SHUBIN + DONALDSON ARCHITECTS INC.

UNIVERSITY OF SANTA BARBARA - WEBB HALL
Trace Metal Lab Location Analysis Report
Phase 1

Prepared July 8, 2014

UNIVERSITY OF SANTA BARBARA WEBB HALL
Trace Metal Lab Location Analysis Report

The following report has been prepared by Architects at Shubin + Donaldson, Lab Consultants at Research Facilities Design, and Structural Engineers at Nelson Consulting Engineers to evaluate and give recommendation for a new Trace Metal Lab in Webb Hall at the University of California Santa Barbara.

The University has selected two possible locations for the new Trace Metal Lab within Webb Hall. The first location is on the first floor at the intersection of the two major hallways near the Main Entry. The second location is directly above, on the second floor. Both locations can accommodate the Trace Metal Lab's functional needs, but depending on where the lab is placed, it will impact the building in different ways. This document will evaluate all building impacts and costs associated with both possible "sites" and provide a recommendation as to the better suited location.

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1. EXISTING BUILDING CODE ANALYSIS

Webb Hall was constructed in 1952 and occupied by UCSB in 1954. While there have been several alteration and upgrade projects done in the building over the years, none of the existing drawing records that were located contain code analysis or building construction type information. S+D has prepared the following code analysis to determine the building type for this project based on the current CBC.

The existing building has offices, labs, and a lecture hall. The offices and labs are Type B Occupancy and the lecture hall is Type A Occupancy.

Webb Hall is two stories high and has an overall height of 28 feet. The existing building is not sprinklered.

Gross Building Area per CBC
Level 1 = 23,053 sf (includes 1602 sf of exterior covered area)
Level 2 = 13,337 sf
Total Area = 36,390 sf
It is assumed that no hazardous materials are stored or used in the building beyond limits listed in Table 307.1(1) or Table 443.7.3.1. UCSB to confirm.

Use & Occupancy
Type B: Business (Educational plus Laboratories (testing and research))
Type A-1: Assembly with fixed seats in Lecture Hall. Assembly net square footage is 1,848 sf. which is calculated by multiplying 7sf net for seating area with 168 occupants. This area is equivalent to 8.0% of the total Level 1 floor area.

Heights & Areas
The Trace Metal Lab project will not require any height modification of the existing building.
(Sidelines of fume hood exhausts will be examined in Phase 2)

Obtain maximum allowable area.

Calculate for Increase for frontage. Aa = At + (At x If)
Building perimeter = 1018 ft.
97% of perimeter faces a public way wider than 20 ft. This 97% faces a public way greater than 30 ft.
31.5 ft. have public way of 11 ft. (at south end).

If = (F/P – 0.25) x W/30
If = (986.5/1018 – 0.25) x 30.35 / 30 If = 0.969 x 1.01 If = 0.98

W = (L1 x w1 + L2 x w2) / F
W = 31.5 x 11 + 986.5 x 30) / 986.5 W=346.5 + 29,595 / 986.5 W = 30.35

A possible 2 hour fire separation exists between the A-1 Auditorium Occupancy and the remaining B Occupancy consisting of a 12” concrete wall at the South side of the Auditorium and a 10” concrete wall with 4” brick veneer at the West side of the Auditorium. The existing Door 114 on the South side requires a 90 minute fire rating if a label indicating this rating does not already exist. There is a 48” wide cased opening on the short West side of the Vestibule wall. This opening requires a 90 minute fire rated door to be installed, which could be on a hold-open.

For this 2 hr. fire separation:
For B, Type VA: Aa = 18,000 + (18,000 x 0.98) = 35,650 sf. 3 stories, 50 ft. high max. allowed – Greater than 23,053 sf. OK for each story.

For B, Type IIIB = Aa = 19,000 + (19,000 x 0.98) = 37,620 sf. 3 stories, 55 ft. high max. allowed - Greater than 23,053 sf. OK for each story.

For A-1, Type VA: Aa = 11,500 + (11,500 x 0.98) = 22,770 sf., 2 stories, 50 ft. max. allowed – Greater than 1848 sf. OK for each story.
For A-1, Type IIIB: Aa = 8,500 + (8,500 x 0.98) = 16,830 sf., 2 stories, 55 ft. max. allowed - Greater than 1848 sf. OK for each story.

The height and area analysis of Webb Hall confirms that the existing height, square footages, and uses of within the building are within the building code permitted limits.

Construction Types
VA = 1 hr. rated
IIIB = 2 hr. rated exterior bearing wall, otherwise no rating.
The structure appears to consist of concrete pilasters and columns with concrete exterior walls which may also be load bearing.

CONCLUSION:
TYPE VA OR TYPE IIIB CAN BE USED.
(If 2 hr rated fire separation cannot be obtained, Type IIIA (1 hr. rated) would have to be used.)

The proposed Trace Metal Lab will not change the use within the building nor will the use be intensified. Therefore, the only work required outside of the new TML is compliance with Chapter 11B/Accessibility of the 2013 California Building Code.

2. ARCHITECTURAL ANALYSIS

Building Program

The proposed Trace Metal Lab (TML) will be a new program within the existing building. The two proposed spaces are currently occupied by other functions. The first floor location is one large space that has been separated by tall bookcases to serve as two separate rooms and functions. The smaller portion of the first floor room is accessed from the East - West corridor. It serves as an office supply room and IT distribution closet. The larger portion of the room is accessed from the exterior adjacent to the rear Loading Dock. The space serves as a storage room for equipment and materials to be used during Field Trips. If the TML is placed on the first floor, the University would need to determine another place on campus for this storage.

The second floor location is currently used for faculty offices. All faculty offices within this area would need to be relocated. The existing first floor storage space could be used for the relocated offices, although this space is undesirable because of the lack of natural light. The windows within the TML on the second floor would need to be replaced with fixed windows with inoperable panes to maintain the environment and room air balance.

Mechanical Space Allocation

The Trace Metal Lab has several duct risers required for the exhaust fume hoods. Several of the fume hood exhaust ducts can be combined into one shaft, and the perchloric exhaust must remain in a separate shaft. These exhaust air must exit the riser 10'-0" above the existing roof. If the TML is located on the second floor, the fume hood ducts can exit directly through the roof. If the TML is located on the first floor, a ductwork riser shaft must be constructed to travel through the second floor. This will require additional space allocation on the second floor. The length of ductwork will increase, which will in turn increase cost. Locating the TML on the first floor will be more costly in terms of duct routing.

There are numerous existing services running under the slab of the Second Floor. Existing piping for chilled water, hot water, gas, sanitary sewer, etc., lower the available height for the lab if located on the first floor. If the lab were to be placed on the first floor, relocation of these lines is required.

The available clear height within the two potential TML locations varies. The first floor measures 10'-0" from finished floor to underside of lowest beam at the ceiling. The second floor is slightly lower and measures 9'-5" from finished floor to underside of lowest beam at the ceiling.

Restrooms

Restroom plumbing fixture counts and accessibility requirements are a concern in both potential locations of the Trace Metal Lab. Fixture counts are determined based upon the use at each floor level. The Auditorium on the first floor increases the number of occupants on the first floor and in turn, increases the number of required plumbing fixtures. The existing conditions within the restrooms do not satisfy the fixture counts required by Code at the first floor. While the existing first floor Men's restroom meets the required number of fixtures, the Women's restroom requires two additional toilets. Unless provided otherwise, the additional fixtures should be considered by UCSB. These additional plumbing fixtures are separate from the Trace Metal Lab work within the building. The construction of the Trace Metal Lab alone on either floor does not trigger the need for additional plumbing fixtures.

There have been some modifications within the first floor restrooms to provide an accessible stall; however, work is still required to achieve accessible design compliance. This work includes the following modifications:

First Floor Men's Restroom

a. Revise toilet partitions to provide 5'-0" turning radius within accessible stall.
b. Provide grab bars in accessible restroom.
c. Provide new urinal or relocate existing urinal to 17" A.F.F.
d. Provide new sink at 34" A.F.F. that allows for 29" A.F.F. knee clearance with insulated sink piping.
e. Patch existing tile as necessary.
f. Provide new mirror or relocate existing mirror to 34" A.F.F.

First Floor Women's Restroom

a. Revise toilet partitions to provide 5'-0" turning radius within accessible stall.
b. Provide grab bars in accessible restroom.
c. Provide new sink at 34" A.F.F. that allows for 29" A.F.F. knee clearance with insulated sink piping.
d. Patch existing tile as necessary.
e. Provide new mirror or relocate existing mirror to 34" A.F.F.
f. Two toilet fixtures would be required to meet Code fixture counts in this restroom.

Locating the TML on the second floor will require that the restrooms on the second floor meet accessible design requirements. To achieve compliance, the following work must be completed:

Second Floor Men's Restroom

a. Removal of two existing toilet fixtures to provide one larger accessible stall with 5'-0" turning radius.
b. Provide grab bars in accessible restroom.
c. Provide new urinal or relocate existing urinal to 17" A.F.F.
d. Provide new sink at 34" A.F.F. that allows for 29" A.F.F. knee clearance with insulated sink piping.
e. Patch existing tile as necessary.
f. Provide new mirror or relocate existing mirror to 34" A.F.F.

Second Floor Women's Restroom

a. Removal of two existing toilet fixtures to provide one larger accessible stall with 5'-0" turning radius. Removal of two toilet fixtures will be acceptable with the Code required number of fixtures at this floor.
b. Provide grab bars in accessible restroom.
c. Provide new sink at 34" A.F.F. that allows for 29" A.F.F. knee clearance with insulated sink piping.
d. Patch existing tile as necessary.
e. Provide new mirror or relocate existing mirror to 34" A.F.F.

IT Infrastructure

The existing IT and network cabling distribution is within the two proposed locations for the TML. Access to this cabling must be maintained. Access shall not be from within the Clean Rooms of the TML. A new opening in the existing walls may be required to provide a door from the Corridor to create an IT closet.

Fire Alarm and Fire Sprinklers

Webb Hall does not currently have an NFPA 13 sprinkler system.

The University is investigating the existing Fire Alarm panel to determine if there is additional capacity available. It appears that a current or new fire alarm system may be required for the building based upon preliminary discussions with on campus departments. There is an existing system within Webb Hall, but it appears to be inadequate and/or antiquated.

3. LAB CONSULTANT ANALYSIS

Overview

The University is considering one of two spaces for the construction of a new approximately 1,000 square foot Trace Metals Clean Laboratory to support geochemistry research for the Department of Earth Science. Both space locations considered have been identified in the existing building Webb Hall located on the main University campus. Webb Hall is a two level building with a partial basement, Level 1, and Level 2. The building has mixed use with offices, wet laboratories, storage, and computer labs. The first location considered is on Level 1 of the building off the main lobby at the corner of the L-shape floor plan. The second location considered is on Level 2 at a similar location in the floor plan. Level 2 is the top level of the building with an exposed flat roof well and perimeter sloped roof attic space above.

The Trace Metals Clean Laboratory suite will consist of multiple rooms including gowning, multiple analysis lab rooms, weighing, prep, and a thermal ionization mass spectrometry (TIMS) room. The TIMS equipment will be sensitive to floor vibrations. The University has conducted some preliminary vibrations surveys of the potential spaces and determined that they are acceptable with regards to vibrations from the building elevator and adjacent foot fall traffic.

The design team conducted interviews with the Owner and Departmental representatives to gather program information and discuss the usage and requirements of the Trace Metals Clean Laboratory. Additionally, a thorough walk through was performed of the two floor spaces considered, as well as the roof area above, basement, and loading dock areas of the building that contain MEP support spaces. The following is an analysis of these spaces along with discussion for suitable construction for the new lab.

Webb Hall Level 1

The proposed location for Level 1 is shown in Figure 1.

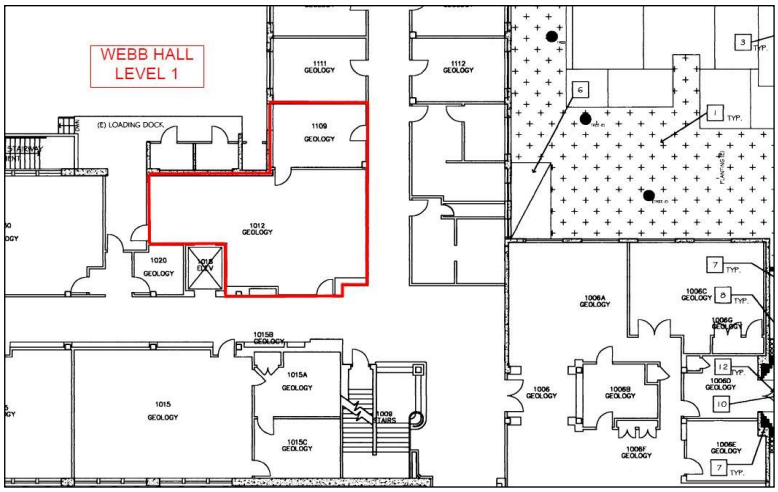
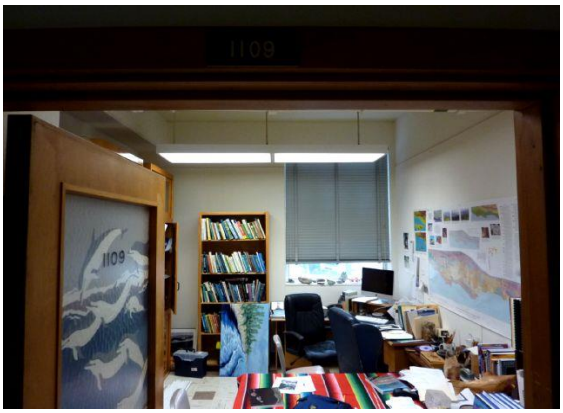


Figure 1: Webb Hall Level 1 Proposed Location

Webb Hall Level 1 Existing Usage

The location is off of the building main entry and at the bend of the L-shaped floor plan. The space is currently occupied by an office, an IT infrastructure server and switch rack, loading dock receiving storage, and department storage of field gear.



Level 1 Office

Level 1 Field Gear Storage

Webb Hall Level 1 Construction

The Level 1 overhead clearance is approximately 10'-0" clear to the underside of the Level 2 structure. The Level 2 floor structure consists of a concrete floor slab and concrete beams. The receiving/storage area and office has an exposed structure with painted finish. The concrete finish appears to be standard finish with pits and voids and has numerous cored holes, cast hangers, and attached hangers. This surface finish is not suitable for direct air contact for cleanroom construction but may be able to be worked smooth, sealed, and painted with a high performance epoxy coating to make it suitable for direct air contact for an air plenum area. The walls appear to be framed with painted plaster or gypsum board finish.

Webb Hall Level 1 HVAC

The office room has an air supply vent from a central heating and ventilating system which is currently not operational, therefore, the room is essentially unconditioned. The receiving/storage area is served by a local heating and ventilating ceiling blower unit. All HVAC systems in this area will need to be removed for the construction of the new lab.

Webb Hall Level 1 Plumbing

The piping mains for the building plumbing services are routed through the receiving/storage overhead area. These services include distilled water (actually DI water), hot water, cold water, gas (natural), compressed air, and vacuum. There is an extensive infrastructure of industrial drain and vent piping through the receiving/storage area. The office has an industrial drain main routing in the overhead and has plumbing services stubbed into the room and valved off from the adjacent corridor.

Level 1 Receiving/Storage Plumbing Piping Mains

Level 1 Receiving/Storage Industrial Waste/Vent Piping

Level 1 Office Industrial Waste Piping

Level 1 Office Plumbing Piping Stubbed Services

The piping is installed in the 8'-0" to 10"-0" range throughout the area. Most if not all of the piping in this area will have to be either elevated or relocated outside of the space to accommodate the construction of the lab. The hot water, cold water, and compressed air systems are services that would be used in the new lab. There is a potential for the existing pure water system to be used as supply water for local water polishers in the new lab.

Webb Hall Level 1 Electrical

The branch circuit electrical services for the area are sourced from panelboards located in the Level 1 corridor. The lighting electrical services were not confirmed, but they are presumed to also be sourced from a panelboard located in the corridor. All of the power and lighting electrical services for the area will need to be removed for the construction of the new lab. Due to the age of the existing electrical panelboards, a new electrical panelboard will need to be installed for the 120/208vac branch power circuit loads for the new lab. The existing lighting circuits can likely be repurposed for the new lab.

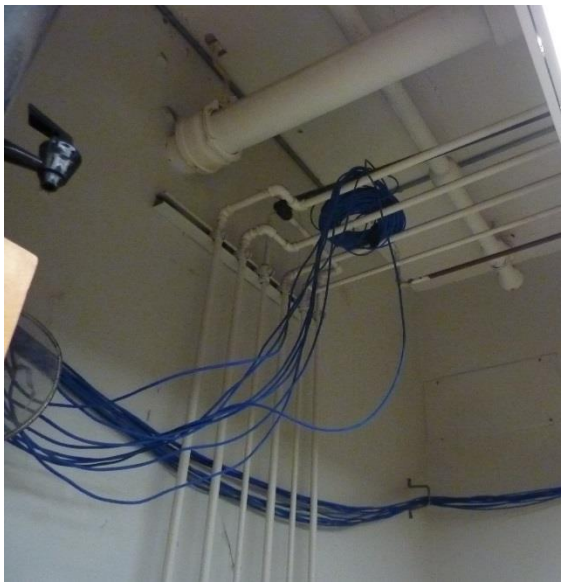
Level 1 Electrical Panelboard in Corridor

Level 1 Typical Electrical Panelboard Branch Circuits

Webb Hall Level 1 Telecomm

The Level 1 area has an IT infrastructure rack for telecomm services, presumably for the Level 1 areas of the building. This rack is free-standing in the storage space. There is substantial telecomm cabling routed throughout the space to other areas of the building. The IT rack and wiring will need to be relocated to accommodate construction of the new lab.

Level 1 Storage IT Rack



Level 1 Storage IT Cabling

Webb Hall Level 2

The proposed location for Level 2 is shown in Figure 2.

