2017

NYC Buildings

Alterations in NYC: Common Pre-Construction, Construction & Inspection Issues

Course Number SW0617

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BUILD SAFE / LIVE SAFE CONFERENCE

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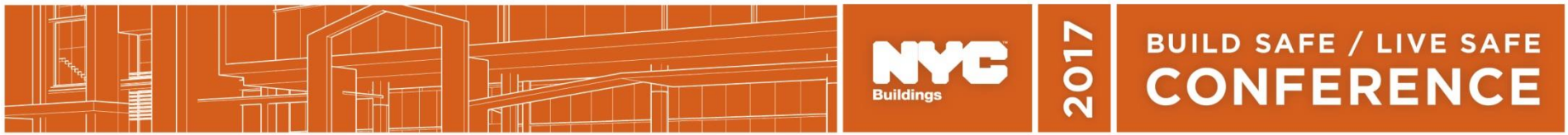

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Course Description

This course will focus on the Code requirements and design documents necessary for partial demolitions, alterations and alterations to meet NB requirements. This course will discuss what is expected to be provided by Design and Construction Professionals as well as highlight common errors and omissions noted and observed by reviewers.

References to applicable Construction Code sections will be provided. The course will explain how the Code requirements and design documents relate to construction safety with multiple project types and examples being provided. The course will also correlate between design documents with field construction.

Learning Objectives

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

1. Participants will examine the process for dating buildings and will be able to distinguish between prior and current governing Construction Codes.
2. Participants will discuss common errors and omissions that are discovered during the design phase of projects and be able to develop detailed design documents which will lead to safer building construction.
3. Participants will discuss the most common errors and omissions that are discovered during the construction phase of projects; which result in the issuance of stop work orders due to lack of Code compliance and unsafe practices.
4. Participants will be able to identify potential hazards and unsafe construction practices through examples and photos of both acceptable and unacceptable construction practices.

DEFINING THE PROBLEM

What universes are we exploring today?

- Partial Demolitions
- Alterations
- Alterations to Meet NB Requirements

LEARNING OBJECTIVES

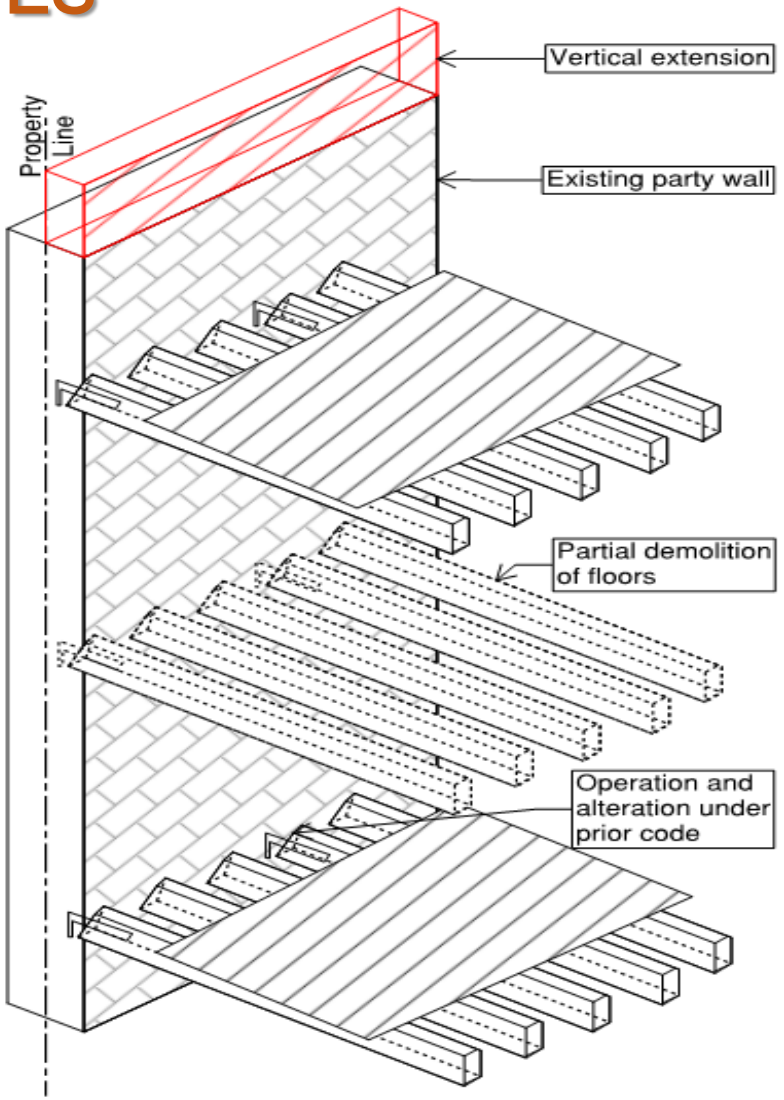
Alteration with Partial Demolition

What are our considerations:

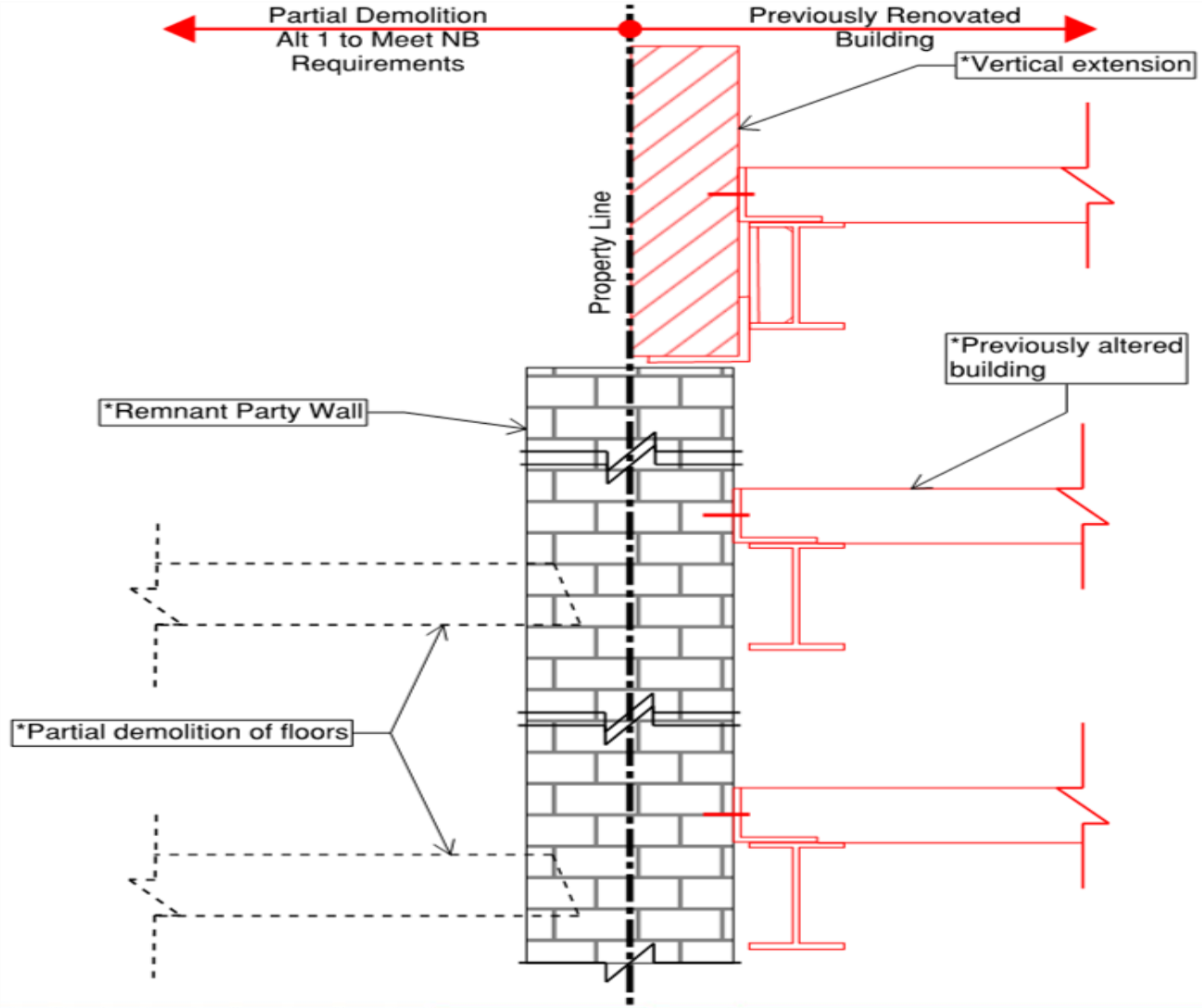
Design?

Construction?

Inspection?



LEARNING OBJECTIVES



GOVERNING CODES: RELEVANT CODES

- **NYC Administrative Code** (2014)
- **NYC Building Codes** (2014, Optional Use of Prior)

  **Prior Codes still govern the use of existing buildings* §28-102.4

New York City Building Codes

- 1860
- 1887
- 1896
- 1899
- 1906
- 1916
- 1922
- 1938
- 1968
- 2008
- 2014

- **NYC Rules** (1RCNY 101-06, 1RCNY 101-07, 1RCNY 3301-02)
- **NYC Building Bulletins** (BB 2016-12, BB 2016-006)

GOVERNING CODES: DEFINING PRIOR CODE

Resources

1. BIS
   - Actions
   - CO
   - Emergency declaration history
   - Enforcement history

2. NYPL Digital Tax Maps
   https://digitalcollections.nypl.org/collections/atlases-of-new-york-city#/?tab=navigation
   - http://spacetime.nypl.org/maps-by-decade/#/

3. https://www.oldnyc.org/

GOVERNING CODES: DEFINING PRIOR CODE

Resources

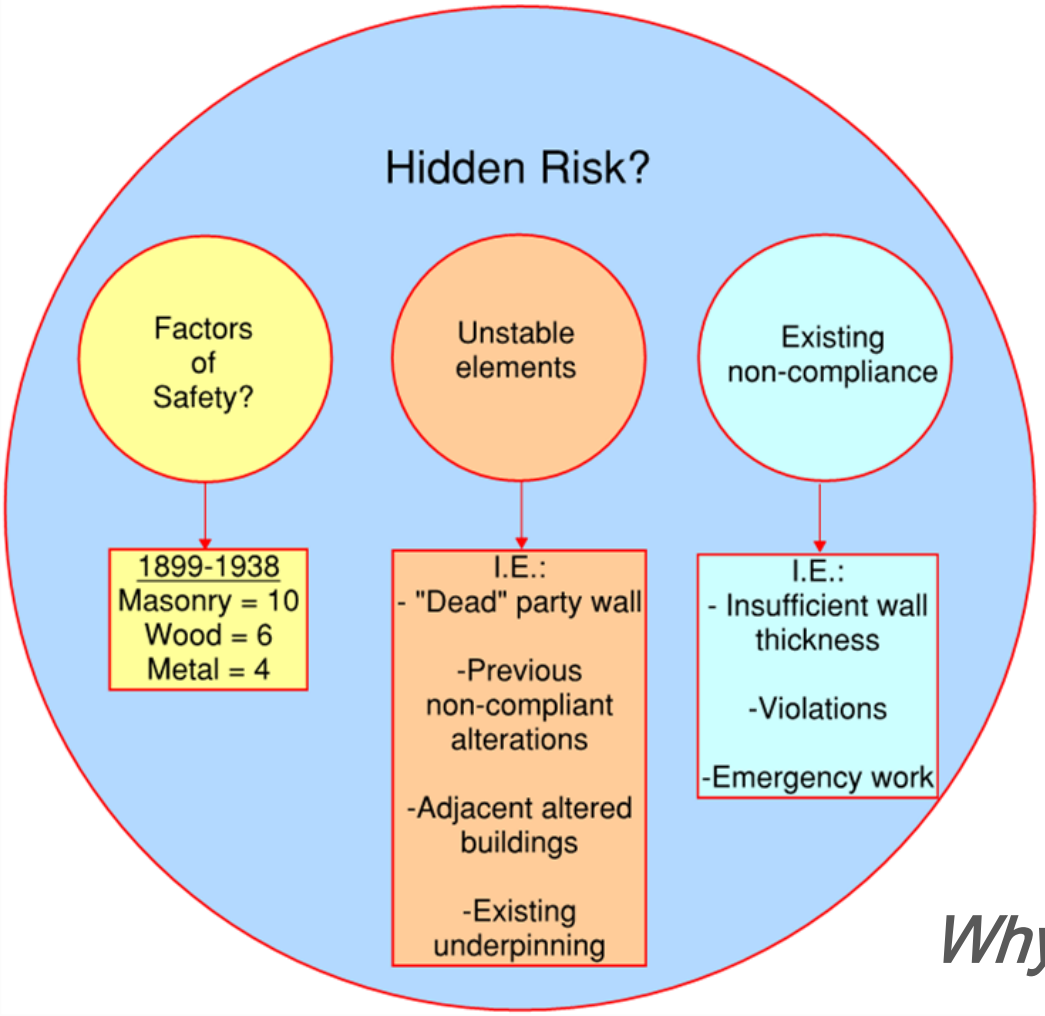
4. LPC GIS Maps
   http://www1.nyc.gov/site/lpc/designations/maps.page

5. http://www.oasisnyc.net/
   - NY Digital Tax Maps
   - ACRIS
   - Aerial Timeline

6. HPD I-cards

7. Google Street View

GOVERNING CODES: DEFINING PRIOR CODE



Identifies minimum requirements

§28-101.2

Why is this important?

