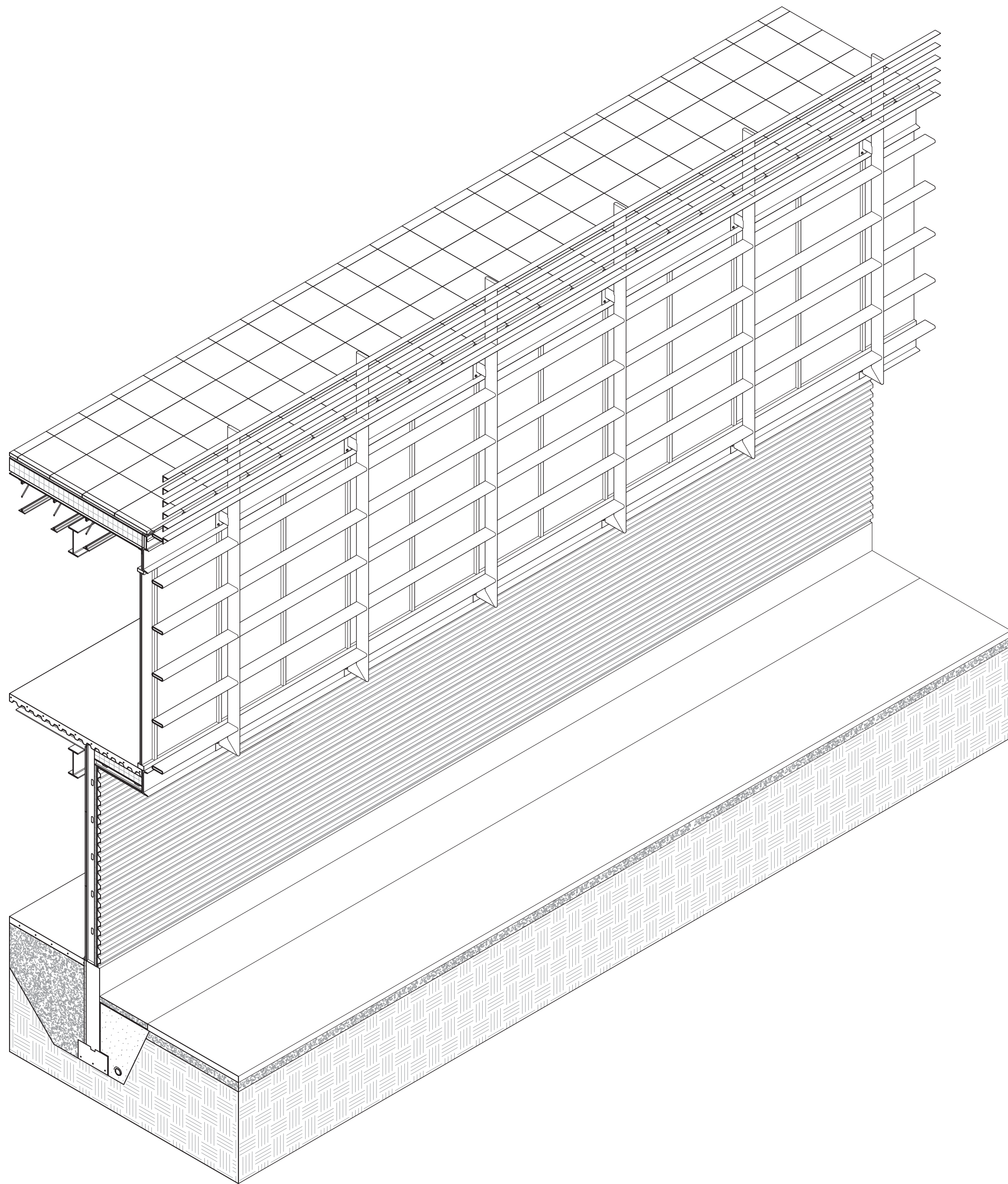


MATERIALS + ASSEMBLY

**SPRING 2017
SELENA ZHEN**



ASSEMBLED PARALINE

SCALE: 1/4" = 1'0"

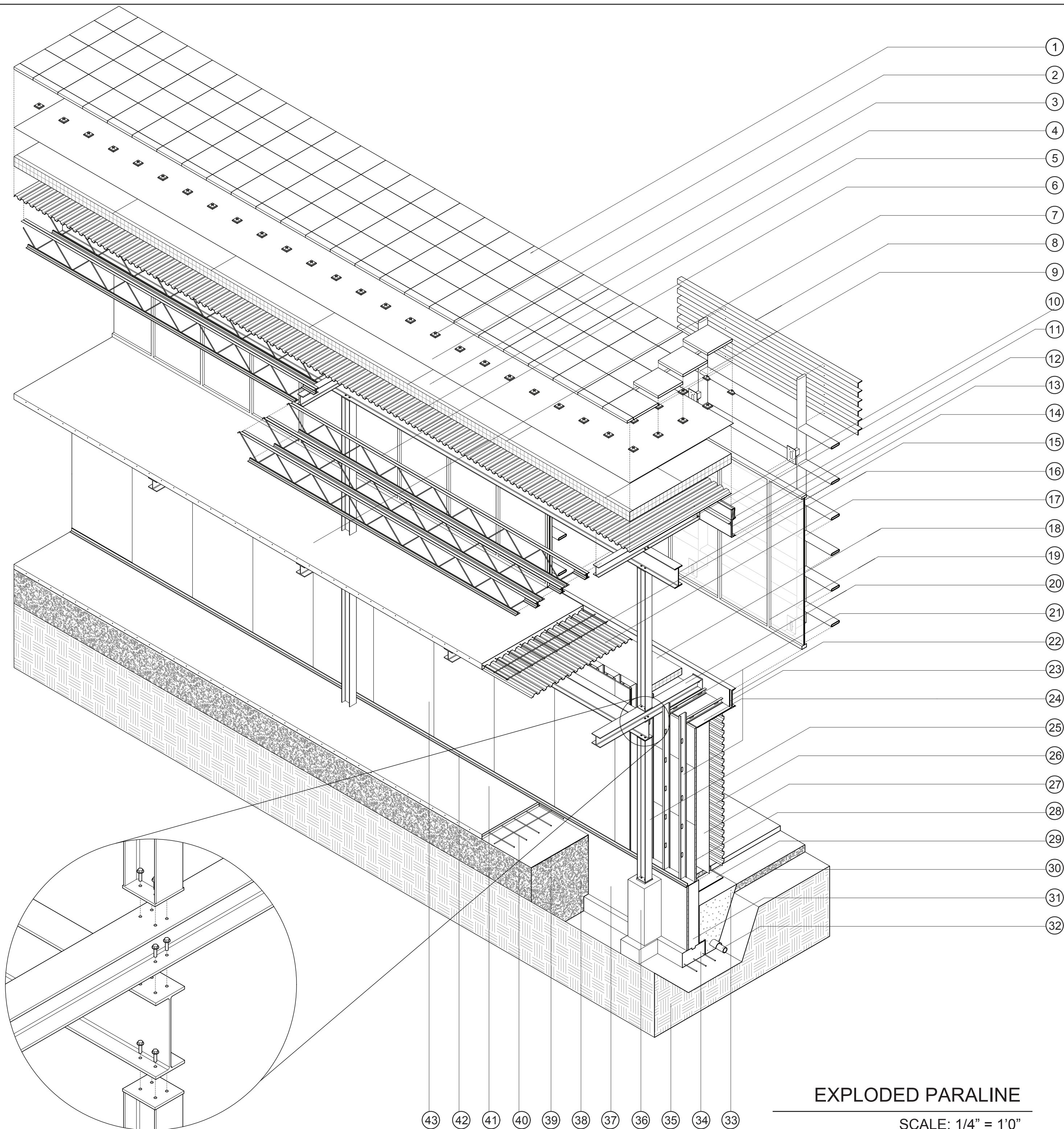
ASSEMBLY SEQUENCE

PAGE 1 OF 2

ASSIGNMENT 1

48-215 MATERIALS & ASSEMBLY
SPRING 2017
INSTRUCTOR: DAMIANI

SELENA ZHEN



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

ASSEMBLY SEQUENCE

PAGE 2 OF 2

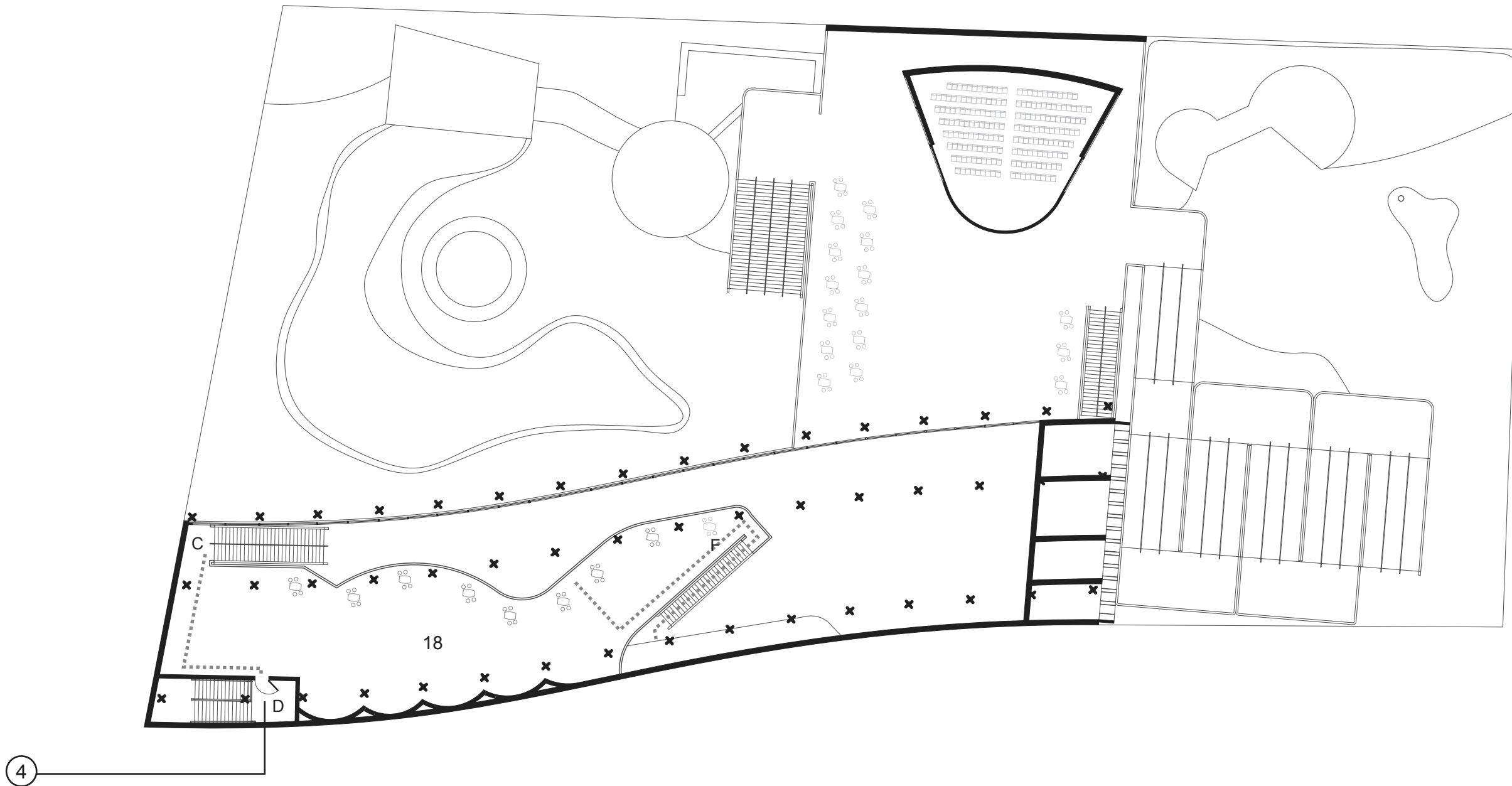
ASSIGNMENT 1

48-215 MATERIALS & ASSEMBLY
SPRING 2017
INSTRUCTOR: DAMIANI

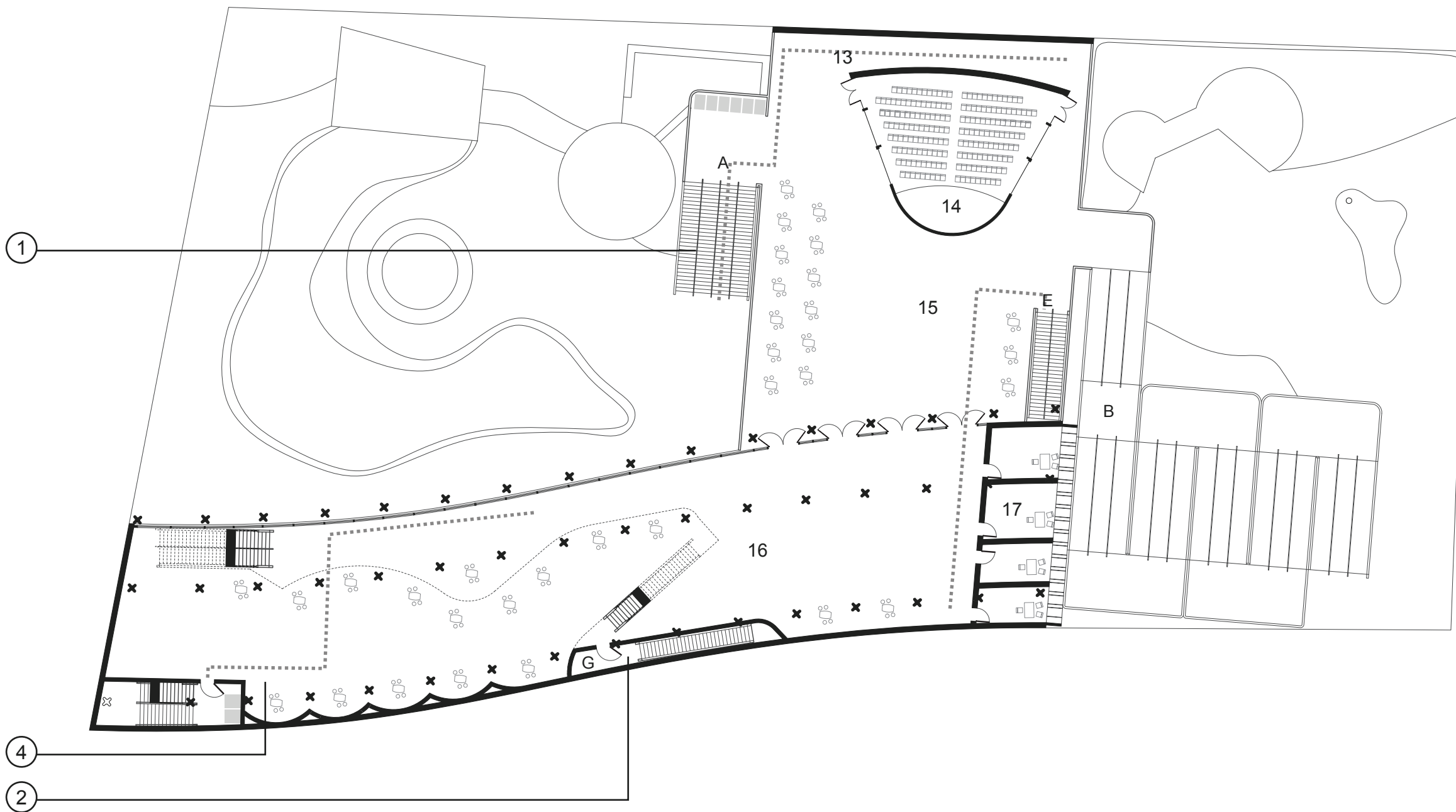
SELENA ZHEN

EXPLODED PARALINE

SCALE: 1/4" = 1'0"