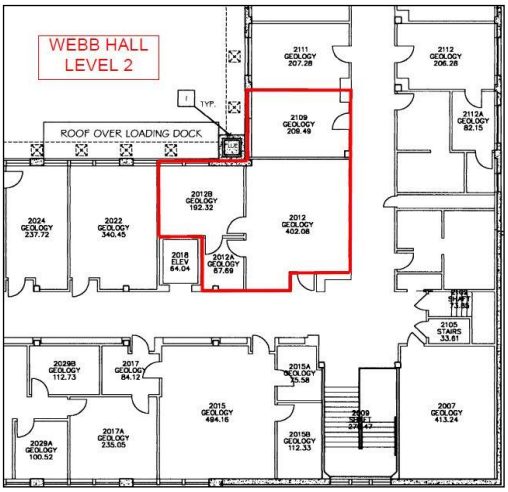
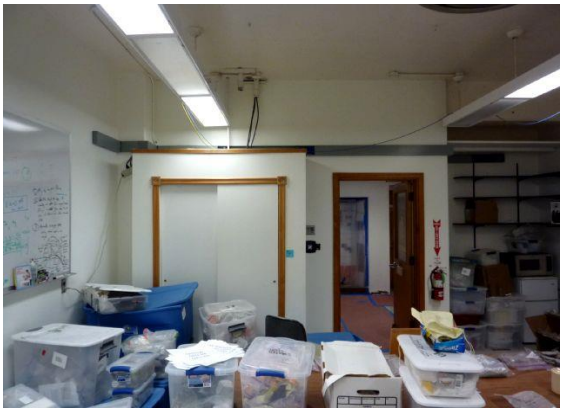


Figure 2: Webb Hall Level 2 Proposed Location

Webb Hall Level 2 Existing Usage

The location is at the bend of the L-shaped floor plan. The space is currently occupied by two separate offices, a wet lab, an IT closet, and a small storage room.



Level 2 Wet Lab

Level 2 Office

Webb Hall Level 2 Construction

The Level 2 overhead clearance is approximately 9’-4” clear to the underside of the roof structure. The roof structure consists of a concrete floor slab and concrete beams. The wet lab area has an exposed structure with painted finish. The office areas have a dropped ceiling with tiles. The concrete finish appears to be standard finish with pits and voids and has numerous cored holes, cast hangers, and

attached hangers. This surface finish is not suitable for direct air contact for cleanroom construction but may be able to be worked smooth, sealed, and painted with a high performance epoxy coating to make it suitable for direct air contact for an air plenum area. The walls appear to be framed with painted plaster or gypsum board finish.

Webb Hall Level 2 HVAC

The office and lab rooms have air supply vents supplied from a central heating and ventilating system which is currently not operational, therefore, the rooms are essentially unconditioned. The supply vents are routed through the roof slab with air distribution ductwork located in the roof attic area above. All HVAC systems in this area will need to be removed for the construction of the new lab.

Webb Hall Level 2 Plumbing

The plumbing piping services for the wet lab bench appear to be routed up from the floor below through the receiving/storage overhead area on Level 1. These services include distilled water (actually DI water), hot water, cold water, gas (natural), compressed air, and vacuum. The overhead areas are mostly free of piping with the exception of one small system which appears to be zone reheat hydronic piping. The hot water, cold water, and compressed air systems are services that would be used in the new lab. There is a potential for the existing pure water system to be used as supply water for local water polishers in the new lab.

Level 2 Lab Overhead Piping

Level 2 Overhead Exposed Ceiling Area

Webb Hall Level 2 Electrical

The branch circuit electrical services for the area are sourced from panelboards located in the Level 2 corridor. The lighting electrical services were not confirmed, but they are presumed to also be sourced from a panelboard located in the corridor. All of the power and lighting electrical services for the area will need to be removed for the construction of the new lab. Due to the age of the existing electrical panelboards, a new electrical panelboard will need to be installed for the 120/208vac branch power circuit loads for the new lab. The existing lighting circuits can likely be repurposed for the new lab. There is a DC power panel along with conduit and wiring located in an office area and storage overhead area. The equipment does not appear to be active and this panel along with its associated supply and distribution power circuits will need to be removed for the construction of the new lab.

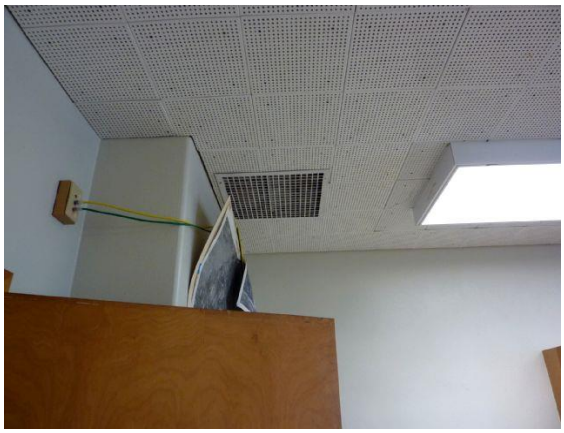
Level 2 DC Power Panel

Level 2 DC Power Panel Circuits in Storage Overhead

Webb Hall Level 2 Telecomm

The Level 2 area has an IT infrastructure rack for telecomm services, presumably for the Level 2 areas of the building. This rack is located in a framed closet located in the lab room. Most of the telecomm cabling is routed outside of the space to other areas of the building. The IT rack and wiring will need to be relocated to accommodate construction of the new lab.

Level 2 IT Closet



Level 2 Office Telecomm Cabling

COMPARISON OF SPACES: Cleanroom Construction

Level 1 has 8” of additional floor height clearance to structure. This is valuable clearance for laboratory cleanroom construction in an older building with a small 12’-0” floor-to-floor construction. Depending upon the design of the supply air ceiling system, this may allow for a higher finished ceiling height for the cleanroom areas. Both levels appear to have similar overhead and wall finishes and thus do not have any specific advantages.

Advantage: Level 1

COMPARISON OF SPACES: HVAC

Both Level 1 and Level 2 locations will require completely new independent HVAC systems including a makeup air-handling unit, supply air zone distribution, hood exhaust fans, and a perchloric hood exhaust fan/stack. The makeup air-handling unit and exhaust fan systems will need to be located on the roof. This makes the Level 2 location advantageous for the following:

- Shorter duct runs for supply and exhaust air systems.
- Ability to locate zone air terminals in roof attic area and keep them outside of the cleanroom overhead areas.
- Ability to utilize above roof and attic space for horizontal ducting of air systems.
- Leve1 location will require a shaft or multiple shafts through Level 2 for supply and exhaust air systems.
- Flexibility in locating the perchloric acid hood which requires straight vertical ductwork for duct washdown system.

Although Level 1 does have more overhead clearance, it will likely require more horizontal distribution of supply and exhaust air as these systems will likely travel vertically from the roof to Level 1 overhead area then distribute horizontally to various hood and room locations. For the Level 2 area, it is likely that the above roof and attic spaces may be utilized for horizontal ducting of air systems, thus relieving the demand on above ceiling spaces for ducting.

Advantage: Level 2

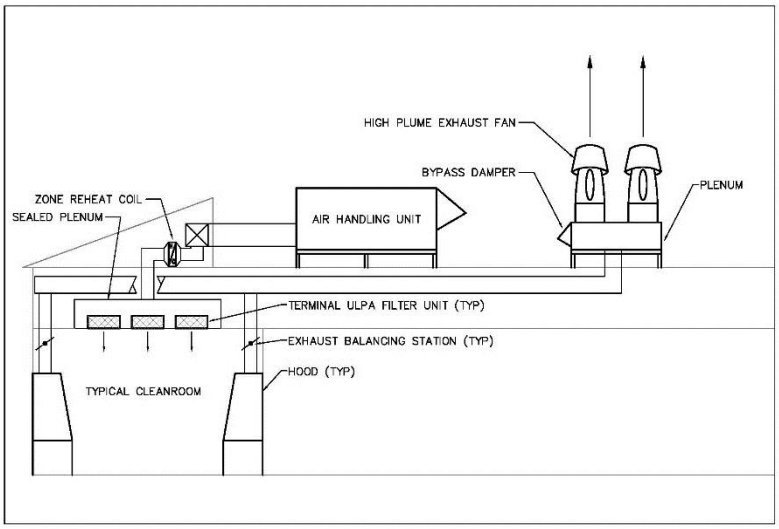


Figure 3: Webb Hall Concept HVAC Diagram

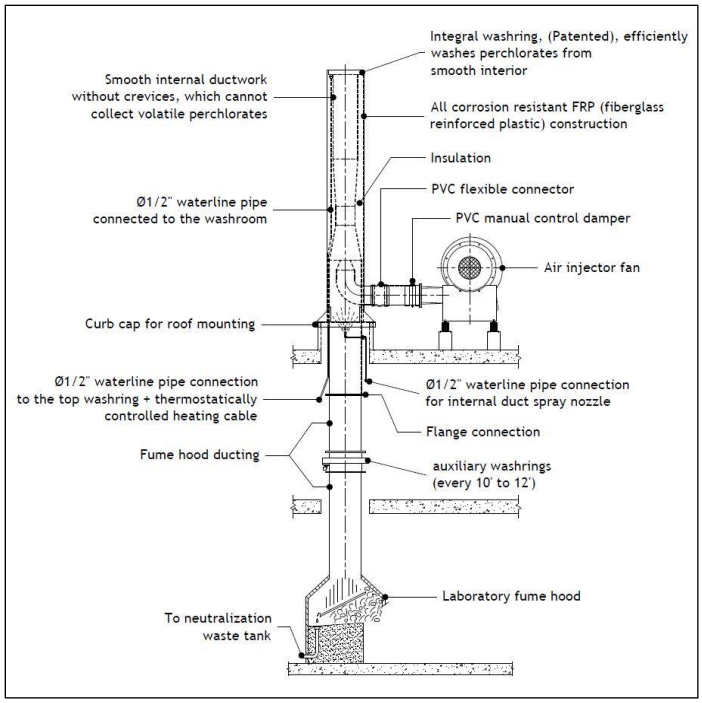


Figure 4: Perchloric Acid Hood Exhaust Fan System Diagram

COMPARISON OF SPACES: Plumbing

The Level 1 area will require substantial rework and relocation of the existing building plumbing system to free up the overhead area. Some of these systems will be difficult to rework such as the gravity industrial drainage. This will result in substantial costs for plumbing utility relocations as well as significant shutdown periods for the building plumbing systems which will negatively impact the remaining building tenants. The Level 2 area is nearly free of existing plumbing systems with overhead areas free of piping. Minor demolition of existing systems will be required for the Level 2 location. For the pressurized plumbing piping systems, the Level 2 location can be supplied from the Level 1 areas below keeping the plumbing piping systems out of the cleanroom overhead areas. For sink and hood drainage, the Level 2 location is advantageous since the Level 1 areas below have exposed ceiling and an infrastructure of waste piping; additional drainage piping can be installed with little impact.

Advantage: Level 2

COMPARISON OF SPACES: Electrical

Both the Level 1 and 2 locations will require new electrical power distribution systems. Level 1 is closer to the basement electrical distribution room which will likely be the source for regular and emergency power distribution. However, the distance difference is minor (12-ft floor height) thereby having minor cost impact.

Advantage: Neutral

COMPARISON OF SPACES: Telecomm

Both the Level 1 and 2 locations will require the relocation of the IT infrastructure rack that is currently in the area where the new lab will be constructed. These IT racks appear to serve their respective floor plan so significant effort and cabling will likely be required for both levels.

Advantage: Neutral

Summary

First Floor Location

With the amount of square footage increased on this floor from when we started it has become the preferred floor location for the Trace Metal Lab. It has a higher floor to floor height which will make it easier to provide supply air plenums and also has more room for fume hood exhaust ducts to run horizontally to a vertical shaft. The drawbacks to placing the Trace Metals Laboratory on this floor is the added cost to move existing building infrastructure and the need to create a shaft through the second floor of Webb Hall.

Second Floor Location

This floor will not allow all requested program requirements to be fulfilled, specifically the amount and length of Vertical Laminar Flow Hoods (VLFH) and Laminar Flow Benches (LFB). It also has a shallower floor to floor height which will make it difficult to provide supply air plenums & exhaust ducts while still providing code required finished ceiling heights. The decreased ceiling height will make it difficult to provide adequate vertical clearance inside the VLFH's. Also the windows to the exterior on the second floor takes away possible fume hood space if we are to keep them. This floor will not need a shaft taking away usable real estate nor has it added infrastructure relocation costs.

4. STRUCTURAL ENGINEER ANALYSIS

Webb Hall is a two-story building with a partial mechanical basement and tile roof mansards. Existing structural drawings for the building were made available for review. Sheets S-1 to S-21 dated July 18, 1952 were prepared by Donald F. Shugart, Structural Engineer.

Webb Hall Existing Foundations

Shallow conventional pad footings and grade beams. Allowable footing bearing pressure is not specified on the drawings. Improvements for the laboratory do not require strengthening of existing foundations.

Webb Hall Existing Floor System

The first and second floors are one-way reinforced concrete slab and beam systems. Slabs are 5½" thick and span up to 16'-0". Beams have a maximum total depth of 24" (18½" below bottom of slab) and span up to 28'-0". Concrete strength and reinforcing grade are not specified on the drawings and shall be determined by the Design/Build Contractor.

Webb Hall Existing Roof System

The roof is a one-way reinforced concrete slab and beam system. Slabs are 5" thick and span up to 16'-0". Beams have a maximum total depth of 24" (19" below bottom of slab) and span up to 28'-0". Concrete strength and reinforcing grade are not specified on the drawings and shall be determined by the Design/Build Contractor. Sloping tile roof mansards are constructed with wood 2x10 rafters supported on the reinforced concrete roof.

Webb Hall Existing Columns

Reinforced concrete. No modifications are being made to existing columns. Improvements for the laboratory do not require strengthening of existing columns.

Webb Hall Lateral System

Reinforced concrete shearwalls, beams, and columns. No modifications are being made to existing lateral elements. Improvements for the laboratory do not require strengthening of existing lateral systems.

Webb Hall - Alterations of Existing Structures

Improvements for the laboratory do not alter the existing lateral system of the structure in a manner that would require a seismic upgrade.

Other Buildings Considered for Location of the Laboratory

Professor Jackson had the team observe two adjacent buildings for consideration for location of his laboratory. Existing structural drawings of these building were not made available.

- The first building was Building 546, a one-story stucco building presumed to be constructed of wood studs and wood roof joists. The existing structure would not be able to support new rooftop mechanical units without significant structural strengthening consisting of structural steel roof beams, tube steel columns, and pad footings.
- The second building was Cloud Lab, a two-story concrete block building with reinforced concrete slabs

and beams. The slabs are single spans as compared to the multiple spans for Webb Hall and span greater distances than for Webb Hall. The nature of the slab for Webb Hall have greater ability to resist new loads than for this building; more strengthening of this building would likely be required than for Webb Hall.
- Based on the structural considerations noted above, NCE's recommendation is that Webb Hall is the preferred location for the laboratory.

Comparison of First Floor vs. Second Floor Laboratory Locations

The first floor and second floor reinforced concrete slabs and beams are nearly identical in their load carrying capacity. It is anticipated that both the first and second floors will be able to carry the weight of equipment and components inside the laboratory in a similar fashion without room-wide strengthening.

If the laboratory is located on the second floor:

- Vertical duct penetrations through the roof slab will be accomplished by sawcutting the concrete slabs. Wide flange beams located under the roof slab to strengthen the edges of the openings are required.

If the laboratory is located on the first floor:

- In addition to the roof slab sawcutting noted above, vertical ducts will be required to pass through the second floor space in order to enter the first floor ceiling space. The second floor slab will require sawcutting.
- Wide flange beams to strengthen the edges of the openings in the roof slab and second floor slab are required.
- Vertical ducts passing through the second floor space will result in a loss of useable square footage of the second floor.
- There are significant existing water, gas, and waste piping in the ceiling of the first floor that would need to be rerouted in order for the laboratory to be located on the first floor. Additional coring and investigation of existing steel reinforcing may be required.

Based on the structural considerations noted above, NCE's recommendation is that the laboratory be located on the second floor.

Description of Structural Work

Two exhaust fans and one large air handler will be located on the roof between the vertical walls of the sloping mansard roofs. These three units will be supported by raised steel wide flange platform beams placed under the perimeter of the units. Short pipe columns under the platform beams will be bolted to the roof slab at a height to be determined by the Architect, ensuring sufficient clearance for waterproofing, drainage, and reroofing. The existing roof slab does not have sufficient capacity to carry the weight of the new mechanical units; however, the roof beams do have sufficient capacity. Where possible, the short pipe columns will be located directly above existing concrete roof beams. Where the short pipe columns are located on the slab, steel wide flange beams will be added under the roof slab that will be epoxy bolted to the sides of existing concrete roof beams. See plan sheet S-2 and details on sheet S-3.

Roof-top ducts running horizontally will need to penetrate the wood stud walls of the mansards before they penetrate vertically through the roof slab. The ducts will be wider than the space between the wood studs. New wood studs, headers, and sills will need to be added. See detail 11/S-3.

Vertical duct penetrations through the roof slab will be accomplished by sawcutting the concrete slabs. Wide flange beams to strengthen the edges of the openings may be required. If the laboratory is located on the first floor, the duct penetrations and wide flange strengthening beams will be required on the second floor also. See plan sheet S-2 and details on sheet S-3.

Fume hoods will be suspended from the structure above. Steel wide flange beams will be added under the slab above that will be epoxy bolted to the sides of existing concrete beams. See detail 8/S-3.

If a new transformer is located in the parking lot, it will require a concrete pad on grade. See detail 14/S-3.

5. CONCLUSION AND RECOMMENDATION

The data and analysis presented within this report provides enough information to recommend a "site" for the new Trace Metal Lab within Webb Hall.

