**CALIFORNIA POLYTECHNIC UNIVERSITY, HUMBOLDT**

# HEALTHCARE HUB

## STEWART BUILDING ASSESSMENT

June 5, 2025

California Polytechnic University Humboldt
Healthcare Hub
Stewart Building Assessment
June 5, 2025

# HEALTHCARE HUB

## STEWART BUILDING ASSESSMENT

**INTRODUCTION**



**ASSESSMENT NARRATIVES**



**APPENDICES**

# INTRODUCTION

**Executive Summary:**

This building assessment report outlines the observed conditions of the existing Stewart Building, and its related site located at 1125 16th Street, Arcata, CA 95521 for the California Polytechnic University, Humboldt (the University) and College of the Redwoods Healthcare Education Hub following a site visit conducted by the design team on Monday, April 14th from 2:00 pm – 5:00 pm and Tuesday, April 15th from 9:00 am – 12:00 pm. The weather was in the 50□F range each day with sunshine on April 14 and partly cloudy on April 15 with no sign of rain or recent rain while at the site walk. Site observations were limited to the existing conditions without removal of building elements (ceiling tiles, walls, etc.) and based on limited existing documentation of the building to include rudimentary drawings (basic floor plan only), *Independent Seismic Review* report dated August, 29 2022, an updated *Independent Seismic Review and Concept Retrofit Design* report dated January 31, 2025, both conducted by Estructure, and a *Property Acquisition Due Diligence Report* dated March 30, 2023, conducted by the University. The design team consists of Architectural, MEP and Lighting design services provided by SmithGroup, Structural design services provided by Rutherford + Chekene and Civil design services provided by Sandis. Additional design team entities that were not present for the site observations include SmithGroup Fire Protection, Resonance Acoustics for Acoustical design services, and Salter for Audiovisual, Technology and Security design services. The following assessment is not exhaustive in nature, but provides high level observations of the existing building and site with recommendations for addressing observed conditions and deficiencies. As an assessment of the physical facility, it should be noted that challenges and/or deficiencies will be addressed as part of the wider design process with a future, selected Construction Manager at Risk entity.

## STEWART BUILDING GENERAL DESCRIPTION AND INFORMATION

**Building Information:**

The Stewart Building is located approximately one quarter mile west of the California Polytechnic University, Humboldt Campus in a 2-story exterior concrete and interior wood-framed building and a clay-tile and asphalt roof owned by the University in Arcata, California at 1125 16th Street. The existing building was originally dedicated in 1925 as the Stewart School and holds historic significance with The Arcata Historic Preservation Office. Currently, the building partially contains leased business office suites and rented storage spaces for tenants while the remaining space serves as storage for the University. The existing building is situated on an approximately 1.59-acre site with on-site parking to the south and west sides of the building, and vehicular access to the property from both 16th and L Streets. The property is surrounded to its immediate east and south by single-family residential homes and Stewart Park. Across the street on the northside of the building is Arcata High School and the Arcata Community Pool.

**Building Area:** 42,000 GSF

**Building Height:** Approximately +37′ – 2″ to Main Roof and +42′ – 2″ to High Roof

**Number of Stories:** 2

# ASSESSMENT NARRATIVES

## STRUCTURAL AND MATERIAL ASSESSMENT

### SUMMARY

The Stewart Building on 1125 16th Street in Arcata, CA is a two-story structure circa 1925, approximately 42,000 sf of construction, that is located 330 feet from the nearest known fault. The scope of work consists of the seismic upgrade and complete renovation of the existing Stewart Building. The building is a two-story structure with plywood diaphragms spanning between wood joists, supported on wood walls, wood posts and perimeter reinforced concrete shear walls. The building will contain approximately 30000 square feet of program space for instructional labs and classrooms, offices, common areas and service and utility rooms.

The Stewart building has a Seismic Performance Level V based on a Tier 1 seismic evaluation based on ASCE 41-17 done by Estructure. The report, titled *Independent Seismic Review,* includes a concept seismic retrofit of the existing building based on 2022 California Existing Building Code.

The building must be seismically retrofitted to achieve a Seismic Performance Level IV based on future program included in the California Polytechnic Humboldt Health Hub project.

### CODES AND STANDARDS

California Existing Building Code (CBC 2025), as modified by the provisions contained in the August 2024 edition of the CSU Seismic Requirements, and ASCE 41-17 “Seismic Evaluation and Retrofit of Existing Buildings”. The acceleration parameters for the design earthquake are as specified in the CSU Seismic Requirements.

### SYSTEMS DESCRIPTIONS

Existing Building Description

The Steward Building was built in 1925. Original structural drawings are not available. The building underwent several renovations, including certain degree of seismic retrofit in the roof diaphragm, but there are no as-built documents containing substantial structural information regarding these alterations to the original structure.

The existing building consists of a two-story structure with a partial basement, with an approximate area of 42,000 sf of construction, plan dimensions of approximately 290 feet by 88 feet, and story heights of 7-9”, 11’-0” and 12’-0” for basement, Level 1 and Level 2, respectively. The building main roof and high roof are at approximately Elevations +37’ and +42’, respectively. The building is rectangular in shape, approximately 290 feet by 58 feet with a central core that projects about 25’ south of the building.

The structural gravity system consists of:

- Level 2: Plywood straight sheathing framed with 2x10 and 2x16 wood joists at 16″ on center that span to either wood bearing walls or wood beams and posts, and perimeter reinforced concrete bearing walls.

- Roof Level: The higher and main roof structure consists of plywood straight sheathing framed with 2x4 and 2x6 wood joists at 16″ on center. The joists at the high roof span to wood and steel trusses that extend the full width on the high roof in the north-south direction. The joists at the main roof span to wood beams supported on interior wood posts and on the perimeter reinforced concrete bearing walls. The attic at the main roof consists of 2x6 joists at 16″ on center along the main corridor, and 2x14 joists at 32″ on center alternating with 2x4 joists at 32″ on center for the balance of the roof. The attic at the high roof consists of 3/8″ plywood sheathing on top of 2x joists supported on the wood and steel trusses. The roof and high roof have S-shaped clay tiles around the perimeter and asphalt shingles and panels elsewhere.

Interior wood posts are typically spaced at approximately 7’-6″ by 12’ -6″ spacing. The perimeter of the building is supported by reinforced concrete shear walls that extend from Level 1 and partial basement to the main roof. The building has a partial basement on the east end as the exterior grade slopes down about 3% in the west direction, resulting in ground floor walls in the east side retaining up to 5 feet of soil.

The lateral force-resisting system consists of perimeter reinforced concrete shear walls in both north-south and east-west directions. The walls are approximately 12″ thick at the first floor and 8″ thick at the second floor. The perimeter walls have numerous large window and door openings that are typically aligned between floors.

It appears that the second-floor diaphragm is tied into the walls with ½″ diameter bars extending out of the concrete walls and connecting the walls to the perpendicular joists. The roof diaphragm spans between the concrete walls, and it appears not connected to the top of the wall. Below the main roof, the attic plywood diaphragm connects to the perimeter on three sides, and to the interior walls. On the north side of the attic, there is no connection to the north concrete wall, but it appears the diaphragm connects to the full height sheathed wood wall. There are also short wood frame cripple walls on top of the concrete walls connecting the high roof to the walls.

The ground floor (Level 1) consists of a concrete slab-on-grade. There is no as-built information available regarding the foundation system. It is assumed that perimeter reinforced concrete walls and interior bearing walls are supported on continuous footings and that the interior posts are supported on spread footings.

Conceptual Seismic Retrofit

R+C has not performed any structural analysis or evaluation of the Stewart Building. Therefore, Estructure's seismic retrofit concept included in their "Independent Seismic Review and Concept Retrofit Design" document dated 1/31/2025 should be utilized as basis of design for cost estimate purposes.

Estructure's retrofit design concept for achieving a Seismic Performance Level Rating of IV consists of:

- Providing out-of-plane wall anchorage at flexible diaphragms
- Strengthening of cripple walls below the high roof
- Added new plywood shear walls in the north-south direction
- Added cross ties between diaphragm chords.
- Fastening of each clay tile on the roof

This retrofit concept is preliminary, and it is based on the current building conditions. We will review and update this retrofit concept in response to changes in the Architectural and MEP programs related to the California Polytechnic Humbold Health Hub project. These changes may include added MEP equipment on the main roof and selected demolition of the higher roof, new shaft openings through Levels 2 and roof, and potential utilization of the partial basement space that could affect gravity and seismic demands in the structure and its foundations

# MECHANICAL, ELECTRICAL AND PLUMBING ASSESSMENT

**HVAC NARRATIVE**

The intent of this assessment is to evaluate the existing mechanical systems in place, review conditions and suitability for re-use, while identifying challenges and opportunities for improvement. This assessment is based on observations made during (2) 4-hour site surveys**.** No as-built drawings, testing & balancing reports or other documentation have been provided for this building, which may impact the accuracy of certain details. The findings and recommendations provided herein aim to support the informed decision-making for the proposed renovation and ensure the HVAC system meets program demands.

Given the visible condition of all existing HVAC equipment, it is beyond its anticipated service life and shall be replaced as part of retrofit work. Refer to the recommendations section for proposed improvements.

HVAC Systems

The building has been divided into zones with separate independent HVAC solutions in certain zones (no centralized plant equipment). There is variety across the building in terms of space usage per zone including teaching space, artists' studios and a physical therapy studio.

Heating

A minimum of 6 different indoor gas-fired furnace units were found distributed through the building in various locations including attic space above Level 2 and floor mounted within cupboards in Level 1 art studios. Each recirculating furnace unit is paired with a wall mounted room programmable thermostat within the space served and connected via supply and return ducting. A single condensing 5-ton Trane condensing unit is located to the south side of the building and is assumed to have reversible capability to provide heating or cooling dependent on demand. The paired indoor unit was not located during the site survey.

The furnace units are of varying condition and age, however all are either past their working life or sized only to meet demands of the spaces they currently serve.

***Figure 1. Furnace In Level 1 Art Studio***

***Figure 2. Furnace Above Room 213A Ceiling***

Cooling

The same condensing 5-ton Trane condensing unit mentioned above located to the south side of the building is assumed to be provided to meet latent and sensible cooling requirements of the physical therapy studio. There is no other visible cooling provided at the building.

***Figure 3 Condensing Unit Location***


***Figure 4 Condensing Unit Nameplate***

<u>Ventilation</u>

There is currently no visible mechanical ventilation control for the building. Windows are operable and certain spaces are provided with ceiling fans to circulate air, however, there does not appear to be any direct control of ventilation/outdoor air intake/relief and therefore shall need to be provided with any further major renovation.

Individual restrooms are provided with dedicated ceiling mounted exhaust fans, with on/off operation connected to manual light-switch position (no delay/timer).

The latest code and CSU standards will demand increased Indoor Air Quality (IAQ) capabilities of the HVAC system which the current equipment is incapable of providing.

<u>Distribution</u>

Ducting on the East side of Level 1 is largely exposed galvanized steel ducts from cupboard mounted vertical furnaces to the various individual studios. Ductwork at this level appears to be more recently installed and in better condition than Level 2, and has some potential for reuse, should this space remain in scope and not require demolition. Ducting on the West side of Level 1 is concealed above acoustic ceiling tiles and was not inspected; however, it is expected to be at end of life and unfit to be retained once the ceiling has been demolished to suit the new program needs.

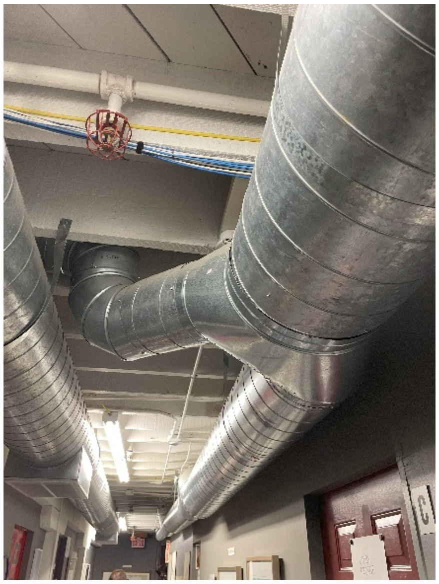


***Figure 5. Level 1 Corridor Duct Main***

***Figure 6. Level 1 Art Studio Duct and Diffuser***

Ducts on Level 2 from HVAC units to ceiling-mounted air diffusers are mostly routed through the attic space (accessed via hatches in level 2 main corridor ceiling). This space appears sufficient for future ducting, piping and terminal units where required, however some structural and architectural modifications may be required to permit proper maintenance access.

***Figure 7. HVAC Unit in Attic above Central Corridor***

***Figure 8. Attic Space above East Corridor***

Majority of ducts are partially or fully uninsulated. Interiors of ducts were not inspected, however the exteriors showed damage, patched, disconnected and capped ducts throughout, all of which will require replacement to facilitate new system installation.

***Figure 9. Ductwork above 213A, supplying 213***

***Figure 10. Ductwork condition in Attic Space***

Diffusers on Level 2 are a blend of ACT mounted 2'x2' perforated square diffusers in classrooms and linear double deflection adjustable grilles in the architectural high-ceiling corridors/rooms.

Roof

The roof is free of HVAC equipment apart from a single decommissioned condensing unit and several attic relief hoods. The available roof area is sufficient for small future HVAC plant units such as Dedicated Outdoor Air Units (DOAS) or Rooftop Packaged Units (RTUs) if required, however this would necessitate installation of appropriate fall-protection and potential structural upgrades (further study required – see Architecture and Structural sections for more detail). A permanent access pathway would also be recommended up to the roof, as the current route (via attic crawl space) is not sufficient to maintain HVAC plant. This is due to a high-risk of damage to the building (foot fall through ceiling) and injury to the maintenance staff.

Envelope

From a thermal performance perspective, the existing building envelope is insufficient to meet current code requirement and CSU standards. The vast majority of windows are steel framed, single-panel operable type and therefore will not meet Title 24 (T24). The wall assemblies will need to be improved to meet T24 U-values for this climate zone, likely upgrading the wall interiors with additional insulation in order to preserve the visual aesthetic of the historic building façade.

California Polytechnic University Humboldt
Healthcare Hub
Stewart Building Assessment
June 5, 2025

**ELECTRICAL AND LIGHTING NARRATIVE**

The purpose of this assessment is to evaluate the existing electrical infrastructure and identify any challenges or opportunities for improvement. This assessment is based on observations made during two (2) 4-hour site surveys. It is important to note that no as-built drawings were available for reference, which may impact the accuracy of certain details. The findings and recommendations provided herein aim to support the informed decision-making for the proposed renovation and ensure the electrical system meets program demands.

<u>Electrical Service</u>

The existing electrical service is supplied by Pacific Gas and Electric (PG&E). Power is delivered via an overhead connection originating from a pole-mounted utility transformer located on 16$^{th}$ Street. The service conductors are routed through a weatherhead to the Level 1 service equipment (see Figure 11). The existing service is rated at 600A, 120/240V, 1-phase, 3-wire and is equipped with six (6) utility meters (see Figure 12). This single-phase system lacks the capacity and flexibility required for a healthcare hub, which demands higher power density and support for higher-voltage loads. As such, a complete replacement of the electrical system – including electric service equipment, distribution equipment, feeders, and devices – is necessary to meet program requirements. Refer to the Recommendations section of this narrative for detailed upgrade options and implementation guidance.

*Figure 11. Overhead Service*


*Figure 12. Service Equipment and Meters*

<u>Emergency / Standby Power System</u>

There is currently no emergency generator or central inverter system on site. Emergency power available is limited to battery-powered emergency lighting units, commonly referred to as "bug-eye" fixtures, installed to illuminate egress paths upon loss of normal power (see Figure 13). The fixtures are sparsely distributed throughout the facility. A detailed assessment may be warranted to determine whether the current quantity and placement of units meet applicable life safety code requirements.

***Figure 13. Emergency Lighting Unit***

<u>Lighting</u>

The existing interior lighting systems are comprised of various sources; fluorescent, CFL, LED, with many of the lamps having failed or the luminaires in general being in bad working condition. Some spaces like the main corridors have lighting solutions adequate and representative of the space and use case. There are some spaces where LED fixtures have been added but are not integrated or aligned with the use of the space or the architectural quality of the space.

***Above: Examples of various interior lighting systems***

There is very minimal exterior lighting on the site. Nearly all lighting on the exterior of the building is located at the roof soffit. The exterior lighting also exhibits multiple lamp types and luminaire designs, with some appearing functional and others clearly not. Lighting for the site does not appear to be adequate for the use case due to lack of parking lot lighting and general lighting for pedestrian movement around the site. Additionally, there is concern about light trespass beyond the building property line due to nature of soffit lighting being high and aimed outward away from building. Although, no night time lighting assessment has been completed to date.

***Above: Example of only types of exterior lighting, mounted high at roof soffit***

All lighting and lighting controls will need to be replaced to meet code. Refer to Recommendations for general upgrade suggestions.

Lighting Controls

The existing indoor lighting control system predominantly utilizes manual toggle on/off switches throughout the building. While bi-level switching is present in corridors and some larger rooms, there are no dimming controls for the installed lighting fixtures. In select recently renovated tenant spaces, occupancy sensors have been added to automate lighting based on room usage. However, there is no centralized lighting control network in place to manage or automate lighting across the facility.

The current indoor lighting controls do not meet Title 24 requirements for mandatory indoor controls, such as automatic shutoff, multi-level lighting, and daylight controls.

For exterior lighting, most fixtures appear to be equipped with integral photocell controls. However, no time-based scheduling controls were identified during the survey, and low-mounted fixtures do not appear to include motion sensors. As with the indoor lighting controls, the outdoor lighting controls do not meet Title 24 requirements. Refer to the Recommendations section below for detailed upgrade strategies to bring the controls system in compliance and improve operational efficiency.

California Polytechnic University Humboldt
Healthcare Hub
Stewart Building Assessment
June 5, 2025

**PLUMBING NARRATIVE**

The purpose of this assessment is to evaluate the existing plumbing infrastructure and identify any challenges or opportunities for improvement. The assessment of plumbing systems is solely based on two (2) 4-hoursite surveys as no as-built drawings or other documentation have been provided for this building, which may impact the accuracy of certain details. The findings and recommendations provided herein aim to support the informed decision-making for the proposed renovation and ensure the plumbing system meets program demands.

Plumbing Utilities/Points of Connection

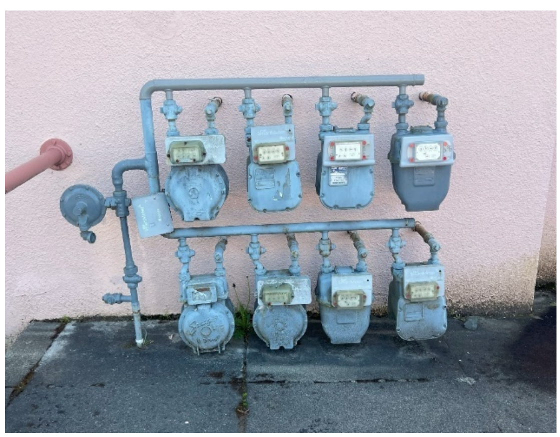
Cold water (1-1/2”) enters the building from the North. There is a below-grade meter located within the sidewalk and shut-off valve in the building.

Based on the planned program, the cold water service will need to be upsized with a new service.

***Above: Below-grade water meter and water service into building***

Gas enters the building from the North. There are multiple meters installed against building exterior, exposed at the sidewalk.

Based on the planned program and Cal Poly Humboldt’s goal for reduced carbon footprint, the natural gas service will be removed in its entirety.



***Above: Gas service and gas meters into building***

Sanitary waste leaves the building toward the South. There is a cleanout located within the sidewalk before the parking lot. Further investigation will need to be done in order to verify if size and condition of piping leaving the building is able to be reused.

Sanitary Waste & Vent

Sanitary and vent piping through the building is a combination of hub and spigot cast iron, ABS, and plastic tubing. Piping is not adequately supported and does not have proper slope.

Storm Drainage

Storm drainage is conveyed down sloped roofs to gutters and exposed downspouts around the perimeter of the building. Some downspouts appear to discharge into landscape/grade and others continue to below grade. Additionally, the exposed downspouts at the pedestrian level have been damaged and in some instances replaced with steel piping. The project will consider replacement of the downspouts to be consistent when exposed to view.

***Above: Storm drain leader to grade***

Domestic Cold Water

Cold water within the building is distributed through a combination of copper and what appears to be galvanized steel piping. The routing in the building appears to have been modified over the years, such that there is not a clear distribution path or isolation valves on a per floor or room basis. Therefore, we anticipate the complete removal of the existing domestic cold water system.

California Polytechnic University Humboldt
Healthcare Hub
Stewart Building Assessment
June 5, 2025

Domestic Hot Water

Hot water is produced by localized water heaters. There is a mix of water heater types including electric tankless and gas tank-type throughout the building. Additionally, some are located within equipment rooms, while others are located above ceiling, or directly below the fixture being served.

Hot water piping is not consistently insulated per code.

The routing in the building appears to have been modified over the years, such that there is not a clear distribution path or isolation valves on a per floor or room basis. Therefore, we anticipate the complete removal of the existing domestic cold water system.


***Above: Water heater with uninsulated domestic hot water piping***

# ARCHITECTURAL AND ACCESSIBILITY ASSESSMENT

**ARCHITECTURAL AND ACCESSIBILITY NARRATIVE**

The Stewart Building is a two-story building constructed primarily of concrete exterior walls, some interior concrete structural walls, and wood framed interior walls and roof. The building, designed in the Craftsman Period in a blended mission revival and craftsman style, was completed in 1925. The Stewart Building is a designated local historical landmark in the Arcata Heights Conservation Area per The Arcata Historic Preservation Office. The existing documentation of the building is limited with no documented as-builts or record drawings provided prior to the site visit observations as indicated in the Executive Summary. The current building documentation received prior to the onsite observations consisted of CSU required *Independent Seismic Review* report conducted by Estructure, and a *Property Acquisition Due Diligence Report* conducted by the University. This architectural assessment primarily outlines the observed conditions of the existing Stewart Building during the site visit supplemented with the limited existing building information through the following categories:

<u>Building Envelope</u>

The building envelope assessment consisted of visual observation of the exterior wall system, roof system, window and door systems for visible evidence of deficiencies and other types of distress.

<u>ROOF</u>: The existing roof is a combination of three roofing materials:

1. Built-up roof (BUR) with a mineral cap sheet at the flat, or low-sloped, areas.
2. Asphalt shingles at the sloped area connecting the higher and lower low-sloped roofs.
3. Concrete S-tile that runs the perimeter of the building over 1x sheathing boards.

<u>Asphalt shingle roof:</u> There is no transition from the BUR roof to the asphalt shingles and or from the asphalt shingles back to the BUR roof. It appears the material transition is a lapping of materials with lap distance unknown at this time.

<u>BUR</u>: There is no obvious insulation at the BUR. Slopes on the low-sloped roofs are nearly flat and do not meet current low-sloped roofing standards. There is evidence of ponding on the roof. There are also numerous areas below the roof that attempt to catch water at intermittent leaks; no water was present at the time of site walk.

<u>Concrete S-tile roof:</u> The perimeter of the roof has concrete S-tiles which appear to be quite old. A number of tiles are broken at various locations. There is lead flashing visible at many of the roof intersections as well as at the top row of tiles from the flashing cap.

Transition from low-sloped roof to concrete S-tile roof is at a short curb that is approximately 6 inches high and 2 inches wide that is flashed either with a painted galvanized sheet metal (GSM) cap and/or an applied asphaltic material. There are occasional openings at the short curb that act as scuppers and allow water from the upper low-sloped roofs to drain onto the S-tile roof that runs the building's perimeter.

There are no internal rainwater leaders from the low-sloped roof. All the water from both the high and the low main roof sheet drains to the building perimeter into the perimeter gutters and down exterior rainwater leaders.

The gutters appear to be the original ogee redwood gutters with no rot immediately apparent upon visual inspection. There were areas visible where small plants had sprouted from within the gutters at small, isolated locations, but those areas were not accessible for review.

There is currently no equipment on the roof, other than an abandoned condensing unit.

The roof has no system for fall-prevention in place.

The sides of the asphalt roof terminate under the barrel tiles that typically ride the ridge in a typical barre-tile/S-tile roof.

The roof is not insulated. The insulation layer is at the floor of the attic spaces and the attic is currently unconditioned space.

***Figure 14 – BUR at Low-Sloped 'Low Roof'***

***Figure 15 – Asphalt Shingle Roof at 'High Roof'***

***Figure 16 – BUR to Asphalt Shingle Roof Transition***

***Figure 17 – Concrete S-Tile Roof***

<u>VERTICAL ENVELOPE</u>: The building is primarily painted concrete. There were no obvious major deficiencies as viewed from the ground at the time of the site walk. Some areas of past cracks and repairs that had been painted over are visible at some of the corners of some of the openings around the building. There are signs of water intrusion at the building interior around window openings where plaster is starting to peel off the concrete walls.

The windows appear to be steel windows with narrow frames and single-pane glazing at the building exterior. Often within a window, there are mullions approximate 1.5" square that allow some windowpanes to be operable. A few of the larger openings at the south elevation have large arches as part of the glazing that will want to remain in the new construction.

The exterior doors at the pedestrian entries appear to be the original wood doors with large amounts of glazing per door as well with glazing surrounding the doors in the form of sidelights and clerestory windows.

There are numerous window openings at the lower level that have been boarded up. These will need to be evaluated if the building is best served by possibly making these closures more permanent and or opened-up for the building and program.

Building Interior

Visual observation of the general building interior was conducted during the site visit. As it is understood that all the interior walls and rooms will be part of an earlier demolition package, interior areas of note for visual observation include:

General Existing Layout and Allocation of Existing Spaces: The general layout of the interior at level 1 is divided between occupiable leased tenant and storage spaces and non-occupiable service spaces. Generally, Level 1 has a slope running west to east with the eastern half of Level 1 retaining soil, as identified in the *Independent Structural Review and Concept Retrofit Report*. With the noticeable grade change throughout Level 1, a series of sloped walkways are present within the interior hallways connecting the varying spaces.

At Level 2, the general layout consists of rooms accessed off both sides of a primary hallway running east west through the middle of the building. Another two hallways connect from the south, flanking either side of the protruding center volume from the two southern entry points. The protruding center volume on the south side of the building is divided into two suites. The overall ceiling height is approximately 18 feet with an offset mezzanine level in the west suite. The larger window openings at the south elevation of the center volume have large arches as part of the glazing.

Overall, the ceiling height at Level 2 is +/- 12 feet, Level 1 at +/- 11 feet and the portion of Level 1 that recedes below grade at +/- 7'-9" at its highest point (see Appendix 8 for more Level 1 slab elevations).

Vertical circulation within the building consists of two (2) existing stairs within the building; the eastern stairs from Level 1 to Level 2 have been framed and floored over to house an IDF room. The western stairs from Level 1 to Level 2 are currently open with a wood guardrail and handrail system.

Interior Environment Materiality and Condition: The general interior construction consists of majority load-bearing walls as concrete shear walls, with one wood-framed straight sheathed shear wall, and non-load bearing walls as wood-framed walls. A plaster finish is applied to most concrete walls and a painted gypsum board at wood-framed walls. Concrete walls are exposed at Level 1 non-occupiable services areas and the east-portion of Level 1 that begins to recede below grade.