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

- **§ 28–301.1 Owner's responsibilities** - All buildings and all parts thereof and all other structures shall be maintained in a safe condition…

  - *In addition this governs notification of DOB of hazardous conditions.*

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

- §28-101.2 – **Intent** – Establish reasonable **minimum** requirements
  - *Concept dates back to 1860*
- § 28-103.2 – Interpretation
  - *First occurrence 1866*
- § 28-104.7.1 – Construction documents to be of sufficient clarity

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

What defines an alteration?

- §28-101.4.5 – Cannot exceed 110% of floor replacement area
- § 28-101.4.5.1 – If scope of work changes in construction and exceeds 110% -> Alt 1 to meet NB
- BB 2016-12 provides calculation clarification

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

§28-102.4 Existing buildings. The lawful use or occupancy of any existing building or structure, including the use of any service equipment therein, may be continued unless a retroactive change is specifically required by the provisions of this code or other applicable laws or rules.

- §28-102.4 – Buildings are governed by the code at the time they were built*

§28-102.4.3 Alteration of prior code buildings. Except as otherwise provided in sections 28-101.4.1, 28-101.4.2, 28-101.4.3 and 28-101.4.4, prior code buildings altered after July 1, 2008 shall comply with the provisions of this code. In accordance with subdivision eleven of section three of the multiple dwelling law and article 4 of subchapter 1 of the 1968 building code, at the option of the owner, multiple dwellings erected prior to December 6, 1969 may be altered and buildings erected prior to December 6, 1969 may be converted to multiple dwellings in accordance with applicable provisions of the multiple dwelling law and the building laws and regulations in effect prior to December 6, 1968, provided the general safety and public welfare are not thereby endangered.

- §28-102.4.3 – Alterations must comply with 2014 code except as provided in §28-101.4.1 through §28-101.4.4

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

§28-101.4.3 Optional use of the 1968 building code for work on prior code buildings. At the option of the owner, and subject to applicable provisions of this code, work on prior code buildings may be performed in accordance with the requirements and standards set forth in the 1968 building code, or where the 1968 code so authorizes, the code in effect prior to December 6, 1968.

§ 28-101.4.3 – Use of prior codes for alterations

- Notable 2014 BC governing structural:
  - 2014 NYCBC 1601.2 – Structural Design
  - 2014 NYCBC Chapter 17 – Special Inspections
  - 2014 NYCBC Chapter 33 – Safeguards During Construction and Demo.
  - 2014 NYCBC Chapter 18 – For Underpinning and Retaining Walls *
  - Areas of Special Flood Hazard – Appendix G § 28-104.9.4

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

§28-101.4.4 Reductions of fire safety or structural safety of prior code buildings prohibited. Notwithstanding any other provision of this code, where the alteration of any prior code building or structure in accordance with a provision of this code would result in a reduction of the fire safety or structural safety of such building, relevant provisions of the 1968 building code shall apply to such alteration unless there is full compliance with those provisions of this code that would mitigate or offset such reduction of fire protection or structural safety. Where the owner, having a choice to elect the 1968 building code or this code, chooses this code, the applicant shall submit a comparative analysis acceptable to the commissioner of the relevant fire safety and structural safety provisions under the 1968 building code and this code, demonstrating that the alteration does not result in a reduction to the fire and life safety of the building.

Exception: The use of automatic-closing by smoke detection for doors serving vertical exit enclosures in accordance with section 708.7 of the New York city building code in a prior code building shall not be deemed to result in a reduction of the fire safety or structural safety of such a building.

- § 28-101.4.4 – Reductions of fire and structural safety is prohibited

HIGH RANKING PROVISIONS: ADMINISTRATIVE CODE

§28-105.12.3 Adherence to lot diagram. All work shall be strictly located in accordance with the lot diagram approved in accordance with this code and no lot or plot shall be changed, increased or diminished in area from that shown on the approved lot diagram, unless and until a revised diagram showing such changes, accompanied by the necessary statement of the owner or applicant, shall have been submitted to and approved by the commissioner.

- **§ 28-105.12.3 – Adherence to diagram**
  - Early references start in 1916

HIGH RANKING PROVISIONS: BUILDING CODE

706.2 Structural stability. Fire walls shall have sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall for the duration of time indicated by the required fire-resistance rating.

- § 706.2 – Structural Stability. Fire wall cannot collapse with collapse of construction on either side.

HIGH RANKING PROVISIONS: BUILDING CODE

1601.2 Special provisions for prior code buildings. The provisions of Sections 1601.2.1 through 1601.2.4 shall apply to structural work on prior code buildings.

1601.2.1 Use of this code. Notwithstanding the applicant's election to use the *1968 Building Code* or prior code, the structural calculations shall be permitted to be performed in accordance with this code provided that the structural safety of the prior code building is not reduced. Notwithstanding the provisions of Section 28-101.4.4 of the *Administrative Code*, the use of Load and Resistance Factor Design (LRFD) engineering calculations shall not be deemed to reduce structural safety provided the properties of the existing materials are determined using accepted engineering principles.

1601.2.2 Live loads. Loads indicated in the applicable prior code shall be permitted for structural calculations using engineering formulas from this code provided that the structural safety of the prior code building is not reduced.

1601.2.3 Seismic loads. The determination as to whether seismic requirements apply to an alteration shall be made in accordance with the *1968 Building Code* and interpretations by the department relating to such determinations. Any applicable seismic loads and requirements, including for the bracing of architectural, mechanical, plumbing, fuel gas, fire suppression and electrical systems and equipment, shall be permitted to be determined in accordance with this chapter or the *1968 Building Code* and reference standard RS 9-6 of such code.

1601.2.4 Wind loads. All alterations, minor alterations, and ordinary repairs, to the extent of such work, shall be permitted to be performed in accordance with the wind load requirements set forth in the *1968 Building Code*, or where the *1968 Building Code* so authorizes, the code in effect prior to December 6, 1968.

Exceptions:

1. Equipment, appliances and supports that are exposed to wind shall be designed and installed to resist the wind pressures determined in accordance with Section 1609.
2. Wind loads on glass shall not be permitted to be calculated in accordance with the code in effect prior to December 6, 1968.
3. When the wind surface area of a prior code building or structure is increased by more than 5 percent in any direction or there is a permanent decrease of the lateral force capacity by more than 20 percent in any direction, the entire building or structure shall be designed to resist the design wind load as calculated pursuant to the applicable code, but not less than 5 psf (0.24k N/m^2).

CODE PROVISIONS

Masonry Erection Tolerances

- All walls shall be carried up plumb and straight, and shall be built with close joints

NYBC 1860 - 1916

- Masonry shall be plumb and true

NYBC 1916 - 1968

- Masonry shall be laid plumb

NYBC 1968 - 2008

- Masonry shall be within the ACI 530.1 tolerances

NYBC 2008 - Present

CODE PROVISIONS

Anchorage to Masonry Walls When Joists are Parallel

NYBC 1860 - 1899
- Fastened to beams per diagram on file at the office of the superintendent of buildings
- 8' o/c max

NYBC 1899-1916
- Engage 4 joists min, anchor to hook over 4th joists
- 6' o/c max

NYBC 1916-1938
- Each tier shall be anchored

NYBC 1938-1968
- Engage 3 joists min.
- Anchor 6' o/c
- Anchor upset and "T" ends to develop full strength of material

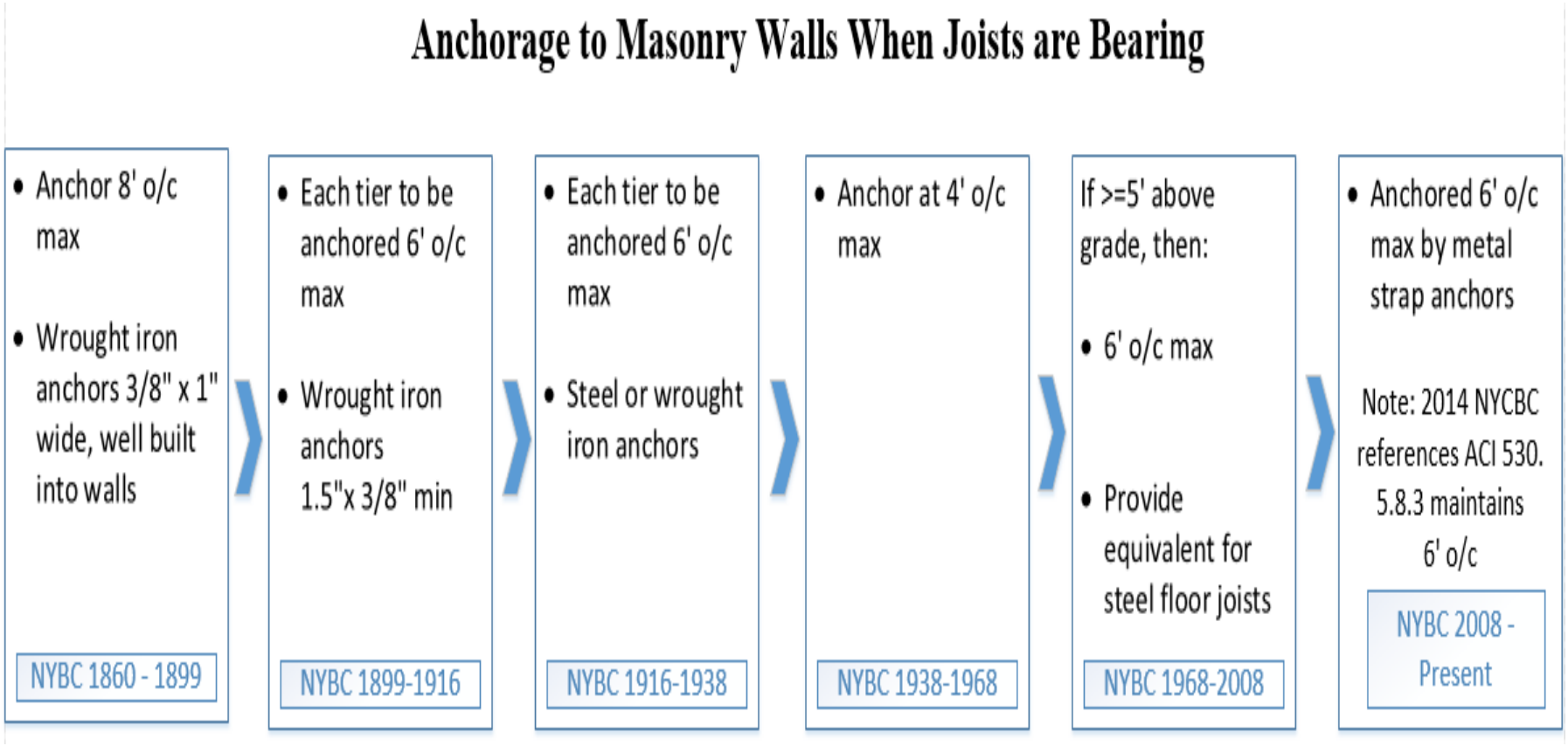
NYBC 1968-2008

If >=5' above grade, then:
- Engage 3 joists min.
- 8' o/c max
- In line with bridging or blocking
- Provide equivalent for steel floor joists

NYBC 2008 - Present
- Engage 3 joists min
- 6' o/c max

Note: 2014 NYCBC references ACI 530. 5.8.3 maintains 6' o/c

CODE PROVISIONS



CODE PROVISIONS

Wall bracing relates to demolition sequence and permanent structure:

- BC 3306.8.2

  No section of wall with a height more than 22 times its thickness shall be permitted to stand without bracing designed by a registered design professional.

  ***Simply supported, does not apply to cantilevers*

- BC 2104.10.1

  2104.10.1 Use of existing walls. An existing masonry wall may be used in the alteration or extension of a building provided that it meets the requirements of this code.