SUMMARY OF LAB EVALUATION CRITERIA	FIRST FLOOR LOCATION	SECOND FLOOR LOCATION
Demolition and Relocation of existing utilities scope of work	CON	PRO
Available square footage within Building	PRO	CON
Available height within Building	PRO	CON
Structural scope of work	CON	PRO
Mechanical scope of work	CON	PRO
Available space for Mechanical Installation	PRO	CON
Electrical scope of work	NEITHER PRO OR CON	NEITHER PRO OR CON
Telecom and Data scope of work	NEITHER PRO OR CON	NEITHER PRO OR CON
Accessibility Design Retrofit work	NEITHER PRO OR CON	NEITHER PRO OR CON
Lab ability to serve as learning and marketing tool for Building Visitors	PRO	CON
Lab layout accommodates number of fume hoods, equipment, and working stations requested per UCSB's program	PRO	CON
Total Project Cost	CON	PRO

The complete Trace Metal Lab program and equipment as prescribed by the University of California Santa Barbara can be accommodated within the space available on the First Floor. While it is understood this location requires existing services and infrastructure is relocated, the benefits from the Lab layout and function is preferable due to the greater amount of space available on this floor. The Second Floor layout is much tighter due to the limited space but a smaller Trace Metal Lab can be provided within this area. The First Floor can accommodate all hoods requested by UCSB program and the Second Floor can accommodate 2 less hoods.

While the Structural Analysis indicates the Second Floor is the optimal location for the Trace Metal Lab, this conclusion is based upon scope of structural work required. While there are additional structural accommodations required if the Trace Metal Lab is placed on the First Floor, this amount of work does not outweigh the functional benefits the First Floor location provides.

The cost difference between the First Floor location and the Second Floor location is approximately $350,000 with the First Floor being the more expensive option. If the cost is prohibitive for the University and the lower cost option is preferred, it is recommended that the University proceed with the understanding that the Second Floor Lab will not be able to provide everything the First Floor layout presents. A review of the Second Floor Lab

working conditions due to the limited available space shall be reviewed by the University Lab user to determine if the smaller Lab will achieve the operational, research objectives, and goals.

APPENDIX A: CONCEPTUAL DRAWING PACKAGE

i. Architectural Drawings indicating Existing Conditions and Accessibility Improvements

ii. Lab Consultant Drawings for Trace Metal Lab Plan Layouts

iii. Structural Drawings and Details

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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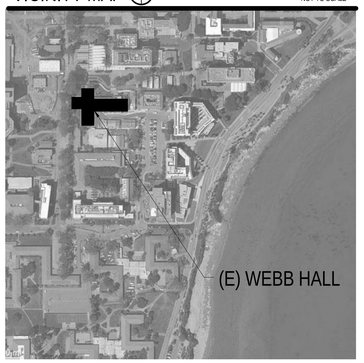
APPENDIX OF DRAWINGS TO ACCOMPANY SPACE ANALYSIS REPORT

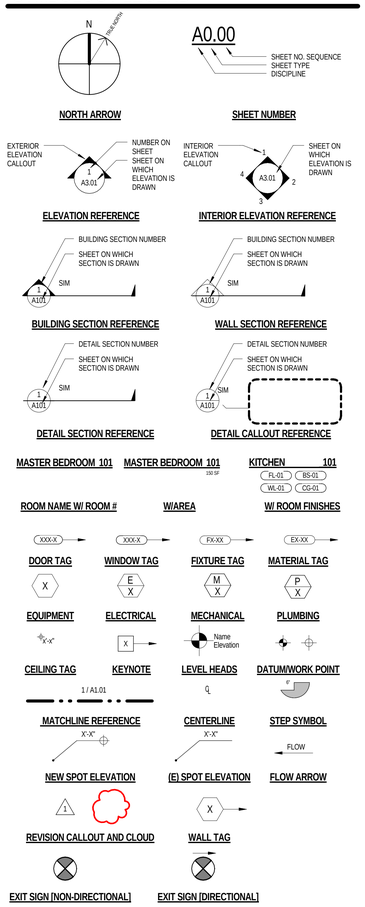
DRAWING INDEX

VICINITY MAP

NOT TO SCALE



SYMBOLOGY LEGEND



ABBREVIATIONS

&	AND	FL	FLOOR	PSF	POUNDS PER SQUARE FOOT
@	AT	FLASH	FLASH(ING)	PSI	POUNDS PER SQUARE INCH
¢	PENNY	FLUOR	FLUORESCENT	PT	POINT
°	ANGLE	FOC	FACE OF CONCRETE	PTDF	PRESSURE TREATED DOUGLAS FIR
⊥	PERPENDICULAR	FOF	FACE OF FINISH		
		FOM	FACE OF MASONRY		
A/C	AIR CONDITIONER / CONDITIONING	FOP	FACE OF PLYWOOD	Q	QUARTZ
AB	ANCHOR BOLT	FOS	FACE OF STUDS	QT	QUARRY TILE
ABV	ABOVE	FOW	FACE OF WALL	QTY	QUANTITY
AC	ASPHALTIC CONCRETE	FP	FIREPROOF; FIREPLACE		
AD	AREA DRAIN	FT	FOOT OR FEET	R	RISER
ADA	AMERICANS WITH DISABILITIES ACT	FTG	FOOTING	RAD	RADIUS
		FURR	FURRING	RCP	REFLECTED CEILING PLAN
ADJ	ADJUSTABLE / ADJACENT			RD	ROOF DRAIN
AFF	ABOVE FINISHED FLOOR	GA	GAUGE	REF	REFERENCE; REFRIGERATOR
AFG	ABOVE FINISHED GRADE	GALV	GALVANIZE(D)	REG	REGISTER
AFS	ABOVE FINISHED SLAB	GC	GENERAL CONTRACTOR	REINF	REINFORCE(D)
AL / ALUM	ALUMINUM	GL	GLASS / GLAZING	REQ	REQUIRED
ALT	ALTERNATE	GR	GRADE	REV	REVISE / REVISION
ANOD	ANODIZED	GYP	GYPSUM	RFL	REFLECTED
AP	ACCESS PANEL	GYP BD	GYPSUM BOARD	RH	RIGHT HAND; ROUND HEAD
APPROX	APPROXIMATELY			RM	ROOM
ARCH	ARCHITECT(URAL)	HB	HOSE BIB	RO	ROUGH OPENING
ASPH	ASPHALT	HDR	HEADER	RWD	REDWOOD
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS	HDWR	HARDWARE		
		HORI / HORIZ	HORIZONTAL	S	SOUTH
AUTO	AUTOMATIC	HP	HIGH POINT; HORSEPOWER	SCHED	SCHEDULE
AVG	AVERAGE	HR	HANDRAIL; HOUR	SD	STORM DRAIN
		HT	HEIGHT	SECT	SECTION
BD	BOARD	HTR	HEATER	SF	SQUARE FEET
BET	BETWEEN	HVAC	HEATING / VENTILATION / AIR CONDITIONING	SHT	SHEET
BITUM	BITUMINOUS			SHTG	SHEATHING
BLDG	BUILDING	HW (R)	HOT WATER (RETURN)	SHWR	SHOWER
BLK	BLOCK			SIM	SIMILAR
BLKG	BLOCKING	ID	INSIDE DIAMETER	SIMILAR	RE: THE ARCH SHEET METAL MANUAL
BN	BOUNDARY NAILING	IN	INCH / INCHES	SOG	SLAB ON GRADE
BOT	BOTTOM	INCL	INCLUDED / INCLUDING	SPEC	SPECIFY / SPECIFICATION
		INSUL	INSULATE / INSULATION	SQ	SQUARE
CAB	CABINET	INT	INTERIOR	SQFT	SQUARE FEET
CB	CATCH BASIN			SQIN	SQUARE INCH(ES)
CF	CUBIC FOOT	JT	JOINT	SS	STAINLESS STEEL
CI	CAST IRON;CONTRACTOR INSTALLED			ST	STONE
		LAM	LAMINATE(D)	STD	STANDARD
CIP	CAST IN PLACE	LAV	LAVATORY	STL	STEEL
CJ	CONTROL JOINT; CEILING JOIST	LB	LAG BOLT	STOR	STORAGE
CL	CENTER LINE	LB(S)	POUND(S)	STRUCT	STRUCTURE / STRUCTURAL
CLG	CEILING	LF	LINEAR FOOT (FEET)	SUSP	SUSPENDED
CLOS	CLOSET	LH	LEFT HAND	SYM	SYMMETRICAL
CLR	CLEAR	LIB	LIBRARY	SYN	SYNTHETIC
CMU	CONCRETE MASONRY UNIT	LP	LOW POINT	SYS	SYSTEM
CO	CLEAN;CLEAN OUT	LT	LIGHT		
COL	COLUMN	LVR	LOUVER	T&B	TOP AND BOTTOM
CONC	CONCRETE			T&G	TONGUE AND GROOVE
CONST	CONSTRUCTION	MACH	MACHINE	TBD	TO BE DETERMINED
CONT	CONTINUOUS	MAINT	MAINTENANCE	TBS	TO BE SELECTED
CORR	CORRIDOR	MAS	MASONRY	TEL	TELEPHONE
CSK	COUNTERSINK	MATL	MATERIAL	TEMP	TEMPORARY / TEMPERATURE
		MAX	MAXIMUM	THK	THICK
DBL	DOUBLE	MB	MACHINE BOLT	THRU	THROUGH
DEMO	DEMOLISH; DEMOLITION	MECH	MECHANICAL	TOC	TOP OF CONCRETE
DF	DOUGLAS FIR	MEMB	MEMBRANE	TOS	TOP OF SLAB
DIA	DIAMETER	MEZZ	MEZZANINE	TOW	TOP OF WALL
DIAG	DIAGONAL	MFR	MANUFACTURER(R)	TV	TELEVISION
DIM	DIMENSION	MIN	MINIMUM	TYP	TYPICAL
DIV	DIVISION	MISC	MISCELLANEOUS		
DN	DOWN	MR	MOISTURE RESISTANT	UL	UNDERWRITER'S LABORATORY
DS	DOWNSPOUT	MTL	METAL	UNF / UNFIN	UNFINISHED
DWG	DRAWING			UNO	UNLESS NOTED OTHERWISE
(E)	EXISTING	(N)	NEW	UON	UNLESS OTHERWISE NOTED
E	EAST	N	NORTH	UPS	UNINTERRUPTIBLE POWER SUPPLY
EA	EACH	NA OR N/A	NOT AVAILABLE / APPLICABLE		
EJ	EXPANSION JOINT	NIC	NOT IN CONTRACT		
EL	ELEVATION	NO / #	NUMBER	V	VOLT
ELEC	ELECTRICAL	NOM	NOMINAL	VB	VAPOR BARRIER
ELEV	ELEVATOR	NTS	NOT TO SCALE	VERT	VERTICAL
EMER	EMERGENCY			VEST	VESTIBULE
EN	EDGE NAIL	OC	ON CENTER	VGDF	VERTICAL GRAIN DOUGLAS FIR
ENG	ENGINEER	OD	OUTSIDE DIAMETER	VIF	VERIFY IN FIELD
EQ	EQUAL(LY)	OFCI	OWNER FURNISHED CONTRACTOR INSTALLED	VNR	VENEER
EQPT	EQUIPMENT	OPG / OPNG	OPENING	VOL	VOLUME
EQUIP	EQUIPMENT	OZ	OUNCE	VTR	VENT THRU ROOF
EST	ESTIMATE				
EXIST	EXISTING	P	PAINT (NUMBER - SEE SPEC'S)	W	WEST
EXP	EXPANSION	PED	PEDESTAL	W/	WITH
EXT	EXTERIOR	PER	PERIMETER	W/O	WITHOUT
		PERF	PERFORATED	WC	WATER CLOSET
FAST	FASTEN(ER)	PERP	PERPENDICULAR	WD	WOOD
FAU	FORCED AIR UNIT	PL	PROPERTY LINE	WF	WIDE FLANGE
FBO	FURNISHED BY OWNER	PLAS	PLASTER	WH	WATER HEATER
FCO	FLOOR CLEAN OUT	PLYWD	PLYWOOD	WI	WROUGHT IRON
FD	FLOOR DRAIN	POC	POINT OF CONNECTION	WIN	WINDOW
FF	FINISHED FLOOR	PR	PAIR	WP	WATERPROOF(ING)
FG	FINISHED GRADE	PREFAB	PREFABRICATED	WPT	WORK POINT
FH	FLAT HEAD	PROP	PROPERTY	WWF	WELDED WIRE FABRIC
FIN	FINISH(ED)				
FIXT	FIXTURE			YD	YARD

CODE COMPLIANCE

THE PROJECT SHALL COMPLY WITH 2013 CALIFORNIA BUILDING CODE, 2013 CALIFORNIA PLUMBING CODE, 2013 CALIFORNIA MECHANICAL CODE, 2013 CALIFORNIA ELECTRICAL CODE, AND APPLICABLE LOCAL CODES.

CODE ANALYSIS

UCSB METALS TRACE LAB CODE REPORT CBC 2013

Webb Hall. Constructed 1952
2 stories. Building height 28 ft.
Not sprinklered. Concrete Construction
Level 1 = 23,053 sf (includes 1602 sf covered area). Level 2 = 13,337 sf. Total = 36,390 sf.
Assumed no hazardous materials in building beyond limits of Table 307.1(1) or Table 443.7.3.1.

Use & Occupancy
B Business (Educational plus Laboratories (testing & research))
A-1 Assembly w/ fixed seats, lecture hall. 1848 nsf. @ 7 net for seating area = 168 occupants. (Area is 8.0% of Level 1 floor area.)

Heights & Areas
No height modification needed.

Obtain maximum allowable area.

Calculate for Increase for frontage. Aa = At + (At x If)
Building perimeter = 1018 ft.
97% of perimeter faces a public way wider than 20 ft. This 97% faces a public way greater than 30 ft.
31.5 ft. have public way of 11 ft. (at south end).

If = (F/P – 0.25) x W/30
If = (986.5/1018 – 0.25) x 30.35 / 30 If = 0.969 x 1.01 If = 0.98

W = (L1 x w1 + L2 x w2) / F
W = 31.5 x 11 + 986.5 x 30) / 986.5 W=346.5 + 29,595 / 986.5 W = 30.35

A (possible) 2 hour fire separation exists between the A-1 Auditorium Occupancy and the remaining B Occupancy, consisting of a 12" concrete wall at the south side and a 10" concrete wall w/ 4" brick veneer at the west side. Door 114 on the south side would have to be rated at 90 minutes. There is a 48" wide cased opening on the short west side Vestibule wall. It would have to have a 90 minute door installed, which could be on a hold-open.

For this 2 hr. fire separation:
For B, Type VA: Aa = 18,000 + (18,000 x 0.98) = 35,650 sf. 3 stories, 50 ft. high max. allowed – Greater than 23,053 sf. OK for each story.
For B, Type IIIB = Aa = 19,000 + (19,000 x 0.98) = 37,620 sf. 3 stories, 55 ft. high max. allowed - Greater than 23,053 sf. OK for each story.

For A-1, Type VA: Aa = 11,500 + (11,500 x 0.98) = 22,770 sf., 2 stories, 50 ft. max. allowed – Greater than 1848 sf. OK for each story.
For A-1, Type IIIB: Aa = 8,500 + (8,500 x 0.98) = 16,830 sf., 2 stories, 55 ft. max. allowed - Greater than 1848 sf. OK for each story.

Construction Types
VA = 1 hr. rated
IIIB = 2 hr. rated exterior bearing wall, otherwise no rating.
The structure looks like concrete pilasters and columns with non-load bearing curtain wall, although some exterior walls may be load bearing.

Table 602 - If exterior walls are non-load bearing:
97% of walls face a public way greater than 30 ft. No fire resistance rating required.
3% of walls (at south end of building) are between 10 and 30 ft. facing public way. 1 hr. rated wall is required there and should be provided.

CONCLUSION:
TYPE VA OR TYPE IIIB CAN BE USED.
(If 2 hr rated fire separation cannot be obtained, Type IIIA (1 hr. rated) would have to be used.)

PROJECT DESCRIPTION

NEW TRACE METAL LAB INSIDE WEBB HALL. THE SCOPE OF PHASE ONE IS TO FIND THE MOST SUITABLE LOCATION FOR THE NEW LAB OUT OF THE TWO POSSIBLE LOCATIONS SELECTED BY UCSB.

PROJECT DATA

OWNER:	**MR. & MRS. X** **123 STREET** **SANTA BARBARA, CA 9XXXX**
PROJECT ADDRESS:	**123 STREET** **SANTA BARBARA, CA 9XXXX**
A.P.N.	**000-000-000**
ZONING	**INSERT ZONING HERE**
CONSTRUCTION TYPE:	**VA = 1 HR** **IIIB = 2 HR.(EXTERIOR BEARING WALL)**
OCCUPANCY:	**B BUSINESS (EDUCATIONAL PLUS LABORATORIES** **A-1 ASSEMBLY**
SPRINKLERED:	**NO**
HIGH FIRE HAZARD AREA:	**NO**
BUILDING HEIGHT LIMITATION:	**28 FEET**
NUMBER OF STORIES:	**2**
MAX. GROSS FLOOR AREA (FAR):	**LEVEL 1 = 23,053 SF / LEVEL 2 = 13,337 SF / TOTAL = 36,390 SF**

PROJECT TEAM

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CONTACT: PAUL LEMESTRE

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LABORATORY CONSULTANTS
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C [619] 757-3046
CONTACT: TERRY BROWN

PROJECT PHASE: PHASE ONE

S+D SHUBIN+DONALDSON ARCHITECTS INC.

