LESSON 6: Structural Plan Review

Exterior Walls
Building Code Chapter 14

1402.2 Weather Protection
- Weather-resistant exterior envelope
  - Flashing
  - Water-resistant barrier
  - Means to drain
  - Protection from condensation
1404.3.1 Class I and II Vapor Retarders

- Climate Zone 4
  - Class II vapor retarders
  - Exterior wall only
- Climate Zones 5 & 6
  - Class I or II
  - Exterior wall only
- **1404.3.2 Class III**
Roof Assemblies and Rooftop Structures
Building Code Chapter 15

1503.1
- roof decks shall be covered with approved roof coverings securely fastened to the building

1507.2 Asphalt Shingles
- Solidly sheathed deck
- Slope
- Underlayment
- Attachment
- Ice dam membrane
- Flashings
- Drip edge
1507.2.5 Fasteners

- We do not have any information on how the shingles will be fastened
- What will be used to attach the sheathing, claddings, even the trim?

Roofing nails

- Galvanized
- Stainless steel
- Copper
- Aluminum

What about staples?
Chapter 16  Structural Design

Student Activity

- Checklist item #17, Structural Documentation
  - Appendix page 11 has the SUBMITTED INFORMATION
- Based on YOUR LOCAL CONDITIONS
  **IS THE DESIGNER’S DOCUMENTATION SUFFICIENT?**
- Reminder, accuracy of any engineering calculations is the responsibility of the design professional
### Building Code, Chapter 16
Checklist item #1, Structural Documentation

<table>
<thead>
<tr>
<th>Topic</th>
<th>Information required</th>
<th>Designer documentation</th>
<th>Local conditions</th>
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<tbody>
<tr>
<td>1(a)</td>
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<td>3rd floor – 50 psf</td>
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Checklist item #1, Structural Documentation

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Building Code, Chapter 16
Checkpoint item #1, Structural Documentation

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<td>Components, Cladding</td>
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September 28, 2020

Determination of Seismic Design Category

Step 1: Spectral Response Acceleration
$S_a$ and $S_h$ (from Figures 1613.2(1) and 1613.2(2))
Step 2: Determine Site Class: Section 1613.2.2 (page 379)
Assume Site Class D if soils unknown
Step 3: Determine Site Class Coefficients (page 382)
Table 1613.2.3(1) Table 1613.2.3(2)
Step 4: Determine Maximum Earthquake (page 379)
Equation 16-36 $S_{MS} = F_aS_s$
Equation 16-37 $S_{M1} = F_vS_1$
Step 5: Reduce for Acceptable Damage (page 379)
Equation 16-38 $S_{DS} = \frac{2}{3}S_{MS}$
Equation 16-39 $S_{D1} = \frac{2}{3}S_{M1}$
Step 6: Determine Building Risk Category (page 358)
Table 1604.5
Step 7: Determine SEISMIC DESIGN CATEGORY (page 383)
Table 1613.2(1) and Table 1613.2(2)
### Section [NY] 1612.3

**ESTABLISHMENT OF FLOOD HAZARD AREAS**

- To establish flood hazard areas, each community regulated under Title 19, Part 1203... shall adopt a flood hazard map and supporting data. ... shall include, at a minimum, special flood hazard areas as identified by FEMA ... as amended or revised with:
  - i. The accompanying Flood Insurance Rate Map (FIRM),
  - ii. Flood Boundary and Floodway Map (FBFM), and
  - iii. Related supporting data along with any revisions thereto.

- The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.
Section [NY] 1612.4
Flood Hazard Documentation

If it is determined that the proposed structure is to be constructed in an area subject to flooding, the design professional must provide documentation to the CEO to show the design conforms with ASCE 24

Building Code, Chapter 16
Structural Documentation

<table>
<thead>
<tr>
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<th>Design load bearing value of soils</th>
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<td>1603.1.7 Flood load</td>
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<td>Elevation-lowest horizontal member</td>
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Special Inspections
Operations Requiring Special Inspections

[NY] 1704.2 other than the contractor...shall employ... in accordance with 1705
- Special inspector qualifications
- Statement of special inspections
- Content of Statement of special inspections
- Contractor responsibility
- Structural observations

1705 Required Special Inspections and Tests
Special Inspections

Operations Requiring Special Inspections

- Steel Construction
- Concrete Construction
- Masonry Construction
- Wood Construction
- Soils
- Driven deep Foundations
- Cast-in-place Foundations
- Helical pile Foundations
- Fabricated Items
- Spec insp Seismic Resistance
- Spec insp Wind Resistance
- Testing for Seismic Resistance
- Sprayed Fire-Resistance Material
- Mastic and Intumescent fire-resistant coatings
- Exterior Insulation Finish System
- Fire-resistant joint systems
- Testing for Smoke Control

1809.4
Depth and Width of Footings

Sheet A3-1

Chapter 19  Concrete
Chapter 19  Concrete

Italics are used for text within Sections 1903 through 1905 of this code to indicate provisions that differ from ACI 318.

ACI 318 refers to the 2014 edition

1901.5 Construction Documents

There are 11 items that shall be included in the construction documents for structural concrete:

- Compressive strength
- Reinforcement specification
- Location of elements
- Provision for dimensional changes
- Pre-stressing forces
- Reinforcement details
- Splices of reinforcement
- Contraction or isolation joints
- Strength for post-tensioning
- Post-tensioning sequence
- Seismic Design Category D, E or F statement
Provisions for Dimensional Changes

Student Activity

• 1907 Minimum Slab Provisions

- Using sheet A1-1, determine if the proposed slab meets the requirements of Section 1907

Building Code, Chapter 19

Structural Documentation

<table>
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<th>S</th>
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<th>Vapor barrier</th>
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2107.1 Masonry

TMS 402/ACI 530/ASCE 5

• Standard for masonry structures in Allowable Stress Design

2107.1.2 Masonry Fireplaces

<table>
<thead>
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<tr>
<td>Masonry Fireplaces</td>
<td>2107.1 / 2106 TMS 402/ACI 530/ASCE 5</td>
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<table>
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<th>Fasteners</th>
<th>Corbeling</th>
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<tbody>
<tr>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>

Fireplace drawings:
- Construction documents
- Location
- Size
- Construction
- Materials
- Thickness
- Characteristics
- Clearances from walls, ceilings, partitions

n/a
2205.2 Seismic design
- SDC categories B - F
- Specific design requirements

Sheet ST-2

2201 Steel

Sheet ST-3

Identification of steel:
- AISC 360
- SJI
- AISI S211
- AISI S100
- AISI S200/S220
- NYS SED Law

Special loads:
- Steel joist drawings: None specified
- ASTM A501: None specified
### Conclusion

- The exterior wall appears to be compliant. There may be a question on the location of the flashing at the base of the brick veneer.
- The roof design is compliant, but more information on roof materials would be helpful including fastening info.
- More information is needed to verify that the concrete construction is going to meet the requirements of the code.
- More information is needed to satisfy the Code requirements for the design loads.
- More information is needed for Masonry and Steel elements
Chapter 9
Fire Protection and Life Safety Systems

September 28, 2020 1

Student Activity
Checklist Item #12

- Determine what fire protection systems will be required in the proposed building using Chapter 9 of the Fire Code.