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

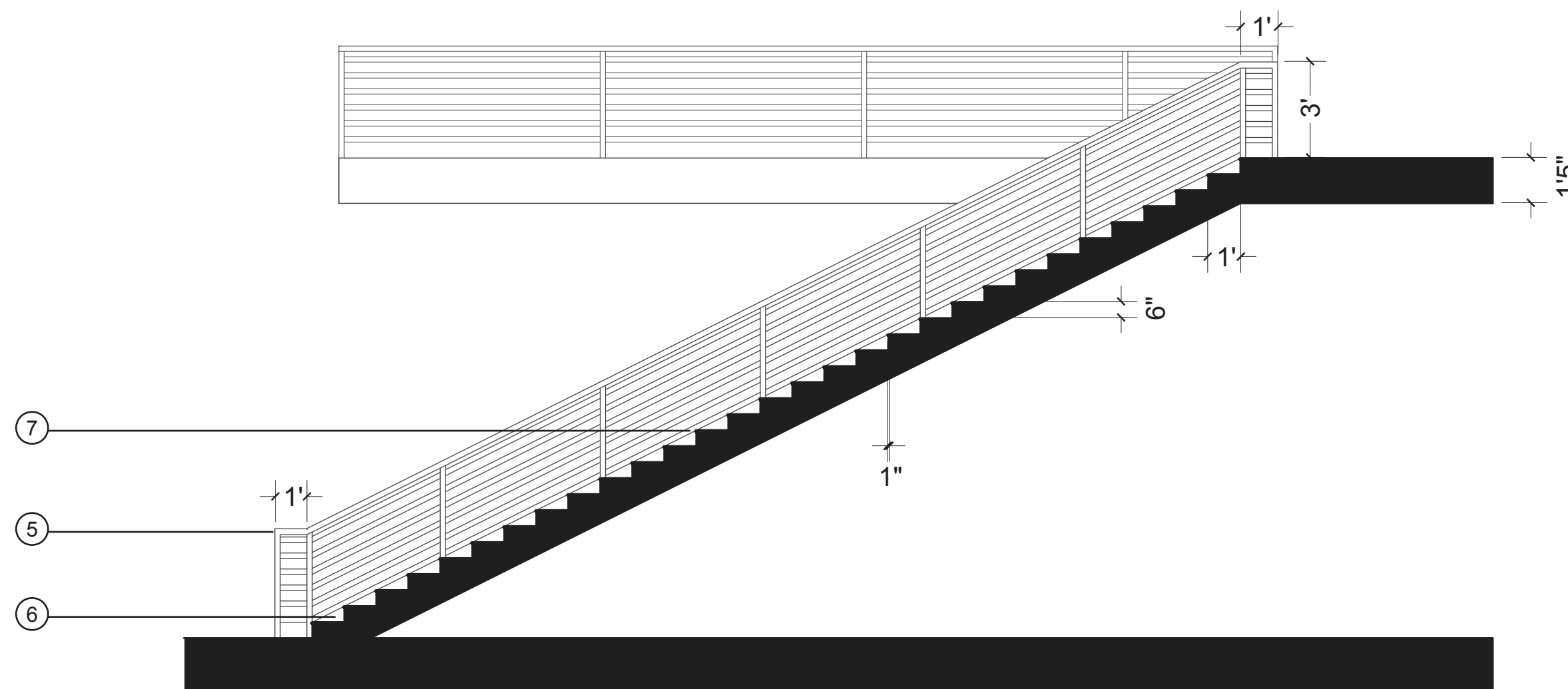
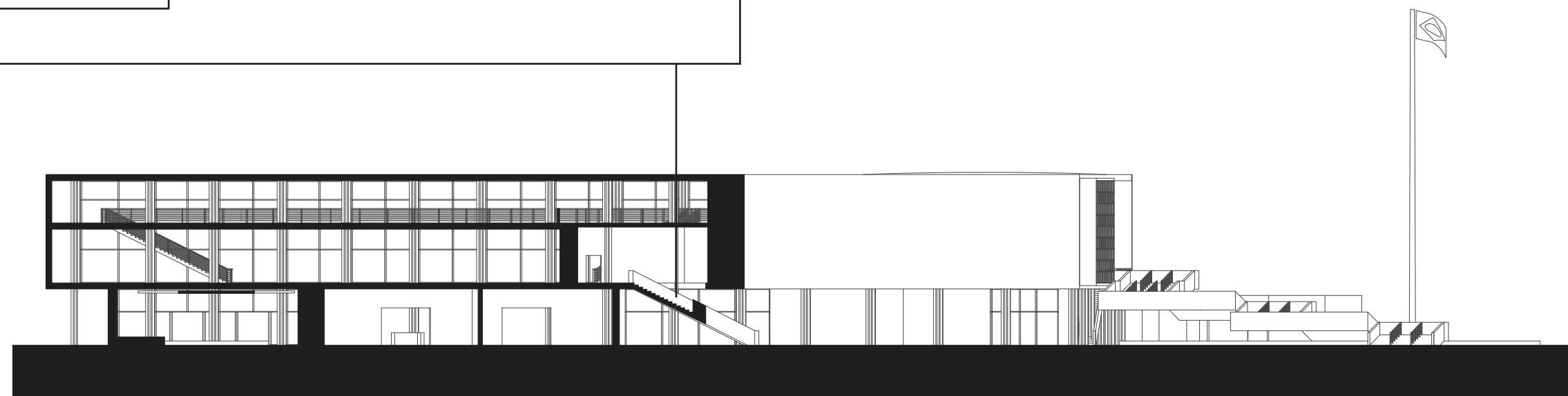
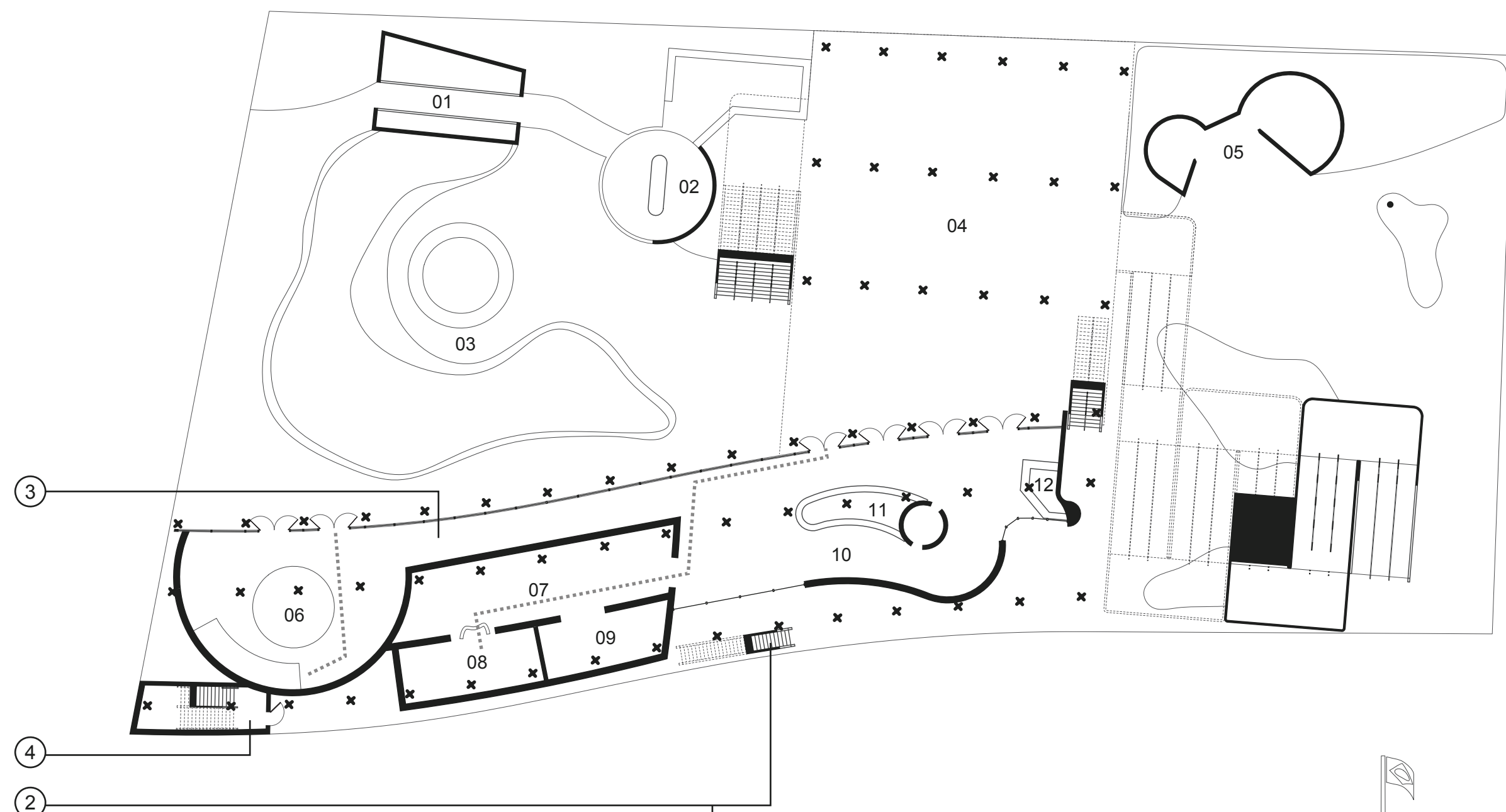
MEANS OF EGRESS (STAIRS & RAMPS)

