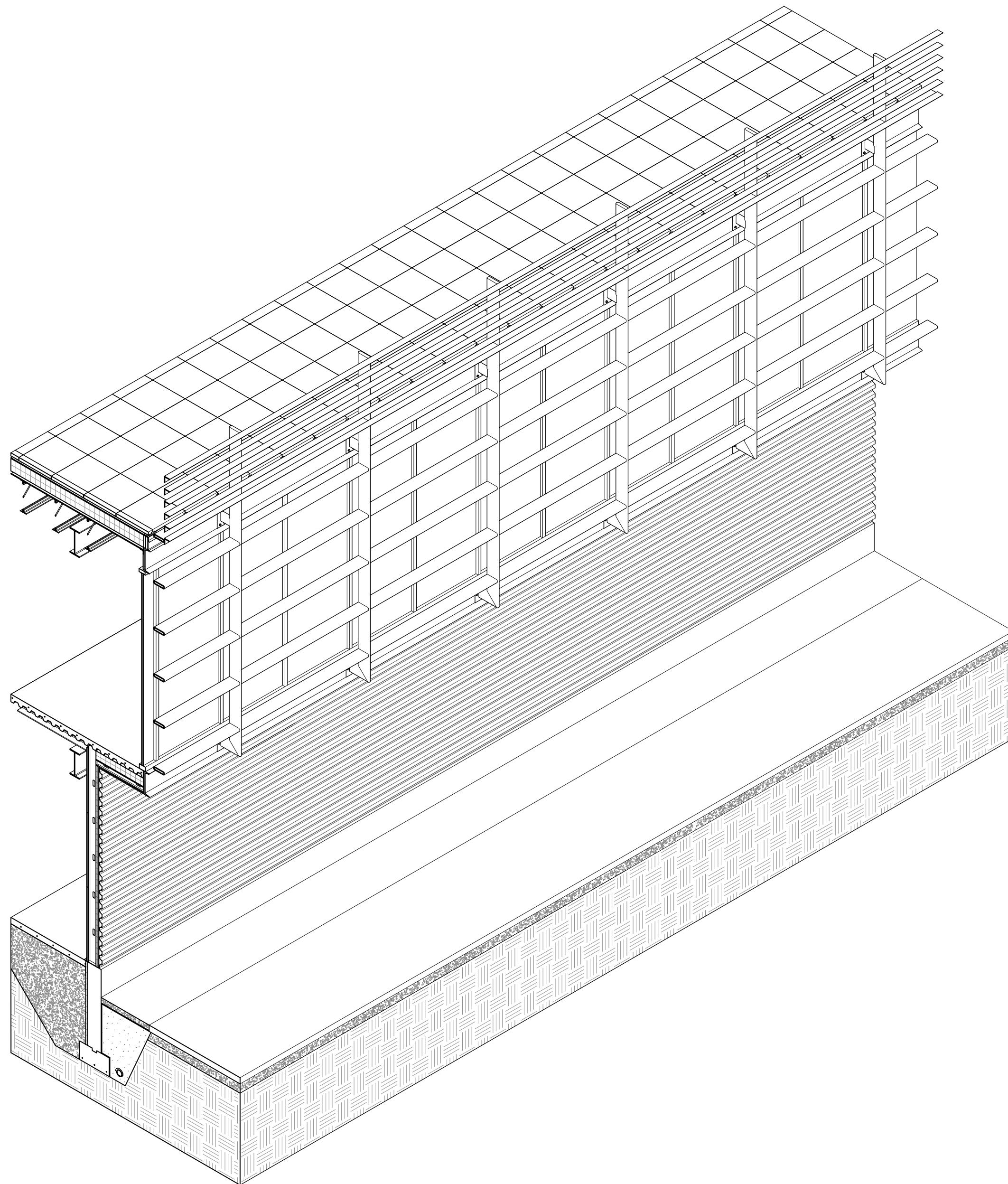


# **MATERIALS + ASSEMBLY**

**SPRING 2017  
SELENA ZHEN**



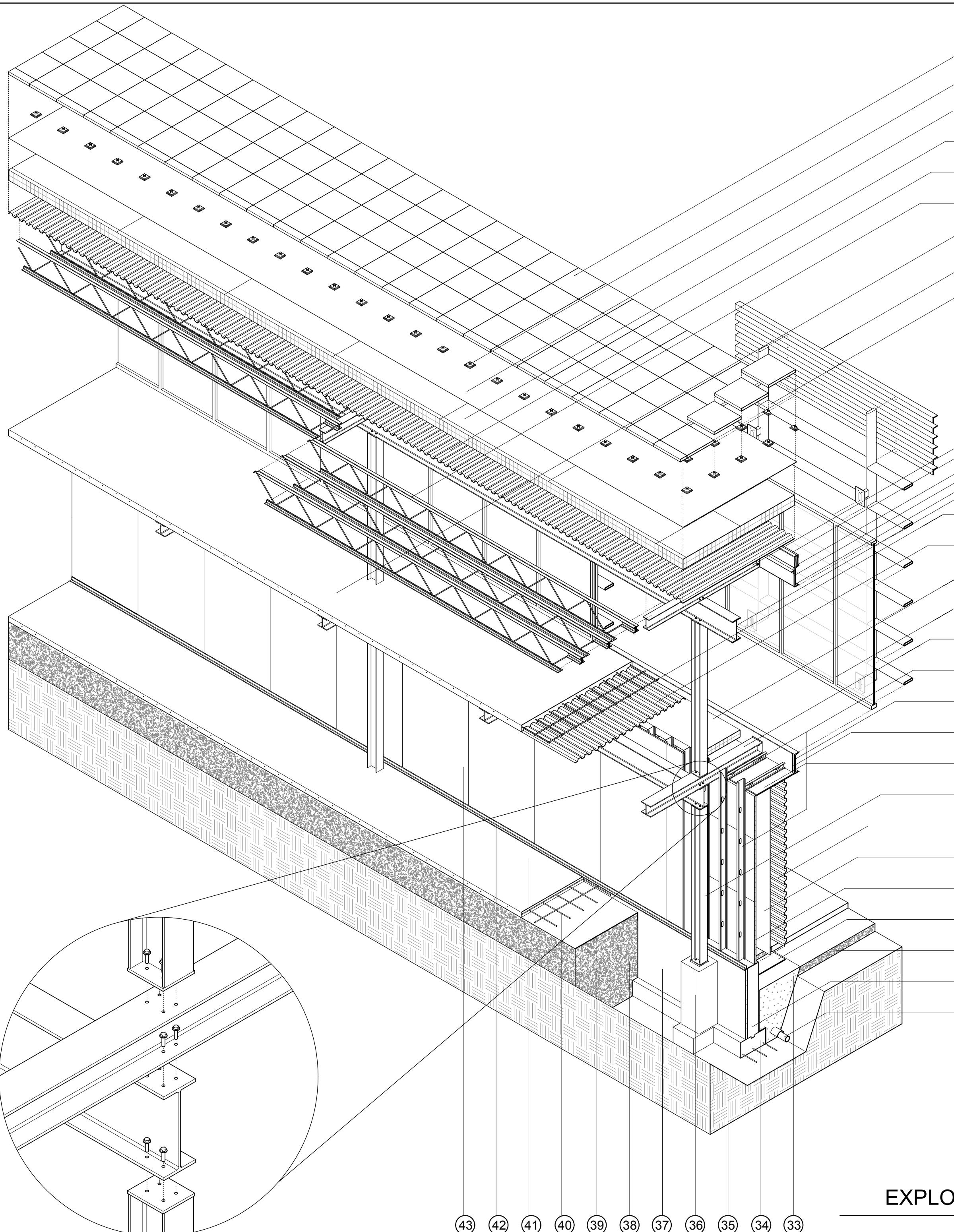
ASSEMBLED PARALINE

SCALE: 1/4" = 1'0"

ASSEMBLY SEQUENCE  
PAGE 1 OF 2

ASSIGNMENT 1  
48-215 MATERIALS & ASSEMBLY  
SPRING 2017  
INSTRUCTOR: DAMIANI

SELENA ZHEN



**EXPLODED PARALINE**

SCALE: 1/4" = 1'0"

CONSTRUCTION MATERIAL KEY:	
1	2'-0" X 2'-0" X 2'-0" CONCRETE PAVER
2	PAVE EL PEDESTAL WITH PROTECTION PAD
3	EPDM ROOFING
4	RIGID INSULATION
5	STEEL DECKING
6	STEEL BAR JOIST
7	POLISHED CONCRETE SLAB
8	4" X 4" X .375" STEEL ANGLE BOLTED
9	STEEL TUBE 8" X 2" X .375" @8 8'0" O.C. VERTICALLY AND @ 2'6" HORIZONTALLY, .375" THICK STEEL PLATE WELDED TO TUBE & BOLTED TO CHANNEL
10	STEEL SECONDARY BEAM W8X21 @ 24'-0" CENTERS
11	STAINLESS FLASHING
12	TREATED WOOD BLOCKING
13	THERMAL BREAK
14	STEEL CHANNEL C15X50
15	STEEL PRIMARY BEAM W16X45
16	WELDED WIRE MESH
17	STEEL DECKING
18	RIGID INSULATION
19	KAWNEER WINDOW 451T SPACED 4'-0" O.C.
20	STEEL SECONDARY BEAM W8X40 @12'0" O.C.
21	COLD ROLLED METAL FRAMING @16" O.C. SPACING
22	STEEL CHANNEL C15X50
22	THERMAL BREAK
24	5/8"1/2" TK. FIBER CEMENT PANEL
25	STEEL COLUMN W8X24 @ 24'-0" O.C. WITH 1/2" DIA. ANCHOR BOLTS WITH NON SHRINK GROUT BED
26	CORRUGATED METAL SIDING
27	VAPOR BARRIER
28	RIGID INSULATION
29	WATERPROOFING
30	COMPACTED GRAVEL FILL
31	10" TK. CAST IN PLACE CONCRETE
32	FOUNDATION DRAIN W/ GEO TEXTILE FABRIC
33	GRAVEL BACKFILL
34	REINFORCED CONCRETE FOOTING
35	EARTH/GROUND
36	18" WIDE CONCRETE PIER
37	RIGID INSULATION
38	COMPACTED GRAVEL FILL
39	VAPOR BARRIER
40	CONCRETE SLAB
41	WELDED WIRE MESH
42	SILL SEAL
43	TYPE X GYPSUM BOARD

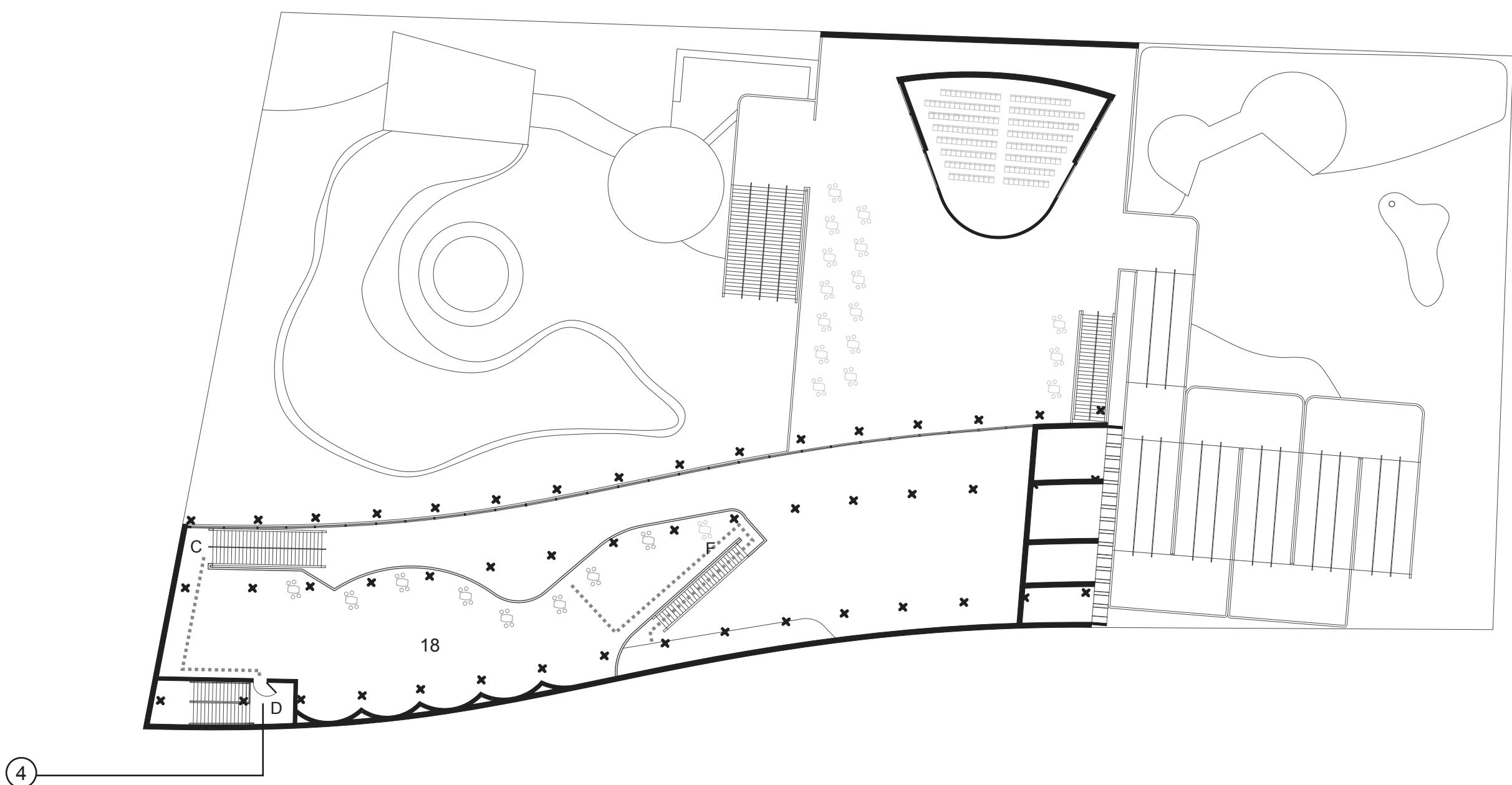
## ASSEMBLY SEQUENCE

PAGE 2 OF 2

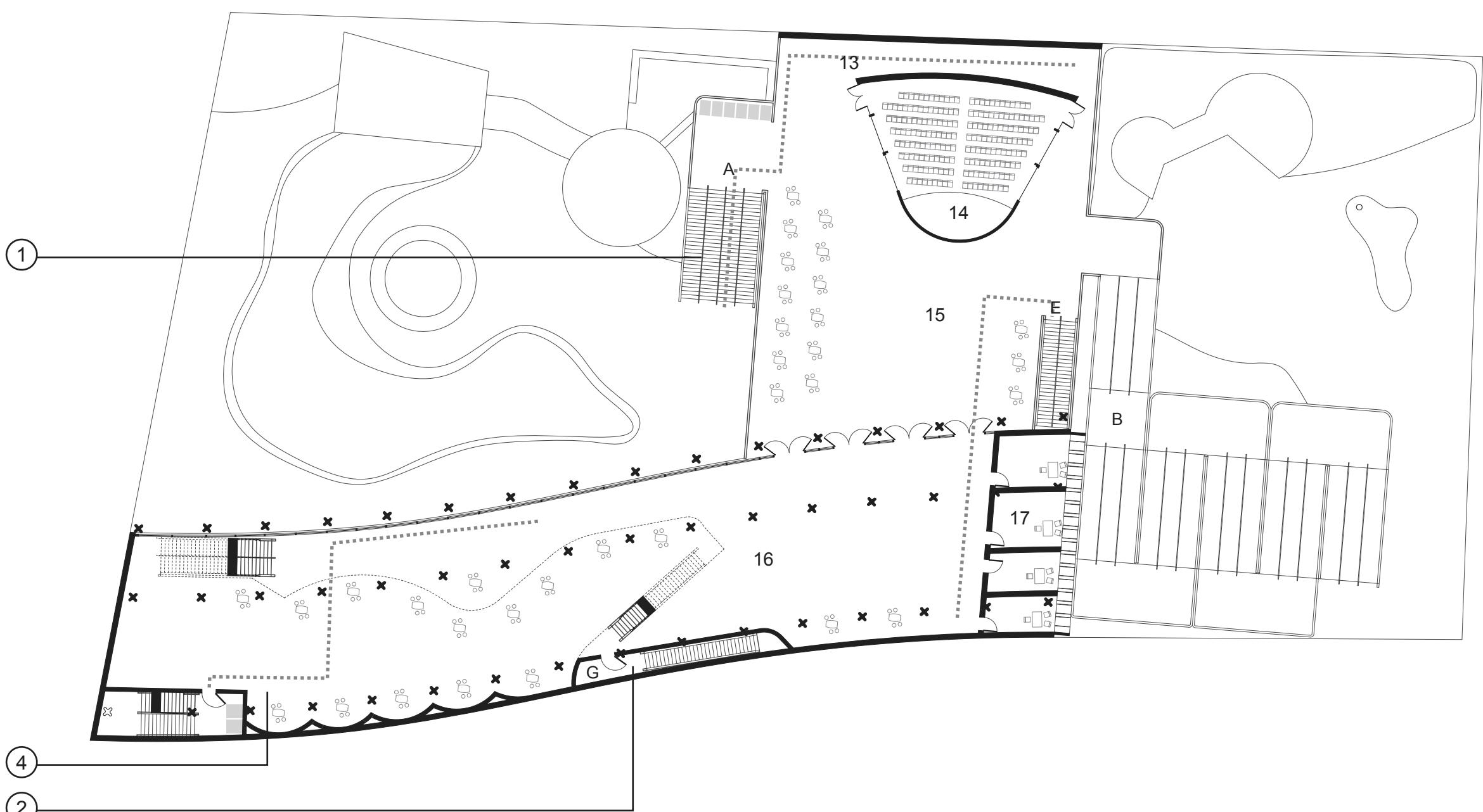
## ASSIGNMENT 1

48-215 MATERIALS & ASSEMBLY  
SPRING 2017  
INSTRUCTOR: DAMIANI

SELENA ZHEN



THIRD FLOOR PLAN  
SCALE 1/32" = 1'



SECOND FLOOR PLAN  
SCALE 1/32" = 1'

#### CODE REVIEW

IBC 503: The Brazilian Pavilion by Oscar Niemeyer is a Type 1B construction building. According to IBC Table 503, the floor area for a Type 1B occupancy building is unlimited, and the maximum stories allowed is 11. This building is 52,216 sf, and 3 stories, and is therefore compliant with Table 503.

