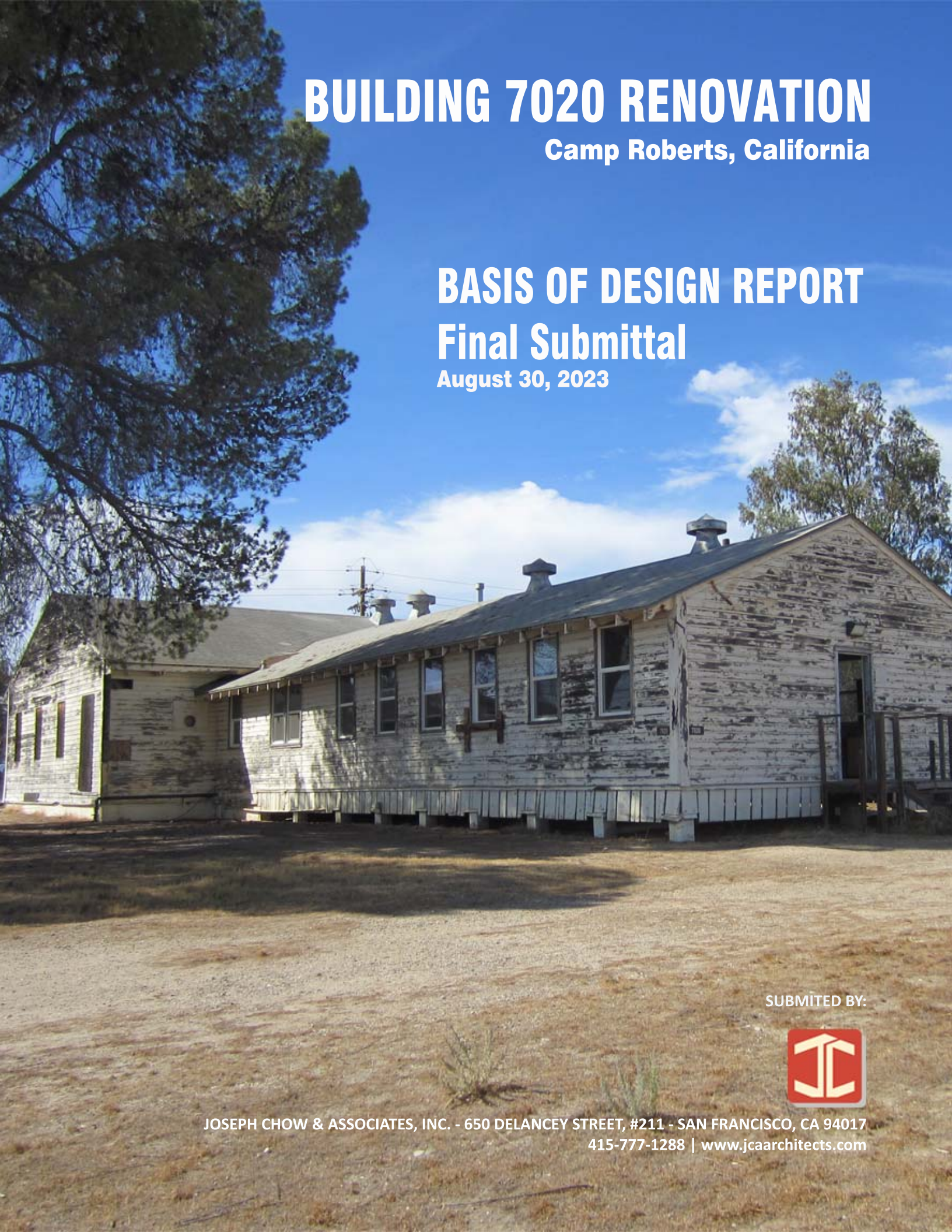


BUILDING 7020 RENOVATION

Camp Roberts, California

BASIS OF DESIGN REPORT

Final Submittal

August 30, 2023

SUBMITED BY:

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BUILDING 7020 RENOVATIONS
CAMP ROBERTS, CALIFORNIA
Agreement Number 94373 (IDIQAE2020-09)
BASIS OF DESIGN REPORT

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Acronyms

ADA	Americans with Disability Act
ACM	Asbestos-Containing Materials
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AT/FP	Anti-terrorism Force Protection
B	Building
BOD	Basis of Design
BTU	British Thermal Unit
CBC	California Building Code
CFM	Cubic Feet per Minute
CMC	California Mechanical Code
CMD	California Military Department
CPC	California Plumbing Code
DBB	Design-Bid-Build
DDC	Direct Digital Control
DPW	Department of Public Works
DX	Direct Expansion
FPM	Feet per Minute
FT	Feet
GPF	Gallons per Flush
GPM	Gallons per Minute
HVAC	Heating, Ventilation, and Air Conditioning
IN	Inch
JCA	Joseph Chow & Associates, Inc.
LBP	Lead Base Paint
LCP	Lead Containing Paint
LED	Light Emitting Diode
LEED	Leadership in Energy and Environmental
NFPA	National Fire Protection Association
POC	Point of Connection
PVT	Performance Verification Testing
SMACNA	Sheet Metal and Air Conditioning Contactor's National Association
TAB	Testing and Balancing
UFC	Unified Facilities Criteria
UFGS	United Facilities Guide Specifications

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PROJECT TEAM

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1.0 Project Team

This Basis of Design (BOD) Report was prepared by a multidisciplinary team of architects and engineers led by Joseph Chow & Associates, Inc. for the California Military Department (CMD).

The data collected will be used to develop a Design-Bid-Build (DBB) construction package consisting of full plans, specifications, detailed cost estimate, and other services as requested within the Scope of Work dated 08 July 2020. Project to be constructed includes exterior and interior renovations to Building 7020. The data contained within are based on field investigations conducted on October 20 to October 21, 2022 and discussions, meetings and interviews with the Base and User representatives.

Contributors to this report include the following:

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EXECUTIVE SUMMARY

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2.0 Executive Summary

This Basis of Design (BOD) Report is hereby submitted for the Renovation of Building 7020 located at the Camp Roberts, California. This BOD Report has been prepared in accordance with the Scope of Work dated 08 July 2020.

The objectives of this report include collecting sufficient data to perform qualitative evaluation for preparation of a Design-Bid-Build (DBB) construction package consisting of full plans, specifications, detailed cost estimate, and other services as requested within the *Scope of Work* for renovations to this building. The information contained here will be utilized as the basis of design during the design package preparation phase.

This project is intended to make Building 7020, which was constructed in 1940's and has been mainly underutilized, into a new code compliant, functional Fire Administration Building.

To meet the goals of this project, a team of architects and engineers led by Joseph Chow & Associates, Inc. provides site survey observations and design recommendations in this report. The information reflects a professional review of the facility's condition and the following building systems:

- Interior and Exterior Condition
- Egress and Accessibility
- Anti-terrorism / Force Protection
- Site Civil Utilities
- Superstructure - Structural
- Mechanical, Plumbing and Electrical Systems
- Telecommunication Systems
- Fire Protection and Life Safety
- Hazardous Materials

2.1 Project Description

Building 7020 was built using the Army Faculties Components System – Designs developed by the Department of the Army. It is located on Utah Avenue between Avenue 21 and Texas Avenue. Based on the archival drawings date and discussions with the Base, this building was most likely built in 1941/1942. See historical drawings in Attachment A. The building originally functioned as a Fire House with a 3 bay vehicle area and dormitory. There have been renovations to the building. The overall building square footage is approximately 2,400. The building is currently unoccupied.

The Plant Replacement Value (PRV) is $1,983,064.00. It is possible the construction cost of this project

may exceed 50% of the PRV.

Camp Roberts was opened in 1941 and sits just north of the Mission San Miguel Arcángel which was established in 1797. See Figure 1, Vicinity Map and Figure 2, Location Map. Franciscans chose this location due to the large number of Native Americans living on the land; the Mission leaders wanted to evangelize the Native population. The land that Camp Roberts sits on was part of the original Mission property. Today, the Mission is open and acts as a parish for the Diocese of Monterey.

In 1902, Congress tasked the Army Corps of Engineers with identifying property that would be well suited for military use. The Corps settled on the land that would become Camp Roberts; however, President Teddy Roosevelt chose not to move forward with developing the property and Camp Roberts was stalled for the next 38 years. Finally, in 1940, funds were made available to purchase acreage and construction began.

The original base name was changed from Camp Nacimiento to Camp Roberts after World War I Medal of Honor recipient Corporal Harold W. Roberts. Corporal Roberts was a tank driver who died in the Meuse-Argonne Offensive in France. Camp Roberts stands as the only major Army base named in honor of a non-commissioned military officer.

In 1944, Camp Roberts had seen approximately 45,000 forces pass through its gates for training. This installation also had a prisoner encampment where German and Italian POW's were held. Camp Roberts also hosted various celebrity entertainers for the Soldier Bowl such as Bob Hope and Lucille Ball.

After WWII, Camp Roberts became mostly inactive and saw to the training of Reserve units during the summer. When the Korean War began, Camp Roberts was fully activated to provide training and support mobilization efforts. By the end of the Korean War, Camp Roberts had prepped over 300,000 troops. In 1954, Camp Roberts again became mostly dormant until the Vietnam War.

The US Army officially closed Camp Roberts in April 1970, and on April 2, 1971, the California Army National Guard received control of the Camp under license from the Army to establish a Reserve Component training and mobilization facility. Camp Roberts continues to operate in this fashion today. Military units from all service branches (and some foreign countries) continue to train here, and it also hosts a large wheel and track maintenance school for reserve soldiers. In recent years, many National Guard units have been processed through Camp Roberts to meet the Nation’s needs in the War on Terrorism by being deployed throughout the Middle East and Eastern Europe.

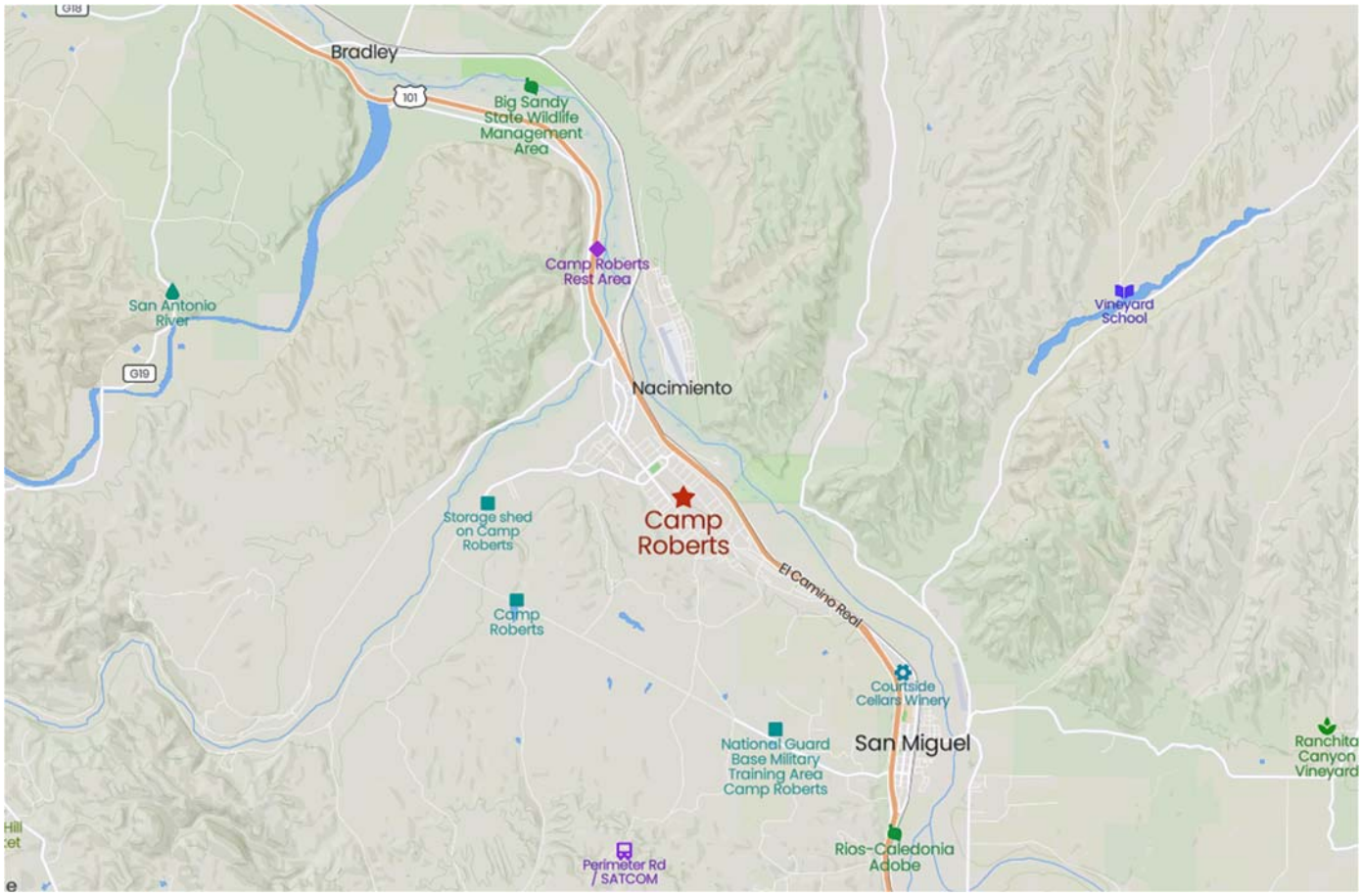


Figure 1 – Vicinity Map



Figure 2 – Location Map

This project will allow the renovation of Building 7020 into new Fire Administration Offices which will include offices, work areas, restrooms, utility rooms, a storage bay, and accessible parking.

The proposed scope of work includes the following:

Phasing: The project will be completed in one phase.

Structural: Our code analysis indicates that based on the project program the CBC/CEBC requires the structure to be retrofitted to resist 75% of the code prescribed loads for new buildings. This project will include seismic strengthening based on this standard.

AT/FP: The project must comply with the AT/FP regulations, in accordance with UFC 4-010-01 DoD *Minimum Anti-Terrorism Standards for Buildings,* Change 2, July 2022 because it is classified as inhabited. Inhabited buildings are routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 430 gross square feet.

The AT/FP concerns for this project include:
- Provide 33-foot unobstructed space around building
- Provide AT/FP prescriptive glazing
- Provide bracing of architectural features and electrical and mechanical equipment
- Provide air intakes at 10 feet above grade
- Provide HVAC shutoff
- Limit underbuilding access
- Provide mass notification system as part of Fire Alarm system. Per base direction fire alarm and mass notification system are not to be connected to central station because one does not exist.

Architecture: The project includes comprehensive renovations to the interior and exterior of the building.

Exterior building work includes, but is not limited to:
- Replace the exterior siding to comply with Base standards.
- Replace the roof to comply with Base Standards.
- Replace the existing doors and frames.
- Infill existing exterior openings not used.
- Replace the existing windows and frames.
- Removal of the existing stair.
- Repair damaged building wood framing as needed.
- Provide accessible path of travel.

Interior work includes, but is not limited to:
- Demolish and replace interior wall and ceiling finishes.
- Remove interior floor finishes and wall base.

- Remove existing light fixtures.
- Remove non-accessible ramp.
- Renovate the existing restrooms to provide one single occupancy and one ADA accessible restroom and shower.
- Reconfigure the existing layout to provide two new private offices, open office area, break nook, janitor's closet, storage room, and storage bay.
- Modify the existing utility rooms to support the program.

Fire Protection and Life Safety: Per UFC 3-600-01 8 August 2016 Change 6, 6 May 2021, a fire sprinkler and fire alarm system is not required. This building is a single-story, Type V construction less than 5,000 ft2 (465 m2). However, the project will provide a fire alarm system with mass notification system. Per Base direction fire alarm and mass notification system are not to be connected to central station because one does not exist.

Code complaint paths of travel within the building shall be incorporated into the floor plan.

Fire Alarm:

- Provide full fire alarm system including smoke detectors, heat detectors, horn/strobes and fire alarm control panel. Provide shop drawings and calculations stamped by California licensed Fire Protection Engineer.

Plumbing:

- Demolish and replace existing plumbing fixtures for the restrooms.
- Provide all new cold water, sewer, and gas piping from the mains.
- Provide new meter and backflow preventer assembly for the cold water line.
- Provide new meter, seismic valve, and regulator assembly for the gas line.
- Provide new storage tank type electric domestic hot water heater. If mechanical HVAC uses gas-fired packaged air handling unit, then a gas-fired domestic hot water heater will be used.

Mechanical:

- Demolish and replace the HVAC equipment and air distribution to accommodate the new renovation.
- Provide new HVAC system for the renovated building.
- Provide exhaust system for the restrooms, break nook and janitor's closet. There is no more laundry room.
- Provide a split system for the telecom room.

Electrical:

- Demolish all electrical equipment, wiring devices, lighting, switches and associated wiring and raceways.
- Provide underground service feeder from existing pole mounted transformer.
- Provide service disconnect with meter.

- Provide main service panelboard.
- Provide ground bus bar in telecommunication room.
- Provide power to new mechanical equipment.
- Provide receptacles throughout spaces.
- Provide LED light fixtures with manual on/off switches and automatic shutoff occupancy sensor controls.
- Provide exterior LED lights on building façade and at door locations.

Low Voltage/Telecommunications:

- Provide underground conduit for communications optical backbone cabling. Cabling provided by government.
- Provide horizontal cabling and raceway. Provide plywood backboard, communications cabinet, patch panel, and horizontal terminations.

Hazardous Materials:

- Remove existing hazardous materials from the interior and exterior of the building as part of the demolition work.

Sustainability: LEED certification will not be obtained. The project will incorporate sustainable features to the greatest extent possible, while maintaining consistency with mission and budget.

Background

The California (CA) National Guard is part of the National Guard of the United States, a dual federal-state military reserve force. The California National Guard has three components: the CA Army National Guard, CA Air National Guard, and CA State Guard. With a total strength of over 24,000 troops, it is the largest National Guard in the United States. As of January 2012, California National Guardsmen have been deployed overseas more than 38,000 times since 2001.

The Constitution of the United States specifically charges the National Guard with dual federal and state missions. When under the control of its state governor, National Guard functions range from limited actions during non-emergency situations to full scale law enforcement of martial law when local law enforcement officials can no longer maintain civil control. The National Guard may be called into federal service in response to a call by the President or Congress.

The Governor of California may call individuals or units of the California National Guard into state service during emergencies or special situations. The state mission of the National Guard is: "To provide trained and disciplined forces for domestic emergencies or as otherwise provided by state law."

Building 7020 will be used to house the 233rd who will be conducting fire field training while occupying the building. The building will not be considered a fire house, as firefighting services are conducted in another

building. This building will be used to support their field training functions and will be used for administration and storage.

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PROJECT INFORMATION

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3.0 Project Information

3.1 Existing Conditions

The original building was built using the Army's "Kit of Parts." The front portion of the building was constructed using the Firehouse 20' x 40' with shed template (Plan Number 74-13) as well as a modified Guard House Type GH-2 (Plan Number 700.260.1). See Figures 3 and 4. The building is a wood framed building with painted 1" x 5" wood siding over vapor paper and ½" gypsum board and wood skirting below the siding. The roof is comprised of asphalt shingles and gutters which appear to be original. There are penetrations through the roof for mechanical venting. The building sits on concrete piers/foundation. The exterior doors are wood, except for the vehicle roll up door which is metal. The windows are not original. They are retrofit vinyl windows, dual paned. There is existing signage with the building number.

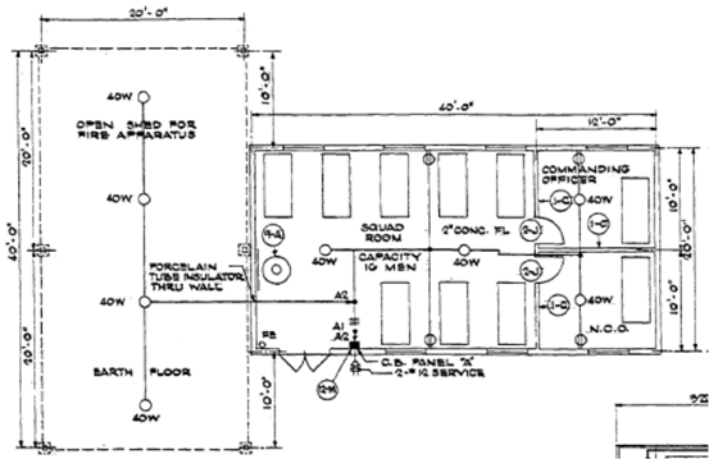


Figure 3

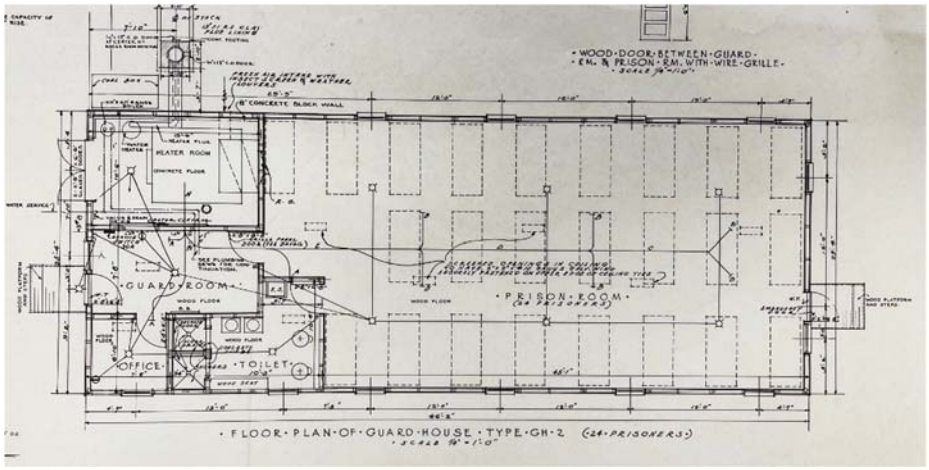


Figure 4

Access to the building is via a non-ADA accessible man door in the metal roll up door and a non-ADA accessible door in the rear of the building.

The existing building has undergone renovations which has change the original configuration. For example, there used to be three bay doors in the original Apparatus Bay. There is now only one bay door, centered in the existing front façade. The other two bay doors have been infilled.

The interior comprises of gypsum board wall and ceiling finishes, wood siding, and acoustic tile ceiling finishes. The floor finish consists of unfinished wood flooring and vinyl tile with wood baseboard in the administration side of the building and concrete elsewhere. In the existing Apparatus Bay, which is now used for storage has plywood covered walls which have been left unfinished and gypsum board ceilings.

The restroom contains two water closets, a sink and shower. The restroom is not accessible and is approximately 5" lower than the adjacent floor.

The building interior has six different level changes. The different level changes are accessed by non-accessible ramps.

During the original site visit, there were two active bee hives located within the framing of the building. Some areas where not accessible for detailed measurements and documentation due to the presence of active bees. Out of concern for the bees' survival, relocation of the bee hives was planned for the Spring of 2023.

In June 2023, the bee hives original observed were removed by the Base. Additional surveys were conducted as well as a Pest Inspection. Evidence of subterranean termites was observed during the inspection. See Attachment H, *Pest Report* for more information. It shall also be noted, that another bee hive may be present. Multiple bees were seen flying in and out of a hole in the exterior of the building.

Overall, the exterior façade, roof, and a majority of the interior is in poor condition and has reached its useful life. The building needs repair and upgrades to meet current California Building Code and UFC requirements.

3.2 Existing Photographs

See photos of the existing conditions on the following pages.



Exterior North Façade



Exterior East Façade



Exterior North/East Façade (Active Bee Hive)



Exterior East Façade



Exterior South Façade



Exterior West Façade



Exterior West Façade



Exterior West Façade (Active Bee Hive)



Exterior North/South Façade



Utah Street View



Partial Concrete Foundation



Concrete Pier Foundation



Existing Gutter – Full of debris



Existing Signage



Existing Open Office (Upper Level)



Existing Open Office (Upper Level)



Existing Open Office (Upper Level)



Existing Private Office (Upper Level)



Existing Private Office (Upper Level)



Existing Private Office (Upper Level)



Existing non-accessible Interior Ramp



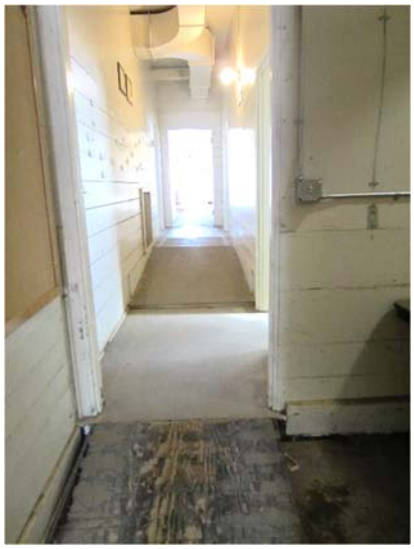
Existing Step Down to Restroom



Existing Restrooms



Existing Restroom Exposed Piping



Existing non-accessible Interior Ramp



Existing Storage Area



Existing Apparatus Bay Storage #1



Existing Apparatus Bay Storage #1



Existing Apparatus Bay Storage #2



Existing Roll Up Door Infill – Apparatus Bay Storage #2



Existing Apparatus Bay Storage #3



Existing Apparatus Bay Storage #3



Existing Telcom/Electrical Room



Existing Telcom/Electrical Room



Existing Mechanical Room



Existing Mechanical Room

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BASIS OF DESIGN

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4.0 Basis of Design

4.1 Project Goals

This project aims to provide a complete, useable, and code compliant building for the Stakeholders. This project will renovate Building 7020 to create a new, efficient, and inviting Fire Administration Building which will help meet the User's missions and goals.

4.2 Applicable Codes and Standards

References and standards used in this study include but are not limited to the following:

- California Building Code (CBC), 2022

- UFC 1-200-01, *DOD Building Code, 01 September 2022*
- UFC 1-200-02, *High Performance and Sustainable Building Requirements, June 2022*
- UFC 1-300-02, *Unified Facilities Guide Specifications (UFGS) Format Standard*, *May 2021*
- UFC 3-101-01, *Architecture, January 2021*
- UFC 3-120-10, *Interior Design, June 2021*
- UFC 3-201-01, *Civil Engineering, with Change 5, April 1, 2021*
- UFC 3-210-10, *Low Impact Development, with Change 3*, March 2020
- UFC 3-301-01, *Structural Engineering, with Change 1, February 4, 2022*
- UFC 3-401-01, *Mechanical Engineering, Change 1, October 2015*
- UFC 3-410-01, *Heating, Ventilation, and Air Conditioning Systems, Change 8, July 21, 2021*
- UFC 3-420-01, *Plumbing Systems, April 2021*
- UFC 3-501-01, *Electrical Engineering, with Change 1, November 2019*
- UFC 3-520-01, *Interior Electrical Systems, with Change 2, April 12, 2021*
- UFC 3-530-01, *Interior and Exterior Lighting Systems and Controls, Change 4, November 2019*
- UFC 3-580-01, *Telecommunications Interior Infrastructure Planning and Design, Change 1, June 2016*
- UFC 4-010-01, *DoD Minimum Antiterrorism Standards for Buildings Requirements, Change 2, July 2022*

- NFPA *90A: Standard for the Installation of Air Conditioning and Ventilation Systems, Latest Edition*
- NFPA 70, *National Electrical Code, Latest Edition*
- NFPA 101, *Life Safety Code, Latest Edition*

- NIST GCR 11-917-12 *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings* ICSSC Recommended Practice 8 (RP 8)

4.3 Civil

Accessible Parking: Accessible parking will be provided near the westerly side of the building, in or adjacent to the concrete driveway. One new ADA compliant parking space will be provided and will connect to an accessible building entry with an ADA compliant path of travel.

Gravel Parking Area: A new aggregate base rock gravel parking area will be installed adjacent to and south of the proposed accessible parking space. The new gravel parking area will allow parking for up to 10 vehicles and include concrete wheel stops to indicate the parking areas. The gravel parking area will be graded to sheet slow back towards the new curb, gutter, and sidewalk adjacent to Utah Boulevard.

Curb, Gutter, and Sidewalk: Curb, gutter, and sidewalk will be installed across the project frontage along Utah Boulevard. The concrete curb and gutter will be a depressed and mountable curb that will allow vehicle access to the accessible and gravel parking areas. The curb and gutter will collect drainage from Utah Boulevard and route it towards the south side of the project site.

Site Grading Improvements: Site grading improvements will consist of grading for surface drainage to flow away from the building. On the westerly side of the building, the existing concrete driveway will be replaced out to Utah Boulevard to assure positive drainage away from the building. For the remaining sides of the building, where impervious surfaces abut the building, those areas will be graded away at 2% for a minimum distance of 10 feet and where pervious surfaces abut the building, those areas will be graded away at 5% for a minimum distance of 10 feet. The disturbed and new impervious areas are estimated to be less than 5,000 square feet and thus storm water treatment or detention is not anticipated to be required for this project.

Domestic Water: The domestic water service will be updated utilizing the existing water service saddle and corporation stop at the 10” water main in Utah Boulevard. A new service line will be installed from the existing service saddle up to the service point to the building and will include a new water meter, water meter box, and backflow prevention device.

Sanitary Sewer: The existing 4” sanitary service lateral will be replaced with a new lateral connecting to the existing sewer main located just south of the building. The new sewer lateral will be routed outside of the dripline of the existing trees. The existing sewer lateral will be abandoned in place and disconnected from the existing sanitary sewer main.

Natural Gas: A new 1” natural gas service will connect to the existing main located in Utah Boulevard and be routed along the northerly side of the building to the backside where a meter will be installed, and a service point of connection will be provided. The existing gas service will be abandoned in place and disconnected from the existing main located in Utah Boulevard.

4.4 AT/FP

The project security is exempt from the AT/FP regulations, and security mitigation in accordance with UFC 4-010-01 DoD Minimum Anti-Terrorism Standards for Buildings.

The AT/FP Classification for this building is classified as inhabited in accordance with UFC 4-010-01 with change 2, dated 30 July 2022. Inhabited buildings are routinely occupied by 11 or more DoD personnel and with a population density of greater than one person per 430 gross square feet.
Standard 1. Standoff Distance: The building is located more than 50 feet from perimeter.

Standard 2. Unobstructed Space: It is required to maintain a 33-foot clear area around the building to prevent concealment of explosive devices.

Trash containers: Not allowed unless enclosed and covered per UFC 4-010-01. This project does not propose an enclosed and covered trash enclosure within the 33 ft unobstructed space.

Electrical & mechanical equipment: Electrical and mechanical equipment may be located within unobstructed spaces if they do not provide opportunities for concealment of explosives as described above or if they are enclosed & covered per UFC 4-010-01. This project may propose an enclosed and covered equipment area within the 33 ft unobstructed space.

Standard 3. Not used.

Standard 4. Not used.

Standard 5. Parking Beneath Building or on Rooftops: This is not applicable to this project. No parking is planned beneath the building or on the roof.

Standard 6. Progressive Collapse Resistance: This is not applicable to this project. Structure is under three stories.

Standard 7. Structural Isolation: Not applicable. No portion of the building is being classified as low occupancy.

Standard 8. Building Overhangs and Breezeways: This is not applicable to this project. There are no occupied spaces above overhangs or breezeways.

Standard 9. Exterior Masonry Walls: Not applicable. No masonry walls are included in the project.

Standard 10. Glazing: All new glazing will comply with AT/FP criteria.

Standard 11. Building Entrance Layout: This is not applicable to this project. The entrances are not visible from outside the controlled perimeter.

Standard 12. Exterior Doors: All exterior doors into inhabited areas must open outwards. By doing so, the doors will seat into the door frames in response to an explosive blast.

Standard 13. Mail Rooms and Loading Docks: This is not applicable to this project. There are no loading docks or mailrooms.

Standard 14. Roof Access: Any roof access must be controlled to prevent unauthorized access. Eliminate all external roof access.

Standard 15. Overhead Mounted Architectural Features: Ensure that overhead mounted features weighing 31 pounds or more (excluding distributed systems such as suspended ceilings that collectively exceed that weight) are mounted using either rigid or flexible systems to minimize the likelihood that they will fall and injure building occupants. Mount all such systems so that they resist forces of 0.5 times the component weight in any horizontal direction and 1.5 times the component weight in the downward direction. This standard does not preclude the need to design architectural feature mountings for forces required by other criteria such as seismic standards.

Standard 16. Air Intakes: Locate all air intakes at least 10 ft. (3 m) above the ground.

Standard 17. Mail Rooms and Loading Dock Ventilation: This is not applicable to this project. There are no loading docks or mailrooms.

Standard 18. Emergency Air Distribution Shutoff: Provide an emergency shutoff switch in the HVAC control system.

Standard 19. Equipment Bracing: Mount all overhead utilities and other fixtures weighing 31 pounds (14 kilograms) or more (excluding distributed systems such as piping networks that collectively exceed that weight) using either rigid or flexible systems to minimize the likelihood that they will fall and injure building occupants. Design all equipment mountings to resist forces of 0.5 times the equipment weight in any horizontal direction and 1.5 times the equipment weight in the downward direction. This standard does not preclude the need to design equipment mountings for forces required by other criteria such as seismic standards.

Standard 20. Under Building Access: There are existing crawl spaces under the rear portion of the building. The project must limit access to crawl spaces under the building. This project proposed to eliminate the draw space and provide a new slab on grade in that area.

Standard 21. Mass Notification System (MNS): Building must have a capability to provide real-time information to building occupants or personnel in the immediate vicinity of the building during emergency situations. The information relayed must be specific enough to determine the appropriate response actions. The information must be capable of being originated both locally at the building and from a remote location. The MNS building's design shall be in accordance with UFC 4-021-01.

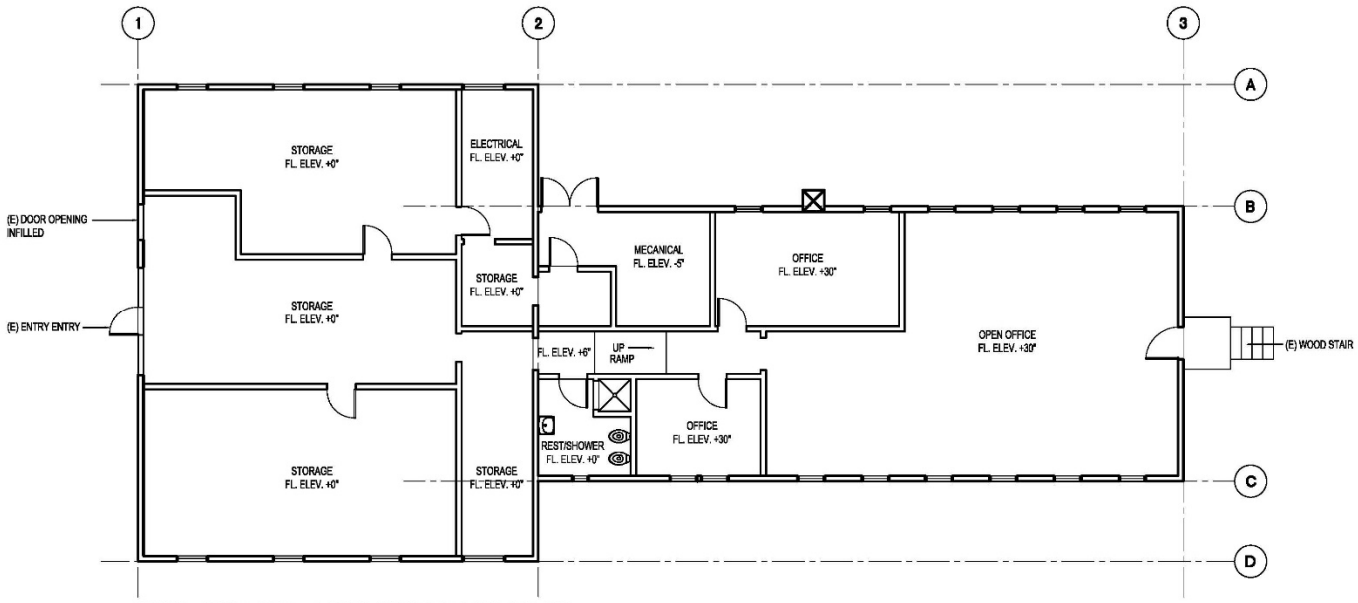
Per base direction fire alarm and mass notification system are not to be connected to central station because one does not exist.

4.5 Architectural

Interior renovation includes lead/asbestos abatement and encapsulation, wall framing, rough and finish plumbing, HVAC system, thermal insulation in all walls and attic, rough and finish electrical, LED light fixtures with motion sensors, new data/communication system, finished gypsum board, door assemblies, baseboard, paint, and vinyl flooring.

Exterior renovation includes lead/asbestos abatement and encapsulation, removal and replacement of all exterior doors, windows, siding, trim, wood steps, concrete, roof, and deteriorated utilities. Grading and one new standard ADA accessible parking space is included in the scope of work.

The existing as-built plan as surveyed is as follows:



BUILDING 7020 - EXISTING FLOOR PLAN

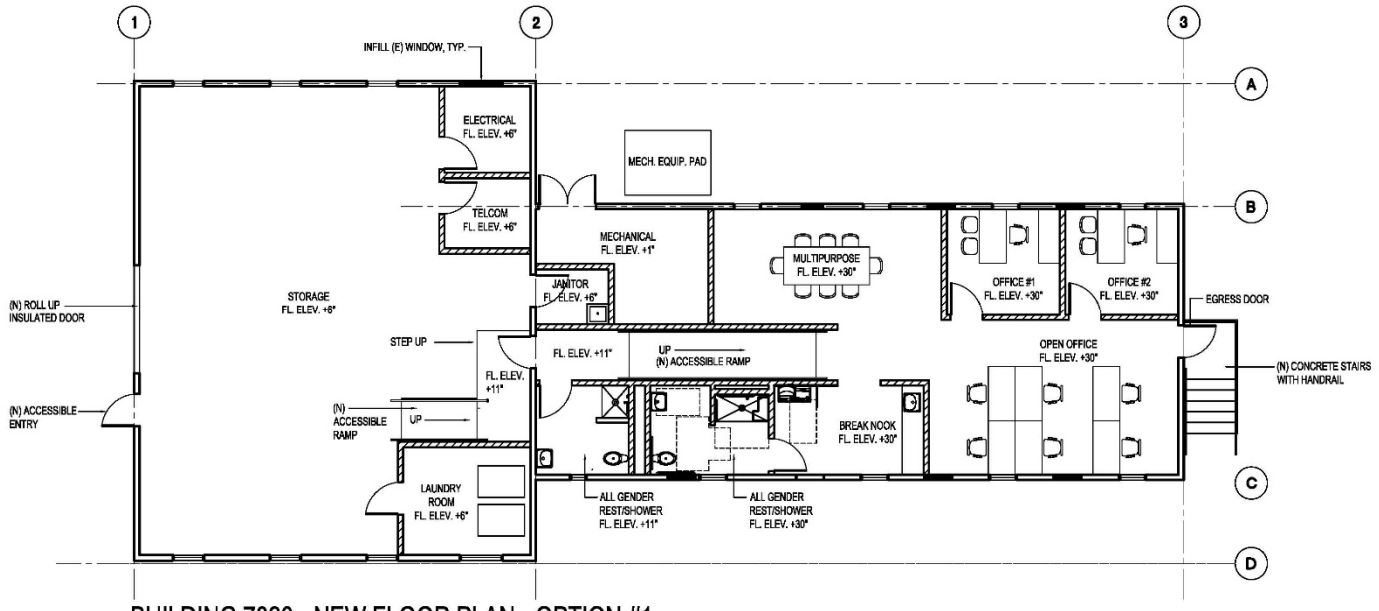
The original building occupancy classification was a B occupancy per the California Building Code and was considered an essential facility. The new building occupancy will be a B occupancy for the administration portion and an S-1 occupancy for the storage area. A fire separation between the occupancies is not required. This building will not be considered an essential facility.

During the kick off meeting on October 21, 2022 the Users wanted to include the following program and project requirements in this renovation project:

- Space for 8 people.
- Two private offices.
- Open work area.
- Open meeting area.
- Equipment storage.
- Garage door for standard vehicle.
- Charging station for 8-10 radios. Charging stations can be in the Office area.
- Washer (Extractor) and Dryer for turnouts.
- Air compressor for tanks (existing will be relocated by Users).
- Two single use restrooms with shower.
- Janitor's closet/mop sink.
- Kitchenette with garbage disposal.
- Consider removal windows to allow for more interior wall space to provide storage/shelving

Based on these requirements JCA proposed three options for consideration. In all three options we considered the building to be divided in two different uses. One for storage and the other for administrative use. It should be noted, that in each design Option, openings along Column Grid 2 where either infilled, maintained, and new openings minimized for structural purposes.

OPTION #1



BUILDING 7020 - NEW FLOOR PLAN - OPTION #1

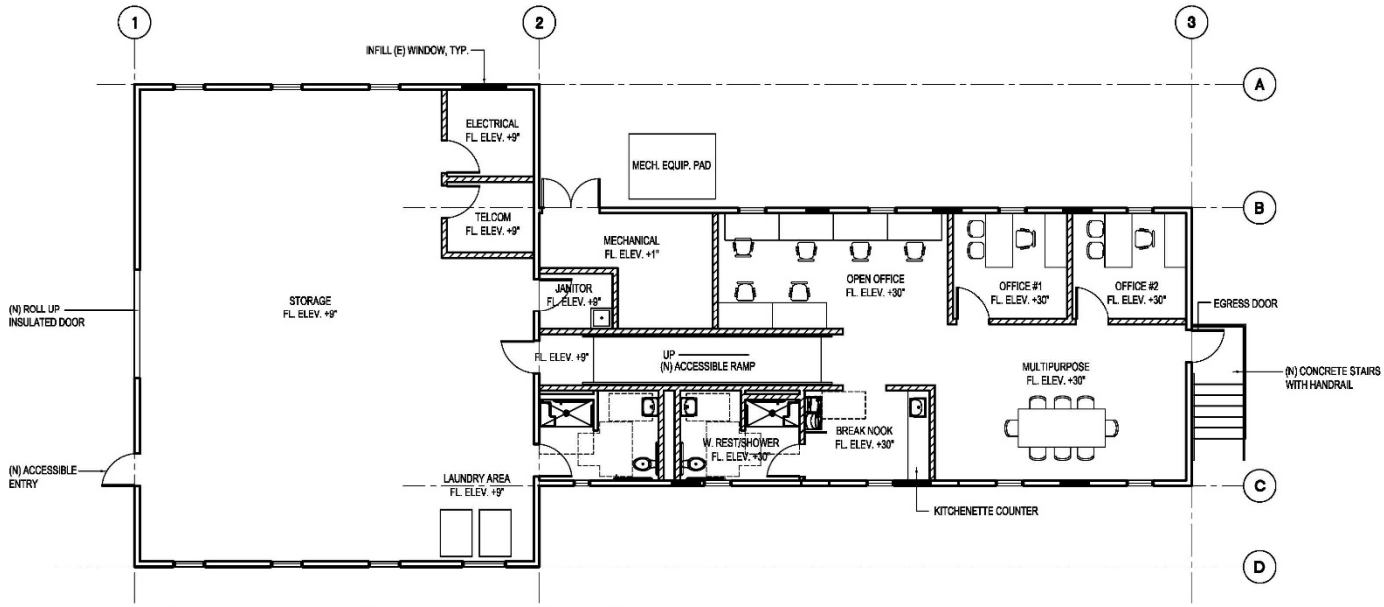
A description of Option #1 was as follows:

1. The Storage Area elevation is raised **6"** from the existing elevation to accommodate the required driveway work for drainage and accessible ADA parking.

2. New Telecommunication and Electrical Room.
3. New Laundry Room.
4. New Janitor's Closet.
5. Existing Mechanical Room remains in its current location.
6. New accessible ramp to accommodate a 7" change in elevation from the Storage Area to an intermediate level change.
7. Two All-Gender Restrooms/Showers with one Drinking Fountain with Bottle Filler. One accessible restroom is provided.
8. New accessible ramp to meet the existing elevation of the upper portion of the building. The upper portion of the building is approximately 30" above grade.
9. Two new offices.
10. Open Office Area.
11. Multipurpose Area.
12. Break Nook with a break counter with sink and garbage disposal.
13. Select windows will be infilled to accommodate the latest layout.
14. New stair in the rear of the building to replace the existing deteriorated wood stair.

Option #1 utilized the existing elevation of the building as much as possible. A system of ramps was required to address the accessibility requirement from one portion of the building to another. The identification of the single occupancy restrooms as All-Gender Restrooms allowed for only one accessible restroom to be installed. This saved some floor space and can be located where the existing restroom is currently.

OPTION #2



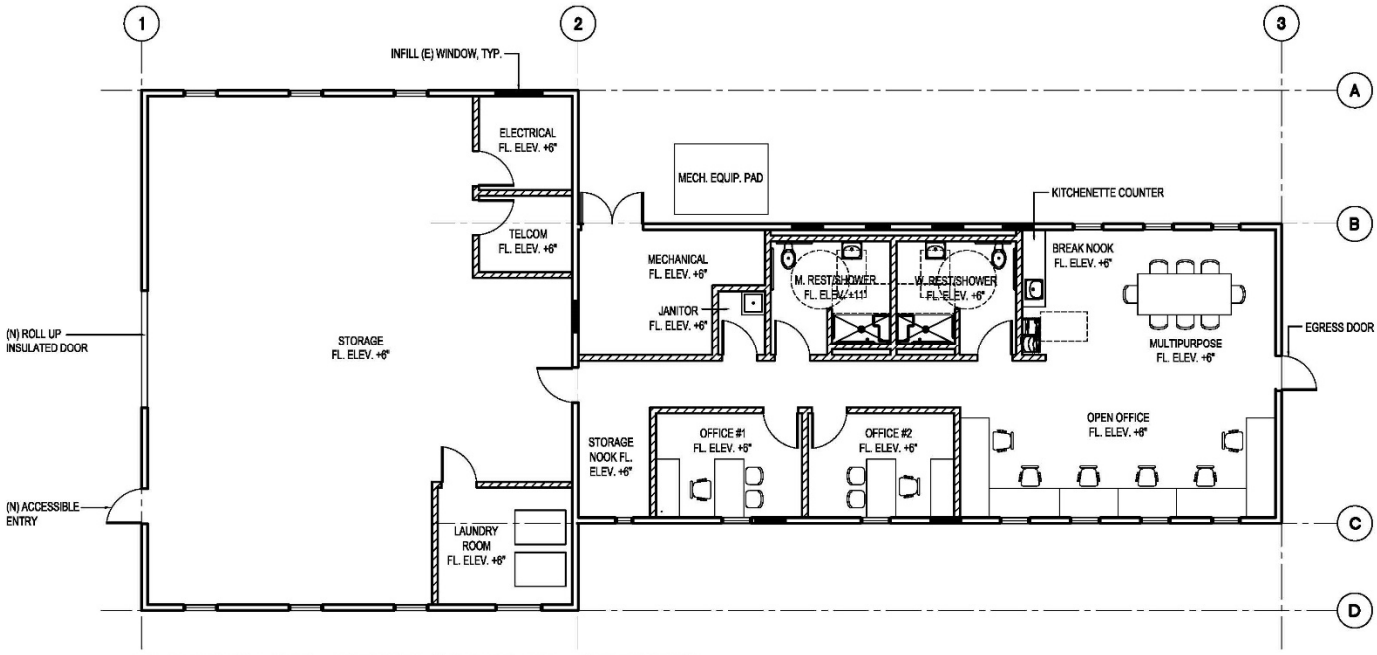
BUILDING 7020 - NEW FLOOR PLAN - OPTION #2

A description of Option #2 was as follows:

1. The Storage Area elevation is raised **9”** from the existing elevation to accommodate the required driveway work for drainage and accessible parking. The elevation in the Storage Area was raised 3” higher than Option #1 to minimize the number of accessible ramps and to keep the existing elevation in the upper portion of the building as much as possible.
2. New Telecommunication and Electrical Room.
3. New Laundry Area. This Option does not have an enclose laundry area as an option to save cost.
4. New Janitor’s Closet.
5. Existing Mechanical Room remains in its current location.
6. Two accessible Restrooms/Showers with one Drinking Fountain with Bottle Filler. The two restrooms have been identified as Men and Women’s therefore two accessible restrooms are required.
7. New accessible ramp to meet the existing elevation of the upper portion of the building. The upper portion of the building is approximately 30” above grade.
8. Two new offices.
9. Open Office Area.
10. Multipurpose Area.
11. Break Nook with a break counter with sink and garbage disposal.
12. Select windows will be infilled to accommodate the latest layout.
13. New stair in the rear of the building to replace the existing deteriorated wood stair.

Option #2 utilized the existing elevation of the building as much as possible. In this Option, the Storage Area’s elevation was raised 3” higher than Option #1 which required more civil work in the driveway and concrete in the Storage Area, however, in this scheme, only one ramp was required to address the accessibility requirement from one portion of the building to another. Two fully accessible restrooms/showers were provided, one identified for Men and the other for Women. A restroom accessible to the Storage Area was designed to allow for easier access from the Storage Room. For staff mainly working in the Storage area the location of the Men’s Restroom as shown made it easier to access as opposed to going into the administration portion of the building.

OPTION #3



BUILDING 7020 - NEW FLOOR PLAN - OPTION #3

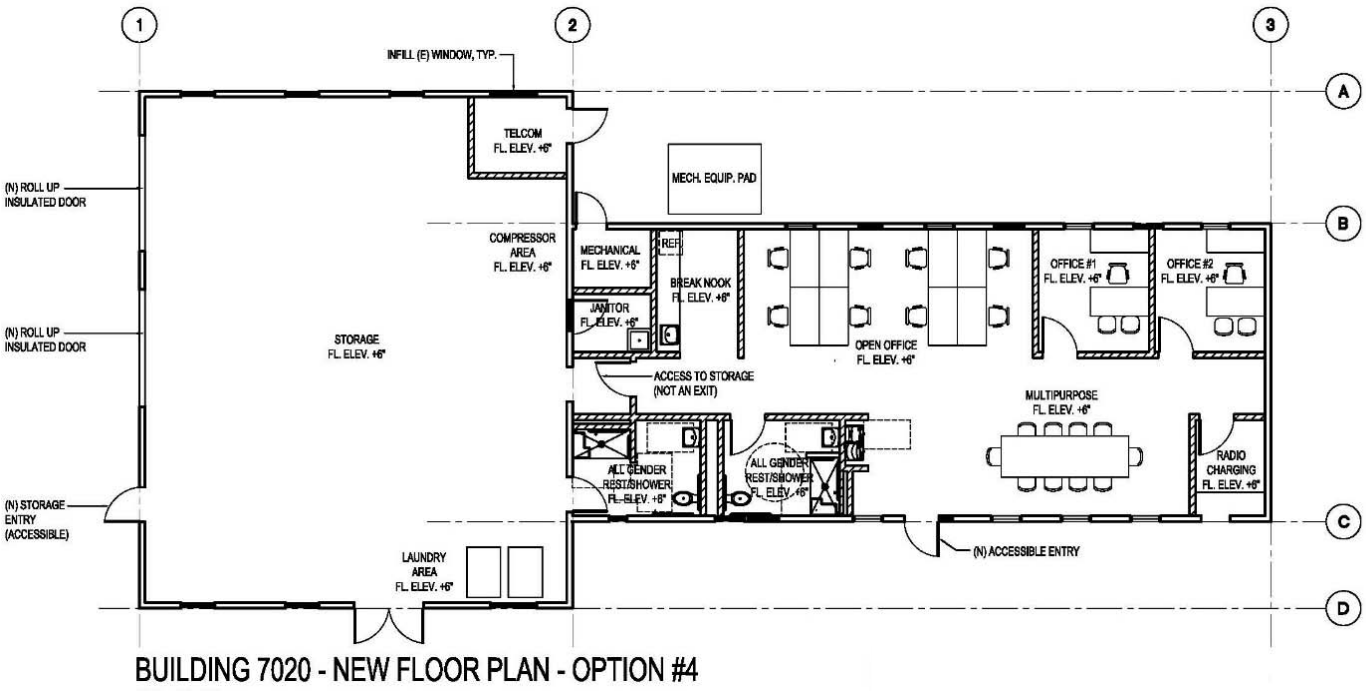
A description of Option #3 was as follows:

1. This Option proposed to create one continuous floor elevation. The Storage Area elevation was raised 6", the Mechanical Elevation would be raised 11", and the Administrative Area would drop down approximately 24".
2. New Telecommunication and Electrical Room.
3. New Laundry Room.
4. New Janitor's Closet.
5. Existing Mechanical Room remains in its current location.
6. Two accessible Restrooms/Showers with one Drinking Fountain with Bottle Filler. The two restrooms were identified as Men and Women's therefore two accessible restrooms are required.
7. Two new offices.
8. Open Office Area.
9. Multipurpose Area.
10. Break Nook with a break counter with sink and garbage disposal.
11. Select windows were infilled to accommodate the latest layout.

By raising and lowering portion of the existing building in Option #3 the design eliminated all ramps and exterior stairs. Two accessible exit and entries was provided.

Per our 10% Review meeting with the Base on December 2, 2023 the Base liked the floor plan of Option #2 with the structural design of Option #3. A fourth Option, Option #4 was provided after the meeting.

OPTION #4



BUILDING 7020 - NEW FLOOR PLAN - OPTION #4

The new concept design includes the following changes:

- One floor level, steps or ramps will not be required.
- Minimization of the number of windows. The use of the building (Armory) does not require a lot of windows.
- Reduction of the size of the mechanical room.
- Addition of 2 open workstations, bringing the total number of open workstations to 8.
- Removal of the Electrical Room. Panel(s) will be mounted on the exterior.
- Provide Telecommunications Room access to the exterior.
- Provides 2 garage doors for standard vehicle.
- Removal of the garbage disposal requirement.
- Places the main entrance closer to the front of the building.
- Removes the Laundry Room.
- Addition of a double door to the Storage Room.

Besides to the changes listed above, the JCA design team was directed in an email on 12/9/22 to remove the design aspects for a washer and dryer, equipment washdown stations, compressor, and radios. Electrical outlets/circuits for general use will be provided in the facility to provide the most flexibility in function.

Option #4 with changes was approved and was being used as the Basis of Design for the development of

construction documents.

See Attachment B – Conceptual Plans for additional information.

After the 35% Review Meeting a request was made to add a door to the Restroom serving the Storage Bay from the corridor. The revision has been made to the plans. As a result of the revision, there will be two All Gender Restrooms, with one being accessible.

DEMOLITION

During the site investigation, Lead Based Paint (LBP) was identified on interior and exterior wood components (e.g., walls, doors, and window frames). Additionally, joint compound associated with certain gypsum board walls and roof penetration mastics were identified as asbestos-containing materials (ACM). See Attachment C - *Report of Limited Asbestos-Containing Materials and Lead-Containing Materials Surveys.*

Remove and dispose all wall and ceiling gypsum board, wall and ceiling coverings, insulation, doors, jambs, trims, windows, siding, restroom fixtures and accessories, ramps, nails, screws, other fasteners from wall studs and ceiling joists. Remove and dispose of water heater, furnace, select wall framing, and ducting. Remove and dispose exterior/interior electrical system, all branch circuitry to be removed back to panel. Remove and dispose of all conduit, electrical boxes, and wire back to source. Remove and dispose existing data devices throughout building, remove and dispose of all conduit, data boxes and wire back to communications room. Remove and dispose of all water, vent, and sewer lines as indicated in the Construction Documents.

Remove and dispose of existing concrete apron, stair, siding, trims, windows, mechanical, plumbing, electrical, etc. equipment no longer in use. Clear the entire exterior of building of all obstructions or debris. The result is a smooth surface to build back on.

All demolition and construction wastes will be transported off post to a certified 50% recycling wastes facility or Hazmat facility. Provide the government copies of weigh master receipts and manifests identifying type of waste disposed or recycled. All Hazmat materials manifest to be signed by Camp Roberts Environmental Office prior to removal from site. Concrete is to be transported to the rock crushing plant at Camp Roberts. Provide an estimate of weight or volume of concrete for recycling purposes.

EXTERIOR

Exterior Walls and Finishes: Provide new wood framing as necessary to address structural requirements, opening infills, door and/or window relocations.

The proposed exterior design materials will comply with the Base standard and have a similar appearance to the most recent renovated buildings on Base. An example of a newly constructed building is below:





The exterior shall consist of the following:

Replace exterior windows with Base standard, white flanged vinyl single hung windows, dual glazed, Sun-Coat low E, flat grids, Clear glazing by Milgard Model Tuscany or approved equal. Glazing shall be insulated 1" thick, glazing units (IGU) consisting of ¼" glass on the interior and ¼" low-e solar gray tinted glass. Frame as required. Properly flash using metal flashing and Tyvek moisture barrier and air barrier system or approved equal. Provide and install inside mount premium double cell blackout shades with continues cord loop on all windows.

Provide and install moisture barrier and air barrier system (Tyvek or approved equal) to exterior of building.

Provide and install 5/4 Hardi trim (or equal) around all windows, doors, openings, and corners. Provide and install 8" Colonial Smooth Hardi plank siding (or approved equal) on all exterior walls. Provide and install all flashing, fasteners, furring strips or backing as required. All materials to be installed per manufacturer's instructions.

Provide and install new white metal clad on facia and enclosed metal vented soffits. All rotten or bad fascia, eaves, or rafters to be repaired prior to applying metal. Soffit material is to be fully vented. Drill 5 each 2 inch ventilation holes through each freeze block between the rafters into rafter bay. Trim and enclose where edge of soffit attaches to existing wood siding, fascia, and rake with metal that matches soffit material. Provide and install full metal clad to all facia boards, color to match soffit materials.

Provide and install new 5-inch box shape continuous rain gutters the entire length of the eaves. Break in the middle to provide for thermal expansion. Provide and install four (4) 4-inch rectangular down spouts on each side of the building. Provide and install continues perforated lock-on gutter guards (or approved equal) in all gutters. Provide and install a concrete splash block below each downspout.

Provide and install vented roof ridge, integral to the roofing system.

Exterior Hardi Siding:
Exterior shall receive three coats, 1 coat primer, and 2 coats Satin finish applied by spraying (roller or brush finish is not acceptable).

- **Primer:** Loxon Concrete & Masonry Primer Sealer, A24W8300 or approved equal.
- **1st coat:** A-100 Exterior Latex Satin, A82 Series or approved equal.
- **2nd coat:** A-100 Exterior Latex Satin, A82 Series or approved equal. Siding and eve color (eves can match white roof) shall be Analytical Gray SW7051. Trim color shall be Black Fox SW7020 applied by spray, roller or brush.

Exterior Sidewalks: Install exterior sidewalks at all exterior doors as required. Set top surface of landing and sidewalks at 1" above finished grade. Minimum concrete thickness shall be 6".

Sidewalks are to conform to ADA and Title 24, California Code of Regulations, latest adopted edition.

Accessible Parking: Provide one new ADA accessible parking space and path of travel to the main entry of the building. Regrade and provide accessible parking spaces and signage.

Miscellaneous Items*:* Grub and grade area around building, slope to provide drainage away from building and drain towards storm water drain or street gutter to prevent standing water under and around building. Provide and apply approved herbicide such as Round Up Pro, provide and install weed barrier fabric with compacted 1" diameter rock to 3" thick. All exterior work shall extend past perimeter of building a minimum distance of twenty-feet (20').

Roof: Provide standing seam metal roof matching the Base Standards.

Exterior Doors/Frames: All of the exterior doors will be replaced. Provide and install 16 gauge 3'-0" x 7'-0" x 1¾ hollow metal doors and frames by Curries series 747 or approved equal. Hollow metal frames to be welded, clips to be welded, grouted or polyurethane foam shall be installed around entire perimeter of frame for weather barrier and to prevent movement.

Exterior doors shall have: a 8" x 32" x ¼" flush vision lite, 110 degree swing closer with thumb turn, Norton Model 8301T or approved equal, fire exit panic hardware with Thumb Piece exterior handle, Von Duprin Model XP99TPF US26D or approved equal, with IC core 7pin, continues geared full mortise hinge, clear anodized, Pemko model CFMHD3 or approved equal, stainless steel kick plate 10" x 34", heavy duty floor stop, Trimco Model: 1231 or approved equal, threshold, sweep, drip cap, screw on jamb weather-stripping and astragal.

The existing manual uninsulated roll up door will be replaced with a manual, insulated roll up door. The man door in the existing door will not be replaced. A new entry door will be provided.

Insulation: Provide and install minimum R-15 paper faced insulation in all exterior walls. Provide and install R-38 insulation in all attic space. Foam and seal all penetrations in walls, around doors and windows.

Provide and install moisture barrier.

Exterior Signage: New building number signage will be provided which meets the Base Standards.

INTERIOR

Walls and Ceilings: Provide and install new wall and ceiling framing with 2" x 4" x 1-1/2" or 2" x 6" x 1-1/2" #1 or BTR Douglas fir 16" on center. Cut and install blocking from dimensional lumber to provide complete perimeter nailing for gypsum board and T-bar ceiling. Provide and install 5/8 inch Type X gypsum board to all walls and ceilings per ceiling plan. Wrap windows with 5/8" sheetrock and metal corner bead. Finish the gypsum board to a level 4 finish, texture with an orange peel texture. Paint the textured gypsum board with one coat of primer and two coats of paint.

Provide and install clear 1" x 4" kiln dried Douglas fir, Spruce or Poplar chair rail around the entire interior of all rooms, except restrooms. All edges of lumber to receive ¼" Radius bull nose. Clip the end of the rail at a 30 degree angle where it abuts a door frame. Finish shall be semi-gloss.

Provide 6" rubber base along wall perimeters, except restrooms. Finish paint like the gypsum board walls.

Provide and install 2" x 2" x 48" brushed stainless steel corner guards on all outside wall corners.

Interior Doors and Frames: Provide and install 16 gauge 3'-0" x 7'-0" x 1¾ hollow metal doors and frames on all interior doors, Curries series 747 or approved equal. Hollow metal frames to be welded, clips to be welded, grouted or polyurethane foam shall be installed around entire perimeter of frame for weather barrier and to prevent movement. If using grout the surrounding lumber must be pressure treated and protected from potential wood rot. Modify framing as required.

All hardware to be ANSI grade 1 in US 26D finish unless specified other.

All locksets to be Best 9K series, 2-¾" backset, 626 finish, 15 handle, D rose, ASA strike and IC core 7pin (when required).

Provide Best IC core cylinders for each interior and exterior door with locking function, IC cores to be keyed and master keyed to Camp Roberts keying system with one (1) Control key and two (2) Operating keys per cylinder. IC cores and keys to be dropped shipped to Camp Roberts Locksmith direct from factory. Contact Camp Roberts Locksmith for instructions prior to ordering.

Office doors shall have: a 8" x 32" x ¼" flush vision lite, classroom F84 function lockset with IC core 7pin, continuous geared full mortise hinge, clear anodized, Pemko model CFMHD3 or approved equal, stainless steel kick plate(s) and a heavy duty floor stop.

Communication door shall have: a storage F86 function lockset with IC core 7pin, 8ga 24" x 24" louvered vent at bottom half of door, Anemostat Model: AFDL or approved equal, continuous geared full mortise

hinge, clear anodized Pemko model CFMHD3 or approved equal, stainless steel kick steel kick plate(s) and a heavy duty floor stop.

Restroom doors shall have: a privacy F87 function lockset, continuous geared full mortise hinge, clear anodized, Pemko model CFMHD3 or approved equal, stainless steel kick steel kick plate(s), a heavy duty floor stop, and all ADA signage.

Janitor's Closet door shall have: a storage F86 function lockset with IC core 7pin, 8ga 24" x 24" louvered vent at bottom half of door, Anemostat Model: AFDL or approved equal, continuous geared full mortise hinge, clear anodized, Pemko model CFMHD3 or approved equal, stainless steel kick steel kick plate(s) and a heavy duty floor stop.

Toilets and Accessories: Two restrooms shall be built. Each restroom shall have a floor mounted toilet, wall hung lavatory sink with faucet, shower and curtain, signage, and restroom accessories.

Provide and install restroom accessories including: toilet tissue dispensers (Bobrick B-2740), mirrors with stainless steel channel frame (Bobrick B-165 2436), liquid soap dispensers (Bobrick B-2112), paper towel holder/waste receptacles (Bobrick B-3944), toilet seat cover dispensers (Bobrick B-221), stainless steel grab bars 1-1/2" x 30" and 1-1/2" x 48" (Bobrick 6806x30 and 6806x48). Shower accessories shall be provided to meet Base standards *(will update upon receipt of Base Standards).*

Janitor's Closet: Provide and install a floor mount mop sink (with stainless steel side and back splash), faucet and accessories.

Drinking Fountain: Provide and install accessible Bottle Filling Station and Drinking Fountain.

Solid Surface: Provide and install a solid surface counter top with Bullnose edge and 18" stainless steel back splash. Corian Canvas or approved equal. Support counter top by brackets rated for 1000 lbs. each on 16" center. Provide stainless steel sink with garbage disposal. Provide and install full-length stainless-steel shelf above counter.

Accessibility: The project shall comply with the Americans with Disability Act (ADA).

Miscellaneous:
Provide and install at each exit door: fire extinguisher semi-recessed box, full tempered glass door, white finish, Die Cast "Fire" Handle, Red Letter "Fire" decal Activar Inc. Model: 2012F10-PUCH-LDCVRF, and Main Room ABC 20 lbs. fire extinguisher Cosmic E.

Provide and install 3/4" horizontal black out cellular window shades on all windows, Brand: Hunter Douglass Model: Duett Honeycomb Shades Color: Gold Myst or approved equal.

4.6 Interior Design

The design will following the Base standards for interior finishes. We will include the following:

1. Finishes
   A. Gypsum Board – Walls/Ceilings: Prepare, sand, caulk, and putty all imperfections in gypsum board walls and ceilings prior to paint. Walls and ceilings shall receive one coat of primer and two coats applied by spray, roller or brush, final 2 coats shall be applied by roller or brush. Finish shall be semi-gloss.
      a. Primer: ProMar 200 Zero VOC Latex Primer, B28W2600 or approved equal.
      b. 1st coat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46 Series or approved equal.
      c. 2nd coat: Pro Industrial Pre-Catalyzed Waterbased Epoxy Semi-Gloss, K46 Series or approved equal. Color shall be Navajo White SW6126.

   B. Ferrous Metal — Doors, Frames and Miscellaneous Metals: Prepare, sand, caulk, and putty all door and frame surfaces prior to paint to ensure an ultra-smooth paint finish without imperfections. Hollow metal doors and frames shall be painted applying three coats, 1 coat primer, and 2 coats semi-gloss applied by spraying (roller or brush finish is not acceptable). Finish shall be semi-gloss.
      a. Primer: Pro Industrial™ Pro-Cryl® Universal Primer, B66-310 Series or approved equal.
      b. 1st coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series or approved equal.
      c. 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series or approved equal. Color shall be Bison Beige SW7051.in sound absorption, they will also bring visual impact to the spaces in which they are installed.

   C. Wood — Painted Base, Trim and Chair Rails: Prepare, sand, caulk, and putty all interior trims and moldings. Trims and moldings shall receive one coat of primer and two coats applied by spraying (roller or brush finish is not acceptable). Finish shall be semi-gloss.
      a. Primer: PrepRite ProBlock® Latex Primer/Sealer B51 Series or approved equal.
      b. 1st coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series or approved equal.
      c. 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 Series or approved equal. Color shall be Bison Beige SW7051.

   D. Restrooms and Janitor's Closet: In addition to paint, provide and install FRP wainscoting with clear aluminum trim to a minimum height of 4' from finished floor on all walls, Brand: Artizan Color: 5348 Oyster Textured or approved equal.

2. Flooring
   A. Restrooms, Vestibule: Prepare all surface for flooring installation. Provide and install commercial grade vinyl sheet flooring Brand: Mannington Series: MAGNA MULTIFLEC Color: 18002 GRAPHITE with a 15 year Light Commercial Warranty or approved equal in Latrines and corridor. Shape the perimeter into a 6" cove from horizontal floor using plastic preformed cove sticks. Finish cove

edge with aluminum top cap. Mechanically hot weld all seams in vinyl sheet flooring.

B. All other areas: Prepare all surface for flooring installation. Provide and install planked vinyl flooring. Manufacturer to be determine at a later date. LVT flooring shall be glued down. All doorways shall have rubber transition pieces as recommended by manufacturer.

C. Areas with exposed concrete shall receive a clear sealer.

Fixtures, Furniture, and Equipment

This contract will include the purchase of fixtures, furniture, and equipment (FF&E). The items for purchase include workstations, chairs, conference table, monitor, AV credenza, and private office furniture. The information contained in the construction drawings are the basis of design. The Contractor can propose alternate furniture selections however, they must be equal or exceed the FF&E used as the basis of design for this project. The Contractor is required to submit all proposed furniture shop drawings, cut sheets, fabric, and finish samples, etc. for CMD to review and approve.

The FF&E cost will be a Bid Add Option and shall include FF&E, vendor designed shop drawings, delivery, and installation costs.

4.7 Fire Protection and Life Safety

This building is a single-story, Type V construction less than 5,000 ft2 (465 m2). Per UFC 3-600-01 8 August 2016 Change 6, 6 May 2021, a fire sprinkler and fire alarm system is not required, however CMD has requested a fire alarm system be added to the project.

The fire alarm design shall be a Deferred Approval. The Contractor shall submit design drawings stamped by a California licensed Fire Protection Engineer.

A fire separation between building occupancies is not required.

Based on the occupant calculations the appropriate number of egress doors will be provided.

4.8 Structural

Camp Roberts and Building 7020 are owned by the federal government and leased to the State of California. The Project is following both the California Building Code (CBC) and the Unified Facility Criteria (UFC).

Seismic Retrofit Requirements

UFC Seismic Retrofit Requirements

UFC 3-301-01 *Structural Engineering* Section 4-1 references *Standards of Seismic Safety for Existing Federally Owned and Leased Buildings ICSSC Recommended Practice 8* (RP 8). RP 8 outlines when a building is needed to be retrofitted. Since the facility is owed by the federal government RP 8 applies. RP 8 Section 1.3 contains

the following exception to its applicability:

> *"e. One-story buildings of steel light frame or wood construction with areas less than 280 m^2 (3,000 ft^2), unless designated for an occupancy-based performance objective"*

Therefore, the facility is exempt from the retrofit requirements of the UFC/RP 8 due to being a one-story wood framed structure under 3,000 square feet. The building does not contain a special occupancy (i.e. essential facility, etc.) that would require it to be retrofitted.

CBC Seismic Retrofit Requirements

The *California Building Code* (CBC) includes Part 10 *The California Existing Building Code* (CEBC). The CBC/CEBC gives the state agency regulating the building permit some discretion in which provisions apply. We have not seen any documentation from the California Military Department as to exactly which provisions have been adopted.

The CEBC contains special provisions for state owned facilities. See CEBC 1.1.3, 301.1 & 501.1.2. Since this is a facility leased by the State of California but not owned by the State, these provisions do not appear applicable. The California Military Department should confirm this. Our Code analysis will proceed assuming these provisions do not apply. The CBC/CEBC contains some modified chapters applicable to certain agencies. These chapters are designated with an "A" after them in both the CBC and CEBC. We have assumed for our Code analysis that the "A" chapters are not applicable to the California Military Department.

The modifications to the structure proposed by this project are considered an "Alteration" in accordance with the CEBC. CEBC section 301.3 covers alterations to existing building. These sections provide three compliance methods:

301.3.1 Prescriptive compliance method
301.3.2 Work Area compliance method
301.3.3 Performance Compliance Method

For our code analysis we shall use the Prescriptive compliance method in Chapter 5 of the CEBC.

Section 503.11 address substantial structural alterations:

> *"Where the work area exceeds 50 percent of the building area and where work involves a substantial structural alteration, the lateral load-resisting system of the altered building shall satisfy the requirements of Sections 1609 and 1613 of the California Building Code. Reduced seismic forces shall be permitted."*

Substantial Structural Alterations are defined in CEBC Section 202 as:

> *"SUBSTANTIAL STRUCTURAL ALTERATION. An alteration in which the gravity load-carrying structural*

elements altered within a 5-year period support more than 30 percent of the total floor and roof area of the building or structure. The areas to be counted toward the 30 percent shall include mezzanines, penthouses, and in-filled courts and shafts tributary to the altered structural elements."

This project includes the removal of all exterior and interior cladding and the repair of 100% of the exterior walls. The exterior walls support more than 30% of the roof structure. The work area of the project is 100% of the building. It appears to us this project meets the definition of a major structural alteration.

Section 1069 and 1613 of the CBC address wind and earthquake loads. Section 304.3.2 defines several options for reduced seismic forces. For the purposes of this project reduced seismic forces will be 75% of the loads in the CBC for new buildings.

Based on Section 503.11, and the definition of a substantial structural alteration, strengthening is required by the CBC/CEBC for this project.

Seismic Retrofit Requirements Conclusions

Our code analysis indicates that based on the project program the CBC/CEBC requires the structure to be retrofitted to resist 75% of the code prescribed loads for new buildings. This project will include seismic strengthening based on this standard.

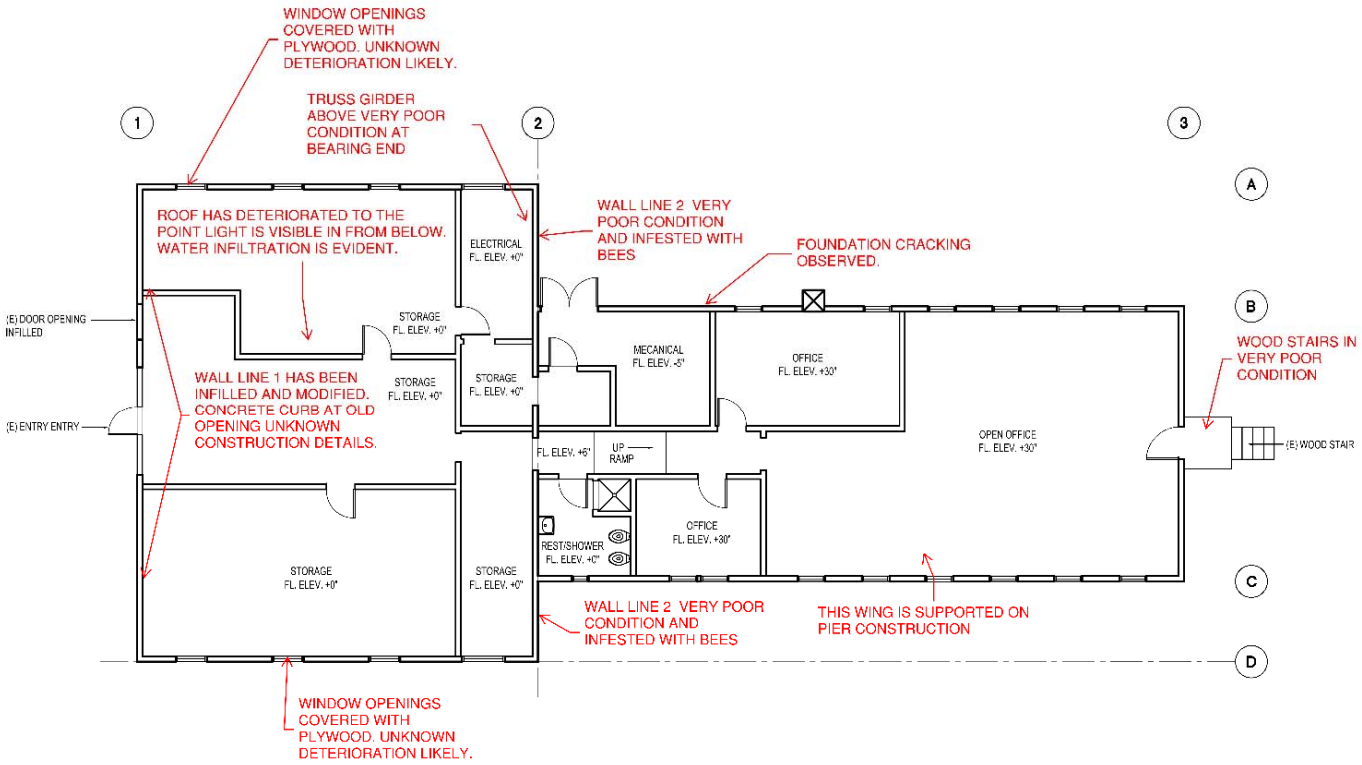
See Structural Calculations in Attachment F.

Existing Structural Conditions: The existing building is a wood framed building on an assumed shallow foundation. The front of the structure is an old fire apparatus bay with a slab on grade construction. The rear is a platform on concrete pier construction. The structure is in generally poor shape.

We note the following apparent deficiencies:

1. Rear wood stairs are deteriorated and need to be replaced.
2. Wood framed floor is not anchored to pier construction. Adequate connections need to be provided.
3. Wall at line 2 is infested with bees and should be replaced.
4. Truss girder bearing near grid A2 appear deteriorated and needs repair. Access was limited to this area due to bees.
5. Exterior has been unpainted for years and numerous openings are covered with plywood. Hidden rot is likely. A repair allowance should be considered.
6. Roof structure is not waterproof. Light is visible in several places. Hidden rot is likely. A repair allowance should be considered.
7. Wall line 1 has been modified with new openings and new concrete curbs. Recommend reframing wall with new foundation.
8. Foundation cracking observed at mechanical room.
9. Exterior siding is in poor repair and should be replaced.
10. Roof sheathing is straight sheathing and should be strengthened with plywood. This will include blocking and connections to the new shear elements.

11. Adequate structural bracing is not provided. Shear walls and footings should be added.



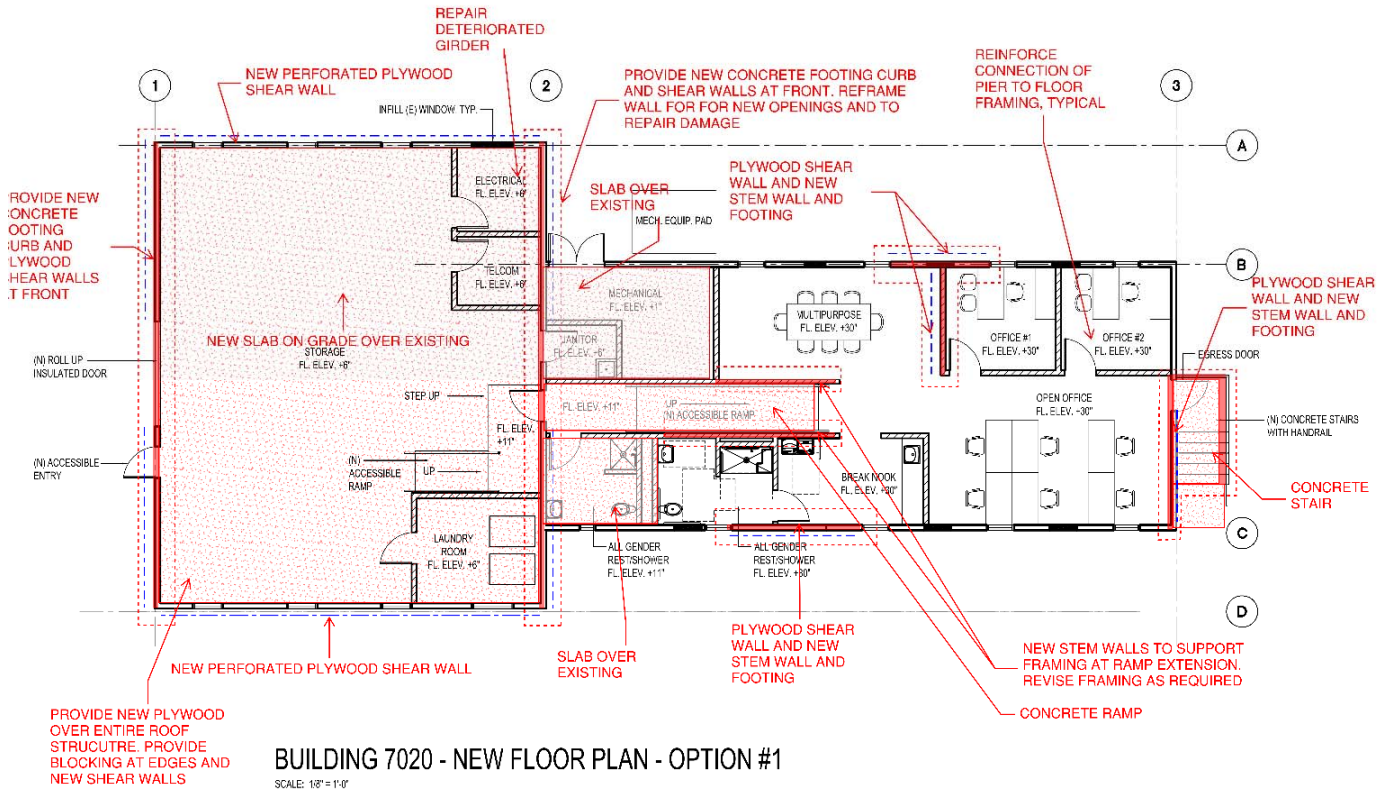
BUILDING 7020 - EXISTING FLOOR PLAN

OPTION #1

Structural scope of work for Option #1 included:

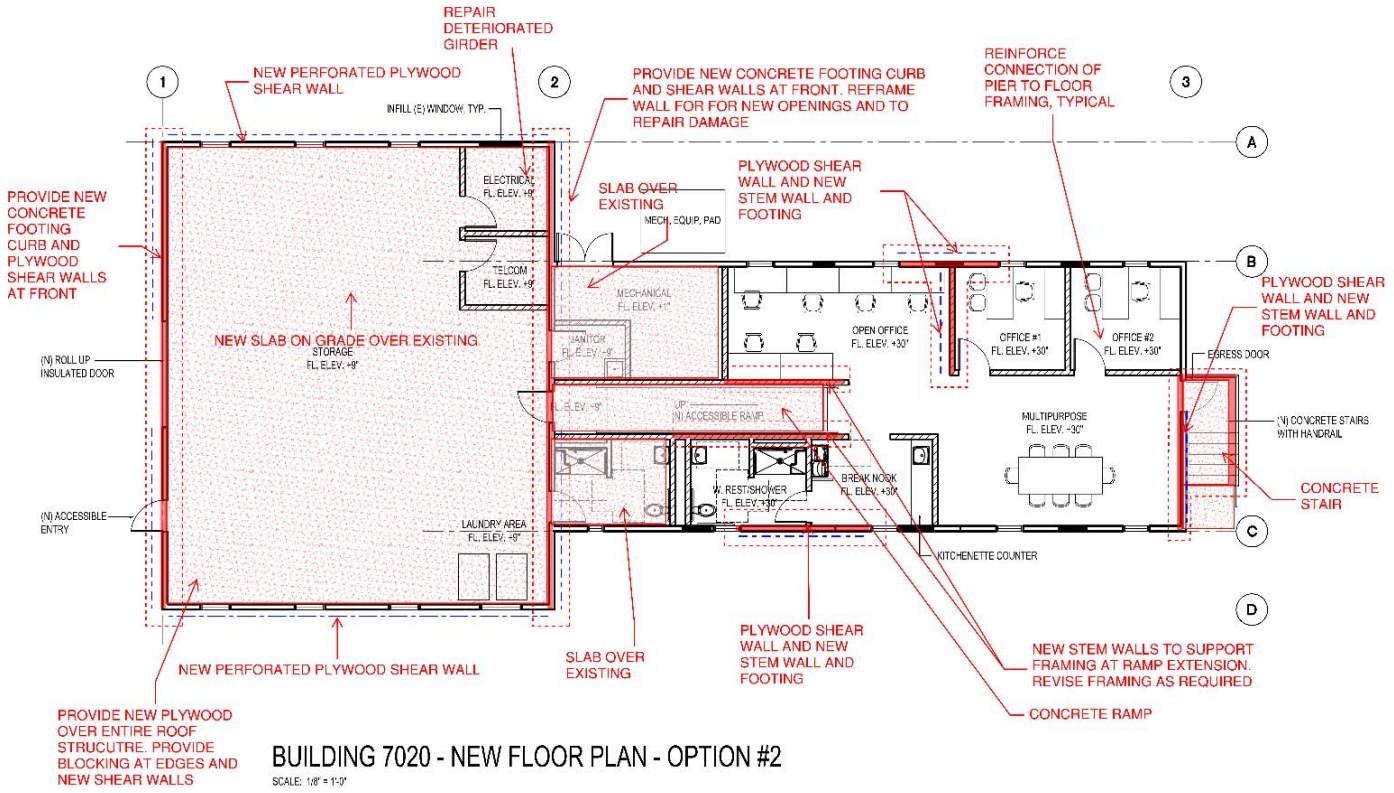
1. New Wood framed shear walls.
   A. Line 1: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   B. Line 2: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   C. Line 3: Provide new stem wall and footing at shear wall above.
   D. Intermediate interior shear wall: Provide new stem wall and footing at shear wall above.
   E. Line A & D: Provide new perforated shear wall on existing footing. Provide uplift anchorage at corners into new footings.
   F. Line B & C: Provide new stem wall and footing at shear wall above.
2. New concrete stairs Integral with stem wall.
3. New connections for wood floor to piers.
4. Repair truss girder near grid A2.
5. Repair of exterior wall for rot and reframe openings as required.

6. Repair rot in roof construction as required.
7. Repair foundation cracking at mechanical room and Line B.
8. Replace exterior siding with plywood and architectural finish.
9. New plywood over straight sheathing at the roof with blocking and connections to the new shear elements.
10. New slabs on grade either over the existing slabs or on new compacted base rock.
11. At the ADA ramp provide new concrete stem walls to support the wood floor. Provide concrete ramp.



OPTION #2

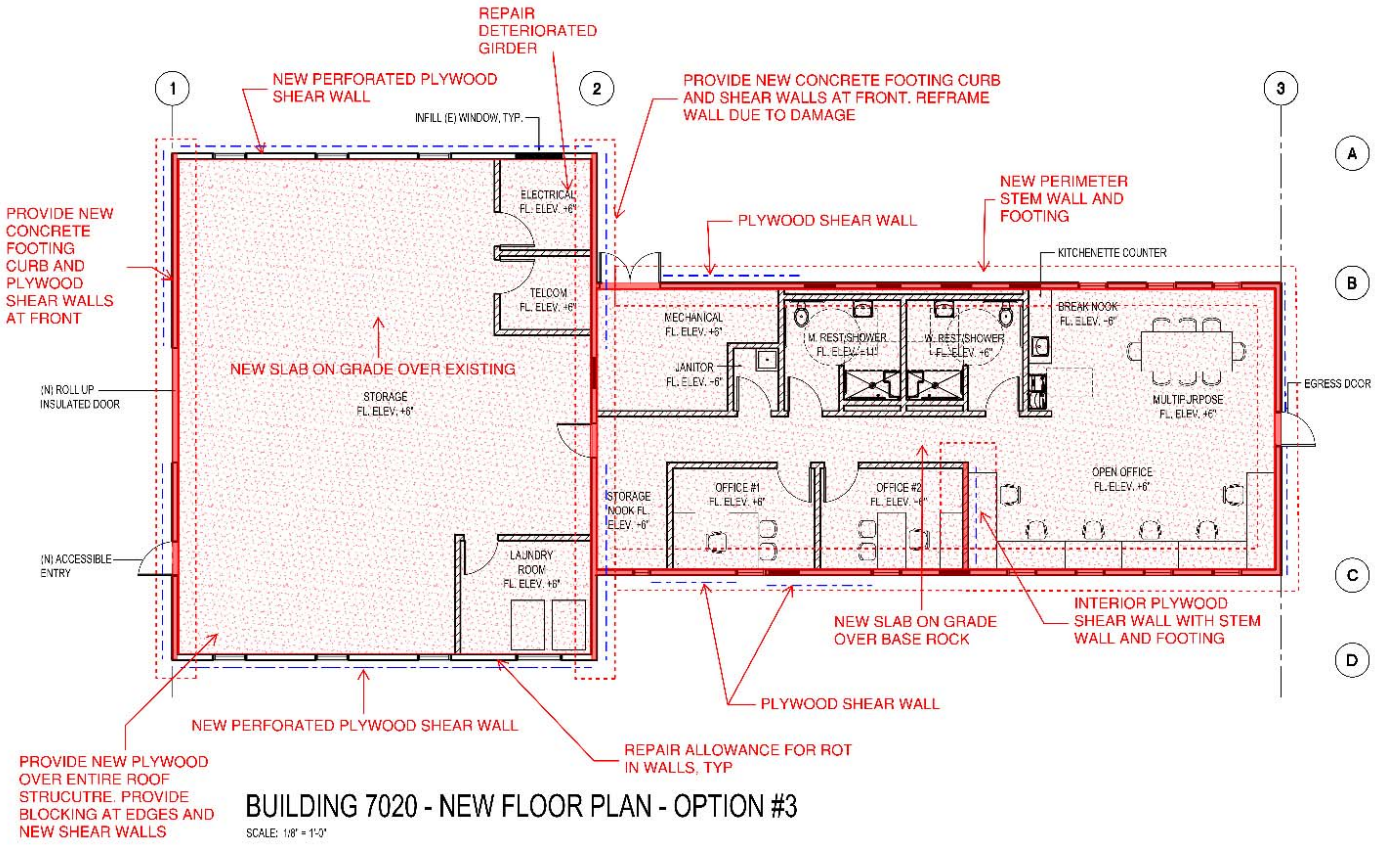
Structural scope of work for Option #2 was the exact same as for Option #1.



OPTION #3

Structural scope of work for Option #1 included:

1. New Wood framed shear walls.
   A. Line 1: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   B. Line 2: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   C. Line 3: Provide new continuous stem wall and footing plus shear walls where required.
   D. Intermediate interior shear wall: Provide new stem wall and footing at shear wall.
   E. Line A & D: Provide new perforated shear wall on existing footing. Provide uplift anchorage at corners into new footings.
   F. Line B & C: Provide new continuous stem wall and footing plus shear walls where required.
2. Repair truss girder near grid A2.
3. Repair of exterior wall for rot and reframe openings as required.
4. Repair rot in roof construction as required.
5. Replace exterior siding with plywood and architectural finish.
6. New plywood over straight sheathing at the roof with blocking and connections to the new shear elements.
7. New slabs on grade either over the existing slabs or on new compacted base rock.