September 28, 2020 2

Student Plan Review Activity
What is required / What is provided
page 5 of 11 in the commercial plan checklist, in your appendix

September 28, 2020 3
Supervisory Service

- **BCNY 901.6 Supervisory service.**
  Where required, fire protection systems shall be monitored …

  - Sprinkler System
  - Fire Alarm System
  - Group H Emergency Alarm

- Required and Provided
### Sprinkler Systems

- **903.2** Where required...
  - Group B not listed
  - Group A-2 based on *Fire Area*  
    - 5000 SF
    - 100 people
  - *Not required*

### SPRINKLER REQUIREMENTS

What other requirements found in section 903 would apply to this building?

- **903.2.11.3**
  - Buildings over 55’ in height
- **903.2.11.6**
  - Other required suppression systems
903.2.11.3
Buildings over 55’ in height

Sprinkler system required if...
- Floor area with an occupant load over 30 people
- 55’ or more above the lowest level of fire department vehicle access

This requires 3 steps
1. Determine the elevation of the finish grade
2. Determine the elevation of the finished floors above grade
3. Determine the occupant load of floors above 55’

STEP 1
- How would we determine the lowest level of fire department access?
  - Site plan sheet S1-3
  - Topography lines
- What is the lowest level of fire department vehicle access?
  - East elevation @ 37’.00”
**STEP 2**

- How would we determine the elevation of the floor levels?
  - Sheet A3-1 or A3-2
- What are the finish floor elevations?
  - First floor 0', At grade
  - Second floor 0' + 11' 6" = 11' 6"
  - Third floor 11' 6" + 11' 6" = 23'
- What about the flat roof area for the HVAC equipment is it a floor or a flat roof?

**STEP 3**

- Determine the occupant load of the floors
  - First
  - Second
  - Third
**FINAL DETERMINATION 903.2.11.3**

- The third floor is 23' above the LLFDVA
  - That's below 55'
- The flat roof area is 34' 4.5" above the LLFDVA
  - But it has no occupant load

903.2.11.3 does not require a sprinkler system

**903.2.11.6**

Other Required Suppression Systems

903.2 sends you to table 903.2.11.6

The only item in the table that appears to apply is the atrium requirement that we have already determined in section 404.3

**Basement Sprinkler Requirements**

903.2.11.1 Stories without openings

903.2.11.1.3 Basements

- Do not apply to this building because it does not have a basement
<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Section</th>
<th>Required or Allowed</th>
<th>Actual</th>
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<td>9-101.6</td>
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<td>Fire Extinguishers</td>
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</table>

**Information on the Plans Sheet SP - 3**

**903.3 Installation Requirements**

- Automatic sprinkler system shall be designed and installed to this section
  - 903.3.1 – sprinklers shall be designed to 903.3.1.1 unless otherwise permitted by sections 903.3.1.2 and 903.3.1.3
  - 903.3.1.1 – where the provisions of this code require that a building…

A Division of New York Department of State
BCNYS 901.2 Exception:

- Any fire protection system or portion thereof not required by this code shall be permitted to be installed for partial or complete protection provided that such system meets the requirements of this code.

FCNYS 901.4.2

- Non-required fire protection systems...

“Shall be allowed to be furnished...provided such installed systems meet the requirements of this code and the Building Code.”

Information on the Plans 903.3.1.1 NFPA 13

- The Code requires that the system be installed in accordance with NFPA 13.
Typical Information associated with Hydraulic Sprinklers

Typical information associated with Hydraulic Sprinklers

This system as shown is company owned.

It is designed to discharge a rate of 4001.

Seawater is supplied at a rate of 1500.

A section of the base of the hose is not

Minimum storage height

Typical Information associated with Hydraulic Sprinklers
Information on the Plans

903.4.1 (Sprinkler System) Monitoring

- All valves controlling the water supply and water-flow switches shall be electronically monitored.
905 Standpipe Systems

- 905.3 Required Installations.
  - Building height, floor level 30'
  - Group A, non-sprinklered, 1000 people
  - Covered mall
  - Stage, >1000 SF
  - Underground building
  - Helistops and Heliports
  - Marinas and Boatyards

Not Required

- Review section 905.3 and determine if a standpipe system is required in the proposed new construction.
Using section 906, determine if portable fire extinguishers are required.

• 906.1 … shall be installed in …

• New and Existing:
  – Group A, B, E, F, H, I, M, R-1, R-2, R-4, and S occupancies
  – No information provided by the design professional on the type or placement of the extinguishers. More information is required.
### Section 907

Fire Alarm and Detection Systems

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<th>Topic</th>
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</table>

### 907 Fire Alarm and Detection

*907.1.1 Construction documents:* shall be of sufficient clarity to indicate the location, nature and extent of the work proposed and show detail.

*907.1.2 Fire Alarm Shop Drawings:* shall be submitted and approved prior to system installation.
From NFPA 72

1. Written narrative describing intent and system description.
2. Riser diagram.
3. Floor plan layout showing locations of all devices and control equipment.
4. Sequence of operation.
5. Equipment technical data sheets
6. Manufacturer’s published instructions including operation and maintenance instructions.
7. Battery calculations.

From NFPA 72

8. Voltage drop calculations.
9. Completed record of inspection and testing.
10. Completed record of completion
11. Copy of site-specific software.
12. As-built drawings.
13. Periodic inspection, testing, and maintenance documentation
14. Records, record retention, and record maintenance.

Example of item #3 – location of devices
907 Fire Alarm and Detection

907.2 Where required-new buildings and structures.

907.2.2 Group B ... shall be installed?

Required for the Group B Manual or Automatic?

----

---

907 Fire Alarm and Detection

- 907.2 Where required-new buildings and structures.
  - Group A ... shall be installed ([NY] 907.2.1.3)
  - Group B
    - 500 or more people
    - 100 or more above LLED
    - Group B fire areas containing an ambulatory care facility

Building Occupant Load

218

2nd and 3rd floor occupant load

90 people

MANUAL SYSTEM NOT REQUIRED
907 Fire Alarm and Detection

- 907.2 Where required…

- 907.2.2 Group B. A manual fire alarm system …
  - 100 or more above LLed

<table>
<thead>
<tr>
<th>GROSS SQUARE FOOTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST FLOOR 7,500 G.S.F.</td>
</tr>
<tr>
<td>SECOND FLOOR 7,500 G.S.F.</td>
</tr>
<tr>
<td>THIRD FLOOR 6,000 G.S.F.</td>
</tr>
</tbody>
</table>

907.2.14 Buildings with an Atrium

Sheet E - 6

Not Required
Student Activity 7

- Using Sheets E-4, E-6 and E-7 identify and locate the following:
  1. Fire alarm control panel
  2. Fire alarm sub panel
  3. Duct mounted smoke detector
  4. Tamper switch
  5. Wall mounted strobe
  6. Annunciator panel
Fire Alarm Zones

- **907.6.4 Zones** Each floor shall be zoned separately and the zones shall not exceed 22,500 square feet nor be more than 300 feet in any direction.

