FIRE AND LIFE SAFETY CODE REVIEW AND ANALYSIS

Project Description:
The Project consists of 90,000 s.f. of interior alternation/ fit-up in a newly constructed 4-story commercial building in Downtown Portland. The tenant space will serve as the world headquarters for WEX Inc. The building occupancy is for business purposes and the program consists of open office spaces, closed office spaces, conference rooms, meeting spaces, toilets, and showers.

Applicable Codes and Standards:
Building Code: International Building Code, (IBC), 2009 Edition
Fire: National Fire Protection Association, (NFPA), Life Safety Code 101, 2009 Edition
Accessibility: 2010 ADA Standards for Accessible Design, Department of Justice, September 10, 2010
Mechanical: International Mechanical Code, 2009
Plumbing: Uniform Plumbing Code, 2009
Electrical: National Electric Code,
Energy: International Energy Conservation Code, 2009
ASHRAE Standard 62.1 Ventilation for Acceptable Air Quality
ASHRAE Standard 90.1 Energy Standard for Buildings Except for Low-Rise Residential Buildings

Building Use: Office
Sprinklered: Fully throughout in accordance with IBC 903 and NFPA 13

Use Group Classification:
IBC: I-3, Condition 1 (Free Egress is permitted) – Primary Use
~~B – Business (in conjunction with building with two accessory assembly spaces~~
NFPA: Chapter 38 – Business

Specific Occupancy Areas/Hazardous Area Protection:
IBC: Chapter 5 – table 508.2
NFPA Chapter 38

Type of Construction:
IBC: Type IIA
NFPA 101: Type II (111)

Square Footages:

1st Floor	~ 25,624 SF
2nd Floor	~ 30,353 SF
3rd Floor	~ 30,353 SF
4th Floor	~ 9,336 SF
TOTAL	~ 95,666 SF

CODE SUMMARY:

Chapter 3 - Use and Occupancy Classification Mixed Use

303.1 Assembly Group A-3
304.1 Business Group B
Rooftop Assembly Space
Office at Levels 1-4

Chapter 5 - General Building Heights and Area

Table 503 Allowable Heights and Areas

Business Group B	Type 2A Construction - 3 Stories , 65 feet, 37,000 SF
Mercantile Group M	Type 2A Construction - 4 Stories, 65 feet, 21,5000 SF
Assembly Group A-3	Type 2A Construction - 3 Stories , 65 feet, 15,500 SF

504.2 Automatic Sprinkler System Increase (Building Height)
In buildings equipped with an NFPA 13 automatic sprinkler system, the maximum building height is increased by 20 feet and the maximum number of stories is increased by one.

Construction Type 2A	
Group B (Business)	4 stories
Group M (Mercantile)	5 stories
Group A-3 (Assembly)	4 stories

506.0 Building Area Modifications

506.1 General Equation 5-1
Aa = [At + [At x If] + [At x Is]]

Table 503 for Type 2A Construction, B Business Use
Aa = 37,000 sf + 0 + (37,000 x 2)
Aa = 111,000 sf allowable building area per story

506.3 Automatic Sprinkler System Increase
Approved Automatic Sprinkler System in accordance with Section 903.3.1. More than one-story above grade = 200% increase above Table 503 tabular area allowed:
Group B: Type 2A: 37,000 + (2 x 37,000) = 111,000 allowable sf
Group M: Type 2A: 21,5000 + (2 x 21,500) = 64,500 allowable sf
Group A-3: Type 2A: 15,500 + (2 x 15,500) = 46,500 allowable sf

506.5.2 Mixed Occupancy Area Determination
For building with more than three stories above grade plane, the total building area shall be such that the aggregate sum of the ratios of the actual area of each story divided by the allowable area of such stories based on the applicable provisions of Section 508.1 shall not exceed 3.

First Floor:	30,625 / 46,500 =	0.658602
Second Floor:	31,353 / 46,500 =	0.674258
Third Floor:	31,353 / 46,500 =	0.674258
Fourth Floor:	31,353 / 46,500 =	0.674258
		Total = 2.681376

508 Mixed Use and Occupancy
508.3 Non-Separated Occupancies
Buildings or portions of buildings that comply with the provisions of this section shall be considered non-separated occupancies.