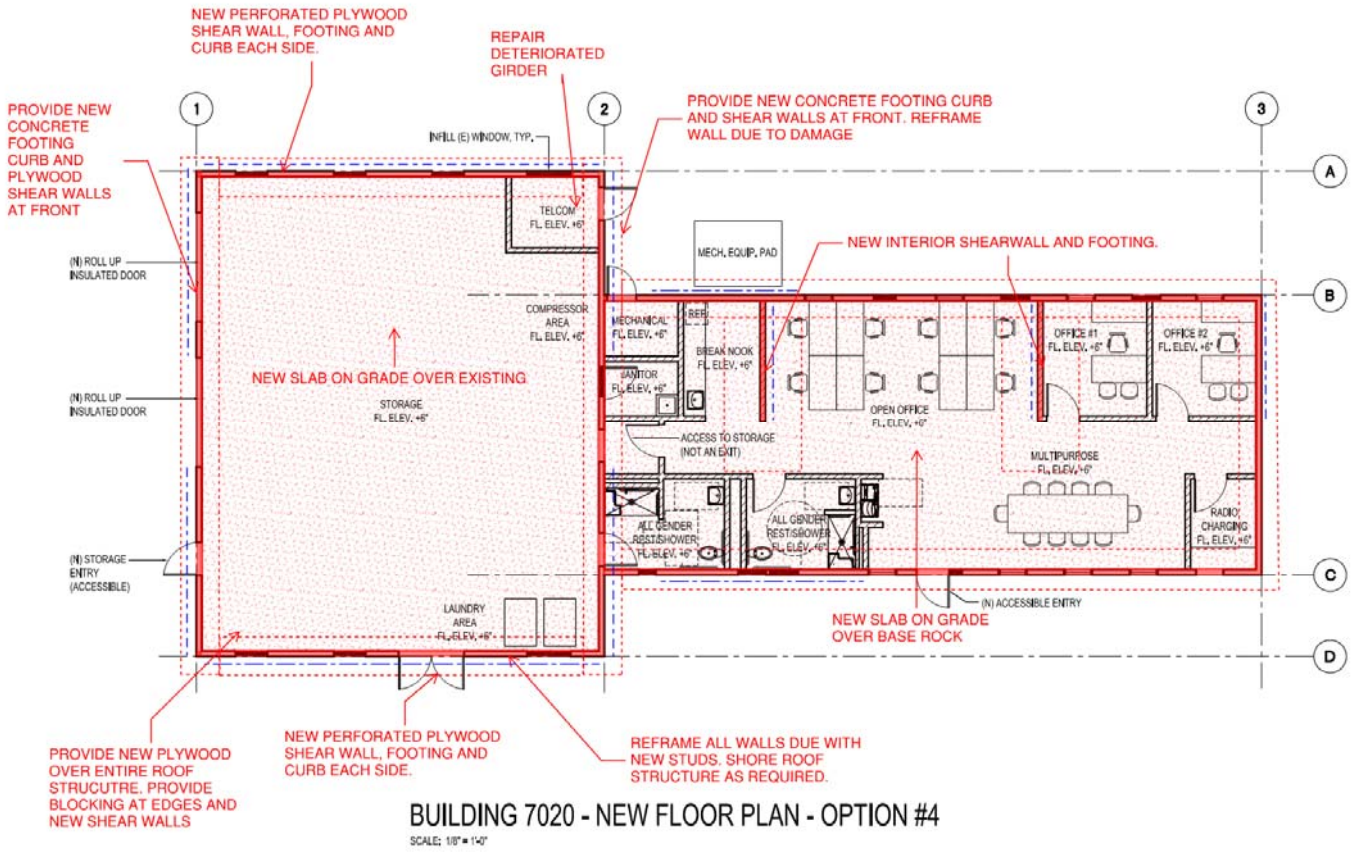
OPTION #4

Structural scope of work for Option #1 includes:

8. New Wood framed shear walls.
   A. Line 1: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   B. Line 2: Provide concrete footing and stem wall. Provide new wall framing with new shear elements.
   C. Line 3: Provide new continuous stem wall and footing plus shear walls where required.
   D. Intermediate interior shear wall: Provide new stem wall and footing at shear wall.
   E. Line A & D: Provide new perforated shear wall on new footings footing. This is being was added to the site grading considerations.
   F. Line B & C: Provide new continuous stem wall and footing plus shear walls where required.
9. Repair truss girder near grid A2.
10. Repair of exterior wall for rot and reframe openings by reframing all exterior walls. This is added to allow the stem wall to be lower in the rear and to raise the stem wall in the front.
11. Repair rot in roof construction as required.
12. Replace exterior siding with plywood and architectural finish.
13. New plywood over straight sheathing at the roof with blocking and connections to the new shear

elements.

14. New slabs on grade either over the existing slabs or on new compacted base rock.



Option #4 with changes was approved and was used as the Basis of Design for the development of construction documents.

See Attachment B – Conceptual Plans for additional information on Options 1-4.

4.9 Plumbing

Plumbing Existing System: The existing plumbing system appeared to be the original fixtures and they are in poor condition. There is only one restroom in the building with two waterclosets, one lavatory and one shower. Most of the pipes are exposed and uninsulated inside the building.

There is a 28 year old 30-gallon hot water heater in the mechanical room and it is beyond its useful life.

The incoming cold water pipe size is 1 ½" and the natural gas pipe size is 1 ¼". The sewer pipe size is 4".

Proposed Plumbing System: The plumbing system for the remodeled building, inside the area of work will consists of all fixtures, potable cold and hot water piping and equipment, piping insulation, water heating equipment, sanitary waste and vent piping systems, and other specialty piping and equipment within 5 foot (1.5 meter) of the building. Provide complete and functional domestic cold/hot water distribution, sanitary sewer, and venting systems with all associated fixtures, equipment, and appurtenances.
Provide quantity and type of plumbing fixtures required for the occupancy, use, and functions described for this building.

Water closets: Provide floor mounted vitreous china flush valve type elongated water closets. Manual operated flush-valve with 1.1 gallons per flush (gpf) based on the California Green Building Code water consumption in all public restroom spaces. Provide wall mounted 1.1 gpf flush valve type elongated water closets with manual flushvalves in ABA accessible restroom spaces.

Urinals: None.

Lavatories: Provide countertop integral lavatories for the restrooms. Provide under sink guard. Provide faucets with automatic control washer-less ceramic disc (drip less). Provide grid drain guard.

Breakroom Sinks: Provide 18-gauge stainless steel kitchen sink with a single compartment in the break room space. Provide ABA type gooseneck dual level faucet with washer-less ceramic disc (drip less).

Mop Sink: Pre-cast terrazzo floor-mounted mop sink, 24-inches x 24-inches x 12-inches, made of marble chips cast in white Portland cement to a compressive strength of not less than 3000 PSI 7 days after casting. Brass body drains with nickel bronze strainers cast integral with terrazzo shall be provided with stainless steel rim guard. Chrome-plated exposed hot and cold water faucets ASME A112.18.1 wall-mounted copper alloy faucets shall be provided swing spout with 3/4-inch hose connection, vacuum breaker, and pail hook and a mop hanger on wall above sink suitable for four mops.

Drinking Fountain: Refrigerated type wall hung stainless steel, Bi-level with rounded edges. ABA type drinking fountains. Provide bottle fillers and integrate with the water coolers. Include a water filtration system.

Showers: ABA type solid surface pre-molded shower pan with solid surface wall panels and shower supply and drain fittings in the shower rooms. push button flow control for handheld showerheads to meet ABA requirements. The showers will use a water consumption of 2 gpm or less. Provide trench drains in the showers.

The plumbing work will be designed based on the following:

- Domestic cold water and hot water shall use Type K copper piping.
- A reduced principle backflow preventer assembly and water meter will be used in the incoming cold water line to the building.
- Sewer and vent will be hubless cast iron pipe with heavy duty stainless steel couplings for aboveground.

- Sewer and Vent will be PVC Pipe for underground.
- Provide floor drains in public restrooms and floor sink in the mechanical room.
- Indoor air conditioner condensate drain piping will be soft-drawn copper tubing, with flexible elastomeric insulation over indoor piping. Indoor exposed condensate piping will be provided with PVC jacketing over insulation.
- Deep seal traps on all floor drains and floor sinks and provide automatic trap primers with the exception for the showers.
- Install water supply filter for the trap primers. Include access panels to maintain both the water supply filter and trap primer.
- Provide mineral fiber insulation with vapor barrier on domestic hot water supply and recirculation piping. Provide cellular glass insulation with vapor barrier on domestic cold-water supply piping. Provide identification for piping and equipment.
- Provide wall hydrants along the building exterior such that all points along the perimeter can be reached with a 100-foot-long hose.
- Provide roof drains that are compatible with the roofing system unless gutters are used.
- Provide an electric or gas fired hot water heater with storage tank. Hot water recirculation system will not be provided if hot water piping is less than 50 feet from the fixtures. Provide an expansion tank with the domestic hot water heating system. Another alternative is to use heat pump domestic hot water system with a heat exchanger and storage tank. The use of electric power for the domestic hot water system is due to the State mandated reduction/elimination of the use of natural gas by 2035. If the Base decides to use natural gas fired equipment, then a domestic hot water heater with a storage tank can be used.
- A natural gas meter with seismic valve and regulator will be provided. The piping material will be a medium-density polyethylene (yellow) pipe for underground and then painted gray steel pipe for aboveground.

4.10 Mechanical

Reference Documents:

- ASHRAE 55, Thermal Environmental Conditions for Human Occupancy, 2017
- ASHRAE 62.1, Ventilation for Acceptable Indoor Air Quality, 2019
- ASHRAE 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings, 2019
- Latest ASHRAE Standards
- American Refrigeration Institute Standard 550/590
- National Institute of Occupational Safety and Health (NOISH) Standards
- Occupational Safety and Health Administration (OSHA) Standards
- Sheet Metal and Air Conditioning Contractors' National Association, Inc. (SMACNA): HVAC Duct
- Construction Standards – Metal and Flexible
- NFPA 54, National Fuel Gas Code, 2017
- NFPA Standards

- Americans with Disability Act (ADA)

Mechanical Existing System: The building has a gas-fired furnace with ducted supply and a common return grille in the hallway. The furnace heating capacity is 154,000 Btuh input and 125,000 Btuh output. It does not have a fresh air intake and only recirculating the air in the building. The front of the building which is used as a storage, does not have any heating nor cooling system. There are vent openings in the rooms and appeared to be just venting the air into the attic space. One of the rooms has a packaged terminal air conditioner mounted on the exterior wall, an electric heater and a ceiling fan which are all in poor condition.

The restroom with a shower is only using the operable window for exhaust.

The outdoor and indoor condition temperatures will be the following:

Outside Conditions					
Summer	96	Degrees F dry bulb	Winter	26	Degrees F
	68	Degrees F wet bulb			

The outdoor conditions set points being used are based on UFC 3-410-01 and UFC 3-400-02. Based on 1.0% dry bulb and the corresponding mean coincident wet bulb temperature for summer and 99.0% dry bulb for winter per Paso Robles, California.

Inside Conditions: Offices and Conference Room					
Summer	78	Degrees F dry bulb	Winter	68	Degrees F

Inside Conditions: Data/Telcomm Room					
Summer	76	Degrees F dry bulb	Winter	45	Degrees F

Inside Conditions: Electrical and Mechanical Rooms					
Summer	85	Degrees F dry bulb	Winter	45	Degrees F

The inside conditions set points being used are based on UFC 3-410-01.

The ventilation rates and systems used are per the latest edition of California Title 24 requirements, ASHRAE Standard 62.1, and Ventilation for Acceptable Indoor Air Quality and the International Mechanical Code, whichever is more stringent.

Proposed New HVAC System

Four options are proposed for this building:

Option #1: Provide a gas-fired packaged outdoor type air handling unit with direct expansion for cooling. The supply and return ductwork will be routed in the attic space since there are ample room to route the ducts. This is like the HVAC system used in other renovation projects in the Base.

Option #2: Provide an indoor furnace with DX cooling coil and outdoor condensing unit. The supply and return ductwork will be routed in the attic space since there are ample room to route the ducts. An intake air ducting will be connected to the return air duct to meet the required ventilation rate.

Option #3: Provide an outdoor type heatpump air handling unit system with supplemental electric heat resistance to handle the heating when temperature goes below 35-degrees Fahrenheit. The supply and return ductwork will be routed in the attic space since there are ample room to route the ducts. Electric type system can be used if the building is less than 5,000 sf. This will reduce or eliminate the need for natural gas.

Option #4: Provide a variable refrigerant flow (VRF) heatpump system with cassette type fan coil units and an energy recovery ventilator (ERV) to provide fresh air to the rooms. Electric type system can be used if the building is less than 5,000 sf. This will reduce or eliminate the need for natural gas.

Option #1 HVAC system was chosen to move forward with the design. The size of the unit is 6 tons and the packaged air conditioning unit will be installed outside of the mechanical room with a housekeeping pad. The outdoor ductwork will be routed into the ceiling space. The HVAC system will have ducted supply and return. The air conditioning unit will be provided with a fresh air intake snorkel at with high intake at 10 foot above grade.

Air Distribution, Heating and Cooling: Provide insulated, galvanized steel ductwork in un-air conditioned spaces such as the attic. Provide double walled insulated galvanized steel ductwork for outdoor or inside the mechanical room.

System Velocities:

a.	Maximum Main Duct Velocity	1500 fpm
b.	Maximum Branch Duct Velocity, Low Pressure	1200 fpm
c.	Maximum Coil Face Velocity, Cooling	500 fpm
d.	Maximum fins/inch, Minimum Rows	10, 6
e.	Maximum Coil Face Velocity, Heating	600 fpm
f.	Maximum fins/inch, Minimum Rows	10, 6
g.	Maximum Fan Coil Face Velocity, Heating/Cooling	500 fpm
h.	Maximum fins/inch, Minimum Rows	10, 6
i.	Maximum Louver Face Velocity intake	600 fpm
j.	Maximum Louver Face Velocity exhaust	650 fpm

Unit Pressure Drops:

a. Ductwork (using equal friction method), except for supply air ductwork upstream of VAV terminals
b. Supply/Return/Exhaust - 0.1 - in W.G./100 LF

Unit Pressure Drops:

a. Ductwork (using equal friction method)
b. Supply/Return/Exhaust - 0.1 - in W.G./100 LF

Exhaust System: Individual in-line exhaust fan will be provide provided for the restrooms and janitor's closet. Individual ceiling exhaust fan will be provided for the breakroom and janitor's closet. The restroom exhaust fans will be controlled by occupancy sensors. The breakroom exhaust fan will be controlled by occupancy sensor with manual bypass switch with a timer. The janitor's closet will be controlled by a switch.

As an alternative, a centralized exhaust fan can be provided to exhaust all the rooms simultaneously and then controlled by the DDC system.

The recommended exhaust system will be a centralized exhaust system to serve the restrooms and janitor's room and will be controlled by a time clock. The break nook will have a separate exhaust fan and will be controlled by a timer.

HVAC Controls: Provide a programmable thermostat to control the outdoor packaged air handling unit.

Systems Testing and Balancing: Mechanical systems to be commissioned, if provided, include HVAC systems and controls, and domestic hot water systems. Provide commissioning in compliance with SMACNA standards level II.

Provide complete Testing and Balancing (TAB) of all air distribution systems and HVAC equipment.

See Attachment D – Mechanical Cutsheets for additional information.

4.11 Electrical

The building is fed from a 75kVA, 208/120V, three phase pole mounted transformer. From the transformer, 3 wire single phase feeds building 7020. A 200A disconnect located on the exterior of the building feeds a 240/120V panelboard on the interior. The panelboard has signs of wear and shall be replaced. The pole mounted transformer also has 4 wire feeds to three, approximately 8000 square feet, buildings across the street. One building appears to be lightly used and the other two buildings do not appear to be in use.

Fluorescent lighting is installed throughout.

The existing fire alarm consists of standalone smoke detectors.

Proposed Scope of Work

Electrical Distribution:

The existing pole mounted transformer shall be reused. The splices shall be reconfigured to bring 3 phase 208/120V power to Building 7020. The existing overhead lines shall be removed and new feeder shall be routed underground. A new service disconnect with meter shall be installed on the exterior of the building. Provide a new 200A, 208/120V panelboard on the exterior of the building. Provide new receptacles throughout. Dedicated receptacles shall be provided above the breakroom counter. Provide floor receptacle for conference table. Provide connection points for workstations. Provide dedicated receptacle in the telecommunication room for telecommunication equipment. Provide dedicated circuit for the fire alarm control panel. Provide power to mechanical equipment.

Provide a ground rod for the service disconnect. Provide a telecommunications ground bar in the telecommunications room.

Lighting:

Provide interior LED lighting throughout. Provide manual on/off switches and occupancy sensor controls. New fixtures shall have 90-minute emergency battery backup as required. Illuminated exit signs with emergency battery backup shall be provided as required.

Provide wall mounted exterior lighting on building façade and at exit doors. Exterior lights shall be controlled by one roof mounted photocell.

See Attachment E – Lighting Cutsheets for additional information.

4.12 Low Voltage

Provide data outlets at workstations. Provide low voltage wiring and raceway to telecommunications room. Provide data outlet at ceiling for wireless access point. Provide telephone backboard, telecommunications cabinet with patch panel and terminate horizontal cabling.

4.13 Sustainability

This project is not required to be LEED certified, however the design shall make every effort to be as energy efficient as possible. LEED-EB will not be sought for this project.

4.14 Hazardous Materials

A survey of the existing building detailing the presence of hazardous materials was conducted at Building 7020. A report presenting the results of the Hazardous Building Materials Survey (HBMS) performed by Kleinfelder on October 20, 2022 is included as part of this report.

See Attachment C for the *Report of Limited Asbestos-Containing Materials and Lead-Containing Materials Surveys.*

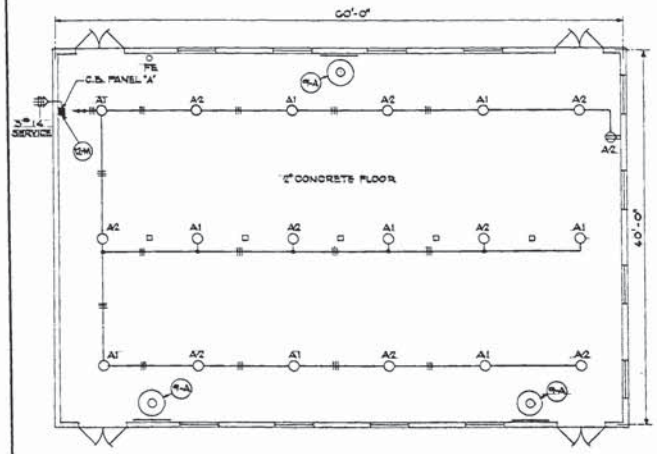


ATTACHMENTS

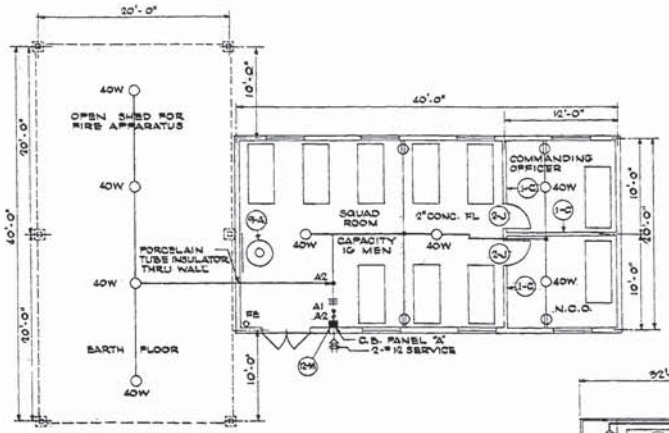
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Attachment A
Original Plans

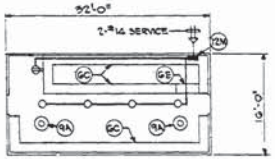
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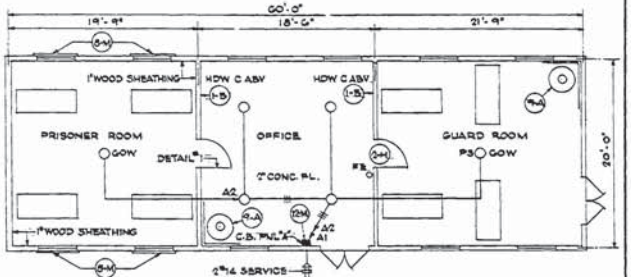
DAY ROOM 40'X60'
SCALE NO. 24
FACIL. NO. 741301 - INTERIOR ONLY
FACIL. NO. 741311 - STEEL FRAME W/INTERIOR
FACIL. NO. 741321 - WOOD FRAME W/INTERIOR



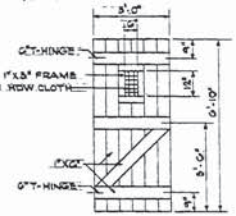
FIREHOUSE - 20'x40' WITH 20'X40' SHED
SCALE NO. 24
FACIL. NO. 741302 - INTERIOR ONLY
FACIL. NO. 741312 - STEEL FRAME W/INTERIOR
FACIL. NO. 741322 - WOOD FRAME W/INTERIOR



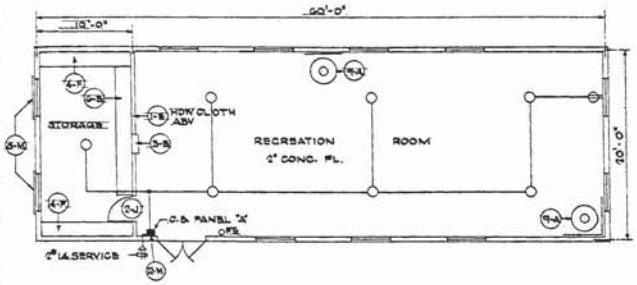
CAMP EXCHANGE - 250 MAN
16'x32' TENT W/FRAME
SCALE NO. 1
FACILITY NO. 741508 - INTERIOR ONLY



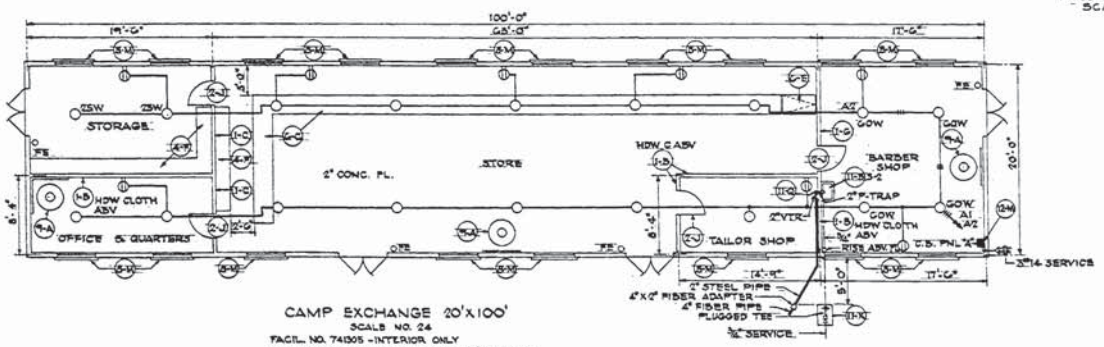
GUARD HOUSE
SCALE NO. 24
FACIL. NO. 741303 - INTERIOR ONLY
FACIL. NO. 741313 - STEEL FRAME W/INTERIOR
FACIL. NO. 741323 - WOOD FRAME W/INTERIOR



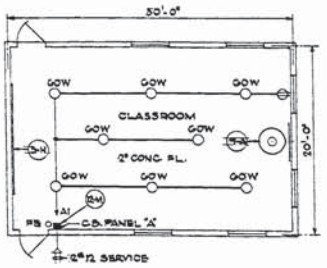
DETAIL #1
PRISONER ROOM DOOR
SCALE NO. 4



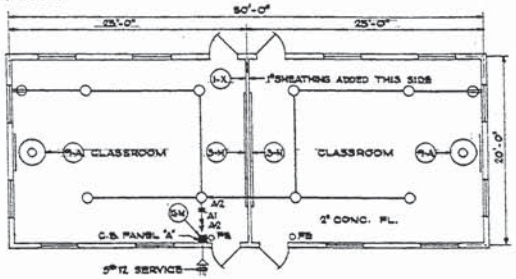
CAMP EXCHANGE 20' X 60'
SCALE NO. 24
FACIL. NO. 741304 - INTERIOR ONLY FACIL. NO. 741314 - STEEL FRAME W/INTERIOR
FACIL. NO. 741324 - WOOD FRAME W/INTERIOR



CAMP EXCHANGE 20'X100'
SCALE NO. 24
FACIL. NO. 741305 - INTERIOR ONLY
FACIL. NO. 741315 - STEEL FRAME W/INTERIOR
FACIL. NO. 741325 - WOOD FRAME W/INTERIOR



EDUCATION BUILDING 20'X30'
SCALE NO. 24
FACIL. NO. 741306 - INTERIOR ONLY
FACIL. NO. 741316 - STEEL FRAME W/INTERIOR
FACIL. NO. 741326 - WOOD FRAME W/INTERIOR



EDUCATION BUILDING 20'X50'
SCALE NO. 24
FACIL. NO. 741307 - INTERIOR ONLY
FACIL. NO. 741317 - STEEL FRAME W/INTERIOR
FACIL. NO. 741327 - WOOD FRAME W/INTERIOR

ELECTRICAL NOTES

CONNECTED LOAD

BUILDING	DAY ROOM 40'X60'	FIRE HOUSE 20'X40'	GUARDHOUSE 20'X60'	CAMP EXCHANGES 20'X60'	CAMP EXCHANGES 20'X100'	EDUCATION BUILDING 20'X30'	EDUCATION BUILDING 20'X50'
LIGHTING	1.80 KW	0.32 KW	0.32 KW	0.70 KW	1.49 KW	0.48 KW	0.80 KW
RECP. EST.	0.10 KW	0.40 KW	—	1.0 KW	0.80 KW	0.10 KW	0.10 KW
TOTAL	1.90 KW	0.72 KW	0.32 KW	0.80 KW	2.29 KW	0.58 KW	0.90 KW

1. ALL LAMPS TO BE 100W UNLESS OTHERWISE NOTED ON PLANS.
2. ALL 40, 60 & 100W LAMPS TO HAVE 8" CONICAL SHADES.

GENERAL NOTES

1. REFER TO TM5-303 FOR BUILDING SHELL REQUIREMENTS
2. FOR F.S.N. BILL OF MATERIALS-REFER TO TM5-303 BY FACILITY NUMBER.

SCHEDULE OF DRAWINGS

DWG. NO.	DESCRIPTION	SHEET NO.
74-13	PLAN	1 OF 1
99-98	STANDARD DETAILS	
34-03	WOOD FRAME CONST. BARRACKS TYPE BLDGS.	1-7 OF 7
34-04	WOOD FRAME CONST. WAREHOUSE TYPE BLDGS.	1-3 OF 3
35-21	STEEL FRAME CONST. BARRACKS TYPE BLDGS.	1-4 OF 4
35-36	STEEL FRAME CONST. WAREHOUSE TYPE BLDGS.	1-3 OF 3

SYMBOL	DESCRIPTION / REVISIONS	DATE	APPROVAL

GRAPHIC SCALES: 0 5' 10' 15' NO.1 | 0 1' 2' 3' 4' NO.4 | 0 5' 10' NO.24

MAYER, BEAY, MATTERN & MATTERN
ARCHITECTS - ENGINEERS
ROANOKE, VIRGINIA WASHINGTON, D. C.

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
MILITARY CONSTRUCTION - ENGINEERING DIVISION
WASHINGTON, D. C.

DRAWN BY: HELTON
TRACED BY:
CHECKED BY: BADE
SUBMITTED BY: C. W. DEITCHMANN
APPROVED: H. Adams
CHIEF, CONSTRUCTION BRANCH
APPROVED: D. M. Williams
CHIEF, ENGINEERING DIVISION, MIL. CONSTR., O.C.E.
APPROVED FOR PROPONENT AGENCY:
DATE

THEATER OF OPERATIONS

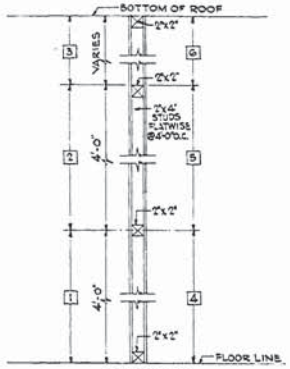
CAMP EXCHANGES, DAY ROOM, EDUCATION BUILDINGS GUARDHOUSE & FIREHOUSE

13 MAR 1953

SCALE: AS NOTED
SPEC. NO.
DRAWING NUMBER: 74-13
SHEET 1 OF 1

CORPS OF ENGINEERS

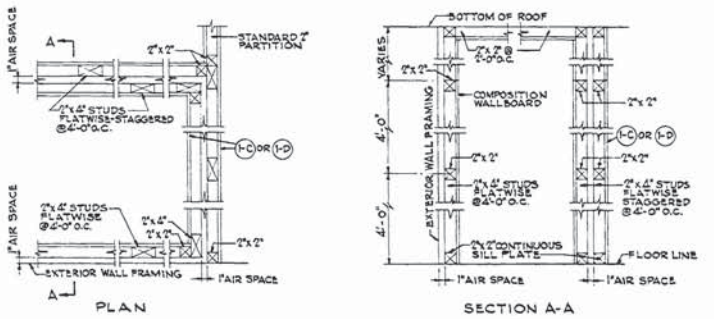
U. S. ARMY



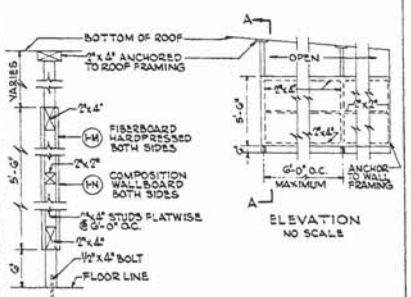
SECTION
SCALE NO.7

DETAIL NO.	SCHEDULE OF WALL FINISHES 1	2	3	4	5	6	WIRE FABRIC ONLY WHEN NOTED ON PLANS	FIBERBOARD HARDPRESSED WAINSCOT IF CORRIDOR SIDE
1-A	NONE	NONE	NONE	FIBERBOARD HARDPRESSED		NONE	6	4
1-B	NONE	NONE	NONE	COMPOSITION WALLBOARD		NONE	6	4
1-C	NONE	NONE	NONE	COMPOSITION WALLBOARD			—	4
1-D	NONE	NONE	NONE	FIBERBOARD HARDPRESSED			—	4
1-E	COMPOSITION WALLBOARD		NONE	COMPOSITION WALLBOARD		NONE	6	1 OR 4
1-F	FIBERBOARD HARDPRESSED		NONE	FIBERBOARD HARDPRESSED		NONE	6	1 OR 4
1-G	COMPOSITION WALLBOARD						—	1 OR 4
1-H	FIBERBOARD HARDPRESSED						—	1 OR 4
1-J	COMPOSITION WALLBOARD		NONE	FIBERBOARD HARDPRESSED		NONE	6	1 OR 4
1-K	COMPOSITION WALLBOARD			FIBERBOARD HARDPRESSED			—	1 OR 4
1-X	1" WOOD SHEATHING			NONE			—	—

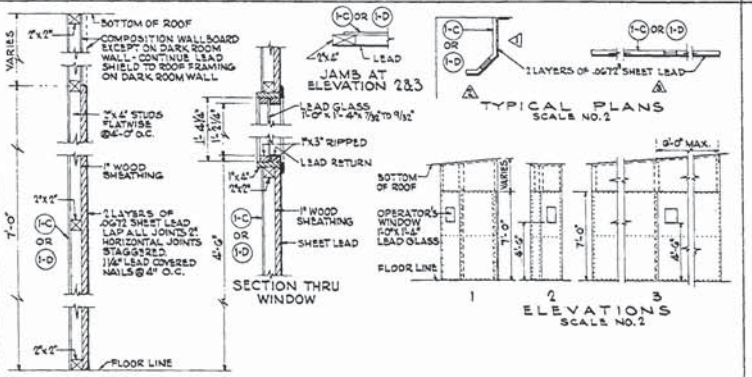
INTERIOR PARTITIONS



SOUNDPROOF PARTITION (1-L)
SCALE NO.7

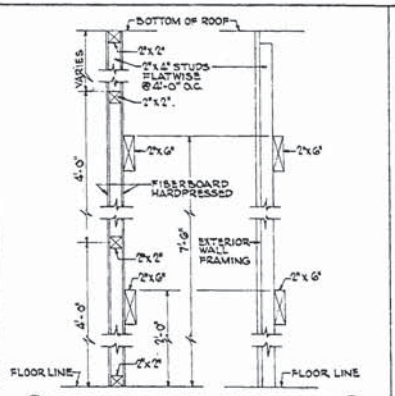


INTERIOR PARTITIONS (1-M) (1-N)
SCALE NO.7

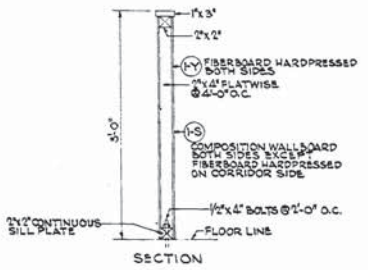


SECTIONS & JAMB
SCALE NO.7

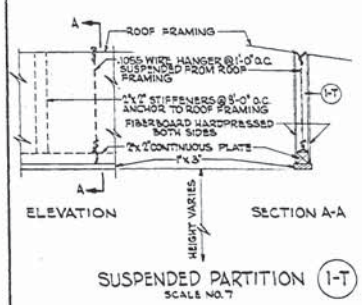
LEADED PARTITION & WINDOW (1-P)



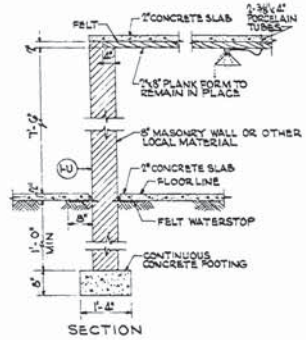
PHYSICAL TRAINING EQUIPMENT PARTITIONS (1-Q) (1-R)
SCALE NO. 7



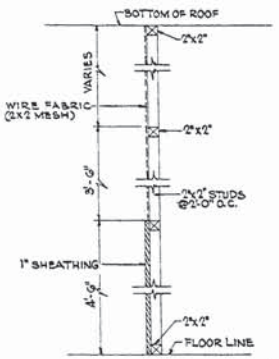
RAILING (1-S) (1-Y)
SCALE NO.7



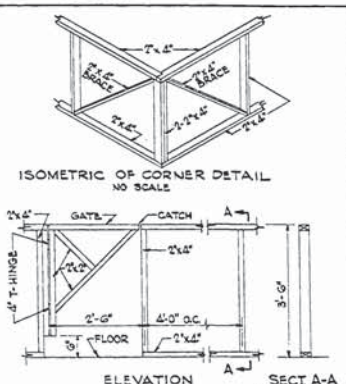
SUSPENDED PARTITION (1-T)
SCALE NO.7



VAULT (1-U)
SCALE NO. 5



INTERIOR PARTITION (1-W)
SCALE NO.7



RAILING & GATE (1-Z)
SCALE NO.5

SYMBOL	DESCRIPTION	DATE	APPROVAL
	REVISIONS		

GRAPHIC SCALES
0 5' 0 1' 2' 3' 0 3" 6" 9" 1' 2'
NO.2 NO.5 NO.7

HAYES, SEAY, MATTERN & MATTERN
ARCHITECTS - ENGINEERS
ROANOKE, VIRGINIA WASHINGTON, D. C.

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
MILITARY CONSTRUCTION - ENGINEERING DIVISION
WASHINGTON, D. C.

DRAWN BY: DE ICHMANN
TRACED BY:
CHECKED BY: J.LYUS
SUBMITTED BY: C. W. DE ICHMANN
APPROVED: [signature]
CHIEF, STRUCTURAL BRANCH

THEATER OF OPERATIONS
STANDARD DETAILS
1-A THRU 1-Z

APPROVED: [signature] for J. M. Williams
CHIEF, ENGINEERING DIVISION, MIL. CONSTR., O.C.E.
DATE: 19 MAR 1951

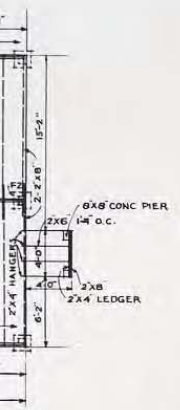
APPROVED FOR PROCUREMENT AGENCY:
DATE
SCALE: AS NOTED
SPEC. NO.
DRAWING NUMBER: 99-98
SHEET 1

PLUMBING NOTES

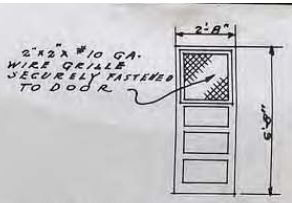
TER HEATER TO HAVE A CAPACITY OF 40 G.P.H.

ER HEATER TO HAVE A STORAGE CAPACITY OF
APACITY OF 55 G.P.H. AT 60° RISE.

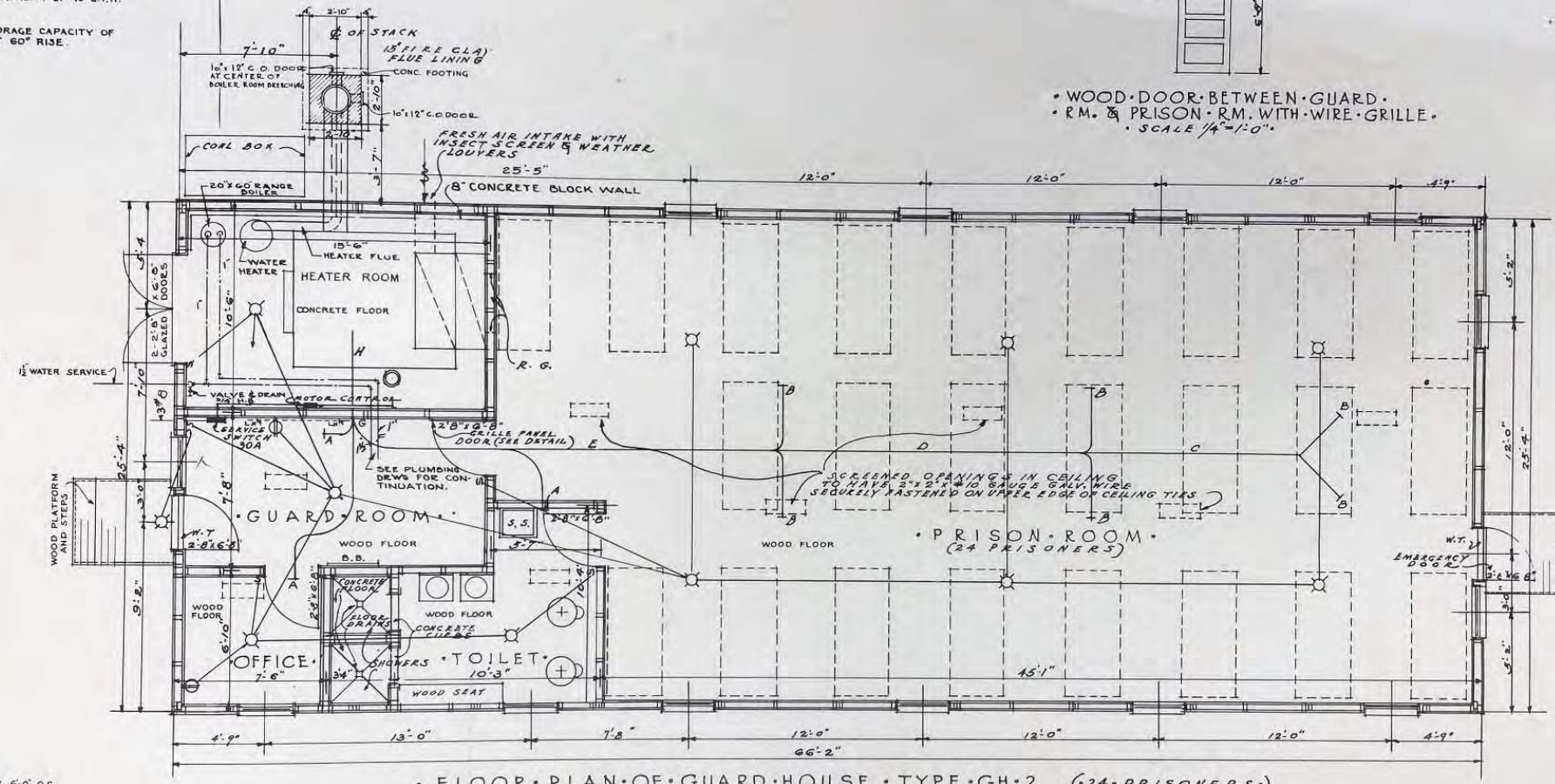
DIM. 20" x 60"



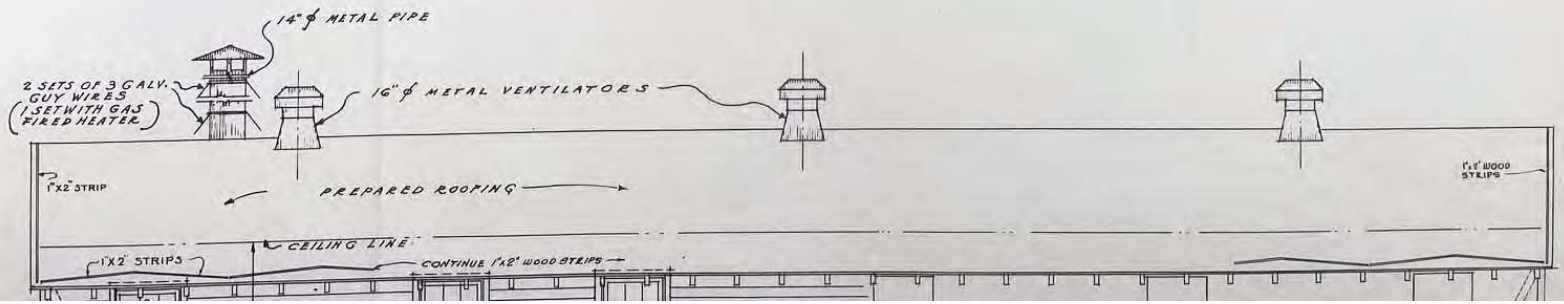
ES TO BE PROVIDED APPROX. 6'-0" O.C.
CROSS SECTION DWG. #700-228
UDS TO BE DOUBLED AT KNEE
TAILED.



• WOOD • DOOR • BETWEEN • GUARD •
• R.M. & PRISON • RM. WITH • WIRE • GRILLE •
• SCALE 1/4"=1'-0" •



• FLOOR • PLAN • OF • GUARD • HOUSE • TYPE • GH • 2 (• 24 • PRISONERS •)
• SCALE 1/4" = 1'-0"



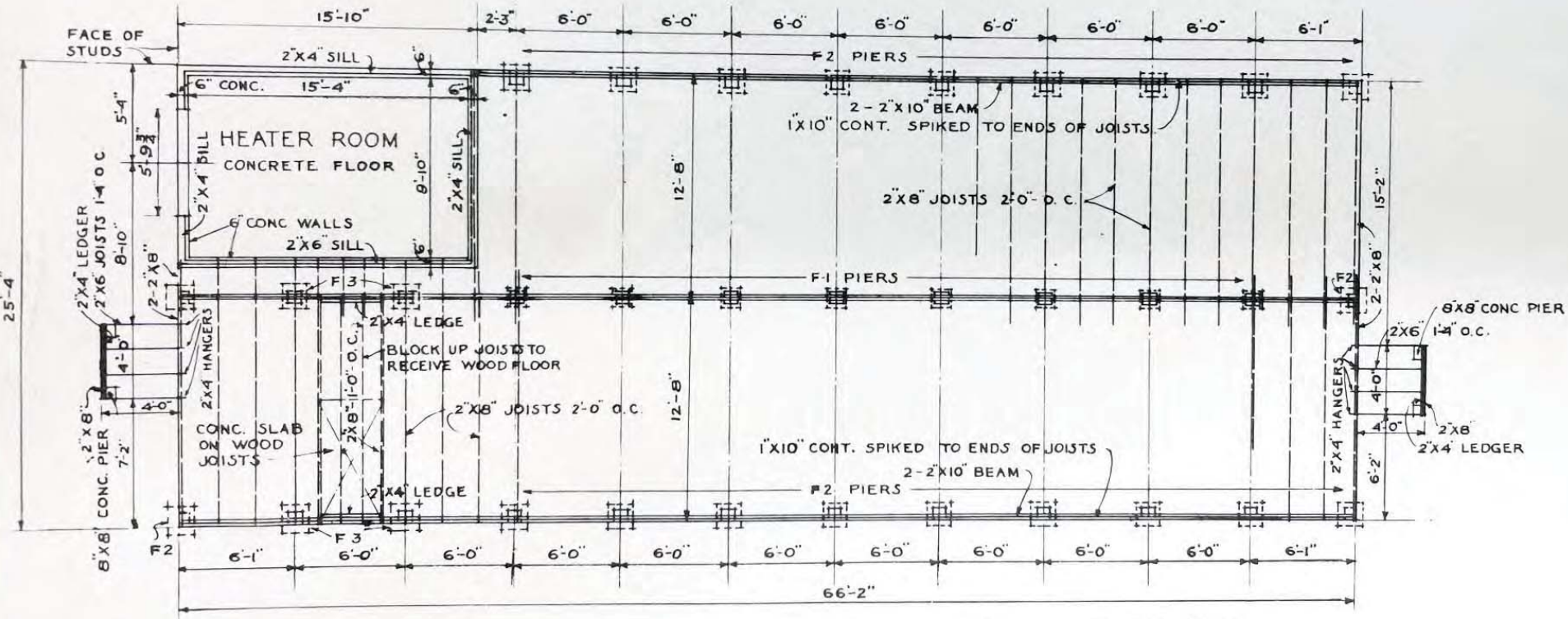
Ⓐ PLUMBING SYMBOLS AD

PLUMBING NOTES

COAL FIRED WATER HEATER TO HAVE A CAPACITY OF 40 G
AT 85° F RISE.

GAS FIRED WATER HEATER TO HAVE A STORAGE CAPACITY
55 GAL. HEATING CAPACITY OF 55 G.P.H. AT 60° RISE.

RANGE BOILER DIM. 20" X 60"

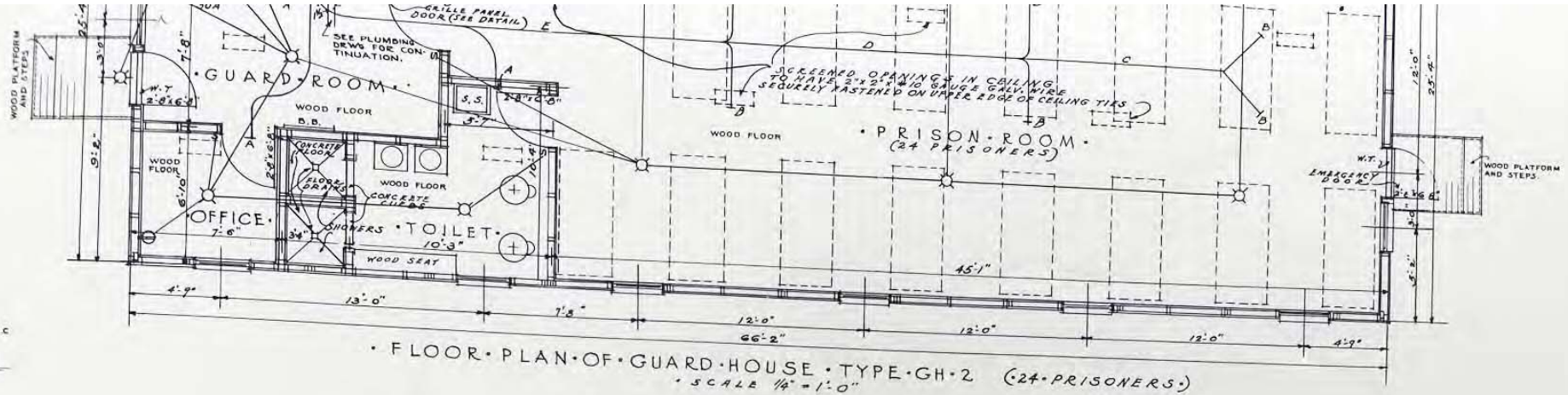


FLOOR FRAMING PLAN OF GUARD HOUSE TYPE GH 2

SCALE $\frac{1}{8}$" = 1'-0"

1½" WATER SERVI

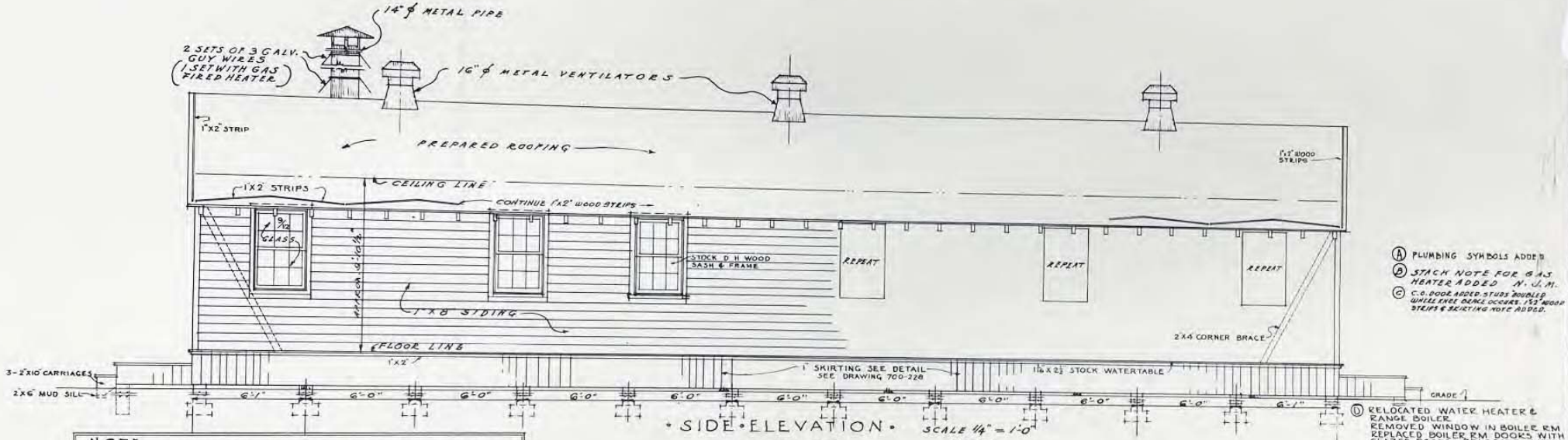
WOOD PLATFORM AND STEPS



PROVIDED APPROX 6'-0" O.C
ECTION DWG. 700-228
BE DOUBLED AT KNEE

FLOOR PLAN OF GUARD HOUSE TYPE GH-2 (24 PRISONERS)

SCALE 1/4" = 1'-0"



SIDE ELEVATION

SCALE 1/4" = 1'-0"

(A) PLUMBING SYMBOLS ADDED

(B) STACK NOTE FOR GAS HEATER ADDED N. J. M.

(C) C.O. DOOR ADDED STUDS DOUBLED WHERE KNEE BRACE OCCURS. 1"X2" WOOD STRIPS & SKIRTING NOTE ADDED.

(D) RELOCATED WATER HEATER & RANGE BOILER. REMOVED WINDOW IN BOILER RM. REPLACED BOILER RM. DOORS WITH GLAZED DOORS - RELOCATED LIGHT SWITCH. GAS WATER HEATER NOTE ADDED.

(E) FRAMING PLAN, END ELEVATION GENERAL NOTES & KNEE BRACE NOTE ADDED.

NOTE
SKIRTING OF 1" RANDOM WIDTH BOARDS LAID VERTICAL AS SHOWN APPLIES ONLY IN 0°F. AND -20°F ZONES. SEE "DETAILS OF SKIRTING FOR +20°F. ZONE" AS SHOWN ON DWG.# 700-228.

HEATING SCHEDULE
GUARD HOUSE
TYPE GH-2

ZONES	-20°F	0°F	+20°F
MIN. CAP. BTU/HR	200,000	156,000	121,000
MIN. C.F.M.	2440	1880	1400
S.P. IN WATER	1/8"	1/8"	1/8"

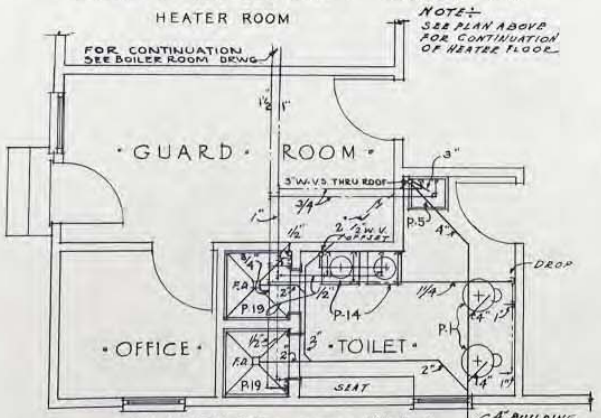
ELEC. FIXT. SCHEDULE

RM. DESIGNATION	TYPE	WATTS
PRISON	C	60
TOILET	JX	60
OFFICE	B	100
GUARD	B	100
HEATER	A	25
EXTERIOR	F	60

DUCT SCHEDULE

SYMBOL	-20°F	0°F	+20°F
A	9"X9"	8"X8"	7"X7"
B	12"X12"	11"X11"	10"X10"
C	12"X12"	11"X11"	10"X10"
D	24"X12"	22"X11"	20"X10"
E	36"X12"	32"X11"	30"X10"
F	36"X14"	32"X13"	30"X12"
G	38"X14"	34"X13"	32"X12"
H	38"X15"	34"X14"	32"X13"
RETURN GRILLE	30"X30"	28"X28"	24"X24"
FRESHAIRGRILLE	12"X10"	12"X10"	12"X10"

PLUMBING LEGEND
H.B. — HOSE BIBB.
S.O.IL —
C.W. — COLD WATER
H.W. — HOT "
V. — VENT LINE
V.S. = VENT STACK
F.D. = FLOOR DRAIN



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

NOTE
THIS DRAWING SUPERSEDES PLAN SHOWN ON DRAWING NO 700-260

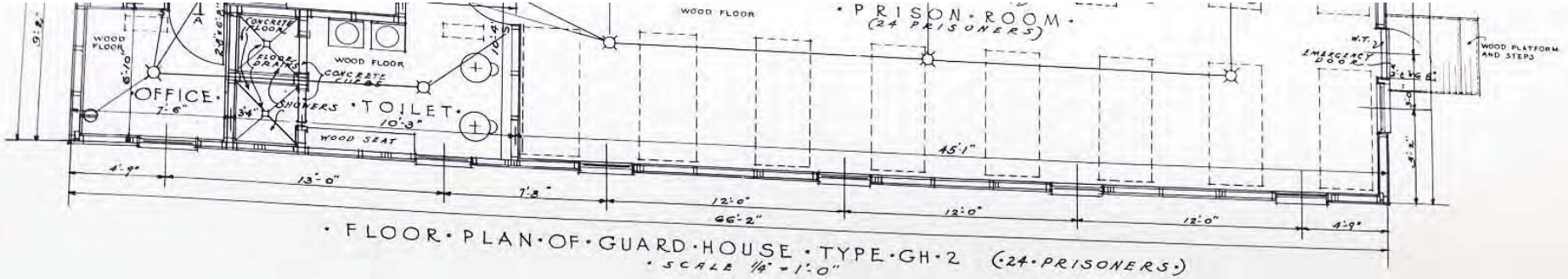
SCALE	CONSTRUCTION DIVISION
AS NOTED	OFFICE OF THE QUARTERMASTER GENERAL

REVISIONS

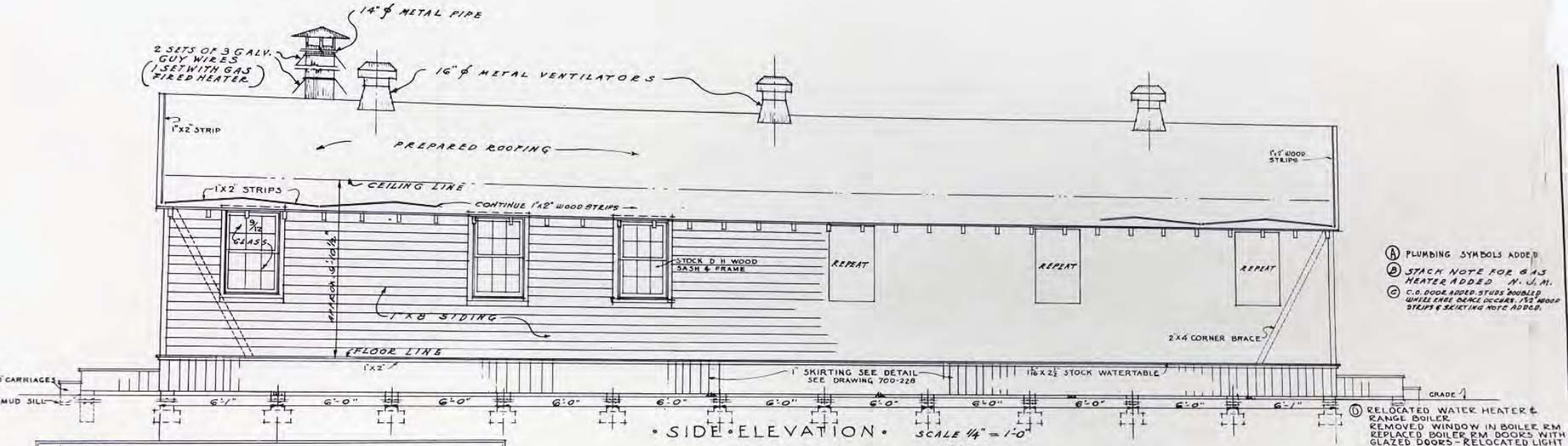
(A)	9-9-40	F.M.
(B)	9-24-40	N.J.M.
(C)	1-29-41	J.B.D.
(D)	2-5-41	H.W.Y.
(E)	2-13-41	L.J.C.

MOBILIZATION BUILDING
GUARD HOUSE TYPE GH-2
PLAN & ELEVATION
(24 PRISONERS)

DRAWN BY	CHECKED BY	APPROVED BY DIRECTION	DATE
MAZZIOTTA	C.E.G.	Elmer Stoltes MAJOR, C.E.	JUNE 17, 1940
TRACED BY J.E.W. SOHL	J.T.C.		PLAN NUMBER 700-260.1



• FLOOR • PLAN • OF • GUARD • HOUSE • TYPE • GH • 2 (24 • PRISONERS •)
• SCALE 1/4" = 1'-0"



• SIDE • ELEVATION • SCALE 1/4" = 1'-0"

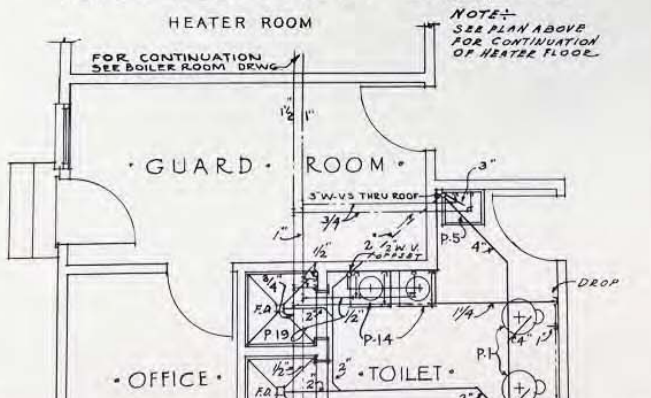
NOTE
SKIRTING OF 1" RANDOM WIDTH BOARDS LAID VERTICAL AS SHOWN APPLIES ONLY IN 0°F. AND -20°F. ZONES. SEE "DETAILS OF SKIRTING FOR +20°F. ZONE" AS SHOWN ON DWG. # 700-228.

(A) PLUMBING SYMBOLS ADDED
(B) STACK NOTE FOR GAS HEATER ADDED N. J. M.
(C) C.O. DOOR ADDED. STUDS DOUBLED WHERE KNEE BRACE OCCURS. 1"X2" WOOD STRIPS & SKIRTING NOTE ADDED.
(D) RELOCATED WATER HEATER & RANGE BOILER. REMOVED WINDOW IN BOILER RM. REPLACED BOILER RM. DOORS WITH GLAZED DOORS - RELOCATED LIGHT SWITCH. GAS WATER HEATER NOTE ADDED.
(E) FRAMING PLAN, END ELEVATION GENERAL NOTES & KNEE BRACE NOTE ADDED

• HEATING • SCHEDULE • GUARD • HOUSE • TYPE • GH-2 •			
ZONES	-20°F	0°F	+20°F
MIN. CAP. BTU/HR	200,000	156,000	121,000
MIN. C.F.M.	2440	1880	1400
S.P. IN "WATER	1/8"	1/8"	1/8"

• DUCT • SCHEDULE •			
SYMBOL	-20°F	0°F	+20°F
A	9"X9"	8"X8"	7"X7"
B	12"X12"	11"X11"	10"X10"
C	12"X12"	11"X11"	10"X10"
D	24"X12"	22"X11"	20"X10"
E	36"X12"	32"X11"	30"X10"
F	36"X14"	32"X13"	30"X12"
G	38"X14"	34"X13"	32"X12"
H	38"X15"	34"X14"	32"X13"
RETURN GRILLE	30"X30"	28"X28"	24"X24"
FRESH AIR GRILLE	12"X10"	12"X10"	12"X10"

• ELEC. FIXT. SCHEDULE •		
RM DESIGNATION	TYPE	WATTS
PRISON	C	60
TOILET	JX	60
OFFICE	B	100
GUARD	B	100
HEATER	A	25
EXTERIOR	F	60



• PLUMBING • SCALE 1/4" = 1'-0"

PLUMBING LEGEND
H.B. — HOSE BIBB
— SOIL
C.W. — COLD WATER
H.W. — HOT "
V. — VENT LINE
V.S. = VENT STACK
F.D. = FLOOR DRAIN

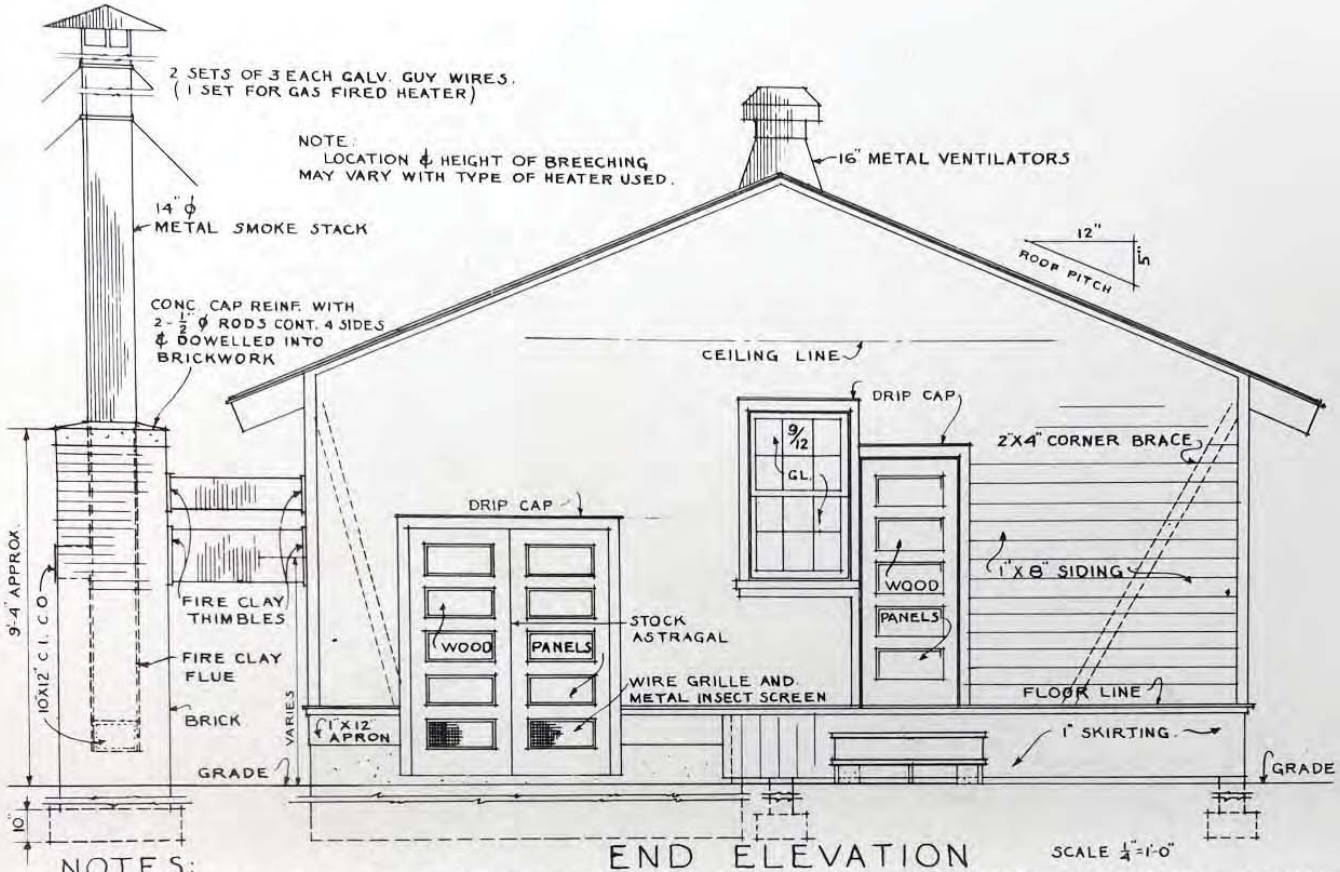
NOTE
THIS DRAWING SUPERSEDES PLAN SHOWN ON DRAWING NO 700-260

SCALE	
AS NOTED	
REVISIONS	
(A) 9-9-40	F.M.
(B) 9-24-40	N.J.M.
(C) 1-29-41	J.B.O.
(D) 2-5-41	H.W.Y.
(E) 2-13-41	L.J.C.

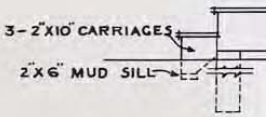
CONSTRUCTION DIVISION
OFFICE OF THE QUARTERMASTER GENERAL

• MOBILIZATION • BUILDING •
• GUARD • HOUSE • TYPE • GH-2 •
• PLAN & ELEVATION •
(24 PRISONERS)

DRAWN BY	CHECKED BY	APPROVED BY DIRECTION	DATE
MAZZIOTTA	C.E.G.	Edward Markham MAJOR, C.E.	JUNE 17, 1940
TRACED BY J.E.W. SOHL	J.F.C.		PLAN NUMBER 700-260



END ELEVATION SCALE ¼"=1'-0"



NOTES:

DIMENSIONS ARE TO OUTSIDE FACE OF STUDS FOR EXTERIOR WALLS, AND CENTER TO CENTER OF STUDS FOR PARTITIONS.
OFFICE AND TOILET ROOM DOORS TO HAVE THE LOWER PANEL A VENT. PANEL.
ALL EXTERIOR DOORS TO HAVE SCREEN DOORS, EXCEPT HEATER ROOM AND EMERGENCY DOORS.
ALL WINDOWS TO HAVE SCREENS, EXCEPT HEATER ROOM.
PRISON AND TOILET ROOMS TO HAVE WALLS, PARTITIONS AND CEILING FINISHED WITH T & G BOARDS IN ALL ZONES.
WALL BOARD CEILINGS IN ALL ZONES EXCEPT AS OTHERWISE NOTED.
LIGHTS TO AVOID HEAT DUCTS.
LINE ALL WALLS, PARTITIONS AND UNDERSIDE OF ROOF RAFTERS IN HEATER ROOM, IN ALL ZONES WITH GYPSUM WALL BOARD.
ALL HEAT DUCTS TO BE LOCATED AT OR NEAR THE CEILING.
ALL RETURN GRILLES TO BE LOCATED NEAR THE FLOOR.
ALL SCREENED OPENINGS IN CEILING TO BE 8"X10" UNLESS OTHERWISE INDICATED.
PROVIDE WHERE INDICATED, 2 HOOKS, PROJECTING 5" TO HOLD A LITTER.
PROVIDE A 14 FOOT LADDER AND 2 BRACKETS TO HOLD SAME ON SIDE OF BUILDING, WHEN NOT IN USE.
PARTITONS OF HEATER ROOM TO BE FINISHED BOTH SIDES IN ALL ZONES.
ALL WINDOWS IN PRISON ROOMS TO HAVE FIXED WINDOW GUARDS AND DOORS TO HAVE CYLINDER LOCKS.
ALL GRILLES OF PRISON ROOM TO BE OF 2"X2" MESH #10 GAUGE WIRE SECURELY FASTENED IN PLACE.
ALL INTERIOR DOORS TO BE 2'-8"X 6'-8"X1⅜ - 5 CROSS PANEL UNLESS OTHERWISE NOTED.
STACK: 15" ϕ FIRE CLAY FLUE & 14" ϕ METAL PIPE, 42'-0" HIGH FROM HEATER ROOM FLOOR TO TOP OF STACK.
FOR GAS FUEL RUN STACK 2'-0" ABOVE HIGH POINT OF ROOF.

THE FOLLOWING DETAIL DRAWINGS APPLY TO THIS BUILDING.
700-227 PLANS, ETC. AND SECTIONS, ALL CONSTRUCTION ZONES
700-228 ELEVATIONS AND SECTIONS ALL CONSTRUCTION ZONES.
700-231 MISC. DETAILS.

700-239 HEATING DETAILS, ALL ZONES
700-241 PLUMBING DETAILS AND SPECIFICATIONS
700-243 ELECTRICAL DETAILS AND SPECIFICATIONS, ALL ZONES.
700-1162 MISC SUPERSEDING DETAILS.
700-1163 TERMITE PROTECTION DETAILS. WHERE NECESSARY

NOTE
APPLIES
+20°F, ZON

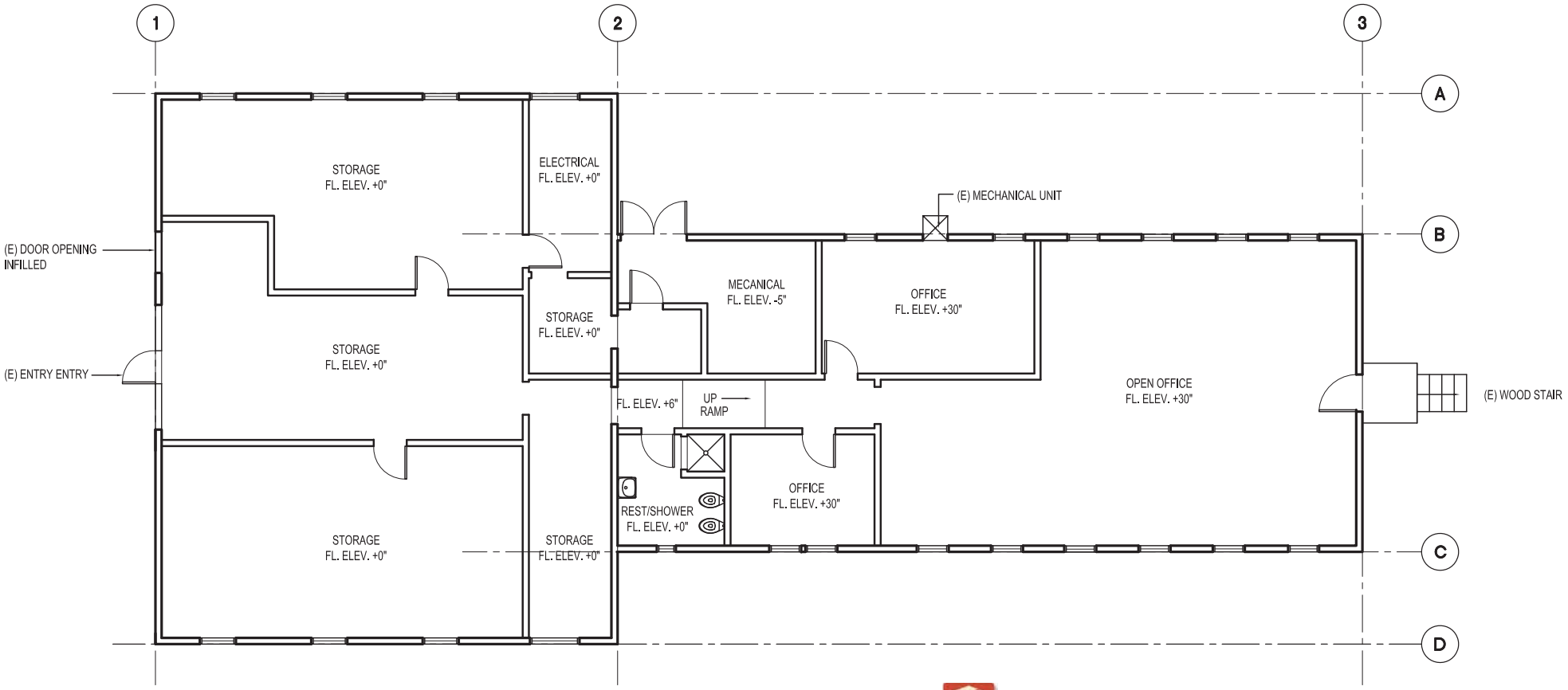
◦HEAT
◦GUA
◦T
·ZONES
MIN. CAP. BTU/
MIN. C.F.M
S.P. IN WATE

◦ELEC.
RM. DESIG
PRISON
TOILET
OFFICE
GUARD
HEATER
EXTERIO

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Attachment B
Conceptual Plans

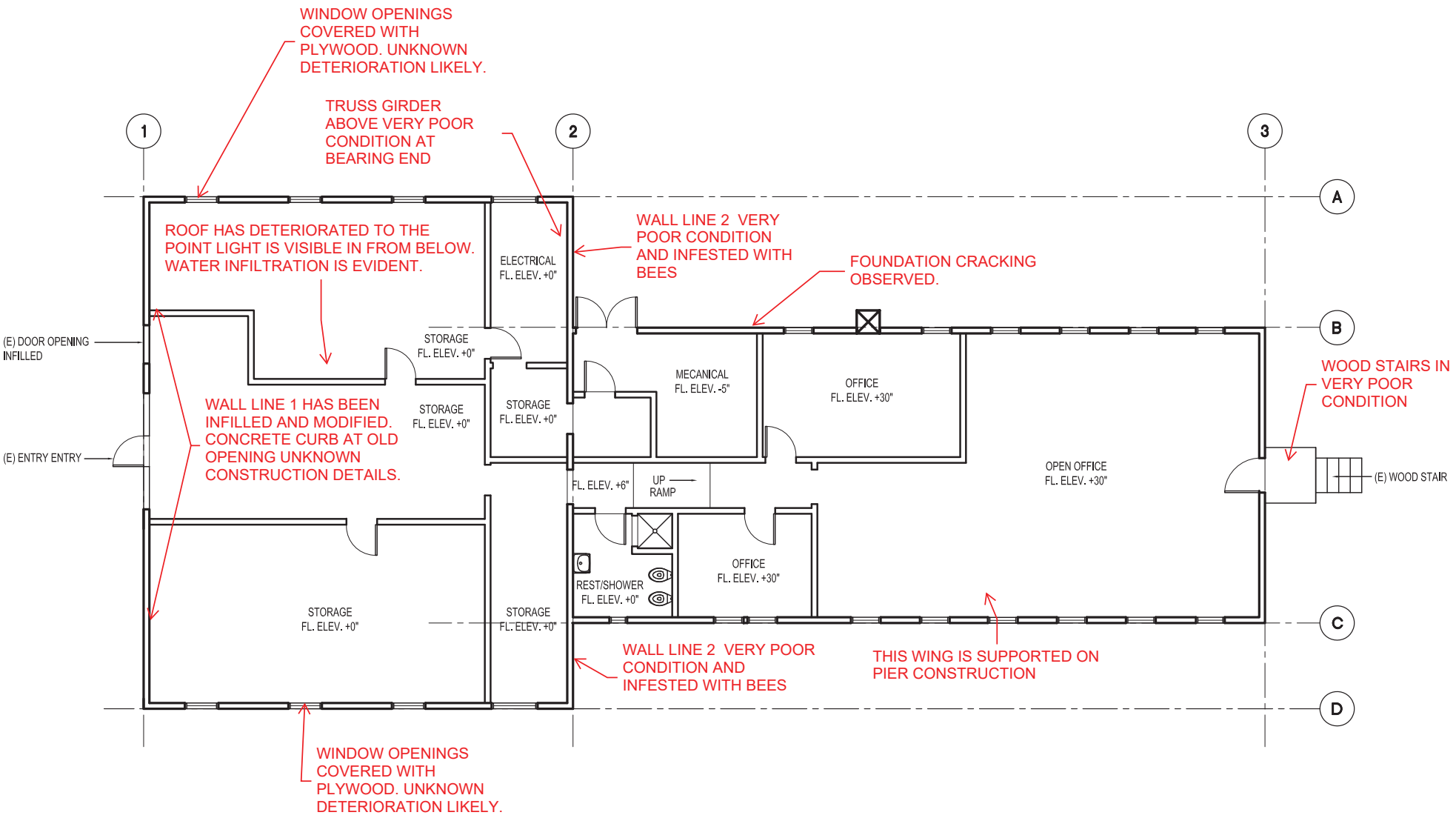
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BUILDING 7020 - EXISTING FLOOR PLAN

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

JOSEPH CHOW & ASSOCIATES, INC.

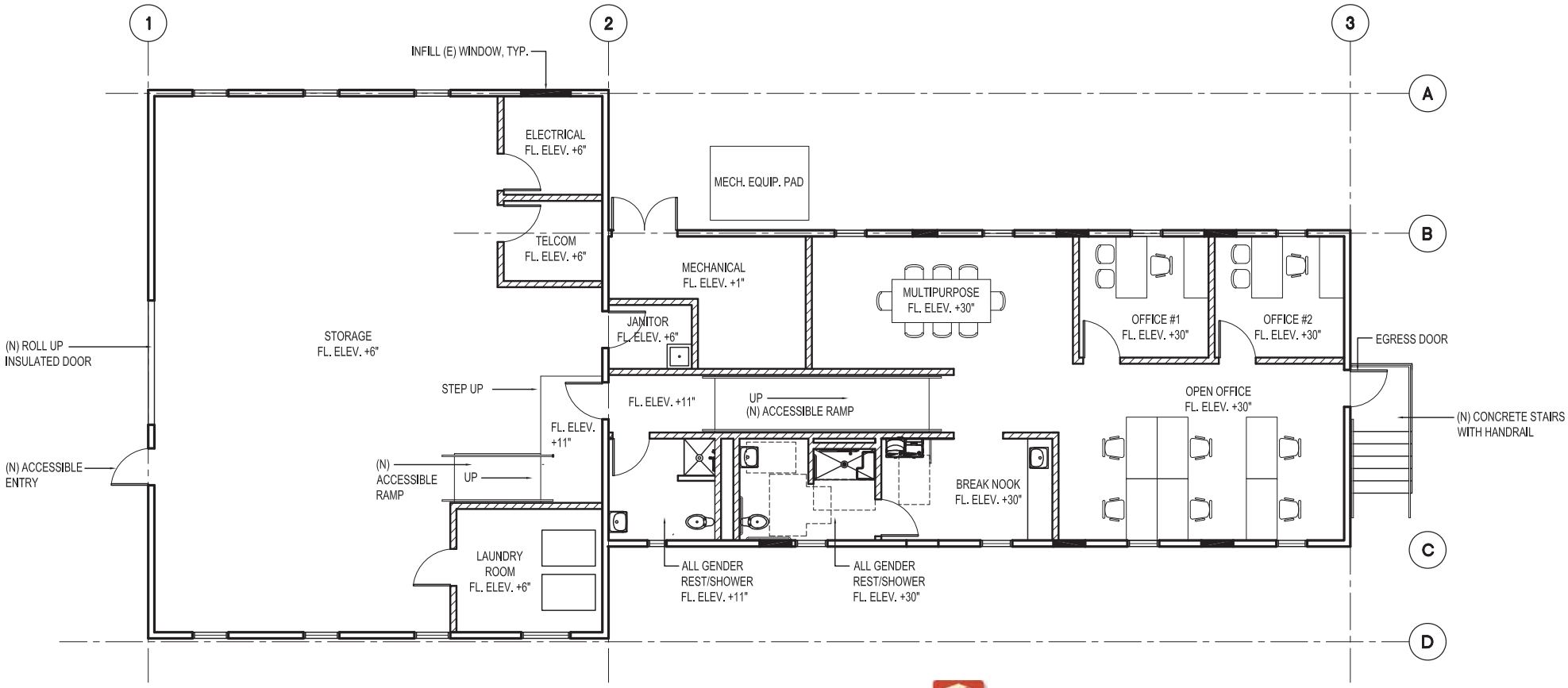


BUILDING 7020 - EXISTING FLOOR PLAN

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

PROJECT: CAMP ROBERTS B7020
TITLE: CONCEPT STRENGTHENING
SHEET NO.: SKS-1 OF 4
BY: TFL DATE: 11/11/2022
SCALE: -----

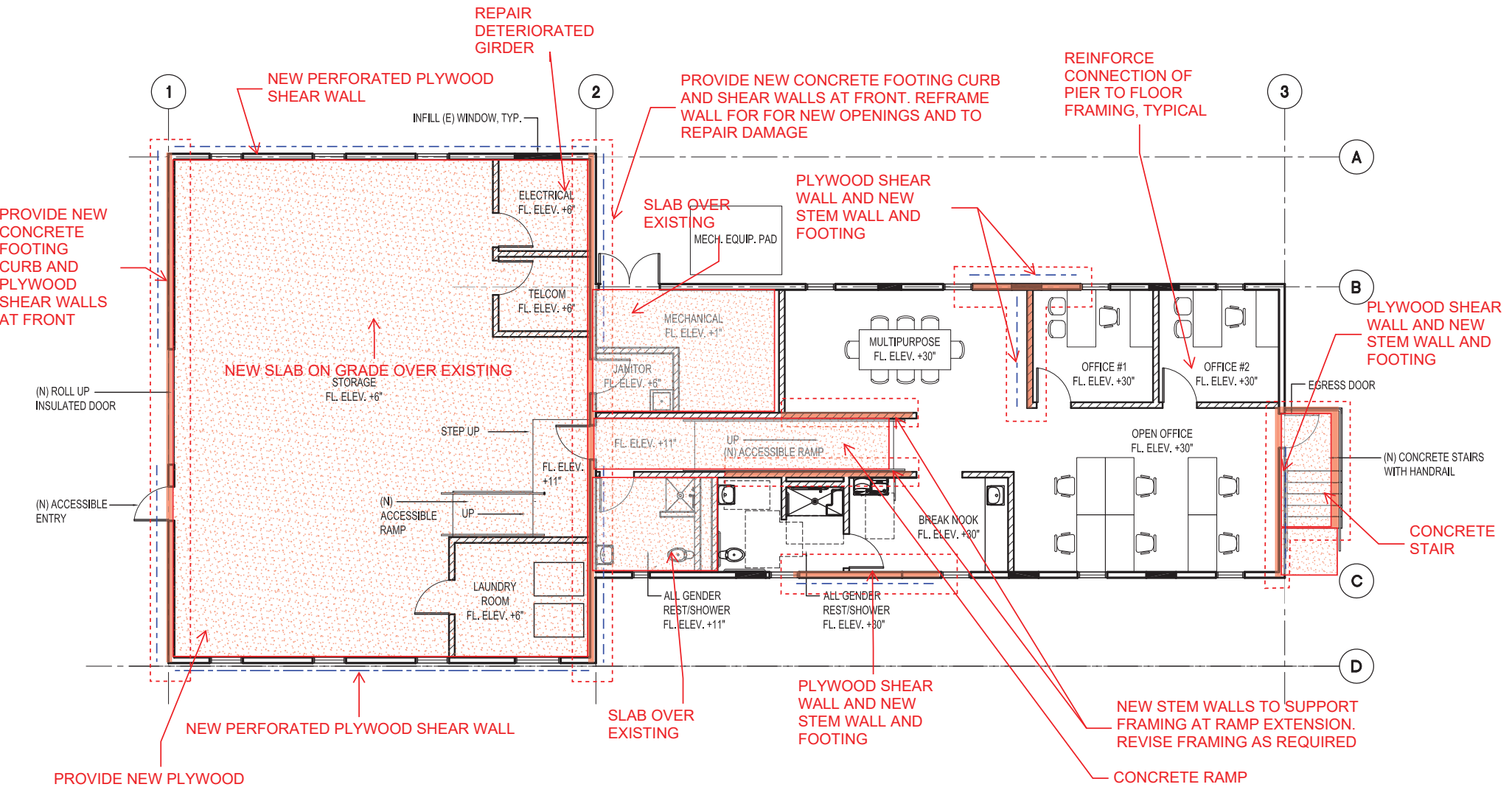
BrokawDesign
www.BrokawDesign.com
(415) 999-0323
tim.lengyel@brokawdesign.com



BUILDING 7020 - NEW FLOOR PLAN - OPTION #1

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

JOSEPH CHOW & ASSOCIATES, INC.

