



Commercial Building Rehabilitation I



Department of Civil and Environmental Engineering

The University of Iowa

Agenda

Project Overview

- Project Location
- Clients

Scope of Work & Design Elements

- 3rd Floor Renovations
- Traction Elevator Replacement
- Exterior Façade Restoration
- Foundation Walls Repair

Cost Estimate

- Costs by Division
- Allowances, Contingencies & Markups

Project Location

241-247 5 Ave S, Clinton, IA 52732



Project Overview

Scope of Work



3rd Floor Renovations Design



Passenger Elevator Replacement Design



Façade Restoration Design



Foundation Repair



3rd Floor Renovation

Provide a fully functioning design for the third-floor space that will achieve commercial occupancy.

N



3rd Floor Layout

2 8'X9'
Openings

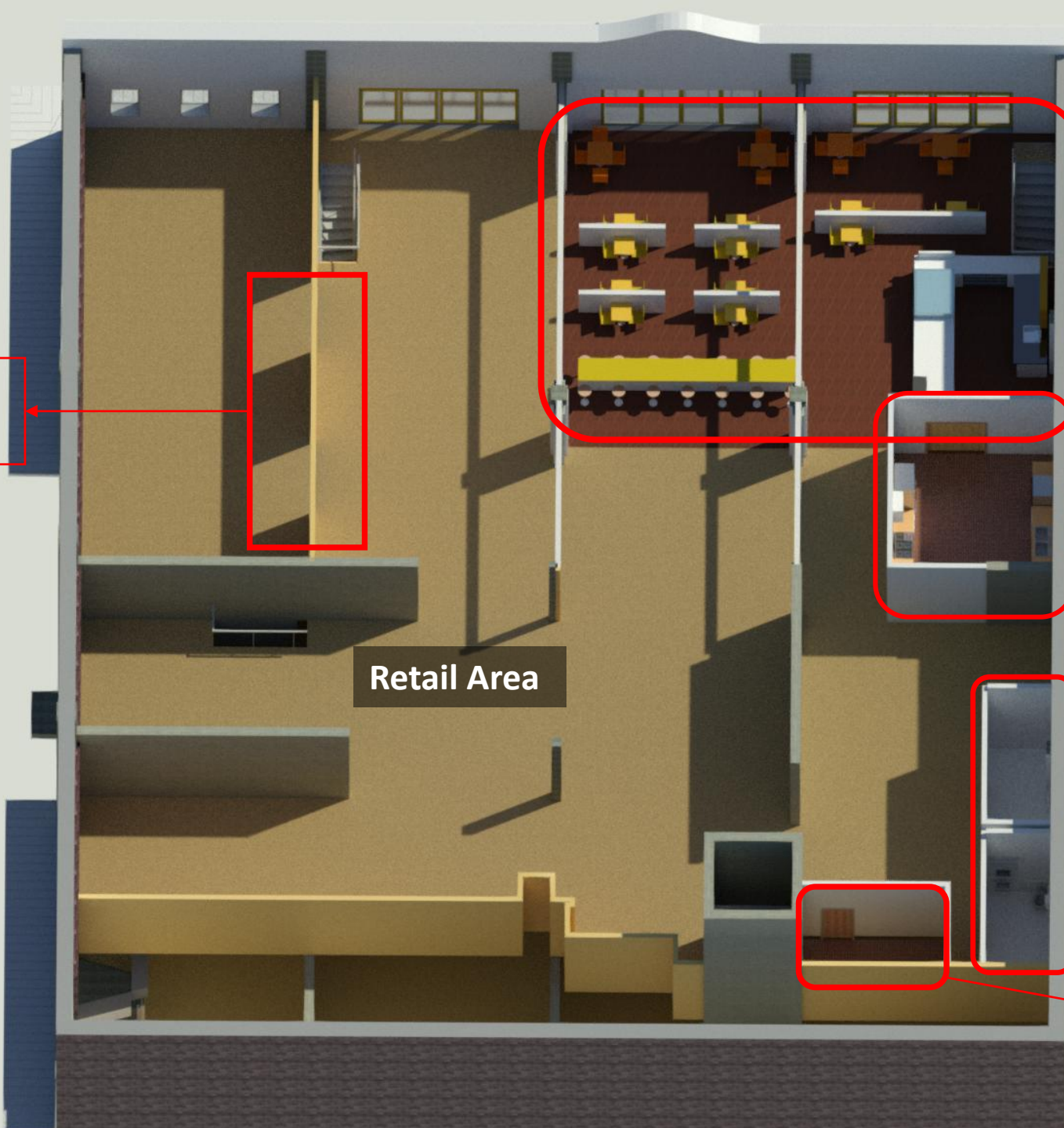
Café Area

Kitchen

Retail Area

Restrooms

Utility Room



Architectural Design – Café Design Assumptions



Target Customers

The overall median age is
47.9.

2.28 people per household



Number of Customers

Method: Annual Average Daily
Traffic (AADT)

Description: traffic volumes at
5th Ave S (3170) and S 3rd St
(4110) from Iowa Department of
Transportation (DOT)

Conclusion: 50/day



Total Area of Café

15 S.F. per person in dining room

70% of dining room and 30%
of workspace

Total square footage: 1694 SF

Architectural Design – Walkthrough Video



<https://youtu.be/9pEwgggQtQ0>

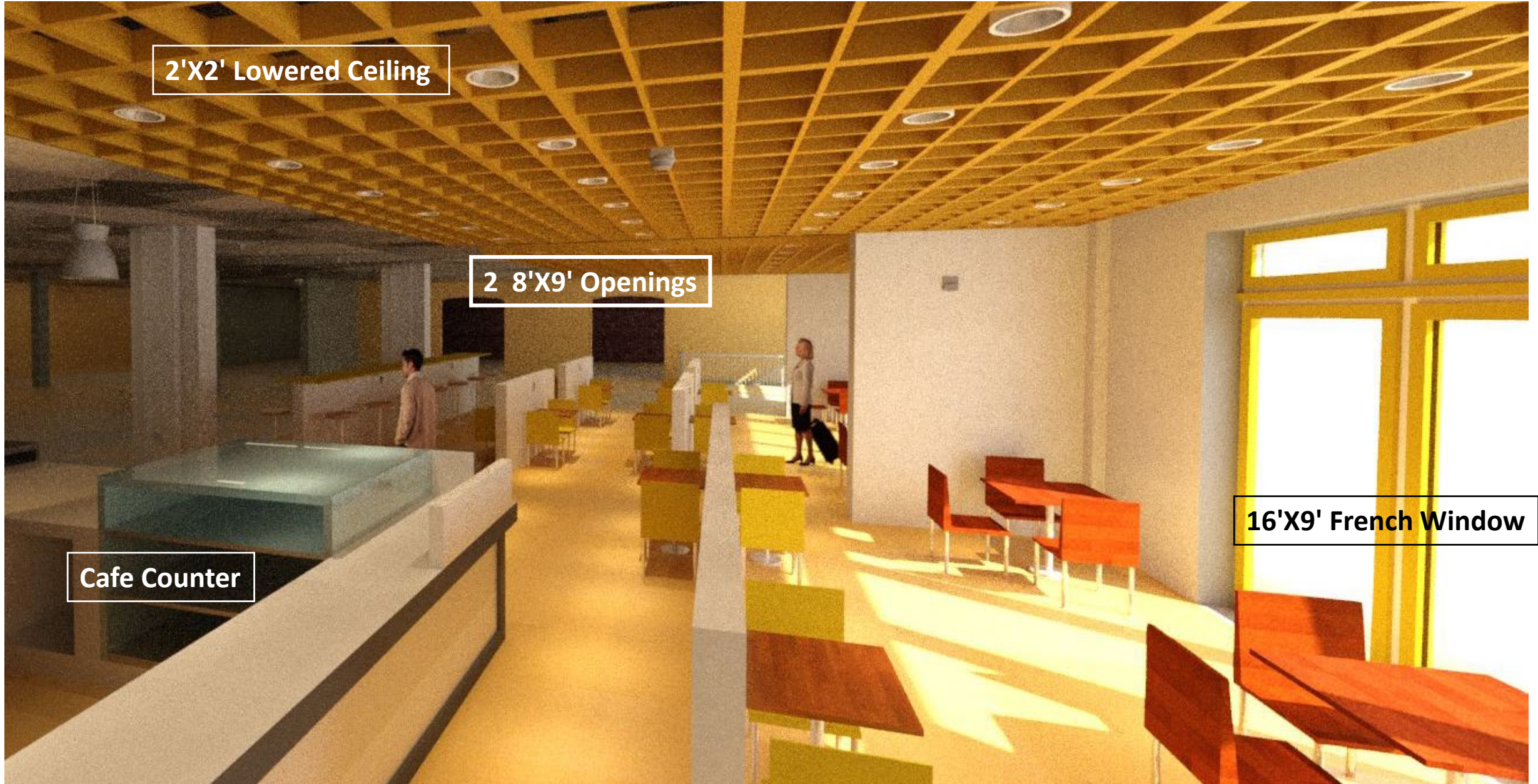
Cafe Interior Design Rendering

2'X2' Lowered Ceiling

2 8'X9' Openings

Cafe Counter

16'X9' French Window



Cafe Interior Design Rendering



MEP-FP Design – Code and Standards

- ASME A17.1 Elevators and Escalators Code
- NFPA 70 / 2020 National Electric Code
- 2018 International Mechanical Code
- 2019 ASHRAE 62.1
- 2018 International Energy Conservation Code
- 2018 International Building Code
- NFPA 13 Automatic Fire Sprinkler Systems
- NFPA 72 National Fire Alarm and Signaling Code
- 2018 International Fire Code (IFC)
- 2018 Uniform Plumbing Code (UPC) / ASPE Handbook

