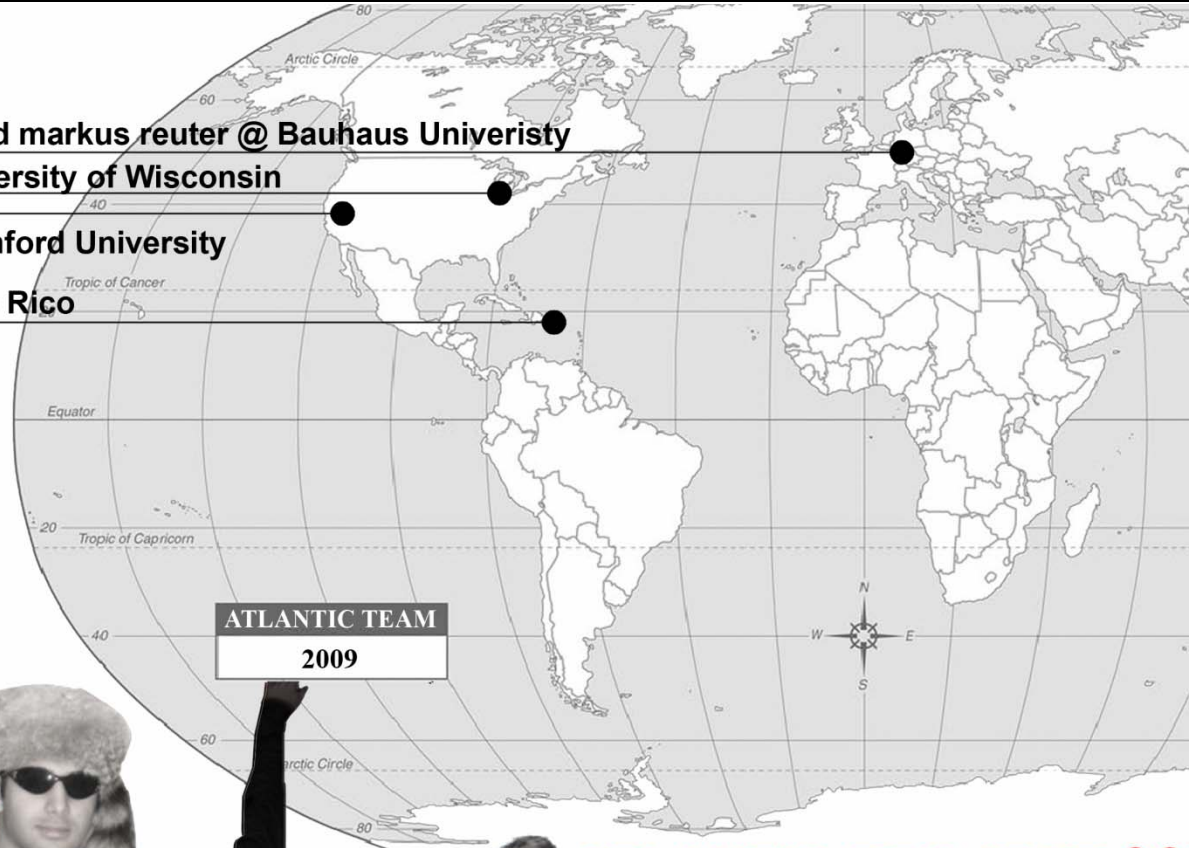


SE robert bingel and markus reuter @ Bauhaus Univeristy
CM michael spittler @ University of Wisconsin

SE anirudh rao and **CM** hoss nasser | @ Stanford University

A maria julia escalona @ University of Puerto Rico

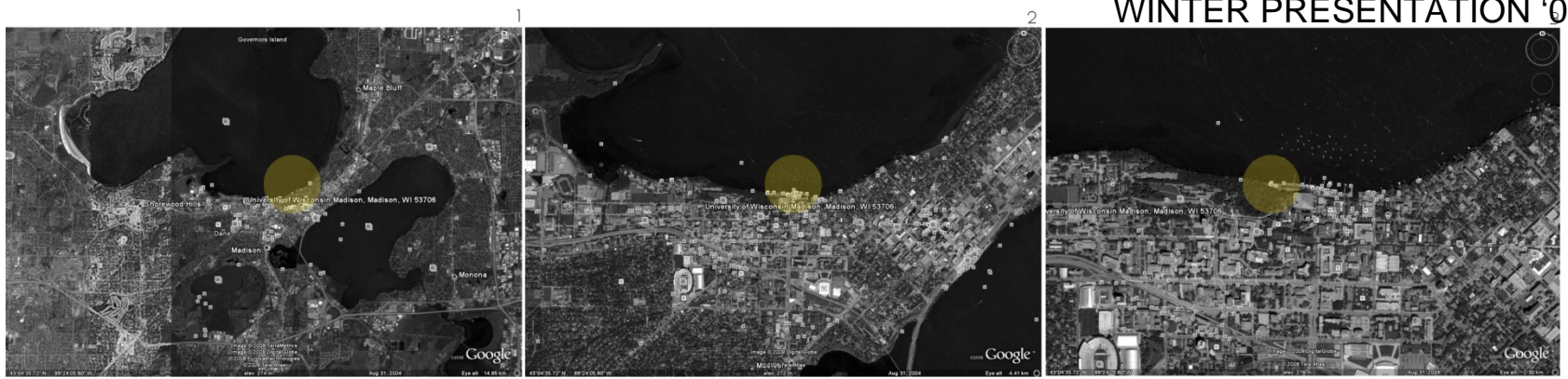


ARCHITECTURE

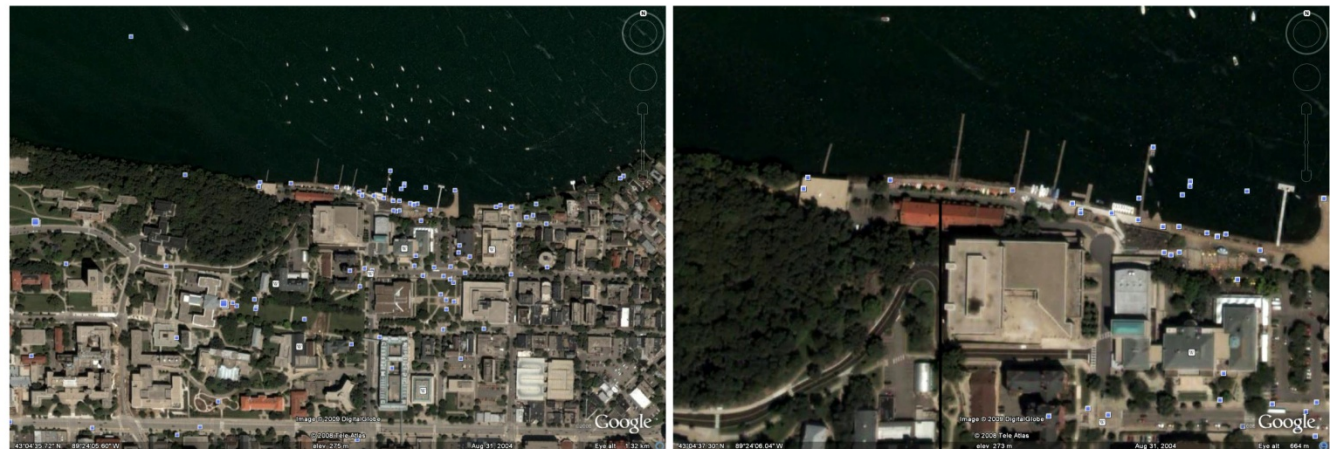
STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

WINTER PRESENTATION '09



UW Madison surrounded by Lake Mendota and Lake Monona



site

ATLANTIC PROJECT

University of Wisconsin @ Madison, School of Engineering

ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT



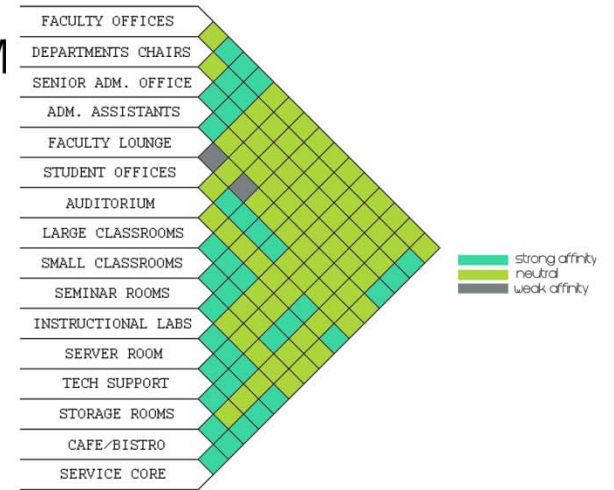
PREFACE: ABOUT THE SITE

- borders south coast of Lake Mendota
- two climates: extreme winter/summer
- variety of outdoor activities
- adjacent to Lakeshore Natural Preserve and the Muir Woods
- North: lake
- Southwest: woods
- South: mountain (slope)
- East: campus building



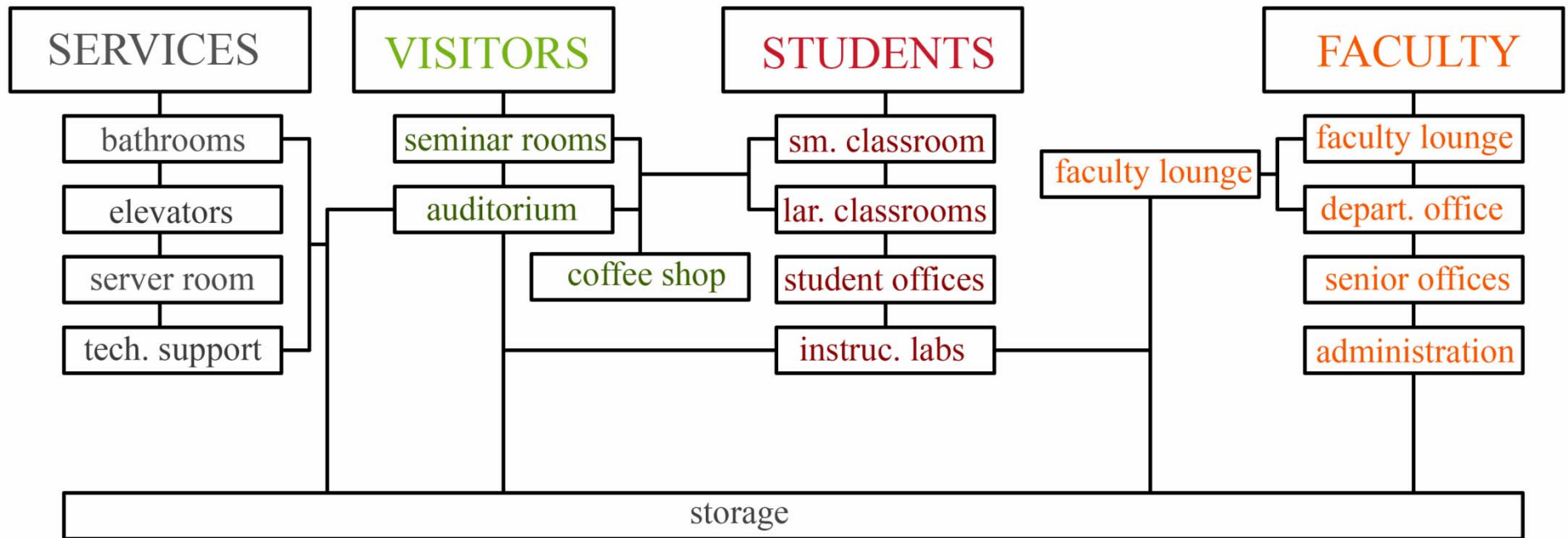


PROGRAM AND RELATIONSHIP DIAGRAM



TYPES OF USERS

1. Students
2. Faculty Members
3. Visitors



ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

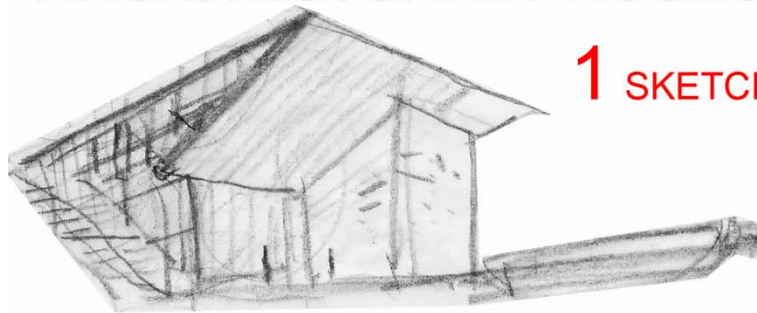
CONCEPT I DOUBLE DIAMOND

The conceptual phase of the project developed regarding the word TRANSITION, both as a noun or verb. Transition, derived from the prefix trans, is a symbolic or physical movement, going across,