  **What is the condition of the masonry walls?*

Design Applicant Provisions

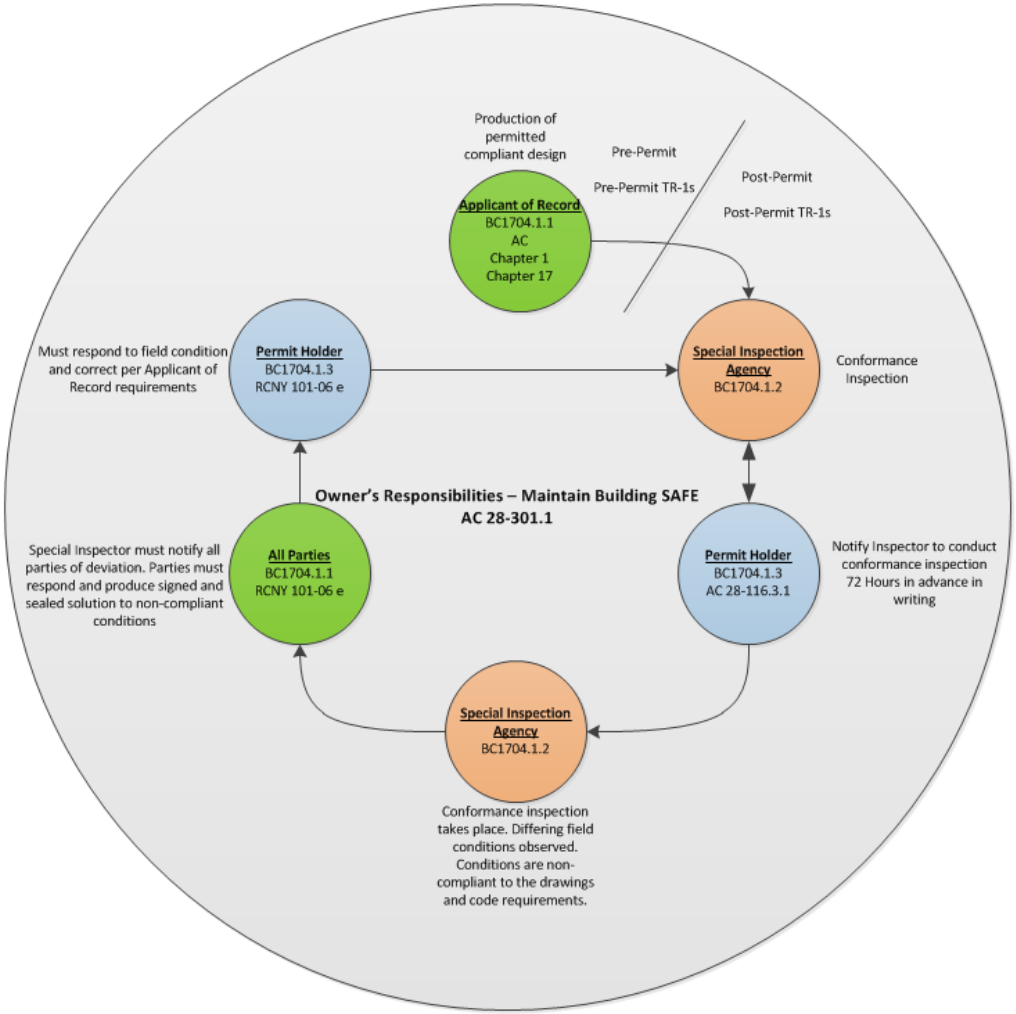
- **BC Chapter 1**
  - §101.2 – Scope – defines applicability
  - §107 – Construction Document Requirements
- **BC Chapter 17**
  - §1704.1.1 – Responsibilities of the design professional of record

Design Applicant Provisions

BC Chapter 33

- §3301.1.1 – Responsibility for safety
- §3306.5.1 – Partial demolition drawing requirements
- §3309.8 – Adjoining walls (Design/Construction/Inspection)
- §3309.9 – Weatherproof integrity (Design/Construction/Inspection)
  - Chapter 14 – Exterior Walls

CHAPTER 17 CIRCULAR RELATIONSHIPS



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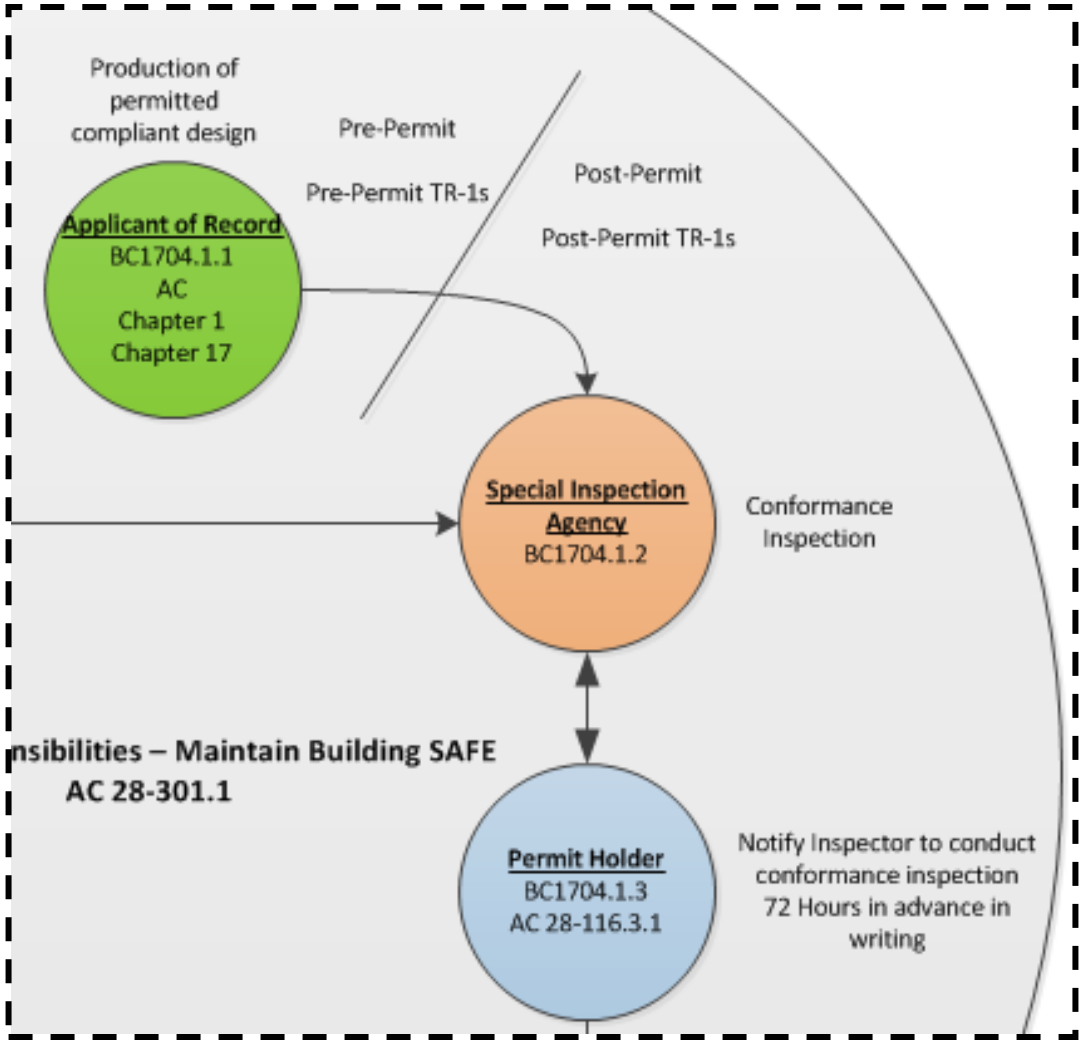

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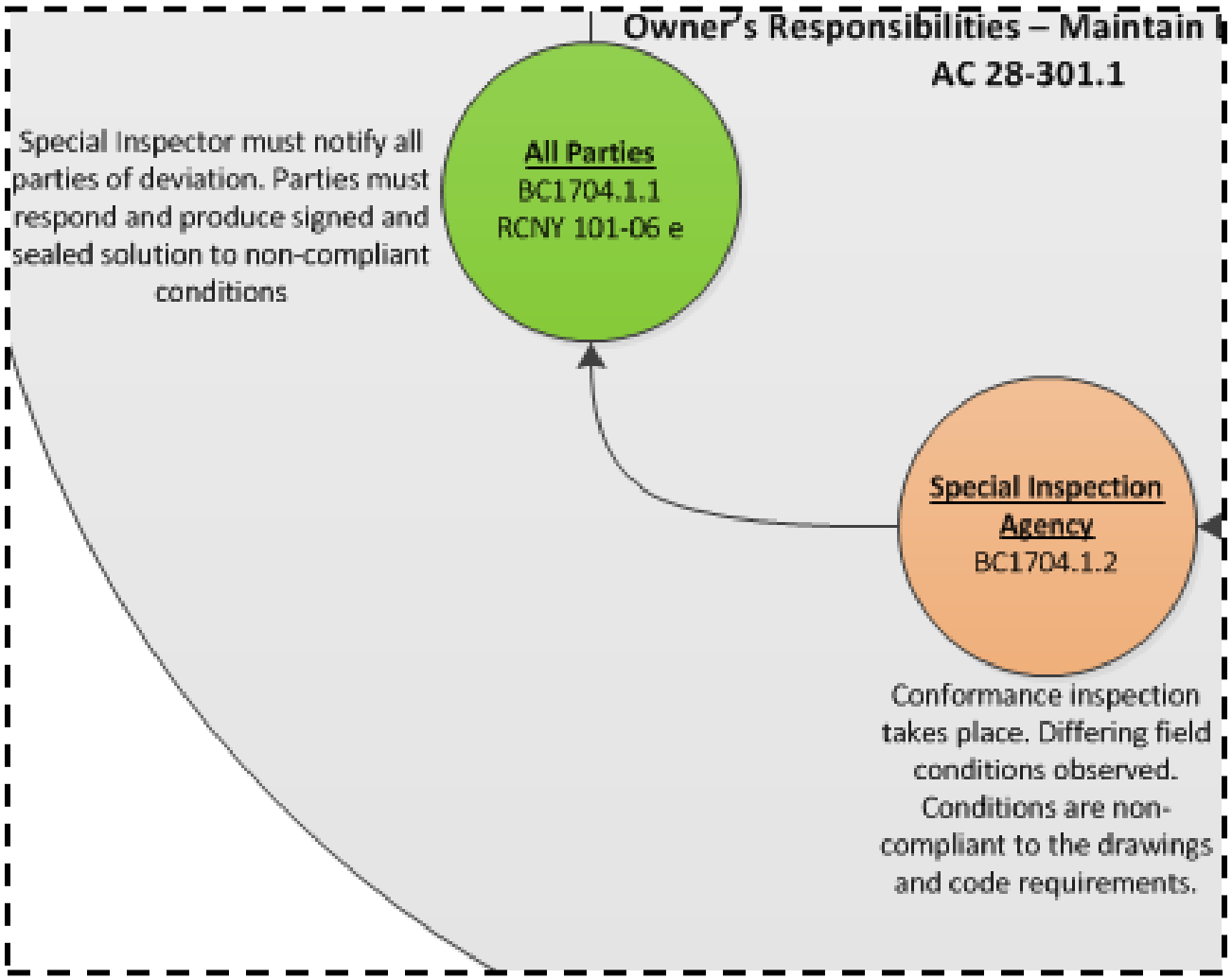