Mechanical

Galvanized
Double-Lined
Spiral Ductwork

NATURAL GAS PIPING

(2" Diameter)
Piping Material: Black Steel
Schedule 40

Air-Cooled
Condensing Unit

REFRIGERANT PIPING

(3/4" Diam. Suction, 1/2"
Diam. Liquid)
Piping Material: Type K
Copper

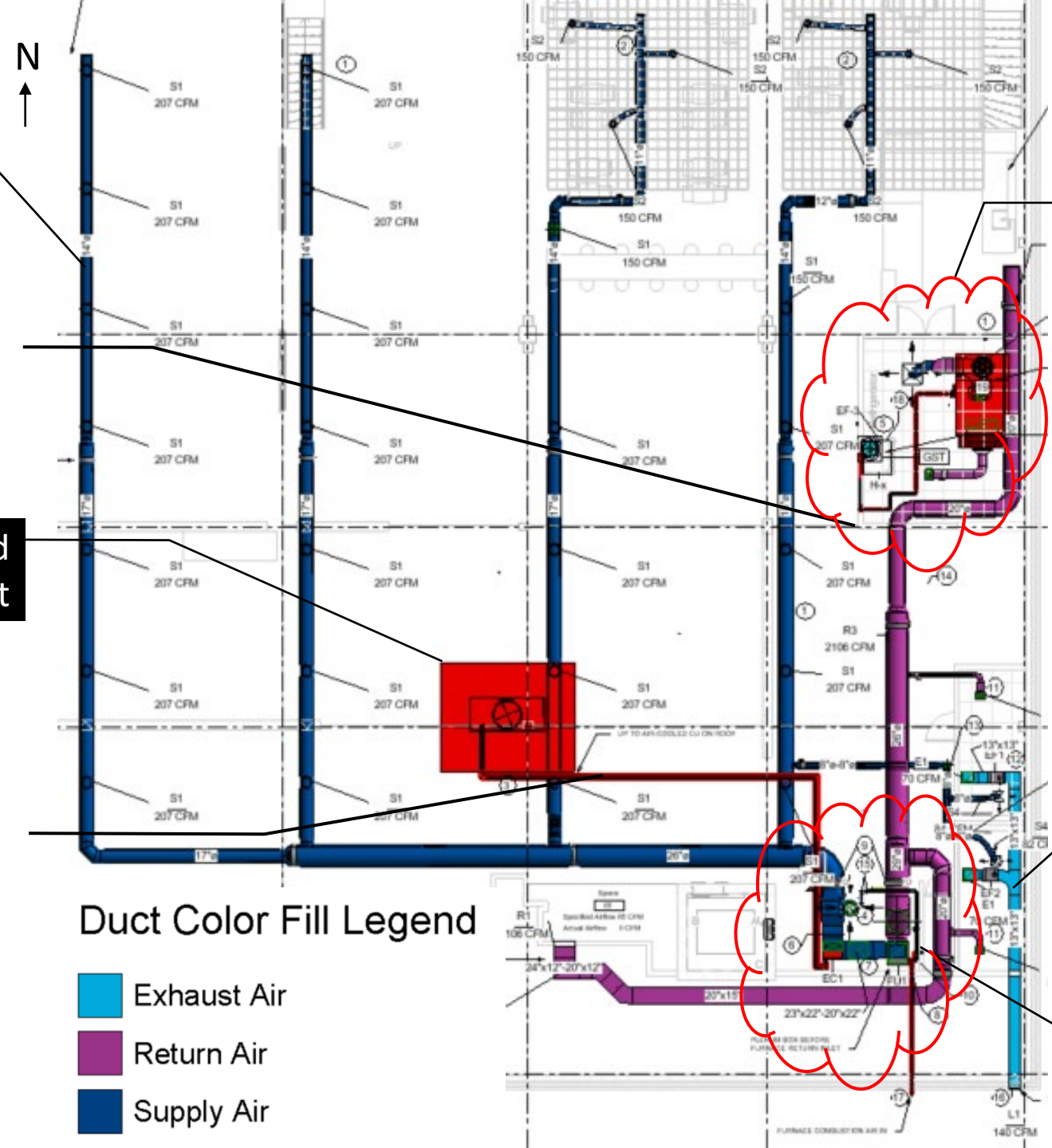
Duct Color Fill Legend

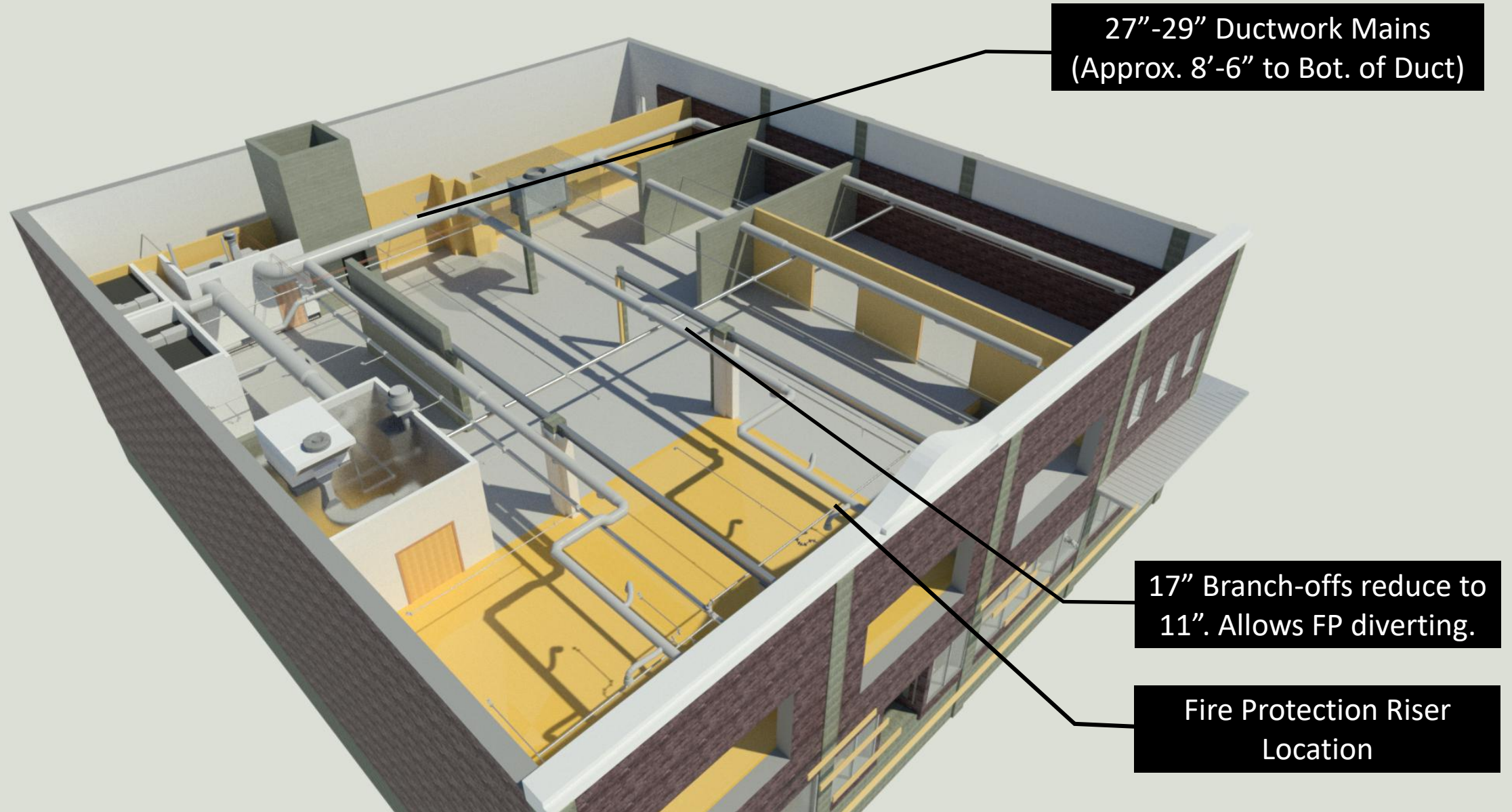
- Exhaust Air
- Return Air
- Supply Air

- Makeup Air Unit
- Rooftop Exhaust Fan
- Commercial Kitchen Hood

Bathroom Exhaust System

- Gas-Fired Furnace
- Evaporator Coil
6,800 CFM
246,500 btu/h





Mechanical and Fire Protection Coordination

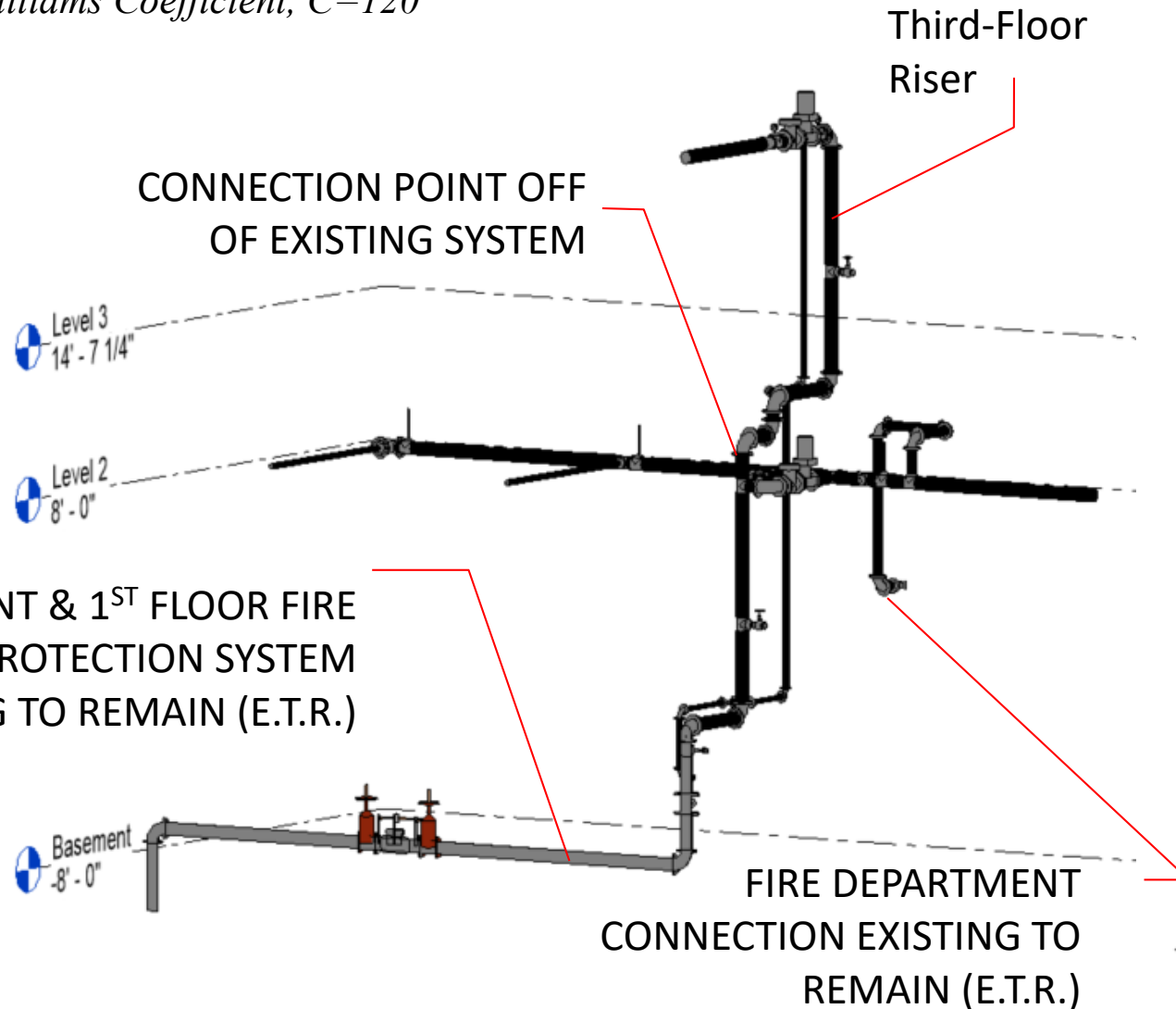
FIRE PROTECTION

Wet Pipe Sprinkler System Third Floor Total Flow 1410 GPM
Overflow Rate: 1.3 Hose Allowance: 250 GPM