IBC 601: According to Table 601, the fire resistance rating for a Type 1B building must be 2 hours.

IBC 1004.1.1: Table 1004.1.1 determines the maximum floor area allowances per occupant based on function of space. According to this, the total maximum occupancy of the occupiable spaces are 4,600 persons. [Individual spaces are listed in Occupancy Loads below]

IBC 1004.6: The occupant load of a mezzanine level with egress into a room or area below shall be added to that room or area's occupant load, and the capacity of the exits shall be designed for the total occupant load thus established.

IBC 1005.1: Using the factors given in Table 1005.1 Egress Width per Occupant Served, the stairway egress width (inches per occupant) is 0.3 and other egress components' width (inches per occupant) is 0.2.

The first floor's required occupancy based on spaces is 239 persons, which requires 3.97' means of egress. There is now 48' of egress to serve 2,880 persons, which is more than required and complies with Table 1005.1.

The second floor's required occupancy based on area is 1,671 persons, which requires 41.75' means of egress. There is now 51.57' of egress to serve 2,063 persons, which is more than required and complies with Table 1005.1.

The third floor's [mezzanine] required occupancy based on area is 305 persons, which requires 7.61' means of egress. There is now 9.57' of egress to serve 383 persons, which is more than required and complies with Table 1005.1.

Code Review continues on Page 2.

#### CODE ANNOTATION KEY:

- ① 1012.8: Intermediate handrails are required in areas so that all portions of the stairway width required for egress capacity are within 30 inches of a handrail [Required for Egress A, B, C, E.]
- ② 1020.1.7 & 1020.1.7.1: According to this section, 50% of interior means of egress stairways are required to be enclosed because of the occupancy number for the floors it serves. The smokeproof enclosure stairway shall exit into a public way.

#### MEANS OF EGRESS WIDTHS

- |          |       |
|----------|-------|
| A. 19'   | E. 8' |
| B. 15'   | F. 4' |
| C. 8'10" | G. 4' |
| D. 5.6"  |       |

#### OCCUPANCY LOADS [OCCUPIABLE AREAS ONLY]

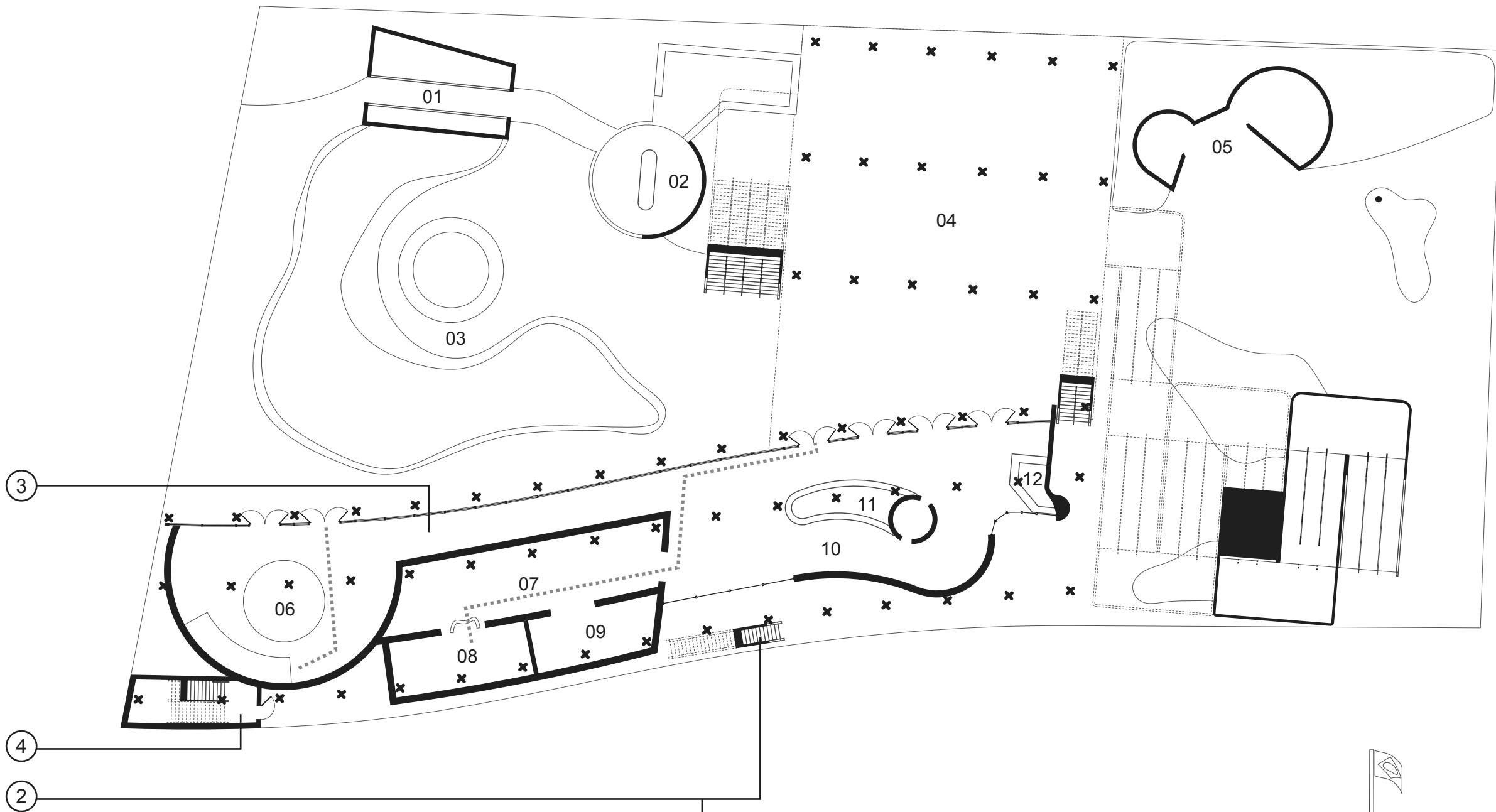
- 13. CLOAKROOM: S1, ACCESSORY STORAGE AREA: 593 sf OCCUPANCY: 2
- 14. LECTURE HALL: A3, ASSEMBLY FIXED SEATS AREA: 1172 sf OCCUPANCY: 192
- 15. ESPLANADE: A5, ASSEMBLY UNCONCENTRATED AREA: 6017 sf OCCUPANCY: 402
- 16. EXHIBITION HALL: A3, ASSEMBLY UNCONCENTRATED AREA: 11426 sf OCCUPANCY: 762
- 17. OFFICES: B, BUSINESS AREAS AREA: 880 sf OCCUPANCY: 9
- 18. EXHIBITION MEZZANINE: A3, ASSEMBLY UNCONCENTRATED AREA: 4566 sf OCCUPANCY: 54

## MEANS OF EGRESS (STAIRS & RAMPS)

**ASSIGNMENT 2**  
**PAGE: 1 of 5**

**48-215 MATERIALS & ASSEMBLY**  
**SPRING 2017**

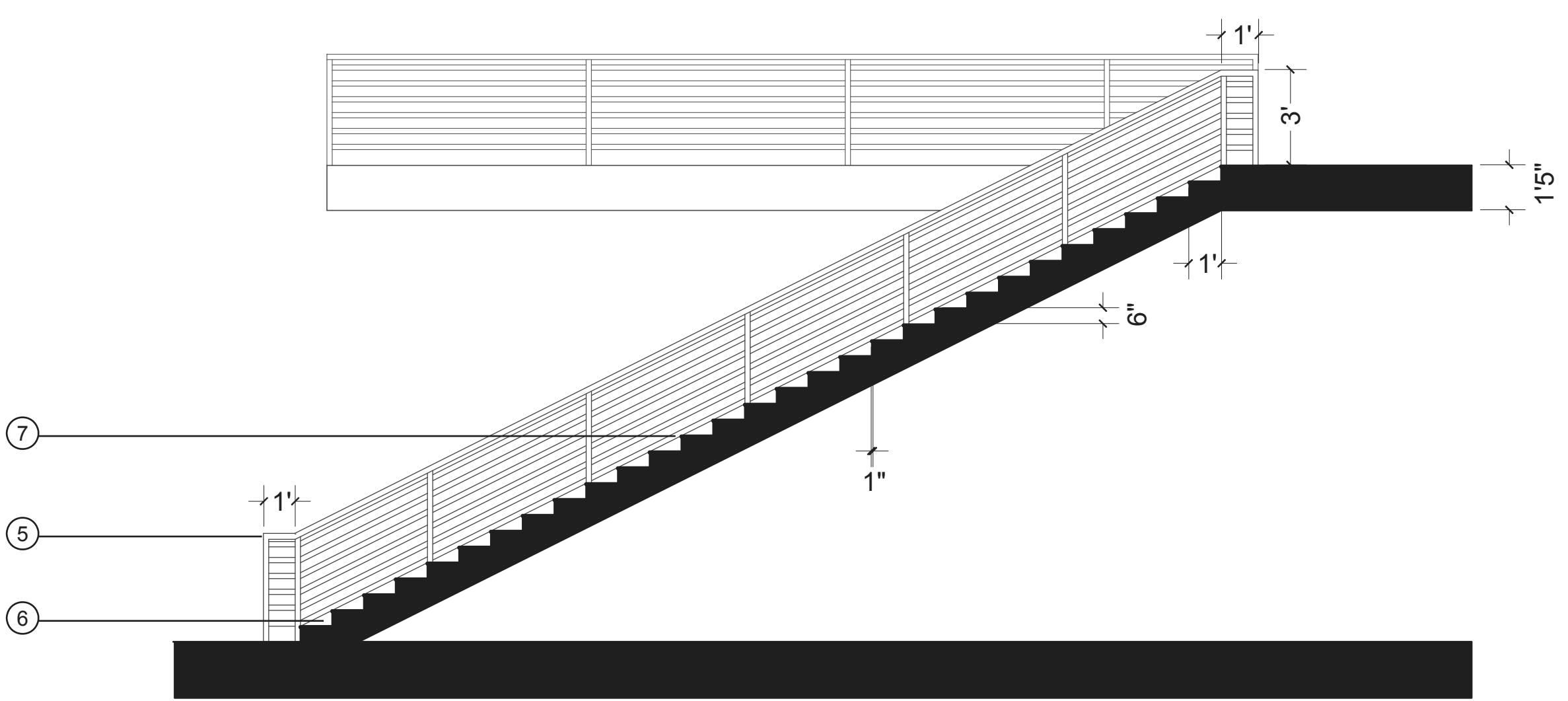
**INSTRUCTOR: DAMIANI**  
**SELENA ZHEN**



GROUND FLOOR PLAN  
SCALE 1/32" = 1'



CROSS SECTION  
SCALE 1/32" = 1'



STAIR SECTION DETAIL  
MEANS OF EGRESS E  
SCALE 1/4" = 1'

#### CODE REVIEW

IBC 1015.1 & IBC 1019.1: According to Table 1015.1 Spaces With One Means Of Egress and the occupancy load of the floors of the building, each floor needed additional means of egress. According to Table 1019.1 Minimum Number of Exits for Occupant Load, the minimum number of exits per story is as follows; Floor 1=2 exits, Floor 2 = 4 exits, Floor 3 = 3 exits. The new means of egress exists for the entire building now complies with Table 1015.1 and Table 1019.1.

IBC 1016.1: Exits are so located on each story such that the length of travel does not exceed distances according to Table 1016.1 Exit Access Travel Distance [200 ft for occupancies A, F1, S1, B: 300 ft for S2].

IBC 1017.1: According to Table 1017.1, the corridor on the first floor has a required fire-resistance rating of at least 1 hour [see code annotation 3].

#### CODE ANNOTATION KEY:

- (3) Corridor serves an occupant load greater than 30, which requires a 1 hour minimum fire-resistance rating. Corridor also results in a dead end and a length of 73' (1017.3), requiring a means of egress arranged adjacent to the dance floor.
- (4) 1020.1.7 & 1020.1.7.1: According to this section, 50% of interior means of egress stairways are required to be enclosed because of the occupancy number for the floors it serves. The smokeproof enclosure stairway shall exit into a public way.
- (5) 1012: According to this section, handrails must be changed to comply:
  - Height must be between 34"-38"; is now 36".
  - Perimeter dimension of at least 4"-6.25" with a max cross section of 2.23"; is now 6"x2".
  - Handrail must extend horizontally at least 12" beyond the slope.
- (6) 1013: According to this section, handrails must be changed to comply:
  - Opening limitations: open guards shall have balusters such that an 8" diameter sphere cannot pass through any opening.
  - A sphere of 6" cannot pass through the opening of triangular openings formed by the riser, treads and bottom rail of a stairway.
- (7) 1009: Nosings are required on stairways and shall not project more than 1.25".

#### OCCUPANCY LOADS [OCCUPIABLE AREAS ONLY]

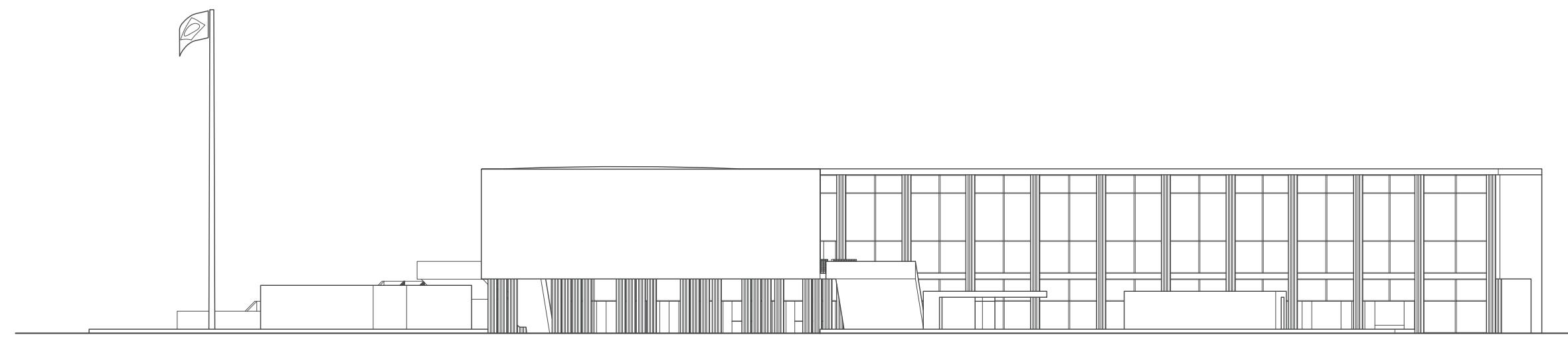
01. ORCHID HOUSE: U, ASSEMBLY STANDING	AREA: 268 sf	OCCUPANCY: 54
02. AQUARIUM: A3, ASSEMBLY STANDING	AREA: 693 sf	OCCUPANCY: 139
03. SNAKES/POND: A3, ASSEMBLY UNCONCENTRATED	AREA: 8268 sf	OCCUPANCY: 552
04. OUTDOOR EXHIBITION: A3, ASSEMBLY STANDING	AREA: 9010 sf	OCCUPANCY: 1802
05. BIRD HOUSE: U, ASSEMBLY STANDING	AREA: 729 sf	OCCUPANCY: 146
06. DANCE FLOOR: A2, STAGES AND PLATFORMS	AREA: 367 sf	OCCUPANCY: 25
07. RESTAURANT: A2, ASSEMBLY UNCONCENTRATED	AREA: 1077 sf	OCCUPANCY: 72
08. KITCHEN: F1, KITCHENS, COMMERCIAL	AREA: 532 sf	OCCUPANCY: 3
09. STORAGE: S2, MERCANTILE	AREA: 469 sf	OCCUPANCY: 2
10. COFFEE EXHIBIT: A3, ASSEMBLY STANDING	AREA: 677 sf	OCCUPANCY: 136
11. COFFEE BAR: A2, KITCHENS, COMMERCIAL	AREA: 191 sf	OCCUPANCY: 1
12. INFO DESK: A3, EDUCATIONAL [SHOPS AND OTHER]	AREA: 75 sf	OCCUPANCY: 2