COVER SHEET

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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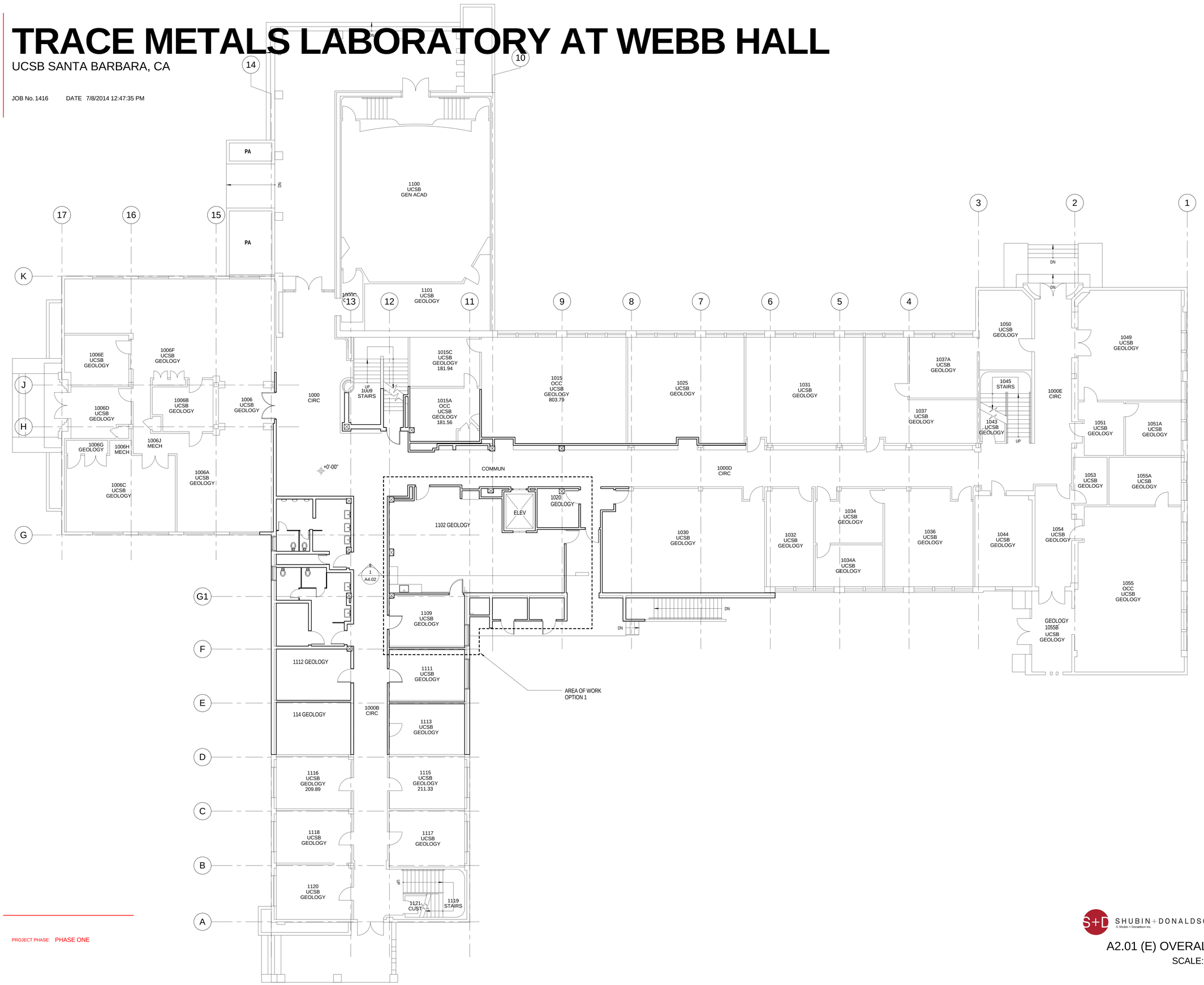

PROJECT PHASE: PHASE ONE

N

SHUBIN+DONALDSON ARCHITECTS INC.

A2.01 (E) OVERALL 1ST FLOOR PLAN

SCALE: 1/8" = 1'-0"

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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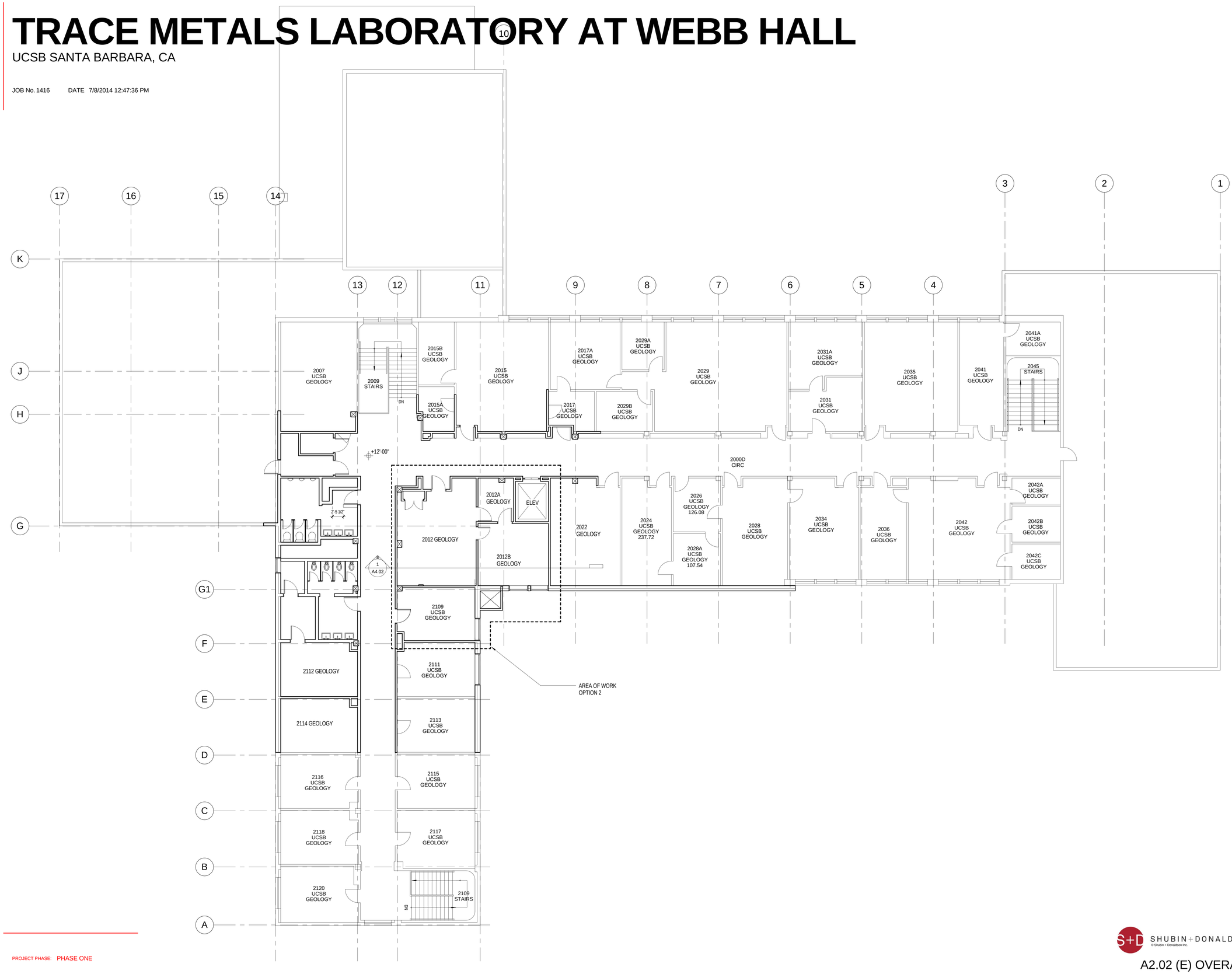

PROJECT PHASE: PHASE ONE

N

SHUBIN+DONALDSON ARCHITECTS INC.

A2.02 (E) OVERALL 2ND FLOOR PLAN

SCALE: 1/8" = 1'-0"

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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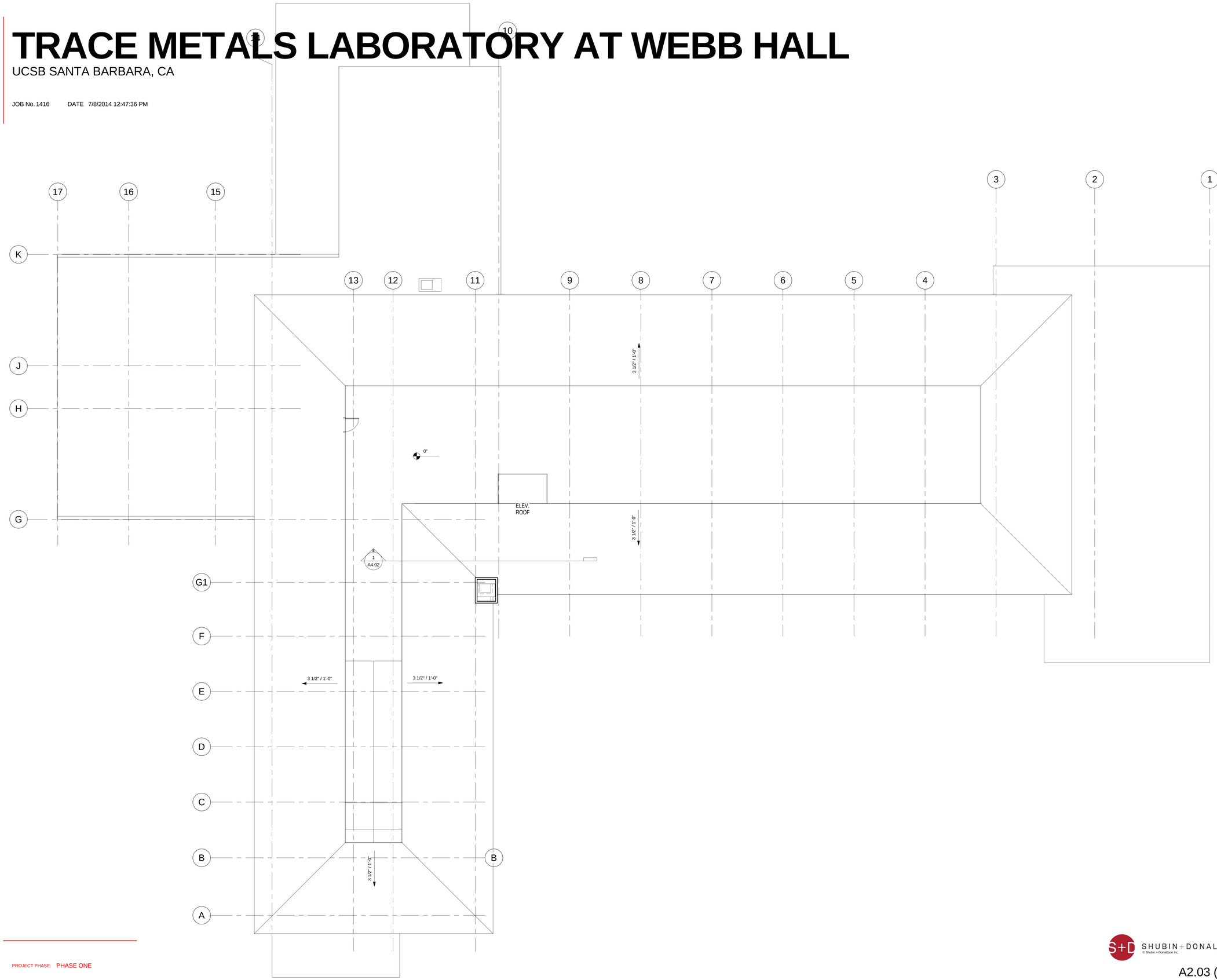

PROJECT PHASE: PHASE ONE

N

SHUBIN+DONALDSON ARCHITECTS INC.

A2.03 (E) ROOF PLAN

SCALE: 1/8" = 1'-0"

TRACE METALS LABORATORY AT WEBB HALL

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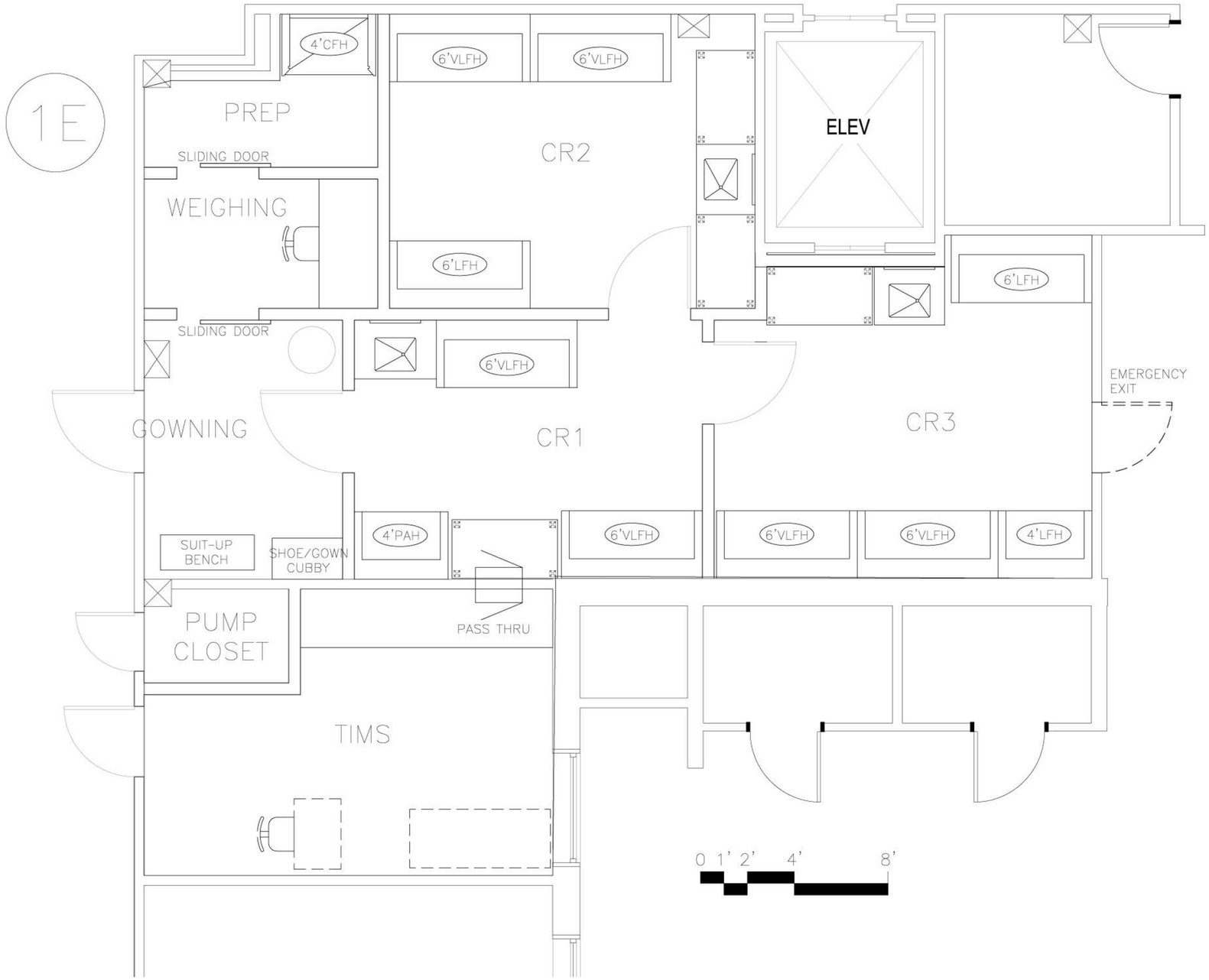

FIRST FLOOR LAB LAYOUT

SCALE: 1/2" = 1'-0"

PROJECT PHASE: PHASE ONE

SHUBIN+DONALDSON ARCHITECTS INC.

A2.11 FIRST FLOOR LAB LAYOUT

SCALE: 1/2" = 1'-0"

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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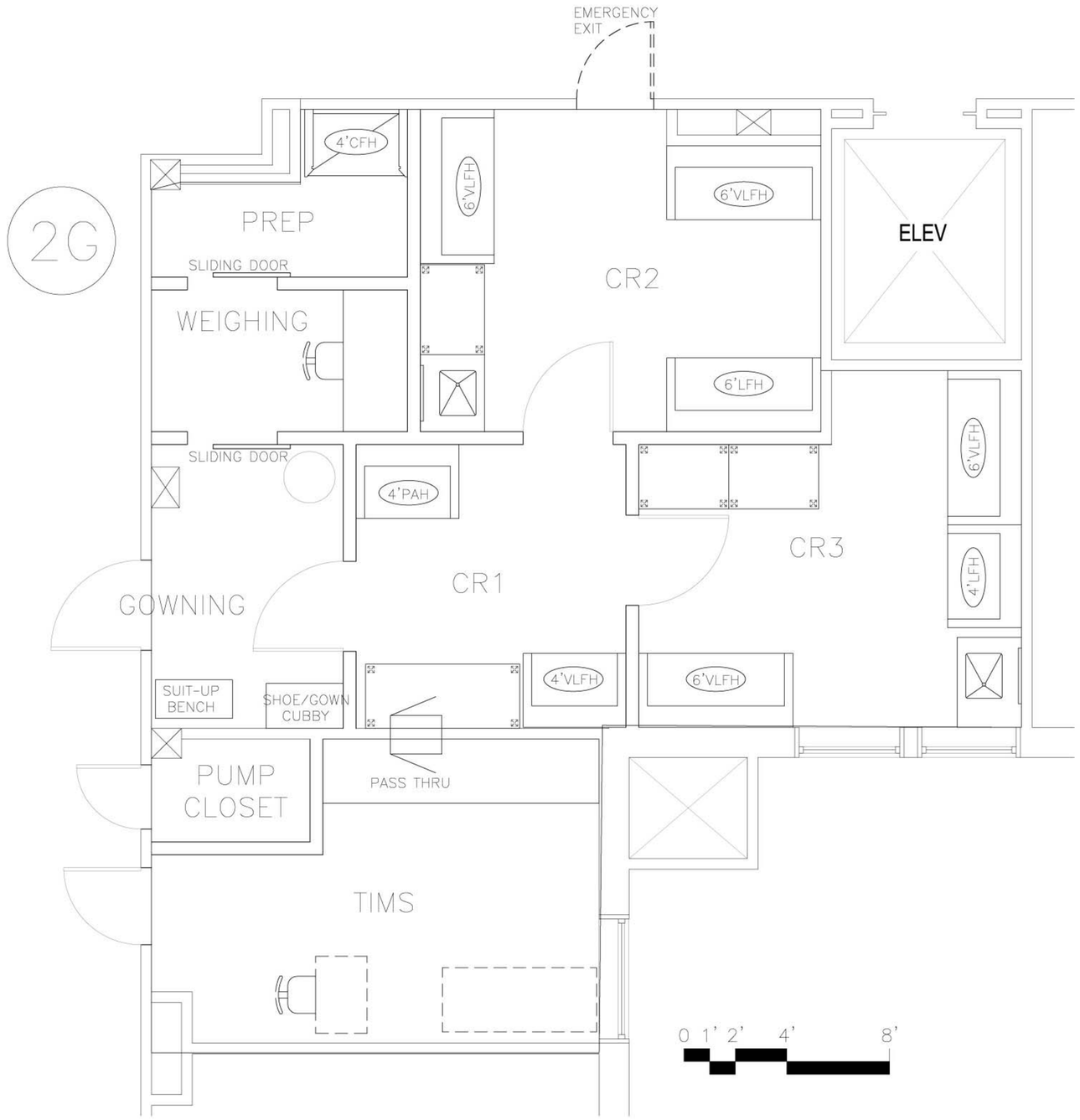


SECOND FLOOR LAB LAYOUT

SCALE: 1/2" = 1'-0"

PROJECT PHASE: PHASE ONE

SHUBIN+DONALDSON ARCHITECTS INC.