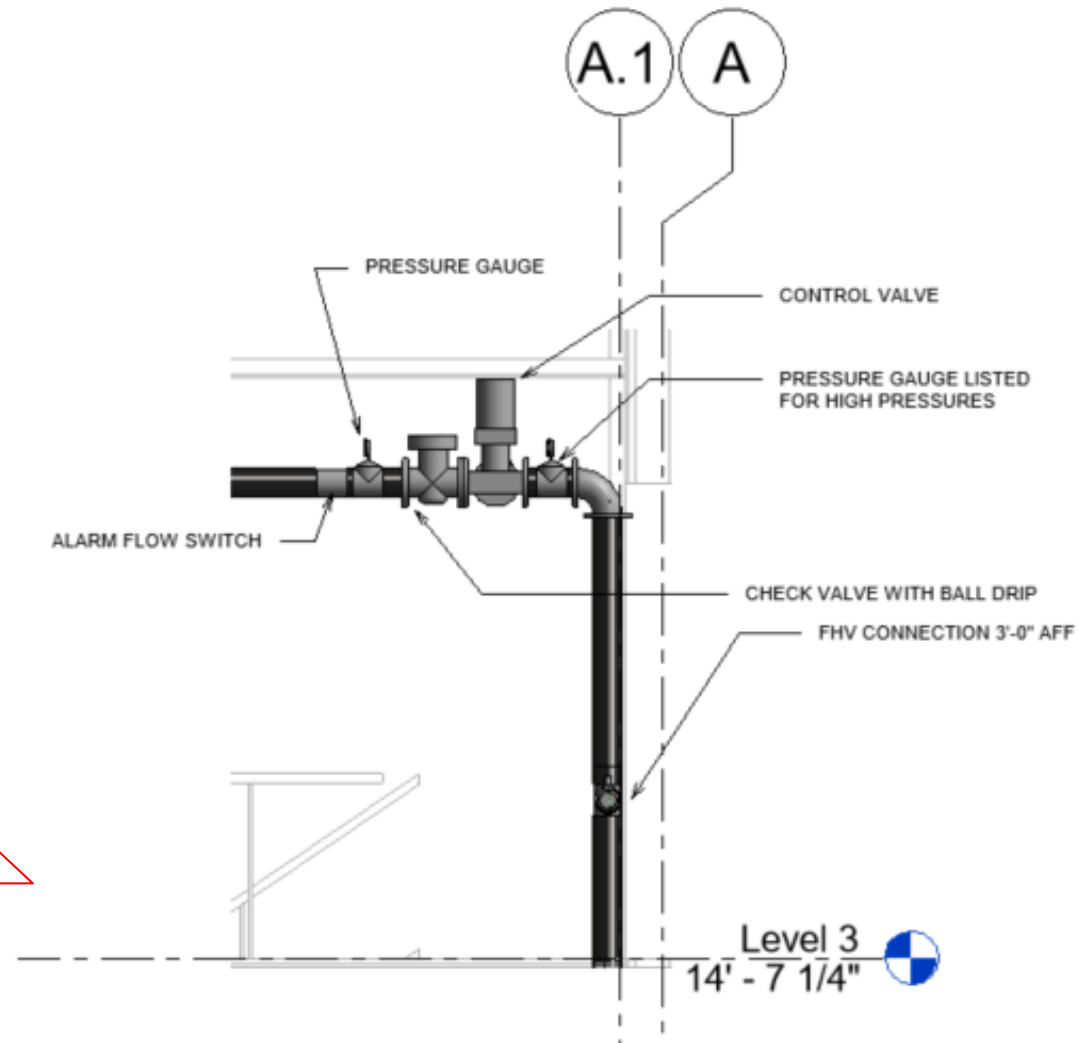
Fire Protection Piping

Black Steel Schedule 40

Hazen-Williams Coefficient, $C=120$



Combination Standpipe Riser System



CONVENTIONAL FIRE ALARM SYSTEM

Identification Device Circuits

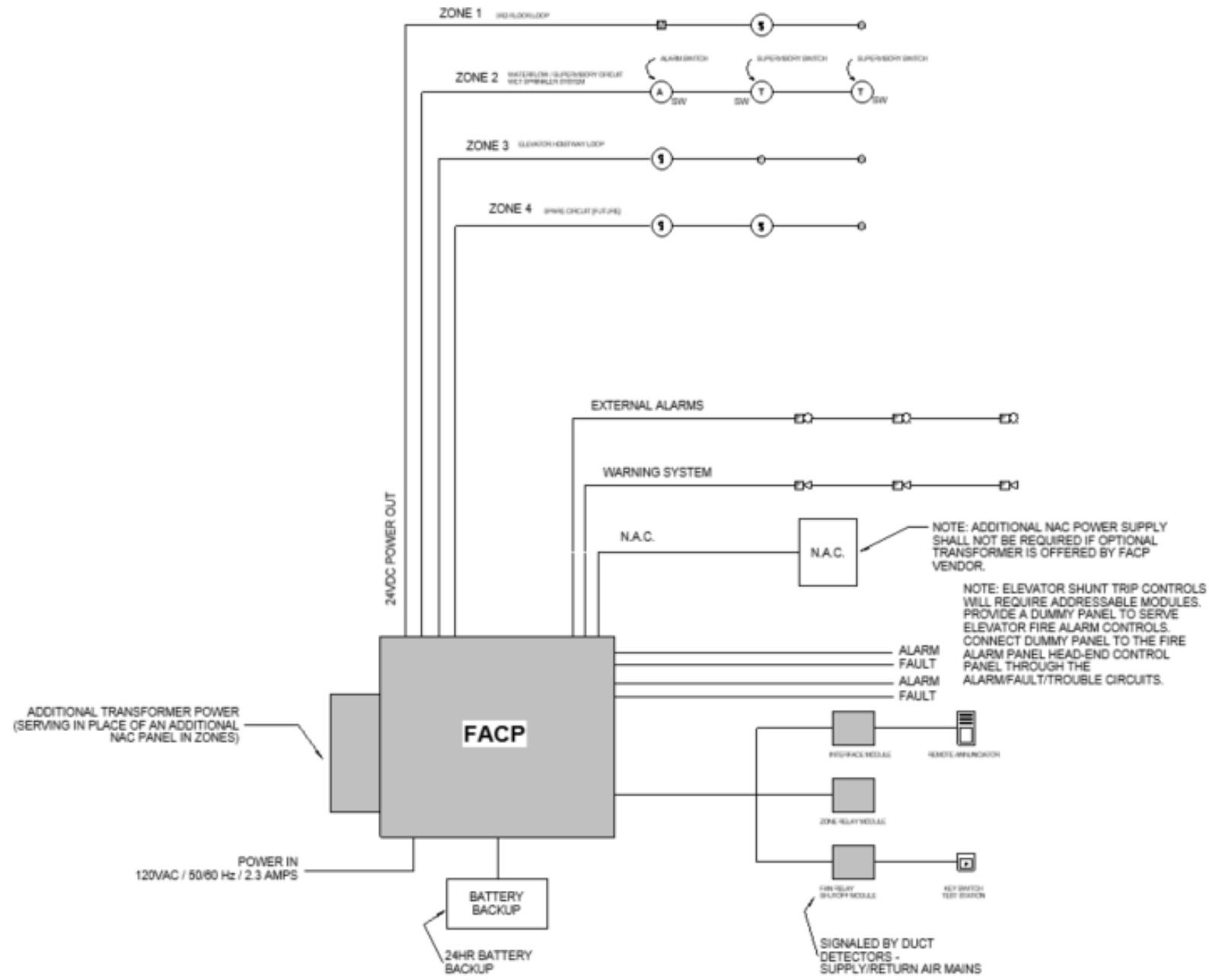
- 24 VDC devices
- Zone 4 spare
- Sprinkler System Supervisory Circuit (Zone 2)
- Duct detectors with key switch

Notification Appliance Circuits

- 75 Candela Horn Strobes
- Notification Speakers

Battery Backup

- 24 Hrs. of Standby + 5 Minutes of Alarm Current Draw
- Required power: 6.6 Amp-Hours
- Design Battery: 10 Amp-Hours (45% Safety Factor)



LIGHTING | Increases in energy efficiency.

Lighting Illuminance

Footcandles = f.c.

Retail | 10 f.c. **Workroom** | 49 f.c.

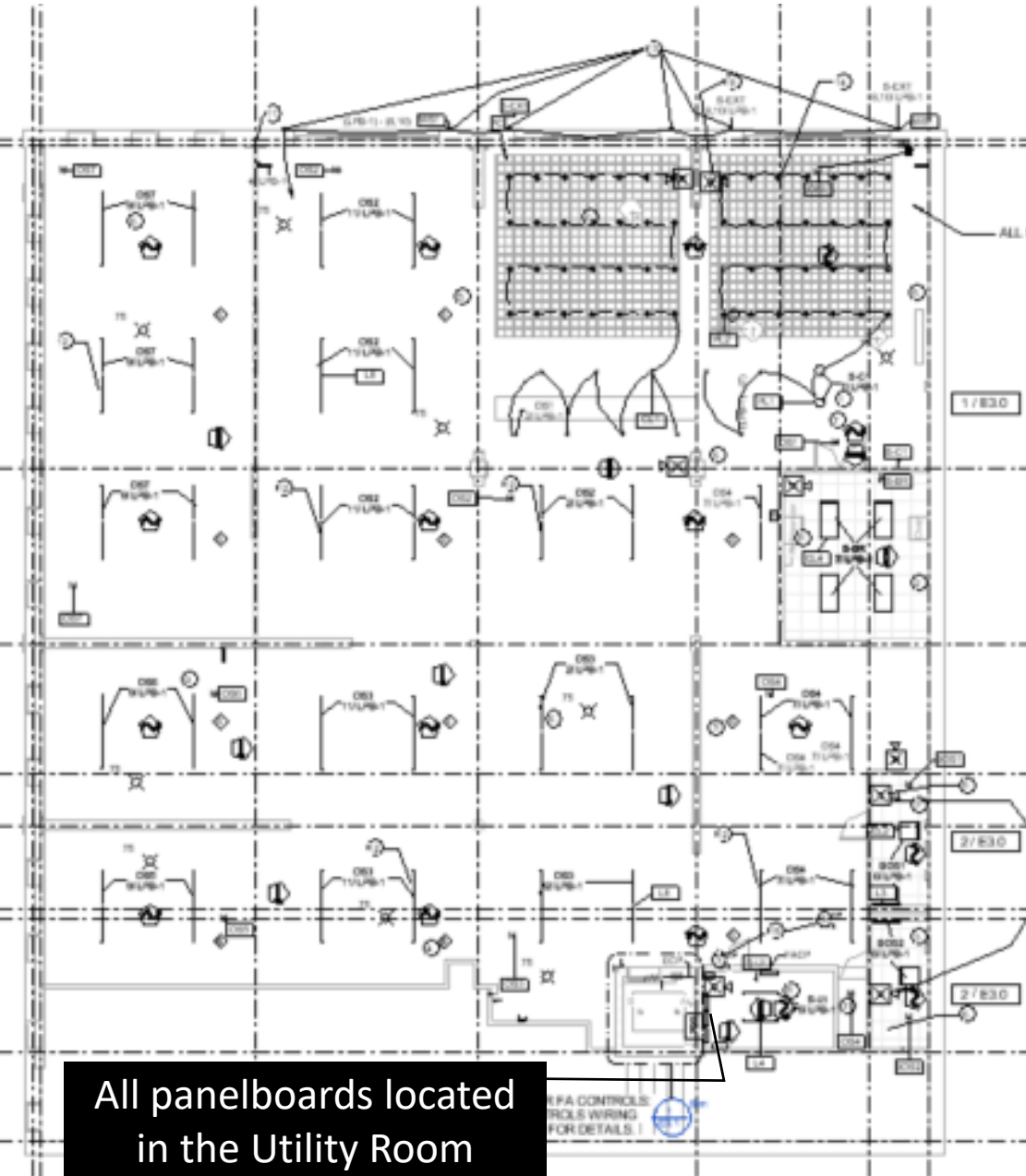
Café | 40 f.c. **Bathrooms** | 15 f.c.