- Using sheet E-7 identify the 7 Zones.

Sheet E-7

1st Floor

Sheet E-7

2nd Floor

Sheet E-7

1st Floor

Sheet E-7

2nd Floor

Sheet E-7

1st Floor
FC 907.5.2 Alarm Notification

907.5.2.1 Audible alarms required
907.5.2.3 Visible Alarms
907.5.2.3.1 Public Use and Common Areas
   Employee Work Areas (wired)
FC 907.3.1 Duct Smoke Detectors

- Connected to the buildings alarm system

Sheet E-7

BCNYS Section 915.1
Carbon Monoxide Detection

[NY] 915.1 General
Carbon monoxide alarms and carbon monoxide detection shall be installed in new and existing buildings in accordance with Section 915 of the Fire Code of New York State
Carbon Monoxide Detection

• Are there any carbon monoxide sources?
  Fuel burning appliances.

• How many detection locations are required?

<table>
<thead>
<tr>
<th>No.</th>
<th>Topic</th>
<th>Section</th>
<th>Required or Allowed</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Fire Protection Equipment</td>
<td>B-901.6</td>
<td>Required</td>
<td>Provided</td>
</tr>
<tr>
<td></td>
<td>Sprinkler Systems</td>
<td>F-B-903</td>
<td>Not required</td>
<td>Provided</td>
</tr>
<tr>
<td></td>
<td>Where required</td>
<td>F-B-903.2</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Automatic Extinguishing Systems</td>
<td>F-B-904</td>
<td>Not required</td>
<td>N/A</td>
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<tr>
<td></td>
<td>Commercial cooling</td>
<td>F-B-908.12</td>
<td>Required</td>
<td>No info.</td>
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<tr>
<td></td>
<td>Carbon Monoxide Detection</td>
<td>Chi 3.5-01.3.000</td>
<td>Required</td>
<td>No info.</td>
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<tr>
<td></td>
<td>Standpipe Systems</td>
<td>F-B-605</td>
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<td>No info.</td>
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<tr>
<td></td>
<td>Fire Extinguishers</td>
<td>F-B-606</td>
<td>Required special hazard?</td>
<td>No info.</td>
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</table>

<table>
<thead>
<tr>
<th>Fire Alarm Systems</th>
<th>Section</th>
<th>Required (manual)</th>
<th>Actual</th>
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<tr>
<td>Where required</td>
<td>F-B-907</td>
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<td>N/A</td>
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<td>Smoke Alarms</td>
<td>F-B-907.2</td>
<td>Required</td>
<td>Provided</td>
</tr>
<tr>
<td>Occupant notification</td>
<td>F-B-907.2.10</td>
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<td>Provided</td>
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<tr>
<td>Visible Alarms</td>
<td>F-B-907.5</td>
<td>Required</td>
<td>Provided</td>
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<td>Installation</td>
<td>F-B-907.5.2.3</td>
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<td>Provided</td>
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<tr>
<td>Smoke Control System</td>
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<tr>
<td>Smoke Vents</td>
<td>F-B-909</td>
<td>Not required</td>
<td>Provided</td>
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</table>
FC503 Fire Apparatus Access Road

- Using sheets S1-2, S1-3 or S1-4, determine if the proposed driveway and parking lot meet the requirements of Fire Code Section 503 – Fire Apparatus Access Roads.

FC 507.5 Fire Hydrant Systems

- Where a portion of the building is more than 400 feet from a hydrant on a fire apparatus road, on-site hydrants shall be provided.
### Conclusion
- The building does not require a sprinkler system, but has one.
- There is no information on the sprinkler calculations.
- The building has an automatic and manual fire alarm system.
- Fire extinguishers are required, but there is no information to determine if they are to be provided.
- Atrium smoke detectors appear to be correct.
- No Carbon Monoxide detection is provided.
- The property may need a private yard hydrant. More information is needed.
In this lesson ...

Check the plans to determine compliance with …

- Type and Number of fixtures provided
- Fixture supply pipe size
- Drainage, waste and vent pipe size
### Structural Safety

[NY] 101.2.2 Appendices.
The following appendices have been adopted and are made part of this code:

**Appendix C Structural Safety**
- Appendix D Degree Day and Design Temperatures
- In addition, the following appendices are included for informational purposes:
  - Appendix B Rates of Rainfall for Various Cities
  - Appendix E Sizing of Water Piping System

### Guide: Plumbing

<table>
<thead>
<tr>
<th>Plumbing Code</th>
<th>General Requirements</th>
<th>P-3 NS NS</th>
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<tr>
<td>Pipe freezing</td>
<td>P-305.4</td>
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<tr>
<td>Structural Safety</td>
<td>P-TM 308.5</td>
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<tr>
<td>Pipe support</td>
<td>P-312</td>
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<td>Tests/inspections</td>
<td>P-TM 403.1</td>
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<td>Fixture count</td>
<td>P-TM 601.1</td>
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<tr>
<td>Water supply</td>
<td>Service pipe size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Failure pipe size</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pipe material</td>
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<tr>
<td></td>
<td>Valves required</td>
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TABLE 403.1
MINIMUM NUMBER OF REQUIRED PLUMBING FIXTURES

<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>DESCRIPTION</th>
<th>MALE</th>
<th>FEMALE</th>
<th>MALE</th>
<th>FEMALE</th>
<th>SQUADRON</th>
<th>BATHROOMS</th>
<th>OTHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2 Garage</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
</tr>
<tr>
<td>3</td>
<td>3 Garage</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
<td>1 per 25 for the first 50, + 1 WC/50 people for the remaining</td>
</tr>
</tbody>
</table>

Student Activity: Fixture Count

Determine if the proposed number of fixtures are adequate...

- What is the occupancy and use?