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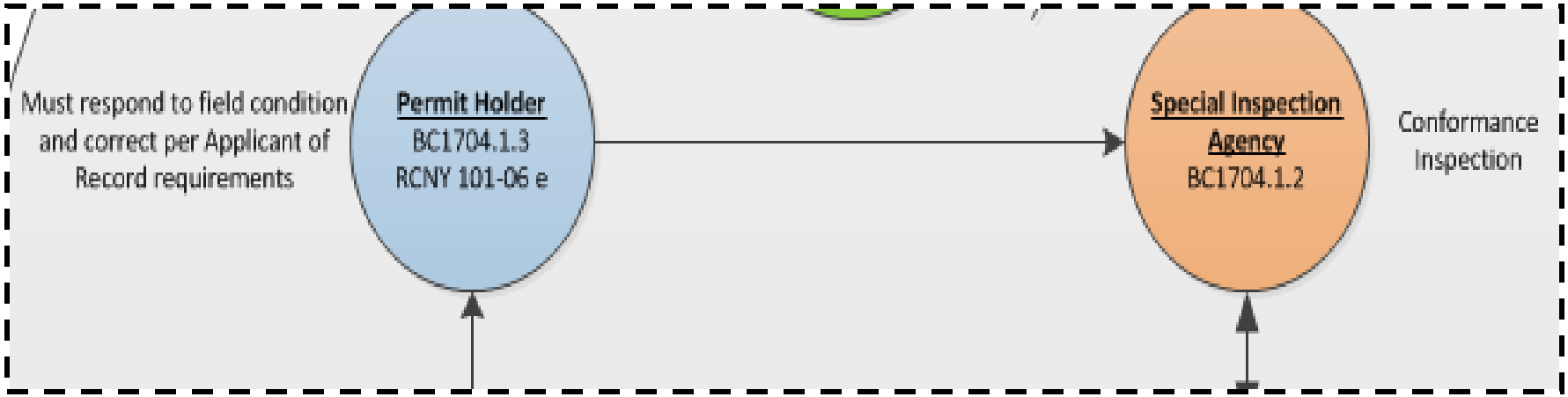
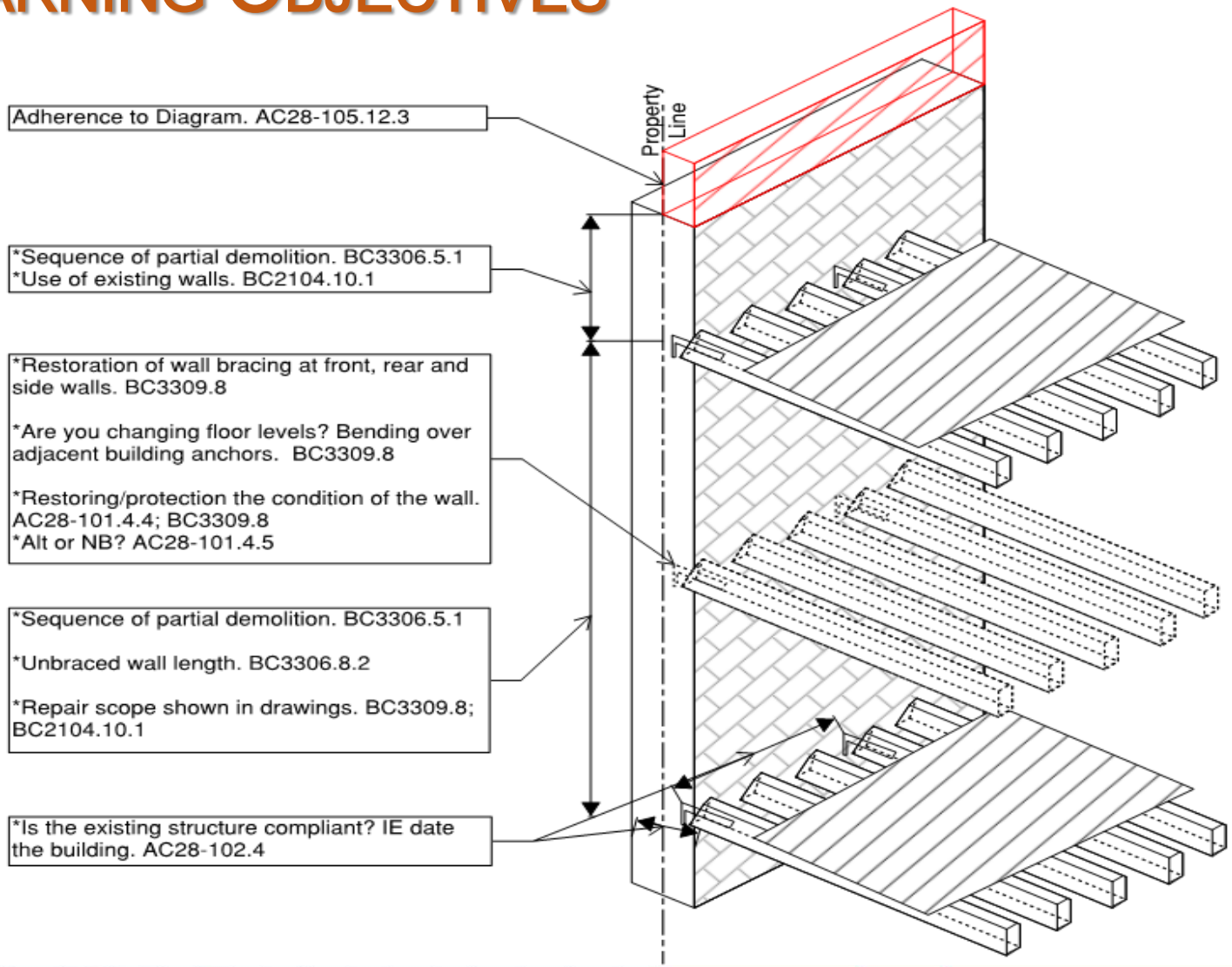
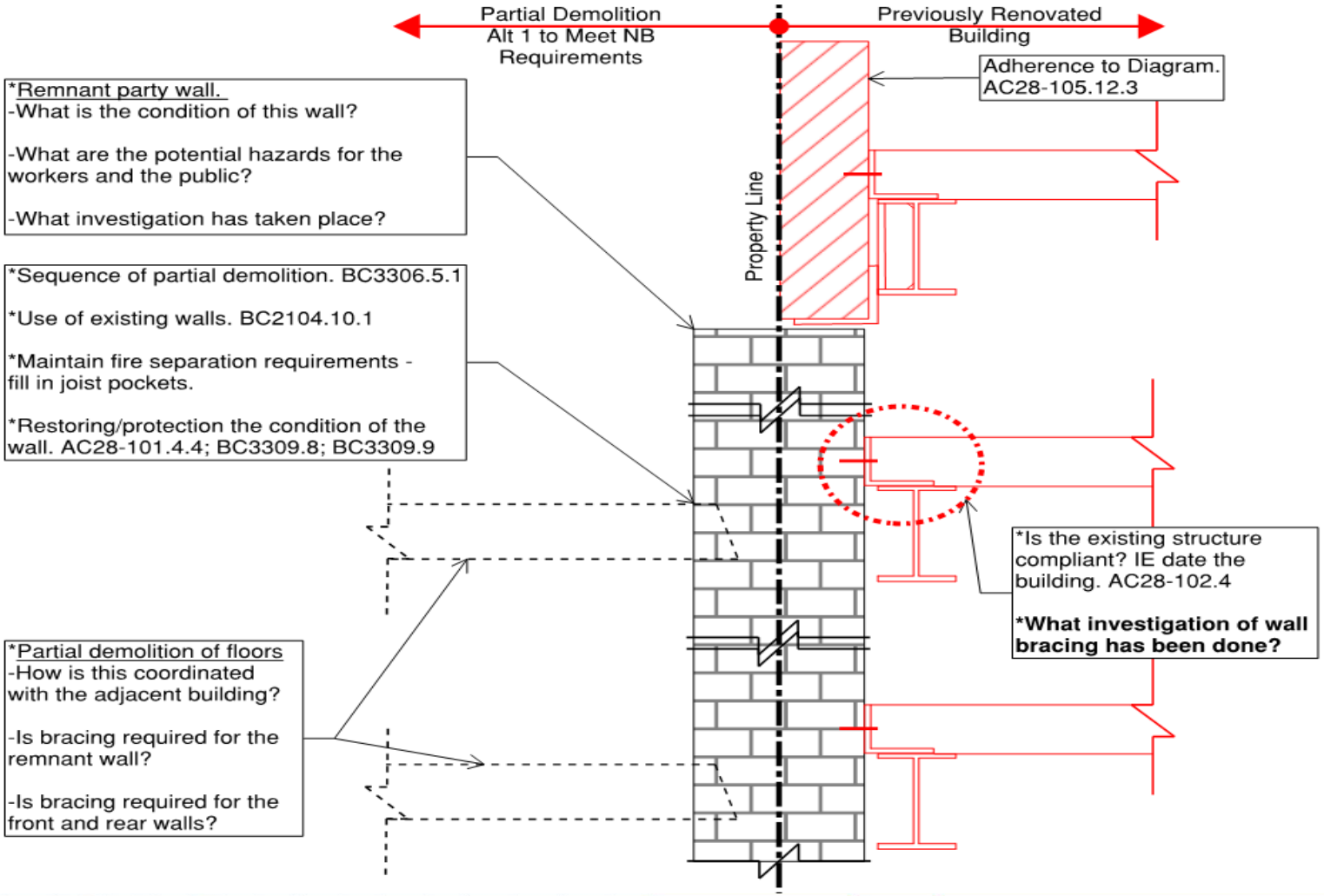


LEARNING OBJECTIVES



LEARNING OBJECTIVES



Pre-permit Common Issues: Demo & Alterations

- Incomplete Drawings
- Failure to identify all required special inspections §1704.1.1
- No pre-construction survey §3309.4.3
- No pre-construction report §1814.1
- No monitoring plan (or non-compliant plan)
  - Structural stability existing buildings (Chapter 17)
  - Subsurface operations (Chapter 33)

Pre-permit Common Issues

Incomplete Drawings

- Partial demolition
- Alteration
- Alt. 1 vs Alt. 1 to meet NB

Pre-permit Common Issues: Alterations Involving Partial Demolition

Incomplete Drawings

- Partial Demolition §3306.5.1
  - Incomplete and undefined scope
  - No sequence
  - Or sequence is not coordinated.
  - No reference to structural stability monitoring plan
  - No details / sections
  - No shoring identified
  - Existing building properties not defined
  - Existing walls and foundation walls are left unbraced
  - Party walls are not secured to the adjacent properties §3309.8

NOTE: Design errors may result in construction injuries, hazards to the public, OATH Summons to all parties, SWOs

Pre-permit Common Issues

Incomplete Drawings

- Alteration (Alt 2s & 3s)
  - Failure to identify condition of existing walls
  - Failure to brace existing walls
  - Adherence to diagram violations
  - Vague scope
  - Plans not coordinated with field conditions
  - Required inspections not identified
  - Failure to meet AC 28-101.4.3 (use of prior codes)

NOTE: Design errors may result in construction injuries, hazards to the public, OATH Summons to all parties, SWOs

Pre-permit Common Issues

Incomplete Drawings

- Alteration (Alt 1s)
  - Same as Alt 2s and 3s
  - Incorrect assessment of Alt 1 vs. Alt 1 to meet NB
  - Insufficient scope represented results in Alt 1 to meet NB

NOTE: Design errors may result in construction injuries, hazards to the public, OATH Summons to all parties, SWOs

POST PERMIT COMMON ISSUES

- Failure to notify the special inspector
- Failure to monitor
- Failure to protect adjacent properties
- Failure to maintain weather protection
- Not identifying plan discrepancies
- Work contrary to plans
- Failure to notify the Department
- No Construction Super (where required)

Special Inspection Common Issues

- Administrative issues
  - Applicant not registered with the Department

  NOTE: Means any inspection conducted is not valid

- Failure to identify discrepancies and missing information on construction documents
- Failure to perform inspections
- Failure to have an inspection schedule
- Failure to notify the Department

Monitoring Plans

When are monitoring plans required?

- Structural Stability – Existing Buildings §1704.20.7.1
- Excavation, Foundation Construction, or Underpinning §1814.3, §3309.4.4
- Subsurface operations affecting adjacent properties (piles, compactions, solidification, dewatering, etc.) §3309.6

Monitoring Plans

Monitoring Plans Minimum Requirements

1. Likely based on a preconstruction report §1814.1
2. Scope developed by an engineer §1814.3
3. Must be included in the design documents for structural stability. §1704.20.7.1

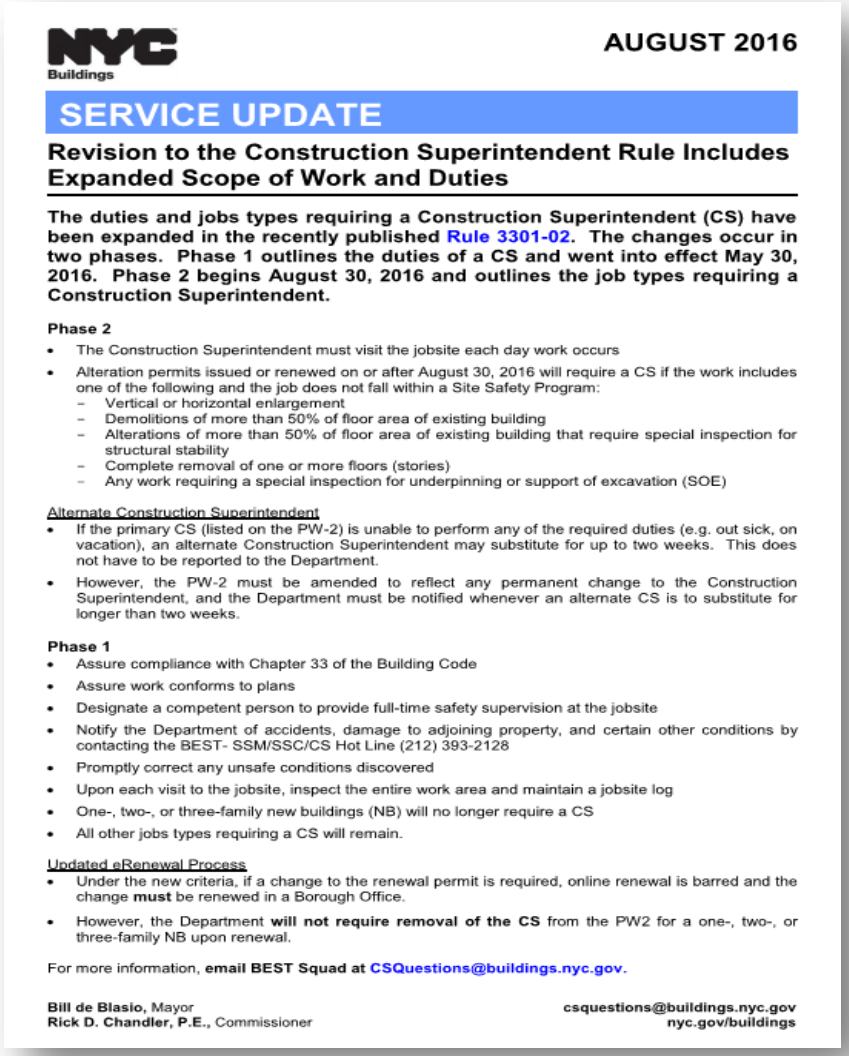
MONITORING PLANS

Monitoring Plans Minimum Requirements

4. §3309.16 – Monitoring Plan
    i. Must be specific to structures and operations
    ii. Must note scope
    iii. Must note frequency
    iv. Must note tolerances
    v. Must note reporting criteria when tolerances are exceeded

5. Commissioner can require more stringent requirements §3309.16, §1814.3

CONSTRUCTION SUPERINTENDENT



NYC Buildings

AUGUST 2016

SERVICE UPDATE

Revision to the Construction Superintendent Rule Includes Expanded Scope of Work and Duties

The duties and jobs types requiring a Construction Superintendent (CS) have been expanded in the recently published Rule 3301-02. The changes occur in two phases. Phase 1 outlines the duties of a CS and went into effect May 30, 2016. Phase 2 begins August 30, 2016 and outlines the job types requiring a Construction Superintendent.