Level 1 consists of a concrete floor slab and Level 2 consists of a wood-framed floor system with varying levels of floor finish from original hardwood floors with apparent adhesive residue remaining from previously removed overlayed floor finish in some vacant spaces, a variation of vinyl tile (Level 2) and ceramic tile (Level 1) in restrooms, carpet tile in office suites and original hardwood floors in the main hallway. Ceiling finishes at Level 1 vary from exposed Level 2 floor joist framing in non-occupiable service areas to acoustical tiles in leased office suites. Similarly, Level 2 has acoustical tiles in leased office suites with plaster finish at the main hallway. The finish ceiling height at the main hallway is around 11'-10".

<u>Building Access and Accessibility</u>

The building access and accessibility assessment consisted of observation of the exterior entry points into the building to include stairs, ramps and walks for evidence of accessibility and access issues. Site access and accessibility assessment is described further in the Site Assessment narrative section.

<u>Building Access</u>: The building perimeter consists of numerous door openings. At Level 1, there are four pedestrian entries. These will all need to be reviewed for security and accessibility against the final design. There are two door openings on the north side of the building along 16th street that currently only provide service access to the unoccupied service area at Level 1.

At Level 2, there are three entries. The east Level 2 entry has one door opening with a pair of doors at the east end of the building with a non-accessible ramp from the sidewalk at 16th Street, the public right of way. The south Level 2 entry-points consist of two separate entries at the top of the two stairs. Neither of these entries are accessible and do not provide accessible stairs, clearances and/or door hardware.

The challenges are greater at the most western door on the Level 1 south elevation as the sill at this door is 4 risers below the main floor level immediately upon entry to the building. This will need a detailed survey for accessibility compliance.

<u>Building Accessibility</u>: General accessibility at the interior of the building, to include restrooms, is not included in this Assessment as it is understood that all the interior walls and rooms will be part of an earlier demolition package. Exceptions reviewed include:

1. Door Operability: There are no powered door openers at exterior or interior spaces in the building.
2. Vertical Circulation:
    a. No elevator exists within the current building.
    b. There are two (2) existing stairs within the building; the eastern stairs from Level 1 to Level 2 have been framed and floored over. The western stairs are currently open but do not meet accessibility requirements.

# SITE ASSESSMENT

### SITE ASSESSMENT NARRATIVE

**Overview:** The site for the Cal Poly Humboldt (CPH) Healthcare Hub is located at 1125 16th Street in Arcata, California. The existing two-story building is oriented east-west along 16th Street, in the northeast portion of the property. The property is surrounded to the north by 16th Street, to the west by L Street and to the south and east by residential homes and Stewart Park.

Vehicular access to the site is from a driveway located on L Street, which runs north-south along the west edge of the site. There is a vehicular rolling gate and parking area off 16th Street on the west end of the building; however, the access is over an approximate 6-inch vertical curb and most recently used for commercial fleet-style vans and trailers.

The parking lot is paved with asphalt and forms an L shape that abuts the west and southwest sides of the building. The parking lot currently provides 77 standard parking spaces and two ADA parking spaces with a loading zone. The enclosed fleet parking area does not have striping; however, would accommodate approximately 16 fleet vehicles. A dumpster with lids is located in a curb island within the parking lot. There is no enclosure or roof at the dumpster location.

***Above – L Street Vehicular Access Point***

***Above - Curb Island Adjacent to Fenced Fleet Parking***

The main entrances of the building are located on the south side and east end of the building. There are no publicly accessed entrances to the building directly from 16th Street. There are two staircases leading to the upper floor and one staircase leading down to the lower floor on the southeast side of the building. There are two locations with level entrances: one on the west end and one on the southwest corner of the building. There are accessible ramps along with adjacent steps: one at the southwest corner of the building to the lower floor and one at the northeast corner of the building to the upper floor. Two recessed entrances are located on the north side of the building for the mechanical and electrical rooms.

The existing exterior pavement at the driveway of the parking lot, the ADA parking spaces, and the access on the east side of the building are in moderately poor to poor conditions. The remainder of the asphalt appears to be in good condition.

The existing public sidewalk along 16th Street is very worn and has damaged areas and large cracks. The curb is broken in several locations.

**Grading and Drainage:** Based on site observation, the site is generally level, with some slope from north to south and east to west. It appears runoff would drain across the parking lot and enter L Street through the driveway. There are existing public storm drain catch basins at the corner of L Street and 16th Street to the north and the corner of L Street and 15th Street to the south. A topographic survey will be required to verify the drainage patterns and infrastructure.

**Floodplain:** Per the FEMA Flood Insurance Rate Map (FIRM) numbers 06023C0689F and 06023C0852G, the property is within special flood hazard area Zone X, which is defined as an area of minimal flood hazard.

**Other hazards:** Initial review of local maps indicate the site is not within a moderate or high fire hazard severity zone, tsunami hazard area or wetland area.

## ACCESSIBILITY AND FIRE ACCESS

**ADA Parking:** Further coordination with the Architect will be required to confirm the required parking spaces for the use of the building. The current count of two ADA parking spaces does not meet current California Building Code (CBC) requirements, which is four ADA spaces under the current parking count of 77. Alternatively, three ADA spaces would be sufficient if two parking spaces were converted to ADA and loading aisle, such that 75 parking spaces will be provided. The existing parking lot striping is faded and some ADA signage is not present.

**ADA Path of Travel:** Further coordination with the Architect will be required to confirm ADA paths-of-travel to the building entrances. Currently, non-compliant paths-of-travel are available on the west, east and south sides of the building with either accessible ramps or level access. Building access on the east side can be accessed from 16th Street, while the other accessible routes are from the parking lot. Some ramps lacked handrail extensions per current ADA code. A topographic survey is required to verify the existing condition of the ADA paths-of-travel, including longitudinal and cross-slopes and dimensions.

The sidewalks in the public right-of-way were not reviewed for compliance with ADA code. The truncated domes at the intersection of 16th Street and L Street are damaged.

**Fire Access and Protection: Fire** truck access is provided on the north side of the building on 16th Street and in the parking lot from L Street via the driveway. It appears that on the east side of the building there is an asphalt area that was widened in the past that includes removable bollards, possibly for fire access. A driveway cut does not exist so if used for fire access the truck would need to navigate over the existing 6-inch vertical curb on 16th Street. There is approximately 130 feet between the current fire truck coverage on the south and east ends, which means all exterior walls of the building are within the current code required 150' of a fire access lane. There is one public fire hydrant and a wall-mounted fire department connection (FDC) on 16th Street in front of the building.

**STORMWATER MANAGEMENT**

**Stormwater Management: The** City of Arcata is the permitting agency for stormwater management on developments. The site does not currently provide any significant on-site stormwater treatment measures. There are a few downspouts that were observed to drain to landscape planters; however, all other runoff appears to drain from the site via overland flow or below ground piping. Based on the Humboldt Low Impact Development Stormwater Manual in accordance with the Phase II Small MS4 General Permit, projects proposing less than 5,000 square feet of impervious surface are exempted from stormwater treatment requirements. Pavement repair is also exempted when the subgrade is not exposed. Therefore, the project will not be subject to stormwater treatment unless the created and/or replaced hardscape area exceeds 5,000 square feet.

**SITE UTILITIES**

**Domestic Water:** Based on initial utility research information, there is an existing 12-inch water main in 16th Street adjacent to the property. A water meter box was observed in the public sidewalk. No available water pressure data was available for the water main, and it appears to be the end of the system as the piping does not extend beyond the property. Depending on the programming and water demand of the building, a new domestic water lateral may be needed.

**Fire Water:** The existing building is sprinklered with a wall-mounted FDC on the northern building wall near the electrical room entrance. The firewater backflow device/check valve with pressure gauge occurs at the building interior side of the exterior wall-mounted FDC. The service lateral size and location are not currently known and further information from the topographic survey, as-built drawings and block maps from the utility provider are needed. Fire water piping and device improvements may be needed.

***Above – 16th Street Fire Hydrant and FDC***

***Above – Firewater Backflow Assembly***

There is an existing public fire hydrant located approximately 40 feet from the FDC on 16th Street which is fed from the existing water main. A hydrant flow test will be required to determine whether the available flow meets the minimum fire flow requirement for the building based on current California Fire Code (CFC). No additional fire hydrants were observed in proximity of the project site. Additional fire hydrants may be required to meet the CFC requirements.

**Storm Drain:** The public storm drainage infrastructure in the vicinity consists of conveying runoff from east to west against the curb on the south side of 16th Street into a shallow catch basin before the intersection of 16th Street and L Street. It appears the catch basin outlet routes under the raised crosswalk and daylights into the gutter pan on L Street. Runoff then drains south in L Street and enters the City's storm drain network at the catch basin near the intersection of L Street and 15th Street. It is believed that the storm drain system in this area eventually discharges into Jolly Giant Creek. The City of Arcata's storm drain network maps will be required to verify the conveyance.

As depicted in the Architectural and Accessibility Narrative, the building roof consists of areas of flat roof and sloped roof consisting of a combination of roofing materials with all water from both the high and low roof sheet draining through building perimeter gutters down exterior rainwater leaders. Fifteen (15) downspouts were counted around the building, the majority of which are discharging onto adjacent surfaces. Two downspouts on the southwest side of the building route below grade, with no outlets observed. Downspouts on the north side of the building daylight onto the public sidewalk and those on the southeast and west sides of the building daylight onto landscaping areas. A downspout on the south side discharges onto the parking lot surface via a thru-curb drain under the sidewalk. No storm drain structures, such as area drains or catch basins were observed on the property. The roof runoff on the south side of the building which daylights in the parking lot likely drains from east to west across the parking lot and exits the site at the driveway to L Street.

**Sanitary Sewer:** Based on initial utility research information, an existing sanitary sewer main is located in 16th Street, which dead-ends to the east. The pipe is 6-inch, then reduces to 4-inch before reaching the dead end. A 6-inch main exists in L Street. A sanitary sewer cleanout was observed on the south side of the building. Additional information is needed regarding the routing, size, and depth of the existing sanitary sewer system. Further study would be necessary to verify whether the existing sanitary sewer line is adequate for the proposed improvements.

# AREAS OF CONCERN OR NOTABLE FEATURES

**AREAS OF CONCERN OR NOTABLE FEATURES NARRATIVE**

Level 1 Grade: As previously noted, Level 1 has a slope running west to east with the eastern half of Level 1 retaining soil, as identified in the *Independent Structural Review and Concept Retrofit* Report. The non-accessible service and back-of-house portion of Level 1 within the eastern wing, poses notable areas of concern relative to overall top of slab to bottom of structure elevations and the presence of a 5'-0" wide by 2'-0" tall concrete "bench" footing along the building perimeter (see Figure 18 and Appendix 8). At its tightest condition, the bottom of beam is at 6'-0" and generally holds a 7'-0" and 7'-9" to bottom of beam and structural floor sheathing elevation respectively. The area would require structural modifications to the building foundations, bearing walls, columns and beams to increase the head height of the space to code compliance in order to be utilized as occupiable building space for the Health Hub program.

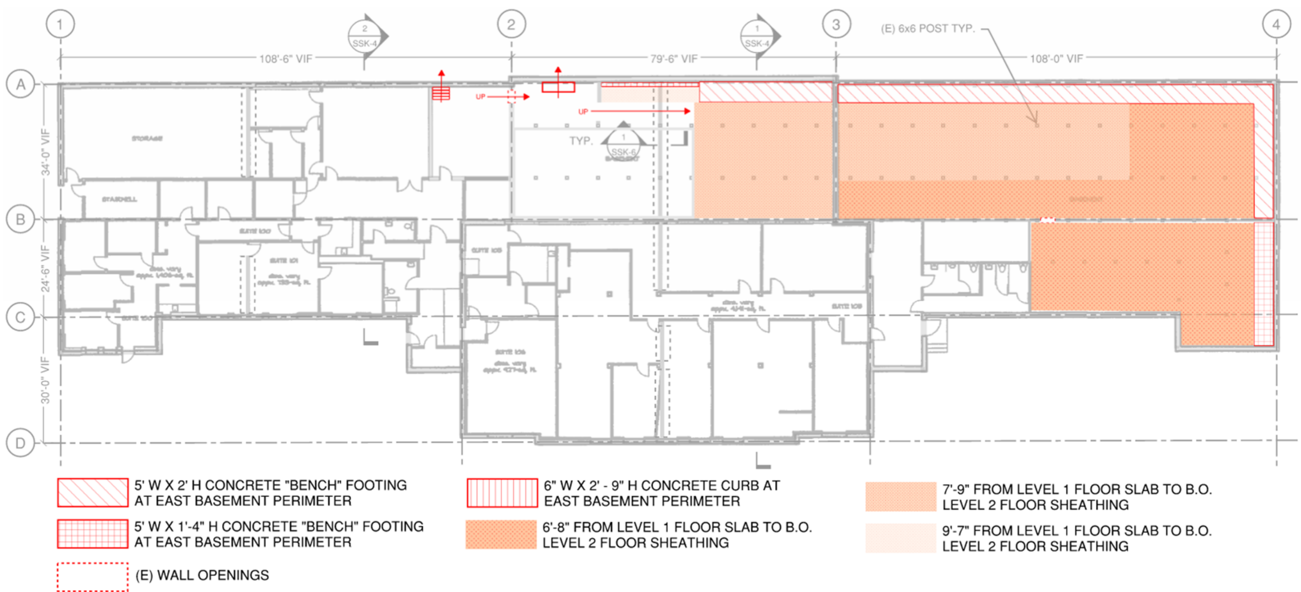



***Figure 18 - Stewart Building Level 1 Floor Plan: Floor Slab to Bottom of Structure Elevations at Non-Occupiable East Wing***

South Elevation Entry Stairs: As previously noted, the south Level 2 entry-points consist of two separate entries at the top of the two stairs that are not compliant with accessibility requirements. These stairs and the associated entries will need a detailed survey for accessibility compliance to determine if selective demolition of a portion or all the entry, to include stairs, is required to generate a code compliant entry access point. See Architectural and Accessibility Recommendations section for more information.

***Figure 19 - Southwest Entry Stairs***

***Figure 20 - Southeast Entry Stairs***

<u>South Elevation Arched Window Openings</u>: The large arched openings at the south elevation are a substantial architectural feature of the building exterior that will need to remain. While the replacement of the windows within the openings is recommended, an in-kind replacement will be required so as not to cause any historical jurisdictional concerns.

***Figure 21- South Elevation Arched Window Openings***

***Figure22–Arched Windows (Interior)***

<u>Redwood Gutters</u>: Previously noted in the Building Envelope sub section of the Architectural and Accessibility section, the gutters appear to be the original ogee redwood gutters with no rot immediately apparent upon visual inspection. The University may want to consider replacing the gutters with a material that has a similar ogee appearance, that would not trigger any historical concerns. See Roof Recommendation sub section of the Architectural and Accessibility Recommendations section for more information.

Original Hardwood Floors: The main Level 2 hallway appears to have original hardwood floors. Similarly, the original hardwood floors, exposed in suite 211 have apparent adhesive residue from a previous underlayment for a carpet or vinyl floor. It is assumed that hardwood floors are beneath all carpeted and vinyl flooring at Level 2. From the limited portion that could be observed, the condition of the floors varies. Per the *Healthcare Hub Schematic Design Basis of Design Document* dated March 4, 2025, the design intent is to repair, refurbish and maintain the existing wood floors at the Level 2 common hallway. It is our understanding that all the interior walls and rooms will be part of a separate demolition package, and the demolishing of hardwood floors would need to be reviewed and confirmed with the University and be vetted against structural design and HVAC solutions for the building.

***Figure 23 - Main Hallway Hardwood Floors***

***Figure 24 - Suite 211 Hardwood Floors***

# OBSERVATIONAL LIMITATIONS

**OBSERVATIONAL LIMITATIONS NARRATIVE**

- The team was not able to review specific wall to roof connections. *See Appendix 2. Plans of Inspection for Stewart Building* for areas that will still need to be reviewed by the Structural team.
- The team was not able to access all portions of the attic spaces; there are limited walkways available with numerous obstructions within the attic consisting of mechanical ducting, new telecom conduits, sprinkler lines, and/or no pathway to access remote areas were available at time of site .
- Some of the rooms were still locked upon the site walk, among them was room 118 and an enclosed area within the non-occupiable back of house portion at Level 1.
- The tile roof was only safely, observable from the areas of low-sloped roofs.

# RECOMMENDATIONS

**RECOMMENDATIONS NARRATIVE**

The following narratives outline recommendations by building element, component and system for addressing observed conditions and deficiencies of the Stewart Building to house the new Health Hub program.

**STRUCTURAL RECOMMENDATIONS**

Structural Site Investigation

R+C performed a site visit on 4/14/2025 and 4/15/2025 to observe general conditions of the structure, discuss potential seismic retrofit schemes and structural modifications in response to architectural and MEP programs. During the visit, limited access was provided for direct observation of key structural components and connections. Therefore, we propose inspections at the Stewart Building that will help inform the team of the structural requirements for the renovation to be performed by a licensed third-party inspection service. The inspections require openings of the levels above grade level that will enable the team to verify key structural components. These components are as follows:

- Beam to concrete wall connection
- Roof, attic and Level 2 floor diaphragm to concrete wall connection
- Beam connection to girders
- Beam connection to columns
- Plywood shear walls and full height post above attic connections

The site investigation must also include taking concrete cores and rebar coupons at selected reinforced concrete walls to determine design properties of the existing wall, including concrete compressive strength and rebar tension strength, as well as rebar size, number of layers and rebar spacing in the walls. The investigation would be conducted in accordance with ASCE 7-16 and ASCE 41-17. The means and methods of the inspection procedure are delineated in the guideline for the inspection of existing concrete buildings from the LA DBS, included in *Appendix 3 ASCE 7-16, ASCE 41 Guidelines for Concrete Testing for the Stewart Building*. The number of tests cores and rebar samples (coupons) are provided in Table 1 and 2 of the LA DBS document based on the risk category (Risk Category II) and available construction documents. We recommend taking 6 concrete cores per level (total = 12) and 3 rebar coupons. Refer to *Appendix 2* for proposed locations where as-built conditions of key structural components require verification, and locations where concrete cores and rebar coupons must be taken.

It is recommended to hire an inspector who can provide visual grading of the wood (species and grade) in a walkthrough of the ceiling spaces.

As the discussion included a potential utilization of the partial basement at the central north portion and eastern portion of the building as part of the building program space, it would be recommended to perform a digital scan of the basement at this area to capture the numerous existing conditions that occur here, where the team will require modification to the foundations, bearing walls, columns and beams to increase the head height of this space to code compliance.

Geotechnical Investigation

There is no site-specific geotechnical investigation available. The building is located approximately 330 feet from the nearest known fault. Therefore, a site-specific geotechnical investigation will be required that includes detailed geological studies and evaluation of near fault effect in the seismic demands used for building design.
It is the design team's understanding that a fault study is not required at the Stewart Hall per meetings with the Cal Poly Humboldt.

## HVAC RECOMMENDATIONS

Given the findings in Site Assessment portion of this report, it is recommended that all existing and abandoned HVAC systems (including equipment, distribution, terminal units and controls) be demolished from the building.

There are a number of options that could be implemented to replace existing systems and bring the building up to required performance for it's new functionality and occupancy. See OPTIONS presented in the System Recommendations sub-sections below for details of each.

The below sections outline the preliminary criteria upon which the new systems should be based.

### Outdoor and Indoor Design Criteria

#### Ambient Weather Conditions

Climate Zone 01

Arcata

Latitude: 41.0°N

Longitude: 124.1°W

Elevation: 203 ft

0.1% Cooling DB/MCWB: 75°F/61°F

Heating 0.2% DB: 31°F

Heating Degree days: 5029 HDD

Indoor Space Temperature and Humidity

Occupied setpoints:

For occupied spaces:

Cooling: 74 °F DB, target 60% RH (Not Controlled).

Heating: 70 °F DB, 60% RH (Not Controlled).

Unoccupied setback:

All occupied spaces (with exception of continuous load spaces such as Electrical Rooms, and IT rooms) shall be capable of having unoccupied temperature setback. (Cooling: 80 °F Heating: 65 °F).

Building support spaces such as electrical, data/telecom and mechanical rooms:

Cooling only. 80 °F cooling setpoint with 4-hour override button to condition space to 74F for extended work in room.

Internal Load Criteria

The following metabolic rates for sensible and latent heat of people will be used in the load calculations.

*Table 1 Metabolic Rates - People*

| Space Type | Metabolic Rates | |
|---|---|---|
| | Sensible (Btu/h) | Latent (Btu/h) |
| Labs | 275 | 475 |
| Classrooms, Offices | 250 | 200 |
| Multi-Purpose, Exercise Exam & Ambulance Simulation | 305 | 545 |

The following plug loads will be used in the load calculations.

*Table 2 Plug Loads*

| Space Type | Heat Gain | |
|---|---|---|
| | Sensible (W/sf) | Latent (W/sf) |
| Labs, Exam and Multi-Purpose Rooms | 2 | - |
| Offices | 1 | - |
| Corridors | 0.2 | - |
| Classroom | 1.5 | - |
| Lobby | 0.5 | - |
| Electrical, Mechanical, IDF | TBD | |

The following lighting power densities shall be used in the load calculations.

*Table 3 Lighting Power Density*

| Space Type | Lighting Power Density (W/sf) |
|---|---|
| Classrooms | 0.85 |
| Offices | 0.65 |
| Labs, Exam and Multi-Purpose Rooms | 1 |
| Corridors, Lobby, Restrooms | 0.6 |
| Electrical, Mechanical, IDF | 0.4 |

The following baseline schedule of occupancy will be used in the load & energy calculations:

Note that the building is shut down on holidays, except for critical rooms like IT.

*Table 4 Occupancy Schedule*

| Space Type | Weekday | Saturday | Sunday | Holiday |
|---|---|---|---|---|
| Offices | 8:00am – 6:00pm | Not Occupied | Not Occupied | Not Occupied |
| Labs/Classrooms | 6:00am – 10:00pm | 8:00am - 3:00pm | Not Occupied | Not Occupied |

**Ventilation and Exhaust Rates**

Minimum Ventilation Rates: Minimum ventilation rates shall be calculated in accordance with ASHRAE 90.1, the California Energy Code (CEC), and the California Mechanical Code (CMC). The maximum value calculated from the above standards shall be used.

CMC Ventilation rate = [People Outdoor Air Rate] x [Number of occupants] +

[Area Outdoor Air Rate] x [Area of space]

CEC Ventilation Rate = [Area Outdoor Air Rate] x [Area of space]

| | CMC People Outdoor Air Rate (cfm/person) | CMC Area Outdoor Air Rate (cfm/sf) | CEC Area Outdoor Air Rate (cfm/sf) | DCV Area Outdoor Air rate (cfm/sf) |
|---|---|---|---|---|
| Classrooms | 10 | 0.12 | 0.38 | 0.15 |
| Offices | 5 | 0.06 | 0.15 | 0.15 |
| Corridors | - | 0.06 | 0.15 | - |
| Labs | 10 | 0.18 | 0.15 | - |
| Lobby | 5 | 0.06 | 0.50 | - |

Supply air ventilation calculations shall be designed to cumulatively achieve +30% above ASHRAE minimum in-line with LEED gold requirements.

Minimum Exhaust Rates: Minimum ventilation rates shall be calculated in accordance with ASHRAE 90.1, the California Energy Code, and the California Mechanical Code. The maximum value calculated from the above standards shall be used.

Janitor's closets and wet storage areas shall be exhausted at a minimum of 1 cfm/sf.

Restrooms shall be constantly exhausted at a minimum of 50 cfm/fixture.

**Building Envelope and Energy Conservation Criteria**

Cal Poly Humboldt Healthcare Hub (CPH HCH) is located in Arcata, CA Title 24 Climate Zone 1. The existing structure is to be retained from an exterior perspective, given its architectural significance. Due to it's age however it is recommended that improvement upgrades be made in order to meet code requirements while also reducing overall energy usage and HVAC equipment sizes needed.

The following criteria should be the targeted minimum for this building:

| Envelope Element | Code Minimum (T24) U-Values | Improved U-values (Recommended) | High Performance Envelope |
|---|---|---|---|
| Roof | U-0.037 | **U-0.034** | U-0.029 |
| Mass Wall | U-0.63 | **U-0.25** | U-0.19 |
| Altered Glazing | U-0.47 SHGC-0.41 | **U-0.41, SHGC-0.26** | U-0.34, SHGC-0.23 |

To achieve the above-described improvements, the recommendation is to replace the exterior glazing typical at the building exterior, as well as add an additional layer of insulation at the building interior within wall framing, and to add insulation to the ceilings spaces to meet the Title 24 requirements. The recommendation is to keep the attic as a non-conditioned space. The described envelope upgrades are recommended for any of the System Recommendations described below.

**Preliminary Load**

The following data was calculated based on the expected square footage of the building, building type, location and previously modelled data from a previous iteration another location in Arcata that was modelled in full. This information shall be developed in the next design phase using IES to calculate full loads (both peak and hourly) in order to inform proper sizing of equipment.

| | Cooling Load (Tons) | Heating Load (kBtu/h) | Ventilation Load (CFM) |
|---|---|---|---|
| Preliminary Calculations for HH | 42 | 1,010 | 10,000 |

**SYSTEM RECOMMENDATIONS**

Following the visit and assessment of the existing facility, (6) initial HVAC system options were conceptualized. Per the March 5th, 2025, MEP Initial Discussion with the University where the (6) options were reviewed, (3) of those options have been taken forwards as the most suitable based on feedback received.

Refer to *Appendix 4 Healthcare Hub HVAC System Options* for graphical representation of each option.

<u>OPTION 1 – ASHP+ SPLIT DOAS UNITS + FPBs</u>

Air Source Heat Pumps: (3) Modular 4-pipe Air Source Heat Pumps to be located externally in the equipment yard at the west end of the building (shared with electrical transformer). The units shall be capable of heat recovery, simultaneous and independent production of Heating Hot Water (HHW) and Chilled Water (CHW). Each module shall have a minimum capacity of 35 tons allowing for peak load, redundancy and unit defrosting capability.

Air Handling Units: (2) 100% dedicated outside air handling units (DOAS) units to be provided, one for each floor of the building. Level 1 ventilation air shall be served by a unit placed within the back of house storage area (east side of building) while a unit to serve level 2 shall be placed at roof level.

Estimated CFM of each unit is as follows:

- DOAS-1 (Level 1): 3000 CFM
- DOAS-2 (Level 2): 7,000 CFM

It should be noted that although both floors have the same gross square footage (GSF), the northeast quadrant of Level 1 is not suitable for program spaces due to floor-to-structure limitations.