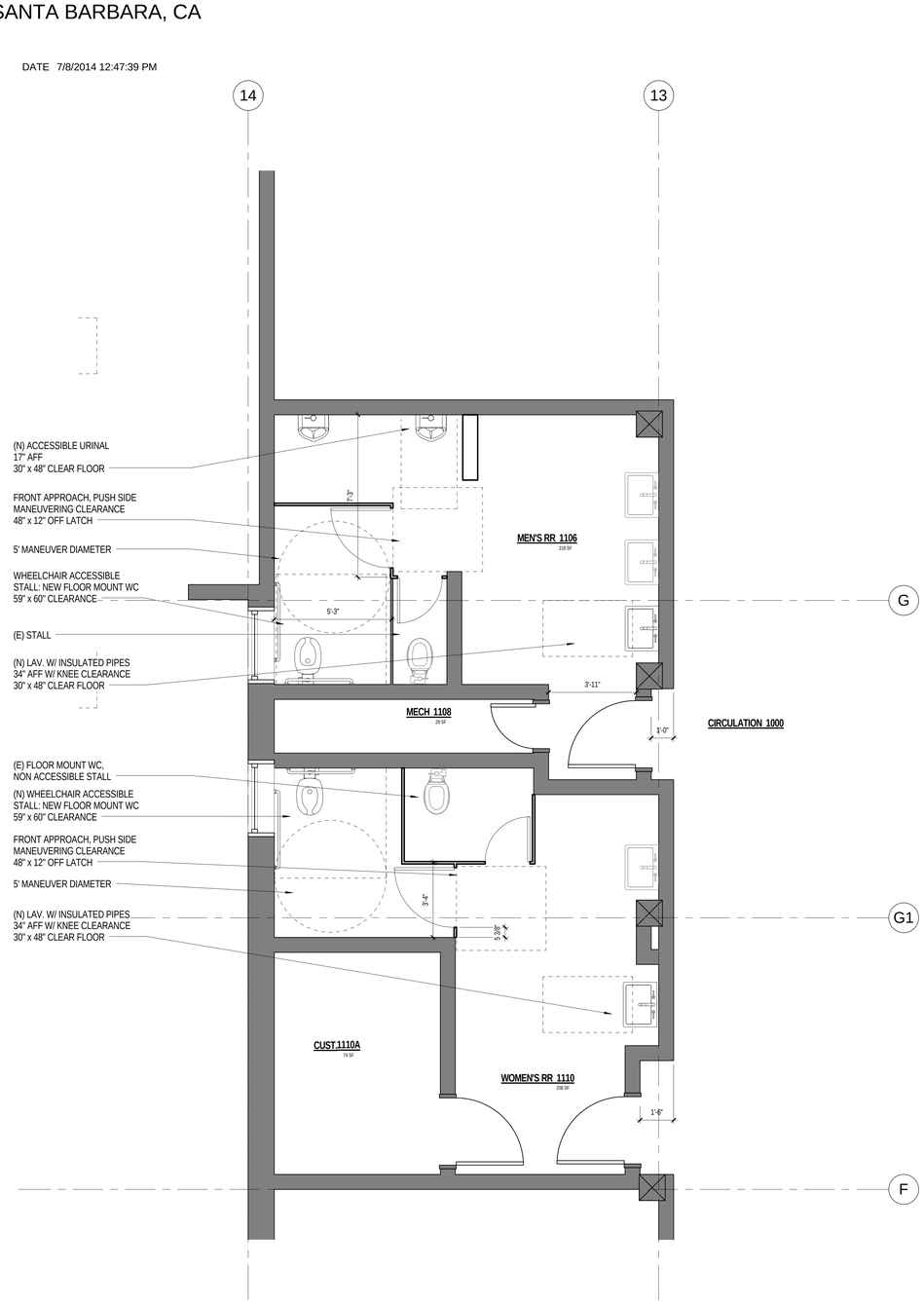
A2.12 SECOND FLOOR LAB LAYOUT

SCALE: 1/2" = 1'-0"

TRACE METALS LABORATORY AT WEBB HALL

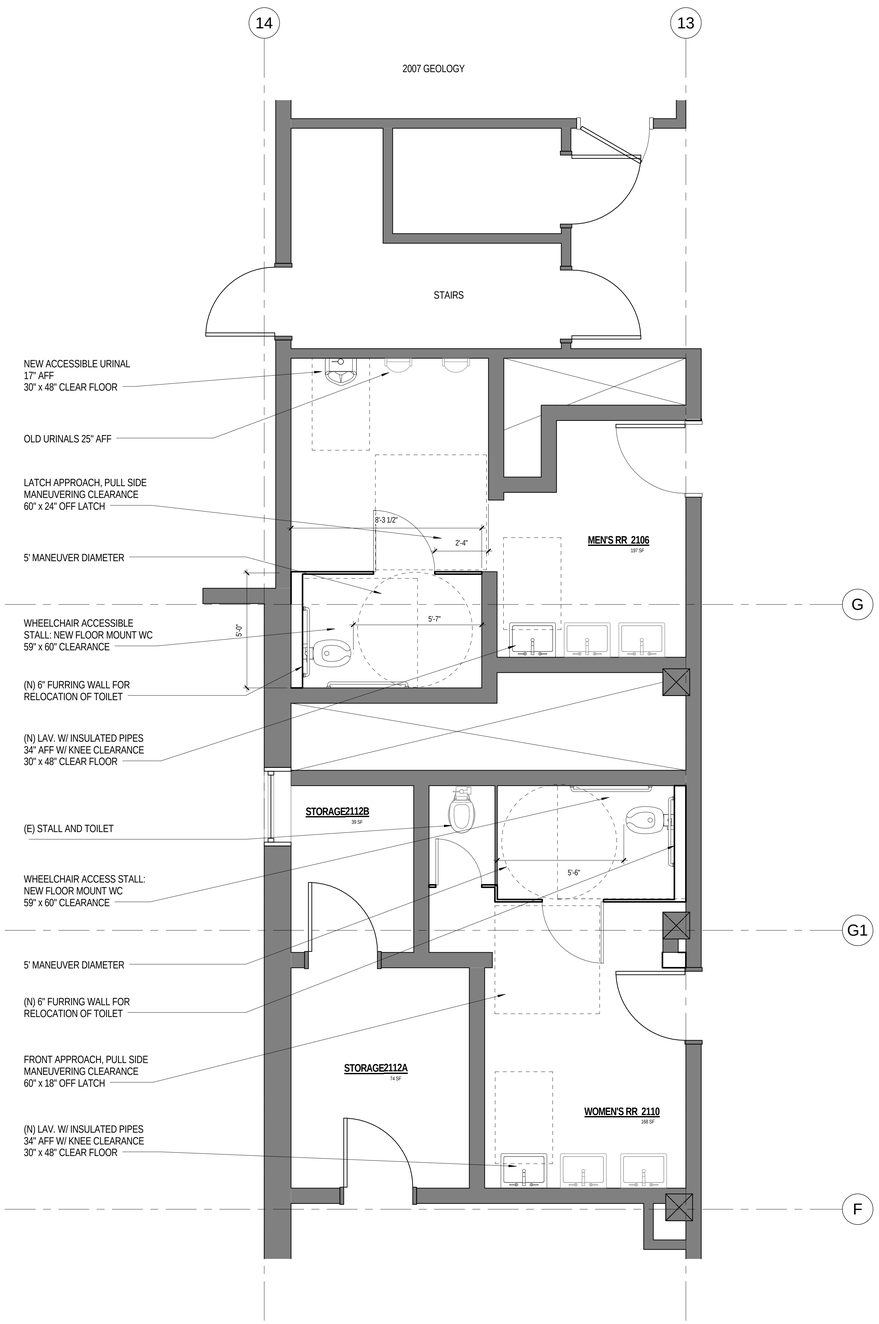
UCSB SANTA BARBARA, CA

JOB No. 1416 DATE 7/8/2014 12:47:39 PM



FIRST FLOOR RESTROOMS

SCALE: 3/8" = 1'-0"



SEE PAGE 4 OF REPORT

SECOND FLOOR RESTROOMS

SCALE: 3/8" = 1'-0"

PROJECT PHASE: PHASE ONE

SHUBIN+DONALDSON ARCHITECTS INC.

A2.20 RESTROOM ACCESSIBILITY IMPROVEMENTS

SCALE: As indicated

TRACE METALS LABORATORY AT WEBB HALL

UCSB SANTA BARBARA, CA

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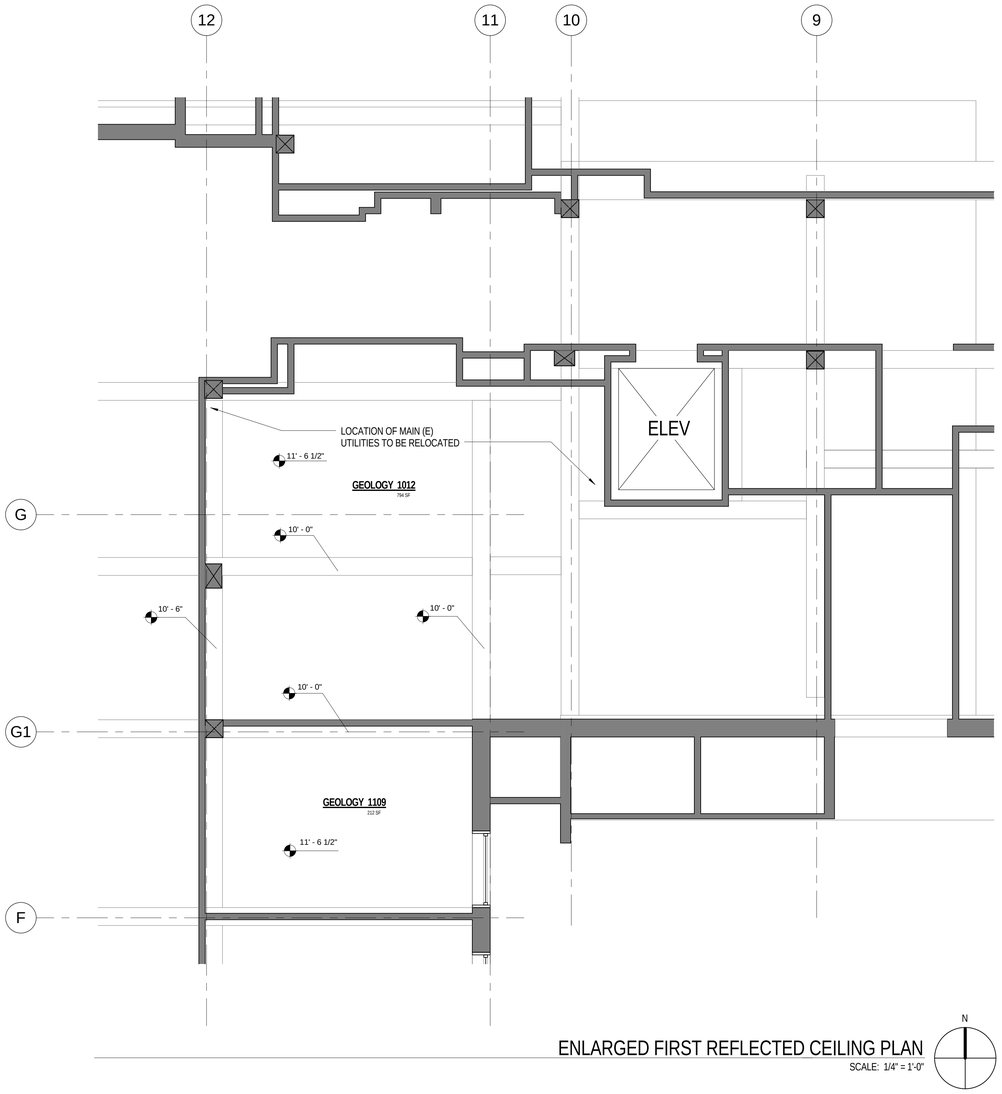
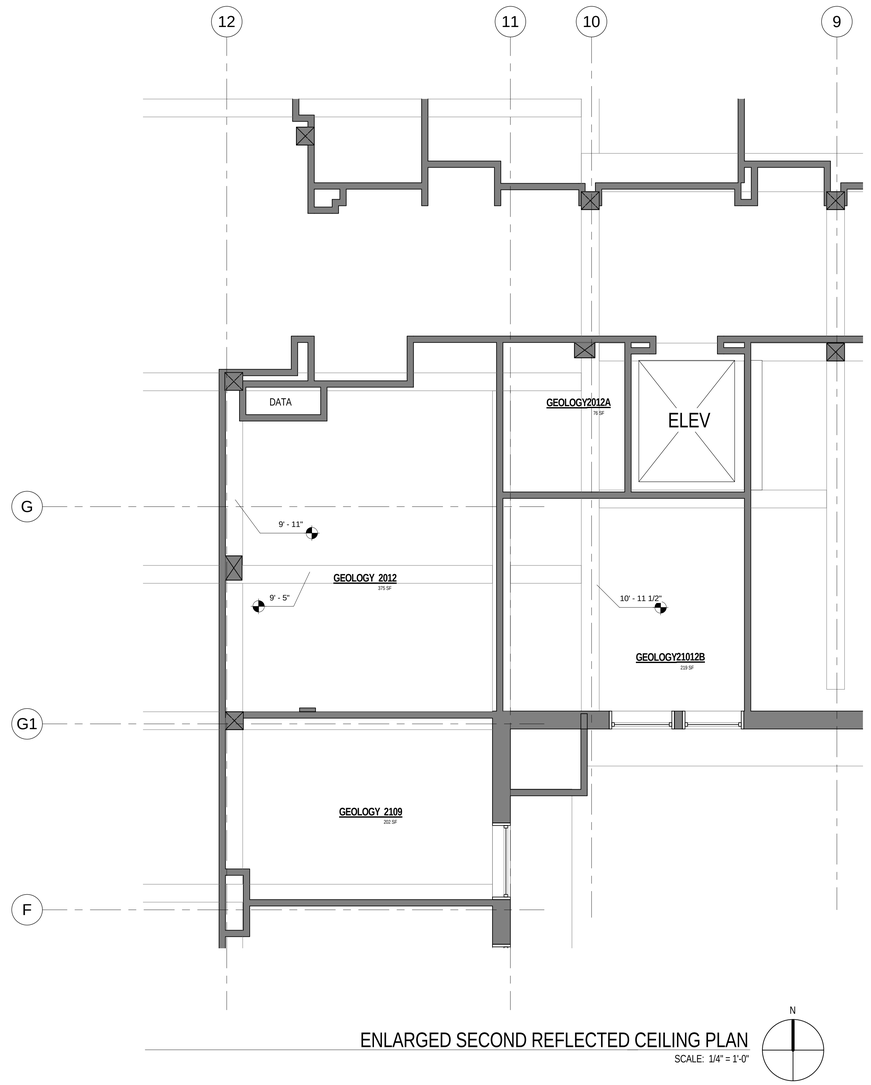


ENLARGED FIRST REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"



ENLARGED SECOND REFLECTED CEILING PLAN

SCALE: 1/4" = 1'-0"

PROJECT PHASE: PHASE ONE

SHUBIN+DONALDSON ARCHITECTS INC.

A2.30 (E) RCP STRUCTURE ONLY

SCALE: 1/4" = 1'-0"

OWNERSHIP OF DOCUMENTS:

1. ALL DRAWINGS, SPECIFICATIONS, AND OTHER WORK PRODUCT FOR THIS PROJECT ARE INSTRUMENTS OF SERVICE FOR THIS PROJECT ONLY AND SHALL REMAIN THE PROPERTY OF THE NCE, INC. WHETHER THIS PROJECT IS COMPLETED OR NOT. REUSE OF INSTRUMENTS OF SERVICE OF NCE, INC. BY THE OWNER ON EXTENSIONS OF THIS PROJECT, OR ON ANY OTHER PROJECT WITHOUT THE WRITTEN PERMISSION OF NCE, INC. SHALL BE AT THE OWNER'S RISK AND THE OWNER AGREES TO DEFEND, INDEMNIFY, AND HOLD HARMLESS NCE, INC. FROM ALL CLAIMS, DAMAGES, AND EXPENSES INCLUDING ATTORNEY'S FEES ARISING OUT OF SUCH UNAUTHORIZED USE OF NCE, INC'S INSTRUMENTS OF SERVICE BY THE OWNER OR BY OTHERS ACTING THROUGH THE OWNER.