Lighting Demand

4,000 Watts

Elec. Total Demand: 75 kVA

- Occupancy Sensor Controlled
- Retrofit existing light fixture housings in retail area
- Greater illumination in Café and Workroom

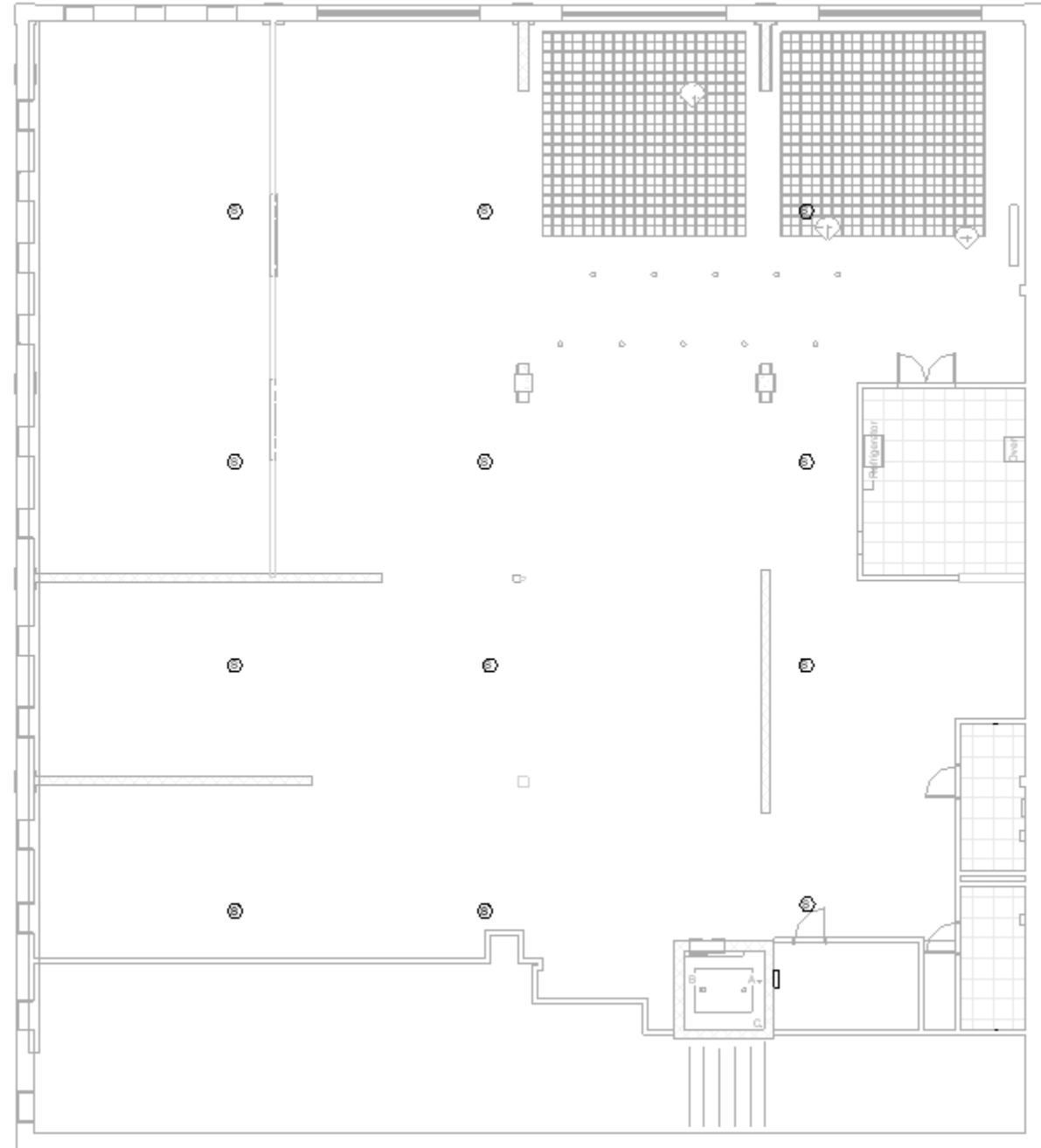


COMMUNICATION SYSTEM

Low voltage speaker system for easy future expansion.

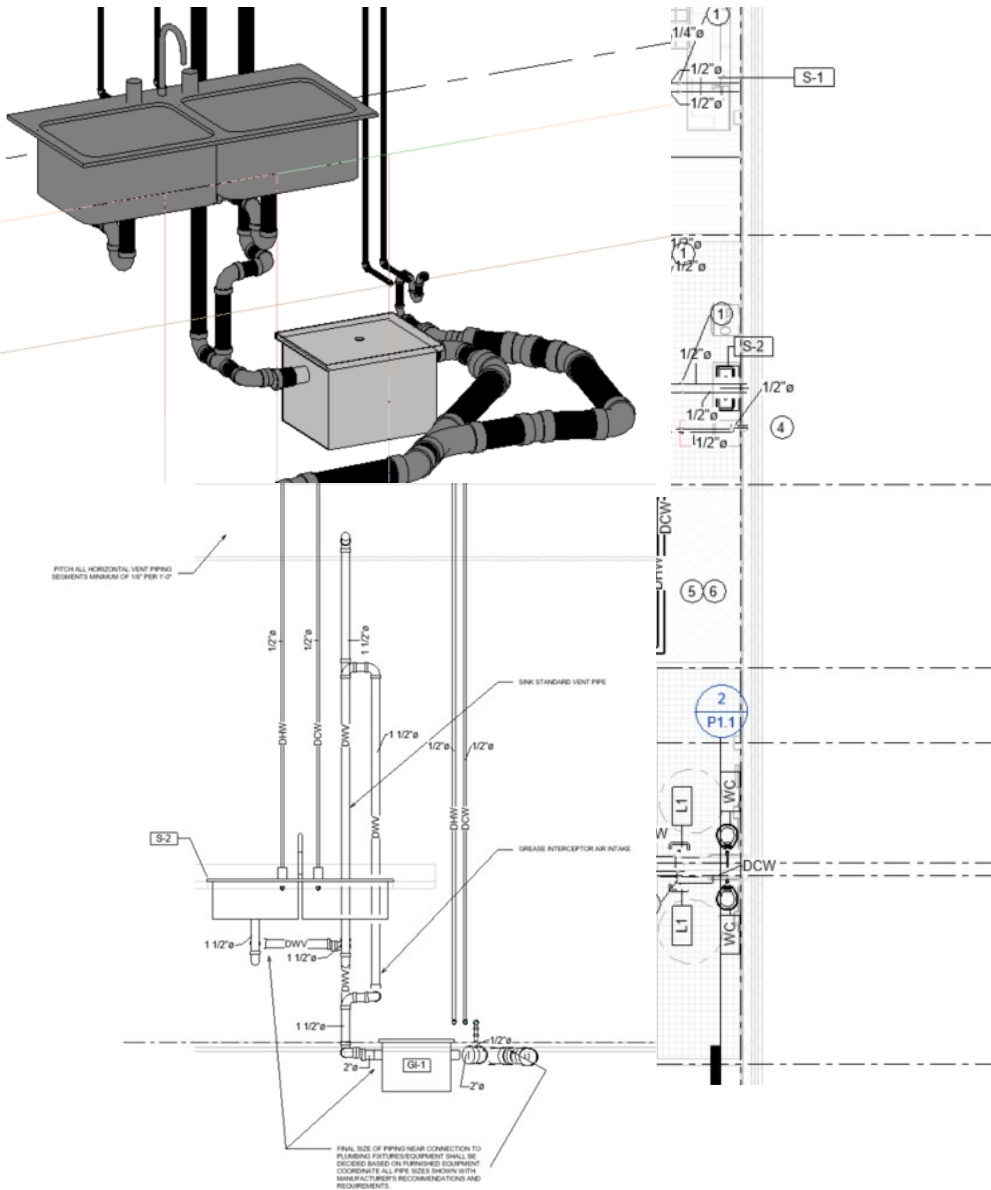
24 VDC Self-Amplifying Speakers

24W Power Supply Head-End unit



PLUMBING

20 lb. Grease Interceptor for Commercial Kitchen



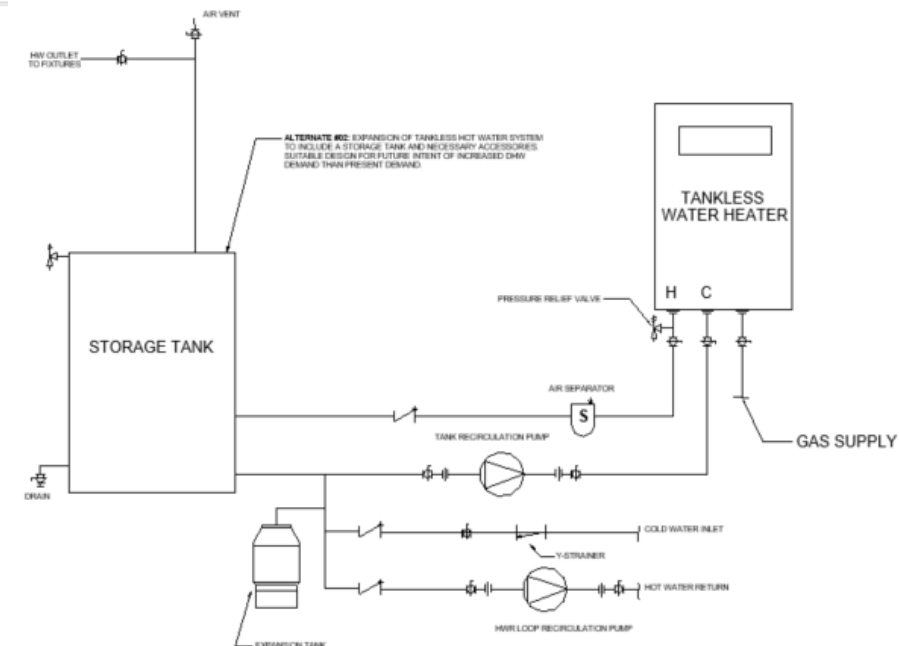
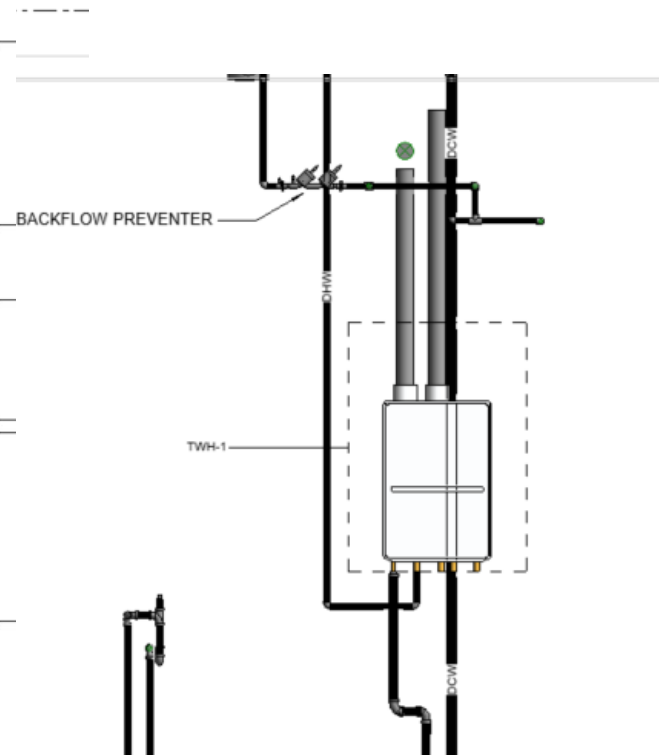
Tankless Hot Water Heater with a Hot Water Return Loop
The Hot Water Return Loop is designed to maintain a 20-degree temperature differential.