ASSIGNMENT 2 PAGE: 1 of 5

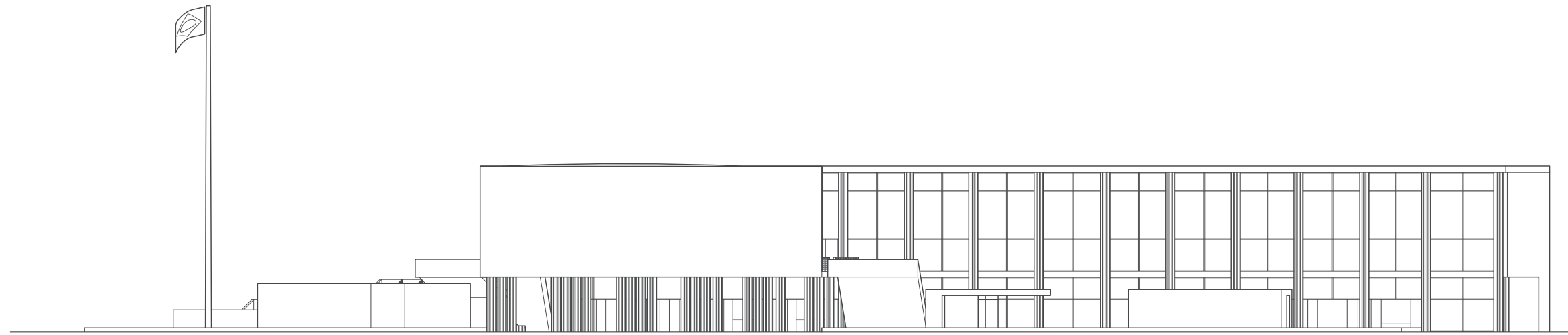
48-215 MATERIALS & ASSEMBLY SPRING 2017

INSTRUCTOR: DAMIANI

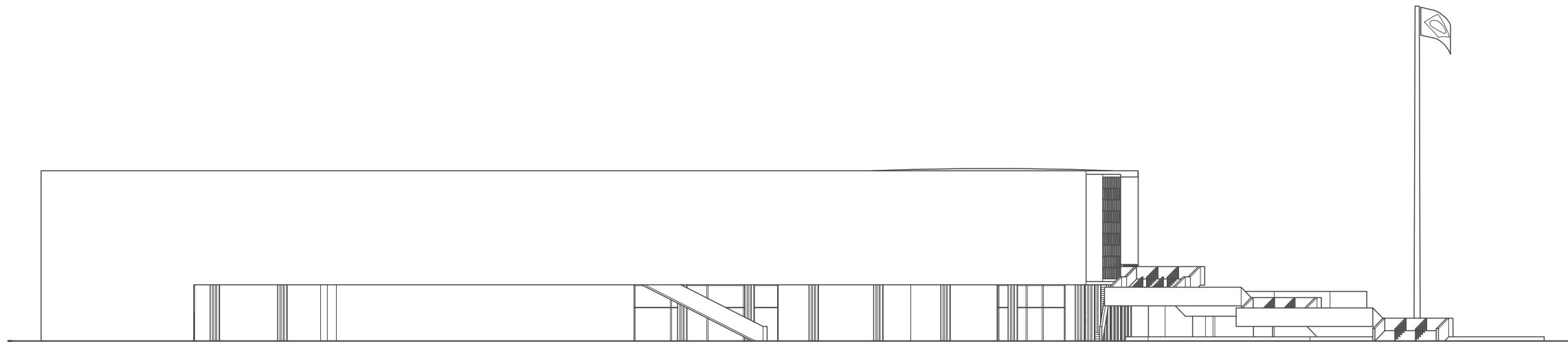
SELENA ZHEN



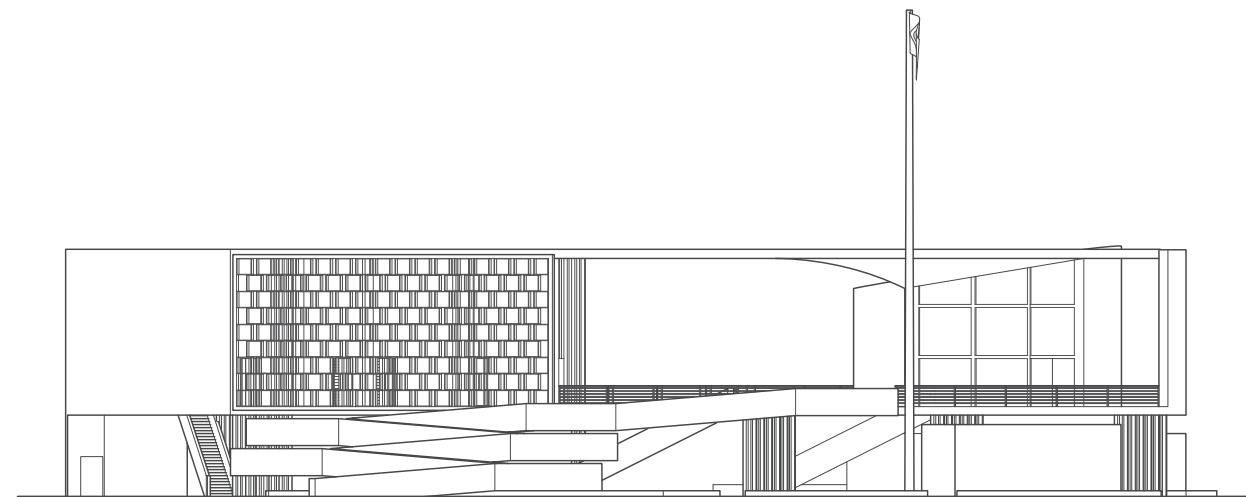
SELENA ZHEN



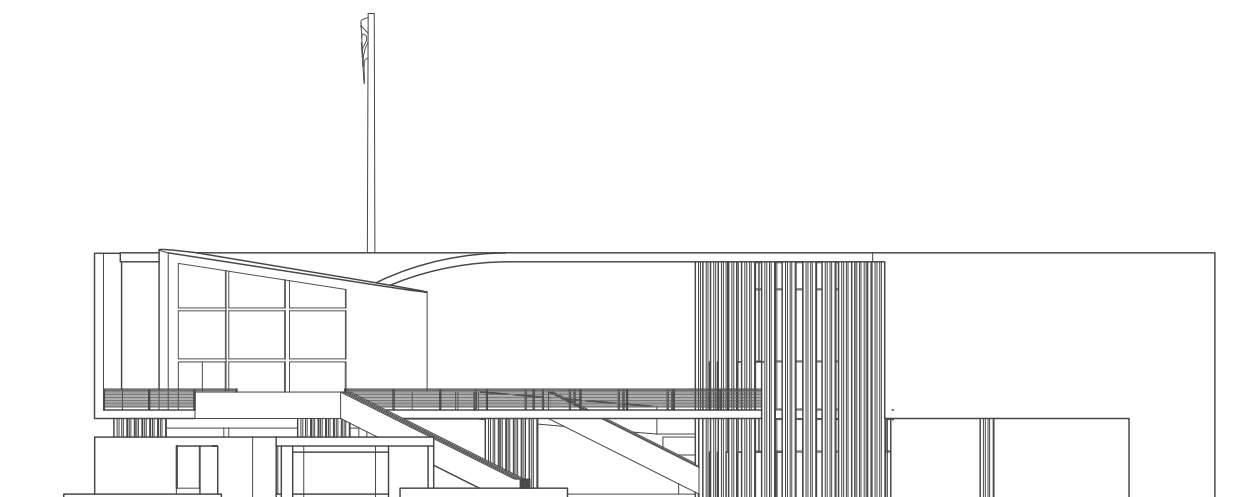
NORTH ELEVATION
SCALE 1/32" = 1'



SOUTH ELEVATION
SCALE 1/32" = 1'



EAST ELEVATION
SCALE 1/32" = 1'



WEST ELEVATION
SCALE 1/32" = 1'

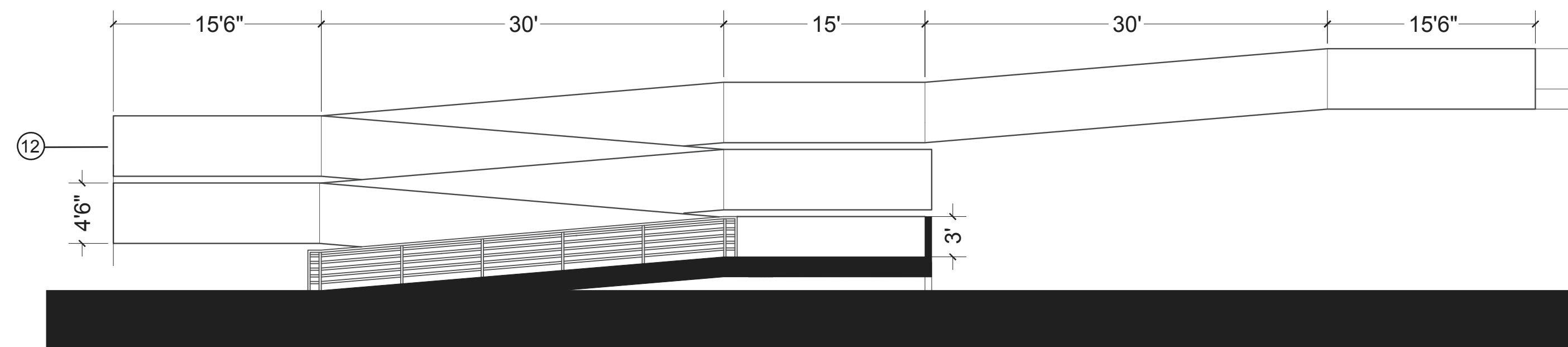
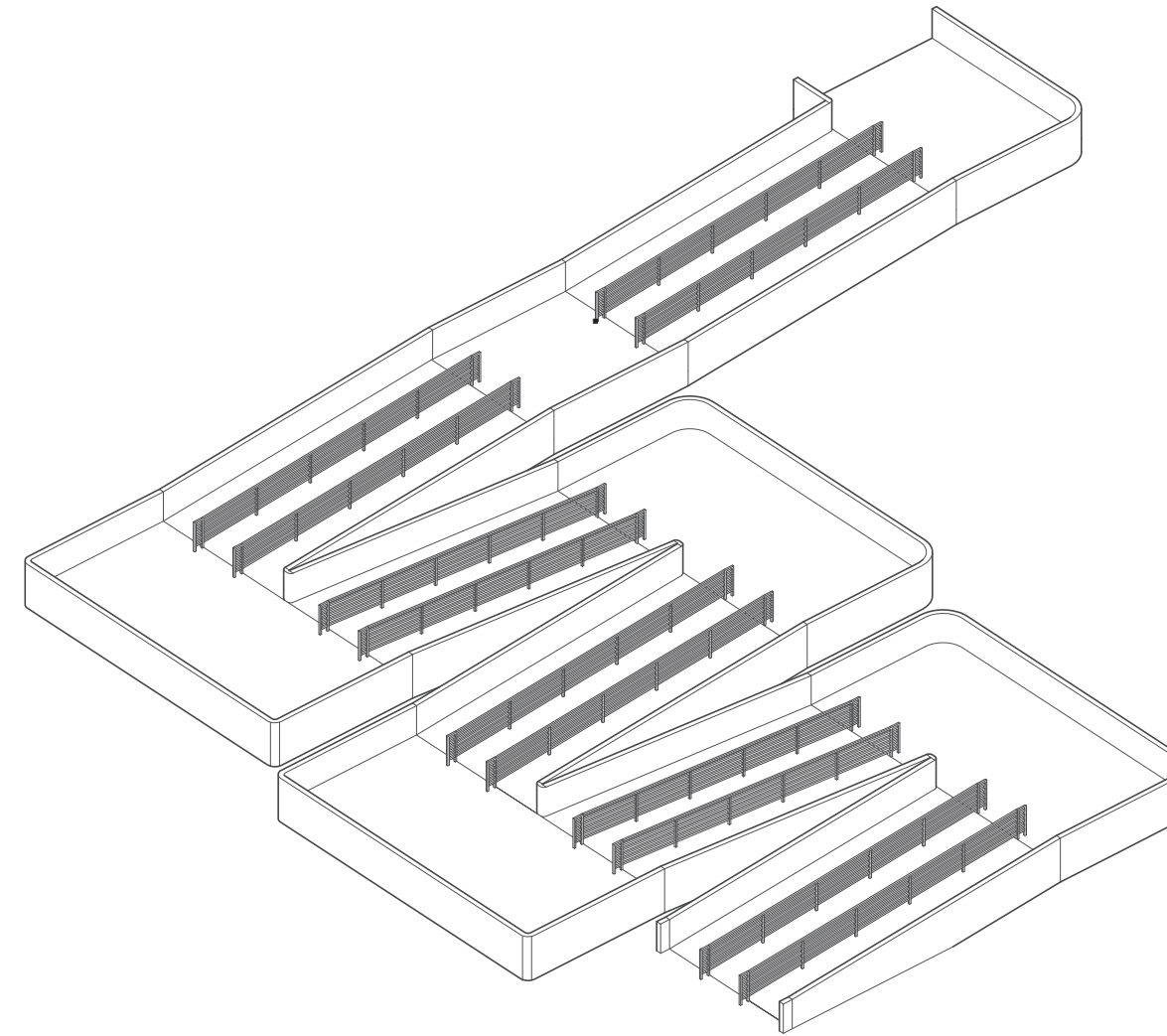
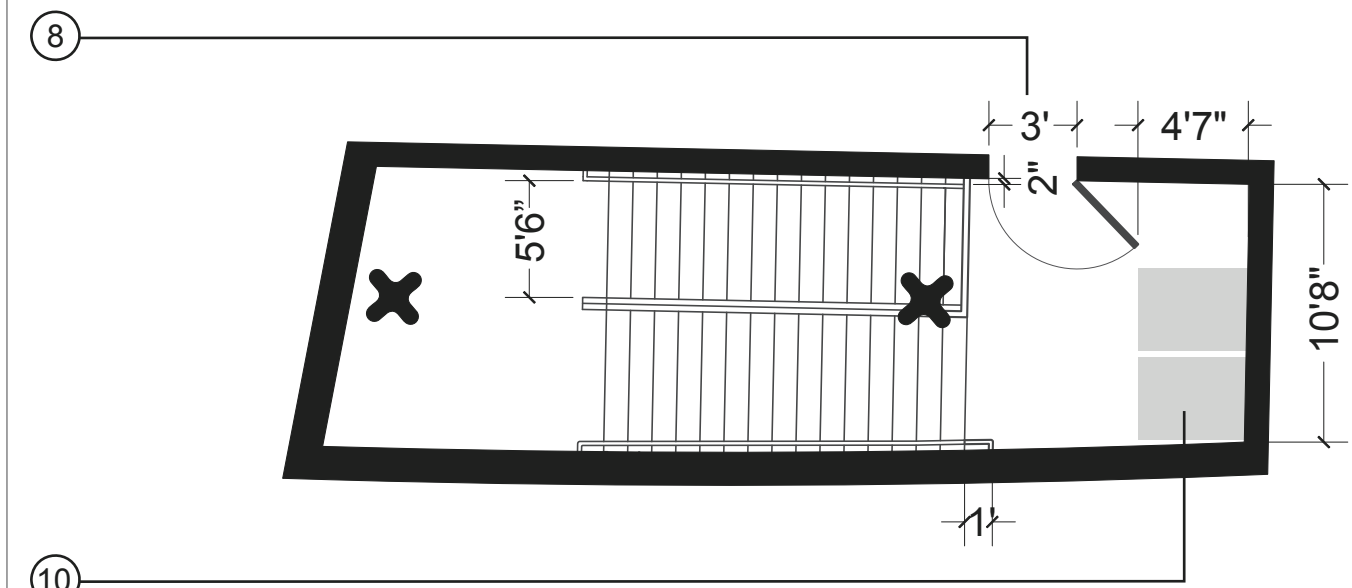
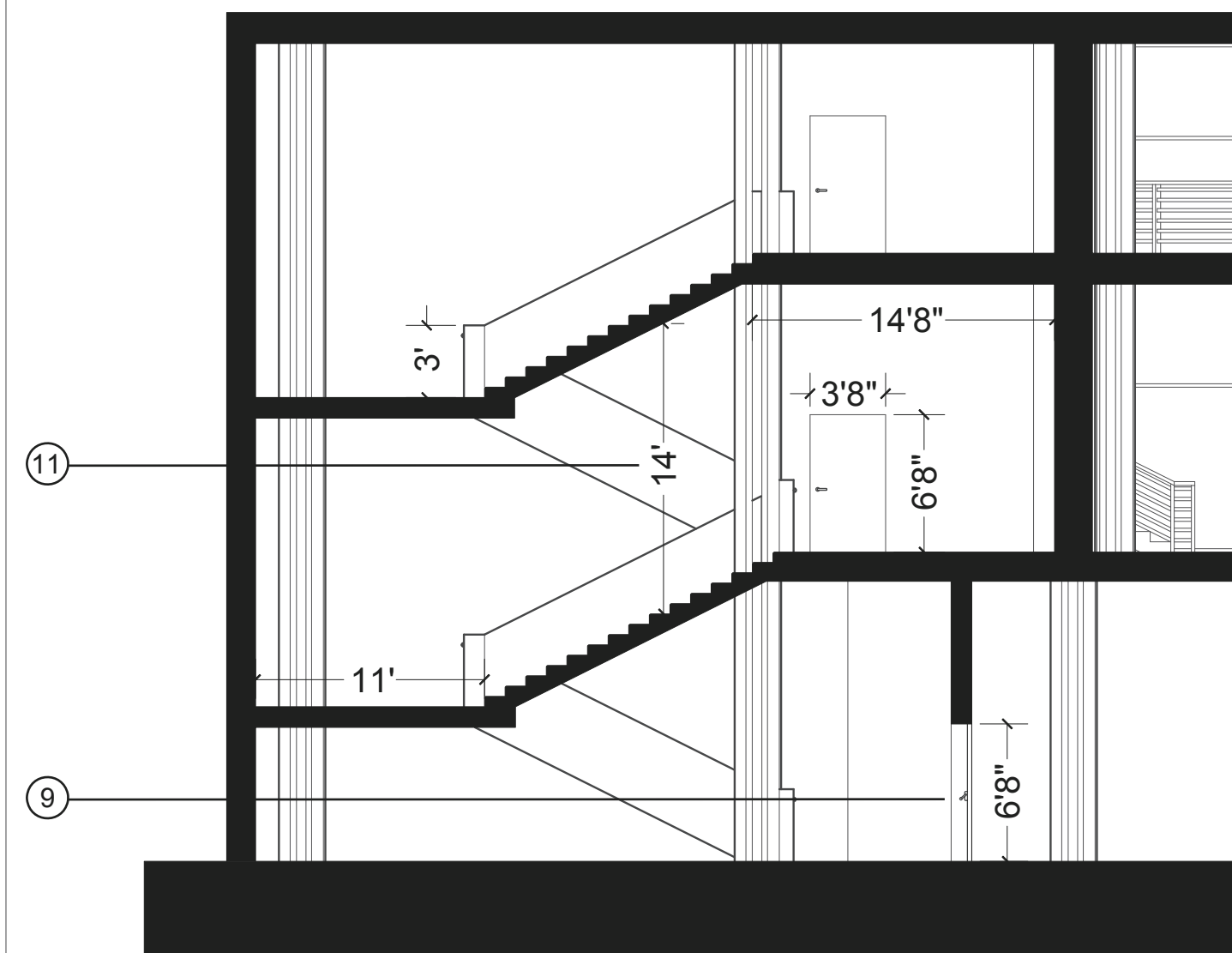
MEANS OF EGRESS (STAIRS & RAMPS)

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.

