

2. Engineer's Inspection - Tie-in Connections



Mast Climber Risk Mitigation

2. Engineer's Inspection - Tie-in-Connection



Mast Climber Risk Mitigation

2. Engineer's Inspection - Tie-in-Connection



Mast Climber Risk Mitigation

3. Owner's Inspection Certificate of On-Site Inspection – MC5

- The Equipment Owner, or an Authorized Representative
- Verification of the Critical Components
- Compliance with ANSI/SIA A92.9-1993 – Section 6.4

Reports shall be submitted within two business days.

Mast Climber Risk Mitigation

3. Owner's Inspection Certificate of On-Site Inspection–MC5

7 Owner's Inspection Checklist								
ITEM	PASS	FAIL	N/A	ITEM	PASS	FAIL	N/A	
Controls (Operating and Emergency)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platform Sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Placards, Warnings, and Control Markings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platform Extensions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Manual/Load Charts Stored on Platform	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platform Free of Obstacles	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Safety/Emergency Devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platform Level	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Brakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Platform Runs Soundly	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Limit Stops (High and Low)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attachments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Horizontal Leveling Device (where required)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Guardrail System	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Emergency Lowering Means	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Mast Guards	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Drive System/Chassis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Outriggers, Stabilizers, and Other Structures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Machinery Frame	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Tires and Wheels	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Air, Hydraulic, and Fuel Lines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lubrication of All Moving Parts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Cables and Wiring Harnesses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Chain and Cable Mechanisms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Attachments Included?				
Fasteners, Pins, Bolts, Nuts	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Notes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A	
Critical Components Match Those Listed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Photographs	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A	
Locking Devices	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					
Mast Sections	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>					

Mast Climber Risk Mitigation

4. Mast Climber Training Requirements

a) Installation or Removal

All individuals and the supervisor shall complete manufacturer's training for the specific make and model.

b) Operation or use

All individuals and the supervisor shall complete a Department of Buildings approved 4-hour training course and 4-hour refresher every 4 years.

Mast Climber Risk Mitigation

4. Mast Climber Training Requirements (Continued)

c) Mast Climber Training Providers

Providers shall be approved by the Department of Buildings. A Provider shall either be:

- A registered NYS Department of Labor Apprenticeship Training Program
- An Educational Institution or School
- Mast Climber Manufacturer
- Mast Climber Owner
- Any Other Entity Acceptable to The Department

Mast Climber Risk Mitigation

5. Mast Climber Installer or Remover - MC-3

- A Supervisor Authorized by The Owner Shall Supervise The Installation or Removal of the Mast Climber
- The Supervisor Shall be:
 - Both a Competent and a Qualified Person
 - Present at The Job Site
 - Able to Directly Communicate With All Individuals Involved in The Installation or Removal Work

Mast Climber Risk Mitigation

6. Safety Meetings / Talks

- Safety Meetings: 24 hours prior to the commencement of installation or removal operations
- Safety Talks: Prior to the first use of the mast climber

Mast Climber Risk Mitigation

7. Safety Notes

- Platform Location Shall Remain Stationary at Lowest Position after Installation and Prior to Plumb Verification, Anchor Bolt Torque Test and Welding Inspection
- Platform Shall be Brought to the Lowest Position and Remain Stationary for out of service
- Wind Speed Maximum Safe in-Service and Out-of-Service Information Shall be Provided for all Configurations
- The Use and Operation of The Mast Climber Shall Cease if Winds Exceed 30 m/h or at Lower Wind Speed When Recommended by the Manufacturer

Mast Climber Risk Mitigation

Mast Climber platform location for out-of-service:



Mast Climber Risk Mitigation

8. Repairs, Adjustments and Maintenance

- All Repairs, Adjustments and Maintenance made to any Mast Climber Part or Component Shall be made by a Qualified Person(s)
- Repairs Shall Be in Accordance With the Followings:
 - Manufacturer' s Specification
 - ANSI/SIA A92.9- 1993 Requirements
 - At Least The Manufacturer' s Original Factor of Safety

Mast Climber Risk Mitigation

9. Logs

- Logs shall be kept up-to-date and contain the following:
 - Installation or Removal Supervisor Information
 - Safety Meetings and Talks
 - Supervisor and Workers Training Information for Installation, Removal and Operation
 - Accidents
 - Repairs and Adjustments
 - Any Hazardous Conditions

Rigging

Rigging Service Notice

Type of work	Requirement
New building construction	<p>Meet one of the following:</p> <ol style="list-style-type: none"> 1. Be supervised by a licensed rigger, or a designated rigging foreman employed by the licensee. Members of the rigging crew must be employed by the licensee. 2. Be supervised by a competent person designated by the contractor using the hoisting equipment. Beginning July 1, 2016, the supervisor, signalpersons, and members of the rigging crew must either possess (a) a national certification for rigging and signaling, or (b) have completed Department approved training.
Full demolition of a building	
Vertical or horizontal enlargement	
Façade alteration, maintenance, or repair project that requires a site safety plan	
Sign hanging	Be supervise by a licensed rigger or licensed sign hanger, or a designated rigging or sign hanging foreman employed by the licensee. Members of the sign hanging crew must be employed by the licensed rigger or the licensed sign hanger.
Tower crane assembly, jumping, or disassembly	Be supervised by a licensed master or tower crane rigger. Members of the rigging crew must be employed by the licensee. The rigger and crew must have completed a 30-hour tower crane training course approved by the Department.
Hoisting or lowering a boiler or tank	Be supervised by a licensed rigger, or a designated rigging foreman employed by the licensee. Members of the rigging crew must be employed by the licensee.
Industrial rope access	
All other work	

Tower Crane Assembly, Jumping or Disassembly

- Supervised by a licensed master rigger, tower crane rigger.
- Rigging crew members must be employed by the licensee.
- The rigger, foreman and crew must have completed a Department-approved, 30-hour tower crane training course.

Hoisting or Lowering a Boiler or Tank

- Supervised by a licensed rigger or a designated rigging foreman employed by the licensee.
- Rigging crew members must be employed by the licensee

Critical Pick

The attachment and detachment of loads from the hook of hoisting equipment used to hoist or lower loads on the outside of a building that involves one or more of the following:

An article:

- At or above 95% of approved rated capacity
- Asymmetrical and is not provided with standard rigging ears
- Wind sail area exceeding 500 square feet
- Fragile or of thin shell construction and is not provided with standard rigging ears

Critical Pick (continued)

- A pick that may present an added risk because of clearance, drift, or other interference
- A pick that requires multiple power operated hoisting equipment (tandem pick)
- A pick that requires out of the ordinary rigging equipment, methods, or setup

Questions?

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

AIA Point of Contact:

Allison Ginsburg

Aginsburg@buildings.nyc.gov

212.393.2167

© 2015 New York City Department of Buildings