Phase 2

- The Construction Superintendent must visit the jobsite each day work occurs
- Alteration permits issued or renewed on or after August 30, 2016 will require a CS if the work includes one of the following and the job does not fall within a Site Safety Program:
  - Vertical or horizontal enlargement
  - Demolitions of more than 50% of floor area of existing building
  - Alterations of more than 50% of floor area of existing building that require special inspection for structural stability
  - Complete removal of one or more floors (stories)
  - Any work requiring a special inspection for underpinning or support of excavation (SOE)

Alternate Construction Superintendent

- If the primary CS (listed on the PW-2) is unable to perform any of the required duties (e.g. out sick, on vacation), an alternate Construction Superintendent may substitute for up to two weeks. This does not have to be reported to the Department.
- However, the PW-2 must be amended to reflect any permanent change to the Construction Superintendent, and the Department must be notified whenever an alternate CS is to substitute for longer than two weeks.

Phase 1

- Assure compliance with Chapter 33 of the Building Code
- Assure work conforms to plans
- Designate a competent person to provide full-time safety supervision at the jobsite
- Notify the Department of accidents, damage to adjoining property, and certain other conditions by contacting the BEST- SSM/SSC/CS Hot Line (212) 393-2128
- Promptly correct any unsafe conditions discovered
- Upon each visit to the jobsite, inspect the entire work area and maintain a jobsite log
- One-, two-, or three-family new buildings (NB) will no longer require a CS
- All other jobs types requiring a CS will remain.

Updated eRenewal Process

- Under the new criteria, if a change to the renewal permit is required, online renewal is barred and the change **must** be renewed in a Borough Office.
- However, the Department **will not require removal of the CS** from the PW2 for a one-, two-, or three-family NB upon renewal.

For more information, **email BEST Squad at CSQuestions@buildings.nyc.gov.**

Bill de Blasio, Mayor
Rick D. Chandler, P.E., Commissioner

csquestions@buildings.nyc.gov
nyc.gov/buildings

- 1RCNY 3301-02
- August 2016 Service Update

CASE STUDIES

CASE STUDY 1: SLIDE 1

- No demolition sequence (BC 3306.5.1)
- No supplemental shoring/bracing (BC 3306.5.1)
- Exceeded allowable height for cantilever unreinforced masonry (BC 3306.8.2)
- Danger to the public

CASE STUDY 1: SLIDE 2

- Resulted in emergency stabilization work (AC 28-105.4.1)

CASE STUDY 1: SLIDE 3

Who has responsibility to report, resolve and safeguard this condition?

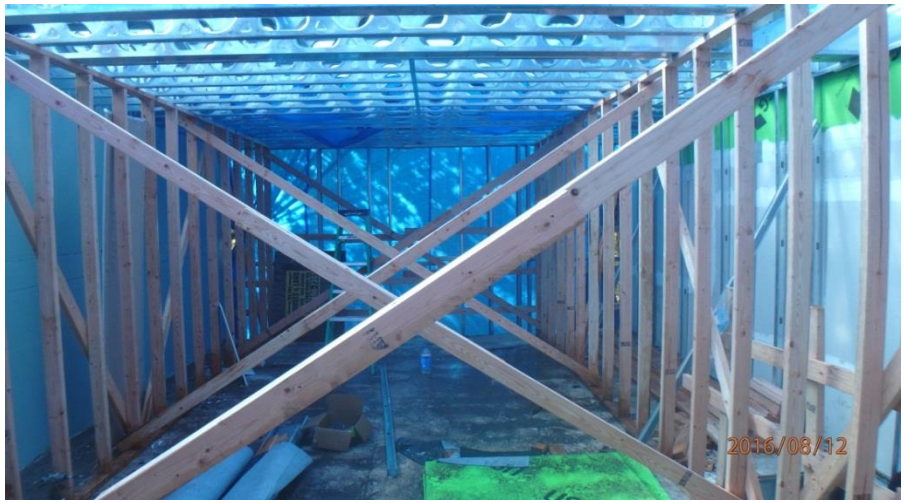
- GC?
- Engineer?
- Architect?
- Owner?
- Special Inspector?

CASE STUDY 2: SLIDE 1

- No demolition sequence
  - No supplemental shoring/bracing (BC 3306.5.1)
- Compromised fire protection of Exp. 2 and 4 buildings
- Removal of interior bearing walls without replacement
- Failed analysis
- Many construction safety violations
- No SOE drawings
- Work contrary to plans
- Deficient inspections

CASE STUDY 2: SLIDE 2

- Resulted in emergency stabilization work (AC 28-105.4.1)
- Adjacent buildings had significant collateral damage
- Damage resulted in vacate order for adjacent building and HPD demolition.
- Enforcement action against the building and professionals

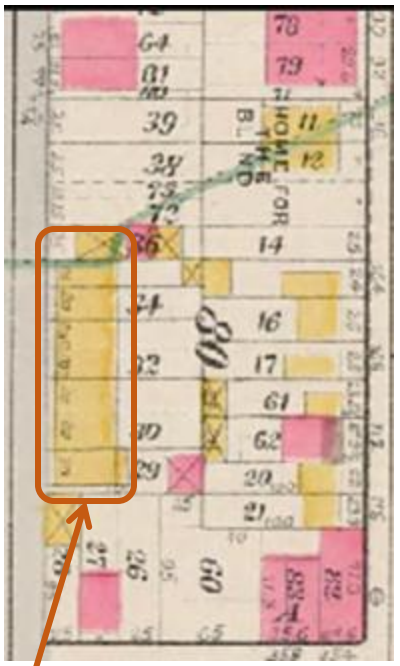


CASE STUDY 2: SLIDE 3

Who has responsibility to report, resolve and safeguard this condition?

- GC?
- Engineer?
- Architect?
- Owner?
- Special Inspector?

CASE STUDY 3: SLIDE 1



Formerly a group of 8 row houses; currently 4 row houses

CASE STUDY 3: SLIDE 2

CASE STUDY 3: SLIDE 3

Relieving Walls

- Provisions found as early as 1860 NYCBC
- Progressive Collapse Provisions, as well as, Structural Requirements

Partial Collapse

- Wood noggin walls
- Loss of fire protection for adjacent properties
- Full collapse of adjacent building prevented by interior walls

CASE STUDY 4: SLIDE 1

- Combination of two buildings under Alteration
- Removal of middle structural wall
- Removal of front wall

CASE STUDY 4: SLIDE 2

- No sequence
- Deficient drawings
- Insufficient load path
- Questionable bearing for new wood stud walls
- Questionable bracing of side and rear walls
- Egress issues
- No monitoring
- Failure to notify the Department

CASE STUDY 4: SLIDE 3

Resulted in:

- Emergency work (AC 28-105.4.1)
- Daily monitoring until stabilization complete
- Enforcement action

Common Errors and Omissions:

Excavations, Interior Demolitions & Alteration Submissions

TOPICS

- 10 Common Errors and Omissions noticed during Pre-Construction and Construction
- Photos of good and bad Support of Excavations (SOE) and Underpinning
- Discuss the following Chapters of the **2014 New York City Building Code** - Relevant to the Excavation, Support of Excavations, Underpinning and Interior Demolitions:
  - Chapter 16 - Structural Designs
  - Chapter 17 - Structural Tests and Special Inspections
  - Chapter 18 - Soils and Foundations
  - Chapter 33 - Safeguards during Construction

TEN MOST COMMON ERRORS & OMISSIONS

Ten (10) Common Errors and Omissions encountered during Pre-Construction and Construction

1. Adjacent buildings structure not shown on the plans. Bottom of existing adjacent footings not indicated.

2. Deficient design of SOE systems where the lateral loads and eccentricities are not accounted for in the design. Existing footing projections are removed.

3. No SOE provided for excavations less than 5ft., but within 5ft. of adjacent foundation

TEN MOST COMMON ERRORS & OMISSIONS

4. Inadequate bracing for underpinning or SOE systems. Excessive vertical and horizontal displacements. Deflection/ lateral movements must be considered in the design (only stress accounted for).

5. Sequence of construction not indicated or not indicated in sufficient detail.

6. No monitoring specified for protection of adjacent buildings and/or Landmark structures within 90ft.buildings structure not shown on the plans. Bottom of existing adjacent footings not indicated.

TEN MOST COMMON ERRORS & OMISSIONS

7. No pre-construction surveys for determining existing condition of adjacent buildings.

8. Structural stability inspections for adjacent structures not indicated or implemented.

9. Inadequate soil investigations and lack of documentation.

10. Adjacent utilities not surveyed/located and documented prior to start of construction.

TEN MOST COMMON ERRORS & OMISSIONS

Adjacent Building Structure Not Indicated

1. Adjacent buildings structure not shown on the plans. Bottom of existing adjacent footings not indicated.

2014 Building Code: Chapter 1 Administration

BC 107 Construction Documents

BC 107.7.1 Foundation Plans

Foundation plans shall show compliance with the requirements of Chapter 18 of this code regarding foundation design and shall show the plan locations, design loads, design elevations of the bottoms, and details as to sizes, reinforcement, and construction of all footings, piers, foundation walls, pile groups, and pile caps. **The levels of footings of adjacent structures shall be indicated or, if the adjacent structures are pile supported, this shall be stated.** Where applicable, the plans shall include underpinning details.

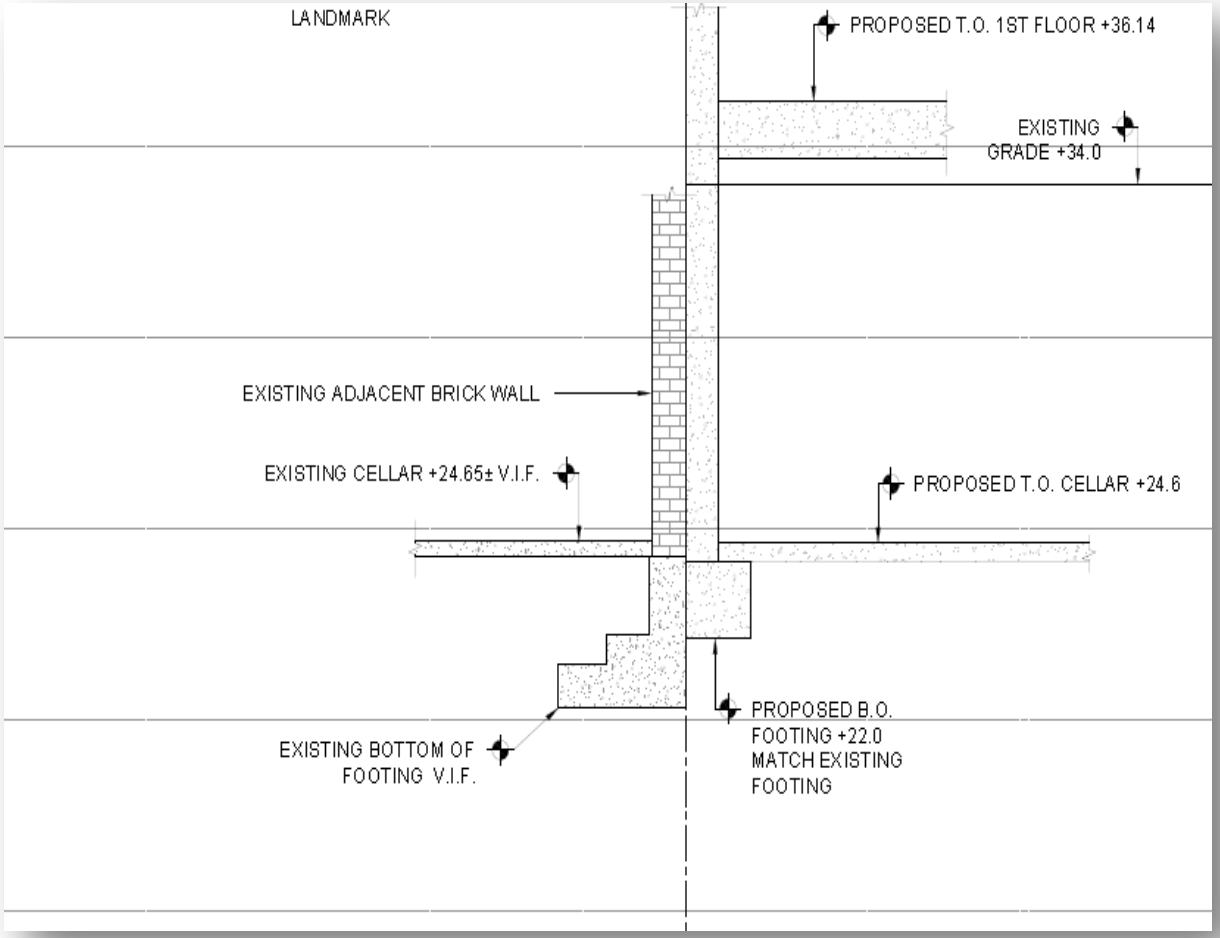
2014 Building Code: Chapter 1 Administration

BC 107 Construction Documents

BC 107.8 Earthwork Plans

For excavation operations, **the plans shall also indicate the levels of footings of all adjacent structures or, if the adjacent structures are pile supported, this shall be stated.** Where applicable, the plans shall also include underpinning details, soil information in accordance with Chapter 18, and a final grading plan representing the lot after all earthwork, excavation or fill operations have been completed.