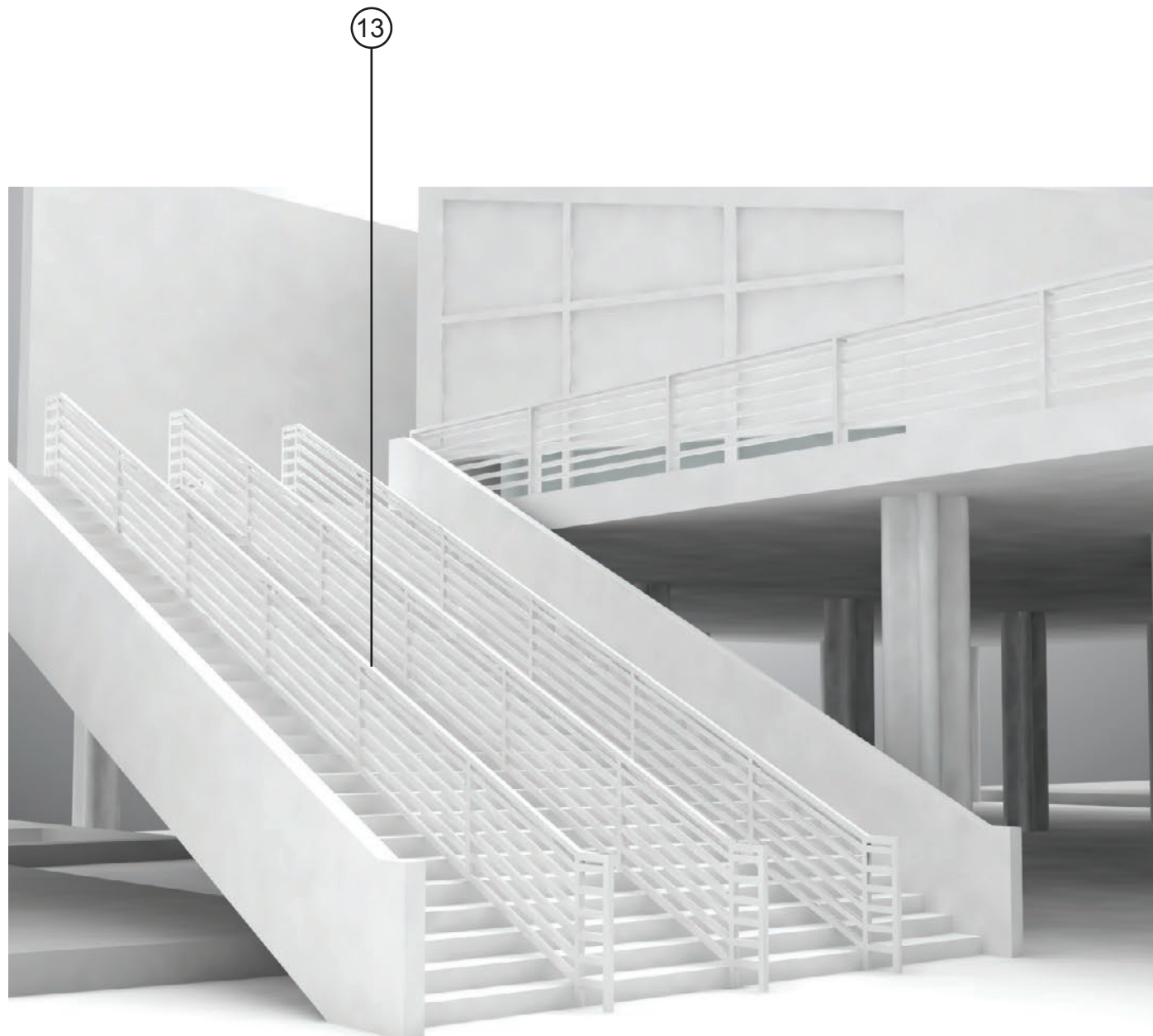
MEANS OF EGRESS (STAIRS & RAMPS)

ASSIGNMENT 2
PAGE: 4 OF 5

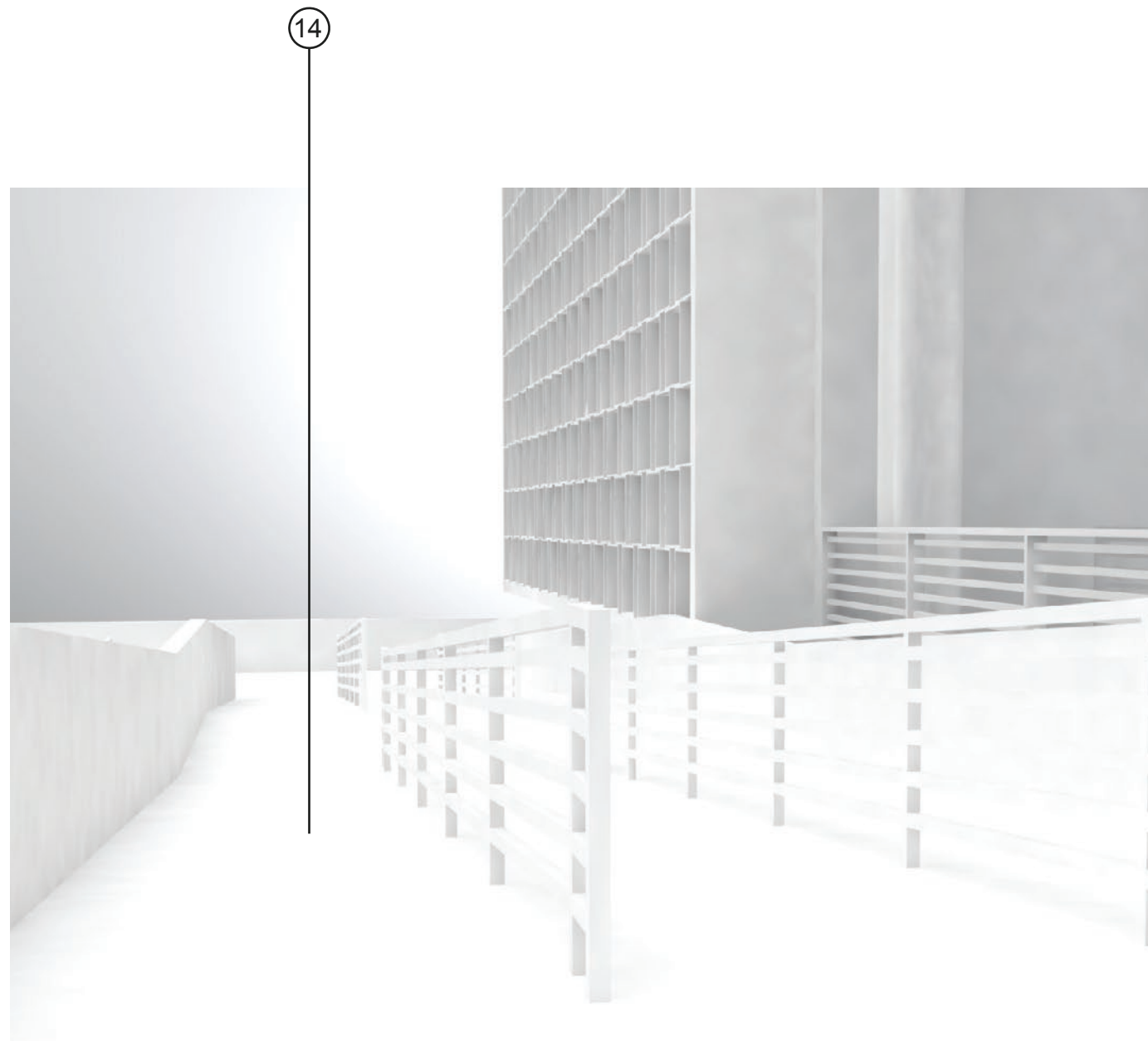
48-215 MATERIALS & ASSEMBLY
SPRING 2017

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.

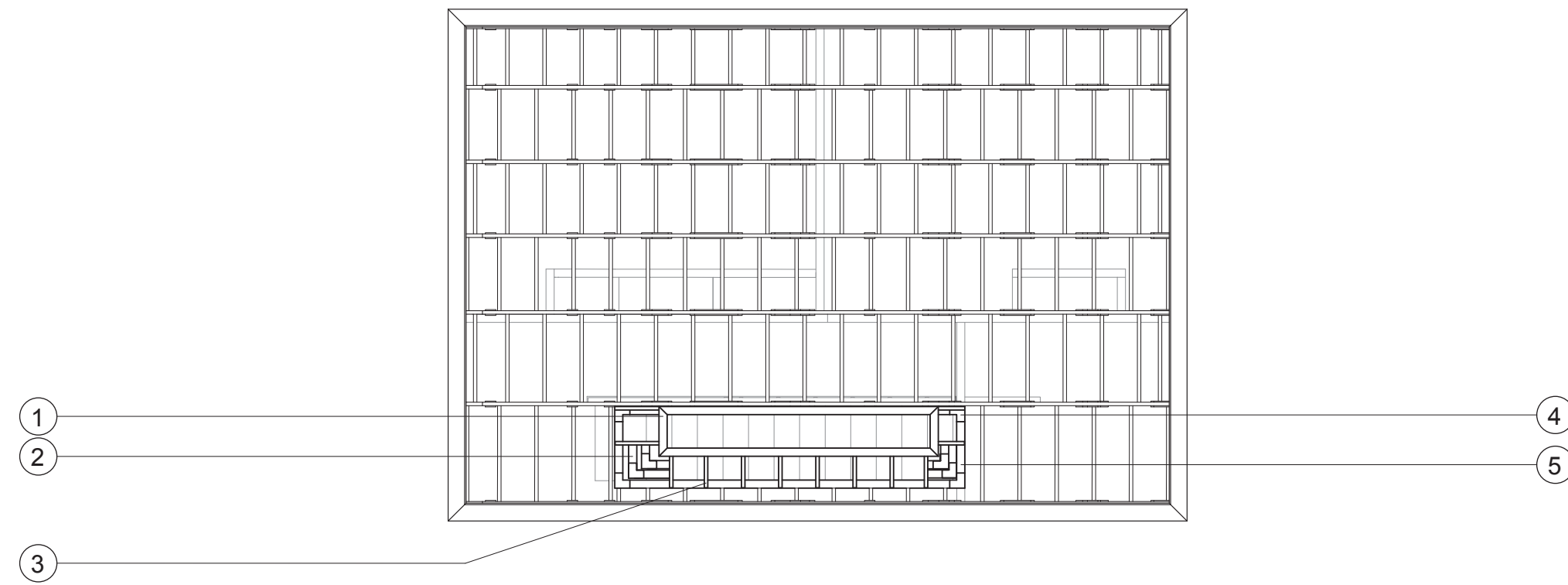
MEANS OF EGRESS
(STAIRS & RAMPS)