The unit shall include the following components:

1. Outside air damper.
2. Air flow monitoring to measure outside air.
3. MERV 8 filter bank (min 4" depth)
4. Air-to-air heat recovery (see note)
5. Heating hot water coils capable of heating incoming air to 55F.
6. Chilled water coils capable of cooling incoming air to 55F.
7. MERV 14 filter bank (min 12" depth).
8. Fan array with variable frequency drive and provide N+1 fan redundancy within the AHU.
9. Isolation damper with smoke detector per code.
10. Air handling unit shall be sized at 350 fpm at filters and coils to reduce internal static pressure.
11. Air handling units shall be provided with a convenience outlet for maintenance. Power shall be available for servicing when power to the unit is off.
12. Access doors (minimum 24" wide") shall be provided at all required points

Note: Air-to-air heat recovery within the DOAS units (e.g. heat recovery wheel or fixed plate) carries a static pressure penalty, resulting in higher fan energy consumption. Detailed investigation and modelling shall be carried out to confirm if the energy saved on re-heat is outweighed by this and thus if heat recovery shall remain.

Terminal Units: Zone level control of supply air shall be met by Fan-Powered Boxes (FPBs) complete with heating coils, 2-port control valves and primary air valves to transfer heat to and from CHW/HHW and the airstream according to demand. The boxes shall be installed above ceilings and in attic space, and connected to rooms via overhead diffusers.

Higher continuous load cooling spaces (such as IT and Electrical) shall be supplied with individual recirculating fan coil units to meet cooling demand.

Hydronic Plant: Dedicated HHW and CHW pumps shall be mounted within the Level 1 back out house space converted to an MEP room. Piping shall connect these pumps to the external ASHPS, DOAS unit's and terminal unit coils.

To accommodate the DOA unit at the roof level, "sleeper" beams will be installed spanning between existing columns to provide adequate support. In the back-of-house storage area, installation of the DOA unit will require creating a new opening through the existing perimeter concrete shear wall on the east side of the building to allow for an exhaust vent. In addition, concrete housekeeping pads will be required for the DOA unit located inside of the back-of-house storage area, as well as for the air-source heat pumps located in the equipment yard. Shaft openings will be created in the wood deck at both roof level and Level 1 to facilitate air circulation. It is assumed that shaft walls will be load-bearing walls to support the existing deck structure.

*<u>OPTION 2 – ASHP+ ROOF DOAS + FPBs (PREFERRED)</u>*

This option contains identical waterside equipment as option 1, however the airside plant shall be placed in alternate locations.

In this option the proposed DOAS units shall be placed entirely at roof level, allowing more floor space within the building to be used for other purposes, but at the expense of increased structural and architectural roof work, as well as increased shaft creation requirements to feed zones on Level 1 by roof-mounted plant. Structurally this option would require adding "sleeper" beams to span between existing columns to provide support to the DOAS units. Architecturally, recommendations would be to minimally affect the building's massing. This is due to the building's historical significance and to maintain the current flow of water around the roof as the option may require a portion of the sloped build-up roof membrane to be "flattened" to create curbs/pads for the central DOAS to sit upon.

This option also features (3) DOAS units, instead of (2) – avoiding the need to breach full height concrete shear walls with large duct penetrations.

<u>OPTION 3 – *ASHP+ ROOF DOAS + RADIANT HEAT*</u>

This option contains an identical waterside plant to Option 1 and can be applied to the airside systems noted in Options 1 or 2. However, this option proposes the use of radiant heating, in the place of fan powered terminal units.

It is anticipated that the Level 2 floor is to be replaced as part of this renovation, providing an opportunity to combine the new floor diaphragm system with a radiant floor system for improved thermal comfort. The added diaphragm also provides the opportunity to reinforce the existing floor and improve building resilience.

HHW would be pumped to manifolds which distribute heat to zones at ~90F supply water temperature, which would boost the operating efficiency of the central air source heat pumps.

Level 1 floor is non-uniform mix of both concrete slab and built-up wood construction on top of slab. The radiant panel system on this Level would be assumed identical to Level 2 on the west side of the building. The east side of the building would be supplied with fan powered boxes.

Pressure independent VAV boxes (no re-heat) would be provided to control ventilation air to zones to the correct rate to match the occupancy status/CO2 concentration. These would be above-ceiling mounted.

## <u>GENERAL RECOMMENDATIONS</u>

The following measures are recommended, regardless of the option chosen from the above.

- Operable windows – Per Title 24, if operable windows are retained as part of this upgrade, each shall be provided with window sensor switches linked to zonal equipment in order to setback the zone HVAC temperature to unoccupied mode, in order to reduce energy wastage.

- Attic Space Access – All options require new mechanical equipment to be placed in the attic space accessed through ceiling hatches in level 2 corridor. In order to provide adequate access, some modifications shall be required to provide adequate access for maintenance to reach equipment in order to carry out repairs and replacement of filters, coils, motors etc. This includes providing a surface to stand/walk on such as a catwalk or platform to stand at each piece of equipment. Minimum attic height is approximately 60", while the maximum is around 90".
- Controls – Regardless of option, the building should be provided with a full Direct Digital Control (DDC) system to manage the mechanical systems. Building control system shall be compliant with any campus master controls specifications and standards. Sequences of Operation shall comply with the latest ASHRAE Guidance 36 in order to minimize consumption, cost and downtime in-line with best in class standardized practice.
- Basement Conditioning – The large north-east quadrant basement is unlikely to be utilized for occupied space following this renovation (refer "Areas of Concern or Notable Features" section), however it is recommended that this area of the building be provided with a re-circulating fan coil unit (FCU). If kept as Storage the FCU will regulate temperature and humidity in this zone, while if utilized as HVAC/Plumbing equipment space the FCU shall meet the equipment driven cooling demand.

## ELECTRICAL AND LIGHTING RECOMMENDATIONS

Given the findings outlined in the Site Assessment section of this report, it is recommended that all existing and abandoned electrical infrastructure – including electric service equipment, distribution equipment, feeders, fixtures, devices – be completely demolished and removed from the building.

The following sections present the preliminary design criteria for the new electrical system.

### Electrical Utility Service and Load Analysis

To support the increased electrical demand required for the healthcare educational facility, the existing electric service will need to be upgraded. Based on the preliminary load calculations, it is estimated that the new service from Pacific Gas & Electric (PG&E) will need to be 1600A, 480Y/277V, 3-phase, 4-wire system supplied via underground feeder from PG&E point of connection (POC) to a pad-mounted utility transformer. The transformer is proposed to be located on the west side of the project site. All requirements for service feeder and transformer will need to comply with PG&E's latest Greenbook (Electrical Service Requirement) manual. Further coordination with PG&E is also required to verify the point of connection to the utility grid.

Due to floor-to-ceiling height constraints within the building, the main service switchboard will need to also be installed outdoors with a NEMA 3R-rated outdoor enclosure, located adjacent to the west side of the building to allow overhead conduit entry to the building.

The following table summarizes the estimated electrical loads for the healthcare facility. These load estimates are based on a volt-ampere (VA) per square foot calculation using gross square footage (GSF) of building areas and estimated VA load for large equipment such as HVAC.

| MAIN SWBD 'MSB' LOAD ESTIMATION | | |
|---|---|---|
| LIGHTING | 78.0 | kVA |
| RECEPTACLE | 146.1 | kVA |
| EQUIPMENT | 134.5 | kVA |
| HVAC | 470.5 | kVA |
| PLUMBING | 90.0 | kVA |
| MISCELLANEOUS | 66.4 | kVA |
| Subtotal | 985.4 | kVA |
| 20% Spare Capacity | 197.1 | kVA |
| Total (kVA) | 1182.5 | kVA |
| Total (Amps @ 480V 3-phase) | 1423.0 | A |
| MSB Rating | 1600.0 | A |

Electrical Room Layout / Power Distribution

The electrical distribution strategy for the proposed renovation is described to accommodate estimated power demands while optimizing system efficiency and maintainability. Power distribution will be at 480/277V for long feeders, with localized step-down transformation to 208Y/120V in electrical rooms. This approach reduces the voltage drop and minimizes feeder (conduit & cable) conductor sizing over long runs, while providing proper voltages for lighting, receptacle, and general power loads.

The main electrical room, located in the west wing of the building, will serve as the primary hub for the building's electrical infrastructure. The main electrical room, sized approximately 16 feet by 8 feet, is planned to house the primary distribution equipment and support power distribution to west wing of the building. A secondary auxiliary electrical room, proposed in the central/east wing, sized approximately 22 feet by 8 feet, is planned to house the lighting control system components, a central lighting inverter, and fire alarm system equipment, and support power distribution to central and east wing of the building.

All 480V to 208Y/120V transformation will take place within the Level 1 electrical rooms. On Level 2, no dedicated electrical rooms are planned as the electrical distribution will be achieved by strategically locating panelboards in corridors, support spaces, and classrooms to optimize branch circuit routing, minimize branch circuit lengths, and ensure ease of access for maintenance. When installed in areas accessible to general public, all panelboards will be secured with lockable enclosures to maintain safety and prevent unauthorized access.

Coordination with the structural design team will be essential for routing feeders from the main service switchboard located exterior of the building, as well as feeders between electrical rooms and Level 2 panelboards, particularly where conduit penetrations through structural elements are required. All such penetrations must be carefully planned and executed to maintain the building's structural integrity.

Refer to the *Appendix 5 Electrical Room(s) Requirements* for additional details.

Additionally, electrical riser shafts will need to be provided to allow vertical feeder pathway to Level 2 and roof.

Emergency / Standby Power System

The emergency power needs for this building are limited to egress lighting and fire alarm system, in accordance with applicable life safety codes. A standby generator is not planned for this project. Instead, a UL924 central lighting inverter system will be provided to provide minimum 90-minute backup power to the designed emergency loads upon loss of normal utility power.

This centralized inverter approach offers several advantages over traditional individual battery-backed emergency lighting fixtures. By consolidating emergency power into a single, centrally located system, maintenance is significantly simplified – routine testing and battery replacement can be performed in one location and reducing overall operational burden. Additionally, it allows for greater design flexibility and improves aesthetics by eliminating the need for visible "bug-eye" fixtures throughout the facility.

Lighting

Overall, all lighting will be demolished and replaced to ensure consistent application of LED lamps and adhere to the current Title 24 Energy Code. Interior lighting will target the following general characteristics; 3500K CCT, 90+CRI, LED, dimmable drivers, and architectural integration where appropriate. Selection of interior light fixtures is dependent on architectural design but will be selected primarily to meet the functional requirements of each space type.

Existing exterior lighting will need to be removed and replaced with upgraded systems. Exterior lighting will need to target the following general characteristics; 3000K CCT, 80+CRI, dimmable drivers, and integrated controls. Before finalizing the exterior lighting recommendations, a nighttime lighting assessment will need to occur. This assessment will evaluate the current lighting conditions to identify any areas that fall below recommended illumination levels for safety and security, as defined by IESNA (Illuminating Engineering Society of North America). The nighttime lighting assessment should be reviewed with the University and other approval agencies with direction for required illumination levels to adhere to. The site may need to add 12ft tall pole mounted lights to cover the parking area and any pedestrian walkways. Pole lighting will need to be shielded to limit uplight and light trespass off the building's property. Entry, exits, and stairs will need to utilize building mounted lighting at or around the height of the entry doors to reduce the scale and focus the light where needed to egress.

For emergency egress lighting, selected light fixtures will need to be connected to the standby power system as noted above to provide egress lighting along the egress paths in accordance with the California Building Code. 1.0 fc average, 0.1 fc minimum, 40:1 uniformity ratio.

Illuminated exit signs will also need to be used along the path of egress, allowing a sign to be seen at any one time. Exit signs will be LED and UL listed with red lettering and an operating voltage of 277-volts.

Lighting Control System

The indoor lighting control system will be a digital system consisting of operating software, bridges, switches, room controllers, occupancy / vacancy sensors, daylight sensors, and dimming controls in compliance with the latest Title 24 lighting control requirements. The lighting control system will be networked through network bridges and/or room controllers to allow for real-time remote monitoring of lighting and plug loads and be equipped with the backbone infrastructure to accept demand response signal from PG&E and able to reduce overall lighting power by 15% through selective dimming controls.

All indoor lighting fixtures will be dimmed or switched per Title 24 requirements and best practice design. Open and public areas such as corridors and lobbies will be switched based on a preset, scheduled astronomical time clock capable of being overridden by local switches. Offices, classrooms, and private areas will be provided with local occupancy / vacancy sensors for auto shutoff and partial on/off controls. Areas exposed to daylight through vertical glazing and/or skylights will be provided with daylight sensors for daylight harvesting.

Exterior lighting fixtures will be controlled through a combination of integral motion sensors and astronomical time clock as part of the lighting control system.

## PLUMBING RECOMMENDATIONS

Sanitary Waste and Vent

| Sanitary Waste & Vent Piping Design Criteria | |
|---|---|
| Sizing | California Plumbing Code |
| Piping Slope | Minimum 1/4" per foot |
| Pipe Material (Below Grade) | Hubless cast-iron pipe with CISPI 301 stamp, IAPMO UPC-approved service weight cast-iron, heavyweight no-hub couplings with 4-band stainless steel clamps, PE encasement |
| Pipe Material (Above Grade) | Hubless cast-iron pipe with CISPI 301 stamp and IAPMO UPC-approved service weight cast-iron, heavyweight no-hub couplings with 4-band stainless steel clamps. |

| Pipe Type | Minimum Diameter (Nominal) |
|---|---|
| Vent pipe | 1-1/2" |
| Buried waste | 2" |
| Buried vent | 2" |
| Waste pipe penetrating a single floor (located downstream of trap arms) | 2" |
| Waste and Vent stacks through multiple floors | 3" |
| Horizontal fixture branches | 2" |
| Trap arms | 1-1/2" |

All existing and abandoned sanitary waste piping within the building shall be demolished. Existing underground sanitary piping serving the project scope shall be scoped and observed with a camera to verify conditions of the piping and potential reuse of piping, but it is anticipated that most of the piping will need to be replaced based on age, added program and required invert elevations.

Floor drains and similar traps directly connected to the drainage system shall be provided with electronic trap primers and shall be accessible for maintenance. Pressure-activated trap primers are not recommended.

Soil, waste, and vent piping support installation shall withstand the effects of earthquake motions. All vents from plumbing fixtures shall extend to the roof per code requirements and shall be located with a minimum 25 feet clearance away from air intakes.

Storm Drainage

| **Storm Drain Piping Design Criteria** | |
|---|---|
| Sizing | California Plumbing Code, Rainfall rate: 1.5 inches per hour |
| Piping Slope | Minimum 1/8" per foot |
| Pipe Material (Below Grade) | Hubless cast-iron pipe with CISPI 301 stamp, IAPMO UPC-approved service weight cast-iron, heavyweight no-hub couplings with 4-band stainless steel clamps, PE encasement |
| Pipe Material (Above Grade) | Hubless cast-iron pipe with CISPI 301 stamp and IAPMO UPC-approved service weight cast-iron, heavyweight no-hub couplings with 4-band stainless steel clamps. |

The existing storm drainage system will remain. If the roof is modified for mechanical equipment and flat roof surfaces are created, primary roof and overflow drains shall be provided. Storm drain piping shall be run through the building and connect below grade to Civil point of connections. See Civil recommendations for the site discharge options. Overflow drain piping shall terminate at the building exterior and daylight 18" above grade.

Condensate Drainage

| **Condensate Piping Design Criteria** | |
|---|---|
| Sizing | California Plumbing Code |
| Piping Slope | Minimum 1/8" per foot. |
| Pipe Material (Above Grade) | ASTM 88 and ANSI/NSF 61 Type 'M' hard drawn copper pipe |

| | |
|---|---|
| Insulation | Condensate piping to be insulated within building. If exposed, provide ASJ jacket. |

Natural Gas

Gas service to the building shall be disconnected and capped. All meters, piping, and appurtenances at/within the building shall be removed.

Domestic Water Supply

It is anticipated the proposed programming will require an upgraded 3" domestic water service to the municipal water utility with backflow preventer. All existing domestic cold water distribution piping within the building shall be demolished and replaced with new.

A minimum of 35 psi shall be delivered at the most hydraulically remote fixture. Per results from the fire flow test conducted on 2023-12-20, there is adequate pressure to achieve the minimum pressure without the need of a booster pump.

Each domestic cold water and hot water service will be independently sub-metered and integrated into the BMS per LEED water efficiency standards.

Make-up water connection to serve each mechanical water system will be provided with a backflow preventer and sub-meter.

All sub-meters shall be located inside the building and be provided with three-valve bypass assemblies with a lock on the bypass valve.

Shut-off valves shall be provided on all branch connections and at all equipment connections. Water-hammer arrestors with accessible isolation valve will be provided at all quick closing valves and other potential shock sources. The hammer arresters will be sized and located per PDI standards.

Provide hose bibbs in mechanical equipment rooms and roof, and areas required by the program. Existing hose bibbs located around the building exterior will remain.

Domestic Hot Water

All domestic hot water piping distribution and equipment shall be demolished and replaced with new.

The piping layout design shall be based on a loop system with valved branches to the central restrooms. The recirculated water loop shall be designed to minimize the amount of time waiting for hot water to reach fixtures with non-recirculated fixture branch piping 'dead-leg' not exceeding 25 feet in length including drop in wall to fixture. Hot water piping will be insulated.

Domestic hot water system will include a 120-gallon tank-type air-source heat pump water heater, with grid interactivity, and recirculation pump with electric tankless water heater on the recirculation line to account for recirculation heat loss and promote stratification of the main storage tank. Hot water will be stored in the tank at 140°F and an electronic central thermostatic mixing station will be provided for hot water distribution set at 120°F.

As an alternate, an electric resistance tank type water heater may be used instead of the heat pump type. All components listed above shall be provided for this option except the electric tankless water heater on the recirculating line.

Refer to Plumbing Equipment Layout within *Appendix 6 - Plumbing Supplemental Documentation: Plumbing Equipment* for proposed equipment location.

Provide BAS control and monitoring of the hot water temperature leaving the mixing valve and BAS interface for heat pump water heater and recirculating pump status.

Temperature valves will be provided to automatically regulate the temperature of hot water delivered to plumbing fixtures used by occupants to a range of 105°F minimum to 120°F maximum.

Hot water delivered into public-use lavatories shall be limited to a maximum of 110°F and will be supplied with an ASSE 1070 thermostatic mixing valve.

Simulated Medical Air

| **Compressed Air Design Criteria** | |
|---|---|
| Pipe Material | Copper tube Type 'L', ASTM B819, oxygen clean brazed, silver solder, AWS A5.8 |

The compressed air system shall be functional for simulation but is not intended for human use. Provide a duplex 10-hp air compressor, with receiver tank, to deliver "nonmedical" compressed air and simulated oxygen gas to outlets installed within the room.

Piping and equipment in compliance with NFPA 99 is not required for simulation spaces. Provide signage close to each outlet to indicate "SIMULATION ONLY, NOT FOR HUMAN USE" and which gases are being provided in the simulated environment.

Refer to Plumbing Equipment Layout within *Appendix 6 - Plumbing Supplemental Documentation: Plumbing Equipment* for proposed equipment location.

Simulated Medical Vacuum

| **Vacuum Design Criteria** | |
|---|---|
| Pipe Material | Copper tube Type 'L', ASTM B819, oxygen clean brazed, silver solder, AWS A5.8 |

The vacuum system shall be functional for simulation but is not intended for human use. Provide a duplex 4-hp vacuum, with receiver tank, to deliver "nonmedical" vacuum to vacuum outlets.

Piping and equipment in compliance with NFPA 99 is not required for simulation spaces. Provide signage close to each outlet to indicate "SIMULATION ONLY, NOT FOR HUMAN USE" and which gases are being provided in the simulated environment.

Refer to Plumbing Equipment Layout within *Appendix 6 - Plumbing Supplemental Documentation: Plumbing Equipment* for proposed equipment location.

Plumbing Fixtures

All applicable fixtures will meet the American Disabilities Act (ADA) for accessibility. The design team will use advanced innovative, water-efficient plumbing fixtures to help attain water conservation goals. Plumbing Fixtures shall be highly efficient, decreasing total water demands without negatively impacting user experience.

All toilets, urinals, and lavatories shall be WaterSense labeled to comply with LEED. The project targets a minimum of 30% water savings and the fixtures shall have the following maximum flow rates: 1.1 gpf, 0.125 gpf, and 0.35 gpm, respectively. Sinks shall have a maximum flow rate of 1.5 gpm.

See estimated minimum plumbing fixture counts below per the anticipated Health Hub program within the Stewart Building, tabulating both a binary approach and an all-gender approach. Final direction on plumbing fixture allocation to include fixture count per gender to be developed with the University and the Design Team through the course of design.

For exam rooms and simulation labs, sinks shall be provided with laminar-flow, gooseneck faucets.

Any sensor-operated faucets shall be hard-wired.

All floor drains except for toilet rooms to be provided with 3" traps.

**PLUMBING FIXTURES: MINIMUM PLUMBING FIXTURE ACCOMODATION (BASED ON 2022 CPC TABLE 422.1)**

| A-3 - ASSEMBLY (UNCONCENTRATED) | | | B - BUSINESS | | | S-1, S-2 - STORAGE | | |
|---|---|---|---|---|---|---|---|---|
| | TOTAL OCCUPANTS | 164 | | TOTAL OCCUPANTS | 262 | | TOTAL OCCUPANTS | 2 |
| | 1/2 MALE | 82 | | 1/2 MALE | 131 | | 1/2 MALE | 1 |
| | 1/2 FEMALE | 82 | | 1/2 FEMALE | 131 | | 1/2 FEMALE | 1 |
| MALE | | | MALE | | | MALE | | |
| WC | 1: 1 - 100 | 1 | WC | 3: 101-200 | 3 | WC | 1: 1-100 | 1 |
| URINAL | 1: 1 - 100 | 1 | URINAL | 2: 101-200 | 2 | URINAL | N/A | 0 |
| LAVATORY | 1: 1-200 | 1 | LAVATORY | 2: 76-150 | 2 | LAVATORY | 1: 1-200 | 1 |
| FEMALE | | | FEMALE | | | FEMALE | | |
| WC | 3: 51 - 100 | 3 | WC | 8: 101-200 | 8 | WC | 1: 1-100 | 1 |
| LAVATORY | 1: 1 - 100 | 1 | LAVATORY | 3: 101-150 | 3 | LAVATORY | 1: 1-200 | 1 |
| DRINKING FOUNTAINS | 1: 1-250 | 1 | DRINKING FOUNTAINS | 1 PER 150 | 1 | DRINKING FOUNTAINS | 1: 1-250 | 1 |
| JANITOR'S SINK | | 1 | JANITOR'S SINK | | 1 | JANITOR'S SINK | | 1 |

**TOTAL PLUMBING FIXTURES**

| MALE | | FEMALE | | GRAND TOTAL | BINARY | ALL GEN |
|---|---|---|---|---|---|---|
| WC | 5 | WC | 12 | WC | 17 | 20 |
| URINAL | 3 | N/A | 0 | URINALS | 3 | 0 |
| LAVATORY | 4 | LAVATORY | 5 | LAVATORY | 9 | 9 |
| | | | | DRINKING FOUNTAINS | 3 | 3 |
| | | | | JANITOR'S SINK | 3 | 3 |

***Above: Minimum estimated plumbing fixture tabulation per anticipated Health Hub program***

**ARCHITECTURAL AND ACCESSIBILITY RECOMMENDATIONS**

Roof Recommendations:

Low-sloped roofs should be removed and reinstalled with tapered insulation to provide adequate roof slope so to ensure no standing water on the roof.

Proposed roofing materials to be evaluated. The current roof is a BUR roof. The recommendation for the low-sloped portions of roof to be a single-ply membrane roof. The areas of low-sloped roof would require new tapered roof insulation to ensure water moves efficiently off the roof. The tapered roof insulation is not provided to meet insulation and energy requirements as the attic will continue to be an un-conditioned space. It is recommended that there should continue to be no internal rainwater leaders and water should continue to be directed to the building's perimeter.

The low roof curbs will need to be re-framed to a minimal height, approx. 12 inches, to ensure meeting roofing material manufacturer's up-turn requirements. The low curbs are to be capped with a painted GSM flashing cap where this curb occurs.

A similar approach to the scupper for removing water off the roof is acceptable, but with scuppers to occur at approximately every 24 feet minimum along the north and south portions of the S-tiled roof. Scuppers to be flashed with single ply-roofing material to match the color of the adjacent painted GSM flashing cap.

Roof openings and hatches should be replaced with new updated roof hatches.

Mechanical roof pads should be built-up from wood and/or pre-manufactured framed mechanical curbs.

Fall protection in the form of pipe-rail that meets CBC and OSHA requirements (location, spacing, and openings) should be placed at the roof perimeter wherever a mechanical unit may be placed so to allow access by workers for servicing any units. The recommendation is to place the fall-protection inbound of the flashing cap at the low curb. This could either be secured directly to the building through the new roofing and or possibly via a ballasted system.

Among recommended roofing assemblies would a single-ply PVC type roof and or an SBS-modified bitumen roof assembly. It may be difficult to meet the SRI (Solar Reflectance Index) requirement with a mod-bit roof, but this would need to be evaluated. A PVC type roof would meet the SRI requirements but may necessitate service-stairs to access the high roof from the main lower roof.

The options at the sloped area currently joining the low and high roofs would be determined by the type of roofing assembly at the main low-slope roofs.

- If using a PVC type roof, this sloped area would want to continue to be the same material at the sloped area. PVC type roofs can be very slippery and if this roof is pursued, then the service stair mentioned above may be required.
- If a mod-bit roof type assembly is used, then this sloped area may continue to be an asphalt shingle roof installed with care at the transitions at the top and bottom , as well as at the sides. A mod-bit roof would also mean that less items should be ballasted at the roof since the associated granules would promote

early wear at the roof. Again, this roof would need to be evaluated is permissible by the Structural Engineer and the Energy Code.

The concrete S-tiles should be replaced by an S-tile that matches size, shape and color of the existing roof tiles. Options to discuss with the University and the Design Team should include a lighter-weight material to reduce structural loads. A composite synthetic roof tile such as the Brava Spanish Barrel Tile, with an alignment in color selection to the original tile should be used. Final material and color to be reviewed and approved by the University and the Design Team.

The existing wood gutters should be inspected for operability and operation. Restoration will involve removal of the old paint as required to get a good substrate to apply new paint as part of roof renovation. The University may want to consider replacing the gutters with a material that has a similar ogee appearance, but that would also not trigger any historical concerns.

All flashing and substrates at the roof should be replaced where required to provide a warrantable roofing assembly.

Vertical Envelope Recommendations:

Once demolition has been completed and windows and doors have been removed, the building's exterior concrete should be evaluated and receive minor patch and repair where necessary. Items of concern should be brought to the attention of the Owner and the Design Team. The existing windows should be removed and replaced with new more energy efficient windows intended to replicate the look and operability of the existing windows – particularly at the more prominent arched windows.

The existing pedestrian doors may be difficult to maintain as part of the new project. If the project intends to keep the existing wood doors and glazing, the mechanical team may need to change the building envelope evaluation criteria to use a 'performance approach' to also allow for increased efficiency in other parts of the design. The energy code may allow the doors to remain, but this approach and reasoning should be confirmed with the Mechanical team before Schematic Design ends as this will affect the design targets and then in turn size and location of equipment as well as structural supports necessary for that equipment. An alternative approach to be reviewed with the Design Team would entail replacing the doors with a similar aesthetic.