Basis for the Calculation

- 403.1.1 Fixture calculations.
  - 50% male and 50% female
  - Group B requirements (140 people)
    - 1 WC/25 for the first 50, + 1 WC/50 people for the remaining
    - 1 Lavatory for the first 80, + 1 Lavatory for the remaining
    - 1 Drinking Fountain per 100
    - 6 Water Closets (3 each)
    - 4 Lavatories (2 each)
    - 2 Drinking Fountains
### Basis for the Calculation

<table>
<thead>
<tr>
<th></th>
<th>Male – 70</th>
<th>Female – 70</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Closets</td>
<td>25 + 25 + 20 = 3</td>
<td>25 + 25 + 20 = 3</td>
</tr>
<tr>
<td>Lavatories</td>
<td>40 + 30 = 2</td>
<td>40 + 30 = 2</td>
</tr>
</tbody>
</table>

- Drinking fountains – 2
- Service sink – 1 for the building

### Service Pipe Size

- **603.1**

  The water service pipe shall be sized to supply water to the structure in the quantities and at the pressures required in this Code. The minimum diameter of water service pipe shall be ¾"
Student Activity

- Using Section 604 of the Plumbing Code and the fixture connection schedule on sheet P - 4 of the assigned plans, determine if the fixture pipe size is adequate.

```
<table>
<thead>
<tr>
<th>Plumbing Supply</th>
<th>Size Code</th>
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<tbody>
<tr>
<td>Water closet</td>
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<tr>
<td>Lavatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drinking fountain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service sink</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```
Section 709 – Fixture Units

- Sets the Drain Fixture Units (DFU) for plumbing fixtures
  - Table 709.1 for fixture type
  - Table 709.2 for fixture drains and traps
- Then...Table 710.1(1) and 710.1(2) uses DFU for establishing drain size
### 710 – Drainage System Sizing

#### Table 710.1(1) Building Drains and Sewers

<table>
<thead>
<tr>
<th>Diameter of Pipe (Inches)</th>
<th>% G a</th>
<th>% G b</th>
<th>% G c</th>
<th>% G d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>1</td>
<td>1</td>
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</tr>
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<td>1</td>
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<td>2.5</td>
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<td>4</td>
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<td>6</td>
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</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

#### Table 710.1(2) Horizontal Fixture Branches and Stacks

<table>
<thead>
<tr>
<th>Diameter of Pipe (Inches)</th>
<th>% G a</th>
<th>% G b</th>
<th>% G c</th>
<th>% G d</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>1.5</td>
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<tr>
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</tr>
<tr>
<td>2.5</td>
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</tr>
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</tr>
<tr>
<td>6</td>
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<tr>
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</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Total for electric water coolers and sink = 3 DFU

What is a branch interval?
Student Activity

- Using Sections 709 and 710 of the Plumbing Code and Page P – 4 of the assigned plans, determine if the proposed drainage piping is adequate for the main stack.

  *worksheet is on page 17 & 18 of your Appendix*

  **NOTE:** for this exercise, use the number of fixtures as shown on the plans.
Drainage System DFU for Stack #2

Total for WC and Lavatories = 30 DFU

Total permitted for Stack #2 = 240 DFU

COMPLIANT?

YES!
Capacity of Main Drain

Use ¼" pitch on main drain

Total DFU to the Main Drain = 35 ½ DFU

Table 710.1(1)

Main Drain at ¼" per foot pitch allows up to 216 DFU

Actual used is 35 ½ DFU

COMPLIANT?

YES!
**Chapter 9: Vents**

- Individual vent
- Branch vent
- Stack vent
- Vent stack

---

**903 – Vent Terminals**

- **18” Minimum**
- [NY] 903.1 Roof Extension

---

**Vent Size**

- **904.1 Required vent extension**… *at least one vent pipe that extends to the outdoors.*
  - Sized in accordance with 906.2 based on the building drain
    - At least ½ of the drain served
The minimum required diameter of stack vents and vent stacks shall be determined from the developed length and the total drainage fixture units (DFU) connected thereto in accordance with Table 906.1 …
Determining Stack Vent Size

How long do you think the vent is!! Does it comply?

906.2 Vents other than stack vents or vent stacks

- General Rule
  - Minimum ½ drain size
  - No less than 1 ¼”
water closet – 4" waste pipe and 2" vent
4" x 50% = 2"
lavatory – 1½" waste pipe and 1½" vent
service sink – 3" waste pipe and 1½" vent
3" x 50% = 1½"
Don’t forget documentation…

- Planning Code: P-313.4, P-313.1, P-316.1.2, P-315, P-716.7
- 4th party certification
- Required Tests
- Alternate system submittal
- Vacuum drainage system
- Pipe bursting post-inspection

And NOW….. A curve or 2

Student Activity: Fixture Count

Determine if the proposed number of fixtures are adequate…

- What if the first floor north office is changed to a cafeteria lunchroom?
  A2 - Assembly
Mixed Occupancy

- Group A requirements (87 people)
- Group B requirements (131 people)
- Total load is now 218
  1. Do we have enough fixtures?
  2. Do we have enough DFU capacity for drainage?
  3. Is the sewer drain large enough?

Basis for the Calculation

- 50% male and 50% female
- Group A requirements (87 people)
  - 1 WC / 75 of each sex
  - 1 Lavatory / 200 of each sex
  - 1 Drinking Fountain per 500
Basis for the Calculation

- Group A2 requirements (87 people)
  - WC 1 / 75 = .35 each
  - Lavatory 1 / 200 = .22
  - Drinking fountain 1 / 500 = .17
- Group B requirements (131 people)
  - WC 1 / 25 of first 50, 1 / 50 after = 2.32
  - Lavatory 1 / 40 of first 80, 1 / 80 after = 1.32
  - Drinking fountain 1/100 = 1.31

Basis for the Calculation

[NY] 403.1.1 Fixture Calculations:
Sum fractional numbers, then round up:

W.C. (A-2) 0.6 + (B) 2.32 = 2.92 ≈ 3 (each sex, 6 total)
Lavs. (A-2) 0.2 + (B) 1.32 = 1.52 ≈ 2 (each sex, 4 total)
D.F. (A-2) 0.17 + (B) 1.31 = 1.48 ≈ 2

BUT how about location, travel distance to the facilities, etc

Conclusion

- More information is needed on the water service pipe, the water distribution pipe material, and drain pipe material?
- AND, those pesky tests and documentation
LESSON 9  
Energy Code

2020 BUILDING CODE of New York State  
Chapter 13  
• 1301.1.1  
  – Buildings shall be designed and constructed in accordance with the Energy Conservation Construction Code of New York State.

[NY] C101.5.1 Compliance software  
• Permitted to be used, not required to be utilized.  
• Must be approved by either US DOE or NY Secretary of State  
• Must indicate compliance with either ECCNYS or ASHRAE 90.1-2016
[NY] C101.5.2 Mandatory provisions. The use of the software approach to demonstrate compliance with the ECCCNYS—Commercial Provisions does not excuse compliance with any mandatory provision of the ECCCNYS—Commercial Provisions. When using the software approach to demonstrate compliance with the provisions of the ECCCNYS—Commercial Provisions, compliance with all applicable mandatory provisions of the ECCCNYS—Commercial Provisions will still be required.