ASSIGNMENT 2
PAGE: 5 OF 5

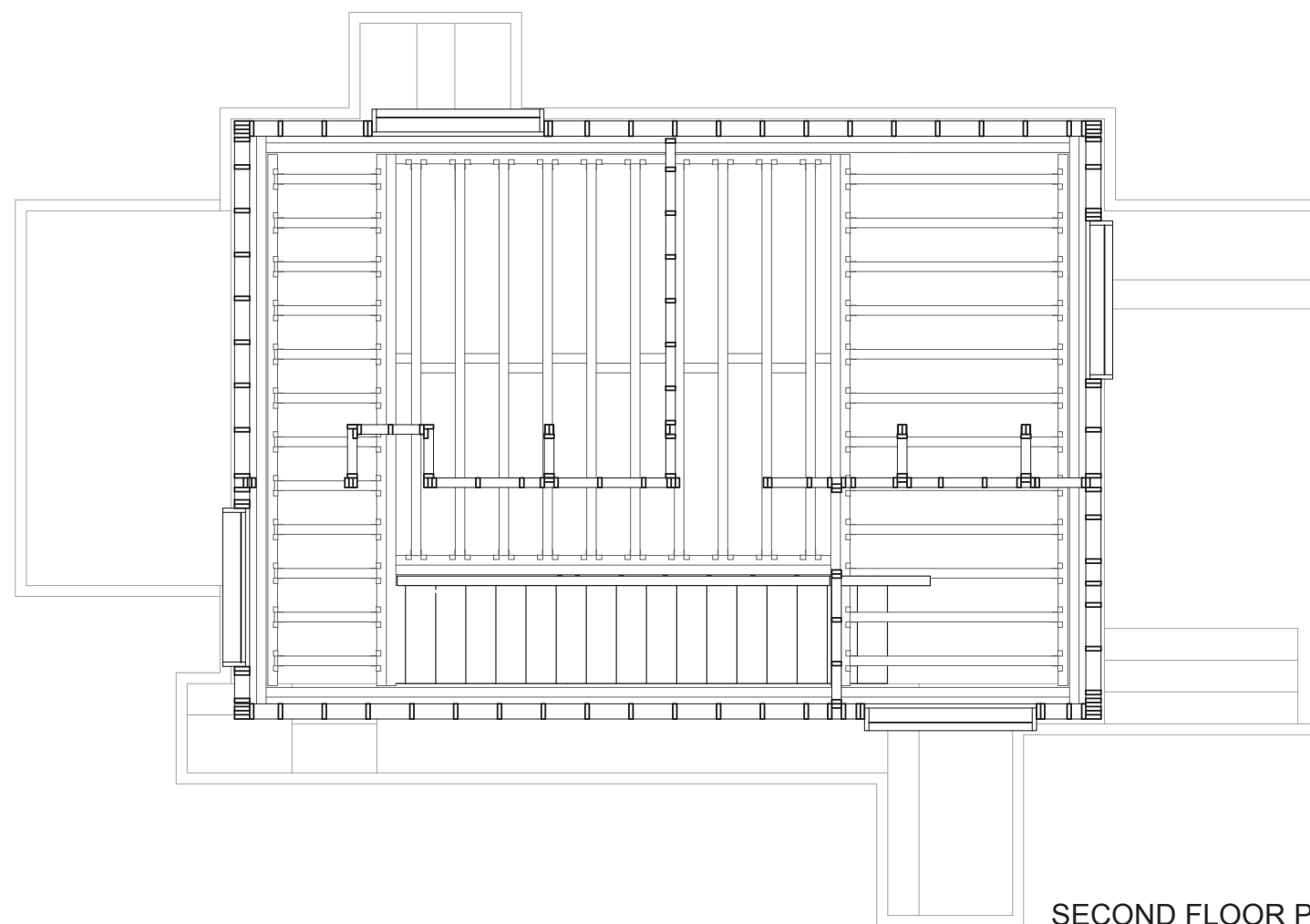
48-215 MATERIALS & ASSEMBLY
SPRING 2017

INSTRUCTOR: DAMIANI

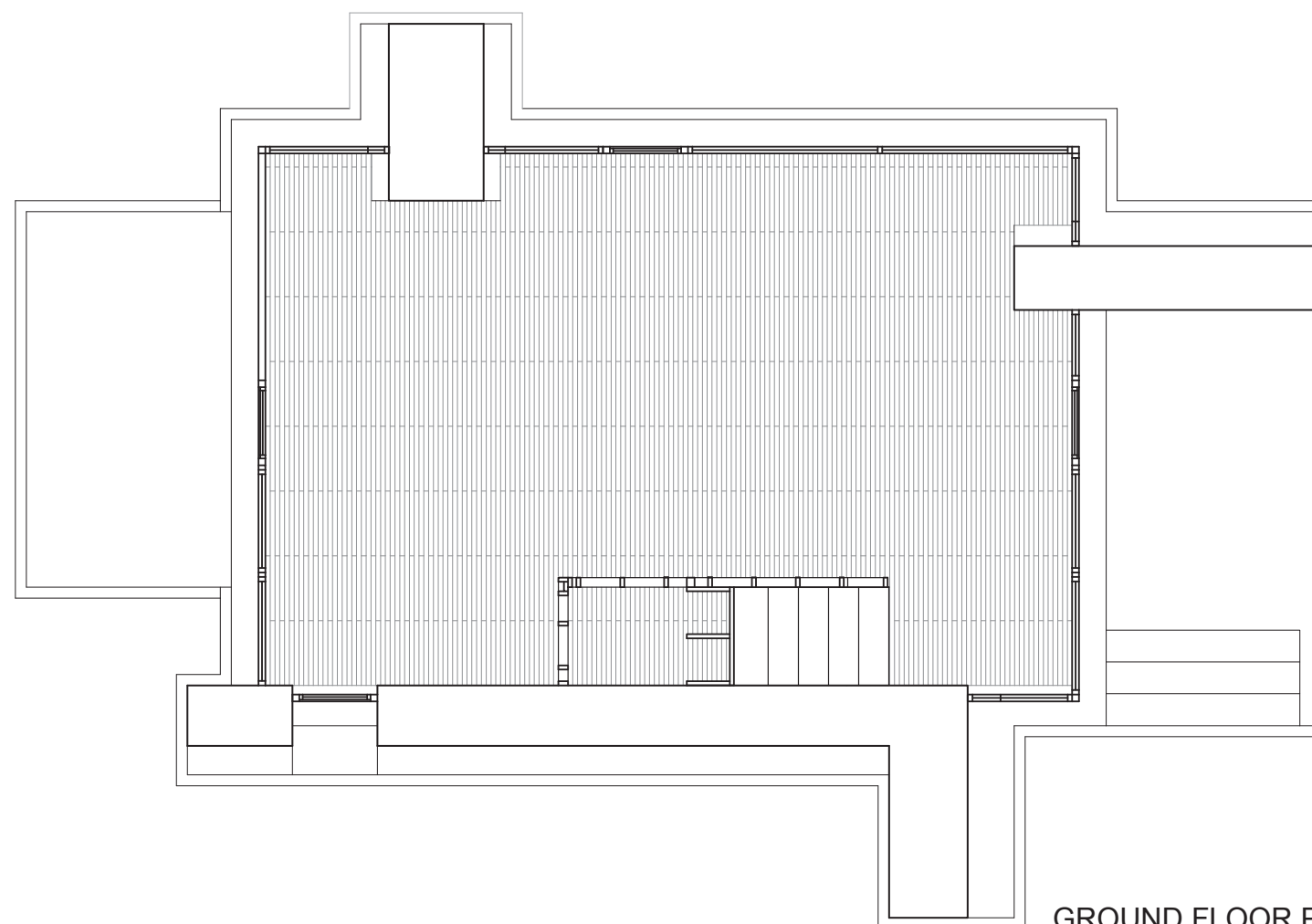
SELENA ZHEN



ROOF PLAN



SECOND FLOOR PLAN



GROUND FLOOR PLAN

- 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

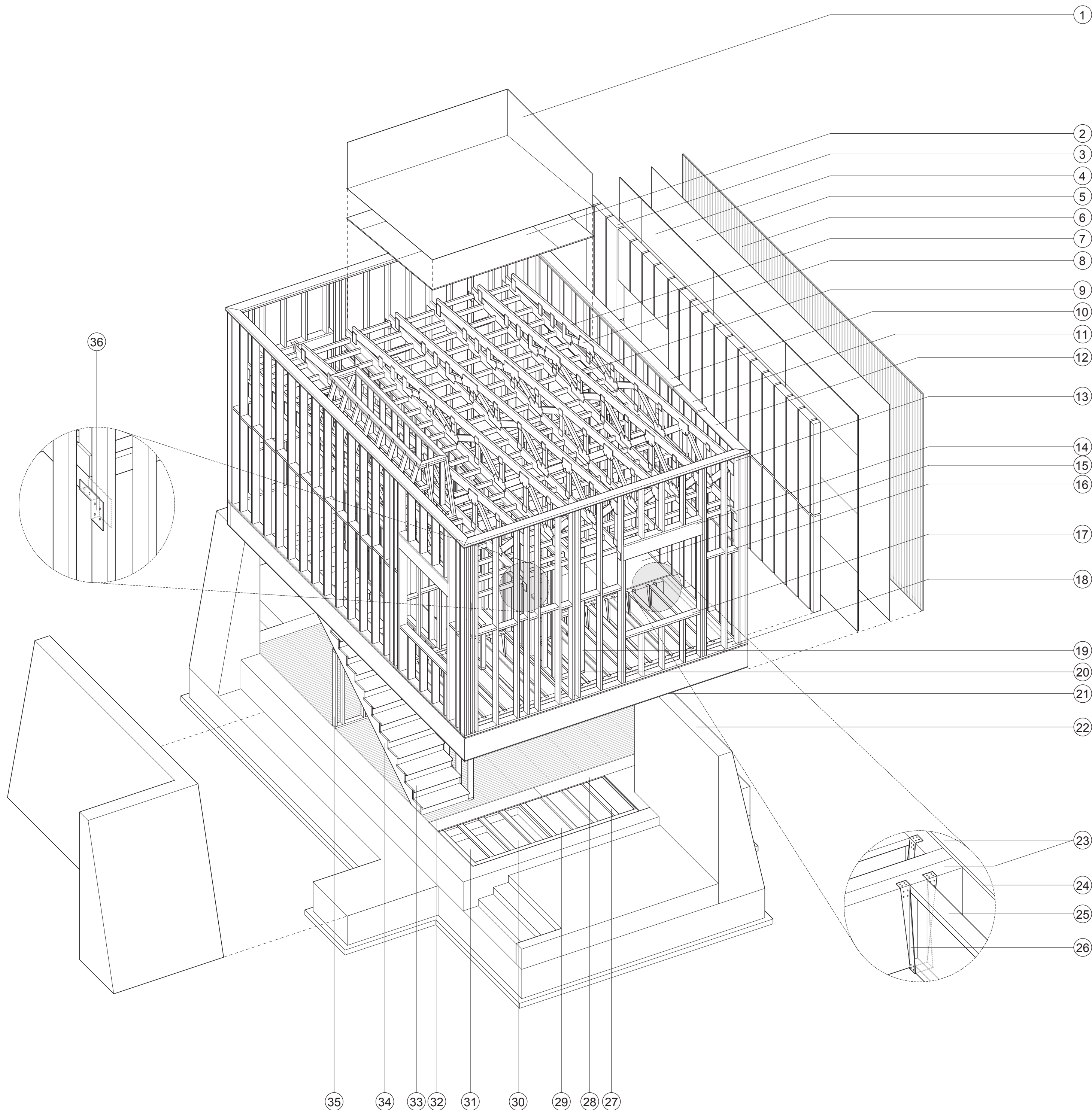
WOOD FRAMING

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. 1'1" ~ 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