508.3.1 Occupancy Classification
Non-separated occupancies shall be individually classified in accordance with Section 302.1. The requirements of this code shall apply to each portion of the building based on the occupancy classification of that space except that the most restrictive applicable provisions of Section 403 and Chapter 9 shall apply to the building of portion thereof in which the non separated occupancies are located.

508.3.2 Allowable Building Area and Height
The allowable building area and height of the building or portion thereof shall be based on the most restrictive allowances for the occupancy groups under consideration for the type of construction of the building in accordance with Section 503.1

508.3.3 Separation
No separation is required between nonseparated occupancies.

Chapter 6 - Types of Construction
Table 601 - Fire Resistance Ratings for Building Elements

Rating of Building Elements, IBC Table 601

Building Element	Type 2A
Primary Structural Frame:	1 hour
Bearing Walls	
Exterior:	1 hour
Interior:	1 hour
Nonbearing Walls and Partitions:	
Exterior:	(See Table 602)
Interior:	0 hour
Floor Construction and secondary members:	1 hour
Roof Construction and secondary members:	1 hour

602.2 Type II Construction
Noncombustible materials, Fire Retardant Treated Wood (FRTW) is permitted in limited uses. Other combustible materials are permitted as outlined in Section 603.1.

Chapter 7 - Fire and Smoke Protection Features

708.4 Openings
Openings in a shaft enclosure shall be protected in accordance with Section 715 as required for fire barriers. Doors shall be self or automatic-closing by smoke detection in accordance with 715.4.8.3

708.8.1 Penetration
Penetrations other than those necessary for the purpose of the shaft shall not be permitted.

708.14.1 Elevator Lobby Enclosure
Not required per Exception No. 4 "...building is protected by an automatic sprinkler system in accordance with Section 903.3.1.1"

713 Penetrations

713.1.1 Penetrations of fire resistance rated walls by ducts (not protected by dampers): Sleeves through walls, in cavity construction, shall be securely fastened (a fire stop assembly is required between sleeve and pipe/duct).

713.3.2 Membrane penetrations shall be limited to 16 square inches each and an aggregate of 100 square inches/100 sf of wall.
- Offset boxes by 24" on opposite sides of wall
- Not required at sprinklers with escutcheon plate

714 Fire-Resistant Joint Systems

713.1.1 General
Joints installed in or between fire-resistance-rated walls, floor or floor/ceiling assemblies and roof or roof/ceiling assemblies shall be protected by an approved fire-resistant joint system matching the required fire resistance rating.

708.4 Openings
Openings in a shaft enclosure shall be protected in accordance with 715 as required for fire barriers. Doors shall be self or automatic-closing by smoke detection in accordance with 715.4.8.3

Chapter 8 - Interior Finishes

Table 803.9 Interior Wall and Ceiling Finish Requirements By Occupancy Sprinklered

Group	Exit Enclosures	Corridors	Rooms and Enclosed Spaces
A-3	Class B	Class B	Class C
B	Class B	Class C	Class C
M	Class B	Class C	Class C

NOTE: ALL FINISH MATERIALS TO BE CLASS A FIRE RATED

Chapter 9 - Fire Protection Systems

903.3.1.1 NFPA 13 Sprinkler Systems
The building will be equipped throughout with an automatic sprinkler system in accordance with NFPA 13.

903.4 Actuation
Valve controlling water supply for automatic sprinkler system shall be electronically supervised by a fire alarm control unit.