The use of the software approach to demonstrate compliance with ASHRAE 90.1—2016 (as amended) does not excuse compliance with any mandatory provision of ASHRAE 90.1—2016 (as amended). When using the software approach to demonstrate compliance with ASHRAE 90.1—2016 (as amended), compliance with all applicable mandatory provisions of ASHRAE 90.1—2016 (as amended), will still be required.

• [NY] C105.2 Information on construction documents.
  • Insulation materials and their R-values.
  • Fenestration U-factor and solar heat gain coefficient (SHGC).
  • Area-weighted U-factor and solar heat gain coefficient (SHGC) calculations.
  • Mechanical system design criteria.
  • Mechanical and service water heating system and equipment types, sizes and efficiencies.

• [NY] C105.2 Information on construction documents.
  • Economizer description.
  • Equipment and system controls.
  • Fan motor horsepower (hp) and controls.
  • Duct sealing, duct and pipe insulation and location.
  • Lighting fixture schedule with wattage and control narrative.
  • Location of daylight zones on floor plans.
  • Air sealing details
- [NY] C105.2.1 Building thermal envelope depiction. The building’s thermal envelope shall be represented on the construction drawings.

- [NY] C105.2.2 Written statement. When plans or specifications bear the seal and signature of a registered design professional, such registered design professional shall also include a written statement that to the best of his or her knowledge, belief and professional judgment, such plans or specifications are in compliance with the Energy Code.

- [NY] C105.3. Examination of documents.
  – CEO shall examine or cause to be examined
  • Authorized to use 3rd party to review
  – [NY] C105.3.1 Approval of construction documents
  • Construction documents shall be endorsed
    – “Reviewed for Energy Code Compliance”

None of the drawings have information dedicated to energy code compliance

For our purposes we will assume the designer is using the prescriptive compliance path
[NY] C106.2 Required inspections. The code official (or other qualified inspector approved by the code official pursuant to Section C106.1), upon notification, shall make the inspections set forth in Sections C106.2.1 through C106.2.6.

- [NY] C106.2.1 Footing and foundation inspection.
- [NY] C106.2.2 Thermal envelope
- [NY] C106.2.3 Plumbing system.
- [NY] C106.2.4 Mechanical system.
- [NY] C106.2.5 Electrical system.
- [NY] C106.2.6 Final inspection.

[NY] C106.2.6.1 HVAC System certification.

202 Definitions

- Commercial Buildings. … not included in the definition of Residential Building.
- Residential Building. … (Residential Code Buildings) … R-2, R-3 and R-4 buildings three stories or less in height above grade. Also Factory Manufactured and Mobile Homes

2020 Energy Conservation Construction Code of New York State

- Chapter 3[CE]
  - C301 Climate Zones
    - [NY]Table C301.1
  - NYS Climate Zones
    - 4A, 5A, 6A
  - ‘A’ means ‘Moist’
• Using the provided information,
  – The 2020 ECCNYS
• Complete Section 1(a) of the Energy Checklist
[NY] C401.2 Application. Commercial buildings shall comply with one of the following:

1. **ASHRAE Compliance Path:** The requirements of ASHRAE 90.1-2016 (as amended).

2. **Prescriptive Compliance Path:** The requirements of Sections C402 through C405 and C408. In addition, commercial buildings shall comply with Section C406 and tenant spaces shall comply with Section C406.1.1.

3. **Performance Compliance Path:** The requirements of Sections C402.5, C403.2, C403.3 through C403.3.2, C403.4 through C403.4.2.3, C403.5.5, C403.7, C403.8.1 through C403.8.4, C403.10.1 through C403.10.3, C403.11, C403.12, C404, C405, C407, and C408. The building energy cost shall be equal to or less than 85 percent of the standard reference design building.

---

**Climate Zone 5 Checklist Update**

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Section</th>
<th>Topic</th>
<th>Req</th>
<th>Actual</th>
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<td>Air Leakage</td>
<td>E-C402.5</td>
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</tr>
</tbody>
</table>

Add details here As we look at the Code requirements

---

**Directions for Using Table C402.1.3**

**C402.2.2 Roof assembly.** … installed either between the roof framing or continuously … as specified in Table C402.1.3 …

**CLIMATE ZONE**

<table>
<thead>
<tr>
<th>4 EXCEPT MARINE</th>
<th>5 AND MARINE 4</th>
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<tbody>
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<td>R-50</td>
<td>R-50</td>
</tr>
<tr>
<td>Insulation for horses</td>
<td>R-50</td>
</tr>
</tbody>
</table>

- Metal buildings with M-5 thermal blocks (1)
- R-10 + R-11 LS
- R-10+R-11 LS
- R-10+R-11 LS
- R-10+R-11 LS
- R-10+R-11 LS
- R-10+R-11 LS

*Flat roof portion requires R-30 Continuous Insulation*
**Directions for Using Table C402.1.3**

**C402.2.2 Roof assembly.** … installed either between the roof framing or continuously … as specified in Table C402.1.3 …

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>4 EXCEPT MARINE</th>
<th>3 AND MARINE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other</td>
<td>Group R</td>
<td>All other Group R</td>
</tr>
<tr>
<td>Insulation entirely above deck</td>
<td>R-30c</td>
<td>R-30c</td>
</tr>
<tr>
<td>Metal buildings (with R-5 thermal blocka, b)</td>
<td>R-19 + R-11 LS</td>
<td>R-19 + R-11 LS</td>
</tr>
<tr>
<td>Attic and other</td>
<td>R-38</td>
<td>R-38</td>
</tr>
</tbody>
</table>

Gable Roof portion requires R-38 Insulation

---

**C402.2.3 Above-grade walls.** … installed in the wall cavity between the framing members and continuously … as specified in Table C402.1.3

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>4 EXCEPT MARINE</th>
<th>3 AND MARINE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other</td>
<td>Group R</td>
<td>All other Group R</td>
</tr>
<tr>
<td>Walls, Above Grade</td>
<td>R-9.5c</td>
<td>R-11.4c</td>
</tr>
<tr>
<td>Metal building</td>
<td>R-13 + R-13c</td>
<td>R-13 + R-13c</td>
</tr>
<tr>
<td>Wood framed and other</td>
<td>R-13 + R-7.5c</td>
<td>R-13 + R-7.5c</td>
</tr>
</tbody>
</table>

Wood Stud Walls
R-13 Cavity + R-7.5 Continuous

---

**C402.2.4 Floors.** over outdoor air or unconditioned space … as specified in Table C402.1.3 …

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>4 EXCEPT MARINE</th>
<th>3 AND MARINE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>All other</td>
<td>Group R</td>
<td>All other Group R</td>
</tr>
<tr>
<td>Floors: Mass</td>
<td>R-10c</td>
<td>R-10.4c</td>
</tr>
<tr>
<td>Joist/substrate</td>
<td>R-30</td>
<td>R-30</td>
</tr>
</tbody>
</table>

We have no Floors over Unconditioned Space
Directions for Using Table C402.1.3

C402.2.5 Slabs-on-grade perimeter insulation. ... around the perimeter of unheated or heated slab-on-grade floors ... as specified in Table C402.1.3.