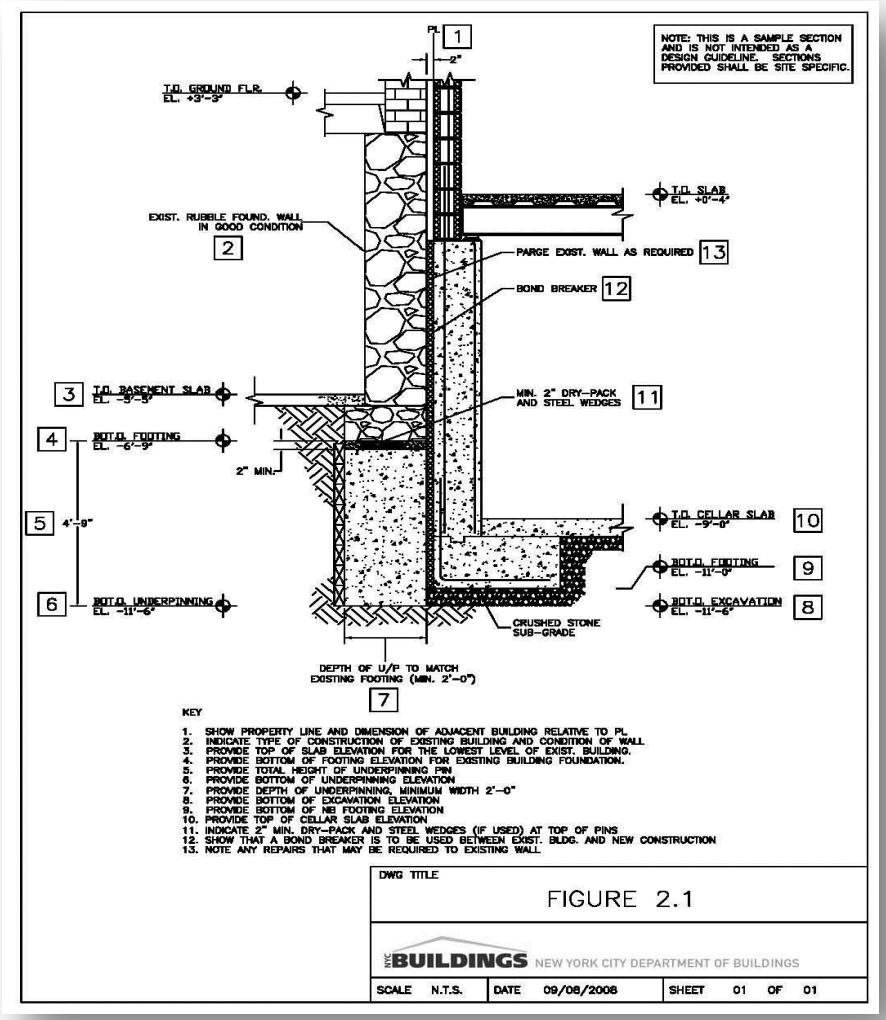
BOTTOM OF EXISTING FOOTING V.I.F. – NOT GOOD



Bottom of existing adjacent footings **must** be documented prior to filing and permitting with the Department.

Do not address during construction and note V.I.F.

BOTTOM OF EXISTING FOOTING V.I.F. – GOOD



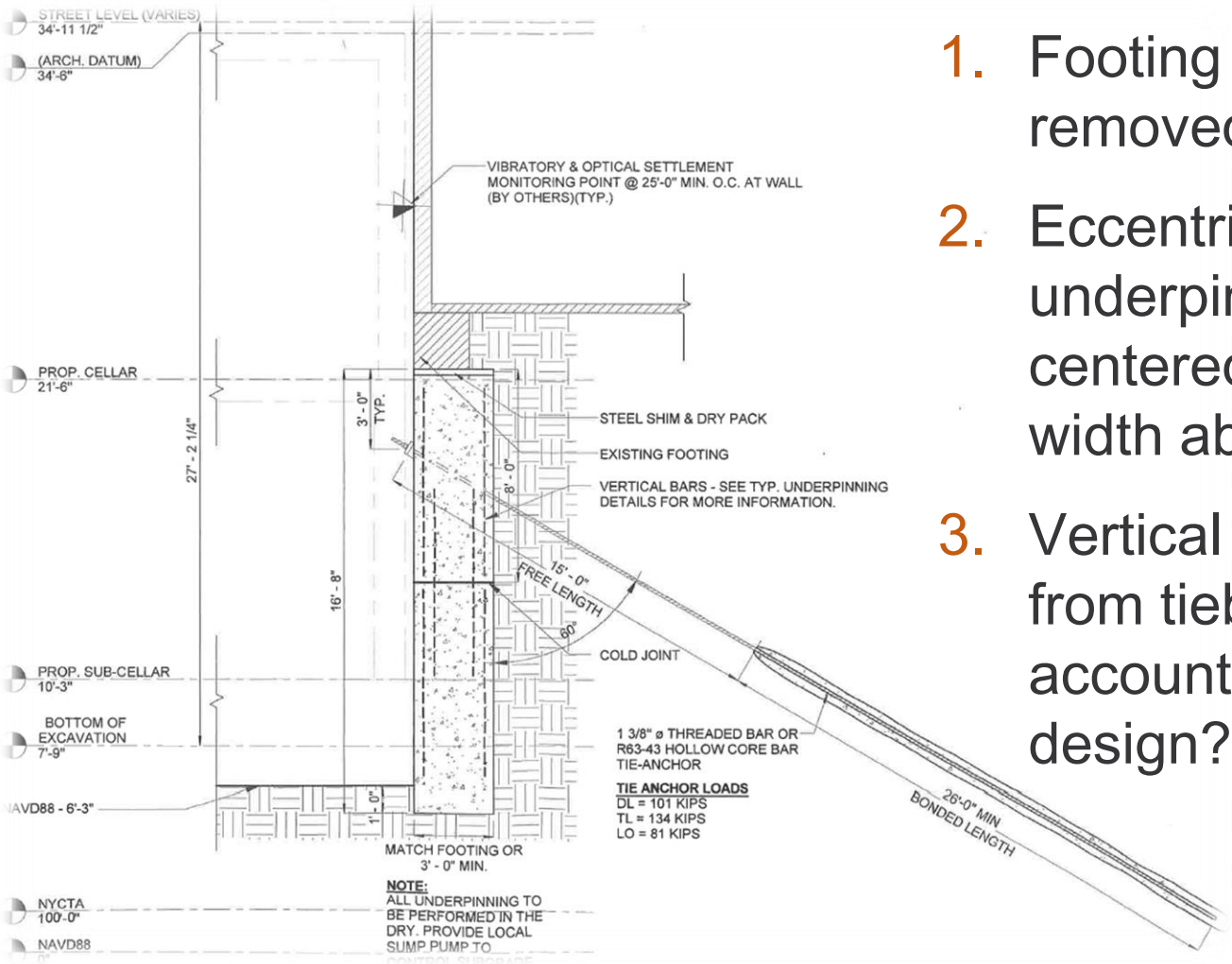
Example of sufficient documentation of **existing** and **new construction**, and **bottom of existing adjacent footing**

TEN MOST COMMON ERRORS & OMISSIONS

Lateral Loads & Eccentricities Not Accounted for in the Design

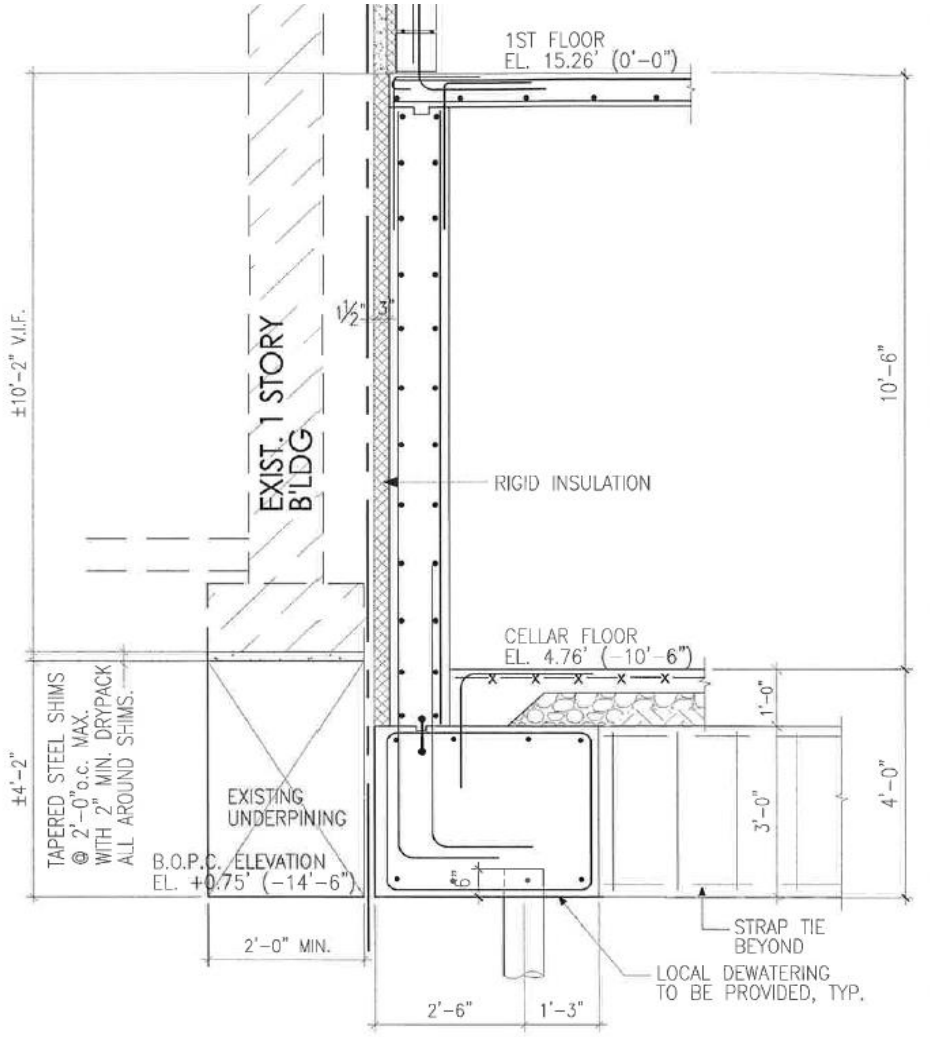
2. Deficient design of SOE systems where the lateral loads and eccentricities are not accounted for in the design. Existing footing projections are removed.

Eccentricity and Lateral Loads



1. Footing projection/toe removed.
2. Eccentrically loaded underpinning. Not centered with footing width above.
3. Vertical component from tieback accounted for in design?

ECCENTRICITY AND LATERAL LOADS



1. Footing projection/ toe maintained
2. Concentrically loaded footing
3. Width of underpinning matches existing footing width

TEN MOST COMMON ERRORS & OMISSIONS

No SOE provided for < 5ft

3. No SOE provided for excavations less than 5ft., but within 5ft. of adjacent foundation.

2014 Building Code: Chapter 33 Safeguards

BC 3304 Soil and Foundation Work

3304.2 Support of excavation drawings

The sides of all excavations, including related or resulting embankments, shall be supported as specified on the drawings. Such drawings shall be site specific and shall clearly illustrate all related protection and support of excavation, including but not limited to sloping, stepping, sheeting, shoring, bracing, guardrail systems, and fences as required by Section 3304.4 (protection of sides of excavation), with all dimensions indicated. Such drawings shall also indicate any utilities or public infrastructure impacted by the excavation.