LAND <----> WATER

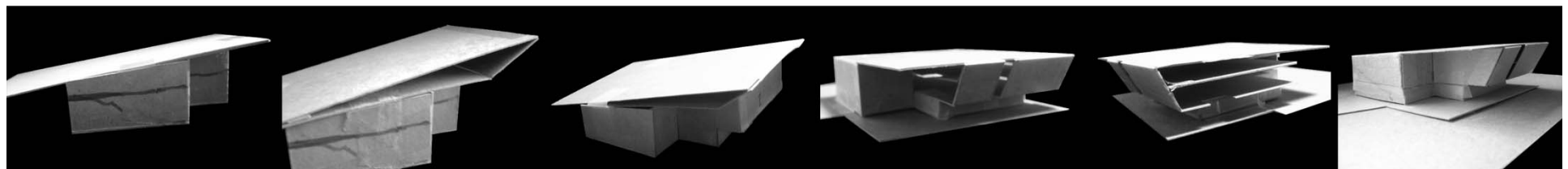


ARCHITECTURAL PROCESS AND DESIGN



1 SKETCHES AND PROGRAM ANALYSIS

2 STUDY MODELS AND FLOOR PLANS



ARCHITECTURE

STRUCTURAL ENGINEERING

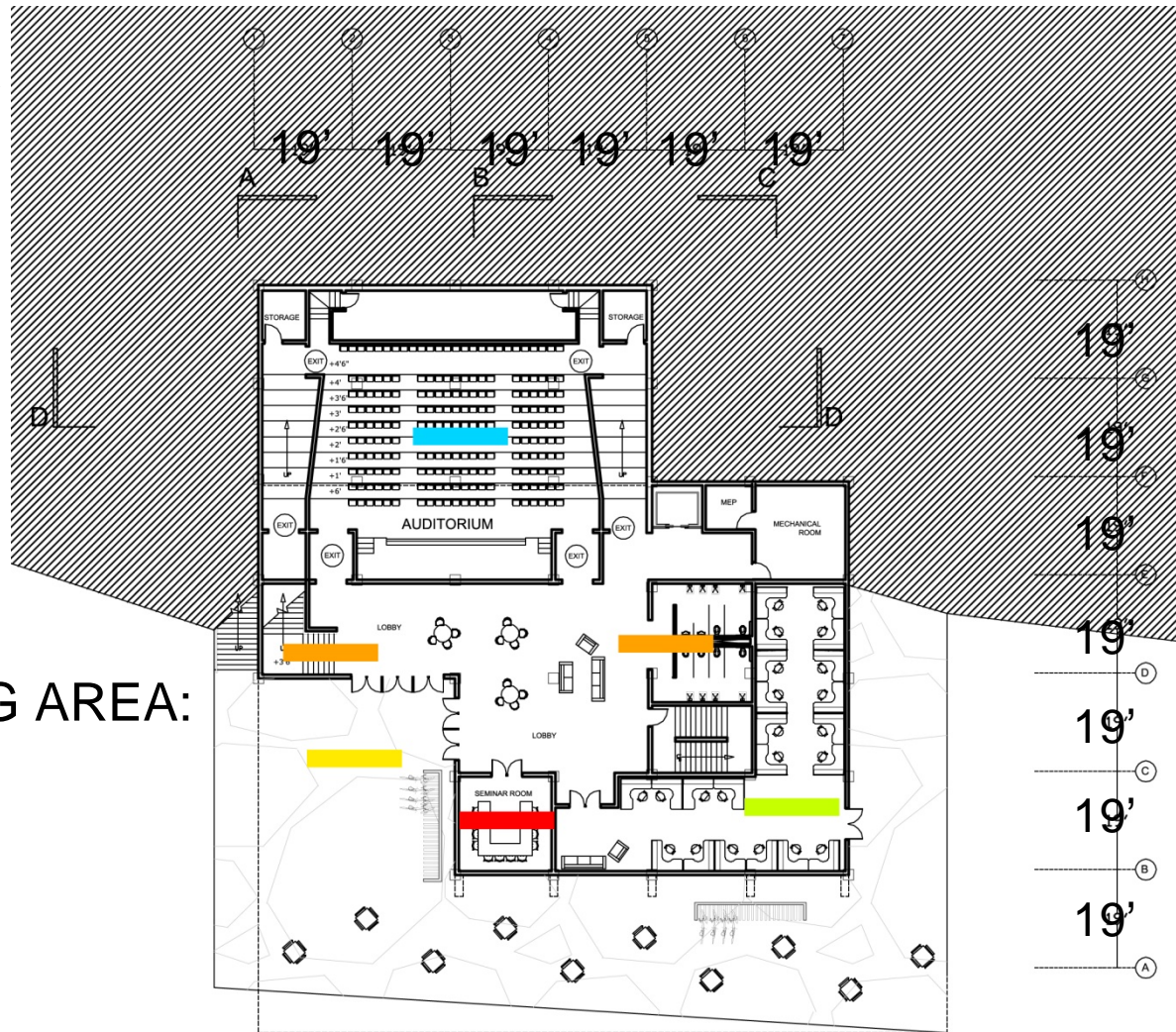
CONSTRUCTION MANAGEMENT

+ ZERO WASTE

3 /ARCHITECTURAL/
/ENGINEERING/
/CONSTRUCTION MANAGERS/



GROUND FLOOR

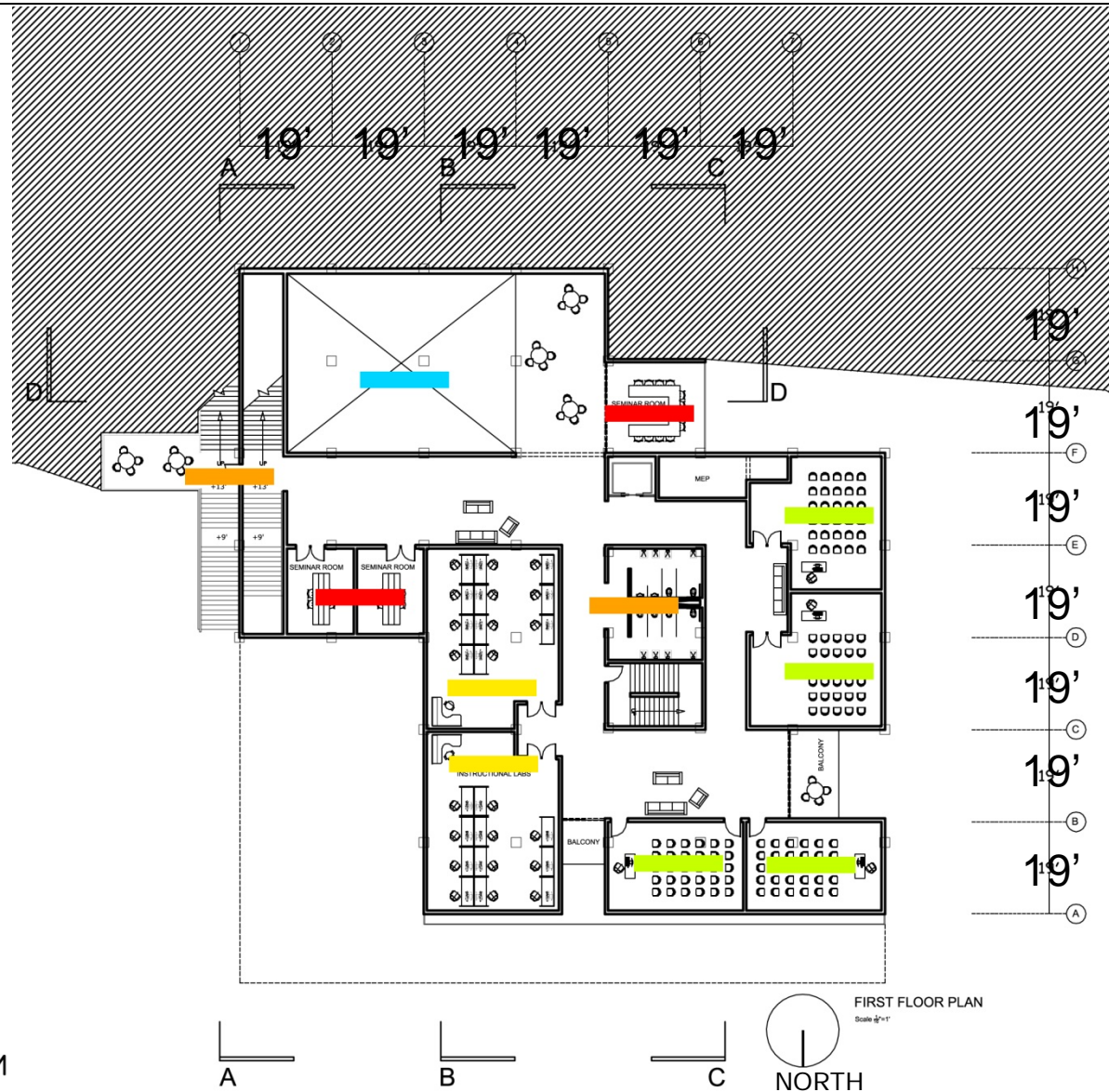


TOTAL BUILDING AREA:
38,000 SQ FT

- AUDITORIUM
- VERTICAL CIR.
- SEMINAR ROOM
- MAIN ENTRANCE
- STUDENT OFFICES

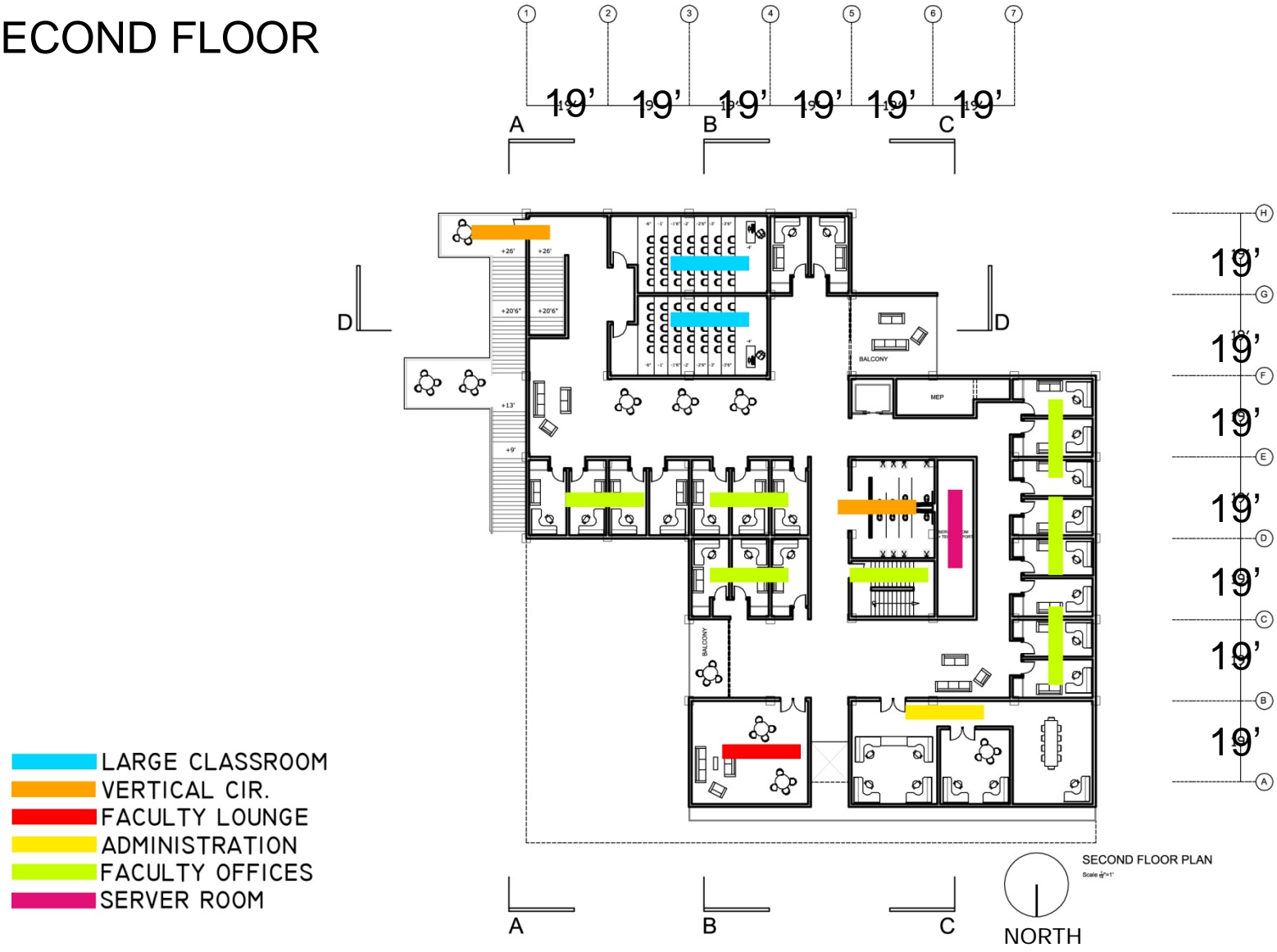


FIRST FLOOR

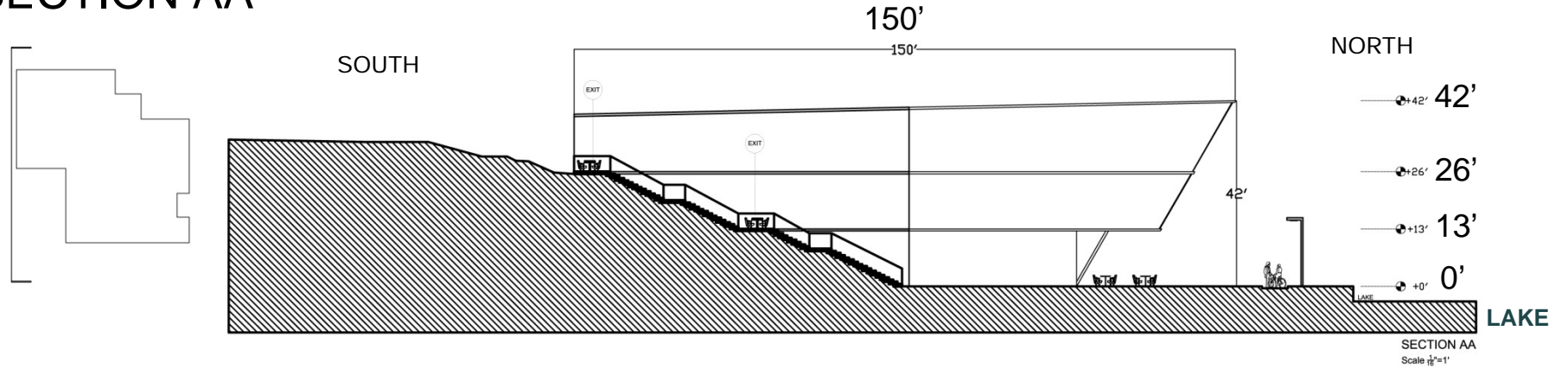


- AUDITORIUM
- VERTICAL CIR.
- SEMINAR ROOM
- INST. LABS
- SMALL CLASSROOM

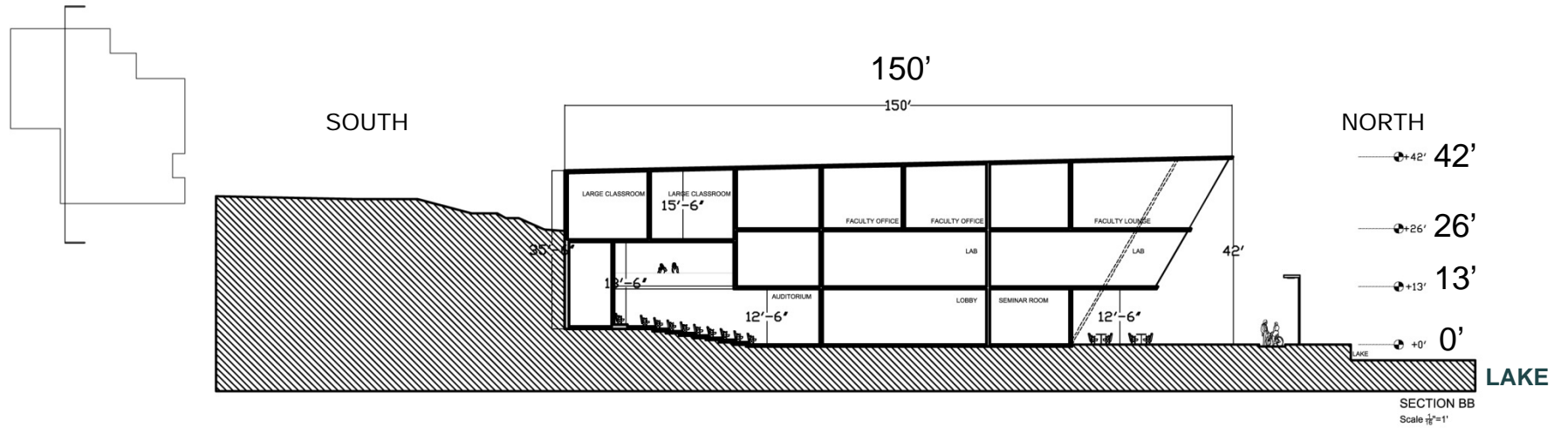
SECOND FLOOR



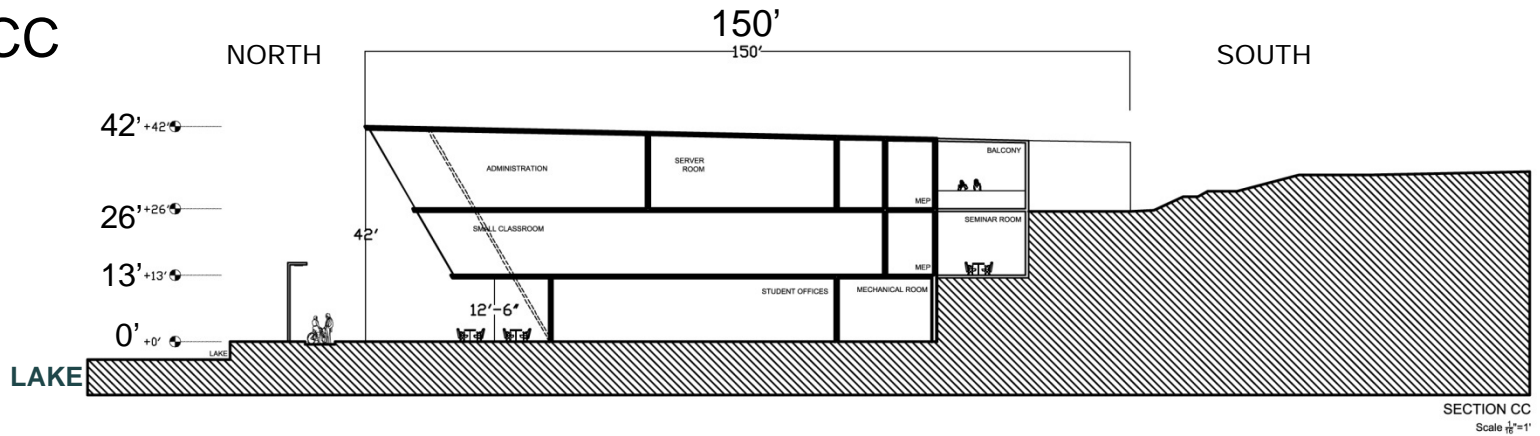
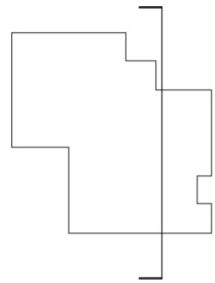
SECTION AA



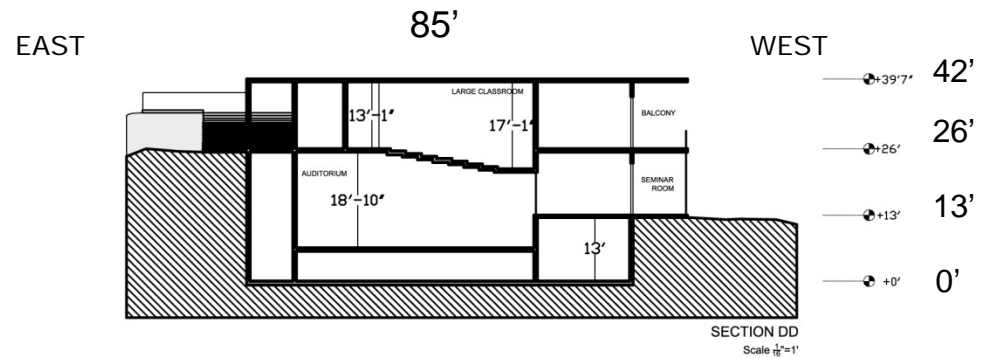
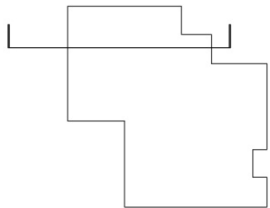
SECTION BB

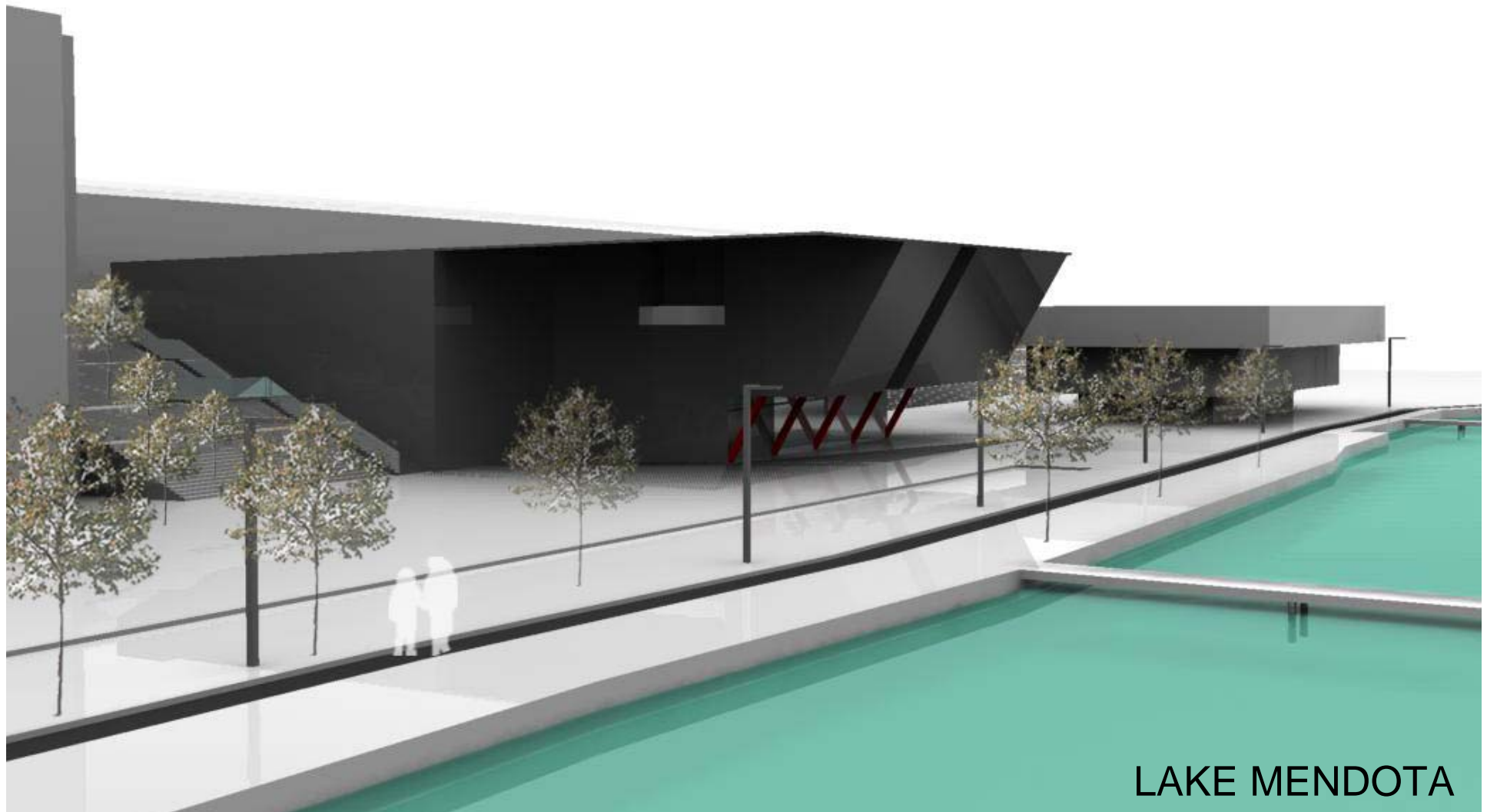


SECTION CC



SECTION DD





ARCHITECTURE

STRUCTURAL ENGINEERING

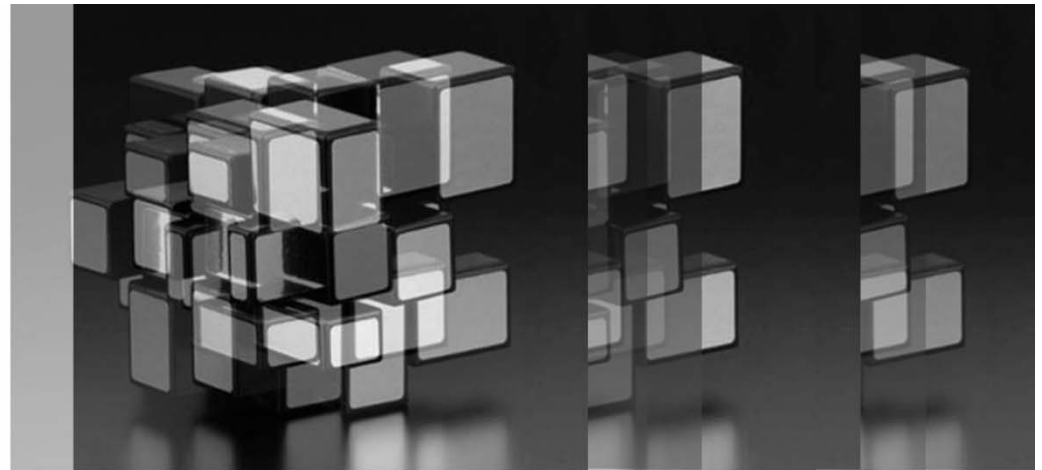
CONSTRUCTION MANAGEMENT

CONCEPT 2

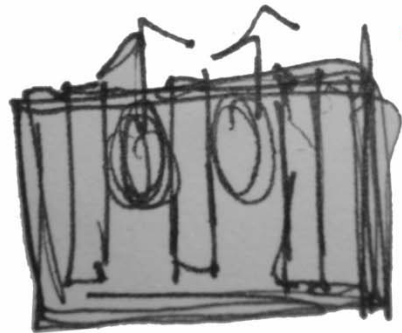
The platonic shape of the square offers an indefinite number of solutions, which can be presented in the architectural design. A FRACTURE as the characteristic appearance of a broken surface, was experimented as the idea behind breaking the cube.