The interior of the concrete walls will need to have an additional layer of insulation applied at all the occupied interior spaces. The additional layer of insulation will consist of 6" metal framing and 5/8" gypsum board with a half-inch air gap between the existing concrete and new metal studs that will be from finished floor levels up to the underside of the attic insulation layer above.

In some locations, to be reviewed against the building program and Structural design, existing vertical envelope openings will need to be removed and enclosed with plywood shear walls extending the full height of the building structure to provide additional structural support where required. Refer to *Appendix 7 – Potential Locations for Added Shear at Building Vertical Envelope* for locations to be confirmed through the course of design.

The attic will remain unconditioned space. The floor of the attic should receive new blow-in insulation per the R-value recommended by the mechanical narrative. Attic insulation to be blow-in type at the flat areas and possibly a batt or rigid insulation at the sloped or vertical planes to maintain continuity.

Utility Yard Enclosure Recommendations: A built-up mechanical screen is to be provided at the side yard where electrical and mechanical equipment locations are recommended. Refer to the *Healthcare Hub Schematic Design Basis of Design Document* dated March 4, 2025 for more information regarding design intent. A roof may be required, pending review with the University and the Design Team once selected systems options and associated placement of both mechanical and plumbing equipment are determined. Aesthetic design direction of the roof will need to be studied with the Design Team to ensure alignment with the existing Stewart Building.

Building Interior Recommendations:

The building interior recommendations are to be largely guided by the *Healthcare Hub Schematic Design Basis of Design Document* dated March 4, 2025. Interior elements and features by system are described therein. For additional features beyond items listed within this section and the aforementioned document, refer to the *Areas of Concern or Notable Features* section of this document.

Interior Stairs: Both interior stairs will be demolished as part of the interior demolition. The location of the existing west stairs, currently open with a wood guardrail and handrail system, will be built over with an extension of the Level 2 floor system to accommodate the new program. The proposed replacement stairs will be reconstructed as a new code-compliant egress stair with a new floor opening at a new location on the west side of the building. The east interior stairs will be removed, and Level 2 floor opening will be extended over the opening to fill it in.

Interior Elevator: A new interior elevator will be added to the building to connect the Level 1 and Level 2 program spaces from a universal access standpoint for staff, students and visitors. The current recommended Basis of Design per University standards is 1 passenger/service elevator, 4500 lb. at 150 fpm, machine-room-less electric traction elevator with 42-inch single-speed side opening door.

Interior Partitions: New interior partitions will be 5/8-inch gypsum board on 6-inch steel studs with acoustic batt insulation. Interior glazed partitions will be tempered glass system with prefinished aluminum frames with intermediate mullions. A manual horizontal operation partition system will be provided as the demising wall within the central volume to provide versatility for the Health Hub program.

Level 1 Basement: Per the *Areas of Concern or Notable Features* section, the level 1 basement, the eastern portion of level 1, has limitations in its use as occupiable building space due to the overall head height elevation. As previously indicated, the area would require structural modifications to the building foundations, bearing walls, columns and beams to increase the head height of the space to code compliance to be utilized as occupiable building space for the Health Hub program. With the amount of work required, the recommendation is to position the space as unoccupiable, back-of-house space for placement of utility equipment as needed and not for occupiable program space for the Health Hub.

Building Access and Accessibility Recommendations:

Wherever work is performed, it should be per CBC 11B-202 so that where existing elements or spaces are altered, each altered element or space shall comply with the applicable requirements of Division 2, including Section 11B-202.4.

All four (4) Level 1 four pedestrian entries will need to be reviewed for security and accessibility against the final design.

The Level 1 door nearest to the proposed elevator will likely be the wheelchair accessible entrance for the proposed renovation and will require an updated path of travel from the parking lot to the building entrance itself.

Doors not on powered door openers/closers typically find it difficult to meet the opening force requirements. It is recommended to provide powered door openers at main pedestrian entrances, four (4) total:

- Two (2) at Level 2 – Southwest stair and Easternmost entrance near ramp, and
- Two (2) at Level 1 – Far West exit door and Middle door on South elevation near elevator.

A new accessible elevator will need to be provided. Currently there is no elevator within the building.

One (1) new accessible stair will need to be provided. The existing west stairs would require extensive modification to make accessible. Also, the location does not work with the proposed floor plan. It is recommended to provide a new enclosed accessible stair at a new location per the current floor plan at the west-end of the building.

**SITE RECOMMENDATIONS**

- Obtain a Boundary and Topographic Survey of the site, including existing utility information.
- Obtain a geotechnical report for the site, including recommendations for paving sections, compaction and moisture conditioning, infiltration rates and corrosive soil analysis.
- Obtain available fire flow data and as-built drawings of the existing water main from City of Arcata to confirm available water for fire protection requirements.
- Obtain as-built drawings from the City of Arcata to evaluate the sanitary sewer main and capacity, and lateral location.
- Further investigate the existing onsite sanitary sewer line to determine size, location, and depth.
- Meet with Fire Marshal to discuss fire access and protection requirements. Correct any deficiencies, which may include adding driveway cuts, additional fire access routes and/or fire hydrants.
- Meet with the City of Arcata to discuss the project and any offsite improvements that will be necessary.
- The existing asphalt pavement at the driveway to the parking lot, the ADA parking spaces and the access-way from 16th Street at the east end of the building should be rehabilitated. It is possible that the wearing course of the existing pavement could have a grind-and-overlay with the underlying aggregate base layer to remain in place; however further investigation of the asphalt paving section is recommended.
- Perform a parking count study and assess the required number of ADA parking stalls. Add the required number, along with proper striping and signage.
- Revisit parking lot layout and restripe parking lot with minimum parking stall and drive aisle dimensions. Consider fire access width requirements if necessary in the parking lot.
- Correct any deficiencies in the ADA paths-of-travel and ADA parking stalls based on review of the topographic survey and site observations.
- Per the *Healthcare Hub Schematic Design Basis of Design Document* dated March 4, 2025, the design intent is to provide a built-up enclosure for a utility yard by way of mechanical screen or an unconditioned, roofed enclosure. Further requirements and intent will need to be reviewed with the University and the Design Team, particularly as HVAC and plumbing equipment locations and recommendations are considered and developed. See the Architectural Recommendation section for more information on enclosure recommendations.
- Per the *Healthcare Hub Schematic Design Basis of Design Document,* the design intent is to provide a built-up trash enclosure at the site. The enclosure, with a roof and a drain connecting to the sanitary sewer network may be required and will be determined by the University/local requirements for the trash area. Further design intent should be reviewed with the University and the Design Team.

California Polytechnic University Humboldt
Healthcare Hub
Stewart Building Assessment
June 5, 2025

- Discharge from downspouts shall be modified to not splash onto walkways. This can be achieved by routing underground and daylighting at curbs via thru-curb drains where possible or incorporating planters adjacent to the building.
- Additional landscaping elements beyond what may be required for bioretention purposes is not currently allocated within the scope of the project. The general intent is for existing landscaping and vegetation to be protected in place. Some existing landscaping and vegetation will more than likely need to be removed for recommended building systems, once selected, and for building envelope upgrades. Landscaping elements to be removed should be reviewed by the University and the Design Team for relocation of replacement landscape where required.




***Above: General vegetation and landscaping around the building***

# APPENDICIES

# APPENDIX 1
STEWART BUILDING INSPECTION REQUEST MEMO

# Memorandum

101 Mission Street, Suite 300
San Francisco, CA 94105
Tel: (415) 568-4400
Fax: (415) 618-0684
www.ruthchek.com

**To:** Richard Kirr

**From:** David Bleiman/Franisco Parisi

**Date:** April 22, 2025

**Subject:** Stewart Building Inspection Request

---

Richard:

The purpose of this memo is to provide the team with suggestions for inspections at the Stewart Building that will help inform the structural requirements for the renovation. The plans that are attached to this memo indicate:

1. Recommended digital scan of the basement where the team will require modification to the foundations, bearing walls, columns and beams to increase the head height of this space to code compliance
2. Openings in the ceilings of the levels above grade that will enable the team to verify key structural components.

In addition to these requirements, we also have included a guideline for the inspection of existing concrete buildings from the LA DBS which clarifies the requirements of ASCE 7-16 and ASCE 41-17 for establishing design properties of existing concrete buildings. The means and methods of the inspection procedure are provided in the body of this document. The number of tests cores and rebar samples are provided in Table 1 and 2 where we have clouded the relevant testing protocol based on the risk category and available construction documents.

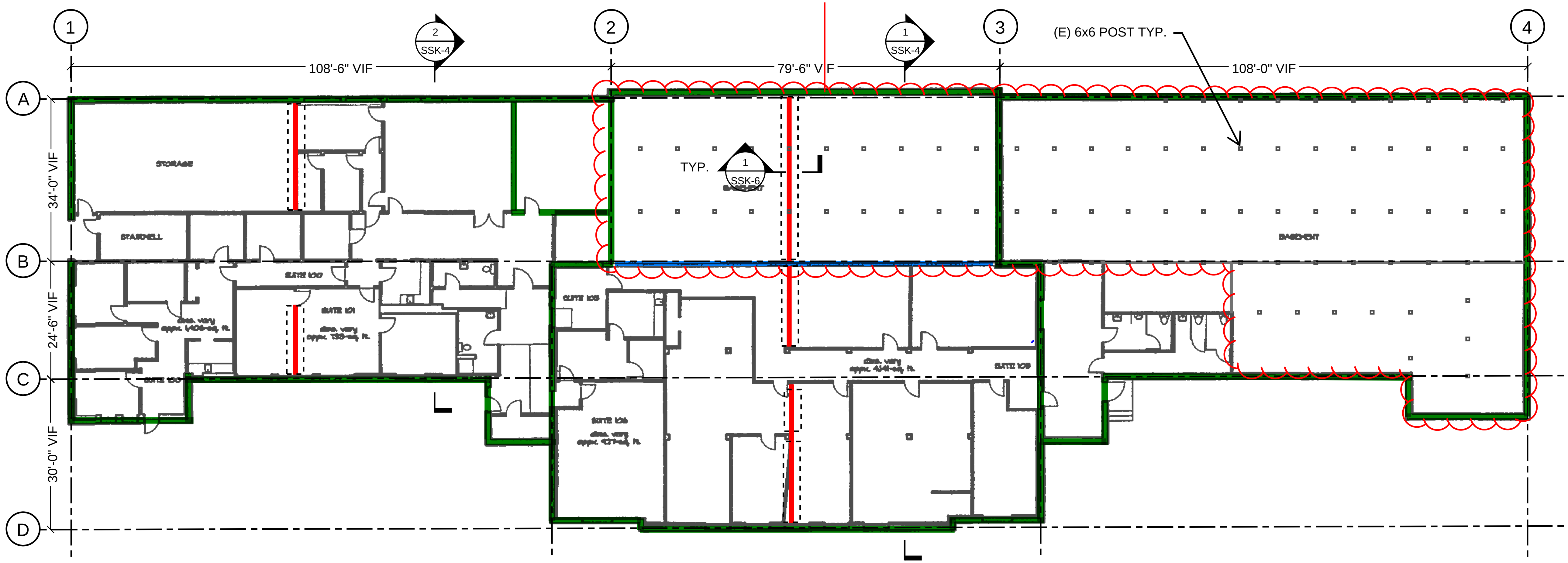
We would also recommend hiring an inspector who can provide visual grading of the wood (species and grade) in a walkthrough of the ceiling spaces.

# **APPENDIX 2**
PLANS OF INSPECTION FOR STEWART BUILDING

SHEET NOTES:

- (E) CONCRETE SHEAR WALL WITH OPENINGS
- (E) WOOD SHEAR WALL WITH STRAIGHT SHEATHING AND OPENINGS
- (N) PLYWOOD SHEAR WALLS UP TO UNDERSIDE OF SECOND FLOOR ONLY
- (N) STRIP FOOTINGS UNDER (N) PLYWOOD SHEAR WALLS
- (E) FOOTINGS NOT SHOWN

1.0) Clear out stored materials and create a digital scan of space for design and construction team




NOT TO SCALE

Estructure
1144 65th Street, Suite A
Oakland, CA 94608
510.235.3116
www.estruc.com

STEWART BUILDING
CONCEPT SEISMIC RETROFIT
1125 16TH STREET
ARCATA, CA
CAL POLY HUMBOLDT

DATE

01/31/2025

SKETCH TITLE

FOUNDATION AND FIRST FLOOR FRAMING PLAN

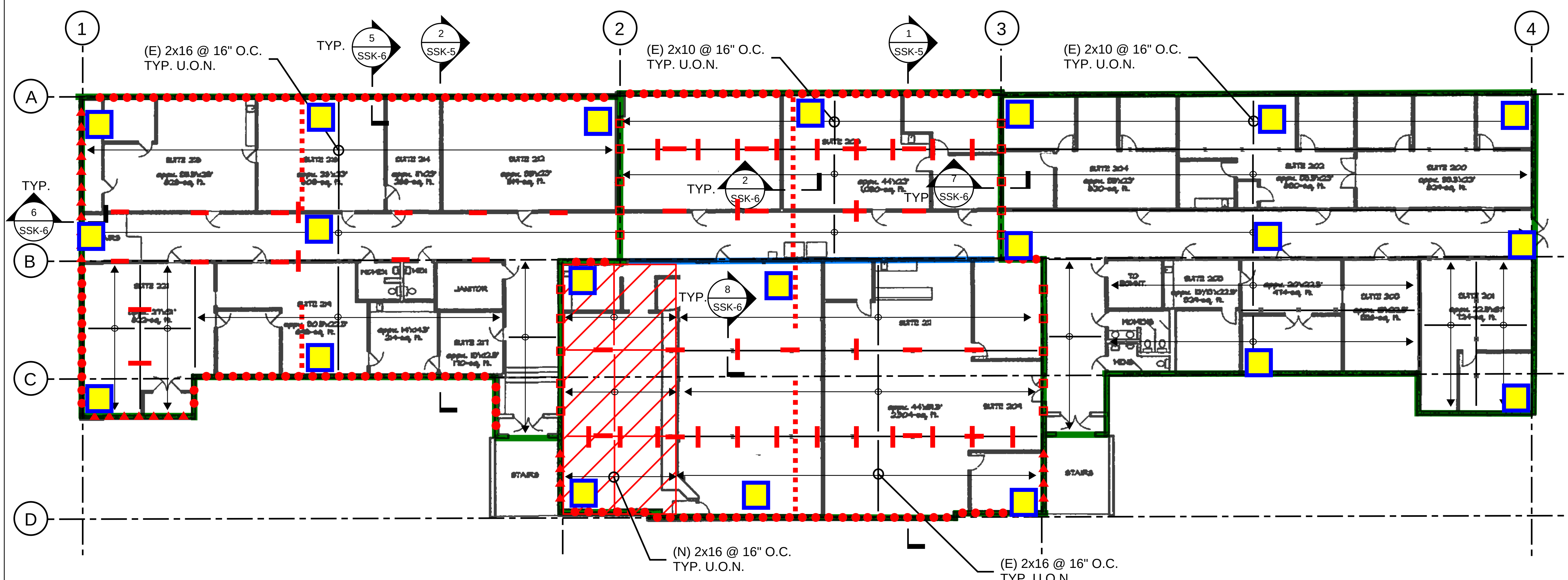
SKETCH #

SSK-1

SHEET NOTES:

- (E) CONCRETE SHEAR WALL WITH OPENINGS
- (E) WOOD SHEAR WALL WITH STRAIGHT SHEATHING AND OPENINGS
- (N) WOOD SHEAR WALL BELOW
- OUT-OF-PLANE WALL TIE AT 32" O.C. (EVERY OTHER JOIST), TYPICAL AT CONCRETE WALLS WEST OF GRIDLINE 3 WHERE JOISTS ARE PERPENDICULAR
- OUT-OF-PLANE WALL TIE AT 36" O.C., TYPICAL AT CONCRETE WALLS WEST OF GRIDLINES 3 WHERE JOISTS ARE PARALLEL
- OUT-OF-PLANE WALLS TIES AT 5'-0" O.C. TYPICAL AT INTERIOR CONCRETE WALLS WHERE JOISTS ARE PARALLEL
- CROSS-TIES IN N-S DIRECTION AT SPLICED JOISTS AT 8'-0" O.C. TYPICAL AS SHOWN ABOVE (E) WOOD BEARING WALLS OR BEAMS
- CROSS-TIES IN E-W DIRECTION AT LOCATIONS OF SPLICED TOP PLATES OR BEAMS AT THE (E) WOOD BEARING WALLS
- DEMOLISH AND RE-BUILD RAISED FLOOR AT TYICAL SECOND FLOOR ELEVATION

Estructure
1144 65th Street, Suite A
Oakland, CA 94608
510.235.3116
www.estruc.com




Indicates location to remove ceiling to provide clear view of structure for inspection and measurement

NORTH

NOT TO SCALE

STEWART BUILDING
CONCEPT SEISMIC RETROFIT
1125 16TH STREET
ARCATA, CA
CAL POLY HUMBOLDT

DATE

01/31/2025

SKETCH TITLE

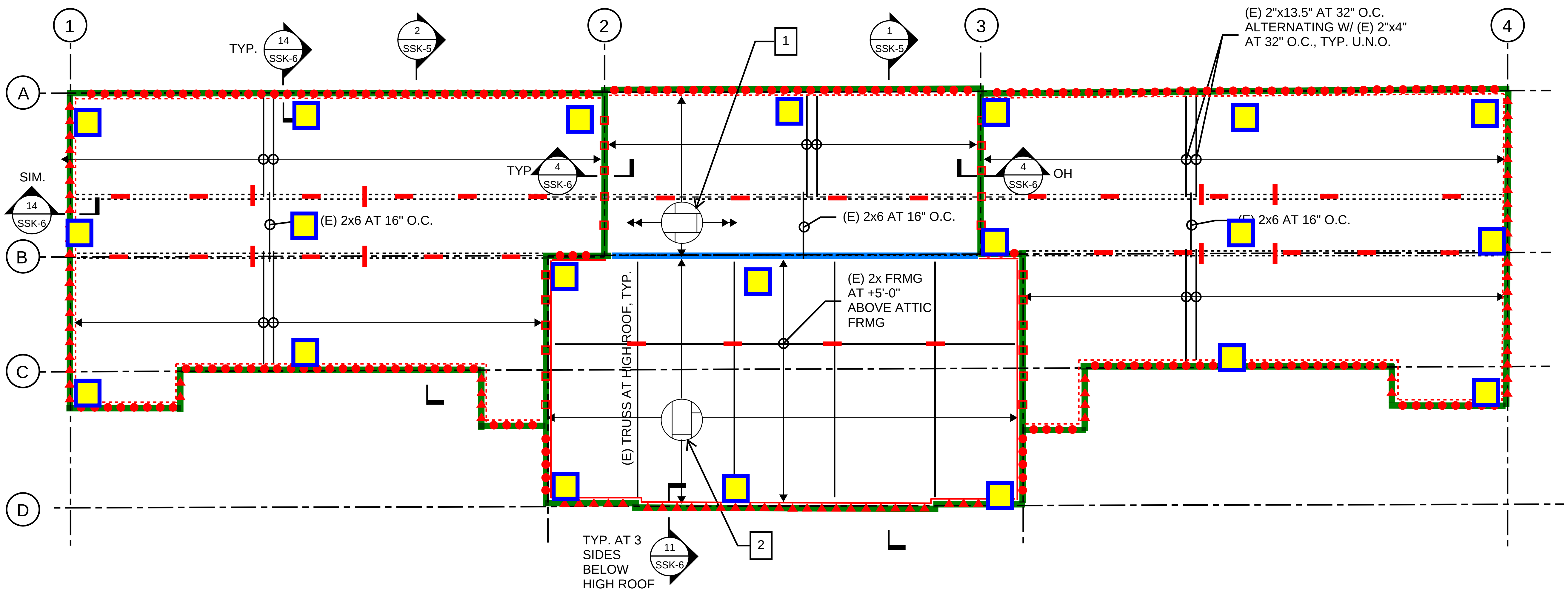
SECOND FLOOR FRAMING PLAN

SKETCH #

SSK-2

SHEET NOTES:

- (E) CONCRETE SHEAR WALL WITH OPENINGS BELOW
- (E) WOOD SHEAR WALL WITH STRAIGHT SHEATHING AND OPENINGS
- (E) WOOD BEARING WALL
- 1 — (E) 1/2" PLYWOOD SHEATHING AT UNDERSIDE OF ATTIC FRAMING W/ EDGE NAILING AT 5" O.C., ALL EDGES BLOCKED
- 2 — (E) 3/8" PLYWOOD SHEATHING OVER 2x FRMAING AT +5'-0" ABOVE ATTIC FRAMING
- OUT-OF-PLANE WALL TIE AT 32" O.C. (EVERY 2"x13.5" JOIST), TYPICAL WHERE JOISTS ARE PERPENDICULAR TO WALL
- OUT-OF-PLANE WALL TIE AT 36" O.C., TYPICAL WHERE JOISTS ARE PARALLEL TO WALL
- OUT-OF-PLANE WALL TIE AT 5'-0" O.C. AT INTERIOR CONCRETE WALLS WHERE JOISTS ARE PARALLEL
- CROSS-TIES IN N-S DIRECTION AT SPLICED JOISTS AT 8'-0" O.C. TYPICAL ABOVE (E) WOOD BEARING WALLS
- CROSS TIES IN E-W DIRECTION AT LOCATIONS OF SPLICED TOP PLATES OR BEAMS AT (E) WOOD BEARING WALLS. LOCATIONS TO BE FIELD VERIFIED.
- PLYWOOD AT (E) CRIPPLE WALL AT HIGH ROOF ATTIC
- PLYWOOD SPANNING FROM MAIN ROOF SHEATHING ABOVE TO CONCRETE WALL BELOW AT PERIMETER OF MAIN ROOF




Indicates location to remove ceiling to provide clear view of structure for inspection and measurement

NORTH

NOT TO SCALE

Estructure
1144 65th Street, Suite A
Oakland, CA 94608
510.235.3116
www.estruc.com

STEWART BUILDING
CONCEPT SEISMIC RETROFIT
1125 16TH STREET
ARCATA, CA
CAL POLY HUMBOLDT

DATE
01/31/2025

SKETCH TITLE
ATTIC FRAMING PLAN

SKETCH #
SSK-3

# APPENDIX 3
ASCE 7-16, ASCE 41-17 GUIDELINES FOR CONCRETE TESTING FOR THE STEWART BUILDING

CITY LA DBS
DEPARTMENT OF BUILDING AND SAFETY

**INFORMATION BULLETIN / PUBLIC – GENERAL INFORMATION**
**REFERENCE NO.: ASCE 7-16, ASCE 41-17** Effective: 1-1-2023
**DOCUMENT NO.: P/BC 2023-153** Revised:
Previously Issued As: N/A

# DATA COLLECTION, MATERIAL TESTING AND CONDITION ASSESSMENT REQUIREMENTS FOR EXISTING CONCRETE BUILDINGS

This Information Bulletin establishes the required protocol for investigation of as-built conditions, data collection, and material testing and condition assessments for an existing concrete buildings. The data obtained from available drawings, specifications, inspection records and testing as outlined here shall be used for evaluation and/or analysis of the existing concrete buildings.

## I. BACKGROUND

As-built conditions and material properties of building elements are required in order to properly characterize building performance in seismic analysis. In order to make sound engineering assumptions and judgments, an engineer shall either obtain the existing building construction documents and records and/or perform appropriate condition assessment and material testing to establish the properties of building structural components. A preliminary review should identify the gravity and lateral-force-resisting elements and systems, and their critical components and connections. When complete as-built drawings and prior testing records are not available, the engineer shall perform a thorough investigation of the building gravity and lateral-load-resisting systems.

This bulletin was developed based on data collection and testing protocols in ASCE 41-17. However, it can also be used when analyzing the building using ASCE 7-16.

## II. DEFINITIONS

**Coefficient of Variation** – the ratio of the standard deviation to the mean value of a specific material property based on a number of tests.

**Comprehensive** – a more in depth level of assessment of the Lateral Force Resisting System, which may include removal of finishes or, for concrete structures, local minimized removal of concrete cover to observe steel reinforcing.

**Comprehensive Data Collection** - a minimum level of testing to confirm material strengths and properties that is used when there is little or no knowledge of material properties or when the building is being analyzed for greater than Life Safety performance level.

**Expected Properties** –the mean tested value of when testing is performed. Expected material properties are used to check deformation controlled actions.

**Exposure** – local minimized removal of cover concrete and other materials to inspect reinforcing system details.

**Lower Bound Properties** – Defined as either the listed default property, nominal material value from construction documents or specifications, or the mean minus one standard deviation when material testing is performed. Lower bound material properties are used to check force-controlled actions.

**Material Properties** – the strength and stiffness properties of the building material.

**Nominal Properties** – material properties specified in the construction documents, if available, which shall be taken as lower-bound material properties.

**Testing** – laboratory testing of material samples taken from a structure to determine in –place mechanical properties of materials and components of the Lateral Force Resisting System.

**Usual Data Collection** – a minimum level of testing to confirm material strengths and properties that is used when there is little to no knowledge of material properties and the building is being analyzed for a Life Safety or lower performance level.

**Visual** – a direct visual inspection of representative primary seismic components and connections.

## III. CONDITION ASSESSMENT AND MATERIAL TESTING PROTOCOL

The condition assessment and material testing requirements shall be per Flowchart 1 and Tables 1 and 2.

### A. Condition Assessment

Condition assessment of existing building and site conditions shall be performed and shall include the following:

1. Examination of the physical condition of primary and secondary components, and the presence of any degradation.
2. Verification of the presence and configuration of components and their connection, and the continuity of load paths between components, elements, and systems,
3. A review and documentations of other conditions, including neighboring party walls and buildings presence of non-structural components and mass, and prior remodeling,
4. Collection of information needed to select a knowledge factor
5. Confirmation of component orientation, plumbness, and physical dimensions.

ASCE 41-17 Section 10.2.3.2 provides two types of condition assessments: Visual Condition Assessment and Comprehensive Condition Assessment.

**Visual Condition Assessment**

For Visual Condition Assessment, a representative sampling of at least 20% of the components and connections shall be visually inspected at each floor level. If significant damage or degradation is found, the assessment sample of all similar type critical components in the building shall be increased to 40% or more, as necessary, to accurately assess the performance of components and connection with degradations.

**Comprehensive Conditions Assessment**

For Comprehensive Conditions Assessment, if detailed design drawings exist, exposure of at least three different primary connections shall occur to verify that there are no deviations or consistent deviations from the drawings. If inconsistent deviations are noted, then at least 25% of the specific connection type shall be inspected to identify the extent of deviation.

In the absence of detailed design drawings, at least three connections of each primary connection type shall be exposed for inspection. If common detailing among the three connections is observed, it shall be permitted to consider this condition as representative of installed conditions. If variations are observed among like connections, additional connections shall be inspected until an accurate understanding of building construction is gained.

## B. Material Testing Protocol

**Material Properties:**

The following component and connection material properties shall be obtained for the as-built building:

1. Concrete compressive strength, and
2. Yield and ultimate strength of nonprestressed and prestressed steel reinforcement, cast-in-place and post installed anchors, and metal connection hardware.