## MEANS OF EGRESS (STAIRS & RAMPS)

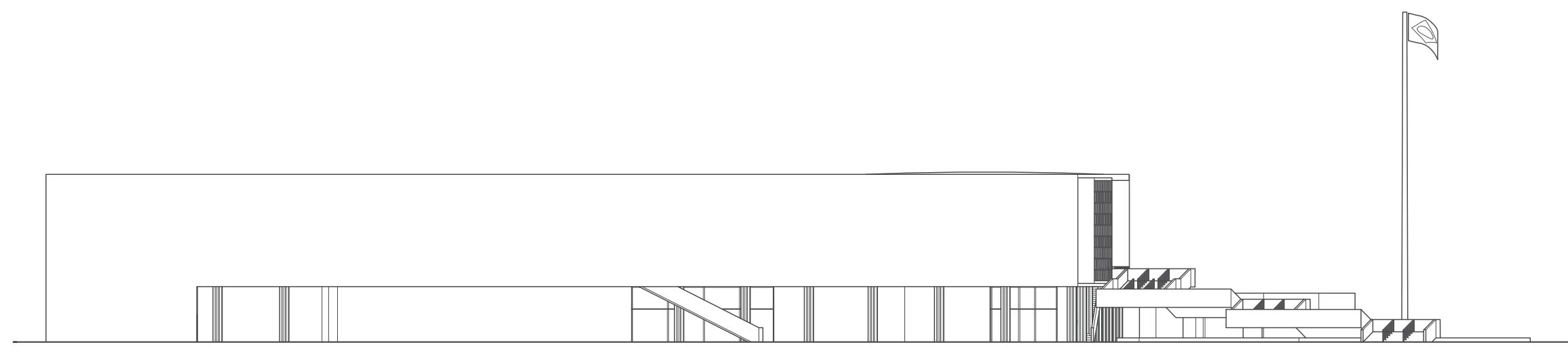
ASSIGNMENT 2  
PAGE: 2 OF 5

48-215 MATERIALS & ASSEMBLY  
SPRING 2017

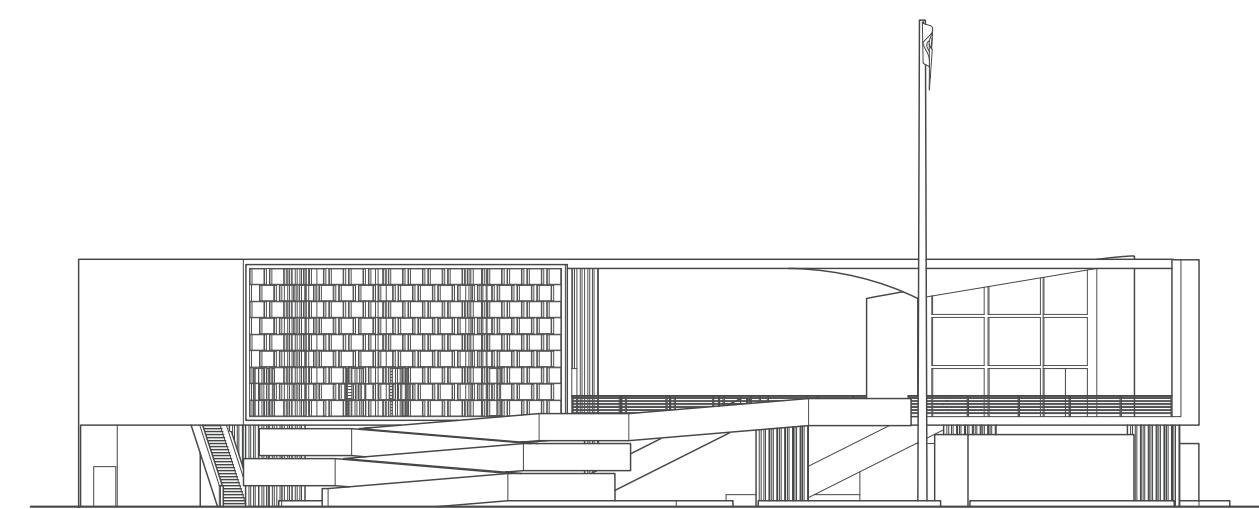
INSTRUCTOR: DAMIANI  
SELENA ZHEN



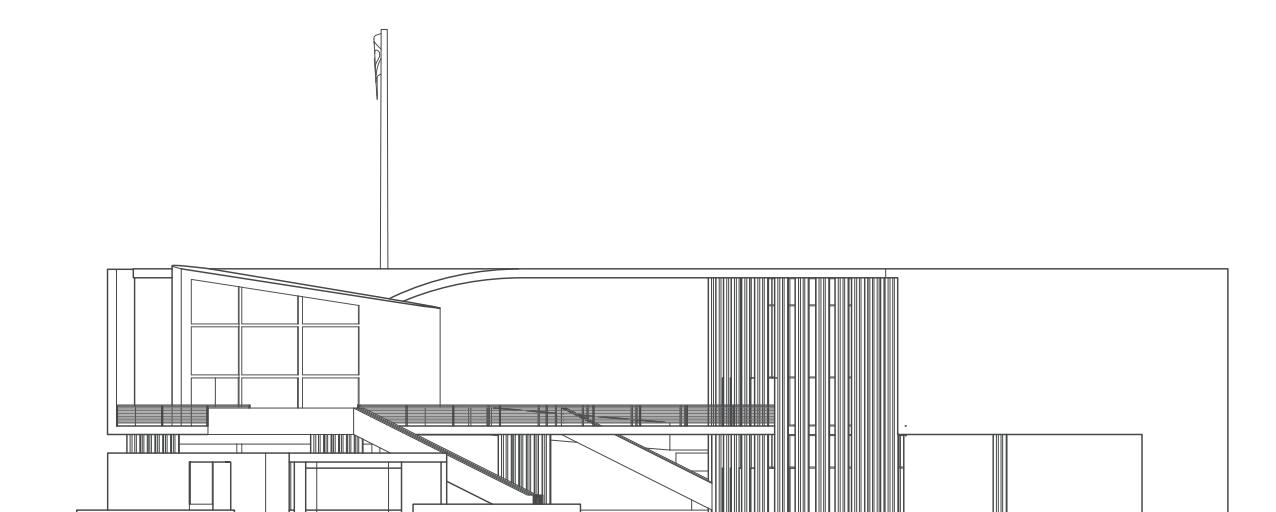
NORTH ELEVATION  
SCALE 1/32" = 1'



SOUTH ELEVATION  
SCALE 1/32" = 1'



EAST ELEVATION  
SCALE 1/32" = 1'



WEST ELEVATION  
SCALE 1/32" = 1'

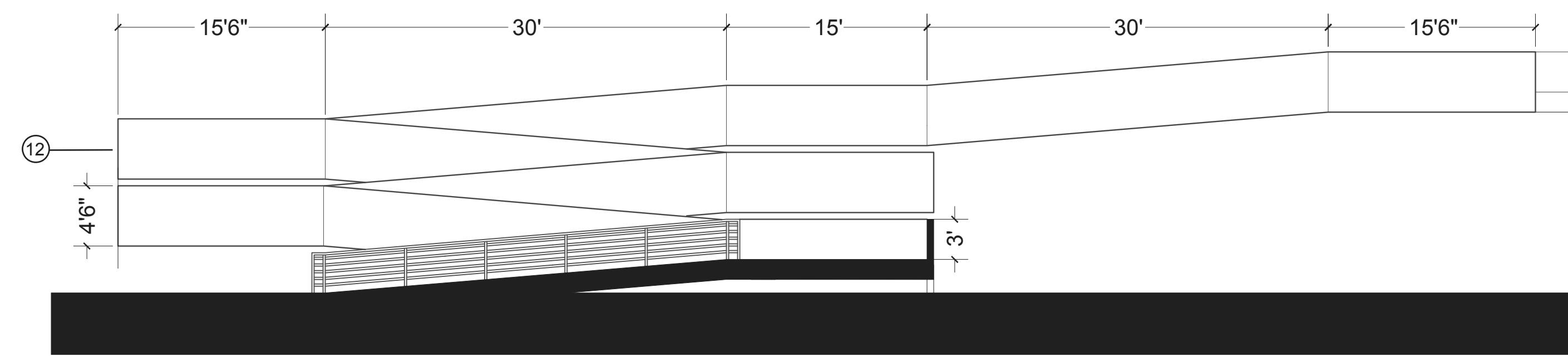
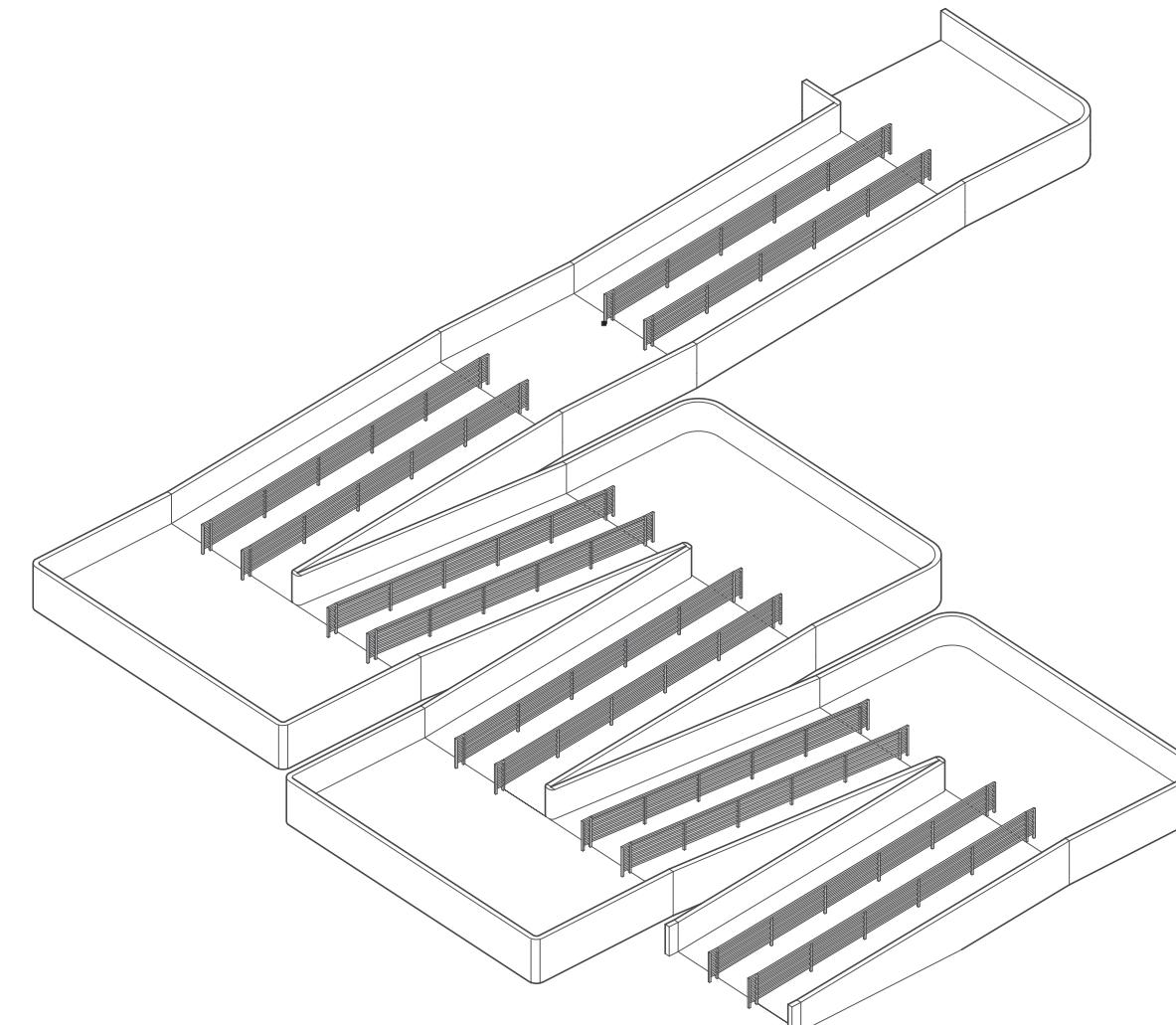
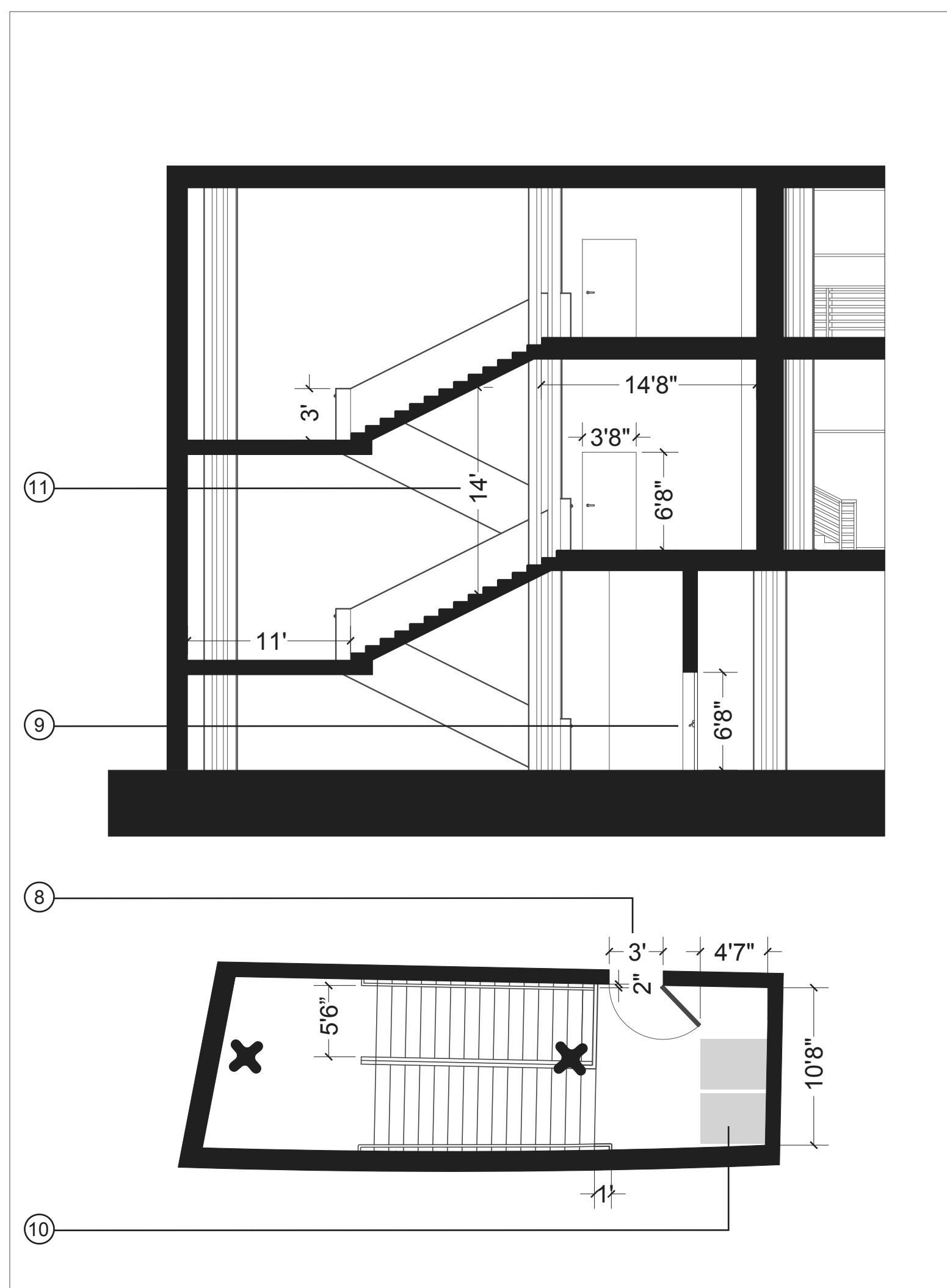
## MEANS OF EGRESS (STAIRS & RAMPS)