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>4 EXCEPT MARINE</th>
<th>5 AND MARINE 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All other</td>
<td>Group R</td>
</tr>
<tr>
<td>Unheated slabs</td>
<td>R-10 for 24&quot; below</td>
<td>R-10 for 24&quot; below</td>
</tr>
<tr>
<td>Heated slabs</td>
<td>R-15 for 24&quot; below</td>
<td>R-15 for 36&quot; below</td>
</tr>
</tbody>
</table>

Slab Edge Insulation R-10 for 24" below grade

Directions for Using Table C402.1.4

C402.4.5 Doors. Opaque swinging doors shall comply with Table C402.1.4. Opaque non-swinging doors shall comply with Table C402.1.3,...

<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>4 EXCEPT MARINE</th>
<th>5 AND MARINE 4</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All other</td>
<td>Group R</td>
<td>All other</td>
</tr>
<tr>
<td>Swinging</td>
<td>U - 0.61</td>
<td>U - 0.37</td>
<td>U - 0.37</td>
</tr>
<tr>
<td>Stairway Exit Doors have no Glazing</td>
<td>U - 0.37 or smaller</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2020 Energy Conservation Construction Code of New York State

- C402.4.5 Doors. Opaque swinging doors shall comply with Table C402.1.4. Opaque non-swinging doors shall comply with Table C402.1.3. Opaque doors shall be considered as part of the gross area of above-grade walls that are part of the building thermal envelope. Other doors shall comply with the provisions of Section C402.4.3 for vertical fenestration.
<table>
<thead>
<tr>
<th>CLIMATE ZONE</th>
<th>Vertical fenestration</th>
<th>SHGC</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Fixed fenestration</td>
<td>0.38</td>
</tr>
<tr>
<td></td>
<td>Operable fenestration</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Entrance doors</td>
<td>0.77</td>
</tr>
<tr>
<td>PF &lt; 0.2</td>
<td></td>
<td>0.36</td>
</tr>
<tr>
<td>0.2 ≤ PF &lt; 0.5</td>
<td></td>
<td>0.43</td>
</tr>
<tr>
<td>PF ≥ 0.5</td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Skylights</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>U-factor</td>
<td></td>
<td>0.50</td>
</tr>
<tr>
<td>SHGC</td>
<td></td>
<td>0.40</td>
</tr>
</tbody>
</table>

**Building Envelope Fenestration Maximum U-Factor and SHGC Requirements**

**IF -**

A = 8”
B = 12' (144”)
PF = A/B
PF = 8”/12'
PF = 0.05555

Top of Sheet A4-3
C402.5 Air Leakage

- Manufactured components must be tested and labeled

<table>
<thead>
<tr>
<th>Window and Door assemblies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curtain wall and Storefront glazing</td>
</tr>
</tbody>
</table>

Climate Zone 5 Checklist Update

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Section</th>
<th>Topic</th>
<th>Req</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2(a)</td>
<td>Building Envelope Commercial</td>
<td>E-C402</td>
<td>Flat Roof</td>
<td>R-30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-TM C402.1.3</td>
<td>Walls R-19</td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-TM C402.1.4</td>
<td>Opaque doors, U-0.37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Opaque elements R value</td>
<td>E-C402.4</td>
<td>Fixed windows, U-0.38</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>E-C402.5</td>
<td>Operable windows, U-0.45</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Entrance door, U-0.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solar Heat Gain Coefficient, 0.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air Leakage</td>
<td></td>
<td>Windows &amp; swinging doors, 0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glazed entry doors, 1.50 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Storefront glazing, 0.40 cm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
• Using the provided plans,
• The 2020 ECCNYS
• Complete the 'actual' column in Section 2(a) of the Energy Checklist. Just the 'building envelope' for now.

Climate Zone 5 Checklist Update

<table>
<thead>
<tr>
<th>No</th>
<th>Code</th>
<th>Section</th>
<th>Topic</th>
<th>Req</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2(a)</td>
<td>C402.3</td>
<td>E</td>
<td>Flat Roof</td>
<td>R-20 ci</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Attic spaces</td>
<td>R-38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Walls R-13.9</td>
<td>7.5 ci</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Slab R-10, 24</td>
<td>below</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Opaque doors</td>
<td>L-30</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Fixed windows</td>
<td>L-0.35</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operable windows</td>
<td>L-0.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Entrance doors</td>
<td>L-0.77</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Solar Heat Gain Coefficient</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Windows &amp; swinging doors</td>
<td>0.20cfm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Glazed entry doors</td>
<td>1.00 cfm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Storefront glazing</td>
<td>0.60cfm</td>
<td></td>
</tr>
</tbody>
</table>

[NY] C402.2.1 Roof Assembly

Sheet A3 - 1
Hytherm Roof Insulation Specification

<table>
<thead>
<tr>
<th>Nominal Thickness (in)</th>
<th>R-6 (0.1524)</th>
<th>R-8 (0.1905)</th>
<th>R-10 (0.2317)</th>
<th>R-12 (0.2730)</th>
<th>R-16 (0.3586)</th>
<th>R-20 (0.4769)</th>
<th>R-24 (0.5953)</th>
<th>R-30 (0.7917)</th>
<th>R-40 (1.059)</th>
<th>R-50 (1.352)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditioned R-value¹</td>
<td>15.0</td>
<td>12.5</td>
<td>10.0</td>
<td>8.5</td>
<td>7.0</td>
<td>6.0</td>
<td>5.0</td>
<td>4.5</td>
<td>4.0</td>
<td>3.5</td>
</tr>
<tr>
<td>Nominal Thickness (cm)</td>
<td>64.0</td>
<td>50.8</td>
<td>40.6</td>
<td>33.0</td>
<td>25.4</td>
<td>20.3</td>
<td>16.0</td>
<td>13.3</td>
<td>11.4</td>
<td>9.5</td>
</tr>
<tr>
<td>Conditioned R-value²</td>
<td>17.0</td>
<td>14.5</td>
<td>12.0</td>
<td>10.5</td>
<td>9.0</td>
<td>8.0</td>
<td>6.5</td>
<td>6.0</td>
<td>5.5</td>
<td>5.0</td>
</tr>
</tbody>
</table>

¹ R-value is based on R-6 fiberglass batt insulation.

[NY] C402.2.1 Roof Assembly

Sheet A3 - 4

Cross section calls for R-30 Fiberglass Batt insulation to be installed.

C402.2.2 Above Grade Walls

Sheet A4 - 1

Cross section shows insulation to be installed.
C402.4 Fenestration

C402.4 Fenestration (Prescriptive).
Fenestration shall comply with Sections C402.4.1 through C402.4.5 and Table C402.4. Daylight responsive controls shall comply with this section and Section C405.2.3.1.

C402.2.4 Slabs-on-Grade Perimeter Insulation

C402.4.5 Doors
Doors D03 and D12
Required U-factor 0.37
Note only states 'to be insulated'
C402.5.2 Air Leakage

- Manufactured components must be tested and labeled
  - Window and Door assemblies
  - Curtain wall and Storefront glazing
### C402.5.7 VESTIBULES

- Sheet A1-1

### Section C403
Building Mechanical Systems

- Section C403.2 Provisions applicable to all...
- **Mandatory** C403.2.1 through C403.2.2
  - If that system is present it must comply
- Where addressed in C403.3-C403.12
  - Section C403.5 Economizers (Prescriptive)