SOLID <----> CLEAR

SQUARE

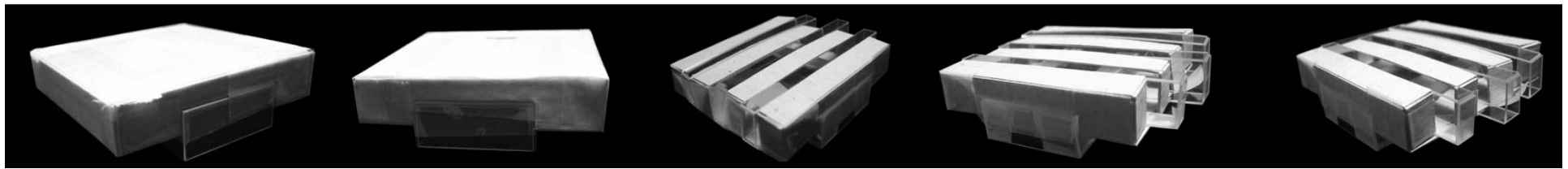


ARCHITECTURAL PROCESS AND DESIGN:



1 SKETCHES AND PROGRAM ANALYSIS

2 STUDY MODELS AND FLOOR PLANS



ARCHITECTURE

STRUCTURAL ENGINEERING

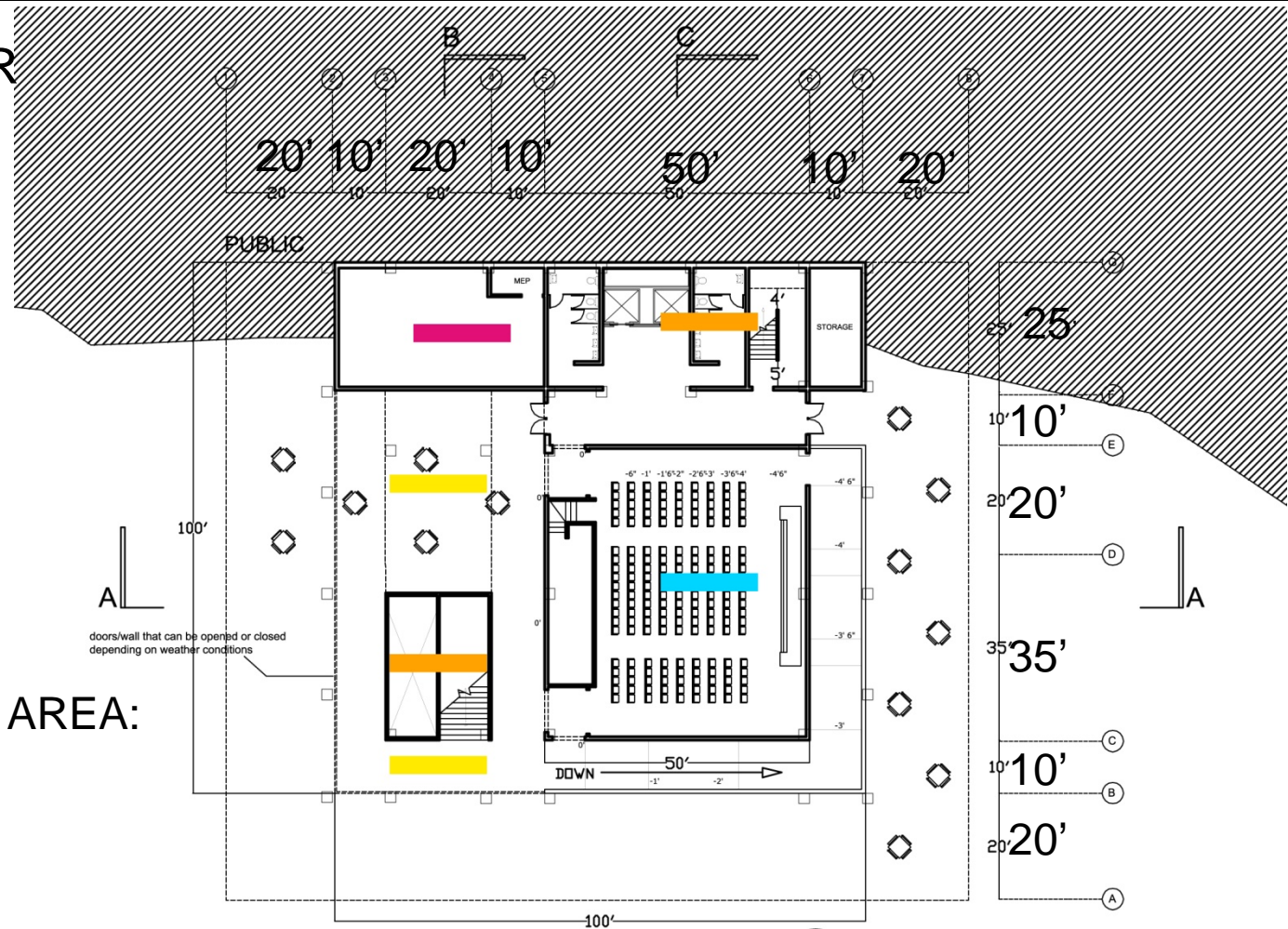
CONSTRUCTION MANAGEMENT

+ ZERO WASTE

3 /ARCHITECTURAL/
/ENGINEERING/
/CONSTRUCTION MANAGERS/



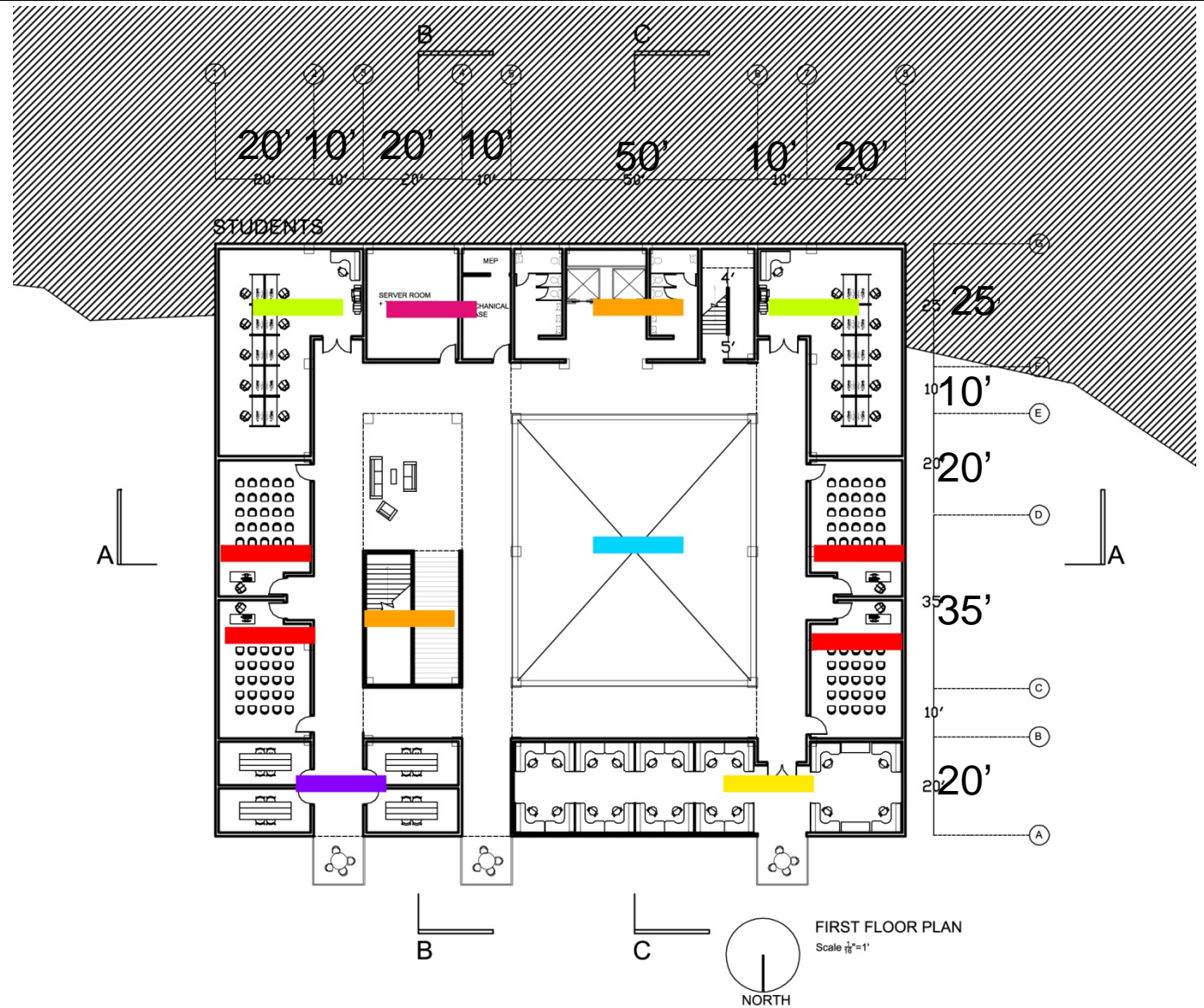
GROUND FLOOR



TOTAL BUILDING AREA:
44,000 SQ FT

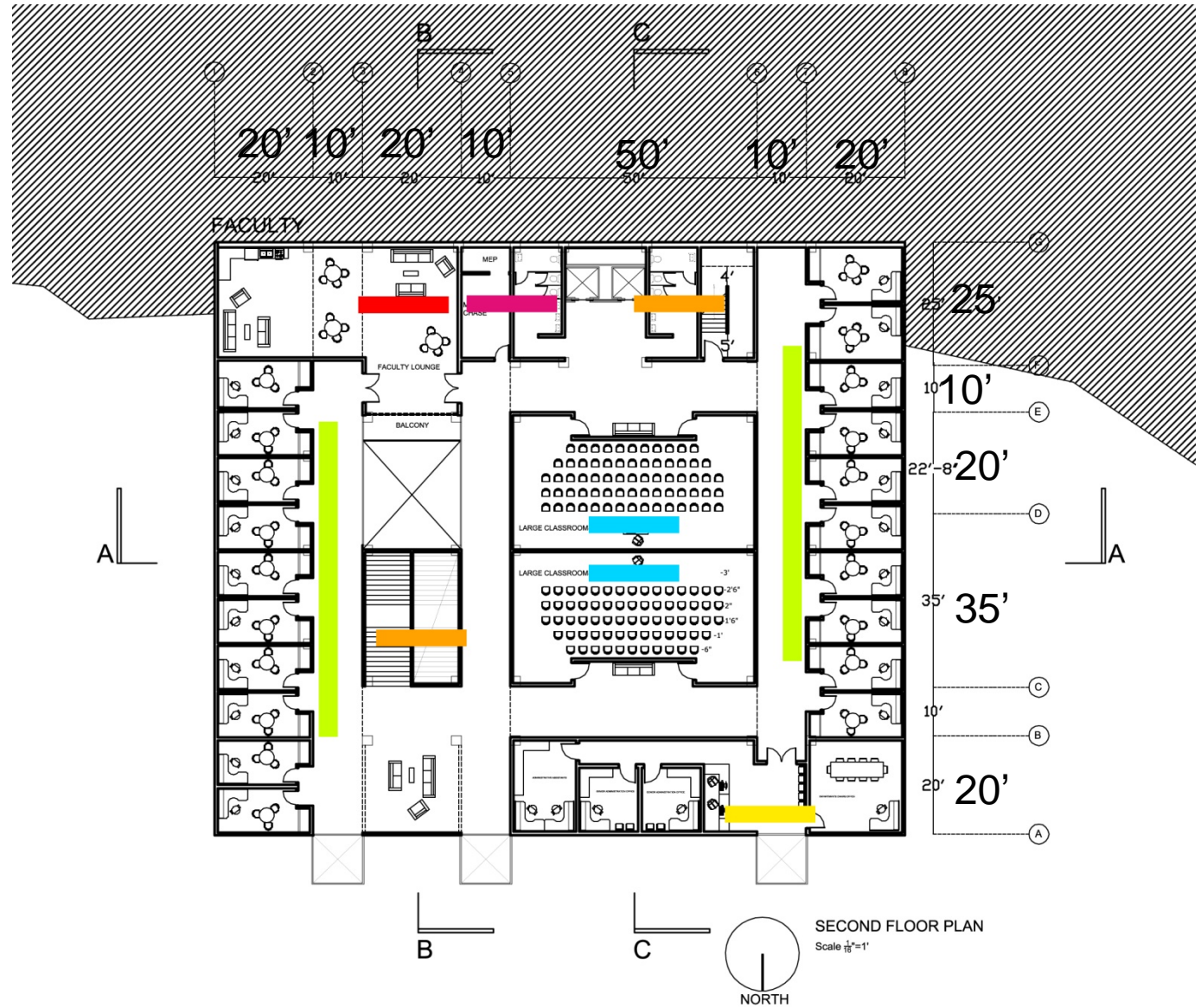
- AUDITORIUM
- VERTICAL CIR.
- MECHANICAL ROOM
- ENTRANCE

FIRST FLOOR



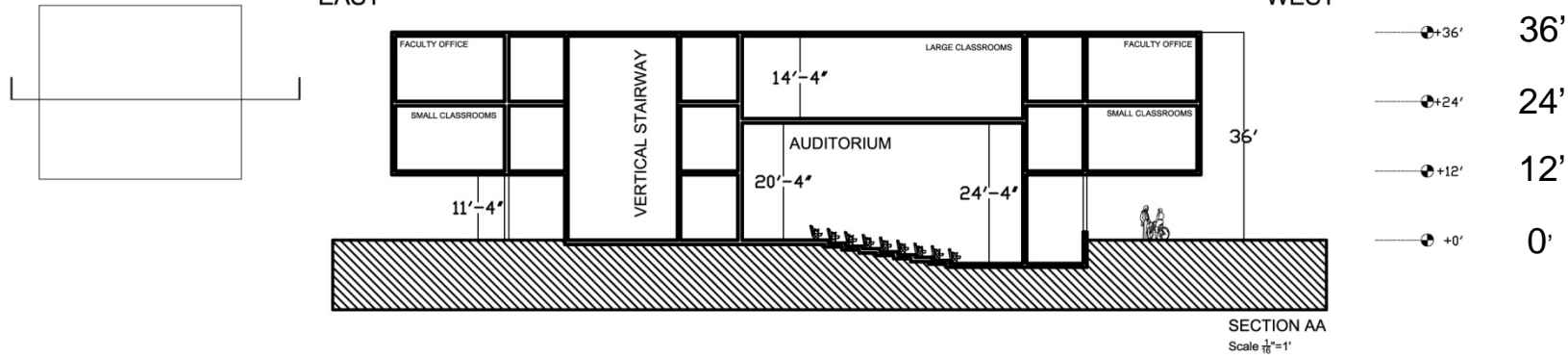
- AUDITORIUM
- VERTICAL CIR.
- SERVER +TECH
- STUDENT OFFICES
- INST. LABS
- SMALL CLASSROOM
- SEMINAR ROOMS