ASSIGNMENT 2  
PAGE: 3 OF 5

48-215 MATERIALS & ASSEMBLY  
SPRING 2017

INSTRUCTOR: DAMIANI

SELENA ZHEN



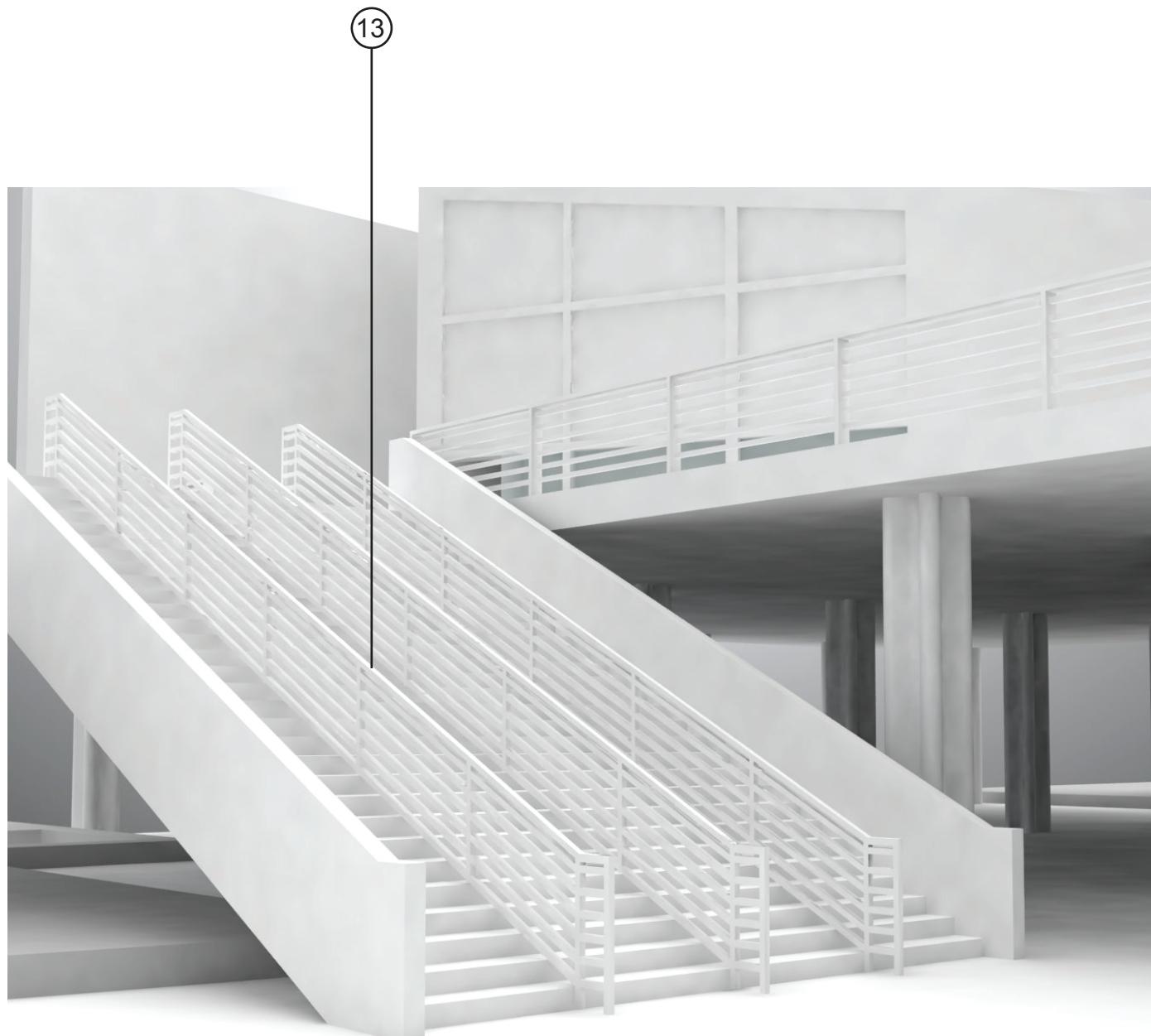
- CODE ANNOTATION KEY:
- (8) 1008: According to this section, means of egress doors should be a minimum width of 32", a minimum height of 6'8", and should be side-hinged and swing in the direction of egress travel.
  - (9) 1008.1.8. Door handles and hardware should be readily openable. Because this building serves mainly Group A Occupancies, panic hardware is required for means of egress.
  - (10) 1007: According to this section and 1007.6, 9 areas of refuge are required and should comply:
    - One wheelchair space of 30"x48" for each 200 occupants served.
    - Each area of refuge should be separated from the building by a smoke barrier as well as have direct access to an enclosed stairway.
  - (11) 1009.2 Headroom: Stairways shall have a minimum headroom clearance of 80"; it is now 14'.
  - (12) 1010: According to this section, the ramp must be changed to comply:
    - Slope of a means of egress ramp should be no steeper than 1:12 (8% slope).
    - Width shall be 36" minimum; is now 15'.
    - Landings should occur at the top and bottom of each ramp, points of turning, and shall be 60" minimum in length.
    - Compliance with 1012's section on handrails.
    - Vertical rise for any ramp run should be 30" maximum.

## MEANS OF EGRESS (STAIRS & RAMPS)

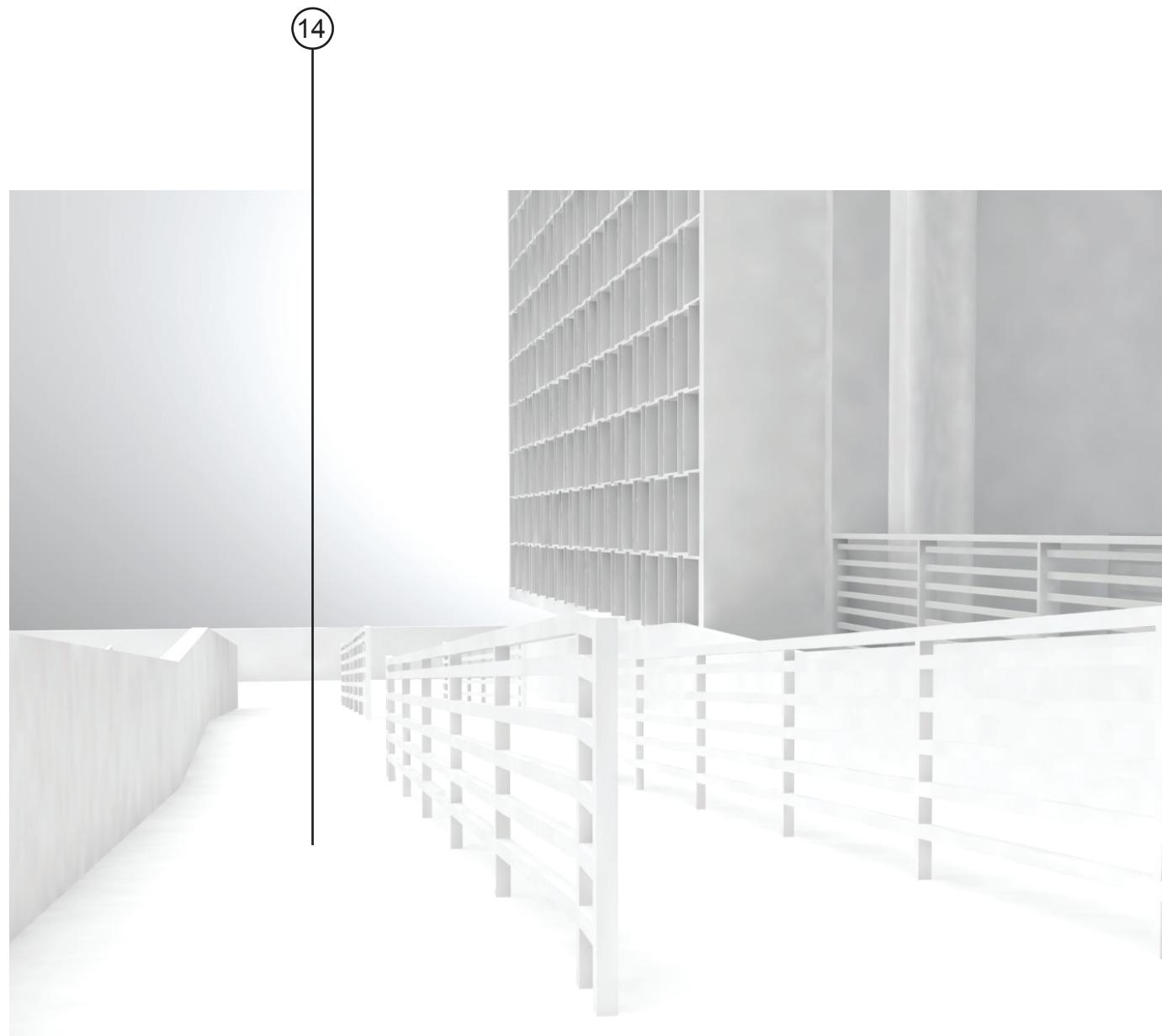
ASSIGNMENT 2  
PAGE: 4 OF 5

48-215 MATERIALS & ASSEMBLY  
SPRING 2017

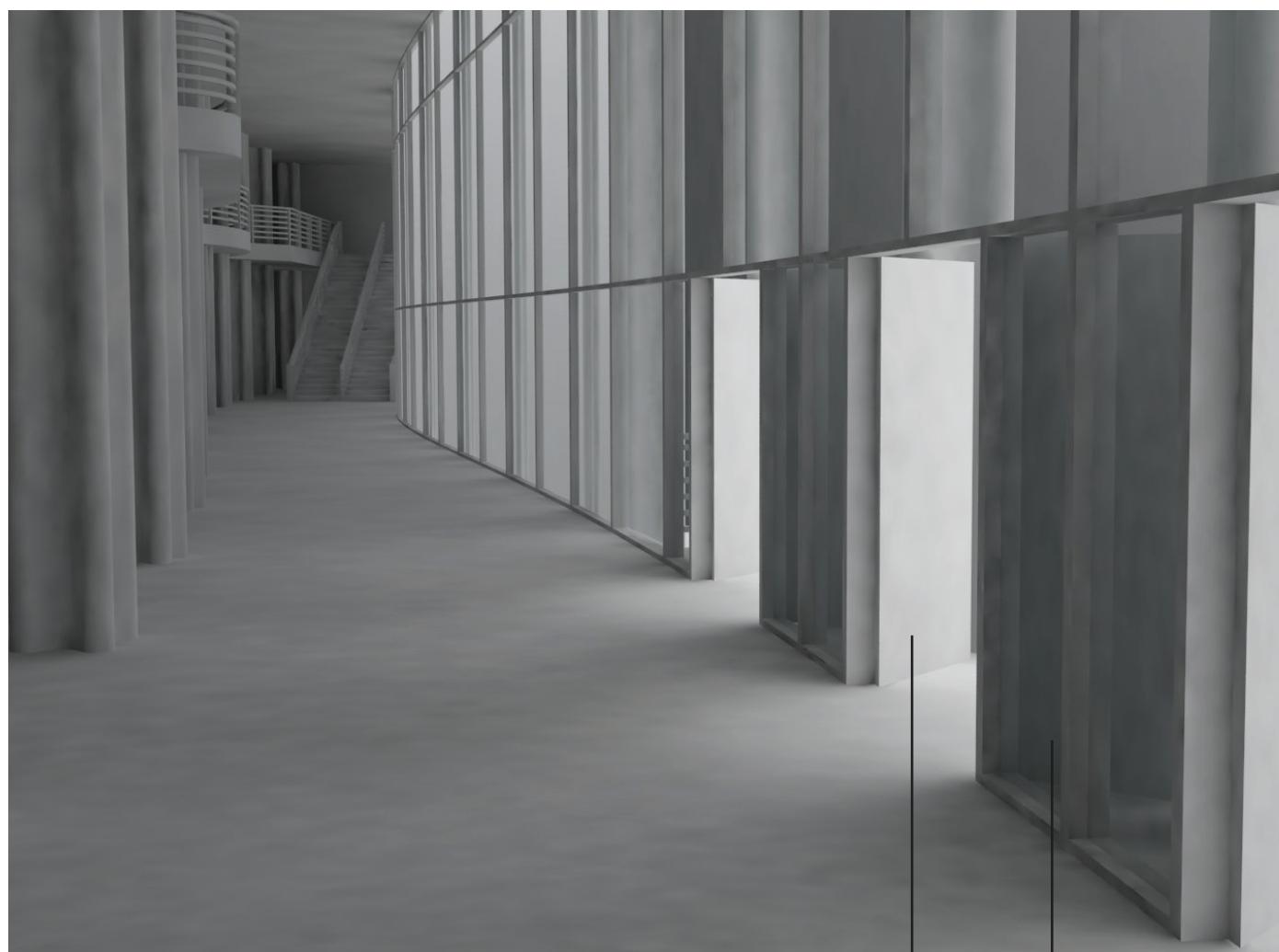
INSTRUCTOR: DAMIANI  
SELENA ZHEN



RENDER 1: EXTERIOR



RENDER 2: EXTERIOR



RENDER 3: INTERIOR



RENDER 4: INTERIOR

- CODE ANNOTATION KEY:
- (13) 1016.1 Travel Distance Limitations: Exterior means of egress from the esplanade.
  - (14) 1010: The vertical rise for any ramp run should be 30" maximum, resulting in ramps every 30'.
  - (15) 1008: By changing these doors to swing open 135 degrees, they become egress doors
  - (16) 1008.1.7 Door Arrangement: Space between two doors in a series shall be 48" minimum. Doors in a series shall swing either in the same direction or away from the space between the doors.
  - (17) 1020: Enclosed Stair and Fire Wall Means of Egress Stair and Entrance.