905 Standpipe Systems

905.2 Standpipe Systems will be provided in accordance with NFPA 14

905.3.1 Height
Class 1 Standpipes are allowed in buildings equipped throughout with an automatic sprinkler system

905.4 Class I Standpipe Hose Connections shall be provided in the following locations:
- In every stairway at an intermediate floor level between floors, unless otherwise approved by the fire code official
- Where roof slope is less than 4:12 each standpipe shall be provided with a hose connection either on the roof or the highest landing of a stairway with stair access to roof
- On each side of the wall adjacent to exit opening of horizontal exit (not required where hose stream is reachable)

906 Portable Fire Extinguishers Required in Group A, B, and M Occupancies: provided in accordance with NFPA 10
- Exception: In Group A and B Occupancies extinguishers only required on each floor

907 Fire Alarm and Detection Systems

907.2 Where Required-New Buildings and Structures
- Exception 2: Automatic heat detection is not required in buildings with automatic sprinkler system

907.2.1 Group A: Manual fire alarm system with occupant notification system required in areas over 50 occupants

907.2.2 Group B: Manual fire alarm system required.

907.2.7 Group M: Manual fire alarm system required.

907.2.9.2 Smoke alarms shall be installed per Section 907.2.11 (within sleeping units)

912.2.1 Fire Department Connections: Locations as approved by fire chief so vehicles and hose lines will not interfere with building access (visible location on street side of building).

Chapter 10 - Means of Egress

1004 Occupant Load

Means of Egress, (IBC Chapter 10 NFPA Chapter 38)
Table 1004.1 Maximum Floor Area Allowances Per Occupant

Assembly	15 net sf. Un-concentrated
Business	100 gross sf
Mercantile	Grade Floor Area = 30 gross sf

1005 Egress Width

1007 Accessible Means of Egress

1007.3 Stairways
Clear Width 48": Not required in buildings with automatic sprinkler system. Exception No. 2.
Area of Refuge: Not required in buildings with automatic sprinkler system. Exception No. 1 & 3.

1007.4 Elevators Exception 2: Area of Refuge not required if building equipped with automatic sprinkler system

1007.8 Two-way communication system shall be provided at each elevator landing.

1007.10 Directional signage shall be provided at elevator landings

1008 Doors, Gates, and Turnstiles
1008.1.1 Size of Doors- Minimum clear width = 32", maximum leaf width = 48"

1008.1.5 Provide a level landing on each side of door, except at exterior locations with 2% slope pitch for drainage

1008.1.8 48" plus door width required minimum space between doors in series

1008.1.9.10 Interior stairway means of egress doors shall be openable from both sides

Exception 1: Stairway discharge doors shall only be locked from the opposite side

1008.1.10 Doors serving an occupancy load of 50 or more in Group A shall be provided with panic hardware. Electrical rooms with equipment rated at 1200 amps or more will also require panic hardware.

1015 Exit and Exit Access Doorways
1015.1 Two exits required from any space except as permitted by Table 1015.1

1015.2.1 Exit doors shall be placed not less than 1/3 (exception #2) the length of the maximum overall diagonal dimension.

	Fire Area	Max. Diagonal	1/3 Min.	Actual
1st Floor	30,624 sf	338'-11"	112'-11"	144'-4"
2nd Floor	31,353 sf	338'-11"	112'-11"	144'-4"
3rd Floor	31,353 sf	338'-11"	112'-11"	144'-4"
4th Floor	9,336 sf	163'-7"	54'-6"	55'-1"

1016 Exit Access Travel Distance
Table 1016.1 Exit Access Travel Distance

Occupancy	Max. Distance Sprinklered	Actual Distance
A3 - Assembly	250'	110'-8"
B-Business (Level 1)	300'	84'-0"
B-Business (Level 2-3)	300'	126'-6"
B-Business (Level 4)	200'	84'-0"
M-Retail	250'	TBD

1021 Number of Exits and Continuity
Table 1021.1 Minimum Number of Exits for Occupant Load

	Occupant Load	Min Number of Exits
1st Floor (B)	257	2
1st Floor (M)	334	2
2nd Floor (B)	278	2
2nd Floor (A-2)	170	2
3rd Floor (B)	304	2
4th Floor (B)	94	2
4th Floor (A-3)	506	3

1022 Exit Enclosures
1022.1 Exit Enclosures Required 2 hour rated fire barriers/enclosures provided.

1022.6 Exit Enclosures Exterior Walls Exterior exit walls comply with Section 705

1022.8 Floor Identification Signs Floor level identification signs required at each floor landing within stair (tactile).