GENERAL:

1. THE FOLLOWING NOTES AND TYPICAL DETAILS APPLY TO ALL DRAWINGS IN THIS SET UNLESS NOTED OTHERWISE.
2. THE CONTRACTOR SHALL VERIFY AND COORDINATE ALL DIMENSIONS WITH THE ARCHITECTURAL AND OTHER CONSULTANTS DRAWINGS AND WITH CONDITIONS AT THE JOB SITE PRIOR TO STARTING CONSTRUCTION. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL, MECHANICAL, PLUMBING, ELECTRICAL, LANDSCAPE, CIVIL, AND ALL CONSULTANTS' DRAWINGS. IN NO CASE SHALL DIMENSIONS BE SCALED FROM DRAWINGS AND/OR DETAILS. ANY DISCREPANCIES BETWEEN CONDITIONS INDICATED AND THE ARCHITECTURAL AND CONSULTANT DRAWINGS OR WITH ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT AND THE STRUCTURAL ENGINEER OF RECORD FOR CLARIFICATION PRIOR TO PROCEEDING. ANY WORK INSTALLED PRIOR TO AND/OR IN CONFLICT WITH SUCH CLARIFICATION SHALL BE CORRECTED BY THE CONTRACTOR AT HIS EXPENSE AND AT NO ADDITIONAL COST TO THE OWNER.
3. ALL PHASES OF WORK, CONSTRUCTION, AND WORKMANSHIP SHALL CONFORM TO THE MINIMUM STANDARDS OF THE 2013 CALIFORNIA BUILDING CODE. ALL ASTM SPECIFICATIONS NOTED ON THE DRAWINGS SHALL BE OF THE LATEST REVISION.
4. THE STRUCTURAL DRAWINGS REPRESENT THE FINISHED STRUCTURE. UNLESS OTHERWISE SHOWN, THEY DO NOT INDICATE THE METHOD OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR MEANS, METHODS, TECHNIQUES, SEQUENCES, AND PROCEDURES. THE CONTRACTOR SHALL PROVIDE ALL MEASURES NECESSARY TO PROTECT THE STRUCTURE, WORKMEN, AND OTHER PERSONS DURING CONSTRUCTION. SUCH MEASURES SHALL INCLUDE, BUT NOT BE LIMITED TO, BRACING, SHORING FOR CONSTRUCTION EQUIPMENT, SHORING FOR THE BUILDING, FORMS AND SCAFFOLDING.
5. OPENINGS, POCKETS, ETC, SHALL NOT BE PLACED OR CUT IN SLABS, BEAMS, COLUMNS, WALLS, ETC, UNLESS SPECIFICALLY DETAILED ON THE STRUCTURAL DRAWINGS. IN THE CASE THAT OPENING, POCKETS, ETC ARE REQUIRED, THE CONTRACTOR SHALL SUBMIT THE PROPOSED SIZES AND LOCATIONS OF ALL HOLES TO THE STRUCTURAL ENGINEER OF RECORD FOR REVIEW PRIOR TO ANY DRILLING, CORING, OR CUTTING. THE CONTRACTOR SHALL TAKE WHATEVER STEPS ARE NECESSARY TO LOCATE AND AVOID ALL CONCRETE OR MASONRY REINFORCEMENT.
6. IN THE EVENT THAT CERTAIN FEATURES OF THE CONSTRUCTION ARE NOT FULLY SHOWN ON THE DRAWINGS OR CALLED FOR IN THE NOTES, THEN THEIR CONSTRUCTION SHALL BE OF THE SAME CHARACTER AS FOR SIMILAR CONDITIONS THAT ARE SHOWN OR CALLED FOR AND SHALL BE REVIEWED BY THE STRUCTURAL ENGINEER OF RECORD.

PROJECT DESIGN CRITERIA:

1. CODE: 2013 CALIFORNIA BUILDING CODE.
2. MAXIMUM ALLOWABLE DEFLECTION NORMAL TO THE SURFACE OF A WALL UNDER SEISMIC OR WIND LATERAL FORCE LOADING SHALL NOT EXCEED:

FINISH	MAX DEFLECTION
CEMENT PLASTER	L/240
LATEX PLASTER	L/240
I NTERIOR GYP BD	L/120
TILE AND STONE	L/480

3. MAXIMUM ALLOWABLE DEFLECTION FOR HORIZONTAL MEMBERS SHALL NOT EXCEED:

FINISH	LIVE LOAD DEFLECTION	TOTAL LOAD DEFLECTION
CEMENT PLASTER	L/360	L/240
LATEX PLASTER	L/240	L/240
INTERIOR GYP BD	L/240	L/180
TILE AND STONE	L/360	L/360

4. ALL MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE BRACED TO RESIST THE FORCES PRESCRIBED IN ASCE 7 SECTION 13.6 WITH DETAILS IN ACCORDANCE WITH THE SMACNA SEISMIC RESTRAINT MANUAL, GUIDELINES FOR MECHANICAL SYSTEMS.

STATEMENT OF SPECIAL INSPECTIONS AND STRUCTURAL TESTS:

1. PROVIDE A STATEMENT OF SPECIAL INSPECTIONS AND STRUCTURAL TESTS IN ACCORDANCE WITH CBC CHAPTER 17. ALL SPECIAL INSPECTORS SHALL SUBMIT FINAL REPORTS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO SEE THAT THESE TEST AND INSPECTIONS ARE MADE AND TO DETERMINE WHEN INSPECTIONS ARE CONTINUOUS OR PERIODIC. STRUCTURAL TESTS AND INSPECTIONS ARE REQUIRED FOR THE FOLLOWING WORK:
2. FOUNDATIONS:
   A. COMPACTED FILL INCLUDING UTILITY TRENCHES -- YES
   B. VISUAL EXAMINATION AND APPROVAL OF ALL FOUNDATION EXCAVATIONS -- YES
3. CONCRETE: SPECIAL INSPECTIONS AND VERIFICATIONS FOR CONCRETE CONSTRUCTION SHALL BE AS REQUIRED BY CBC SECTION 1705.3 AND CBC TABLE 1705.3.
   A. CONTINUOUS INSPECTION AND TEST CYLINDERS FOR CONCRETE DESIGN STRENGTH OVER 2,500 PSI -- YES
   B. REINFORCING, BOLT, AND EMBEDDED PLATE INSTALLATION IN CONCRETE (DURING INSTALLATION AND PLACING OF CONCRETE) -- YES
4. REINFORCING STEEL:
   A. PLACING OF REINFORCING STEEL -- YES
   B. MILL REPORTS AND IDENTIFICATION OF STEEL -- YES
   C. SAMPLING AND TESTING OF REINFORCING STEEL -- NO
5. WOOD -- NO
6. STRUCTURAL STEEL: SPECIAL INSPECTIONS FOR STRUCTURAL STEEL SHALL BE IN ACCORDANCE WITH THE QUALITY ASSURANCE INSPECTION REQUIREMENTS OF AISC 360.
   A. MILL REPORTS AND IDENTIFICATION OF STEEL (AFFIDAVIT OF COMPLIANCE) -- YES
   B. SAMPLING AND TESTING OF STEEL -- NO
7. WELDING: WELDING INSPECTION AND WELDING INSPECTOR QUALIFICATIONS SHALL BE IN ACCORDANCE WITH AWS D1.1 FOR STRUCTURAL STEEL, AWS D1.3 FOR SHEET STEEL, AND AWS D1.4 FOR REINFORCING STEEL.
   A. ALL STRUCTURAL FIELD AND SHOP WELDING (INCLUDING METAL DECK, METAL STUD FRAMING, AND HEADED STUD ANCHORS) EXCEPT WELDING IN AN APPROVED FABRICATOR'S SHOP PER CBC SECTION 1704.2.2 -- YES
   B. NON-DESTRUCTIVE TESTING OF PARTIAL AND COMPLETE JOINT PENETRATION WELDS AT MEMBER SPLICES AND MEMBER CONNECTIONS -- YES
   C. WELDING OF REINFORCING STEEL -- YES
   D. STRUCTURAL LIGHT GAGE METAL FRAMING -- AS SPECIFIED BY THE STRUCTURAL ENGINEER OF RECORD
   E. REVIEW AND APPROVAL OF WELDING PROCEDURE SPECIFICATIONS -- YES
8. BOLTING:
   A. HIGH STRENGTH BOLTING -- YES
   B. EXPANSION BOLTING IN CONCRETE -- YES
   C. EPOXY BOLTING IN CONCRETE -- YES
   D. SIMPSON TITEN HD SCREWS IN CONCRETE -- YES
9. APPROVED FABRICATORS: SUBMIT CERTIFICATE OF COMPLIANCE FOR ALL OFF-SITE FABRICATION SUCH AS STRUCTURAL STEEL, MAUNFACTURED LUMBER, WOOD I-JOISTS, WOOD OPEN WEB TRUSSES, METAL PLATE CONNECTED WOOD TRUSSES, PRECAST CONCRETE, STEEL JOISTS, ETC -- YES
10. ALL TESTS AND INSPECTIONS SHALL BE PERFORMED BY AN INDEPENDENT INSPECTION AGENCY WHOSE QUALIFICATIONS ARE ACCEPTABLE TO NCE, INC., THE STRUCTURAL ENGINEER OF RECORD, AND THE AUTHORITY HAVING JURISDICTION. THE SPECIAL INSPECTOR SHALL BE EMPLOYED BY THE OWNER. INSPECTION REPORTS SHALL BE WRITTEN DAILY WITH COPIES SENT TO THE OWNER, ARCHITECT, STRUCTURAL ENGINEER OF RECORD, AND AUTHORITY HAVING JURISDICTION.
11. SPECIAL INSPECTIONS LISTED ARE IN ADDITION TO THE CALLED INSPECTIONS REQUIRED BY THE CODE AND ARE NOT A SUBSTITUTE FOR INSPECTIONS BY THE CITY INSPECTOR. SPECIAL INSPECTIONS SHALL BE CONTINUOUS UNLESS ALLOWED OTHERWISE BY THE CODE. JOB SITE VISIT AND OBSERVATIONS DO NOT CONSTITUTE AN OFFICIAL INSPECTION.
12. WORK REQUIRING SPECIAL INSPECTION THAT IS INSTALLED OR COVERED WITHOUT THE INSPECTION SHALL BE SUBJECT TO REMOVAL AT THE CONTRACTOR'S EXPENSE.

STRUCTURAL OBSERVATION:

1. REFERENCE CBC SECTION 1704.5.
2. FOR THE CONSTRUCTION OF STRUCTURAL WORK SHOWN IN THE DRAWINGS, THE OWNER SHALL EMPLOY THE STRUCTURAL ENGINEER OF RECORD OR ANOTHER ENGINEER DESIGNATED BY THE STRUCTURAL ENGINEER OF RECORD TO PERFORM STRUCTURAL OBSERVATION.
3. THE STRUCTURAL ENGINEER OF RECORD SHALL PERFORM STRUCTURAL OBSERVATION (VISUAL OBSERVATION) OF THE STRUCTURAL SYSTEM, FOR GENERAL CONFORMANCE TO THE APPROVED PLANS AND SPECIFICATIONS, AT SIGNIFICANT CONSTRUCTION STAGES AND AT COMPLETION OF THE STRUCTURAL SYSTEM. STRUCTURAL OBSERVATION DOES NOT WAIVE THE RESPONSIBILITY FOR THE INSPECTIONS REQUIRED BY CBC SECTION 110, THE SPECIAL INSPECITONS OF CBC SECTION 1704, OR OTHER SECTIONS OF THE CODE. THE STRUCTURAL ENGINEER OF RECORD SHALL PROVIDE WRITTEN FIELD REPORTS TO THE ARCHITECT DESCRIBING THE STATUS OF CONSTRUCTION AND IDENTIFYING DISCREPANCIES FROM THE STRUCTURAL DRAWINGS.
4. STRUCTURAL OBSERVATIONS SHALL BE MADE AT THE FOLLOWING APPLICABLE STAGES OF CONSTRUCTION:
   A. CONCRETE AND REINFORCING STEEL: AFTER EXCAVATION OR FORMING, AND AFTER PLACEMENT OF REINFORCING STEEL, PRIOR TO CONCRETE PLACEMENT AND CLOSING OF FORMS.
   B. STRUCTURAL STEEL ERECTION.

DESIGN/BUILD AND DEFERRED APPROVAL ELEMENTS AND REQUIREMENTS:

1. IN THE EVENT THAT THE STRUCTURAL ENGINEER OF RECORD DOES NOT DESIGN ALL STRUCTURAL ELEMENTS REQUIRED FOR COMPLETION OF THE PROJECT, THE CONTRACTOR MAY ELECT TO HIRE A DESIGN/BUILD ENGINEER. THE CONTRACTOR SHALL CONTACT THE AUTHORITY HAVING JURISDICTION TO DETERMINE WHICH DESIGN/BUILD ITEMS REQUIRE A PERMIT THROUGH A DEFERRED APPROVAL PROCESS.

3. FOR DESIGN/BUILD ELEMENTS, THE CONTRACTOR SHALL PREPARE ALL REQUIRED DOCUMENTS: CALCULATIONS, SHOP DRAWINGS, MATERIAL SPECIFICATIONS, AND DATA SHEETS, ALL OF WHICH SHALL BE STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROJECT STATE. ALL DOCUMENTS SHALL BE SUBMITTED TO THE STRUCTURAL ENGINEER OF RECORD AND NCE, INC. FOR REVIEW TO VERIFY THAT THE DESIGN COMPLIES WITH THE PROJECT DESIGN LOADING CRITERIA, THAT THE PRIMARY STRUCTURAL SYSTEM IS CAPABLE OF SUPPORTING THE IMPOSED LOADS AT CONNECTION POINTS, AND FOR COORDINATION AS REQUIRED. THE PREPARER OF THE DOCUMENTS IS SOLELY RESPONSIBLE FOR THEIR DESIGN AND FOR VERIFICATION THAT THEIR COMPONENTS ARE INSTALLED CORRECTLY. THE STRUCTURAL ENGINEER OF RECORD IS RESPONSIBLE FOR VERIFICATION OF CODE COMPLIANCE. WHERE THE DESIGN/BUILD ELEMENT REQUIRES A DEFERRED APPROVAL, THE CONTRACTOR SHALL SUBMIT THE DOCUMENTS TO THE AUTHORITY HAVING JURISDICTION AND RESOLVE ALL PLAN CHECK CORRECTIONS TO OBTAIN A PERMIT. FABRICATION AND INSTALLATION OF DESIGN/BUILD AND DEFERRED APPROVAL ELEMENTS SHALL NOT PROCEED UNTIL THE DESIGN TEAM HAS REVIEWED THE DOCUMENTS AND THE CONTRACTOR HAS OBTAINED A PERMIT FOR THE ITEMS REQUIRING DEFERRED APPROVAL.
4. THE CONTRACTOR SHALL COORDINATE WITH OTHER TRADES, THE ARCHITECT, AND OTHER CONSULTANTS. DESIGN SHALL INCLUDE THE DESIGN OF THE ELEMENT AND ITS CONNECTION TO THE STRUCTURE. ONLY THE FOLLOWING ITEMS MAY BE CONSIDERED FOR THE DESIGN/BUILD AND DEFERRED APPROVAL PROCESS:
   A. CURTAIN WALL, WINDOW WALL, LOUVER, AND GLAZING SYSTEMS.
   B. FIRE SPRINKLER SUPPORT.
   C. ANCHORAGE OF EQUIPMENT AND COMPONENTS FOR MECHANICAL, ELECTRICAL, PLUMBING, ETC.
   D. ANY STRUCTURE THAT IS NOT SHOWN ON THE STRUCTURAL DRAWINGS BUT IS REQUIRED BY OTHER DISCIPLINES, SUCH AS ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, LANDSCAPE, ETC.
5. ALL MECHANICAL AND ELECTRICAL COMPONENTS SHALL BE BRACED TO RESIST THE FORCES PRESCRIBED IN ASCE 7 SECTION 13.6 WITH DETAILS IN ACCORDANCE WITH THE SMACNA SEISMIC RESTRAINT MANUAL, GUIDELINES FOR MECHANICAL SYSTEMS.

SHOP AND ERECTION DRAWINGS:

1. SHOP AND ERECTION DRAWINGS SERVE TO AID SUBCONTRACTORS IN THE PERFORMANCE OF THEIR WORK. THE CONTRACTOR SHALL REVIEW SUBMITTALS RECEIVED BY THEIR SUBCONTRACTORS FOR COMPLIANCE AND CONFORMANCE WITH THE REQUIREMENTS OF THE STRUCTURAL DRAWINGS AND MARK ANY DISCREPANCIES. SHOP AND ERECTION DRAWINGS SHALL INCORPORATE THE LATEST REVISIONS TO THE STRUCTURAL DRAWINGS AND THOSE THAT DO NOT SHALL NOT BE FORWARDED TO THE DESIGN TEAM FOR REVIEW. THE CONTRACTOR SHALL ASSIGN A NUMBER TO EACH SUBMITTAL AND PROVIDE A REVIEW STAMP AND SIGNATURE. WORK SHALL NOT BEGIN UNTIL THE SHOP AND ERECTION DRAWINGS REVIEWED BY THE STRUCTURAL ENGINEER OF RECORD ARE RECEIVED AT THE JOBSITE.
2. WHERE THE FOLLOWING TYPES OF WORK ARE SHOWN IN THE PLANS, SHOP AND ERECTION DRAWINGS ARE REQUIRED:
   A. REINFORCING STEEL.
   B. CONCRETE MIX DESIGNS.
   C. STRUCTURAL STEEL.
   D. CURTAIN WALL, WINDOW WALL, LOUVER, AND GLAZING SYSTEMS.
   E. FIRE SPRINKLER SUPPORT.
   F. ANCHORAGE OF EQUIPMENT AND COMPONENTS FOR MECHANICAL, ELECTRICAL, PLUMBING, ETC.
3. CORRECTIONS OR COMMENTS MADE BY THE STRUCTURAL ENGINEER OF RECORD ON THE SHOP AND ERECTION DRAWINGS DURING REVIEW DO NOT RELIEVE THE CONTRACTOR FROM COMPLIANCE WITH THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS. REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR CONFIRMING AND CORRELATING ALL QUANTITIES AND DIMENSIONS, SELECTING FABRICATION PROCESSES AND TECHNIQUES OF CONSTRUCTION, COORDINATING WORK WITH THAT OF ALL OTHER TRADES, AND PERFORMING HIS WORK IN A SAFE AND SATISFACTORY MANNER.