Expected material properties shall be based on mean values of tested material properties. Lower bound material properties shall be based on mean values of tested material properties minus one standard deviation, σ.

Nominal material properties, or properties specified in construction documents, shall be taken as lower-bound material properties. Corresponding expected material properties shall be calculated by multiplying lower-bound values by a factor taken from Table 10-1 of ASCE 41-17 to translate from lower-bound to expected values

**Table 10-1. Factors to Translate Lower-Bound Material Properties to Expected Strength Material Properties**

| Material Property | Factor |
|---|---|
| Concrete compressive strength | 1.50 |
| Reinforcing steel tensile and yield strength | 1.25 |
| Connector steel yield strength | 1.50 |

## Component Properties

The following component properties and as built conditions shall be established:

1. Cross-sectional dimensions of individual components and overall configuration of the structure;
2. Configuration of component connections, size, embedment depth, type of anchors, thickness of connector material, anchorage and interconnection of embedments, and the presence of bracing or stiffening components;
3. Modification to components or overall configuration of the structure;
4. Most recent physical condition of components and connections, and the extent of any deterioration;
5. Deformations beyond those expected because of gravity loads, such as those caused by settlement or past earthquake events; and
6. Presence of other conditions that influence building performance, such as nonstructural components that can interact with structural components during earthquake excitation.

## Test Methods to Quantify Material Properties

When determining material properties with the removal and testing of samples for laboratory analysis, sampling shall take place in primary gravity- and seismic-force-resisting components in regions with the least stress.

For concrete material testing, the sampling program shall include the removal of standard cores. Core drilling shall be preceded by nondestructive location of the reinforcing steel, and core holes should be located to avoid damage to or drilling through the reinforcing steel. Core holes shall be filled with concrete or grout of comparable strength having non-shrinkage properties. If conventional reinforcing steel is tested, sampling shall include removal of local bar segments and installation of replacement spliced material to maintain continuity of the reinforcing bar for transfer of bar force unless an analysis confirms that replacement of the original components is not required.

Removal of core samples and performance of laboratory destructive testing shall be permitted to determine existing concrete strength properties. Removal of core samples shall use the procedures specified in ASTM C42. Testing shall follow the procedures contained in ASTM C42, ASTM C39, and ASTM C496. Core strength shall be converted to in-place concrete compressive strength by an approved procedure.

Removal of bar or tendon samples and performance of laboratory destructive testing shall be permitted to determine existing steel reinforcement strength properties. The tensile yield and ultimate strengths for reinforcing and prestressing steels shall follow the procedures included in ASTM A370. Reinforcing samples that are slightly damaged during removal are permitted to be machined to a round bar as long as the tested area is at least 70% of the gross area of the original bar. Prestressing materials shall meet the supplemental requirements in ASTM A416, ASTM A421, or ASTM A722, depending on material type. Properties of connector steels shall be permitted to be determined by wet and dry chemical composition tests and direct tensile and compressive strength tests as specified by ASTM A370. Where strength, construction quality for either anchors or embedded connectors are required, in-place testing shall satisfy the provisions of ASTM E488-96.

**Data Collection**

Materials testing is not required if material properties are available from original construction documents that include material test records or reports. Material test records or reports shall be representative of all critical components of the building structure.
Data collection from material tests is classified as either comprehensive or usual.

Usual Data Collection

The minimum number of tests required to determine concrete and reinforcing steel material properties for usual data collection shall be based on the following criteria:

1. If the specified design strength of the concrete is known, at least one core shall be taken from samples of each different concrete strength used in the construction of the building, with a minimum of three cores taken for the entire building;
2. If the specified design strength of the concrete is not known, at least one core shall be taken from each type of seismic-force-resisting component, with a minimum of six cores taken for the entire building;
3. If the specified design strength of the reinforcing steel is known, nominal or specified material properties shall be permitted without additional testing; and
4. If the specified design strength of the reinforcing steel is not known, at least two strength test coupons of reinforcing steel shall be removed from the building for testing.

Comprehensive Data Collection

*Coefficient of Variation*

A minimum of three tests shall be conducted to determine any property. If the coefficient of variation exceeds 20%, additional tests should be performed until the coefficient of variation is equal to or less than 20%. In determining coefficient of variation, cores shall be grouped by grades of concrete and element type. The number of tests in a single component shall be limited so as not to compromise the integrity of the component.
*Concrete Materials*

For each concrete element type, a minimum of three core samples shall be taken and subjected to compression tests. A minimum of six total tests shall be performed on a building for concrete strength determination. If varying concrete classes or grades were used in the building construction, a minimum of three samples and tests shall be performed for each class and grade. The modulus of elasticity and tensile strength shall be permitted to be estimated from the compressive strength testing data. Samples shall be taken from components, distributed throughout the building, that are critical to the structural behavior of the building.

Tests shall be performed on samples from components that are identified as damaged or degraded to quantify their condition. Test results from areas of degradation shall be compared with strength values specified in the construction documents. If test values less than the specified strength in the construction documents are found, further strength testing shall be performed to determine the cause or identify the degree of damage or degradation.

The minimum number of tests to determine compressive strength of each concrete element type shall conform to one of the following criteria:

1. For concrete elements for which the specified design strength is known and test results are not available, a minimum of three core tests shall be conducted for each floor level, 400 $yd^3$ of concrete, or 10,000 $ft^2$ of surface area, whichever requires the most frequent testing; or

2. For concrete elements for which the design strength is unknown and test results are not available, a minimum of six core tests shall be conducted for each floor level, 400 $yd^3$ of concrete, or 10,000 $ft^2$ of surface area, whichever requires the most frequent testing. Where the results indicate that different classes of concrete were used, the degree of testing shall be increased to confirm class use.

3. Alternatively, for concrete elements for which the design strength is known or unknown and test results are not available, it is permitted to determine the lower-bound compressive strength according to the provisions in Section 6.4.3 of ACI 562-16. If the lower-bound compressive strength is determined in this manner, the expected compressive strength shall be determined as the lower-bound compressive strength value obtained from ACI 562-16, Eq. 6.4.3 plus one standard deviation of the strength of the core samples. When following the provisions in Section 6.4.3 of ACI 562-16, the minimum number of samples per element type shall be four. The sample locations shall be:

   a. Distributed to quantify element material properties throughout the height of the building, and
   b. Distributed to quantify element material properties in locations critical to the structural system being investigated.

*Nonprestressed Reinforcement and Connector Steels*

Tests shall be conducted to determine both yield and ultimate strengths of reinforcing and connector steel. Connector steel is defined as additional structural steel or miscellaneous metal used to secure precast and other concrete shapes to the building structure. A minimum of three tensile tests shall be conducted on conventional reinforcing steel samples from a building for strength determination, subject to the following supplemental conditions:

1. If original construction documents defining properties exist, then at least three strength coupons shall be randomly removed from each element or component type and tested; or
2. If original construction documents defining properties are unavailable, but the approximate date of construction is known and a common material grade is confirmed, at least three strength coupons shall be randomly removed from each element or component type for every three floors of the building; and
3. If the construction date is unknown, at least six strength coupons for every three floors shall be performed.

*Prestressing Steels*

Sampling prestressing steel tendons for laboratory testing shall only be performed on prestressed components that are part of the seismic-force-resisting system. Prestressed components in diaphragms shall be permitted to be excluded.

Tendon or prestress removal shall be avoided if possible. Any sampling of prestressing steel tendons for laboratory testing shall be done with extreme care. Determination of material properties may be possible, without tendon or prestress removal, by careful sampling of either the tendon grip or the extension beyond the anchorage, if sufficient length is available.
All sampled prestressed steel shall be replaced with new, fully connected, and stressed material and anchorage hardware, unless an analysis confirms that replacement of original components is not required.

**Knowledge Factor**

To account for uncertainty in the collection of as-built data, a knowledge factor, k, shall be selected from Tables 1 and 2 of this document on individual component basis, as determined by the level of knowledge obtained for that component during the data collection. Table 1 provides the testing requirements for Concrete component. Table 2 provides the testing requirements for Reinforcing Steel Material. The knowledge factor, k, shall be lesser of the values obtained from Tables 1 and 2 and shall be applied to determine component capacities as specified in Chapter 7 of ASCE 41-17. Similarly, if ASCE 7-16 is used, reduction factor, K, shall be used when calculating the component capacity.

## C. Plan Submittal and Testing Result Summary Requirements

The submitted plans shall contain material testing result summary for each required structural components which identifies the following information.

- Required and proposed number of tests for each required structural component

- Coefficient of Variation (COV)
- Upper bound strength
- Lower bound strength
- Allowed and proposed “k” factor for each type of required structural component

The plans shall specify the test locations (vertical & horizontal) and types of testing for each structural component. Also, they shall identify the types and locations (with pictures) of detected structural deficiencies per condition assessment section, as well as, proposal corrective actions for each such structural deficiencies

The Building Structural Engineer of Record shall confirm and accept qualifications of material testing agency, including but not limited to field test/sample collecting agency and laboratory testing agency. The testing and collecting agencies shall be certified by the Los Angeles Department of Building and Safety, as testing agencies.

## Flowchart 1
## Data Collection for Concrete
## Condition Assessment and Material Testing Requirements

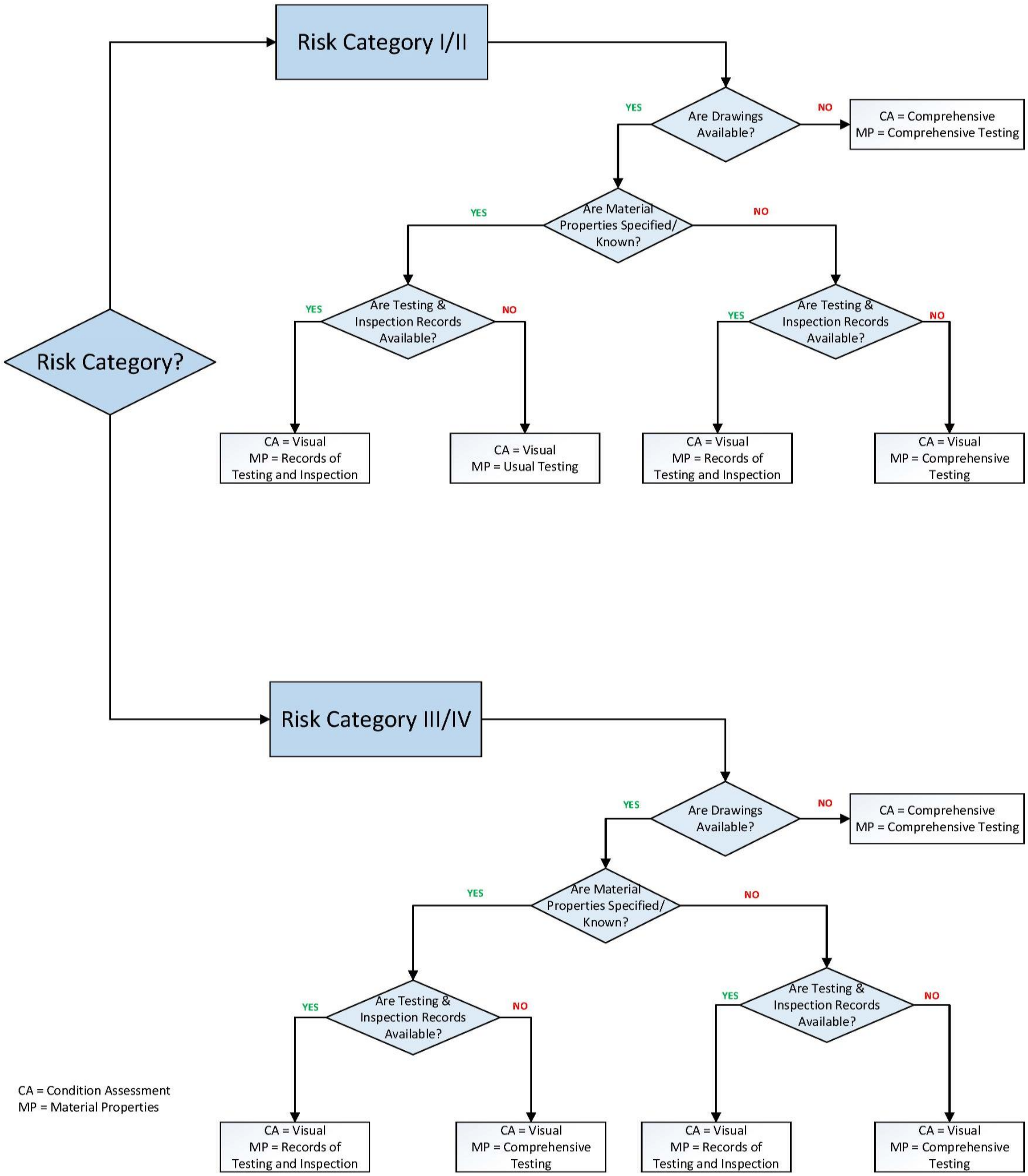


**Table 1**
**Concrete Testing Requirements**

| Performance Level | Available Information: Drawings | Available Information: Material Properties | Available Information: Inspection and Testing Records | Level of Testing Performed | Minimum Number of Tests Required | Test Results | Expected Strength | Lower- Bound Strength | Knowledge Factor (k) |
|---|---|---|---|---|---|---|---|---|---|
| Risk Category I/II | Drawings are available | Properties are specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Corresponding specified strength x (1.5) factor | Corresponding specified strength | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Usual Testing | (1) Core tests for each different concrete strength, with minimum of (3) cores taken from the entire building | Less than specified expected strength | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Table 6-1) |
| | | | | | | Greater than specified expected strength | Corresponding specified strength x (1.5) factor | Corresponding specified strength | k=1.0 (Table 6-1) |
| | | Properties are not specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Corresponding specified strength x (1.5) factor | Corresponding specified strength | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Comprehensive Testing | (3) Core tests for each floor level, 400 cy of contrete, or 10,000 sq ft or surface area, whichever requires the most frequent testing. | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| | Drawings are not available | Properties are not specified | Inspection Records are not available | Comprehensive Testing | (6) Core tests for each floor level, 400 cy of contrete, or 10,000 sq ft or surface area, whichever requires the most frequent testing. | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| Risk Category III/IV | Drawings are available | Properties are specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Corresponding specified strength x (1.5) factor | Corresponding specified strength | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Comprehensive Testing | (3) Core tests for each floor level, 400 cy of contrete, or 10,000 sq ft or surface area, whichever requires the most frequent testing. | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| | | Properties are not specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Corresponding specified strength x (1.5) factor | Corresponding specified strength | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Comprehensive Testing | (6) Core tests for each floor level, 400 cy of contrete, or 10,000 sq ft or surface area, whichever requires the most frequent testing. | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| | Drawings are not available | Properties are not specified | Inspection Records are not available | Comprehensive Testing | (6) Core tests for each floor level, 400 cy of contrete, or 10,000 sq ft or surface area, whichever requires the most frequent testing. | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |

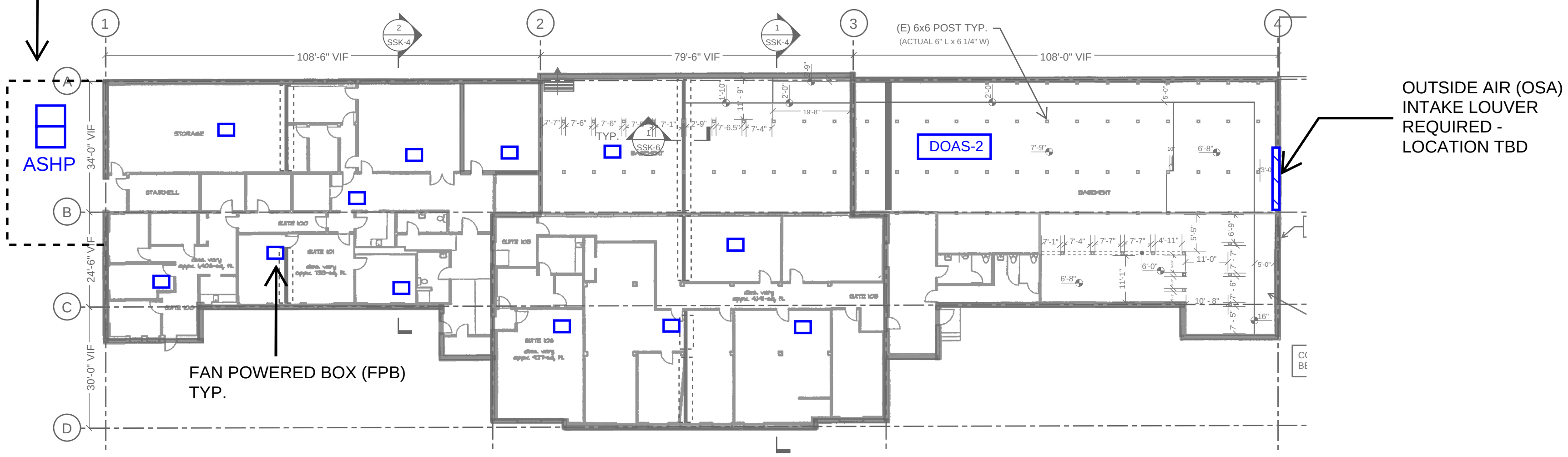
**Table 2**
**Reinforcing Steel Material Testing Requirements**

| Performance Level | Available Information: Drawings | Available Information: Material Properties | Available Information: Inspection and Testing Records | Level of Testing Performed | Minimum Number of Tests Required | Test Results | Expected Strength | Lower- Bound Strength | Knowledge Factor (k) |
|---|---|---|---|---|---|---|---|---|---|
| Risk Category I/II | Drawings are available | Properties are specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Specified Value x (1.25) Factor | Specified Value | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | No Testing | N/A | N/A | Specified Value x (1.25) Factor | Specified Value | k=0.9 (Table 6-1) |
| | | Properties are not specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Specified Value x (1.25) Factor | Specified Value | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Usual Testing | (2) Strength test coupons of reinforcing steel shall be removed from the building for testing | N/A | Average Tested Value | Average Tested Value / (1.25) factor | k=1.0 (Table 6-1) |
| | Drawings are not available | Properties are not specified | Inspection Records are not available | Comprehensive Testing | (3) Strength coupons shall be randomly removed from each element or component type for every three floors of the building | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |

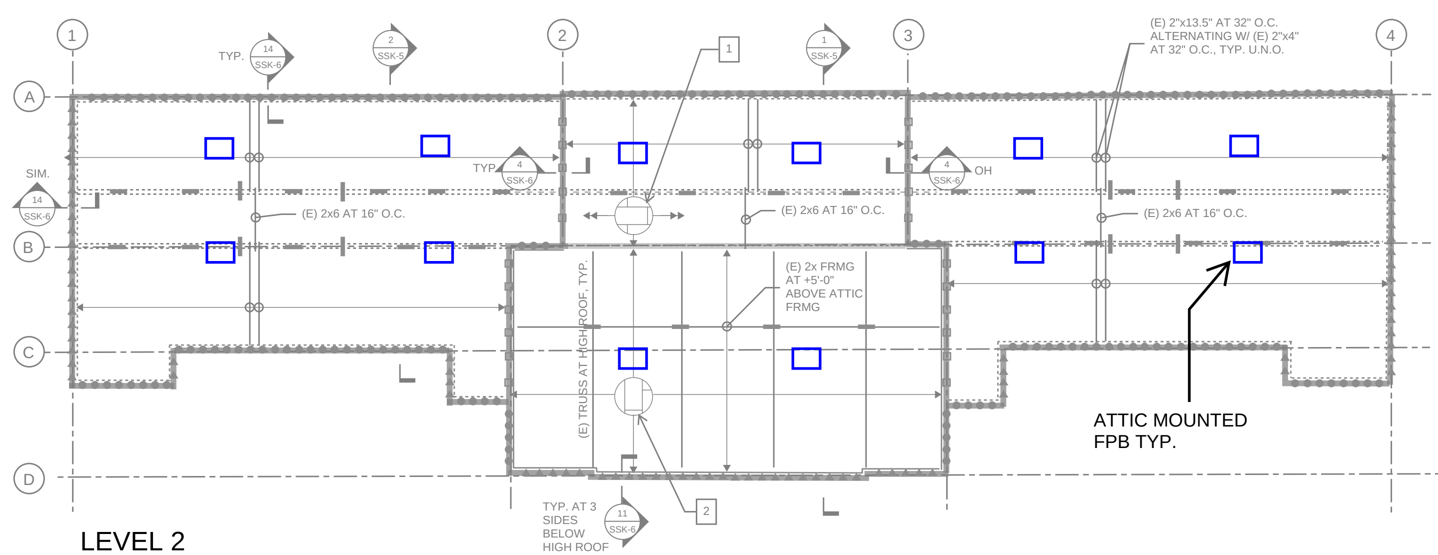
| Performance Level | Available Information: Drawings | Available Information: Known Information | Available Information: Inspection and Testing Records | Level of Testing Performed | Minimum Number of Tests Required | Test Results | Expected Strength | Lower- Bound Strength | Knowledge Factor (k) |
|---|---|---|---|---|---|---|---|---|---|
| Risk Category III/IV | Drawings are available | Properties are specified | Inspection / Testing Records are available | No Testing | N/A | N/A | Specified Value x (1.25) Factor | Specified Value | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Comprehensive Testing | (3) Strength coupons shall be randomly removed from each element or component type for every three floors of the building | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| | Drawings are not available | Date of Construction is know | Inspection / Testing Records are available | No Testing | N/A | N/A | Specified Value x (1.25) Factor | Specified Value | k=1.0 (Table 6-1) |
| | | | Inspection/Testing Records are not available | Comprehensive Testing | (3) Strength coupons shall be randomly removed from each element or component type for every three floors of the building | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |
| | | Date of Construction is not know | Inspection Records are not available | Comprehensive Testing | (6) Strength coupons for every three floors | COV<20% | Mean Tested Value | Mean Tested Value - Std Dev | k=1.0 (Section 10.2.4) |
| | | | | | | COV>20% | Mean Tested Value | Mean Tested Value - Std Dev | K=0.75 (Section 10.2.4) |

# APPENDIX 4
HVAC SYSTEM OPTIONS

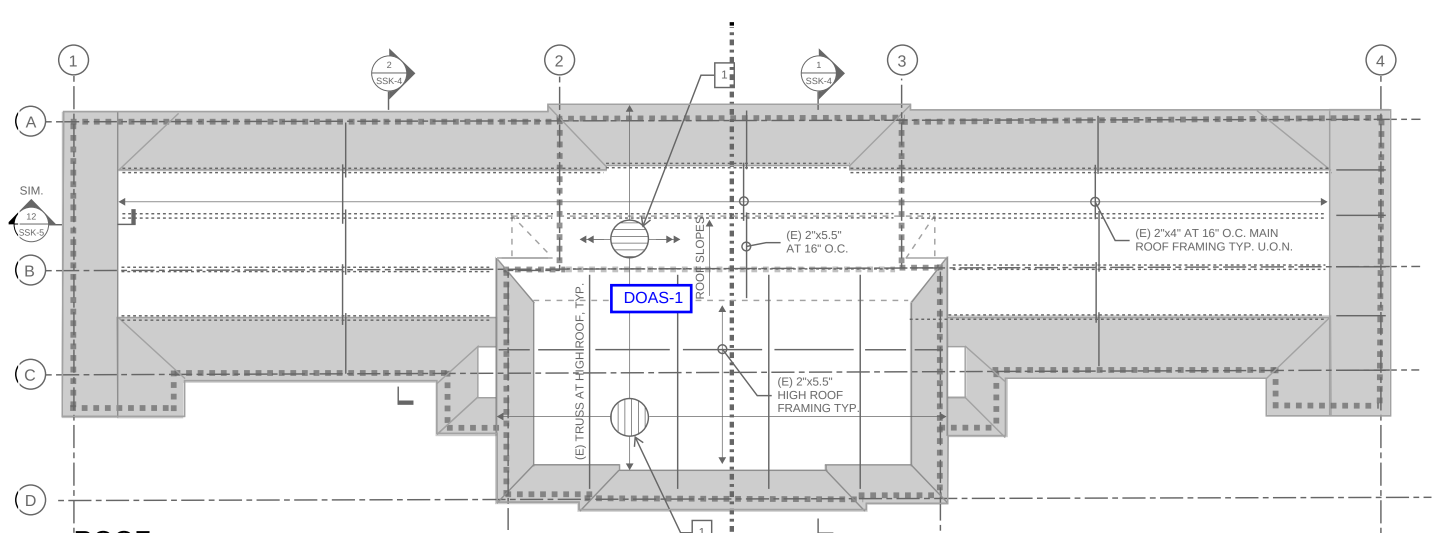
## OPTION 1: ASHP+ ROOF DOAS UNITS + FPBs