SECOND FLOOR

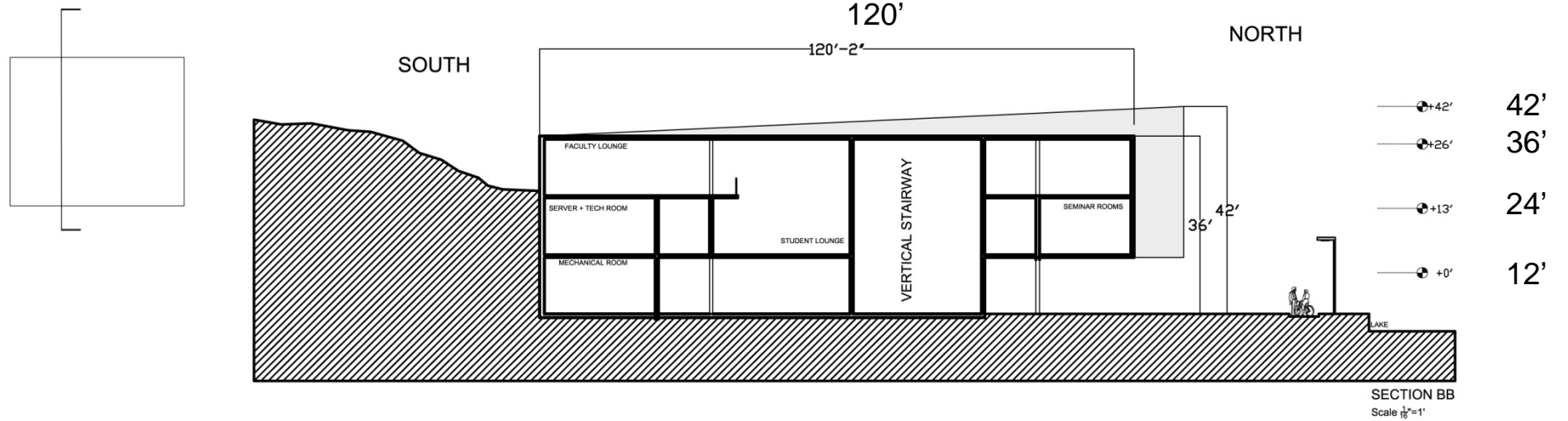


- AUDITORIUM
- VERTICAL CIR.
- SERVICES
- ADMINISTRATION
- FACULTY OFFICES
- FACULTY LOUNGE

SECTION AA



SECTION BB





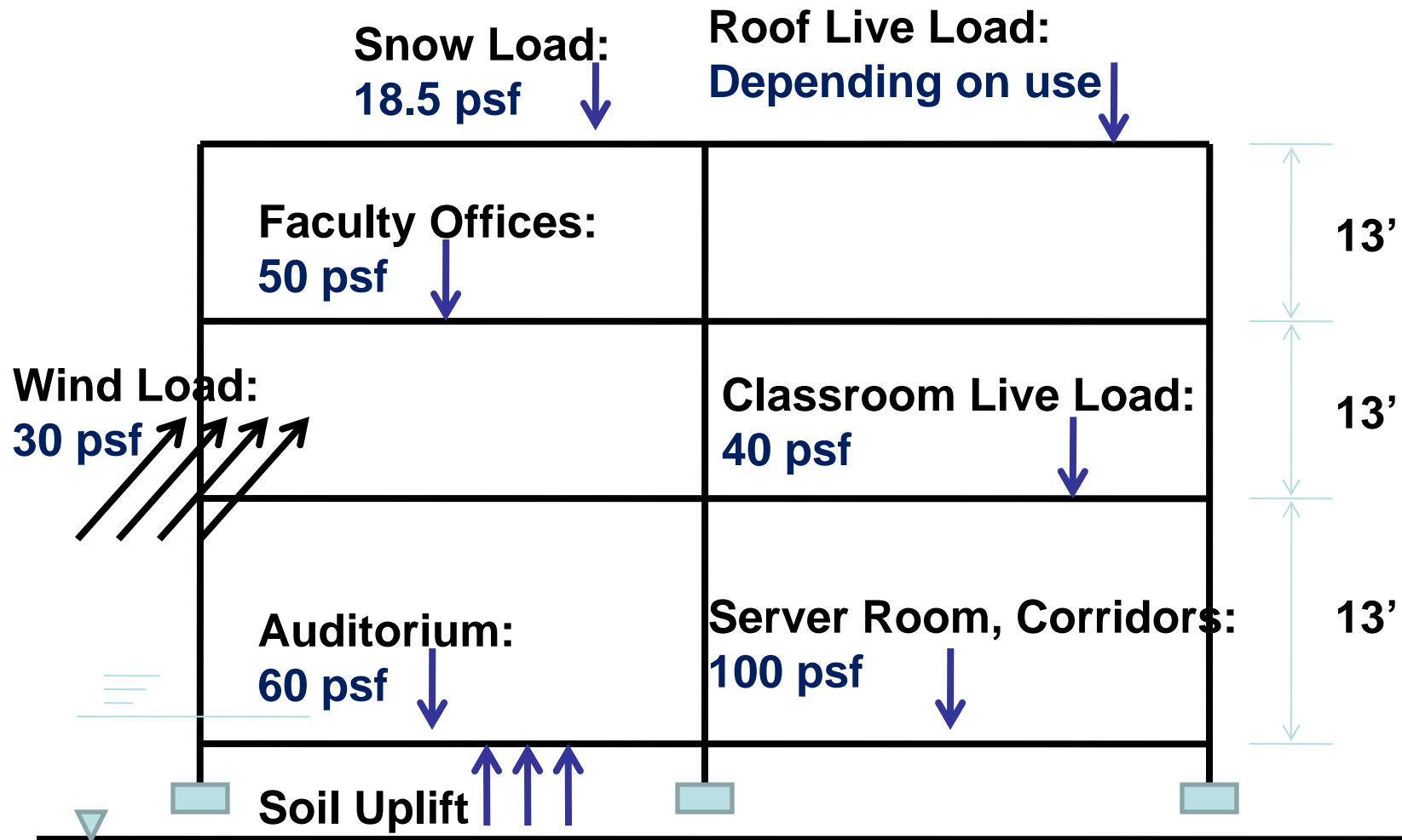
ARCHITECTURE

STRUCTURAL ENGINEERING

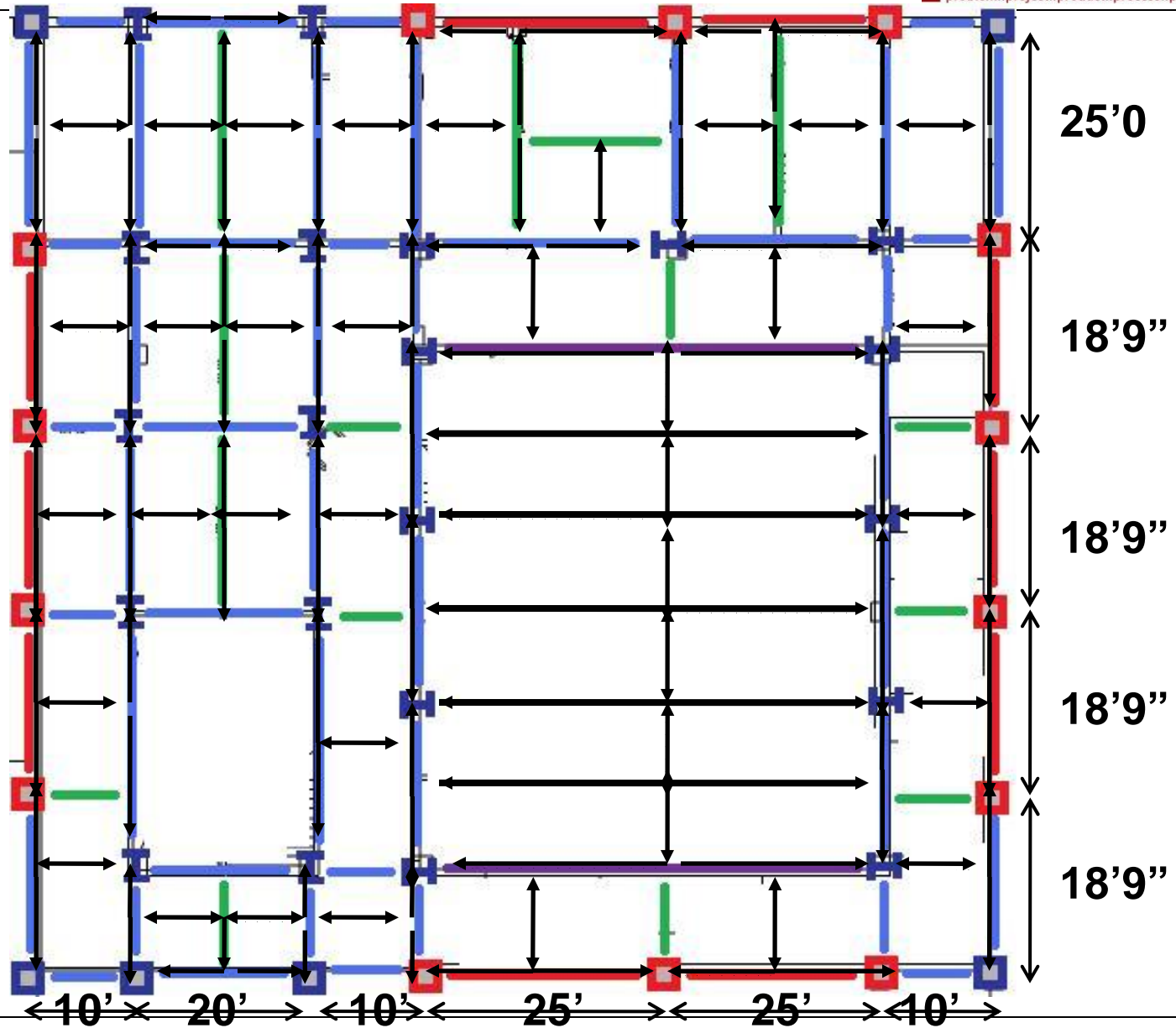
CONSTRUCTION MANAGEMENT

LOADS

Seismic Load:
negligible compared to wind



LOAD PATH - GRAVITY

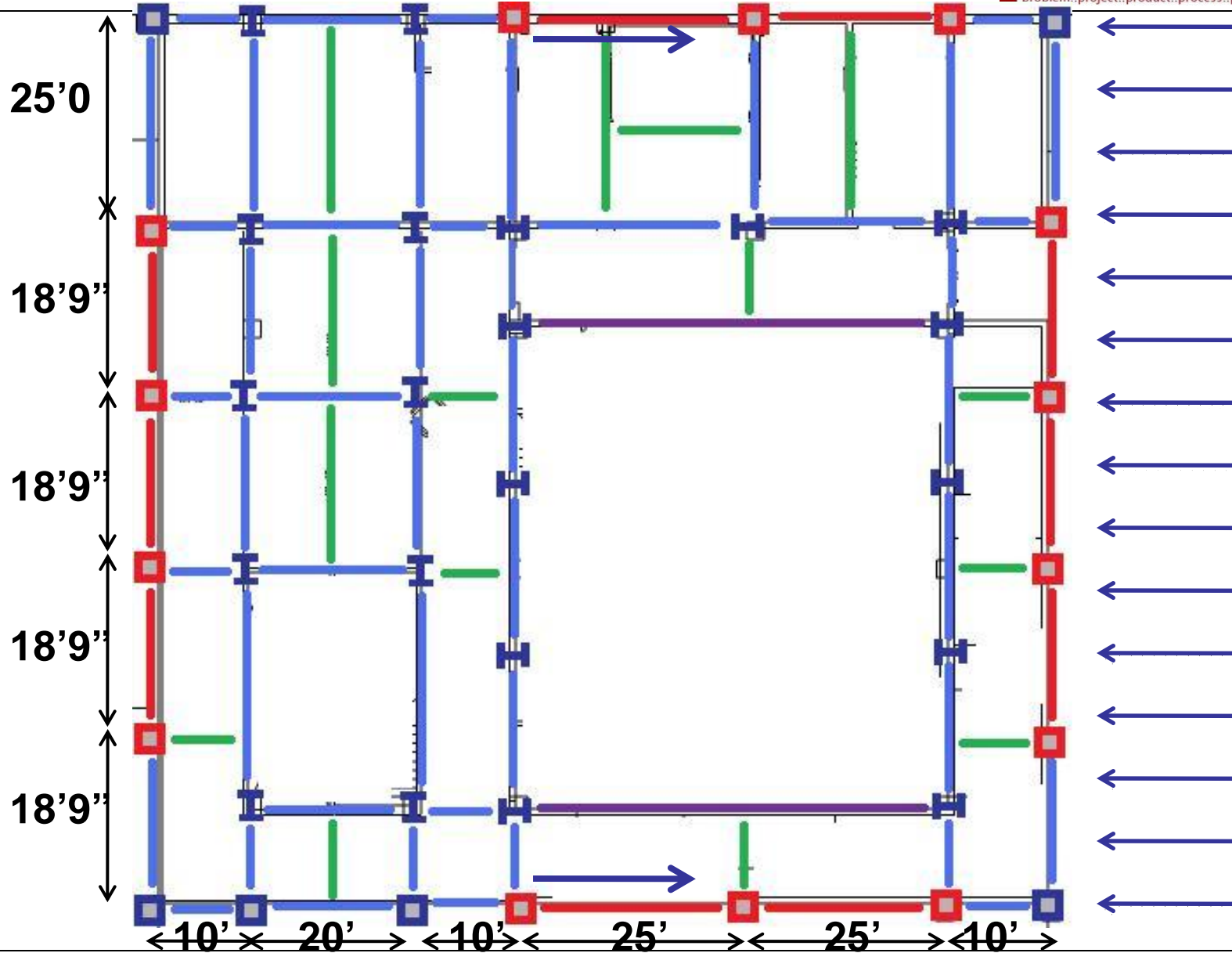


ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGER

LOAD PATH - LATERAL

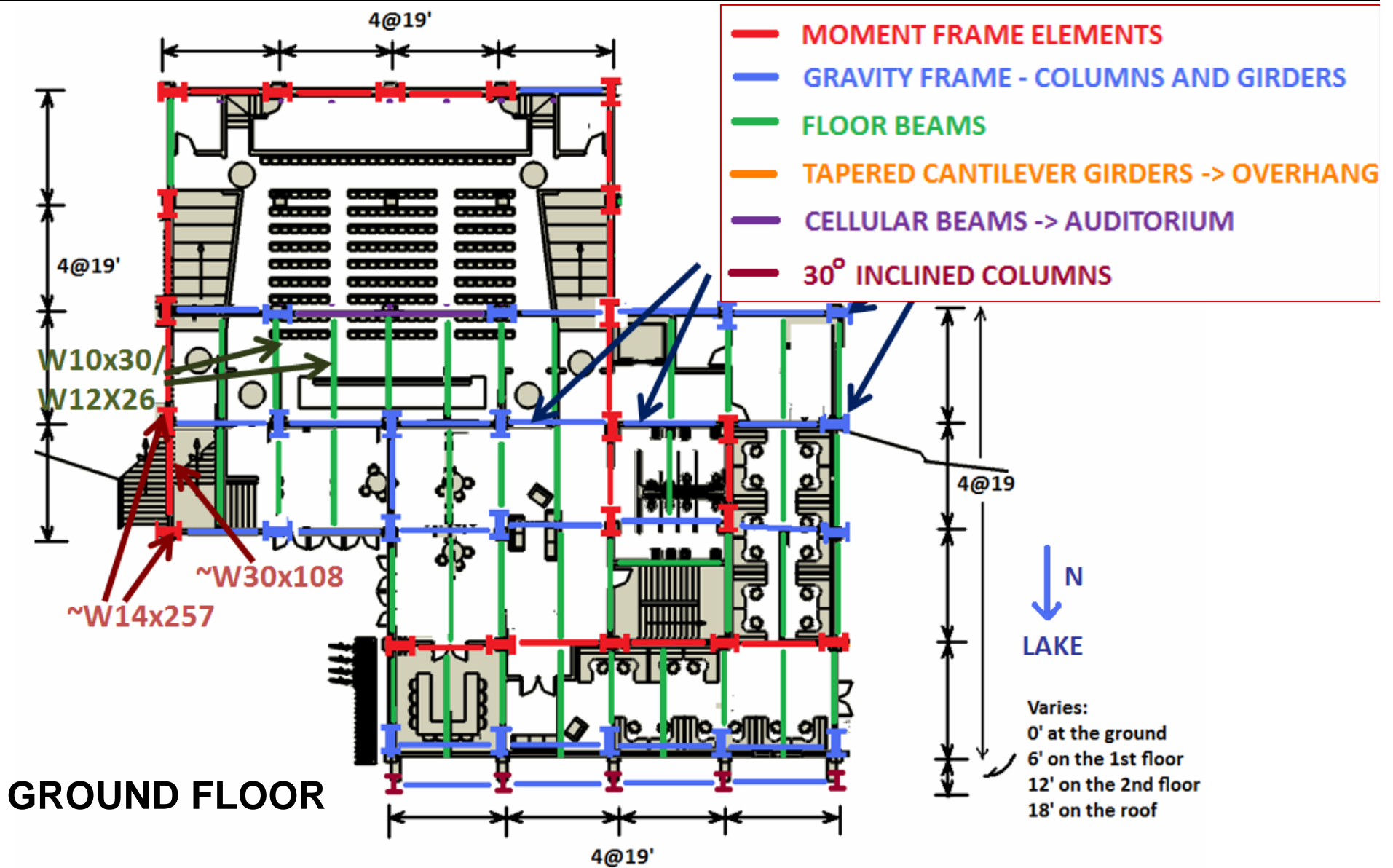


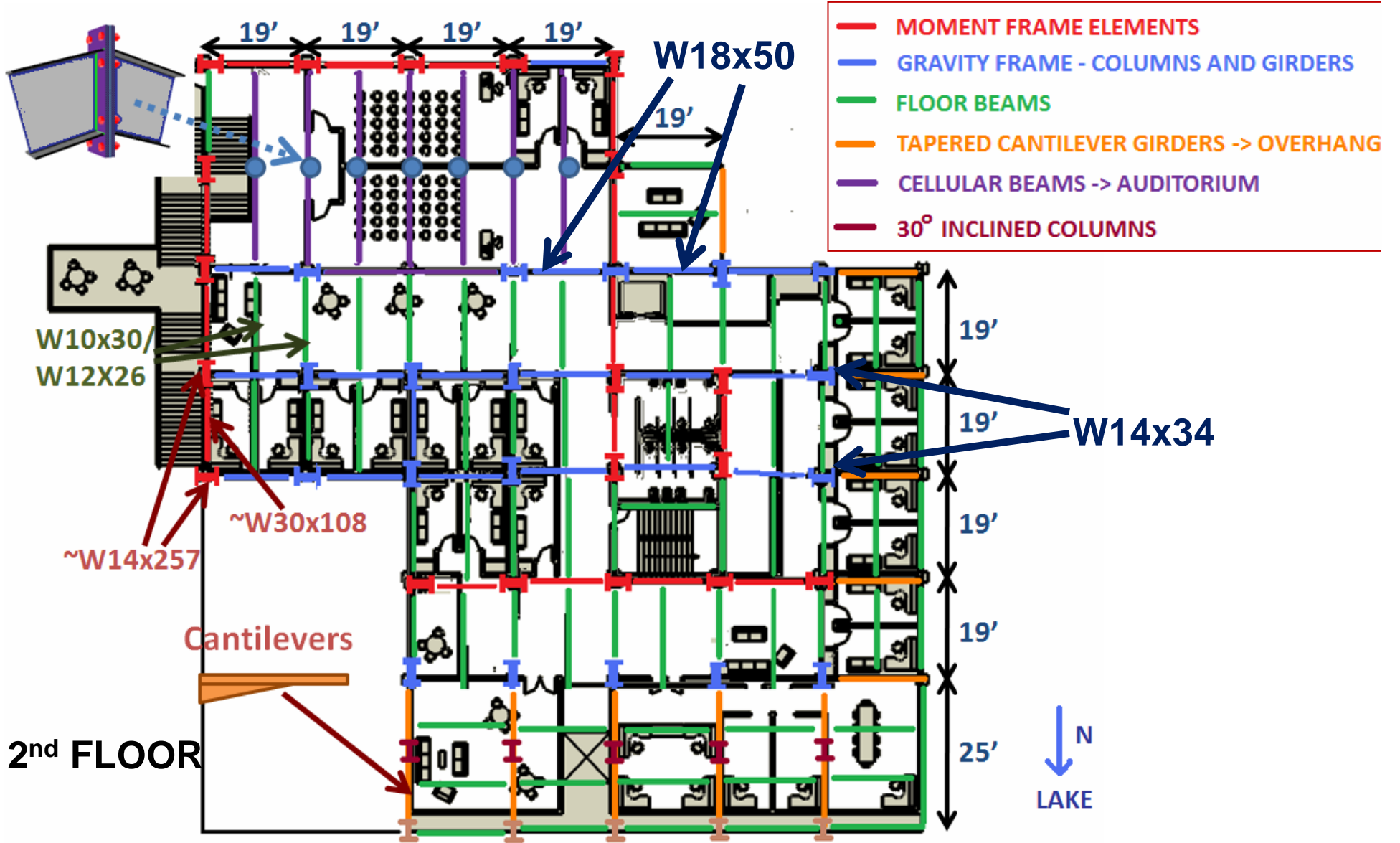