  - Section C403.6 Requirements for mechanical systems serving multiple zones
Mandatory provisions include:

- Calculation of Loads
- Sizing Equipment
- Performance (efficiency) Requirements
- Controls
- Ventilation
- Heating Outside the Building
- Energy Recovery Ventilation Systems
- Duct Insulation and Sealing
- Piping Insulation
- System Commissioning and Completion requirements
- Air System Design and Control

HVAC SYSTEMS

- C403.3.2 HVAC equipment performance requirements
  - Meet the efficiency requirements of the tables
  - Tables C403.2.3(1) through (9) – as applicable
  - Efficiency verified through certification
    - Or data provided by the manufacturer
    - Multiple ratings/requirements, must satisfy all
  - Table C403.3.2(4), Generally 80% required
[NY] C403.5 Economizers (Prescriptive)

• Each cooling system shall include an economizer
  – C403.5.1 Integrated economizer control
  – C403.5.2 Economizer heating system impact
  – C403.5.3 Air economizers
  – C403.5.4 Water-side economizers
  – C403.5.5 Fault Detection

• The Rooftop A/C Unit Schedule (top of Sheet M-3)
  – Indicates 100% Economizer in far right column

C403.6 Requirements for mechanical systems serving multiple zones

• C403.6.1 Variable air volume and multi-zone systems.

C404 Service Water Heating (Mandatory)

• Service Water Heating equipment performance efficiency
  – Per Table C404.2
  – Verified by manufacturer or certification

• Heat Traps
  – C404.3 For Hot Water Storage Tanks
  – If not integral, must be provided

• Insulation of piping
  – Per Table C403.11.3
C405 Electrical Power and Lighting Systems

- **C405.2 Lighting Controls (Mandatory)**
  - Per Sections C405.2.1 through C405.2.6
    - Occupant sensor controls
    - Time-switch controls
    - Daylight-responsive controls
    - Specific application controls
    - Exterior lighting controls
C406 Additional Efficiency Package Options

• C406.1 Requirements  At least one of the following
  – More efficient HVAC – C406.2
  – Reduced lighting power density – C406.3
  – Enhanced lighting controls – C406.4
  – On-site supply of renewable energy – C406.5
  – Dedicated outdoor air system for certain HVAC – C406.6
  – High-efficiency service water heating – C406.7
  – Enhanced envelope performance – C406.8
  – Reduced air infiltration – C406.9

C408 System Commissioning

• C408.1 General.
• C408.2 Mechanical systems and service water-heating systems commissioning and completion requirements
• C408.3 Lighting system functional testing
• Student exercise:
  • Complete the second part of Section 2(a) of the Energy Checklist

2(a)

<table>
<thead>
<tr>
<th>System design (Mandatory)</th>
<th>N/S</th>
<th>N/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment sizing (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Intake performance (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Equipment (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Thermal envelope (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Service Water Heating (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Lighting and Power</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Controls (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Additional Efficiency (Mandatory)</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Package Options</td>
<td>N/S</td>
<td>N/S</td>
</tr>
<tr>
<td>Commissioning</td>
<td>N/S</td>
<td>N/S</td>
</tr>
</tbody>
</table>

Many Energy Code requirements are not clearly addressed on the plans provided.
Once the applicant is advised of these concerns they can resubmit revised plans.
LESSON 10

Accessibility

1103.1 Where required. Sites, buildings, structures, facilities, elements and spaces ... shall be accessible to individuals with disabilities.

With some EXCEPTIONS

WHAT IS THE ADA? AND WHO DOES ENFORCEMENT?

Legislation Signing in 1990
Accessibility Issues

- Chapter 11 of the 2020 BCNYS
- Appendix E of the 2020 BCNYS
  - Establishes what and when

  **ICC A117.1**
  - Provides the Accessibility Details

Outside Stuff: Parking and Passenger Loading Facilities

- Building Code Chapter 11 Section 1106.1
  - Where parking is provided
  - Spaces in conform with ICC A117.1
    - [NY] Section 1106.1.1
      - Except provide 8’ access aisle
1106 Parking and Passenger Loading Facilities

Number Required

<table>
<thead>
<tr>
<th>Total Parking Spaces Provided in Parking Facilities</th>
<th>Number of Accessible Spaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 25</td>
<td>1</td>
</tr>
<tr>
<td>26 to 50</td>
<td>2</td>
</tr>
<tr>
<td>51 to 75</td>
<td>3</td>
</tr>
<tr>
<td>76 to 100</td>
<td>4</td>
</tr>
<tr>
<td>101 to 150</td>
<td>5</td>
</tr>
<tr>
<td>151 to 200</td>
<td>6</td>
</tr>
<tr>
<td>201 to 300</td>
<td>7</td>
</tr>
<tr>
<td>301 to 500</td>
<td>8</td>
</tr>
<tr>
<td>501 to 500</td>
<td>9</td>
</tr>
<tr>
<td>1,001 and over</td>
<td>2% of total, or Section 703.6.3.1</td>
</tr>
</tbody>
</table>

Symbol per Section 703.6.3.1

Sheet S1-5 shows access aisle details

1106.6 Location  WRONG

Number of Accessible spaces  2

Remember, number of parking spaces is a local condition
• Accessible Entrances

• Accessible Routes

Section 1105.1
– At least 60 percent of all public entrances shall be accessible.
– Exceptions:
  1. Entrances to spaces not required to be accessible
  2. Loading and service entrances that are not the only entrance to a building or to a tenant space.

It has different requirements things like parking garages, tunnels and elevated walkways ...
• BCNYS 1010.1.1
  Fig 403.5.1(a) Clear Width of Hinged Door

Fig 404.2.3.2(a) Front Approach, Pull Side

• BCNYS 1012.6 Landings / 1012.6.5 Doorways
  No landing (or latch side clearance). Problem mitigated by power operated door (though the push plate cannot be located on the slope).
ICC A117.1 404.2.5 Two Doors in Series

Distance between two hinged or pivoted doors in series shall be 48 inches minimum plus the width of any door swinging into the space. The space between the doors shall provide a turning space complying with Section 304.

Fig 404.2.5(a)

IBC 1010.1.8 Door operation

Section 404.2.6 Door Hardware.
Handles, pulls, latches, locks and other operable parts on accessible doors shall have a shape that is easy to grasp with one hand and does not require tight grasping, pinching, or twisting of the wrist to operate. ...

IBC 1010.1.9.1 Hardware

ICC A117.1 404.2.6 Door Hardware

ICC A117.1 404.2.4.6 Door Hardware
Inside Moves

• Interior accessible routes

Elements of accessible routes

• Level surfaces
• Ramps
• Elevators
• Wheelchair (platform) lifts
• Doors

Accessible Routes
Ramp requirements: 405 ICC A117.1

• Running slope:
  Greater than 1:20
  and not steeper
  than 1:12 maximum
• Cross slope:
  1:48 maximum
• Clear width:
  36 inches minimum
  between handrails
• Rise: maximum rise
  30 inches
1109.8 Lifts. Platform (wheelchair) lifts are permitted to be a part of a required accessible route in new construction where indicated in Items 1 through 10. ...
Important!

- LU/LAs are “limited” by the restriction of ASME A17.1 and not any scoping provisions in the BCNYS.

ASME A17.1 LU/LA Requirements