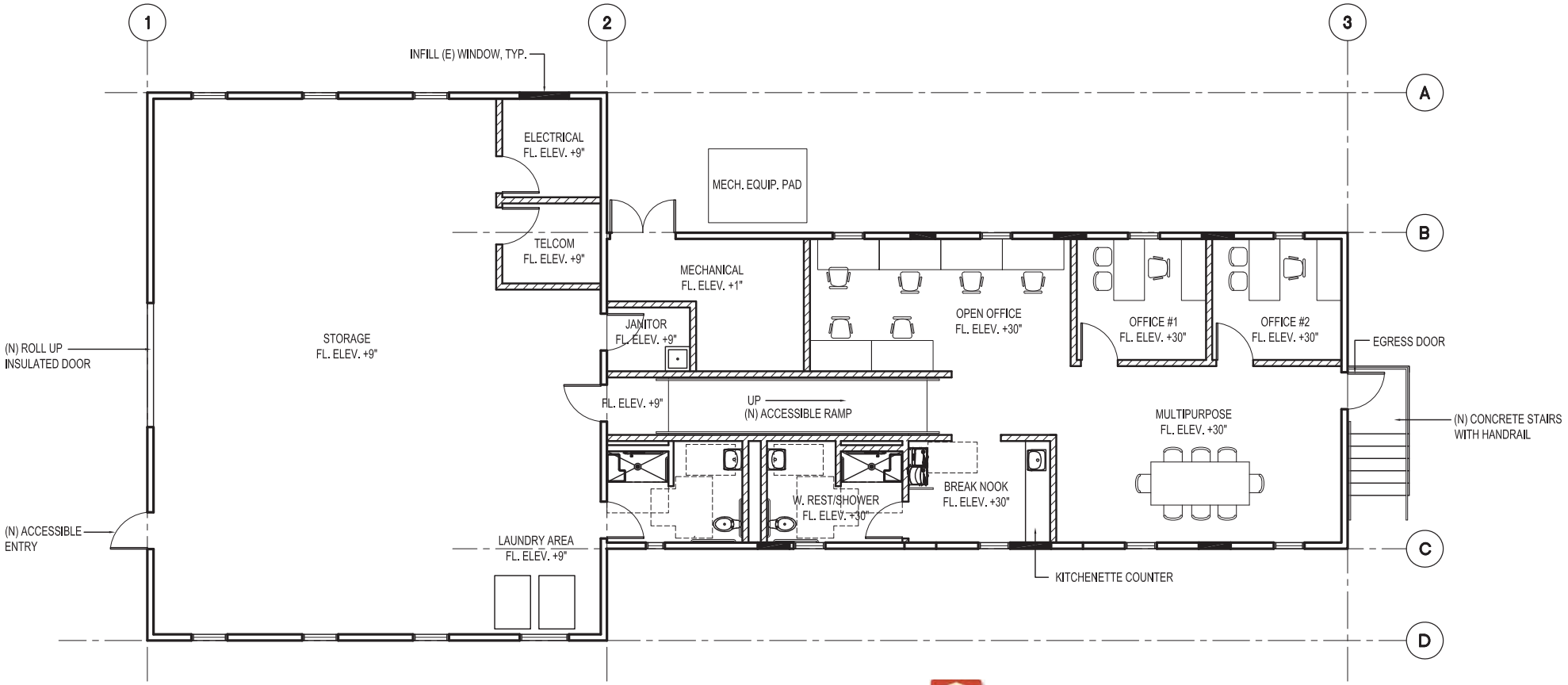


BUILDING 7020 - NEW FLOOR PLAN - OPTION #1

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

PROJECT: CAMP ROBERTS B7020
TITLE: CONCEPT STRENGTHENING
SHEET NO.: SKS-2 OF 4
BY: TFL DATE: 11/11/2022
SCALE: -----

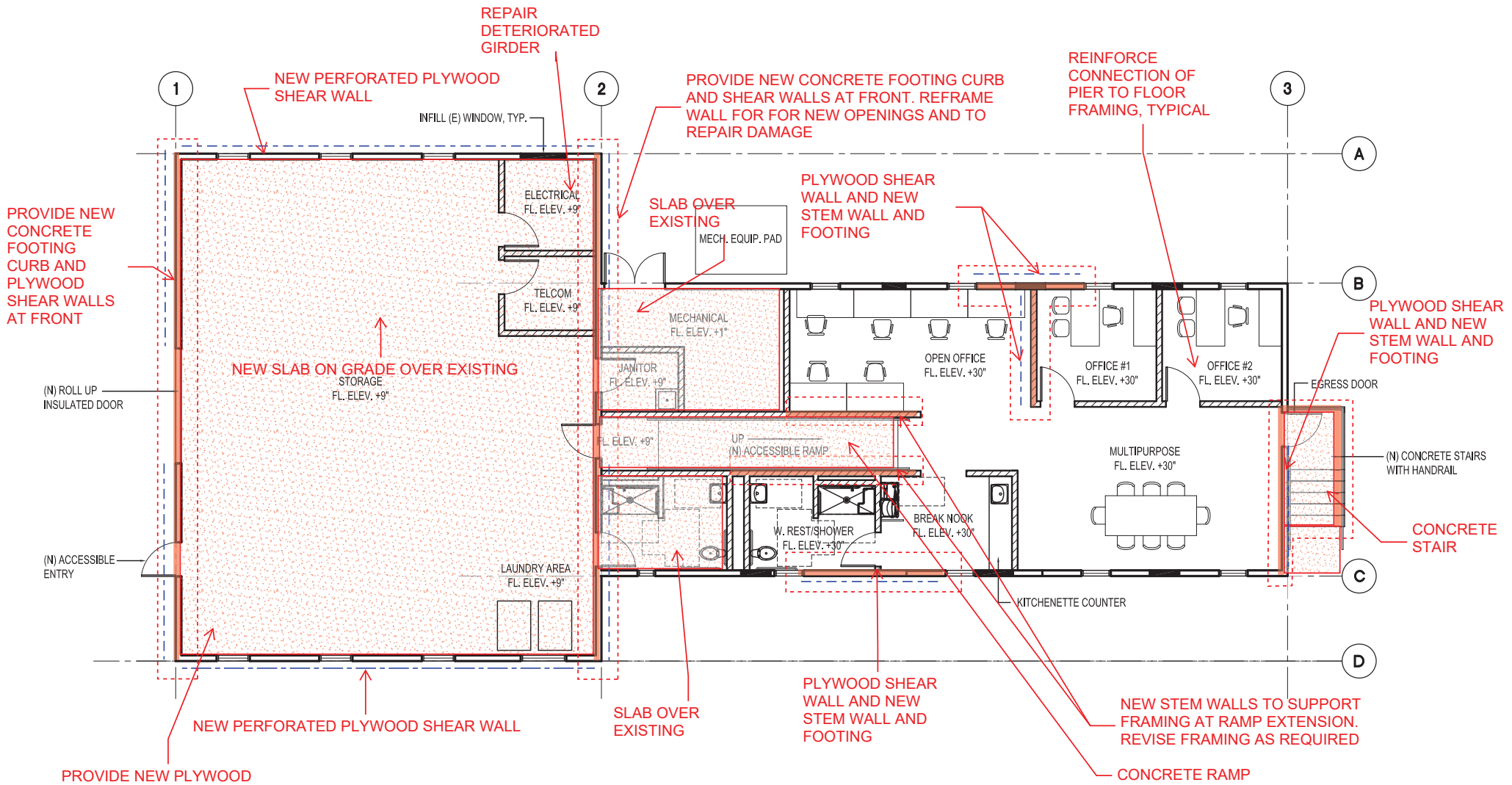
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BUILDING 7020 - NEW FLOOR PLAN - OPTION #2

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

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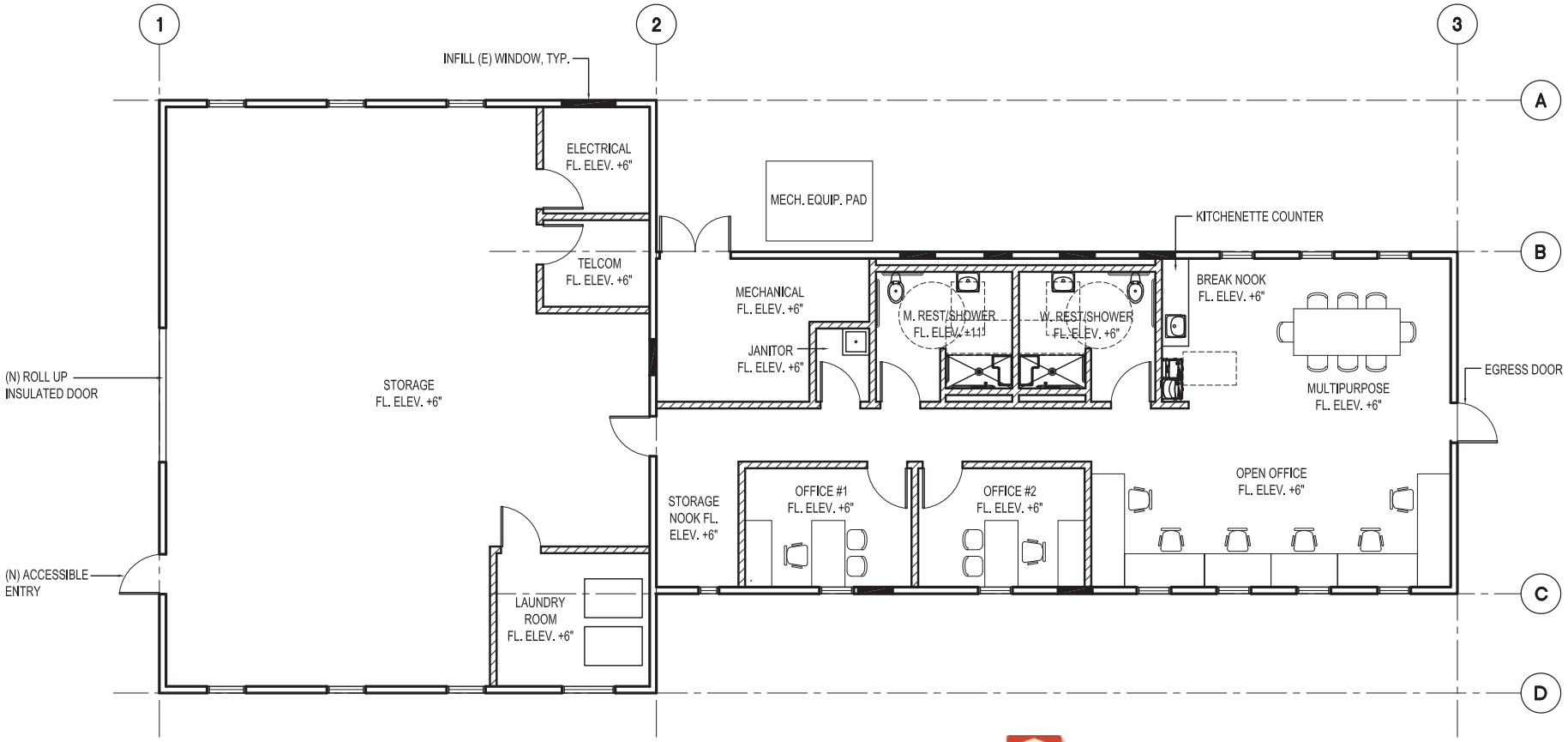


BUILDING 7020 - NEW FLOOR PLAN - OPTION #2

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

PROJECT: CAMP ROBERTS B7020
TITLE: CONCEPT STRENGTHENING
SHEET NO.: SKS-3 OF 4
BY: TFL DATE: 11/11/2022
SCALE: -----

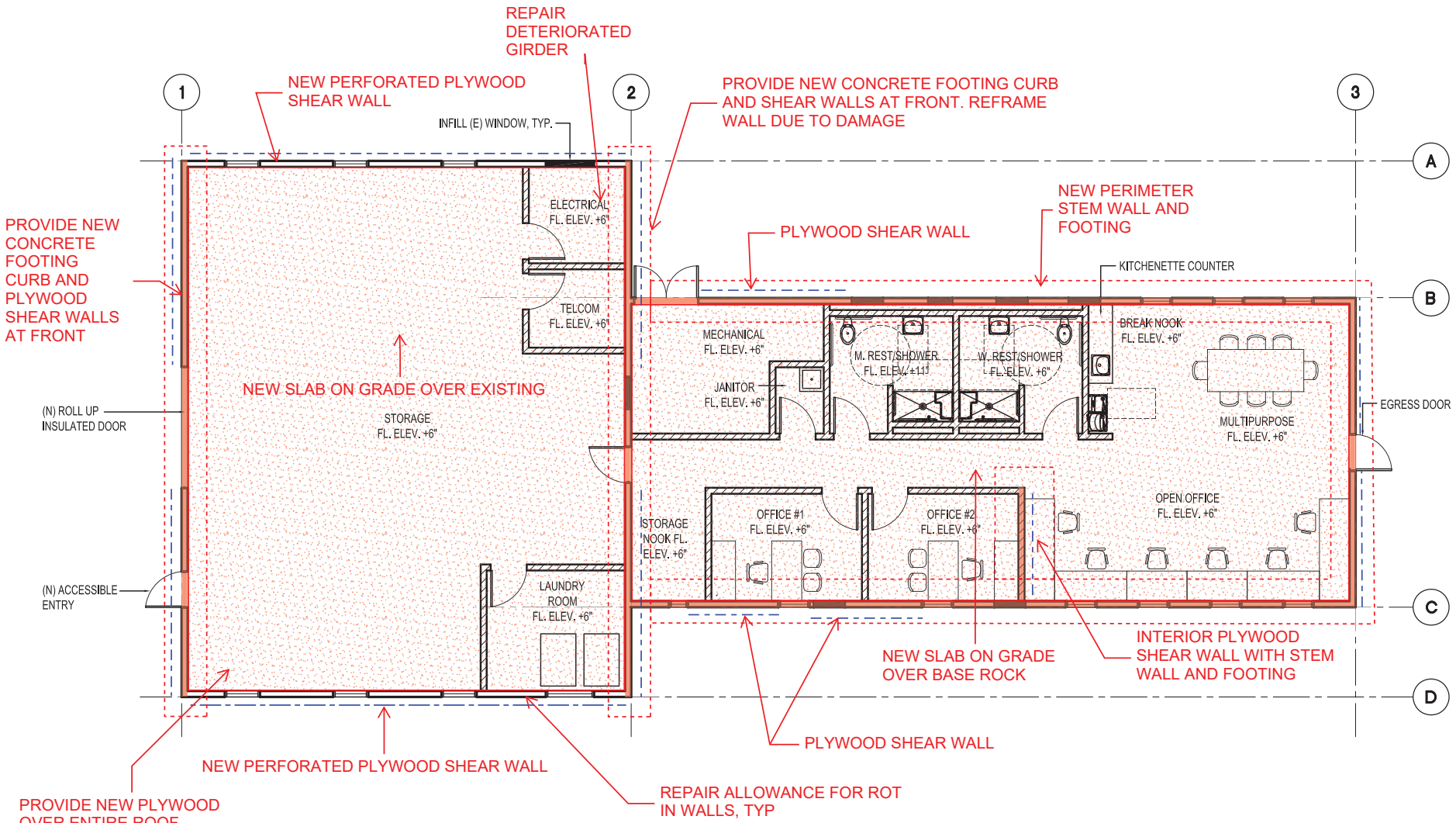
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BUILDING 7020 - NEW FLOOR PLAN - OPTION #3

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

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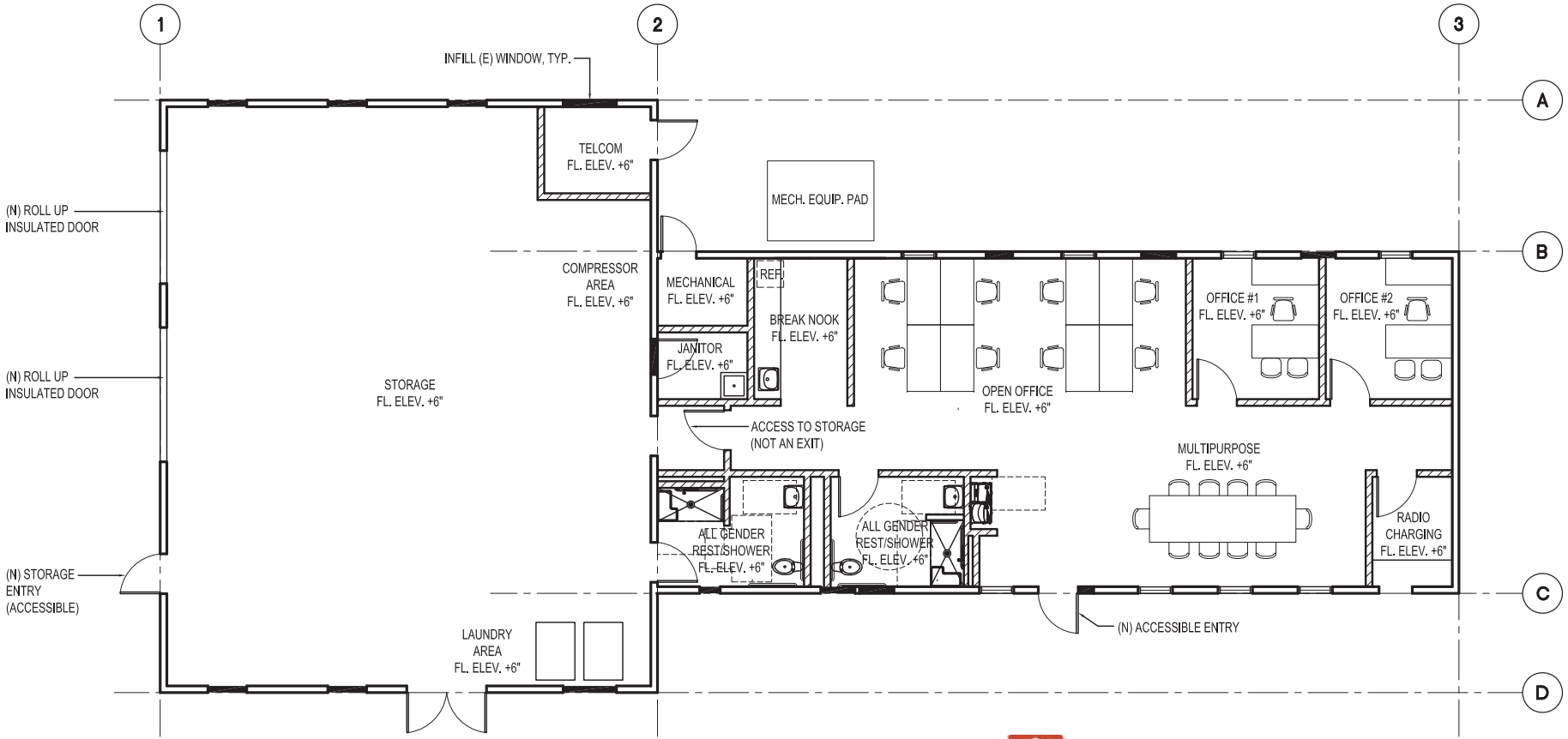


BUILDING 7020 - NEW FLOOR PLAN - OPTION #3

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

PROJECT: CAMP ROBERTS B7020
TITLE: CONCEPT STRENGTHENING
SHEET NO.: SKS-4 OF 4
BY: TFL DATE: 11/11/2022
SCALE: -----

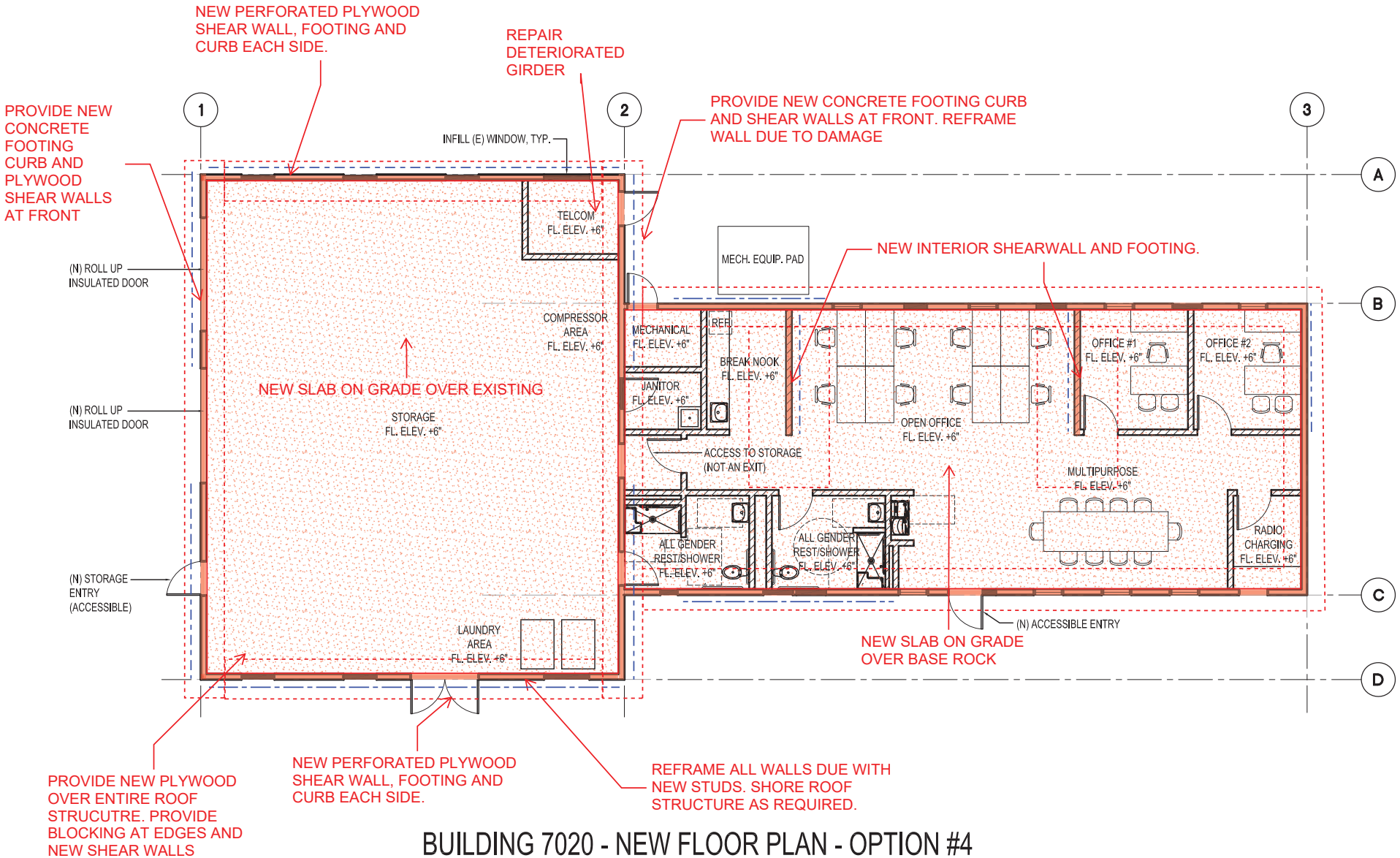
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BUILDING 7020 - NEW FLOOR PLAN - OPTION #4

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

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BUILDING 7020 - NEW FLOOR PLAN - OPTION #4

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

Attachment C
Report of Limited Asbestos-Containing Materials and Lead-Containing Materials Surveys

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REPORT OF
HAZARDOUS BUILDING MATERIALS SURVEY
BUILDING 7020 RENOVATIONS
CAMP ROBERTS
SAN MIGUEL, CALIFORNIA
KLEINFELDER PROJECT NO. 20233038.001A

AUGUST 28, 2023

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REPORT OF HAZARDOUS BUILDING MATERIALS SURVEY
BUILDING 7020 RENOVATIONS
CAMP ROBERTS
SAN MIGUEL, CALIFORNIA

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August 28, 2023
Kleinfelder Project No. 20233038.001A

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FIGURE
1 Sample Location Map

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Embedded
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1 Summary of Asbestos Survey Results
2 Summary of Lead-Containing Materials XRF Survey Results
3 Summary of Paint Chip Analytical Results
4 Summary of Other Hazardous Building Materials Survey Results

APPENDICES
A XRF Measurement Record Logs, Laboratory Analytical Reports and Chain-of-Custody Documentation
B Inspector Certifications

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1 EXECUTIVE SUMMARY

This report presents results of the Hazardous Building Materials Survey (HBMS) performed by Kleinfelder on October 20, 2022 at Building 7020 (Site), located on Camp Roberts in San Miguel, California. The HBMS was performed as part of the overall design package being developed to renovate the exterior and interior of the Site. The survey was performed to evaluate the presence, location, and quantity of accessible suspected hazardous building materials that may represent a potential worker safety hazard if disturbed, and/or may require special handling and/or disposal as hazardous waste as part of future renovation activities. Suspected hazardous building materials surveyed included asbestos-containing materials (ACMs), lead-containing materials (LCMs), and building equipment that may contain other hazardous materials, including polychlorinated biphenyls (PCBs), mercury or mercury vapor, chlorofluorocarbon (CFC)-containing refrigerants, or other potential hazardous materials.

The following presents a summary of findings from the limited HBMS. The findings are based on observations made during the HBMS and our review of laboratory analytical results of samples collected during the HBMS. Detailed discussions of HBMS survey methods and results are presented in Sections 3 through 5 of this report.

Asbestos-Containing Materials

- Joint compound associated with drywall wall systems in the Commander's Office and 1st Sargent's Office.
- Roof penetration mastics could not be safely accessed during the survey due to active beehives present in the Site building and are assumed to contain asbestos.

Lead-Containing Materials

Both lead-based paints (LBP) and lead-containing paints (LCP) were identified at the Site during the LCM portion of the survey. Tables 4-1 through 4-3 in Section 4 provide summaries of LBPs and LCPs identified at the Site.

Other Hazardous Building Materials

- Fluorescent light tubes that may contain mercury or mercury vapor.
- Fluorescent light fixture ballasts that may contain PCBs.
- CFC-containing refrigerant in a wall-mounted air conditioner in the Commander's Office.

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2 INTRODUCTION AND BUILDING DESCRIPTIONS

2.1 INTRODUCTION

This report presents results of the HBMS performed by Kleinfelder on October 20, 2022 at Building 7020 (Site), located on Camp Roberts in San Miguel, California. The HBMS was performed as part of the overall design package being developed to renovate the exterior and interior of the Site. The survey was performed to evaluate the presence, location, and quantity of accessible suspected hazardous building materials that may represent a potential worker safety hazard if disturbed, and/or may require special handling and/or disposal as hazardous waste as part of future renovation activities. Suspected hazardous building materials surveyed included ACMs, LCMs, and building equipment that may contain other hazardous materials, including PCBs, mercury or mercury vapor, CFC-containing refrigerants, or other potential hazardous materials.

2.2 SITE DESCRIPTION

The Site building is a one-story wood-framed structure occupying a footprint of approximately 3,130-square feet. Wall exteriors are finished with wood siding underlain by gypsum board. Interior wall finishes consist of wood panels or drywall. Flooring finishes consist of concrete, wood planks, vinyl sheet flooring, or 12-inch vinyl floor tile (VFT). The ceiling is finished with either wood panels or drywall. Roofing materials consist of asphaltic shingles and mastic at the bases of vent roof penetrations.

2.3 PHYSICAL LIMITATIONS

Kleinfelder's survey included accessible areas of the interior and exterior of the Site building. The roof penetrations of the Site building were not accessible during the survey due to active beehives present in the Site building; therefore, samples of this suspect ACM were not collected. Additionally, there is a possibility that additional ACMs, LCMs, or other hazardous materials may be encountered during future building renovation activities in areas inaccessible to Kleinfelder at the time of the survey (e.g., within interstitial wall spaces or underground utilities). If suspect hazardous materials are encountered during hazardous material abatement or renovation activities, they should be assumed to be hazardous until results of an appropriate assessment of the material indicate whether special handling and/or disposal are necessary.

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3 ASBESTOS-CONTAINING MATERIALS SURVEY

3.1 ASBESTOS-CONTAINING MATERIALS SURVEY METHODS

Kleinfelder personnel performed a visual survey of the Site building and collected representative bulk samples of building materials suspected to contain asbestos. Mr. Richard Stevenson, a California Division of Occupational Safety and Health (DOSH, also known as Cal/OSHA) Certified Asbestos Consultant (CAC, Number [No.] 06-3992) performed the ACM survey. The survey was completed consistent with United States Environmental Protection Agency (US EPA) Asbestos Hazard Emergency Response Act (AHERA) methods (40 Code of Federal Regulations [CFR] Part 763), and Monterey Bay Air Resources Board (MBARB) requirements as guidelines.

Areas of homogeneous suspect ACM were identified by the visual inspection of building materials. Bulk samples of suspect ACM were collected using hand tools, such as utility knives, chisels, or putty knives, or using a T-handled manual corer with 3-inch brass core tubes. Up to approximately 2-square inches of material were collected for each sample, which was then placed in either 2-ounce or 4-ounce plastic "Whirl-Pak" sample bags and labeled with a unique sample identification number directly on the sample bag. Sampling tools were cleaned with soap and water following collection of each sample.

Kleinfelder collected a total of 24 representative building material samples during the asbestos survey at the Site. Bulk samples collected during the survey were delivered by Kleinfelder under chain-of-custody protocol to SGS Forensic Laboratories, Inc. (SGS) in Carson, California for analysis of asbestos content by polarized light microscopy (PLM). SGS is a US EPA and California State-certified laboratory and National Voluntary Laboratory Accreditation Program (NVLAP) participant. Summaries of building material samples collected, sample locations, asbestos content, condition, friability, and area estimates are presented in embedded Table 3-1 and attached Table 1. A Sample Location Map, indicating the approximate locations of building material samples collected is provided as Figure 1. Copies of the analytical laboratory report and chain-of-custody documentation are included in Appendix A. Inspector certifications are presented in Appendix B.

3.2 REGULATORY OVERVIEW FOR ASBESTOS

Regulatory oversight for the management, removal, and disposal of ACMs is provided by a variety of Federal, State, and local agencies.

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The three primary regulations enforced by regulatory agencies that govern various activities (e.g., inspection, assessment, abatement, etc.) relating to ACMs include the following: AHERA, National Emission Standards for Hazardous Air Pollutants (NESHAP), and the Asbestos Construction Safety Standard (as codified in Federal Occupational Safety and Health Administration [OSHA] and Cal/OSHA regulations). US EPA regulations concerning the identification, handling, management, and abatement of ACMs (as defined in the AHERA and NESHAP) are implemented locally by MBARB. Both Cal/OSHA and Federal OSHA regulate asbestos as a worker health and safety issue. In addition, the transportation and disposal of asbestos-containing wastes are overseen by the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC). Federal OSHA, US EPA, DTSC, and SCAQMD define ACM as material containing greater than 1 percent (%) asbestos.

The following is a brief description of the three major regulations relating to ACMs.

3.2.1 Asbestos Hazard Emergency Response Act

AHERA (40 CFR Part 763), as implemented by the US EPA, primarily pertains to the assessment and management of ACMs in Kindergarten through Grade 12, non-profit schools. However, many of the procedures, training requirements, and certifications defined by AHERA have become the industry standard for most other facilities. For this survey, AHERA protocols were generally utilized in the identification, assessment, and sampling of building materials suspected of containing asbestos.

3.2.2 National Emission Standards for Hazardous Air Pollutants

The asbestos NESHAP (40 CFR Part 61, Subpart M) is an asbestos standard that protects the general public from asbestos exposure due to renovation or demolition activities. NESHAP requires surveying for suspect materials (as defined above), notifying of intent to renovate or demolish, removing Regulated Asbestos-Containing Material (RACM) prior to renovation or demolition, and properly managing asbestos-containing wastes. A RACM is defined by NESHAP as any of the following:

- Any friable ACM;
- A Category I non-friable ACM (such as floor tiles, mastics, and asphalt roofing products) that has become friable or will be subject to sanding, grinding, cutting, or abrading during renovation or demolition activities; and
- A Category II non-friable ACM (all other non-friable ACMs) that has a high probability of becoming friable during demolition or renovation activities.

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NESHAP requires that demolition activities be conducted with no visible emissions using wet methods. Note that although NESHAP regulates renovation and demolition activities, it does not protect individual workers performing asbestos abatement or provide instructions for how asbestos abatement projects should be performed.

3.2.3 Asbestos Standard for the Construction Industry

Federal OSHA, under its Asbestos Standard for the Construction Industry (29 CFR 1926.1101), and Cal/OSHA, under California Code of Regulations (CCR) Title 8, Section 1529, regulate asbestos exposure in the workplace. This includes persons working in a building containing ACM, as well as asbestos abatement workers/contractors. For abatement workers and contractors, the Asbestos Standard for Construction (i.e., the Construction Standard) regulates the following:

- Protection of workers and the public during removal of ACM;
- Medical surveillance requirements for workers;
- Detailed requirements for how ACMs are to be removed; and
- Training requirements for abatement personnel.

Furthermore, Cal/OSHA defines asbestos-containing construction material (ACCM) as any building material that contains more than 0.1% asbestos by weight. Building materials presumed or known to contain at least "trace" amounts (less than 1%, but greater than 0.1% by weight) of asbestos should be considered ACCM and managed according to Cal/OSHA regulations (as presented in CCR Title 8, Section 1529).

3.3 ASBESTOS-CONTAINING MATERIALS SURVEY RESULTS

Based on our observations and evaluation of the laboratory analytical reports, the following ACM (defined as materials containing greater than 1% asbestos) were confirmed or assumed to be present at the Site building (estimated quantities are based on area measurements made by Kleinfelder staff in the field at the time of the survey):

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Table 3-1: Summary of ACM

MATERIAL	SAMPLE NUMBER	LOCATION	ASBESTOS CONTENT	ESTIMATED QUANTITY
Joint compound associated with drywall walls	7020-4 through 7020-6	Commander's Office, 1st Sargent's Office	2% CH (less than 1% CH as a composite by 400 PC)	850 SF
Roof penetration mastics	Not sampled	Base of roof penetrations	Assumed greater than 1%	30 SF

Notes: CH – Chrysotile asbestos
400 PC – Point count analysis by 400 Point Count Method
SF – Square feet

It is noted that dark brown mastic associated with 12-inch acoustic ceiling tiles in the Commander's Office (Samples 7020-17 and 7020-18) was initially reported by the laboratory as containing "trace" anthophyllite asbestos. This material was further analyzed by the more accurate 1,000-Point Count method and was reported to contain less than 0.004% anthophyllite asbestos. Therefore, dark brown mastic is neither ACM or asbestos-containing construction material (ACCM) but contains detectable amounts of asbestos and should be managed in accordance with CCR Title 8 Section 1529.

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4 LEAD-CONTAINING MATERIALS SURVEY

4.1 LEAD-CONTAINING MATERIALS SURVEY METHODS

Kleinfelder personnel performed a survey of painted and/or coated surfaces suspected of containing lead at each of the Site buildings. Mr. Richard Stevenson, a California Department of Public Health (CDPH) Certified Lead Inspector/Assessor/Project Monitor (No. 14042), performed the LCM survey using US EPA, Federal Housing and Urban Development (HUD), and CDPH protocols as a general guidance.

Predominant interior and exterior painted and/or coated surfaces were tested for the presence of lead utilizing a portable Niton X-ray fluorescence (XRF) analyzer unit. The XRF unit allows for non-destructive/non-intrusive measurements of lead content in paints up to 3/8-inch thick. Kleinfelder collected 75 XRF readings (including calibration checks) from building components suspected of containing lead in the Site buildings. The XRF measurements were recorded manually on field records during the survey.

Three paint chip samples (7020-P1 through 7020-P3) were also collected from the Site building. Each paint chip sample included a minimum of two-square inches of painted surface area, but not more than four-square inches. A clean putty knife and/or chisel were used to scrape paint directly from the asphalt pavement substrate. The inspector attempted to remove paint material without including the substrate. Each paint chip sample was placed in a 2-ounce plastic “Whirl-Pak” bag and labeled with a unique sample identification number directly on the bag. The paint chip samples were delivered under chain-of-custody protocol to SGS in Carson, California, a US EPA- and California State-accredited laboratory and Environmental Lead Lab Accreditation Program (ELLAP) participant, for total lead analysis by Flame Atomic Absorption (Method SW 846 3050B/7420).

The survey also included a visual observation and physical assessment of painted surfaces. The physical assessment is performed by assessing if a painted surface is in intact, fair, or poor condition. Suspect painted surfaces observed to be cracking, peeling away from the substrate, or otherwise damaged are considered to be in fair to poor condition, depending on the degree of the observed damage. Materials that do not exhibit these conditions are considered to be in intact condition.

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4.2 REGULATORY OVERVIEW FOR LEAD-BASED PAINTS

The US EPA, HUD and CDPH define lead-based paint (LBP) as paint containing greater than 0.5% lead by weight or 5,000 parts per million (ppm) of total lead by laboratory analysis, or a lead content of 1.0 milligrams per square centimeter (mg/cm^2) by XRF measurement. Federal OSHA and Cal/OSHA regulations (Lead Construction Standard) do not provide a definition for "lead-based paint" but refer to the US EPA, HUD and CDPH criteria mentioned above. Cal/OSHA is primarily concerned with worker protection and regulates any amount of lead contained within painted building components.

Both Federal OSHA and Cal/OSHA provide an Action Level (AL) of 30 micrograms per cubic meter ($\mu g/m^3$) of airborne lead for an 8-hour, time-weighted average (TWA). Specific worker training and worker protection are to be provided by employers if workers are exposed to airborne lead at or above the AL. Additionally, both Federal OSHA and Cal/OSHA provide a Permissible Exposure Limit (PEL) for worker exposure to airborne lead particles of 50 $\mu g/m^3$ of air for an 8-hour, TWA.

According to Cal/OSHA (CCR Title 8, Section 1532.1), employers may assume that disturbance of coatings or materials shown to contain less than 0.06% lead by weight (equivalent to 600 ppm lead) will not result in exposures above the applicable AL as long as workers are not performing the Cal/OSHA designated "trigger tasks" (such as manual demolition, manual sanding or scraping, or abrasive blasting). However, renovation or demolition activities that include materials with lead in any concentration could, under certain circumstances, trigger Federal OSHA and Cal/OSHA regulations. The concentrations of airborne lead generated by disturbing paints at the Site would vary based upon several factors, including the type of activity (including "trigger tasks") and the severity of disturbance to the building materials. Measurement of airborne lead concentrations would require air monitoring during building material disturbance by a trained lead professional.

4.3 LEAD-CONTAINING MATERIALS SURVEY RESULTS

A summary of Kleinfelder's XRF measurements of the lead content of the various paints applied to the Site building components is presented in the attached Table 2. A summary of paint chip analytical results is presented in the attached Table 3. In accordance with CCR Title 8 Section 1532.1 and CCR Title 17 Section 35001 et. seq., XRF measurement results were interpreted as follows: a "Positive-Lead-Based Paint (LBP)" result is indicated when the XRF measurement reading is 1.0 mg/cm^2 or greater, a Negative-Lead-Containing Paint (LCP) is indicated when the XRF measurement reading is greater than 0.10 mg/cm^2 but less than 1.0 mg/cm^2, and a "Negative" result is indicated when the XRF measurement reading is less than 0.10 mg/cm^2.

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Based on Kleinfelder's review of XRF readings and the analytical laboratory report, painted or coated surfaces that met or exceeded the established HUD and US EPA criteria of 1.0 mg/cm^2 of lead by XRF measurement or 0.5% by weight (5,000 ppm) of lead by paint chip analysis and therefore, are classified as LBPs as summarized in Tables 4-1 and 4-2 below:

Table 4-1: Summary of LBPs by XRF

READING NUMBER	COMPONENT	SUBSTRATE	CONDITION	COLOR	LOCATION	mg/cm^2
7, 13	Window Frame	Wood	Intact	White	Open Office	1.10 – 1.18
10	Door	Wood	Fair	White	Open Office	6.09
19 – 22	Wainscot	Wood	Intact	White	1st Sargent's Office	3.16 – 5.44
23	Window Frame	Wood	Intact	White	1st Sargent's Office	5.06
24	Door	Wood	Intact	White	1st Sargent's Office	5.47
32	Door Frame	Wood	Intact	White	Commander's Office	2.83
36, 37	Wainscot	Wood	Intact	White	Hallway	7.11 – 8.52
39	Door Frame	Wood	Intact	White	Hallway	3.20
40 – 43	Wall	Wood	Intact	White	Bathroom	6.53 – 9.73
44	Toilet	Porcelain	Intact	White	Bathroom	6.49
47	Door	Wood	Intact	White	Bathroom	9.25
48	Door Frame	Wood	Intact	White	Bathroom	4.07
50 – 52	Wall	Wood	Intact	White	PUBS Hallway	1.26 – 4.07
53	Baseboard	Wood	Intact	White	PUBS Hallway	3.03
55	Joist	Wood	Intact	White	PUBS Hallway	1.95
56 – 57	Wall	Wood	Fair to Intact	Green	Garage 1	1.85 – 2.41
67, 69, 72	Wall	Wood	Poor	White	Exterior	1.14 – 7.72
70	Door	Wood	Fair	White	Exterior	10.05

Notes: mg/cm^2 – milligrams per square centimeter

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Table 4-2: Summary of LBPs by Paint Chip Analysis

SAMPLE NUMBER	SAMPLE LOCATION AND DESCRIPTION	LEAD CONCENTRATION (wt% / ppm)
7020-P1	Garage 1, green paint on wood wall	5.2 / 52,000
7020-P2	Exterior northwest wall, white paint on wood wall	22 / 220,000
7020-P3	Exterior, northwest side of building, brown paint on wood window frame	15 / 150,000

Notes: wt% = percentage by weight
ppm = parts per million

Based on our review of XRF readings and the analytical laboratory report, the following painted or coated surfaces had lead content greater than 0.10 mg/cm^2 but less than 1.0 mg/cm^2 by XRF measurement or detectable lead content by laboratory analysis, and therefore, are classified as LCPs and summarized in Table 4-3:

Table 4-3: Summary of LCPs by XRF

READING NUMBER	COMPONENT	SUBSTRATE	CONDITION	COLOR	LOCATION	mg/cm^2
5	Wainscot	Wood	Intact	White	Open Office	0.90
6, 12	Wall	Drywall	Intact	White	Open Office	0.15 – 0.75
8, 14	Baseboard	Wood	Intact	White	Open Office	0.32 – 0.54
45	Sink	Porcelain	Intact	White	Bathroom	0.53
46	Vent Pipe	Metal	Intact	White	Bathroom	0.42
62, 63	Wall	Wood	Fair – Intact	Green	Garage 3	0.19 – 0.28
66	Window Frame	Wood	Intact	White	Garage 3	0.25
68, 73	Window Frame	Wood	Poor	Brown	Exterior	0.55 – 0.62

Notes: mg/cm^2 – milligrams per square centimeter

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5 OTHER HAZARDOUS BUILDING MATERIALS SURVEY

5.1 OTHER HAZARDOUS BUILDING MATERIALS SURVEY METHODS

Kleinfelder personnel visually inspected the Site for equipment that may contain PCBs, mercury or mercury vapor, CFC-containing refrigerants, and other potential hazardous materials. Survey methods included visual observation. No samples of suspect hazardous materials were collected during this portion of the survey.

5.2 REGULATORY OVERVIEW FOR OTHER HAZARDOUS MATERIALS

Other hazardous building materials documented at the Site included PCB-containing equipment, mercury-containing equipment, equipment containing radioactive materials, and Universal Wastes (e.g., fluorescent light tubes and batteries). Regulatory oversight for removal and disposal of these materials is provided by a variety of Federal and State agencies.

5.2.1 PCBs

US EPA (40 CFR Part 761) requires that insulating oils containing PCBs at concentrations greater than 50 milligrams per liter be disposed of properly by a licensed hazardous waste hauler. Cal/OSHA provides a PEL for worker exposure to airborne PCBs of 0.05 milligram per cubic meter (mg/m^3) on an 8-hour TWA basis.

5.2.2 Universal Waste

California's Universal Waste Rule allows individuals and businesses to transport, handle, and recycle certain common hazardous wastes, termed Universal Wastes, in a manner that differs from the requirements of most hazardous wastes. The hazardous waste regulations found in CCR, Title 22, Division. 4.5, Chapter 11, Section 66261.9 list seven categories of hazardous wastes that can be managed as Universal Wastes. An unwanted item that falls within one of these waste streams may be handled, transported, and recycled following the simple requirements set forth in the Universal Waste Regulations (UWR) in CCR Title 22, Division 4.5, Chapter 23.

A small quantity generator of Universal Waste accumulates no more than 5,000 kilograms (kg) of waste and no more than 35 kg of mercury drained from gauges on a given site. A US EPA identification

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(ID)/Notification and Uniform Hazardous Waste Manifest is not required for disposal of Universal Waste. Universal Wastes should be placed in containers according to the "Universal Waste Container Requirements" in CCR Title 22, Section 66273.13. Universal Wastes, and containers and packages of Universal Waste, should be labeled or marked to identify their types. Universal Waste should be sent to a facility authorized to collect, recycle, or dispose of Universal Waste.

Pursuant to Cal/OSHA, the PEL for airborne mercury is 0.1 mg/m^3 and the PEL for acid (using the PEL for sulfuric acid) is 1.0 mg/m^3 of air for an 8-hour TWA basis.

Certain other regulations that may apply include the following (although this is not a complete list):

- 29 CFR 1910.1000 - Air Contaminants.
- 40 CFR, Part 82 - Protection of Stratospheric Ozone; Refrigerant Recycling.
- 40 CFR, Part 761 - PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions.
- 40 CFR, Parts 260 through 270 - Federal Regulations for Identification, Transportation, and Disposal of Hazardous Wastes.
- 22 CCR, Division 4.5 - California Regulations for Identification, Transportation, and Disposal of Hazardous Wastes.
- 49 CFR, Parts 171 through 180 - United States Department of Transportation (DOT) regulations.

5.3 OTHER HAZARDOUS BUILDING MATERIALS SURVEY RESULTS

A summary of equipment observed at the Site, which may contain other hazardous materials is presented in Table 4. Typical hazardous building materials observed at the Site included, but are not limited to:

- Approximately 26 fluorescent light tubes that may contain mercury or mercury vapor;
- Approximately 14 fluorescent light fixture ballasts that may contain PCBs; and
- One wall-mounted air conditioner that may contain CFCs (unit was unlabeled as to type or quantity of refrigerant).

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6 CONCLUSIONS AND RECOMMENDATIONS

6.1 CONCLUSIONS

Based upon Kleinfelder's ACM and LCM survey and subsequent laboratory analysis, ACM, LBP, LCP, and other hazardous building materials were identified at the Site.

6.2 RECOMMENDATIONS

Planned seismic retrofit activities or other future renovation activities, which may disturb ACM, LBP, LCP, or other hazardous building materials should be performed by properly trained and qualified personnel in accordance with all Federal, State, and local regulations, as implemented by Cal/OSHA, Federal OSHA, US EPA, DTSC, and MBARB. Prior to future demolition work, Kleinfelder recommends that the following actions be taken:

- Materials assumed to contain asbestos (roof penetration mastics) should either be sampled and analyzed for asbestos content prior to renovation activities or may still be assumed to contain greater than 1% asbestos and handled as such. Sampling will need to be performed by a Cal/OSHA CAC or Certified Site Surveillance Technician.
- Prior to building renovations, the owner of the property should retain a State of California-licensed asbestos/lead abatement contractor to perform abatement of ACM and LBP/LCP that could potentially be disturbed. The general contractor for the renovation project may be a source of information concerning locally licensed abatement contractors. Kleinfelder can also provide names of licensed and qualified abatement contractors in the area upon request.
- Submittal of an MBARB Notification of Demolition or Asbestos Removal is required for every demolition in MBARB jurisdiction, even when no ACMs are present, and for each asbestos removal project where the amount of ACM to be removed is equal to, or greater than 100 square feet. Prior to the initiation of abatement or demolition work, the abatement or demolition contractor must complete the Notification of Demolition or Asbestos Removal form and submit it to MBARB at least 10 business days before the start of abatement or demolition. MBARB will return the form, with a "notification number" added, to the abatement or demolition contractor, depending on who submitted the form.
- Written notification to the local Cal/OSHA district office will be required from the selected asbestos/lead abatement contractor regarding its "Intent to Conduct Asbestos Related Work"

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and/or “Intent to Conduct Lead-Related Work.” These notifications should be submitted at least 24 hours in advance of performing the respective asbestos-related or lead-related work.

- The Site may have a waste management program designed to manage and reduce waste. Kleinfelder recommends the client research records for the Site regarding its waste management program to evaluate if the other potentially hazardous building materials can be managed under the Universal Waste Rules. These items will require segregation and may require further testing and analysis to determine whether they meet the definition of a hazardous waste in California. Hazardous wastes should only be handled by properly trained workers.
- Notification should be provided to contractor and subcontractor personnel as to the presence of ACM, LCM, and other hazardous building materials at the Site.

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7 LIMITATIONS

Kleinfelder's work was performed in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions, and at the date the services were provided. Our conclusions, opinions and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This report may be used only by Joseph Chow and Associates, Inc. (Client), the Project Manager, and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two (2) years from the date of the report.

The work performed was based on project information provided by the Client. If Client does not retain Kleinfelder to review any revisions or modifications to the plans and specifications, Kleinfelder assumes no responsibility for the suitability of our estimate. In addition, if there are any changes in the field to the plans and specifications, Client must obtain written approval from Kleinfelder's engineer that such changes do not affect our recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

Kleinfelder offers various levels of investigative and engineering services to suit the varying needs of different clients. It should be recognized that definition and evaluation of environmental conditions are a difficult and inexact science. Judgments leading to conclusions and recommendations are generally made with incomplete knowledge of site conditions present due to the limitations of data from field studies. Although risk can never be eliminated, more-detailed and extensive studies yield more information, which may help understand and manage the level of risk. Since detailed study and analysis involves greater expense, our clients participate in determining levels of service that provide adequate information for their purposes at acceptable levels of risk. Acceptance of this report will indicate that the Client has reviewed the document and determined that it does not need or want a greater level of service than provided.

During the course of the performance of Kleinfelder's services, hazardous materials may have been discovered. Kleinfelder assumes no responsibility or liability whatsoever for any claim, loss of property value, damage, or injury that results from pre-existing hazardous materials being encountered or present

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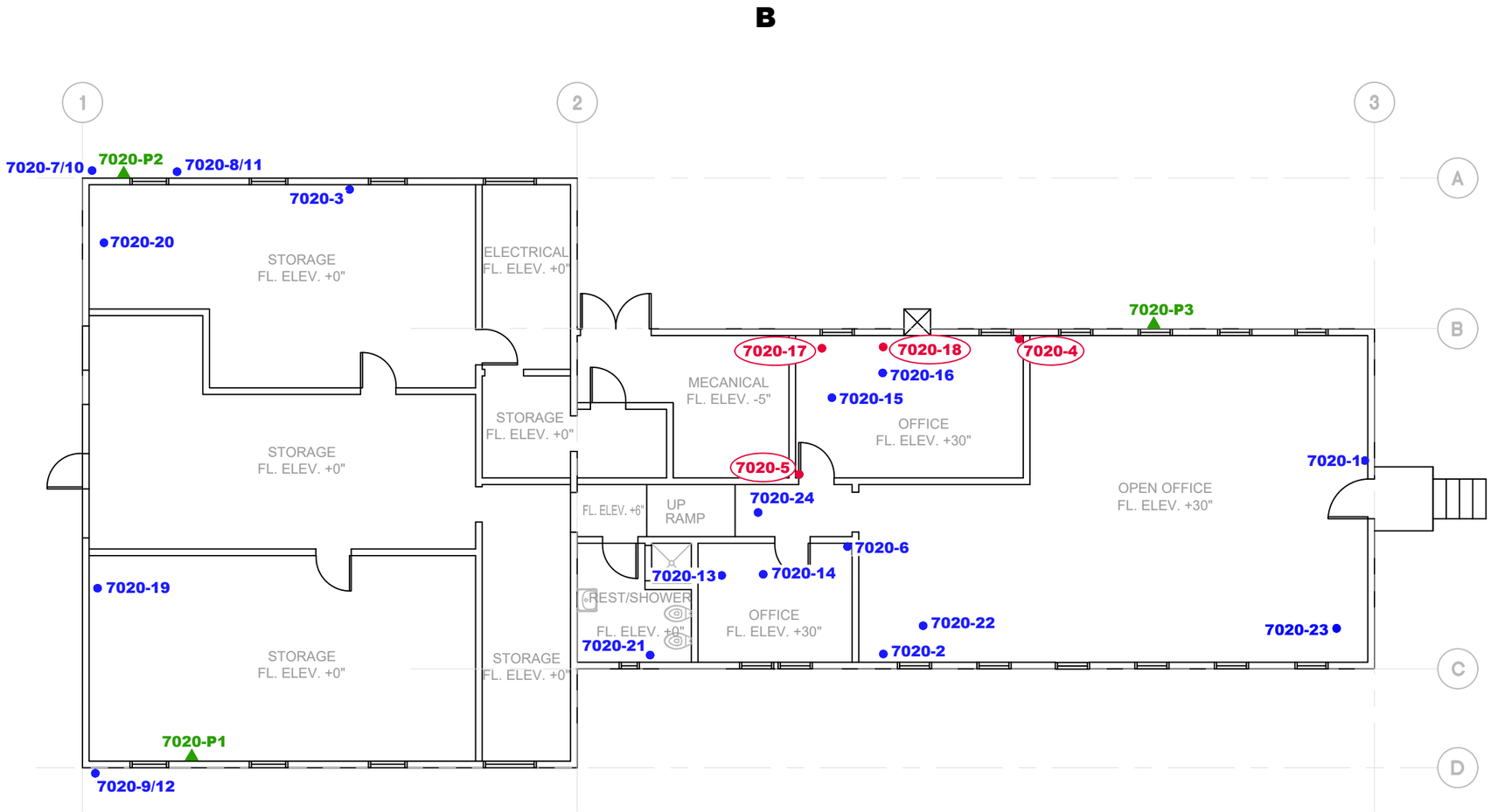
on the project site, or from the discovery of such hazardous materials. Nothing contained in this letter should be construed or interpreted as requiring Kleinfelder to assume the status of an Owner, operator, or generator, or person who arranges for disposal, transport, storage, or treatment of hazardous materials within the meaning of any governmental statute, regulation, or order. Client is solely responsible for directing notification of all governmental agencies, and the public at large, of the existence, release, treatment or disposal of any hazardous materials observed at the project site, either before or during performance of Kleinfelder's services. Client is responsible for directing all arrangements to lawfully store, treat, recycle, dispose, or otherwise handle hazardous materials, including cuttings and samples resulting from Kleinfelder's services.

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FIGURE

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PLOTTED: 11/9/2022 4:19 PM BY: dean fahrney



10 5 0 10

APPROXIMATE SCALE (feet)

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

EXPLANATION

7020-24 ●	SAMPLE IDENTIFICATION AND APPROXIMATE LOCATION OF BULK SAMPLE
7020-18 ●	SAMPLE IDENTIFICATION AND APPROXIMATE LOCATION OF BULK SAMPLE CONTAINING ASBESTOS
7020-P1 ▲	SAMPLE IDENTIFICATION AND APPROXIMATE LOCATION OF PAINT CHIP SAMPLE
A,B,C,D	ORIENTATION OF LEAD PAINT XRF SURVEY

KLEINFELDER
Bright People. Right Solutions.

PROJECT	20233038
DRAWN BY	DMF
CHECKED BY	RS
DATE:	11/2022
REVISED:	-

SAMPLE LOCATION MAP

HAZARDOUS BUILDING MATERIALS SURVEY
BUILDING 7020 RENOVATIONS
CAMP ROBERTS, SAN MIGUEL, CALIFORNIA

FIGURE
1

CAD FILE: C:\Users\DFahrney\Downloads\20233038\20233038_Camp-Roberts-7020.dwg LAYOUT: 1

TABLES

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TABLE 1
Summary of Asbestos Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Sample Number	Sample Description	Sample Location	Sample Layer Description	Asbestos Content	Condition / Friability	Estimated Quantity
7020-1	Drywall (no joint compound)	Open Office, northeast wall	Off-white drywall / White drywall / Paints	ND / ND / ND	NA	NA
7020-2	Drywall (no joint compound)	Open Office, southeast wall	White drywall	ND	NA	NA
7020-3	Drywall (no joint compound)	Garage 3, northwest wall	White drywall panel / Paint	ND / ND	NA	NA
7020-4	**Drywall / Joint compound**	**Commander's Office, north corner**	Wood / White drywall / **Off-white joint compound** / Drywall tape / **Off-white joint compound** / Paint	ND / ND / **2% CH** / ND / **2% CH** / ND (less than 1% CH as a composite by 400 PC)	**Good / F**	**850 SF**
7020-5	**Drywall / Joint compound**	**Commander's Office, south corner**	Wood / White drywall / **Off-white joint compound** / Drywall tape / **Off-white joint compound** / Paint	ND / ND / **2% CH** / ND / **2% CH** / ND (less than 1% CH as a composite by 400 PC)	**Good / F**	**See Sample 7020-4**
7020-6	Drywall / Joint compound	1st Sargent's Office, north corner	Beige drywall / Paint	ND / ND	Good / F	See Sample 7020-4
7020-7	Tar paper	Exterior, northwest wall (under wood)	Brown fibrous material with black tar	ND	NA	NA
7020-8	Tar paper	Exterior, northwest wall (under wood)	Brown fibrous material with black tar	ND	NA	NA
7020-9	Tar paper	Exterior, southeast wall (under wood)	Brown fibrous material with black tar	ND	NA	NA
7020-10	Gypsum board siding	Exterior, northwest wall (under wood)	White drywall	ND	NA	NA
7020-11	Gypsum board siding	Exterior, northwest wall (under wood)	White drywall	ND	NA	NA
7020-12	Gypsum board siding	Exterior, southeast wall (under wood)	White drywall	ND	NA	NA
7020-13	12-inch brown VFT / Yellow mastic	1st Sargent's Office	Brown tile / Tan mastic	ND / ND	NA	NA
7020-14	12-inch brown VFT / Yellow mastic	1st Sargent's Office	Brown tile / Tan mastic	ND / ND	NA	NA
7020-15	12-inch tan VFT / Black mastic	Commander's Office	Light brown tile / Black mastic	ND / ND	NA	NA

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TABLE 1
Summary of Asbestos Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Sample Number	Sample Description	Sample Location	Sample Layer Description	Asbestos Content	Condition / Friability	Estimated Quantity
7020-16	12-inch tan VFT / Black mastic	Commander's Office	Light brown tile / Black mastic / Wood	ND / ND / ND	NA	NA
7020-17	*12-inch acoustic ceiling tile / Dark brown mastic*	*Commander's Office*	*Brown mastic / Brown fibrous tile / Paint*	*Trace AN / ND / ND (less than 0.04% AN by 1,000 PC)*	*Good / NF*	*215 SF*
7020-18	*12-inch acoustic ceiling tile / Dark brown mastic*	*Commander's Office*	*Brown mastic / Brown fibrous tile / Paint*	*Trace AN / ND / ND*	*Good / NF*	*See Sample 7020-17*
7020-19	Asphaltic roof shingle	Roof, southwest edge	Grey roof shingle	ND	NA	NA
7020-20	Asphaltic roof shingle	Roof, southwest edge	Grey roof shingle	ND	NA	NA
7020-21	Asphaltic roof shingle	Roof, southeast edge	Grey roof shingle	ND	NA	NA
7020-22	Brown sheet flooring	Open Office	Brown sheet flooring / Fibrous backing	ND / ND	NA	NA
7020-23	Brown sheet flooring	Open Office	Brown sheet flooring / Fibrous backing	ND / ND	NA	NA
7020-24	Brown sheet flooring	Hallway	Brown sheet flooring / Fibrous backing	ND / ND	NA	NA
Assumed ACM	**Roof penetration mastic**	**Bases of roof vents**	**Not sampled**	**Assumed greater than 1%**	**Good / NF**	**30 SF**

Notes:
Bold = Asbestos-containing material (ACM) or asbestos-containing construction material (ACCM) with 0.1% asbestos content or greater.
Italics = Material is neither ACM or ACCM but contains detectable amounts of asbestos and should be managed in accordance with Title 8 California Code of Regulations, Section 1529.
Trace = Denotes presence of asbestos below laboratory limit of quantification of 1%. Point count analysis is necessary to confirm asbestos content of less than 1%.
400 PC = Point-count analysis by 400 Point-Count method
1,000 PC = Point-count analysis by 1,000 Point-Count method
ND = None detected
NA = Not applicable. Condition, friability, and area estimates are NA because laboratory results were reported as none detected for asbestos content.
CH = Chrysotile asbestos
AN = Anthophyllite asbestos
SF = Square feet
F = Friable
NF = Non-friable
VFT = Vinyl floor tile
Assumed ACM = Material was observed but was not safely accessible for sampling. Material is assumed to contain greater than 1% asbestos (pending future sampling).
Material quantities are estimates only, and are not intended for bidding purposes. Contractors are responsible for verifying quantities prior to bid.

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TABLE 2
Summary of Lead-Containing Materials XRF Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Reading Number	Component	Substrate	Side	Condition	Color	Location	Results	mg/cm^2
1	System Check						Pass	Pass
2	Calibration - 1.0 mg/cm^2 standard						Pass	1.06
3	Calibration - 1.0 mg/cm^2 standard (buried)						Pass	0.87
4	Wall	Drywall	A	Intact	White	Open Office	Negative	< 0.01
5	*Wainscot*	*Wood*	*A*	*Intact*	*White*	*Open Office*	*Negative - LCP*	*0.90*
6	*Wall*	*Drywall*	*B*	*Intact*	*White*	*Open Office*	*Negative - LCP*	*0.15*
7	**Window Frame**	**Wood**	**B**	**Intact**	**White**	**Open Office**	**Positive - LBP**	**1.10**
8	*Baseboard*	*Wood*	*B*	*Intact*	*White*	*Open Office*	*Negative - LCP*	*0.54*
9	Wall	Drywall	C	Intact	White	Open Office	Negative	0.06
10	**Door**	**Wood**	**C**	**Fair**	**White**	**Open Office**	**Positive - LBP**	**6.09**
11	Door Frame	Wood	C	Intact	White	Open Office	Negative	< 0.01
12	*Wall*	*Drywall*	*D*	*Intact*	*White*	*Open Office*	*Negative - LCP*	*0.75*
13	**Window Frame**	**Wood**	**D**	**Intact**	**White**	**Open Office**	**Positive - LBP**	**1.18**
14	*Baseboard*	*Wood*	*D*	*Intact*	*White*	*Open Office*	*Negative - LCP*	*0.32*
15	Wall	Drywall	A	Intact	White	1st Sargent's Office	Negative	< 0.01
16	Wall	Drywall	B	Intact	White	1st Sargent's Office	Negative	0.04
17	Wall	Drywall	C	Intact	White	1st Sargent's Office	Negative	< 0.01
18	Wall	Drywall	D	Intact	White	1st Sargent's Office	Negative	< 0.01
19	**Wainscot**	**Wood**	**A**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**4.28**
20	**Wainscot**	**Wood**	**B**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**5.44**
21	**Wainscot**	**Wood**	**C**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**3.98**
22	**Wainscot**	**Wood**	**D**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**3.16**
23	**Window Frame**	**Wood**	**D**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**5.06**
24	**Door**	**Wood**	**B**	**Intact**	**White**	**1st Sargent's Office**	**Positive - LBP**	**5.47**
25	Door Frame	Wood	B	Intact	White	1st Sargent's Office	Negative	< 0.01
26	Wall	Drywall	A	Intact	White	Commander's Office	Negative	< 0.01
27	Wall	Drywall	B	Intact	White	Commander's Office	Negative	< 0.01
28	Wall	Drywall	C	Intact	White	Commander's Office	Negative	< 0.01
29	Wall	Drywall	D	Intact	White	Commander's Office	Negative	< 0.01
30	Window Frame	Wood	B	Intact	White	Commander's Office	Negative	< 0.01
31	Door	Wood	D	Intact	White	Commander's Office	Negative	< 0.01
32	**Door Frame**	**Wood**	**D**	**Intact**	**White**	**Commander's Office**	**Positive - LBP**	**2.83**
33	Baseboard	Wood	B	Intact	White	Commander's Office	Negative	< 0.01

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TABLE 2
Summary of Lead-Containing Materials XRF Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Reading Number	Component	Substrate	Side	Condition	Color	Location	Results	mg/cm^2
34	Wall	Drywall	B	Intact	White	Hallway	Negative	< 0.01
35	Wall	Drywall	D	Intact	White	Hallway	Negative	< 0.01
36	**Wainscot**	**Wood**	**B**	**Intact**	**White**	**Hallway**	**Positive - LBP**	**7.11**
37	**Wainscot**	**Wood**	**D**	**Intact**	**White**	**Hallway**	**Positive - LBP**	**8.52**
38	Door Frame	Wood	C	Intact	White	Hallway	Negative	0.06
39	**Door Frame**	**Wood**	**A**	**Intact**	**White**	**Hallway**	**Positive - LBP**	**3.20**
40	**Wall**	**Wood**	**A**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**9.73**
41	**Wall**	**Wood**	**B**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**6.80**
42	**Wall**	**Wood**	**C**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**6.53**
43	**Wall**	**Wood**	**D**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**7.59**
44	**Toilet**	**Porcelain**	**C**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**6.49**
45	*Sink*	*Porcelain*	*A*	*Intact*	*White*	*Bathroom*	*Negative - LCP*	*0.53*
46	*Vent Pipe*	*Metal*	*A*	*Intact*	*White*	*Bathroom*	*Negative - LCP*	*0.42*
47	**Door**	**Wood**	**B**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**9.25**
48	**Door Frame**	**Wood**	**B**	**Intact**	**White**	**Bathroom**	**Positive - LBP**	**4.07**
49	Wall	Wood	A	Intact	White	PUBS Hallway	Negative	< 0.01
50	**Wall**	**Wood**	**B**	**Intact**	**White**	**PUBS Hallway**	**Positive - LBP**	**4.07**
51	**Wall**	**Wood**	**C**	**Intact**	**White**	**PUBS Hallway**	**Positive - LBP**	**1.41**
52	**Wall**	**Wood**	**D**	**Intact**	**White**	**PUBS Hallway**	**Positive - LBP**	**1.26**
53	**Baseboard**	**Wood**	**A**	**Intact**	**White**	**PUBS Hallway**	**Positive - LBP**	**3.03**
54	Door Frame	Wood	A	Intact	White	PUBS Hallway	Negative	0.05
55	**Joist**	**Wood**	**C**	**Intact**	**White**	**PUBS Hallway**	**Positive - LBP**	**1.95**
56	**Wall**	**Wood**	**C**	**Intact**	**Green**	**Garage 1**	**Positive - LBP**	**2.41**
57	**Wall**	**Wood**	**D**	**Fair**	**Green**	**Garage 1**	**Positive - LBP**	**1.85**
58	Door	Wood	B	Intact	White	Garage 1	Negative	< 0.01
59	Door Frame	Wood	B	Intact	White	Garage 1	Negative	< 0.01
60	Wall	Drywall	A	Fair	Green	Garage 2	Negative	0.07
61	Roll-up Door	Metal	A	Intact	White	Garage 2	Negative	< 0.01
62	*Wall*	*Wood*	*B*	*Intact*	*Green*	*Garage 3*	*Negative - LCP*	*0.19*
63	*Wall*	*Wood*	*C*	*Fair*	*Green*	*Garage 3*	*Negative - LCP*	*0.28*
64	Door	Wood	D	Intact	White	Garage 3	Negative	< 0.01
65	Door Frame	Wood	D	Intact	White	Garage 3	Negative	< 0.01
66	*Window Frame*	*Wood*	*B*	*Intact*	*White*	*Garage 3*	*Negative - LCP*	*0.25*

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TABLE 2
Summary of Lead-Containing Materials XRF Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Reading Number	Component	Substrate	Side	Condition	Color	Location	Results	mg/cm^2
67	**Wall**	**Wood**	**B**	**Poor**	**White**	**Exterior**	**Positive - LBP**	**1.14**
68	*Window Frame*	*Wood*	*B*	*Poor*	*Brown*	*Exterior*	*Negative - LCP*	*0.62*
69	**Wall**	**Wood**	**C**	**Poor**	**White**	**Exterior**	**Positive - LBP**	**7.72**
70	**Door**	**Wood**	**C**	**Fair**	**White**	**Exterior**	**Positive - LBP**	**10.05**
71	Door Frame	Wood	C	Poor	Grey	Exterior	Negative	< 0.01
72	**Wall**	**Wood**	**D**	**Poor**	**White**	**Exterior**	**Positive - LBP**	**2.72**
73	*Window Frame*	*Wood*	*D*	*Poor*	*Brown*	*Exterior*	*Negative - LCP*	*0.55*
74	Calibration - 1.0 mg/cm^2 standard						Pass	1.03
75	Calibration - 1.0 mg/cm^2 standard (buried)						Pass	0.85

Notes:

XRF = X-ray fluorescence

LBP = Lead-based paint

LCP = Lead-containing paint

mg/cm^2 = milligrams per square centimeter

Negative = Result indicates an XRF reading less than 0.10 mg/cm^2.

Positive-LBP = Result indicates LBP with an XRF reading greater than or equal to 1.0 mg/cm^2. Results are indicated in bold text.

Negative-LCP = Result indicates an XRF reading greater than or equal to 0.10 mg/cm^2, but less than 1.0 mg/cm^2. Results are indicated in italicized text.

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TABLE 3
Summary of Paint Chip Analytical Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Sample Number	Sample Description	Sample Location	Lead Content (%wt / ppm)
7020-P1	Green paint on wood wall	Building 7020, Garage 1, southeast wall	5.2 / 52,000
7020-P2	White paint on wood wall	Building 7020, exterior northwest wall	22 / 220,000
7020-P3	Brown paint on wood window frame	Building 7020, exterior, northwest side of building	15 / 150,000

Notes:
%wt = Percentage lead by weight
ppm = Parts per million
Bold = Indicates lead-based paint material with lead concentration of 5,000 parts per million or greater.

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TABLE 4
Summary of Other Hazardous Building Materials Survey Results
Building 7020 Renovations
Camp Roberts
San Miguel, California

Installed Equipment	Locations	Estimated Quantity	Potential Hazardous Material
Fluorescent light tubes	Commander's Office, Garages	26	Mercury and mercury vapor
Fluorescent light fixture ballasts	Commander's Office, Garages	14	PCBs
Wall-mounted air conditioner	Commander's Office	Unknown, unit was not labeled with type or quantity or refrigerant	CFCs

Notes:
PCBs = Polychlorinated Biphenyls
CFCs = Chlorofluorocarbons
Material quantities are estimates only and are not intended for bidding purposes. Contractors are responsible for verifying quantities prior to bid.

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APPENDIX A
XRF FIELD MEASUREMENT TABLE, LABORATORY ANALYTICAL REPORTS, AND CHAIN-OF-CUSTODY DOCUMENTATION

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Analysis

(EPA Method 40CFR, Part 763, Appendix E to Subpart E and EPA 600/R-93-116, Visual Area Estimation)
NVLAP Lab Code: 101459-1

Kleinfelder Inc.
Rich Stevenson
24411 Ridge Route Drive
Suite 225
Laguna Hills, CA 92653

Client ID: 6640
Report Number: B339955
Date Received: 10/21/22
Date Analyzed: 10/24/22
Date Printed: 10/24/22
First Reported: 10/24/22

Job ID/Site: 20233038.001A, Camp Roberts Building 7020, San Miguel, CA

SGSFL Job ID: 6640
Total Samples Submitted: 31
Total Samples Analyzed: 31

Date(s) Collected:

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
MATES-1	51601855						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Fibrous Glass (99 %)							
MATES-2	51601856						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Fibrous Glass (99 %)							
MATES-3	51601857						
Layer: Grey Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Fibrous Glass (99 %)							
MATES-4	51601858						
Layer: Black Non-Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
MATES-5	51601859						
Layer: Grey Fibrous Material			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (35 %) Fibrous Glass (45 %)							
MATES-6	51601860						
Layer: White Drywall			**ND**				
Layer: White Fibrous Material			**ND**				
Layer: Black Tar			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Fibrous Glass (2 %)							

20535 South Belshaw Avenue, Carson, CA 90746 / Telephone: (310) 763-2374 (888) 813-9417 / Fax: (310) 763-4450

Report Number: B339955

Client Name: Kleinfelder Inc. **Date Printed:** 10/24/22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
MATES-7	51601861						
Layer: White Drywall			**ND**				
Layer: White Fibrous Material			**ND**				
Layer: Black Tar			**ND**				
Layer: White Non-Fibrous Material			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace) Fibrous Glass (2 %)							
7020-1	51601862						
Layer: Off-White Drywall			**ND**				
Layer: White Drywall			**ND**				
Layer: Paints			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (15 %) Fibrous Glass (Trace)							
7020-2	51601863						
Layer: White Drywall			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (2 %) Fibrous Glass (Trace)							
7020-3	51601864						
Layer: White Drywall Pannel			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %) Fibrous Glass (Trace)							
7020-4	51601865						
Layer: Wood			**ND**				
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Drywall Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (25 %) Fibrous Glass (Trace)							
7020-5	51601866						
Layer: Wood			**ND**				
Layer: White Drywall			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Drywall Tape			**ND**				
Layer: Off-White Joint Compound		Chrysotile	**2 %**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (25 %) Fibrous Glass (Trace)							

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Report Number: B339955

Client Name: Kleinfelder Inc. **Date Printed:** 10/24/22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
7020-6	51601867						
Layer: Beige Drywall			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %) Fibrous Glass (Trace)							
7020-7	51601868						
Layer: Brown Fibrous Mat'l with Black Tar			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (75 %)							
7020-8	51601869						
Layer: Brown Fibrous Mat'l with Black Tar			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (75 %)							
7020-9	51601870						
Layer: Brown Fibrous Mat'l with Black Tar			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (75 %)							
7020-10	51601871						
Layer: White Drywall			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (2 %) Fibrous Glass (Trace)							
7020-11	51601872						
Layer: White Drywall			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (5 %) Fibrous Glass (Trace)							
7020-12	51601873						
Layer: White Drywall			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (5 %) Fibrous Glass (Trace)							
7020-13	51601874						
Layer: Brown Tile			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
7020-14	51601875						
Layer: Brown Tile			**ND**				
Layer: Tan Mastic			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							

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Report Number: B339955

Client Name: Kleinfelder Inc. **Date Printed:** 10/24/22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
7020-15	51601876						
Layer: Light Brown Tile			**ND**				
Layer: Black Mastic			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (Trace)							
7020-16	51601877						
Layer: Light Brown Tile			**ND**				
Layer: Black Mastic			**ND**				
Layer: Wood			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %)							
7020-17	51601878						
Layer: Brown Mastic		Anthophyllite	**Trace**				
Layer: Brown Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (85 %)							
7020-18	51601879						
Layer: Brown Mastic		Anthophyllite	**Trace**				
Layer: Brown Fibrous Tile			**ND**				
Layer: Paint			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (85 %) Comment: This comment applies to the Brown Mastic layer only: Insufficient material for additional analyses.							
7020-19	51601880						
Layer: Grey Roof Shingle			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %) Fibrous Glass (45 %)							
7020-20	51601881						
Layer: Grey Roof Shingle			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %) Fibrous Glass (45 %)							
7020-21	51601882						
Layer: Grey Roof Shingle			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (10 %) Fibrous Glass (45 %)							
7020-22	51601883						
Layer: Brown Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (15 %)							

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Report Number: B339955

Client Name: Kleinfelder Inc. **Date Printed:** 10/24/22

Sample ID	Lab Number	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer	Asbestos Type	Percent in Layer
7020-23	51601884						
Layer: Brown Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (15 %)							
7020-24	51601885						
Layer: Brown Sheet Flooring			**ND**				
Layer: Fibrous Backing			**ND**				
Total Composite Values of Non-Asbestos Fibrous Components: Cellulose (15 %)							



Tiffani Ludd, Laboratory Supervisor, Carson Laboratory

Note: Limit of Quantification ('LOQ') = 1%. 'Trace' denotes the presence of asbestos below the LOQ. 'ND' = 'None Detected'.

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ASBESTOS BULK SAMPLE DATA SHEET

Kleinfelder, Inc.	Project Name : Camp Roberts Building 7020	Sampled By: Rich Stevenson	Laboratory:
24411 Ridge Route Drive, Suite 225	Project No.: 20233038.001A	Sampled By:	SGS Forensic
Laguna Hills, CA 92653	Project Manager: Michael Foster	Sampled By:	Carson, CA
Tel: (949)727-4466	Site Address: Camp Roberts	Date Sampled: 10/19/22, 10/20/22	
Fax: (949)727-9242	San Miguel, CA		

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time(24 hr.)	Received By: (sign/print)	Laboratory
[signature]	Kleinfelder	10/21/22	1315	/	
/				/	

Sample ID	Building Number	Room Number	Sample Location	Sample Description	Quantity (SF/LF/E	Friable (Y/N)	Condition
MATES-1	MATES		BOILER ROOM	BOILER INSULATION			
MATES-2	↓		↓	↓			
MATES-3							
MATES-4				BOILER DOOR GASKET			
MATES-5			HALL OUTSIDE BOILER ROOM	2'x4' LAY-IN CEILING TILE			
MATES-6			MAINTENCE BAYS ROOF	WHITE MEMBRANE/BLACK TAR/WHITE INSULATING CONCRETE			
MATES-7	↓		↓	↓			
7020-1	7020		OPEN OFFICE, NE WALL	DRYWALL (NO JOINT COMPOUND)			
7020-2			" " , SE WALL	↓			
7020-3			GARAGE 3, NW WALL				
7020-4			CDRS OFFICE, ~~EAST~~ N CORNER	DRYWALL / JOINT COMPOUND			
7020-5			" " ~~SOUTH~~ S CORNER				
7020-6			1SGT OFFICE, NORTH CORNER				
7020-7			EXTERIOR, NW WALL (UNDER WOOD)	~~CDRS OFF~~ TAR PAPER			
7020-8	↓		↓	↓			

ASBESTOS BULK SAMPLE DATA SHEET

Kleinfelder, Inc. 24411 Ridge Route Drive, Suite 225 Laguna Hills, CA 92653 Tel: (949)727-4466 Fax: (949)727-9242	**Project Name : Camp Roberts Building 7020** Project No.: 20233038.001A Project Manager: Michael Foster Site Address: Camp Roberts San Miguel, CA	Sampled By: Rich Stevenson Sampled By: Sampled By: Date Sampled: 10/20/22	**Laboratory:** SGS Forensic Carson, CA

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time(24 hr.)	Received By: (sign/print)	Laboratory
[signature]	Kleinfelder	10/21/22	1315	/	
/				/	

Sample ID	Building Number	Room Number	Sample Location	Sample Description	Quantity (SF/LF/E	Friable (Y/N)	Condition
7020-9	7020		EXTERIOR, SE WALL (UNDER WOOD)	TAR PAPER			
7020-10	↓		EXTERIOR, NW WALL (UNDER WOOD)	GYPSUM BOARD SIDING			
7020-11			↓	↓			
7020-12			EXTERIOR, SE WALL (UNDER WOOD)	↓			
7020-13			1SG OFFICE	12" BROWN VFT / YELLOW MASTIC			
7020-14			↓	↓			
7020-15			CDR OFFICE	12" TAN VFT / BLACK MASTIC			
7020-16			↓	↓			
7020-17			↓	12" ACOUSTIC CEILING TILE / DARK BROWN MASTIC			
7020-18			↓	↓			
7020-19			ROOF, SW EDGE	ASPHALTIC ROOF SHINGLE			
7020-20			↓	↓			
7020-21			ROOF, SE EDGE	↓			
7020-22			OPEN OFFICES	BROWN SHEET FLOORING			
7020-23	↓		↓	↓			

ASBESTOS BULK SAMPLE DATA SHEET

Kleinfelder, Inc. 24411 Ridge Route Drive, Suite 225 Laguna Hills, CA 92653 Tel: (949)727-4466 Fax: (949)727-9242	**Project Name : Camp Roberts Building 7020** Project No.: 20233038.001A Project Manager: Michael Foster Site Address: Camp Roberts San Miguel, CA	Sampled By: Rich Stevenson Sampled By: Sampled By: Date Sampled: 10/20/22	**Laboratory:** SGS Forensic Carson, CA

CHAIN OF CUSTODY INFORMATION:

Relinquished By: (sign/print)	Company	Date	Time(24 hr.)	Received By: (sign/print)	Laboratory
RS	Kleinfelder	10/21/22	1315	/	
/				/	

Sample ID	Building Number	Room Number	Sample Location	Sample Description	Quantity (SF/LF/E	Friable (Y/N)	Condition
7020-24	7020		HALLWAY	BROWN SHEET FLOORING			

RS 10/20/22

SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Kleinfelder Inc.
Rich Stevenson
24411 Ridge Route Drive
Suite 225
Laguna Hills, CA 92653

Client ID: 6640
Report Number: N015061
Date Received: 10/26/22
Date Analyzed: 10/31/22
Date Printed: 10/31/22

Job ID/Site: 20233038.001A, Camp Roberts Building 7020, San Miguel, CA

SGSFL Job ID: 6640
Total Samples Submitted: 2
Total Samples Analyzed: 2

PLM Report Number: B339955

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description
7020-4	51601865	**Composite of ALL Layers** Wood White Drywall Off-White Joint Compound Drywall Tape Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

Sample ID	Lab Number	Layer Description
7020-5	51601866	**Composite of ALL Layers** Wood White Drywall Off-White Joint Compound Drywall Tape Off-White Joint Compound Paint

Point Count Results:

Number of asbestos points counted:	0
Number of non-empty points:	400
Layer percentage of entire sample:	100
Percent asbestos in layer:	**< 1**

Asbestos type(s) detected: Chrysotile

Comment: Asbestos was detected but no points were counted due to counting criteria. Therefore quantitation deemed to be < 1%.

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Point Count Analysis

(NESHAP Final Rule, 40 CFR, Part 61)

Kleinfelder Inc.
Rich Stevenson
24411 Ridge Route Drive
Suite 225
Laguna Hills, CA 92653

Client ID: 6640
Report Number: N015061
Date Received: 10/26/22
Date Analyzed: 10/31/22
Date Printed: 10/31/22

Job ID/Site: 20233038.001A, Camp Roberts Building 7020, San Miguel, CA

SGSFL Job ID: 6640
Total Samples Submitted: 2
Total Samples Analyzed: 2

PLM Report Number: B339955

Sample Preparation and Analysis:

The NESHAP Final Rule does not define the preparation method for multi-layered samples. In order to determine the composite quantity of asbestos, the volume percent of each layer is determined, the asbestos containing layers are analyzed by point counting and the composite quantity of asbestos is calculated. The NESHAP Final Rule can not be applied to matrices that dissolve in refractive index liquid. This includes tar, mastic or adhesive typically found on the back of floor tiles. According to the NESHAP Final Rule, point count data is only necessary when the visual estimate of asbestos is below 10%.

Sample ID	Lab Number	Layer Description

Note: Point count results are reported to the nearest percent per EPA method.



Tiffani Ludd, Laboratory Supervisor, Carson Laboratory

Note: Limit of Quantification (LOQ) = 1%. Trace denotes the presence of asbestos below the LOQ. ND = None Detected.

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SGS FORENSIC LABORATORIES

Final Report

Bulk Asbestos Material Analysis

(EPA Method 600/R-93/116, Point Count Analysis)

Kleinfelder Inc.
Rich Stevenson
24411 Ridge Route Drive
Suite 225
Laguna Hills, CA 92653

Client ID: 6640
Report Number: N015062
Date Received: 10/27/22
Date Analyzed: 11/02/22
Date Printed: 11/02/22

Job ID/Site: 20233038.001A, Camp Roberts Building 7020, San Miguel, CA

SGSFL Job ID: 6640
Total Samples Submitted: 1
Total Samples Analyzed: 1

PLM Report Number: B339955

Sample Preparation and Analysis:

Each sample was prepared using the gravimetric technique. A representative subsample was weighed, ashed for eight hours, and reweighed to determine the proportion of the organic component. The ashed residue was ground in concentrated hydrochloric acid, dried and reweighed to determine the acid-soluble component weight percentage. The residual material was analyzed for asbestos using polarized light microscopy. Asbestos quantitation was performed using the semi-quantitative Point Count method following the general guidelines in EPA Method 600/R-93/116. The analytical sensitivity for the method is calculated as the asbestos concentration that results from one point counted in the analysis adjusted using the residual weight of the sample. The limit of detection for this method has not been determined.

Sample ID	Lab Number	Sample Description
7020-17	51601878	**Brown Mastic**

Point Count Results:

Number of asbestos points counted:	0	Organic weight percentage:	52.32
Number of non-empty points:	1000	Acid-soluble weight percentage:	9.84
Percent asbestos in layer:	**< 0.04**	Residual weight percentage:	37.84
Analytical sensitivity (%):	0.04		
Asbestos type(s) detected:	Anthophyllite		

Comment: Asbestos was detected but no points were counted due to counting criteria.

Tiffani Ludd, Laboratory Supervisor, Carson Laboratory

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XRF: NITON XL5
S/N: FA05106

XRF MEASUREMENT RECORD LOG

INSPECTOR: R. STEVENSON
DATE: 10/19-20/22

Reading #	Component	Substrate	Side	Cond.	Color	Location	Reading (mg/cm²)
1			SYSTEM CHECK				PASS
2			CALIBRATION (1.0 mg/cm²)				1.08
3			CALIBRATION (1.0 mg/cm², buried)				1.01
4	DOOR	METAL	B	I	BLUE	BOILER ROOM	<0.01
5	DOOR F	↓	B	I	TAN	↓	<0.01
6	DOOR	↓	D	I	BLUE	↓	<0.01
7	DOOR F	↓	D	I	TAN	↓	<0.01
8	BOILER DOOR	↓	B	F	GREY	↓	<0.01
9	BOILER DOOR	↓	D	F	↓	↓	<0.01
10	DOOR	METAL	A	I	BLUE	MAINTENANCE BAYS	<0.01
11	DOOR F	↓	↓	↓	TAN	↓	<0.01
12	COLUMN - UPPER	↓	↓	↓	RED	↓	<0.01
13	COLUMN - LOWER	↓	↓	↓	YELLOW	↓	3.37
14	ROLL-UP DOOR	METAL	C	I	BLUE	↓	<0.01
15	ROLL-UP DOOR F	↓	↓	↓	↓	↓	0.07
16	COLUMN - UPPER	↓	↓	↓	RED	↓	<0.01
17	COLUMN - LOWER	↓	↓	↓	YELLOW	↓	7.34
18	ROLL-UP DOOR	METAL	A	I	BLUE	↓	<0.01
19	ROLL-UP DOOR F	↓	A	↓	↓	↓	<0.01
20			CALIBRATION (1.0 mg/cm²)				1.06
21			CALIBRATION (1.0 mg/cm², buried)				1.02
22			SYSTEM CHECK				PASS
23			CALIBRATION (1.0 mg/cm²)				1.06
24			CALIBRATION (1.0 mg/cm², buried)				0.87
25	WALL	DRY	A	I	WHITE	OPEN OFFICE	<0.01
26	WAINSCOTT	WOOD	A	↓	↓	↓	0.90
27	WALL	DRY	B	↓	↓	↓	0.15
28	WINDOW F.	WOOD	↓	↓	↓	↓	1.10
29	BASEBOARD	↓	↓	↓	↓	↓	0.54
30	WALL	DRY	C	↓	↓	↓	0.06

MATES 10/19/22

7020 10/20/22

XRF MEASUREMENT RECORD LOG

Reading #	Component	Substrate	Side	Cond.	Color	Location	Reading (mg/cm^2)
31	DOOR	WOOD	C	F	WHITE	OPEN OFFICE	6.09
32	DOOR F	↓	C	I			<0.01
33	WALL	DRY	D	I			0.75
34	WINDOW F	WOOD	D				1.18
35	BASEBOARD	↓	D	↓	↓	↓	0.32
36	WALL	DRY	A	I	WHITE	156 OFFICE	<0.01
37	↓	↓	B	↓	↓	↓	0.04
38	↓	↓	C	↓	↓	↓	<0.01
39	↓	↓	D	↓	↓	↓	<0.01
40	WAINSCOTT	WOOD	A	↓	↓	↓	4.28
41	↓	↓	B	↓	↓	↓	5.44
42	↓	↓	C	↓	↓	↓	3.98
43	↓	↓	D	↓	↓	↓	3.16
44	WINDOW F	↓	D	↓	↓	↓	5.06
45	DOOR	↓	B	↓	↓	↓	5.47
46	DOOR F	↓	B	↓	↓	↓	<0.01
47	WALL	DRY	A	I	WHITE	CDR's OFFICE	<0.01
48	↓	↓	B	↓	↓	↓	↓
49	↓	↓	C	↓	↓	↓	↓
50	↓	↓	D	↓	↓	↓	↓
51	WINDOW F	WOOD	B	I	↓	↓	<0.01
52	DOOR	↓	D	↓	↓	↓	<0.01
53	DOOR F	↓	D	↓	↓	↓	2.85
54	BASEBOARD	↓	B	↓	↓	↓	<0.01
55	WALL	DRY	B	I	WHITE	HALLWAY	<0.01
56	↓	↓	D	↓	↓	↓	<0.01
57	WAINSCOTT	WOOD	B	↓	↓	↓	7.11
58	↓	↓	D	↓	↓	↓	8.52
59	DOOR F	↓	C	↓	↓	↓	0.06

XRF MEASUREMENT RECORD LOG

Reading #	Component	Substrate	Side	Cond.	Color	Location	Reading (mg/cm^2)
60	DOOR F	WOOD	A	I	WHITE	HALLWAY	3.20
61	WALL	WOOD	A	I	↓	BATHROOM	9.73
62	↓	↓	B	↓	↓	↓	6.80
63	↓	↓	C	↓	↓	↓	6.53
64	↓	↓	D	↓	↓	↓	7.59
65	TOILET	POR.	C	I	↓	↓	6.49
66	SINK	↓	A	I	↓	↓	0.53
67	VENT PIPE	METAL	A	I	↓	↓	0.42
68	DOOR	WOOD	B	↓	↓	↓	9.25
69	DOOR F	↓	B	↓	↓	↓	4.07
70	WALL	WOOD	A	I	WHITE	PODS HALLWAY	<0.01
71	↓	↓	B	↓	↓	↓	4.07
72	↓	↓	C	↓	↓	↓	1.41
73	↓	↓	D	↓	↓	↓	1.26
74	BASEBOARD	WOOD	A	I	↓	↓	3.03
75	DOOR F	WOOD	A	↓	↓	↓	0.05
76	JOIST	WOOD	C	↓	↓	↓	1.95
77	WALL	WOOD	C	I	GREEN	GARAGE 1	2.41
78	WALL	↓	D	F	↓	↓	1.85
79	DOOR	WOOD	B	I	WHITE	↓	<0.01
80	DOOR F	↓	B	I	↓	↓	<0.01
81	WALL	DRY	A	F	GREEN	GARAGE 2	0.07
82	ROLL-UP DOOR	METAL	A	I	WHITE	↓	<0.01
83	WALL	WOOD	B	I	GREEN	GARAGE 3	0.19
84	↓	↓	C	F	↓	↓	0.28
85	DOOR	WOOD	D	I	WHITE	↓	<0.01
86	DOOR F	↓	D	I	↓	↓	<0.01
87	WINDOW F	WOOD	B	I	↓	↓	0.25
88	WALL	WOOD	B	P	WHITE	EXTERIOR	1.14

XRF MEASUREMENT RECORD LOG

Reading #	Component	Substrate	Side	Cond.	Color	Location	Reading (mg/cm^2)
89	WINDOW F	WOOD	B	P	BROWN	EXTERIOR	0.62
90	WALL	↓	C	P	WHITE	↓	7.72
91	DOOR	↓	↓	F	↓	↓	10.05
92	DOOR F	↓	↓	P	GREY	↓	<0.01
93	WALL	↓	D	↓	WHITE	↓	2.72
94	WINDOW F	↓	D	↓	BROWN	↓	0.55
95			CALIBRATION		(1.0 mg/cm²)		1.03
96			CALIBRATION		(1.0 mg/cm², buried)		0.85
97							
98							
99							
100							
101							
102							
103							
104							
105			NS 10/20/22				
106							
107							
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115							
116							
117							

SGS FORENSIC LABORATORIES

Final Report

Metals Analysis of Paints

(AIHA-LAP, LLC Accreditation, Lab ID #101629)

Kleinfelder Inc.
Rich Stevenson
24411 Ridge Route Drive
Suite 225
Laguna Hills, CA 92653

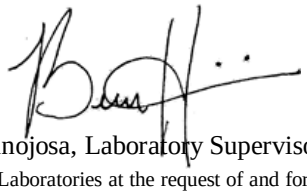
Client ID: 6640
Report Number: M246193
Date Received: 10/21/22
Date Analyzed: 10/25/22
Date Printed: 10/26/22
First Reported: 10/26/22

Job ID / Site: 20233038.001A - Camp Roberts Building 7020, San Miguel
Date(s) Collected: 10/20/22

SGSFL Job ID: 6640-1
Total Samples Submitted: 3
Total Samples Analyzed: 3

Sample Number	Lab Number	Analyte	Result	Result Units	Reporting Limit*	Method Reference
7020-P1	LM235076	Pb	5.2	wt%	0.6	EPA 3050B/7000B
7020-P2	LM235077	Pb	22	wt%	2	EPA 3050B/7000B
7020-P3	LM235078	Pb	15	wt%	0.6	EPA 3050B/7000B

* The Reporting Limit represents the lowest amount of analyte that the laboratory can confidently detect in the sample, and is not a regulatory level. The Units for the Reporting Limit are the same as the Units for the Final Results.



Beatriz Hinojosa, Laboratory Supervisor, Carson Laboratory

Analytical results and reports are generated by SGS Forensic Laboratories at the request of and for the exclusive use of the person or entity (client) named on such report. Results, reports or copies of same will not be released by SGS Forensic Laboratories to any third party without prior written request from client. This report applies only to the sample(s) tested. Supporting laboratory documentation is available upon request. This report must not be reproduced except in full, unless approved by SGS Forensic Laboratories. The client is solely responsible for the use and interpretation of test results and reports requested from SGS Forensic Laboratories. SGS Forensic Laboratories is not able to assess the degree of hazard resulting from materials analyzed. SGS Forensic Laboratories reserves the right to dispose of all samples after a period of thirty (30) days, according to all state and federal guidelines, unless otherwise specified. Any modifications that have been made to referenced test methods are documented in SGS Forensic Laboratories' Standard Operating Procedures Manual. Sample results have not been blank corrected. Quality control and sample receipt condition were acceptable unless otherwise noted.
Note* Sampling data used in this report was provided by the client as noted on the associated chain of custody form.

20535 South Belshaw Avenue, Carson, CA 90746 / Telephone: (310) 763-2374 (888) 813-9417 / Fax: (310) 763-4450

SGS FORENSIC LABORATORIES

Analysis Request Form (COC)

Client Name & Address: Client No.: 6640

Kleinfelder
24411 Ridge Route Drive, Suite 225
Laguna Hills, CA 92653

PO / Job#: 20233038.001A Date: 10/21/22

Turn Around Time: Same Day / 1Day / 2Day / 3Day / 4Day / 5Day

☐ PCM: ☐ NIOSH 7400A / ☐ NIOSH 7400B ☐ Rotometer

☐ PLM: ☐ Standard / ☐ Point Count 400 - 1000 / ☐ CARB 435

Contact: Rich Stevenson Phone: 949-233-0974

E-mail: Rhstevenson@Kleinfelder.com

☐ TEM Air: ☐ AHERA / ☐ Yamate2 / ☐ NIOSH 7402
☐ TEM Bulk: ☐ Quantitative / ☐ Qualitative / ☐ Chatfield
☐ TEM Water: ☐ Potable / ☐ Non-Potable / ☐ Weight %
☐ TEM Microvac: ☐ Qual / ☐ D5755(str/area) / ☐ D5756(str/mass)

Site Name: Camp Roberts Building 7020

☐ IAQ Particle Identification (PLM LAB) ☐ PLM Opaques/Soot
☐ Particle Identification (TEM LAB) ☐ Special Project

Site Location: San Miguel, CA

☒ Metals Analysis Matrix: Paint Method: Flame AA
Analytes: Total lead

Comments:

☐ Silica in Air ☐ w/Gravimetry
☐ Quartz Only

Sample ID	Date / Time	Sample Location / Description	FOR AIR SAMPLES ONLY Type	Time On/Off	Avg LPM	Total Time	Sample Area / Air Volume
7020-P1	10/20/22	GARAGE 3, SE WALL / GREEN PAINT ON WOOD WALL	A P C				
7020-P2	↓	EXTERIOR, NW WALL / WHITE PAINT ON WOOD WALL	A P C				
7020-P3	↓	EXTERIOR, NW SIDE / BROWN PAINT ON WOOD WINDOW FRAME	A P C				
			A P C				
			A P C				
		RLS 10/20/22	A P C				
			A P C				
			A P C				
			A P C				
			A P C				

Sampled By: R. STEVENSON Date/Time: 10/20/22 Shipped Via: ☒ Fed Ex ☐ UPS ☐ US Mail ☐ Courier ☐ Drop Off ☐ Other:

Relinquished By:	Relinquished By:	Relinquished By:
Date / Time: 10/21/22 1315	Date / Time:	Date / Time:
Received By:	Received By:	Received By:
Date / Time: 10/21/22 1:30 DLO	Date / Time:	Date / Time:
Condition Acceptable? ☑ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No	Condition Acceptable? ☐ Yes ☐ No

APPENDIX B
INSPECTOR CERTIFICATIONS

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STATE OF CALIFORNIA Gavin Newsom, Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
Division of Occupational Safety and Health-Asbestos Certification
1750 Howe Avenue, Suite 460
Sacramento, CA 95825
(916) 574-2993 Office http://www.dir.ca.gov/dosh/asbestos.html actu@dir.ca.gov

604243992C **290**

April 17, 2023

Richard H Stevenson
17521 Teachers Avenue
Irvine CA 92614

Dear Certified Asbestos Consultant or Technician:

Enclosed is your certification card. **To maintain your certification, you must abide by the rules printed on the back of the certification card.**

Your certification is valid for a period of one year. If you wish to renew your certification, you must apply for renewal at least 60 days before the expiration date shown on your card. [8 CCR 341.15(h)(1)].

Please hold and do not send copies of your required AHERA refresher renewal certificates to our office until you apply for renewal of your certification.

Certificates must be kept current if you are actively working as a CAC or CSST. The grace period is only for those who are not actively working as an asbestos consultant or site surveillance technician.

Please contact our office at the above address or email w any changes in your contact/mailing information within 15 days of the change.

Sincerely,

Kevin Graulich
Principal Safety Engineer

Attachment: Certification Card

cc: File



Renewal – Card Attached

California Department of PublicHealth

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH

LEAD-RELATED CONSTRUCTION CERTIFICATE

INDIVIDUAL:	CERTIFICATE TYPE:	NUMBER:	EXPIRATION DATE:
	Lead Inspector/Assessor	LRC-00000992	9/29/2024
	Lead Project Monitor	LRC-00000991	9/29/2024

Richard Stevenson

Disclaimer: This document alone should not be relied upon to confirm certification status. Compare the individual's photo and name to another valid form of government issued photo identification. Verify the individual's certification status by searching for Lead-Related Construction Professionals at www.cdph.ca.gov/programs/clppb or calling (800) 597-LEAD

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Attachment D
Mechanical Cutsheets

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WH-1

The new degree of comfort.®

Medium duty ultra low NOx gas commercial water heaters meet 14 ng/J NOx requirements and are designed for greater installation flexibility

Features and Benefits

The tighter the commercial retrofit, the more you will appreciate how this water heater's compact size simplifies installations.