## MEANS OF EGRESS (STAIRS & RAMPS)

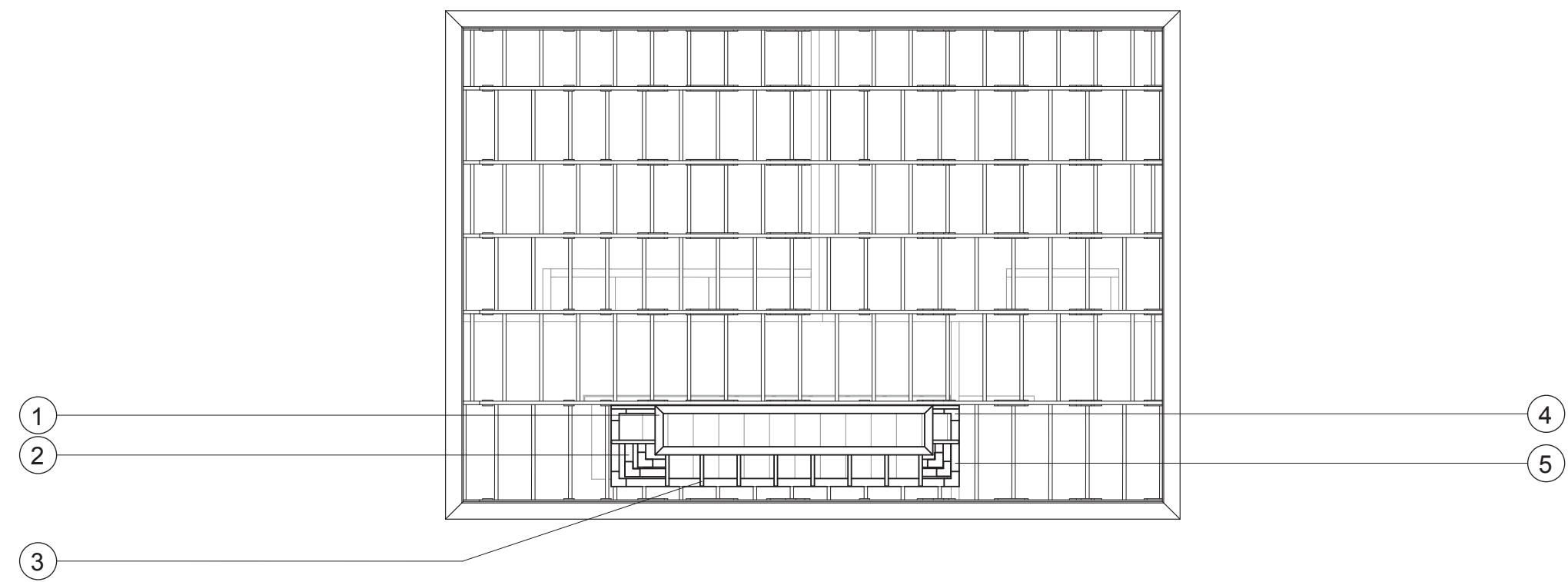
ASSIGNMENT 2  
PAGE: 5 OF 5

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SPRING 2017

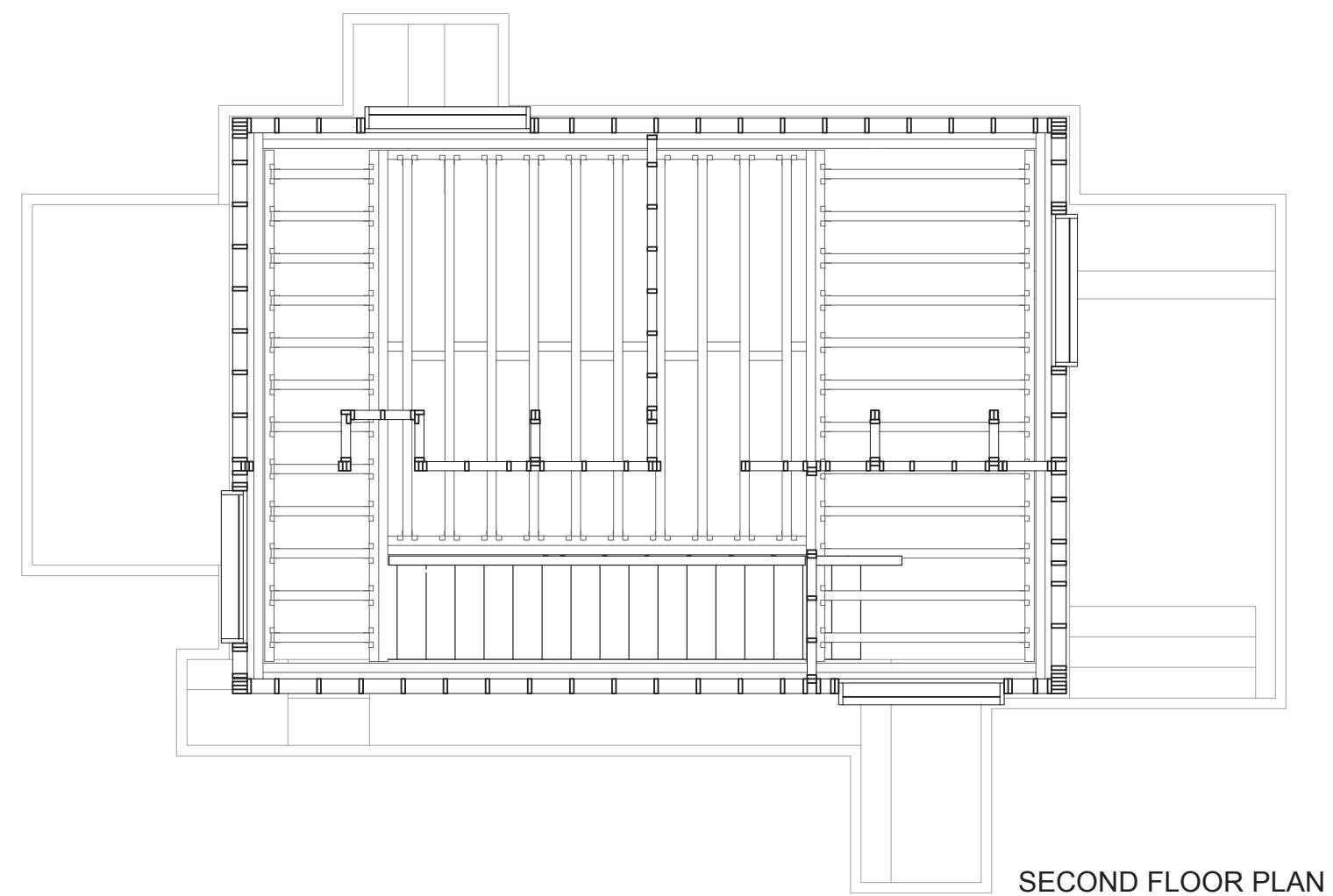
INSTRUCTOR: DAMIANI  
SELENA ZHEN

**CONSTRUCTION MATERIAL KEY**

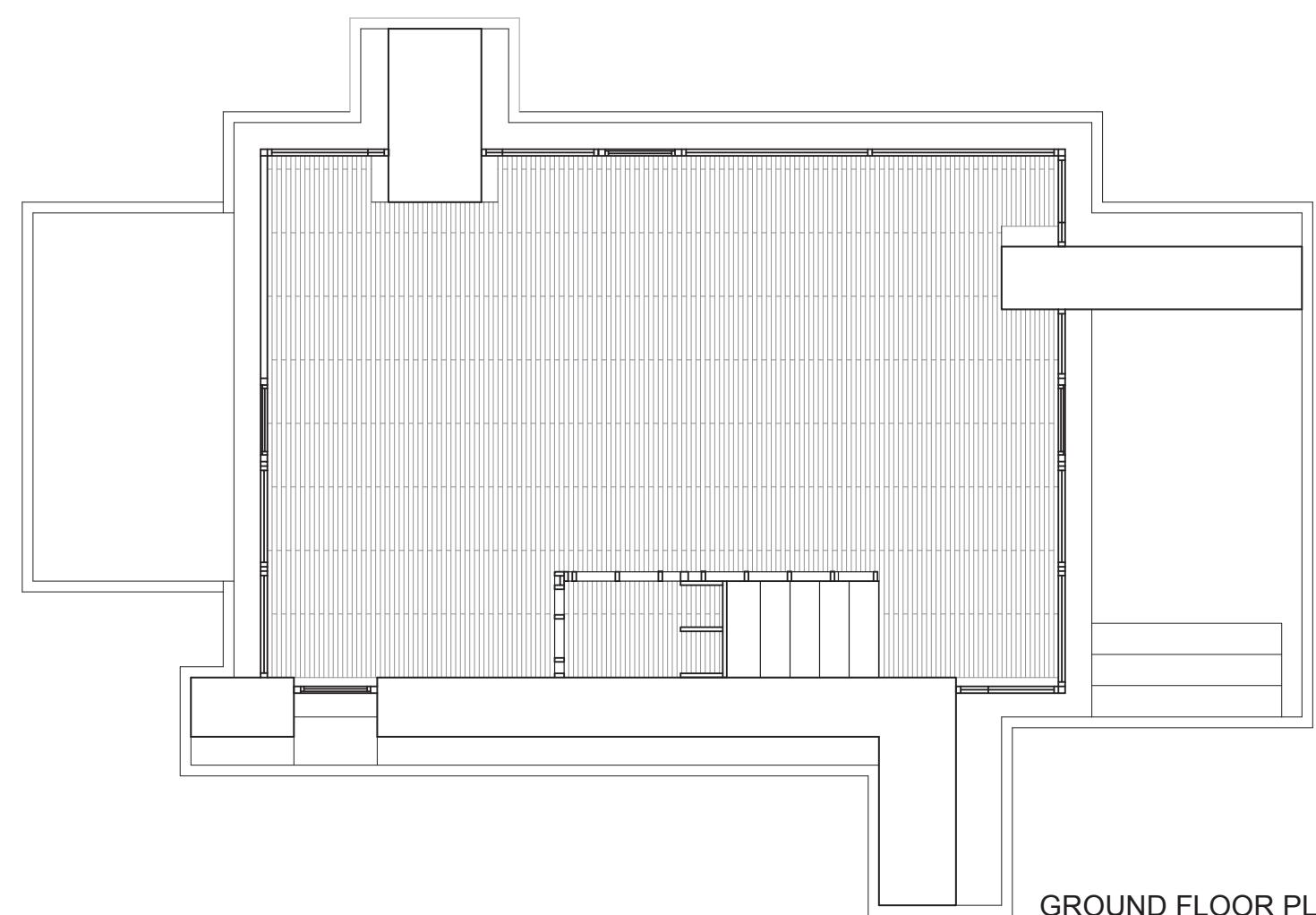
- 1. 3.5"x1.5" TOP PLATE (x2)
- 2. 3.5"x1.5" HORIZONTAL BRIDGING
- 3. 3.5"x1.5" STUD (16" O.C.)
- 4. 3.5" CONNECTION PLATE
- 5. 3.5"x1.5" SOLE PLATE



ROOF PLAN



SECOND FLOOR PLAN



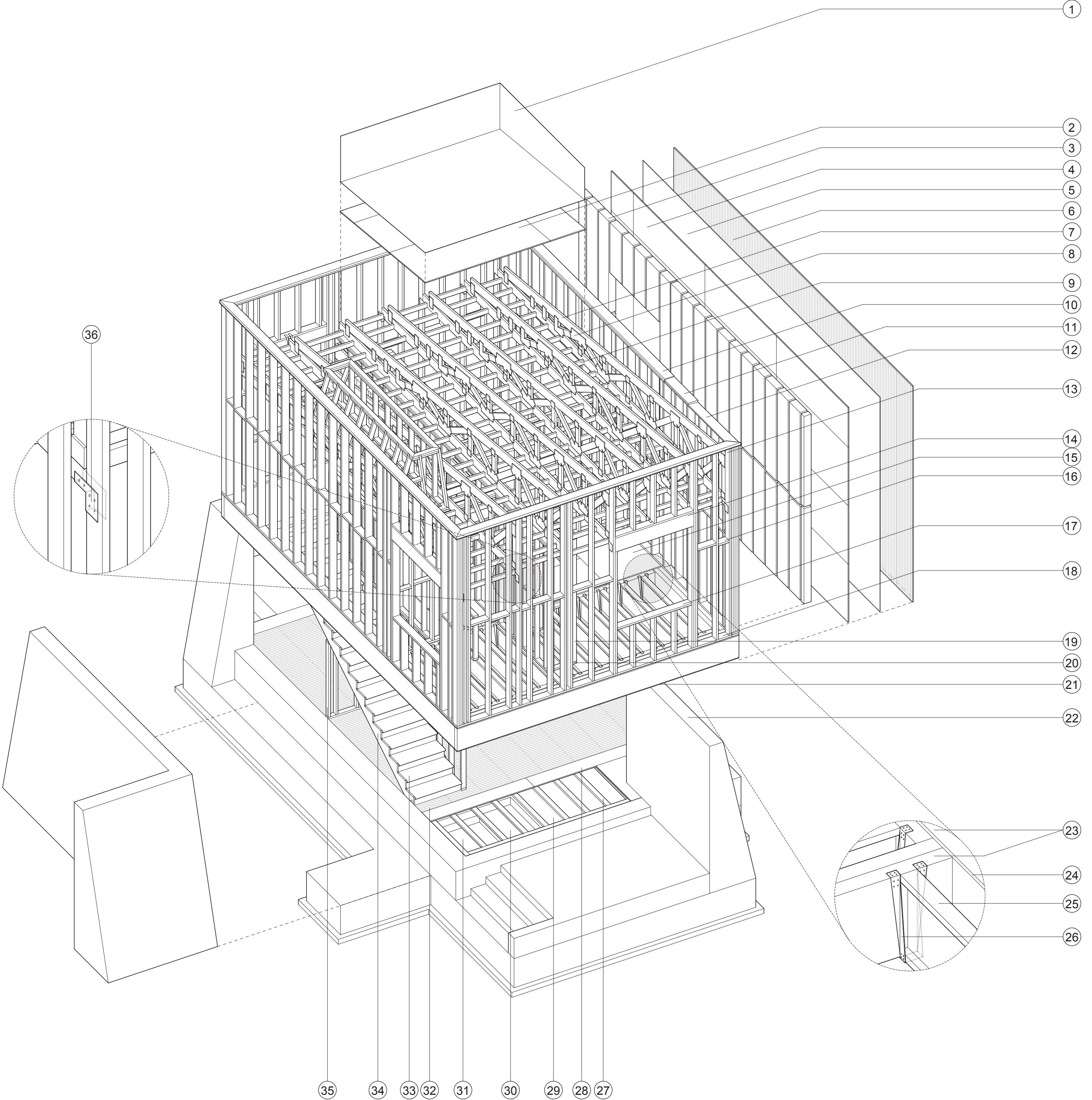
GROUND FLOOR PLAN

## WOOD FRAMING

**ASSIGNMENT 3  
PAGE: 1 OF 3**

**48-215 MATERIALS & ASSEMBLY  
SPRING 2017**

**INSTRUCTOR: DAMIANI  
SELENA ZHEN**



**CONSTRUCTION MATERIAL KEY**

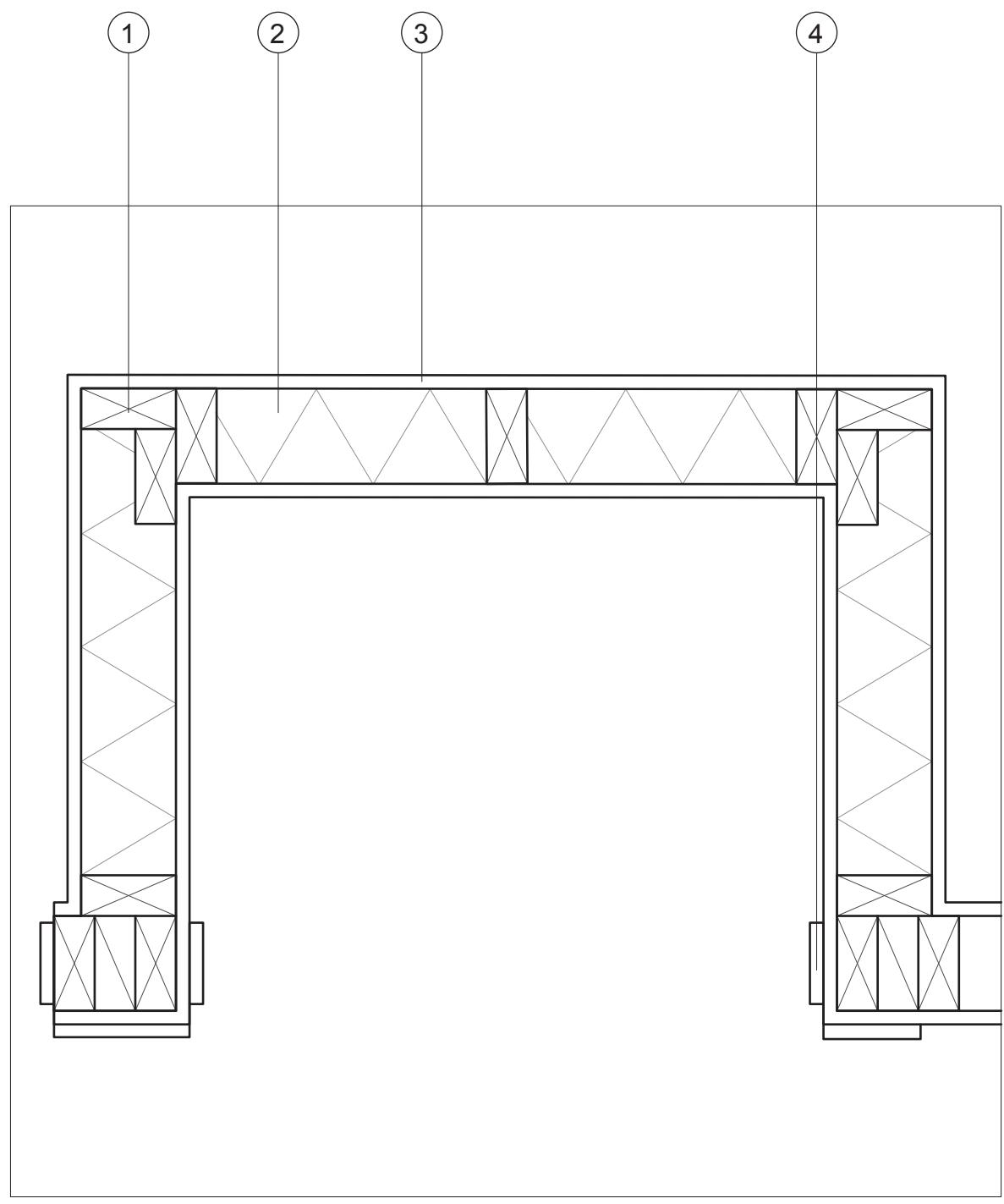
- 1. RUBBER WATERPROOFING MEMBRANE
- 2. 0.75" EXTERIOR GRADE PLYWOOD
- 3. 5.5" CLOSED CELL INSULATION
- 4. 0.75" EXTERIOR GRADE PLYWOOD
- 5. WATERPROOF MEMBRANE
- 6. 1.5"x0.75" LARCH SLAT
- 7. 7.25"x1.5" TRUSS CHORDS AND WEB
- 8. 0.5" OSB GUSSET
- 9. 3.5"x1.5" CEILING FRAME
- 10. PARAPET FLASHING
- 11. WOOD CAP
- 12. 5.5"x1.5" TOP PLATE
- 13. 5.5"x1.5" STUD (16" O.C.)
- 14. 11.25"x1.5" HEADER
- 15. 0.75" EXTERIOR GRADE PLYWOOD
- 16. 5.5"x1.5" BRIDGING
- 17. 5.5"x1.5" SILL PLATE
- 18. 5.5"x1.5" SOLE PLATE
- 19. 3.5"x1.5" STUD (16" O.C.)
- 20. 3.5"x1.5" SOLE PLATE
- 21. 0.5" THK. CAPILLARY PAD
- 22. 11" ~ 2'8.5" BOARD FORMED CONCRETE PIER
- 23. 18"x3.5" PSL
- 24. 0.75" PLYWOOD
- 25. I-JOIST: PLYWOOD AND LVL
- 26. JOIST HANGAR
- 27. 3.5"x1.5" SLEEPER STUD AND VENTILATION GAP
- 28. 0.75" PLYWOOD FLOOR
- 29. 6" POURED CONCRETE FLOOR SLAB
- 30. 6" COMPACTED GRAVEL
- 31. EARTH/GROUND
- 32. 0.75" HARDWOOD FLOOR
- 33. 1.5" THK STAIR TREAD
- 34. 5.5"x1.5" TIMBER STRINGER
- 35. 3.5"x1.5"X STUD (16" O.C.)
- 36. TRUSS HANGAR