Wind load - 30 psf

ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT





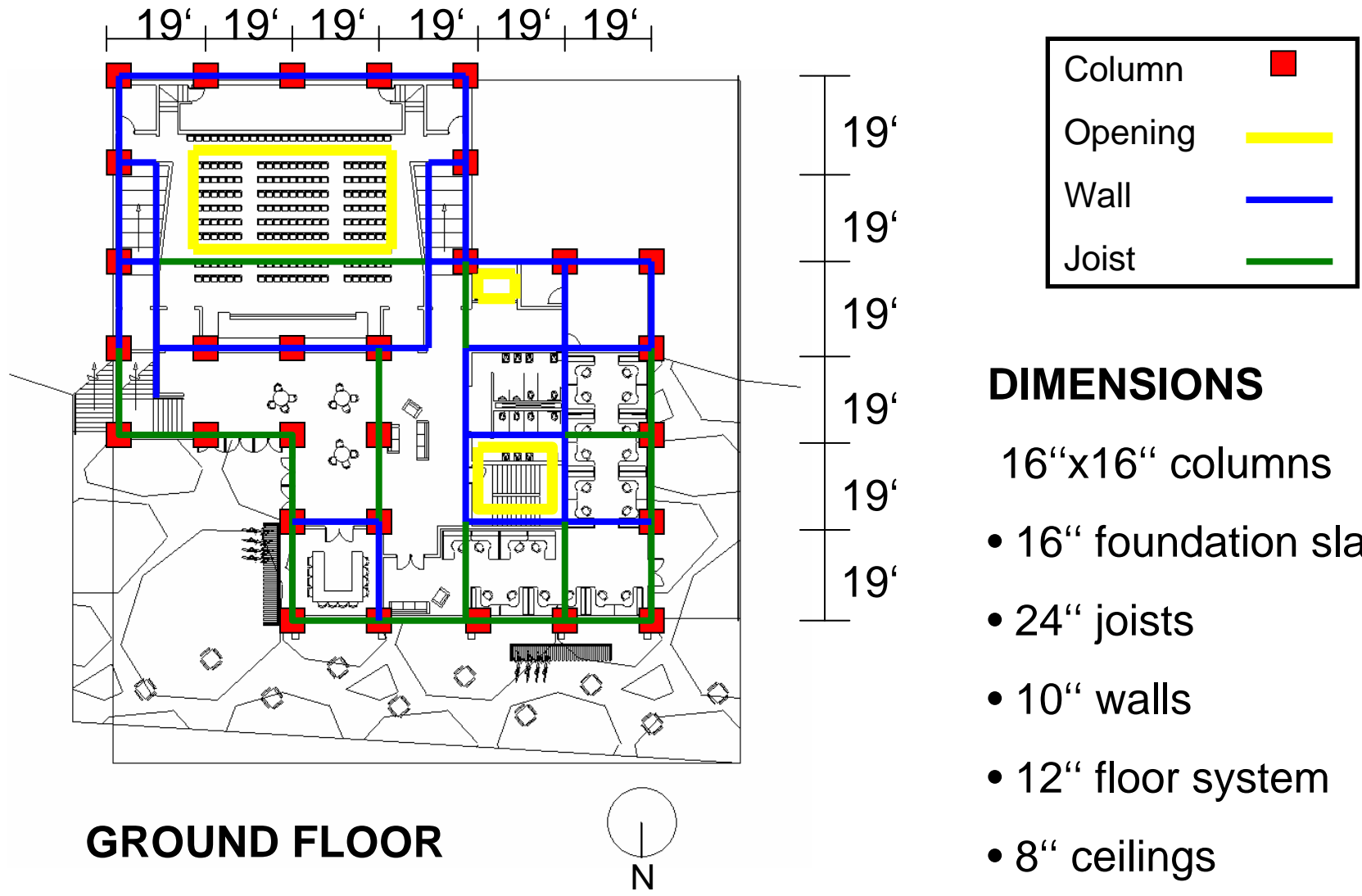
ARCHITECTURE

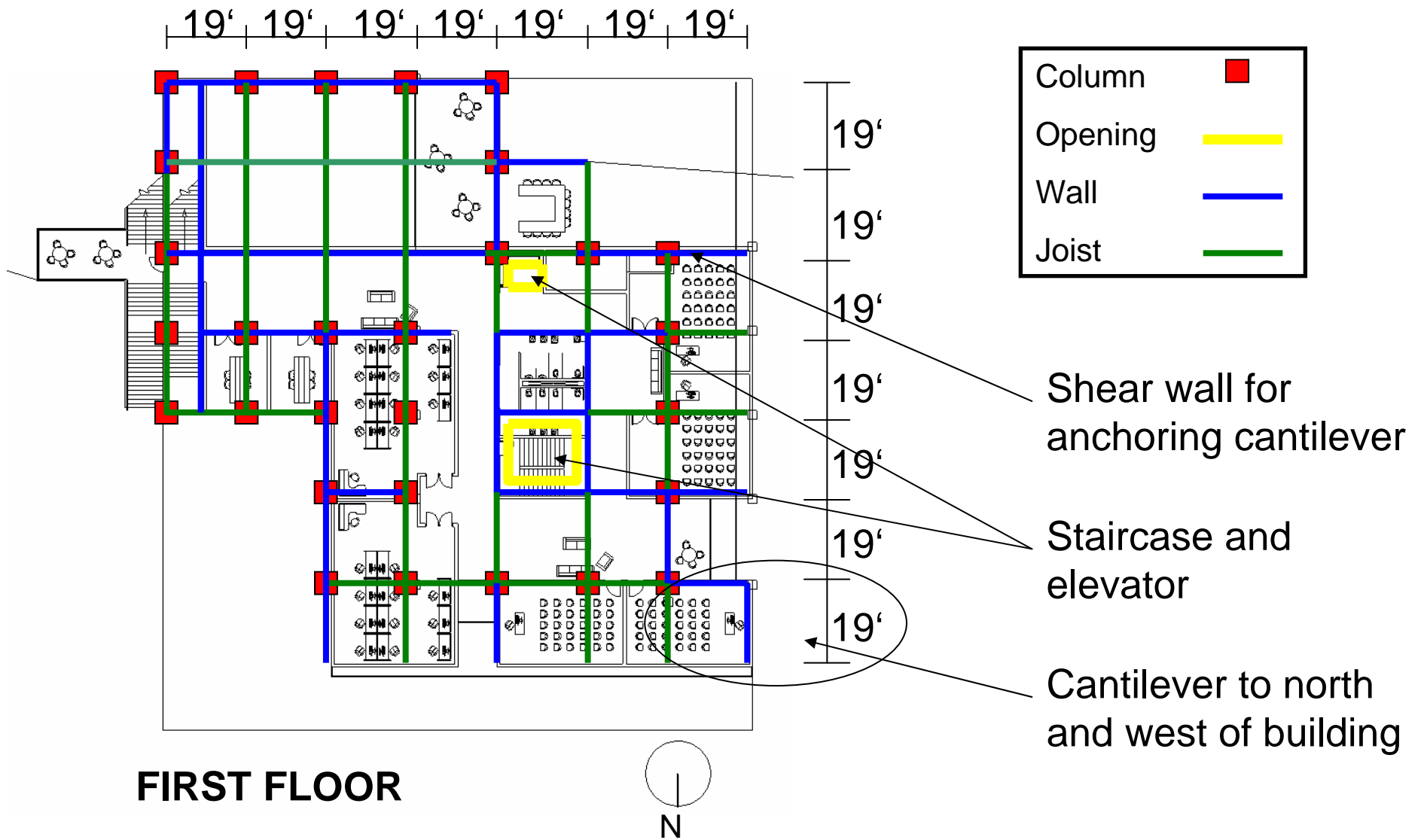
STRUCTURAL ENGINEERING

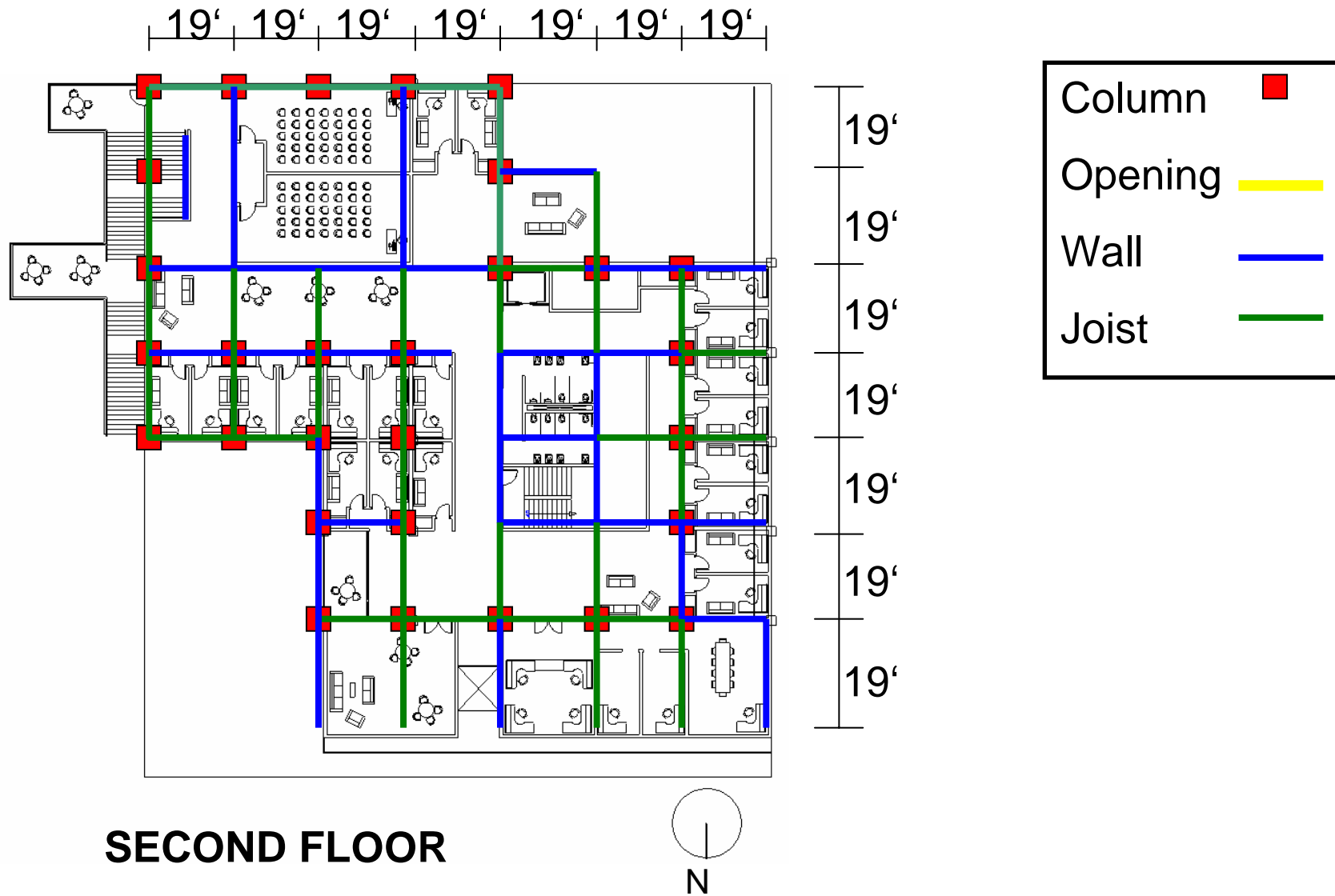
CONSTRUCTION MANAGEMENT

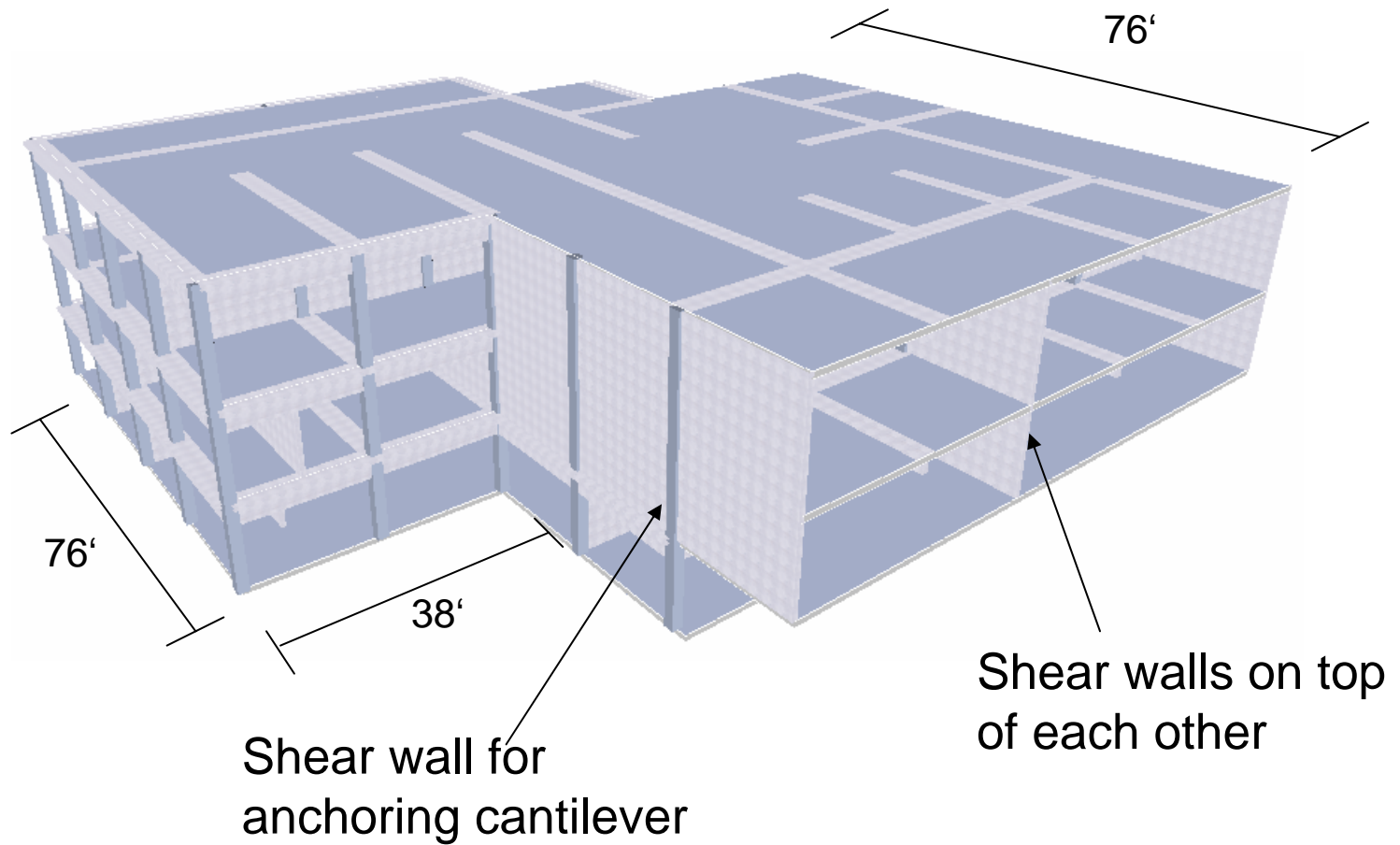
DOUBLE DIAMOND

ICICLE









3-D MODEL: NORTH-EAST

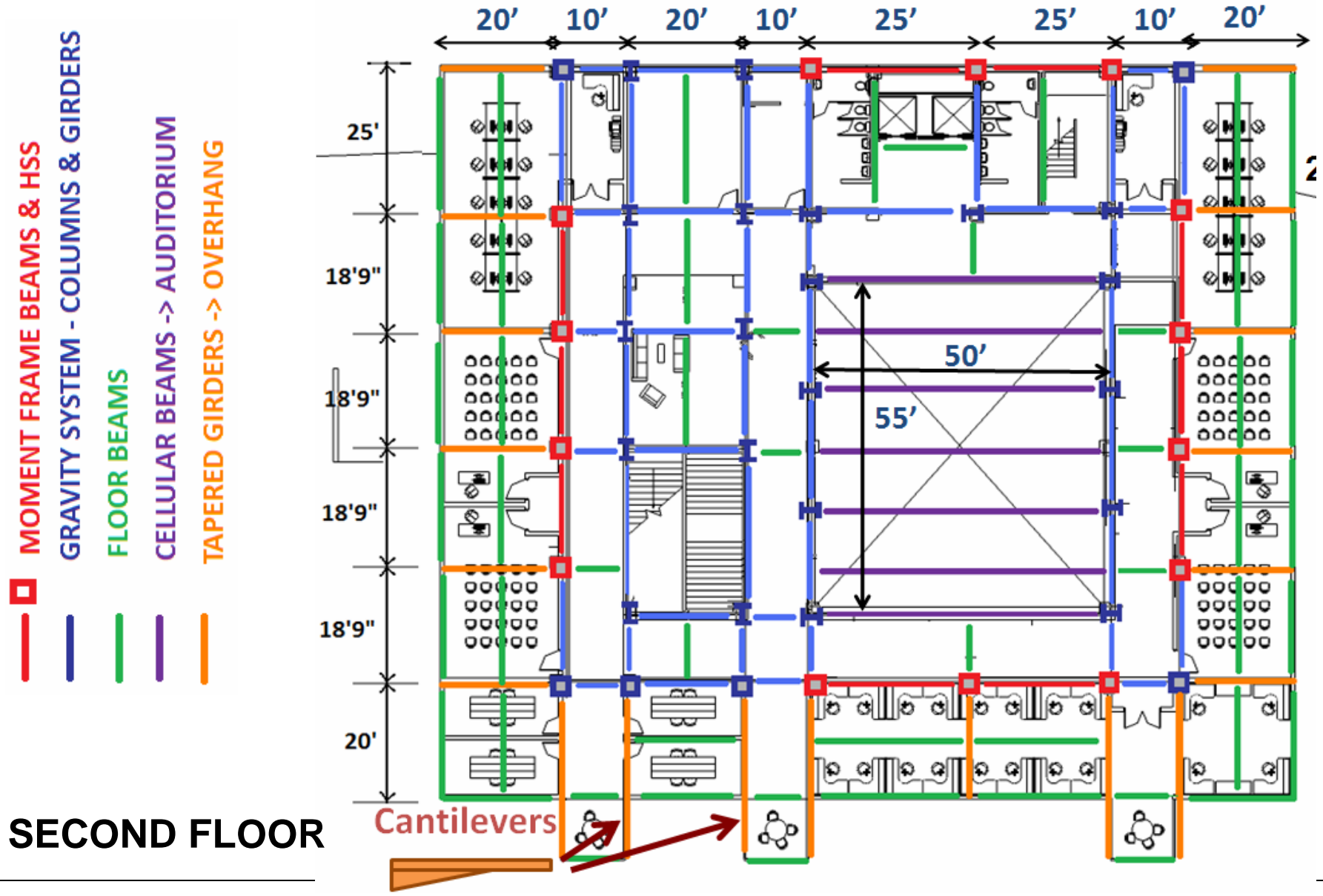
ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

DOUBLE DIAMOND

ICICLE



ARCHITECTURE

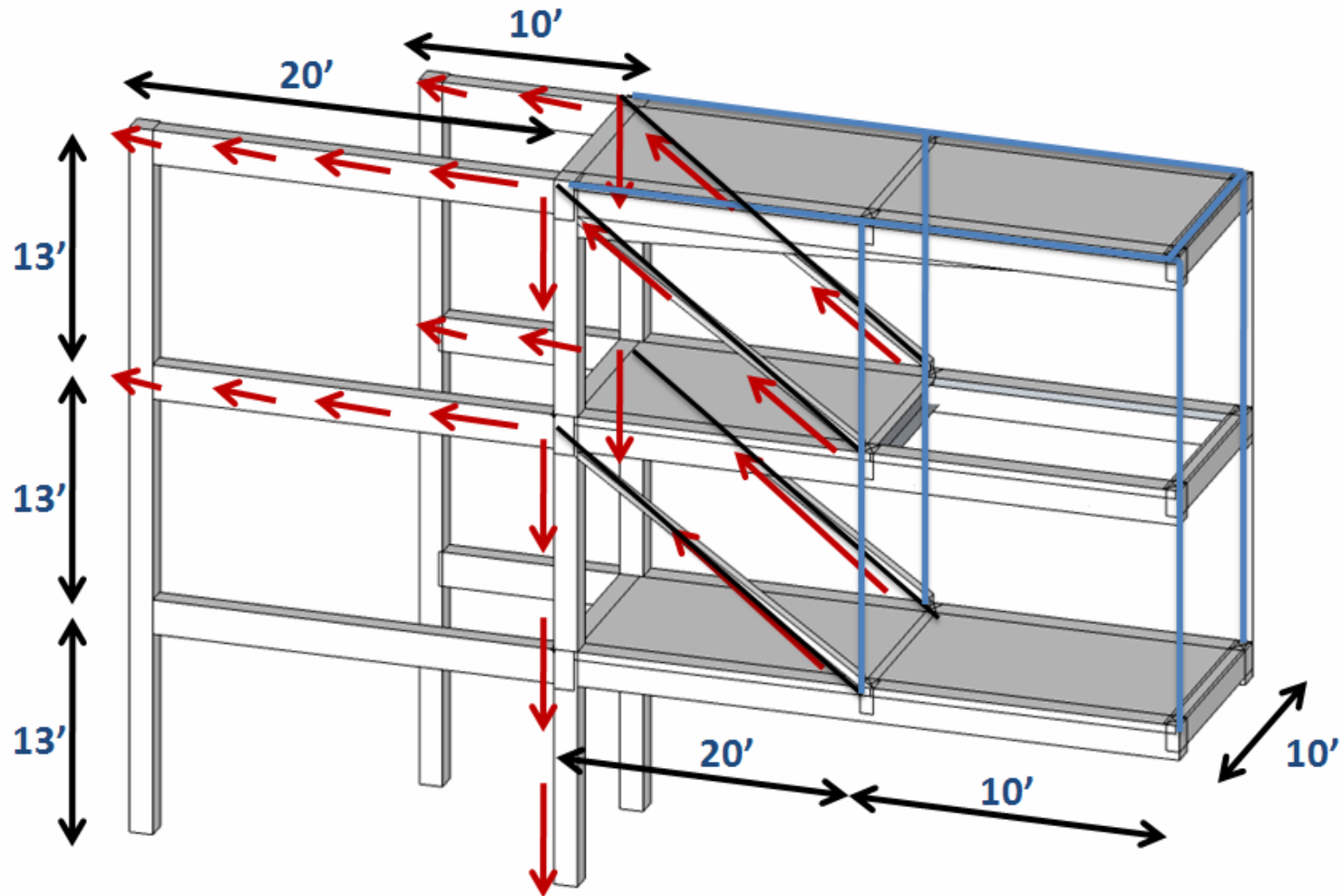
STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