Self-Diagnostic System

Integrated system control for easy installation and service

Ultra Low NOx Burner

The power assist burner design incorporates stainless steel multi-port burner tubes for long term ultra low NOx performance, less than 14 ng/J. A sight glass allows for burner observation. The entire design is removable and it is highly resistant to the effects of negative air pressure common in modern commercial buildings.

Patented Technology

Proprietary steel formulation with a unique coat of high temperature porcelain enamel to maximize corrosion resistance resulting in a superior tank design.

Patented Anode Rods

Magnesium anode rods are used to ensure corrosion resistance for a long tank life.

Efficiency

Rigid foam insulation provides superior insulating qualities, improves efficiency and reduces operating costs. Our patented process of injecting foam into the insulating cavity adds additional durability.

High Altitude Compliant

All models are certified for applications up to 8,500 feet above sea level.

CSA/ASME Rated T&P Valve

Factory installed relief valve

Full Port, Full Flow Brass Drain Valve

Factory installed brass drain valve allows for faster draining and servicing.

Plus

Side water connections for space heating applications

Standard replacement parts

Standard 110-volt electrical connection

Durable silcon nitride ignitor – Hot Surface Ignition (HSI)

Warranty

3-Year limited tank and 1-year limited parts warranty

See Commercial Warranty Certificate for complete information

Safety and Construction | These products are design certified by CSA Laboratories: a) For operation at 180°F. b) To meet all safety and construction requirements of ANSI Z21.10.1/ANSI Z21.10.3. c) As an automatic storage water heater. d) For operation of combustible floors and alcove installations. e) For combination water heating and space heating applications. All models are North Carolina and Massachusetts Code compliant. **Certified for 150 PSI maximum working pressure**.



Rheem
Medium Duty
Ultra Low NOx
75 and 98-Gallon Capacities
75,100 BTU/h
Natural Gas

PRINTED IN U.S.A. 12/20 WP FORM NO. RR102C-2M-ULN Rev. 5

RECOVERY CAPACITIES Recovery in U.S. Gallons/Hr. (GPH) and Liters/Hr. (LPH) at various temperature rises

MODEL NUMBER	INPUT (BTU/H) NATURAL	UNITS	40°F (22°C)	50°F (28°C)	60°F (33°C)	70°F (39°C)	80°F (45°C)	90°F (50°C)	100°F (56°C)	110°F (61°C)	120°F (67°C)	130°F (72°C)
G75UN	75,100	GPH	182	146	121	104	91	81	73	66	61	56
		LPH	*690*	*552*	*460*	*394*	*345*	*307*	*276*	*251*	*230*	*212*
G100UN	75,100	GPH	182	146	121	104	91	81	73	66	61	56
		LPH	*690*	*552*	*460*	*394*	*345*	*307*	*276*	*251*	*230*	*212*

MAXIMUM DELIVERY Delivery in U.S. Gallons and Liters. (Includes useable storage and recovery for indicated times)

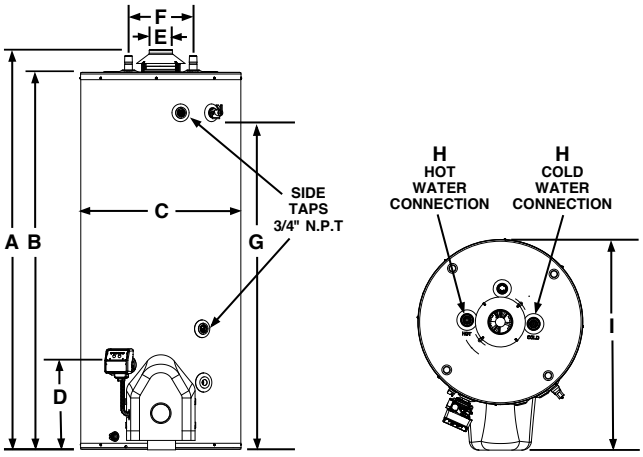
MODEL NUMBER	CAPACITY GALS	CAPACITY LITERS	INPUT (BTU/H) NATURAL GAS	TEMP. RISE	UNITS	5 MIN.	10 MIN.	15 MIN.	20 MIN.	30 MIN.	45 MIN.	60 MIN.	120 MIN.	180 MIN.	MIN. TO REC. CONTENTS
G75UN	75	284	75,100	100 °F	GAL	59	65	71	77	89	107	125	198	271	62
				55.6 °C	*LTR*	*224*	*246*	*267*	*292*	*337*	*405*	*474*	*750*	*1027*	
G100UN	98	371	75,100	100 °F	GAL	75	81	87	93	105	123	141	214	287	81
				55.6 °C	*LTR*	*283*	*306*	*329*	*352*	*398*	*467*	*536*	*812*	*1088*	

DIMENSIONAL INFORMATION All dimensions in English and Metric units

MODEL NUMBER	UNITS	HT. TO VENT A	TANK HEIGHT B	DIAM. C	HT. TO GAS CONN. D	VENT SIZE E	WATER CONN. CTR F	HT. TO SIDE T&P VALVE G	WATER CONN. SIZE H	FRONT TO BACK I	SHIP. WEIGHT
G75UN	inches	64-1/8	60-1/4	26-1/4	14-1/4	4	11	52-1/4	1	33-3/4	300 Lbs
	mm	*1629*	*1527*	*667*	*362*	*102*	*279*	*1327*	*25*	*857*	–
G100UN	inches	67-7/8	64	27-1/8	14-1/4	4	11	56-1/8	1	34-3/4	370 Lbs
	mm	*1724*	*1626*	*689*	*362*	*102*	*279*	*1426*	*25*	*883*	–

Recommended Specifications

Water heater(s) shall be model _____, manufactured by Rheem, having gas input of _____ Btu/h and a recovery rate of _____ GPH at a 100°F temperature rise. Water heater(s) shall have a storage capacity of _____ gallons. Water heater(s) shall have the CSA seal of certification and be factory equipped with an CSA/ASME rated temperature and pressure relief valve. Tank(s) shall have a coating of high temperature porcelain enamel and furnished with a magnesium anode rod rigidly supported and a brass drain valve. Water heater(s) shall meet or exceed the energy factor requirements of ASHRAE. Tanks shall have a working pressure rating of 150 psi, and shall be completely factory assembled, including a pressure regulator properly adjusted for operation on_____ gas. Controls will be arranged for safety shutoff in event of pilot failure. Complete unit shall be insulated with rigid polyurethane foam insulation.



In keeping with its policy of continuous progress and product improvement, Rheem reserves the right to make changes without notice.

Rheem Water Heating • 1115 Northmeadow Parkway, Suite 100
Roswell, Georgia 30076 • www.rheem.com

Rheem Canada Ltd./Ltée • 125 Edgeware Road, Unit 1
Brampton, Ontario L6Y 0P5 • www.rheem.ca

PRINTED IN U.S.A. 12/20 WP FORM NO. RR102C-2M-ULN Rev. 5

ELKAY®
SPECIFICATIONS

Elkay ezH2O Bottle Filling Station & Versatile Bi-Level ADA Cooler High Efficiency Filtered Refrigerated Stainless

DF-1 **Model LZSTLG8WSSK**

PRODUCT SPECIFICATIONS

Elkay ezH2O® Bottle Filling Station & Versatile Bi-Level ADA Cooler High Efficiency Filtered Refrigerated Stainless. Chilling Capacity of 8.0 GPH (gallons per hour) of 50° F drinking water, based on 80° F inlet water and 90° F ambient, per ASHRAE 18 testing. Features shall include Antimicrobial*, Filtered, Green Ticker™, Hands Free, High Efficiency, Laminar Flow, Real Drain, Visual Filter Monitor. Furnished with Flexi-Guard ® StreamSaver ™ bubbler. Electronic Bottle Filler Sensor with Electronic Front and Side Bubbler Pushbar activation. Product shall be Wall Mount (On Wall), for Indoor applications, serving 2 station(s). Unit shall be certified to UL 399 and CAN/CSA C22.2 No. 120.

Special Features:	Antimicrobial, Filtered, Green Ticker™, Hands Free, High Efficiency, Laminar Flow, Real Drain, Visual Filter Monitor
Finish:	Stainless Steel
Power:	115V/60Hz
Bubbler Style:	Flexi-Guard ® StreamSaver ™
Activation by:	Electronic Bottle Filler Sensor with Electronic Front and Side Bubbler Pushbar
Mounting Type:	Wall Mount (On Wall)
Chilling Capacity*:	8.0 GPH
Full Load Amps	6
Rated Watts:	360
Dimensions (L x W x H):	36-3/4" x 19" x 39-1/16"
Approx. Shipping Weight:	104 lbs.
Installation Location:	Indoor
No. of Stations Served:	2
*Based on 80° F inlet water & 90° F ambient air temp for 50° F chilled drinking water.	

Special Note: Installs with stainless steel back panel (1000004920); accessory to enhance design & ease of installation.

- Visual Filter Monitor: LED Filter Status Indicator for when filter change is necessary.
- Filter is certified to NSF 42 and 53 for lead, cyst, particulate, chlorine, taste and odor reduction. 3,000 gal. capacity.
- High-performance compressor and insulation greatly reduce energy consumption.
- Green Ticker: Informs user of number of 20 oz. plastic water bottles saved from waste.



Included with Product: **Water Cooler (LZSTLG8WSSC), Bottle Filler (LZWSR), Filter**

▼ Ships in multiple boxes.

A Century of Tradition and Quality.
For more than 100 years, Elkay has been making innovative products and providing exceptional customer care. We take pride in offering plumbing products that make life easier, inspire change and leave the world a better place.

PRODUCT COMPLIANCE

ADA & ICC A117.1
ASME A112.19.3/CSA B45.4
Buy American Act
CAN/CSA C22.2 No. 120
GreenSpec®
NSF/ANSI 42, 53, 61, & 372 (lead free)
UL 399

Installation Instructions (PDF) - 1000001714

5 Year Limited Warranty on the refrigeration system of the unit. Electrical components and water system are warranted for 12 months from date of installation. **Warranty pertains to drinking water applications only. Non-drinking water applications are not covered under warranty.**

Warranty (PDF)

PART:_____QTY: _____
PROJECT:_____
CONTACT:_____
DATE:_____
NOTES:_____
APPROVAL:_____

- Laminar flow provides clean fill with minimal splash.

In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit elkay.com for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.

- Key plastic components are manufactured with silver ion antimicrobial agent helping to provide clean, stain- and odor-free surfaces.
- Real Drain System eliminates standing water.

*Antimicrobial claims are in refence to components manufactured antimicrobial agents, helping to provide clean, stain- and odor-free surfaces.

COOLING SYSTEM

- Compressor: Hermetically-sealed, reciprocating type, single phase. Sealed-in lifetime lubrication.
- Condenser: Fan cooled, copper tube with aluminum fins. Fan motor is permanently lubricated.
- Cooling Unit: Combination tube-tank type. Continuous copper tubing with is fully insulated with EPS foam that meets UL requirements for self-extinguishing material.
- Refrigerant Control: Refrigerant R-134a is controlled by accurately calibrated capillary tube.
- Refrigerant Control: Refrigerant HFC-134a is controlled by accurately calibrated capillary tube for positively trouble-free operation.
- Temperature Control: Easily accessible enclosed adjustable thermostat is factory preset. Requires no adjustment other than for altitude requirements.

Optional Accessories		
51300C	Elkay WaterSentry Replacement Filter (Bottle Fillers & Liv Pro) Spec Sheet (PDF)	
LKAPREZL	Elkay Cane Apron for EZ Gray Spec Sheet (PDF)	
MLP200	In-wall Carrier for Bi-level On-wall Bottle Fillers Coolers & Fountains Spec Sheet (PDF)	
36292C	Power Block for Multistation Bottle Filling Stations Spec Sheet (PDF)	

In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit elkay.com for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.

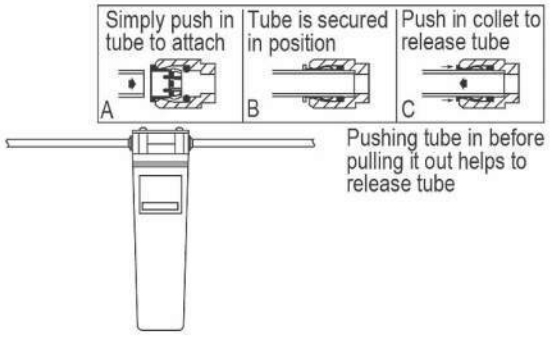
IMPORTANT!
INSTALLER PLEASE NOTE :

This water cooler has been designed and built to provide water to the user which has not been altered by materials in the cooler waterways. The grounding of electrical equipment such as telephone, computer, etc. to water lines is a common procedure. The grounding may be in the building but may also occur away from the building. This grounding can cause electrical feedback into a water cooler creating an electrolysis which creates a metallic taste or causes an increase in the metal content of the water. This condition is avoidable by installing the cooler using the proper materials as shown below.

NOTICE

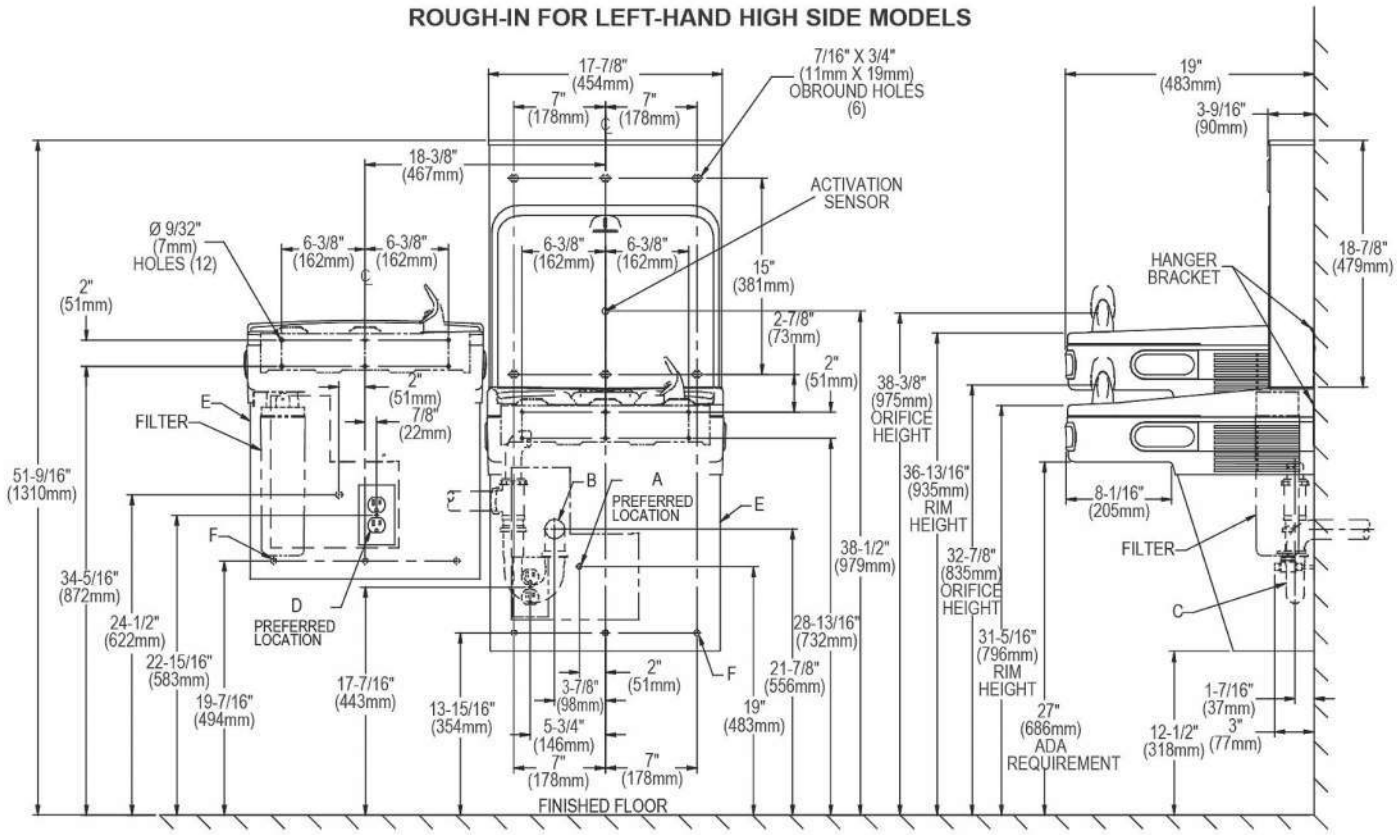
This water cooler must be connected to the water supply using a dielectric coupling. The cooler is furnished with a non-metallic strainer which meets this requirement. The drain trap which is provided by the installer should also be plastic to completely isolate the cooler from the building plumbing system.
Bottle filler unit on bracket attached to wall by 6 holes (as shown). Water and electrical will connect through pre-punched hole in basin.
These products are designed to operate on 20 psi to 105 psi supply line pressure. Simultaneous operation of both bubblers on a bi-level unit may not be possible depending on water supply pressure. If simultaneous operation is desired, please ensure a minimum of 65 psi supply.

OPERATION OF QUICK CONNECT FITTINGS



WaterSentry® Plus Filter System

ROUGH-IN FOR LEFT-HAND HIGH SIDE MODELS



REDUCE HEIGHT BY 3 INCHES FOR INSTALLATION OF CHILDREN'S ADA COOLER

LEGEND:
A = Recommended Water Supply location. Shut-off Valve (not furnished) to accept 3/8" O.D. unplated copper tube. Up to 3" (76mm) maximum out from wall.
B = Recommended Waste Outlet location. To accommodate 1-1/4" nominal drain. Drain stub 2" (51mm) out from wall.
C = 1-1/4" Trap (not furnished).
D = Electrical Supply (3) Wire Recessed Box Duplex Outlet.
E = Insure proper ventilation by maintaining 6" (152mm) minimum clearance from cabinet louvers to wall.
F = 7/16" (11mm) Bolt Holes for fastening to wall.
Note : New Installations Must Use Ground Fault Circuit Interrupter (GFCI). It is highly recommended that the circuit be dedicated and the load protection be sized for 20 amps.

In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit elkay.com for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.

Z5665-BWL1

HET Elongated Floor Mounted, ADA Height EcoVantage® Flush Valve Toilet System

WC-1

TAG _____

Architectural/Engineering Specification:

☐ **Z5665-BWL1**
EcoVantage High Efficiency Toilet System
Vitreous China, 1.1 gpf [4.2 Lpf] or greater high efficiency, ADA, floor mounted, bottom outlet toilet with siphon jet flushing action and elongated front rim with 1-1/2" top spud. This bowl is designed to perform to industry standards with as little as 1.1 gallons per flush.

☐ **Z5665-BWL1-AM**
EcoVantage High Efficiency Toilet System
Vitreous China, 1.1 gpf [4.2 Lpf] or greater high efficiency, ADA, floor mounted, bottom outlet toilet with siphon jet flushing action, ZurnSHIELD™ ceramic glaze and elongated front rim with 1-1/2" top spud. This bowl is designed to perform to industry standards with as little as 1.1 gallons per flush.

☐ **Z5666-BWL1**
EcoVantage High Efficiency Toilet System
Vitreous China, 1.1 gpf [4.2 Lpf] or greater high efficiency, ADA, floor mounted, bottom outlet toilet with siphon jet flushing action, ZurnSHIELD™ ceramic glaze and elongated front rim with integral bedpan lugs, and 1-1/2" top spud. This bowl is designed to perform to industry standards with as little as 1.1 gallons per flush.

Product Features:

Z5665 HET Series

- Zurn High Efficiency Toilets and paired performance flush valve systems are designed to exceed industry standards, while using as little as 1.1 gallons of water per flush.
- Universal high efficiency toilet can be specified with 1.1 gpf [4.2 Lpf] , 1.28gpf [4.8Lpf], 1.6 gpf [6.0 Lpf] or dual flush valves.
- Vitreous china
- ADA height
- Elongated front rim
- 2-1/8" fully glazed trapway
- High efficiency siphon jet flush action
- Shipping weight 65 lbs.

Compliance and Certification:

- Complies with ASME A119.2 / CSA B45.1
- ADA Compliant

This product should be used with a WaterSense labeled counterpart with a compatible flush volume to ensure that the entire system meets the requirements for water efficiency and performance.



Variant Options:

☐ **Z5665-BWL1**
Z5665 Series Top spud toilet

☐ **Z5665-BWL1-AM**
Z5665 Series top spud toilet with ZurnSHIELD™ glaze

☐ **Z5666-BWL1**
Z5665 Series top spud toilet with Top Spud Toilet with integral bedpan lugs and ZurnSHIELD™ glaze

Recommended Trim:

☐ **Z5955SS-EL**
Elongated, standard white, open front toilet seat less cover with stainless steel check hinge.

☐ **Z5972-COMB**
Closet bolt & wax ring kit.

NOTE: To ensure system performance:
Minimum Running Water Pressure = 25 psi.

See Zurn One Systems for suggested packages.

Architectural/Engineering Approval

The information contained in this document is subject to change without notice.
Please contact Zurn for most up to date information.

ZURN INDUSTRIES, LLC 511 W. Freshwater Way, Milwaukee, WI U.S.A. 53204 · Ph. 1-855-ONE-ZURN, Fax 919-775-3541
In Canada: **ZURN INDUSTRIES LIMITED** 7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 905-405-8272, Fax 905-405-1292

Rev. E Date: 08/08/2022 C.N. No. 144736 Prod. | Dwg. No. SS Z5665-BWL1

WC-1

OPTIONS

Flush Volume

- [ ] 1.6 gpf (6.0 Lpf) (1.6)
- [ ] 1.28 gpf (4.8 Lpf) (1.28)
- [ ] 1.1 gpf (4.2 Lpf) (1.1)

Finish

- [ ] Polished Chrome (CP)
- [ ] Polished Brass (PB)
- [ ] Brushed Nickel (BN)
- [ ] Brushed Stainless (SF)
- [ ] Graphite (GR)

Water Efficiency

- [ ] Low Consumption
- [ ] High Efficiency

Handle

- [ ] Front of Valve (H)
- [ ] Sanigard® (SG)
- [ ] Left of Valve (G)
- [ ] Nickel-Silver (YA)
- [ ] CuVerro
- [ ] Right of Valve (I)

Push Button

- [ ] Metal Index (L)
- [ ] 3" Metal Oscillating (L3)
- [ ] Front of Valve (HL3)

Control Stop

- [ ] 1" Straight (E)
- [ ] Wheel Handle (K)
- [ ] Ground Joint (GJ)
- [ ] Less (L/STOP)

Tailpiece

- [ ] H551A 3 1/16" (H551A-3-1/16)
- [ ] H551A 4 1/16" (H551A-4-1/16)
- [ ] H551A 5 1/16" (H551A-5-1/16)

Inlet

- [ ] Left of Valve (C)
- [ ] Back of Valve (B)

Vacuum Breaker

- [ ] Less (XYV)

Offset

- [ ] 1 ½" (38mm) (1-1/2-OFST)
- [ ] 1" (25mm) (1-OFST)



Image for a standard ROYAL 111 shown

DESCRIPTION

Royal® Exposed Manual Water Closet Flushometer

FEATURES

- Water conservation is aided by the ADA-compliant, non-hold-open handle, which prevents toilet from exceeding intended flush volume
- Flush accuracy is controlled by CID™ technology, also enhancing water efficiency
- Integrity of the product is maintained with the vandal-resistant stop cap
- Durability is facilitated with high copper, low zinc brass castings for dezincification resistance
- Adjustable tailpiece
- PERMEX synthetic rubber diaphragm with Dual Filtered Fixed Bypass
- Valve body, Cover, Tailpiece and Control Stop shall be in compliance with ASTM Alloy Classification for Semi-Red Brass
- Valve shall be in compliance to the applicable sections of ASSE 1037.

DOWNLOADS

- Royal Exposed Installation Instructions
- Control Stop Repair and Maintenance Guide
- Flush Connections Flanges Repair and Maintenance Guide
- Tail Piece Repair and Maintenance Guide
- Royal Manual Diaphragm Flushometer Repair and Maintenance Guide
- Tools/Accessories
- Flushometer Pressure gauges
- Additional Downloads

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Outlet Tube

- [ ] Trap Primer (TP)
- [ ] F189 (F189)
- [ ] F188 (F188)

Adapter

- [ ] Cast Set Screw Wall Flange (YBC)

Bumper

- [ ] Angle Stop (YO)
- [ ] Angle Stop Extended (YG)

Pipe Support

- [ ] Solid Ring (YK)

Special Features

- [ ] Less Logo (LL)
- [ ] Carbon Offset (CO)
- [ ] Whitworth Thread (WWT)

Compliances & Certifications

- [ ] BAA Compliant
- [ ] cUPC Certified
- [ ] Made in the USA
- [ ] ADA Compliant
- [ ] Satisfies LEED Credits
- [ ] cUPC Green Certified
- [ ] WaterSense Listed
- [ ] BREEAM Water Credit
- [ ] Green Globes Water Credit
- [ ] LEED V4 Water Efficiency Credit

VIDEOS

PVD Special Finishes

NOTES

For product line drawings, view model-specific spec sheets.

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Z5950

Commercial Heavy Duty Toilet Seat

WC-1

TAG _____

Select your seat and check all options that apply
Engineering Specification:

☐ Z5955SS-EL Elongated, standard white, open front toilet seat, less cover, with stainless steel check hinge.
- ☐ -AM ZurnSHIELD™ protection
- ☐ -AMFR ZurnSHIELD™/Fire Retardant
- ☐ -BK Black
- ☐ -STS Self-sustaining stainless steel check hinge

☐ Z5956SS-EL Elongated, extra heavy duty, premium white, open front toilet seat, less cover, with stainless steel check hinge.
- ☐ -ADA 2" Lift
- ☐ -AM ZurnSHIELD™ protection
- ☐ -BK Black
- ☐ -STS Self-sustaining stainless steel check hinge

☐ Z5956SS-EL Elongated, extra heavy duty, premium white, open front toilet seat, less cover, with stainless steel check hinge.
- ☐ -ADA 2" Lift
- ☐ -AM ZurnSHIELD™ protection
- ☐ -BK Black
- ☐ -STS Self-sustaining stainless steel check hinge

☐ Z5957SS White, open front toilet seat, with cover and stainless steel check hinge.
- ☐ -AM ZurnSHIELD™ protection
- ☐ -AMFR ZurnSHIELD™/Fire Retardant
- ☐ -BK Black
- ☐ -EL Elongated
- ☐ -RD Round
- ☐ -STS Self-sustaining stainless steel check hinge

☐ Z5958SS White, closed front toilet seat, with cover and stainless steel check hinge.
- ☐ -AMFR ZurnSHIELD™/Fire Retardant
- ☐ -EL Elongated
- ☐ -RD Round
- ☐ -STS Self-sustaining stainless steel check hinge

☐ Z5959SS-JUV White, ZurnSHIELD™ open front child's toilet seat, less cover, with stainless steel check hinge.

Product Features:

- Injection molded for rugged, heavy duty use.
- Highly resistant to cleansers and strong chemicals
- Stainless steel check hinge
- Integrally molded bumpers for lasting durability

*ZurnSHIELD™ protects the seat by inhibiting the growth of stain and odor causing mold mildew and bacteria, thus reducing the amount of time, chemicals and water to clean the seat.



Z5955SS-EL shown above



Z5956SS-EL shown above



Z5957SS shown above

Z5958SS --



Z5959SS-JUV shown above

Architectural/Engineering Approval

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In Canada: **ZURN INDUSTRIES LIMITED** 7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 905-405-8272, Fax 905-405-1292

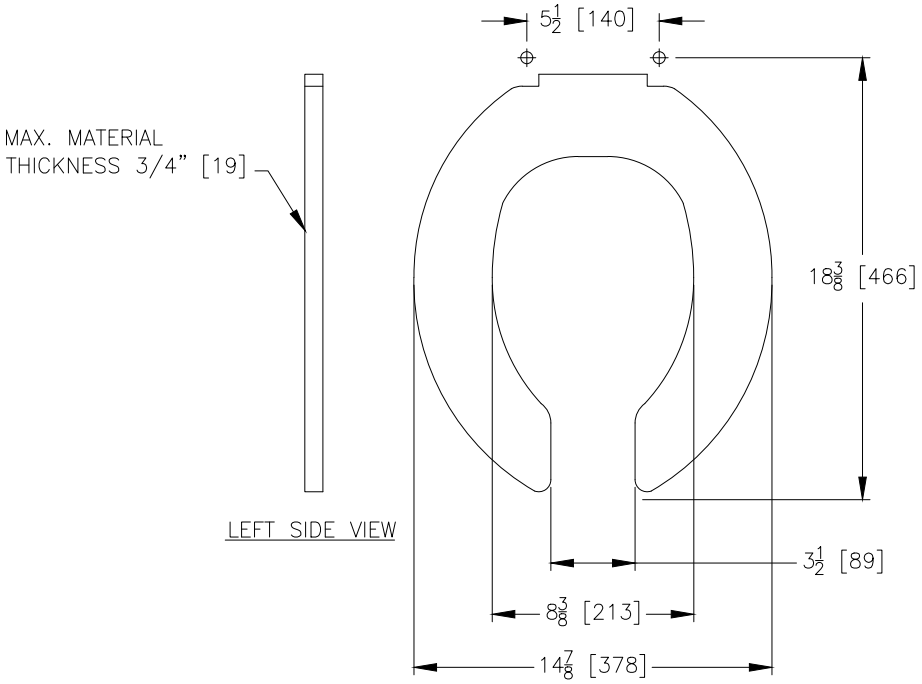
Rev. A Date: 02/23/21 C.N. No.143432 Prod. | Dwg. No. SS Z5950

Z5950

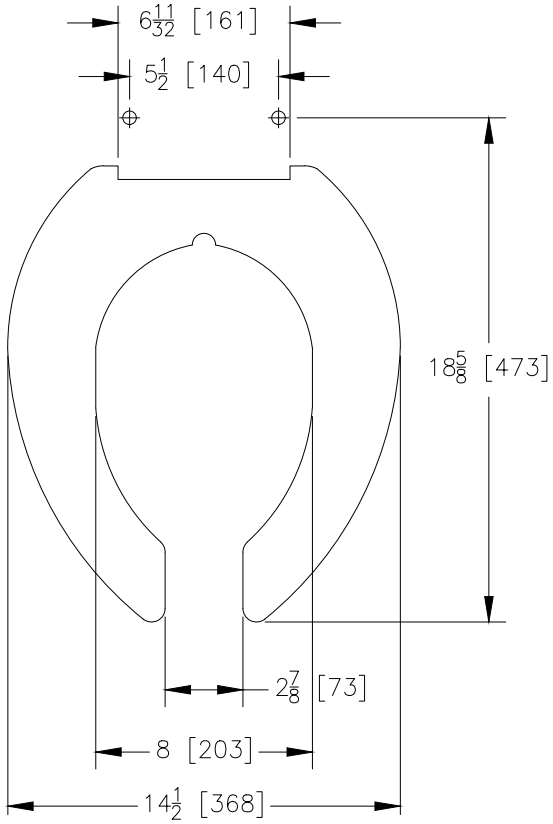
Commercial Heavy Duty Toilet Seat

TAG _____

Rough-in dimensions/Overview dimensions



Z5955SS-EL shown above



Z5956SS-EL shown above

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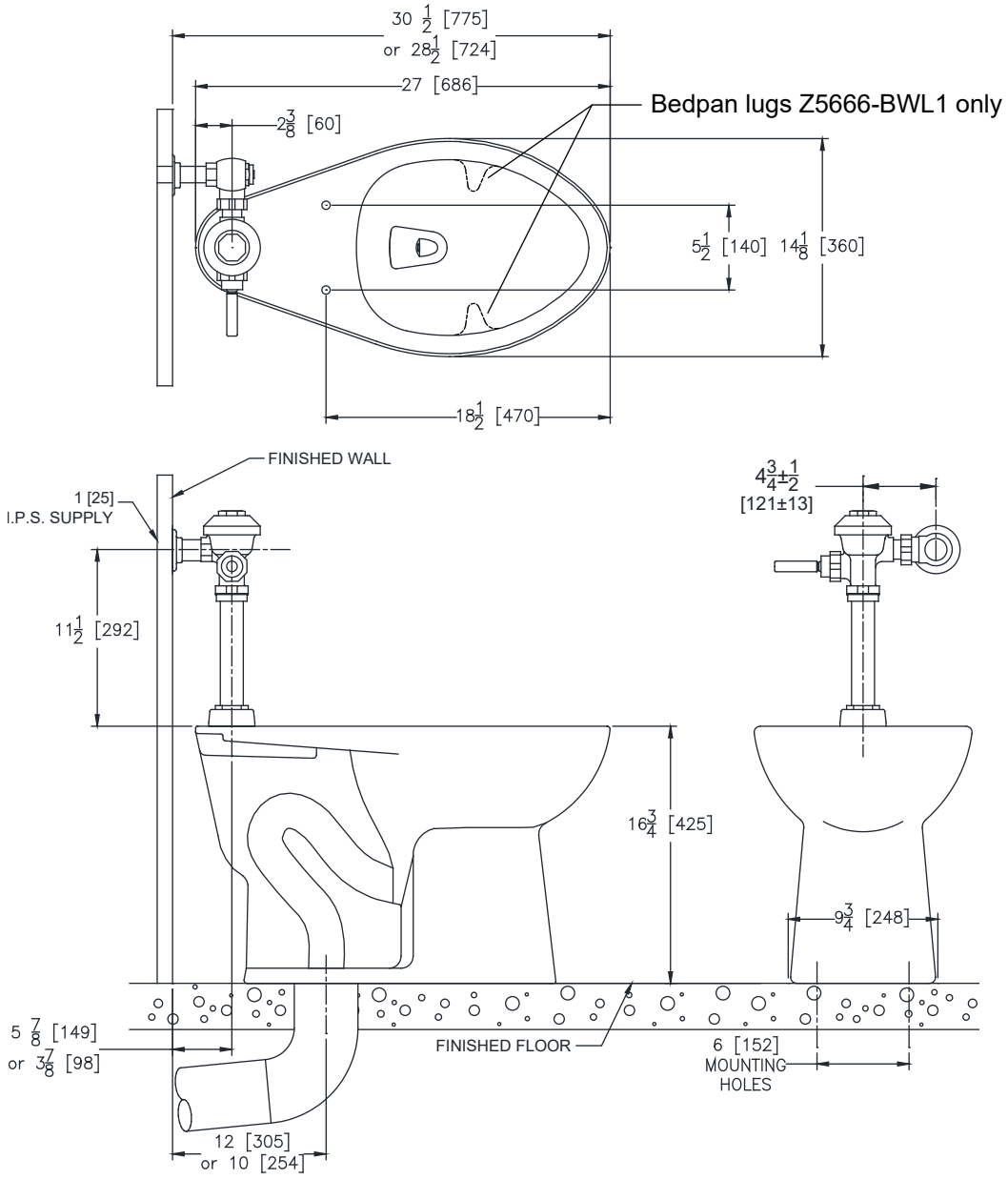
Rev. A Date: 02/23/21 C.N. No.143432 Prod. | Dwg. No. SS Z5950

Z5665-BWL1

HET Elongated Floor Mounted, ADA Height
EcoVantage® Flush Valve Toilet System

TAG _____

Rough-in dimensions/Overview dimensions

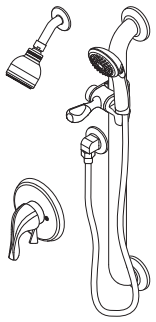


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Location: SH-1

SYMMONS® Origins®
the smart choice™

S9608PLRTRM, S9608PLRTRMTC
Shower/Hand Shower Trim
Specification Submittal



Feature Highlights

- Origins Shower/Hand Shower Trim
- Requires Temptrol® Pressure Balancing Tub/Shower Valve
- Integral diverter control
- Metal lever handle
- ADA 36" grab bar for hand shower wand
- Dual checks for backflow protection
- 60" flexible metal hose
- ADA 1 mode hand shower wand with non-positive shutoff
- 1 mode showerhead with easy to clean nozzles
- 2.5 gpm (9.5 L/min) flow restrictors
- Tub spout not included
- Components shall be metal and nonmetallic construction, plated in standard Polished Chrome finish
- Available with TA-10 flow control spindle and T-12A cap assembly for Temptrol valve bodies installed with Test Cap (order p/n S9608PLRTRMTC)
- For optional in-line vacuum breaker order p/n EF-109

Model Numbers

☐ **S9608PLRTRM**
Shower/Hand Shower Trim with integral diverter control, Temptrol Pressure Balancing Tub/Shower Valve ordered separately

☐ **S9608PLRTRMTC**
Shower/Hand Shower Trim with integral diverter control, TA-10 flow control spindle and T-12A cap assembly, must order Temptrol valve with Test Cap

Compliance

- ASME A112.18.1/CSA B125.1

C US

Warranty

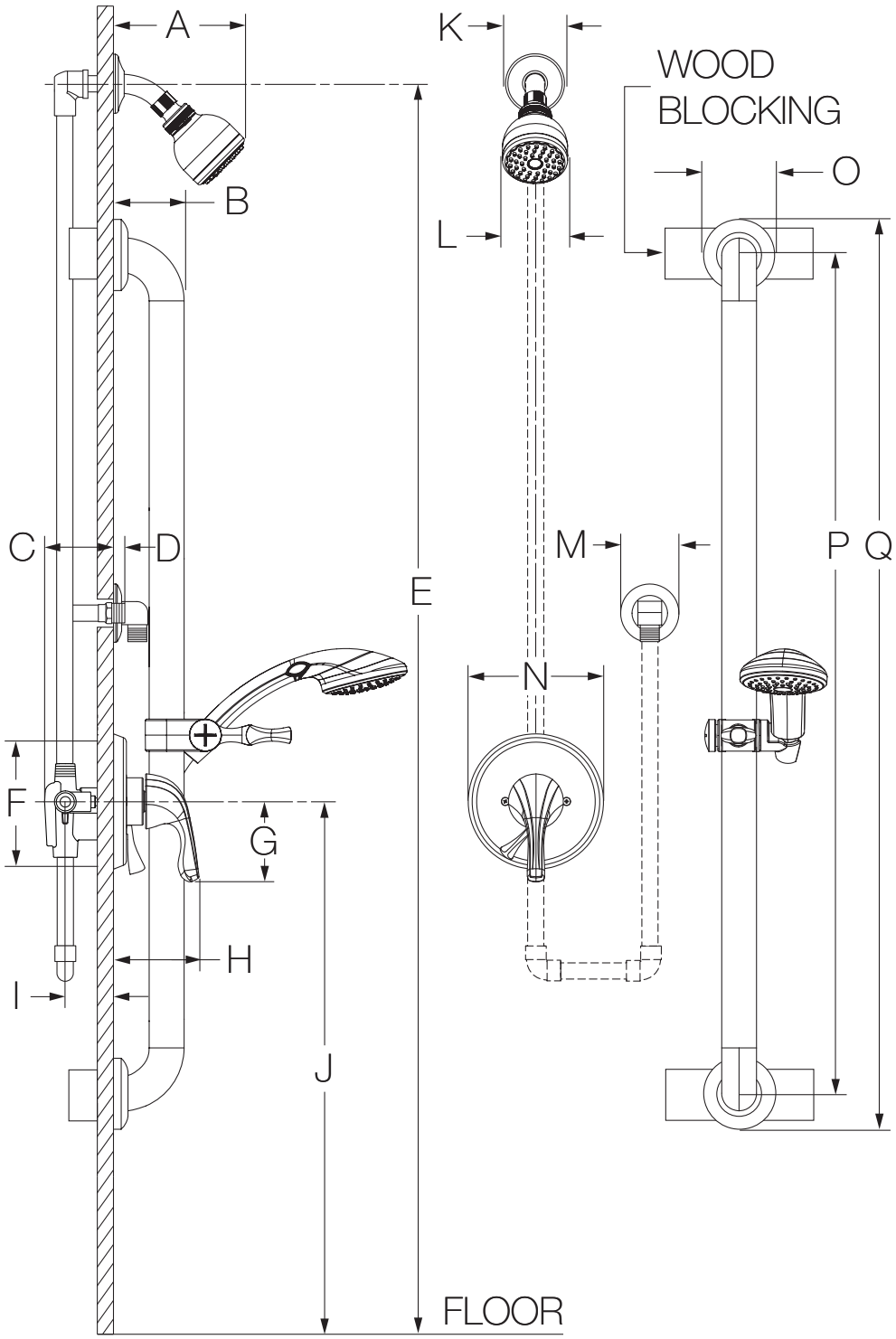
Limited Lifetime - to the original end purchaser in consumer/residential installations.
5 Years - for industrial/commercial installations.
Refer to www.symmons.com/warranty for complete warranty information.
Go to www.symmons.com/register to register your Symmons product.

Options/Modifications

☐	**-1.5**	CG	*1.5 gpm (5.7 L/min) flow restrictor*
☐	**-2.0**		*2.0 gpm (7.6 L/min) flow restrictor*
☐	**-143**		*3 mode showerhead*
☐	**-145**		*5 mode showerhead*
☐	**-151**		*1 mode showerhead*
☐	**-231**		*Super showerhead*
☐	**-295**		*Institutional showerhead*
☐	**-72**		*72" hose in place of 60" hose*
☐	**-ADAHS**		*ADA hand shower wand (white)*
☐	**-B**		*Brass escutcheon (chrome only)*
☐	**-B30**		*30" slide bar in place of 36" grab bar*
☐	**-B48**		*48" slide bar in place of 36" grab bar*
☐	**-D**		*Brass dome cover (chrome only)*
☐	**-H321-V**		*1 mode hand shower unit with slide bar*
☐	**-H323-V**		*3 mode hand shower unit with slide bar*
☐	**-L1**		*Less showerhead*
☐	**-L2**		*Less hand shower wand*
☐	**-L3**		*Less showerhead & hand shower wand*
☐	**-LAM**		*Metal finish insert handle*
☐	**-LP**		*Loop handle*
☐	**-L/GB**		*Less grab bar*
☐	**-OP**		*13" oval plate*
☐	**-QD**		*Quick-disconnect on hand shower units*
☐	**-R**		*60" white vinyl hose in place of 60" metal hose*
☐	**-REB**		*Rebuild trim kit, includes TA-10 and TA-4*
☐	**-T724**		*24" slide bar/grab bar with ADA wand*
☐	**-T748**		*48" slide bar/grab bar with ADA wand*
☐	**-VB**		*Elevated vacuum breaker*
☐	**-VP**		*Vandal resistant escutcheon screws in place of standard screws*
☐	**-STN**		*Satin Nickel finish*

Note: Append appropriate -suffix to model number.

Dimensions



Measurements	
A	6-3/8", 162 mm
B	3", 76 mm
C	3-1/2", 89 mm
D	Male 1/2" NPT fitting must protrude 3/8" (10 mm) from finished wall
E	Ref. 77", 1956 mm
F	Shower Valve Hole Size Min. Ø 3", 76 mm Max. Ø 4", 102 mm
G	3-3/8", 86 mm
H	3-5/8", 92 mm
I	Rough-in 2-3/8" ± 1/2", 60 mm ± 13 mm
J	Ref. 42", 1067 mm
K	Ø 2-1/2", 64 mm
L	Ø 2-3/4", 70 mm
M	Ø 2-1/2", 64 mm
N	Ø 5-3/4", 146 mm
O	Ø 3-1/8", 79 mm
P	36", 914 mm
Q	39", 991 mm

Notes:

1) Valve body and piping not included and shown as reference only.
2) Plaster shield (p/n T-176) for dry wall, plaster or other type walls 1/2" or greater.
3) All dimensions measured from nominal rough-in (see I as reference).
4) Dimensions subject to change without notice.

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QUICKDRAIN

SH-1

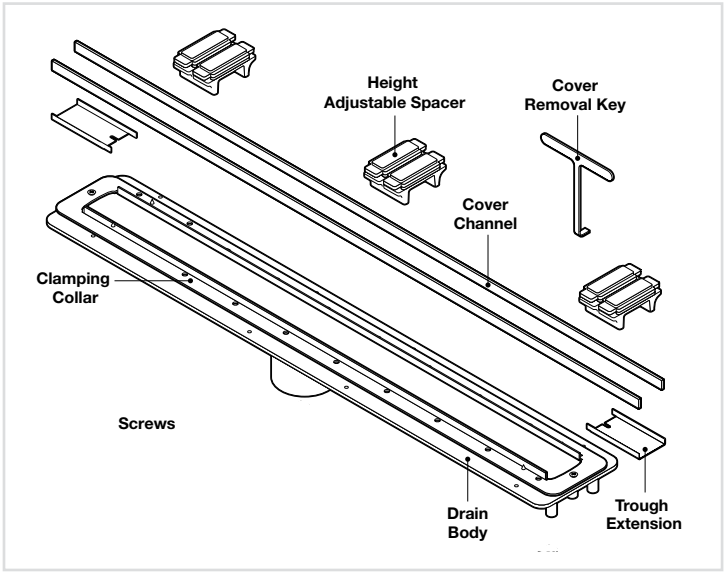
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Location _____
Engineer _____ Contractor _____
PO # _____ Tag _____
Representative _____

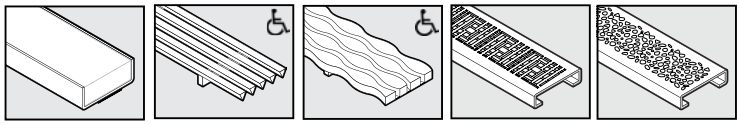
SHOWERLINE DRAIN KIT TECHNICAL SPECIFICATION

DESCRIPTION

- The ShowerLine system shall be used when installing linear shower drains in curbed or curbless applications. The shower drain body shall be made of PVC with an internally sloped trough to prevent stagnant water from sitting in the trough and hard water build up.
- The drain shall feature trough extensions (5" for each side, 10" total) to achieve wall-to-wall coverage and accommodate on-site adjustments if the existing drain is not centered.
- The drain shall include height adjustable spacers for use with finish materials that are 3/8" to 3/4" thick and to ensure the drain cover is flush with the finished floor.
- The shower drain shall be compatible with the following types of waterproofing: sheet waterproofing membrane, topical liquid waterproofing, hot mop, and various forms of shower pan liner including PVC (PolyVinyl Chloride), CPE (Chlorinated PolyEthylene), vinyl, and rubber).
- Drain capacity for shower drains with a 2" outlet shall be 12 GPM for shower pans with a curb and 5 GPM for shower pans without a curb at the entry. For drains with a 1.5" outlet the drain capacity shall be 9 GPM for shower pans with a curb and 3.5 GPM for shower pans without a curb at the entry.**

  *** The actual volume is limited by the plumbing lines and P-trap.*





APPLICATIONS/USES

- Industrial, commercial and residential showers
- Gang showers
- Pet Showers

SUITABLE SUBSTRATES (INTERIOR ONLY)

- Concrete
- Exterior glue plywood
- OSB or Avantech

DRAIN KIT INCLUDES

- PVC Parts: Drain Body (1), Height Adjustable Spacers[1]
- 304 Stainless Steel Parts: Decorative Drain Cover (1), Clamping Collar (1), Cover Channel (2), Trough Extension (2), Screws[2]
- Other: Cover Removal Key

  See chart for part quantities of different drain lengths.

REQUIRED PARTS NOT INCLUDED

- ShowerLine installation kit or dry pack mortar bed with choice of waterproofing:
  - QuickDrain Sheet Waterproofing
  - Oatey Shower Pan Liner
  - Hot mop material
  - Topical liquid waterproofing

APPROVALS AND LISTINGS

Before installing the QuickDrain system, check with your local building department/plumbing inspector to ensure compliance with the local building codes. QuickDrain is not responsible for any conflicts with local building codes or improper installation of any part of the assembly or the waterproofing membrane. Dimensions are subject to manufacturer's tolerance and can change without notice.

MODEL NUMBER	HEIGHT ADJUSTABLE SPACERS[1]	SCREWS[2]
PVC2430D15, PVC2430D20	4	22
PVC3240D20	4	26
PVC4048D20	6	34
PVC4856D20	6	38
PVC5664D20	8	42
PVC6472D20	8	50

Access BIM/Revit content through www.LRBrands.com/QuickDrain

QUICKDRAIN®

SHOWERLINE DRAIN KIT TECHNICAL SPECIFICATION

PRODUCT SELECTOR

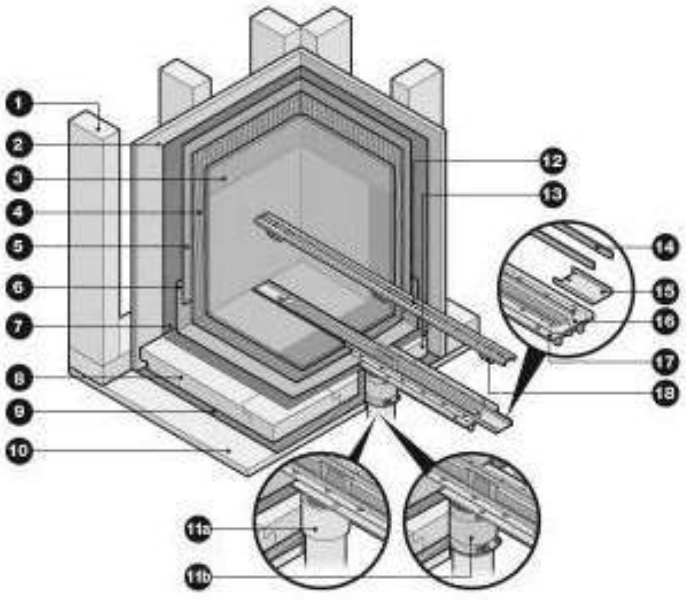
EXAMPLE: SL2432-BG-DECO SHOWERLINE INSTALLATION KIT FOR SHOWERS 24IN TO 32IN WIDE WITH BRUSHED GOLD DECO DRAIN COVER

SL		-		-	
ShowerLine Drain Kit	**Drain Body Size**		**Finish**		**Cover Design**

✓	DRAIN BODY SIZE	
☐	2432 =	For rough opening 24"-32" wide
☐	3240 =	For rough opening 32"-40" wide
☐	4048 =	For rough opening 40"-48" wide

✓	FINISH	
☐	BG =	Brushed Gold
☐	BSS =	Brushed Stainless Steel
☐	MB =	Matte Black
☐	PSS =	Polished Stainless Steel*

✓	COVER DESIGN
☐	DECO
☐	LINES
☐	STONES
☐	STREAM
☐	TILE-IN



INSTALLATION NOTES

- Drain body cannot be cut, but can be extended with use of trough extensions.
- Drain cover can be cut onsite to achieve wall-to-wall installation.
- Cutaway illustration shown here is for installation using a pre-sloped shower pan and sheet waterproofing. For different types of installations, please see our other cutaway illustrations at LRBrands.com/QuickDrain

1 Stud wall
2 Backer board
3 Wall tile and grout
4 Thin-set (for wall tile)
5 Sheet waterproofing for wall
6 Sheet waterproofing for shower pan
7 Thin-set
8 Pre-sloped shower pan
9 Thin-set
10 Sub-floor
11a PVC-to-PVC connection
11b Shielded no-hub coupling
12 Drain cover
13 Interlocking drain support frame
14 Cover channel
15 Trough extensions
16 Clamping collar
17 Drain body
18 Height adjustable spacer

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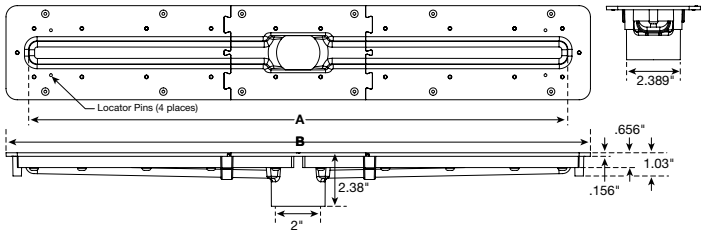
L. R. BRANDS™
AN OATEY INNOVATION

QUICKDRAIN®

SHOWERLINE DRAIN KIT TECHNICAL SPECIFICATION

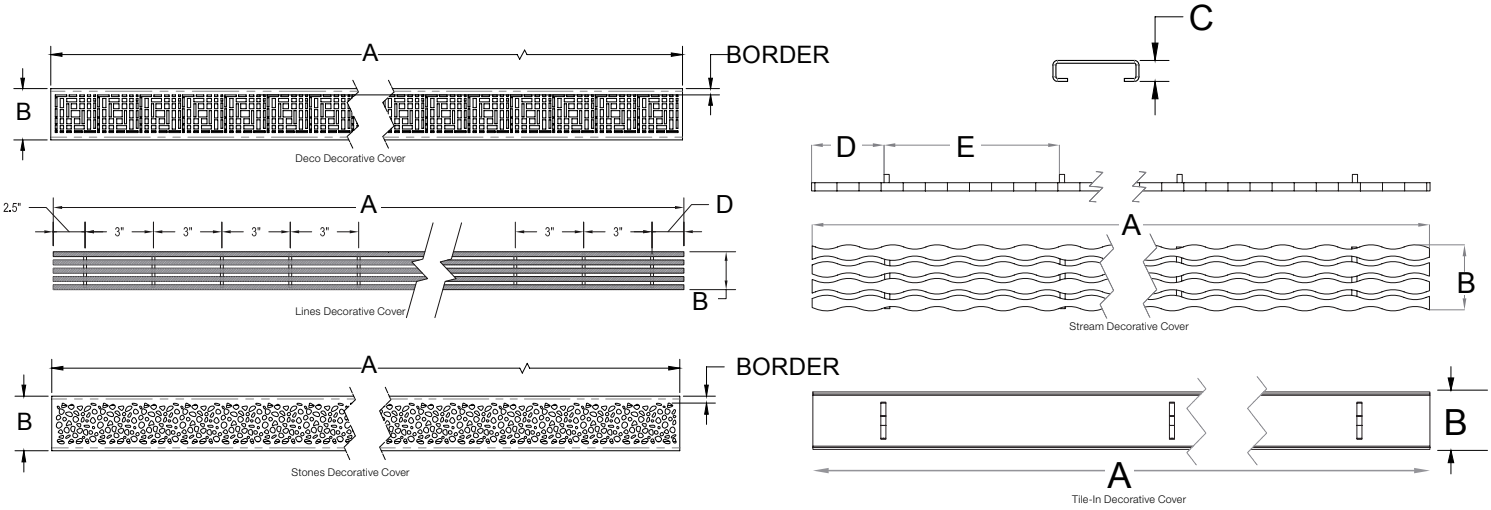
DRAIN BODY DIMENSIONS

	SL2432-	SL3240-	SL4048-
Trough Opening [A]	24"	32"	40"
Drain Body Width [B]	26"	34"	42"
Maximum Width with Trough Extensions	32"	40"	48"
Height Adjustable Spacers	4	4	6
Screws for Clamping Collar	22	26	34



DECORATIVE DRAIN COVER DIMENSIONS

	[A] Length	[B] Width	[C] Depth	[D] Distance between Crossbars	[E] Final Crossbar to Edge	Border
Deco	32", 40", 48"	1-1/2"	3/8"	n/a	n/a	3/16"
Lines				3"	2-1/2"	n/a
Stones				n/a	n/a	3/16"
Stream				4-1/16"	1-11/16"	n/a
Tile-In		1-3/8"		n/a	n/a	n/a



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Z1231

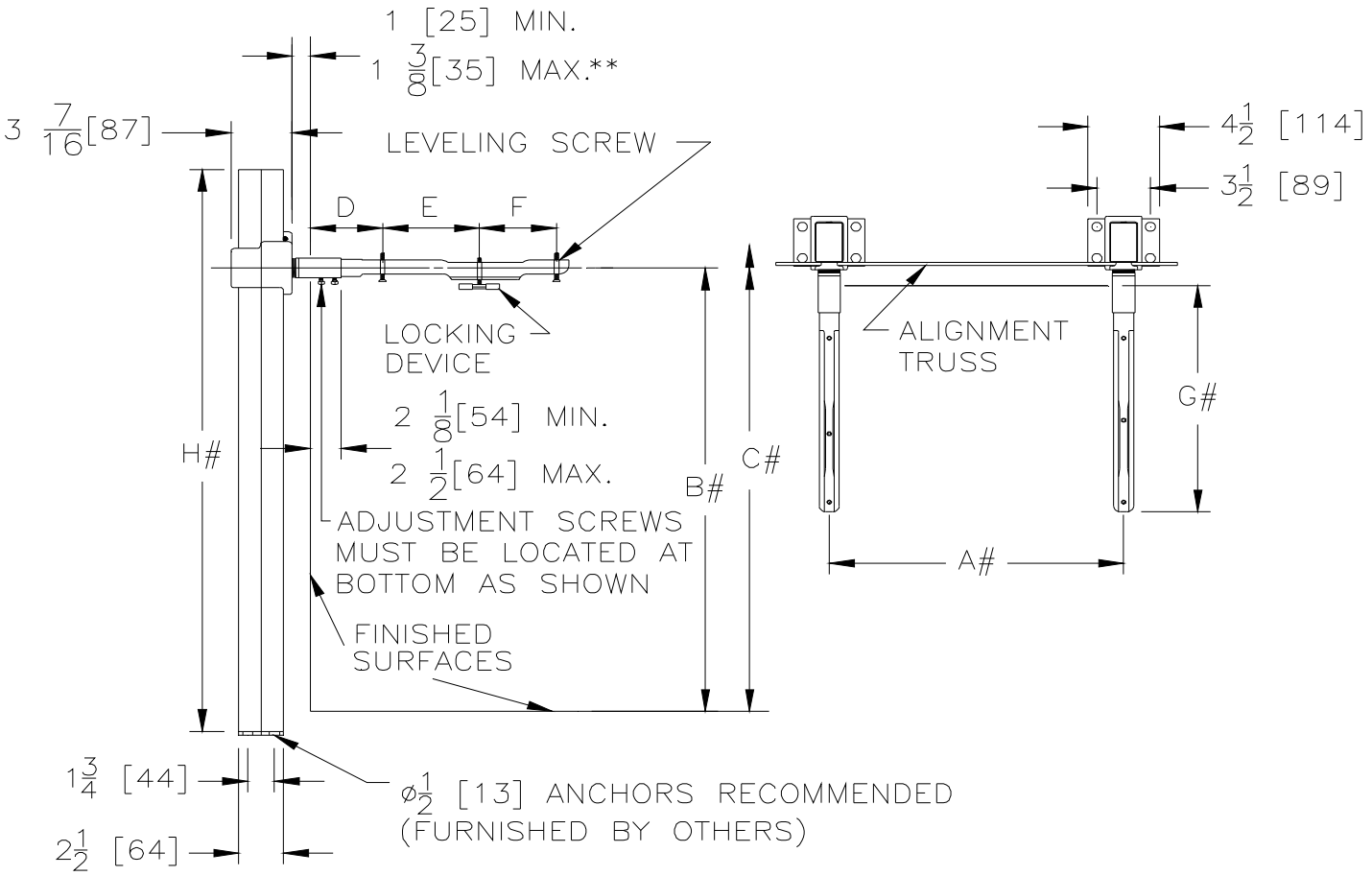
CONCEALED ARM SYSTEM
WALL LAVATORIES

LV-1

SPECIFICATION SHEET

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



NOTES:
REFER TO ROUGH-IN GUIDE OF SPECIFIC FIXTURE FOR DIMENSION
** WITH STANDARD SLEEVE LENGTH OF 4 [102]

Product No.	Approx. Wt. Lbs. [kg]
Z1231	45 [20]

ENGINEERING SPECIFICATION: ZURN Z1231
Lavatory support system with concealed arms. Complete with Dura-Coated rectangular steel uprights with welded feet, cast iron adjustable headers, concealed arms, steel sleeves, alignment truss, and mounting fasteners.

OPTIONS (Check/specify appropriate options)

PREFIXES

____ Z Dura-Coated System with Concealed Arms*

SUFFIXES

____ -AL Adapter Lug
____ -CB Carrier Bank
____ -D Back to Back System
____ -E2 Concealed Arm Escutcheons 2 [51] Long
____ -SL Sleeve Length Over 4 [102] (Specify Length)
____ -WS Wall Support Valve Plate (Specify Knee or Foot action, Valve Name, and Number)
____ -79 ADA Rough-in

* Regularly furnished unless otherwise specified.

Zurn Industries, LLC | **Specification Drainage Operation**
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

Rev. J
Date: 09/27/2017
C.N. No. 137983
Prod. | Dwg. No. Z1231

Z5360

20” x 18” High Back Wall Hung Lavatory LV-1 **TAG** _____

Architectural/Engineering Specification:

20” x 18” vitreous china wall hung lavatory. Provided with hanger plate and holes for concealed arm carrier systems.



Product Features:

- 20” [508 mm] x 18” [457 mm]
- Vitreous china
- 4” high back splash
- Faucet holes for single, 4”, or 8” centers
- Wall hung lavatory provided with wall hanger or for use with concealed arm carrier systems
- Front overflow
- Waste: 1-1/4” O.D.
- Depth: 5-3/4”
- Shipping Weight: 42 lbs.

Recommended Trim:

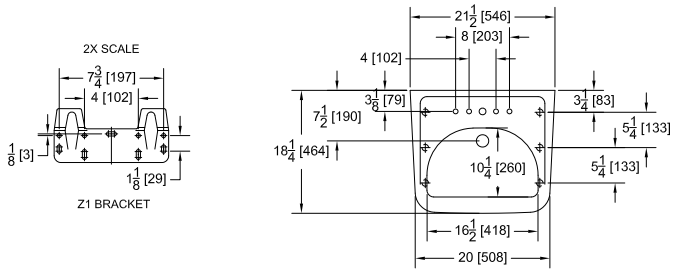
Z8743-PC	Grid Strainer
Z8700 Series	P-Trap
Z8800 Series	Top with Flexible Supplies
Z8946-1-NT	ADA Trap, Stop, and Supply Protectors

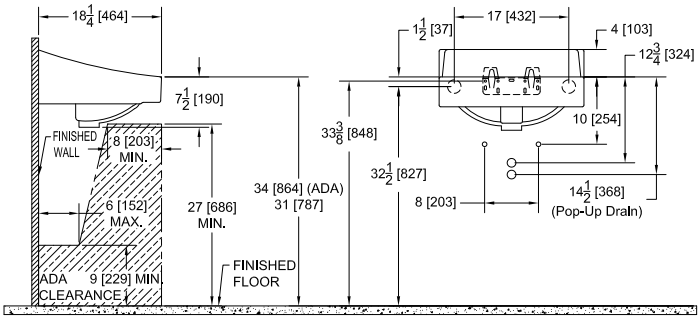
Optional Trim:

Z8746-PC	ADA Grid Strainer
Z8946-3-NT	ADA Trap, Stop, and Supply Protectors for Offset Grid Strainer

Configurations:

Z5361	Lavatory with single faucet hole
Z5364	Lavatory with 4” center faucet holes
Z5368	Lavatory with 8” center faucet holes





Rough-in/Overview dimensions for Z5340 Series
Z5361 Lavatory with single hole faucet
Z5364 Lavatory with 4” center faucet holes
Z5368 Lavatory with 8” center faucet holes

See Zurn One Systems for suggested packages.

Architectural/Engineering Approval

The information contained in this document is subject to change without notice.
Please contact Zurn for most up to date information.

Compliance and Certification:

- ADA Compliant

ADA DESIGNED

Meets the American Disabilities Guidelines and ANSI A117.1 requirements when installed 34”[84mm] from finished floor.
Fixture dimensions meet ASME A112.19.2/CSA B45.1 requirements.
In Canada - Consult local codes and standards.

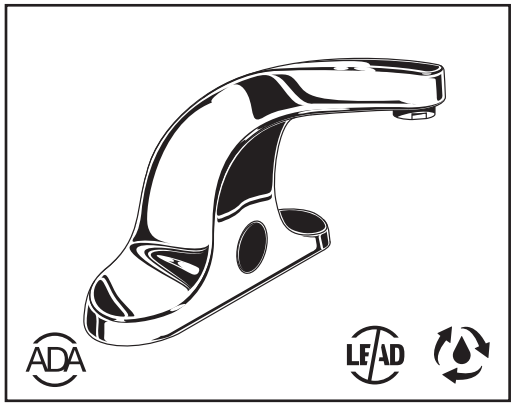
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LV-1

INNSBROOK SELECTRONIC®

ELECTRONIC PROXIMITY LAVATORY FAUCET

CAST BRASS SPOUT, BASE MODEL



PRODUCT FEATURES:

- **Flexible Selectronic Platform** with programmable, multi-function sensor.
- **Hygienic, touch-free operation**
- **Easy & Flexible Installation:** 3-hole, 4" centerset installation. Water resistant solenoid enclosure mounts to wall.
- **Durable Vandal-Resistant Brass Body:** Ideal for high-use commercial applications.
- **Self-Cleaning Solenoid Valve:** Wiper spring prevents clogging.
- **Easy to Service Integrated Strainer:** Patented integrated strainer protects solenoid from debris. Strainer is enclosed in removable debris cup for easy service.
- **Optional Auto Purge Feature:** Faucet can be programmed to open at a pre-determined time after last use to purge the faucet and water lines of stagnant water.
- **Safety Timer**: Helps prevent vandalism by turning off the faucet if the sensor is covered for 55 seconds or more. Timing is adjustable with optional remote control.
- **Adjustable Range:** Detection zone can be adjusted manually or with optional remote control.
- **Fail-Safe:** Faucet automatically shuts off upon loss of power or dead battery. Prevents costly excess water usage and potential flooding.
- **Lead-Free:** Faucet contains ≤ 0.25% total lead content by weighted average.

GENERAL DESCRIPTION:

Electronic faucet with proximity operation. 4" centerset with vandal-resistant solid brass construction. Water pressure range from 20 to 125 psi. Single inlet. 18" flexible inlet hose with 3/8" compression fitting for connection to control box.

MODEL NUMBER:

■ **BASE UNIT (Does not include power supply)**

- ❑ **605B.205** 0.5 gpm/1.9 L/min pressure compensating, vandal-resistant multi-laminar spray.
- ❑ **605B.204** 0.35 gpm/1.3 L/min pressure compensating, vandal-resistant multi-laminar spray. Faucet is factory set for 7.5 second running time to deliver 0.044 gpc/0.17 L per cycle.
- ❑ **605B.202** 1.5 gpm/5.7 L/min pressure compensating, vandal-resistant aerator.

■ **POWER KITS (Must be purchased separately)**

- ❑ **PK00.CRP** CR-P2 lithium battery and holder.
- ❑ **PK00.WRK** PWRX™ 10-Year battery pack and holder.
- ❑ **PK00.PAC** Plug-In AC transformer and Single AC adapter.
- ❑ **PK00.HAC** Hard-Wired AC power supply and 10' extension cable.
- ❑ **PK00.MAC** Multi-AC adapter and 10" extension cable.

■ **OPTIONAL Battery Back-Up**

- ❑ **PK00.BBU** Allows AC powered faucets to continuously operate during a power failure.

■ **OPTIONAL Mixing Valve**

- ❑ **605XTMV1070** Thermostatic mixing valve. 20" flexible inlet hoses with 3/8" compression fittings. ASSE 1070 certified down to 0.35 gpm/1.3 L/min.

■ **OPTIONAL Remote Control**

- ❑ **605XRCT** Adjusts setup parameters and allows for customization of functions. Can be used to program all Selectronic faucets and flush valves.

POWER OPTIONS:

- **Plug-In AC:** UL 1310, Class 2 certified. 6' long power cord. 100 - 240 VAC, 50/60 HZ.
- **Hard-Wired AC:** UL 1310, Class 2 certified. 2-piece plate-mounted power supply (electrical box by others). 120 VAC, 60 HZ.
- **Multi-AC:** One AC transformer can power up to 15 faucets and/or flush valves in a daisy chain configuration. **POWER SUPPLY NOT INCLUDED**.
- **PWRX™ 10 Year Battery System:** Battery Life - 480,000 cycles (10 years @ 4,000 cycles per month).
- **DC (Battery):** Includes CR-P2 lithium battery. Battery Life - 192,000 cycles (4 years @ 4,000 cycles per month).

RECOMMENDED SPECIFICATION:

Electronic, sensor-operated lavatory faucet shall feature a programmable, multi-function sensor and an electronically operated self-cleaning solenoid valve. Shall also feature a vandal resistant solid brass construction with single inlet and in-line strainer. Shall meet ANSI A112.18.1 and ANSI 117.1 codes. Fitting shall be American Standard Model # 605B_.20_.

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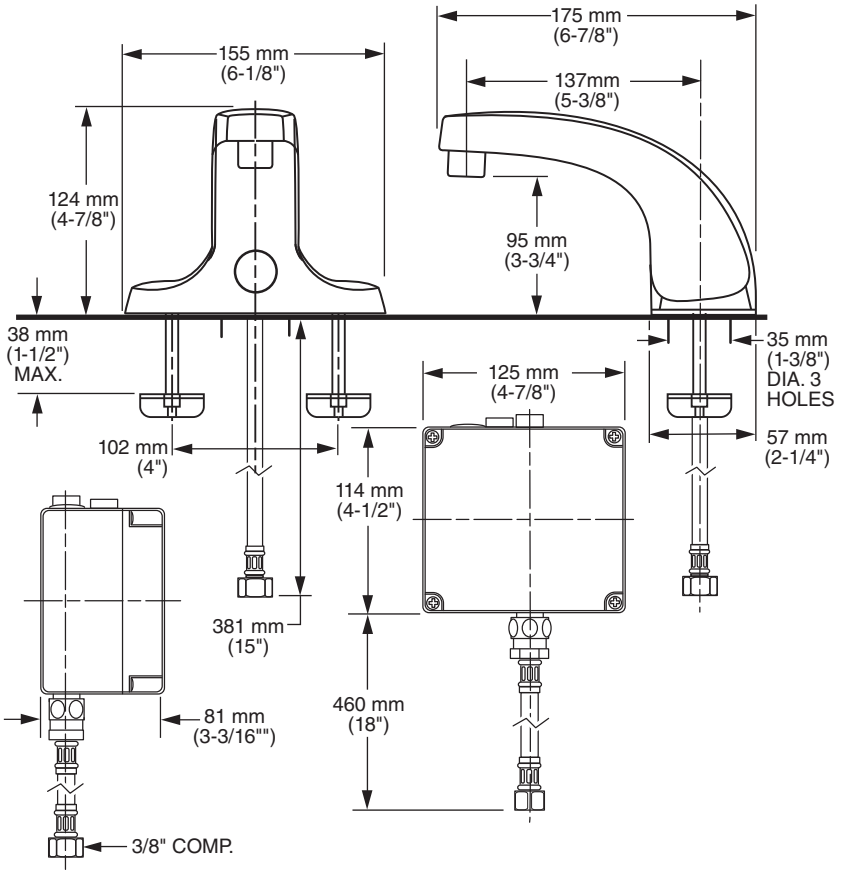
CODES AND STANDARDS

These products meet or exceed the following codes and standards:

ANSI A117.1
ASME A112.18.1
CSA B125.1
NSF 372

Other Aerators Available:	
Part Suffix	**Description**
LV15	1.5 gpm/5.7 L/min PCA Vandal-Resistant Non-Aerated Laminar Flow Outlet
LV10	1.0 gpm/3.8 L/min PCA Vandal-Resistant Non-Aerated Laminar Flow Outlet
V10	1.0 gpm/3.8 L/min PCA Vandal-Resistant Aerator
V035*	0.35 gpm/1.3 L/min PCA Vandal-Resistant Multi-Laminar Spray

PCA - Pressure Compensating
* Meets Cal Green Code



Meets the American Disabilities Act Guidelines and **ANSI A117.1** Requirements for accessible and usable building facilities - check local codes

PART OF LIXIL

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Z871C1-XL

KITCHEN SINK FAUCET

SK-1

TAG _____

Architectural/Engineering Specification:

Polished chrome-plated 8” [203mm] brass deck faucet with an 8” [203mm] centerline rigid or swing gooseneck spout and quarter turn ceramic disc cartridges. Unit is furnished with a 2.2 GPM [8.3 L] pressure compensating aerator (complying withANSI A112.18.1 Standard for flow), 4” [102mm] vandal-resistant color-coded metal wrist blade handles, mounting hardware and 1/2” NPSM coupling nuts for standard lavatory risers.

Zurn Lead Free products (-XL) are manufactured to comply with Section 1417 of the Safe Drinking Water Act (SDWA) which mandates the weighted average lead content of no more than 0.25% of the wetted surface..

Compliance and Certification:

- Complies with ASME A112.18.1 / CSA B125.1
- ADA Compliant

Aerator Options:

	Flow rate GPM [LpM]	Vandal Resistant	Pressure Compression	Outlet Type
☐ **-2F**	2.2[8.3]	✓	✓	Aerator
☐ **-3F**	0.5[1.9]	✓	✓	Spray
☐ **-4F**	2.2[8.3]	✓	✓	Laminar
☐ **-7F**	1.0[3.8]		✓	Spray
☐ **-16F**	1.0[3.8]	✓	✓	Spray
☐ **-17F**	1.5[5.7]	✓	✓	Aerator
☐ **-18F**	1.5[5.7]	✓	✓	Laminar
☐ **-21F**	1.0[3.8]	✓		Laminar
☐ **-22F**	1.0[3.8]	✓		Laminar
☐ **-23F**	1.5[5.7]		✓	Areator
☐ **-24F**	0.35[1.3]		✓	Spray
☐ **-25F**	0.35[1.3]	✓	✓	Spray

Suffix Options:

☐ -FC 1-1/4” [32mm] Grid Strainer Drain
☐ -HS Hose and Spray

Architectural/Engineering Approval

The information contained in this document is subject to change without notice.
Please contact Zurn for most up to date information.

ZURN INDUSTRIES, LLC 511 W. Freshwater Way, Milwaukee, WI U.S.A. 53204 · Ph. 1-855-ONE-ZURN, Fax 919-775-3541
In Canada: **ZURN INDUSTRIES LIMITED** 7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 905-405-8272, Fax 905-405-1292

Rev. C Date: 02/19/21 C.N. No. 143432 Prod. | Dwg. No. SS Z871C1-XL

ELKAY®
SPECIFICATIONS

Elkay Lustertone Classic Stainless Steel 19-1/2" x 22" x 6-1/2" Single Bowl Drop-in ADA Sink with Perfect Drain

SK-1 **Model(s) LRAD202265PD**

PRODUCT SPECIFICATIONS

Elkay Lustertone™ Classic Stainless Steel 19-1/2" x 22" x 6-1/2", Single Bowl Drop-in ADA Sink with Perfect Drain. Sink is manufactured from 18 gauge 304 Stainless Steel with a Lustrous Satin finish, Rear Center drain placement, and Bottom only pads.

Installation Type:	Drop-in
Material:	304 Stainless Steel
Special Features:	Perfect Drain
Finish:	Lustrous Satin
Gauge:	18
Sound Deadening:	Bottom only pads
Number of Bowls:	1
Sink Dimensions:	19-1/2" x 22" x 8"
Bowl 1 Dimensions:	16" x 16" x 6-3/8"
Drain Size:	3-3/8" (86mm)
Drain Location:	Rear Center
Minimum Cabinet Size:	24"
Mounting Hardware:	Part # 64090012 included for countertops up to 3/4" (19mm) thick
Template Included:	No
Cutout Template #:	1000001263

Template is available for download at elkay.com. CAD software will be required to open the template.

Cutout Dimensions for Drop-in Installation:
18-7/8" x 21-3/8" (479mm x 543mm) with 1-1/2" (38mm) corner radius

Perfect Drain: Seamlessly welded stainless steel collar eliminates the gap between a traditional drain and the sink for a sanitary and gap free installation. An InSinkErator® garbage disposer can be installed on either sink bowl for user convenience.
U.S. Patent Nos 9,057,185 and 9,783,968.



Included with Product: **One LKPD1 Perfect Drain and strainer**

AMERICAN PRIDE. A LIFETIME TRADITION.
Like your family, the Elkay family has values and traditions that endure. For almost a century, Elkay has been a family-owned and operated company, providing thousands of jobs that support our families and communities.

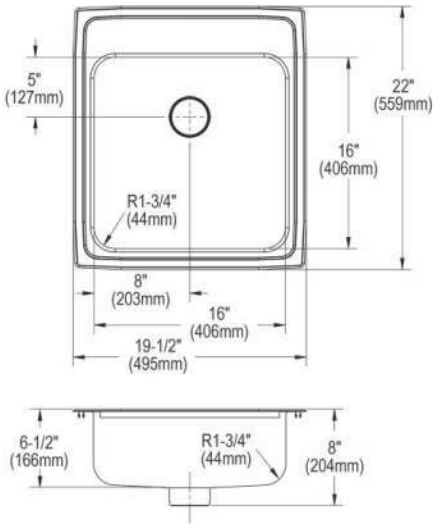
Product Compliance: ADA & ICC A117.1
ASME A112.19.3/CSA B45.4
Buy American Act
Accessory: ASME A112.18.2/CSA B125.2

Sinks are listed by IAPMO® as meeting the applicable requirements of the Uniform Plumbing Code®, International Plumbing Code®, and National Plumbing Code of Canada.

Complies with ADA & ICC A117.1 accessibility requirements when installed according to the requirements outlined in these standards.

Clean and Care Manual (PDF)
Installation Instructions (PDF) - 1000005236
Installation Instructions (PDF) - 74180289_Disposer
Installation Instructions (PDF) - 74180340-USA_Drain
Warranty (PDF)

Similar models are available with: Quick-Clip Mounting System



inSinkErator

Elkay® Perfect Drain™ sinks are designed and approved for compatible disposers manufactured by InSinkErator® utilizing the Quick Lock® mounting configuration. Use of non-approved disposers may void Elkay warranty.

InSinkErator, Quick Lock and the mounting collar configuration are trademarks of Emerson Electric Co.

PART:_____QTY: _____
PROJECT:_____
CONTACT:_____
DATE:_____
NOTES:_____
APPROVAL:_____

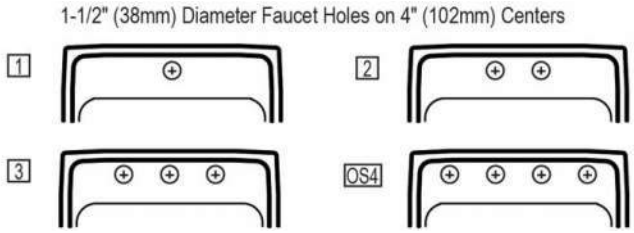
In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit elkay.com for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.

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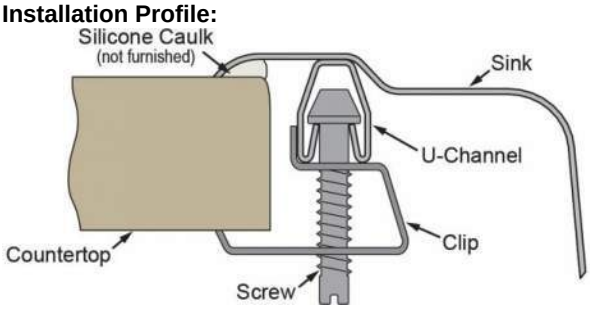
Elkay Lustertone Classic Stainless Steel 19-1/2" x 22" x 6-1/2" Single Bowl Drop-in ADA Sink with Perfect Drain

Model(s) LRAD202265PD

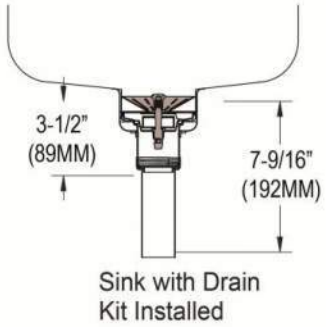
Hole Drilling Configurations:



Installation Profile:









Optional Perfect Grid Drain available (sold separately) Model: LKPDVR18B

Optional Accessories		
LKWOBG1616SS	Elkay Stainless Steel 15" x 15" x 1" Bottom Grid Spec Sheet (PDF)	
CB1713	Elkay Hardwood 13-1/2" x 17" x 1" Cutting Board Spec Sheet (PDF)	
CBS1316	Elkay Hardwood 14-1/2" x 17" x 3/4" Cutting Board Spec Sheet (PDF)	
LKPDVR18B	Elkay Perfect Drain Chrome Plated Brass Body, Vandal-resistant Strainer and LKADOS Tailpiece Spec Sheet (PDF)	
LKPDAD18B	Elkay Perfect Drain Chrome Plated Brass Body, Strainer and LKADOS Tailpiece Spec Sheet (PDF)	
LKDS99	Elkay 3-1/2" Disposal Stopper / Strainer for use with, InSinkErator® Disposal Chrome Polished Stainless Steel Spec Sheet (PDF)	
LKWRB1316SS	Elkay Stainless Steel 12-1/2" x 15" x 7" Rinsing Basket Spec Sheet (PDF)	

In keeping with our policy of continuing product improvement, Elkay reserves the right to change product specifications without notice. Please visit elkay.com for the most current version of Elkay product specification sheets. This specification describes an Elkay product with design, quality, and functional benefits to the user. When making a comparison of other producers' offerings, be certain these features are not overlooked.

Terrazzo-Ware™ Mop Sink - Standard Height (12") Series



TSH-24-KF24

Fixture May Show Some Available Options

Please visit ***www.acorneng.com*** for most current specifications.

Terrazzo Standard Height Mop Sink

Mop Sink is an attractive, durable fixture designed to be easy to install and maintain. **ACORN Terrazzo-Ware™** precast mop sinks provide flexibility in configuration and size as required by the design of the building and the specific installation. Custom sizes and colors are also available.

Construction is one piece, precast terrazzo composed of marble chips cast in Portland cement to provide a compressive strength of at least 3,000 PSI seven days after casting. The mop sink surface is ground smooth and sealed to provide years of service.

Integral Drain is supplied with a removable, stainless steel grid strainer and provides for an inside caulked connection to a 3" pipe. The mop sink has coved corners and is pitched to the drain outlet to provide positive drainage. A beehive dome strainer is optionally available.

Shoulders are 12” high and pitched to provide drainage and come standard without caps exposing the natural terrazzo finish. Optionally, they may be capped with stainless steel for protection.

Tiling Flanges made of galvanized steel are provided loose as an easy to install accessory when flexibility and simplicity are desired. As an alternative, factory installed galvanized steel tiling flanges extending at least 1" above the shoulder can be specified.

Accessories to complement and complete the installation of the mop sink include:

- chrome finish faucets
- 36" hose to reduce splashing with wall hanger to support the hose
- mop hanger for easy storage of the mop over the sink
- rubber drain gaskets for easy installation of the fixture
- stainless steel wall guards to protect sensitive walls from splashing water
- tiling flanges for simple, flexible field installation

GUIDE SPECIFICATION

Provide and install an **ACORN Standard Height Mop Sink** (specify model number and options). Mop Sink shall be made of precast terrazzo to produce a compressive strength of not less than 3,000 PSI seven days after casting. All exposed surfaces shall be ground smooth and sealed. No air holes or pits shall be allowed on the finished surface. Sink shall have coved corners and be pitched to the outlet for positive drainage. Integral drain shall have a stainless steel strainer and provide for an inside caulked connection to a 3" pipe. The manufacturer will provide to the installer the necessary installation instructions.

Acorn Engineering Company • 15125 Proctor Avenue • P.O. Box 3527 • City of Industry, CA 91744-0527 U.S.A.
Tel: (800) 488-8999 • (626) 336-4561 • Fax: (626) 961-2200 • www.acorneng.com • E-mail: info@acorneng.com

Terrazzo-Ware™: Mop Sink-Standard Height (12") Series

BASE MODEL, SIZE & TYPE

- ❑ **TSH-24** 24" Square Terrazzo Standard Height Mop Sink
- ❑ **TSH-32** 32" Square Terrazzo Standard Height Mop Sink
- ❑ **TSH-36** 36" Square Terrazzo Standard Height Mop Sink
- ❑ **TSH-3624** 36" x 24" Rectangular Terrazzo Standard Height Mop Sink

SUFFIX OPTIONS

- ❑ - BDS Beehive Dome Strainer
- ❑ - OC Optional Colors (contact factory)
- ❑ - SSC Stainless Steel Cap

TILING FLANGES (factory installed)

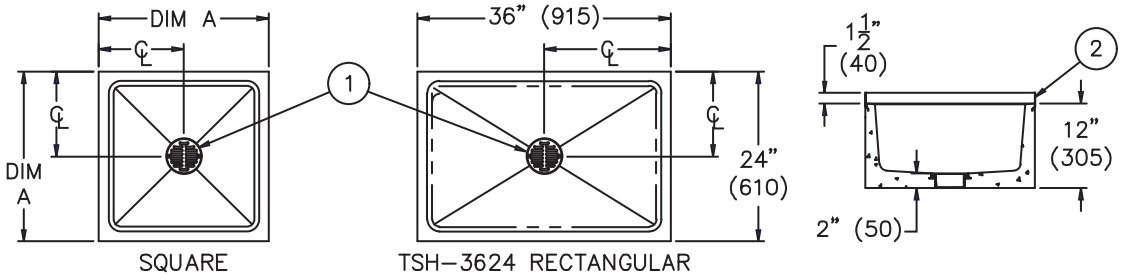
- ❑ - TF1 Tiling Flange, Rear Side
- ❑ - TF2 Tiling Flange, Two Adjacent Sides
  Specify: ❑ Right & Rear ❑ Left & Rear
- ❑ - TF3 Tiling Flange, Three Sides

ACCESSORIES

- ❑ KDG3 Rubber Drain Gasket for 3" Waste Pipe
- ❑ KDG32 Rubber Drain Gasket Reducer for 2" Waste Pipe
- ❑ KF Tiling Flange(s) (Shipped Loose; N/A With -TF Options)
  Specify length(s):
  ❑ 24" Qty:_____ ❑ 32"Qty:_____
  ❑ 36" Qty:_____
- ❑ KFC Faucet, Chrome Finish (H & C)
- ❑ KH36 Hose 36" Long with Wall Hanger
- ❑ KMH Mop Hanger with 3 Grips on a Stainless Steel Bracket
- ❑ KWG Wall Guard (Shipped Loose)
  Specify number of sides:
  ❑ 1 Side ❑ 2 Sides ❑ 3 Sides
  Specify length(s):
  ❑ 24" Qty:_____ ❑ 32" Qty:_____
  ❑ 36" Qty:_____
- ❑ LB Lint Basket/Strainer

Please visit ***www.acorneng.com*** for most current specifications.

MODEL NUMBER	TYPE	SIZES/DIMENSIONS
		A – LENGTH
TSH–24	SQUARE	24" (610)
TSH–32	SQUARE	32" (815)
TSH–36	SQUARE	36" (915)



TERRAZZO–WARE BACK STANDARD HEIGHT SERIES MOP SINKS

NOTES:

1. Integral drain with removable grid strainer. Drain provides inside caulk connection to 3" pipe.
2. –TF Tiling flange. Shown for reference only.

⚠ WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Important: Installation instructions and current rough-in are furnished with each fixture. Do not rough in without certified dimensions.

Dimensions are subject to manufacturer's tolerance of plus or minus 1/4" and change without notice. Acorn assumes no responsibility for use of void or superseded data. © Copyright 2007 Acorn Engineering Company

Selection Summary

Model No. & Option_____

Quantity_____

Approved for Manufacturing

Company_____Title_____

Signature_____ Date_____

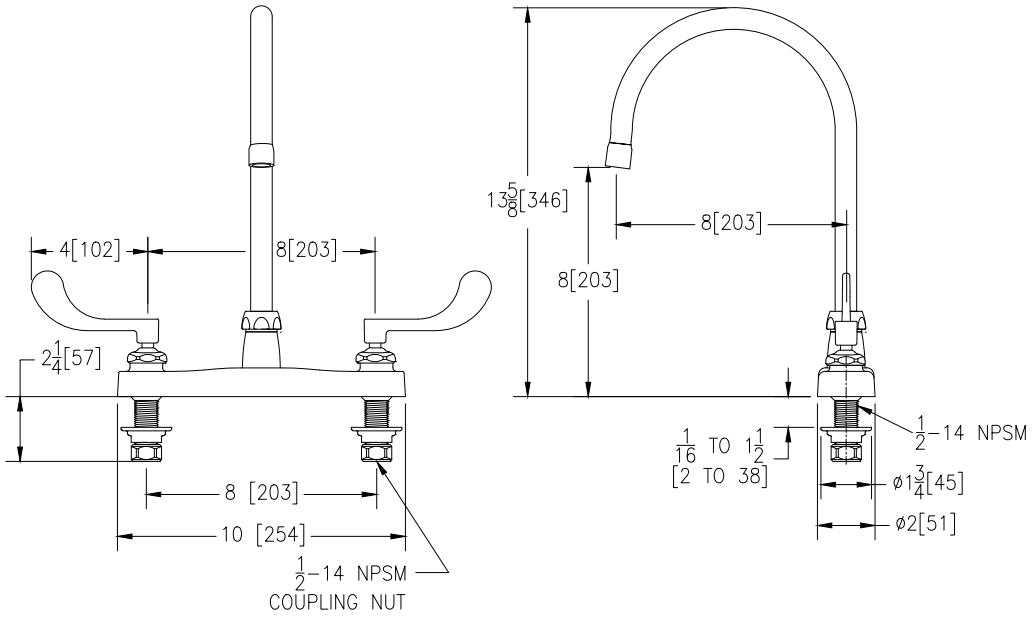
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Z871C1-XL

KITCHEN SINK FAUCET

TAG _____

Rough-in dimensions/Overview dimensions



ZURN INDUSTRIES, LLC 511 W. Freshwater Way, Milwaukee, WI U.S.A. 53204 · Ph. 1-855-ONE-ZURN, Fax 919-775-3541
In Canada: **ZURN INDUSTRIES LIMITED** 7900 Goreway Drive, Unit 10, Brampton, Ontario L6T 5W6, Ph. 905-405-8272, Fax 905-405-1292

SERVICE SINK FAUCET

SS-1

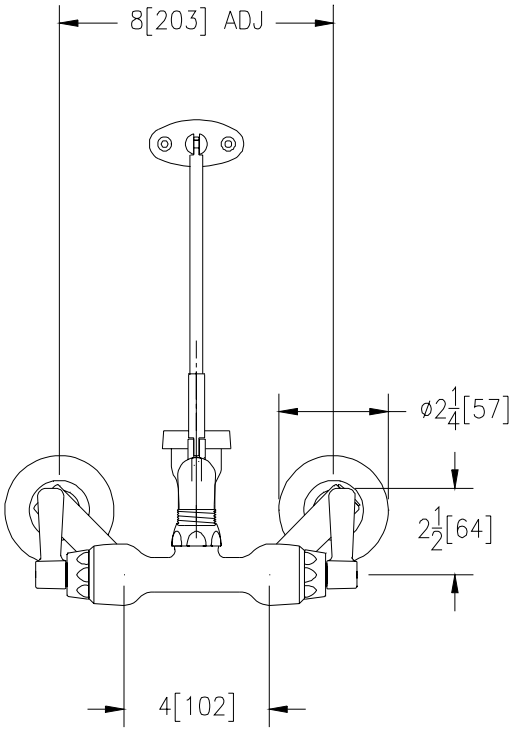
Z841M1

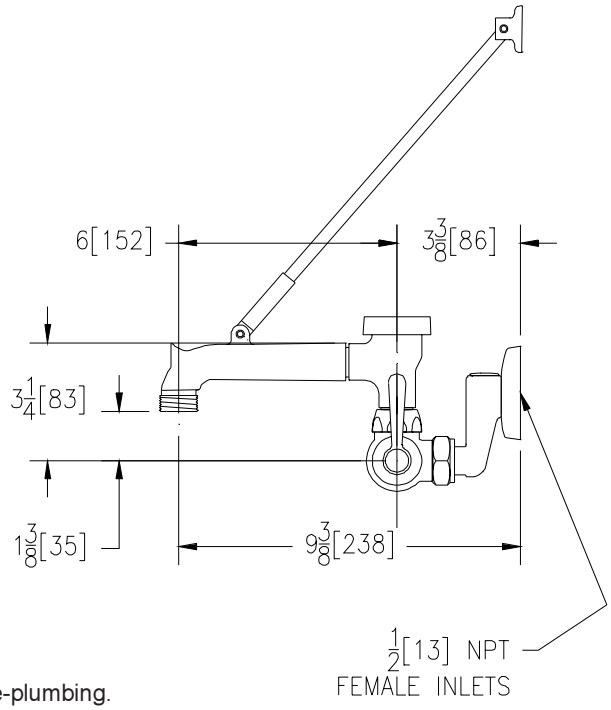
TAG _____



Engineering Specifications: Zurn AquaSpec® Z841M1
Polished chrome-plated cast brass service sink faucet with quarter turn ceramic disc cartridges, 2-1/2" [64mm] long swivel inlets (with integral stops) providing adjustable centers from 4" [102mm] to 8-3/8" [213mm] and a 6" [152mm] centerline cast brass vacuum breaker spout with an integral 3/4" [19mm] hose threaded outlet, pail hook and wall brace. Unit is provided with 2-1/2" [64mm] vandal-resistant color-coded brass lever handles.