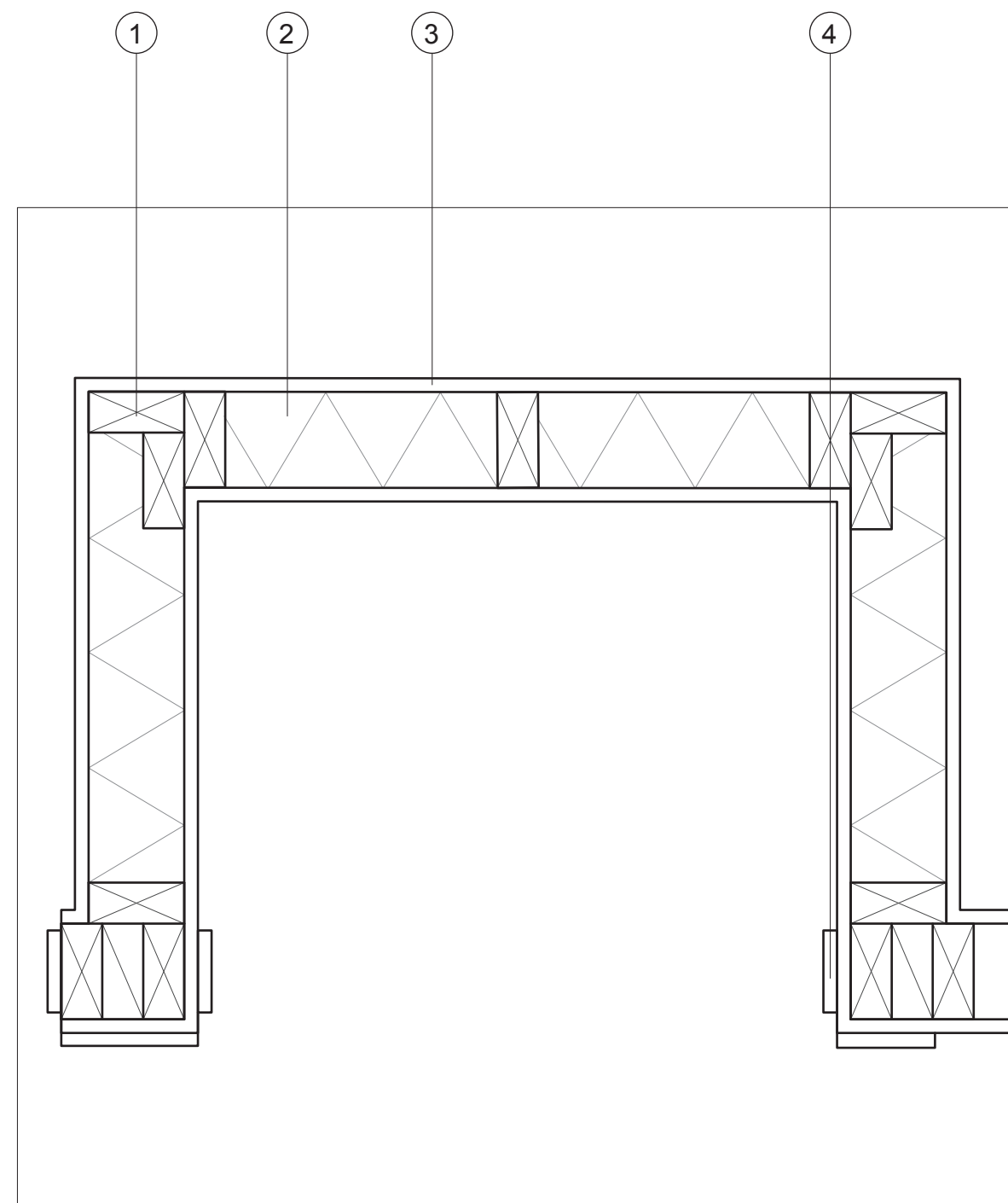
WOOD FRAMING

ASSIGNMENT 3
PAGE: 2 OF 3

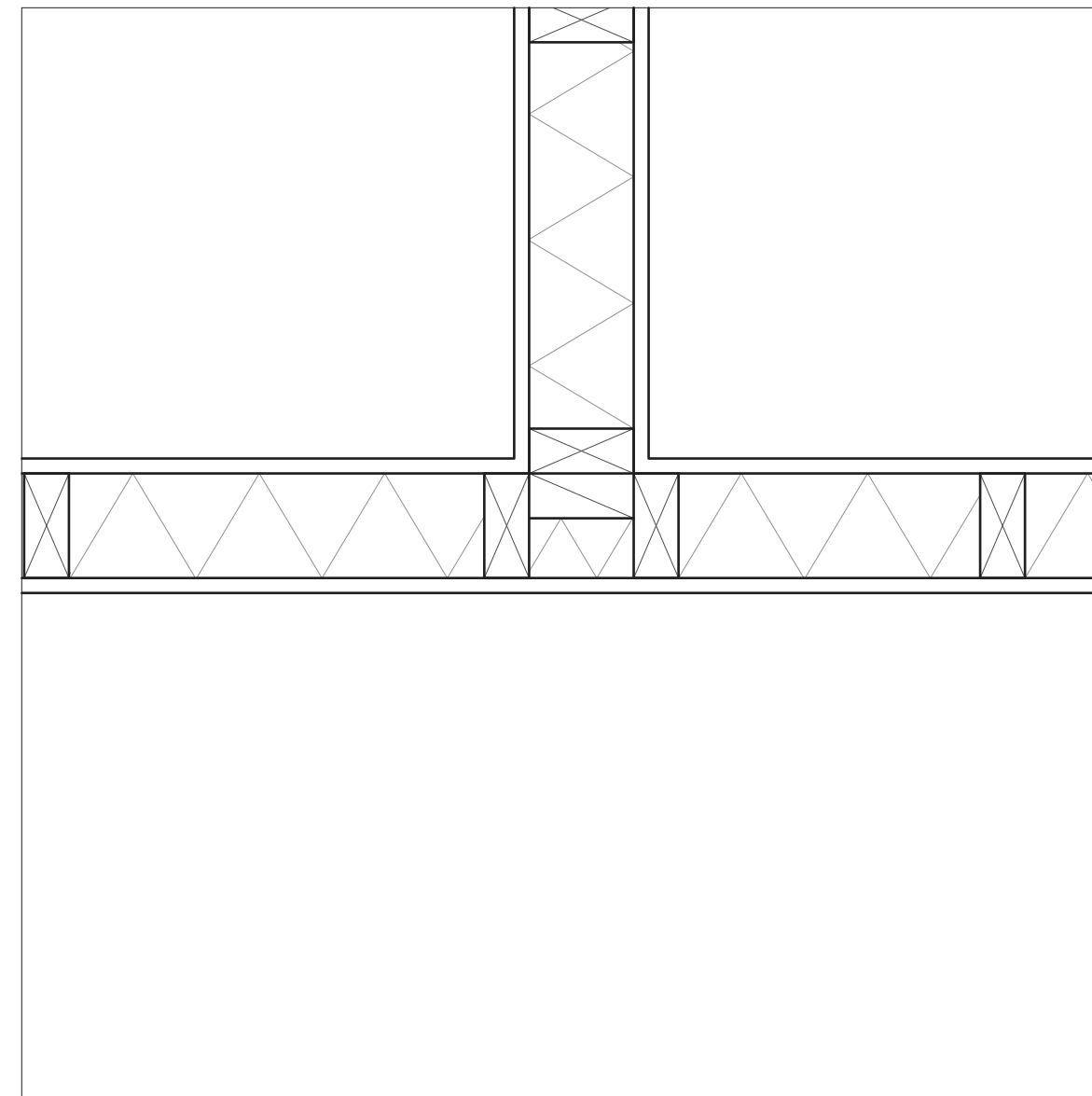
48-215 MATERIALS & ASSEMBLY
SPRING 2017

INSTRUCTOR: DAMIANI

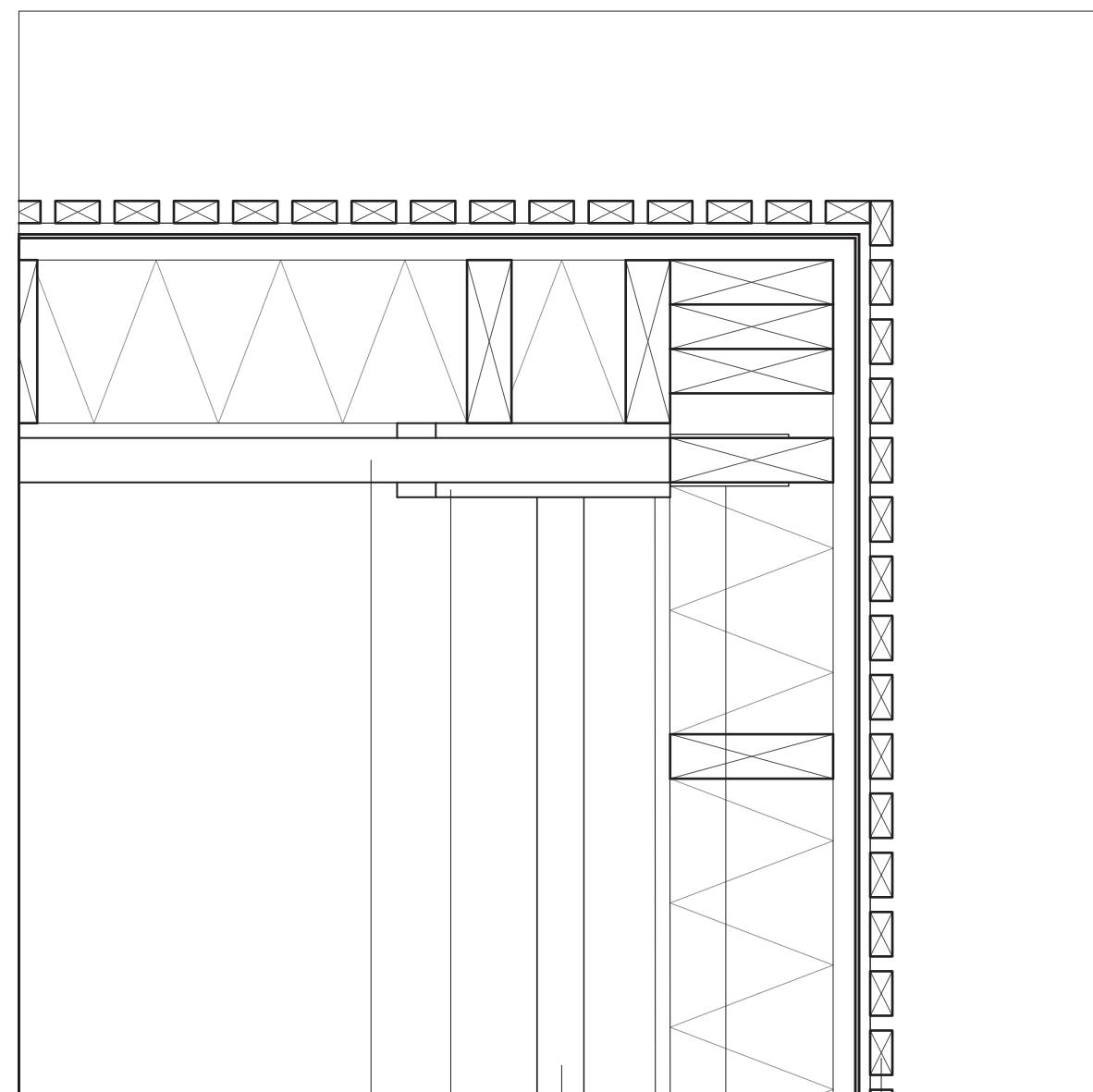
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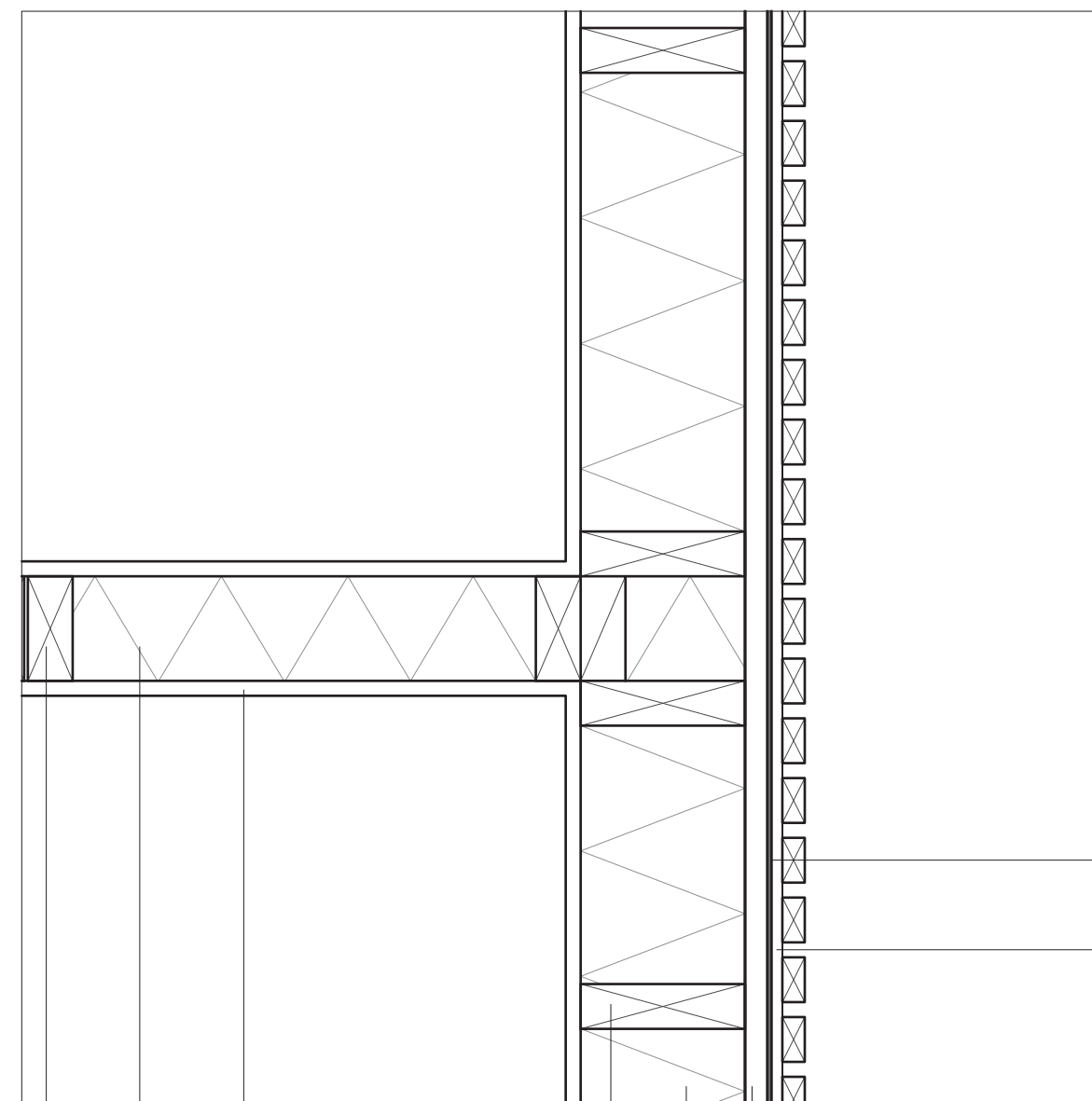
INTERIOR CORNER DETAIL 1