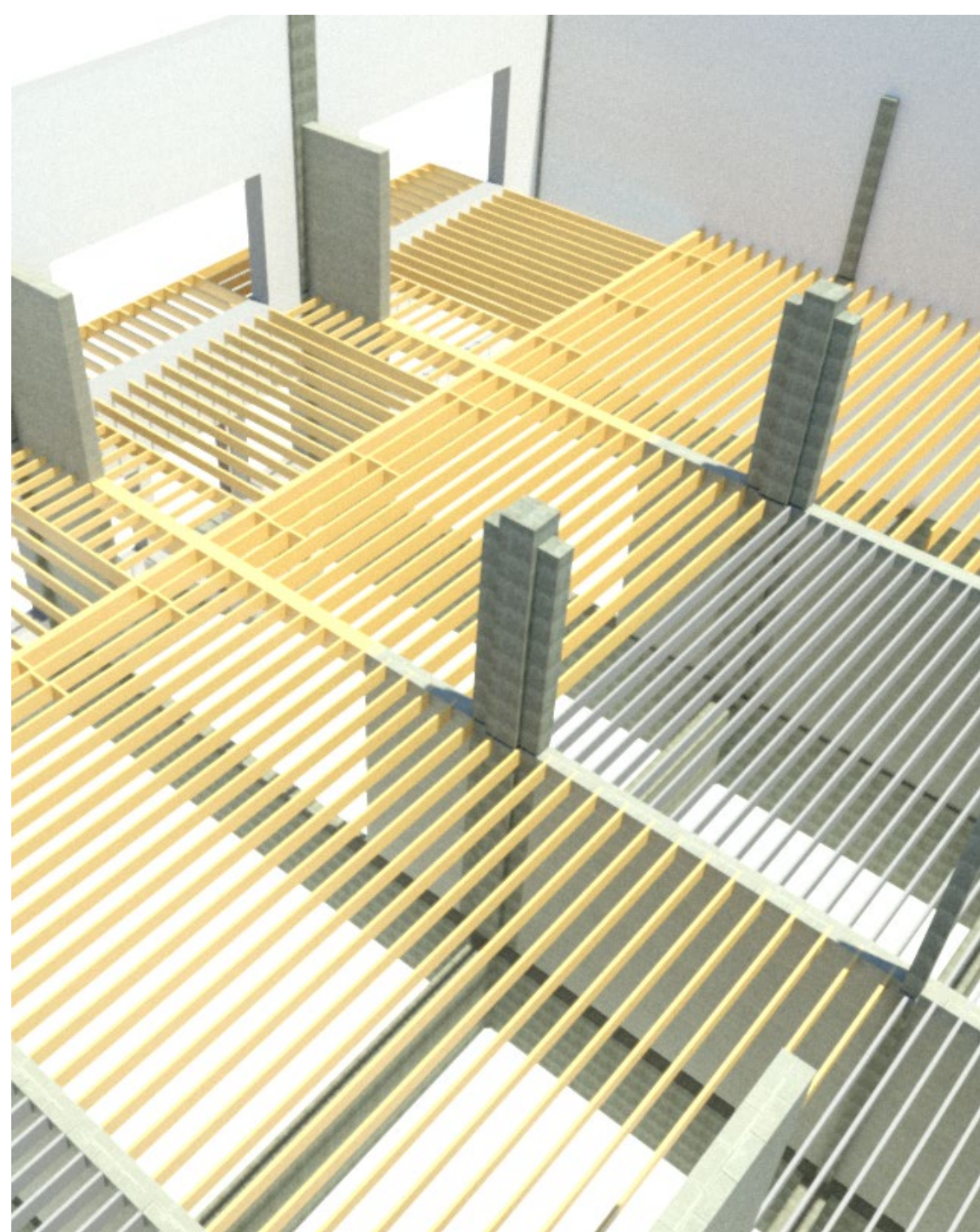
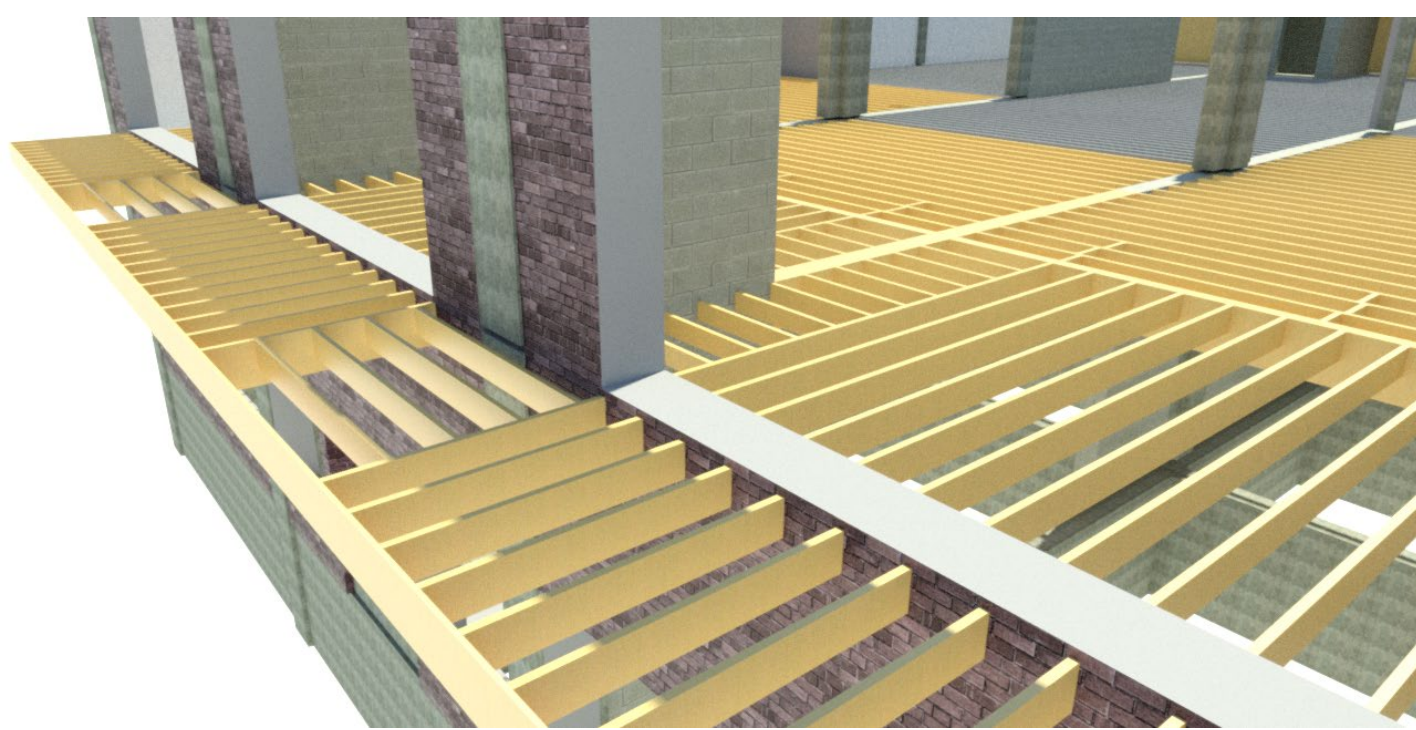
Hot Water Recirculation Pump:

Design Flow: 6 GPM

Design Pressure Head: 20 ft.