ADA DESIGNED





Note: All dimensions are for reference only. Do not use for pre-plumbing.

OPTIONAL ACCESSORIES

Suffix	Description
__ -SSI	3/8" [10mm] Short Swivel Inlets
__ -WHK	Wall Hook
__ -5H	5' [152cm] Vinyl Hose

ZURN INDUSTRIES, INC. ♦ COMMERCIAL BRASS OPERATION ♦ 2640 SOUTH WORK STREET ♦ FALCONER NY 14733
Phone: 1-716-665-1132 ♦ Fax: 1-716-665-1135 ♦ World Wide Web: www.zurn.com
In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905/405-8272 Fax: 905/405-1292

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Rev. H Date: 4/14/04 C.N. No.100493
Dwg. No. 60882 Product No. Z841M1

Z1400

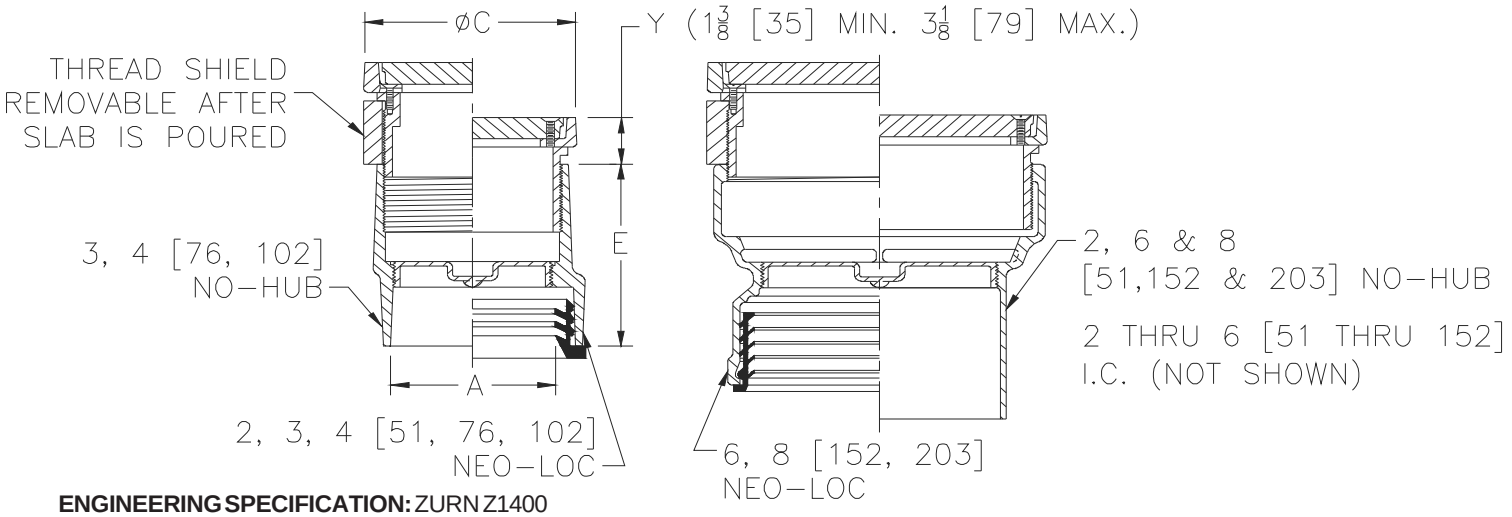
EXTRA-HEAVY-DUTY "LEVEL-TROL"
ADJUSTABLE FLOOR CLEANOUT

FCO

SPECIFICATION SHEET

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



ENGINEERING SPECIFICATION: ZURN Z1400
"Level-Trol" Adjustable floor cleanout, Dura-Coated cast iron body with gas and watertight ABS tapered thread plug and round scoriated cast iron extra-heavy-duty secured top (Specify finish Z, ZB, ZN, ZS) adjustable to finished floor.

A-Pipe Size	Dimension In Inches[mm] C	E	Approx. Wt. Lbs. [kg.]
Inside Caulk			
2 [51]	6-1/8 [156]	6-7/8 [175]	13.8 [6.3]
3 [76]	6-1/8 [156]	6-7/8 [175]	14 [6.4]
4 [102]	7-1/4 [184]	6-7/8 [175]	18.3 [8.3]
6 [152]	9-1/4 [235]	6-7/8 [175]	32.2 [14.6]
No-Hub			
2 [51]	4-1/8 [105]	4-5/8 [117]	7 [3]
3 [76]	4-1/8 [105]	4-3/4 [121]	7.7 [3.5]
4 [102]	5-1/8 [130]	4-3/4 [121]	10.3 [4.7]
6 [152]	8-1/4 [210]	4-3/4 [121]	22.2 [10.1]
8 [203]	9-1/4 [235]	7-1/2 [191]	29.9 [13.6]
Neo-Loc			
2 [51]	4-1/8 [105]	4-3/4 [121]	7.9 [3.6]
3 [76]	5-1/8 [130]	4-3/4 [121]	10.6 [4.8]
4 [102]	5-1/8 [130]	4-3/4 [121]	11.9 [5.4]
6 [152]	8-1/4 [210]	5-7/8 [149]	21.9 [9.9]
8 [203]	9-1/4 [235]	6-1/2 [165]	23.5 [10.7]

OPTIONS (Check/specify appropriate options)

PREFIXES

_____ Z Dura Coated Cast Iron*
_____ ZB D.C.C.I. w/ Polished Bronze Light-Duty Top (Deduct 1/2 [13] from 'Y' Dim.)
_____ ZN D.C.C.I. w/ Polished Nickel Bronze Light-Duty Top (Deduct 1/2 [13] from 'Y' Dim.)
_____ ZS D.C.C.I. w/ Polished Stainless Steel Extra Heavy-Duty Top (Add 3/16 [5] to 'Y' Dim.)

SUFFIXES

_____ -AR Acid Resisting Epoxy Coated Finish
_____ -BP Bronze Plug
_____ -CF Carpet Flange Cover (ZB and ZN only)
_____ -CM Carpet Marker
_____ -DC Duresist Cover
_____ -DX Round ZB or ZN Top with Dex-o-tex Flange (2, 3, 4 [51, 76, 102] Sizes only)
_____ -G Galvanized Cast Iron
_____ -HD Extra-Heavy-Duty Veneer Top (Add 1/8 [3] to 'Y' Dim.) (ZB and ZN only)
_____ -K Anchor Flange
_____ -KC Anchor Flange w/ Clamping Collar
_____ -PC Protective Cover
_____ -SG Solid Gasketed Cover
_____ -SM Special Marking Stamped on Top
_____ -T Square Top
_____ -TC Neo-Loc Test Cap Gasket (2, 3, 4 [51, 76, 102] NL Bottom Outlet Only)
_____ -TX Square Top Recessed for 1/8 [3] Tile (ZB and ZN only)
_____ -VP Vandal-Proof Screws
_____ -X Round Top Recessed for 1/8 [3] Tile (ZB or ZN only)
_____ -Z Round Top Recessed for 1-1/4 [32] Terrazzo (ZB or ZN only)

PIPE SIZE
2,3,4,6 [51,76,102,152]
2,3,4,6,8 [51,76,102,152,203]
2,3,4,6,8 [51,76,102,152,203]

(Specify size/type) **OUTLET**
_____ IC Inside Caulk
_____ NH No-Hub
_____ NL Neo-Loc

'E' BODY HT. DIM.
See Chart
See Chart
See Chart

* Regularly furnished unless otherwise specified.

Zurn Industries, LLC | **Specification Drainage Operation**
1801 Pittsburgh Avenue, Erie, PA U.S.A. 16502 · Ph. 855-663-9876, Fax 814-454-7929
In Canada | **Zurn Industries Limited**
3544 Nashua Drive, Mississauga, Ontario L4V 1L2 · Ph. 905-405-8272, Fax 905-405-1292
www.zurn.com

Rev. T
Date: 09/28/2017
C.N. No. 138018
Prod. | Dwg. No. Z1400

Z415B

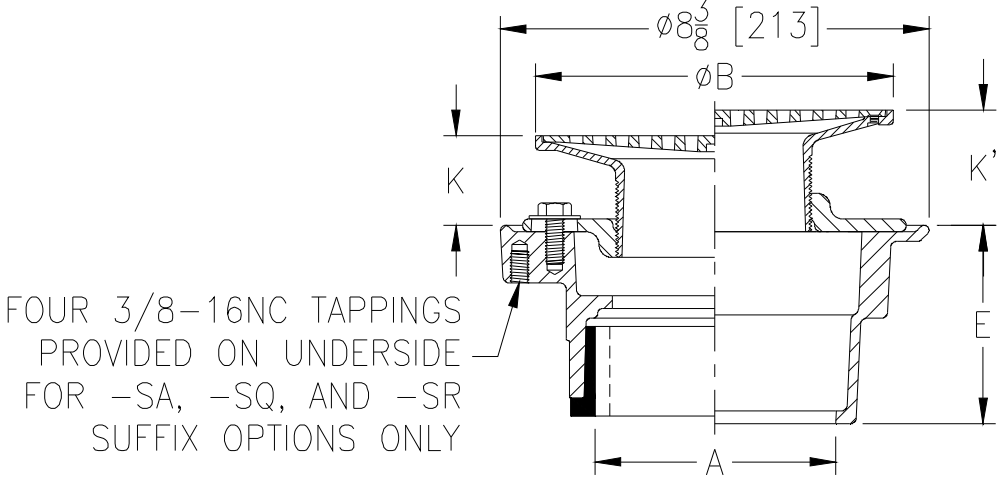
BODY ASSEMBY W/ "TYPE B" STRAINER

FD-1

SPECIFICATION SHEET

TAG FD-1

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Dimensions in In [mm]						Approx. Wt. Lbs. [kg]	Strainer Open Area Sq. In. [cm²]
A Pipe Size	B Strainer Dia.	K		K'			
		Min.	Max.	Min.	Max.		
2,3 [51,76]	5 [127]	1 [25]	1-1/2 [38]	1-3/32 [28]	2-1/4 [57]	11 [5]	6-1/4 [40]
2,3,4 [51,76,102]	6 [152]	1 [25]	1-25/32 [45]	1-13/32 [36]	2-17/32 [64]	13 [6]	9 [58]
2,3,4 [51,76,102]	7 [178]	1 [25]	2-1/8 [54]	1-23/32 [44]	2-7/8 [73]	14 [6]	12 [77]
3,4 [76,102]	8 [203]	1-5/32 [30]	2-1/8 [54]	1-3/4 [44]	2-7/8 [73]	16 [7]	19 [123]
6 [152]	8 [203]	1-5/32 [30]	2-1/8 [54]	1-3/4 [44]	2-7/8 [73]	18 [8]	19 [123]
6 [152]	10 [254]	1-7/16 [37]	2-1/2 [64]	2 [51]	3-1/4 [83]	22 [10]	23 [148]

ENGINEERING SPECIFICATION: ZURN ZN415B

Floor and shower drain, Dura-Coated cast iron body with bottom outlet, combination invertible membrane clamp and adjustable collar with seepage slots and "TYPE B" polished nickel bronze, light-duty strainer.

OPTIONS (Check/specify appropriate options)

PIPE SIZE

2,3,4 [51,76,102]
2 [51]
3 [76]
4 [102]
6 [152]
2,3,4 [51,76,102]
2,3,4 [51,76,102]

(Specify size/type) **OUTLET**

_____ IC Inside Caulk
_____ IP Threaded
_____ IP Threaded
_____ IP Threaded
_____ IP Threaded
_____ NH No-Hub
_____ NL Neo-Loc

'E' BODY HT. DIM.

4-3/16 [106]
2-7/16 [62]
2-3/4 [70]
2-13/16 [71]
2-7/8 [73]
3-13/16 [97]
3-7/8 [98]

PREFIXES

___ ZB D.C.C.I. Body Assembly w/ Polished Bronze Top
___ ZN D.C.C.I. Body Assembly w/ Polished Nickel Bronze Top*

SUFFIXES

___ -AR Acid Resisting Epoxy Coated Cast Iron
___ -CP Chrome-Plated Bronze Top
___ -G Galvanized Cast Iron
___ -HD Heavy-Duty Slotted Grate (ZN 5,6 [127,152] Sizes Only)
___ -OF Oval Funnel (Z329-7) (6,7,8,10 [152,178,203,254] Strainers Only)
___ -P Trap Primer Connection (Specify 1/2 [13] or 3/4 [19])
___ -PC Protective Cover
___ -SA Stabilizer Assembly (See Z1035)
___ -SQ Stabilizer Q-Deck (See Z1035-Q)
___ -SR Stabilizer Ring
___ -TC Neo-Loc Test Cap Gasket (2,3,4 [51,76,102] NL Outlet Only)
___ -U 1-3 [25-76] High Extension Adapter
___ -V Backwater Valve
___ -VP Vandal-Proof Secured Top
___ -Y Sediment Bucket
___ -4 4 [102] Diameter Funnel (Z328)
___ -90 90° Threaded Side Outlet Body Assembly (2,3 [51,76] Only)

* Regularly furnished unless otherwise specified.

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Rev. T
Date: 09/26/17
C.N. No. 137856
Prod. | Dwg. No. Z415B

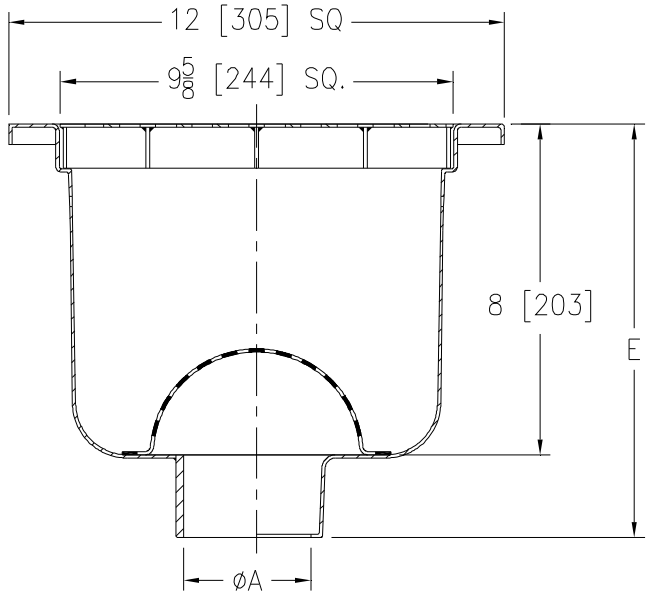
Z1751

12 X 12 [305 X 305] SANI-FLOR RECEPTOR
8 [203] SUMP DEPTH

SPECIFICATION SHEET

TAG FS-1

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



A- Pipe Size in. [mm]	Approx. Wt. lbs [kg]	Grate Open Area in^2 [cm^2]
2, 3, 4 [51, 76, 102]	19 [9]	23 [148]
6 [152]	21 [9]	23 [148]

ENGINEERING SPECIFICATION: ZURN Z1751
12" x 12" x 8" [305mm x 305mm x 203mm] deep, 16 gage, All Type 304 (CF8) Stainless Steel light-duty Sani-Flor receptor with non-tilt, loose set full grate with 1/2" [13mm] square openings and anti-splash stainless steel interior dome strainer.

OPTIONS (Check/specify appropriate options)

PIPE SIZE
3 ,4 [76, 102]
2, 3, 4, 6 [51, 76, 102, 152]
2, 3, 4 [51, 76, 102]

(Specify size/type) **OUTLET**
_____ IC Inside Caulk
_____ NH No-Hub
_____ NL Neo-Loc

'E' BODY HT. DIM.
10-9/16 [268]
10-1/16 [256]
9-13/16 [249]

PREFIXES
_____Z Type 304 (CF8) Stainless Steel Body*
_____ZM Type 316 (CF8M) Stainless Steel

SUFFIXES
_____ -DX Dex-o-tex Flange
_____ -HD Extra Heavy-Duty Grate
_____ -HP Heel-Proof Grate
_____ -K Anchor Flange
_____ -KC Anchor Flange w/ Seepage Holes and Clamp Collar
_____ -P 1/2 [13] Trap Primer Connection
_____ -SG Solid Gasketed Cover
_____ -TC Neo-Loc Test Cap Gasket
(2, 3 ,4 [51, 76, 102] NL Bottom Outlet Only)
_____ -VP Vandal-Proof Secured Top
_____ -Y Sediment Bucket
_____ -YS Suspended Sediment Bucket

_____ -1 (Less) Grate
_____ -2 1/2 Grate
_____ -3 3/4 Grate
_____ -4 Full Grate w/ 3 [76] Square Center Opening
_____ -5 Grate w/ 4 [102] Dia. x 3-3/4 [95] High Type 304 Stainless Steel Funnel
_____ -8 Grate w/ 8-3/8 x 3-5/8 x 3-3/4 [213 x 92 x 95] High Type 304 Stainless Steel Oval Funnel
_____ -15 Solid Cover
_____ -16 1/2 Solid Cover
_____ -19 Full Hinged Grate
_____ -20 Full Hinged Solid Cover

* Regularly furnished unless otherwise specified.

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www.zurn.com

Rev. K
Date: 09/28/2017
C.N. No. 138070
Prod. | Dwg. No. Z1751

TP-1

Precision Plumbing Products
"Specify with Confidence - Install with Pride"®

P1-500 AND P2-500 PRESSURE DROP ACTIVATED SUBMITTAL TRAP PRIMER

www.pppinc.net

The P1-500 and P2-500 are adjustable to the static line pressure by use of the adjusting screw. System operating range is 20 psi minimum to 80 psi (138 to 552 kpa) maximum.

The valve requires a 10 psi (70 kpa) pressure drop across the valve to activate and will deliver a metered amount of water to the floor drain. The trap Primer is to be connected to a cold water supply only.

Constructed of C693 Lead Free brass, EPDM E70 O-rings, Dow #7 Silicone, #60 stainless steel mesh screen, stainless steel adjustment screw.

Model P1-500 will prime 1-4 floor drains using our patented DU-U Distribution unit.

Model P2-500 will prime 1-2 floor drains using our patented DU-U Distribution unit.

Model P-1 Model P-2



PROJECT SUBMITTAL

Project: _____

Contractor: _____

Engineer: _____

Date Submitted: _____

Prepared By: _____

FLOOR DRAIN TRAP PRIMER VALVE
MODELS: P1-500 & P2-500

LEAD FREE
NSF/ANSI - 372- 2016

US PATENT NO. 5,263,508

INSTALLATION REQUIREMENTS

This valve is designed to be installed on ½" to 1 ½" cold water line, feeding a flush valve or other open and closing valve supply line that is frequently used.

Trap Primer valve makeup line to floor drain is recommended to be a minimum of 12" off the finished floor before a 90° elbow can be installed.

The furthest recommended distance of makeup line is 20' to the floor drain.

Trap primer make up line must have continuous slope to the floor drain (consult local code requirements).

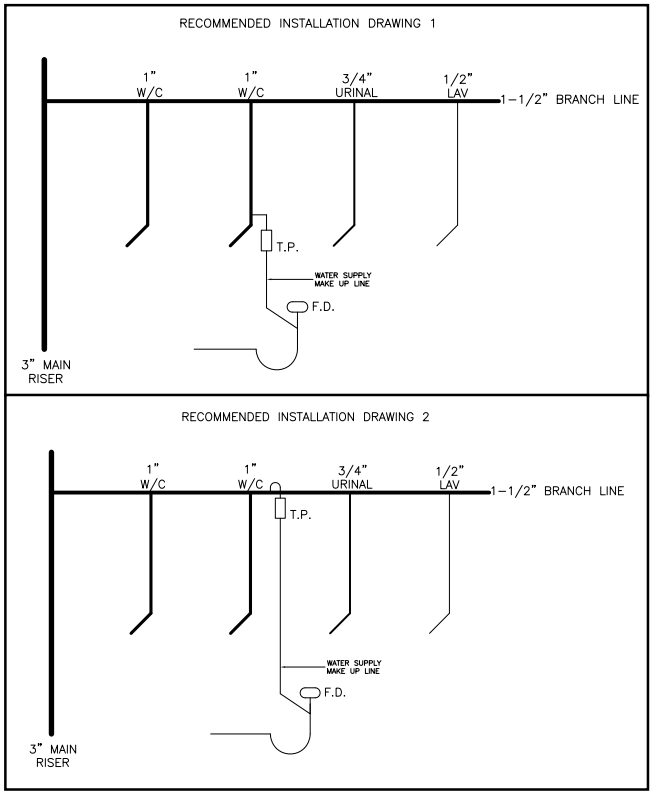
Install with a shut off valve for servicing on the inlet side and a union connection on the outlet side.

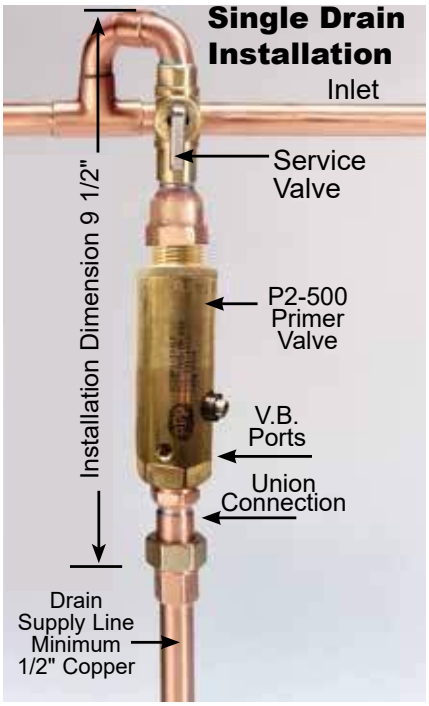
The valve must be installed level.

If using the distribution unit the clear plastic cover must be used.

Do not subject the valve to rough in pressure test.

FLOOR DRAIN TRAP PRIMER DISTRIBUTION CHART		
Primer Model	# of Drains	Distribution Units
P2-500	1	N/A
P2-500	2	DU-4/DU-U
P1-500	3	DU-4/DU-U
P1-500	4	DU-4/DU-U





Multiple Drain Installation



Precision Plumbing Products
Division of JL Industries, Inc.
802 SE 199th Ave
Portland, Oregon 97233
T (503) 256-4010
F (503) 253-8165
www.pppinc.net

LEAD FREE
NSF/ANSI - 372 - 2016

Rev 01/21

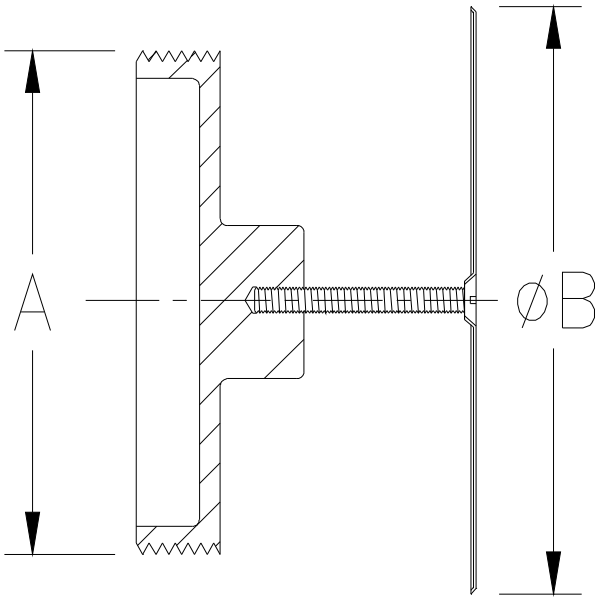
Z1468
ACCESS COVER AND PLUG

WCO

SPECIFICATION SHEET

TAG WCO _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Product Designation	Dimensions In Inches		Approx. Wt. Lbs. [kg]
	A-Pipe Size	B	
-1.25	1-1/4 [32]	4 [102]	4 [2]
-1.5	1-1/2 [38]		
-2	2 [51]	5 [127]	5 [2]
-2.5	2-1/2 [64]		
-3	3 [76]		
-3.5	3-1/2 [89]		6 [3]
-4	4 [102]	7 [178]	8 [4]
-5	5 [127]		11 [5]
-6	6 [152]	9 [229]	14 [6]
-8	8 [203]	11 [279]	25 [11]

ENGINEERING SPECIFICATION: ZURN ZS1468
Round stainless steel wall access cover complete with securing screw and bronze raised hex head plug.

OPTIONS (Check/specify appropriate options)

PREFIXES

☐ ZAB Bronze Plug with Polished Bronze Cover
☐ ZS Bronze Plug with Stainless Steel Cover*

SUFFIXES

☐ -SL Screw Longer Than 3 1/2 [89]
☐ -VP Vandal-Proof Screw

*REGULARLY FURNISHED UNLESS OTHERWISE SPECIFIED

REV. D DATE: 11/5/10 C.N. NO. 120267

DWG. NO. 58781 PRODUCT NO. Z1468

ZURN INDUSTRIES, LLC ♦ SPECIFICATION DRAINAGE OPERATION ♦ 1801 Pittsburgh Ave. ♦ Erie, PA 16514
Phone: 814/455-0921 ♦ Fax: 814/454-7929 ♦ World Wide Web: www.zurn.com
In Canada: ZURN INDUSTRIES LIMITED ♦ 3544 Nashua Drive ♦ Mississauga, Ontario L4V1L2 ♦ Phone: 905/405-8272 Fax: 905/405-1292

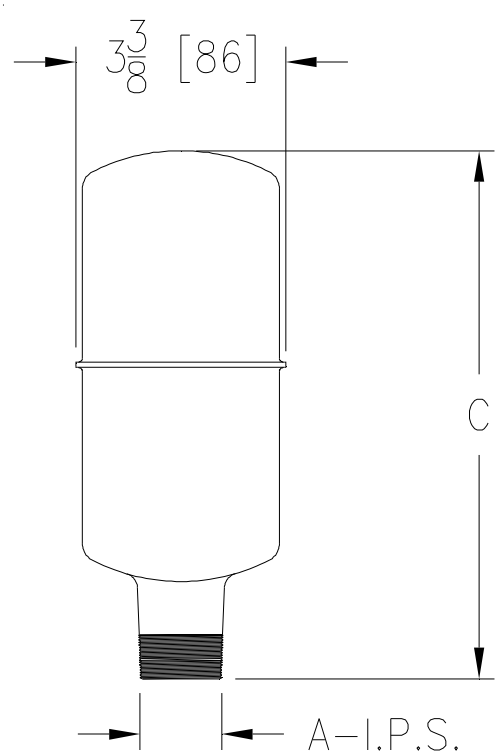
Z1700

SHOKTROL WATER HAMMER ARRESTORS WHA

SPECIFICATION SHEET

TAG _____

Dimensional Data (inches and [mm]) are Subject to Manufacturing Tolerances and Change Without Notice



Size	A Inches [mm]	C Inches [mm]	Approx. Wt. Lbs. [kg]	Fixture Unit Capacity
100	3/4 [19]	3-1/2 [90]	1 [.5]	1-11
200	3/4 [19]	3-1/2 [90]	1-1/2 [.7]	12-32
300	1 [25]	4-1/2 [114]	1-3/4 [.8]	33-60
400	1 [25]	6-5/8 [168]	2-3/4 [1.2]	61-113
500	1 [25]	7-1/2 [191]	3-1/4 [1.5]	114-154
600	1 [25]	8-1/2 [216]	3-3/4 [1.7]	155-330

Pressure and Temperature Requirements:
Maximum Working Pressure: 125 psi [862 Kpa]
Maximum Static Pressure: 250 psi [1724 Kpa]
Operating Temperature Range: 33 °F to 300 °F [1 °C to 149 °C]

ENGINEERING SPECIFICATION: ZURN Z1700
Shoktrol Water Hammer Arrestors are regularly furnished in all stainless steel construction. Pipe threads are accurately machined to assure tight connection. 3/4" [19mm] male I.P.S. inlet is standard for the 100 and 200 size units, while 1" [25mm] male I.P.S. inlet is standard for sizes 300 thru 600.

All sizes of Zurn Z1700 Shoktrol Water Hammer Arrestors comply with the following specifications:

PDI	WH-201
ANSI	A112.26.1M
ASSE	1010

Where required in piping systems, properly sized water hammer arrestors shall be ZURN Z1700 (specify size) with nesting type bellows contained within a casing having sufficient displacement volume to dissipate the calculated kinetic energy generated, in the piping system. Both casing and bellows constructed of Type 304 stainless steel.

* Regularly furnished unless otherwise specified.

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Rev. D
Date: 11/10/2016
C.N. No. 135481
Prod. | Dwg. No. Z1700

Job Name: Camp Roberts Cal Guard B7020
Prepared For: YEI
Unit Tag: ACS-1
Quantity: 1

ACU-1

Trane Precedent Gas/Electric/Cooling Only Packaged Rooftop

Unit Overview - YHJ072A3S0L**C0E0000000040000000000000000

Application	Unit Size	Supply Fan		External Dimensions (in.)			Operating Weight	EER	IEER/SEER	Elevation
		Airflow	Total External Static Pressure	Height	Width	Length				
DX Cooling / Gas Heat	6 Ton	1860 cfm	1.084 in H2O	4.24 ft	4.44 ft	7.34 ft	1002.0 lb	12.10	15.90	0.00 ft

Unit Features

Hinged Service Access/Filters	Hinged Access Panels with 2-in MERV 13
Fresh Air Selection	Economizer, Dry Bulb



Unit Electrical

Voltage/phase/hertz	208-230/60/3
MCA	38.00 A
MOP	50.00 A
Condenser Fan FLA	3.30 A
Evaporator Fan FLA	8.80 A
Compressor 1 RLA	14.10 A
Compressor 2 RLA	7.30 A

Controls

Unit Controls	Symbio 700
System Monitoring Controls 1	Clogged Filter & Condensate Overflow

Cooling Section

Entering Dry Bulb	86.00 F	**Capacity**	
Entering Wet Bulb	63.20 F	**Gross Total**	63.81 MBh
Ambient Temp	104.00 F	**Gross Latent**	0.00 MBh
Leaving Coil Dry Bulb	52.89 F	**Gross Sensible**	63.81 MBh
Leaving Coil Wet Bulb	50.33 F	**Net Total**	61.75 MBh
Leaving Unit Dry Bulb	55.50 F	**Net Sensible**	61.75 MBh
Leaving Unit Wet Bulb	51.47 F	**Net Sensible Heat Ratio**	100.00 %
Saturated Discharge Temperature	119.93 F	**Fan Motor Heat**	2.06 MBh
Saturated Suction Temperature	46.39 F	**Refrig Charge-Circuit 1**	9.0 lb

Heating Section

Heating Stages	Low Gas Heat
Input Heating Capacity	80.00 MBh
Output Heating Capacity	64.80 MBh
Heating EAT	51.00 F
Heating LAT	83.26 F
Heating Temp Rise	32.26 F

Fan Section

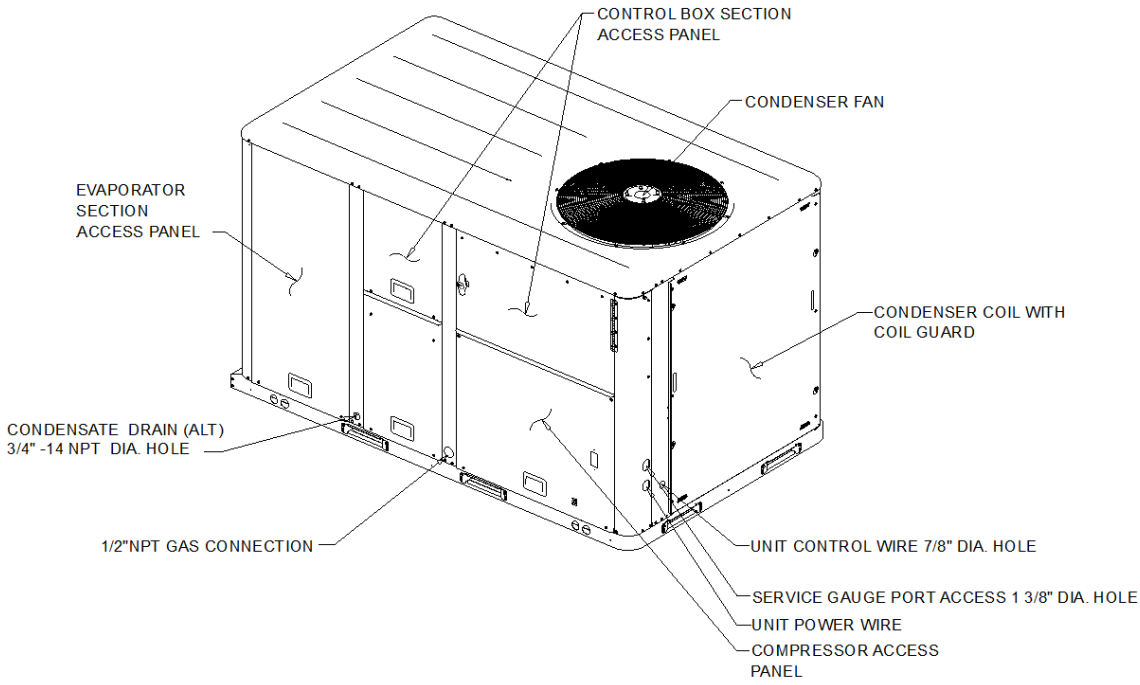
Indoor Fan Data		Indoor Fan Performance	
Airflow Application	Horizontal	**Airflow**	1860 cfm
Design ESP	1.000 in H2O	**Supply Motor Horsepower**	3.100 hp
Component SP	0.084 in H2O	**Indoor Motor Operating Power**	0.745 hp
Heat SP	0.000 in H2O	**Indoor RPM**	1040 rpm
Total External SP	1.084 in H2O		
Supply Fan Count	1.00 Number		

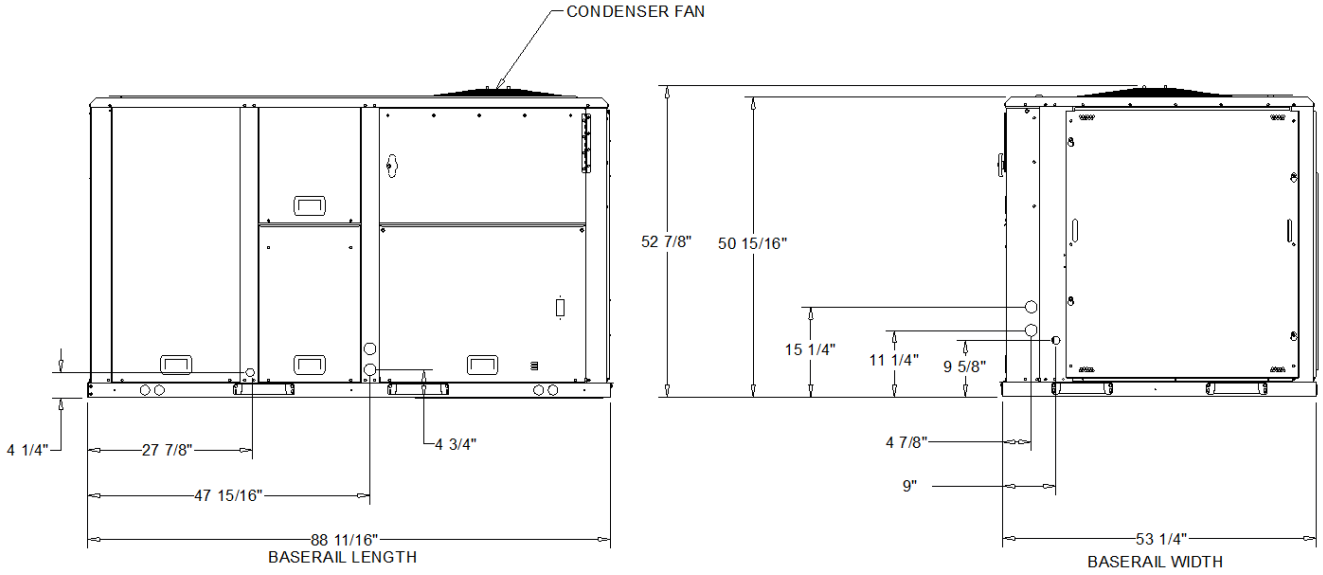
Acoustics

Sound Path	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Ducted Discharge	81 dB	75 dB	72 dB	67 dB	62 dB	59 dB	57 dB	58 dB
Ducted Inlet	76 dB	68 dB	66 dB	57 dB	53 dB	50 dB	49 dB	48 dB
Outdoor Noise	85 dB	84 dB	88 dB	89 dB	86 dB	80 dB	77 dB	71 dB

Note:Ducted Discharge and Ducted Inlet Sound in accordance with AHRI 260-2017
Note:Outdoor Sound in accordance with AHRI 270-2015

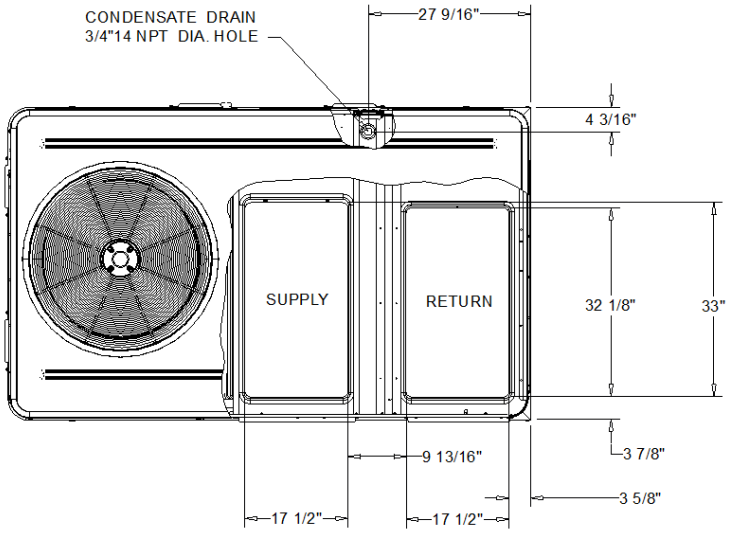
NOTES:
1. VERIFY WEIGHT, CONNECTION, AND ALL DIMENSION WITH INSTALLER DOCUMENTS BEFORE INSTALLATION



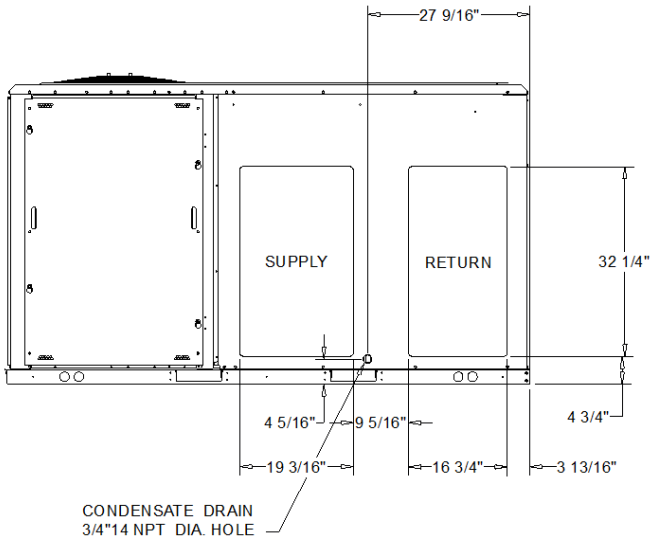


DX COOLING / GAS HEAT HIGH EFFICIENCY

DIMENSION DRAWING



PLAN VIEW OF DOWNFLOW OPENINGS



HORIZONTAL AIR FLOW OPENING

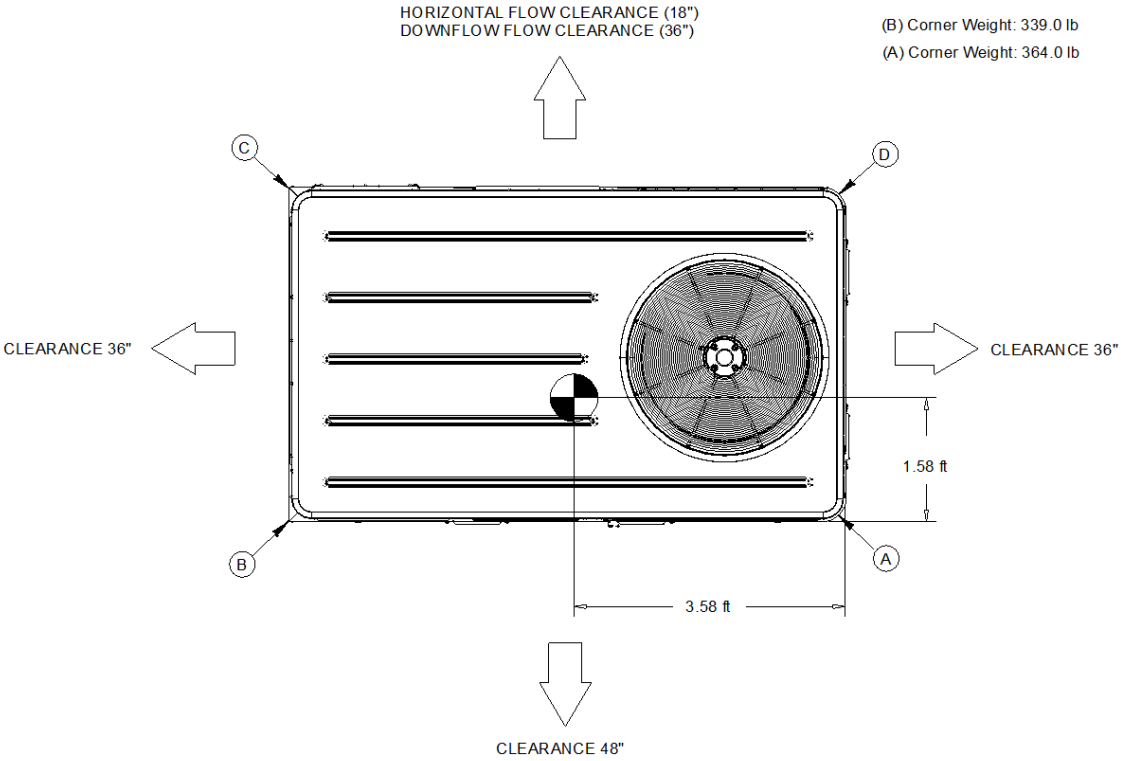
DX COOLING / GAS HEAT HIGH EFFICIENCY

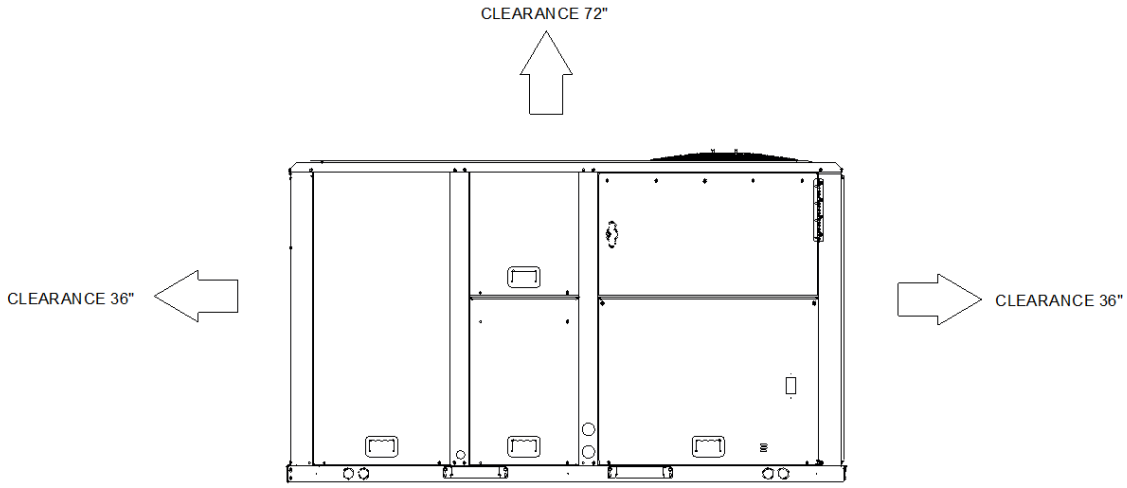
DIMENSION DRAWING

NOTES:
1. APPROX. INSTALLED WEIGHT INCLUDES ALL SELECTED OPTIONS AND ACCESSORIES.
2. CORNER WEIGHTS ARE FOR BASE UNIT ONLY AND DO NOT INCLUDE OPTIONS OR ACCESSORIES.
3. WEIGHT INCLUDES BOTH FACTORY AND FIELD INSTALLED ACCESSORY.

Approximate Installed Weight: 1,002.0 lb

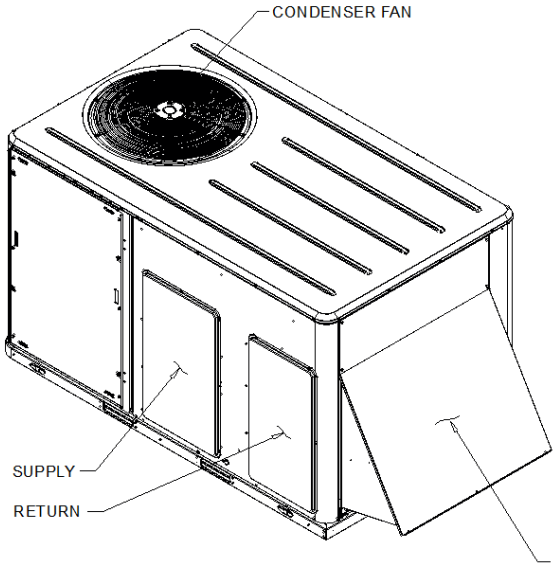
(B) Corner Weight: 339.0 lb	(C) Corner Weight: 195.0 lb
(A) Corner Weight: 364.0 lb	(D) Corner Weight: 209.0 lb

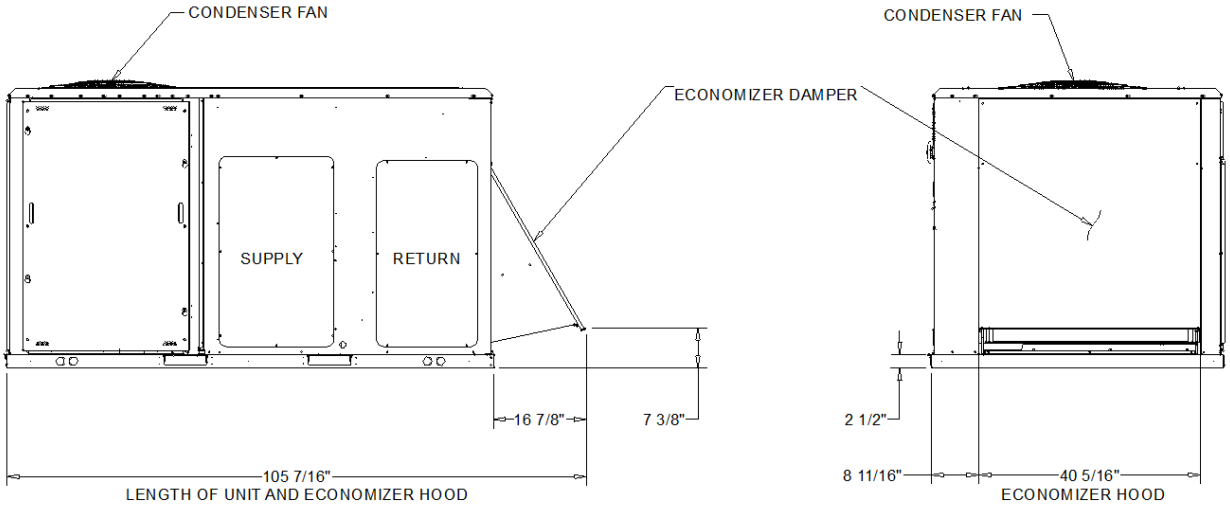




DX COOLING / GAS HEAT HIGH EFFICIENCY

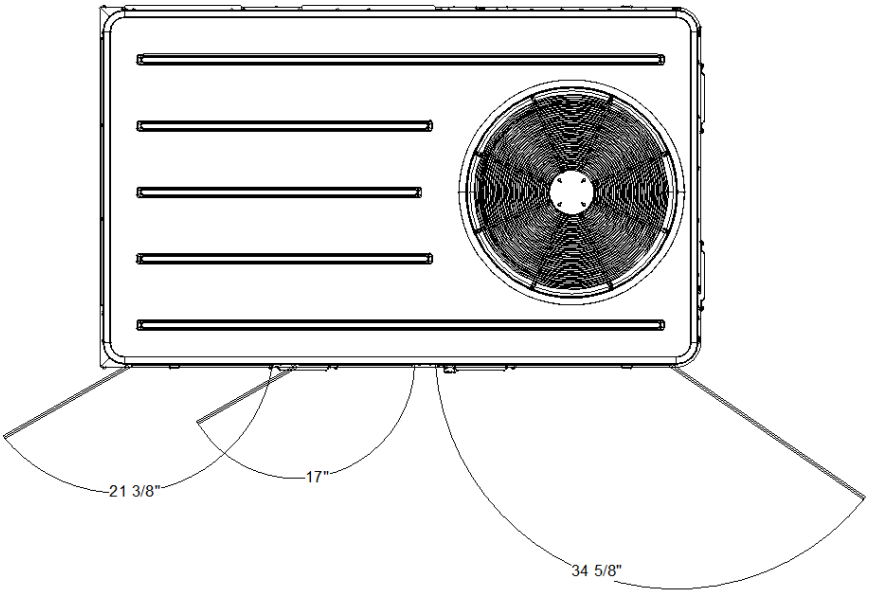
WEIGHTS AND CLEARANCES

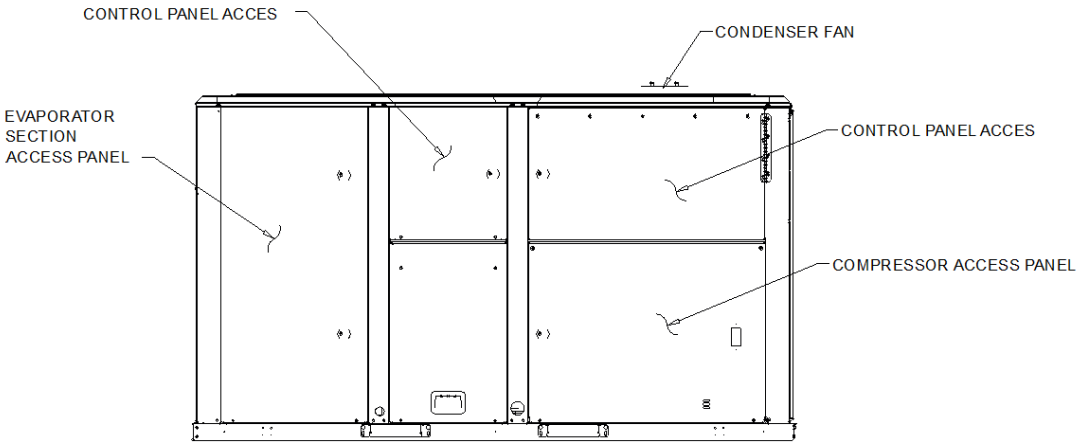




ECONOMIZER AIR DAMPER(S) (OPTION)

6 TON STANDARD GAS/ELECTRIC UNIT





SWING DIAMETER FOR HINGED DOOR(S) (OPTION)

6 TON STANDARD GAS/ELECTRIC UNIT

General
- Packaged rooftop units cooling, heating capacities, and efficiencies are AHRI Certified within scope of AHRI Standard 210-240 for 6 to 25 Tons and ANSIZ21.47 and 10 CFR Part 431 pertaining to Commercial Warm Air Furnaces (all gas heating units).
-Convertible airflow.
-Symbio controls operating range is from 0-125 from factory; if designing for cooling mode operation below 40 deg F ambient temp, add low ambient kit to assure continuous and reliable operation.
-Factory assembled, internally wired, fully charged with R-410A, and 100 percent run tested to check cooling operation, fan and blower rotation, and control sequence before leaving the factory.
-Colored and numbered wiring internal to the unit for simplified identification.
-Units cULus listed and labeled, classified in accordance for Central Cooling Air Conditioners.

Casing
-Zinc coated, heavy gauge, galvanized steel.
-Weather resistant pre-painted metal with galvanized substrate.
-Meets ASTM B117, 672 hour salt spray test.
-Removable single side maintenance access panels.
-Lifting handles in maintenance access panels (can be removed and reinstalled by removing fasteners while providing a water and air tight seal).
-Exposed vertical panels and top covers in the indoor air section insulated with a cleanable foil-faced, fire-retardant permanent, odorless glass fiber material.
-Base pan shall have no penetrations within the perimeter of the curb other than the raised 1 inch high downflow supply/return openings to provide an added water integrity precaution, if the condensate drain backs up.
-Base of the unit insulated with 1/8 inch, foil-faced, closed-cell insulation.
-Unit base provisions for forklift and/or crane lifting on three sides of unit.

Hail Guards
-Provides condenser coil protection.

Microchannel Coils
-Optimal heat transfer performance due to flat, streamlined tubes with small ports, and metallurgical tube-to-fin bond.
-Reduce system refrigerant charge by up to 50% leading to better compressor reliability.
-Compact all-aluminum microchannel coils reduce the unit weight.
-Recyclable all aluminum coils All aluminium construction minimizes galvanic corrosion.
-Strong aluminum brazed structure provides better fin protection.
-Flat streamlined tubes more dust resistant and easy to clean.
-Coils leak tested at the factory to ensure the pressure integrity.

Compressors
-All units have direct-drive, hermetic, scroll type compressors with centrifugal type oil pumps.
-Suction gas-cooled motor with voltage utilization range of plus or minus 10 percent of unit nameplate voltage.
-Internal overloads standard with scroll compressors.
-Crankcase heaters are standard on all compressors.
-All units have dual compressors.
-Three stages of cooling available on 6 to 17.5 tons units and four stages of cooling available on 20 and 25 tons units.

Filters
Two inch pleated media filters shall be available on all models.

Frostat
-Utilized as a safety device.
-Opens to prevent freezing temperatures on evaporator coil.
-Temperature will need to rise to 50°F before closing.
-Utilized in low airflow or high outside air applications (cooling only).

Gas Heating Section

-The heating section shall have a progressive tubular heat exchanger with corrosion-resistant aluminized steel tubes and burners as standard on all models.
-Stainless steel heat exchanger with 409 stainless steel tubes and 439 stainless steel burners shall be optional.
-Induced draft combustion blower shall be used to pull the combustion products through the firing tubes.
-Heater shall use a direct spark ignition (DSI) system.
-On initial call for heat, the combustion blower shall purge the heat exchanger for 20 seconds before ignition.
-After three unsuccessful ignition attempts, entire heating system shall be locked out until manually reset at the thermostat/zone sensor.
-Units shall be suitable for use with natural gas or propane (field-installed kit).

Heat Exchanger

-Compact cabinet features a tubular heat exchanger in low, medium and high heat capacities.
-Corrosion-resistant aluminized steel tubes and burners are standard on all models.
-Induced draft blower to pull the gas mixture through the burner tubes.
-Direct spark ignition and a flame sensor as a safety device to validate the flame.

TRANE PRECEDENT 7.5-10 TON:
THC I20G, THC I20H, YHC I20G, YHC I20H, YZC I20E, I20F, WSC I20E, WHC I20H, GERE I20

6146-PE/MPE**-****

POWER EXHAUST/ECONOMIZER
VERTICAL OR HORIZONTAL APPLICATIONS

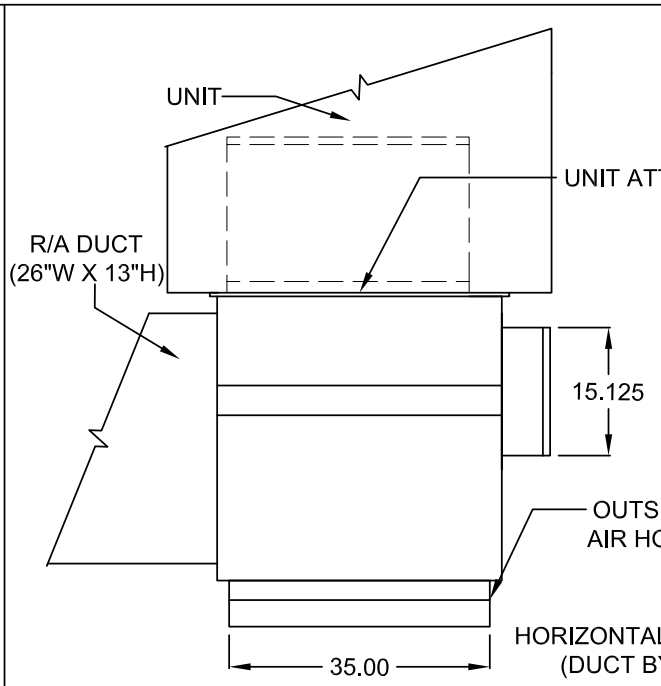
FEATURES

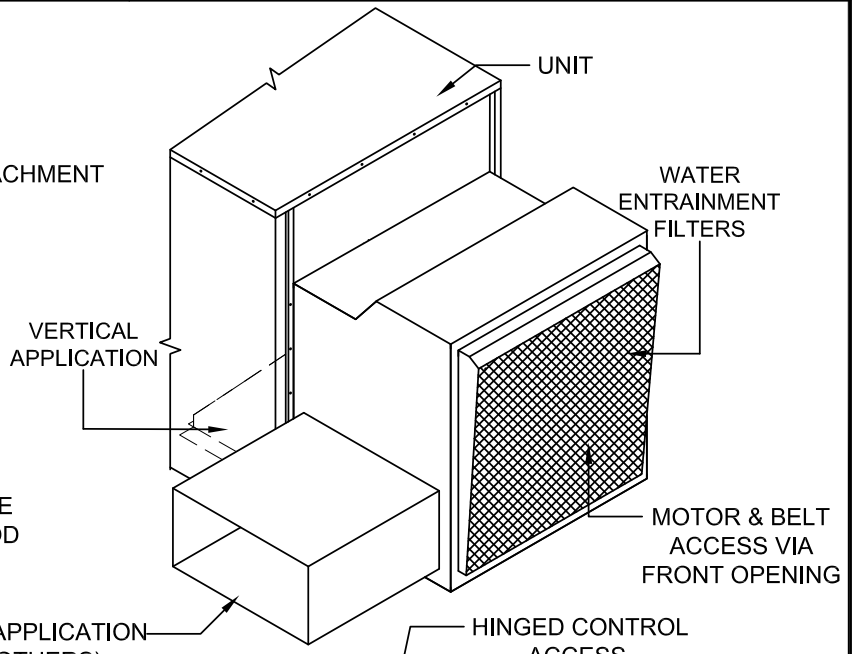
1) CONVERTIBLE FOR BOTH HORIZONTAL & VERTICAL APPLICATIONS.
2) COLOR KEYED CHASSIS.
3) DWDI FORWARD CURVE CENTRIFUGAL FAN.
4) THERMAL OVERLOAD PROTECTED MOTORS.
5) HINGED CONTROL ACCESS DOOR.
6) VARIABLE FREQUENCY DRIVE (MODULATING OPTION)
7) LOGIC MODULE.
8) OAT SENSOR.
9) MAT SENSOR.
10) COMMUNICATING ACTUATOR.
11) CLASS 1A OUTSIDE AIR & RETURN AIR DAMPERS.
12) COMMERCIAL BACKDRAFT DAMPER WITH BLADE EDGE SEALS MECHANICALLY LOCKED INTO BLADE EDGE.

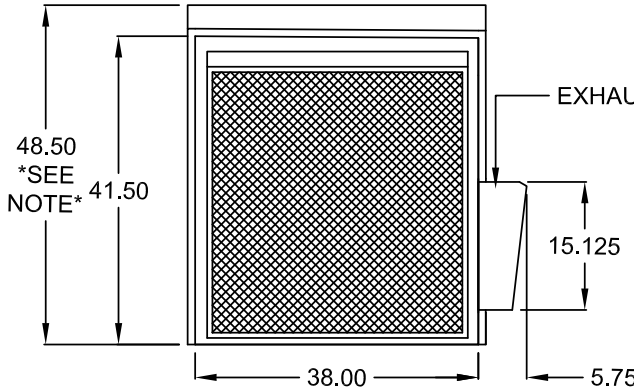
AMCA RATED CLASS 1A LEAKAGE RATED HIGH PERFORMANCE DAMPER ONE-PIECE AIRFOIL BLADE FOR LOW PRESSURE DROP

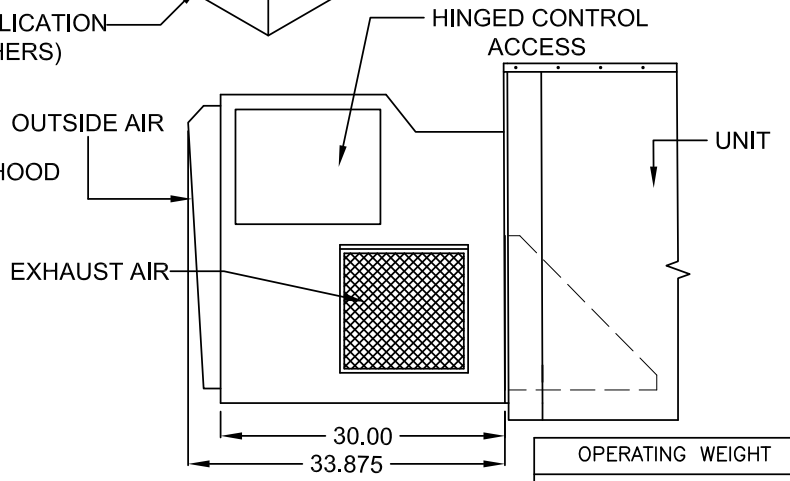
OPTIONS

1) DRY BULB SENSOR (OAT)
2) ENTHALPY SENSOR (OAT)
3) DUAL DRY BULB (OAT/RAT)
4) DUAL ENTHALPY (OAT/RAT)
5) BACNET VARIABLE FREQUENCY DRIVE
6) ACTUATOR ONLY
7) NO CONTROLS
8) RELIATEL AND ELECTROMECHANICAL









* POWER EXHAUST OVERALL HEIGHT @ UNIT CONNECTION

OPERATING WEIGHT
331 LBS

CanFab
CANNON FABRICATION INC
182 GRANITE STREET, SUITE 101, CORONA, CA 92879
PHONE: (951)278-1830 FAX: (951)278-8444 www.canfab.com canfab@canfab.com

FOR:		
PART NO:	PROJECT:	
ENGINEER: DV	DISTRIBUTOR:	
DRAWING NO:	Rev: 10	DATE: 5/1/20
APPROVED BY:		DATE: / /

MOTOR / ELECTRICAL DATA

MODEL:	6146			115 VOLT/1 PH			208 VOLT/ 1PH			230 VOLT/ 1PH			208 VOLT/3 PH			230 VOLT/ 3PH			460 VOLT/ 3PH		
			MOTOR	MOTOR			MOTOR			MOTOR			MOTOR			MOTOR			MOTOR		
TONS	CFM	RPM	HP	FLA	MCA	MOCP	FLA	MCA	MOCP	FLA	MCA	MOCP	FLA	MCA	MOCP	FLA	MCA	MOCP	FLA	MCA	MOCP
8.5	3000	860	1.5	16.4	20.5	36.9	8.4	10.5	18.9	8.2	10.25	18.45	6	6.25	11.25	3.4	6	10.8	3.4	3	5.4
8.5	3400	904	1.5	16.4	20.5	36.9	8.4	10.5	18.9	8.2	10.25	18.45	6	6.25	11.25	3.4	6	10.9	3.4	3	5.4
10	4000	978	2	21	26.25	47.25	11.3	13.125	25.425	10.5	13.125	23.625	6.2	7.75	13.95	6.2	7.75	13.95	3.1	3.875	6.975

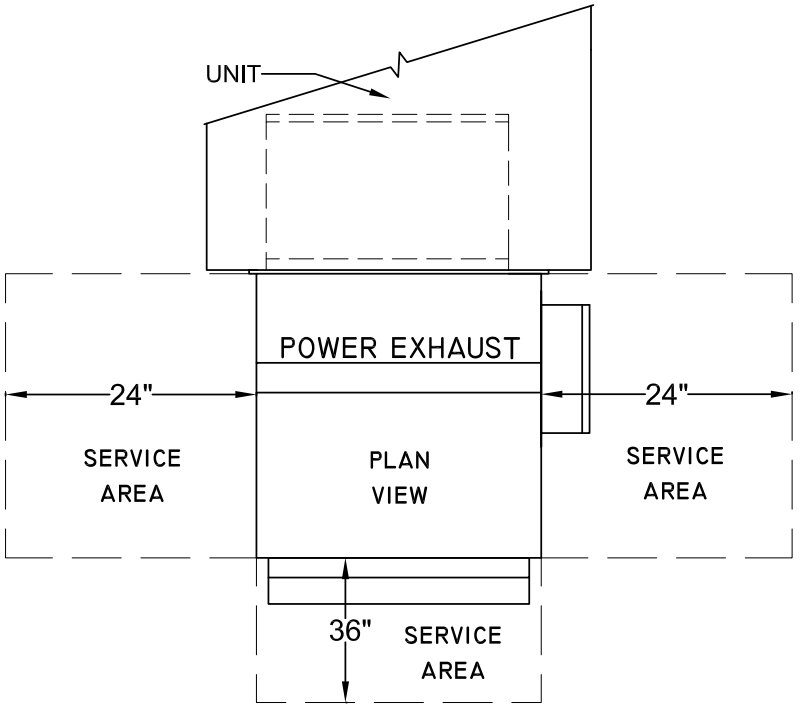
POWER EXHAUST IS DESIGNED FOR A ESP OF .50 WC
FAN PERFORMANCE LAB TESTED BY FAN MANUFACTURER

SOUND POWER LEVELS

	FREQ (Hz)	63	125	250	500	1K	2K	4K	8K	OVERALL
3000	Lw (dB)	93	86	75	83	71	66	83	66	92
	Lw (dB) (A)	67	77	69	75	71	67	67	69	78
	FREQ (Hz)	63	125	250	500	1K	2K	4K	8K	OVERALL
3400	Lw (dB)	66	92	92	71	75	66	66	66	95
	Lw (dB) (A)	69	75	71	77	75	77	69	69	81
	FREQ (Hz)	63	125	250	500	1K	2K	4K	8K	OVERALL
4000	Lw (dB)	93	83	83	66	66	71	66	83	95
	Lw (dB) (A)	67	77	71	75	75	77	67	69	82

SERVICE CLEARANCES

SERVICE AREA NOT DRAWN TO SCALE.



SHEAVE ADJUSTMENT

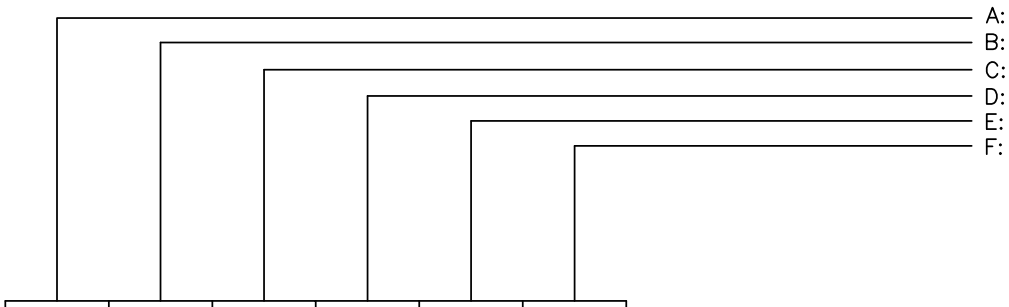
SHEAVE TURNS TO ACHIEVE CFM/RPM		
CFM	SHEAVE TURNS	ACTUAL RPM
3000	3.5	860
3400	2.5	904
4000	1	978

DAMPER PRESSURE DROP

DAMPER PRESSURE DROP		
CFM	O/A PD (INW.G.)	R/A PD (INW.G.)
3000	0.0152	0.0152
3400	0.0195	0.0195
4000	0.027	0.027

NOTE: TURNS OPEN ARE DETERMINED FROM FULLY CLOSED POSITION
FAN DATA ACQUIRED BY 3RD PARTY TESTING

PART NUMBER DESCRIPTOR



A	B	C	D	E	F
		CFM	MOTOR		
CHASSIS	TYPE	X100	HP	VOLTAGE	CONTROL
6142	PE	24	B	4	H
6142	MPE	24	B	4	H

COMPLETED PART NUMBER
6142–PE24B–4H
6142–MPE24B–4H

MOTOR	
HP	
0.5	A
0.75	B
1	C
1.5	D
2	E
3	F
5	G
7.5	H
10	I
15	J

VOLTAGE	
115/1	5
208/1	0
230/1	2
208/3	1
230/3	3
460/3	4

CONTROL OPTION PACKAGES			
	ACTUATOR	SENSORS	SYSTEM
A =	HONEYWELL	DRYBULB	JADE
B =	TRANE	DRYBULB	RELIATEL
C =	HONEYWELL	ENTHALPY	JADE
D =	TRANE	ENTHALPY	RELIATEL
E =	HONEYWELL	DUAL DRY BULB	JADE
F =	TRANE	DUAL DRY BULB	RELIATEL
G =	HONEYWELL	DUAL ENTHALPY	JADE
H =	TRANE	DUAL ENTHALPY	RELIATEL

CanFab
CANNON FABRICATION INC
182 GRANITE STREET, SUITE 101, CORONA, CA 92879
PHONE: (951)278–1830 FAX: (951)278–8444 www.canfab.com canfab@canfab.com

FOR:

PART NO: PROJECT:

ENGINEER: DISTRIBUTOR:

DRAWING NO: PND001.DWG DATE: 6/2/2020

APPROVED BY: DATE: / /

CO2 SENSOR

CO2METER.COM
CO2 MEASUREMENT SPECIALISTS

SE-0012
eSense II CO2 Transmitter



Wall-mount IAQ Transmitter

The eSense II is a cost-effective carbon dioxide transmitter designed to be installed in areas like office buildings or classrooms where carbon dioxide levels are monitored to determine occupancy levels for energy savings and indoor air quality.

The default eSense is normally maintenance-free thanks to the built-in self-correcting ABC algorithm (Automatic Baseline Correction). This algorithm constantly keeps track of the sensor's lowest reading over several days and corrects for long-term drift.

Features

- Wall-Mount IAQ Transmitter
- Self-Calibrating - Saves Money
- Industry Standard Design
- Measurement range: 0 - 2 000 ppm CO2
- Two analogue outputs (not model –I):
- Internal automatic self-diagnostics.
- Maintenance-free in normal applications
- Cost-optimized for connection to DDC's
- Prepared for complementary passive
- temperature element (model -Tr).

Applications

- Homes
- Classrooms
- Commercial Buildings
- Offices
- Gymnasiums

Accessories

SENSE™ is an extremely cost-optimized sensor solution for climate control of buildings and other processes.
By controlling the ventilation based on actual demand, it helps you decrease your energy consumption and yet have a healthy indoor climate!

The different housing options makes the **eSENSE™** available to almost any application or environment for example in greenhouses, residential and commercial buildings.

eSENSE™ -Tr is also prepared for quick mounting of a complementary passive temperature element, which can easily be done by the customer.

eSENSE™II has a new housing that fits directly on top of EU and US electrical junction box standards

Speak to a Technical Sales Expert
1.877.678.4259 | sales@CO2Meter.com

SE-0012

eSense II CO2 Transmitter

General Performance

Compliance with ..... EMC directive 89/336/EEC. RoHS directive 2002/95/EG
Operating Temperature Range ..... 0 - 50 °C
Storage Temperature Range ..... -40 to +70 °C (display model -D: -20 to +70 °C)
Operating Humidity Range ..... 0 to 95% RH (non-condensing)
Operating Environment ..... residential, commercial and industrial spaces 1
Warm-up Time ..... 1 min. (@ full specs 15 minutes)
Sensor Life Expectancy ..... > 15 years
Maintenance Interval ..... no maintenance required 2
Self Diagnostics ..... complete function-check, LCD error indication (display model -D)
Display (model -D) ..... 4 Digits, 7 segments LCD with ppm indicator

Electrical

Power Input ..... 24 VAC/VDC ±20%, 50 Hz (half-wave rectifier input)
Power Consumption ..... < 1 Watt average
Connection screw terminal A ..... 4 x 1,5 mm2
for power input (G+, G0) and voltage outputs (OUT1, OUT2)
Connection screw terminal B ..... 2 x 1,5 mm2 for passive resistive output (Y, M) for option –Tr

CO2 Measurement

Sensing method ..... Gold-plated infrared (NDIR) waveguide technology with Automatic Background
Calibration (ABC) and passive gas diffusion (no moving parts)
Response Time (T1/e) ..... < 10 sec. @ 30 cc/min. flow rate , < 3 min. diffusion time
Repeatability ..... ± 20 ppm ± 1 % of reading
Accuracy 2 ..... ± 30 ppm ± 3 % of reading
Annual Zero Drift 2 ..... < ± 10 ppm
Pressure Dependence ..... + 1.6 % reading per kPa
Measurement range ..... 0 - 3 000 ppm

CO2METER.COM
CO2 MEASUREMENT SPECIALISTS

Call 1.877.678.4259
Email Sales@CO2Meter.com | Support@CO2Meter.com
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Last Update: 4-16-2021

EF-1

Job Name: CSP-A510 Cut Sheet
Tag: MK-1
Quantity: 1
Printed Date: April 17, 2023

Model: CSP-A510

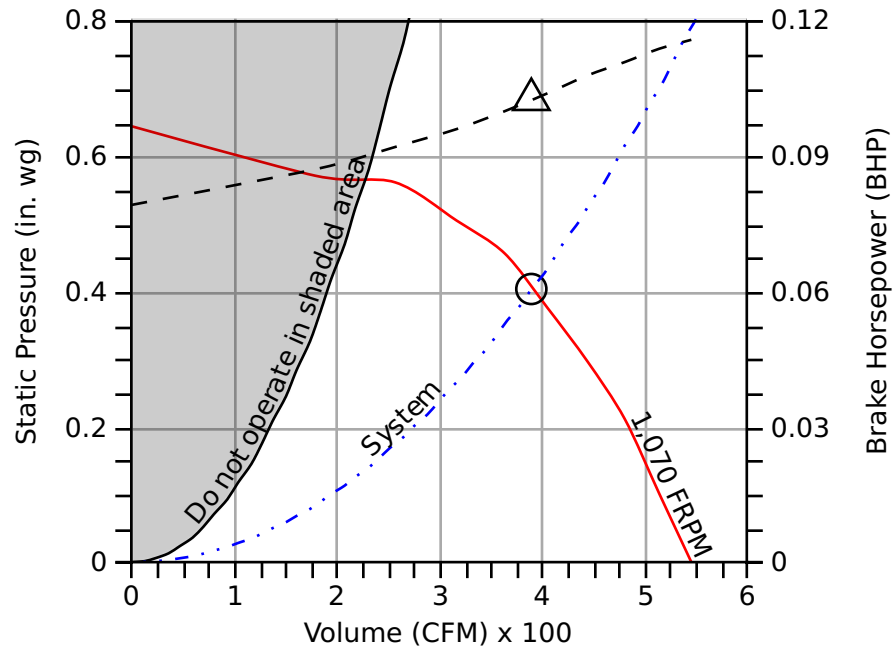
Direct Drive Cabinet Fan

Standard Construction Features: Galvanized steel housing with duct collars. Centrifugal forward curved wheel. Direct driven motor in the air stream.

Fan Configuration	
Drive type	Direct

Performance	
Requested Volume (CFM)	375
Actual Volume (CFM)	389
Total External SP (in. wg)	0.4
Fan RPM	1,070
Operating Power (bhp)	0.1
Startup Power (bhp)	0.1
Air Stream Temp (F)	75
Start-up Temp (F)	70
Air Density (lbs/ft^3)	0.074
Watts (W)	191
Static Efficiency (%)	24
Outlet Velocity (ft/min)	885

Motor	
V/C/P	115/60/1
NEC FLA (Amps)	3.3



- Fan curve
- Brake horsepower curve
- Operating Point SP
- Operating Bhp point
- Max system curve
- System curve

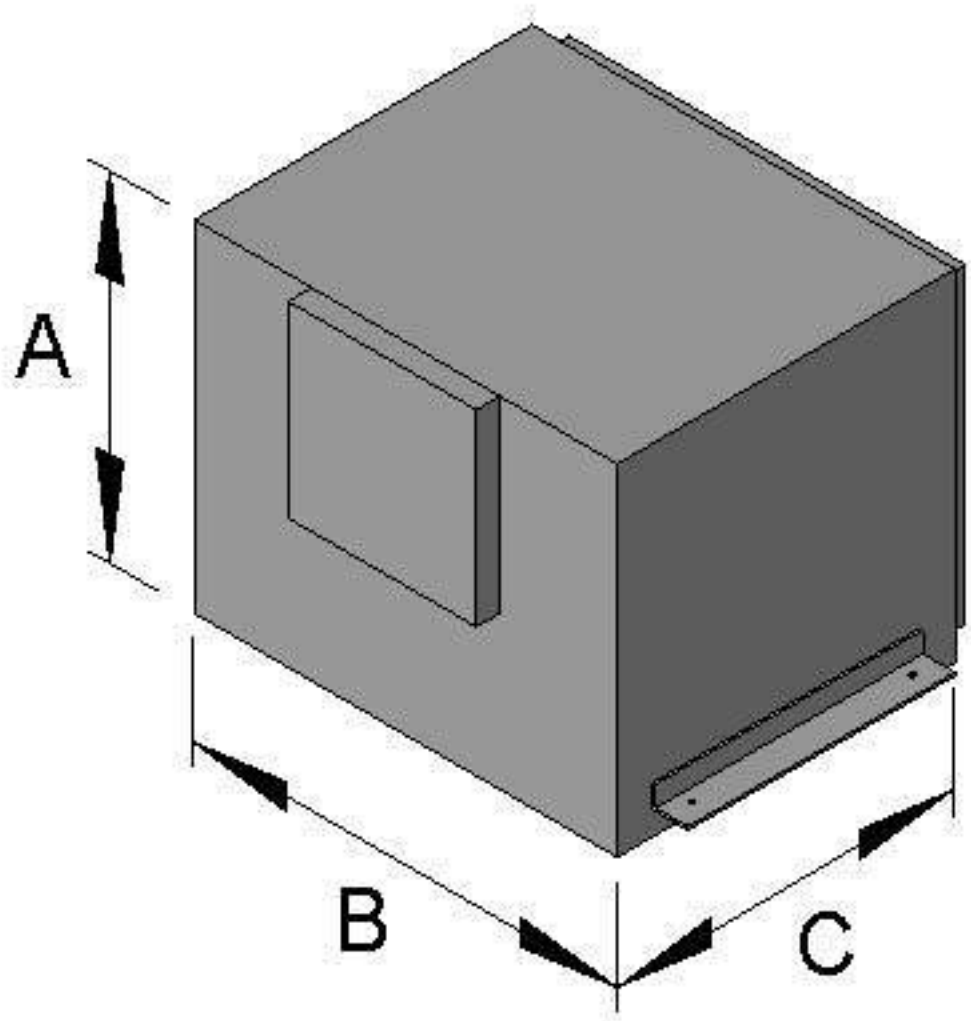
Static Pressure Calculations	
External SP	0.38 in. wg
Direct Drive RPM Adjustment	0.03 in. wg
Total External SP	0.4 in. wg

Sound

	Octave Bands (hz)								LwA	dBA	Spherical Sones
	62.5	125	250	500	1000	2000	4000	8000			
Inlet	59	68	52	38	35	35	29	26	53	39	2.0

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA certified ratings seal applies to air performance ratings only.Performance certified is for installation type D: Ducted inlet, ducted outlet.Power rating does not include transmission losses.Performance ratings include the effects of a backdraft damper.Speed (RPM) shown is nominal. Performance is based on actual speed of test.The sound ratings shown are loudness values in spherical sones at 1.5 m (5 ft) in a spherical free field calculated per ANSI/AMCA 301.Values shown are for installation Type D: ducted inlet spherical sone levels. Ratings do not include the effects of duct end correction. Ratings are based on 10 ft. of insulated duct.

Dimensions and Weights		
Label	**Value**	**Description**
-	36	Weight w/o accessories (lbs)
A	15	Overall Height (in)
B	18	Overall Width (in)
C	14	Overall Length (in)
-	16.875	Inlet Width (in)
-	13.25	Inlet Height (in)
-	8	Outlet Width (in)
-	8	Outlet Height (in)



*All dimensions are in inches.

EF-2

Job Name: SP-LP0511-1 Cut Sheet
Tag: MK-1
Quantity: 1
Printed Date: February 9, 2023

Model: SP-LP0511-1

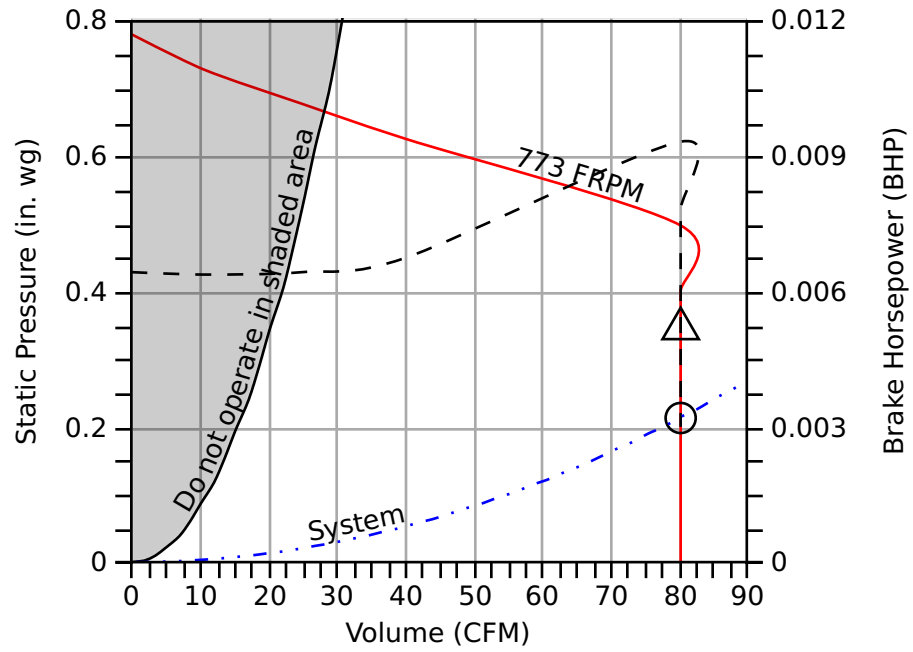
Direct Drive Bathroom Exhaust Fan

Standard Construction Features: Galvanized steel housing and grille. Centrifugal forward curved wheel. Direct driven motor in the air stream.

Fan Configuration	
Drive type	Direct

Performance	
Requested Volume (CFM)	75
Actual Volume (CFM)	80
Total External SP (in. wg)	0.21
Fan RPM	773
Operating Power (bhp)	0.01
Startup Power (bhp)	0.01
Air Stream Temp (F)	70
Start-up Temp (F)	70
Air Density (lbs/ft^3)	0.075
Watts (W)	10
Static Efficiency (%)	52
Outlet Velocity (ft/min)	889

Motor	
V/C/P	115/60/1
NEC FLA (Amps)	0.29



- Fan curve
- Brake horsepower curve
- Operating Point SP
- Operating Bhp point
- Max system curve
- System curve

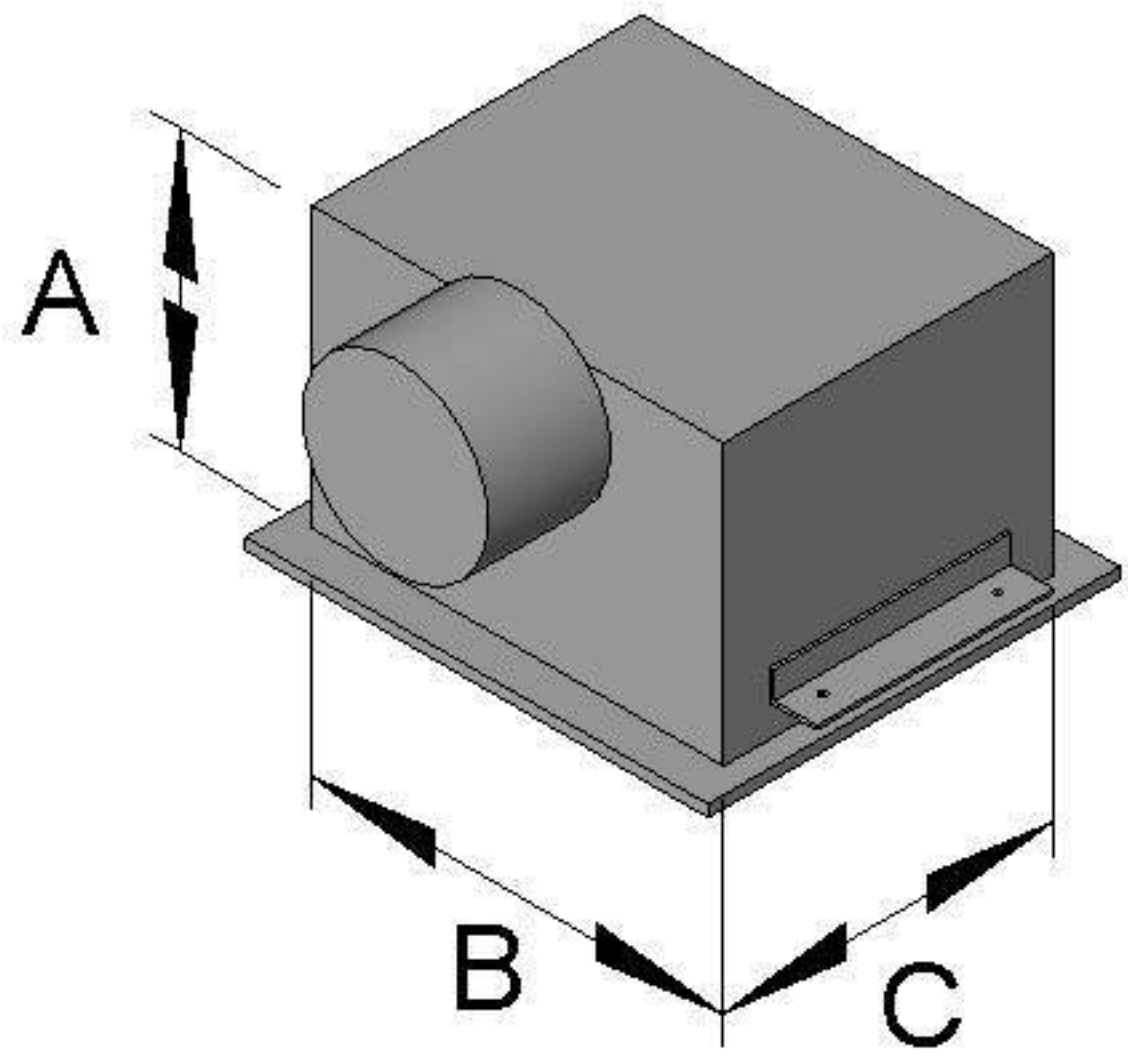
Static Pressure Calculations	
External SP	0.19 in. wg
Direct Drive RPM Adjustment	0.03 in. wg
Total External SP	0.21 in. wg

Sound

	Octave Bands (hz)								LwA	dBA	Spherical Sones
	62.5	125	250	500	1000	2000	4000	8000			
Inlet	32	49	49	51	45	39	32	24	51	36	1.2

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program.The AMCA certified ratings seal applies to sound and air performance ratings only.Performance certified is for installation type B: Free inlet, ducted outlet.Power rating does not include transmission losses.Performance ratings include the effects of an inlet grille and backdraft damper.Speed (RPM) shown is nominal. Performance is based on actual speed of test.The sound ratings shown are loudness values in spherical sones at 1.5 m (5 ft) in a spherical free field calculated per ANSI/AMCA 301.Values shown are for Installation Type B: free inlet spherical sone levels.dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal for Sound applies to sone ratings only.

Dimensions and Weights		
Label	**Value**	**Description**
-	8	Weight w/o accessories (lbs)
A	4	Overall Height (in)
B	10	Overall Width (in)
C	10	Overall Length (in)
-	2.5	Outlet Width (in)
-	5	Outlet Height (in)
-	13.12	Grille Width (in)
-	13.12	Grille Length (in)



*All dimensions are in inches.

TPKA0A0241KA70A & TRUZA0241HA70BA
24,000 BTU/H WALL-MOUNTED INDOOR UNIT
24,000 BTU/H HEAT PUMP UNIVERSAL OUTDOOR

Job Name:

System Reference: CU-1/FCU-1 Date:



Indoor Unit TPKA0A0241KA70A

Outdoor Unit TRUZA0241HA70BA

INDOOR UNIT FEATURES

- Sleek, compact design
- Simple installation
- Vane setting for air flow direction control
- Auto fan speed mode
- Ideal for spaces such as server rooms, daycare centers, classrooms, churches, small offices, and more
- Multiple control options available:
  - kumo cloud® smart device app for remote access
  - Third-party interface options
  - Wired or wireless controllers

OUTDOOR UNIT FEATURES

- Variable speed INVERTER-driven compressor
- Power receiver pre-charged with refrigerant volume for piping length up to 70 ft
- Low ambient cooling down to 0°F providing 100% capacity
- 24-hour continuous operation (cooling mode)
- High pressure protection
- Fast restart
- Superior energy and operational efficiency

Specifications are subject to change without notice.