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

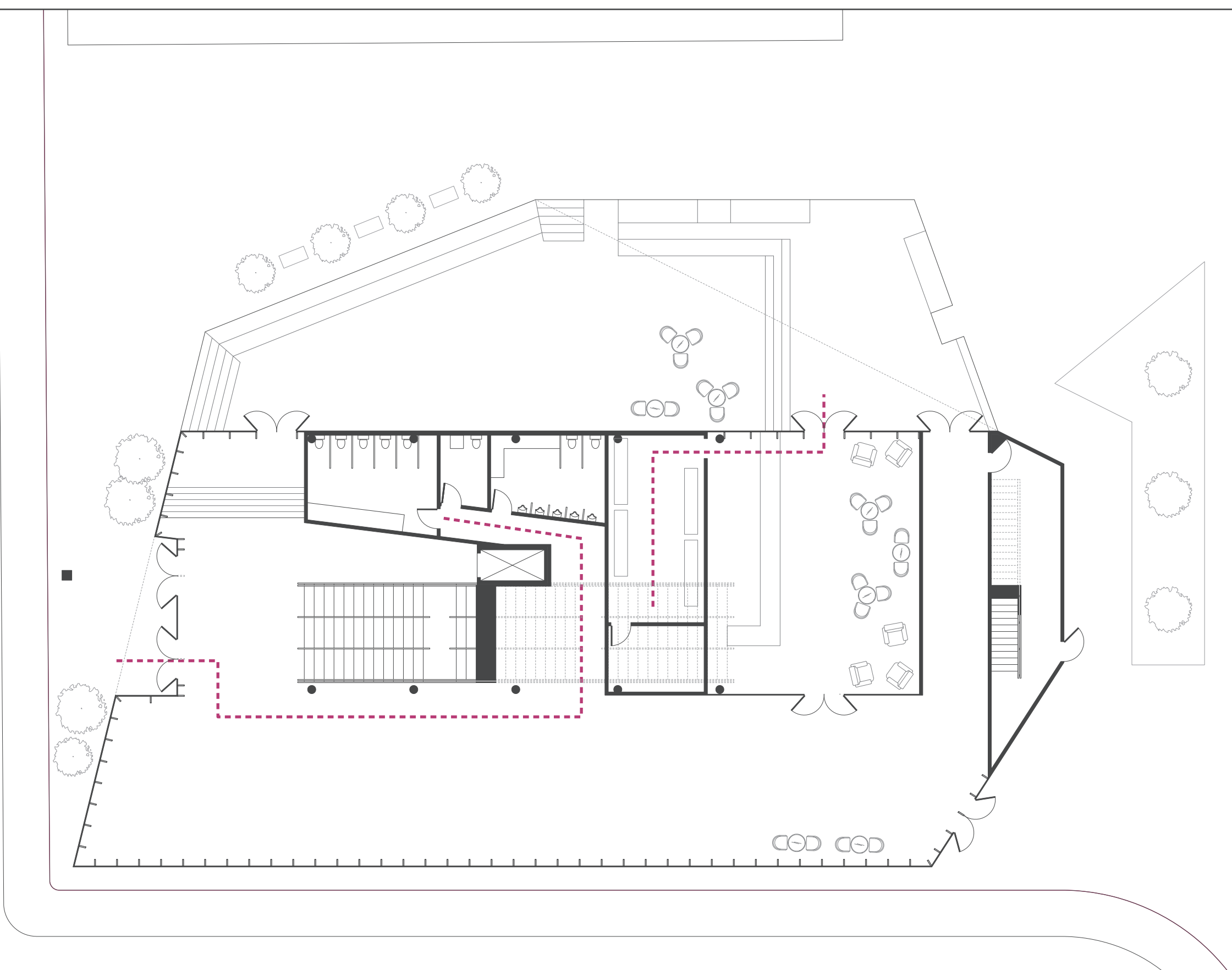
WOOD FRAMING

ASSIGNMENT 3
PAGE: 3 OF 3

48-215 MATERIALS & ASSEMBLY
SPRING 2017

INSTRUCTOR: DAMIANI

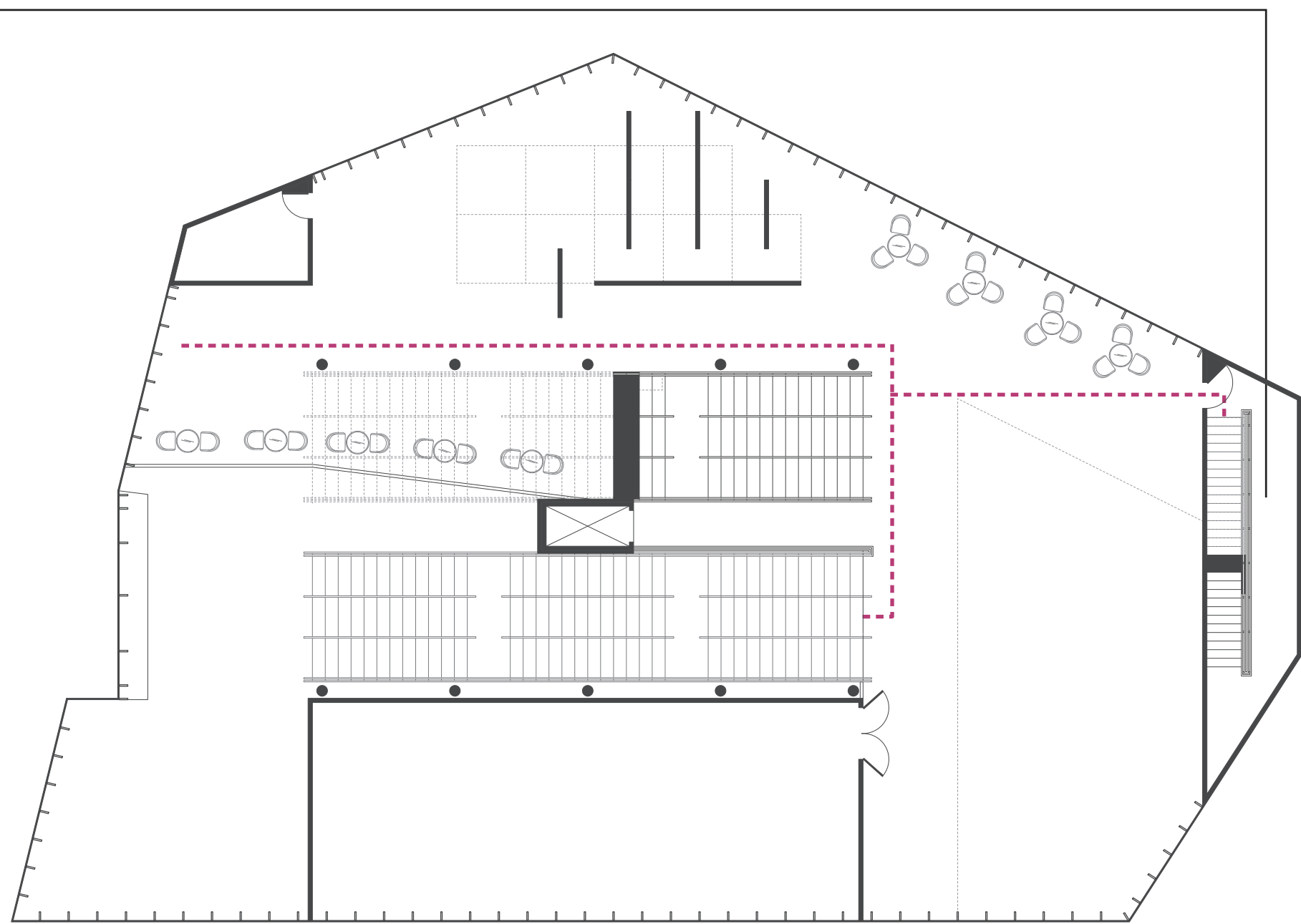
SELENA ZHEN



GROUND FLOOR PLAN
SCALE 1/16" = 1'



2



SECOND FLOOR PLAN
SCALE 1/16" = 1'