## WOOD FRAMING

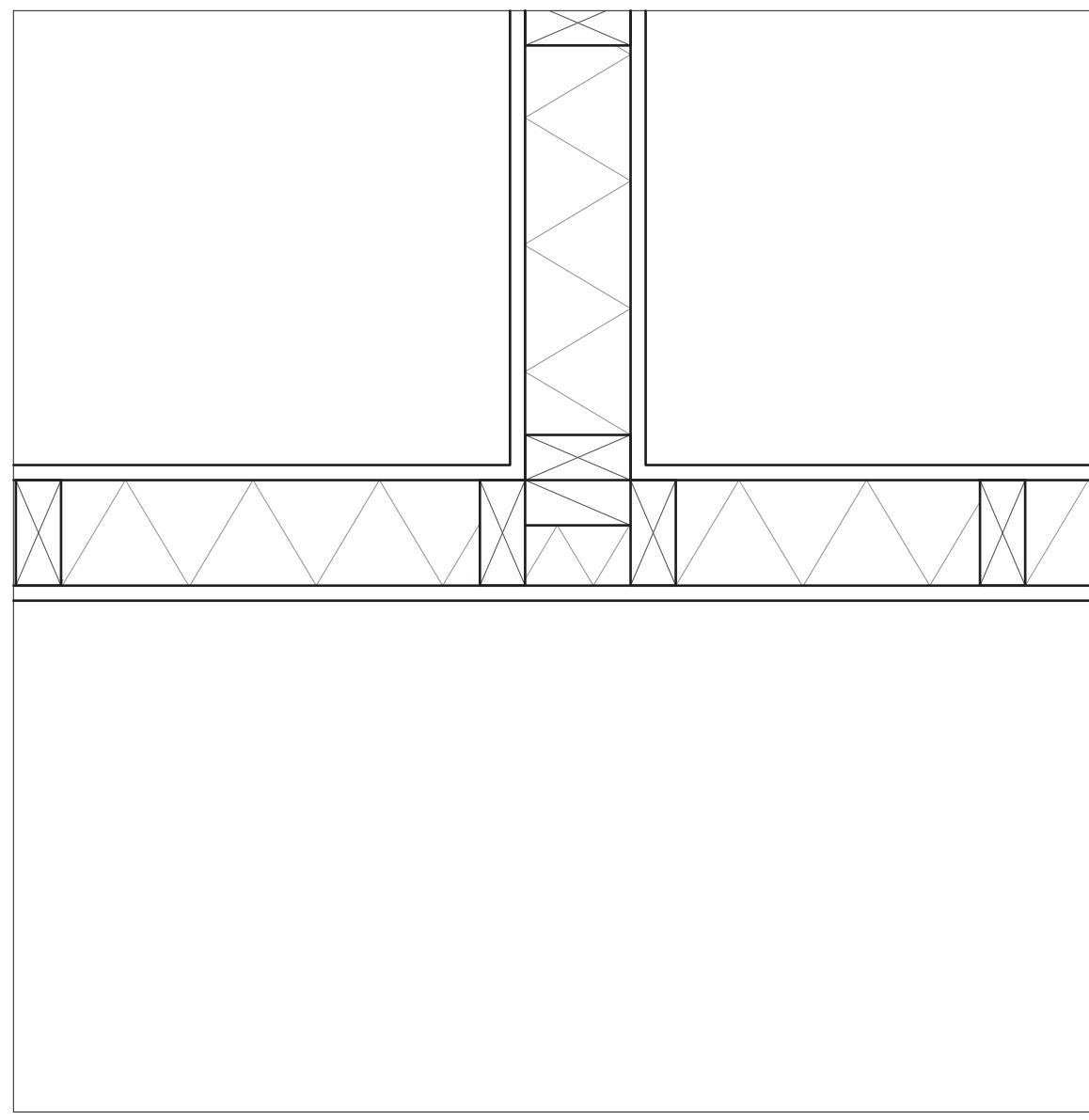
ASSIGNMENT 3  
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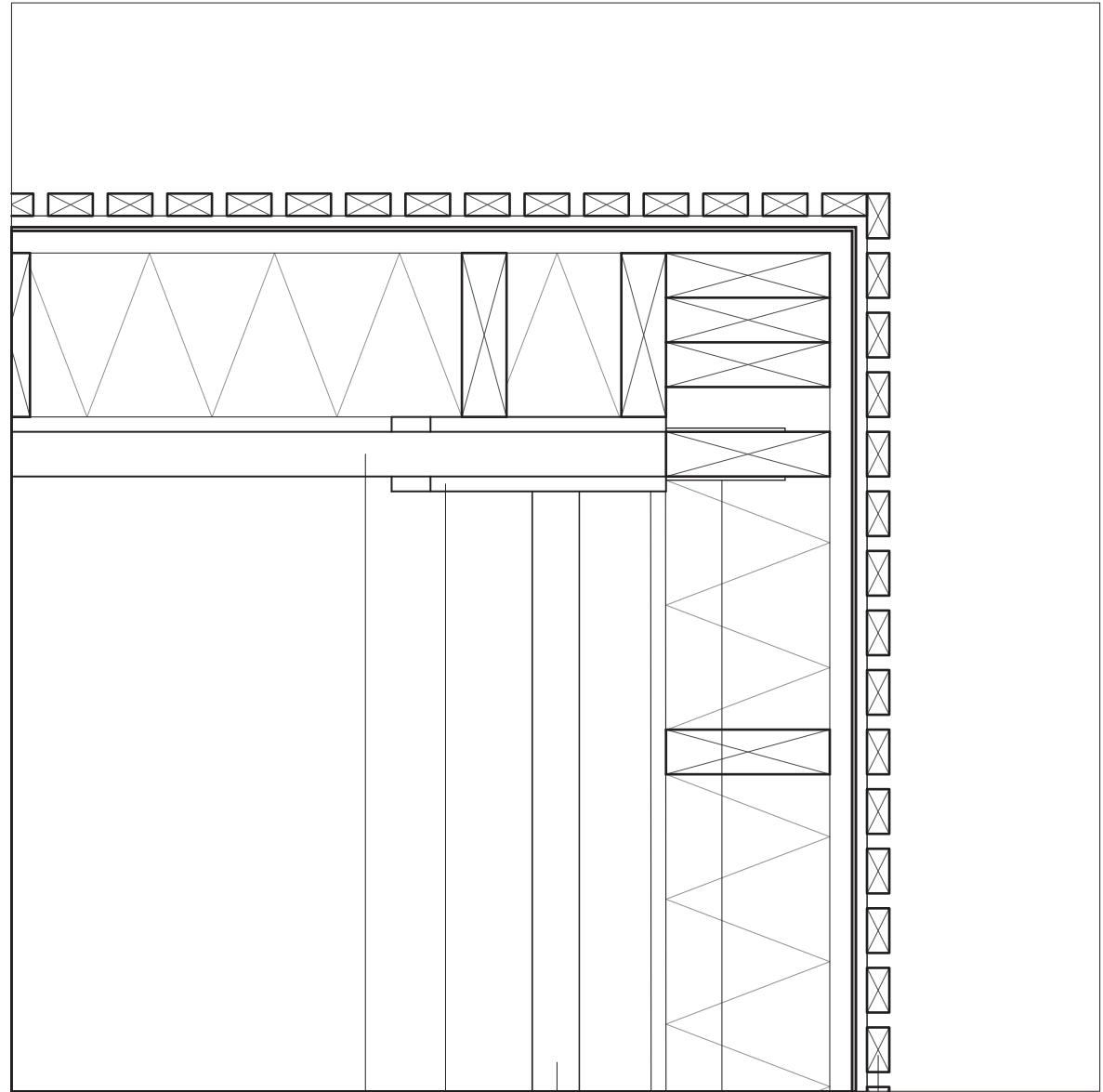
INSTRUCTOR: DAMIANI  
SELENA ZHEN



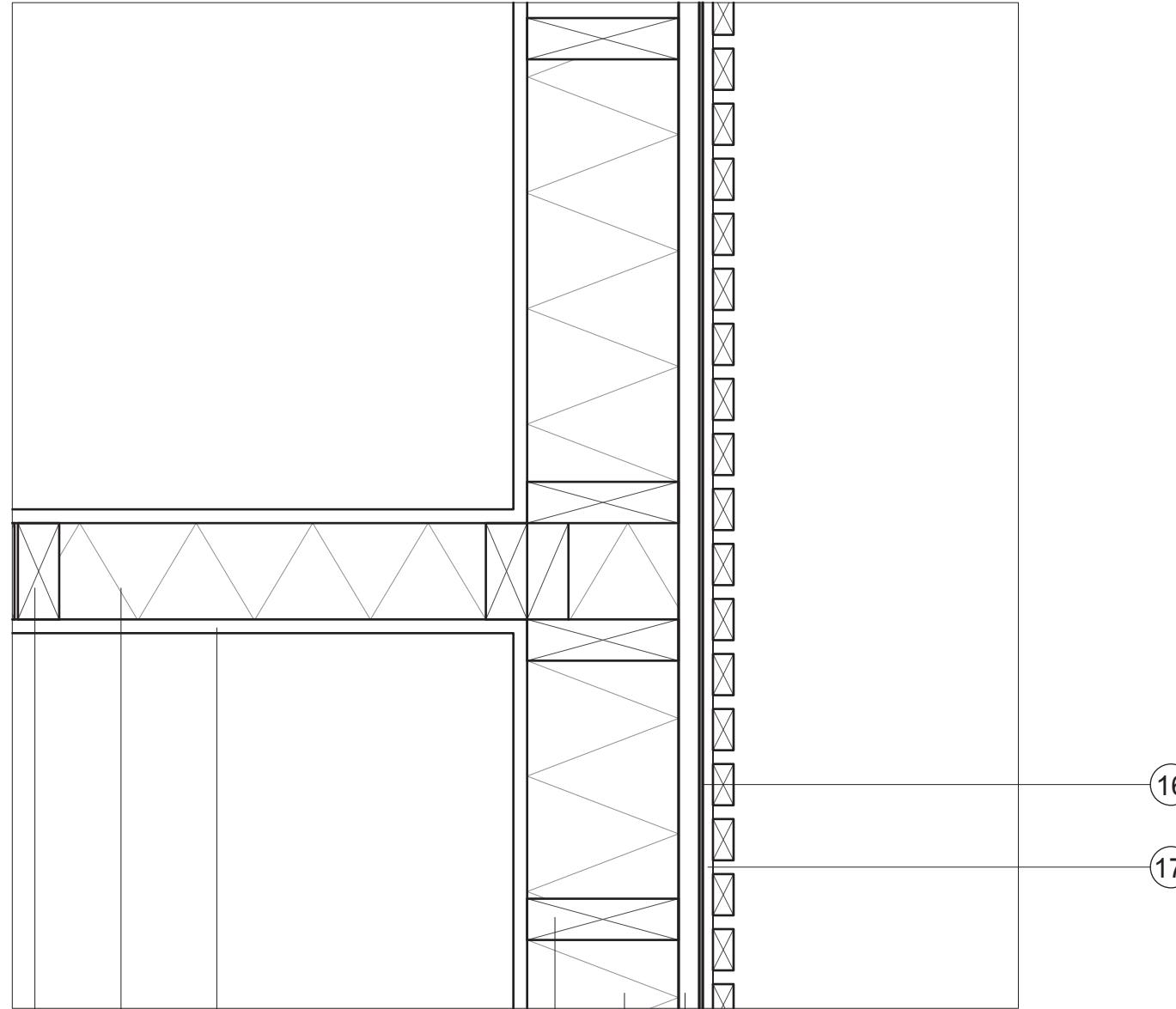
INTERIOR CORNER DETAIL 1



INTERIOR CORNER DETAIL 2



EXTERIOR CORNER DETAIL 1



EXTERIOR CORNER DETAIL 2

**CONSTRUCTION MATERIAL KEY**

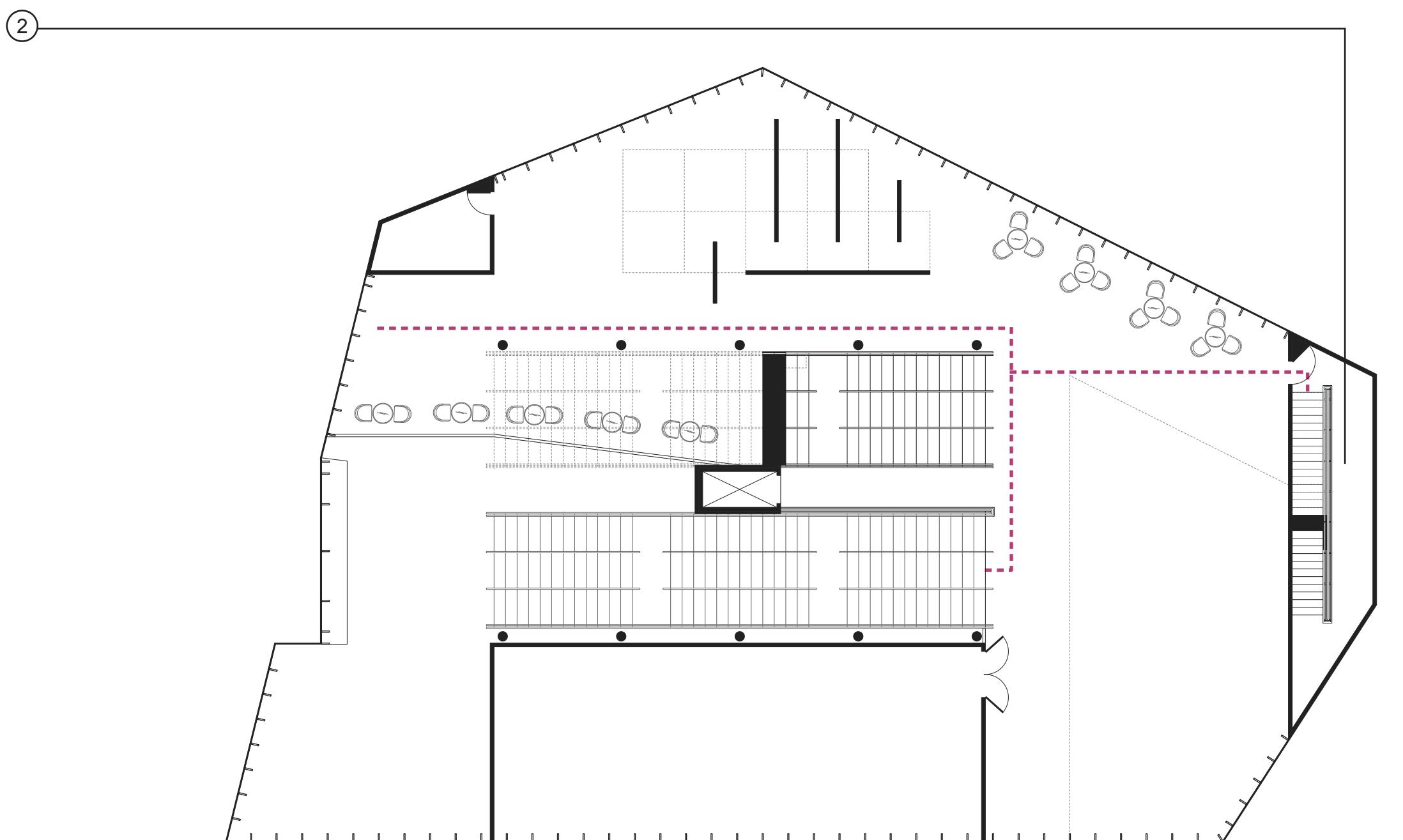
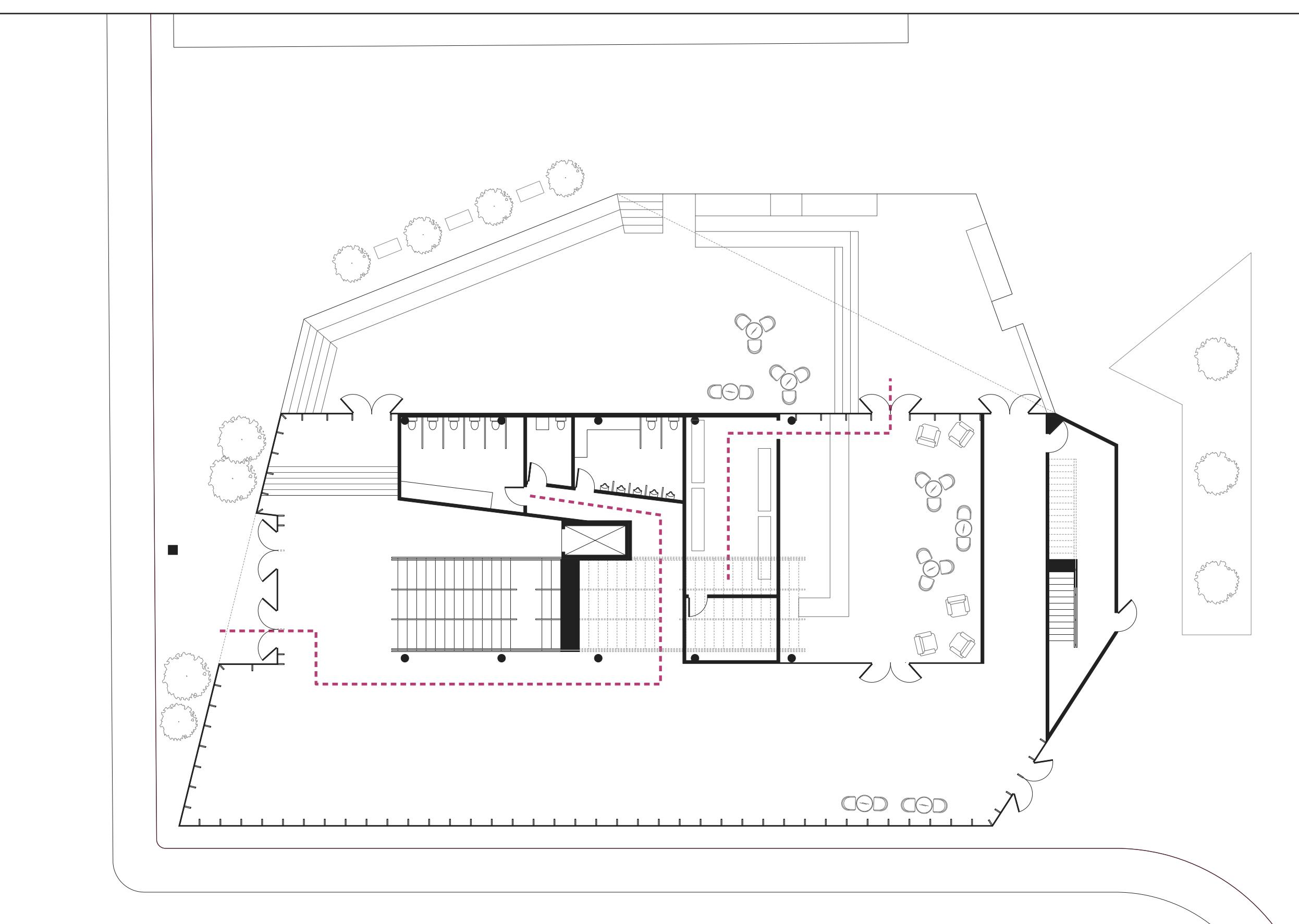
- 1. 3.5"x1.5" STUD (16" O.C.)
- 2. 3.5" CLOSED CELL INSULATION
- 3. 0.5" DRYWALL
- 4. DOOR FRAME
- 5. 7.25"x1.5" TRUSS CHORDS AND WEB
- 6. 0.5" OSB GUSSET
- 7. 3.5"x1.5" CEILING FRAME
- 8. TRUSS HANGAR
- 9. 1.5"x0.75" LARCH SLAT
- 10. 3.5"x1.5" STUD (16" O.C.)
- 11. 3.5" CLOSED CELL INSULATION
- 12. 0.5" DRYWALL
- 13. 5.5"x1.5" STUD (16" O.C.)
- 14. 5.5" CLOSED CELL INSULATION
- 15. 0.75" EXTERIOR GRADE PLYWOOD
- 16. WATERPROOF MEMBRANE
- 17. LARCH SLAT RAIN SCREEN CLIP