DOUBLE DIAMOND

ICICLE

LOAD PATH - ICICLES



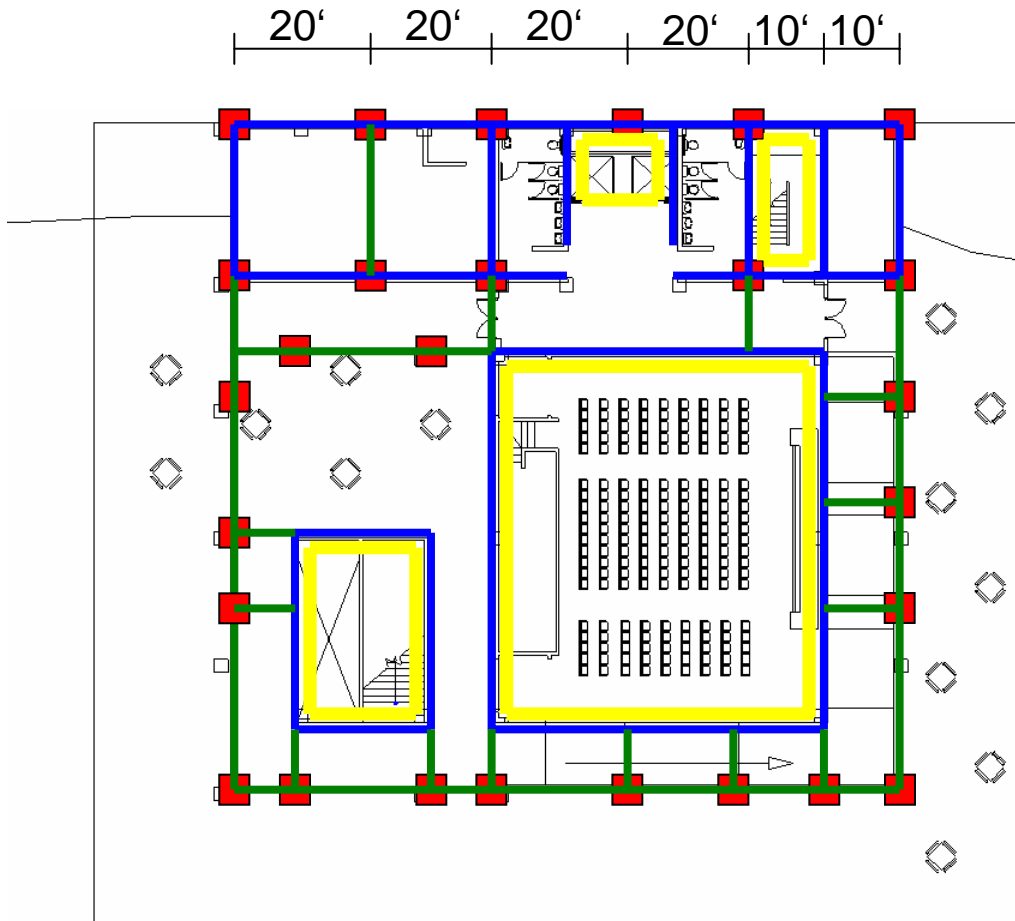
ARCHITECTURE

STRUCTURAL ENGINEERING

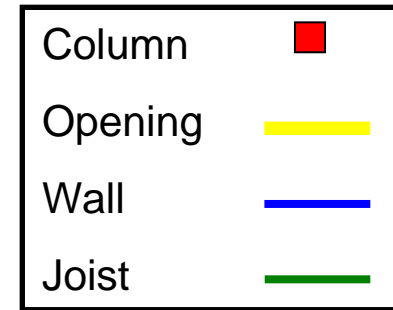
CONSTRUCTION MANAGEMENT

DOUBLE DIAMOND

ICICLE

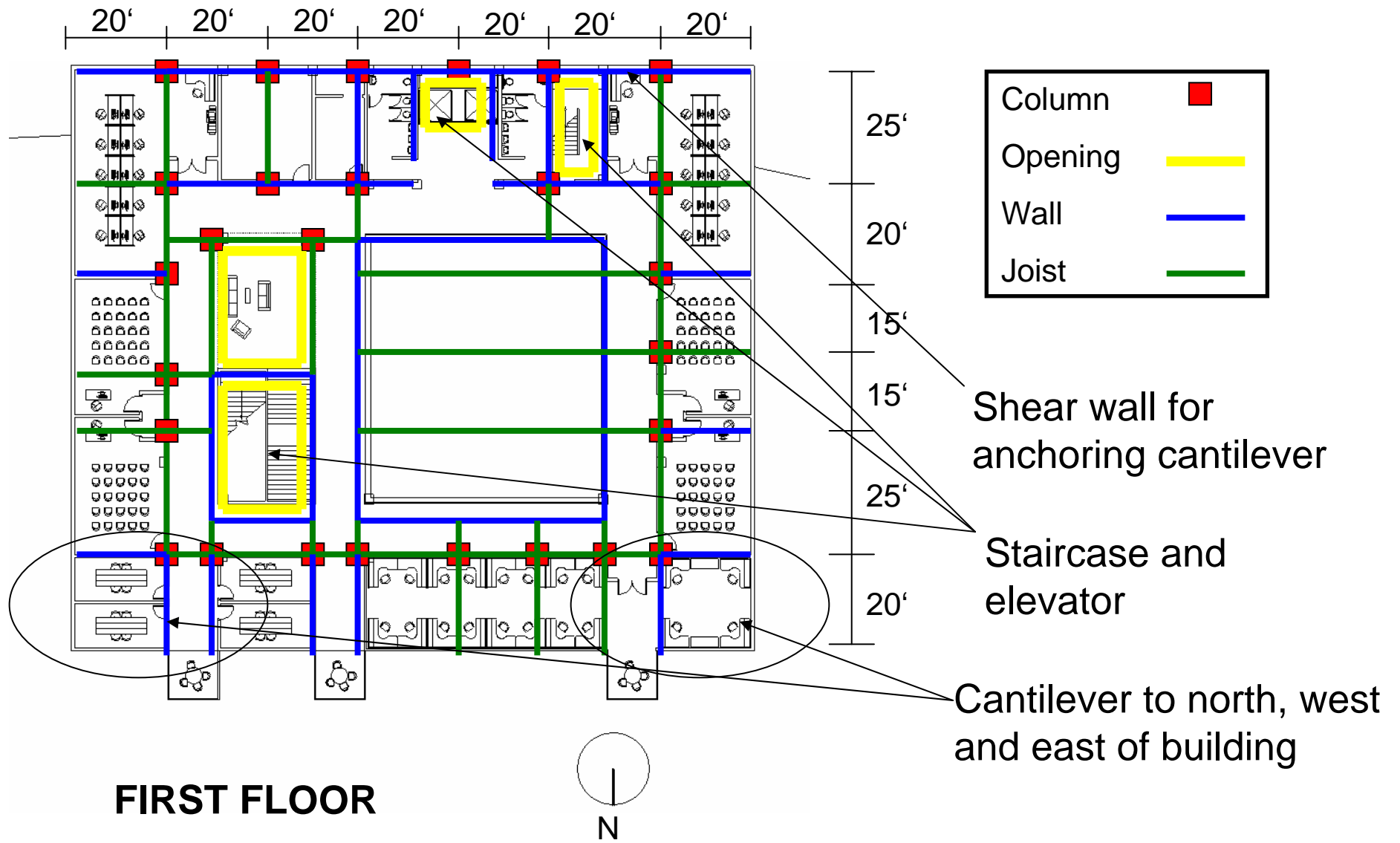


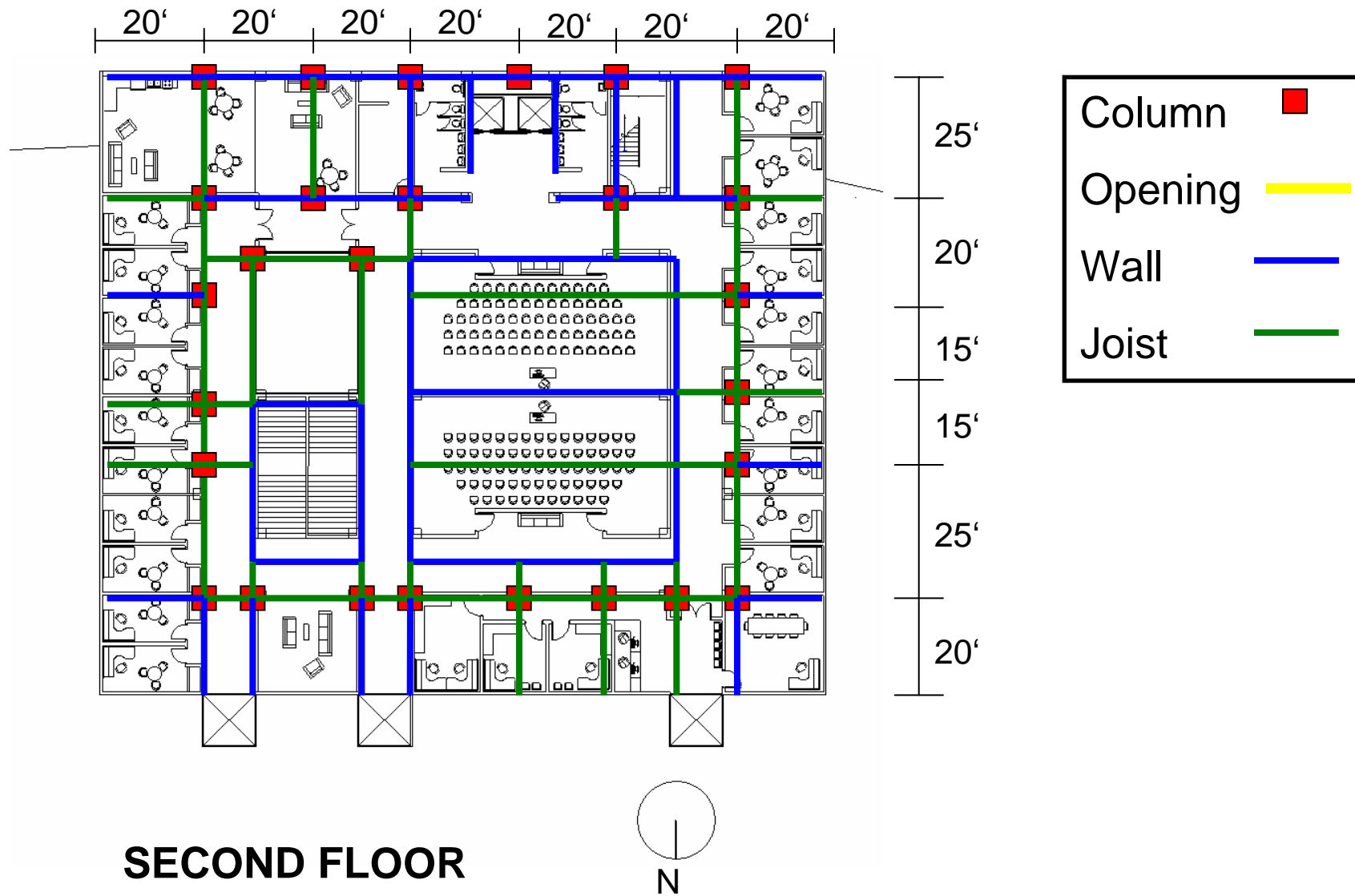
GROUND FLOOR

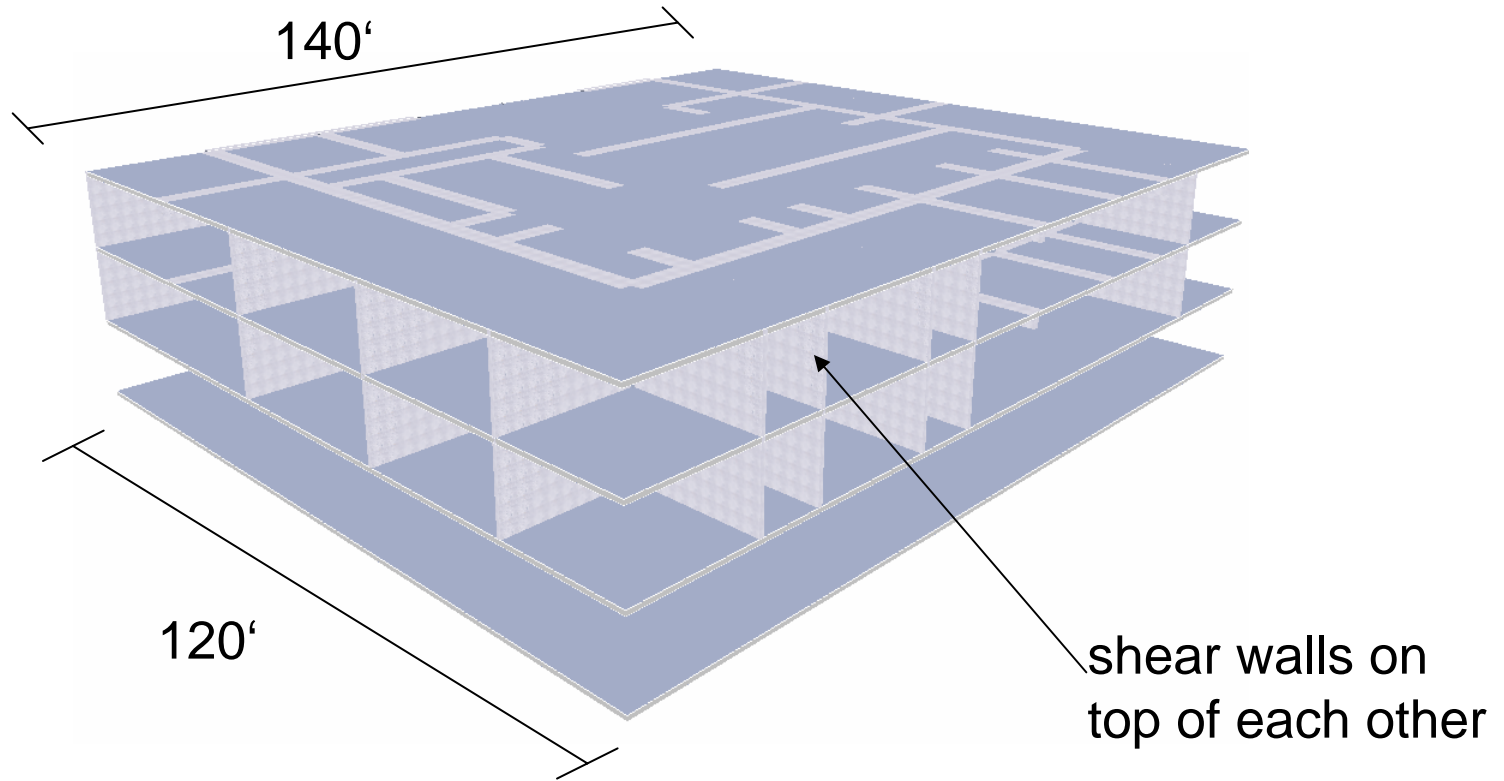


DIMENSIONS

- 16"x16" columns
- 16" foundation slab
- 24" joists
- 10" walls
- 12" floor system
- 8" ceilings