1023 Exit Passageways

1023.1 Exit Passageway Exit passageway used to connect stairway enclosure to an exterior door
- 44" min. width
- Wells, floor, and ceilings shall be of not less than 1 hour fire resistance rated construction and constructed as fire barriers in accordance with Section 707.

1027 Exit Discharge

1027.1 General Exits shall discharge directly to the exterior of the building. Exit Stair is allowed to egress through the Main Lobby per the following:
Exceptions:
1. A maximum of 50 percent of the number and capacity of the exit enclosure is permitted to egress through areas on the level of discharge provided all of the folling are met:
   - 1.1 Such exit enclosures egress to a free and unobstructed path of travel to an exterior exit door and such exit is readily visible and identifiable from the point of termination of the exit enclosure.
   - 1.2 The entire area of the level of exit discharge is separated from areas below by construction conforming to the fire-resistance rating for the exit enclosure.
   - 1.3 The egress path from the exit enclosure on the level of exit discharge is protected throughout by an approved automatic sprinkler system. All portions of the level of exit discharge with access to the egress path shall either be protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, or separated from the egress path in accordance with the requirements for the enclosure of exits.

CODE SUMMARY
1/2" = 1'-0"

THE PROPOSED BUILDING IS AN UNSEPARATED MIXED USE CONSTRUCTION TYPE II (111)
BASED ON 4TH FLOOR ASSEMBLY NFPA 13 SPRINKLER SYSTEM

1ST FLOOR
BUSINESS USE

2ND-3RD FLOOR
BUSINESS USE

4TH FLOOR (INTERIOR)
BUSINESS USE

OCCUPANCY LOAD	WC				URINALS		LAVATORIES				DRINKING FOUNTAIN	
	REQ		PROVIDED		REQ	PROVIDED	REQ		PROVIDED		REQ	PROVIDED
1ST FLOOR 25,624 SF/ 100 SF = 257 M 128 F 127	M 3	F 8	M 4	F 8	2	3	M 2	F 3	M 4	F 5	2	2
2ND FLOOR 27,793 SF/ 100 SF = 278 M 139 F 139	M 3	F 8	M 4	F 8	2	4	M 2	F 3	M 4	F 4	3	4
3RD FLOOR 30,353 SF/ 100 SF = 304 M 157 F 157	M 3	F 8	M 4	F 8	2	4	M 3	F 4	M 4	F 4	3	4
4TH FLOOR 9,336 SF/ 100 SF = 94 M 47 F 47	M 1	F 3	M 2	F 5	1	2	M 1	F 1	M 2	F 3	1	2

2015 Uniform Plumbing Code - TABLE 422.1
NOTE: PLUMBING COUNTS BASED ON OCCUPANCY OF OFFICE USE AREAS ONLY. ACCESSORY ASSEMBLY AREAS ARE FOR OCCUPANTS ALREADY COUNTED IN BUISNESS AREAS. CURRENT PLANNED BUILDING OCCUPANCY BY ACTUAL USE IS 450.

KEY PLAN
1/64" = 1'-0"

Date: 06/15/18

REV	DESCRIPTION	DATE
1	SI - 5	05/31/18
0	ISSUED FOR CONSTRUCTION	04/16/18

SI - 5
05/31/18
CURRENT ISSUE STATUS:

PROJECT NORTH:

SMRT Architects and Engineers
144 Fore Street/P.O. Box 618
Portland, Maine 04104
ARCHITECTURE | ENGINEERING | PLANNING | INTERIORS | ENERGY
SMRT

WEX
CORPORATE HEADQUARTERS

PORTLAND, ME

CODE SUMMARY AND KEY PLAN

SHEET TITLE:

SCALE: AS NOTED

PROJECT MANAGER:	GWV	PROJECT NO:	17120-01
A/E OF RECORD:	GWV		
JOB CAPTAIN:	CBM		A-001
DRAWN BY:	CBM		
SMRT FILE:	A-001-17120-01	SHEET No.	

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