## WOOD FRAMING

ASSIGNMENT 3  
PAGE: 3 OF 3

48-215 MATERIALS & ASSEMBLY  
SPRING 2017

INSTRUCTOR: DAMIANI  
SELENA ZHEN



**CODE REVIEW**

IBC 503: The Urban Incubator and Stimulator is a Type 1A construction building. According to IBC Table 503, the floor area for a Type 1A occupancy building is unlimited, and the maximum stories allowed is 11. This building is 43,567 sf, and 4 stories, and is therefore compliant with Table 503.

IBC 601: According to Table 601, the fire resistance rating for a Type 1A building must be 2-3 hours.

IBC 1004.1.1: Table 1004.1.1 determines the maximum floor area allowances per occupant based on function of space. According to this, the total maximum occupancy of the occupiable spaces are 1845 persons. [Individual spaces are listed in Occupancy Loads below]

IBC 1005.1: Using the factors given in Table 1005.1 Egress Width per Occupant Served, and given the added sprinkler system, the stairway egress width (inches per occupant) is 0.2 and other egress components' width (inches per occupant) is 0.15. The egress provided (5567 persons) is more than the maximum occupancy of the building (1845).

The first floor's required occupancy based on spaces is 569 persons, which requires 9.48' means of egress. There is now 33' of egress to serve 2,640 persons, which is more than required and complies with Table 1005.1.

The second floor's required occupancy based on area is 957 persons, which requires 15.94' means of egress. There is now 18.2' of egress to serve 1091 persons, which is more than required and complies with Table 1005.1.

The third floor's required occupancy based on area is 143 persons, which requires 2.38' means of egress. There is now 18.17' of egress to serve 1091 persons, which is more than required and complies with Table 1005.1.

The third floor's required occupancy based on area is 305 persons, which requires 2.94' means of egress. There is now 12.42' of egress to serve 745 persons, which is more than required and complies with Table 1005.1.

Code Review continues on Page 2.

- ② 1020.1.7 & 1020.1.7.1: According to this section, 50% of interior means of egress stairways are required to be enclosed because of the occupancy number for the floors it serves. The smokeproof enclosure stairway shall exit into a public way.

#### OCCUPANCY LOADS [OCCUPIABLE AREAS ONLY]

01. LOBBY: A3, ASSEMBLY STANDING AREA: 1600 sf	OCCUPANCY: 320
02. CAFE/RESTAURANT: A2, ASSEMBLY UNCONCENTRATED AREA: 1273 sf	OCCUPANCY: 85
03. KITCHEN: F1, KITCHENS, COMMERCIAL AREA: 410 sf	OCCUPANCY: 3
04. STORAGE: S2, MERCANTILE AREA: 145 sf	OCCUPANCY: 1
05. COMMUNITY SPACE: A2, ASSEMBLY UNCONCENTRATED AREA: 2418 sf	OCCUPANCY: 162
06. MULTI-USE GALLERY 1: A3, ASSEMBLY UNCONCENTRATED AREA: 2938 sf	OCCUPANCY: 196
07. GALLERY 2: A3, ASSEMBLY STANDING AREA: 1609 sf	OCCUPANCY: 322
08. GALLERY 3: A3, ASSEMBLY STANDING AREA: 1909 sf	OCCUPANCY: 382
09. EVENT SPACE: A3, ASSEMBLY UNCONCENTRATED AREA: 851 sf	OCCUPANCY: 57
10. STORAGE: S2, MERCANTILE AREA: 131 sf	OCCUPANCY: 1
11. SEATING AREA: A3, ASSEMBLY UNCONCENTRATED AREA: 546 sf	OCCUPANCY: 37
12. KITCHEN: F1, KITCHENS, COMMERCIAL AREA: 430 sf	OCCUPANCY: 3

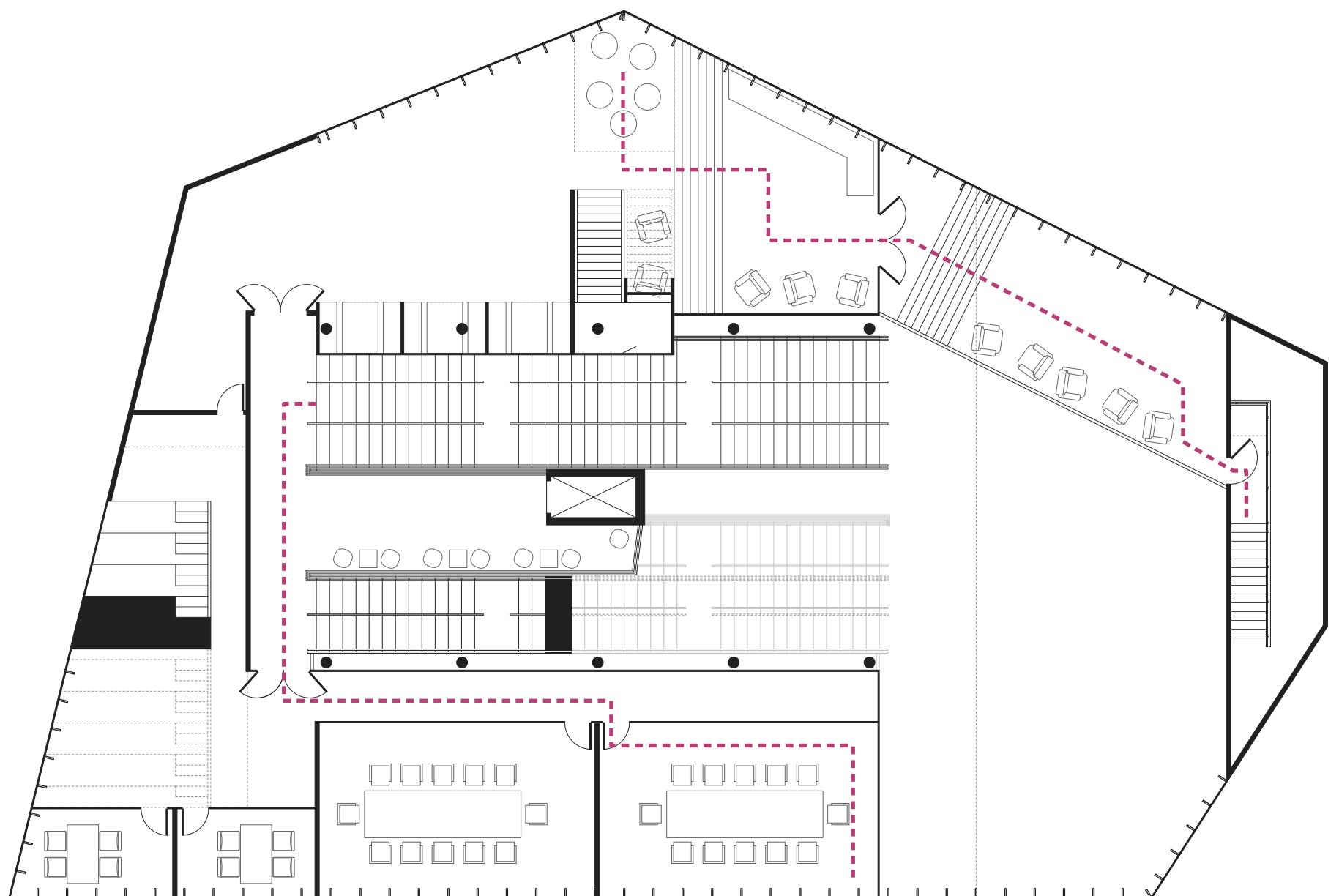
## MEANS OF EGRESS

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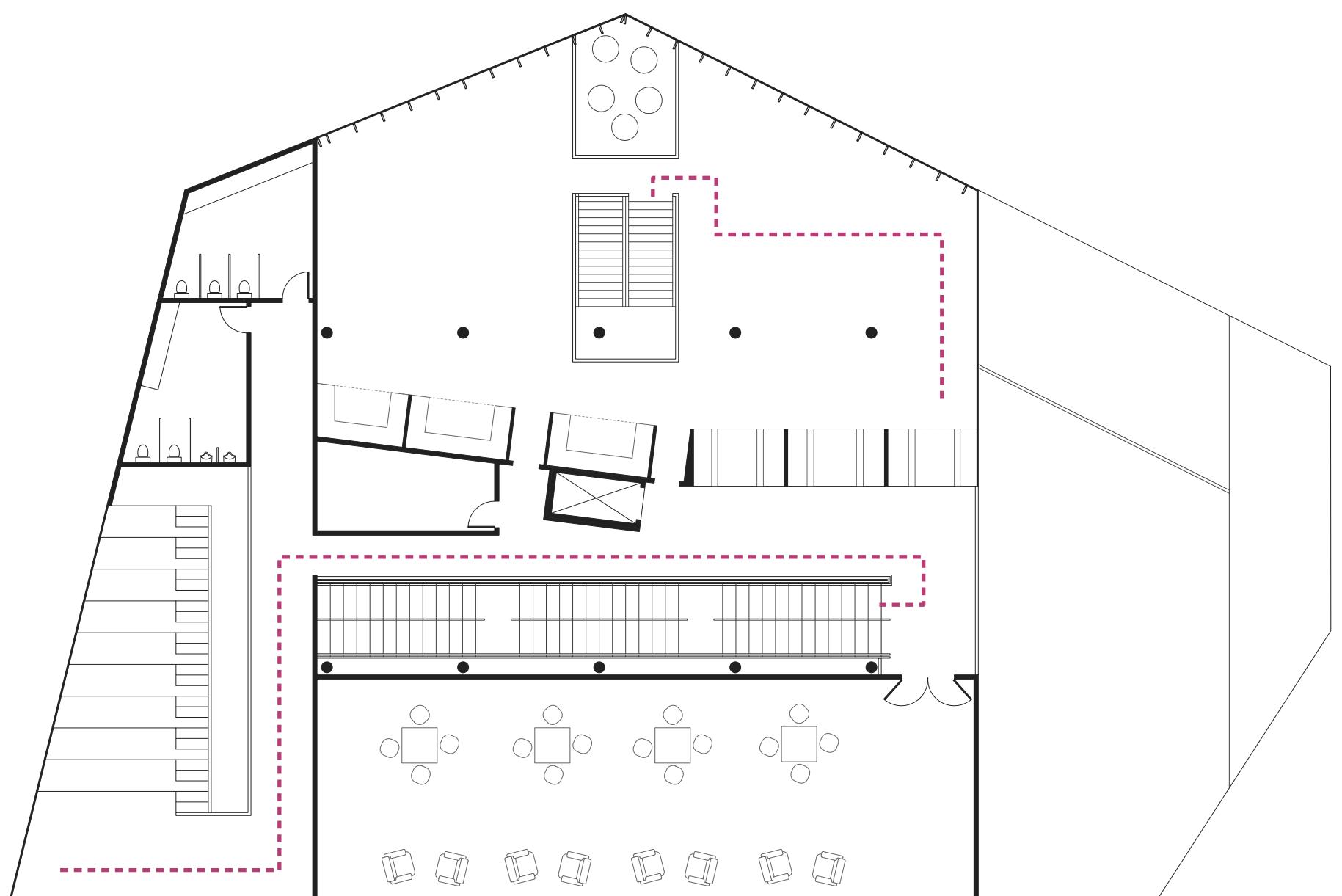
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**INSTRUCTOR: DAMIANI**

**SELENA ZHEN**



THIRD FLOOR PLAN  
SCALE 1/16" = 1'



FOURTH FLOOR PLAN  
SCALE 1/16" = 1'



#### CODE REVIEW

IBC 1015.1 & IBC 1019.1: According to Table 1015.1 Spaces With One Means Of Egress and the occupancy load of the floors of the building, each floor needs 2 means of egress. The new means of egress exits for the entire building now complies with Table 1015.1 and Table 1019.1.

IBC 1016.1: Exits are so located on each story such that the length of travel does not exceed distances according to Table 1016.1 Exit Access Travel Distance [200 ft for occupancies A, F1, S1, B: 300 ft for S2].

IBC 1017.1: According to Table 1017.1, the corridor on the first floor has a required fire-resistance rating of at least 1 hour [see code annotation 3].

#### OCCUPANCY LOADS [OCCUPIABLE AREAS ONLY]

- 13. OFFICE SPACE 1: B, BUSINESS  
AREA: 1326 sf OCCUPANCY: 14
- 14. MEETING ROOMS: B, BUSINESS  
AREA: 1581sf OCCUPANCY: 15.81