Tankless Hot Water Heater Output: 13 GPM

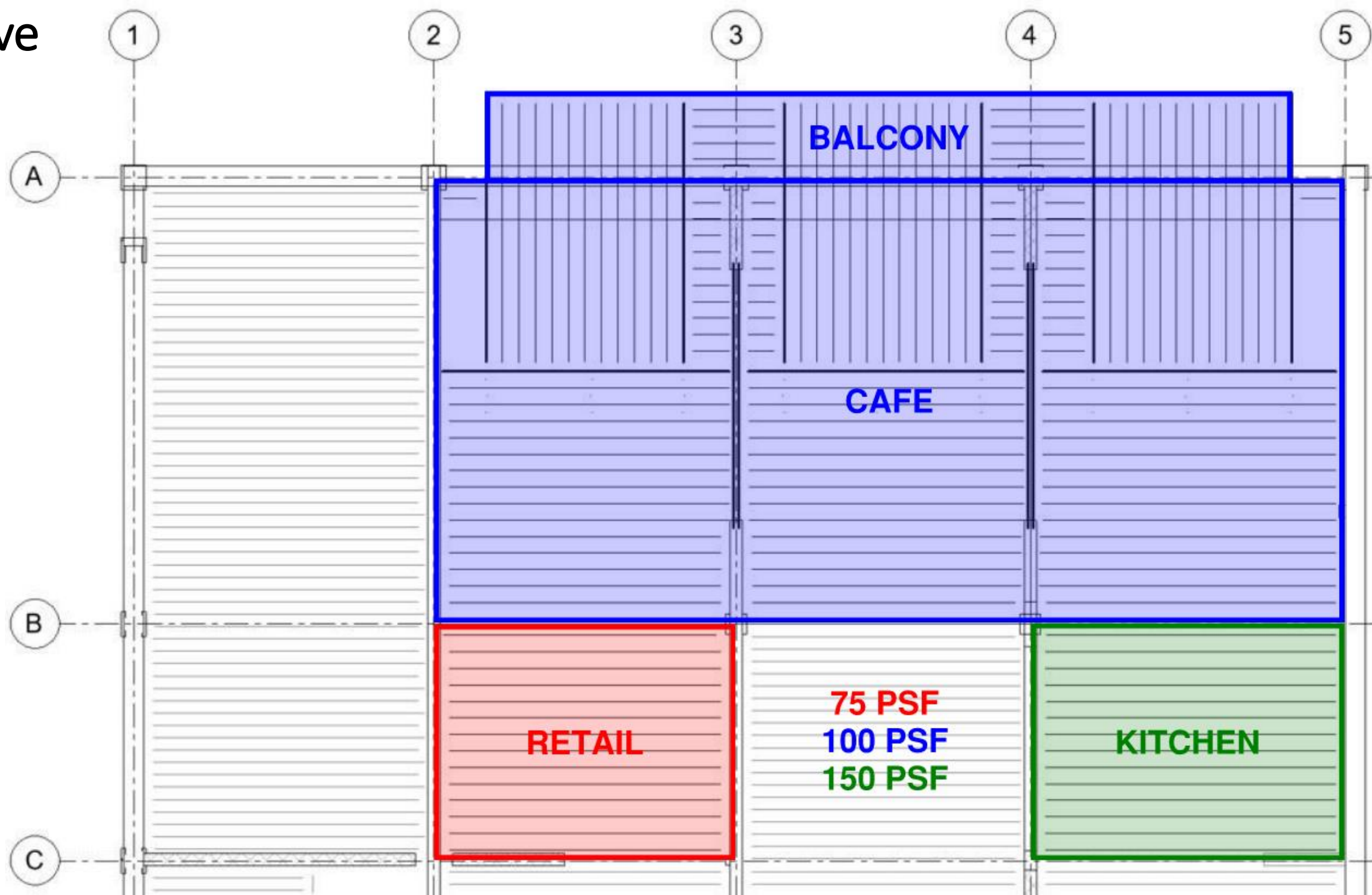




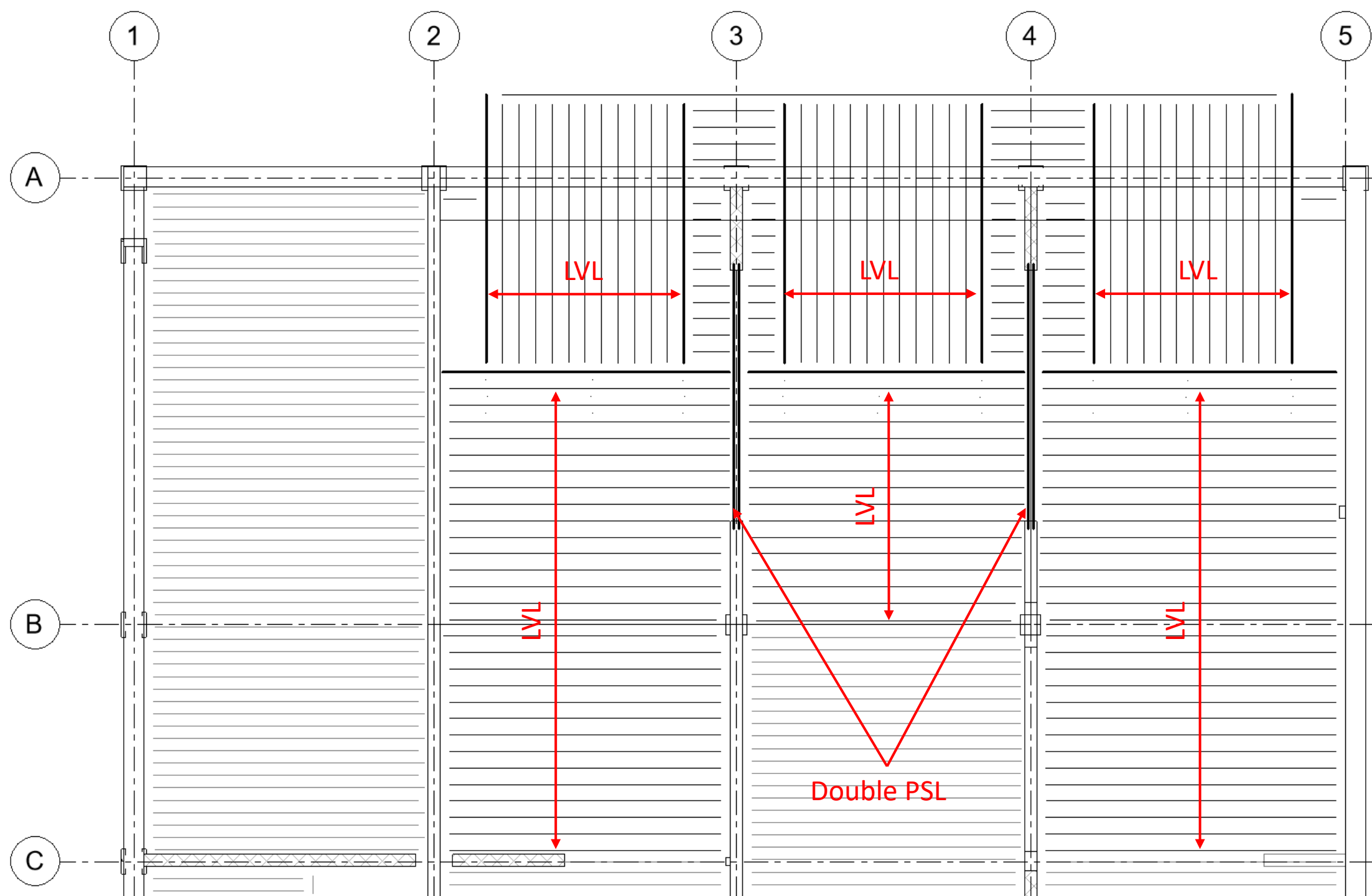
3rd Floor Renovation - Structural Design

- Methods
 - Allowable Stress Design (ASD)
- Resources
 - National Design Specification for Wood Construction (NDS)
 - ASCE 7-16
 - Manufacturer's Product Specifications

Design Live Loads

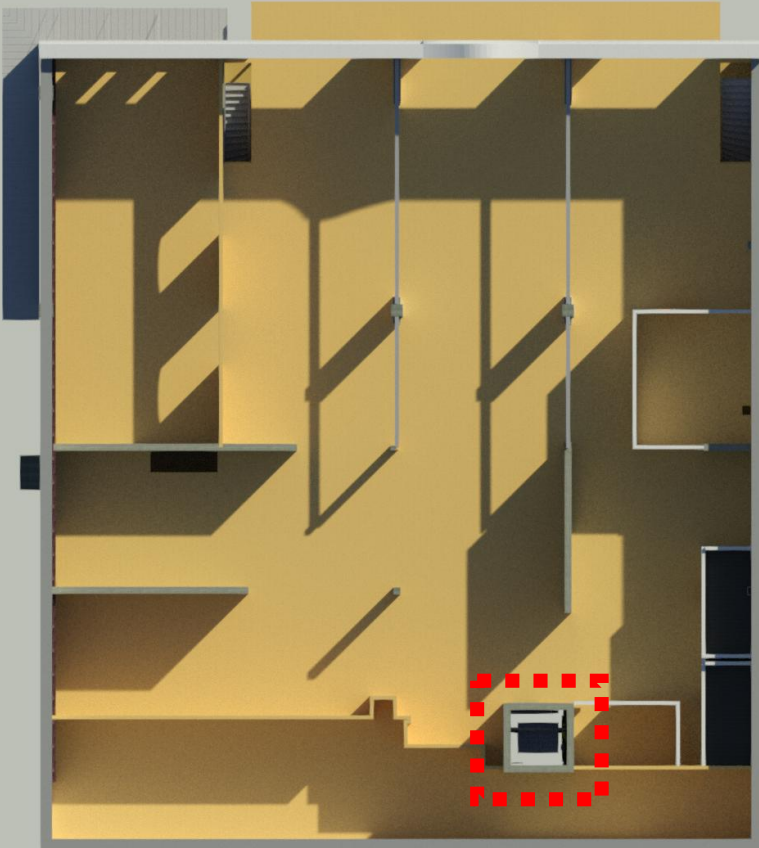


Floor Framing Details



Project Overview

Scope of Work



3rd Floor Renovations Design



Passenger Elevator Replacement Design



Façade Restoration Design



Foundation Repair

Passenger Elevator Replacement

Bring the elevator system up to today's standards.



Traction Elevator System

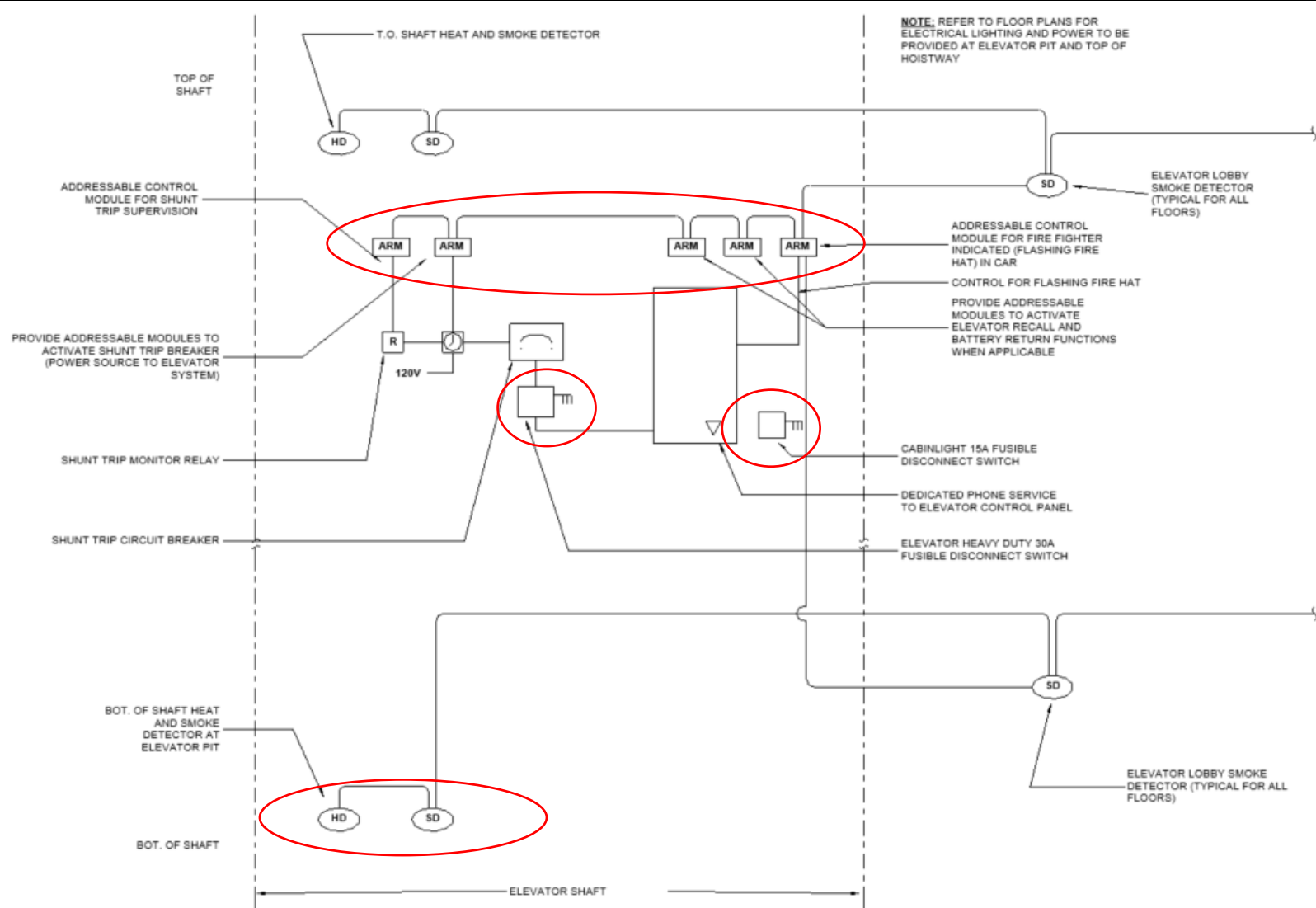
150 fpm / 2000 lb. rated capacity

208V 3-Phase Power

Elevator Controls

Gearless, Machine Room-Less
System

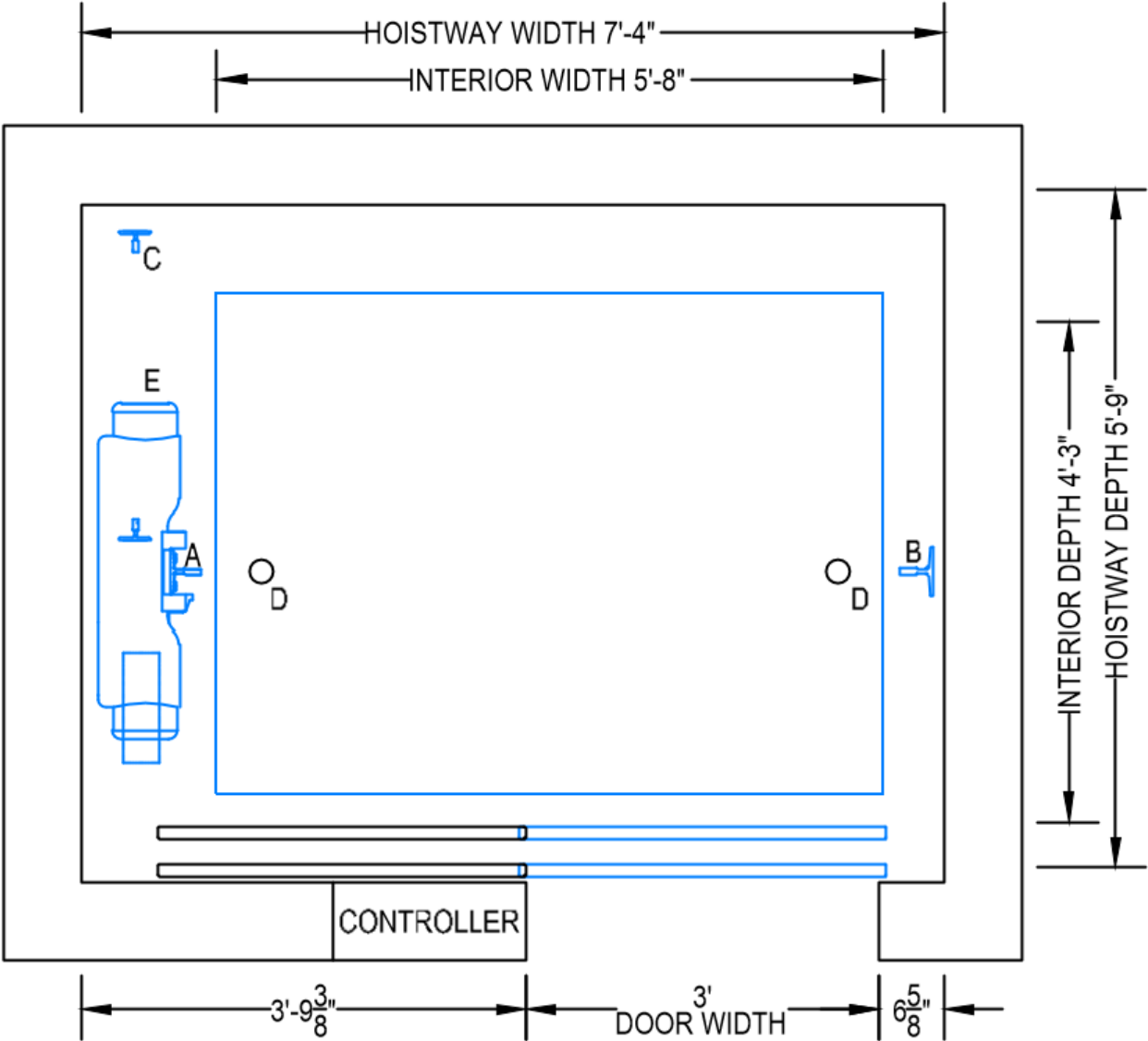
Elevator Control Panel in
Hoistway



Elevator Shaft Structural Design

HOISTBEAM & LIFE LINE VERTICAL FORCES (lbf)				
REACTION LOCATION	A	B	C	D
Z DIRECTION	4800	4700	5000	5000

- Resources
 - Reinforced Masonry Engineering Handbook
- Design Method
 - Allowable Stress Design
- General Notes
 - Hoist Beam Provided By Manufacturer