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SPECIFICATIONS: TPKA0A0241KA70A & TRUZA0241HA70BA

Cooling at 95°F[1]	Maximum Capacity	BTU/H	24,000
	Rated Capacity	BTU/H	24,000
	Minimum Capacity	BTU/H	10,000
	Maximum Power Input	W	1,960
	Rated Power Input	W	1,960
	Moisture Removal	Pints/h	5.0
	Sensible Heat Factor		0.77
	Power Factor [208V / 230V]	%	95.7 / 95.7
Heating at 47°F[2]	Maximum Capacity	BTU/H	28,000
	Rated Capacity	BTU/H	26,000
	Minimum Capacity	BTU/H	9,000
	Maximum Power Input	W	2,600
	Rated Power Input	W	1,750
	Power Factor [208V / 230V]	%	750.0 / 750.0
Heating at 17°F[3]	Maximum Capacity	BTU/H	18,300
	Rated Capacity	BTU/H	15,700
	Maximum Power Input	W	1,820
	Rated Power Input	W	1,750
Heating at 5°F[4]	Maximum Capacity	BTU/H	15,200
	Maximum Power Input	W	2,300
Efficiency	SEER		21.4
	EER[1]		12.2
	HSPF [IV]		11.0
	COP at 47°F[2]		4.35
	COP at 17°F at Maximum Capacity[3]		2.95
	COP at 5°F at Maximum Capacity[4]		1.94
	ENERGY STAR® Certified		No
Electrical	Voltage, Phase, Frequency		208/230, 1, 60
	Guaranteed Voltage Range	V AC	198 - 253
	Voltage: Indoor - Outdoor, S1-S2	V AC	208/230
	Voltage: Indoor - Outdoor, S2-S3	V DC	24
	Short-circuit Current Rating [SCCR]	kA	5
	Recommended Fuse/Breaker Size (Oudoor)	A	25
	Recommended Wire Size [Indoor - Outdoor]	AWG	14
	Power Supply		Indoor unit is powered by the outdoor unit
Indoor Unit	MCA	A	1.0
	Fan Motor Full Load Amperage	A	0.36
	Fan Motor Type		DC Motor
	Airflow Rate at Cooling, Dry	CFM	635–705–775
	Airflow Rate at Cooling, Wet	CFM	570–635–700
	Airflow Rate at Heating, Dry	CFM	635–705–775
	Sound Pressure Level [Cooling]	dB[A]	39–42–45
	Sound Pressure Level [Heating]	dB[A]	39–42–45
	Drain Pipe Size	In. [mm]	5/8 [16]
	Coating on Heat Exchanger		—
	External Finish Color		White Munsell 1.0Y 9.2/0.2
	Unit Dimensions	W x D x H: In. [mm]	46-1/16 x 11-5/8 x 14-3/8 [1,170 x 295 x 365]
	Package Dimensions	W x D x H: In. [mm]	51 x 14-1/4 x 18-1/2 [1,295 x 362 x 470]
	Unit Weight	Lbs. [kg]	46 [21]
	Package Weight	Lbs. [kg]	53 [24]
Indoor Unit Operating Temperature Range	Cooling Intake Air Temp [Maximum / Minimum]*	°F	90 DB, 72 WB / 66 DB, 61 WB
	Heating Intake Air Temp [Maximum / Minimum]	°F	77 DB / 59 DB

NOTES:
AHRI Rated Conditions
(Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor)	°F	80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 17 DB, 15 WB

*Indoor/Outdoor Unit Operating Temperature Range (Cooling Air Temp [Maximum / Minimum]):
- Applications should be restricted to comfort cooling only; equipment cooling applications are not recommended for low ambient temperature conditions.
  - » Wind baffles required to operate below 23°F DB in cooling mode.
  - » Heat pump system with wind baffle: 0°F - 115°F.
  - » Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
- System cuts out in heating mode to avoid thermistor error and automatically restarts at these temperatures.

Specifications are subject to change without notice.

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SPECIFICATIONS: TPKA0A0241KA70A & TRUZA0241HA70BA

Outdoor Unit	MCA	A	19.0
	MOCP	A	26
	Fan Motor Full Load Amperage	A	0.4
	Fan Motor Output	W	86
	Airflow Rate [Cooling / Heating]	CFM	1940 / 1940
	Refrigerant Control		LEV
	Defrost Method		Reverse Cycle
	Coating on Heat Exchanger		Blue Fin Coating (BS Model only)
	Sound Pressure Level, Cooling[1]	dB(A)	47
	Sound Pressure Level, Heating[2]	dB(A)	48
	Compressor Type		INVERTER-driven twin rotary
	Compressor Model		SNB172FWHM1
	Compressor Rated Load Amps	A	7
	Compressor Locked Rotor Amps	A	11.0
	Compressor Oil [Type // Charge]	oz.	FV50S // 23
	External Finish Color		Ivory Munsell 3Y 7.8/1.1
	Base Pan Heater		N/A
	Unit Dimensions	W x D x H: In. [mm]	37-13/32 x 13 (+1-3/16) x 37-1/8 [950 x 330 (+30) x 943]
	Package Dimensions	W x D x H: In. [mm]	40-15/16 x 17-11/16 x 40-11/16 [1040 x 450 x 1033]
	Unit Weight	Lbs. [kg]	153 [69]
	Package Weight	Lbs. [kg]	179 [81]
Outdoor Unit Operating Temperature Range	Cooling Air Temp [Maximum / Minimum]*	°F	115 DB / 0 DB
	Heating Air Temp [Maximum / Minimum]	°F	70 DB, 59 WB / -4 DB, -4 WB
	Heating Thermal Lock-out / Re-start Temperatures**	°F	-8 / -4
Refrigerant	Maximum Charge Quantity	Lbs, oz	7.0, 11.0
	Initial Charge Quantity	Ft. [m]	70.0 [20.0]
	Additional Refrigerant Charge Per Additional Piping Length	oz./Ft. [g/m]	0.7 [50]
Piping	Gas Pipe Size O.D. [Flared]	In.[mm]	5/8 [15.88]
	Liquid Pipe Size O.D. [Flared]	In.[mm]	3/8 [9.52]
	Maximum Piping Length	Ft. [m]	165 [50]
	Maximum Height Difference	Ft. [m]	100 [30]
	Maximum Number of Bends		15

NOTES:

AHRI Rated Conditions
(Rated data is determined at a fixed compressor speed)

[1]Cooling (Indoor // Outdoor)	°F	80 DB, 67 WB // 95 DB, 75 WB
[2]Heating at 47°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 47 DB, 43 WB
[3]Heating at 17°F (Indoor // Outdoor)	°F	70 DB, 60 WB // 17 DB, 15 WB

*Indoor/Outdoor Unit Operating Temperature Range (Cooling Air Temp [Maximum / Minimum]):
- Applications should be restricted to comfort cooling only; equipment cooling applications are not recommended for low ambient temperature conditions.
  - » Wind baffles required to operate below 23°F DB in cooling mode.
  - » Heat pump system with wind baffle: 0°F - 115°F.
  - » Refer to wind baffle documentation for further information.

**Outdoor Unit Operating Temperature Range (Cooling Thermal Lock-out / Re-start Temperatures; Heating Thermal Lock-out / Re-start Temperatures):
- System cuts out in heating mode to avoid thermistor error and automatically restarts at these temperatures.

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INDOOR UNIT ACCESSORIES: TPKA0A0241KA70A

Control Interface	3-Pin Connector	☐ PAC-715AD
	BACnet® and Modbus® Interface	☐ PAC-UKPRC001-CN-1
	IT Extender	☐ PAC-WHS01IE-E
	kumo station® for kumo cloud®	☐ TAC-WHS01HC-E
	Lockdown bracket for remote controller	☐ RCMKP1CB
	Thermostat Interface	☐ PAC-US444CN-1
	Thermostat Interface	☐ PAC-US445CN-1
	USNAP Adapter	☐ PAC-WHS01UP-E
	Wireless Interface for kumo cloud®	PAC-USWHS002-WF-2
Remote Sensor	Flush Mount Remote Temperature Sensor	PAC-USSEN002-FM-1
	Flush Mount Temperature Sensor	PAC-USSEN001-FM-1
	Remote Temperature Sensor	PAC-SE41TS-E
	Wireless temperature and humitity sensor for kumo cloud®	PAC-USWHS003-TH-1
Wired Remote Controller	Deluxe Wired MA Remote Controller†	TAR-40MAAU
	Simple MA Remote Controller†	TAC-YT53CRAU-J
	Touch MA Controller†	TAR-CT01MAU-SB
Wireless Remote Controller	kumo touch™ RedLINK™ Wireless Controller	MHK2
	Wireless MA Receiver	PAR-SR32MA-E
	Wireless MA Remote Controller	☐ TAR-FL32MA-E
Condensate	Blue Diamond (Advanced) Mini Condensate Pump w/ Reservoir & Sensor (208/230V) [recommended]	☐ X87-721
	Blue Diamond (MegaBlue Advanced) Condensate Pump w/ Reservoir & Sensor	X87-835
	Blue Diamond Sensor Extension Cable — 15 Ft.	C13-103
	Drain Pan Level Sensor/Control	SS610E
	Refco Condensate Pump (100-240 VAC)	GOBI-II
	Refco Condensate Pump (100-240 VAC) up to 120,000 BTU/H	COMBI
	Sauermann Condensate Pump	SI30-230
Disconnect Switch	(30A/600V/UL) [fits 2” X 4” utility box] - Black	☐ TAZ-MS303
	(30A/600V/UL) [fits 2” X 4” utility box] - White	☐ TAZ-MS303W
Drain Hose	Flexible Mini-Split Drain Hose	☐ DRX-16
Lineset	10’ x 3/8” x 10’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-10
	100’ x 3/8” x 100’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-100
	15’ x 3/8” x 15’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-15
	30’ x 3/8” x 30’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-30
	50’ x 3/8” x 50’ x 5/8” Lineset (Twin-Tube Insulation)††	MPLS385812T-50
	65’ x 3/8” x 65’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-65

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OUTDOOR UNIT ACCESSORIES: TRUZA0241HA70BA

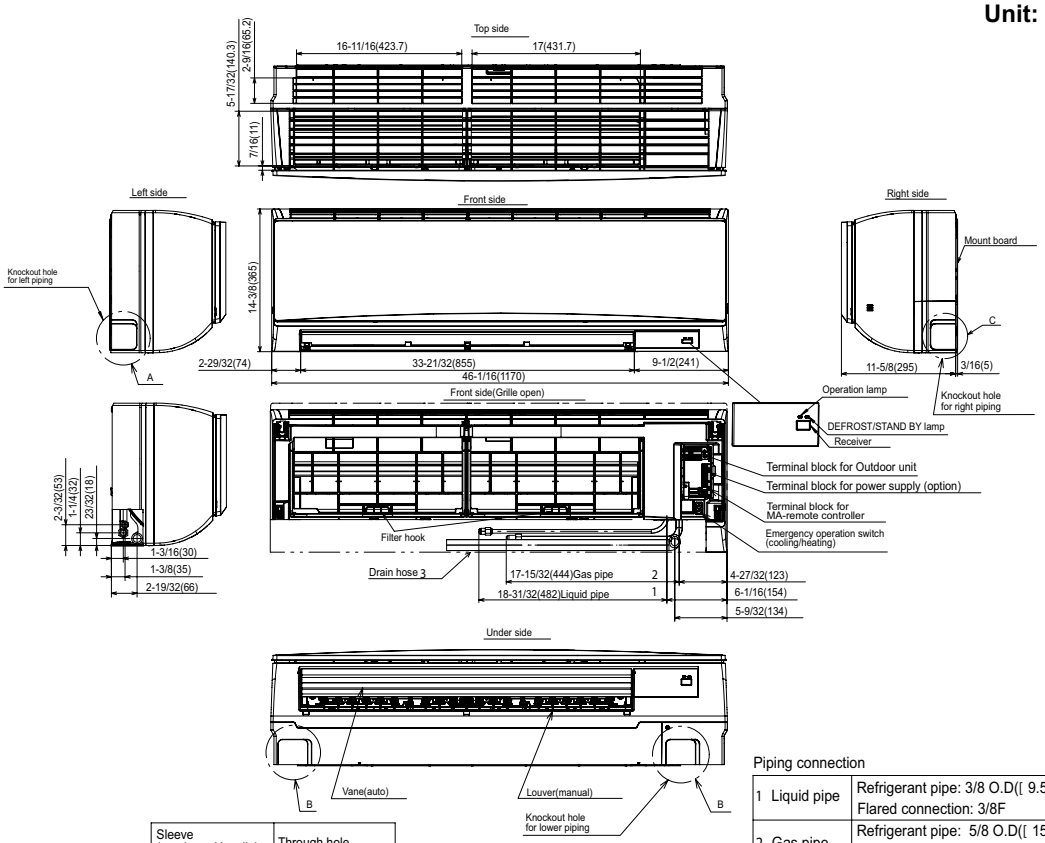
Air Outlet Guide	Air Outlet Guide (1 Piece)	☐ PAC-SG59SG-E
Centralized Drain Pan	Centralized Drain Pan	☐ PAC-SG63DP-E
	Drain Pan	☐ PAC-SG64DP-E
Control/Service Tool	Control/Service Tool	☐ PAC-SK52ST
	M- & P-Series Maintenance Tool Cable Set	☐ M21EC0397
	USB/UART Conversion Cable (Required for all laptop connection)	☐ M21EC1397
Distribution pipe	Twinning Distribution Pipe (50:50)††	☐ MSDD-50TR-E
Hail Guards	Hail Guard	☐ HG-A6
Lineset	10’ x 3/8” x 10’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-10
	100’ x 3/8” x 100’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-100
	15’ x 3/8” x 15’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-15
	30’ x 3/8” x 30’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-30
	50’ x 3/8” x 50’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-50
	65’ x 3/8” x 65’ x 5/8” Lineset (Twin-Tube Insulation)††	☐ MPLS385812T-65
M-NET Converter	M-NET Converter	☐ PAC-SJ85MA-E
	M-NET Converter	☐ PAC-SJ95MA-E
Mounting Pad	Condensing Unit Mounting Pad: 24” x 42” x 3”	☐ ULTRILITE2
Stand	18” Single Fan Stand	☐ QSMS1801M
	24” Single Fan Stand	☐ QSMS2401M
	Condenser Wall Bracket	☐ QSWB2000M-1
	Condenser Wall Bracket - Stainless Steel Finish	☐ QSWBSS
	Outdoor Unit Stand — 12” High	☐ QSMS1201M
Wind Baffle	Front Wind Baffle	☐ WB-PA5
	Rear Wind Baffle	☐ WB-RE5
	Side Advanced Wind Baffle	☐ WB-SD5

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INDOOR UNIT DIMENSIONS: TPKA0A0241KA70A

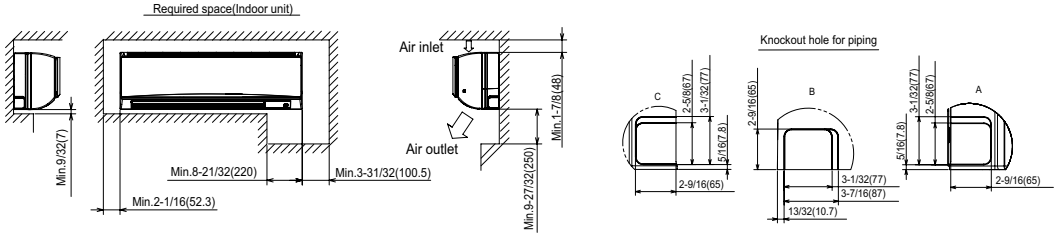
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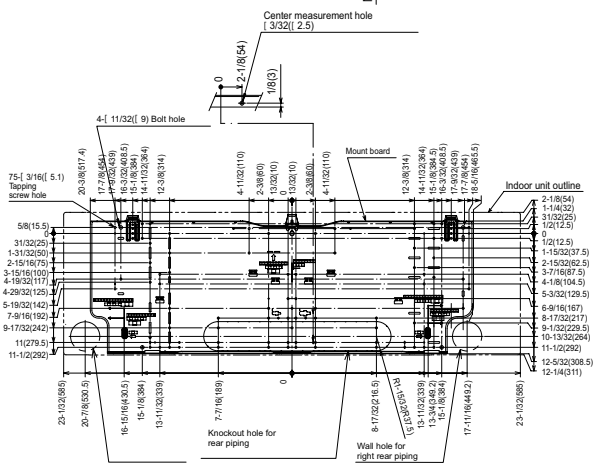


Sleeve (purchased locally)	Through hole
[2-15/16 ([75)	[2-15/16~[3-5/32 ([75~[80)

Piping connection

1 Liquid pipe	Refrigerant pipe: 3/8 O.D([9.52) Flared connection: 3/8F
2 Gas pipe	Refrigerant pipe: 5/8 O.D([15.88) Flared connection: 5/8F
3 Drain hose	5/8([16) O.D Effective length: 23-1/32 (585)

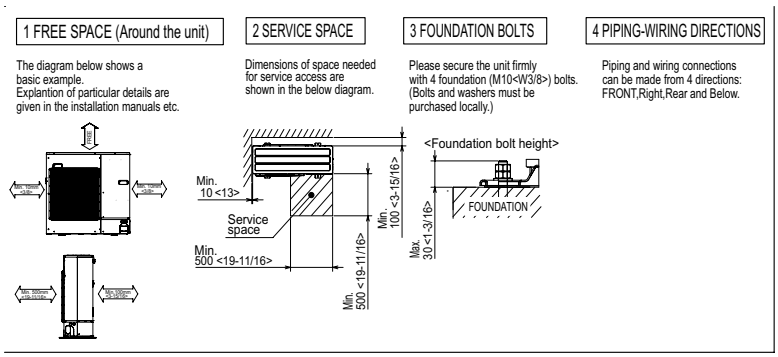




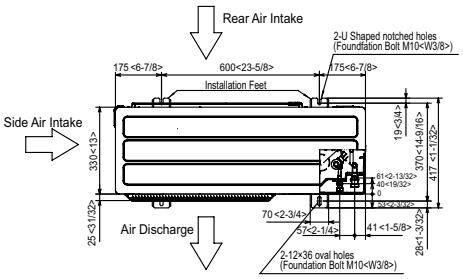
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OUTDOOR UNIT DIMENSIONS: TRUZA0241HA70BA

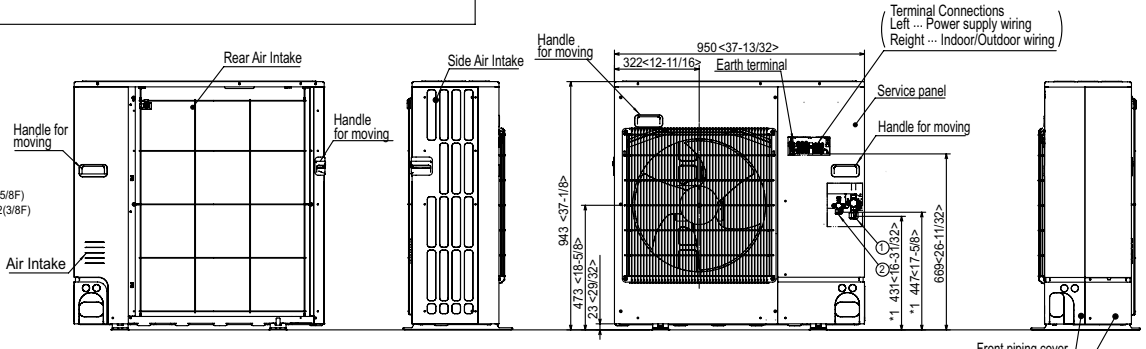


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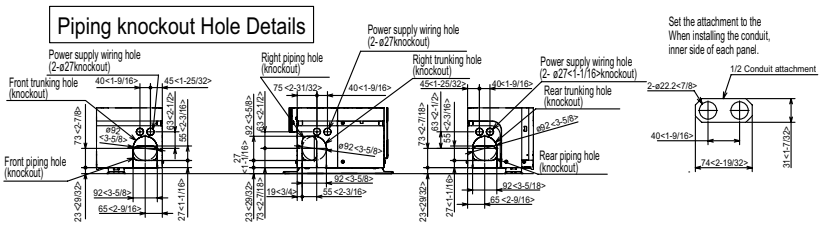


Example of Notes

① ··· Refrigerant GAS pipe connection (FLARE) ø15.88(5/8F)
② ··· Refrigerant LIQUID pipe connection (FLARE) ø 9.52(3/8F)
*1··· Indication of STOP VALVE connection location.



Piping knockout Hole Details



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OMNI / OMNI-AA

- The Titus OMNI diffuser satisfies architectural as well as engineering criteria. Its strong, clean, unobtrusive lines harmonize with the ceiling system, without sacrificing performance.
- The curvature of the OMNI backpan works with the formed edges of the face panel to deliver a uniform 360° horizontal air pattern, without excessive noise or pressure drop
- The OMNI diffuser is an excellent choice for variable air volume systems. The air pattern remains tight and horizontal for effective room air distribution, even when the volume varies over a wide range.
- The face panel is constructed from 22-gauge steel or heavy gauge aluminum. The edges of the face panel are formed to a radius for a solid, crisp appearance. The formed edges also stiffen the face panel and assure a straight and level surface.



OMNI / OMNI-AA

retrofit | MRI compatible | wood grains | metric sizes

See website for Specifications

MODELS:

OMNI / Steel
OMNI-AA / Aluminum

FINISHES:

Standard Finish - #26 White
Optional Finish - Wood grains (See Wood grains Brochure for Finishes)

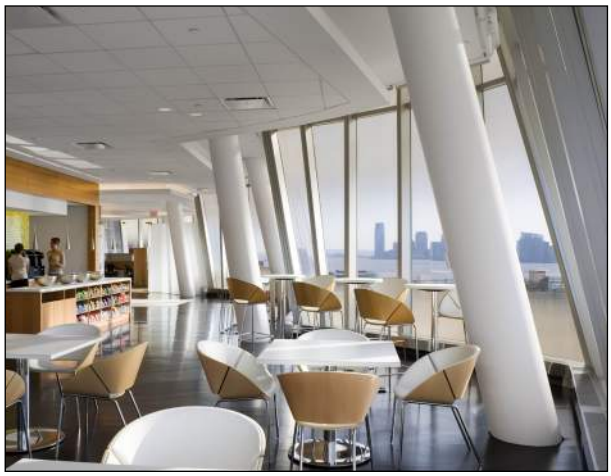
OVERVIEW

Square Plaque

The Titus OMNI (steel plaque) & OMNI-AA (all-aluminum plaque) face diffusers that satisfie architectural and engineering criteria. Their strong, clean, unobtrusive lines harmonize with ceiling systems without sacrificing performance. The curvature of the OMNI & OMNI-AA backpans work with the formed edges of the face panel to deliver a uniform 360 degree horizontal air pattern, without excessive noise or pressure drop. They are an excellent selection for variable air volume systems.

ADDITIONAL FEATURES

- The face panel of the OMNI is laser-welded to the four hanger brackets. This process provides the OMNI face with a smooth finish under any lighting conditions.
- The OMNI-AA is entirely constructed of aluminum, perfect for MRI applications.



Several OMNI diffusers installed in the breakroom of a corporate office

- The face panel is held in place by four hook brackets that positively engage into slots in the backpan. The panel can be removed from the backpan for easy installation of the diffuser or for access to the optional damper.
- Optional factory-insulated R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-15.

OMNI / OMNI-AA - ARCHITECTURAL CEILING / SQUARE PLAQUE

		Neck Velocity	400	500	600	700	800	900	1000	1200	1400
		Velocity Pressure	0.010	0.016	0.022	0.031	0.040	0.051	0.062	0.090	0.122
12"x12" Module Size	4" Round Neck	Airflow, cfm	35	44	52	61	70	79	87	105	122
		Total Pressure, Inches WG	0.034	0.053	0.076	0.103	0.134	0.170	0.210	0.303	0.412
		Throw Feet	1-2-3	1-2-4	2-2-5	2-3-6	2-3-6	2-4-7	3-4-8	3-5-10	4-6-11
		NC (Noise Criteria)	-	-	12	17	21	24	27	33	38
	5" Round Neck	Airflow, cfm	55	68	82	95	109	123	136	164	191
		Total Pressure, Inches WG	0.040	0.063	0.091	0.124	0.161	0.204	0.252	0.363	0.494
		Throw Feet	2-2-5	2-3-6	2-3-7	3-4-8	3-5-9	3-5-10	4-6-12	5-7-14	5-8-15
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	6" Round Neck	Airflow, cfm	78	98	118	137	157	176	196	235	274
		Total Pressure, Inches WG	0.049	0.076	0.109	0.149	0.194	0.246	0.303	0.437	0.594
		Throw Feet	2-3-6	3-4-8	3-5-9	4-5-11	4-6-12	5-7-14	5-8-15	6-9-17	7-11-18
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	7" Round Neck	Airflow, cfm	107	134	160	187	214	240	267	320	374
		Total Pressure, Inches WG	0.058	0.091	0.131	0.178	0.233	0.295	0.364	0.524	0.714
		Throw Feet	3-4-8	3-5-9	4-6-11	4-7-13	5-8-15	6-9-17	6-9-18	8-11-20	9-13-21
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
	8" Round Neck	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure, Inches WG	0.070	0.109	0.156	0.213	0.278	0.352	0.434	0.626	0.852
		Throw Feet	3-5-9	4-6-11	5-7-14	5-8-16	6-9-18	7-10-19	8-11-20	9-14-22	11-16-24
		NC (Noise Criteria)	-	-	12	17	21	24	28	33	38
20" x 20" Module Size	6" Dia.	Airflow, cfm	78	98	118	137	157	173	196	235	274
		Total Pressure	0.016	0.025	0.036	0.049	0.063	.080	0.100	0.142	0.193
		NC (Noise Criteria)	-	-	-	16	20	24	28	34	39
		Throw feet	1-1-3	1-1-4	1-2-4	1-3-5	1-3-6	2-3-6	2-4-7	3-5-8	3-5-8
	8" Dia.	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure	0.019	0.030	0.043	0.058	0.075	.096	0.118	0.169	0.229
		NC (Noise Criteria)	-	-	-	18	22	26	30	36	41
		Throw feet	1-2-4	2-3-6	2-4-6	3-4-7	3-5-7	3-5-8	4-6-8	5-6-9	5-7-10
	10" Dia.	Airflow, cfm	218	273	327	382	436	491	545	654	763
		Total Pressure	0.024	0.038	0.055	0.074	0.096	.123	0.151	0.215	0.292
		NC (Noise Criteria)	-	-	-	18	23	27	31	37	42
		Throw feet	3-4-6	3-4-7	4-5-8	4-6-8	5-6-9	5-7-9	6-7-10	6-8-11	7-9-12
24"x24" Module Size	6" Round Neck	Airflow, cfm	78	98	118	137	157	176	196	235	274
		Total Pressure, Inches WG	0.011	0.017	0.025	0.034	0.044	0.056	0.069	0.099	0.135
		Throw Feet	1-1-4	1-2-4	1-3-5	2-3-6	2-4-7	3-4-8	3-4-9	4-5-11	4-6-11
		NC (Noise Criteria)	-	-	-	-	13	17	21	28	34
	8" Round Neck	Airflow, cfm	140	175	209	244	279	314	349	419	489
		Total Pressure, Inches WG	0.018	0.028	0.040	0.055	0.072	0.091	0.112	0.162	0.220
		Throw Feet	2-3-6	2-4-7	3-4-9	3-5-10	4-6-12	4-6-12	5-7-13	6-9-14	7-10-15
		NC (Noise Criteria)	-	-	-	12	17	21	25	32	38
	10" Round Neck	Airflow, cfm	218	273	327	382	436	491	545	654	763
		Total Pressure, Inches WG	0.027	0.042	0.060	0.082	0.107	0.136	0.168	0.241	0.329
		Throw Feet	3-4-8	3-5-10	4-6-12	5-7-13	5-8-14	6-9-15	7-10-16	8-12-18	10-13-19
		NC (Noise Criteria)	-	-	-	15	20	24	28	35	41
	12" Round Neck	Airflow, cfm	314	393	471	550	628	707	785	942	1099
		Total Pressure, Inches WG	0.038	0.059	0.085	0.115	0.151	0.191	0.235	0.339	0.461
		Throw Feet	4-5-11	5-7-14	5-8-15	6-9-16	7-11-17	8-12-18	9-14-19	11-15-21	13-16-23
		NC (Noise Criteria)	-	-	12	18	23	27	31	38	43
	14" Round Neck	Airflow, cfm	428	535	641	748	855	962	1069	1283	1497
		Total Pressure, Inches WG	0.051	0.079	0.114	0.155	0.202	0.256	0.316	0.455	0.619
		Throw Feet	4-7-13	6-8-16	7-10-17	8-12-19	9-13-20	10-15-21	11-16-23	13-17-25	15-19-27
		NC (Noise Criteria)	-	-	14	20	25	29	33	40	45
	15" Round Neck	Airflow, cfm	491	614	736	859	982	1104	1227	1472	1718
		Total Pressure, Inches WG	0.058	0.090	0.130	0.177	0.231	0.292	0.360	0.519	0.706
		Throw Feet	5-7-15	6-9-17	7-11-19	9-13-20	10-15-22	11-16-23	12-17-24	15-19-26	17-20-29
		NC (Noise Criteria)	-	-	15	21	26	30	34	41	46

Performance notes appear at end of performance data

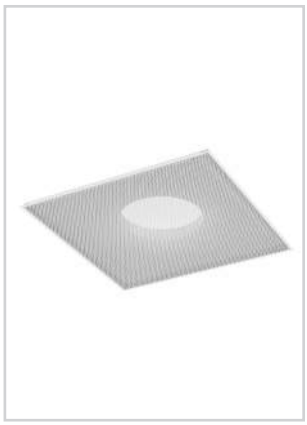
Perforated Ceiling Diffusers

PAS / PAR / PDS / PDR

- Titus perforated ceiling diffusers are designed for both heating and cooling applications
- Excellent performance in variable air volume systems
- A tight, uniform, horizontal blanket of air protects the ceiling against smudging
- Return models have the same face and border construction as the supply models, for harmonious appearance in the room
- Discharge pattern (supply models) can be adjusted to vertical as well as to 1-, 2-, 3- or 4-way horizontal. Can be adjusted before or after installation.
- Discharge pattern is easily adjusted by unlatching and dropping the perforated face, then rotating the pattern controllers
- Dropping the perforated face also gives access to the optional damper



PAS



PAR

metric sizes

See website for Specifications

MODELS:

Steel Models:
PAS / Supply / Flush Face
PAR / Return / Flush Face
PDS / Supply / Drop Face
PDR / Return / Drop Face

Aluminum Models:
PAS-AA / Supply / Flush Face
PAR-AA / Return / Flush Face

FINISH:

Standard Finish - #26 White

OVERVIEW

1-, 2-, 3-, or 4-Way Discharge Pattern

Perforated ceiling diffusers are typically selected to meet architectural demands for air outlets that blend into the ceiling plane. Titus perforated diffusers can be selected for a round pattern to maximize capacity or star pattern to maximize throw.

ADDITIONAL FEATURES

- Perforated face has $^{3}/_{16}$" diameter holes on ¼" staggered centers
- Inlet collar (neck) has ample depth for easy duct connection
- Material is heavy gauge steel backpan; steel or aluminum perforated face according to the model selected
- Optional factory-installed R-6 foil-backed insulation available for 24 x 24" full face models, neck sizes 6-16, borders 1, 2, 3 and 4

- Data obtained from tests conducted in accordance with ANSI / ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field. See the Engineering Guidelines section of this catalog for additional information.
- Throw values given are for terminal velocities of 150, 100 and 50 fpm and for isothermal conditions
- For an explanation of catalog throw data, see the section, Engineering Guidelines
- NC values based on octave band 2 to 7 sound power levels minus a room absorption of 10 dB
- Each NC value represents the noise criteria curve that will not be exceeded by the sound pressure in any of the octave bands, 2 through 7, with a room absorption of 10 dB, re 10^{-12} watts
- Dash (-) in space denotes an NC value of less than 10
- All pressures are given in inches of water
- To obtain static pressure, subtract the velocity pressure from the total pressure

PAR, PXP, PMR, PXP–DR, PDR PERFORMANCE DATA

PAR, PXP, PMR - FLUSH FACE - RETURN; PXP-DR, PDR - DROP FACE - RETURN

12 x 12 Face	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.17	0.23	0.36	0.51	0.70
	6 Dia. *	Flow Rate, cfm	59	78	98	118	137	157	196	235	275
		Room NC	-	-	-	14	18	21	27	32	36
	6 x 6 Neck *	Flow Rate, cfm	75	100	125	150	175	200	250	300	350
		Room NC	-	-	12	17	21	24	30	35	39
	10 x 10 Neck	Flow Rate, cfm	208	278	347	417	486	556	694	833	972
		Room NC	15	23	29	33	37	41	47	51	55
24 x 24 Face	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.18	0.24	0.37	0.54	0.73
	6 Dia. *	Flow Rate, cfm	59	78	98	118	137	157	196	235	275
		Room NC	-	-	-	13	17	20	26	31	34
	6 x 6 Neck *	Flow Rate, cfm	75	100	125	150	175	200	250	300	350
		Room NC	-	-	-	14	18	21	27	32	35
	8 Dia. *	Flow Rate, cfm	105	140	174	209	244	279	349	419	488
		Room NC	-	-	13	17	21	24	30	35	38
	8 x 8 Neck *	Flow Rate, cfm	133	178	222	267	311	356	444	533	622
		Room NC	-	-	14	18	22	25	31	36	39
	10 Dia.*	Flow Rate, cfm	164	218	273	327	382	436	545	654	763
		Room NC	-	-	16	20	24	27	33	38	41
	10 x 10 Neck *	Flow Rate, cfm	208	278	347	417	486	556	694	833	972
		Room NC	-	11	17	21	25	28	34	39	42
	12 Dia. *	Flow Rate, cfm	235	314	392	471	549	628	785	942	1099
		Room NC	-	12	17	22	26	29	34	39	43
	12 x 12 Neck *	Flow Rate, cfm	300	400	500	600	700	800	1000	1200	1400
		Room NC	-	14	20	24	28	31	37	42	45
	14 Dia. *	Flow Rate, cfm	320	427	534	641	748	855	1068	1282	1495
		Room NC	-	15	21	25	29	32	38	43	46
	15 x 15 Neck *	Flow Rate, cfm	469	625	781	938	1094	1250	1563	1875	2188
		Room NC	-	16	22	26	30	33	39	44	47
	16 Dia. *	Flow Rate, cfm	419	558	698	837	977	1116	1395	1674	1953
		Room NC	11	18	24	28	32	35	41	46	49
	18 x 18 Neck *	Flow Rate, cfm	675	900	1125	1350	1575	1800	2250	2700	3150
		Room NC	11	18	24	28	32	36	41	46	49
	22 x 22 Neck	Flow Rate, cfm	1008	1344	1681	2017	2353	2689	3361	4033	4706
		Room NC	13	20	26	30	34	37	43	47	51
Other Sizes	Neck Size	Neck Vel, fpm	300	400	500	600	700	800	1000	1200	1400
		Vp, in. Wg	0.01	0.01	0.02	0.02	0.03	0.04	0.06	0.09	0.12
		Ps (-), in. Wg	0.03	0.06	0.09	0.13	0.17	0.23	0.36	0.51	0.70
	10 x 22 (12 x 24 Face)	Flow Rate, cfm	458	611	764	917	1069	1222	1528	1833	2139
		Room NC	-	-	-	14	18	21	27	32	36
	14 x 14 (16 x 16 Face)	Flow Rate, cfm	408	544	681	817	953	1089	1361	1633	1906
		Room NC	-	-	12	17	21	24	30	35	39
	18 x 18 (20 x 20 Face)	Flow Rate, cfm	675	900	1125	1350	1575	1800	2250	2700	3150
		Room NC	-	11	17	22	26	29	35	40	44
	22 x 46 (24 x 48 Face)	Flow Rate, cfm	2108	2811	3514	4217	4919	5622	7028	8433	9839
		Room NC	12	20	25	30	34	38	43	48	52

PAR, PXP, PMR, PXP-DR, PDR PERFORMANCE NOTES

- Supply unit with deflectors removed
- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- Noise Criteria (NC) based on a room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006
- These products have been tested per ANSI/ASHRAE Standard 70-2006. Actual performance, with flexible duct inlet, may vary in the field.
- See the section, Engineering Guidelines for additional information

A-4

ST Therma-Fuser™

Square Thermally Powered VAV Diffuser

Models: **ST-HC** Separate set points for VAV heating and VAV cooling
ST-C One set point for VAV cooling only



BENEFITS AT A GLANCE.

INDIVIDUAL COMFORT SELECTION AND CONTROL

Every Therma-Fuser™ diffuser is a VAV zone of temperature control providing pleasing comfort in both heating and cooling. The built in thermostat senses average room air temperature from a sample of air induced into the unit. It controls air flow to precisely match the comfort requirements of the room or portion of the room served. Occupants breathe easier knowing that their personal temperature choice will not be changed by someone else.

EASY LOW COST INSTALLATION AND BALANCING

No special skills or equipment are required to install Therma-Fuser VAV—just connect the supply air duct. Expensive electrical or pneumatic connections and complicated controls are eliminated. Minimum flow stop changes are easily dialed in. Opens for balancing with one hand without opening the appearance panel. Maintenance and recalibration are eliminated, even over the long term, due to the dependability of the durable wax motor.

ONLY THERMA-FUSER™ VAV OFFERS THESE BENEFITS

- Separate temperature set points for VAV heating and VAV cooling.
- Superior air distribution, longer throws, no dumping, more entrainment, even temperature distribution, higher ADPI* and better room air change effectiveness.
- Lowest cost per zone of control.
- Lowest energy VAV terminal — green VAV.
- Low to no maintenance —10 year warranty.
- Easily adapts to office changes.

*ADPI (Air Diffusion Performance Index)

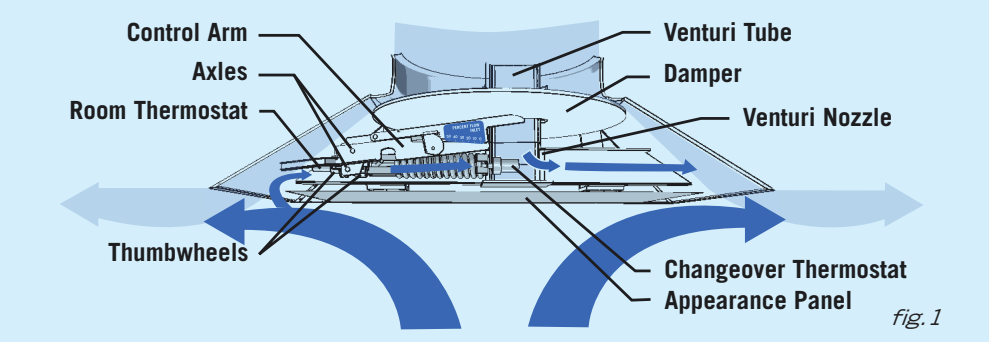


fig. 1

HOW IT WORKS

Model ST Therma-Fuser diffusers are 24" (600mm) square ceiling diffusers with built-in temperature controls and VAV damper. The round damper moves up to close and down to open, metering air flow (warm or cool) into the room in response to room temperature. The damper is mechanically positioned by a thermostat/actuator which is both a room thermostat and damper motor.

The room thermostat/actuator is a large brass cylinder containing a petroleum based wax. The wax melts and expands when heated, pushing against a fixed piston which moves the thermostat outward. A heavy spring pulls the thermostat inward when the wax cools and contracts. Thumbwheels on the room thermostat push the two offset axles of the control arm to move the damper up or down.

ROOM AIR SENSING

As with all diffusers, air circulates around the room in a circular motion. Secondary air rises under the diffuser, passes beneath the appearance panel and entrains with the primary air at the outside edge of the diffuser. *(fig. 1)* This secondary air best represents average room temperature.

To monitor average room temperature, a continuous sample of secondary air is drawn around the appearance panel past the room thermostat and through the channel. This is accomplished by feeding primary air through a nozzle in the side of the venturi tube. Primary air blowing through the nozzle creates just enough vacuum to draw some secondary air around the appearance panel, over the thermostat and out the other side. A properly applied ST will hold the room average within 1.5°F/0.9°C of the temperature selected.

COOLING MODE

In the cooling mode the damper opens on a rise in room temperature. As the room warms, the wax in the room thermostat melts and expands. This pushes the thermostat and cooling thumbwheel outward away from the lower axle of the control arm. The control arm then pivots down around the upper control axle, opening the damper allowing more supply air to enter the room. When the room cools, the wax contracts, the spring pulls the room thermostat inward and the cooling thumbwheel pushes the lower control axle inward. This pivots the control arm up closing the damper.

CHANGEOVER (ST-HC ONLY)

Changeover between the cooling and heating modes is determined by supply air temperature. A second large thermostat/actuator located at the bottom of the venturi tube senses supply air temperature. Warming the changeover thermostat changes the ST-HC to the heating mode by indexing the room thermostat outward. As a result both thumbwheels are indexed outward. This moves the cooling thumbwheel away from the control axles while the heating thumbwheel is moved toward the control axles.

Changeover from cooling to heating begins at supply air temperature 76°F/24.5°C and completes at 80°F/26.5°C. Changeover back to cooling begins at 72°F/22°C and completes at 68°F/20°C. During changeover the damper is closed or at minimum flow. The changeover control rod moves under the control arm, first closing the damper and then opening it.

HEATING MODE (ST-HC ONLY)

In the heating mode, the damper opens on a drop in room temperature. As the room cools, the wax in the room thermostat contracts and the spring pulls the room thermostat inward. This pushes the heating thumbwheel inward away from the upper control axle. The control arm then pivots down around the lower control axle, opening the damper allowing more supply air into the room.

ADJUSTING SET POINTS

Heating and cooling set points are separately adjusted by turning the heating and cooling thumbwheels. *(fig.2)* Align the outside of each thumbwheel with its respective temperature scale. Each set point can be adjusted between 70°F/21°C and 78°F/26°C. Both are factory set at 74°F/23°C. (The model ST-C has only one thumbwheel).

If the cooling thumbwheel is tight when the room is cool, continue to turn the thumbwheel and pull the changeover close rod outward to relieve the tightness.

OPEN FOR BALANCING

To open, push the balancing lever to the right and up. *(fig.3)* To close, push the balancing lever down until it latches.

ADJUSTING MINIMUM FLOW

Turn dial until the desired minimum flow on the scale intersects with the lower metal piece. *(fig.4)*

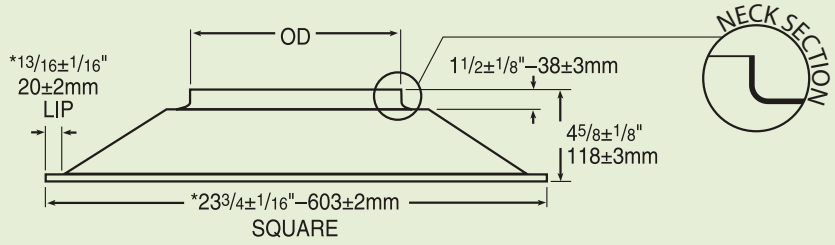
SYSTEM DESIGN

The best control for heating/cooling units supplying air to VAV terminals is a discharge thermostat which maintains a constant supply air temperature. With DX equipment these are a high and low limit. Use a room thermostat for changeover between heating and cooling modes. For hybrid systems (part VAV and part constant volume) control the heating/cooling supply unit with a thermostat in one of the rooms with a constant volume diffuser, preferably the space with the greatest load. For both VAV and hybrid systems, the fan should run continuously.

The constant discharge velocity of Therma-Fuser diffusers at varying air flow provides good room circulation which reduces stratification. Keeping heating supply air temperatures as low

DIMENSIONS

Inlet Designation	OD	
	Inches ± 1/16	mm ± 3
6	5 15/16	150
8	7 15/16	200
10	9 15/16	250
12	11 15/16	300



*595±2mm Square with 12±2mm lip available —specify 595mm square.

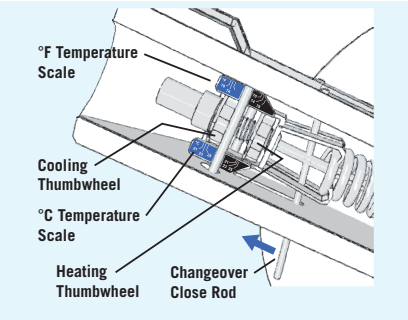


fig.2

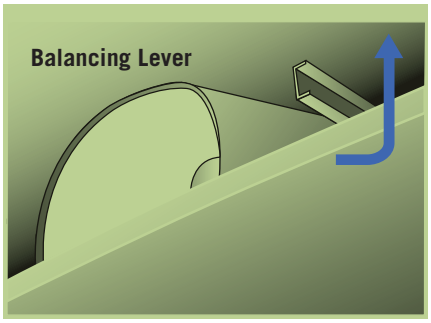


fig.3

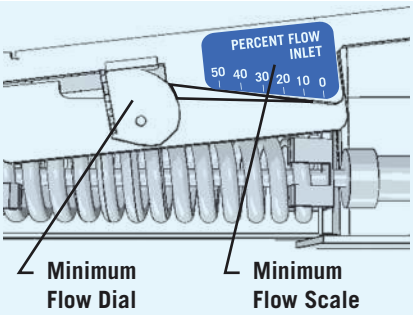


fig.4

as possible will further reduce room air stratification to a negligible level.

Static pressure at the inlet of the Therma-Fuser diffuser should be between .05"wg/12Pa and .25"wg/62Pa, at full and partial air flows. Static pressure below .05"wg/12Pa will result in low air flow and less induction. Above .25"wg/62Pa, Therma-Fuser diffusers operate well but excessive noise may result. Use minimum flow settings where tight shut off is not needed.

If the system turns down more than 30%, static pressure should be controlled. Included in the options for static pressure control are fan speed control and modulating bypass dampers. Modulating zone dampers are recommended where several zones share a higher pressure duct or riser.

When designing ducts, if Therma-Fuser diffusers are to deliver nominal volume at inlet SP of .15"wg/37Pa and if a maximum SP of .25"wg/62Pa is to be held for quiet operation, size the duct for a maximum pressure drop of .1"wg/25Pa between the first and last takeoff.

Manual balancing dampers should be used at the takeoff for each diffuser. Manual balancing dampers may not be required with ducts designed to Acutherm specifications.

Because Therma-Fuser diffusers control room temperature by sensing room air induced up the center of the space, care should be taken not to disturb room air induction and entrainment. For example, location next to walls or dropped lights results in the reflection of primary air back at the Therma-Fuser diffuser. Relocate either the Therma-Fuser diffuser or the light.

Acutherm has "how to" system design brochures for almost every ducted air system. For specific recommendations refer to the brochure for your system.

GUIDE SPECIFICATION

(Suitable for Section 23 36 16 Variable-Air-Volume Units of the CSI MasterFormat) *Material in italics applies only to model ST-HC. Delete the italics for model ST-C.*

2.2 Thermally Powered VAV Diffusers

A. Thermally powered variable air volume diffusers shall be Therma-Fuser™ model ST manufactured by Acutherm, Hayward CA.

B. Thermally powered VAV diffusers shall be a complete VAV terminal and thermostat self-contained in a nominal 24"x24" / 600mm square diffuser. They shall be thermally powered with one room thermostat/actuator and one changeover thermostat/actuator. External wiring or pneumatics shall not be allowed.

C. The VAV diffusers shall have a thumbwheel and temperature scale to adjust the cooling set point *and a separate thumbwheel and temperature scale for the heating set point.* The adjustment shall be right above the hinged appearance panel and shall not require tools. Each set point shall be separately adjustable between 70°F/21°C and 78°F/26°C. The initial set point shall be factory set at 74°F/23°C.

D. In the cooling mode the VAV diffusers shall open on a rise in room temperature *and in the heating mode they shall close on a rise in room temperature. The changeover thermostat shall be factory installed and adjusted to engage the heating mode when the supply air temperature rises above 80°F/27°C and return to the cooling mode when the supply air temperature falls below 68°F/20°C. During changeover the diffuser shall close or if a minimum flow is set, go to the minimum.* Nothing, *including the changeover mechanism,* shall extend above the inlet of the diffuser.

E. All VAV diffusers shall have a dial and scale to adjust minimum flow between 5 cfm/2.4 l/s and 50% of maximum flow without tools. Minimum flow shall be factory set at 10%. A fixed maximum flow stop shall be factory set for the full open air flow of the specified inlet size.

F. All VAV diffusers shall have a lever which will open the damper for balancing without tools. The balancing lever shall be accessible from the outside of the diffuser without folding down the appearance panel or removing any part of the diffuser.

G. All VAV diffusers shall warrant that the diffuser shall be free from defects in materials and workmanship for a period of ten years from date of shipment.

PERFORMANCE GUIDE in I-P UNITS

Nomimal Inlet	Inlet Diameter in	Inlet Static Pressure in wg	Maximum Flow cfm	Maximum Flow		25% Maximum Flow	
				Throw - Feet* @ v_t=50/100/150fpm	†NC	Throw - Feet* @ v_t=50/100/150fpm	†NC
6"	5 15/16"	0.05	105	3/1/<1	< 15	1/<1/<1	< 15
		•0.09	141	4/2/1	17	2/<1/<1	< 15
		0.10	150	4/2/1	17	2/<1/<1	< 15
		0.15	180	5/3/1	25	3/1/<1	< 15
		0.20	210	6/4/2	29	4/1/1	< 15
		0.25	240	7/5/3	32	4/2/2	21
8"	7 15/16"	0.05	165	5/2/1	< 15	2/1/<1	< 15
		0.10	235	7/3/2	18	3/1/<1	< 15
		•0.12	255	7/3/2	21	3/1/<1	16
		0.15	285	8/4/3	25	4/1/1	17
		0.20	330	9/5/3	30	4/2/1	20
		0.25	380	9/6/4	34	5/3/2	25
10"	9 15/16"	0.05	255	6/3/2	< 15	3/1/<1	< 15
		0.10	360	8/5/2	23	3/1/<1	< 15
		•0.13	408	9/6/3	26	4/1/1	16
		0.15	440	9/6/4	28	4/2/1	17
		0.20	510	10/7/5	32	5/3/2	22
		0.25	570	11/8/6	36	6/4/3	26
12"	11 15/16"	0.05	335	8/6/2	< 15	4/1/<1	< 15
		0.10	470	10/7/4	25	5/2/1	< 15
		•0.15	580	11/8/5	31	6/2/1	21
		0.17	616	11/9/6	33	6/2/1	23
		0.20	670	12/10/7	35	7/3/2	27
		0.25	740	13/11/9	38	8/5/2	31

- Denotes 750 fpm / 3.81 m/s inlet velocity.
- * Throw data is for air 20°F/11°C lower than room temperature. Throws for isothermal air are 40 to 50% greater.
- † NC based on L_w(10^{-12} watts reference) -10db
- Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.
- Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories.
- When bypassing air into the plenum at the diffuser with Acutherm R-Rings, throws may be as low as 90% of, and the NC 2db higher than, those listed in the performance chart.
- When blocking for direction with the Acutherm directional baffles, the air volume for a given static pressure is reduced from maximum flow listed in the performance chart by:

	Reduction		
Inlet Designation	3-Way	2-Way Opposite	2-Way Corner
6	0.99	1.00	0.99
8	0.97	0.87	0.86
10	0.88	0.72	0.75
12	0.85	0.77	0.65

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ST Therma-Fuser™ Square Thermally Powered VAV Diffuser

TEN YEAR WARRANTY

Acutherm warrants that its ST diffuser, exclusive of any options and accessories (whether factory or field installed) shall be free from defective material or workmanship for a period of ten (10) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said ten (10) year period due to any such defects which would not have occurred had reasonable care and proper usage and all parts and controls remain unaltered. Acutherm makes NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. ACUTHERM'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT OR CONSEQUENTIONAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty nor for cost of removal or installation.

Protected by U.S. Patents 6,736,326 & 6,857,577. Patents pending in other countries.

ACUTHERM PRODUCT GUIDE


Square VAV Diffusers


Round VAV Diffusers


Linear VAV Diffusers


Accessories


Pressure Control


Temperature Control

PRODUCT INFORMATION DESCRIPTION Use the following model number nomenclature to order Therma-Fuser™ diffusers, options and accessories.

Product

(1) Model	(2) Type	(3) Size
ST		

Product
1. Model: **ST** – Square Therma-Fuser diffuser
2. Type: **C** VAV cooling only or **HC** VAV heating and cooling
3. Size: **6, 8, 10,** or **12** inch inlet

Options

(1) Remote Adjust	(2) R-Ring	(3) Insulation	(4) Security Hanger

(5) Sheared Housing	(6) Blow Patterns	(7) Silk Screen	(8) Sensor

Options
1. Remote Adjust: **DA1 and DA1M** for Digital Wall Adjuster **or WA1M** for Wireless Wall Adjuster
2. R-Ring: **Rx** for bypass relief ring where 'x' is **6**, **8** or **10** inch inlet
3. Insulation: **I** for attic side insulation
4. Security Hanger: **H**
5. Sheared Housing: **595** for 600mm metric grid ceilings, **T1** for $23\frac{3}{16}$" and **T2** for $22\frac{3}{4}$"
6. Blow Patterns: **STD3** for three way blow, **STD2** for two way opposite, and **STD2C** for two way corner
7. Sensor: **AS** for DSMC or for 3rd party

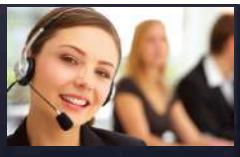
Accessories

(1) Ceiling Frame

Accessories
1. Ceiling Frame: **TFHD** for hard ceiling, **TF4DB** for 4" drop box, **TF1DB** for $\frac{17}{16}$" drop box, **TFSP** for spline, **TFT1** for tegular $\frac{9}{16}$" T-bar, **TFT2** for tegular 1" T-bar, and **TFAL** for air lifter (no ceiling)

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THERMA-FUSER™ SYSTEMS
DIGITAL WALL ADJUSTER
OPTIONS & ACCESSORIES

Acutherm by price
Therma-Fuser™ Systems

INSTALLATION & OPERATIONS MANUAL

Models: **ADJ-D Digital Wall Adjuster**
Compatible with all Type -HC,-CW and -C Therma-Fuser™ Diffusers

ORDERING

The Therma-Fuser diffuser with remote adjust option and the Digital Wall Adjuster must be ordered separately.

1. Order one (1) ADJ-D Digital Wall Adjuster for each space requiring easy temperature control adjustment.
2. Order one (1) Master diffuser and up to four (4) Secondary diffusers per adjuster.
3. Order a remote adjust master option for each Master diffuser (remote adjust master comes complete with 35 ft/10.5 m plenum rated cable with 10 pin quick connector).
   -DA2M for Model TF-HC, TK-HC and TL 4-Slot-diffusers
   -DA1M for ST and all other model diffusers
4. Order a remote adjust option for each Secondary diffuser.
   -DA2 for Model TF-HC, TK-HC and TL 4-Slot-diffusers
   -DA1 for ST and all other model diffusers
5. Order a face plate only if mounting in a standard 2 in. x 4 in. electrical box (the Digital Wall Adjuster comes complete for mounting directly on to the wall).
   Adapter Plate for mounting in 2 in. x 4 in. electrical box

ORDERING – UPGRADING

For each old analog Acutherm wall adjuster to be replaced and reuse the diffuser and wiring already in the wall.

1. Order one (1) Digital Wall Adjuster for each old adjuster to be replaced.
   ADJUSTER-D for all other model diffusers
2. Order one (1) adapter cable for each Digital Wall Adjuster.
   Adapter 6-Pin for wall cable with RJ11 connector
   - or -
   Adapter 4-Wire for wall cable with 4 wires
3. Order a face plate for mounting in the standard 2 in. x 4 in. electrical box.
   Adapter Plate for mounting in 2 in. x 4 in. electrical box.

When the old wiring is reused the BMS Communication option will not be available (see Installation 4a).

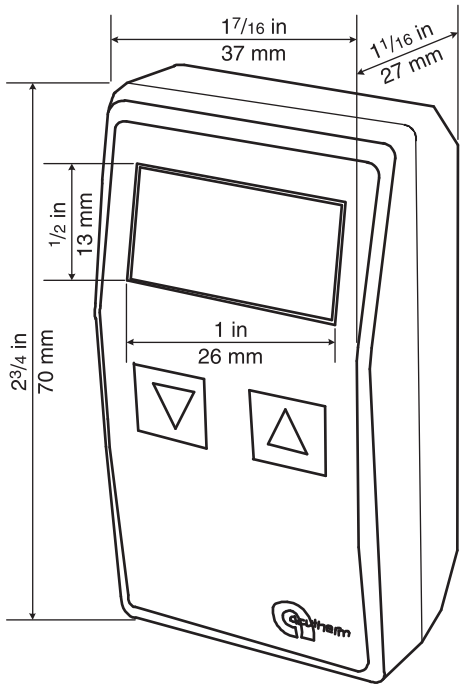
DAMAGED FREIGHT CLAIM PROCEDURES

When the Digital Wall Adjuster units are received, inspect for damage which may have occurred during shipment. If damage is evident, it should be noted on the carrier's freight bill. A written request for inspection by the carrier's agent should be made at once.

STORAGE

Do not store for prolonged times at temperatures exceeding 130°F/ 56°C. Acceptable humidity level is 5 – 95% relative humidity non-condensing.

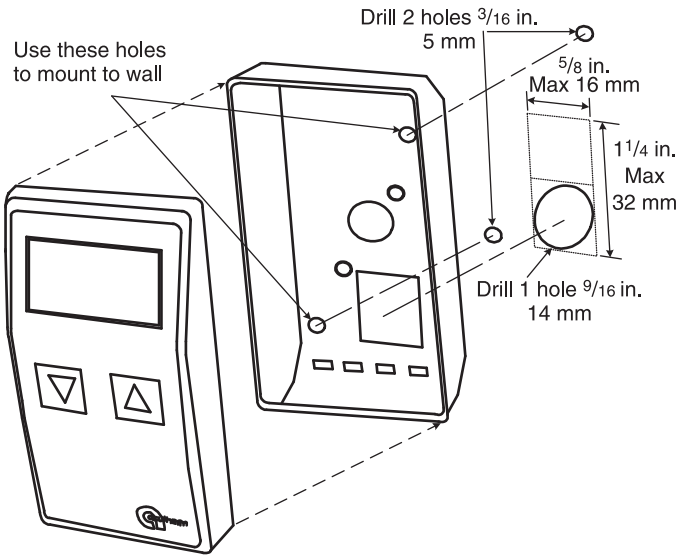
Figure 1. DIGITAL WALL ADJUSTER



INSTALLATION

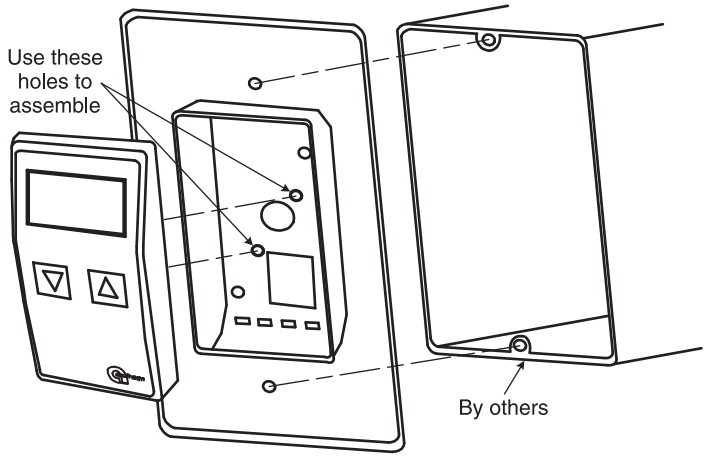
1. Mount the Digital Wall Adjuster.
   The Digital Wall Adjuster is suitable for mounting directly onto the wall or onto a standard 2 in. x 4 in. electrical box. For either installation, the master diffuser is factory wired with a 35 ft/10.5 m plenum rated cable with 10-pin connector. Locate this wire from the master diffuser down inside the wall to where the Digital Wall Adjuster will be installed.

Fig. 2 – Direct To Wall Installation



1a. To mount directly to the wall *(see Fig. 2)*, use the back of the digital wall adjuster as a template to locate the holes. Drill a 9/16 in./14 mm hole for the wiring to pass through (if this is not enough space, the hole may be enlarged vertically upwards but should not be enlarged vertically downward or horizontally to either side). For drywall installation drill two 3/16 in./5 mm holes, insert the plastic wall anchors (included) and attach the base of the digital wall adjuster using the screws provided.

Fig. 3 – Electrical Box Installation



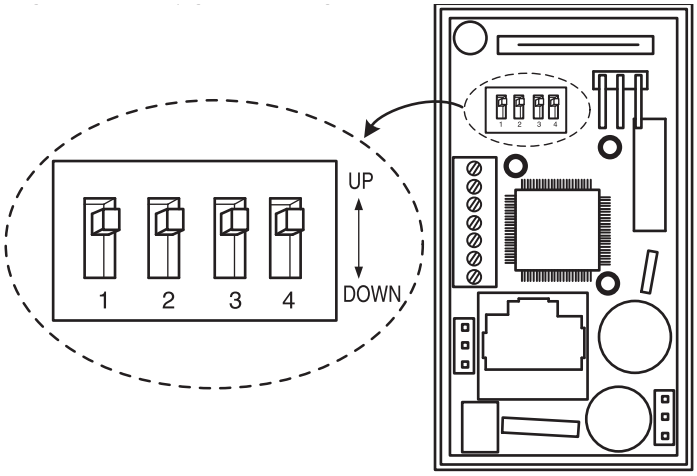
1b. To mount in a 2 in. x 4 in. electrical box *(see Fig. 3)* first remove the base of the adjuster. Locate the base of the adjuster in the hole in the face plate and use the screws provided to attach the cover of the adjuster. Attach the face plate to the electrical box (by others) with the screws provided.

2. Configure Digital Wall Adjuster Settings.
There are four (4) dip switches *(see Fig. 4)* on the board of the adjuster that should be checked and adjusted if required. Switch 1 sets the diffuser model and should **only be switched down for Model ST diffusers.** Switch 2 changes the units of measurement for the set point display from °F to °C.

Communication with a Building Management System (BMS) is activated with switch 3 and switch 4 enables the numerical display of the set point.

After making dip switch adjustments it is necessary to cycle the power to the adjuster off and then on again for the changes to take effect.

Fig. 4 – Configure Settings

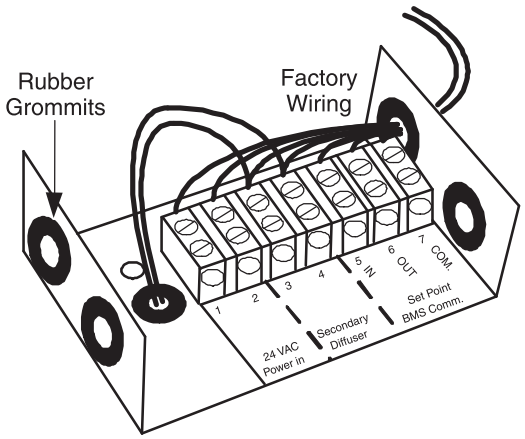


Switch	Purpose	Up	Down
1	Model Select	TF, TK, TL	ST
2	Temp. Display	°F	°C
3	BMS Commun.	Off	On
4	Set Point Display	Off	On

Keep dip switch 3 in the up (off) position to prevent accidental adjustment unless the adjuster has been wired (See Fig. 6) to a BMS.

3. Wire Master Diffuser. 24VAC ±2VAC power is required for the Digital Wall Adjuster to operate. Connect 24VAC to terminals 1 and 2 in the terminal box on the side of the Master diffuser *(see Fig. 5 and Fig. 6)*.

Fig. 5 – Terminal Box



4a. Optional BMS Interface. The option of interfacing through a protocol independent 0-2VDC analog signal is built in to the Digital Wall Adjuster. To activate this option, dip switch 3 must be switched down *(see Fig. 4)* and terminals 5, 6 and 7 connected to the BMS system *(see Fig. 5 and 6)*. A 0-2VDC input signal to terminal 5 will adjust the set point and a 0-2VDC output signal from terminal 6 indicates the set point (see Table 1).

When the BMS interface is active, adjustment with the buttons on the face of the unit is still possible. The last adjustment of the set point, whether by BMS or occupant, will set the control temperature.

Table 1 – Set Point Temperature

Volts DC±0.10	Set Point Temperature
0.00	68°F / 20°C
0.25	69°F / 20°C
0.50	70°F / 21°C
0.75	71°F / 21°C
1.00	72°F / 22°C
1.25	73°F / 22°C
1.50	74°F / 23°C
1.75	75°F / 23°C
2.00	76°F / 24°C

CAUTION: The Digital Wall Adjuster is a floating device and should not be connected to a controller with input/output that are earth grounded.

4b. Optional Secondary Diffuser(s).
Up to 4 Secondary diffusers may be connected to the Master diffuser *(see Fig. 6)*. The Digital Wall Adjuster will control the set point to all the diffusers wired up to terminals 3 and 4 *(see Fig. 5)*. The set point for the Secondary diffusers will be the same as that set for the Master diffuser.

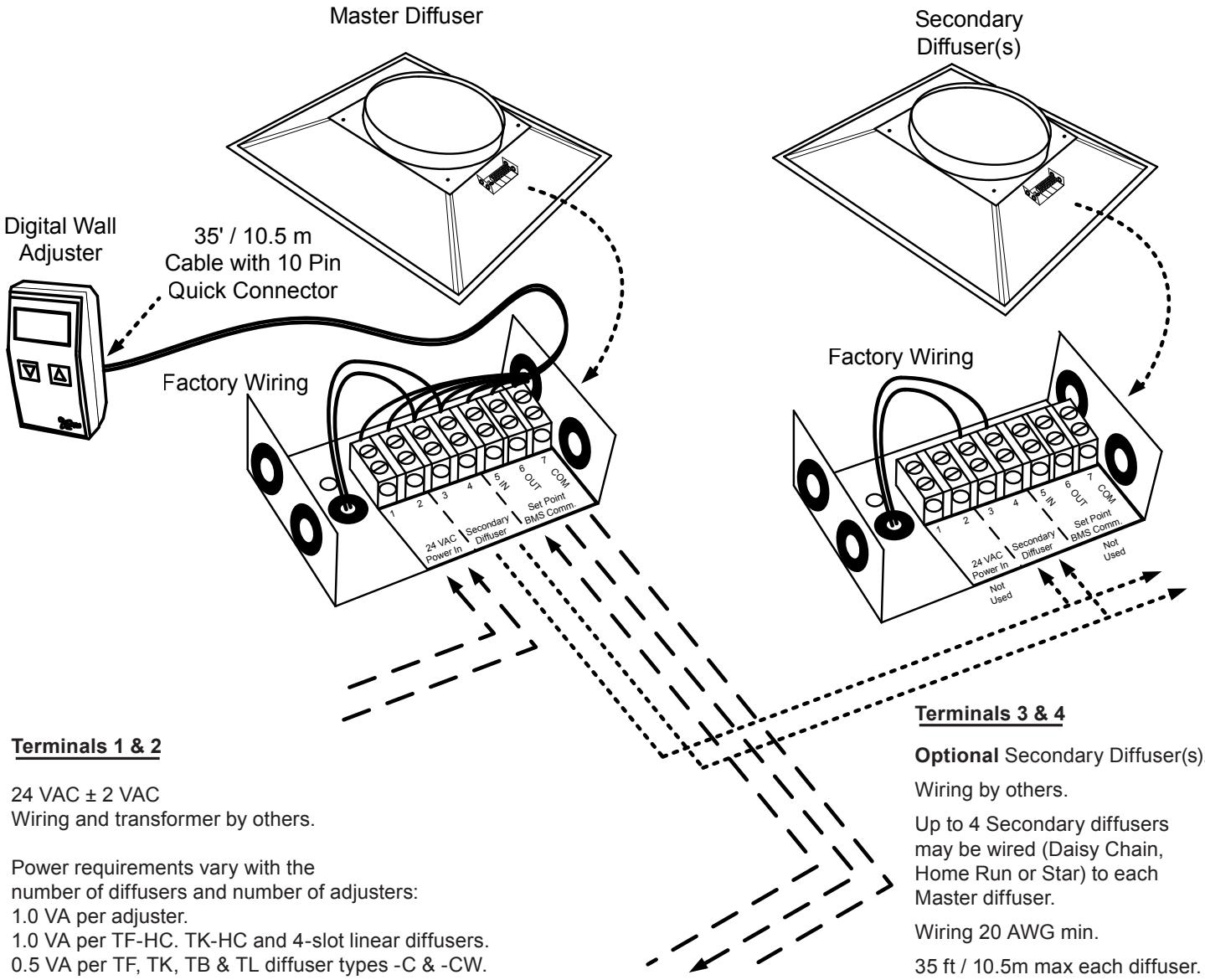
TROUBLESHOOTING

1. Check that the diffuser set points are adjusted to 76°F/24.5°C for both heating and cooling.
2. Inspect the wiring at the terminal box on the Master diffuser:
   A. Check for bad connections at terminals.
   B. Check for loose push connections in wiring between terminal block and heater.
3. Inspect contact between heaters and thermostat(s) located in the Therma-Fuser diffuser. If contact is loose tighten the shrink tubing by heating it.
4. Check the incoming power at the terminal box on the Master diffuser. Power across terminals 1 and 2 *(see Fig. 5)* should be 24VAC ±2VAC. If the power is out of tolerance:
   A. Check for proper sizing of transformer and correct primary voltage.
   B. Check for excessive voltage drop between transformer and Master diffuser.
5. Adjust the set point up to the warmest setting (76°F/24°C) and measure the DC voltage across terminals 3 and 4. Voltage should be less than 1VDC.
6. Adjust the set point down to the coolest setting (68°F/20°C) and measure the DC voltage across terminals 3 and 4. Voltage should be 11-14 VDC (15-18 VDC for Model ST diffusers).
7. Remove wires from terminals 3 and 4 *(see Fig 5)* in the terminal box on the Master diffuser. Separate the wires connected to the heater(s) (they exit down through the housing of the diffuser) from the wires coming from the wall adjuster. Measure resistance across the wires connected to the heaters. Resistance should be:
   A. 500 Ω ± 50 Ω for Model TF-HC, TK-HC and 4-slot linear diffusers.
   B. 1000 Ω ± 100 Ω for all other diffusers.

Two Year Warranty

Acutherm warrants that its Digital Wall Adjuster, exclusive of any options and accessories (whether factory or field installed) shall be free from defective material or workmanship for a period of two (2) years from the date of shipment and agrees to repair or replace, at its option, any parts that fail during said two (2) year period due to any such defects which would not have occurred had reasonable care and proper usage and all parts and controls remain unaltered. Acutherm makes NO WARRANTY OF MERCHANTABILITY OF PRODUCTS OR OF THEIR FITNESS FOR ANY PURPOSE OR ANY OTHER EXPRESS OR IMPLIED WARRANTY WHICH EXTENDS BEYOND THE LIMITED WARRANTY ABOVE. ACUTHERM'S LIABILITY FOR ANY AND ALL LOSSES AND DAMAGES RESULTING FROM DEFECTS SHALL IN NO EVENT EXCEED THE COST OF REPAIR OR REPLACEMENT OF PARTS FOUND DEFECTIVE UPON EXAMINATION BY ACUTHERM. IN NO EVENT SHALL ACUTHERM BE LIABLE FOR INCIDENTAL, INDIRECT OR CONSEQUENTIONAL DAMAGES OR DAMAGES FOR INJURY TO PERSONS OR PROPERTY. Acutherm shall not be responsible for freight to or from its plant in connection with the inspection, repair or replacement of parts under the terms of this limited warranty nor for cost of removal or installation.

Fig. 6 – Wiring Diagram



Terminals 1 & 2

24 VAC ± 2 VAC
Wiring and transformer by others.

Power requirements vary with the number of diffusers and number of adjusters:
1.0 VA per adjuster.
1.0 VA per TF-HC. TK-HC and 4-slot linear diffusers.
0.5 VA per TF, TK, TB & TL diffuser types -C & -CW.
0.65 VA per ST diffuser.

Examples:
1 adjuster + 1 TB-C (Master) = 1.5 VA
1 adjuster + 1 TF-HC (Master) = 2.0 VA
1 adjuster + 3 ST (Master and 2 Secondary) = 2.95 VA

Typically, transformer supplied with packaged units are sized for that unit. A seperate transformer dedicated to the adjuster is recommended.

Terminals 3 & 4

Optional Secondary Diffuser(s).

Wiring by others.

Up to 4 Secondary diffusers may be wired (Daisy Chain, Home Run or Star) to each Master diffuser.

Wiring 20 AWG min.

35 ft / 10.5m max each diffuser.

Terminals 5,6 & 7

Optional BMS Set Point Adjustment. Wiring by others.

0 - 2.0 VDC ± 0.10 VDC input signal for set point adjustment.
0 - 2.0 VDC ± 0.10 VDC output signal for reading the set point.

CAUTION: The Digital Wall Adjuster is a floating device and should not be connected to a controller with input/output that are earth grounded. Use isolation transformer (Terminals 1 & 2) if controller is earth grounded.

Therma-Fuser™ Systems
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PERFORMANCE DATA

Models:

ST-HC Separate set points for VAV heating and VAV cooling.
ST-C One set point for VAV cooling only.

Performance Chart – I-P (Inch Pound)

Nominal Length in	Inlet Diameter in	Inlet Static Pressure in wg	Maximum Flow CFM	Maximum Flow		25% Maximum Flow	
				Throw - Feet* @v_t=50/100/150FPM	tNC	Throw - Feet* @v_t=50/100/150FPM	tNC
6	5 15/16"	0.05	105	3/1/<1	<15	1/<1/<1	<15
		• 0.09	141	4/2/1	17	2/<1/<1	<15
		0.10	150	4/2/1	17	2/<1/<1	<15
		0.15	180	5/3/1	25	3/1/<1	<15
		0.20	210	6/4/2	29	4/1/1	<15
		0.25	240	7/5/3	32	4/2/2	21
8	7 15/16"	0.05	165	5/2/1	<15	2/1/<1	<15
		0.10	235	7/3/2	18	3/1/<1	<15
		• 0.14	255	7/3/2	21	3/1/<1	16
		0.15	285	8/4/3	25	4/1/1	17
		0.20	330	9/5/3	30	4/2/1	20
		0.25	380	9/6/4	34	5/3/2	25
10	9 15/16"	0.05	255	6/3/2	<15	3/1/<1	<15
		0.10	360	8/5/2	23	3/1/<1	<15
		0.15	408	9/6/3	26	4/1/1	16
		• 0.17	440	9/6/4	28	4/2/1	17
		0.20	510	10/7/5	32	5/3/2	22
		0.25	570	11/8/6	26	6/4/3	26
12	11 15/16"	0.05	335	8/6/2	<15	4/1/<1	<15
		0.10	470	10/7/4	25	5/2/1	<15
		• 0.12	580	11/8/5	31	6/2/1	21
		0.15	616	11/9/6	33	6/2/1	23
		0.20	670	12/10/7	35	7/3/2	27
		0.25	740	13/11/9	38	8/5/2	31

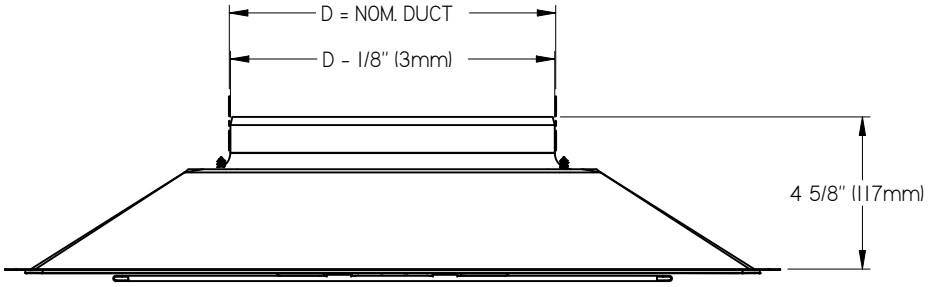
Performance Notes:

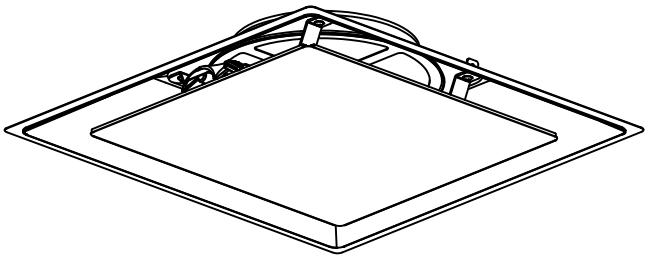
1. • Denotes 750 fpm/3.81 m/s inlet velocity.
2. * Throw data is for air 20ºF 11ºC lower than room temperature. Throws for isothermal air are 40 to 50% greater.
3. tNC based on Lw(10^{-12} watts reference) -10db
4. Ratings independently verified by Inchcape Testing Services, ETL Testing Laboratories.
5. Tested in accordance with ANSI/ASHRAE 70-1991, ANSI S12.31, ARI 890-2001, ISO 5219 and ISO 3741.
6. When bypassing air into the plenum at the diffuser with Acutherm R-Rings, throws may be as low as 90% of, and the NC 2db higher than, those listed in the performance chart.
7. When blocking for direction with the Acutherm directional baffles, the air volume for a given static pressure is reduced from maximum flow listed in the performance chart by:

	Reduction		
Inlet Designation	3-Way	2-Way Opposite	2-Way Corner
6	0.99	1.00	0.99
8	0.97	0.87	0.86
10	0.88	0.72	0.75
12	0.85	0.77	0.65

ST - Therma-Fuser™ VAV DIFFUSER

Thermal 24" / 600mm Square Plaque Diffuser With Disc Damper





CEILING MODULE:
☐ 24" x 24"
☐ 600mm x 600mm

NOMINAL DUCT SIZE:
☐ 6" (152mm) ☐ 10" (254mm)
☐ 8" (203mm) ☐ 12" (305mm)

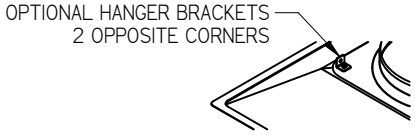
STANDARD CONSTRUCTION:
• STEEL CONSTRUCTION

OPERATION:
☐ HC - VAV HEATING AND COOLING
☐ C - VAV COOLING ONLY

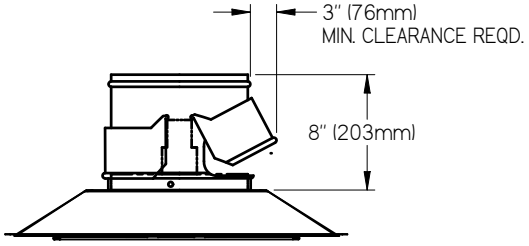
FINISH:
☐ B12 - WHITE
(OPTIONAL FINISHES AVAILABLE)

OPTIONAL REMOTE ADJUST:
☐ DAM - DIGITAL WALL ADJUSTER, MASTER UNIT, INCLUDES ADJUSTER AND 35 FT. (10.7m) CABLE
☐ CPL - COVERPLATE TO INSTALL DAM WALL ADJUSTER IN STANDARD 2"x4" (51mm x 102mm) ELECTRICAL BOX
☐ WAM - WIRELESS WALL ADJUSTER, MASTER UNIT
☐ DA - SECONDARY UNIT, RESPONDS TO SIGNAL FROM DAM OR WAM MASTER UNITS
• DAM AND WAM REQUIRE 24VAC POWER INPUT

OPTIONS:
☐ AFI - FIBERGLASS INSULATION WITH FOIL FACING
☐ HB - HANGER BRACKETS



☐ ARC - PRESSURE RELIEF COLLAR (SHIPPED LOOSE)
(ALSO SEE SUBMITTAL 268238)



NOTES:
• FOR MATCHING RETURN USE MODEL TF-RA
• FACTORY TOLERANCE ±1/16" (2mm)

NOTE - METRIC DIMENSIONS HAVE BEEN ROUNDED TO THE NEAREST MILLIMETER

PROJECT:

ENGINEER:

CUSTOMER:

SUBMITTAL DATE:

SUBMITTAL NO: **268788**

REV 0

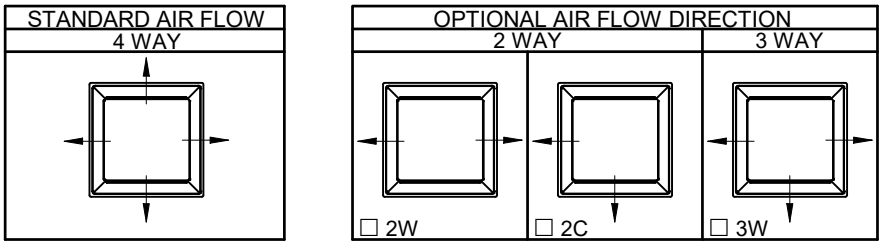
ST
VAV DIFFUSER W/ DISC DAMPER

2017/08/24

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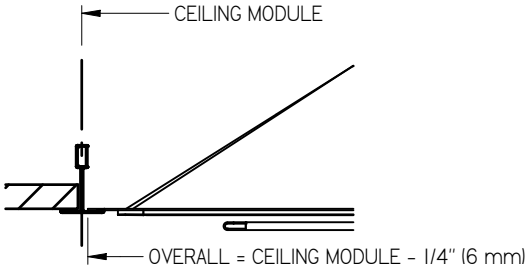
ST - Therma-Fuser™ VAV DIFFUSER

Thermal 24" / 600mm Square Plaque Diffuser With Disc Damper

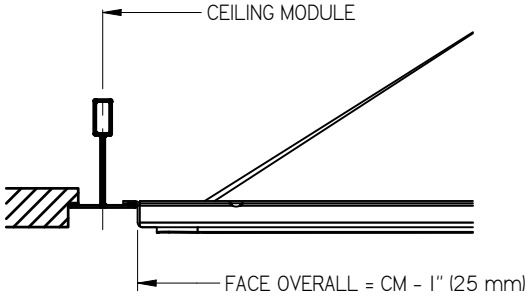


BORDER OPTION

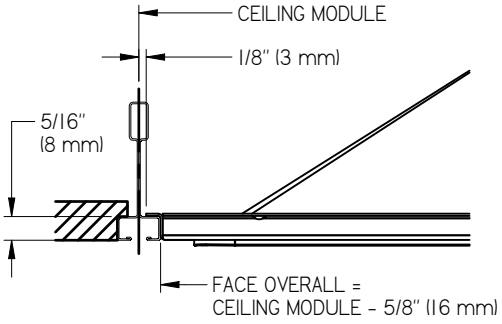
☐ STYLE 3 T-BAR LAY-IN FOR 15/16" AND 9/16" FLAT TEE



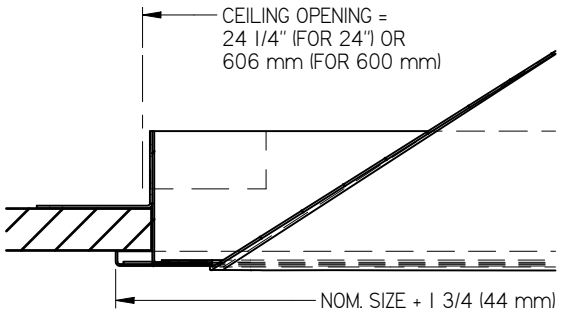
☐ STYLE 15 - 15/16" TEGULAR T-BAR



☐ STYLE 17 - 9/16 TEGULAR OR BOLT SLOT T-BAR



☐ SPF - SURFACE MOUNT W/ STEEL PLASTER FRAME



NOTE - METRIC DIMENSIONS HAVE BEEN ROUNDED TO THE NEAREST MILLIMETER

PROJECT:

ENGINEER:

CUSTOMER:

SUBMITTAL DATE:

SUBMITTAL NO: **268788**

REV 0

ST

VAV DIFFUSER W/ DISC DAMPER

2017/08/24

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25 (RL / RS)

25RL

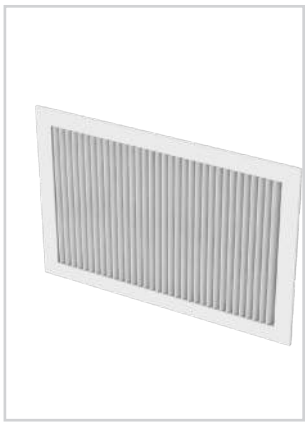
- ½" blade spacing
- 30° fixed deflection
- Reinforced corners
- Blades parallel to the long dimension
- 20-gauge border

25RS

- Same as 25RL with blades parallel to the short dimension



25RL



25RS

metric sizes

See website for Specifications

MODELS:

30° Deflection Models
25RL
25RS

FINISH:

Standard Finish - #26 White

OVERVIEW

1/2" Blade Spacing / Steel

AeroBlade Return Grilles are the companion to AeroBlade Supply Grilles. Aeroblade grilles are available in steel or aluminum construction and various blade spacing options.

For Performance Data, refer to page G36

PRODUCTS INCLUDE

- Material: Roll-formed Steel
- Welded Border
- Available Border Types:
  - #1 - Surface Mount
  - #2 - Snap-In
  - #3 - Lay-In
  - #4 - Spline
- Countersunk Screw Holes.
- #8 x 1¼" Long Phillips Flat Head Sheet Metal Screws, Painted White
- Optional Steel Opposed-Blade Damper

25R / ½" / 30° DEFLECTION
PERFORMANCE BASED ON NOMINAL SIZES SHOWN IN BOLD

						NC-10	NC-20		NC-30		NC-40		NC-50
Nominal Duct Size (in.)	**Nominal Duct Area (ft²)**	**Core Area (ft²)**	**Core Velocity Velocity Pressure Neg. Static Pressure**	**300 0.006 0.023**	**400 0.010 0.041**	**500 0.016 0.064**	**600 0.022 0.092**	**700 0.031 0.126**	**800 0.040 0.164**	**900 0.051 0.208**	**1000 0.062 0.257**	**1100 0.075 0.311**
6x6	**0.25**	**0.19**	Airflow, cfm NC	57 -	76 -	95 13	114 21	133 27	152 33	171 38	190 43	209 47
8x6	**0.33**	**0.26**	Airflow, cfm NC	78 -	104 -	130 14	156 22	182 29	208 34	234 40	260 44	286 48
10x6	**0.42**	**0.34**	Airflow, cfm NC	102 -	136 -	170 15	204 23	238 30	272 36	306 41	340 45	374 49
8x8	**0.44**	**0.37**	Airflow, cfm NC	111 -	148 -	185 16	222 23	259 30	296 36	333 41	370 46	407 50
12x6	**0.50**	**0.41**	Airflow, cfm NC	123 -	164 -	205 16	246 24	287 31	328 36	369 41	410 46	451 50
14x6	**0.58**	**0.48**	Airflow, cfm NC	144 -	192 -	240 17	288 25	336 31	384 37	432 42	480 47	528 51
16x6 **12x8**	**0.67**	**0.57**	Airflow, cfm NC	171 -	228 -	285 17	342 25	399 32	456 38	513 43	570 47	627 52
10x10	**0.69**	**0.59**	Airflow, cfm NC	177 -	236 -	295 18	354 26	413 32	472 38	531 43	590 48	649 52
18x6	**0.75**	**0.63**	Airflow, cfm NC	189 -	252 -	315 18	378 26	441 32	504 38	567 43	630 48	693 52
20x6 **12x10**	**0.83**	**0.72**	Airflow, cfm NC	216 -	288 -	360 19	432 26	504 33	576 39	648 44	720 48	792 53
22x6	**0.92**	**0.77**	Airflow, cfm NC	231 -	308 -	385 19	462 27	539 33	616 39	693 44	770 49	847 53
24x6 **12x12**	**1.00**	**0.88**	Airflow, cfm NC	264 -	352 -	440 19	528 27	616 34	704 40	792 45	880 49	968 53
30x6 **18x10**	**1.25**	**1.11**	Airflow, cfm NC	333 -	444 11	555 20	666 28	777 35	888 41	999 46	1110 50	1221 54
14x14	**1.36**	**1.22**	Airflow, cfm NC	366 -	488 11	610 21	732 29	854 35	976 41	1098 46	1220 51	1342 55
36x6 **18x12**	**1.50**	**1.35**	Airflow, cfm NC	405 -	540 12	675 21	810 29	945 36	1080 42	1215 47	1350 51	1485 55
22x10	**1.53**	**1.37**	Airflow, cfm NC	411 -	548 12	685 21	822 29	959 36	1096 42	1233 47	1370 51	1507 55
30x8 **24x10**	**1.67**	**1.49**	Airflow, cfm NC	447 -	596 12	745 22	894 30	1043 36	1192 42	1341 47	1490 52	1639 56
42x6 **18x14**	**1.75**	**1.59**	Airflow, cfm NC	477 -	636 12	795 22	954 30	1113 36	1272 42	1431 47	1590 52	1749 56
16x16	**1.78**	**1.62**	Airflow, cfm NC	486 -	648 12	810 22	972 30	1134 37	1296 42	1458 47	1620 52	1782 56
24x12 18x16	**2.00**	**1.82**	Airflow, cfm NC	546 -	728 13	910 23	1092 30	1274 37	1456 43	1638 48	1820 53	2002 57
18x18	**2.25**	**2.07**	Airflow, cfm NC	621 -	828 13	1035 23	1242 31	1449 38	1656 43	1863 49	2070 53	2277 57
24x14	**2.33**	**2.14**	Airflow, cfm NC	642 -	856 14	1070 23	1284 31	1498 38	1712 44	1926 49	2140 53	2354 57
30x12	**2.50**	**2.29**	Airflow, cfm NC	687 -	916 14	1145 24	1374 31	1603 38	1832 44	2061 49	2290 54	2519 58
24x16	**2.67**	**2.46**	Airflow, cfm NC	738 -	984 14	1230 24	1476 32	1722 38	1968 44	2214 49	2460 54	2706 58
20x20	**2.78**	**2.57**	Airflow, cfm NC	771 -	1028 14	1285 24	1542 32	1799 39	2056 44	2313 49	2570 54	2827 58
36x12	**3.00**	**2.75**	Airflow, cfm NC	825 -	1100 15	1375 24	1650 32	1925 39	2200 45	2475 50	2750 54	3025 58
30x16 **24x20**	**3.33**	**3.11**	Airflow, cfm NC	933 -	1244 15	1555 25	1866 33	2177 39	2488 45	2799 50	3110 55	3421 59
22x22	**3.36**	**3.14**	Airflow, cfm NC	942 -	1256 15	1570 25	1884 33	2198 39	2512 45	2826 50	3140 55	3454 59
42x12 36x14	**3.50**	**3.22**	Airflow, cfm NC	966 -	1288 15	1610 25	1932 33	2254 40	2576 45	2898 50	3220 55	3542 59
24x22	**3.67**	**3.43**	Airflow, cfm NC	1029 -	1372 16	1715 25	2058 33	2401 40	2744 46	3087 51	3430 55	3773 59
30x18	**3.75**	**3.5**	Airflow, cfm NC	1050 -	1400 16	1750 25	2100 33	2450 40	2800 46	3150 51	3500 55	3850 59

- Static pressures are negative, in inches of water, measured per ANSI/ASHRAE Standard 70-2006
- NC based on room absorption of 10 dB, re 10^{-12} watts, measured per ANSI/ASHRAE Standard 70-2006

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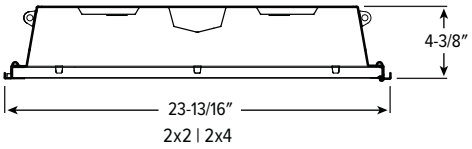
Attachment E
Lighting Cutsheets

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L1/L2 Fixture

50 LED Static Troffer





CATALOG #:

TYPE:

PROJECT:

FEATURES

- Frosted prismatic lens provides pleasing diffused light without LED pixelation
- Fully-enclosed spring-loaded cam latches provide hassle-free room side maintenance
- Triple gasketing and inverted lens options for smooth surface room side
- T-slot steel hinge ensures positive retention when door is opened
- Back reinforcement ribs and rolled-edge channel adds superior strength
- Integral T-bar clips quickly secure fixture to structure. (2x2 and 2x4 only)
- Maximize energy savings with efficacies as high as to 139 lm/W
- Rated for direct contact with insulation
- Fully gasketed door protects against contaminants
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – 22-gauge die-formed C.R.S.
- DOOR FRAME – 20-gauge C.R.S. or .050" extruded aluminum, flat or regress, with mitered corners. T-slot steel hinge allows reversible hinging and latching. Fully enclosed spring-loaded cam latches.
- SHIELDING – Frosted acrylic, pattern #12, .125" thick.
- FINISH – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High quality mid-power LED board. See fixture performance data for lumen maintenance. 25°C maximum ambient operating temperature.
- MOUNTING – Designed for NEMA Type "G" 1" grid ceiling standard. For NEMA Type "NFG" and "SG" 9/16" grid installations, specify EQCLIPS option. NEMA Type "F" available.
- LISTINGS –
  - cCSAus certified as luminaire suitable for dry or damp locations.
  - IC-rated for direct contact with insulation.
  - City of Chicago Environmental Air approved when specified with CP option.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

ORDERING EXAMPLE: 50 G - S 2 4 - L130/835 - S - AF12125 - OPTIONS - DIM - UNV

ORDERING INFO

SERIES	CEILING TYPE	FIXTURE STYLE	WIDTH	LENGTH	LUMENS [1]
50	**G** NEMA Type "G" **F** NEMA Type "F" [2]	**S** Full door frame–no reveal	**1** 1′ [3] **2** 2′	**2** 2′ [4] **4** 4′	**1x4** **L27** 2,700lm **L45** 4,500lm **L65** 6,500lm **2x2** **L26** 2,600lm **L43** 4,300lm **L65** 6,500lm **2x4** **L33** 3,300lm **L59** 5,900lm **L90** 9,000lm **L130** 13,000lm

CRI	CCT	DOOR FRAME	SHIELDING
8 80 **9** 90 [5]	**27** 2700K **30** 3000K **35** 3500K **40** 4000K **50** 5000K	**S** White flat steel **F** White flat aluminum **R** White regress aluminum **SB** Black flat steel **FB** Black flat aluminum **RB** Black regress aluminum	**AF12125** Frosted acrylic, pattern #12, .125" thick **AF19156** Frosted acrylic, pattern #19, .156" thick **A12125** Clear acrylic, pattern #12, .125" thick **A19156** Clear acrylic, pattern #19, .156" thick **PC12187** Polycarbonate, pattern #12, .187" thick

OPTIONS [6]		CONTROL [7]		VOLTAGE	
EM/10W	10-watt emergency battery	**DIM**	Dimming driver	**120**	120V
DG	Double gasket [8]	**DRV**	Non-dimming driver	**277**	277V
TG	Triple gasket [9]			**UNV**	120-277V
EQCLIPS	Earthquake clips [10]			**347**	347V [14]
(L__)	Additional lower lumen packages available. [11] Example: 8,500 nominal lumens = 50G-S24-L90/850-**(L85)**.				
WET	UL/CUL listed for wet location under covered ceiling. [12]				
CP	Chicago Plenum (CCEA)				
TP	Tamper-resistant screws [13]				

ACCESSORIES

TPTG TOOL Tamper-resistant tool for tri-groove screws. [15]

NOTES

1 Lumen output based on 3500K CCT, 80 CRI. Actual lumens may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen package available, see options.
2 See page 3 for NEMA TYPE "F" INSTALLATION.
3 4′ length only.
4 2′ width only.
5 Extended lead times may apply. Consult factory for availability.
6 See page 4 for FLEXIBLE WHIP OPTIONS.
7 See page 2 for ADDITIONAL CONTROL OPTIONS.
8 Flat aluminum door only. See page 3 for GASKETING DETAILS.
9 Flat aluminum door only; field installed. See page 3 for GASKETING DETAILS.
10 4 per fixture. Optional for 1" grid installations. Required for 9/16" grid mounting. Not available with F Ceiling Type.
11 Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
12 Flat aluminum door only, TG option included.
13 Flat aluminum door only. Requires a tamper-resistant tool, see Accessories.
14 Not available with EM drivers.
15 Tamper-resistant tool must be ordered separately. Please specify quantity required per project.