FIRE SPRINKLER SUPPORT:

1. DESIGN OF HANGERS, SWAY BRACING, AND ATTACHMENT TO THE STRUCTURE IS A DEFERRED SUBMITTAL ITEM. SEE DESIGN/BUILD NOTES FOR REQUIREMENTS.
2. CONTRACTOR SHALL SUBMIT DRAWINGS TO THE STRUCTURAL ENGINEER OF RECORD PRIOR TO THE START OF WORK. PROVIDE PIPE SIZES, WET PIPE WEIGHTS, AND PROPOSED DETAILS FOR ATTACHMENT. SIZE OF MEMBERS MAY BE SUBJECT TO CHANGE DUE TO PIPE LOCATIONS. INSTALLATION OF FIRE SPRINLERS SHALL NOT PROCEED UNTIL SHOP DRAWINGS AND METHOD OF STRENGTHENING, IF REQUIRED, HAVE BEEN DETERMINED. CONNECTORS USED FOR ATTACHING SPRINKLER COMPONENTS TO THE STRUCTURE SHALL HAVE A VALID ICC REPORT FOR THE APPLICATIONS USED WHEN CONSIDERING GRAVITY AND SEISMIC LOADING.
3. CONNECTIONS TO CONCRETE BEAMS SHALL OCCUR WITHIN THE MIDDLE THIRD OF THE MEMBER DEPTH.

CONCRETE AND REINFORCING STEEL:

1. CONCRETE MIXES SHALL BE DESIGNED BY A RECOGNIZED TESTING LABORATORY, STAMPED AND SIGNED BY A PROFESSIONAL ENGINEER LICENSED IN THE PROJECT STATE, WITH COPIES OF DESIGN SENT TO THE STRUCTURAL ENGINEER OF RECORD. ALL CONCRETE SHALL CONTAIN A POLYMER BASED WATER REDUCING ADMIXTURE.
2. PORTLAND CEMENT SHALL CONFORM TO ASTM C150. AGGREGATE FOR NORMAL WEIGHT CONCRETE SHALL CONFORM TO ASTM C33. CONCRETE MIX DESIGNS SHALL CONTAIN A BLEND OF SAND, FINE, AND COARSE AGGREGATE; "PEA-GRAVEL" MIXES SHALL NOT BE USED EXCEPT WHERE SPECIFICALLY APPROVED BY THE STRUCTURAL ENGINEER OF RECORD. UNLESS REQUIRED OTHERWISE BY AUTHORITY HAVAING JURISDICTION, MINIMUM ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS SHALL BE 2,500 PSI WITH A MAXIMUM WATER-CEMENT RATIO OF 0.50 AND USE TYPE II/V CEMENT. MAXIMUM SLUMP SHALL NOT EXCEED 4".
3. REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF ASTM A615 GRADE 60. REINFORCING TO BE WELDED SHALL BE ASTM A706.
4. DETAILING OF REINFORCEMENT SHALL CONFORM TO THE REQUIREMENTS OF THE ACI CODE. ALL REINFORCING BAR BENDS SHALL BE MADE COLD. REINFORCING SHALL NOT BE RE-BENT.
5. REINFORCING STEEL SHALL BE CONTINUOUS, EXCEPT AS DETAILED. SPLICE LOCATIONS SHALL BE VERIFIED WITH THE STRUCTURAL ENGINEER OF RECORD. REINFORCING STEEL SHALL BE SPLICED IN ACCORDANCE WITH THE STRUCTURAL DETAIL. UNLESS SHOWN OTHERWISE ON THE DRAWINGS, SPLICES IN WALLS, SLABS, AND FOOTINGS SHALL BE STAGGERED AT LEAST 4'-0" AND SHALL BE PLACED SUCH THAT NOT MORE THAN ONE-THIRD OF THE BARS IN A LAYER ARE SPLICED AT ANY ONE LOCATION.
6. ALL REINFORCING BARS, ANCHOR BOLTS, EMBEDDED BOLTS, THREADED RODS, AND OTHER INSERTS SHALL BE WELL SECURED IN POSITION PRIOR TO PLACING CONCRETE AND GROUT AND SHALL BE FREE OF GREASE, RUST, MUD, MILL SCALE, OR OTHER COATINGS THAT DECREASE BOND. PROVIDE PROPER CONSOLIDATION OF CONCRETE AND GROUT TO ASSURE ADEQUATE BOND.
7. CORNERS AND INTERSECTIONS OF WALLS AND FOOTINGS SHALL HAVE LAPPED HORIZONTAL L-BARS EQUAL IN SIZE AND SPACING TO MATCH HORIZONTAL REINFORCING.
8. CLEAR COVERAGE OF CONCRETE OVER OUTER REINFORCING BARS SHALL BE AS FOLLOWS:
   A. CONCRETE PLACED DIRECTLY AGAINST EARTH: 3" CLEAR.
   B. SLABS ON GRADE: IN MIDDLE THIRD OF SLAB THICKNESS.
   C. FORMED CONCRETE EXPOSED TO EARTH OR WEATHER: 1 1/2" CLEAR (2" CLEAR FOR #6 OR LARGER).

STRUCTURAL STEEL:

1. STRUCTURAL STEEL SHALL BE DETAILED, FABRICATED, AND ERECTED IN ACCORDANCE WITH AISC SPECIFICATIONS AND CODE OF STANDARD PRACTICE AS AMENDED TO DATE. CONTRACTOR SHALL PROVIDE ADDITIONAL MEMBERS AND TAKE MEASURES AS REQUIRED TO ERECT STEEL WITHIN AISC SPECIFIED TOLERANCES.
2. STEEL MEMBERS SHALL CONFORM TO THE FOLLOWING MATERIAL SPECIFICATIONS:
   A. WIDE FLANGE MEMBERS, WT'S: ASTM A992.
   B. PLATES, ANGLES, CHANNELS: ASTM A36.
   C. HOLLOW STRUCTURAL SECTIONS, "HSS" SQUARE AND RECTANGLUAR: ASTM A500, GRADE B, FY = 46 KSI.
   D. HOLLOW STRUCTURAL SECTIONS, "HSS" ROUND: ASTM A500, GRADE B: FY = 42 KSI.
   E. STRUCTURAL PIPES: ASTM A53, GRADE B, FY = 35 KSI. PIPES ARE STANDARD WEIGHT, UNO.
3. STIFFENERS SHALL HAVE THE SAME WIDTH AS THE FLANGES OF THE STEEL MEMBERS, UNLESS DETAILED OTHERWISE, WITH CLOSE BEARING AGAINST FLANGES.
4. MACHINE BOLTS, ANCHOR BOLTS, AND THREADED STUD BOLTS SHALL CONFORM TO ASTM A307 UNLESS NOTED OTHERWISE ON THE DRAWINGS. HOLES FOR MACHINE BOLTS SHALL BE BOLT DIAMETER + 1/16". HOLES FOR ANCHOR BOLTS MAY BE OVERSIZED PER AISC. THREADED STUD BOLTS SHALL BE WELDED ALL AROUND WITH A FILLET WELD SIZE EQUAL TO ONE-HALF THE STUD DIAMETER, OR WELDED BY AUTOMATIC GUN PROCESS.
5. BOLTS, NUTS, AND RODS SHALL NOT BE WELDED OR HEATED, EXCEPT FOR A36, A572 GR50, AND A307, AND THOSE ONLY WITH THE APPROVAL OF THE STRUCTURAL ENGINEER OF RECORD.
6. WELDING SHALL BE PERFORMED BY EXPERIENCED, CERTIFIED WELDERS USING THE ELECTRIC ARC WELDING PROCESS, E70 SERIES ELECTRODES. WELDING SHALL CONFORM TO AISC AND AWS STANDARDS. ALL WELDS USED FOR CONNECTIONS OF STRUCTURAL MEMBERS SHALL BE MADE WITH WELD FILLER METAL WITH A CHARPY V-NOTCH TOUGHNESS OF 20 FOOT-POUNDS AT MINUS 20 DEGREES FAHRENHEIT.
7. WELDS NOT SPECIFIED SHALL BE CONTINUOUS FILLET WELDS. SIZE OF WELD SHALL BE BASED ON AISC STANDARDS FOR THINNER PART JOINED.
8. STRUCTURAL STEEL SHALL NOT BE TACK WELDED IN ANY WAY TO REINFORCING STEEL.
9. PARTIAL AND FULL PENETRATION GROOVE WELDS SHALL HAVE NON-DESTRUCTIVE TESTING PERFORMED BY EITHER ULTRASONIC TESTING OR RADIOGRAPHY. SEE DETAIL SHEETS FOR WELD TESTING REQUIREMENTS OF MOMENT FRAMES.
10. STRUCTURAL STEEL FRAMING MEMBERS SHALL BE SUPPORTED DURING FIELD WELDING. SUPPORTS SHALL REMAIN IN PLACE UNTIL STEEL TEMPERATURE HAS RETURNED TO AIR TEMPERATURE.
11. OPENINGS SHALL NOT BE PLACED IN STEEL MEMBERS UNLESS SPECIFICALLY DETAILED. STEEL MEMBERS SHALL BE SHORED WHEN PERMISSIBLE HOLES ARE CUT WITH TORCH AFTER STEEL IS ERECTED. THE SHORES SHALL REMAIN IN PLACE UNTIL STEEL TEMPERATURE HAS RETURNED TO AIR TEMPERATURE.
12. STRUCTURAL STEEL INSIDE THE BUILDING ENVELOPE SHALL RECEIVE ONE SHOP COAT OF PAINT PRIMER. STRUCTURAL STEEL AND BOLTS EXPOSED TO WEATHER SHALL BE GALVANIZED. FIELD WELDS EXPOSED TO THE WEATHER SHALL BE TOUCHED UP WITH ZINC-RICH PAINT.
13. STRUCTURAL STEEL SHALL BE DELIVERED TO THE JOB SITE FREE OF EXCESSIVE RUST, LOOSE MILL SCALE, GREASE, ETC.

WOOD/LUMBER FRAMING:

1. ALL STRUCTURAL LUMBER SHALL BE DOUGLAS FIR NO. 2 GRADE CONFORMING TO STANDARD GRADING RULES FOR WEST COAST LUMBER, NO. 17.
2. NOTCHING OF EXTERIOR WALL STUDS SHALL NOT EXCEED 25%/40% RESPECTIVELY. BORED HOLES IN BEARING/NONBEARING WALL STUDS SHALL NOT EXCEED 40%/60% RESPECTIVELY. IN NO CASE SHALL THE EDGE OF THE BORED HOLE BE NEARER THAN 5/8" TO THE EDGE OF THE STUD.
3. NOTCHES ON THE ENDS OF JOISTS AND BEAMS FOR BEARING OVER SUPPORTS SHALL NOT EXCEED ONE FOURTH THE MEMBER DEPTH. HOLES BORED IN JOISTS AND BEAMS SHALL NOT BE WITHIN 2" OF THE TOP OR BOTTOM OF THE MEMBER, AND THE DIAMETER OF ANY SUCH HOLE SHALL NOT EXCEED ONE FOURTH THE DEPTH OF THE MEMBER. NOTCHES IN THE TOP OR BOTTOM OF JOISTS AND BEAMS ARE NOT PERMITTED.
4. WOOD IN DIRECT CONTACT WITH THE GROUND, OR WOOD FRAMING MEMBERS INCLUDING SHEATHING THAT RESTS ON EXTERIOR FOUNDATION WALLS AND SLABS THAT ARE LESS THAN 8" FROM EXPOSED EARTH OR LESS THAN 6" FROM ASPHALT OR CONCRETE PAVING SHALL BE OF PRESERVATIVE-TREATED DOUGLAS FIR. CUT ENDS OF PRESERVATIVE-TREATED LUMBER SHALL BE TREATED IN A MANNER TO PROVIDE SAME PROTECTION AS BEFORE THE CUT. FASTENERS USED IN CONNECTING PRESERVATIVE-TREATED AND FIRE-RETARDANT WOOD SHALL BE HOT-DIPPED ZINC COATED GALVANIZED, STAINLESS STEEL, OR SILICON BRONZE.
5. NAILING SHALL BE PER CBC CHAPTER 23 AND CBC TABLE 2304.9.1 UNLESS SHOWN OTHERWISE. FASTENERS FOR PRESERVATIVE-TREATED AND FIRE-RETARDANT-TREATED WOOD SHALL BE OF HOT DIPPED ZINC-COATED GALVANIZED STEEL. THE COATING WEIGHTS FOR ZINC-COATED FASTENERS SHALL BE IN ACCORDANCE WITH ASTM A153. ALL STRUCTURAL FRAMING NAILS USED IN CONSTRUCTION OF THIS PROJECT SHALL BE COMMON NAILS AND CONFORM TO:

PENNY WEIGHT	MINIMUM PENETRATION	NAIL DIAMETER
8D	1 1/2"	0.131"
10D	1 5/8"	0.148"
16D	1 3/4"	0.162"
20D	2 1/8"	0.192"

6. USE OF MACHINE NAILING IS SUBJECT TO A SATISFACTORY JOB SITE DEMONSTRATION AND THE APPROVAL BY THE ARCHITECT AND STRUCTURAL ENGINEER OF RECORD. THE APPROVAL IS SUBJECT TO CONTINUED SATISFACTORY PERFORMANCE. MACHINE NAILING IS NOT ALLOWED FOR 5/16" SHEATHING. IF NAIL HEADS PENETRATE THE OUTER SKIN MORE THAN WOULD BE NORMAL FOR A HAND HAMMER OR IF MINIMUM ALLOWABLE EDGE DISTANCES ARE NOT MAINTAINED, THE PERFORMANCE WILL BE DEEMED UNSATISFACTORY AND MACHINE NAILING SHALL BE DISCONTINUED.
7. ALL NAILS LARGER THAN 16D, LAG SCREWS, AND NAILS SIMILAR TO SIMPSON STRONG-TIE "N54A", SHALL BE INSTALLED IN PROPER PRE-DRILLED HOLES ONLY. DIRECT HAMMERING IS NOT PERMITTED.
8. BOLTS SHALL BE UNFINISHED BOLTS CONFORMING TO ASTM A307. HOLES FOR MACHINE BOLTS IN WOOD SHALL BE BOLT DIAMETER PLUS 1/32" TO 1/16". ALL BOLTS SHALL HAVE STANDARD CUT WASHER UNDER HEAD AND NUT UNLESS NOTED OTHERWISE. ALL BOLTS SHALL BE RETIGHTENED PRIOR TO ENCLOSING WITH SHEATHING, CEILING, PLASTER, ETC.
9. LAG SCREWS SHALL CONFORM TO ANSI/ASME B18.2.1. WOOD SCREWS SHALL CONFORM TO ANSI/ASME B18.6.1.
10. ALL FRAMING ANCHORS, CLIPS, STRAPS, HANGERS, ETC, SHALL BE MANUFACTURED BY SIMPSON STRONG-TIE COMPANY, INC. (OR APPROVED EQUAL WITH VALID ICC REPORT) AND SHALL BE FULLY BOLTED AND/OR NAILED UNLESS NOTED OTHERWISE ON PLANS. NAIL TYPE FOR METAL CONNECTORS SHALL BE AS REQUIRED BY THE CONNECTOR MANUFACTURER. IF ANCHORS HAVE AN OPTION FOR DIFFERENT SIZE AND NUMBER OF NAILS, THE LARGER SIZE AND AMOUNT SHALL BE USED.