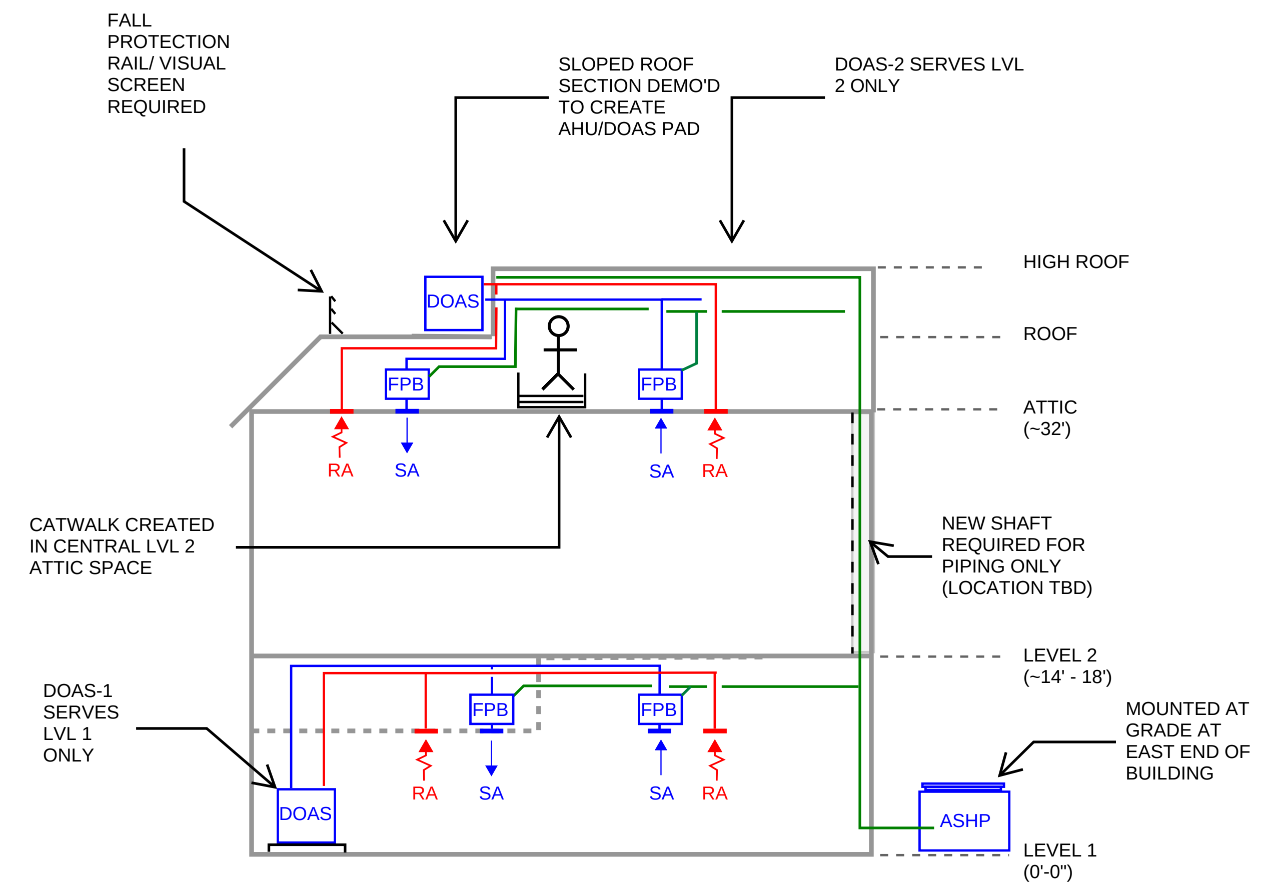

LEVEL 1




LEVEL 2



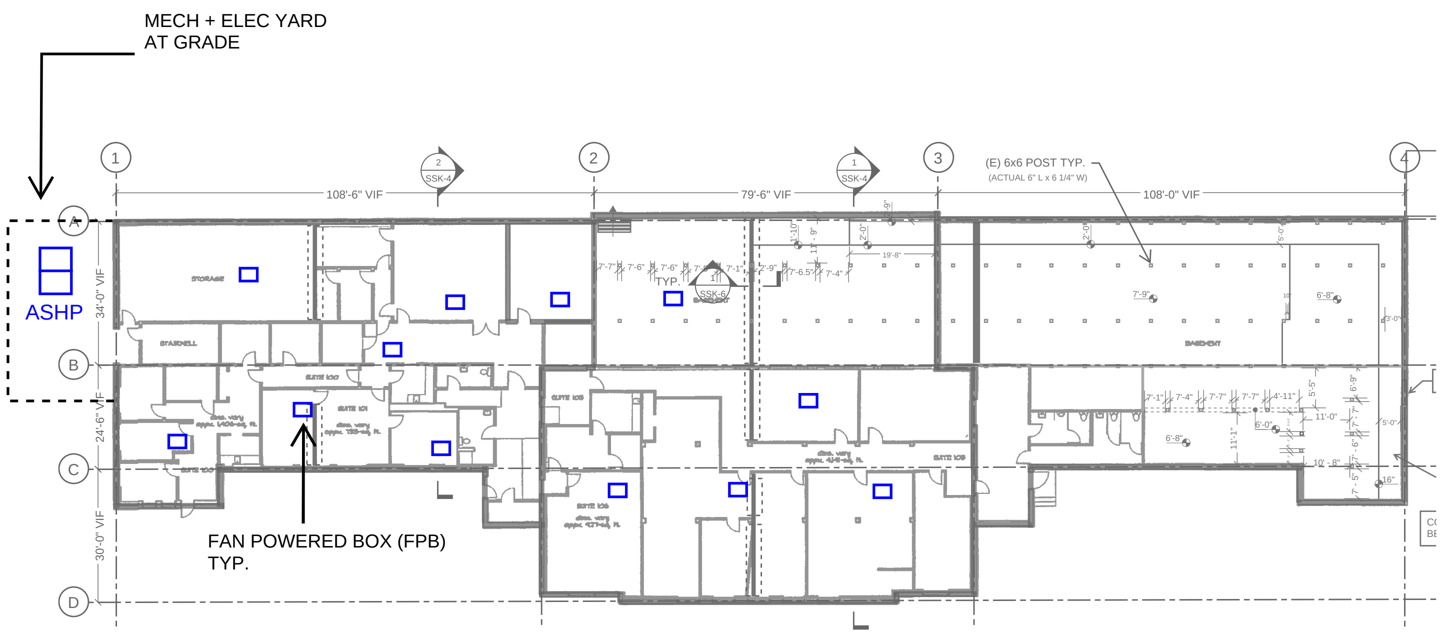

ROOF



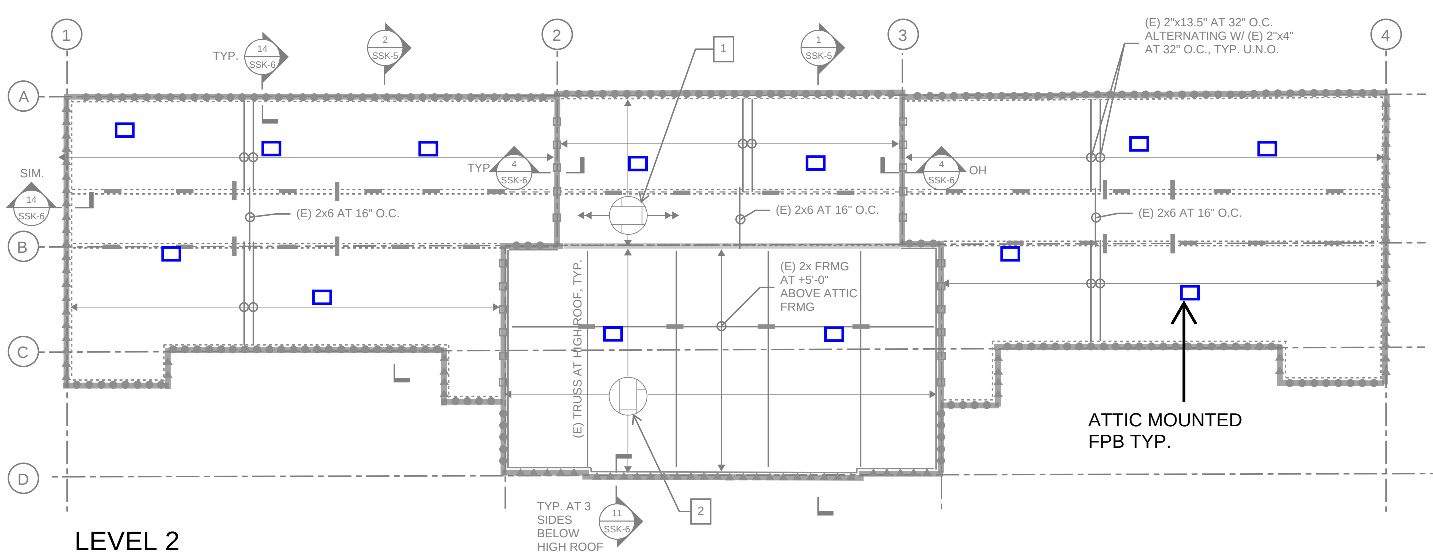

NOTE:
- ONE DOAS UNIT PER FLOOR WILL REQUIRE SHEAR WALL PENETRATIONS
- FALL PROTECTION WORK REQUIRED ON ROOF

| | |
|---|---|
| EXISTING | SUPPLY AIR |
| NEW | RETURN AIR |
| | HYDRONIC PIPING |

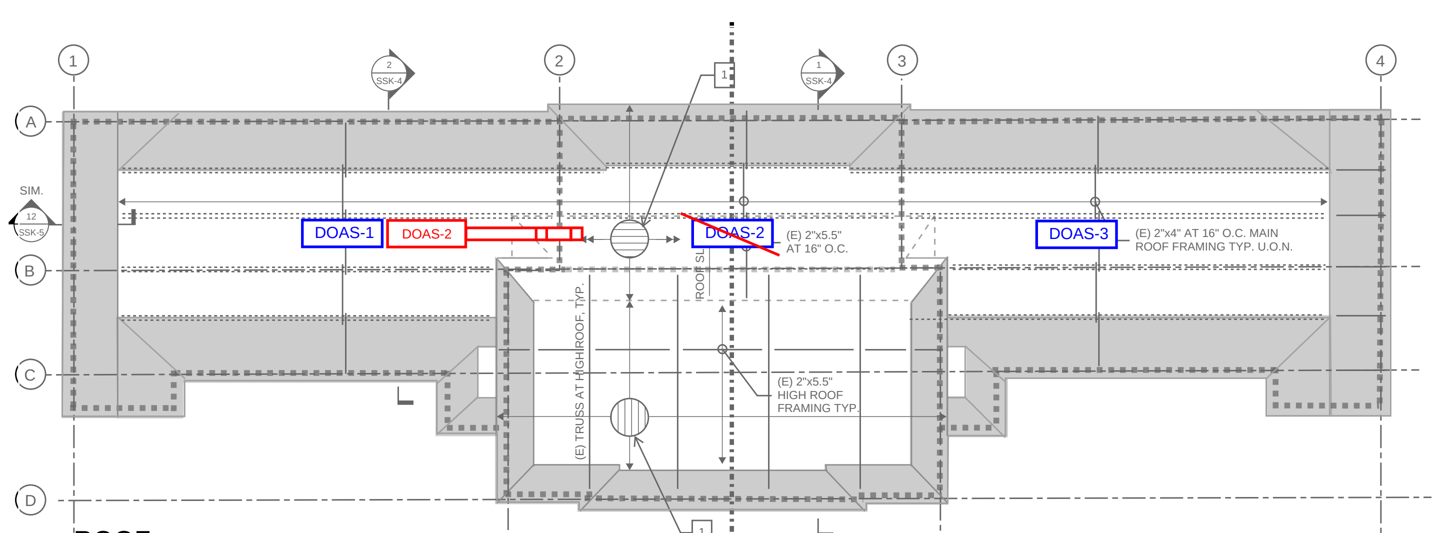
## OPTION 2: ASHP+ ROOF DOAS UNITS + FPBs



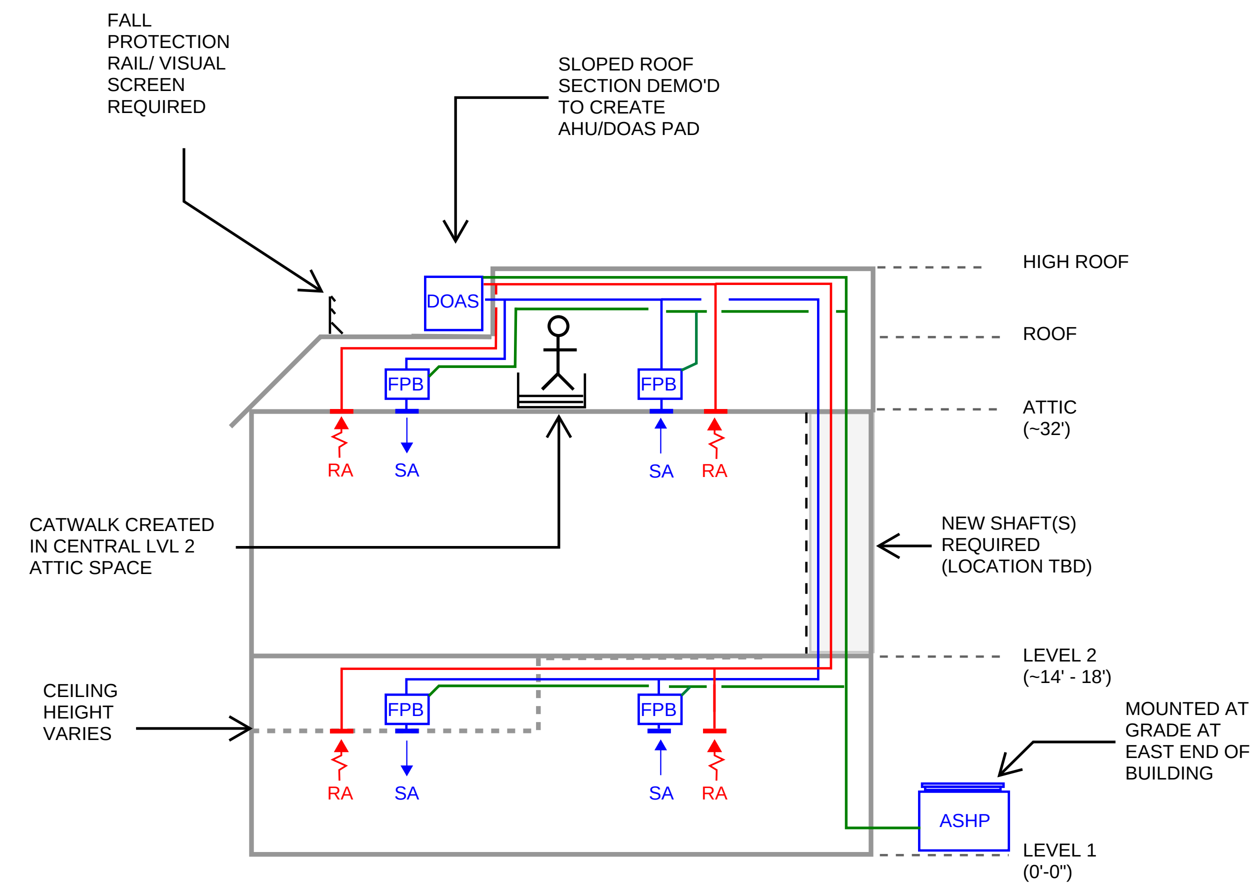

LEVEL 1




LEVEL 2




ROOF



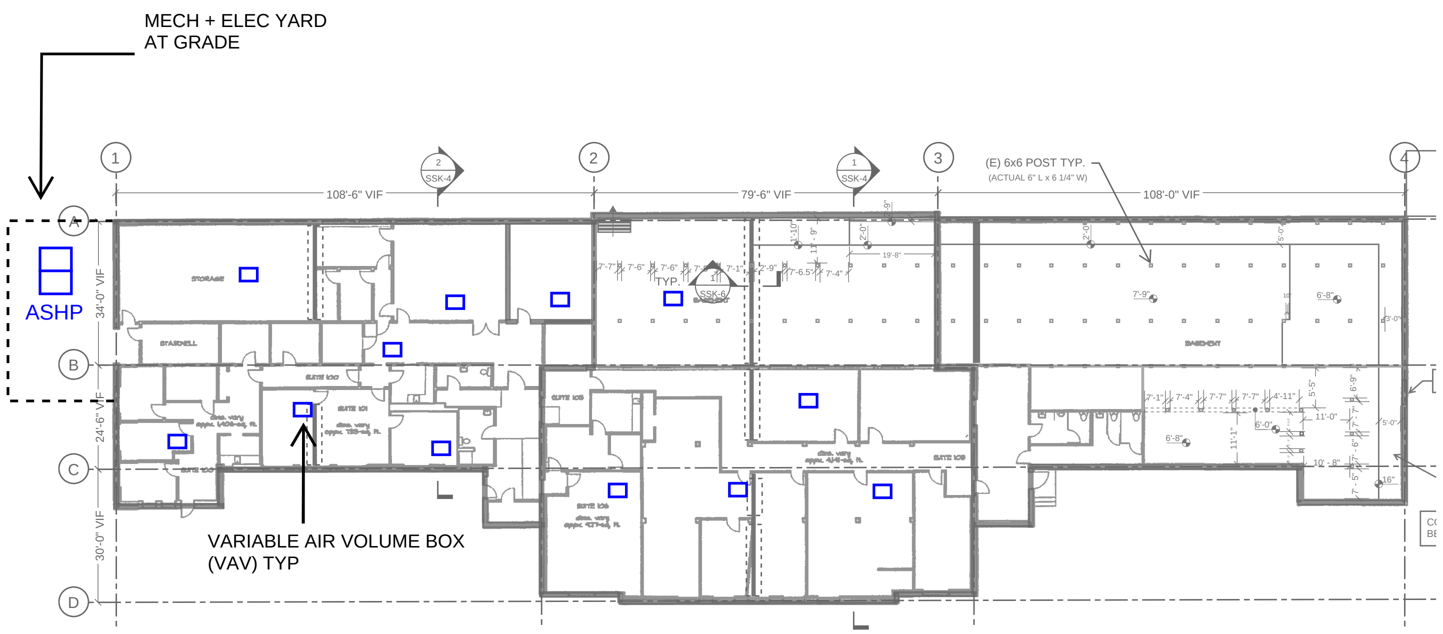

NOTE:
- MULTIPLE SHAFTS WILL BE REQUIRED TO CONNECT DOAS DUCTS TO LVL 1 ZONES
- FALL PROTECTION WORK REQUIRED ON ROOF

| | |
|---|---|
| EXISTING | SUPPLY AIR |
| | RETURN AIR |
| NEW | HYDRONIC PIPING |

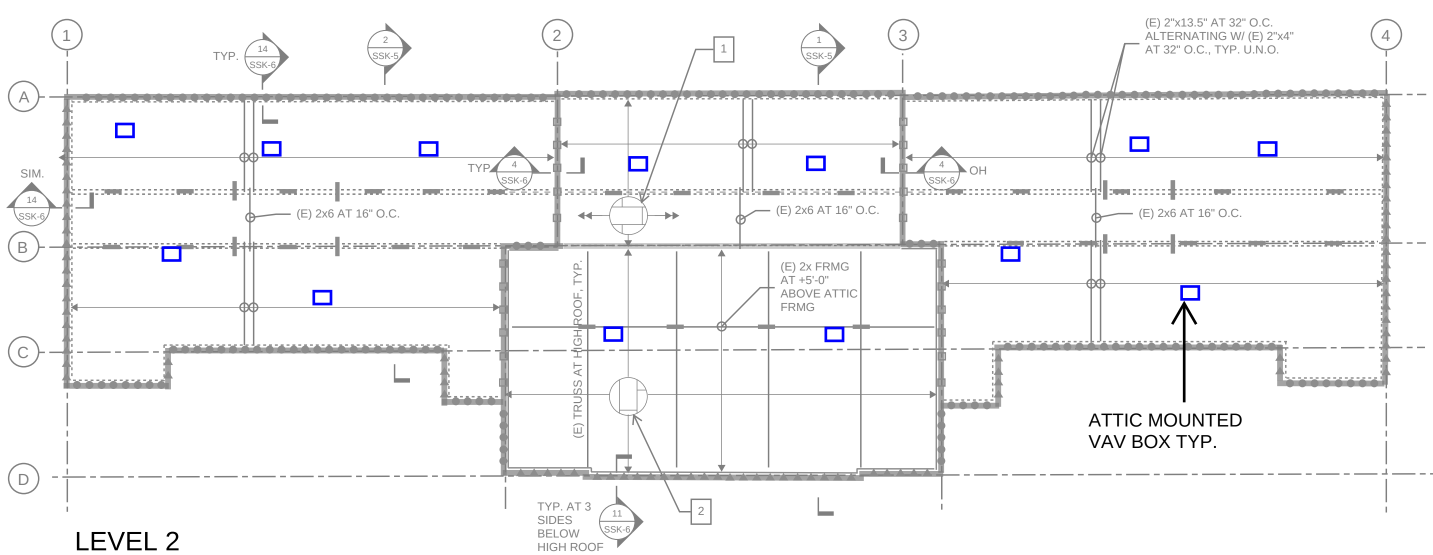
MECHANICAL SYSTEM OPTIONS
*2025-0527*

SMITHGROUP

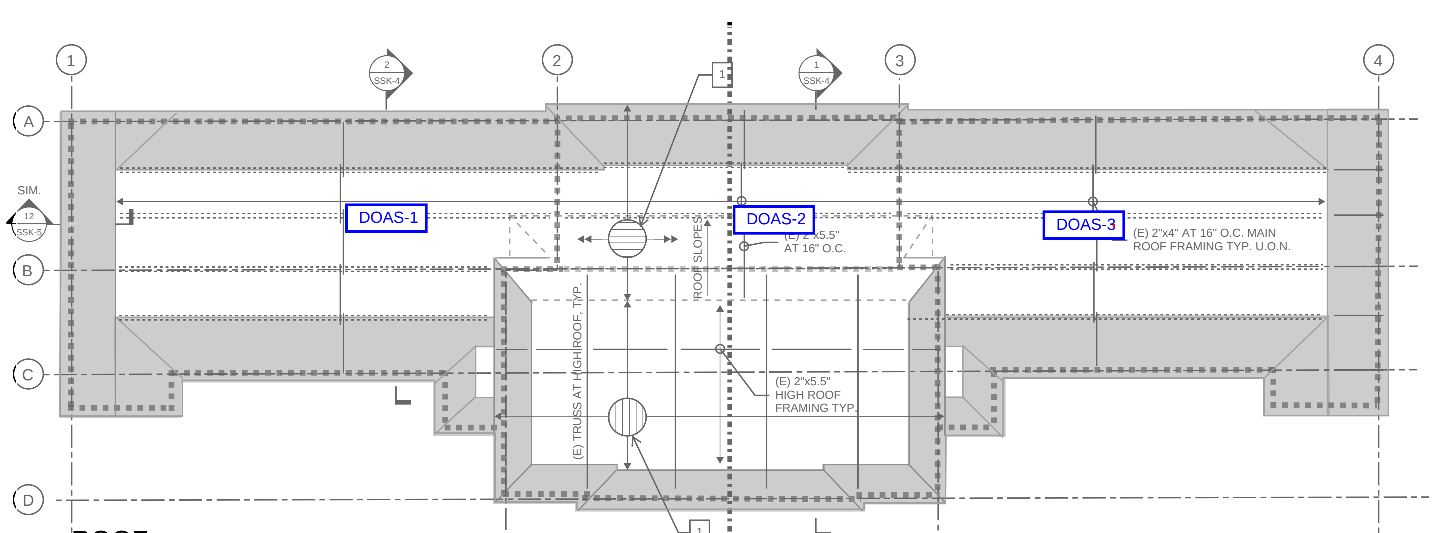
**OPTION 3:** ASHP+ ROOF DOAS UNITS + RADIANT