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

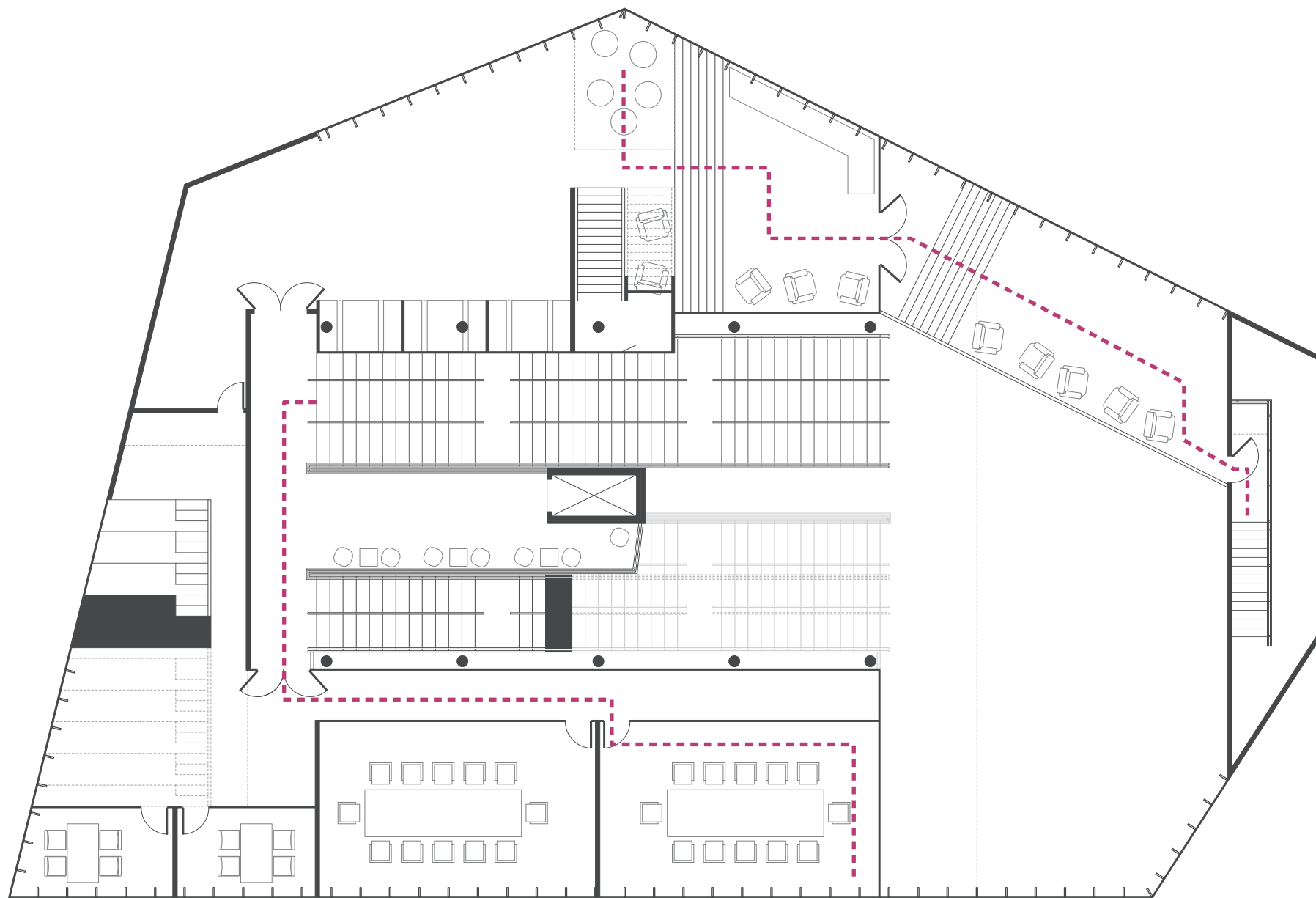
MEANS OF EGRESS

ASSIGNMENT 4A PAGE: 1 OF 3

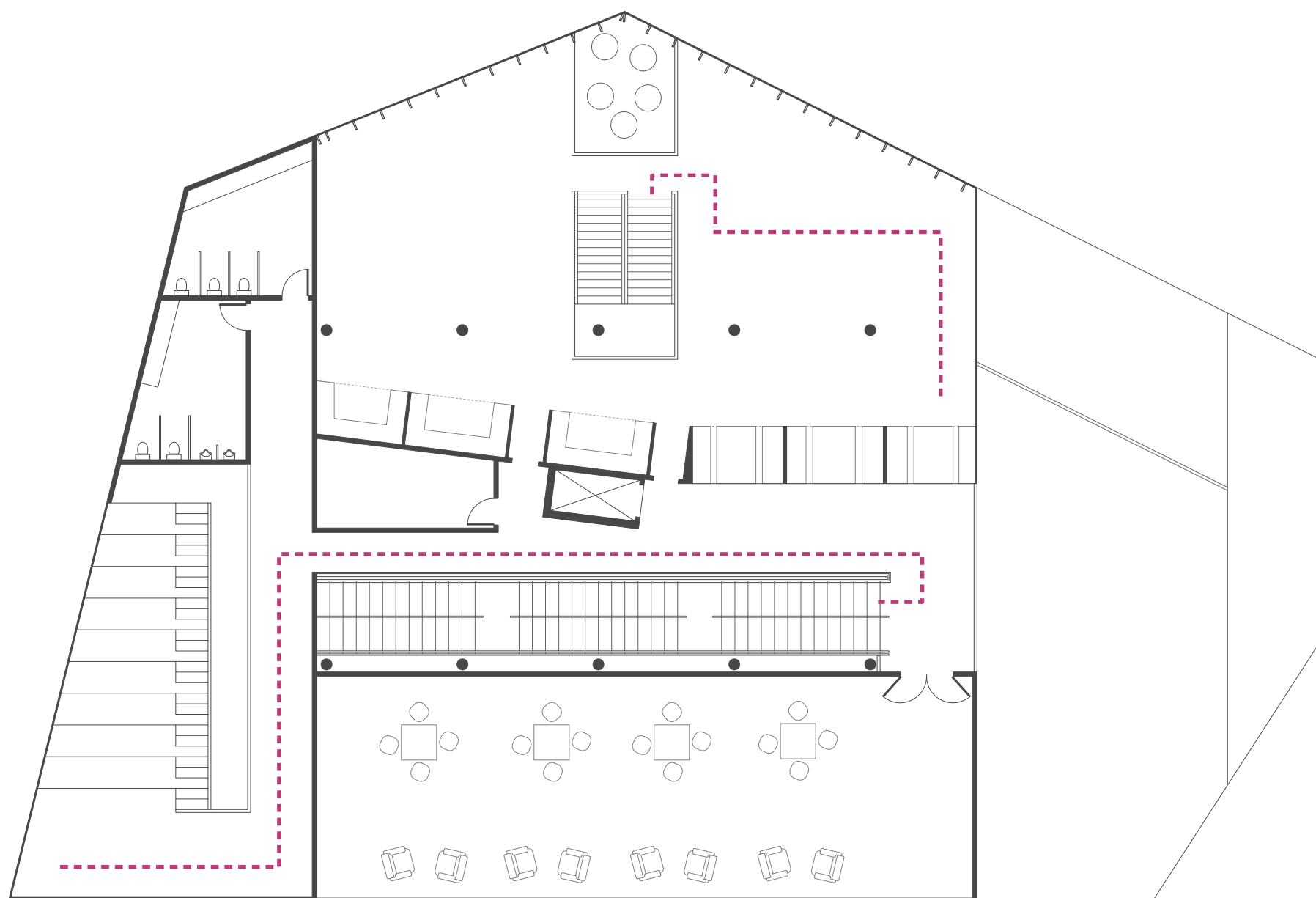
48-215 MATERIALS & ASSEMBLY
SPRING 2017

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

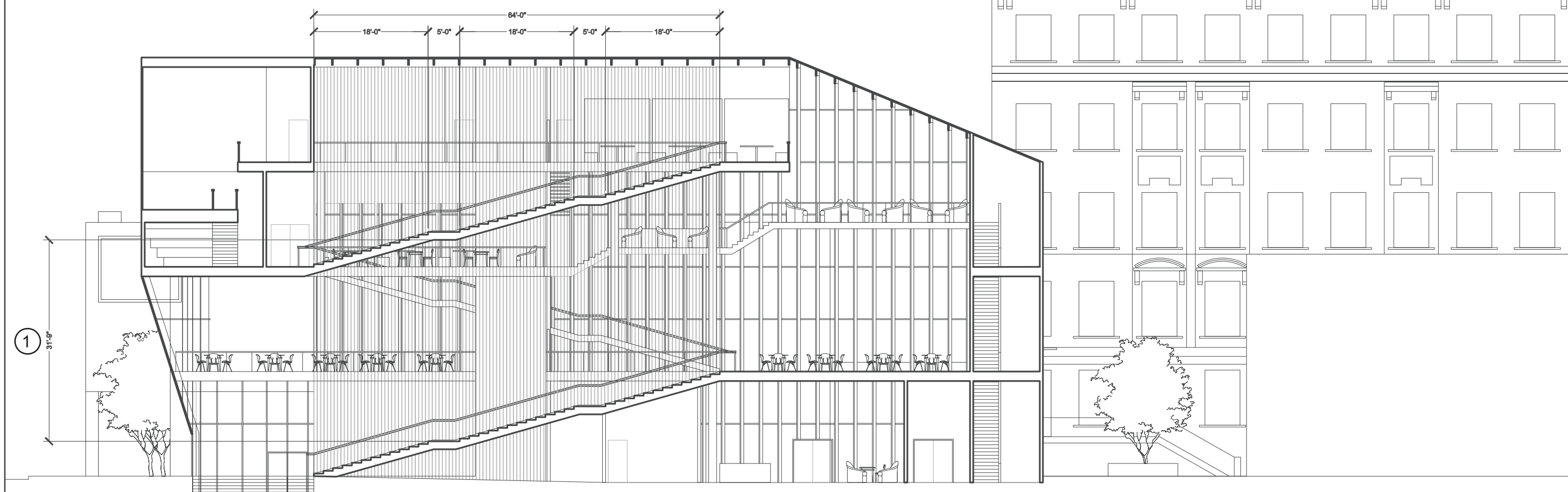
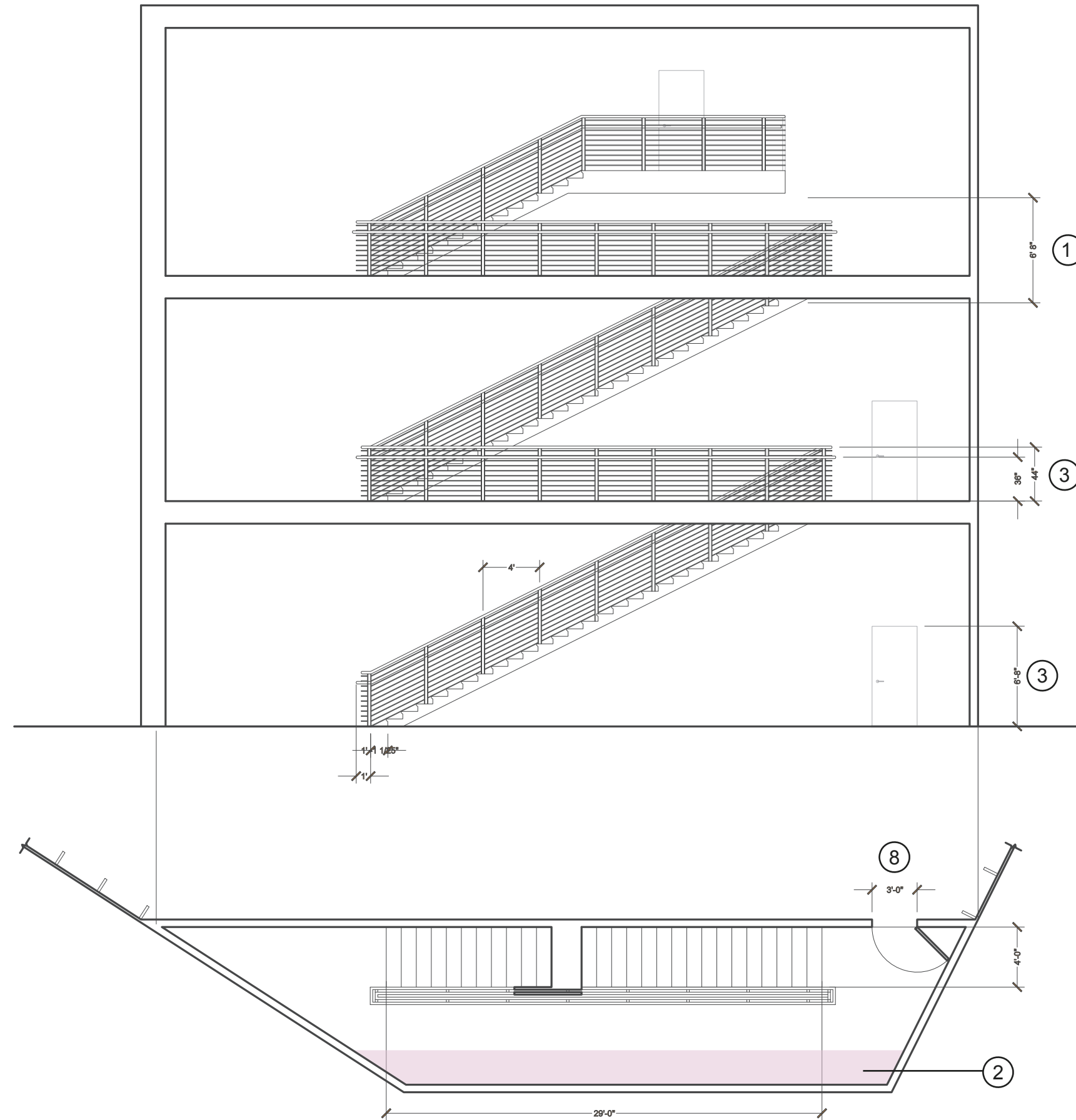
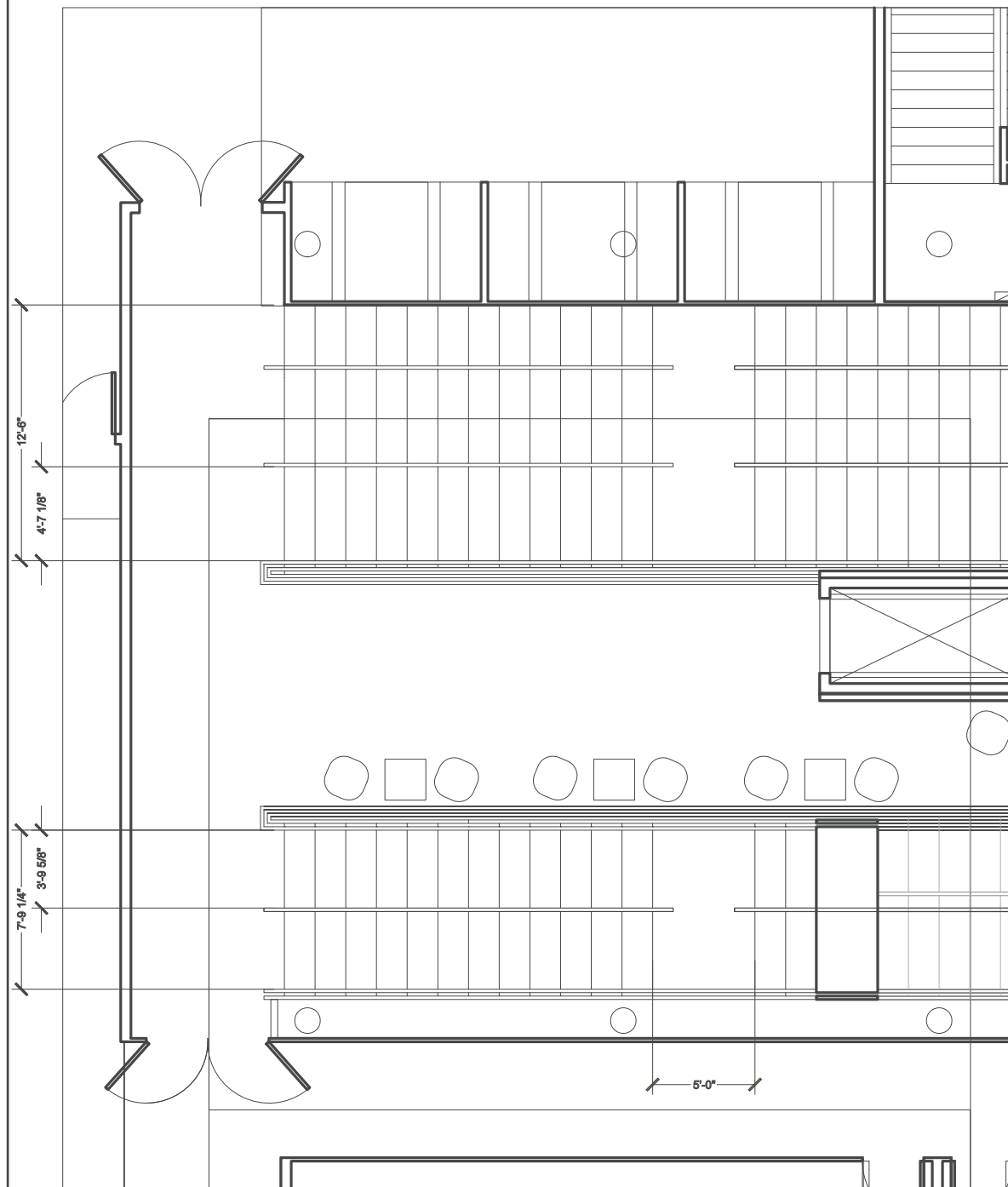
MEANS OF EGRESS

ASSIGNMENT 4A
PAGE: 2 OF 3

48-215 MATERIALS & ASSEMBLY
SPRING 2017

INSTRUCTOR: DAMIANI

SELENA ZHEN



- 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"; 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.

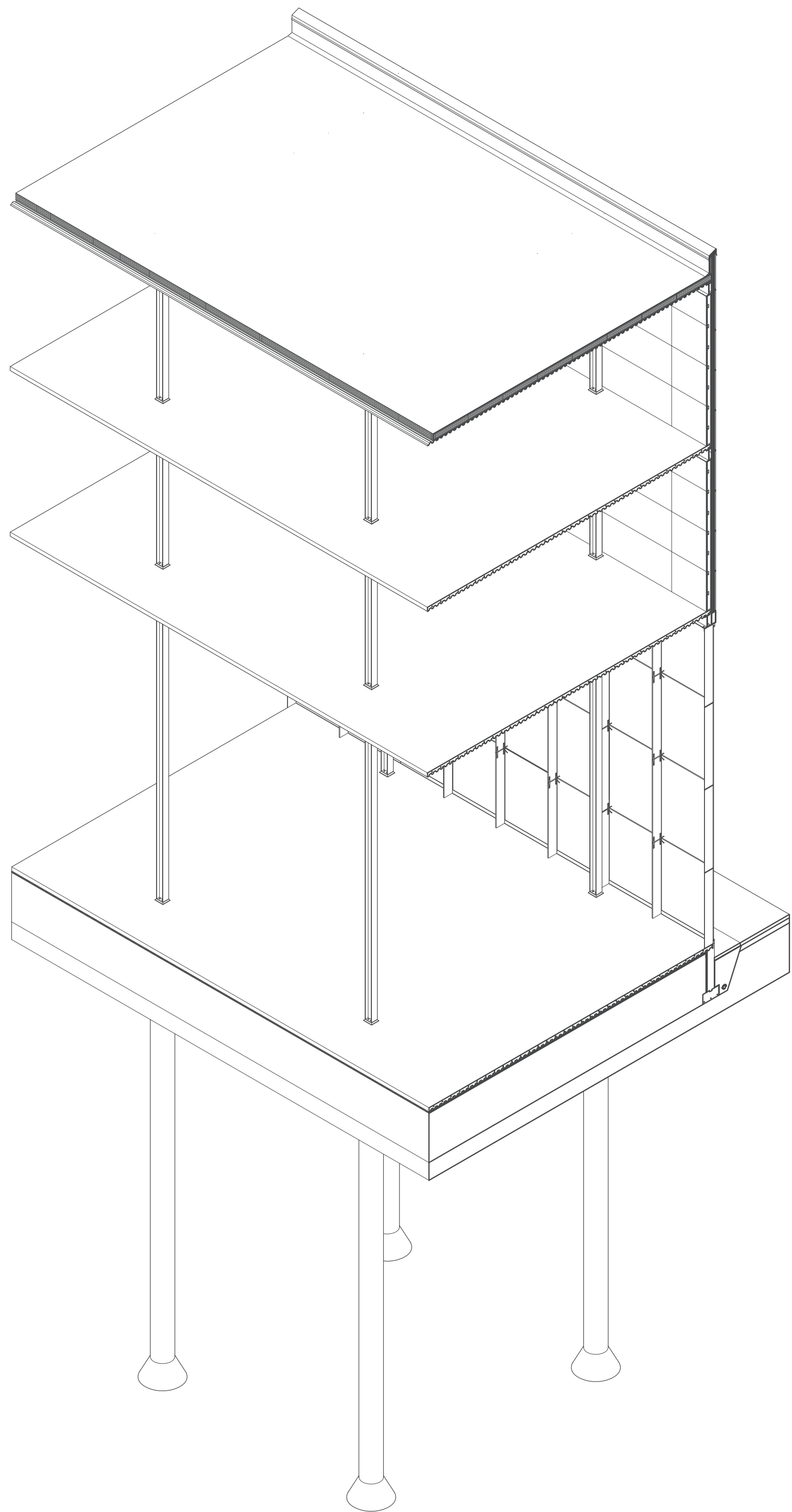
MEANS OF EGRESS

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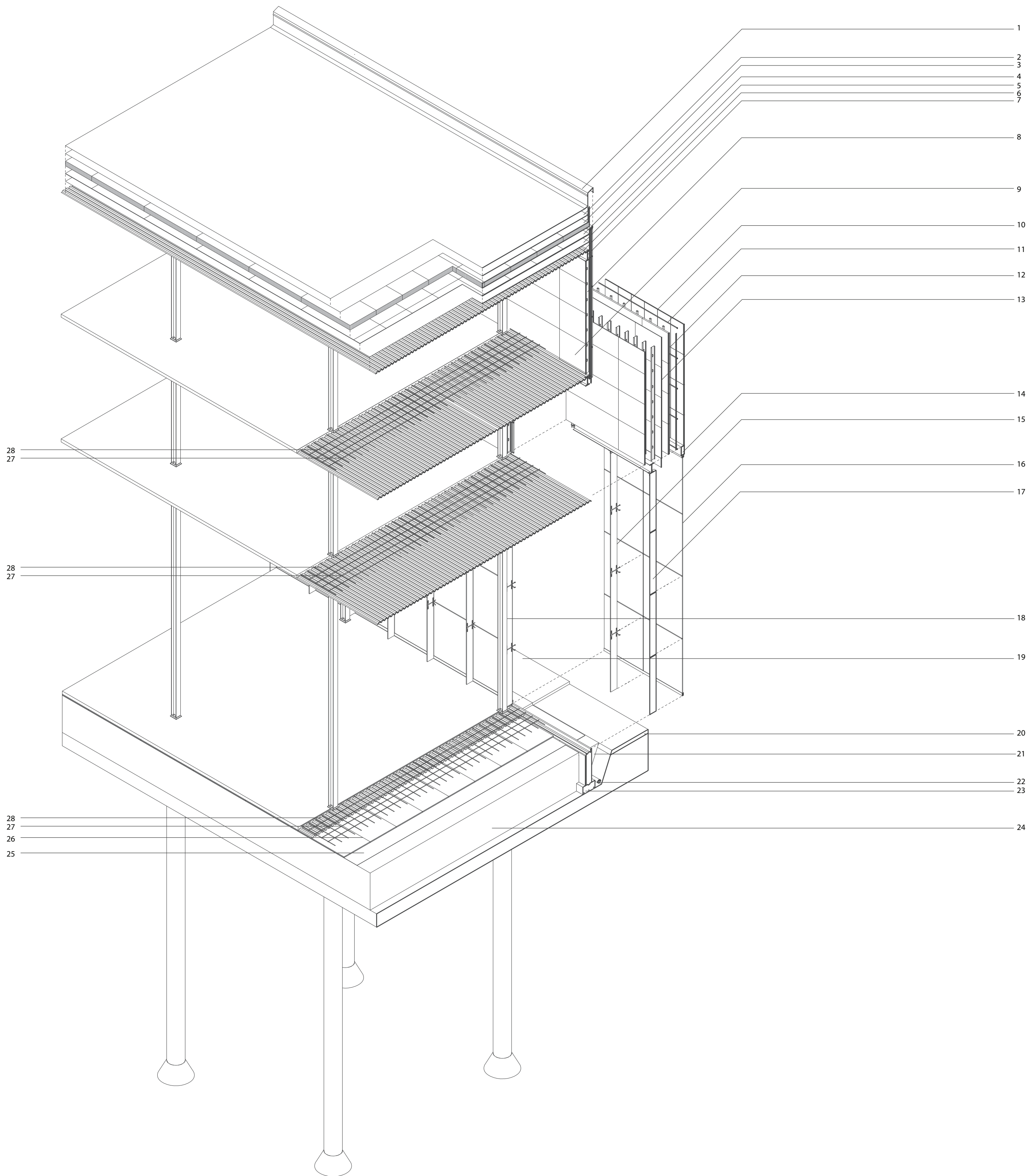
MATERIAL SYSTEMS

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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. COMPACTEDE GRAVEL FILL
- 25. WATERPROOFING
- 26. GYPSUM BOARD
- 27. WIRE MESH
- 28. CONCRETE STEEL FLOOR DECKING

MATERIAL SYSTEMS

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