3-D MODEL: NORTH - EAST

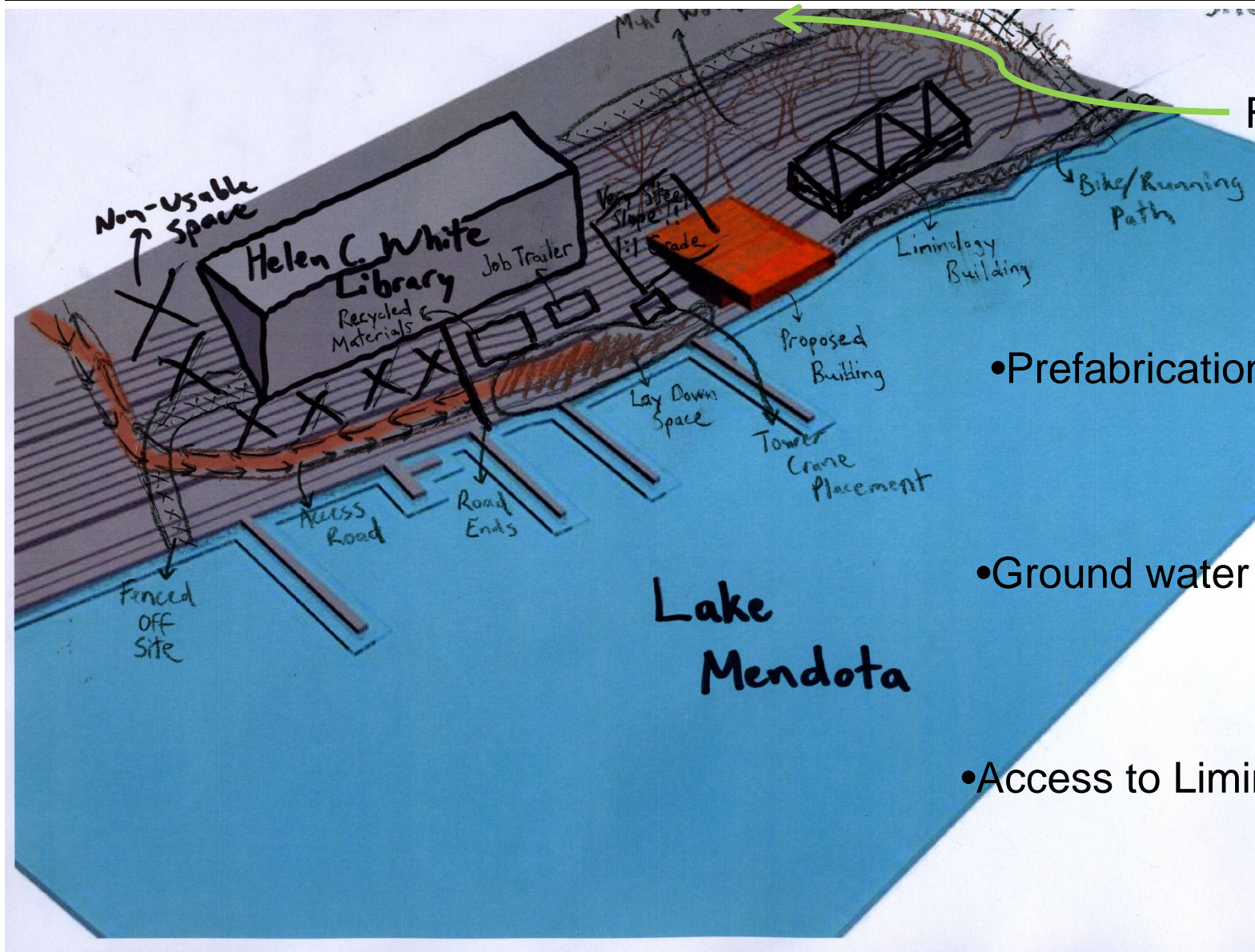
ARCHITECTURE

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DOUBLE DIAMOND

ICICLE



Fenced off site

•Prefabrication

•Ground water table

•Access to Liminology



ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

ENERGY, HEATING, AND COOLING

- UW-Madison Central Heating and Cooling System



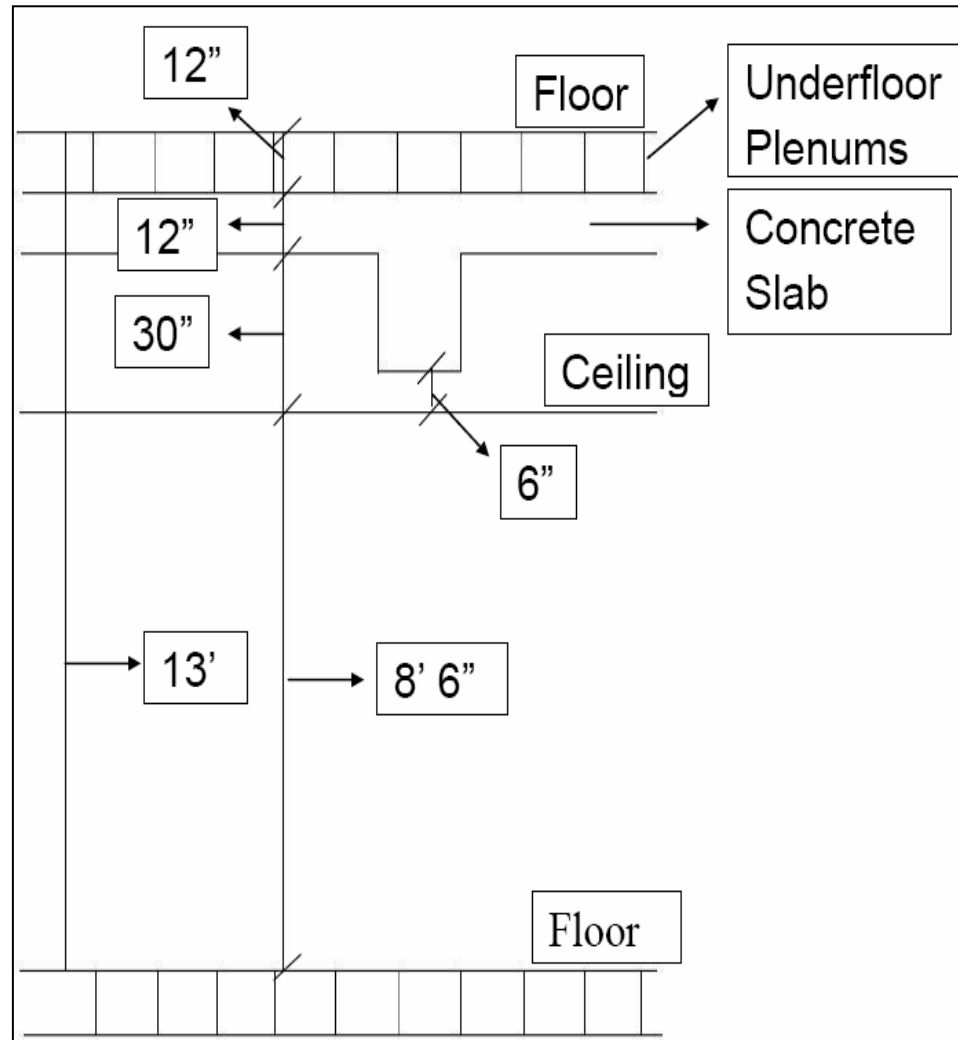
- Charter Street Heating Plant

- West Campus Cogeneration Facility

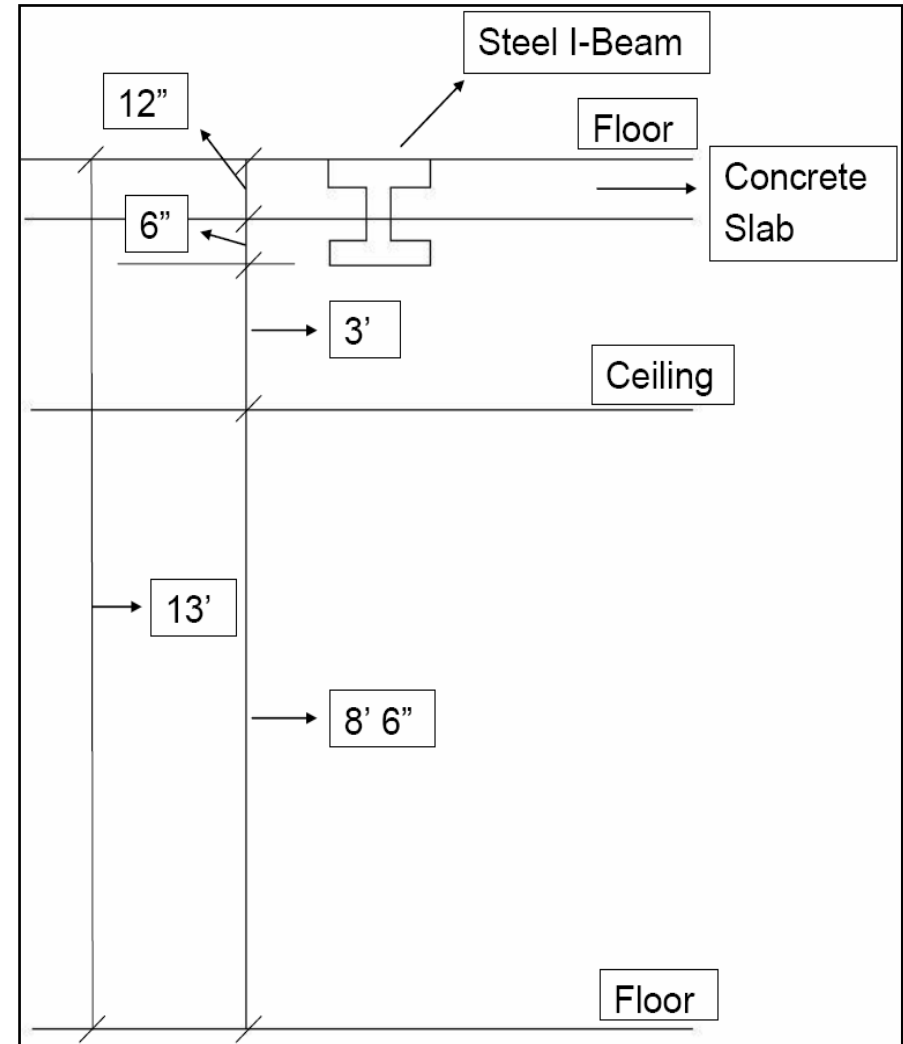


MEP SYSTEMS

Underfloor System With Concrete



Traditional System With Steel

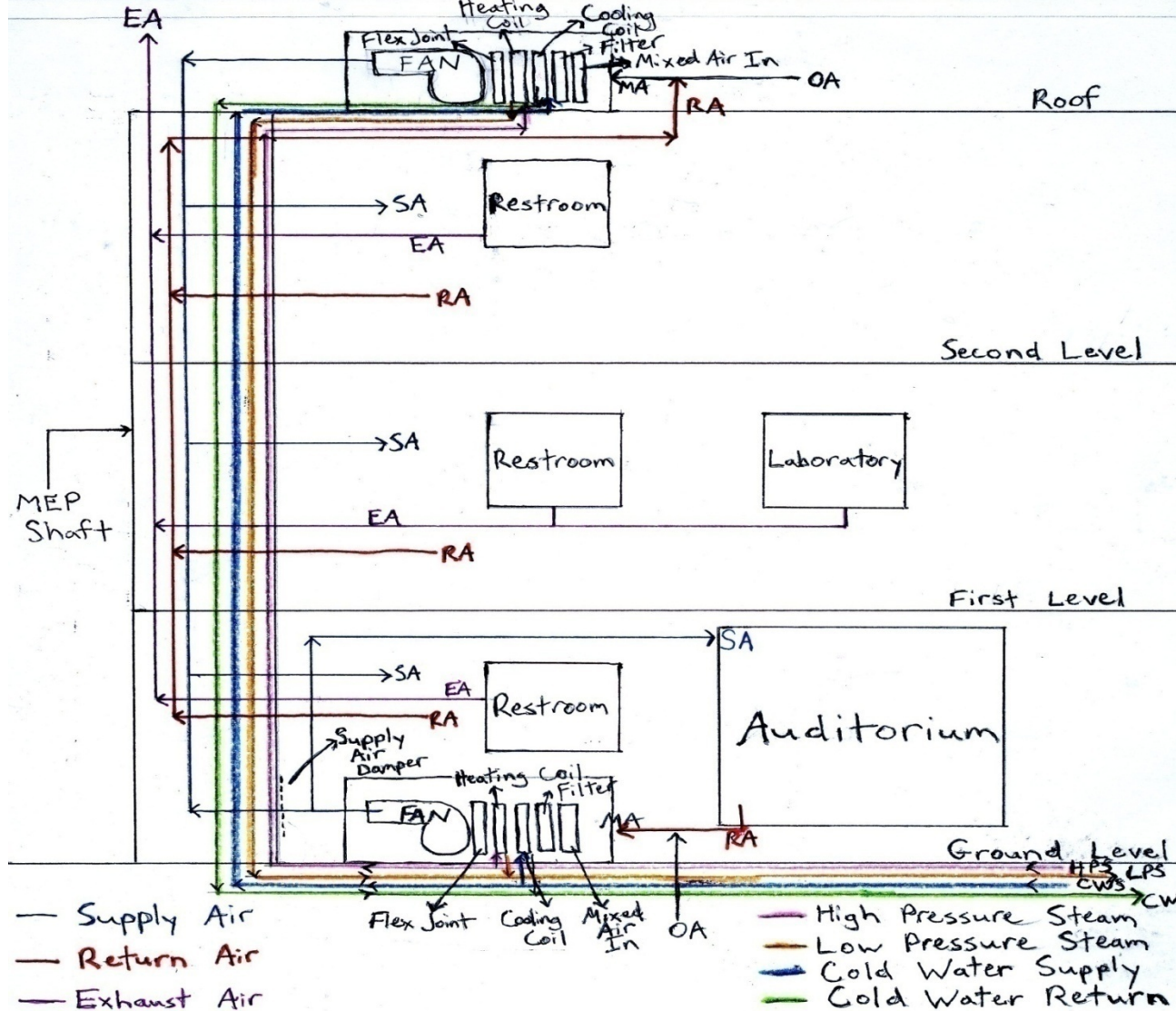


ARCHITECTURE

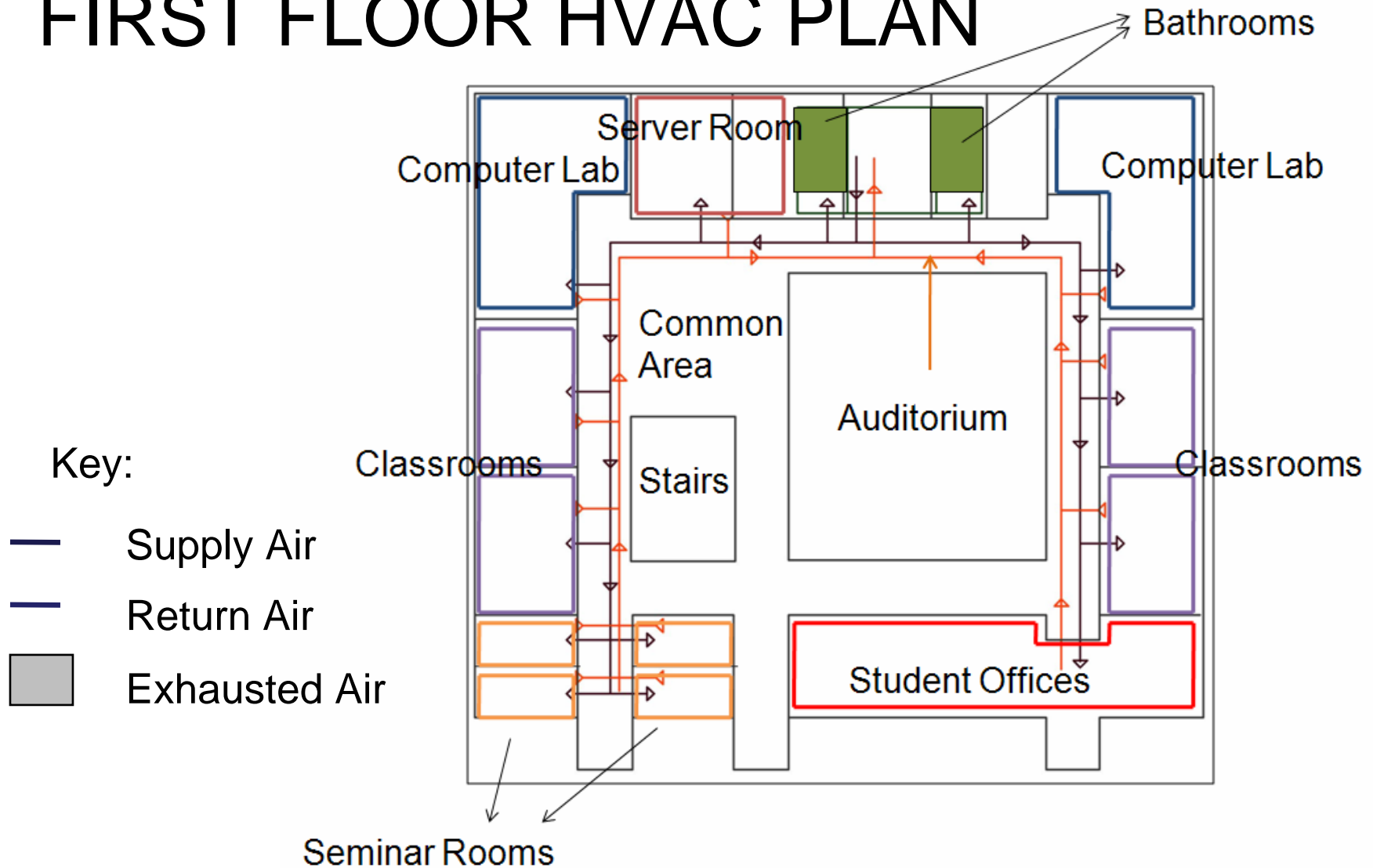
STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

MEP SCHEMATIC DIAGRAM



FIRST FLOOR HVAC PLAN



LIFE CYCLE COST ANALYSIS

Present Value: $PV = \frac{C * [1 - 1 / (1 + i)^n]}{i}$

Operations Costs = \$12.2 million

Maintenance and Repair Costs = \$13.4 million

Replacement Costs = \$5.3 million

Residual Value (assumed 2% of total) = \$.6 million

C = Total Cost
 i = interest rate (assumed 2.5%)
 n = study period (50 years)

Total Life Cycle Cost for 50 year building  **\$30 million**

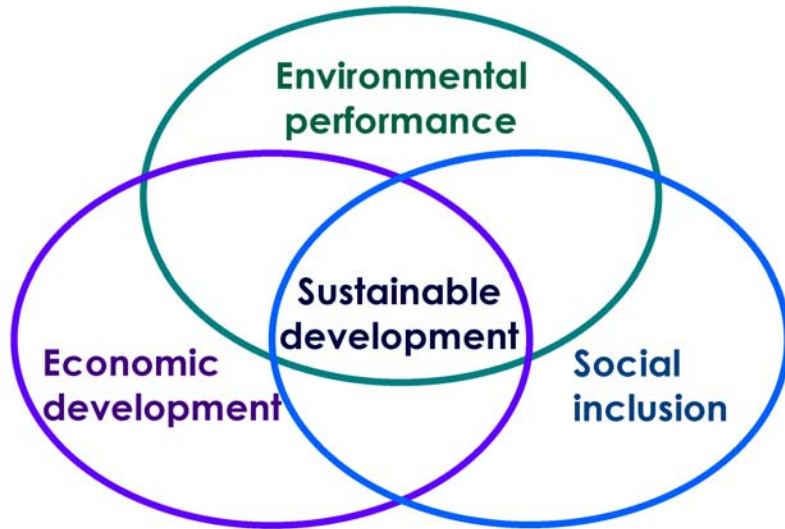
ARCHITECTURE

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CONSTRUCTION MANAGEMENT

SUSTAINABILITY

Triple Bottom Line



LEED Points



| | | |
|--------------------------------|---|---------------|
| Sustainable Sites | ➡ | 8 pts |
| Water Efficiency | ➡ | 3 pts |
| Energy and Atmosphere | ➡ | 10 pts |
| Materials and Resources | ➡ | 10 pts |
| Indoor Environmental Quality | ➡ | 12 pts |
| Innovation and Design Process | ➡ | 3 pts |
| LEED Gold Certification | ➡ | 44 pts |

A ZERO WASTE

- Maximized assignable square footage

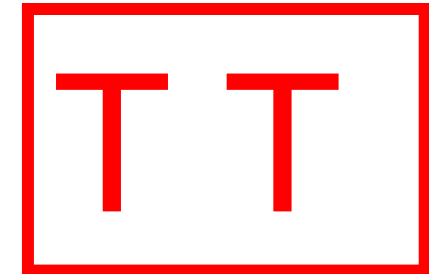
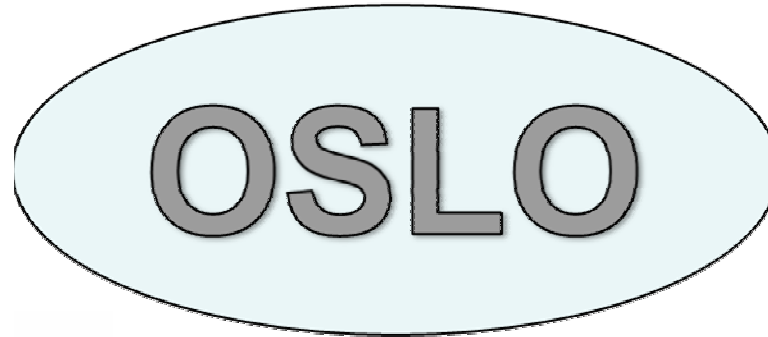
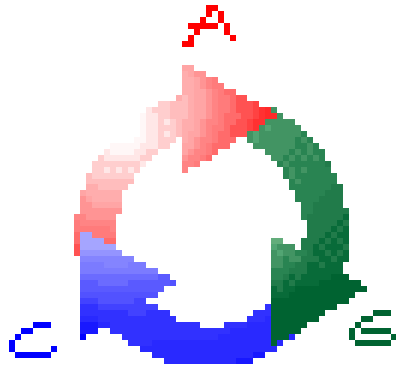
E

- Bubble Deck System
- Concrete Form Reuse
- Cellular Beams
- 100% Recycled Steel

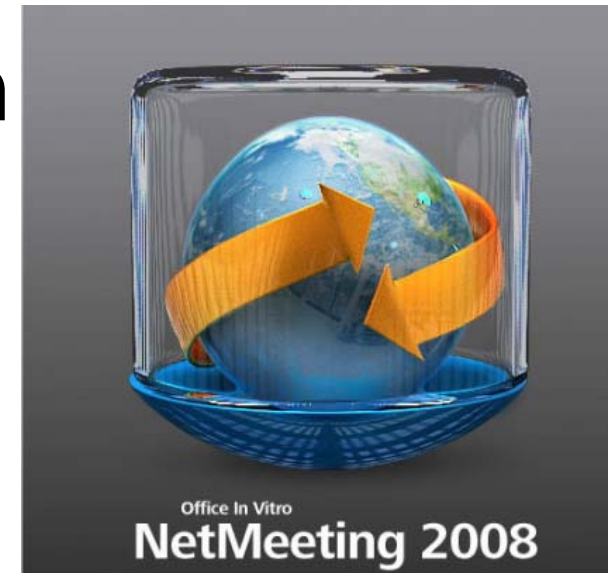


C

- On-Site Cleaning Contract
- Movement sensed lighting



Atlantic Team's Communication



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CONSTRUCTION MANAGEMENT

HOW WE DO WHAT WE DO

Architect



Engineer



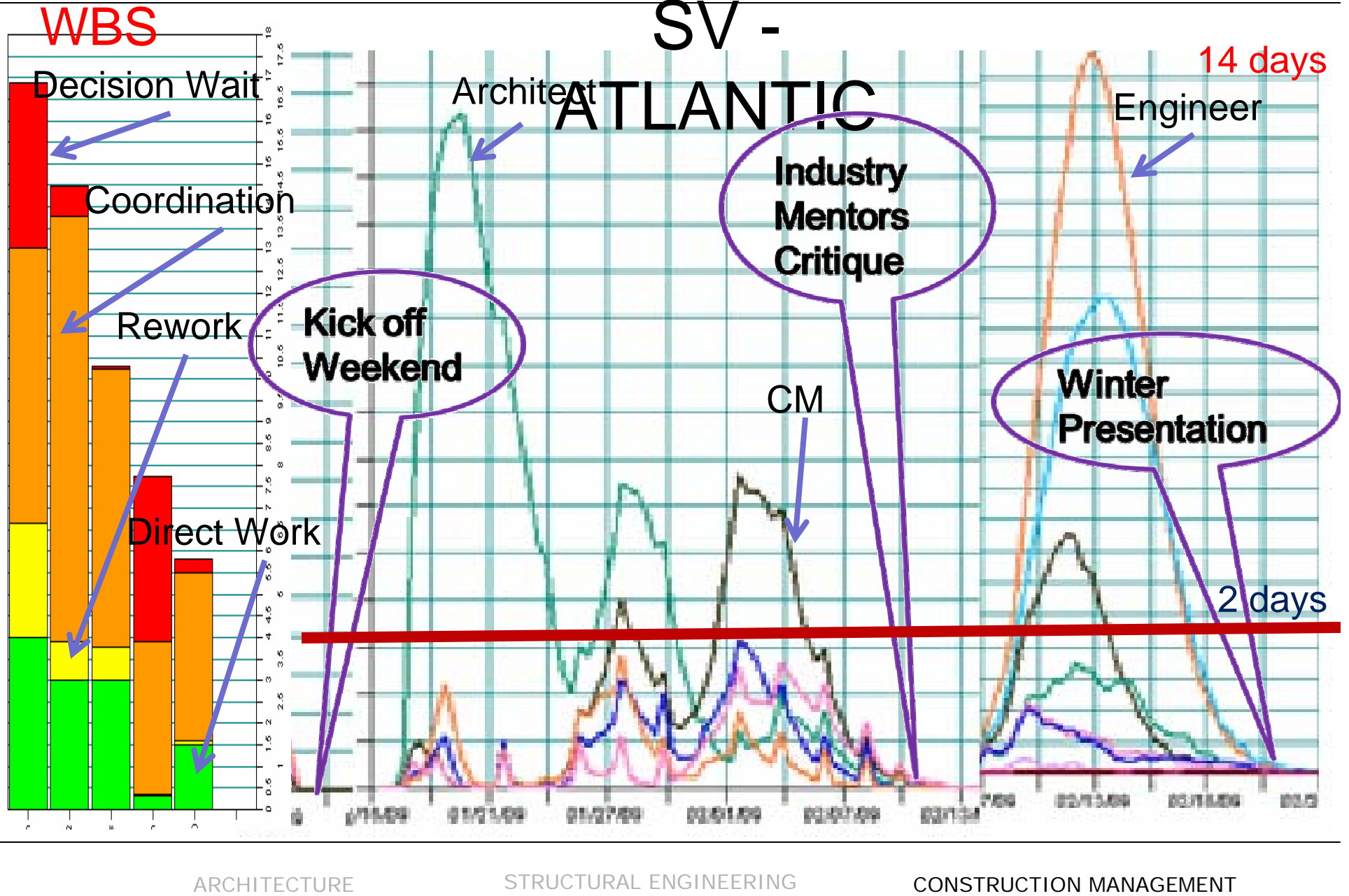
Construction Manager

The grids are too large!!!