50 LED Static Troffer

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	LUMEN MAINTENANCE		
					L80	L85	L90
1x4	L27	2637	20.1	131.0	>72,000	>72,000	50,000
	L45	4311	33.7	127.8	>72,000	>72,000	50,000
	L65	6563	55.7	117.9	>72,000	58,000	36,000
2x2	L26	2630	21.3	123.6	>72,000	58,000	36,000
	L43	4363	33.7	129.3	>72,000	>72,000	50,000
	L65	6513	54.4	119.7	>72,000	>72,000	50,000
2x4	L33	3469	24.9	139.3	>72,000	>72,000	50,000
	L59	6231	48.0	129.7	>72,000	58,000	36,000
	L90	9106	67.1	135.6	>72,000	>72,000	50,000
	L130	13116	101.2	129.6	>72,000	>72,000	50,000

LENS	CONVERSION FACTOR
AF12125	1.00
AF19156	0.98
A12125	0.99
A19156	0.94
PC12187	1.00

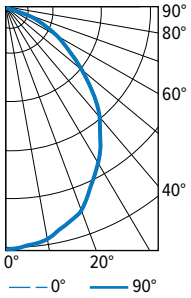
- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25°C ambient temperature.
- Wattage shown is average for 120V through 277V input.
- Results based on 3500K, 80 CRI, actual lumens may vary +/-5%
- Predicted lumen maintenance calculated from LED manufacturer IES LM-80 data and In situ temperature measurement.
- Predicted lumen maintenance calculated in accordance with IES TM-21 per Energy Star (R) TM-21 Calculator rev. 02.08.16.
- Use multiplier table to calculate additional options.

MULTIPLIER TABLE

	COLOR TEMPERATURE	
	CCT	CONVERSION FACTOR
80 CRI	2700K	0.97
	3000K	0.99
	3500K	1.00
	4000K	1.03
	5000K	1.06
90 CRI	2700K	0.80
	3000K	0.82
	3500K	0.83
	4000K	0.86
	5000K	0.89

PHOTOMETRY

50G-S24-L130/835-SAF12125-DIM-UNV Total Luminaire Output: 13116 lumens; 101.2 Watts | Efficacy: 129.6 lm/W | 80 CRI; 3500K CCT



CANDLEPOWER DISTRIBUTION	VERTICAL ANGLE	HORIZONTAL ANGLE			ZONAL LUMENS
		0°	45°	90°	
	0	5906	5906	5906	
	5	5848	5839	5837	555
	15	5508	5508	5517	1559
	25	4856	4865	4872	2249
	35	4025	4015	4031	2512
	45	3124	3080	3037	2356
	55	2091	2021	1959	1810
	65	1239	1165	1149	1183
	75	615	589	621	659
	85	207	207	244	232
	90	0	0	0	

LUMEN SUMMARY	ZONE	LUMENS	% FIXTURE
	0 - 30	4363	33
	0 - 40	6875	52
	0 - 60	11042	84
	0 - 90	13116	100
	0 - 180	13116	100

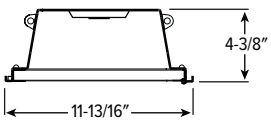
ADDITIONAL CONTROL OPTIONS

Note: Lumen restrictions apply, consult product builder at hew.com/product-builder.

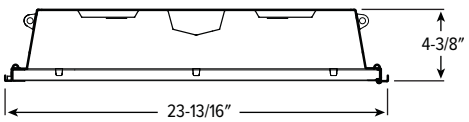
CATALOG NUMBER	DESCRIPTION
DRV	Driver prewired for non-dimming applications
DIM	Dimming driver prewired for 0-10V low voltage applications
DIM1	1% dimming driver prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LTE LINE	Lutron Hi-lume 1% 2-wire dimming driver forward phase line voltage controls (120V only)
LDE1	Lutron Hi-lume 1% EcoSystem dimming LED driver
ELDO SOLOB	EldoLED Solodrive, 0.1% dimming driver for 0-10V controls
ELDO SOLOB DALI	EldoLED Solodrive, 0.1% dimming driver for DALI controls
ELDO ECO1	EldoLED Ecodrive, 1% dimming driver for 0-10V controls
ELDO ECO1 DALI	EldoLED Ecodrive, 1% dimming driver for DALI controls

CROSS SECTIONS

1x4



2x2 | 2x4

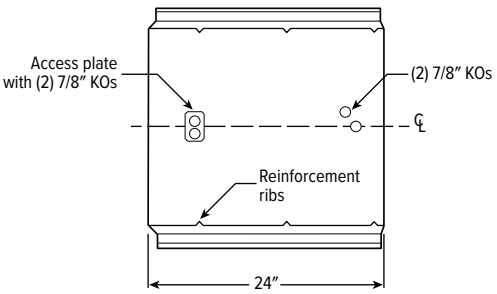


50 LED Static Troffer

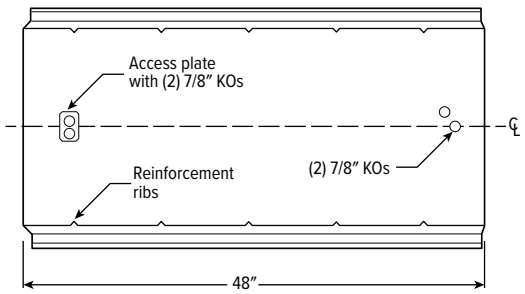
FIXTURE DETAILS

BACKVIEW

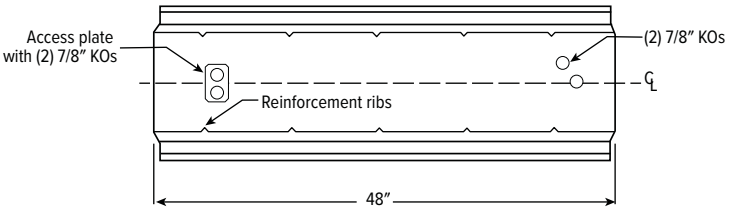
2x2



2x4

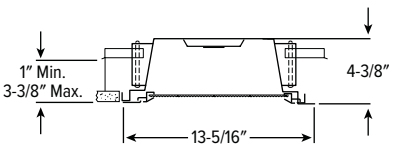


1x4



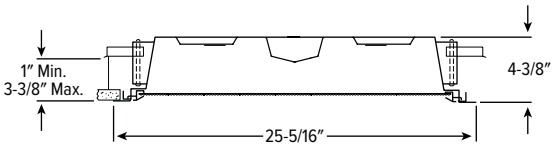
NEMA TYPE "F" INSTALLATION

1x4



Note: Maximum recommended ceiling opening is 12-3/8"x 48-3/8". For continuous row mounting, add 49-5/16" for each additional fixture to obtain ceiling opening. 1-5/16" between end plates.

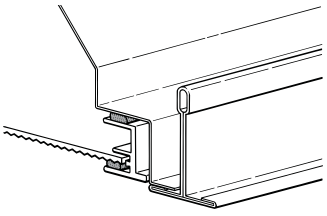
2x2 | 2x4



Note: Maximum recommended ceiling opening is 24-3/8" x 24-3/8" for 2'x2' and 24-3/8"x 48-3/8" for 2'x4'. For continuous row mounting, add 49-5/16" for each additional fixture to obtain ceiling opening. 1-5/16" between end plates.

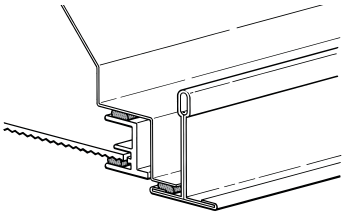
GASKETING DETAILS

DOUBLE GASKETING (DG)



Gasketing is factory-installed continuously between door frame and luminaire housing; and between door frame and lens.

TRIPLE GASKETING



Gasketing is factory-installed continuously between door frame and luminaire housing; and between door frame and lens. Gasketing between bottom perimeter of unit (adjacent to T-bar or hardpan ceiling) is provided by factory and field installed.

FLEXIBLE WHIP OPTIONS

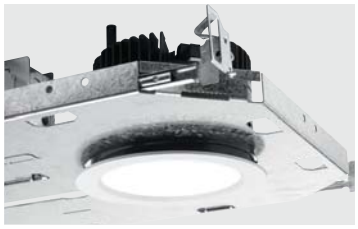
All Williams recessed troffers are available with a flexible metallic wiring harness, factory-attached and hard-wired to the luminaire. See ordering information table.

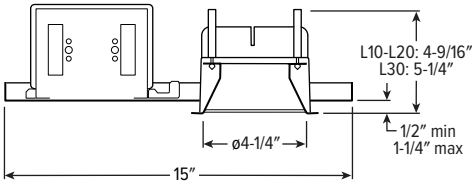
Straight connectors are a snap-in type. Consult factory for wiring harness utilizing connectors secured by lock nuts, optional flex size, lengths, and other wire sizes or circuitry. Three-wire flex utilizes black, white, and green wire. Four-wire flex utilizes black, white, red, and green wire. Adding an emergency option requires an additional wire.

Williams fixtures are UL listed to provide factory-installation of several manufacturers' modular wiring devices. Consult factory for availability and ordering information.

DESIGNATION	DESCRIPTION	DRIVER
F338	6′ of 3/8″ flex, (3) No. 18 AWG wires with (2) straight connectors	DRV, LTE LINE
F348	6′ of 3/8″ flex, (4) No. 18 AWG wires with (2) straight connectors	SD40
F334	6′ of 3/8″ flex, (3) No. 14 AWG wires with (2) straight connectors	DRV, LTE LINE
F344	6′ of 3/8″ flex, (4) No. 14 AWG wires with (2) straight connectors	SD40
F358	6′ of 3/8″ flex, (5) #18 AWG wires with (2) straight connectors	DIM, DALI

4PR LED 4.5″ Shallow Plenum Downlight – Round





CATALOG #:

TYPE:

PROJECT:

NEW CONSTRUCTION AND REMODEL

FEATURES

TrimLock®

- Innovative TrimLock reflector retention system ensures trim remains flush with ceiling plane
- Die cast trim with flush lens provides glare-free illumination for a soft ceiling appearance
- Industry-leading efficacies as high as 100 lm/W – ENERGY STAR® certified
- Fully room-side accessible

SPECIFICATIONS

- HOUSING – Spun housing with forged aluminum heat sink. Galvanized steel splice compartment with driver mounting plate/enclosure. Mounting clips allow for ceiling thickness from 1/2″ – 1-1/4″ (consult factory for additional ceiling thicknesses).
- TRIMLOCK – Innovative TrimLock reflector retention system ensures the trim remains flush with the ceiling plane.
- LENSED TRIM – Die-cast aluminum frame with micro-prismatic, acrylic lens.
- ELECTRICAL – High-performance Class 2 C.O.B. LED array. Modular quick-connect plug for easy field-connection of LED light assembly to driver. Reported L70>55,000 hours. Reported L90>55,000 hours. Estimated L70 = 200,000 hours.
- MOUNTING – Recessed. 20 ga. galvanized steel mounting pan for new construction or IC-rated enclosure. Remodel kit option includes receiver bracket hardware. Minimum 24″ O.C. marked spacing required for L30 lumen package.
- LISTINGS –
  - cCSAus conforms to UL STD 1598; Certified to CAN/CSA STD C22.2 No. 250.0 for damp locations. LED light assembly conforms to UL 2108 for remote installation.
  - Suitable for wet location under covered ceiling when specified with WET/CC option.
  - ENERGY STAR® certified in select configurations, see www.energystar.gov
  - IC-rated for direct contact with insulation when specified with I Mounting Type.
  - City of Chicago Environmental Air approved when specified with CP option.
  - Complies with ASTM-E283 when specified with ATH option.
  - RoHS compliant.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

ENERGY STAR

ORDERING EXAMPLE: 4PR - TL - L20/835 - OPTIONS - DIM - UNV - LW - OF - WH - TRIM OPTIONS - N - F1

HOUSING | TRIM | MOUNT.

HOUSING

SERIES	LUMENS [1]	CRI	CCT
4PR - TL TrimLock	**L10** 1,000lm [3]	**8** 80	**27** 2700K
	L15 1,500lm	**9** 90 [4]	**30** 3000K
	L20 2,000lm		**35** 3500K
	L30 3,000lm		**40** 4000K
			50 5000K

OPTIONS	
ATH	Airtight construction
CP	Chicago plenum (CCEA) [5]
F	Fuse kit
SDT	Stepdown transformer [6]
EM/7W	7-watt emergency battery [8]
EM/10W	10-watt emergency battery [9]
EM/10W/RTS	10-watt emergency battery with regressed test switch [10]

CONTROL [2]	
DIM	Dimming driver, 0-10V
DIM1	1% Dimming driver, 0-10V

VOLTAGE	
UNV	120-277V
347	347V [7]

TRIM [11]

TRIM TYPE	
L	Flush lens
A	Angled lens [13]
S	Non-conductive flush lens for shower applications [14]

DISTRIBUTION [12]	
W	65° Wide
M	35° Medium
N	25° Narrow

FLANGE TYPE	
OF	1/2″ standard flange
SF	1/4″ mud-in flange [15]

REFLECTOR FINISH	
CS	Clear semi-specular powder coat
WH	White texture powder coat
BL	Black texture powder coat

TRIM OPTIONS	
IP	IP65 rated trim
AD	Diffuse acrylic lens [16]
PD	Diffuse 1/8″ polycarbonate lens [17]
WET/CC	Wet location, covered ceiling listed [18]
AM	Anti-microbial [19]

MOUNTING

MOUNTING TYPE [20]

- **N** Open pan for new construction
- **I** IC-rated enclosure for new construction [22]
- **R** Remodel kit [23]

MOUNTING HARDWARE [21]

- **F1** Integral 2-position fixed pan bracket, universal bar hanger included [24]
- **BA1** Adjustable butterfly pan bracket, bar hanger not included [25]
- **CA1** Adjustable caterpillar pan bracket, universal bar hanger included [26]

NOTES

1. Lumen output based on L trim type, W distribution and WH finish, 3500K/80CRI. Actual lumens may vary +/-5%. See page 2 for FIXTURE PERFORMANCE DATA.
2. See page 3 for ADDITIONAL CONTROL OPTIONS.
3. Not available with EM/10W emergency batteries.
4. Extended lead times may apply. Consult factory for availability.
5. I Mounting Type required.
6. May be required for 347V, see product builder at hew.com/product-builder.
7. Not available with EM batteries or DMX controls.
8. N and R Mounting Types only. Not available with ATH or IP options.
9. N and R Mounting Types only. Not available with ATH or IP options.
10. Not available with WET/CC, ATH or IP options. N and R Mounting Types only. See page 4 for EM/10W/RTS DETAILS.
11. Trim ships separately.
12. Beam angle based on WH reflector finish and L Trim Type.
13. Wide distribution only. Diffuse acrylic lens standard.
14. W Distribution, OF Flange Type, and WH Reflector Finish only. Standard with AD diffuse acrylic lens. IP and WET/CC options standard.
15. For use with mud-in plaster construction only, supplied with mud flange installation kit. See page 3 for FLANGE TYPE DETAILS. Not available with ATH or IP options.
16. L Trim Type only. W distribution only.
17. W distribution only.
18. Not available with PD trim option.
19. WH and BL Reflector Finishes only. Not available with S Trim Type.
20. Mounting hardware required (N and I only), ordered separately, see MOUNTING HARDWARE ordering info. See page 4 for MOUNTING TYPE DETAILS.
21. Specify for N and I Mounting Types only. Additional mounting hardware options available. See page 5 for MOUNTING HARDWARE DETAILS.
22. Not available with L30 lumen package.
23. Also used in new construction sheetrock ceilings.
24. N and I Mounting Types only. I Mounting requires external brackets.
25. N Mounting Type only.
26. N Mounting Type only.

4PR LED
4.5" Shallow Plenum Downlight – Round

FIXTURE PERFORMANCE DATA

	DISTRIBUTION	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)
L10	W	921	10.7	85.9
	M	1072	10.7	100.0
	N	1064	10.7	99.2
L15	W	1405	16.7	84.1
	M	1636	16.7	97.9
	N	1624	16.7	97.1
L20	W	1830	22.8	80.4
	M	2130	22.8	93.6
	N	2114	22.8	92.9
L30	W	3127	46.6	67.1
	M	3538	46.6	75.9
	N	3516	46.6	75.5

MULTIPLIER TABLES

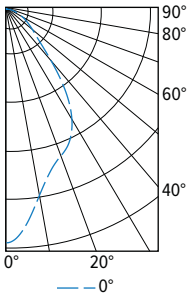
	COLOR TEMPERATURE	
	CCT	CONVERSION FACTOR
80 CRI	2700K	0.92
	3000K	0.98
	3500K	1.00
	4000K	1.01
	5000K	1.02
90 CRI	2700K	0.76
	3000K	0.79
	3500K	0.82
	4000K	0.84
	5000K	0.88

TRIM	
CATALOG NUMBER	CONVERSION FACTOR
S	0.85
AD	0.85
PD	0.85

- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25°C ambient temperature.
- Wattage shown is based on 120V input.
- Results based on 3500K, 80 CRI, actual lumens may vary +/-5%
- Use multiplier tables to calculate additional options.

PHOTOMETRY

4PR-TL-L20/835-DIM-UNV-LW-OF-WH Report #: 12316380.29 ; 06/12/18 | Total Luminaire Output: 1830 lumens; 22.8 Watts | Efficacy: 80.4 lm/W | 82.7 CRI; 3565K CCT



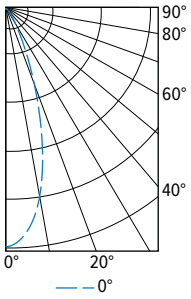
CANDLEPOWER DISTRIBUTION

VERTICAL ANGLE	HORIZONTAL ANGLE 0°	ZONAL LUMENS
0	1465	
5	1365	91
15	1057	167
25	926	222
35	663	187
45	304	10
55	178	73
65	104	45
75	52	22
85	13	4
90	2	

LUMEN SUMMARY

ZONE	LUMENS	% FIXTURE
0 - 40	1253	69
0 - 60	1656	91
0 - 90	1830	100
0-180	1830	100

4PR-TL-L20/835-DIM-UNV-LM-OF-WH Report #: 12316380.31; 06/13/18 | Total Luminaire Output: 2130 lumens; 22.8 Watts | Efficacy: 93.6 lm/W | 82.7 CRI; 3560K CCT



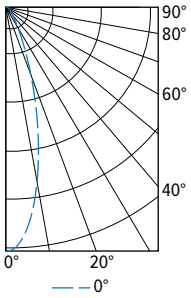
CANDLEPOWER DISTRIBUTION

VERTICAL ANGLE	HORIZONTAL ANGLE 0°	ZONAL LUMENS
0	5004	
5	4751	315
15	2968	390
25	1007	187
35	302	79
45	125	42
55	64	26
65	37	16
75	19	8
85	5	2
90	1	

LUMEN SUMMARY

ZONE	LUMENS	% FIXTURE
0 - 40	1910	90
0 - 60	2067	97
0 - 90	2130	100
0-180	2130	100

4PR-TL-L20/835-DIM-UNV-LN-OF-WH Report #: 12316380.32; 06/13/18 | Total Luminaire Output: 2114 lumens; 22.8 Watts | Efficacy: 92.9 lm/W | 82.6 CRI; 3545K CCT



CANDLEPOWER DISTRIBUTION

VERTICAL ANGLE	HORIZONTAL ANGLE 0°	ZONAL LUMENS
0	7096	
5	6408	398
15	3003	366
25	802	144
35	222	59
45	105	37
55	63	26
65	38	17
75	19	8
85	4	1
90	1	

LUMEN SUMMARY

ZONE	LUMENS	% FIXTURE
0 - 40	1912	90
0 - 60	2051	97
0 - 90	2114	100
0-180	2114	100

4PR LED
4.5″ Shallow Plenum Downlight – Round

ADDITIONAL CONTROL OPTIONS

Lumen restrictions apply: L20 max for DMX driver, L20 max for Lutron drivers, L30 max for DIM LINE driver. R Mounting Type not available with DMX, VRF or FCJS controls. 347V may require stepdown transformer, see product builder at hew.com/product-builder. I Mounting Type not available with Lutron controls.

CATALOG NUMBER	DESCRIPTION
DIM	Dimming driver prewired for 0-10V low voltage applications
DIM1	1% dimming driver prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible at 120V only)
DMX	0.1% dimming driver for DMX controls
LTE LINE	Lutron Hi-lume 1% 2-wire dimming driver forward phase line voltage controls (120V only)
LDE1	Lutron Hi-lume 1% EcoSystem dimming LED driver
VRF/DBI/LDE1	Lutron Vive integral fixture control, RF only (DFCSJ-OEM-RF), Lutron Hi-lume 1% EcoSystem dimming LED driver, and digital link interface
FCJS/DIM	Lutron Vive PowPak wireless fixture control with dimming driver
FCJS/DIM1	Lutron Vive PowPak wireless fixture control with 1% dimming driver
ELDO SOLOB	EldoLED Solodrive, 0.1% dimming driver for 0-10V controls
ELDO SOLOB DALI	EldoLED Solodrive, 0.1% dimming driver for DALI controls
ELDO ECO1	EldoLED Ecodrive, 1% dimming driver for 0-10V controls
ELDO ECO1 DALI	EldoLED Ecodrive, 1% dimming driver for DALI controls

TRIMLOCK DETAILS

TWIST



PULL

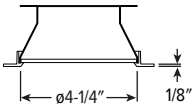


RELEASE

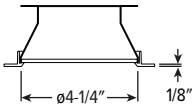


TRIM TYPE DETAILS

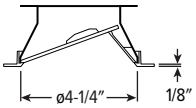
FLUSH



SHOWER

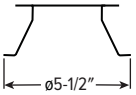


ANGLED



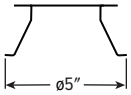
FLANGE TYPE DETAILS

1/2″ STANDARD



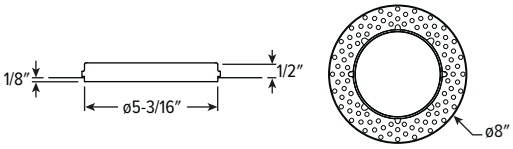
Ceiling Cutout: ø5″

1/4″ MUD-IN



Ceiling Cutout: ø5-1/2″

MUD FLANGE MOUNTING KIT (SLIM FLANGE TYPE)



REFLECTOR FINISH DETAILS

CS
Clear semi-specular



WH
White

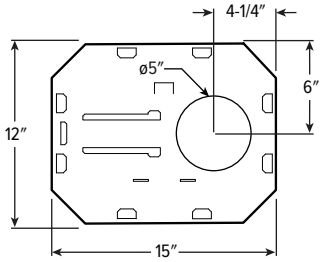
BL
Black



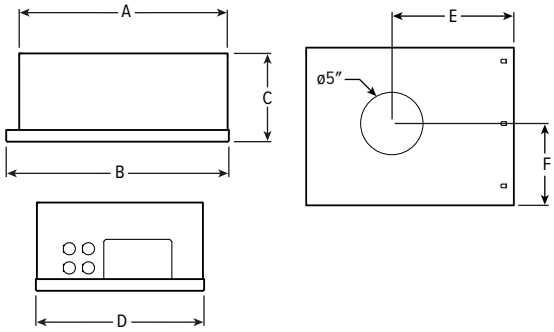
4PR LED
4.5″ Shallow Plenum Downlight – Round

MOUNTING TYPE DETAILS

NEW CONSTRUCTION



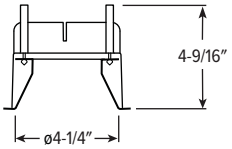
IC-RATED



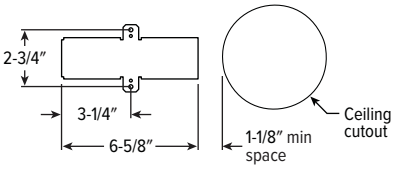
	LENGTH					
LUMENS	A	B	C	D	E	F
L10 - L20	15-1/16″	16″	4-1/2″	12-1/8″	9-1/2″	6-1/16″

REMODEL

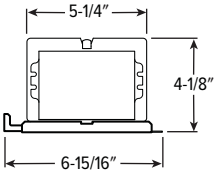
Cross Section



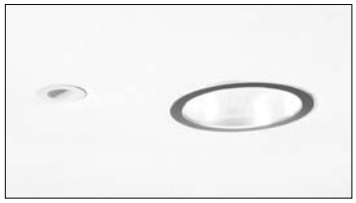
Receiver Bracket



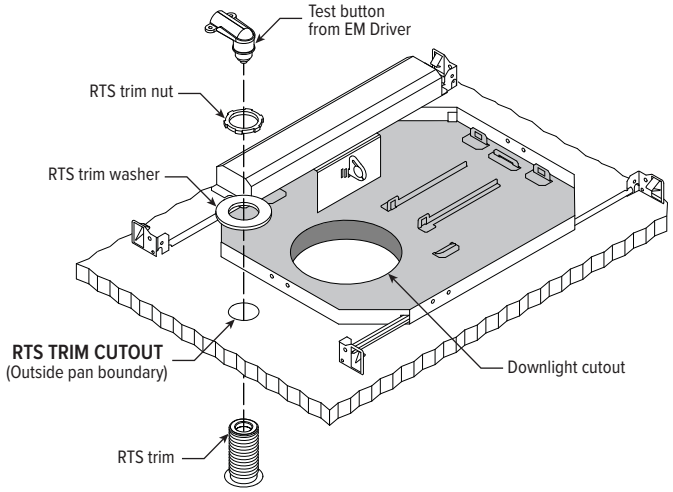
Driver and Junction Box



EM/10W/RTS DETAILS

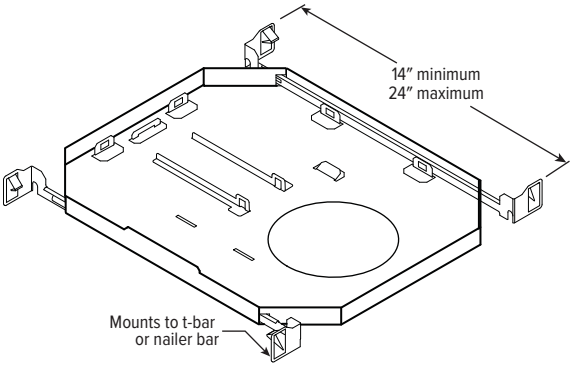


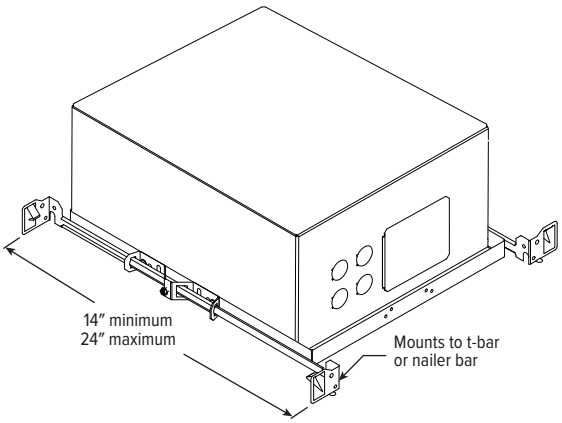
Shown Installed



MOUNTING HARDWARE DETAILS

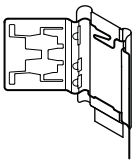
F1 Integral 2-position fixed pan bracket, universal bar hanger included



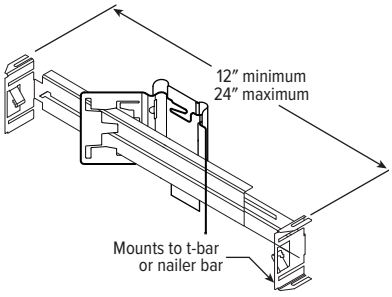


F1 with I Mounting Type

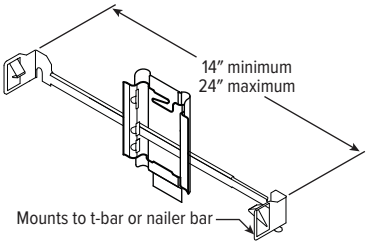
BA1 Adjustable butterfly pan bracket, bar hanger not included (N Mounting Type only)



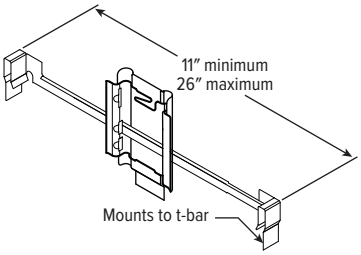
BA2 Adjustable butterfly pan bracket, heavy-duty universal bar hanger included (N Mounting Type only)



CA1 Adjustable caterpillar pan bracket, universal bar hanger included (N Mounting Type only)

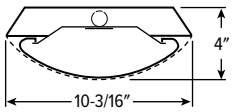


CA2 Adjustable caterpillar pan bracket, t-bar hanger included (N Mounting Type only)



39 LED
Surface or Pendant Mount Wrap





39 Shown

CATALOG #:

TYPE:

PROJECT:

FEATURES

- ADA Compliant design for surface, suspended, or wall applications
- Diffuser is secured continuously along luminaire sides
- Individual or continuous row mounting
- Endplate knock-out for thru feed wiring standard
- High-performance up to 140 lm/W
- Available with Avi-on wireless fixture controls
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – 22-gauge die-formed C.R.S. and riveted construction.
- SHIELDING – Frosted ribbed acrylic.
- FINISH – 92% minimum average reflective white polyester powder coat bonded to phosphate-free, multi-stage pretreated metal. All parts painted after fabrication to facilitate installation, increase efficiency, and inhibit corrosion.
- ELECTRICAL – High-quality mid-power LED boards. See fixture performance data for lumen maintenance.
- MOUNTING – Surface, suspended, or wall.
- LISTINGS –
  - cCSAus certified as luminaire suitable for dry or damp locations.
  - ADA Compliant
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

avi-on Bluetooth® Lighting Controls

ORDERING EXAMPLE: 39 - 4 - L52/835 - A - OPTIONS - CONTROL/DIM - UNV

ORDERING INFO

SERIES	LENGTH	LUMENS [1]	CRI	CCT	SHIELDING
39 Standard width	**4** 4′	**4′**	**8** 80	**27** 2700K	**A** Frosted ribbed acrylic
39W Wide width	**8** 8′ [2]	**L30** 3,000lm	**9** 90 [3]	**30** 3000K	
		L52 5,200lm		**35** 3500K	
		L84 8,400lm		**40** 4000K	
		8′		**50** 5000K	
		L60 6,000lm			
		L104 10,400lm			
		L168 16,800lm			

OPTIONS [4]

EM/10WLP	Low-profile 10-watt emergency battery
QC__	Quick-connect wiring harness. [6]
(L__)	Additional lower lumen packages available. [7] Example: 8,000 nominal lumens = 39-4-L84/835-**(L80)**
SS-12	Single stem and canopy, 12″ [8]
SWS-12	Swivel stem and canopy, 12″ [9]

CONTROL [5]

–	None
AVI-LVFA	Avi-on wireless fixture control [11]
AVI-LVFA-CS2-PIR	Avi-on wireless fixture control with PIR motion and daylight sensor [12]

MOUNTING (EXAMPLE: AC/D48) [10]

Prefix	Type	Length
AC(Y12)/	**D** 1″ grid & hardpan	**24** 24″
	N 9/16″ grid	**48** 48″
	S Slot grid	**96** 96″

DRIVER [13]

DIM	Driver with external dimming wires
DRV	Driver without external dimming wires
DA	Driver with 12V auxiliary power, without external dimming wires [14]

VOLTAGE

120	120V
277	277V
UNV	120-277V
347	347V [15]

NOTES

1. Lumen output based on 3500 CCT. Actual lumens may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA.
2. Ships with (2) 4′ lenses.
3. Extended lead times may apply. Consult factory for availability.
4. See page 3 for FINISH OPTIONS. Custom colors available upon request. See page 3 for MOUNTING DETAILS.
5. See page 3 for SENSOR PLACEMENT DETAILS. See page 4 for AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS.
6. See page 3 for QUICK CONNECT OPTIONS.
7. Specify in increments of 100 nominal lumens. Option must be specified with next higher lumen package.
8. Two stem sets required. One additional stem set required for each row mounted fixture.
9. Two stem sets required. One additional stem set required for each row mounted fixture.
10. Required with suspended mount fixtures. Units specified with aircraft cable require cord. See page 3 for MOUNTING DETAILS.
11. DA Driver only.
12. DA Driver only.
13. See page 5 for ADDITIONAL DRIVER OPTIONS.
14. Avi-on Controls only.
15. Not available with EM batteries or Avi-on Controls.

39 LED
Surface or Pendant Mount Wrap

FIXTURE PERFORMANCE DATA

	LED PACKAGE	DELIVERED LUMENS	WATTAGE	EFFICACY (lm/W)	LUMEN MAINTENANCE L70	L80	L85	L90
4′	L30	3027	22.8	132.6	—	>72000	58,000	36,000
	L52	5206	37.2	140.1	—	>72000	58,000	36,000
	L84	8399	66.0	127.2	>72000	53,000	38,000	24,000
8′	L60	5882	42.3	139.1	—	>72000	58,000	36,000
	L104	10473	75.59	138.5	—	>72000	58,000	36,000
	L168	16797	132.03	127.2	>72000	53,000	38,000	24,000

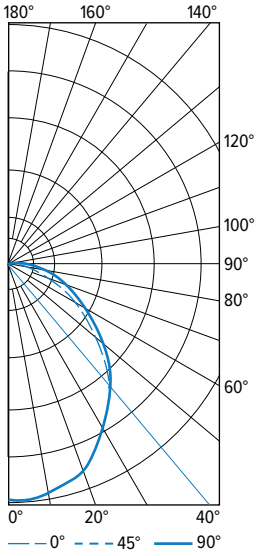
- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25°C ambient temperature.
- Wattage shown is average for 120V through 277V input.
- Results based on 3500K, 80 CRI, actual lumens may vary +/-5%
- Predicted lumen maintenance calculated from LED manufacturer IES LM-80 data and In situ temperature measurement.
- Predicted lumen maintenance calculated in accordance with IES TM-21 per Energy Star (R) TM-21 Calculator rev. 02.08.16.
- Use multiplier table to calculate additional options.

MULTIPLIER TABLE

	COLOR TEMPERATURE CCT	CONVERSION FACTOR
80 CRI	2700K	0.97
	3000K	0.99
	3500K	1.00
	4000K	1.03
	5000K	1.06
90 CRI	2700K	0.80
	3000K	0.82
	3500K	0.83
	4000K	0.86
	5000K	0.89

PHOTOMETRY

39W-4-L52/835-A-DIM-UNV Total Luminaire Output: 5206 lumens; 37.2 Watts | Efficacy: 140.1 lm/W | 84.3 CRI; 3531K CCT

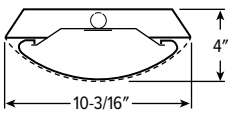


CANDLEPOWER DISTRIBUTION VERTICAL ANGLE	HORIZONTAL ANGLE 0°	45°	90°	ZONAL LUMENS
0	1990	1990	1990	
5	2001	1999	2000	189
15	1887	1892	1896	535
25	1676	1685	1688	780
35	1441	1460	1468	902
45	1124	1158	1177	883
55	774	825	861	736
65	486	550	618	547
75	231	324	405	347
85	59	169	246	178
90	0	100	165	
95	0	64	122	70
105	0	25	57	27
115	0	0	29	10
125	0	0	0	2
135	0	0	0	0
145	0	0	0	0
155	0	0	0	0
165	0	0	0	0
175	0	0	0	0
180	0	0	0	

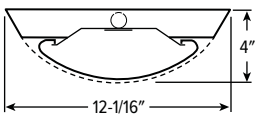
LUMEN SUMMARY ZONE	LUMENS	% FIXTURE
0 - 30	1504	29
0 - 40	2406	46
0 - 60	4025	77
0 - 90	5097	98
90 - 120	107	2
90 - 150	108	2
90 - 180	108	2
0 - 180	5206	100

CROSS SECTIONS

39



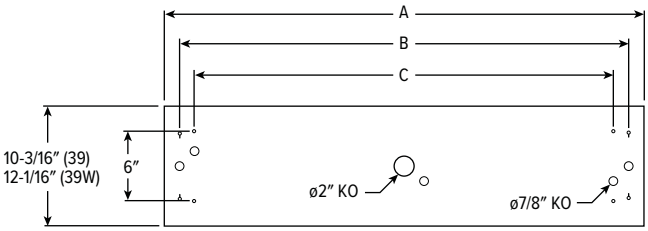
39W



7/8″ KO centered in end plate for thru feed wiring

FIXTURE DETAILS

BACKVIEW



	A (OVERALL)	B (STEM/CABLE O.C.)	C (SURFACE MOUNTING HOLES)
4′	48-1/16″	43″	40″
8′	96-1/16″	91″	88″

39



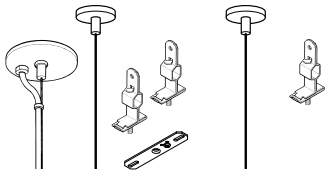
39W



39 LED Surface or Pendant Mount Wrap

MOUNTING DETAILS

STANDARD HARDWARE FOR SUSPENDED PRODUCT (Grid and Hardpan)



Feeder/Stand-Alone Joiner

Notes:

- Fixtures specified with suspended mounting type are provided with adjustable length aircraft cables with two-point "Y" connectors and mounting hardware, must specify.
- Electrical supply is brought into the feeder fixture, either as part of a row or as a stand-alone unit. Joiner fixtures complete the row.
- The feeder kits are standard with a 5" canopy to cover the junction box and a 2" canopy at the non-feed point. No J-box is required at non-feed points.

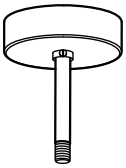
CORD FOR SUSPENDED PRODUCT

Units specified with aircraft cable require cord. Please specify cord type using ordering information below. Long fixture rows may require multiple feed points based on 18ga conductor size.

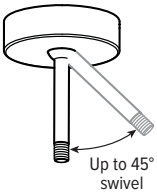
EXAMPLE: S2438D/W				
CORD TYPE	LENGTH	# OF COND. [1]	WIRE SIZE	COLOR
S	**24** 24″ **48** 48″ **96** 96″	**3** **4** **5** **6**	**8D** 18ga	**/W** White **/B** Black

[1] Includes (2) 22ga purple & pink dimming conductors

SS-12



SWS-12



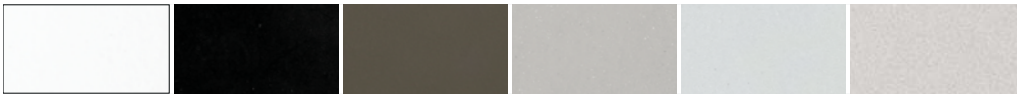
QUICK CONNECT OPTIONS

Note: Quick connect wiring required for row mounting. All QC harnesses contain (5) 16ga conductors plus ground.

DESIGNATION	NUMBER OF 16GA WIRES FACTORY CONNECTED (EXCLUDING GROUND)	WIRE COLOR/POWER SUPPLY FACTORY CONNECTIONS	TYPICAL USE
QCBW	2	Black, White	On/off switching (DRV) or line voltage dimming (DIM LINE)
QCRW	2	Red, White	Alternating circuits on/off switching (DRV) or line voltage dimming (DIM LINE)
QCBRW	3	Black, Red, White	On/off switching (DRV) or line voltage dimming when equipped with EM battery packs
QCBW/PK	4	Black, White, Purple, Pink	Single circuit with 0-10V low voltage dimming (DIM)
QCRW/PK	4	Red, White, Purple, Pink	Alternating circuits on/off switching with 0-10V low voltage dimming (DIM)
QCBRW/PK	5	Black, Red, White, Purple, Pink	On/off switching when equipped with EM battery packs and 0-10V dimming (DIM)
QCBW/RPK	5	Black, White, Red, Purple, Pink	On/off switching with 0-10v dimming and 0-10v tunable using shared common
QCUU	N/A	N/A	QC harness passes through fixture, but is not connected to it

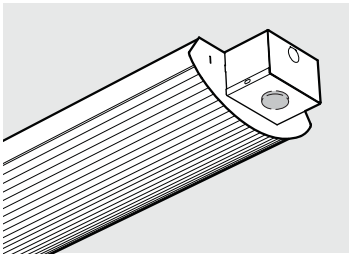
FINISH OPTIONS

WHITE BLACK BRONZE NICKEL SILVER ALUM



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1" square.

SENSOR PLACEMENT DETAILS



39 LED
Surface or Pendant Mount Wrap

AVI-ON BLUETOOTH WIRELESS CONTROL DETAILS

AVI-ON NETWORK FEATURES

Simple

- Gateway-free distributed control
- Factory pre-commissioning
- Contractor friendly installation
- Occupancy/vacancy/daylight sensing

Scalable

- Virtually unlimited network size
- Spans small areas to large warehouses
- Flexible control strategies

Secure

- Optional cloud connectivity
- UL IoT platinum security rating
- DLC 5.0 compliant

DIGITAL INSTALLATION TOOLS

Avi-On mobile apps provide intuitive, quick installation and commissioning. Pro tools are available to qualified installers.

Commissioning Mobile App

Zone Scanner Web App

Commissioning Pro App

SYSTEM COMPONENTS



The Bluetooth® word mark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by Avi-On is under license. Other trademarks and trade names are those of their respective owners.

ACCESSORIES

WALL STATIONS	
AVI-2401AC	Scene controller - numbered 1-4, 120-277VAC
AVI-2402BAT	Scene controller - numbered 1-4, battery powered
AVI-2401AC-2	Dimmer with presets - percentages, 120-277VAC
AVI-2402BAT-2	Dimmer with presets - percentages, battery powered
AVI-2401AC-3	On/off/dimming, 120-277VAC
AVI-2402BAT-3	On/off/dimming, battery powered
CONNECTIVITY	
AVI-2001RAB-01-P	Remote access bridge for projects 100 or greater
AVI-2001RAB-01-C	Remote access bridge for projects less than 100
AVI-KIT-NTM	Network time manager with Battery Backup
CEILING MOUNT SENSORS	
AVI-KIT-SEN-DUCM	PIR motion and ultrasonic sensor kit
AVI-KIT-SEN-ICM	PIR motion and photocell sensor kit

For load controllers and additional accessory info, see hew.com/avi-on

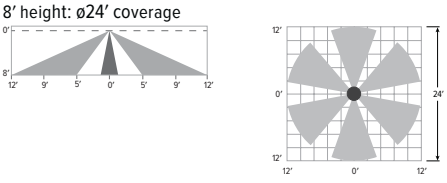
AVI-LVFA-CS2-PIR Avi-on wireless fixture control with PIR motion and daylight sensor. DA Driver only.

SPECIFICATIONS	
TYPE	PIR Motion + Daylight
MOUNTING HEIGHT	8′ – 10′
DETECTION ANGLE	360°
TEMPERATURE RANGE	-30° to 50°C
RELATIVE HUMIDITY	10 to 80% non-condensing
IP RATING	IP20
MANUFACTURER	Avi-On

SENSOR COVERAGE PATTERNS

Side View

8′ height: ø24′ coverage



SENSOR DETAIL



39 LED
Surface or Pendant Mount Wrap

ADDITIONAL DRIVER OPTIONS

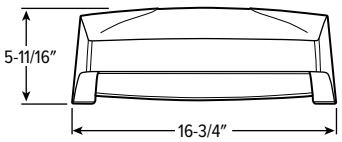
Note: Lumen restrictions apply, consult product builder at hew.com/product-builder.

CATALOG NUMBER	DESCRIPTION
DRV	Driver prewired for non-dimming applications
DIM	Dimming driver prewired for 0-10V low voltage applications
DIM1	1% dimming driver prewired for 0-10V low voltage applications
DIM LINE	Line voltage dimming driver (TRIAC and ELV compatible, 120V only)
DIM TRC	Line voltage dimming driver (TRIAC compatible, 120V only)
DA	Dimming driver with 12V auxiliary
SD40	40% step-dimming driver
SD50	50% step-dimming driver
DALI	DALI dimming driver
LDE1	Lutron Hi-lume 1% EcoSystem dimming LED driver

L5 Fixture

VWP LED
Voltaire Architectural Wall Pack





VWPH Front View
Weight: 15 lbs

CATALOG #:

TYPE:

PROJECT:

FEATURES

- Designed to illuminate sidewalks, entryways, perimeters or facades
- Intended for use in both uplight and downlight applications
- Savings of up to 80% energy compared to HID systems
- Blends seamlessly with a variety of architectural styles
- Made Right Here® in the USA

SPECIFICATIONS

- HOUSING – Die-cast aluminum enclosure.
- THERMAL MANAGEMENT – Integral die-cast aluminum heatsink and LED assembly provide passive thermal management. Rated -30°C to 40°C ambient operating temperature (-20°C to 40°C with EM/10WC; 0°C to 39°C with EM/4W).
- OPTICAL SYSTEM – Precision, injection-molded, refractive acrylic lensing produces standard IES distributions.
- LED ASSEMBLY – ANSI 3000K, 4000K, or 5000K CCT, minimum 70 CRI LEDs.
- LED DRIVER – 0-10V dimming.
- ELECTRICAL – 120-277, 347, and 480 VAC input range; 50-60Hz; power factor >.90; THD <20% at full load. FCC Class A compliant. 10kA/10kV surge protection standard. Quick-disconnect wiring provided. L70 >50,000 hours per IES TM-21.
- FINISH – Super durable polyester powder coat bonded to phosphate-free, multi-stage pretreated metal, meets and exceeds AAMA 2604 specifications for outdoor durability.
- MOUNTING – Surface mounts directly over a 4" maximum outlet box. Must be anchored to adequate structure that can safely support fixture weight (VWPH = 15 lbs, VWPV = 23 lbs).
- LISTINGS –
  - cCSAus certified as luminaire suitable for wet locations.
  - IDA Dark-Sky approved (downlight applications only).
  - RoHS compliant.
  - IP65 rated.
  - Title 24 compliant with OCCWS FSP-311-L_ option.
- WARRANTY – 5-year limited warranty, see hew.com/warranty.

ORDERING EXAMPLE: VWP H - L30/740 - T3 - DBZ - SDGL - OPTIONS - DIM - UNV

ORDERING INFO

SERIES	TYPE	LUMENS [1]	CRI	CCT	DISTRIBUTION [2]
VWP	**H** Horizontal	**L30** 3,000lm	**7** 70	**30** 3000K	**T2** Type II
	V Vertical	**L60** 6,000lm		**40** 4000K	**T3** Type III
				50 5000K	**TFT** Type forward throw

FINISH OPTIONS [3]

BLK Black (RAL #9004)
DBZ Dark bronze
DBR Medium bronze
GRAY Standard gray
SLV Satin aluminum (RAL #9006)
WHT White (RAL #9003)

SHIELDING

SDGL Micro-prismatic tempered glass lens
CGL Clear tempered glass lens

OPTIONS

EM/4W 4-watt integral emergency LED driver [4]
SF Single fuse [5]
DF Double fuse [6]
PC Factory-installed button-style photocell [7]
HSGX Empty housing extension used to match units with EM, OCC, or conduit entry options.
TP Tamper-resistant Torx head screws [8]

CONDUIT ENTRY [9]

CR Right side conduit entry [10]
CL Left side conduit entry [11]
CD Dual conduit entry

VWPH ONLY

EM/10WC 10-watt emergency LED driver [12]
OCCWS FSP-311-L_ Factory-installed occupancy sensor [13]

CONTROL

DIM Dimming driver prewired for 0-10V controls

VOLTAGE

120 120V
208 208V
240 240V
277 277V
UNV 120-277V
347 347V [14]
480 480V [15]

ACCESSORIES

TPTX-25 TOOL Tamper-resistant tool for Torx head screws. [16]

NOTES

1. Lumen output based on 3500 CCT. Actual lumens may vary +/-5%, see page 2 for FIXTURE PERFORMANCE DATA. Additional lumen package available, see options
2. See page 2 for DISTRIBUTION DETAILS.
3. See page 3 for FINISH OPTIONS.
4. 120-277V only; VWPV includes housing extension, increases fixture depth. See page 2 for FIXTURE DETAILS.
5. 120V, 277V, or 347V only; must specify voltage
6. 208V, 240V, or 480V only; must specify voltage.
7. 120V, 208V, or 277V only; must specify voltage. Not available when specified with OCCWS option. See page 3 for OPTIONS DETAILS. Right side when viewed from behind fixture.
8. TP screws have silver finish only. Safety screws providing added support to the lens are not tamper-resistant (lens is sealed to the fixture via adhesion). Requires a tamper-resistant tool, see Accessories.
9. Fixtures require housing extension when specified with conduit entry. Increases fixture depth. Conduit entry provided with 1/2" NPT tapered pipe thread and plug. Increases fixture height. Conduit fitting to be supplied by others. Left and right when viewed from behind fixture.
10. Left and right when viewed from behind fixture.
11. Left and right when viewed from behind fixture.
12. Low temperature, includes housing extension increases fixture depth; 120-277V only; not available with CR and CD options. See page 2 for FIXTURE DETAILS.
13. Includes housing extension (increases fixture depth), must specify lens. See page 3 for OCCUPANCY SENSOR DETAILS.
14. Includes stepdown transformer.
15. Includes stepdown transformer.
16. Tamper-resistant tool must be ordered separately. Please specify quantity required per project.

VWP LED
Voltaire Architectural Wall Pack

FIXTURE PERFORMANCE DATA

Photometrics in process for T2 distribution. Consult factory.

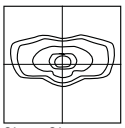
	LED PACKAGE	DISTRIBUTION	WATTAGE	CCT	CLEAR GLASS(CGL)		SOLITE GLASS (SDGL)		BUG RATINGS
					DELIVERED LUMENS	EFFICACY(lm/W)	DELIVERED LUMENS	EFFICACY(lm/W)	
VWPH	L30	T3	36	3000	3174	88.2	2963	82.3	B1-U0-G1
				4000	3327	92.4	3106	86.3	
				5000	3438	95.5	3209	89.1	
		TFT		3000	2713	75.4	2533	70.4	B1-U0-G1
				4000	2844	79.0	2655	73.8	
				5000	2939	81.6	2743	76.2	
	L60	T3	70	3000	5933	84.8	5887	84.1	B1-U0-G1
				4000	6611	94.4	6172	88.2	
				5000	6831	97.6	6376	91.1	
		TFT		3000	5470	78.1	5065	72.4	B2-U0-G1
				4000	5688	81.3	5309	75.8	
				5000	5876	83.9	5486	78.4	
VWPV	L30	T3	36	3000	3115	86.5	2908	80.8	B1-U0-G1
				4000	3403	94.5	3177	88.3	
				5000	3385	94.0	3160	87.8	
		TFT		3000	2840	78.9	2651	73.6	B2-U0-G1
				4000	3103	86.2	2896	80.4	
				5000	3086	85.7	2881	80.0	
	L60	T3	70	3000	6171	88.2	5813	83.0	B2-U0-G2
				4000	6804	97.2	6351	90.7	
				5000	6767	96.7	6317	90.2	
		TFT		3000	5822	83.2	5126	73.2	B3-U0-G1
				4000	5999	85.7	5600	80.0	
				5000	5967	85.2	5570	79.6	

- Photometrics tested in accordance with IESNA LM-79. Results shown are based on 25°C ambient temperature.
- Wattage shown is average for 120V through 277 input.

DISTRIBUTION DETAILS

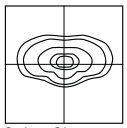
Photometrics in process for T2 distribution. Consult factory.

T3



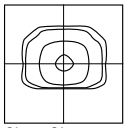
Clear Glass (CGL)

T3



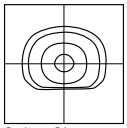
Solite Glass (SDGL)

TFT



Clear Glass (CGL)

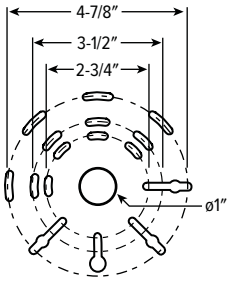
TFT



Solite Glass (SDGL)

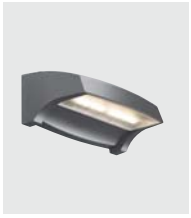
FIXTURE DETAILS

BOLT PATTERN DETAIL

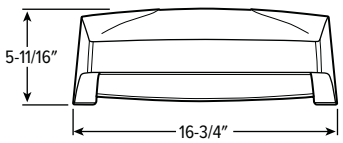


VWPH

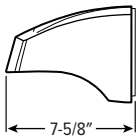
Weight: 15 lbs; maximum weight with EM/10WC or HSGX: 27 lbs.



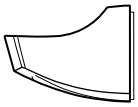
Front View



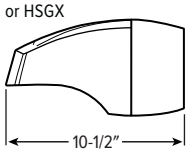
Side View



Uplight Application



Side View shown with EM/10WC or HSGX

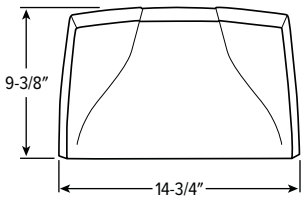


VWPV

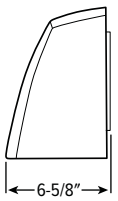
Weight: 23 lbs



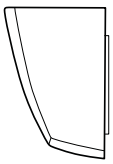
Front View



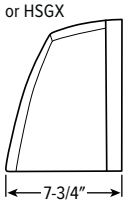
Side View



Uplight Application



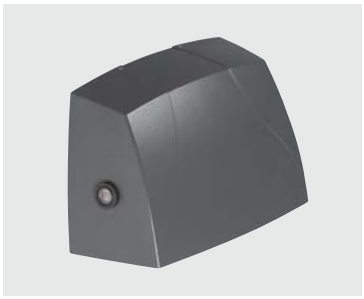
Side View shown with EM/4W or HSGX



VWP LED
Voltaire Architectural Wall Pack

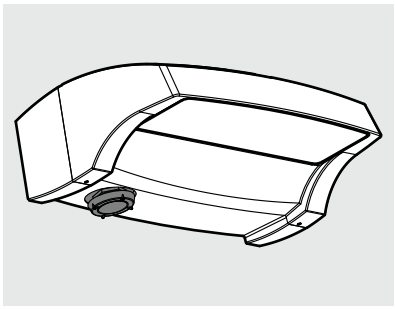
OPTIONS DETAILS

PC OPTION



Factory-installed button-style photocell, right side when viewed from behind fixture. (120V, 208V, or 277V only; must specify voltage)

OCCUPANCY SENSOR DETAILS



EXAMPLE: OCCWS FSP-311-L2

FEATURES

- Fully adjustable high and low dimmed light levels.
- Designed for LED fixtures; rated for extreme temperatures and up to 200,000 on/off cycles.
- Hold-off setpoint with automatic calibration option for convenience and added energy savings.
- Adjustable via sensor configuration app.
- IP66 rated with choice of lenses for wet and outdoor locations, and mounting heights from 8′ to 20′.
- Adjustable time delay and cutoff delay.
- Factory set to 10% dimming at 5 minutes, cutoff at 1 hour.

ORDERING INFORMATION

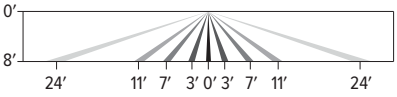
OCCWS FSP-311__ Factory-installed occupancy sensor, must specify lens (120V or 277V only)

LENS

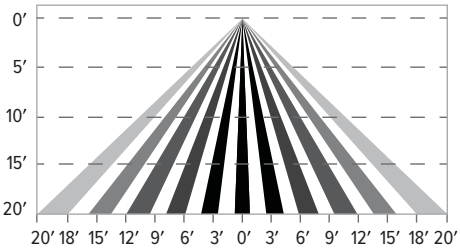
L2 Coverage at 8′ mounting height: ø48′
L3 Coverage at 20′ mounting height: ø40′

COVERAGE PATTERNS

L2 LENS



L3 LENS



SENSOR CONFIGURATION APP

Initial setup and subsequent sensor adjustments are made using the iOS or Android Sensor Configuration App. This app enables adjustment of parameters including high and low modes, sensitivity, time delay, cut off and more. The smartphone app is also used to initiate automatic calibration of the FSP-3x1B ambient light level setpoint. The setpoint is used to hold the controlled lighting off or at low level when there is sufficient daylight. The wireless tool stores an unlimited number of sensor parameter profiles to speed configuration of multiple sensors.

Visit www.wattstopper.com for more information.

FINISH OPTIONS

WHITE | BLACK | GREEN | MEDIUM BRONZE | DARK BRONZE | SILVER | GRAY



For custom color, please specify RAL code or a manufacturer code with description. All custom colors other than RAL require two sample swatches, minimum 1″ square.

L6 Fixture



TWH LED
LED Wall Luminaire

Catalog Number

Notes

Type

Hit the Tab key or mouse over the page to see all interactive elements.

Introduction

The popular TWH luminaire is now available with LED technology. Cast in a traditional dayform, the TWH LED offers a classic appearance and is powered by advanced LEDs.

The new TWH LED luminaire is powerful yet energy efficient, capable of replacing up to a 400W metal halide luminaire while saving up to 77% in energy costs. Offering an expected service life of more than 20 years, the TWH LED eliminates frequent lamp and ballast replacements associated with traditional technologies.

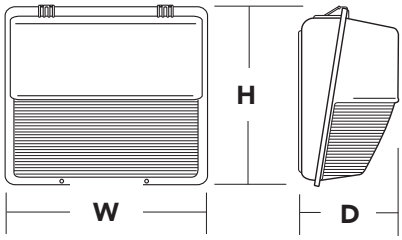
Specifications

Width: 16-1/4" *(41.3 cm)*

Height: 15-3/4" *(40.0 cm)*

Depth: 8" *(20.3 cm)*

Weight: 28 lbs *(12.7 kg)*



Ordering Information

EXAMPLE: TWH LED 30C 1000 50K T3M MVOLT DDBXD

TWH LED								
Series	**LEDs**	**Drive current**	**Color temperature**	**Distribution**	**Voltage**	**Control Options**	**Other Options**	**Finish** *(required)*
TWH LED	10C 10 LEDs (one engine) 20C 20 LEDs (two engines) 30C 30 LEDs (one engine)	1000 1000 mA (1 A)	50K 5000K (standard) 40K 4000K (optional)	T3M Type III Medium	MVOLT [1] 120 [1] 208 [1] 240 [1] 277 [1] 347 [2] 480 [2]	**Shipped installed** DMG 0-10V dimming driver (no controls) PER NEMA twist-lock receptacle only (no controls) PE Photoelectric cell, button type [3]	**Shipped installed** SF Single fuse (120, 277, 347V) [4] DF Double fuse (208, 240, 480V) [4] TP Tamper proof screws NOM NOM Certified SPD Separate surge protection [5] ELSW Emergency battery backup (standard 0°C) [6] ELCW Emergency battery backup (cold weather -20°C) [6] **Shipped separately** VG Vandal guard [7] WG Wire guard [7]	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Textured dark bronze DBLBXD Textured black DNATXD Textured natural aluminum DWHGXD Textured white

Stock configurations are offered for shorter lead times:

Standard Part Number	Stock Part Number
TWH LED 10C 1000 50K T3M MVOLT DDBXD	**TWH LED 10C 50K**
TWH LED 20C 1000 50K T3M MVOLT DDBXD	**TWH LED 20C 50K**
TWH LED 30C 1000 50K T3M MVOLT DDBXD	**TWH LED 30C 50K**

Accessories

Ordered and shipped separately.

DLL127F 1.5 JU	Photocell - SSL twist-lock (120-277V) [8]
DLL347 1.5 CUL JU	Photocell - SSL twist-lock (347V) [8]
DLL480 1.5 CUL JU	Photocell - SSL twist-lock (480V) [8]
SC U	Shorting cap [8]
TWHVG U	Vandal guard accessory [9]
TWHWG U	Wire guard accessory [9]

For more control options, visit *DTL* and *ROAM* online.

NOTES

1. MVOLT driver operates on any line voltage from 120-277V (50/60 Hz). Specify 120, 208, 240 or 277 options only when ordering with fusing (SF, DF options) or photocontrol (PE).
2. Not available with 10C option.
3. Must specify voltage; not available with MVOLT.
4. Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option.
5. See the electrical section on page 2 for more details.
6. Not available with 30C, 347, 480, PER, or SPD. Emergency mode IES files located on product page at www.lithonia.com. ELSW and ELCW warranty is 3-year period.
7. Also available as a separate accessory; see Accessories information at left.
8. Requires luminaire to be specified with PER option. Ordered and shipped as a separate line item.
9. Requires field modification (only when ordered as a separate accessory).

LITHONIA LIGHTING

One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • Fax: 770.918.1209 • www.lithonia.com
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Performance Data

Lumen Output

Lumen values are from photometric tests performed in accordance with IESNA LM-79-08. Data is considered to be representative of the configurations shown, within the tolerances allowed by Lighting Facts. Contact factory for performance data on any configurations not shown here.

LEDs	Drive Current (mA)	Performance Package	System Watts	Dist. Type	40K (4000K, 70 CRI)					50K (5000K, 65 CRI)				
					Lumens	B	U	G	LPW	Lumens	B	U	G	LPW
10C (10 LEDs)	1000	10C 1000 --K	39 W	T3M	2445	0	3	2	63	2559	0	3	2	66
20C (20 LEDs)	1000	20C 1000 --K	72 W	T3M	4683	1	3	3	65	5562	1	3	3	77
30C (30 LEDs)	1000	30C 1000 --K	104 W	T3M	6391	1	3	3	61	6728	1	3	3	65

Lumen Ambient Temperature (LAT) Multipliers

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

Ambient		Lumen Multiplier
0°C	32°F	1.02
10°C	50°F	1.01
20°C	68°F	1.00
25°C	**77°F**	**1.00**
30°C	86°F	1.00
40°C	104°F	0.98

Projected LED Lumen Maintenance

Data references the extrapolated performance projections for the **TWH LED 30C 1000** platform in a **25°C ambient**, based on 10,000 hours of LED testing (tested per IESNA LM-80-08 and projected per IESNA TM-21-11).

To calculate LLF, use the lumen maintenance factor that corresponds to the desired number of operating hours below. For other lumen maintenance values, contact factory.

Operating Hours	0	25,000	50,000	100,000
Lumen Maintenance Factor	1.0	0.95	0.92	0.87

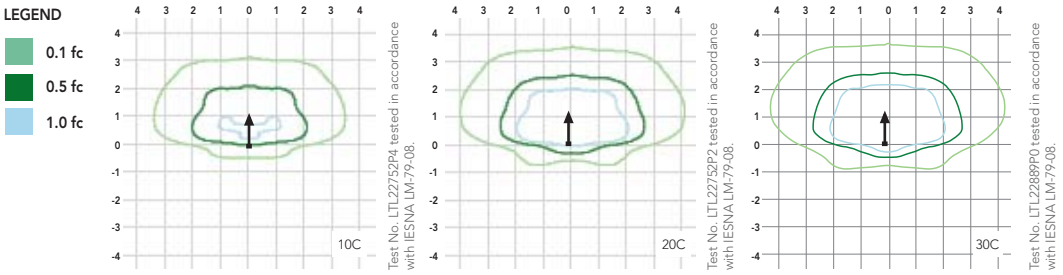
Electrical Load

LEDs	Drive Current (mA)	System Watts	Current (A)					
			120	208	240	277	347	480
10C	1000	39 W	0.36	0.21	0.18	0.16	-	-
20C	1000	72 W	0.67	0.38	0.33	0.29	0.23	0.17
30C	1000	104 W	0.96	0.56	0.48	0.42	0.33	0.24

Photometric Diagrams

To see complete photometric reports or download .ies files for this product, visit Lithonia Lighting's TWH LED homepage.

Isofootcandle plots for the TWH LED --- 1000 50K T3M. Distances are in units of mounting height (15').



FEATURES & SPECIFICATIONS

INTENDED USE
The energy savings, long life and easy-to-install design of the TWH LED make it the smart choice for building-mounted doorway and pathway illumination for nearly any facility.

CONSTRUCTION
Die-cast aluminum housing has an impact-resistant, tempered glass lens that is fully gasketed. Modular design allows for ease of maintenance. The LED driver is mounted to the front casting to thermally isolate it from the light engine for low operating temperature and long life. Housing is completely sealed against moisture and environmental contaminants.

FINISH
Exterior parts are protected by a zinc-infused Super Durable TGIC thermoset powder coat finish that provides superior resistance to corrosion and weathering. A tightly controlled multi-stage process ensures a minimum 3 mils thickness for a finish that can withstand extreme climate changes without cracking or peeling. Available in textured and non-textured finishes.

OPTICS
Protective glass lens covers the light engine's precision-molded proprietary acrylic lenses. Light engines are available in 5000K (65 min. CRI) configurations.

ELECTRICAL
Light engine(s) consist of 10 or 30 high-efficacy LEDs mounted to a metal-core circuit board and integral aluminum heat sink to maximize heat dissipation and promote long life (L87/100,000 hrs at 25°C). The electronic driver has a power factor of >90%, THD <20%, and a minimum 2.5 KV surge rating. When ordering the SPD option, a separate surge protection device is installed within the luminaire which meets a minimum Category C low operation (per ANSI/IEEE C62.41.2).

INSTALLATION
Back housing is separated from front housing, eliminating ballast weight and promoting easy handling. Top 3/4" threaded wiring access. Back access through removable 3/4" knockout. Feed-thru wiring can be achieved by using a condulet tee. Mount on any vertical surface. Not recommended in applications where a sprayed stream of water can come in direct contact with glass lens.

LISTINGS
UL listed for wet locations. Rated for -40°C minimum ambient. Luminaire is IP55 rated.

WARRANTY
Five year limited warranty. Complete warranty terms located at www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx.

Note: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25°C. Specifications subject to change without notice.

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PREMIUM SPEC EDGE-LIT EXIT SIGN

ELX

FEATURES

- **8" Letter Model NYC Approved**
- Universal Mounting Aluminum Extrusion Housing
- Highly Visible, Optically True, Acrylic Panels
- Mirror Background Standard on all Double Face Signs
- Custom Signage Options Available (consult factory)
- Full Compliment of Specified Options
- Battery Access made easy from the Exterior for Recessed Applications
- External components easily accessed below ceilings
- Excellent choice for hard ceiling applications
- Meets ARRA Act of 2009 and Buy American Provisions.

ILLUMINATION

- High Intensity Red or Green LED Standard
- Low Energy consumption.
- Fully Illuminated 6" x 3/4" Letters or 8" Letters with 1" Stroke

BATTERY

- 6 Volt Lead Calcium is Standard
- 6 Volt Ni-Cad Battery is Optional
- 6 Volt Ni-HM Battery is Standard with SD2 Option

ELECTRONICS

- 120/277 Dual Voltage with Test Button and LED AC/DC Indicator Light
- Overload & Short Circuit Protection
- Voltage Surge & Brown-out Protection
- Solid State Constant Current Charger with over-charge protection.
- Flasher / and Audible Options Meet ADA Regulations

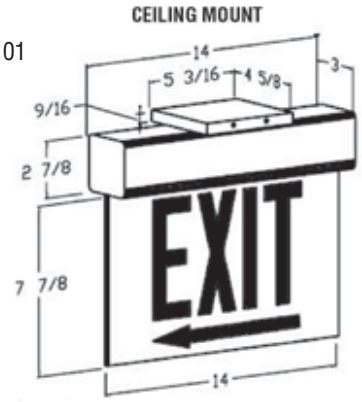
MOUNTING

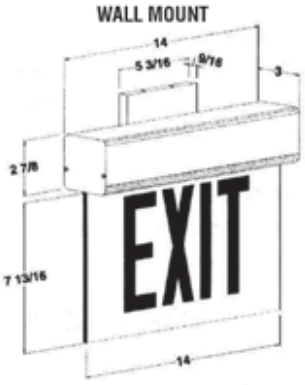
- Universal Mount Surface, Recessed Wall or Ceiling,
- Universal J-Box Mounting Pattern

CODE CONFORMANCE & STANDARDS

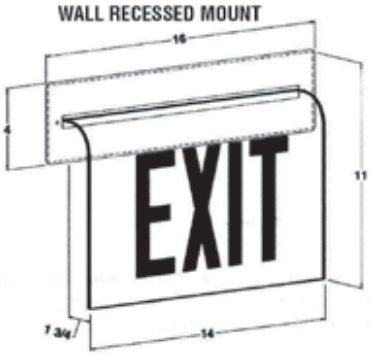
- UL 924 N.E.C, N.F.P.A. 101
- ETL Listed 90 min. Run Time / 24 Hr Recharge Time



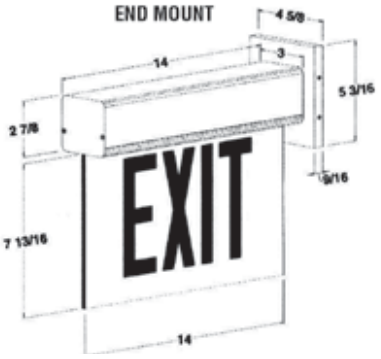




ARRA
Funding Compliant







ORDERING INFORMATION

TYPICAL ORDER EXAMPLE: **ELX U 6 R 1C CL LB WH SD2**

Prefix	Mounting	Character Size	Letter Color	Number of Faces / Background Color	Chevron Arrow Code	Battery	Housing	Options
ELX - Premium Edge-lit Exit	U - Universal Surface Ceiling, End, or Wall Mount RE - Recessed	6 - 6" Tall Letters 3/4" Stroke 8 - 8" Tall Letters 1" Stroke	R - Red G - Green	1C-Single Face Clear 1W-Single Face White 1M-Single Face Mirror 2W-Double Face White 2M-Double Face Mirror	**SINGLE FACE CODES:** CL - Chevron Left CR - Chevron Right BC - Both Chevrons ZC - No Chevrons FC - Field Applicable Chevrons **DOUBLE FACE CODES:** SC- Single Chevrons BC - Both Chevrons (Left And Right Both Sides) FC - (4) Chevrons Field Applicable	LB - Less Battery WB - With Battery	WH - White BK - Black SA - Satin Aluminum	SD2 - Self Test/Self Diagnostics[2] FL- Flasher AA - Audible Alarm FA - Flasher/ Audible Alarm IF - Fire Alarm Interface/Flasher IFA- Fire Alarm Interface/ Audible Alarm/Flasher 2CI12 - 2 Cir Input 120 Volt 2CI27 - 2 Cir. Input 277 Volt PK12 - 12 Inch Pendant Kit PK24 - 24 Inch Pendant Kit PE12 - 12" Pendant Extension Kit PE24 - 24" Pendant Extension Kit

1 - Single face, clear panels only (R 1C or G 1C)
2 - SD2 option comes standard with NiMH battery. Not available with NiCad or without a battery.

Project Name _____ **Fixture Type** _____

Catalog # _____

10/25/18

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LSI INDUSTRIES INC.

Attachment F
Structural Calculations

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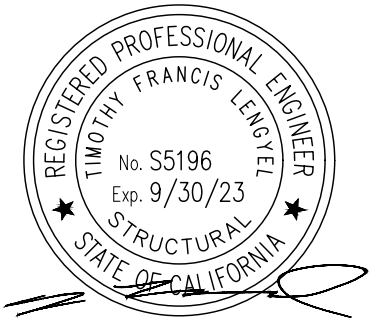
STRUCTURAL CALCULATIONS

BUILDING 7020 RENOVATIONS

CAMP ROBERTS, CA

Prepared for:

JOSEPH CHOW & ASSOCIATES, INC.
ARCHITECTURE • ENGINEERING • INTERIOR DESIGN • PLANNING



Prepared by:
Tim Lengyel, S.E.
415-999-0323

FINAL DESIGN SUBMITIAL
8.30.2023

BrokawDesign

BrokawDesign

www.BrokawDesign.com

(415) 999-0323
tim.lengyel@brokawdesign.com

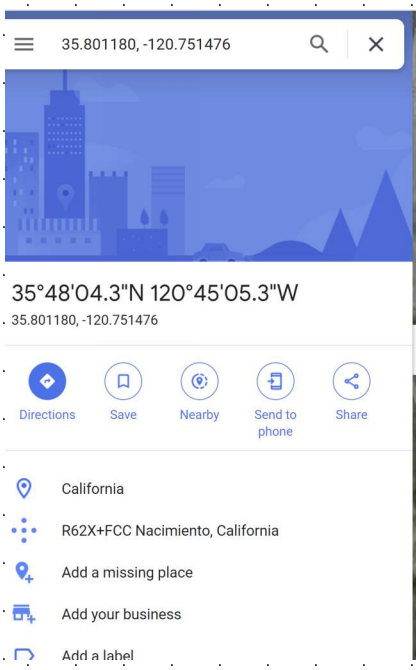
PROJECT: CAMP ROBERTS B7020

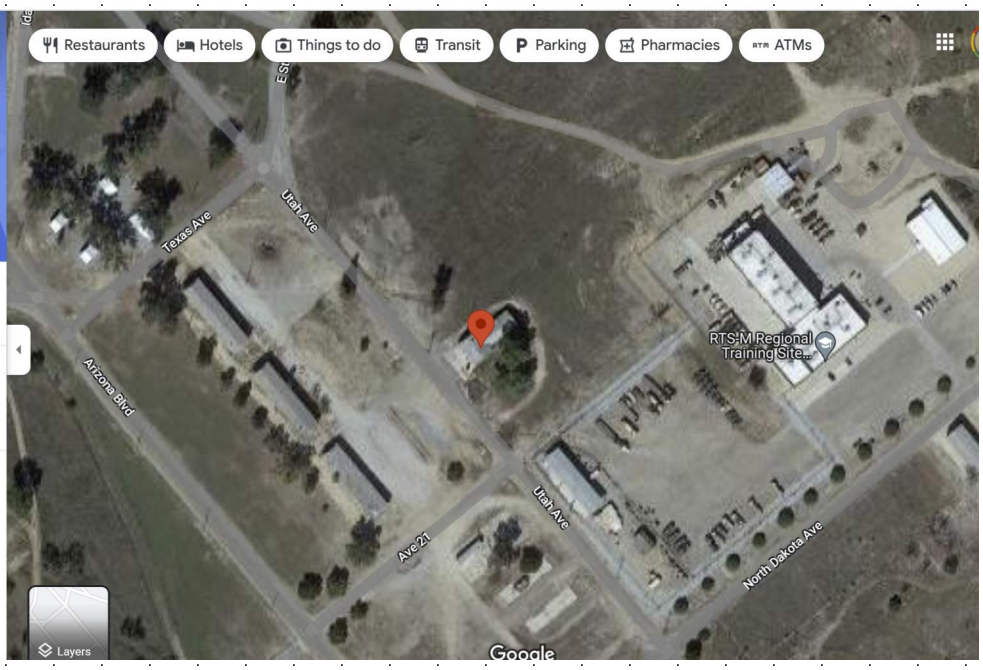
TITLE: -----

SHEET NO.: ----- OF -----

BY: TFL DATE: 2023

SCALE: -----

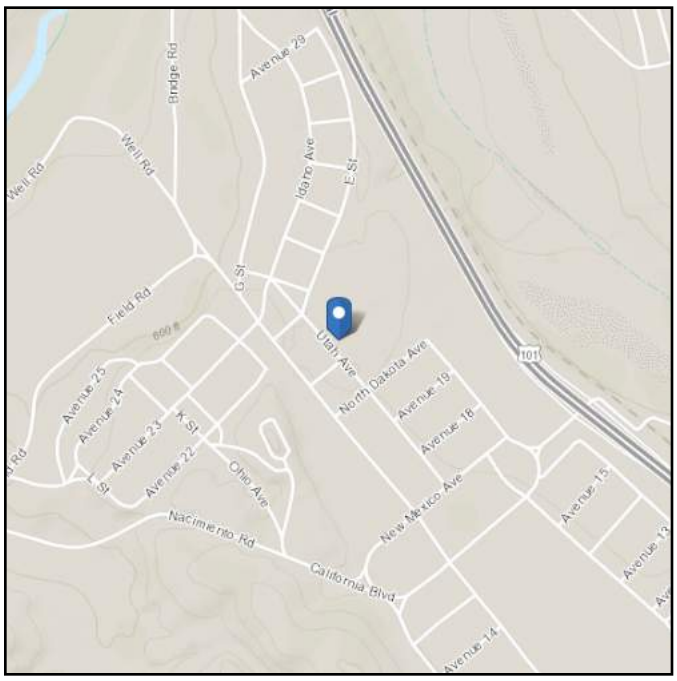




ASCE 7 Hazards Report

Address:
No Address at This Location

Standard:	ASCE/SEI 7-16	**Latitude:**	35.80118
Risk Category:	II	**Longitude:**	-120.751476
Soil Class:	D - Default (see Section 11.4.3)	**Elevation:**	635.9754850985902 ft (NAVD 88)





Wind

Results:

Wind Speed	92 Vmph
10-year MRI	64 Vmph
25-year MRI	70 Vmph
50-year MRI	75 Vmph
100-year MRI	79 Vmph

Data Source:	ASCE/SEI 7-16, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Sun Apr 09 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-16 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years).

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-16 Section 26.2.

Seismic

Site Soil Class: D - Default (see Section 11.4.3)

Results:

S_S :	1.263	S_{D1} :	N/A
S_1 :	0.448	T_L :	12
F_a :	1.2	PGA :	0.505
F_v :	N/A	PGA_M :	0.607
S_{MS} :	1.516	F_{PGA} :	1.2
S_{M1} :	N/A	I_e :	1
S_{DS} :	1.011	C_v :	1.353

Ground motion hazard analysis may be required. See ASCE/SEI 7-16 Section 11.4.8.

Data Accessed: Sun Apr 09 2023

Date Source: USGS Seismic Design Maps

BrokawDesign
www.BrokawDesign.com
(415) 999-0323
tim.lengyel@brokawdesign.com

PROJECT: CAMP ROBERTS B7020
TITLE: -----
SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

BUILDING MASS

	ROOF AREA (SQ.FT)	ROOF WEIGHT (LB/SQ FT)		ROOF MASS (LB)		ROOF LEVEL MASS (LB)
ROOF	3300	25		82500	100% →	123750

	LENGTH OF WALLS (FT)	STORY HEIGHT (FT)	WALL AREA SQ FT	WALL WEIGHT (LB/SQ FT)	WALL MASS (LB)		TOTAL MASS (LB)
WALLS @ 1st	500	11	5500	15	82500	50% → / 50 %	165000

Roof Mass	
Assembly	Mass (PSF)
ROOFING	8
1/2" PLYWOOD	2.5
2x6 @ 24	1.5
5/8 TYPE X	2.8
MISC	0
CEILING JOISTS	2
SUSPENDED CEILING	3
MISC	5.2
Total (psf)	25

Wall Mass	
Assembly	Mass (PSF)
EXTERIOR SIDING	4
1/2" PLYWOOD	1.5
2x6 @ 16	1.7
5/8 TYPE X	2.8
MISC	5
Total (psf)	15

Project Title:
Engineer:
Project ID:
Project Descr:

ASCE 7-16 Seismic Base Shear

Project File: b7020.ec6

LIC# : KW-06015864, Build:20.23.2.14 BROKAW DESIGN (c) ENERCALC INC 1983-2022

DESCRIPTION: Seismic Base Shear Analysis

Specific Description: B7020

Risk Category

Calculations per ASCE 7-16

Risk Category of Building or Other Structure : "II" : All Buildings and other structures except those listed as Category I, III, and IV — *SCE 7-16, Page 4, Table 1.5-1*

Seismic Importance Factor = 1 — *ASCE 7-16, Page 5, Table 1.5-2*

USER DEFINED Ground Motion

ASCE 7-16 11.4.2

Max. Ground Motions, 5% Damping

S_S = 1.263 g, 0.2 sec response

S_1 = 0.4480 g, 1.0 sec response

For the closest datapoint grid location . . .

Latitude = 0.000 deg North

Longitude = 0.000 deg West

Site Class, Site Coeff. and Design Category

Classification: "D" : Shear Wave Velocity 600 to 1,200 ft/sec		=	**D** (By Default per 11.4.3)	*ASCE 7-16 Table 20.3-1*
Site Coefficients Fa & Fv	Fa	=	1.20	*ASCE 7-16 Table 11.4-1 & 11.4-2*
(using straight-line interpolation from table val	Fv	=	1.85	
Maximum Considered Earthquake Accelerat	S_{MS} = Fa * Ss	=	1.516	*ASCE 7-16 Eq. 11.4-1*
	S_{M1} = Fv * S1	=	0.830	*ASCE 7-16 Eq. 11.4-2*
Design Spectral Acceleration	S_{DS} = S_{MS} * 2/3	=	1.010	*ASCE 7-16 Eq. 11.4-3*
	S_{D1} = S_{M1} * 2/3	=	0.553	*ASCE 7-16 Eq. 11.4-4*
Seismic Design Category		=	**D**	*ASCE 7-16 Table 11.6-1 & -2*

Resisting System

ASCE 7-16 Table 12.2-1

Basic Seismic Force Resisting System . . . **Bearing Wall Systems**
15.Light-frame (wood) walls sheathed w/wood structural panels rated for shear resistance.

Response Modification Coefficient " R " = 6.50
System Overstrength Factor " Wo " = 2.50
Deflection Amplification Factor " Cd " = 4.00

NOTE! See ASCE 7-16 for all applicable footnc

Building height Limits :

Category "A & B" Limit:	No Limit
Category "C" Limit:	No Limit
Category "D" Limit:	Limit = 65
Category "E" Limit:	Limit = 65
Category "F" Limit:	Limit = 65

Lateral Force Procedure

ASCE 7-16 Section 12.8.2

Equivalent Lateral Force Procedure

The "Equivalent Lateral Force Procedure" is being used according to the provisions of ASCE 7-16 12.8

Determine Building Period

Use ASCE 12.8-7

Structure Type for Building Period Calcula All Other Structural Systems

" Ct " value = 0.020 " hn " : Height from base to highest leve 12.0 ft

" x " value = 0.75

" Ta " Approximate fundemental period using Eq. 12.8-7 : Ta = Ct * (hn ^ x) = 0.129 sec

"TL" : Long-period transition period per ASCE 7-16 Maps 22-14 -> 22-17 12.000 sec

Building Period " Ta " Calculated from Approximate Method sel = 0.129

" Cs " Response Coefficient

ASCE 7-16 Section 12.8.1.1

S_{DS} : Short Period Design Spectral Response	=	1.010	From Eq. 12.8-2, Preliminary Cs	=	0.155
" R " : Response Modification Factor	=	6.50	From Eq. 12.8-3 & 12.8-4 , Cs need not exce	=	0.660
" I " : Seismic Importance Factor	=	1	From Eq. 12.8-5 & 12.8-6, Cs not be less than	=	0.044

Cs : Seismic Response Coefficient = = **0.1554**

Project Title:
Engineer:
Project ID:
Project Descr:

ASCE 7-16 Seismic Base Shear

Project File: b7020.ec6

LIC# : KW-06015864, Build:20.23.2.14 BROKAW DESIGN (c) ENERCALC INC 1983-2022

DESCRIPTION: Seismic Base Shear Analysis

Seismic Base Shear

ASCE 7-16 Section 12.8.1

Cs = 0.1554 from 12.8.1.1

W (see Sum Wi below) = 125.00 k

Seismic Base Shear V = Cs * W = 19.43 k

Vertical Distribution of Seismic Forces

ASCE 7-16 Section 12.8.3

" k " : hx exponent based on Ta = 1.00

Table of building Weights by Floor Level...

Level #	Wi : Weight	Hi : Height	(Wi * Hi^k)	Cvx	Fx=Cvx * V	Sum Story Shear	Sum Story Moment
1	125.00	12.00	1,500.00	1.0000	19.43	19.43	0.00

Sum Wi = 125.00 k Sum Wi * Hi = 1,500.00 k-ft Total Base Shear = 19.43 k

Base Moment = 233.2 k-ft

Diaphragm Forces : Seismic Design Category "B" to "F"

ASCE 7-16 12.10.1.1

Level #	Wi	Fi	Sum Fi	Sum Wi	Fpx : Calcd	Fpx : Min	Fpx : Max	Fpx	Dsgn. Force
1	125.00	19.43	19.43	125.00	19.43	25.26	50.52	25.26	25.26

Wpx . . . . . Weight at level of diaphragm and other structure elements attached to it.

Fi . . . . . Design Lateral Force applied at the level.