NO SOE: DEPTH LESS THAN 5 FEET

BC 3304 Soil and Foundation Work

3304.2 Support of excavation drawings *(continued)*

Exceptions:

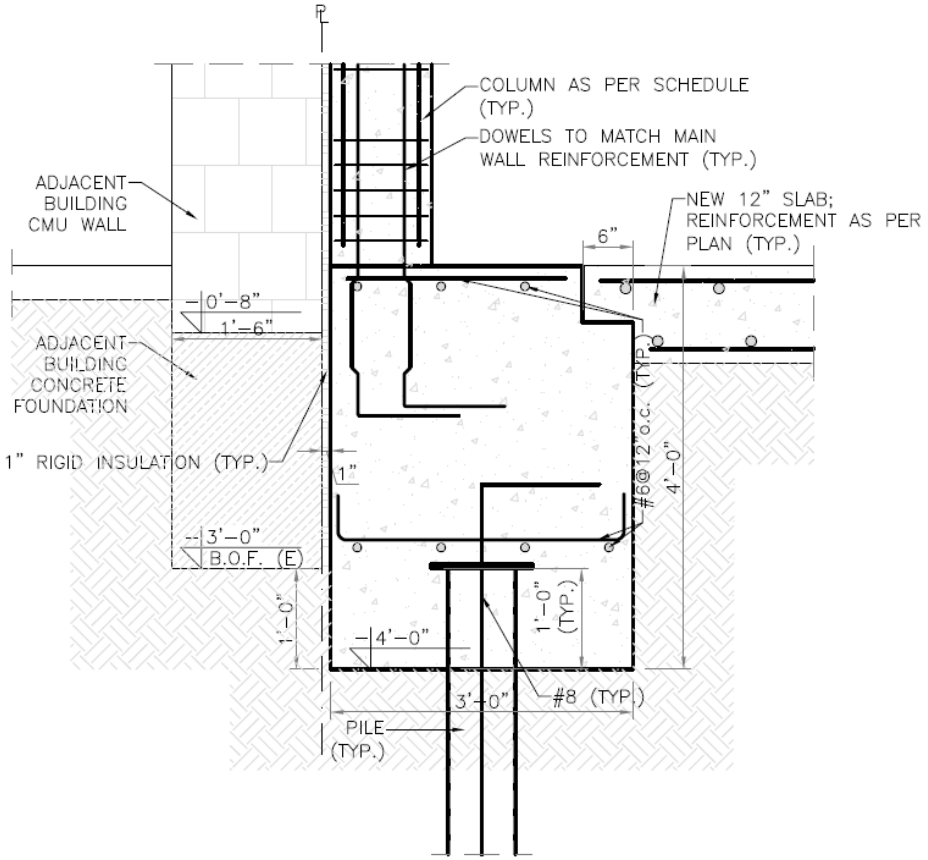
1. Drawings for the support of excavations are not required for an excavation:

    1.1 That occurs 5 feet or less in depth PROVIDED:

    1.1.1 The excavation also occurs more than 5ft from all footings and foundations; or

    1.1.2 Where the excavation occurs within 5ft or less from a footing or foundation, such excavation does not occur below the level of the footing or foundation.

NO SOE: DEPTH LESS THAN 5 FEET



L ADJACENT BUILDING - CORNER CONDITION

Scale: 3/4" = 1'-0"

Excavation is occurring adjacent to and below the existing foundation.

Depth is 4ft.

No Support of Excavation: Bottom of Existing Footing Above New Proposed Footing

TEN MOST COMMON ERRORS & OMISSIONS

Inadequate Bracing and Displacement of Support of Excavation

4. Missing or inadequate bracing for underpinning or support of excavation. Excessive vertical and horizontal displacement. Deflection/lateral movement must be considered in design (only stress accounted for).

2014 Building Code: Chapter 18 Foundations

BC 1814 Underpinning and Support of Adjacent Property

1814.1.1 Underpinning and Bracing

Underpinning piers, walls, piles and footings shall be designed as permanent structural elements and installed in accordance with provisions of this chapter and Chapter 33 and shall be inspected in accordance with the provisions of Chapter 17. *Underpinning shall be designed and installed in such a manner so as to limit the lateral and vertical displacement of the adjacent structure to permissible values as established in accordance with Section 1814.3 (Monitoring).*

Local Collapse Due to Undermining of Rubble Foundation Wall

- Underpinning Pier Width too Large
- Note the Arching Action of the Wall to Remain

2014 Building Code: Chapter 33 Safeguards

BC 3309 Protection of Adjoining Property

3309.4 Soil or foundation work affecting adjoining property

Whenever soil or foundation work occurs, regardless of the depth of such, the person who causes such to be made shall, at all times during the course of such work and at his or her own expense, preserve and protect from damage any adjoining structures, including but not limited to footings and foundations…

2014 Building Code: Chapter 33 Safeguards

BC 3309 Protection of Adjoining Property

3309.4.1 Additional safeguards during construction The following additional requirements shall apply during excavation:

1. The person causing the excavation shall support the vertical and **lateral** load of the adjoining structure by proper foundations, underpinning, or other equivalent means where the level of the foundations of the adjoining structure is at or above the level of the bottom of the new excavation.

Lateral Movement of Support of Excavation: Utilities Not Safeguarded

- Deflection of SOE System **Not** Accounted for in Design

Lateral Movement & Settlement of Adjacent Building Due to Insufficient Bracing of SOE System

SOE – Soldier Piles and External Bracing
Good Example

20ft deep excavation with sufficient bracing provided by raker and waler system

TEN MOST COMMON ERRORS & OMISSIONS

Sequence on Construction

5. Sequence of construction not indicated or not indicated to sufficient detail.

2014 Building Code: Chapter 18 Foundations

BC 1814 Underpinning and Support of Adjacent Property

1814.1 General

Where the protection and/or support of a structure or property adjacent to an excavation is required, an engineer shall prepare a preconstruction report summarizing the condition of the structure or property. The engineer shall determine the requirements for underpinning or other protection of the site and structure-specific plans, including details and ***sequence of work*** for submission to the commissioner.

POOR/INSUFFICIENT SEQUENCING

Sequence of Work

- Responsibility of the Contractor. Means and Methods of Construction…

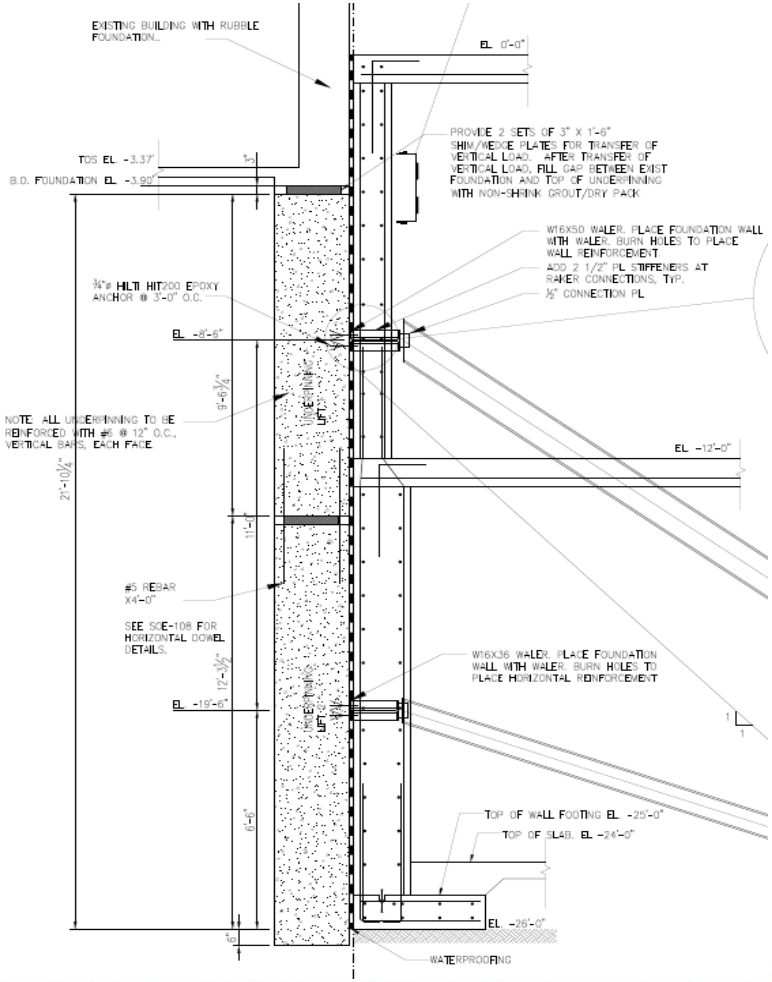
NO

SHORING PROCEDURE:

1. EXCAVATE LOCALLY TO INSERT SOLDIER BEAM TO E.L.
2. INSERT SOLDIER BEAM
3. EXCAVATE LOCALLY AND INSTALL TIMBER LAGGING 3"x 10" OR 1" STEEL PLATE.
4. CONTINUE STEP 3 UNTIL THE EXCAVATION IS DONE UP TO REQUIRED E.LEVATION.
5. CONTINUE WITH PROPOSED CONSTRUCTION.

Site Specific or Generic?

MULTI TIER UNDERPINNING SEQUENCE – *GOOD EXAMPLE*



CONSTRUCTION SEQUENCE:

1. START WITH LIFT 1 UNDERPINNING LABELED "A". EXCAVATE AND CONSTRUCT APPROACH PIT PER DETAILS.
2. CONSTRUCT FORMWORK PER UNDERPINNING PIT FORMWORK DETAILS.
3. PLACE CONCRETE FOR LIFT 1, PIN "A".
4. TRANSFER LOAD TO LIFT 1, PIN "A" PER NOTES 18 HOURS MIN AFTER THE UNDERPINNING IS CAST. DO NOT APPLY LATERAL LOAD TO UNDERPINNING UNTIL 3 DAYS AFTER THE UNDERPINNING IS CAST.
5. REMOVE APPROACH PIT AND BACKFILL.
6. ONCE CONSTRUCTION OF ALL LIFT 1 "A" UNDERPINNING IS COMPLETE, SPECIAL INSPECTOR SHALL PERFORM VISUAL INSPECTION TO ENSURE PINS HAVE NOT SETTLED/SHRUNK AND THAT THE VERTICAL LOAD IS BEING PROPERLY TRANSFERRED. THERE SHOULD BE NO GAPS BETWEEN THE BOTTOM OF EXISTING FOOTING AND THE TOP OF THE UNDERPINNING. IF VERTICAL LOAD IS NOT PROPERLY TRANSFERRED, RE-SHIM AND DRY PACK. CONTRACTOR AND SPECIAL INSPECTOR SHALL INFORM ENGINEER IMMEDIATELY AND WAIT FOR AUTHORIZATION TO PROCEED.
7. REPEAT STEPS 1-6 FOR LIFT 1 UNDERPINNING LABELED "B", "C", AND "D" WHILE PERFORMING CONTINUOUS VISUAL INSPECTIONS.
8. EXCAVATE DOWN TO JUST BELOW TOP BRACING ELEVATION. INSTALL TOP WALER.
9. TRENCH (1) 5' WIDE SECTION @ 1:1 SLOPE AS SHOWN IN SECTION.
10. INSTALL TOP RAKER AND HEEL BLOCK.
11. MOVE TO NEXT RAKER LOCATION AND CONTINUE TO TRENCH LOCALLY AND INSTALL TOP RAKERS AND HEEL BLOCKS ONE AT A TIME UNTIL ALL TOP RAKERS ARE INSTALLED.
12. CONSTRUCT LIFT 2 BY STARTING WITH UNDERPINNING LABELED "A". EXCAVATE AND CONSTRUCT APPROACH PIT PER DETAILS.
13. CONSTRUCT FORMWORK PER UNDERPINNING PIT FORMWORK DETAILS.
14. PLACE CONCRETE FOR LIFT 2, PIN "A".
15. TRANSFER LOAD TO LIFT 2, PIN "A" PER NOTES 18 HOURS MIN AFTER THE UNDERPINNING IS CAST. DO NOT APPLY LATERAL LOAD TO UNDERPINNING UNTIL 3 DAYS AFTER UNDERPINNING IS CAST.
16. REMOVE APPROACH PIT AND BACKFILL
17. ONCE CONSTRUCTION OF ALL LIFT 2 "A" UNDERPINNING IS COMPLETE, SPECIAL INSPECTOR SHALL PERFORM VISUAL INSPECTION TO ENSURE PINS HAVE NOT SETTLED/SHRUNK AND THAT THE VERTICAL LOAD IS BEING PROPERLY TRANSFERRED. THERE SHOULD BE NO GAPS BETWEEN THE BOTTOM OF EXISTING FOOTING AND THE TOP OF THE UNDERPINNING. IF VERTICAL LOAD IS NOT PROPERLY TRANSFERRED, RE-SHIM AND DRY PACK. CONTRACTOR AND SPECIAL INSPECTOR SHALL INFORM ENGINEER IMMEDIATELY AND WAIT FOR AUTHORIZATION TO PROCEED.
18. REPEAT STEPS 12-17 FOR LIFT 2 UNDERPINNING LABELED "B", "C", AND "D" WHILE PERFORMING CONTINUOUS VISUAL INSPECTIONS.
19. STAGGER UNDERPINNING PIERS IN LIFT 1 AND LIFT 2 PER DETAIL.
20. EXCAVATE DOWN TO JUST BELOW BOTTOM BRACING ELEVATION. INSTALL BOTTOM WALER.
21. TRENCH (1) 5' WIDE SECTION AS SHOWN IN SECTION.
22. INSTALL BOTTOM RAKER.
23. MOVE TO NEXT RAKER LOCATION AND CONTINUE TO TRENCH LOCALLY AND INSTALL BOTTOM RAKERS ONE AT A TIME UNTIL ALL BOTTOM RAKERS ARE INSTALLED.
24. ONCE ALL SUPPORT BRACING IS INSTALLED, EXCAVATE TO REQUIRED ELEVATION AS SHOWN IN DETAIL.