I agree! They are too big

Ok, I'll redesign with a smaller grid





WE WANT TO IMPROVE . . .

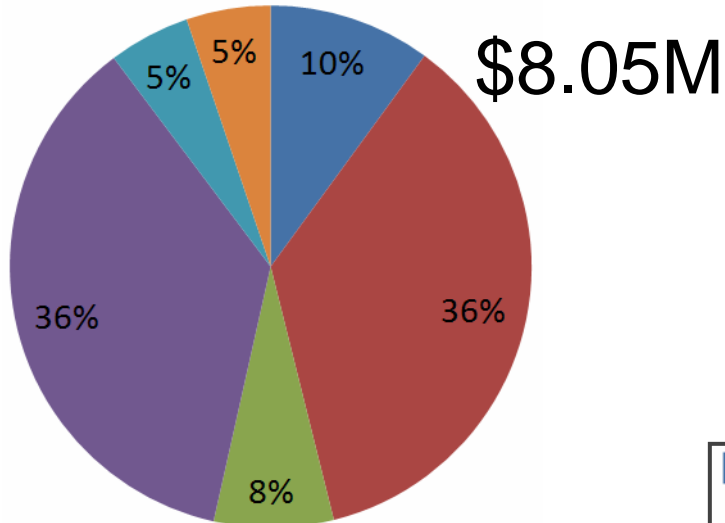
- Clear task assignments and on time completion



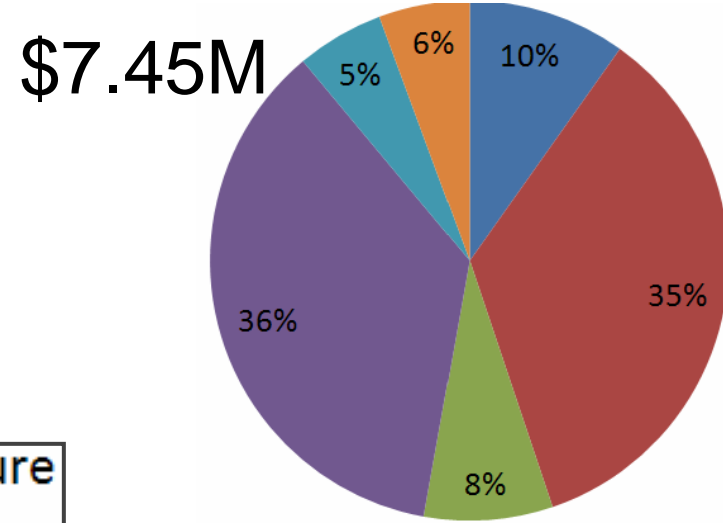
- Keep track of thought processes very clearly



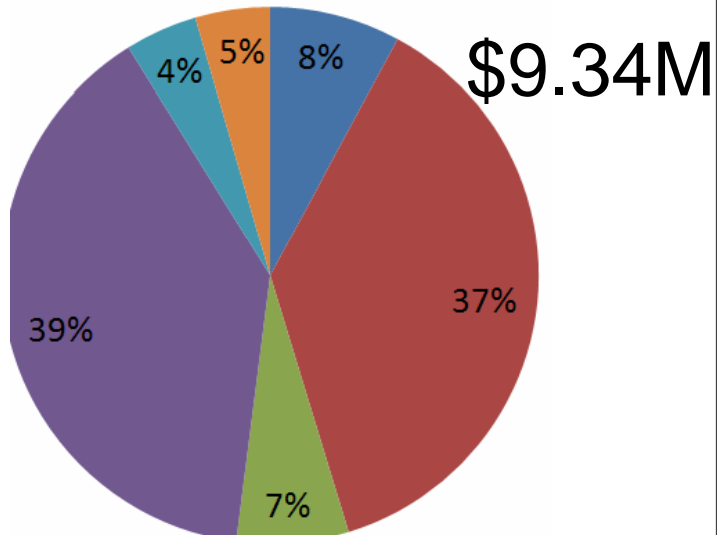
Concept 1 Concrete Design



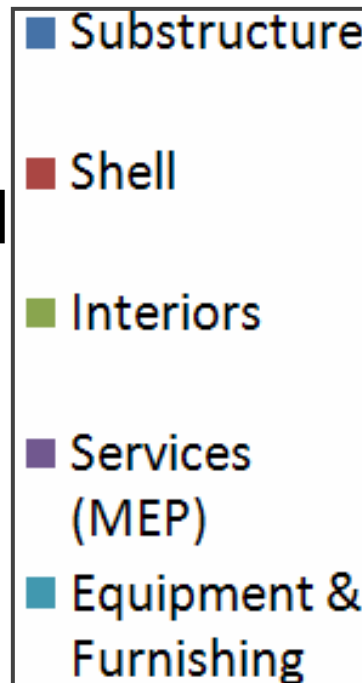
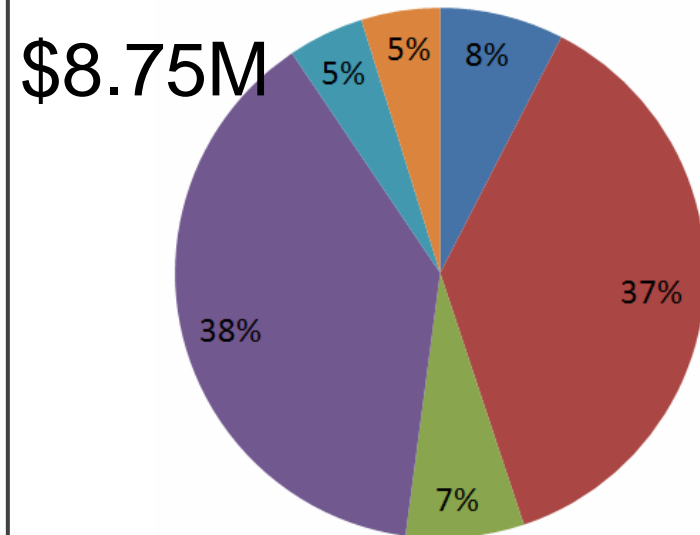
Concept 1 Steel Design



Concept 2 Concrete Design



Concept 2 Steel Design

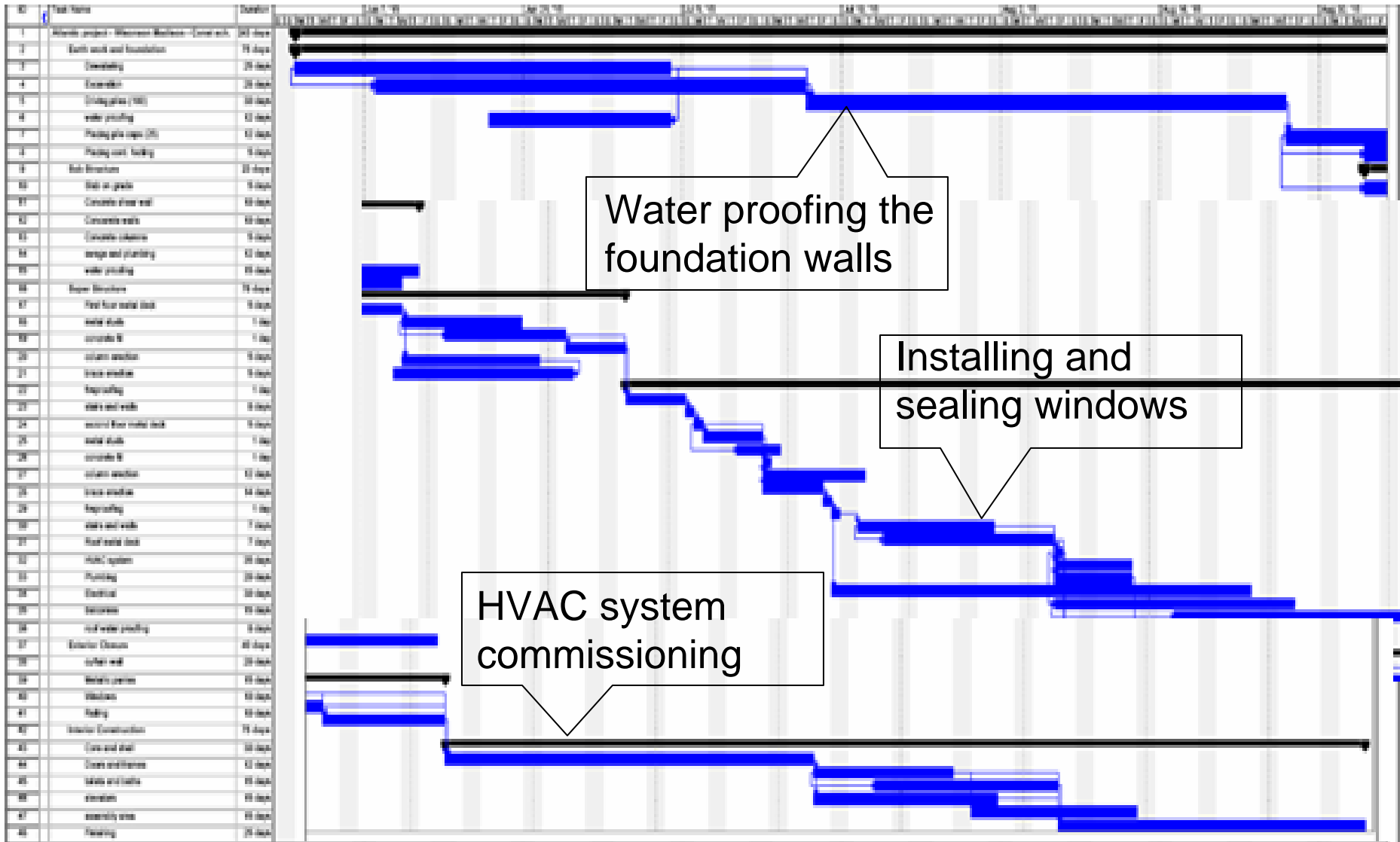


ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

GANTT CHART 07/01/15 - 06/23/16



ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT

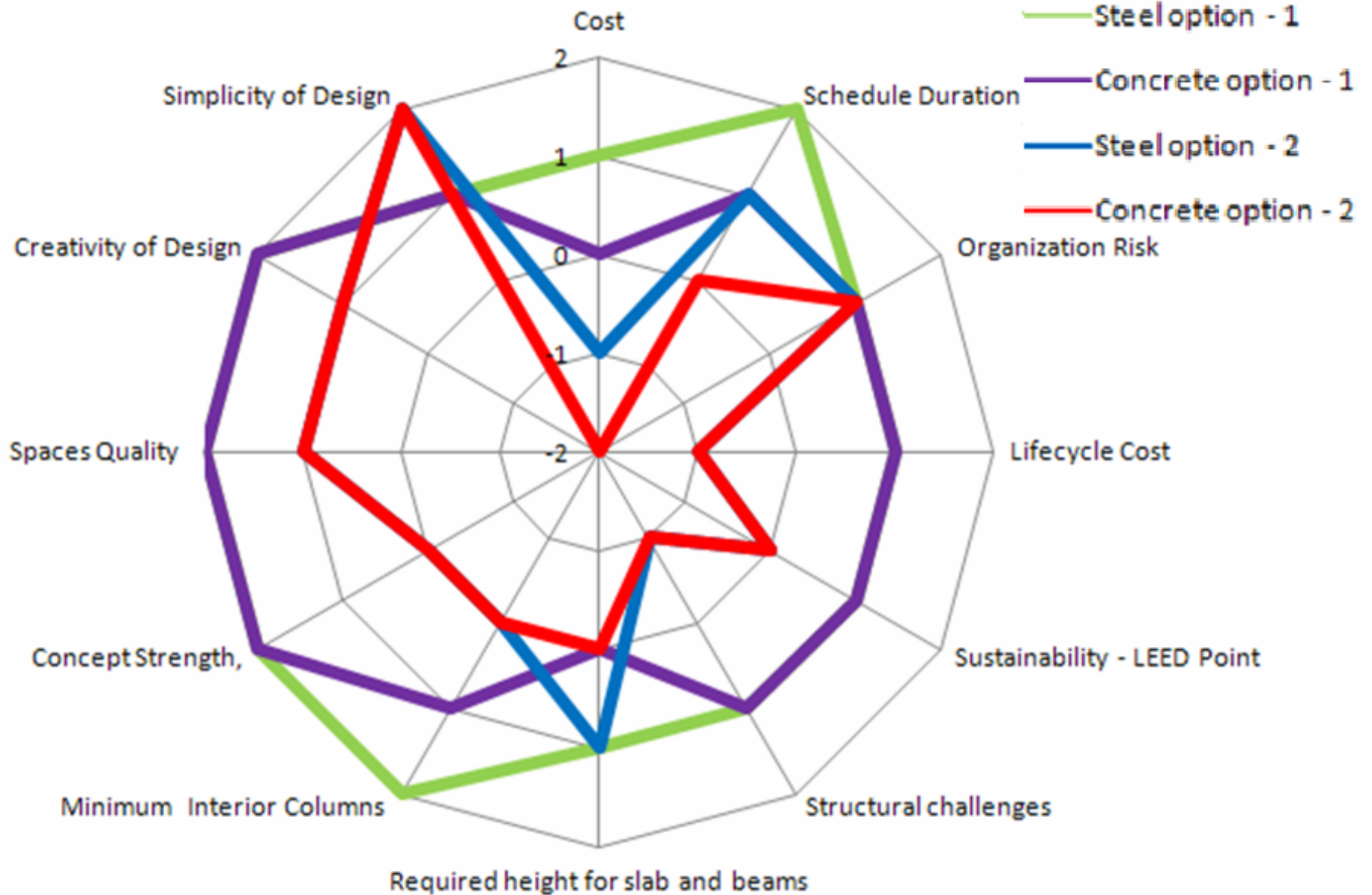
MACDADI EVALUATION

| item | | | Item's Weight | Assessed Behavior | | | | Qualitative Threshold values | | | | |
|------------------------------------|----|---------|---------------|-------------------|---------------|---------------|---------------|---|------------|------------|-------------|----------|
| | | | | Concept 1 - S | Concept 1 - C | Concept 2 - S | Concept 2 - c | -2 | -1 | 0 | 1 | 2 |
| Cost | = | \$7.5 M | 2 | 1 | 0 | -1 | -2 | >9.0 | 8.0 - 9.0 | 7.5 - 8.0 | 7.2 - 7.5 | <7.2 |
| Schedule Duration | = | 1 yr | 3 | 2 | 1 | 1 | 0 | > 14 mo | 13 - 14 mo | 12 - 13 mo | 11 - 12 mo | < 11 mo |
| Organization Risk | < | 30% | 4 | 1 | 1 | 1 | 1 | >50% | 45%-50% | 35%-45% | 25%-35% | <25% |
| Lifecycle Cost | < | \$3.5 M | 3 | 1 | 1 | -1 | -1 | > 4.5M | 4M - 4.5M | 3.5M - 4M | 2.8M - 3.5M | < \$2.8M |
| Sustainability - LEED Point | = | 45 | 3 | 1 | 1 | 0 | 0 | <30 | 30-35 | 35-40 | 40-50 | >50 |
| Structural challenges | | | 5 | 2 | 1 | -1 | -1 | Assessed by the Structural Engineers | | | | |
| Required height for slab and beams | <= | 2.5 ft | 2 | 1 | 1 | -1 | -1 | >4' | 3.5' - 4' | 3' - 3.5' | 2' - 3' | < 2.0' |
| Minimum Interior Columns | <= | 20 | 1 | 1 | 0 | 1 | 0 | <11' | 11' - 12' | 12' - 13' | 13' | >13' |
| Concept Strength, | | | 4 | 1 | 1 | 0 | 0 | Assessed by the architect | | | | |
| Spaces Quality | | | 5 | 2 | 1 | 0 | 0 | | | | | |
| Creativity of Design | | | 2 | 2 | 2 | 0 | 0 | | | | | |
| Simplicity of Design | | | 4 | 2 | 2 | 1 | 1 | | | | | |

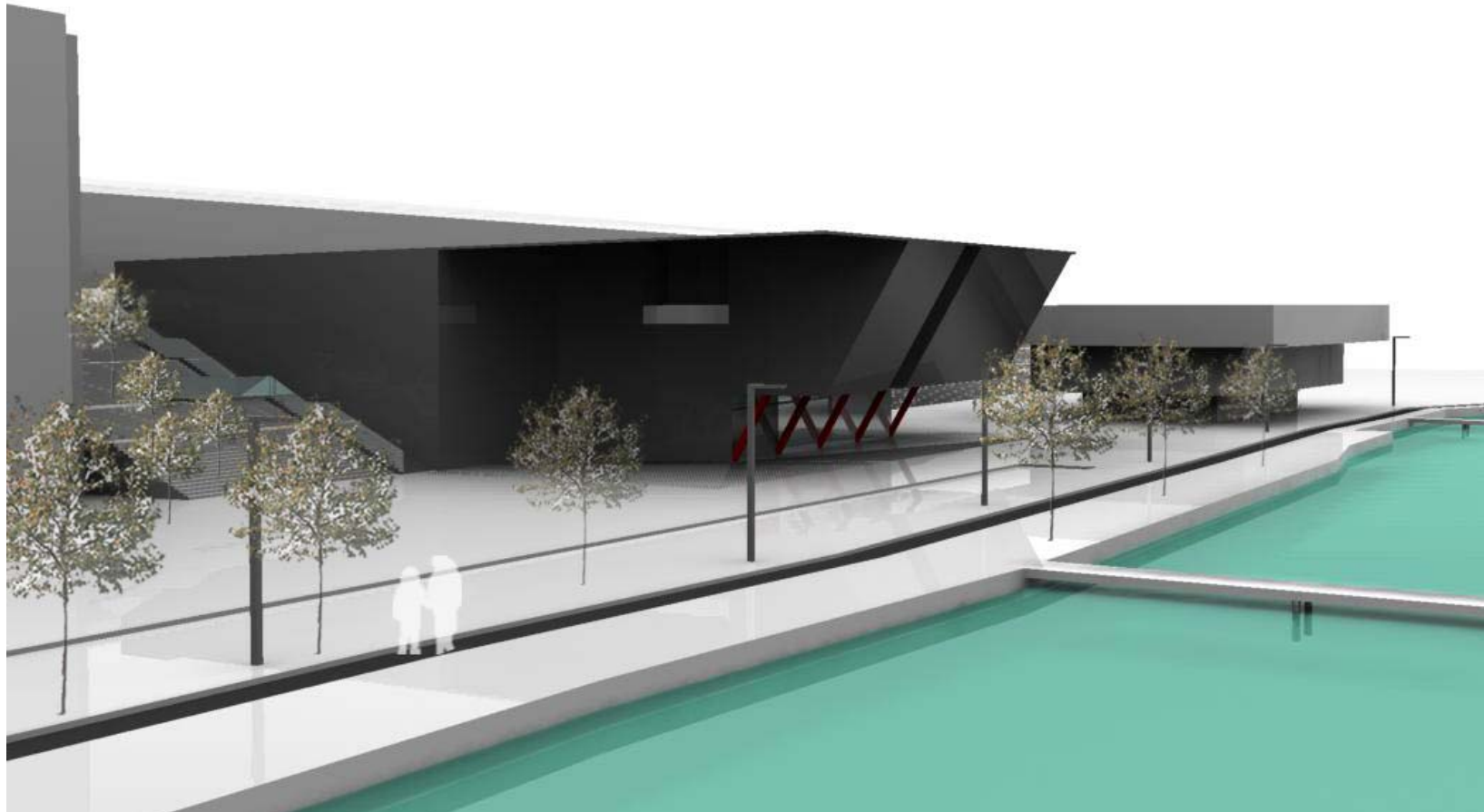
ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT



WE RECOMMEND DOUBLE DIAMOND STEEL



ARCHITECTURE

STRUCTURAL ENGINEERING

CONSTRUCTION MANAGEMENT