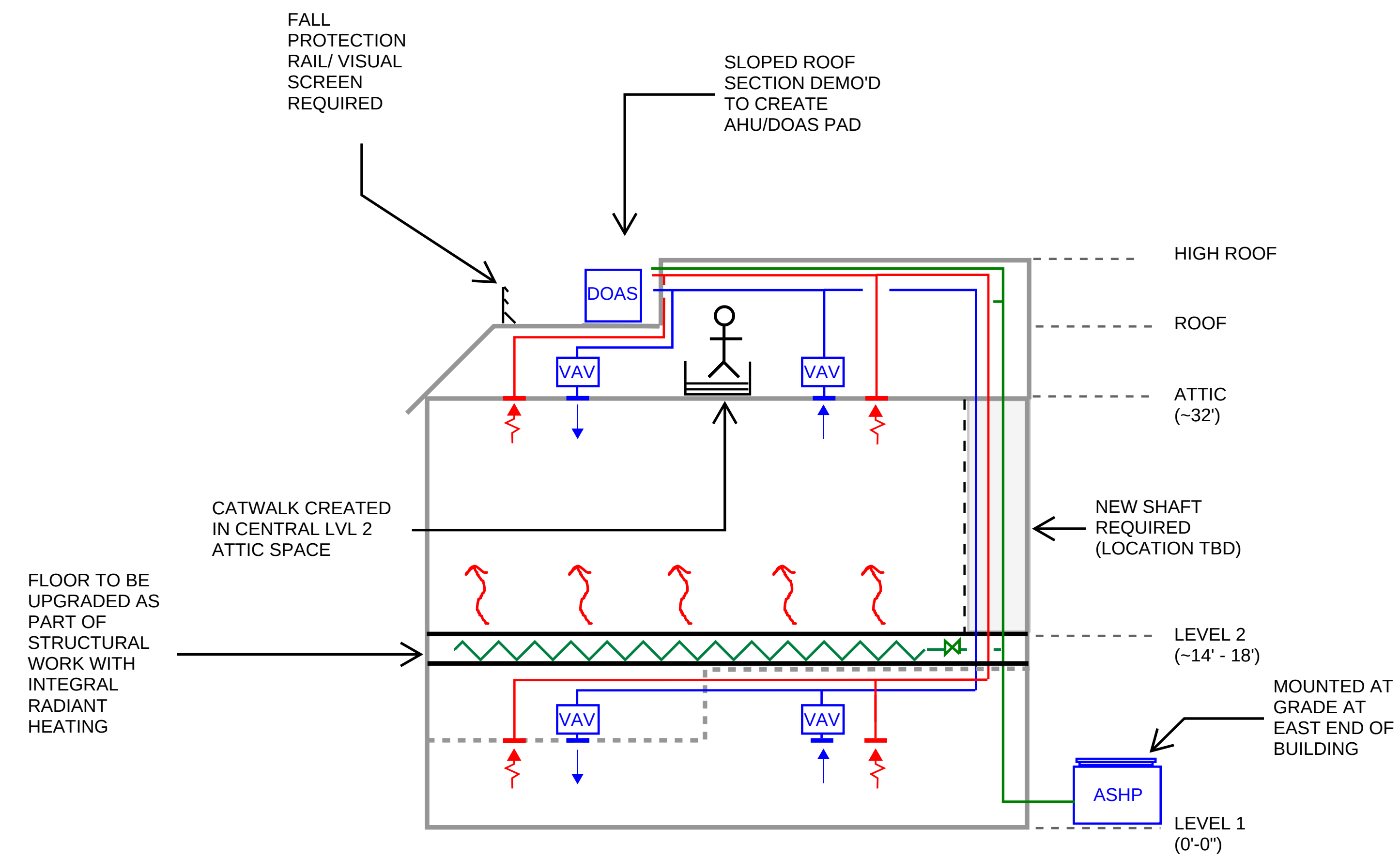

LEVEL 1



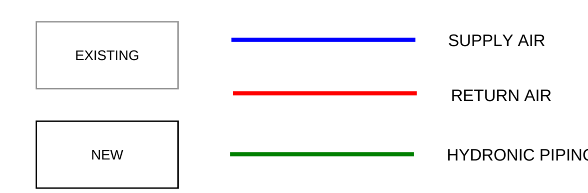

LEVEL 2



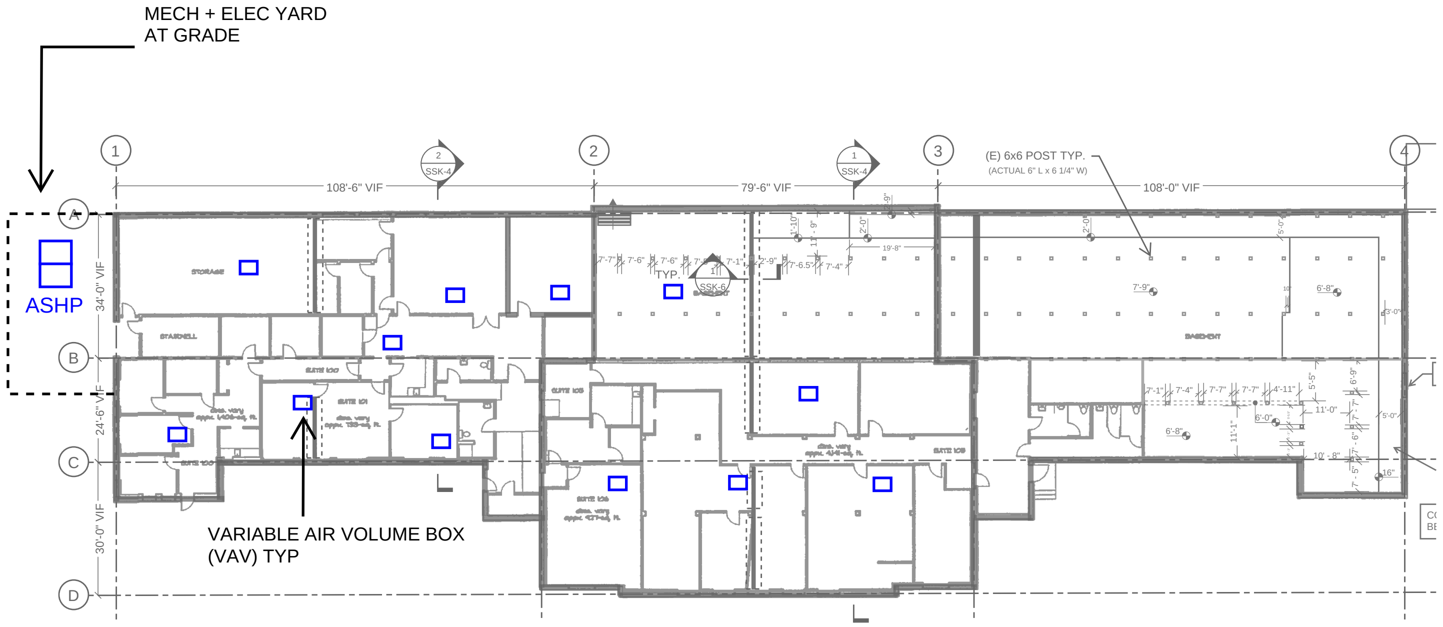

ROOF



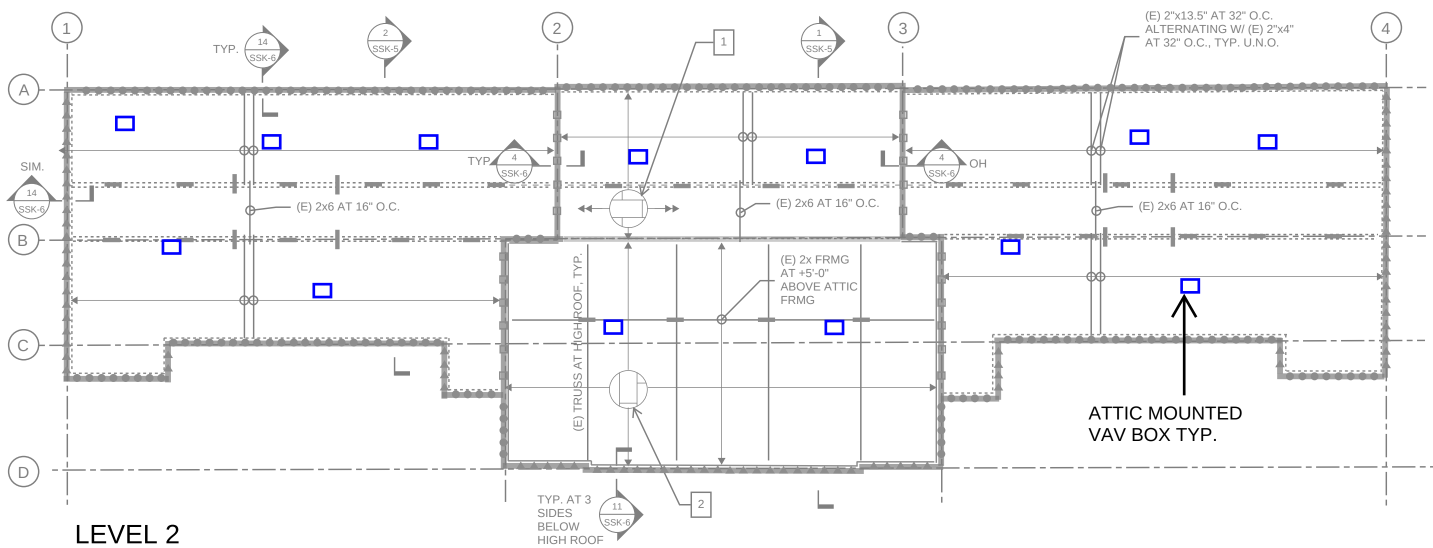

NOTE:
- MULTIPLE SHAFTS WILL BE REQUIRED TO CONNECT DOAS DUCTS TO LVL 1 ZONES
- FALL PROTECTION WORK REQUIRED ON ROOF



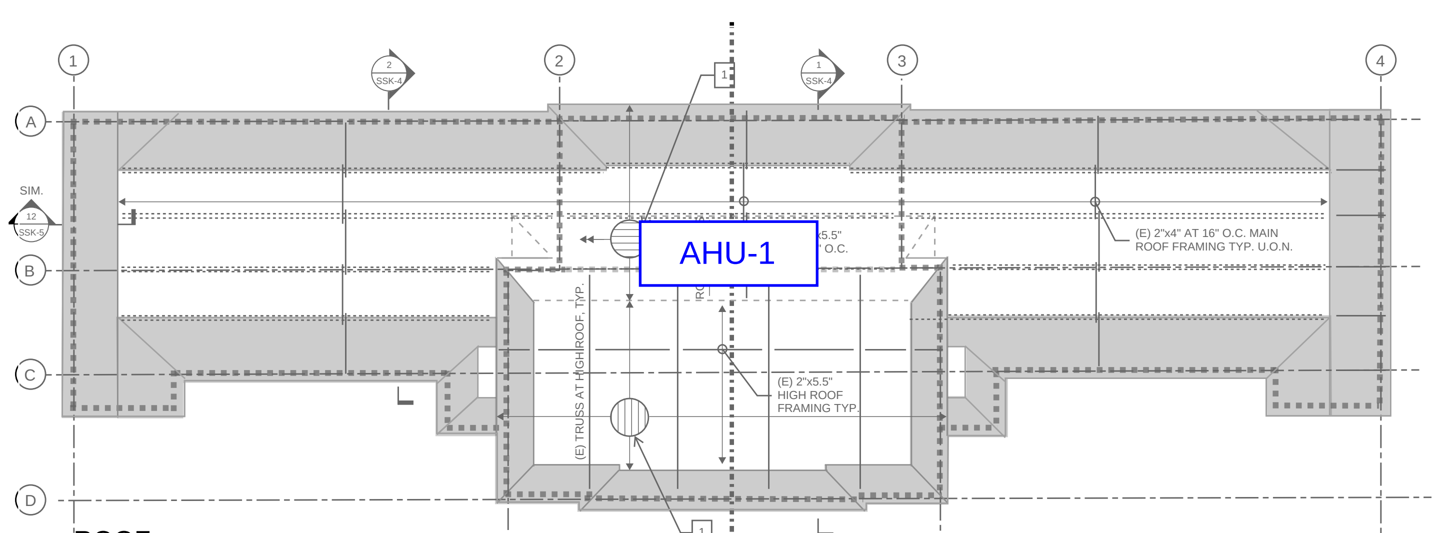
# **OPTION 3:** ASHP + TYPICAL VAV



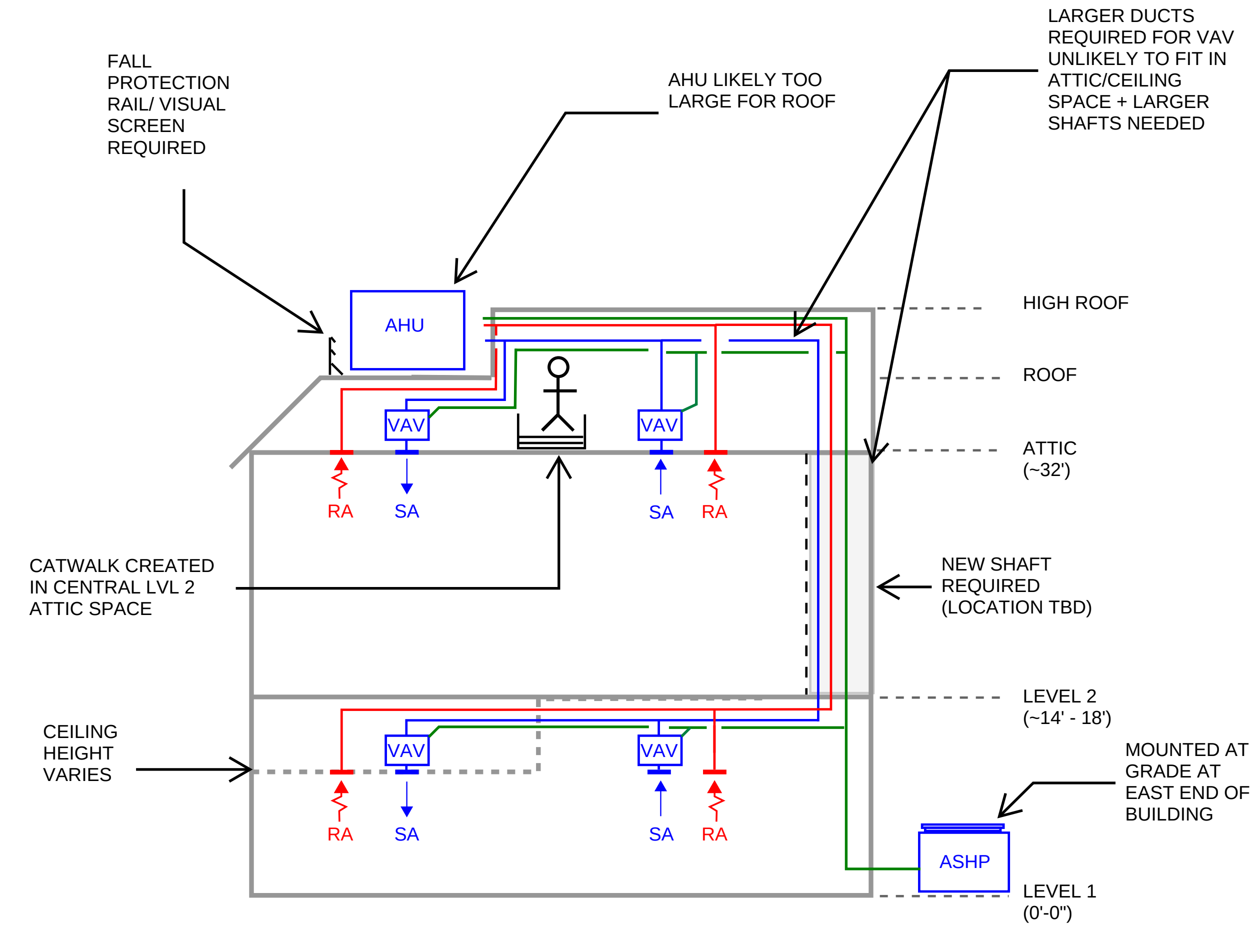

LEVEL 1




LEVEL 2




ROOF




NOTE:
- MULTIPLE SHAFTS WILL BE REQUIRED TO CONNECT AHU DUCTS TO LVL 1 ZONES
- FALL PROTECTION WORK REQUIRED ON ROOF

EXISTING

NEW

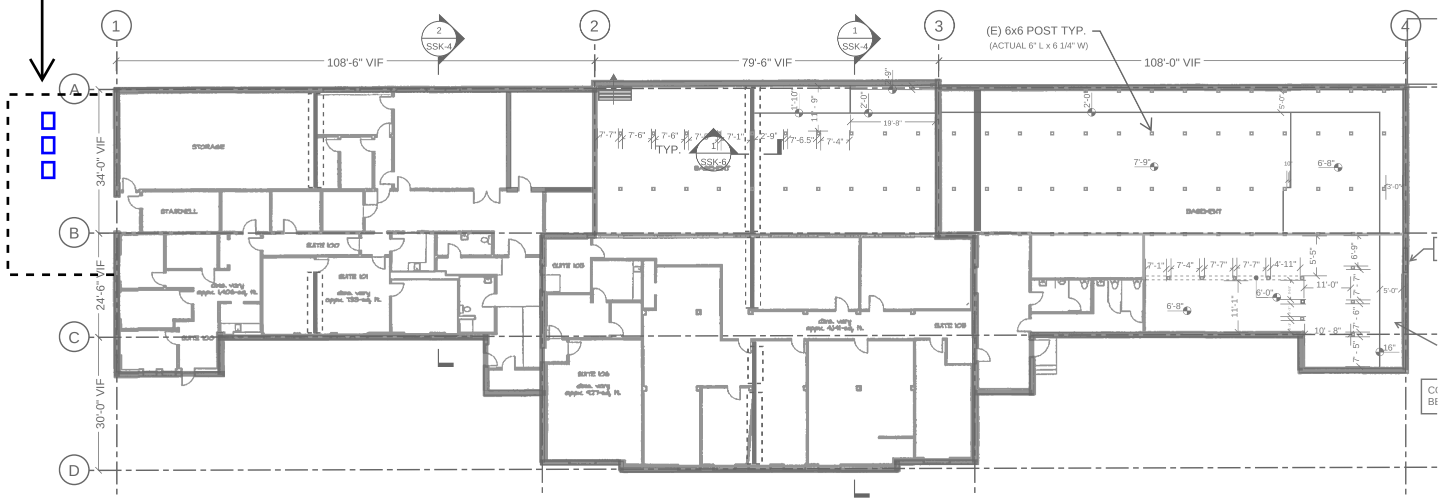
SUPPLY AIR

RETURN AIR

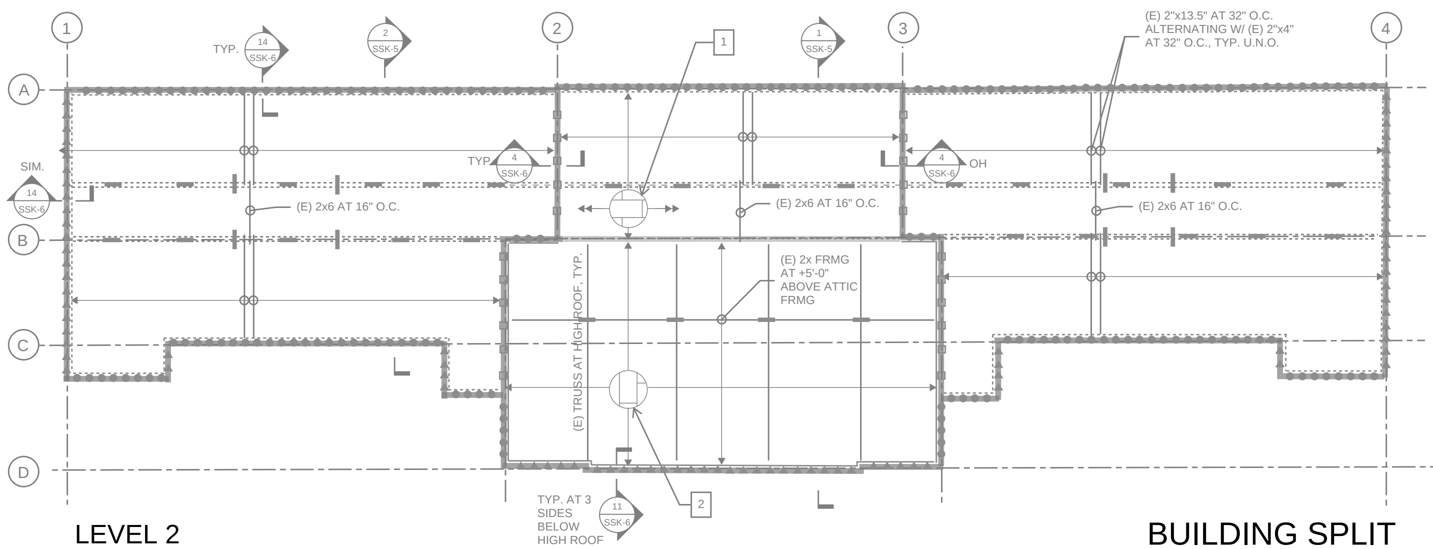
HYDRONIC PIPING

## OPTION 4: RTUs

POTENTIAL CONDENSING UNIT LOCATION FOR FCUs

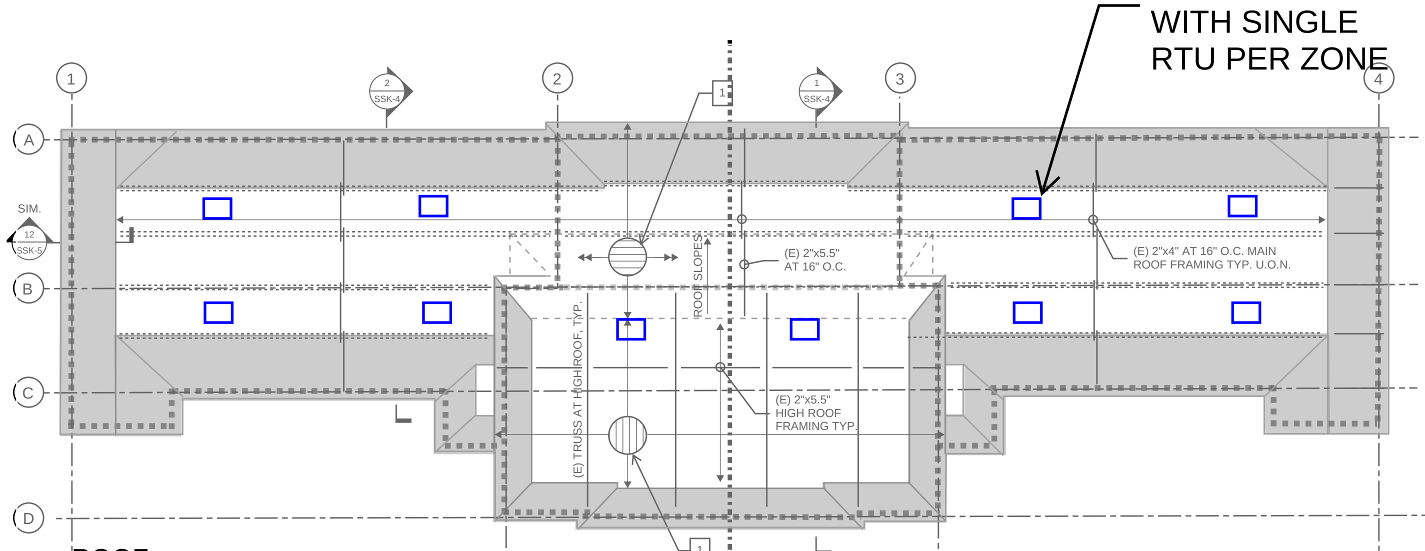


LEVEL 1

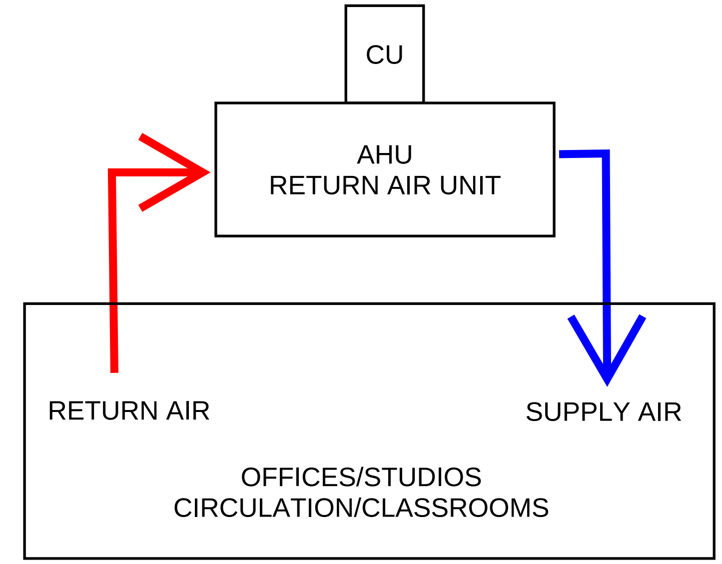


LEVEL 2

BUILDING SPLIT INTO ZONES WITH SINGLE RTU PER ZONE

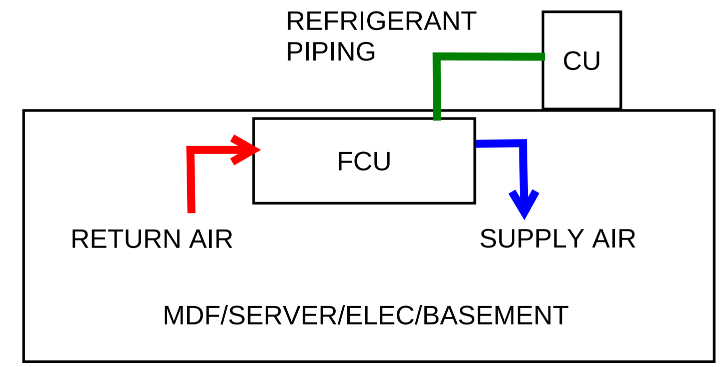


ROOF

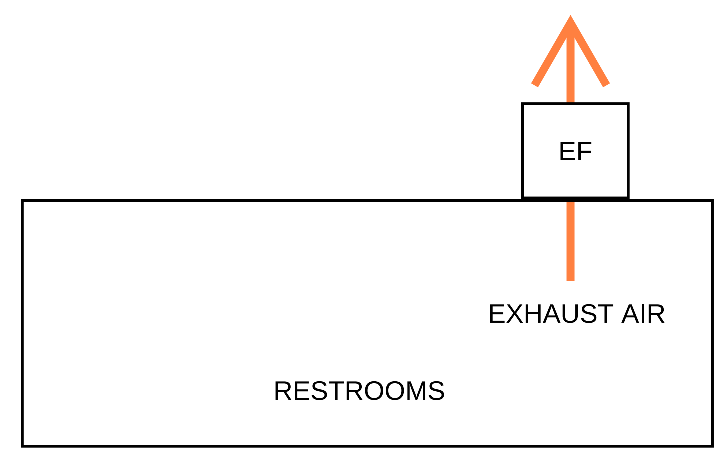



**HEAT PUMP ROOFTOP UNIT (RTU)**

- Return air unit with a DX coil, tied to a condensing unit
- Capable of heating and cooling per zone



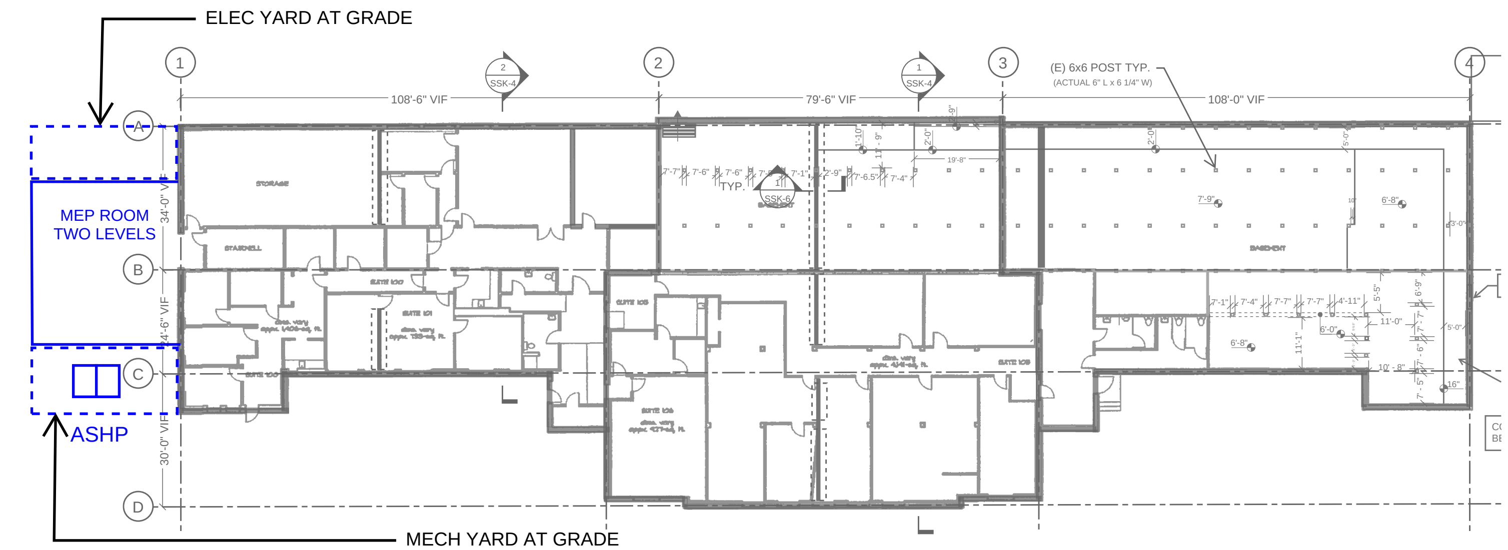

**FAN COIL UNITS (FCU)**
- Indoor fan coil units providing cooling, heating, dehumidification
- Outdoor condensing unit mounted on roof or ground