HOISTWAY PLAN VIEW

Project Overview

Scope of Work



3rd Floor Renovations Design



Passenger Elevator Replacement Design



Façade Restoration Design



Foundation Repair



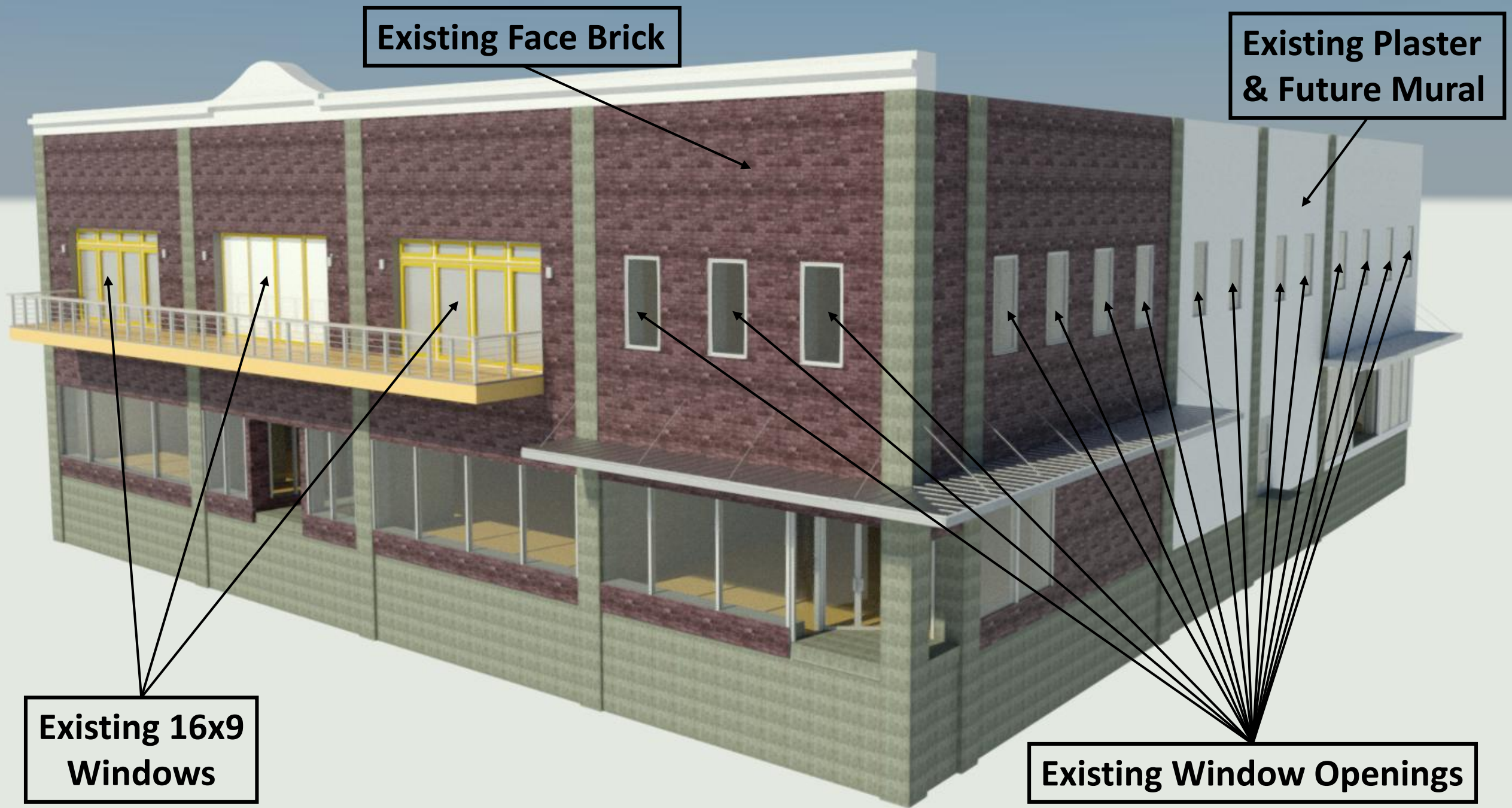
Façade
Restoration

Existing Face Brick

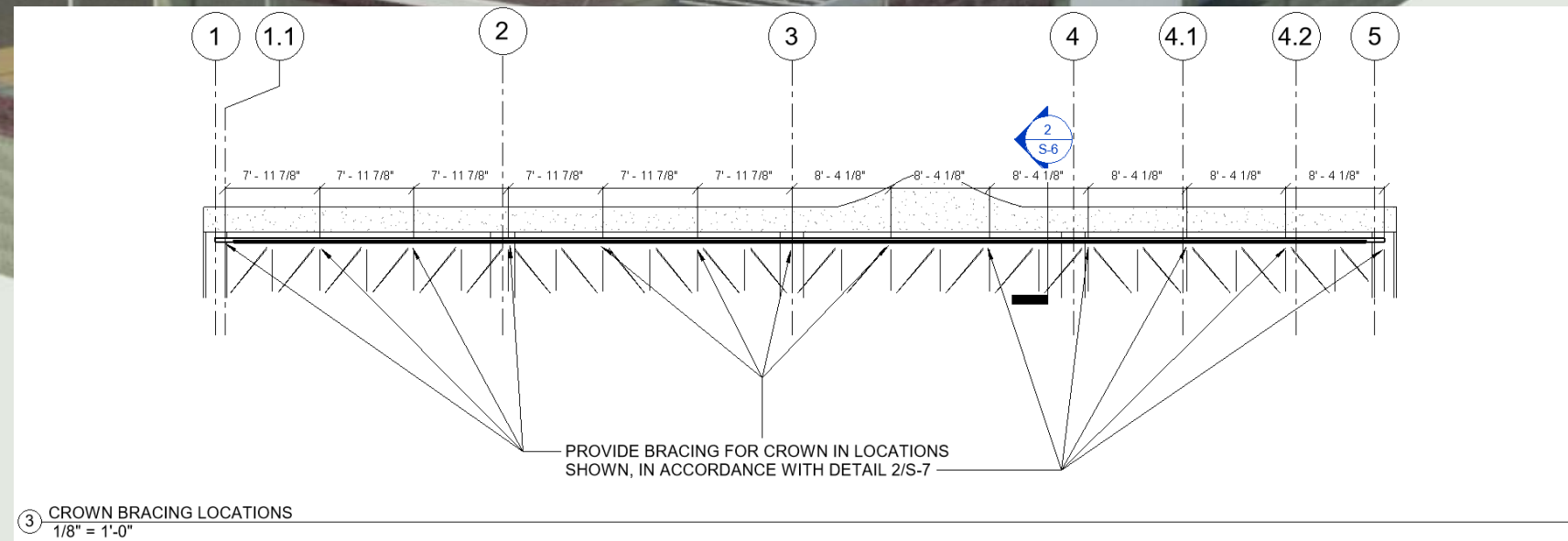
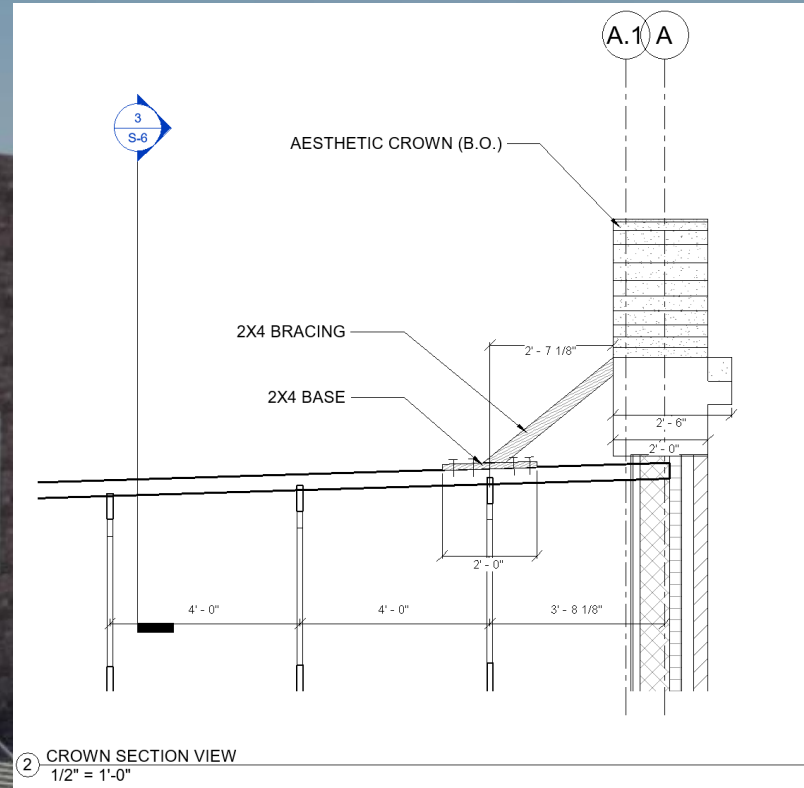
**Existing Plaster
& Future Mural**