- 18 sf maximum car size
- 30 ft. per min. speed
- 25 ft. travel distance
- Loading per passenger elevator requirements
- No pit or overhead car clearance required in existing buildings

ICC A117.1 407.4.6(a) Inside Dimensions of LU/LA Elevators in New Construction

- 42 in. x 42 in.
- 30 in. x 30 in.
- 60 in. x 60 in.
ICC A117.1 407.4.6(b) Inside Dimensions of LU/LA Elevators in Existing Buildings
Common Mistake

- LU/LAs are elevators and must meet all applicable ANSI requirements.
- Some distributors suggest otherwise, saying, “It's not an elevator, it's a LU/LA!”

1009.2.1 Elevator required

- Accessible floor 4 or more stories above or below lowest level of exit discharge
  
  No
Toilet and Bathing Facilities

- 1109.2 Toilet and bathing facilities.
  - Toilet rooms and bathing facilities shall be accessible. At least one of each type of fixture, element, control or dispenser in each accessible toilet room and bathing facility shall be accessible.

Turning space - Section 603.2

Section 304.3 requires 60 inches minimum clear turning space.

Knee and toe clearance is Regulated by Section 306.

Doors are allowed to swing into the turning space per Section 304.4
See any violations here?
The pipe under the sink is not protected.
Section ICC A117.1 606.6

ICC A117.1 604.5.1 Fixed Side Wall Grab Bar

42" minimum in length, 12" maximum from rear wall, extending 54" minimum from rear wall. In addition, 18" minimum vertical bar, bottom 39" – 41" from floor, center line 39" – 41" from rear wall.

A5-4

• Anything missing?
1109.2.2 Water Closet Compartments.

- Ambulatory compartment required where six or more water closets and urinals are provided in a room.

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ICC A117.1 605 Urinals

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1109.5 Drinking Fountains

- BC Section 1109.5.1 Minimum of Two
- BC Section 1109.5.2
  - 50 % Wheel Chair accessible
  - 50 % Standing Person
- A117.1 Section 602
1104.3 Connected Spaces

...at least one accessible route shall be provided to each portion of the building.

EXCEPTIONS ....

None apply, first floor is accessible

1104.4 Multilevel buildings and facilities

At least one accessible route shall connect each accessible story, mezzanine, and occupied roofs in multilevel buildings and facilities.

EXCEPTIONS ....
1104.4 Multilevel buildings and facilities

EXCEPTIONS:
• 1. NOT required to stories, mezzanines or occupied roofs
  • Aggregate area not more than 3000 SF
  • Located above and below accessible levels

Is this building required to be accessible? YES, but are we done?

1009 Accessible Means of Egress

Section 1009.3 Stairways
• 48" wide stairs (between handrails)
• Area of Refuge Within; or
• Accessed from an Area of Refuge

(With Exceptions)
Do any exceptions apply here?

1009 Accessible Means of Egress

Do any exceptions apply here?
Exception 2
1009.3 Stairways

Does either stairway meet our requirements?

1009.6 Areas of refuge

Every required area of refuge shall...

1009.6.1 Travel Distance per 1017.1
1009.6.2 Stairway or Elevator access per 1009.3 and 1023 or 1009.4
1009.6.3 Size wheelchair space 30” x 48”, 1 per 200 occupants
1009.6.4 Separation per 709 or 1026
1009.6.5 Two way communication per 1009.8.1 and 1009.8.2

So.....Do we have an accessible route?

YES
1009 Accessible Means of Egress

BCNYS Section 1009.1 Accessible means of egress. Where more than one means of egress is required by Section 1006.2 or 1006.3 each accessible portion of the space shall be served by not less than two accessible means of egress.

1009 Accessible Means of Egress

COMPONENTS:
- Accessible Routes
- Interior Exit Stairways
- Exit Access Stairways
- Exterior Exit Stairways
- Elevators
- Platform Lifts
- Horizontal Exits
- Ramps
- Areas of Refuge
- Exterior Areas for Assisted Rescue

Section 1009.4 Elevators
- Emergency Operation Controls
- Standby Power
- Area of Refuge or Horizontal Exit
1009 Accessible Means of Egress

Section 1009.5 Platform Lifts
- ONLY when allowed as part of an accessible route in Section 1109.8
  - Except for Item 10.
- Standby Power required

Section 1009.6 Areas of Refuge
- Direct access to stair or elevator
- One space for each 200 people, 30" x 48" area
- Smoke Barrier protection
- Two way communication
- Identification – Section 1009.9
- Instructions - Section 1009.11

Section 1009.7 Exterior Area for Assisted Rescue
- Open to outside air
- Separation – 1 hour minimum fire resistance rating
- 48" width for Stairs
- Identification
- Also 1009.11 for Instructions
Section 1009.10 Directional Signage
• At Exits and Elevators NOT providing accessible Means of Egress

Remember, 1009.9 requires signage to comply with ICC A117.1, and 1009.11 requires instructions.

Student Exercise
• Using the provided plans
• Complete Section 14 of the review sheet
... One More Item

- What about your Municipality's buildings?
Course 9F Conclusion

- That completes the initial plan review
- We have determined:
  - The building exceeds code minimums in many ways
  - Most of the information provided is code compliant or better
  - Some other areas need to be corrected
  - Some information is not provided at all

Course 9F Conclusion

- At this point you have developed a checklist that describes the compliant portions of the plans as well as developed a list of non-compliant issues
- This information should be run through with the designer
- After the corrections have been made to the plans, submitted and checked for compliance the permit can be issued

Training Requirement Reminder

- In-service Training requirements:
  - Starts on January 1st the year after you completed your Basic Program.
  - Is earned from January 1st to December 31st
  - Advanced In-service – Does count as part of the In-service for that year. (don’t have to do extra that year)
In-Service Training Requirements

Building Safety Inspector
- complete a minimum of 6 hours of in-service training each calendar year

Code Enforcement Official
- complete a minimum of 24 hours of in-service training each calendar year

IN-SERVICE TRAINING REQUIREMENTS

Annual in-service requirement – 24 hours
- 12 hours Minimum – DOS approved
  • Must fall under one of three categories
  - 12 hours – “Electives”
    • Contributes to professional development
    • Professional Development Committee
    • Or DOS approved courses

IN-SERVICE TRAINING REQUIREMENTS

- In-service hours for BSIs and CEOs can be obtained by participating in:
  - Courses developed and presented by DBSC
  - Courses approved and certified by DBSC and presented by approved instructors

More . . .
IN-SERVICE TRAINING REQUIREMENTS

In-service hours for BSIs and CEOs can be obtained by participating in:

- Approved On-Line courses
- Professional Development Electives (both online and in-person)
- ICC Certification Exams accepted by DBSC – 8 hours of In-service credit
- Or other certification exam from an approved agency

Professional Development Electives

(PDE) training courses whose subject matter advances the professional development of an individual code enforcement official or building safety inspector.

1208-3.3(2)