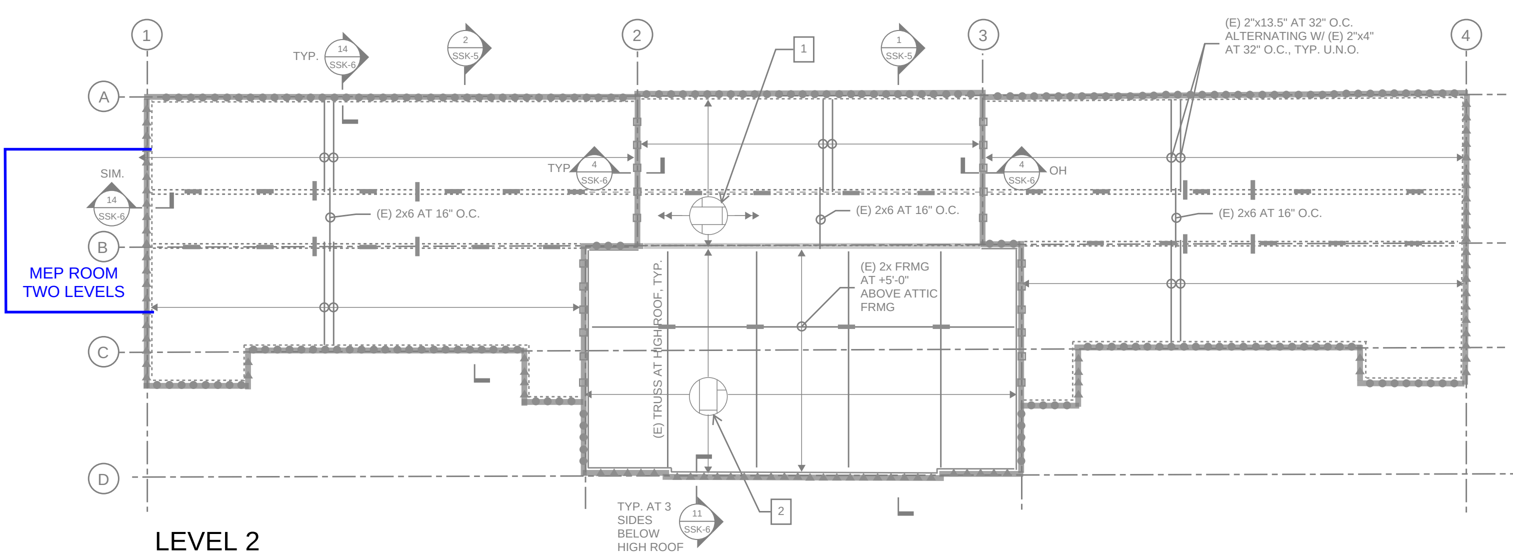

NOTE:
- MULTIPLE SHAFTS WILL BE REQUIRED TO CONNECT RTU DUCTS TO LVL 1 ZONES
- FALL PROTECTION WORK REQUIRED ON ROOF

| | |
|---|---|
| EXISTING | SUPPLY AIR |
| | RETURN AIR |
| NEW | EXHAUST AIR |

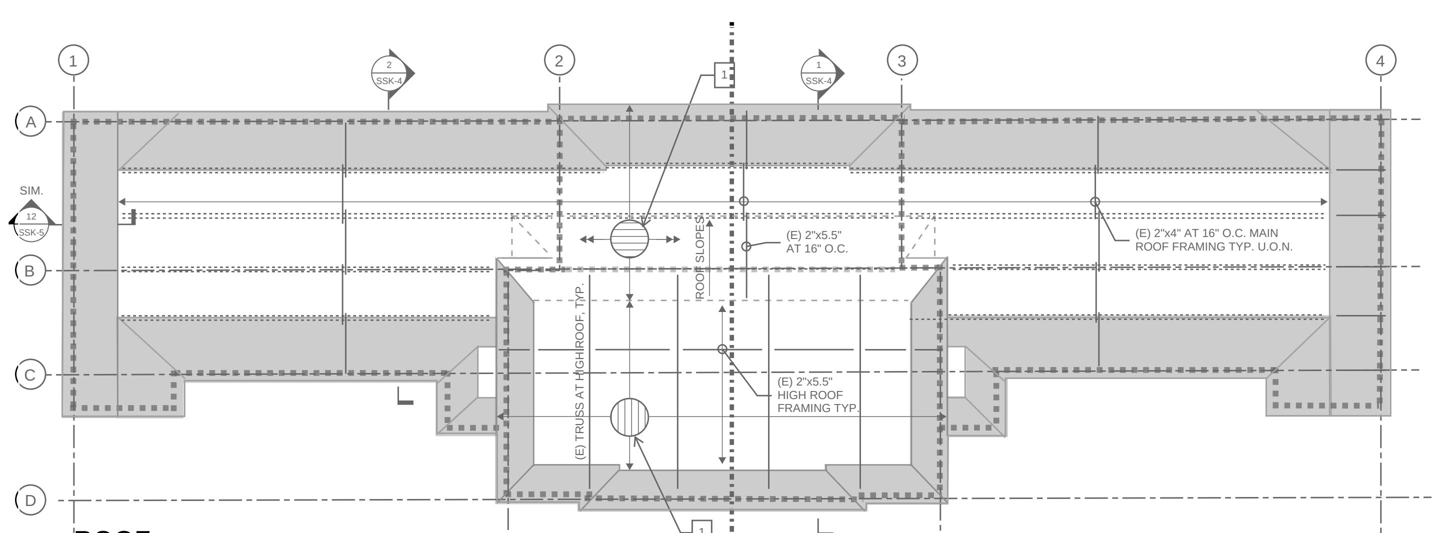
## **OPTION 5:** NEW MECH ROOM



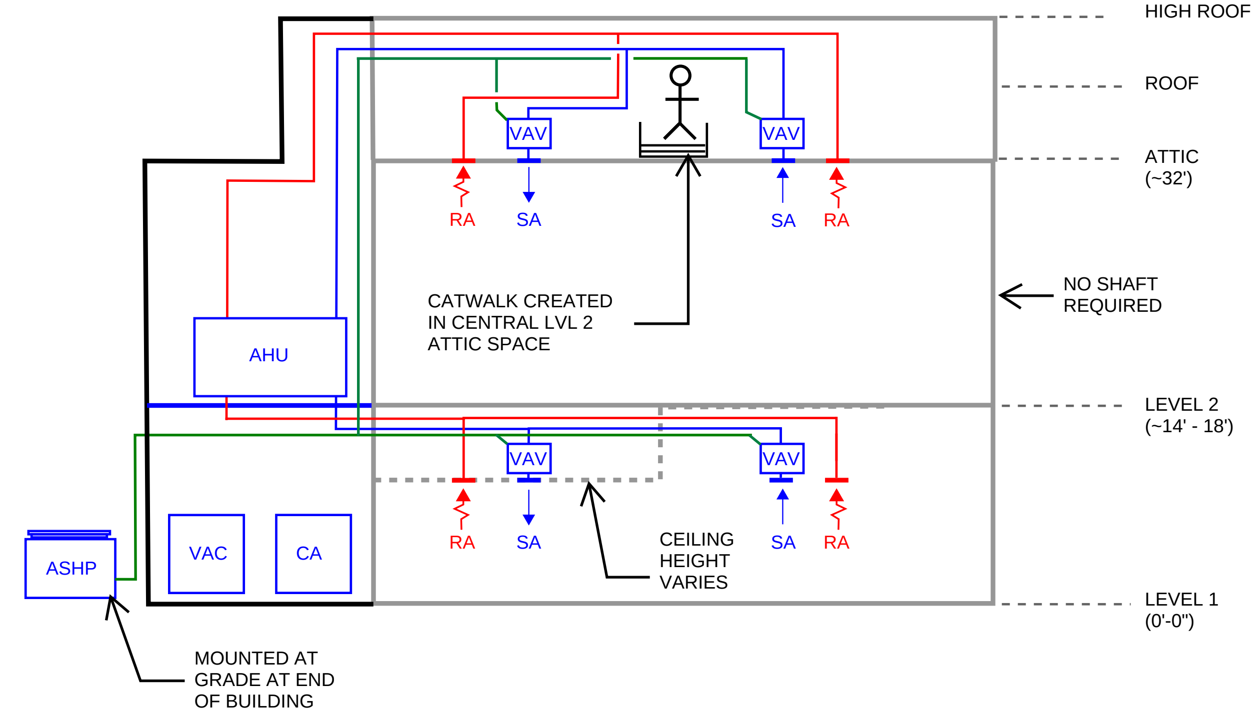

LEVEL 1

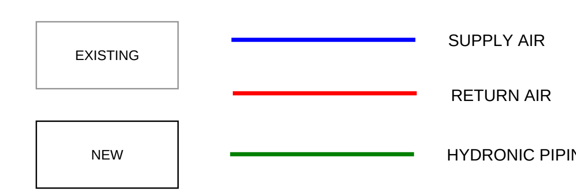



LEVEL 2

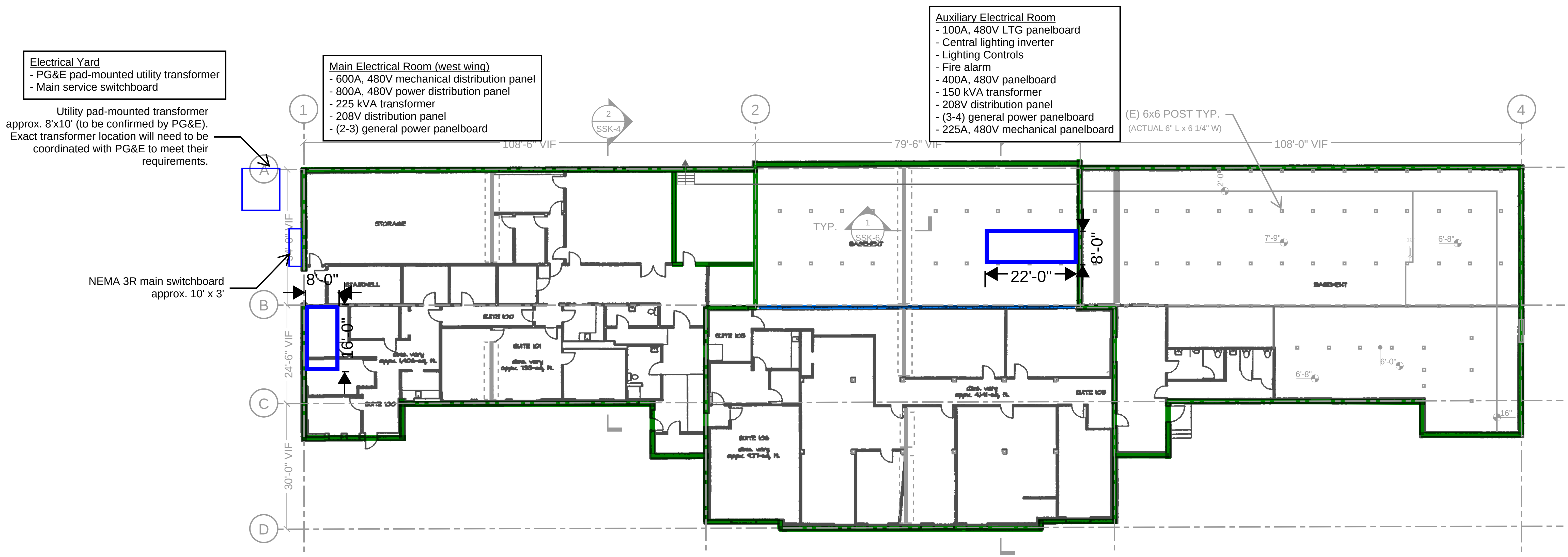



ROOF



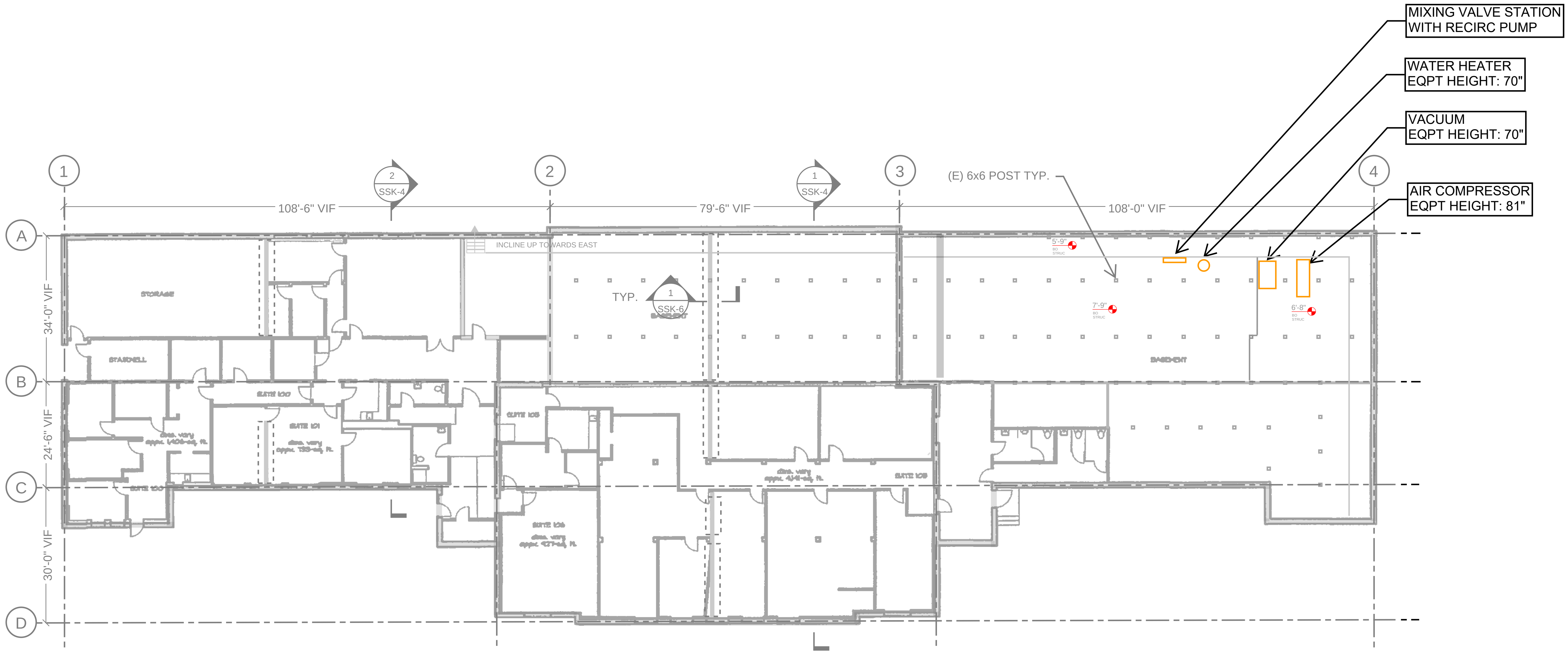
# APPENDIX 5
ELECTRICAL ROOM(S) REQUIREMENTS




LEVEL 1
SCALE: NTS

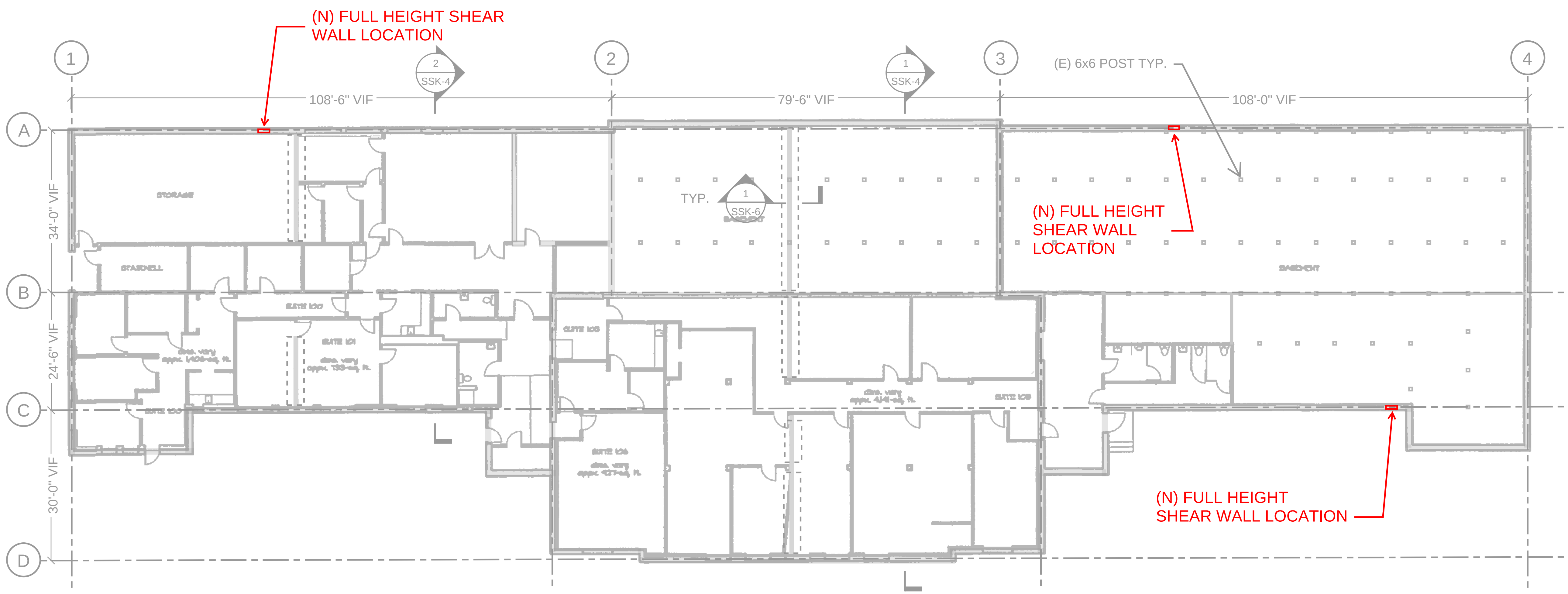
# APPENDIX 6

PLUMBING SUPPLEMENTAL DOCUMENTATION: PLUMBING EQUIPMENT




LEVEL 1
SCALE: NTS

# APPENDIX 7
POTENTIAL LOCATIONS FOR ADDED SHEAR AT BUILDING VERTICAL ENVELOPE



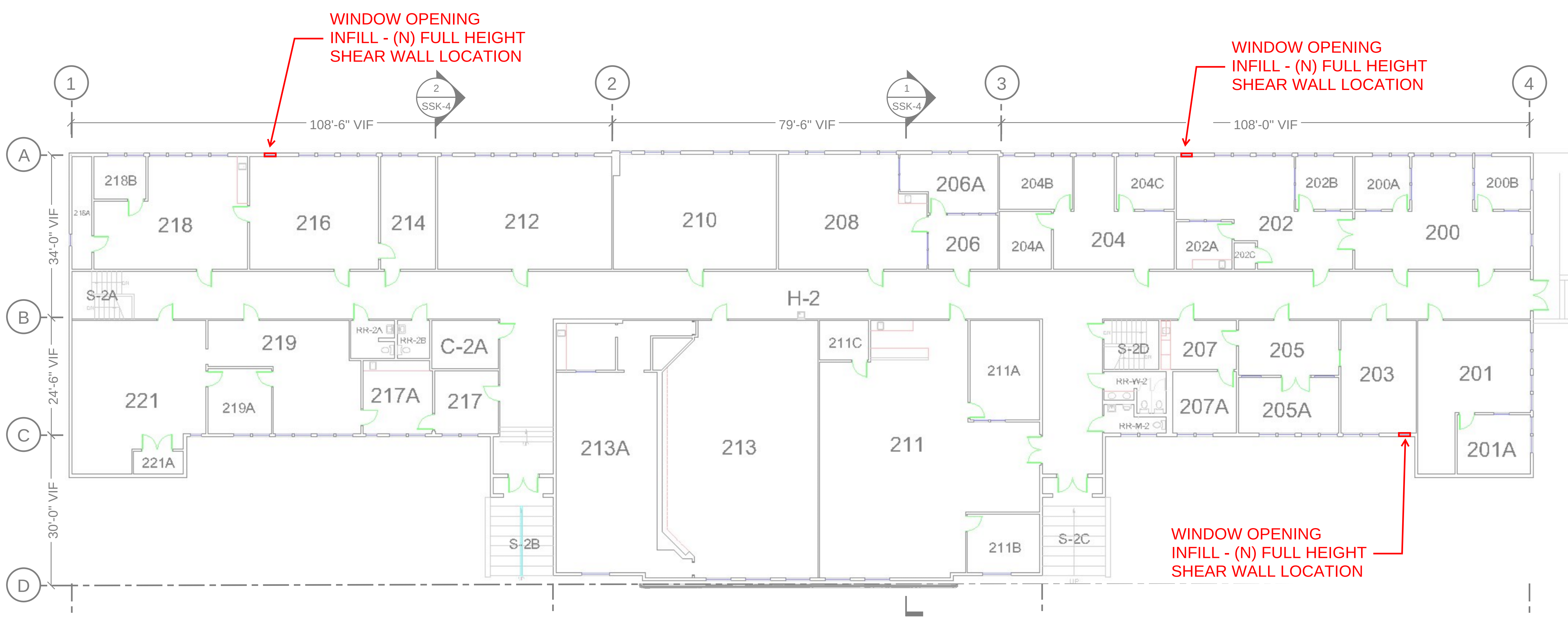

LEVEL 1

SCALE: NTS

POTENTIAL LOCATIONS FOR ADDED SHEAR AT BUILDING VERTICAL ENVELOPE

*2025-0527*

SMITHGROUP




LEVEL 2

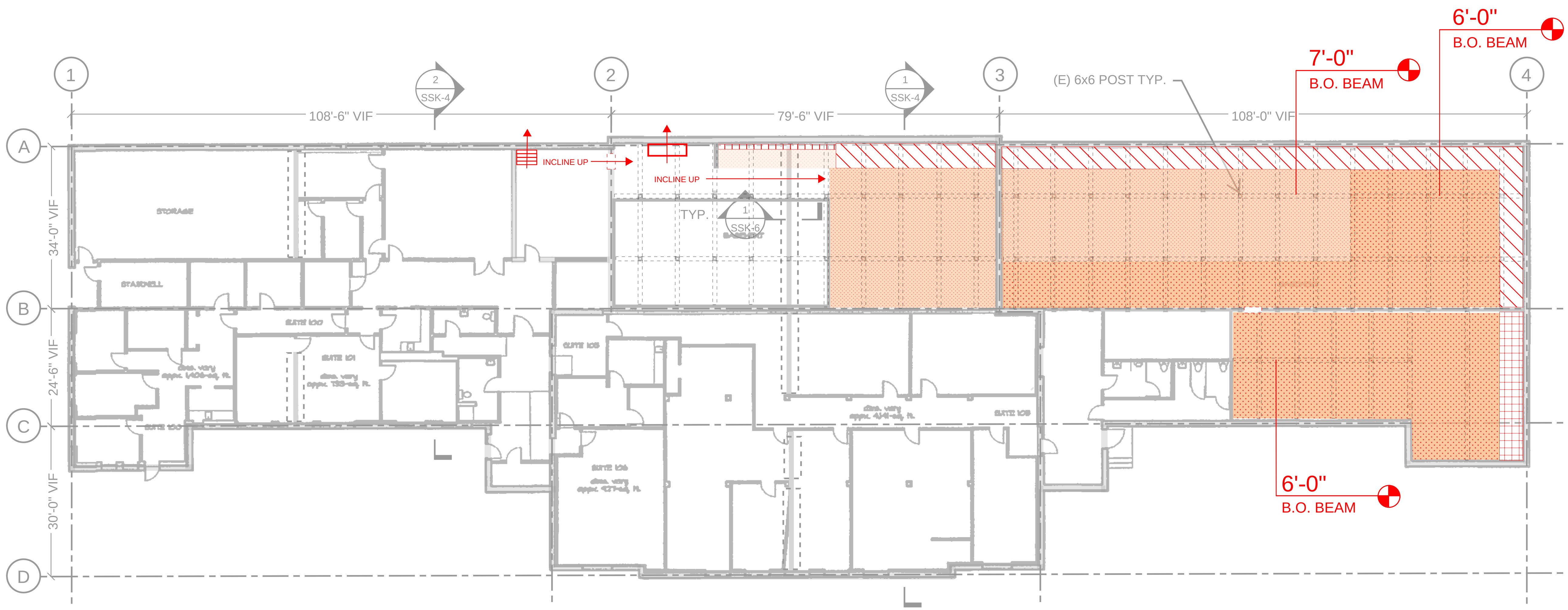
SCALE: NTS

POTENTIAL LOCATIONS FOR ADDED SHEAR AT BUILDING VERTICAL ENVELOPE

*2025-0527*

SMITHGROUP

# APPENDIX 8
STEWART BUILDING LEVEL 1 EAST WING "BASEMENT" SLAB ELEVATIONS




5' W X 2' H CONCRETE "BENCH" FOOTING AT EAST BASEMENT PERIMETER

6" W X 2' - 9" H CONCRETE CURB AT EAST BASEMENT PERIMETER

7'-9" FROM LEVEL 1 FLOOR SLAB TO B.O. LEVEL 2 FLOOR SHEATHING

5' W X 1'-4" H CONCRETE "BENCH" FOOTING AT EAST BASEMENT PERIMETER

6'-8" FROM LEVEL 1 FLOOR SLAB TO B.O. LEVEL 2 FLOOR SHEATHING

9'-7" FROM LEVEL 1 FLOOR SLAB TO B.O. LEVEL 2 FLOOR SHEATHING

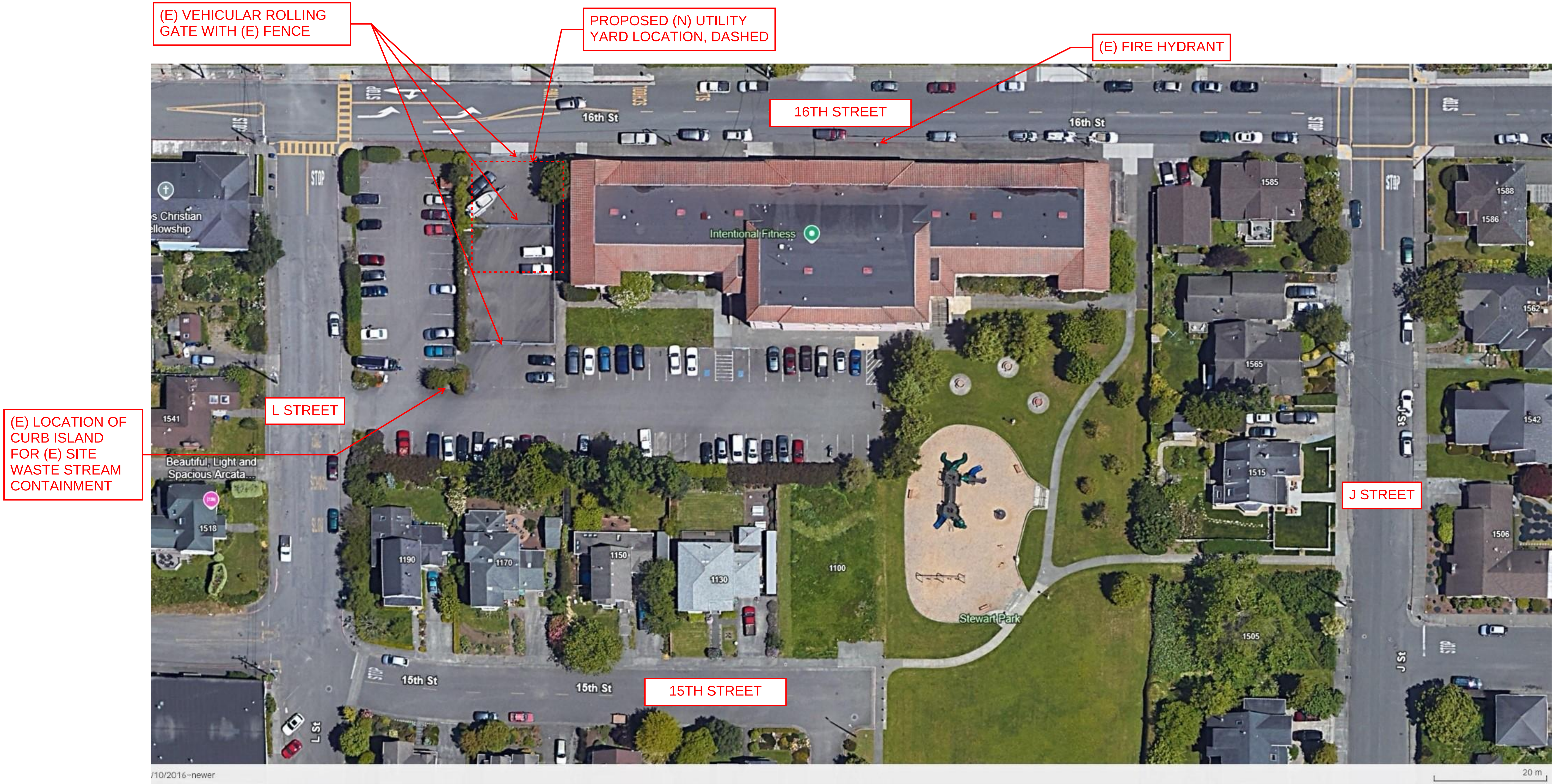
(E) WALL OPENINGS

(E) STRUCTURAL FRAMING

LEVEL 1

SCALE: NTS

# APPENDIX 9
STEWART BUILDING SITE AERIAL SKETCH




SITE AERIAL
SCALE: NTS

PLAN NORTH