**Existing 16x9
Windows**

Existing Window Openings

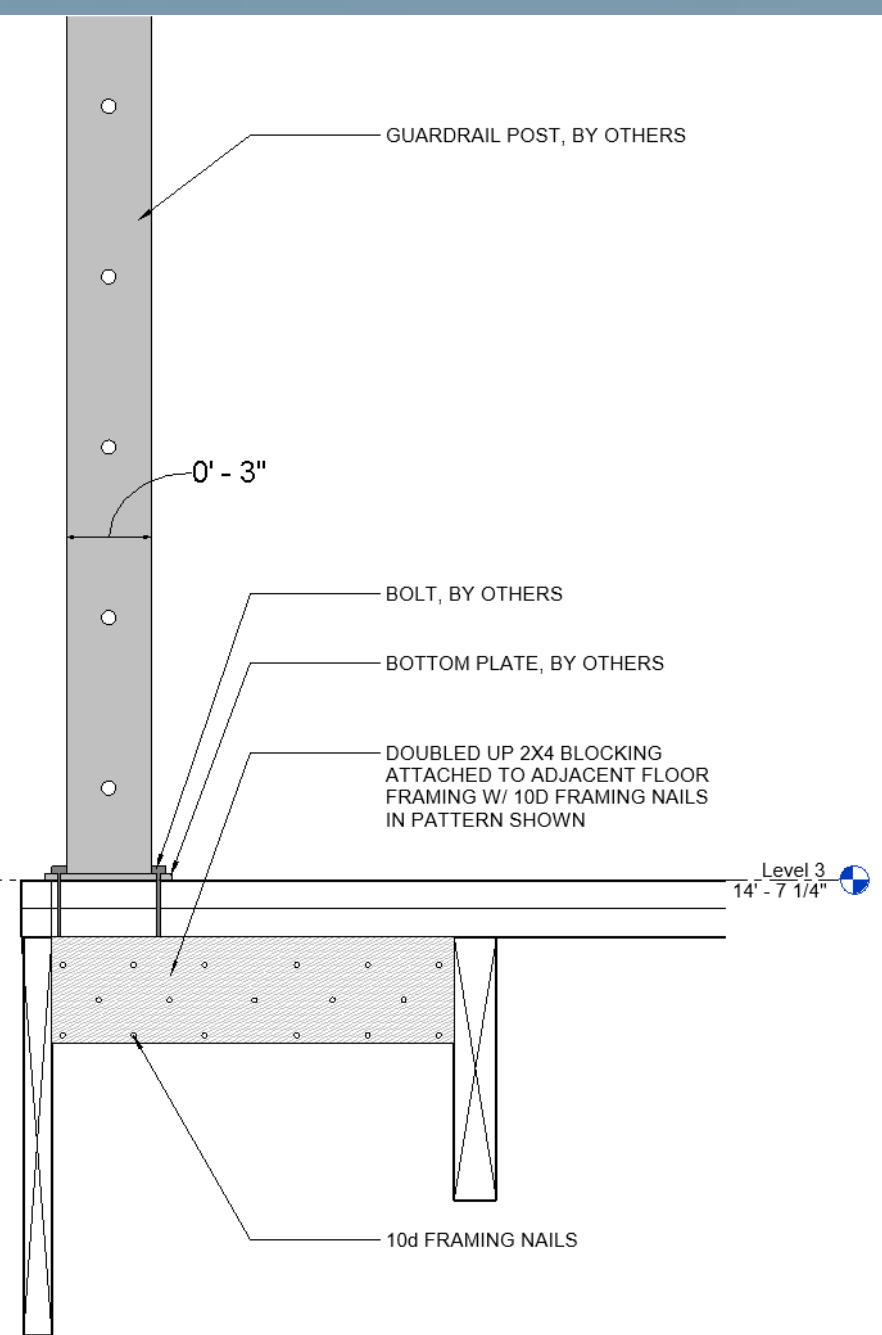


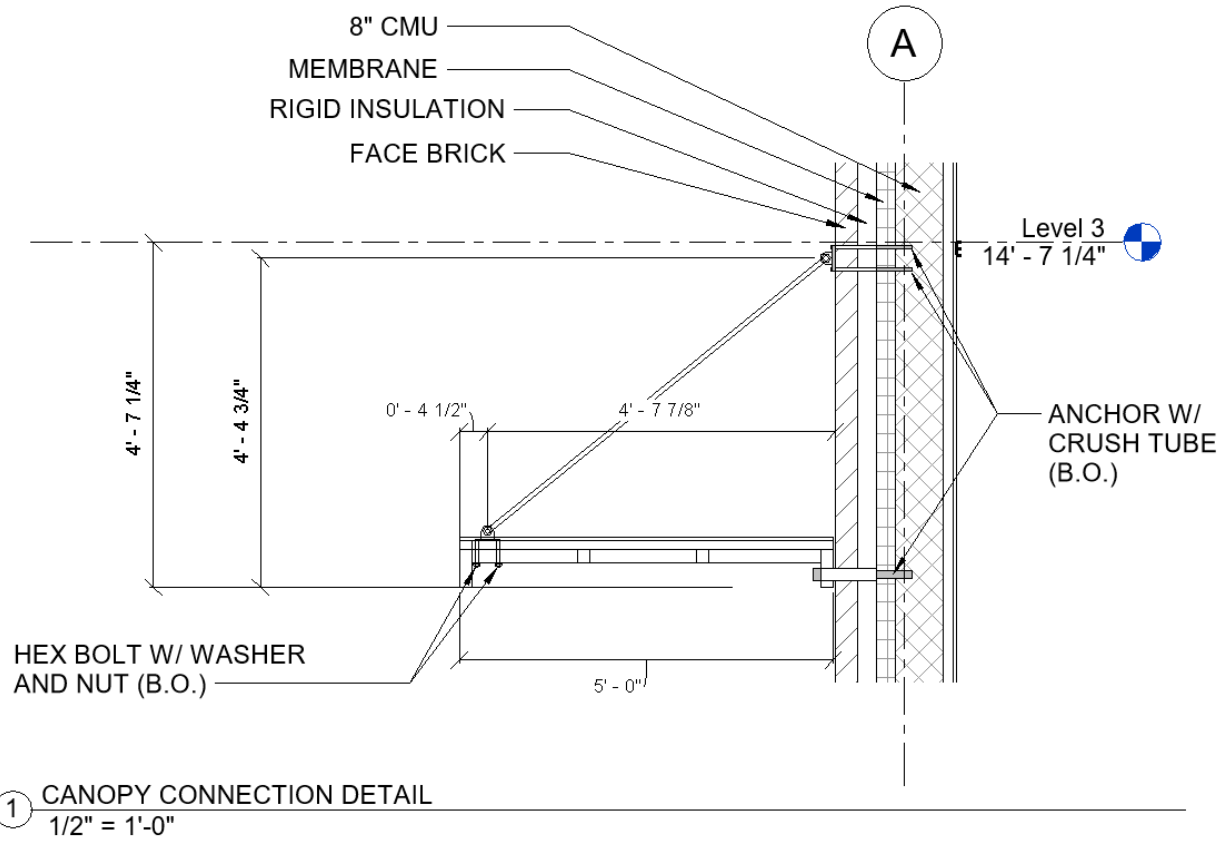
Crown





Balcony & Railing





Project Overview

Scope of Work



3rd Floor Renovations Design



Passenger Elevator Replacement Design



Façade Restoration Design

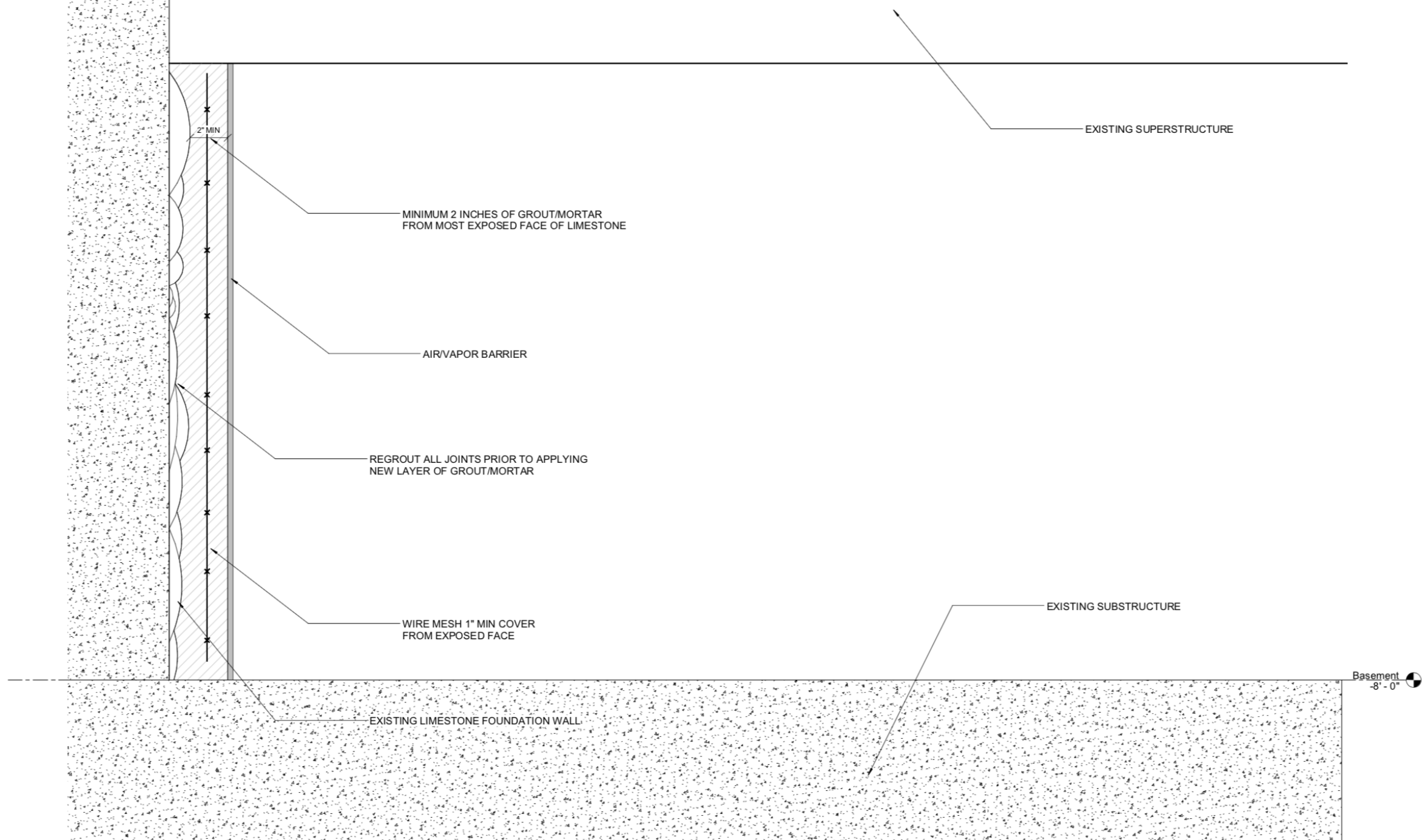


Foundation Repair





Foundation Repair



Cost Estimates

Estimating Method:

- Unit Cost Method
- Costs include 25% OH&P)
- Taxes were included in estimates for all privately funded work
- Added lump sum to estimate for +5% markup for subcontracted work

Cost Index Reference:

- *Building Construction Costs with RSMeans data*, Stephen C. Plotner, Senior Editor

Hard Construction Costs: \$941,500

Subcontracted Markup: \$2,400

Soft Costs: \$74,500

**Allowances: \$55,000*

Contingencies: \$111,500

Grand Total Project Cost: \$1,129,000

COSTS BY DIVISION		
Division 1	GENERAL REQUIREMENTS	\$4,825
Division 2	EXISTING CONDITIONS	\$5,150
Division 3	CONCRETE	\$0
Division 4	MASONRY	\$42,700
Division 5	METAL	\$11,300
Division 6	WOODS, PLASTICS & COMPOSITES	\$67,000
Division 7	THERMAL & MOISTURE PROTECTION	\$5,750
Division 8	OPENINGS	\$31,400
Division 9	FINISHES	\$85,000
Division 10	SPECIALTIES	\$24,700
Division 11	EQUIPMENT	\$32,400
Division 12	FURNISHINGS	\$31,500
Division 13	SPECIAL CONSTRUCTION	\$0
Division 14	CONVEYING SYSTEMS	\$230,000
Division 21	FIRE SUPRESION	\$51,500
Division 22	PLUMBING	\$90,500
Division 23	HEATING, VENTILATING & AIR CONDITIONING	\$102,000
Division 26	ELECTRICAL	\$69,000
Division 27	TELECOMMUNICATIONS	\$6,800
Division 28	ELECTRONIC SAFETY & SECURITY	\$20,300
Division 31	EARTHWORK	\$0
Division 32	EXTERIOR IMPROVEMENTS	\$0
Division 33	UTILITIES	\$0
ALLOWANCES		\$54,700
CONTINGENCY		\$111,500