SOE – Soldier Pile and Lagging Wall *Failure*

- Improper sequencing led to failure
- Toe-pin was required in lieu of rock socket for soldier piles
- Excavation Extended Below the Toe-Pin Elevation

TEN MOST COMMON ERRORS & OMISSIONS

Monitoring

6. No monitoring specified for protection of adjacent buildings and/or landmark structures within 90ft.

2014 Building Code: Chapter 18 Foundations

BC 1814 Underpinning and Support of Adjacent Property

1814.3 Monitoring

When excavation, foundation construction, or underpinning is required, adjacent structures and properties shall be monitored in accordance with a plan prepared by the engineer. The engineer shall develop the scope of the monitoring program, including location and type of instruments, frequency and duration of readings, and permissible movement and vibration criteria.

2014 Building Code: Chapter 18 Foundations

BC 1814 Underpinning and Support of Adjacent Property

1814.3 Monitoring *(continued)*

This scope shall take into account the structures or property to be monitored and the conditions thereof. **The monitoring program shall include necessary actions to address exceedances.** These actions shall include notification of the commissioner. Monitoring of historic and landmarked structures shall be subject to special requirements as determined by the department.

2014 Building Code: Chapter 17 Special Inspections

BC 1704.20 Structural Stability

1704.20.7.1 Monitoring

The design documents shall include any requirements for monitoring of the subject structure **and/or adjacent structures**, as determined by the registered design professional responsible for the design. The monitoring plan shall be specific to the buildings to be monitored and operations to be undertaken, **and shall specify the scope and frequency of monitoring, acceptable tolerances, and reporting criteria for when tolerances are exceeded**.

2014 Building Code: Chapter 33 Safeguards

BC 3309 Protection of Adjoining Property

3309.4.4 Monitoring

During the course of excavation work the following shall be monitored in accordance with Section 3309.16:

1. Buildings that are within a distance from the edge of the excavation that is equal to or less than the maximum depth of the excavation.
2. Historic structures that are contiguous to or within a lateral distance of 90 feet from the edge of the lot where an excavation is occurring.

2014 Building Code: Chapter 33 Safeguards

BC 3309 Protection of Adjoining Property

3309.16 Monitoring plan

Where monitoring is required by Section 3309, such monitoring **shall be in accordance with a monitoring plan developed by a registered design professional** and acceptable to the commissioner. The monitoring plan shall be specific to the structures to be monitored and operations to be undertaken, and **shall specify the scope and frequency of monitoring, acceptable tolerances, and reporting criteria for when tolerances are exceeded**.

TEN MOST COMMON ERRORS & OMISSIONS

Pre-construction Surveys

7. No pre-construction surveys for determining condition and protection of adjacent buildings.

2014 Building Code: Chapter 18 Foundations

BC 1814 Underpinning and Support of Adjacent Property

1814.1 General

Where the protection and/or support of a structure or property adjacent to an excavation is required, **an engineer shall prepare a preconstruction report summarizing the condition of the structure or property**. The engineer shall determine the requirements for underpinning or other protection of the site and structure-specific plans, including details and sequence of work for submission to the commissioner.

2014 Building Code: Chapter 33 Safeguards

BC 3309 Protection of Adjoining Property

3309.4.3 Preconstruction survey

No excavation work to a depth of 5 feet to 10 feet within 10 feet of an adjacent building, or an excavation over 10 feet anywhere on the site **shall commence until the person causing an excavation to be made has documented the existing conditions of all adjacent buildings in a preconstruction survey.**

TEN MOST COMMON ERRORS & OMISSIONS

Structural Stability Inspections

8. Structural stability inspections for adjacent structures not indicated or implemented.

2014 Building Code: Chapter 17 Special Inspections

BC 1704.20 Structural Stability

1704.20.1 Structural stability of existing buildings

Alterations to existing structures in which loads are transferred from one structural system of structural elements to another, such as installation of columns or girders, replacement of existing bearing walls, the creation of openings or slots in existing walls, girders or floors, alteration of arches, rigid frames, trusses in frame buildings, **where the stability or integrity of a structural system is to be temporarily diminished, or where otherwise required by the commissioner, shall be subject to special inspections** in accordance with Sections 1704.20.6 through 1704.20.10.

2014 Building Code: Chapter 17 Special Inspections

BC 1704.20 Structural Stability

1704.20.1.1 Construction operations influencing adjacent structures.
Where construction operations have the potential to affect structurally the condition or occupancy of the subject structure and/or an adjacent structure, the structural stability of such structures shall be subject to special inspections in accordance with Sections 1704.20.6 through 1704.20.10.

2014 Building Code: Chapter 17 Special Inspections

BC 1704.20 Structural Stability

1704.20.2 Excavations
Methods employed to protect the sides of excavations meeting the requirements of Item 1 of Section 3304.4.1 shall be subject to special inspections in accordance with Sections 1704.20.6 through 1704.20.10.

1704.20.3 Underpinning
Underpinning of structures shall be subject to special inspections in accordance with Sections 1704.20.6 through 1704.20.10

TEN MOST COMMON ERRORS & OMISSIONS

Inadequate Soil Investigations

9. Inadequate soil investigations and lack of documentation.

2014 Building Code: Chapter 1 Administration

BC 107 Construction Documents

BC 107.7.1 Foundation Plans

In addition, there shall be a statement indicating the character and minimum class of the soil strata required for the support of the foundation; the allowable soil pressure used for the design of footings; and the character, class, and presumptive bearing capacity of the bearing stratum to which piling is required to penetrate. The types and design capacities of pilings and the records of required borings or test pits shall also be shown…

2014 Building Code: Chapter 16 Structural Design

BC 1603 Construction Documents

BC 1603.1 General *(continued)*

1603.1.7 Geotechnical Information

The design load-bearing values of soils or rock under shallow foundations and/or the design load capacity of deep foundations shall be shown on the construction drawings.

2014 Building Code: Chapter 18 Foundations

BC 1802 Geotechnical Investigations & Material Classifications

1802.2 Where Required

A geotechnical investigation shall be conducted for:

1. New Structures
2. Horizontal Enlargements
3. Vertical enlargements or alterations necessitating new foundations or resulting in additional loading that exceeds 5% of the existing foundation capacity; or
4. As required by the commissioner or applicant of record

TEN MOST COMMON ERRORS & OMISSIONS

Surveying/Locating Adjacent Utilities

10. Adjacent utilities not surveyed/located and documented prior to start of construction.

2014 Building Code: Chapter 1 Administration

BC 107 Construction Documents

107.8 Earthwork Plans

Where the application is sought solely for or includes earthwork, excavation or fill operations, including but not limited to site decontamination, soil remediation and grading, the applicant shall submit 1) a lot diagram showing the exact location of the lot and dimensions to the nearest corner; and
2) *plans showing the exact location, extent, and depth or height of the proposed earthwork, excavation or fill operation and any existing utilities, foundations or other infrastructure potentially impacted by the earthwork, excavation or fill operation.*

2014 Building Code: Chapter 33 Safeguards

BC 3304 Soil and Foundation Work

3304.2 Support of excavation drawings

The sides of all excavations, including related or resulting embankments, shall be supported as specified on the drawings. Such drawings shall be site specific and shall clearly illustrate all related protection and support of excavation, including but not limited to sloping, stepping, sheeting, shoring, bracing, guardrail systems, and fences as required by Section 3304.4 (protection of sides of excavation), with all dimensions indicated. *Such drawings shall also indicate any utilities or public infrastructure impacted by the excavation.*

2014 Building Code: Chapter 33 Safeguards

BC 3304 Soil and Foundation Work

BC 3304.3.1 Notification to the Department

No soil or foundation work within the property line shall commence unless the permit holder, or where there is no permit holder the person causing the soil or foundation work to be made, notifies the department, via phone or electronically, at least 24 hours, but no more than 48 hours prior to the commencement of such work. The notification shall state the date that such soil or foundation work is to commence…

811 Call Before You Dig Notification

NYC Buildings

INDUSTRY NOTICE

Earthwork Notification: 811 (Call Before You Dig) One Call Ticket Number Requirement

Beginning May 1, 2017, the Department of Buildings requires Earthwork Contractors to provide the 811 (Call Before You Dig) One Call ticket number when making normal notification of the commencement of earthwork. The required ticket number can be obtained through the 811 One Call phone number or online at www.newyork-811.com.

Notification is not complete unless the 811 ticket number is provided to the Department. Once the Department receives the required ticket number, the information will be recorded in the Department's notification database. All documents related to the notification **must** be kept on-site and available upon request.

*NOTE: The 811 ticket number **must** address **all street frontages** associated with the excavation.*

To complete the Department's Earthwork Notification, please call (212) 393-2550. For questions or additional information, please email EInquiry@buildings.nyc.gov.

As of May 1, 2017 it is required that the **811 Call Before You Dig** ticket number(s) be provided for **ALL** street frontages associated with the excavation

PROJECT EXAMPLES & PHOTOS

A single cubic yard of soil weighs approximately:

3,000 lbs.

UNDERPINNING: *GOOD EXAMPLE*

- Adequate Approach and Box Pit construction

UNDERPINNING: *POOR EXAMPLE*

- Safeguards?
- Approach pits?
- SOE?

UNDERPINNING: *POOR EXAMPLE*

- Approach Pits?
- Width of Pin?
- Lagging?
- Sequence?

UNDERPINNING: *POOR EXAMPLE*

- Width of Pin?
- Approach Pits/SOE?
- Lagging/SOE?

UNDERPINNING: WIDE PINS

- 8ft. Wide pins
- Double the specified 4ft. width

Underpinning Width Too Large
12 Foot Wide Section

SOE: SOLDIER PILE & LAGGING – *GOOD EXAMPLE*

SOE: Soldier Pile & Lagging – Proper Sequencing and Bracing

SOE: Soldier Pile & Lagging – Proper Sequencing and Bracing

Design of Deep Support of Excavation

- 45 ft. deep excavation – Upper most tie back too low from the top of excavation
- Lateral movement

Lateral Movement of Support of Excavation

- Settlement visible at top of the SOE system due to lateral movement

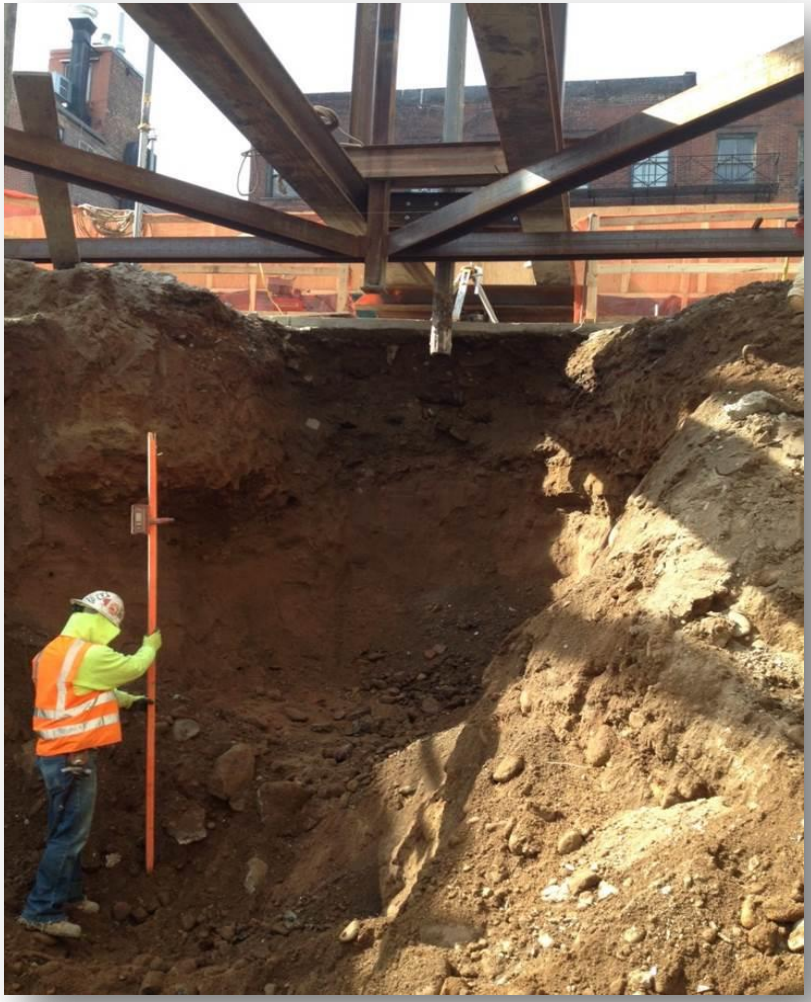
UNSUPPORTED EXCAVATION

- More than 5ft.?
- Sequence?
- Excavation adjacent to neighboring foundation

No Support of Excavation

- Example of improper means and methods/sequence for SOE installation
- Full excavation was performed first!
- No SOE

No Support of Excavation



- Support of Excavation?
- More Than 5 feet?
- Sequence?

Deep Shear Cuts without Support of Excavation

- 12ft High Shear Cuts with No Support of Excavation
- Surcharge from Construction Materials above?

UNDERPINNING – *POOR EXAMPLE*

- Support of Excavation?
- Sequence? Dig then support?

SUPPORT OF EXCAVATION?

- Support of Excavation?
- Surcharge Load from Excavator?

SEQUENCE? SUPPORT OF EXCAVATION?

- Support of Excavation?
- Lagging?
- Bracing?
- Monitoring?
- Safeguard?

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

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