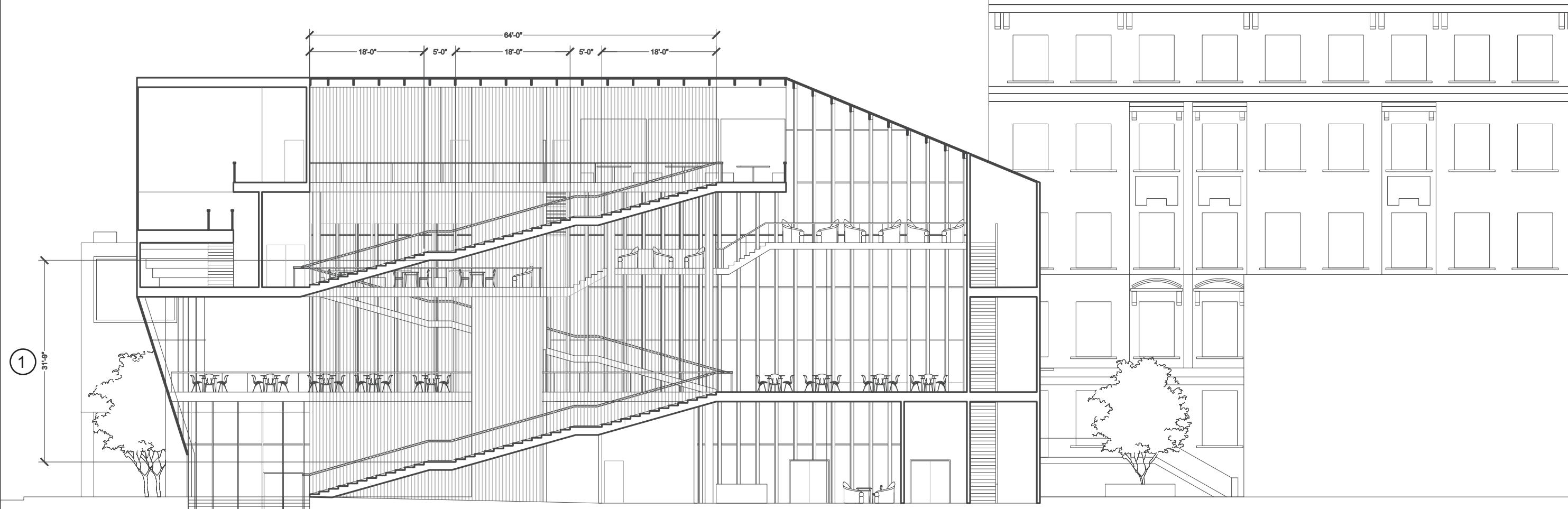
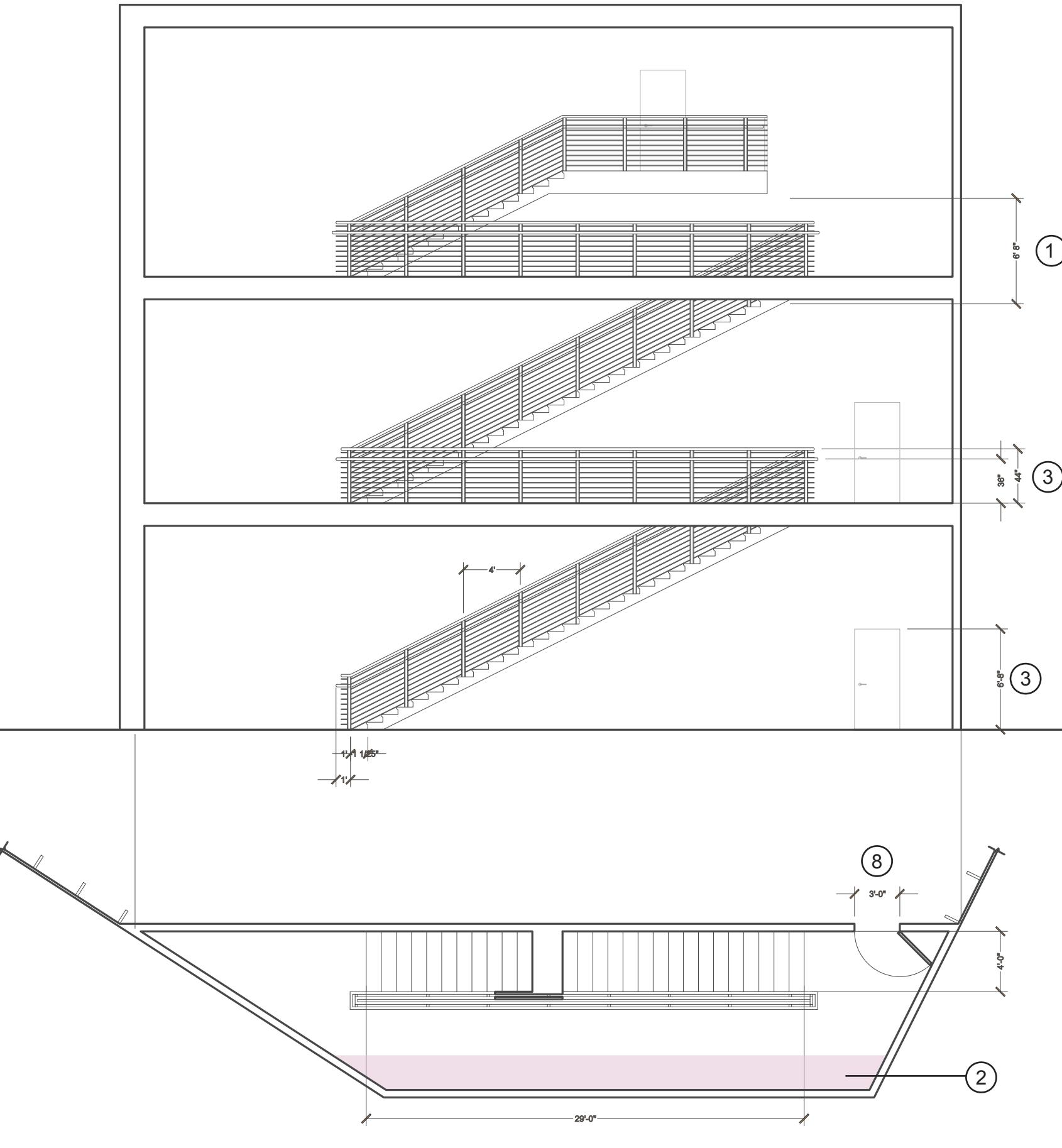
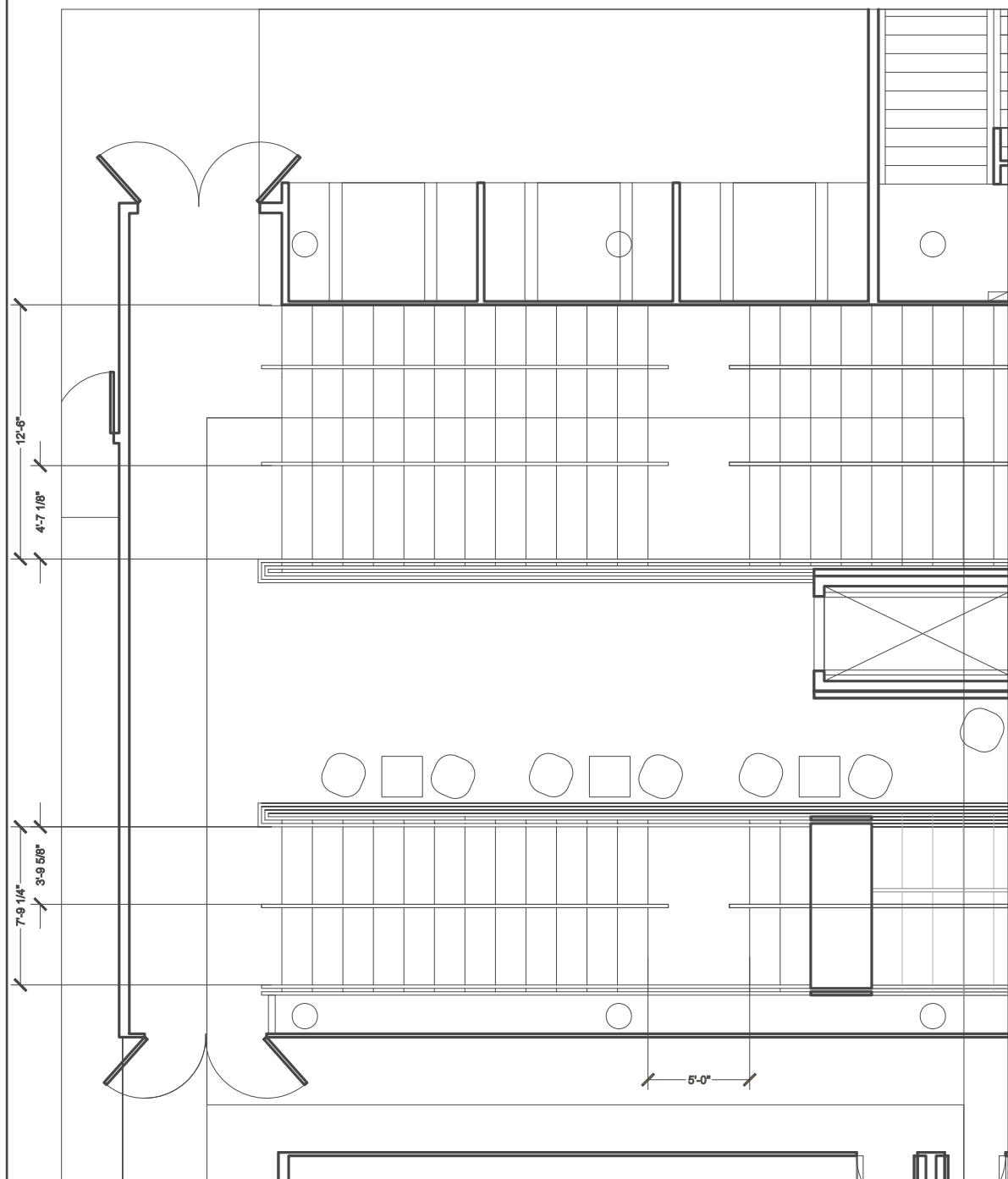
## MEANS OF EGRESS

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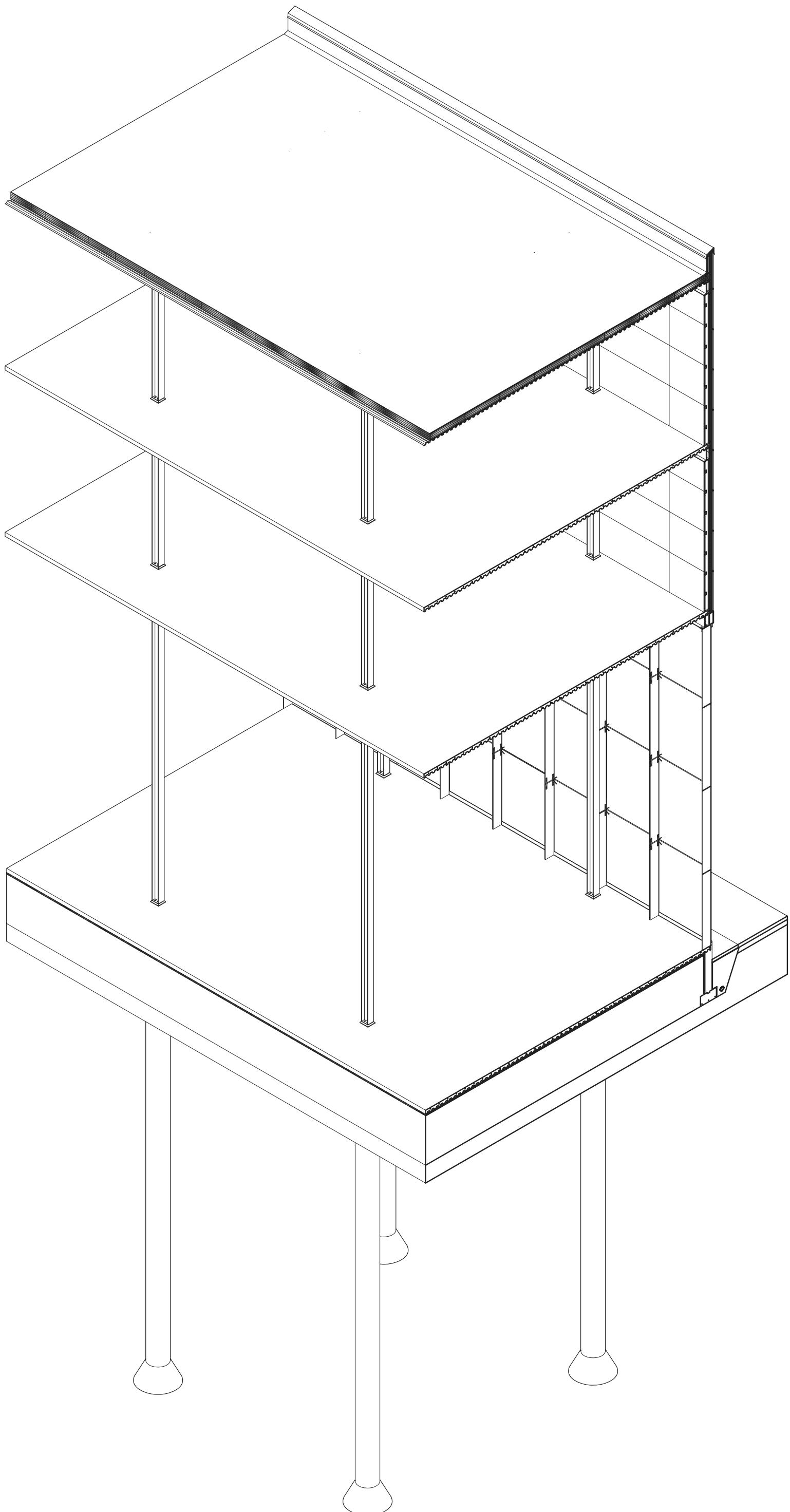


- MEANS OF EGRESS
- ① 1009.2 Headroom: Stairways shall have a minimum headroom clearance of 80"; it is now 14".
  - ② 1007: According to this section and 1007.6, 9 areas of refuge are required and should comply:
    - One wheelchair space of 30"x48" for each 200 occupants served.
    - Each area of refuge should be separated from the building by a smoke barrier as well as have direct access to an enclosed stairway.
  - ③ 1008: According to this section, means of egress doors should be a minimum width of 32", a minimum height of 6'8", and should be side-hinged and swing in the direction of egress travel.
  - ⑤ 1012: According to this section, handrails must be changed to comply:
    - Height must be between 34"-38"; it is now 36".
    - Perimeter dimension of at least 4"-6.25" with a max cross section of 2.23"; it is now 6"x2".
    - Handrail must extend horizontally at least 12" beyond the slope.

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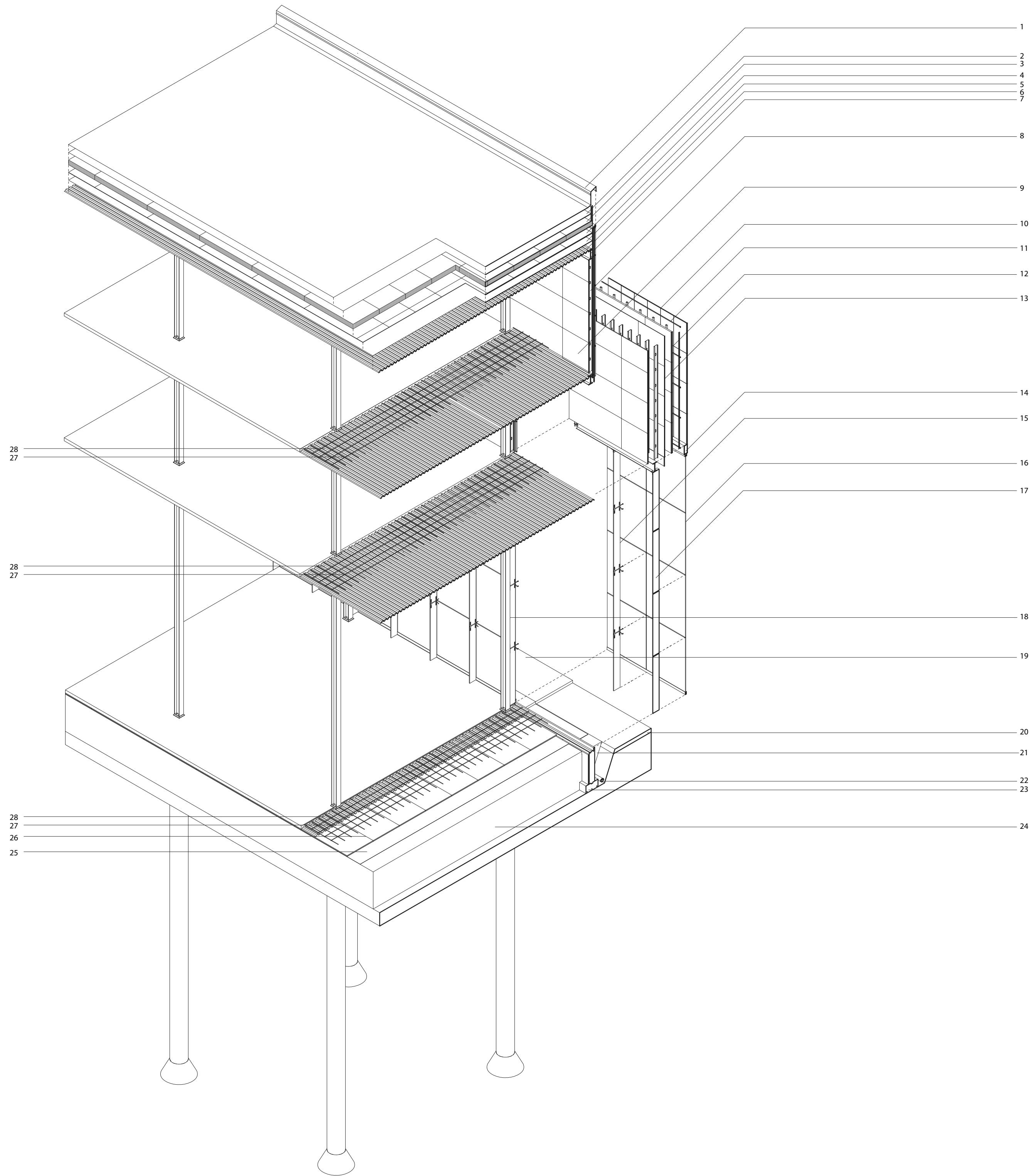


## MATERIAL SYSTEMS

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1. METAL CAP FLASHING AND EPDM ROOFING
2. WATERPROOFING
3. RIGID INSULATION
4. GYPSUM BOARD
5. VAPOR BARRIER
6. STEEL DECKING
7. COPED BEAM GIRDER
8. COLD ROLLED STEEL STUD 16"OC
9. GYPSUM BOARD
10. SLATE PANEL CLADDING
11. STEEL GRID STRUTS
12. RIGID INSULATION
13. PLYWOOD
14. SPANDREL
15. GLASS MULLION FIN SPIDER JOINT
16. GLASS CURTAIN WALL
17. GLASS MULLION FIN 12"
18. STRUCTURAL STEEL COLUMN W8 24"OC
19. SIDEWALK
20. COMPACTED GRAVEL FILL
21. GRAVEL BACKFILL
22. FOUNDATION DRAIN WITH GEO TEXTILE FABRIC
23. REINFORCED CONCRETE FOOTING
24. COMPACTED GRAVEL FILL
25. WATERPROOFING
26. GYPSUM BOARD
27. WIRE MESH
28. CONCRETE STEEL FLOOR DECKING

## MATERIAL SYSTEMS

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