FASTENERS IN EXISTING CONCRETE:

1. ADHESIVE ANCHORS:
   A. ADHESIVE ANCHORS SHALL BE INSTALLED USING SIMPSON SET-XP EPOXY PER ICC ESR-2508 AND ALL MANUFACTURER'S RECOMMENDATIONS.
   B. ANCHOR MATERIAL SHALL BE REBAR CONFORMING TO ASTM A615 GRADE 60 OR CARBON STEEL CONFORMING TO ASTM A307 GRADE C OR ASTM A193 GRADE B7. SIZE OF REBAR AND RODS SHALL BE AS SHOWN ON THE DRAWINGS.
   C. NOMINAL EMBEDMENT DEPTH OF ANCHOR SHALL BE AS SHOWN ON THE DRAWINGS. MINIMUM DRILLED HOLE DEPTH IS DEEPER THAN THE NOMINAL HOLE DEPTH AND SHALL BE AS INDICATED IN THE ICC REPORT. HOLE DIAMETER SHALL BE AS INDICATED IN THE ICC REPORT.
   D. ANCHOR SPACING AND EDGE DISTANCE SHALL BE AS SHOWN ON THE DRAWINGS BUT SHALL NOT BE LESS THAN THE MINIMUMS ALLOWED IN THE ICC REPORT.
   E. CONCRETE SHALL BE 21 DAYS OLD MINIMUM BEFORE DRILLING HOLES FOR ANCHORS.
   F. IN AREAS RECEIVING ANCHORS, ALL EXISTING REINFORCEMENT (PRESTRESS TENDONS AND REINFORCING BARS) SHALL BE LOCATED IN ORDER TO AVOID DAMAGING THE REINFORCEMENT WHILE INSTALLING THE ANCHORS. ANCHORS SHALL BE LOCATED AT LEAST 3" FROM ANY REINFORCEMENT. NOTIFY NCE IF EXISTING REINFORCING IS ENCOUNTERED.
   G. CONTINUOUS SPECIAL INSPECTION OF ANCHOR INSTALLATION IS REQUIRED.
2. EXPANSION ANCHORS:
   A. EXPANSION ANCHORS SHALL BE SIMPSON STRONG-BOLT 2 WEDGE ANCHORS PER ICC ESR-3037 AND ALL MANUFACTURER'S RECOMMENDATIONS.
   B. ANCHORS SHALL BE CARBON STEEL UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
   C. NOMINAL EMBEDMENT DEPTH OF ANCHOR SHALL BE AS SHOWN ON THE DRAWINGS. MINIMUM DRILLED HOLE DEPTH IS DEEPER THAN THE NOMINAL HOLE DEPTH AND SHALL BE AS INDICATED IN THE ICC REPORT. HOLE DIAMETER AND ANCHOR INSTALLATION TORQUE SHALL BE AS INDICATED IN THE ICC REPORT.
   D. CONCRETE SHALL BE 21 DAYS OLD MINIMUM BEFORE DRILLING HOLES FOR ANCHORS.
   E. IN AREAS RECEIVING ANCHORS, ALL EXISTING REINFORCEMENT (PRESTRESS TENDONS AND REINFORCING BARS) SHALL BE LOCATED IN ORDER TO AVOID DAMAGING THE REINFORCEMENT WHILE INSTALLING THE ANCHORS. ANCHORS SHALL BE LOCATED AT LEAST 3" FROM ANY REINFORCEMENT. NOTIFY NCE IF EXISTING REINFORCING IS ENCOUNTERED.
   F. CONTINUOUS SPECIAL INSPECTION OF ANCHOR INSTALLATION IS REQUIRED.
3. CONCRETE SCREWS:
   A. CONCRETE SCREWS SHALL BE INSTALLED USING SIMPSON TITEN-HD SCREWS PER ICC ESR-2713 AND ALL MANUFACTURER'S RECOMMENDATIONS.
   B. NOMINAL EMBEDMENT DEPTH OF ANCHOR SHALL BE AS SHOWN ON THE DRAWINGS. MINIMUM DRILLED HOLE DEPTH IS DEEPER THAN THE NOMINAL HOLE DEPTH AND SHALL BE AS INDICATED IN THE ICC REPORT. HOLE DIAMETER AND ANCHOR INSTALLATION TORQUE SHALL BE AS INDICATED IN THE ICC REPORT.
   C. ANCHOR SPACING AND EDGE DISTANCE SHALL BE AS SHOWN ON THE DRAWINGS BUT SHALL NOT BE LESS THAN THE MINIMUMS ALLOWED IN THE ICC REPORT.
   D. CONCRETE SHALL BE 21 DAYS OLD MINIMUM BEFORE DRILLING HOLES FOR ANCHORS.
   E. IN AREAS RECEIVING ANCHORS, ALL EXISTING REINFORCEMENT (PRESTRESS TENDONS AND REINFORCING BARS) SHALL BE LOCATED IN ORDER TO AVOID DAMAGING THE REINFORCEMENT WHILE INSTALLING THE ANCHORS. ANCHORS SHALL BE LOCATED AT LEAST 3" FROM ANY REINFORCEMENT. NOTIFY NCE IF EXISTING REINFORCING IS ENCOUNTERED.
   F. CONTINUOUS SPECIAL INSPECTION OF ANCHOR INSTALLATION IS REQUIRED.

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NCE Project No.: **14-031**

REV. #	DATE	DESCRIPTION
	6/20/14	PHASE ONE

DRAWN BY: DD

PROJECT PHASE:
PHASE ONE

JOB #: NCE 14-031
S+D FM140334

S0.1

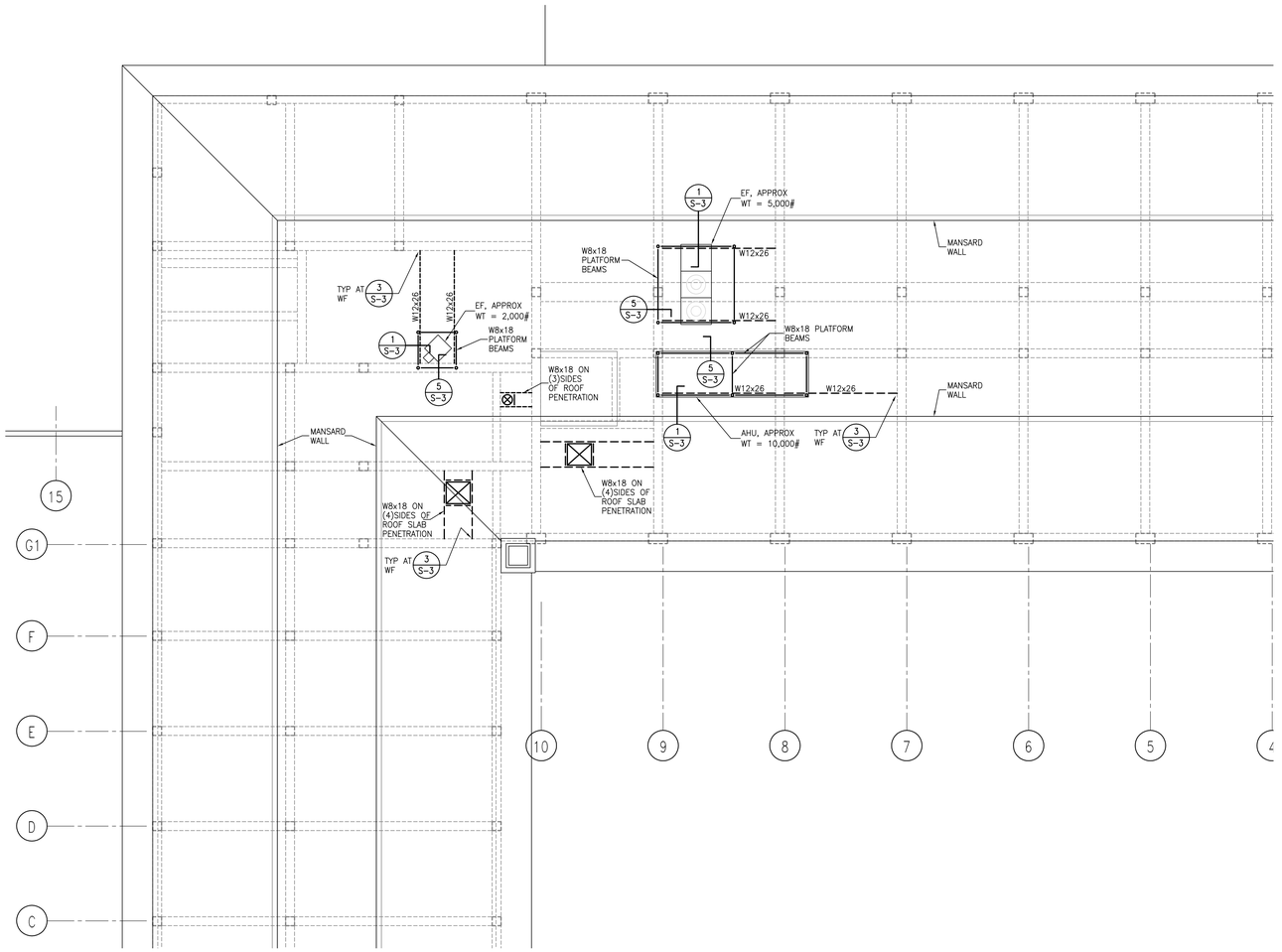
STRUCTURAL NOTES

NOTES:

1. COORDINATE LOCATIONS OF MECH'L UNITS AND PENETRATIONS WITH MECH'L DRAWINGS.
2. INSTALL FRAMING AROUND SLAB PENETRATIONS BEFORE CUTTING HOLES IN SLAB.
3. STRUCTURAL STEEL INSIDE THE BUILDING ENVELOPE SHALL RECEIVE ONE SHOP COAT OF PAINT PRIMER. STRUCTURAL STEEL AND BOLTS EXPOSED TO WEATHER SHALL BE GALVANIZED. FIELD WELDS EXPOSED TO WEATHER SHALL BE TOUCHED UP WITH ZINC-RICH PAINT.
4. SEE 4/S-3 FOR SLAB SAWCUT DETAIL.
5. SEE 11/S-3 FOR HORIZONATAL DUCT PENETRATION DETAIL THRU MANSARD WALL.
6. PROVIDE SUPPORTS ON ROOF FOR HORIZONTAL DUCTWORK.
7. SEE 8/S-3 FOR HOOD SUPPORT DETAIL.
8. SEE 14/S-3 FOR NEW PAD FOR TRANSFORMER.
9. IF LABORATORY IS LOCATED ON THE FIRST FLOOR, IN ADDITION TO SLAB PENETRATIONS AND W8x18'S AROUND OPENINGS AT THE ROOF LEVEL, SLAB PENETRATIONS AND W8x18'S AROUND OPENINGS ARE REQ'D AT THE SECOND FLOOR LEVEL ALSO.

LEGEND:

- STEEL BEAM BELOW ROOF
- STEEL BEAM ABOVE ROOF
- CONCRETE ROOF BEAM



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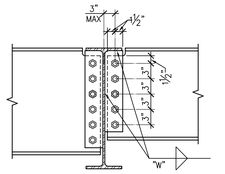
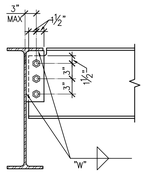
S-2

PARTIAL ROOF FRAMING PLAN



TWO SIDED BM
TO BM CONN (B)

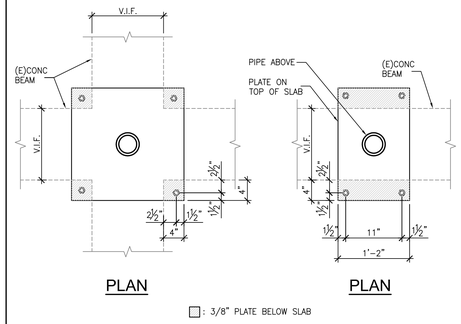


ONE SIDED BM
TO BM CONN (A)

GRAVITY SHEAR PLATE AND BOLT SCHEDULE			
BEAM SIZE	SHEAR PLATE THICKNESS	WELD [1] "W"	NUMBER OF [2,3] A325N BOLTS
W8 & W10	3/8"	1/4"	(2)3/4"ø
W12 & W14	3/8"	1/4"	(3)3/4"ø
W16	3/8"	1/4"	(4)3/4"ø
W18	3/8"	1/4"	(5)3/4"ø

NOTES:
1. OR AWS MIN.
2. AT CONNECTIONS USING SLIP CRITICAL BOLTS (SC): BOLTS SHALL BE TIGHTENED TO THE FULL PRE-TENSION LOAD OF THE BOLT AS REQ'D BY AISC "SPECIFICATION FOR STR'L JOINTS USING ASTM A325 BOLTS".
3. AT CONNECTIONS USING BEARING BOLTS (N):
   A. HOLES CAN BE STANDARD ROUND OR HORIZ SHORT SLOTTED.
   B. BOLTS NEED ONLY BE TIGHTENED TO THE SNUG TIGHT CONDITION.

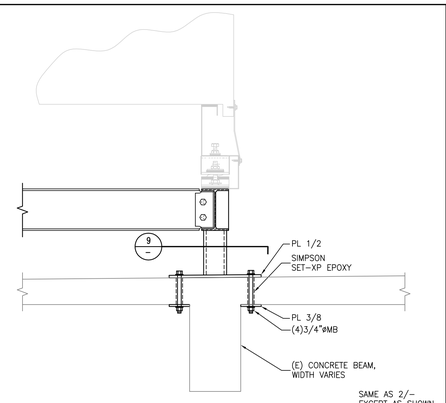
STEEL BEAM CONNECTIONS | 13



PLAN PLAN

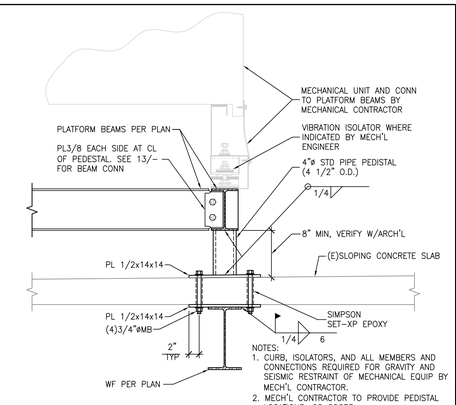
□: 3/8" PLATE BELOW SLAB

MECH'L PLATFORM PIPE SUPPORT | 9



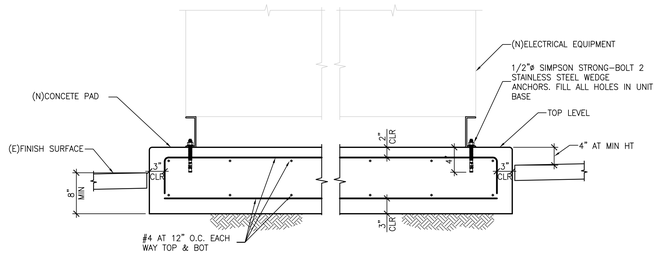
SAME AS 2/– EXCEPT AS SHOWN

MECH'L PLATFORM AT (E) CONC BEAM | 5

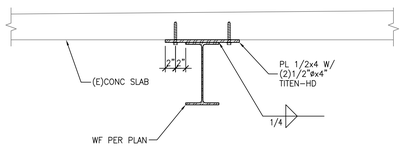


NOTES:
1. CURB, ISOLATORS, AND ALL MEMBERS AND CONNECTIONS REQUIRED FOR GRAVITY AND SEISMIC RESTRAINT OF MECHANICAL EQUIP BY MECH'L CONTRACTOR.
2. MECH'L CONTRACTOR TO PROVIDE PEDISTAL LOCATIONS, GC COORD.

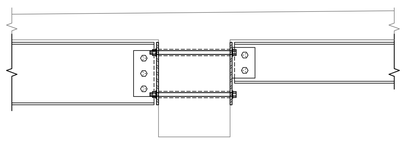
MECH'L PLATFORM AT (N) STEEL BEAM | 1



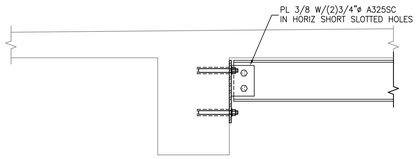
(N)TRANSFORMER PAD ON GRADE | 14



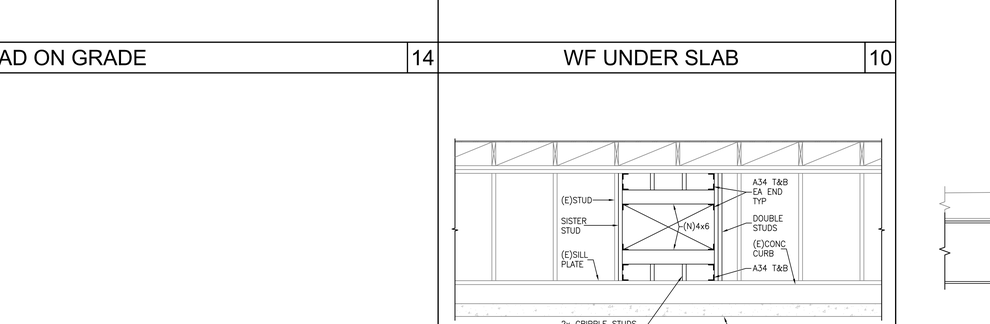
WF UNDER SLAB | 10



AT W8 AND W10

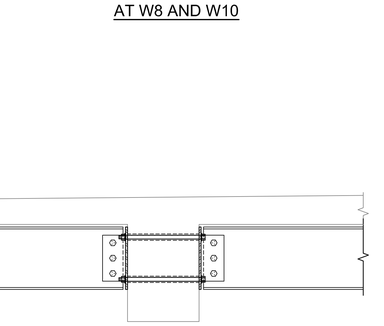


AT W8 AND W10



PLAN SECTION Y-Y

SECTION X-X

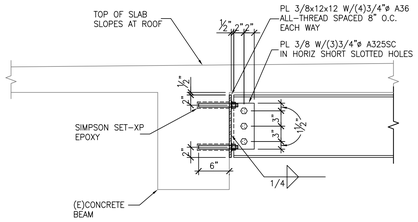


PLAN

DUCT PEN THRU MANSARD WALL | 11

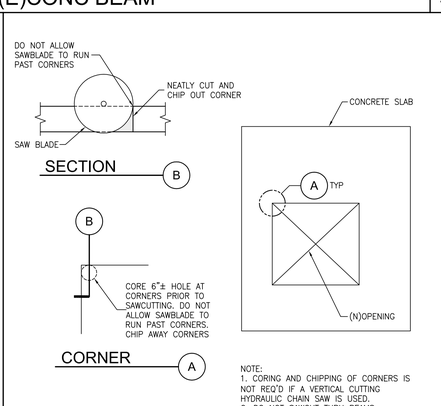
NOTE:
1. STITCH SISTER STUDS AND DOUBLE STUDS TOGETHER W/ 16d AT 6" O.C. STAGGERED.
2. SHORE (E)ROOF RAFTERS BEFORE CUTTING STUDS.
3. DO NOT CUT DIAGONAL BRACING STUDS BELOW THE MANSARD RAFTERS.

AT (2)W12



AT W12

(N)STEEL WF TO (E)CONC BEAM | 3



NOTE:
1. CORING AND CHIPPING OF CORNERS IS NOT REQ'D IF A VERTICAL CUTTING HYDRAULIC CHAIN SAW IS USED.
2. DO NOT SAWCUT THRU BEAMS

SLAB SAWCUT OPENING | 4

19 | 15 | HOOD SUPPORT | 8 | 20

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S-3
STRUCTURAL DETAILS