Sum Fi . . . . . Sum of "Lat. Force" of current level plus all levels above

MIN Req'd Force @ Level . . . $0.20 * S_{DS} * I * Wpx$

MAX Req'd Force @ Level . . . $0.40 * S_{DS} * I * Wpx$

Fpx : Design Force @ Level . . Wpx * SUM(x->n) Fi / SUM(x->n) wi, x = Current level, n = Top Level

RIDGE HEIGHT = 21'

28'-0" SHEAR WALL SW-A1

37'-4"

60'-2"

821.9 sf

LINE 1 SHEAR =

1,029.81 sf

LINE 2 SHEAR =

509.41 sf

LINE 2.3 SHEAR =

588.16 sf

LINE 2.7 SHEAR =

267.7 sf

LINE 3 SHEAR =

RIDGE HEIGHT = 17'

EAVE HEIGHT = 10'

EAVE HEIGHT = 11'-3

44'-6"

16'-0" SHEAR WALL SW-23

8'-0" SHEAR WALL SW-2.3 PLYWOOD BOTH SIDES

8'-0" SHEAR WALL SW-2.7 PLYWOOD BOTH SIDES

8'-0" CLEAR OPENING WALL BETWEEN SHEAR WALLS FOR MECH DUCTS

12'-0" SHEAR WALL SW-D1

12'-0" SHEAR WALL SW-D2

SEISMIC
V= 20 KIPS LRFD
TOTAL SQUARE FOOTAGE = 3220S.F.
RHO = 1.3

LINE 1 = 1.3 * 822/3220 *20K = 6.7K LRFD; 4.7K ASD
LINE 2 = 1.3* 1030/3220 *20K = 8.32K LRFD; 5.83K ASD
LINE 2.3 = 1.3* 510 / 3220 *20K = 4.12K LRFD; 2.89K ASD
LINE 2.7 = 1.3* 589 / 3220 *20K = 4.76K LRFD; 3.33K ASD
LINE 3 = 1.3* 269 / 3220 *20K = 2.17K LRFD; 1.52K ASD

WIND PRESSURE = 30 PSF LRFD

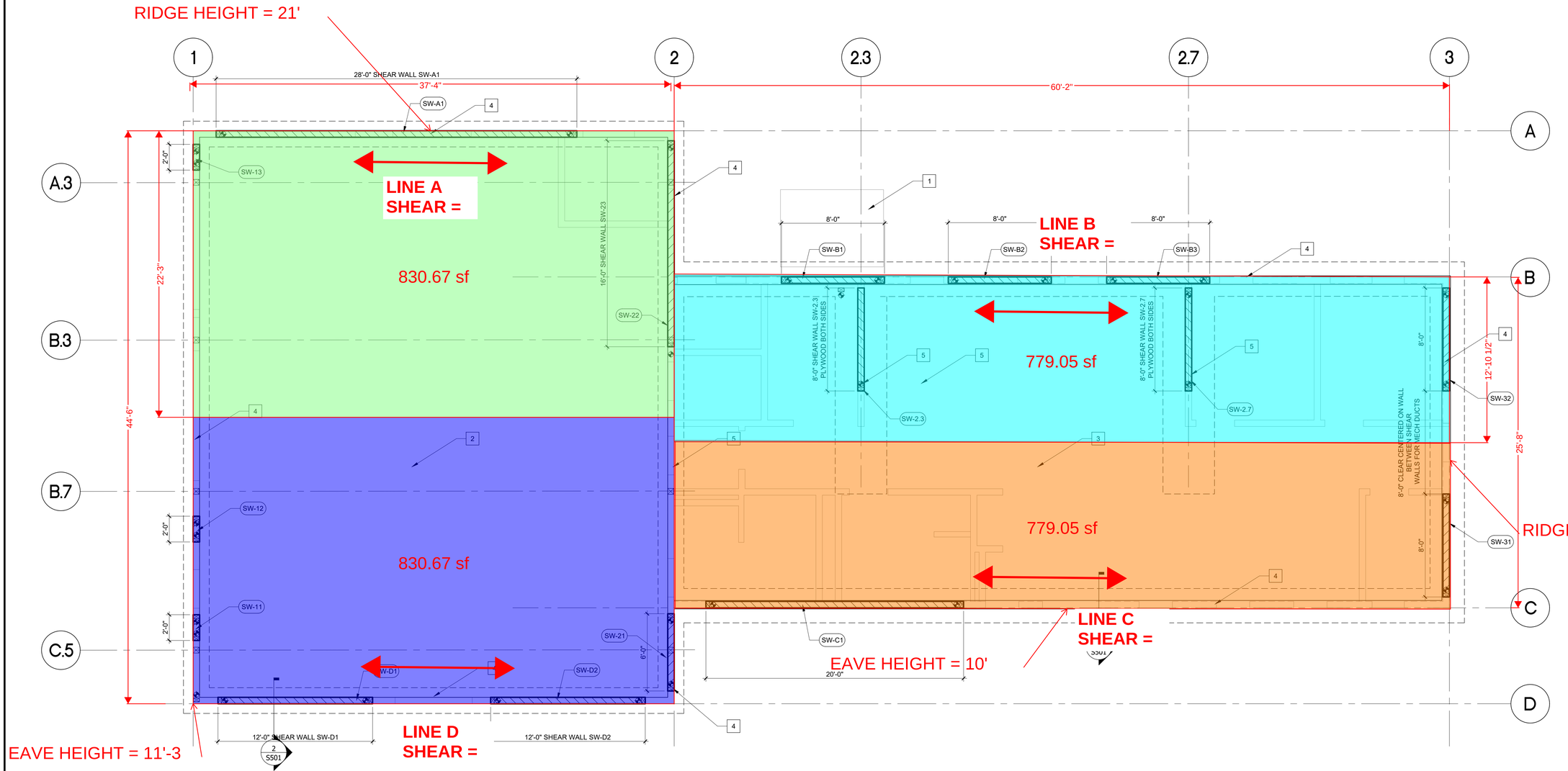
LINE 1 =[(38'/2)*(11.25') + 0.5*(38'/2)*(21'-11.25')]*30PSF = 9.2K LRFD; 5.52K ASD
LINE 2 = 9.2K + 7.5'*17'*30PSF = 13.0K LRFD; 7.8K ASD
LINE 2.3 = (7.5'+12.75') * 17' * 30 PSF= 10.33K LRFD; 6.2K ASD
LINE 2.7 = (12.75'+10.25')*17'*30PSF = 11.73K LRFD; 7.04K ASD
LINE 3 = 10.25' * 17'*30PSF = 5.23K LRFD; 3.14 ASD

BY:	REMARKS	DATE	SYMBOL	REVISIONS	BA/TFL	BA/TFL	TFL	TFL
	35% SUBMITTAL	2/10/2023			DRAWN BY:	DESIGNED BY:	CHECKED BY:	APPROVED BY:

PROJECT NUMBER: RNIA

DATE: 12/19/2022

MILITARY DEPARTMENT



SEISMIC
V= 20 KIPS LRFD
TOTAL SQUARE FOOTAGE = 3220S.F.
RHO = 1.3

LINE A = 1.3 * 831/3220 *20K = 6.70K LRFD; 4.7 ASD
LINE D = 1.3* 831/3220 *20K = 6.70K LRFD; 4.7 ASD
LINE B = 1.3* 780 / 3220 *20K = 6.3K LRFD; 4.41 ASD
LINE C = 1.3* 780 / 3220 *20K = 6.3K LRFD; 4.41 ASD

WIND PRESSURE = 30 PSF LRFD

LINE A = 22.25' * 21' * 30PSF = 14.0K LRFD; 8.4K ASD
LINE D = 22.25' * 21' * 30PSF = 14.0K LRFD; 8.4K ASD
LINE B = 12.83' * 17' * 30 PSF= 6.6K LRFD; 3.96K ASD
LINE C = 12.83' * 17' * 30 PSF= 6.6K LRFD; 3.96K ASD

BY:
REMARKS: 35% SUBMITTAL
DATE: 2/10/2023
SYMBOL
REVISIONS
BA/TFL | BA/TFL | TFL | TFL
DRAWN BY:
DESIGNED BY:
CHECKED BY:
APPROVED BY:
PROJECT NUMBER:
FOUNDATION PLAN
PROJECT: BUILDING 7020
LOCATION: CAMP ROBERTS, CALIFORNIA
STATE OF CALIFORNIA — MILITARY DEPARTMENT
DATE: 12/19/2022
SHEET NUMBER
S-101
X OF XXX

SIMPSON STRONG-TIE COMPANY INC.
(800) 999-5099
5956 W. Las Positas Blvd., Pleasanton, CA 94588.
www.strongtie.com

Job Name: B7020
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

* 2021 International Bldg Code
* Seismic R=6.5
* 4000 psi concrete
* ASD Design Shear = 2000 lbs
* Nominal wall height = 12 ft

Selected Strong-Wall® Panel Solution:

Model	Type	W (in)	H (in)	T (in)	Sill Anchor	End Anchor Bolts	Total Axial Load (lbs)	Actual Uplift (lbs)
WSWH24x12	Wood	24	144	3.5	N/A	2 - 1"	0	16457 lb

Actual Shear & Drift Distribution:

Model	Actual Shear (lbs)		Allowable Shear (lbs)		Actual / Allow Shear	Actual Drift (in)	Drift Limit (in)
WSWH24x12	2000	≤	3525	OK	0.57	0.34	0.63

Notes:

1. Strong-Wall High-Strength Wood Shearwalls have been evaluated to the 2021 IBC/IRC. See www.strongtie.com for additional design and installation information.

2. Anchor templates are recommended for proper anchor bolt placement, and are required in some jurisdictions.

3. The applied vertical load shall be a concentric point load or a uniformly distributed load not exceeding the allowable vertical load. Alternatively, the load may be applied anywhere along the width of the panel if imposed by a continuous bearing vertical load transfer element such as a rimboard or beam. For eccentric axial loads applied directly to the panel, the allowable vertical load shall be divided by two.

4. Panels may be trimmed to a minimum height of 74½".

Disclaimer:

It is the Designer's responsibility to verify product suitability under applicable building codes. In order to verify code listed applications please refer to the appropriate product code reports at www.strongtie.com or contact Simpson Strong-Tie Company Inc. at 1-800-999-5099.

SIMPSON STRONG-TIE COMPANY INC.
(800) 999-5099
5956 W. Las Positas Blvd., Pleasanton, CA 94588.
www.strongtie.com

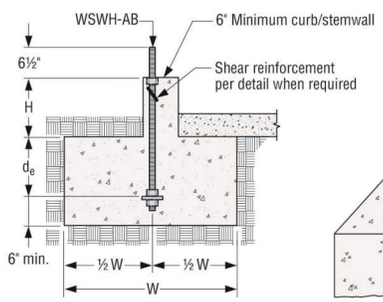
Job Name: B7020
Wall Name: Wall Line 1
Application: Standard Wall on Concrete

Design Criteria:

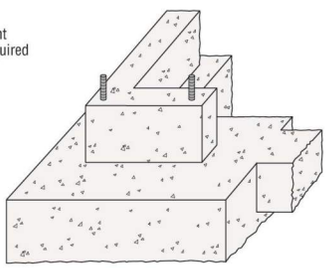
* Stemwall - Garage Front
* 2021 International Bldg Code
* Seismic R=6.5
* 4000 psi concrete

Anchor Solution Details:

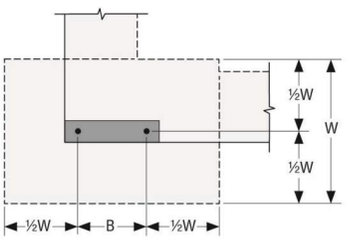
Stemwall Installation



Stemwall Section View

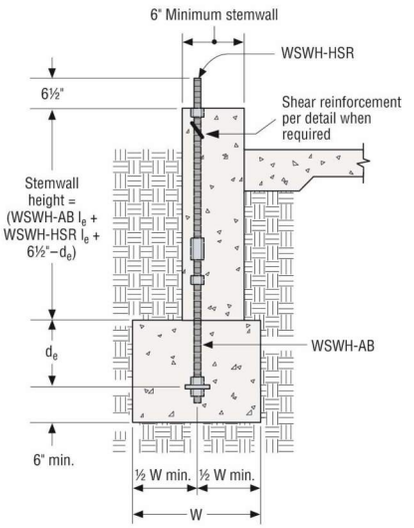


Perspective View
(Slab not shown for clarity)



Footing Plan

Stemwall Extension Installation



Section at Stemwall
WSWH-AB and WSWH-HSR
Extension Application

Anchor Solution Assuming Cracked Concrete Design:

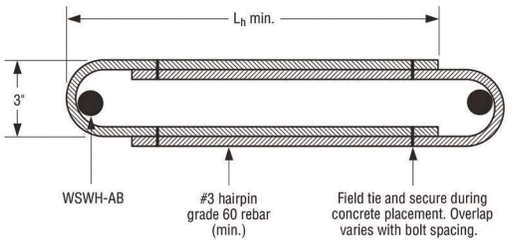
Model	W	de	B	Anchor Bolt	Strength
WSWH24x12	30	10	20	WSWH-AB	Standard

Anchor Solution Assuming Uncracked Concrete Design:

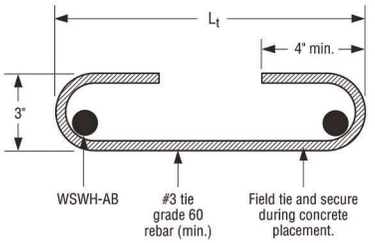
Model	W	de	B	Anchor Bolt	Strength
WSWH24x12	26	9	20	WSWH-AB	Standard

Notes:

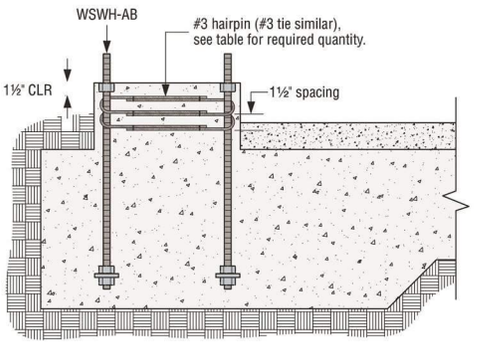
1. Anchorage designs conform to ACI 318-19, ACI 318-14 and 318-11 Appendix D with no supplementary reinforcement for cracked and uncracked concrete as noted.
2. Anchorage strength indicates required grade of anchor bolt. Standard (ASTM F1554 grade 36) or High Strength (HS)(ASTM A193 Grade B7).
3. Seismic indicates Seismic Design Category C though F. Detached 1 & 2 family dwellings in SDC C may use wind anchorage solutions. Seismic anchorage designs conform to ACI 318-11 section D.3.3.4.3 and ACI 318-14 section 17.2.3.4.3 and ACI 318-19 section 17.10.5.3.
4. Foundation dimensions are for anchorage only. Foundation design (size and reinforcement) by others. The registered design professional may specify alternate embedment, footing size or anchor bolt.



Hairpin Shear Reinforcement



Tie Shear Reinforcement



Hairpin Installation
(Garage curb shown, other footing types similar)

Shear Anchorage Solutions

Strong-Wall High-Strength Wood Shearwall Model No.	L_t or L_h (in.)	Seismic [3]		Wind [4]			
		Shear Reinforcement	Minimum Curb/ Stemwall Width (in.)	Shear Reinforcement	Minimum Curb/ Stemwall Width (in.)	ASD Allowable Shear Load, V (lb.) [7]	
						Uncracked	Cracked
WSWH12	10¼	(1) #3 Tie	6	See Note 7	6	1,080	770
WSWH18	15	(2) #3 hairpins[5,6]	6	(1) #3 hairpin	6	Hairpin reinforcement achieves maximum allowable shear load of the Strong-Wall® WSWH	
WSWH24	19	(2) #3 hairpins[5]	6	(2) #3 hairpins[5]	6		

1. Shear anchorage designs conform to ACI 318-14 Chapter 17 and ACI 318-11 and assume minimum 2,500 psi concrete.
2. Shear reinforcement is not required for interior foundation applications (panel installed away from edge of concrete), or braced wall panel applications.
3. Seismic indicates seismic design category C through F. Detached one- and two-family dwellings in SDC C may use wind anchorage solutions. Seismic shear reinforcement designs conform to ACI 318-14, section 17.2.3.5.3 and ACI 318-11 section D.3.3.5.
4. Wind includes seismic design category A and B and detached one- and two-family dwellings in SDC C.
5. Additional ties may be required at garage curb or stemwall installations below anchor reinforcement per designer.
6. Use (1) #3 hairpin for WSWH18 when standard strength anchor is used.
7. Use (1) #3 tie for WSWH12 when panel design shear force exceeds tabulated anchorage allowable shear load.
8. No. 4 grade 40 shear reinforcement may be substituted for WSWH shear anchorage solutions.
9. Concrete edge distance for anchors must comply with ACI 318-14 section 17.7.2 and ACI 318-11 section D.8.2.
10. The designer may specify alternate shear anchorage.

STRONG-WALL® WSWH SHEAR ANCHORAGE SCHEDULE AND DETAILS

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 1 SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	12.0 ft
Number of Stories	1
Story #1 Height	44.0 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Some Shear Panel Aspect Ratios Exceed Limits, Panel Size Changes REQUIRED

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level : See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 1 SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	7.207	+0.90D+E	1	0.0	0.0	NG		3.67	3.50	Ratio NG

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	+1.40D	**2**	**4x6**	**0.71**	**Tension**	**OK**
Comp Values :	Max. Down :	0.5 k	Load Comb :	+1.40D		Max fc =	13 psi	Allow F'c =	0 psi
Tens Values :	Max. Uplift :	33.7 k	Load Comb :	+1.20D+W		Max ft =	876 psi	Allow F't =	1,242 psi
User-specified anchorage device : _____									
C2	1	12.00	0.0	+1.20D+W	**0**	**4x6**	**0.00**	**Comp**	**OK**
Comp Values :	Max. Down :	34.2 k	Load Comb :	+1.20D+W		Max fc =	0 psi	Allow F'c =	0 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	1,242 psi
User-specified anchorage device : _____									

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 2 SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	44.50 ft
Number of Stories	1
Story #1 Height	11.250 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

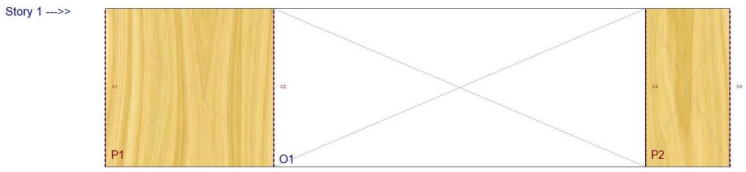
Chord Member Size for each level : See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
O1	12.0	26.50	0.0	11.250 ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 2 SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment: Actual (plf)	Allow	Status	Attachment	Height/Width Ratio: Actual	Allow	Notes
P1	1	4.426	+0.60D+0.60W	1	368.8	392.5	OK	Use 6" at panel edges, 12" in field	0.94	3.50	Ratio OK
P2	1	3.374	+0.60D+0.60W	1	562.4	602.5	OK	Use 4" at panel edges, 12" in field	1.88	3.50	Ratio OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY: # Req'd @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	+D-0.60W	**1**	**4x6**	**0.36**	**Comp**	**OK**
Comp Values :	Max. Down :	4.2 k	Load Comb :	+D-0.60W		Max fc =	220 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	4.1 k	Load Comb :	+D+0.60W		Max ft =	216 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C2	1	12.00	0.0	+D+0.60W	**1**	**4x6**	**0.36**	**Comp**	**OK**
Comp Values :	Max. Down :	4.2 k	Load Comb :	+D+0.60W		Max fc =	220 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	4.1 k	Load Comb :	+D-0.60W		Max ft =	216 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C3	1	38.50	0.0	+D-0.60W	**1**	**4x6**	**0.54**	**Comp**	**OK**
Comp Values :	Max. Down :	6.4 k	Load Comb :	+D-0.60W		Max fc =	333 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	6.3 k	Load Comb :	+D+0.60W		Max ft =	329 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C4	1	44.50	0.0	+D+0.60W	**1**	**4x6**	**0.54**	**Comp**	**OK**
Comp Values :	Max. Down :	6.4 k	Load Comb :	+D+0.60W		Max fc =	333 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	6.3 k	Load Comb :	+D-0.60W		Max ft =	329 psi	Allow F't =	575 psi
User-specified anchorage device : _____									

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE A SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	28.0 ft
Number of Stories	1
Story #1 Height	17.0 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level : See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE A SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment: Actual (plf)	Allow	Status	Attachment	Height/Width Ratio: Actual	Allow	Notes
P1	1	5.520	+0.60D+0.60W	1	197.1	392.5	OK	Use 6" at panel edges, 12" in field	0.61	3.50	Ratio OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY: # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	D Only	**1**	**4x6**	**0.02**	**Comp**	**OK**

Comp Values : Max. Down : 0.1 k Load Comb : D Only — Max fc = 7 psi — Allow F'c = 299 psi
Tens Values : Max. Uplift : 3.4 k Load Comb : +D+0.60W — Max ft = 174 psi — Allow F't = 575 psi

User-specified anchorage device : _____

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY: # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C2	1	28.00	0.0	+D+0.60W	**1**	**4x6**	**0.61**	**Comp**	**OK**

Comp Values : Max. Down : 3.5 k Load Comb : +D+0.60W — Max fc = 181 psi — Allow F'c = 299 psi
Tens Values : Max. Uplift : 0.0 k Load Comb : — Max ft = 0 psi — Allow F't = 575 psi

User-specified anchorage device : _____

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: Line D shear walls

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	28.0 ft
Number of Stories	1
Story #1 Height	17.0 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level :

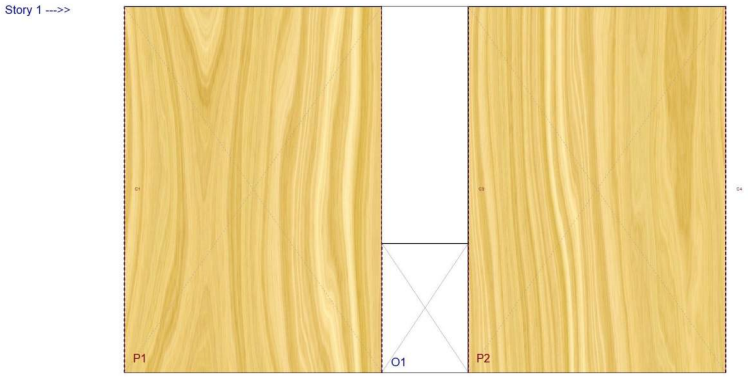
See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
O1	12.0	4.0	0.0	6.0 ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: Line D shear walls

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	2.760	+0.60D+0.60W	1	230.0	392.5	OK	Use 6" at panel edges, 12" in field	1.42	3.50	Ratio OK
P2	1	2.760	+0.60D+0.60W	1	230.0	392.5	OK	Use 6" at panel edges, 12" in field	1.42	3.50	Ratio OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req'd @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	D Only	**1**	**4x6**	**0.02**	**Comp**	**OK**
Comp Values :	Max. Down :	0.1 k	Load Comb :	D Only		Max fc =	7 psi	Allow F'c =	299 psi
Tens Values :	Max. Uplift :	3.9 k	Load Comb :	+D+0.60W		Max ft =	203 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C2	1	12.00	0.0	+D+0.60W	**1**	**4x6**	**0.70**	**Comp**	**OK**
Comp Values :	Max. Down :	4.0 k	Load Comb :	+D+0.60W		Max fc =	210 psi	Allow F'c =	299 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C3	1	16.00	0.0	D Only	**1**	**4x6**	**0.04**	**Comp**	**OK**
Comp Values :	Max. Down :	0.2 k	Load Comb :	D Only		Max fc =	12 psi	Allow F'c =	299 psi
Tens Values :	Max. Uplift :	3.9 k	Load Comb :	+D+0.60W		Max ft =	203 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C4	1	28.00	0.0	+D+0.60W	**1**	**4x6**	**0.72**	**Comp**	**OK**
Comp Values :	Max. Down :	4.1 k	Load Comb :	+D+0.60W		Max fc =	215 psi	Allow F'c =	299 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	575 psi
User-specified anchorage device : _____									

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 2.3 2.7 SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	8.0 ft
Number of Stories	1
Story #1 Height	13.50 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Sheathing in 2nd Side

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level :

See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 6x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 27.563 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 2.3 2.7 SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	7.050	+0.60D+0.60W	2	881.3	1,205.0	OK	Use 4" at panel edges, 12" in field	1.69	3.50	Side 1 OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	+D-0.60W	**1**	**6x6**	**0.96**	**Comp**	**NG!**

Comp Values : Max. Down : 12.0 k Load Comb : +D-0.60W Max fc = 436 psi Allow F'c = 455 psi
Tens Values : Max. Uplift : 11.9 k Load Comb : +D+0.60W Max ft = 432 psi Allow F't = 575 psi

User-specified anchorage device : _____

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	# Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C2	1	8.00	0.0	+D+0.60W	**1**	**6x6**	**0.96**	**Comp**	**NG!**

Comp Values : Max. Down : 12.0 k Load Comb : +D+0.60W Max fc = 436 psi Allow F'c = 455 psi
Tens Values : Max. Uplift : 11.9 k Load Comb : +D-0.60W Max ft = 432 psi Allow F't = 575 psi

User-specified anchorage device : _____

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Footing Information

Footing Dimensions

Dist. Left	2.0 ft	f'c	3.0 ksi	Rebar Cover	3.0 in
Wall Length	8.0 ft	Fy	60.0 ksi	Footing Thickness	18.0 in
Dist. Right	8.0 ft			Width	4.0 ft
Total Ftg Length	18.0 ft				

Max Factored Soil Pressures

@ Left Side of Footing 25,887.1 psf
.... governing load comb +1.20D-W

@ Right Side of Footing 10,369.2 psf
.... governing load comb +1.20D+W

Max UNfactored Soil Pressures

@ Left Side of Footing 1,076.73 psf
.... governing load comb +D-0.60W

@ Right Side of Footing 989.19 psf
.... governing load comb +D+0.60W

Footing One-Way Shear Check...

vu @ Left End of Footing	32.824 psi
vu @ Right End of Footing	32.824 psi
vn * phi : Allowable	93.113 psi

Overturning Stability...

	@ Left End of Ftg	@ Right End of Ftg
Overturning Moment	105.750 k-ft	105.750 k-ft
Resisting Moment	133.747 k-ft	133.747 k-ft
Stability Ratio	1.265 : 1	1.265 : 1
.... governing load comb	+0.60D+0.60W	+0.60D+0.60W

Footing Bending Design...

	@ Left End	@ Right End
Mu	37.578 k-ft	154.218 k-ft
Ru	46.393 psi	190.393 psi
As % Req'd	0.00180 in^2	0.003333 in^2
As Req'd in Footing Width	1.296 in^2	2.40 in^2

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 3 SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	17.0 ft
Number of Stories	1
Story #1 Height	13.50 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Sheathing in 2nd Side

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level :

See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
O1	8.0	1.0	0.0	6.0 ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 3 SHEAR WALL

Applied Concentrated Lateral Loads

Load "Y" Location (ft)	Load Magnitude (kips) Dead	Roof Live	Live	Snow	Wind	Seismic
13.50					5.30	2.30

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	1.590	+0.60D+0.60W	2	198.8	785.0	OK	Use 6" at panel edges, 12" in field	1.69	3.50	Side 1 OK
P2	1	1.590	+0.60D+0.60W	2	198.8	785.0	OK	Use 6" at panel edges, 12" in field	1.69	3.50	Side 1 OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	+D-0.60W	**1**	**4x6**	**0.33**	**Comp**	**OK**
Comp Values :	Max. Down :	2.9 k	Load Comb :	+D-0.60W		Max fc =	148 psi	Allow F'c =	455 psi
Tens Values :	Max. Uplift :	2.7 k	Load Comb :	+D+0.60W		Max ft =	139 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C2	1	8.00	0.0	+D+0.60W	**1**	**4x6**	**0.33**	**Comp**	**OK**
Comp Values :	Max. Down :	2.9 k	Load Comb :	+D+0.60W		Max fc =	148 psi	Allow F'c =	455 psi
Tens Values :	Max. Uplift :	2.7 k	Load Comb :	+D-0.60W		Max ft =	139 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C3	1	9.00	0.0	+D-0.60W	**1**	**4x6**	**0.32**	**Comp**	**OK**
Comp Values :	Max. Down :	2.8 k	Load Comb :	+D-0.60W		Max fc =	145 psi	Allow F'c =	455 psi
Tens Values :	Max. Uplift :	2.7 k	Load Comb :	+D+0.60W		Max ft =	139 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C4	1	17.00	0.0	+D+0.60W	**1**	**4x6**	**0.32**	**Comp**	**OK**
Comp Values :	Max. Down :	2.8 k	Load Comb :	+D+0.60W		Max fc =	145 psi	Allow F'c =	455 psi
Tens Values :	Max. Uplift :	2.7 k	Load Comb :	+D-0.60W		Max ft =	139 psi	Allow F't =	575 psi
User-specified anchorage device : _____									

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE 3 SHEAR WALL

Footing Information

Footing Dimensions

Dist. Left	2.0 ft	f'c	3.0 ksi			Rebar Cover	3.0 in
Wall Length	17.0 ft	Fy	60.0 ksi			Footing Thickness	18.0 in
Dist. Right	8.0 ft					Width	4.0 ft
Total Ftg Length	27.0 ft						

Max Factored Soil Pressures

@ Left Side of Footing 454.830 psf
.... governing load comb +1.20D-W

@ Right Side of Footing 437.830 psf
.... governing load comb +1.20D+W

Max UNfactored Soil Pressures

@ Left Side of Footing 344.398 psf
.... governing load comb +D-0.60W

@ Right Side of Footing 327.398 psf
.... governing load comb +D+0.60W

Footing One-Way Shear Check...

vu @ Left End of Footing	2.206 psi
vu @ Right End of Footing	17.606 psi
vn * phi : Allowable	93.113 psi

Overturning Stability...

	@ Left End of Ftg	@ Right End of Ftg
Overturning Moment	47.70 k-ft	47.70 k-ft
Resisting Moment	304.212 k-ft	304.212 k-ft
Stability Ratio	6.378 : 1	6.378 : 1
.... governing load comb	+0.60D+0.60W	+0.60D+0.60W

Footing Bending Design...

	@ Left End	@ Right End
Mu	3.571 k-ft	46.240 k-ft
Ru	4.408 psi	57.086 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	1.296 in^2	1.296 in^2

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE B SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	32.0 ft
Number of Stories	1
Story #1 Height	11.250 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

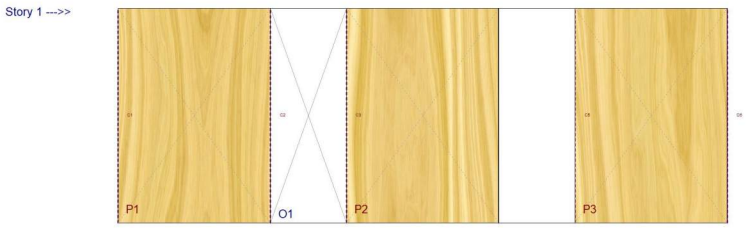
Chord Member Size for each level : See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
O1	8.0	4.0	0.0	11.250 ft
O2	20.0	4.0	0.0	0.0 ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE B SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	1.541	+0.60D+0.70E	1	192.6	280.0	OK	Use 6" at panel edges, 12" in field	1.41	3.50	Ratio OK
P2	1	1.541	+0.60D+0.70E	1	192.6	280.0	OK	Use 6" at panel edges, 12" in field	1.41	3.50	Ratio OK
P3	1	1.541	+0.60D+0.70E	1	192.6	280.0	OK	Use 6" at panel edges, 12" in field	1.41	3.50	Ratio OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req'd @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	D Only	**1**	**4x6**	**0.01**	**Comp**	**OK**
Comp Values :	Max. Down :	0.1 k	Load Comb :	D Only		Max fc =	5 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	2.2 k	Load Comb :	+D+0.70E		Max ft =	113 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C2	1	8.00	0.0	+D+0.70E	**1**	**4x6**	**0.19**	**Comp**	**OK**
Comp Values :	Max. Down :	2.3 k	Load Comb :	+D+0.70E		Max fc =	117 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C3	1	12.00	0.0	D Only	**1**	**4x6**	**0.01**	**Comp**	**OK**
Comp Values :	Max. Down :	0.1 k	Load Comb :	D Only		Max fc =	5 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	2.2 k	Load Comb :	+D+0.70E		Max ft =	113 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C4	1	20.00	0.0	+D+0.70E	**1**	**4x6**	**0.19**	**Comp**	**OK**
Comp Values :	Max. Down :	2.3 k	Load Comb :	+D+0.70E		Max fc =	117 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C5	1	24.00	0.0	D Only	**1**	**4x6**	**0.02**	**Comp**	**OK**
Comp Values :	Max. Down :	0.2 k	Load Comb :	D Only		Max fc =	9 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	2.2 k	Load Comb :	+D+0.70E		Max ft =	113 psi	Allow F't =	575 psi
User-specified anchorage device : _____									
C6	1	32.00	0.0	+D+0.70E	**1**	**4x6**	**0.20**	**Comp**	**OK**
Comp Values :	Max. Down :	2.3 k	Load Comb :	+D+0.70E		Max fc =	122 psi	Allow F'c =	617 psi
Tens Values :	Max. Uplift :	0.0 k	Load Comb :			Max ft =	0 psi	Allow F't =	575 psi
User-specified anchorage device : _____									

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE C SHEAR WALL

General Information

Calculations per NDS 2018, IBC 2018, CBC 2019, ASCE 7-16

Total Wall Length	20.0 ft
Number of Stories	1
Story #1 Height	11.250 ft

Framing & Chord Material :

Wood Species :	Douglas Fir-Larch		
Wood Grade :	No.2		
Fc - Prll =	1,350.0 psi	Ft - Tension	575.0 psi
Fc - Perp =	625.0 psi	E	1,600.0 ksi
Specific Gravity =	.5002		
SDC : Seismic Design Category :	D		

Sheathing

Main Sheathing

SDPWS 2015 Construction Table : 4.3A

Wood Structural Panels, Struct I, 15/32" Thk, 1-3/8" Min Pen, 8d Fstnrs

Nominal Seismic Shear Capacities (plf) :

6" Spac.	560	3" Spac.	1100
4" Spac.	860	2" Spac.	1460

Nominal Wind Shear Capacities (plf) :

6" Spac.	785	3" Spac.	1540
4" Spac.	1205	2" Spac.	2045

Chord Data

Chord Member Size for each level : See Chord Summary Tables for number of Chords required at each panel end.

Level 1 Chord Size : 4x6 Chord Cf: Comp: 1.0 Tens: 1.0 Max. Allow Stress Ratio : 0.90 : 1

Chord Area = 19.250 in^2

All chords treated as unbraced out-of-plane of wall for story height

Opening ID	Dist to Left Edge	Opening Width	Dist to Bottom	Opening Height
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft
				ft



Project Title:
Engineer:
Project ID:
Project Descr:

Wood Shear Wall

Project File: b7020 as well.ec6

LIC# : KW-06015864, Build:20.23.05.25 BROKAW DESIGN (c) ENERCALC INC 1983-2023

DESCRIPTION: LINE C SHEAR WALL

Shear Panel Summary

Panel ID	Level #	Max Shear (kips)	Load Comb	# Sides Used	Shear Summary & Attachment Actual (plf)	Allow	Status	Attachment	Height/Width Ratio Actual	Allow	Notes
P1	1	4.561	+0.60D+0.70E	1	228.1	280.0	OK	Use 6" at panel edges, 12" in field	0.56	3.50	Ratio OK

Chord Summary

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	CHORD DESIGN SUMMARY # Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C1	1	0.00	0.0	D Only	**1**	**4x6**	**0.01**	**Comp**	**OK**

Comp Values : Max. Down : 0.1 k Load Comb : D Only — Max fc = 5 psi — Allow F'c = 617 psi
Tens Values : Max. Uplift : 2.6 k Load Comb : +D+0.70E — Max ft = 133 psi — Allow F't = 575 psi

User-specified anchorage device : _____

Chord ID	Level #	Dist from Left (ft)	Force (kips)	Load Comb	# Req"d @ Location	Member Size	Stress Ratio	Governs	Status
C2	1	20.00	0.0	+D+0.70E	**1**	**4x6**	**0.22**	**Comp**	**OK**

Comp Values : Max. Down : 2.7 k Load Comb : +D+0.70E — Max fc = 138 psi — Allow F'c = 617 psi
Tens Values : Max. Uplift : 0.0 k Load Comb : — Max ft = 0 psi — Allow F't = 575 psi

User-specified anchorage device : _____

Chord Naming Informatio C : Item is a Chord L : Followed by level numbe # : Followed by chord number from left to r
WL : Indicates Chord is on left edge of wall WR : Indicates Chord is on right edge of wall

BrokawDesign
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(415) 999-0323
tim.lengyel@brokawdesign.com

PROJECT: CAMP ROBERTS B7020
TITLE: -----
SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

FOUNDATION DESIGN

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PROJECT: CAMP ROBERTS B7020
TITLE: -----
SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

DEAD LOADS

DL (ROOF) = 22 PSF

DL (WALL) = 8 PSF

LIVE LOADS

LL (ROOF) = 20 PSF

BUILDING A

PLAN WIDTH (PERP TO RIDGE), L1 = 37 FT

EAVE WALL HEIGHT, H1 = 10 FT

GABLE WALL HEIGHT @ MID, H2 = 19 FT

LINE LOAD @ WALL 1:

WDL1 = 22 PSF (37 FT / 2) + 8 PSF (10 FT)
WDL1 = 487 PLF

WLL1 = 20 PSF (37 FT / 2)
WLL1 = 370 PLF

LINE LOAD @ WALL 2:

WDL2 = 22 PSF (37 FT / 2) + 8 PSF (10 FT)
WDL2 = 487 PLF

WLL2 = 20 PSF (37 FT / 2)
WLL2 = 370 PLF

LINE LOAD @ WALL A:

WDLA = 8 PSF (10 FT) TO 8 PSF (19 FT)
WDLA = 80 PLF (END) TO 152 PLF (MID)

WLLA = 0 PLF

LINE LOAD @ WALL D:

WDLD = 8 PSF (10 FT) TO 8 PSF (19 FT)
WDLD = 80 PLF (END) TO 152 PLF (MID)

WLLD = 0 PLF

BUILDING B

PLAN WIDTH (PERP TO RIDGE), L2 = 25 FT

EAVE WALL HEIGHT, H3 = 8 FT

GABLE WALL HEIGHT @ MID, H4 = 14 FT

LINE LOAD @ WALL B:

WDLB = 22 PSF (25 FT / 2) + 8 PSF (8 FT)
WDLB = 339 PLF

WLLB = 20 PSF (25 FT / 2)
WLLB = 250 PLF

LINE LOAD @ WALL C:

WDLC = 22 PSF (25 FT / 2) + 8 PSF (8 FT)
WDLC = 339 PLF

WLLC = 20 PSF (25 FT / 2)
WLLC = 250 PLF

LINE LOAD @ WALL 3:

WDL3 = 8 PSF (8 FT) TO 8 PSF (14 FT)
WDL3 = 64 PLF (END) TO 112 PLF (MID)

WLL3 = 0 PLF

BrokawDesign
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PROJECT: CAMP ROBERTS B7020
TITLE: -----
SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

SHEAR WALL "SW-A1"

L = 26 FT # WALLS = 1
H = 10 FT
FEQ = 6.7 KIPS (LRFD)
FWL = 14.0 KIPS (LRFD)

V (EQ) = (6.7 KIPS / 26 FT) 1000 LB/KIP = 258 PLF

T (EQ) = (6.7 KIPS (10 FT) / 26 FT) 1000 LB/KIP = 2577 LBS

C (EQ) = T (EQ)

V (WIND) = (14.0 KIPS / 26 FT) 1000 LB/KIP = 539 PLF

T (WIND) = (14.0 KIPS (10 FT) / 26 FT) 1000 LB/KIP = 5385 LBS

C (WIND) = T (WIND)

V (EQ) = 258 PLF
T (EQ) = 2577 LBS
C (EQ) = 2577 LBS

V (WIND) = 539 PLF
T (WIND) = 5385 LBS
C (WIND) = 5385 LBS

SHEAR WALL "SW-D1" AND "SW-D2"

L = 10 FT # WALLS = 2
H = 10 FT
FEQ = 6.7 KIPS (LRFD) / 2 WALLS = **3.35 KIPS (LRFD)**
FWL = 14.0 KIPS (LRFD) / 2 WALLS = **7.0 KIPS (LRFD)**

V (EQ) = (3.35 KIPS / 10 FT) 1000 LB/KIP = 335 PLF

T (EQ) = (3.35 KIPS (10 FT) / 10 FT) 1000 LB/KIP = 3350 LBS

C (EQ) = T (EQ)

V (WIND) = (7.0 KIPS / 10 FT) 1000 LB/KIP = 700 PLF

T (WIND) = (7.0 KIPS (10 FT) / 10 FT) 1000 LB/KIP = 7000 LBS

C (WIND) = T (WIND)

V (EQ) = 335 PLF
T (EQ) = 3350 LBS
C (EQ) = 3350 LBS

V (WIND) = 700 PLF
T (WIND) = 7000 LBS
C (WIND) = 7000 LBS

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PROJECT: CAMP ROBERTS B7020
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SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

SHEAR WALL "SW-B1", "SW-B2" AND "SW-B3"

L = 6 FT # WALLS = 3
H = 8 FT
FEQ = 6.3 KIPS (LRFD) / 3 WALLS = **2.1 KIPS (LRFD)**
FWL = 6.6 KIPS (LRFD) / 3 WALLS = **2.2 KIPS (LRFD)**

V (EQ) = (2.1 KIPS / 6 FT) 1000 LB/KIP = 350 PLF

T (EQ) = (2.1 KIPS (8 FT) / 6 FT) 1000 LB/KIP = 2800 LBS

C (EQ) = T (EQ)

V (EQ) = 350 PLF
T (EQ) = 2800 LBS
C (EQ) = 2800 LBS

V (WIND) = (2.2 KIPS / 6 FT) 1000 LB/KIP = 367 PLF

T (WIND) = (2.2 KIPS (8 FT) / 6 FT) 1000 LB/KIP = 2934 LBS

C (WIND) = T (WIND)

V (WIND) = 367 PLF
T (WIND) = 2934 LBS
C (WIND) = 2934 LBS

SHEAR WALL "SW-C1"

L = 18 FT # WALLS = 1
H = 8 FT
FEQ = 6.3 KIPS (LRFD)
FWL = 6.6 KIPS (LRFD)

V (EQ) = (6.3 KIPS / 18 FT) 1000 LB/KIP = 350 PLF

T (EQ) = (6.3 KIPS (8 FT) / 18 FT) 1000 LB/KIP = 2800 LBS

C (EQ) = T (EQ)

V (EQ) = 350 PLF
T (EQ) = 2800 LBS
C (EQ) = 2800 LBS

V (WIND) = (6.6 KIPS / 18 FT) 1000 LB/KIP = 367 PLF

T (WIND) = (6.6 KIPS (8 FT) / 18 FT) 1000 LB/KIP = 2934 LBS

C (WIND) = T (WIND)

V (WIND) = 367 PLF
T (WIND) = 2934 LBS
C (WIND) = 2934 LBS

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SCALE: -----

SHEAR WALL "SW-11", "SW-12" AND "SW-13"

L = 1.67 FT # WALLS = 3
H = 10 FT
FEQ = 6.7 KIPS (LRFD) / 3 WALLS = **2.3 KIPS (LRFD)**
FWL = 9.2 KIPS (LRFD) / 3 WALLS = **3.1 KIPS (LRFD)**

V (EQ) = (2.3 KIPS / 1.67 FT) 1000 LB/KIP = 1378 PLF

T (EQ) = (2.3 KIPS (10 FT) / 1.67 FT) 1000 LB/KIP = 13773 LBS

C (EQ) = T (EQ)

V (WIND) = (3.1 KIPS / 1.67 FT) 1000 LB/KIP = 1857 PLF

T (WIND) = (3.1 KIPS (10 FT) / 1.67 FT) 1000 LB/KIP = 18563 LBS

C (WIND) = T (WIND)

V (EQ) = 1378 PLF

T (EQ) = 13773 LBS

C (EQ) = 13773 LBS

V (WIND) = 1857 PLF

T (WIND) = 18563 LBS

C (WIND) = 18563 LBS

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SCALE: -----

SHEAR WALL "SW-21" AND "SW-22"

L (SW-21) = 5 FT L (SW-22) = 15 FT DIST RATIO: SW-21 = 5/20 & SW-22 = 15/20
H = 10 FT
FEQ = 8.32 KIPS (LRFD)
FWL = 13.0 KIPS (LRFD)

SW-21, FEQ = (5/20) (8.32 KIPS) = 2.08 KIPS
SW-21, FWL = (5/20) (13.0 KIPS) = 3.25 KIPS

V (EQ) = (2.08 KIPS / 5 FT) 1000 LB/KIP = 416 PLF

T (EQ) = (2.08 KIPS (10 FT) / 5 FT) 1000 LB/KIP = 4160 LBS

C (EQ) = T (EQ)

V (EQ) = 416 PLF
T (EQ) = 4160 LBS
C (EQ) = 4160 LBS

V (WIND) = (3.25 KIPS / 5 FT) 1000 LB/KIP = 650 PLF

T (WIND) = (3.25 KIPS (10 FT) / 5 FT) 1000 LB/KIP = 6500 LBS

C (WIND) = T (WIND)

V (WIND) = 650 PLF
T (WIND) = 6500 LBS
C (WIND) = 6500 LBS

SW-22, FEQ = (15/20) (8.32 KIPS) = 6.24 KIPS
SW-22, FWL = (15/20) (13.0 KIPS) = 9.75 KIPS

V (EQ) = (6.24 KIPS / 15 FT) 1000 LB/KIP = 416 PLF

T (EQ) = (6.24 KIPS (10 FT) / 15 FT) 1000 LB/KIP = 4160 LBS

C (EQ) = T (EQ)

V (EQ) = 416 PLF
T (EQ) = 4160 LBS
C (EQ) = 4160 LBS

V (WIND) = (9.75 KIPS / 15 FT) 1000 LB/KIP = 650 PLF

T (WIND) = (9.75 KIPS (10 FT) / 15 FT) 1000 LB/KIP = 6500 LBS

C (WIND) = T (WIND)

V (WIND) = 650 PLF
T (WIND) = 6500 LBS
C (WIND) = 6500 LBS

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SCALE: -----

SHEAR WALL "SW-2.3"

L = 6.5 FT # WALLS = 1
H = 8 FT
FEQ = 4.12 KIPS (LRFD)
FWL = 10.33 KIPS (LRFD)

V (EQ) = (4.12 KIPS / 6.5 FT) 1000 LB/KIP = 634 PLF

T (EQ) = (4.12 KIPS (8 FT) / 6.5 FT) 1000 LB/KIP = 5071 LBS

C (EQ) = T (EQ)

V (EQ) = 634 PLF

T (EQ) = 5071 LBS

C (EQ) = 5071 LBS

V (WIND) = (10.33 KIPS / 6.5 FT) 1000 LB/KIP = 1590 PLF

T (WIND) = (10.33 KIPS (8 FT) / 6.5 FT) 1000 LB/KIP = 12714 LBS

C (WIND) = T (WIND)

V (WIND) = 1590 PLF

T (WIND) = 12714 LBS

C (WIND) = 12714 LBS

SHEAR WALL "SW-2.7"

L = 6.5 FT # WALLS = 1
H = 8 FT
FEQ = 4.76 KIPS (LRFD)
FWL = 11.73 KIPS (LRFD)

V (EQ) = (4.76 KIPS / 6.5 FT) 1000 LB/KIP = 733 PLF

T (EQ) = (4.76 KIPS (8 FT) / 6.5 FT) 1000 LB/KIP = 5859 LBS

C (EQ) = T (EQ)

V (EQ) = 733 PLF

T (EQ) = 5859 LBS

C (EQ) = 5859 LBS

V (WIND) = (11.73 KIPS / 10 FT) 1000 LB/KIP = 1173 PLF

T (WIND) = (11.73 KIPS (10 FT) / 10 FT) 1000 LB/KIP = 11730 LBS

C (WIND) = T (WIND)

V (WIND) = 330 PLF

T (WIND) = 11730 LBS

C (WIND) = 11730 LBS

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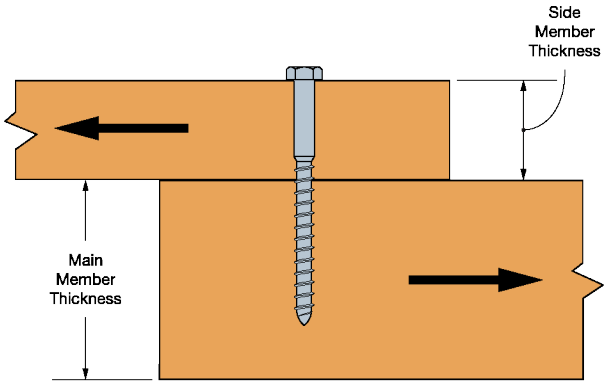
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PROJECT: CAMP ROBERTS B7020
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(E) TRUSS REPAIR

Fastener Designer: Solutions Report

Report Generated: August 23, 2023



Lateral Load Parallel to Grain

BOTTOM CHORD SPLICE

Input

Input	Strong-Drive® SDWH TIMBER-HEX Screw
Design Method	Allowable Stress Design (ASD)
Code	NDS 2012/2015/2018
Main Member Thickness, t_m (in)	6.25
Side Member Thickness, t_s (in)	1.75
Dowel Length, l (in)	6.0
Main Member Bearing Angle, θ_m (deg)	0
Side Member Bearing Angle, θ_s (deg)	0
Main Member Specific Gravity, G_m (deg)	0.5
Side Member Specific Gravity, G_s (deg)	0.5
Actual Diameter, D (in)	0.275
Load (lb)	6000
Load Duration Factor, C_D	1.25
Temperature Factor, C_t	1
Wet Service, C_M	1
End Grain Factor, C_{eg}	1

Calculation

Calculation	Strong-Drive® SDWH TIMBER-HEX Screw
Dowel Root Diameter, D_r (in)	0.183
Main Member Dowel Bearing Length, l_m (in)	4.250
Side Member Dowel Bearing Length, l_s (in)	1.750
Main Member Dowel Bearing Strength, F_{em} (psi)	4637
Side Member Dowel Bearing Strength, F_{es} (psi)	4637
Dowel Bending Yield Strength, F_{yb} (psi)	175000
$R_e = \frac{F_{em}}{F_{es}}$	1
$R_t = \frac{l_m}{l_s}$	2.43
$k_1 = \frac{\sqrt{R_e + 2R_e^2(1 + R_t + R_t^2) + R_t^2 R_e^3} - R_e(1 + R_t)}{1 + R_e}$	0.81
$k_2 = -1 + \sqrt{2(1 + R_e) + \frac{2F_{yb}(1 + 2R_e)D^2}{3F_{em}l_m^2}}$	1.03
$k_3 = -1 + \sqrt{\frac{2(1 + R_e)}{R_e} + \frac{2F_{yb}(2 + R_e)D^2}{3F_{em}l_s^2}}$	1.20

Penetration Check

Penetration Check Detail	Strong-Drive® SDWH TIMBER-HEX Screw
Penetration, p (in)	4.25
Minimum Penetration Requirement, P_{min} (in)	6D = 1.65
Minimum Penetration Requirement Met	Yes

End/Edge Distance and Spacing

End Distance, Edge Distance, and Spacing	Strong-Drive® SDWH TIMBER-HEX Screw
	See figure below the fastener image for end distance, edge distance, and spacing requirements

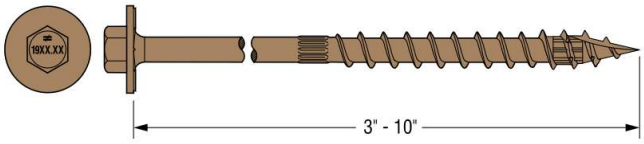
Calculated Reference Design Value

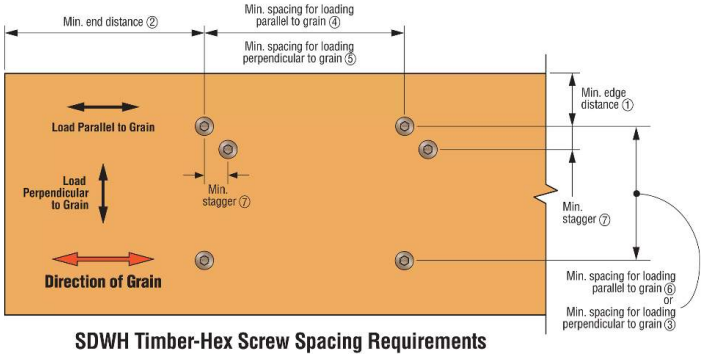
Yield Mode	Yield Limit Equation	Strong-Drive® SDWH TIMBER-HEX Screw	
		Yield Limit, Z	Reduction Term, R_D
Mode I_m	$Z = \frac{Dl_m F_{em}}{R_d}$	Z = 1548 lb	R_D = 2.3
Mode I_s	$Z = \frac{Dl_s F_{es}}{R_d}$	Z = 637 lb	R_D = 2.3
Mode II	$Z = \frac{k_1 Dl_s F_{es}}{R_d}$	Z = 518 lb	R_D = 2.3
Mode III_m	$Z = \frac{k_2 Dl_m F_{em}}{(1+2R_e)R_d}$	Z = 534 lb	R_D = 2.3
Mode III_s	$Z = \frac{k_3 Dl_s F_{em}}{(2+R_e)R_d}$	Z = 254 lb	R_D = 2.3
Mode IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	Z = 236 lb	R_D = 2.3
Minimum Yield Value		Z = 236 lb	
Tested Yield Value		Z = 318 lb	
Adjusted Yield Value		Z = 398 lb	
Total Adjusted Yield Value		Z = 6368 lb	

Solution

Supply (16) 0.195" × 6" Strong-Drive® SDWH TIMBER-HEX Screws SDWH19600DB

16 SCREWS EACH SIDE = 32 SCREWS TOTAL





SDWH Timber-Hex Screw Spacing Requirements

SDWH Timber-Hex Screw Spacing Requirements

Condition	Direction of Load to Grain	ID	Minimum Distance or Spacing (in.)
Edge Distance	Perpendicular	①	1 7/16
	Parallel	①	1 7/16
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

1. For axial loading only, use the following minimum dimensions: end distance = 2¾", edge distance = 1⅛", spacing parallel to grain = 2", spacing perpendicular to grain = 1⅛".

Strong-Drive® SDWH TIMBER-HEX Screw

Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanization, making it suitable for certain exterior and preservative-treated wood applications, as described in the evaluation report.

Notes:

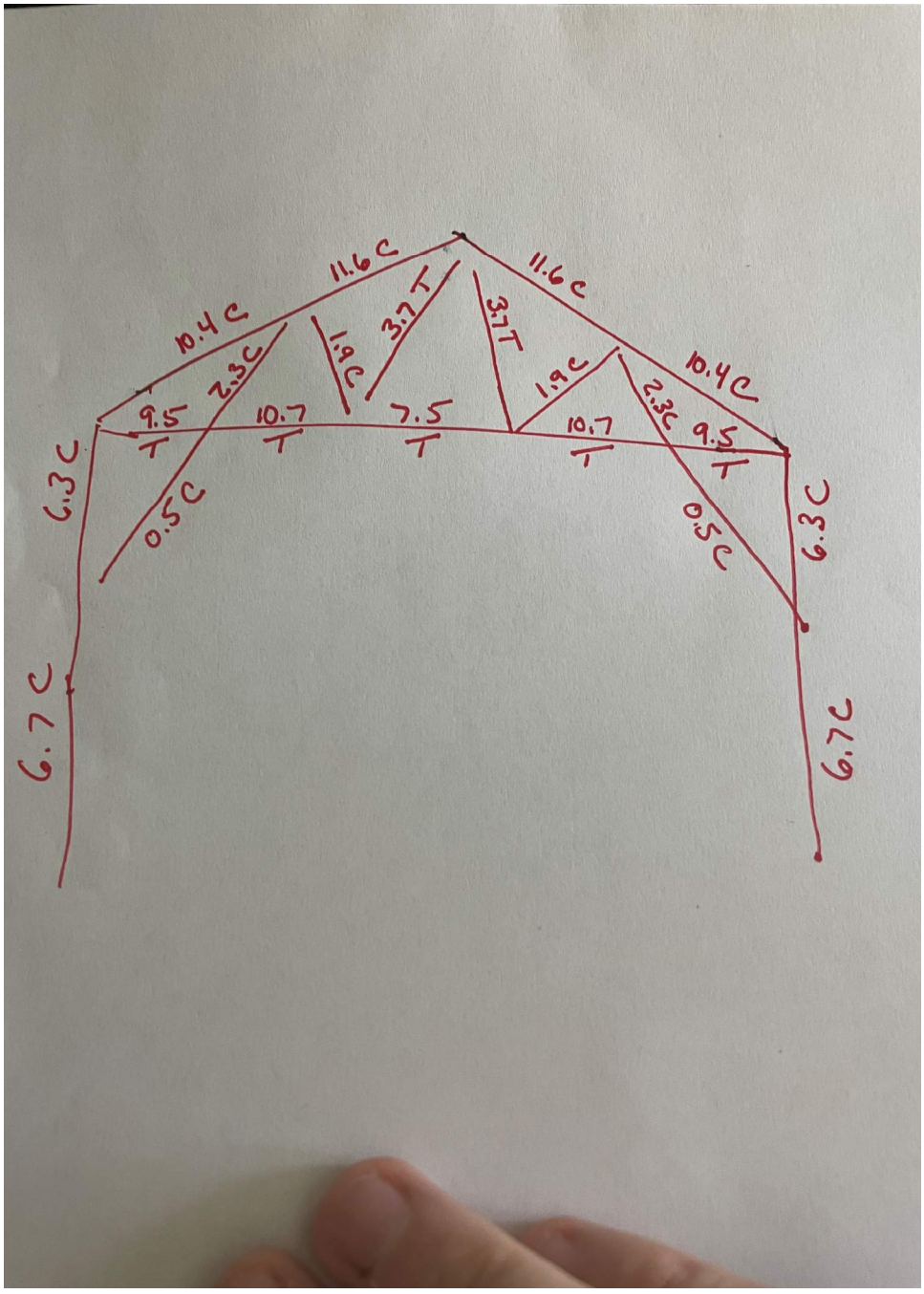
1. Loads are based on installation into side grain of the wood with the screw axis perpendicular to the face of the member.
2. Adjusted yield value includes the adjustment factors selected above.
3. The tested yield value is based on testing conducted in accordance with AC233. It is the average ultimate test value divided by 5. If no testing was done for the selected thickness then the minimum yield value is calculated based on National Design Specification for Wood Construction.
4. View our literature for more information on ledger connections
5. For all other general information refer to the Fastening Systems Catalog.

Codes/Standards: Click Here

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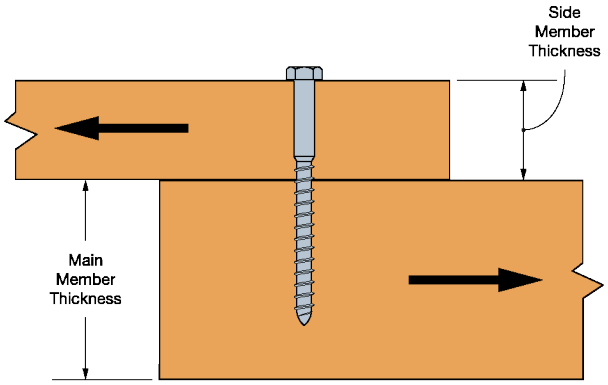
PROJECT: CAMP ROBERTS B7020
TITLE: -----
SHEET NO.: ----- OF -----
BY: TFL DATE: 2023
SCALE: -----

(E) TRUSS REINFORCING (TYPICAL)


11.6C
11.6C
10.4C
10.4C
3.7T
3.7T
1.9C
1.9C
2.3C
2.3C
9.5T
10.7T
7.5T
10.7T
9.5T
6.3C
6.3C
0.5C
0.5C
6.7C
6.7C

Fastener Designer: Solutions Report

Report Generated: August 28, 2023



Lateral Load Parallel to Grain

Input (N) PLYWD GUSSET TO (E) 2x10 TOP CHORD

Input	Strong-Drive® WSV SUBFLOOR Screw
Design Method	Allowable Stress Design (ASD)
Code	NDS 2012/2015/2018
Main Member Thickness, t_m (in)	1.5
Side Member Thickness, t_s (in)	0.71
Dowel Length, l (in)	2.0
Main Member Bearing Angle, θ_m (deg)	0
Side Member Bearing Angle, θ_s (deg)	0
Main Member Specific Gravity, G_m (deg)	0.5
Side Member Specific Gravity, G_s (deg)	0.5
Actual Diameter, D (in)	0.132
Load (lb)	5200
Load Duration Factor, C_D	1.25
Temperature Factor, C_t	1
Wet Service, C_M	1
End Grain Factor, C_{eg}	1

Calculation

Calculation	Strong-Drive® WSV SUBFLOOR Screw
Dowel Root Diameter, D_r (in)	0.113
Main Member Dowel Bearing Length, l_m (in)	1.158
Side Member Dowel Bearing Length, l_s (in)	0.710
Main Member Dowel Bearing Strength, F_{em} (psi)	4637
Side Member Dowel Bearing Strength, F_{es} (psi)	4650
Dowel Bending Yield Strength, F_{yb} (psi)	200000
$R_e = \frac{F_{em}}{F_{es}}$	1
$R_t = \frac{l_m}{l_s}$	1.63
$k_1 = \frac{\sqrt{R_e + 2R_e^2(1 + R_t + R_t^2) + R_t^2 R_e^3} - R_e(1 + R_t)}{1 + R_e}$	0.57
$k_2 = -1 + \sqrt{2(1 + R_e) + \frac{2F_{yb}(1 + 2R_e)D^2}{3F_{em}l_m^2}}$	1.19
$k_3 = -1 + \sqrt{\frac{2(1 + R_e)}{R_e} + \frac{2F_{yb}(2 + R_e)D^2}{3F_{em}l_s^2}}$	1.49

Penetration Check

Penetration Check Detail	Strong-Drive® WSV SUBFLOOR Screw
Penetration, p (in)	1.16
Minimum Penetration Requirement, P_{min} (in)	6D = 0.79
Minimum Penetration Requirement Met	Yes

End/Edge Distance and Spacing

End Distance, Edge Distance, and Spacing	Strong-Drive® WSV SUBFLOOR Screw
	See figure below the fastener image for end distance, edge distance, and spacing requirements

Fastener Designer: Solutions Report

Report Generated: August 28, 2023

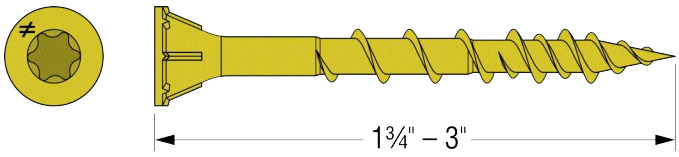
Calculated Reference Design Value

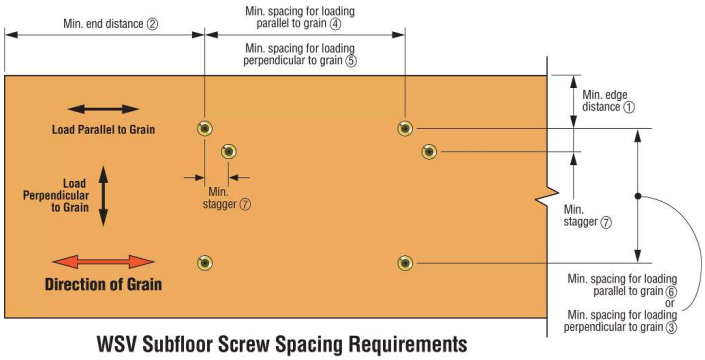
Yield Mode	Yield Limit Equation	Strong-Drive® WSV SUBFLOOR Screw	
		Yield Limit, Z	Reduction Term, R_D
Mode I_m	$Z = \frac{Dl_m F_{em}}{R_d}$	Z = 276 lb	R_D = 2.2
Mode I_s	$Z = \frac{Dl_s F_{es}}{R_d}$	Z = 170 lb	R_D = 2.2
Mode II	$Z = \frac{k_1 Dl_s F_{es}}{R_d}$	Z = 97 lb	R_D = 2.2
Mode III_m	$Z = \frac{k_2 Dl_m F_{em}}{(1+2R_e)R_d}$	Z = 110 lb	R_D = 2.2
Mode III_s	$Z = \frac{k_3 Dl_s F_{em}}{(2+R_e)R_d}$	Z = 84 lb	R_D = 2.2
Mode IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	Z = 102 lb	R_D = 2.2
Minimum Yield Value		Z = 84 lb	
Adjusted Yield Value		Z = 105 lb	
Total Adjusted Yield Value		Z = 5250 lb	

Solution

(N) PLYWD GUSSET TO (E) 2x10 TOP CHORD

Supply (50) #9 x 2" Strong-Drive® WSV SUBFLOOR Screws WSV2S





WSV Subfloor Screw Spacing Requirements

WSV Subfloor Screw Spacing Requirements

Condition	Direction of Load to Grain	ID	Minimum Distance or Spacing (in.)	
			G < 0.50	G ≥ 0.50
Edge Distance	Perpendicular	①	1½	1½
	Parallel	①	1	1½
End Distance	Perpendicular	②	2	2¾
	Parallel	②	2¾	3
Spacing Between Fasteners in a Row	Perpendicular	③	1	1½
	Parallel	④	2¾	2¾
Spacing Between Rows of Fasteners	Perpendicular	⑤	2	2
	Parallel	⑥	1	1½
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	½	¾

1. For axial loading only, use the following minimum dimensions: end distance = 1⅞", edge distance = ¾", spacing parallel to grain = 1⅜", spacing perpendicular to grain = ¾".

Strong-Drive® WSV SUBFLOOR Screw

Notes:

1. Table values are based on attachment of a 1 1/2" side member to a 1 1 / 2" main member of the same species and grade.
2. Table values are based on the 2018 NDS, CD = 1.0. Values shall be multiplied by all applicable factors, such as duration of load, etc., except where noted.
3. Specific Gravities (G) assumed: DFL G = 0.50, SP G = 0.55, SPF G = 0.42.
4. The spacing of applied uniform loads to a multi-ply member shall not exceed 24 inches on center.
5. Adjusted yield value includes the adjustment factors selected above.
6. For all other general information refer to the Fastening Systems Catalog

Codes/Standards: Click Here

Product Information: Strong-Drive WSV SUBFLOOR Screw

Calculation

Calculation	Strong-Drive® WSV SUBFLOOR Screw
Dowel Root Diameter, D_r (in)	0.113
Main Member Dowel Bearing Length, l_m (in)	1.158
Side Member Dowel Bearing Length, l_s (in)	0.710
Main Member Dowel Bearing Strength, F_{em} (psi)	4637
Side Member Dowel Bearing Strength, F_{es} (psi)	4650
Dowel Bending Yield Strength, F_{yb} (psi)	200000
$R_e = \frac{F_{em}}{F_{es}}$	1
$R_t = \frac{l_m}{l_s}$	1.63
$k_1 = \frac{\sqrt{R_e + 2R_e^2(1 + R_t + R_t^2) + R_t^2 R_e^3} - R_e(1 + R_t)}{1 + R_e}$	0.57
$k_2 = -1 + \sqrt{2(1 + R_e) + \frac{2F_{yb}(1 + 2R_e)D^2}{3F_{em}l_m^2}}$	1.19
$k_3 = -1 + \sqrt{\frac{2(1 + R_e)}{R_e} + \frac{2F_{yb}(2 + R_e)D^2}{3F_{em}l_s^2}}$	1.49

Penetration Check

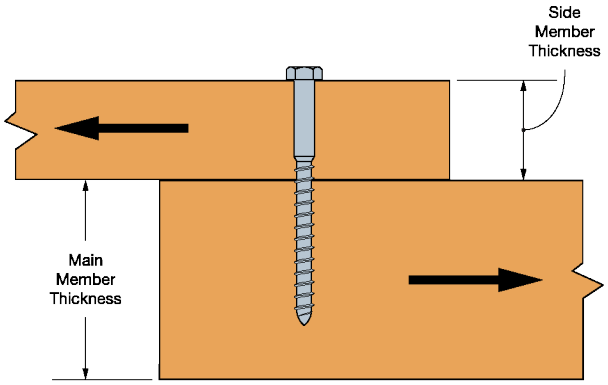
Penetration Check Detail	Strong-Drive® WSV SUBFLOOR Screw
Penetration, p (in)	1.16
Minimum Penetration Requirement, P_{min} (in)	6D = 0.79
Minimum Penetration Requirement Met	Yes

End/Edge Distance and Spacing

End Distance, Edge Distance, and Spacing	Strong-Drive® WSV SUBFLOOR Screw
	See figure below the fastener image for end distance, edge distance, and spacing requirements

Fastener Designer: Solutions Report

Report Generated: August 28, 2023



Lateral Load Parallel to Grain

Input (N) PLYWD GUSSET TO (E) 2x10 BOTTOM CHORD

Input	Strong-Drive® WSV SUBFLOOR Screw
Design Method	Allowable Stress Design (ASD)
Code	NDS 2012/2015/2018
Main Member Thickness, t_m (in)	1.5
Side Member Thickness, t_s (in)	0.71
Dowel Length, l (in)	2.0
Main Member Bearing Angle, θ_m (deg)	0
Side Member Bearing Angle, θ_s (deg)	0
Main Member Specific Gravity, G_m (deg)	0.5
Side Member Specific Gravity, G_s (deg)	0.5
Actual Diameter, D (in)	0.132
Load (lb)	4750
Load Duration Factor, C_D	1.25
Temperature Factor, C_t	1
Wet Service, C_M	1
End Grain Factor, C_{eg}	1

Fastener Designer: Solutions Report

Report Generated: August 28, 2023

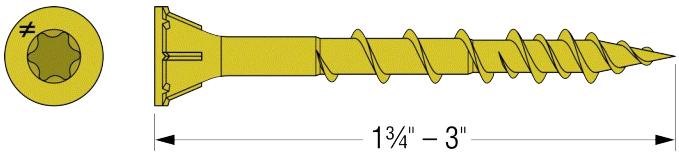
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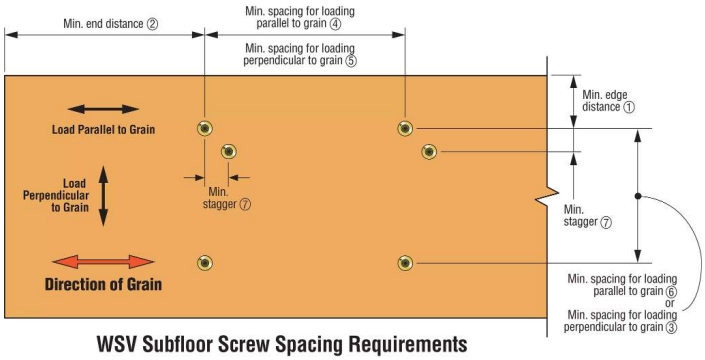
Yield Mode	Yield Limit Equation	Strong-Drive® WSV SUBFLOOR Screw	
		Yield Limit, Z	Reduction Term, R_D
Mode I_m	$Z = \frac{Dl_m F_{em}}{R_d}$	Z = 276 lb	R_D = 2.2
Mode I_s	$Z = \frac{Dl_s F_{es}}{R_d}$	Z = 170 lb	R_D = 2.2
Mode II	$Z = \frac{k_1 Dl_s F_{es}}{R_d}$	Z = 97 lb	R_D = 2.2
Mode III_m	$Z = \frac{k_2 Dl_m F_{em}}{(1+2R_e)R_d}$	Z = 110 lb	R_D = 2.2
Mode III_s	$Z = \frac{k_3 Dl_s F_{em}}{(2+R_e)R_d}$	Z = 84 lb	R_D = 2.2
Mode IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	Z = 102 lb	R_D = 2.2
Minimum Yield Value		Z = 84 lb	
Adjusted Yield Value		Z = 105 lb	
Total Adjusted Yield Value		Z = 4830 lb	

Solution

(N) PLYWD GUSSET TO (E) 2x10 BOTTOM CHORD

Supply (46) #9 x 2" Strong-Drive® WSV SUBFLOOR Screws WSV2S





WSV Subfloor Screw Spacing Requirements

WSV Subfloor Screw Spacing Requirements

Condition	Direction of Load to Grain	ID	Minimum Distance or Spacing (in.)	
			G < 0.50	G ≥ 0.50
Edge Distance	Perpendicular	①	1½	1½
	Parallel	①	1	1½
End Distance	Perpendicular	②	2	2¾
	Parallel	②	2¾	3
Spacing Between Fasteners in a Row	Perpendicular	③	1	1½
	Parallel	④	2¾	2¾
Spacing Between Rows of Fasteners	Perpendicular	⑤	2	2
	Parallel	⑥	1	1½
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	½	¾

1. For axial loading only, use the following minimum dimensions: end distance = 1⅞", edge distance = ¾", spacing parallel to grain = 1⅜", spacing perpendicular to grain = ¾".

Strong-Drive® WSV SUBFLOOR Screw

Notes:

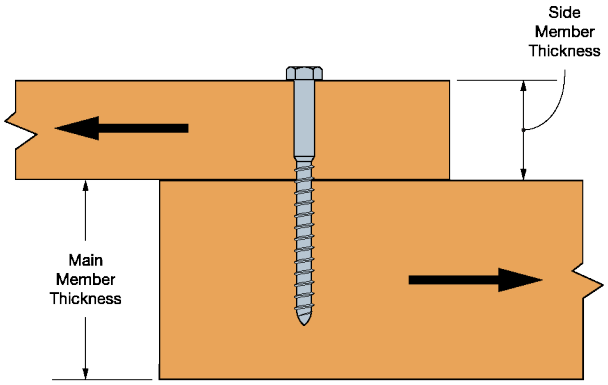
1. Table values are based on attachment of a 1 1/2" side member to a 1 1 / 2" main member of the same species and grade.
2. Table values are based on the 2018 NDS, CD = 1.0. Values shall be multiplied by all applicable factors, such as duration of load, etc., except where noted.
3. Specific Gravities (G) assumed: DFL G = 0.50, SP G = 0.55, SPF G = 0.42.
4. The spacing of applied uniform loads to a multi-ply member shall not exceed 24 inches on center.
5. Adjusted yield value includes the adjustment factors selected above.
6. For all other general information refer to the Fastening Systems Catalog

Codes/Standards: Click Here

Product Information: Strong-Drive WSV SUBFLOOR Screw

Fastener Designer: Solutions Report

Report Generated: August 28, 2023



Lateral Load Parallel to Grain

Input (E) 2x10 WEB TO (E) (2) 2x10 TOP & BOTTOM CHORDS

Input	Strong-Drive® SDWS TIMBER Screw
Design Method	Allowable Stress Design (ASD)
Code	NDS 2012/2015/2018
Main Member Thickness, t_m (in)	1.5
Side Member Thickness, t_s (in)	1.5
Dowel Length, l (in)	3.0
Main Member Bearing Angle, θ_m (deg)	0
Side Member Bearing Angle, θ_s (deg)	0
Main Member Specific Gravity, G_m (deg)	0.5
Side Member Specific Gravity, G_s (deg)	0.5
Actual Diameter, D (in)	0.315
Load (lb)	1850
Load Duration Factor, C_D	1.25
Temperature Factor, C_t	1
Wet Service, C_M	1
End Grain Factor, C_{eg}	1

Calculation

Calculation	Strong-Drive® SDWS TIMBER Screw
Dowel Root Diameter, D_r (in)	0.203
Main Member Dowel Bearing Length, l_m (in)	1.185
Side Member Dowel Bearing Length, l_s (in)	1.500
Main Member Dowel Bearing Strength, F_{em} (psi)	4637
Side Member Dowel Bearing Strength, F_{es} (psi)	4637
Dowel Bending Yield Strength, F_{yb} (psi)	160000
$R_e = \frac{F_{em}}{F_{es}}$	1
$R_t = \frac{l_m}{l_s}$	0.79
$k_1 = \frac{\sqrt{R_e + 2R_e^2(1 + R_t + R_t^2) + R_t^2 R_e^3} - R_e(1 + R_t)}{1 + R_e}$	0.38
$k_2 = -1 + \sqrt{2(1 + R_e) + \frac{2F_{yb}(1 + 2R_e)D^2}{3F_{em}l_m^2}}$	1.45
$k_3 = -1 + \sqrt{\frac{2(1 + R_e)}{R_e} + \frac{2F_{yb}(2 + R_e)D^2}{3F_{em}l_s^2}}$	1.29

Penetration Check

Penetration Check Detail	Strong-Drive® SDWS TIMBER Screw
Penetration, p (in)	1.18
Minimum Penetration Requirement, P_{min} (in)	6D = 1.89
Minimum Penetration Requirement Met	No

End/Edge Distance and Spacing

End Distance, Edge Distance, and Spacing	Strong-Drive® SDWS TIMBER Screw
	See figure below the fastener image for end distance, edge distance, and spacing requirements

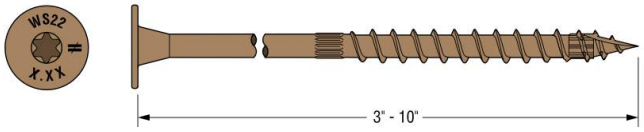
Calculated Reference Design Value

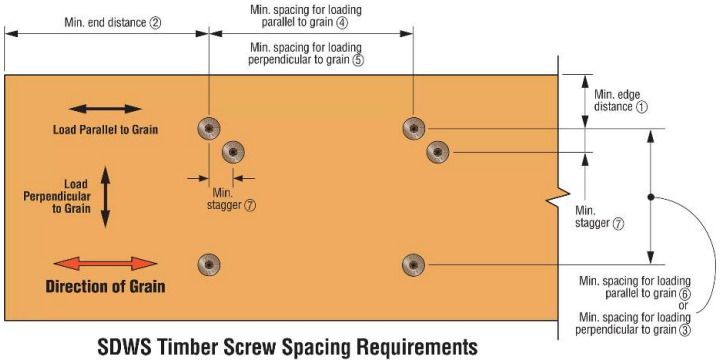
Yield Mode	Yield Limit Equation	Strong-Drive® SDWS TIMBER Screw	
		Yield Limit, Z	Reduction Term, R_D
Mode I_m	$Z = \frac{Dl_m F_{em}}{R_d}$	Z = 441 lb	R_D = 2.5
Mode I_s	$Z = \frac{Dl_s F_{es}}{R_d}$	Z = 558 lb	R_D = 2.5
Mode II	$Z = \frac{k_1 Dl_s F_{es}}{R_d}$	Z = 209 lb	R_D = 2.5
Mode III_m	$Z = \frac{k_2 Dl_m F_{em}}{(1+2R_e)R_d}$	Z = 214 lb	R_D = 2.5
Mode III_s	$Z = \frac{k_3 Dl_s F_{em}}{(2+R_e)R_d}$	Z = 241 lb	R_D = 2.5
Mode IV	$Z = \frac{D^2}{R_d}\sqrt{\frac{2F_{em}F_{yb}}{3(1+R_e)}}$	Z = 256 lb	R_D = 2.5
Minimum Yield Value		N/A	
Tested Yield Value		Z = 255 lb	
Adjusted Yield Value		Z = 319 lb	
Total Adjusted Yield Value		Z = 1914 lb	

Solution

(E) 2x10 WEB TO (E) (2) 2x10 TOP & BOTTOM CHORDS

Supply (6) 0.22" × 3" Strong-Drive® SDWS TIMBER Screws SDWS22300DB





SDWS Timber Screw Spacing Requirements

SDWS Timber Screw Spacing Requirements

Condition	Direction of Load to Grain	ID	Minimum Distance or Spacing (in.)
Edge Distance	Perpendicular	①	1 7/16
	Parallel	①	1 7/16
End Distance	Perpendicular	②	6
	Parallel	②	6
Spacing Between Fasteners in a Row	Perpendicular	③	4
	Parallel	④	8
Spacing Between Rows of Fasteners	Perpendicular	⑤	4
	Parallel	⑥	4
Spacing Between Staggered Rows	Perpendicular or Parallel	⑦	5/8

1. For axial loading only, use the following minimum dimensions: end distance = 3¼", edge distance = 1⅜", spacing parallel to grain = 2½", spacing perpendicular to grain = 1⅜".

Strong-Drive® SDWS TIMBER Screw

Double-barrier coating provides corrosion resistance equivalent to hot-dip galvanization, making it suitable for certain exterior and preservative-treated wood applications, as described in the evaluation report.

Notes:

1. Loads are based on installation into side grain of the wood with the screw axis perpendicular to the face of the member.
2. Adjusted yield value includes the adjustment factors selected above.
3. The tested yield value is based on testing conducted in accordance with AC233. It is the average ultimate test value divided by 5. If no testing was done for the selected thickness then the minimum yield value is calculated based on National Design Specification for Wood Construction.
4. View our literature for more information on ledger connections
5. For all other general information refer to the Fastening Systems Catalog.

Codes/Standards: Click Here

BrokawDesign

www.BrokawDesign.com

(415) 999-0323
tim.lengyel@brokawdesign.com

PROJECT: CAMP ROBERTS B7020

TITLE: -----

SHEET NO.: ----- OF -----

BY: TFL DATE: 2023

SCALE: -----

REFERENCE GEOTECH REPORT FROM NEARBY PROJECT

Earth Systems
4378 Old Santa Fe Road | San Luis Obispo, CA 93401 | Ph: 805.544.3276 | www.earthsystems.com

December 30, 2020

FILE NO.: 303212-002

Mr. John Evans
Cannon
1050 Southwood Drive
San Luis Obispo, CA 93401

PROJECT: CAMP ROBERTS GYM PARKING LOT
CALIFORNIA BOULEVARD
CAMP ROBERTS, CALIFORNIA

SUBJECT: Geotechnical Recommendations for Pavement Reconstruction

REF: Task Order for Consulting Services, Camp Roberts Gym Parking Lot Improvements, Project Number 150117.23, dated October 16, 2020

Dear Mr. Evans:

Earth Systems is pleased to present this report of geotechnical recommendations for pavement reconstruction for the for use in the development of plans and specifications for the planned Camp Roberts Gym Parking Lot Improvements project. These recommendations are based upon our subsurface investigation performed in November 2020, laboratory testing of samples obtained during the investigation, and our subsequent analysis of the data. Results of subsurface exploration and laboratory testing are presented herein.

INTRODUCTION AND SCOPE OF SERVICES

This project will involve the reconstruction of the existing asphalt parking lot behind the gym which runs from New Mexico Avenue to California Boulevard at Camp Roberts, California as shown in the attached Site Vicinity Map. Currently, the parking lot is surfaced with asphalt concrete and has concrete curbs around the perimeter and around isolated landscape areas in the southern portion of the site.

The scope of work for this project included general site reconnaissance by the project engineer, subsurface exploration, laboratory testing, analysis of the data obtained, and preparation of this report. Four borings were drilled to depths of five feet across the parking lot as indicated on the attached Exploration Location Map. Boring logs are also attached. Bulk samples were tested for R-value and evaluated for unconfined compressive strength after being treated with cement.

CONCLUSIONS AND RECOMMENDATIONS

The borings encountered sandy lean clay and clayey sand with variable amounts of gravel beneath the 1.5 to 2.0 inches of existing asphalt concrete (AC). No aggregate base layer was encountered in borings 1 and 3, but 4.0 and 2.0 inches of aggregate base were found in borings 3 and 4, respectively. Soil samples were visually identified in general accordance with the Unified Soil Classification System and ASTM D 2488-17.

Laboratory test results for the Moisture-Density Compaction Tests (ASTM D 1557-12) and R-value test, or resistance to deformation under repeated loading (ASTM D2844/D2844M-13), are attached to this report. The R-value test yielded a result of 9. In addition, a portion of the bulk sample from

boring 2 was treated with cement and recompacted. After curing for seven days, unconfined compression testing was performed on the treated samples to determine a percentage of cement for use with Full Depth Reclamation with Cement (FDR-C).

Pavement sections for both hot mix asphalt (HMA) over Class II Aggregate Base (AB) and HMA over FDR-C were calculated for typical 20-year design life based upon the Caltrans Highway Design Manual (HDM) , the laboratory test results for R-value, and various Traffic Indexes ranging from 4.0 to 9.0. Further, the Uniform Facilities Criteria (UFC) recommends a minimum of a 25-year design life; therefore, we have also provided recommendations for 25 year, or greater, designs in accordance with the 2018 HDM.

Pavement Sections

Hot Mix Asphalt Over Aggregate Base

Parking lot areas should be excavated to subgrade elevation, scarified, and recompacted to 95 percent of the maximum dry density (per ASTM D 1557) of the soil. Aggregate base should then be placed in lifts with a maximum thickness of 8 inches and compacted to 95 percent of maximum dry density (per ASTM D 1557). Further, aggregate base should conform to the requirements of Section 26 of the 2018 Caltrans Standard Specifications and be firm and unyielding after compaction.

HMA should be placed in lifts not exceeding 3 inches and should be a Type A HMA conforming to the 2018 Caltrans Standard Specifications. For 20-year pavements, PG 64-10 binder is recommended; PG 64-28 PM is recommended for design lives greater than 20 years. In addition, as Subgrade Enhancement Geotextile (SEG), class B1 per section 96-1.02 of the 2018 Caltrans Standard Specifications, should be placed on the compacted subgrade of extended life pavement areas.

The following tables show recommended HMA Pavement Sections for several traffic indexes.

20-Year Design Life HMA/AB Pavement Sections		
Traffic Index	HMA (in)	Class II AB (in)
4.0	2.25	7.00
4.5	2.50	8.00
5.0	2.75	9.00
5.5	3.00	10.50
6.0	3.25	11.50
6.5	3.75	12.50
7.0	4.00	13.50
7.5	4.25	15.00
8.0	4.50	16.00
8.5	5.00	17.00
9.0	5.25	18.00

25^{+}-Year Design Life HMA/AB Pavement Sections		
Traffic Index	HMA (in)	Class II AB (in)
4.0	3.25	7.00
4.5	3.50	8.00
5.0	3.75	9.00
5.5	4.00	10.50
6.0	4.25	11.50
6.5	4.75	12.50
7.0	5.00	13.50
7.5	5.25	15.00
8.0	5.50	16.00
8.5	6.00	17.00
9.0	6.25	18.00

Hot Mix Asphalt Over Full Depth Reclamation with Cement

The most cost-effective use of FDR-C would be to treat the entire existing section, including the AC. If maintaining the elevation of the existing parking lot surface is critical, the AC and upper aggregate or subgrade could be removed to the planned bottom of HMA elevation. The entire parking lot should be initially processed to the full depth of the planned treated section. Cement should then be spread at a rate of four percent by dry weight with the site soil being assumed to have a dry weight of 120 pcf. The cement should then be mixed, and moisture conditioned to between optimum moisture content and two percent above optimum (per ASTM D 1557). The treated parking lot should then be compacted to a minimum of 97 percent relative compaction (per CTM 216/231).

HMA should be placed in lifts not exceeding 3 inches and should be a Type A HMA conforming to the 2018 Caltrans Standard Specifications. For 20-year pavements, PG 64-10 binder is recommended; PG 64-28 PM is recommended for design lives greater than 20 years.

The following tables show recommended HMA Pavement Sections for several traffic indexes.

20 Year Design Life HMA/FDR-C Pavement Sections		
Traffic Index	HMA (in)	FDR-C (in)
4.0	2.00	7.50
4.5	2.25	8.50
5.0	2.50	9.50
5.5	2.75	11.00
6.0	3.00	12.00
6.5	3.25	13.50
7.0	3.50	14.50
7.5	3.75	16.00
8.0	4.00	17.00
8.5	4.50	18.00
9.0	5.00	18.00

25 Year Design Life HMA/FDR-C Pavement Sections		
Traffic Index	HMA (in)	FDR-C (in)
4.0	3.00	7.50
4.5	3.25	8.50
5.0	3.50	9.50
5.5	3.75	11.00
6.0	4.00	12.00
6.5	4.25	13.50
7.0	4.50	14.50
7.5	4.75	16.00
8.0	5.00	17.00
8.5	5.50	18.00
9.0	6.00	18.00

General

Maintenance of drainage and other improvements is critical to the long-term stability and integrity of the parking lot improvements. Finished surfaces should be sloped to freely drain toward appropriate drainage facilities. Water should not be allowed to stand or pond on or adjacent to foundations. Where practical, pavement edges should be restrained and set back from descending slopes and infiltration facilities to improve the life. Subgrade and aggregate base should be firm and unyielding when proofrolled with heavy, rubber-tired grading equipment prior to continuing construction.

Utility Trenches

A select, noncorrosive, easily compacted sand should be used as bedding and shading immediately around utilities. In general, trench backfill should be compacted a minimum of 90 percent of maximum dry density. Aggregate base and the upper foot of subgrade soils beneath pavement should be compacted a minimum of 95 percent of maximum dry density. Prior to applying compactive effort, soils should be moisture conditioned to at least optimum moisture. Trench backfill should be placed in level lifts not exceeding 6 inches in loose thickness and compacted to the minimums recommended above.

The recommendations of this section are minimums only and may be superseded by the recommendations of pipe manufacturers or utility companies, or the requirements of the governing jurisdiction.

We appreciate the opportunity to have provided professional services for this project and look forward to working with you again in the future. If there are any questions concerning this report, please do not hesitate to contact the undersigned.

Sincerely,

Earth Systems Pacific

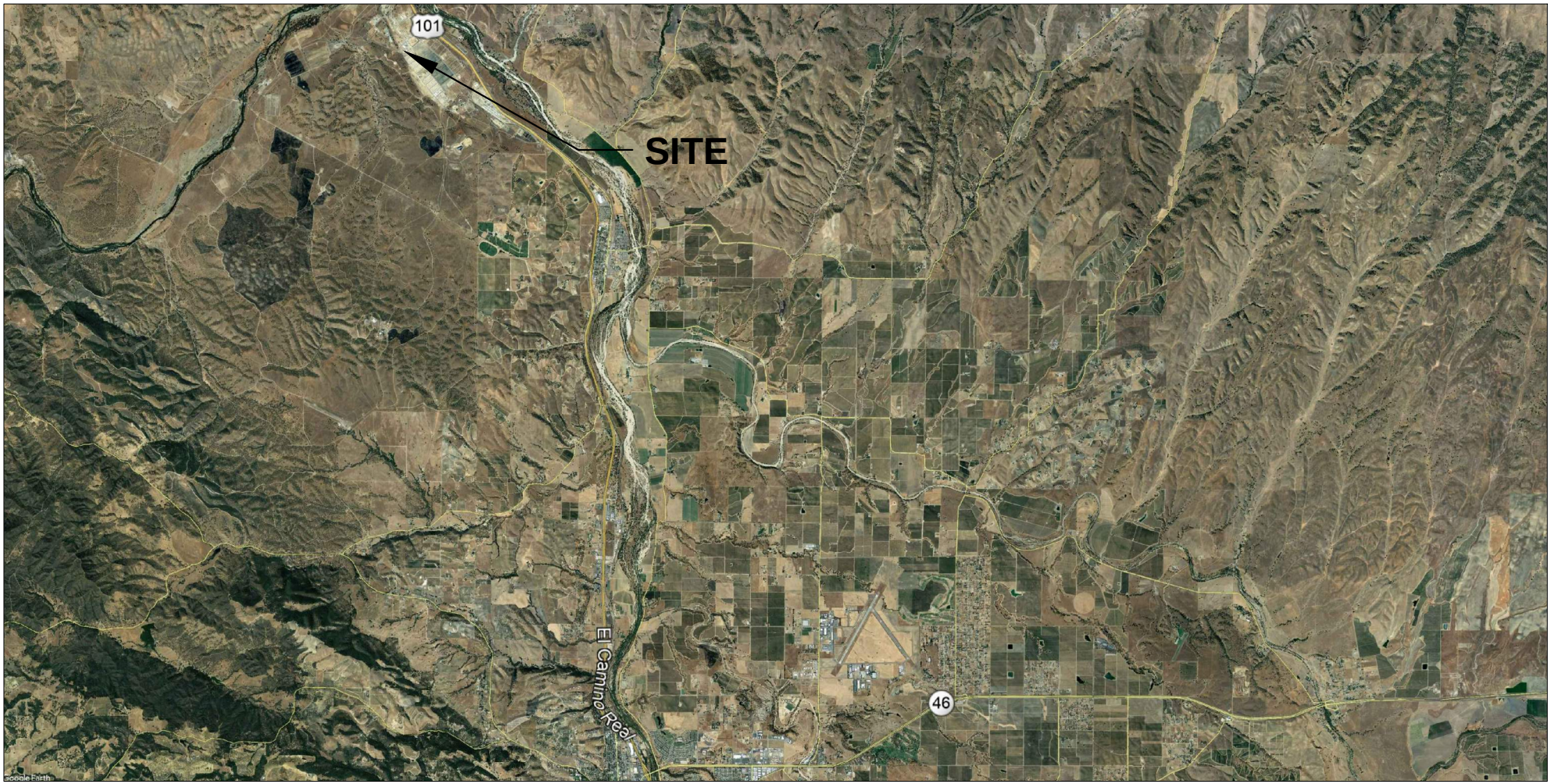


Robert Down, PE
Associate Engineer

Sydney Johnson
Project Manager

Attachments: Site Vicinity Map (1 page)
Exploration Location Map (1 page)
Boring Log Legend (1 page)
Boring Logs (4 pages)
Laboratory Test Results (3 pages)

Doc. No.: 2012-074.SER/pm



N

BASE MAP PROVIDED BY: GOOGLE EARTH (2020)

NOT TO SCALE

Earth Systems Pacific
4378 Old Santa Fe Road, San Luis Obispo, CA 93401
www.earthsystems.com
(805) 544-3276 ● Fax (805) 544-1786

SITE VICINITY MAP

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

Date
December 2020

Project No.
303212-002

Figure 1

303212--002CAMPROBERTSGYMNASIUMPARKINGAREA120820maps.dwg



LEGEND

B1 Boring Location (Approx.)

BASE MAP PROVIDED BY: GOOGLE EARTH (2020)

NOT TO SCALE

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4378 Old Santa Fe Road, San Luis Obispo, CA 93401
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EXPLORATION LOCATION MAP

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

Date
December 2020

Project No.
303212-002

Figure 2

303212--002CAMPROBERTSGYMNASIUMPARKINGAREA120820maps.dwg

Earth Systems Pacific

BORING LOG LEGEND

SAMPLE / SUBSURFACE WATER SYMBOLS	GRAPH. SYMBOL
CALIFORNIA MODIFIED	
STANDARD PENETRATION TEST (SPT)	
SHELBY TUBE	
BULK	
SUBSURFACE WATER DURING DRILLING	
SUBSURFACE WATER AFTER DRILLING	

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

MAJOR DIVISIONS	GROUP SYMBOL	TYPICAL DESCRIPTIONS	GRAPH. SYMBOL
COARSE GRAINED SOILS (MORE THAN HALF OF MATERIAL IS LARGER THAN #200 SIEVE SIZE)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GP	POORLY GRADED GRAVELS, OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
	GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES, NON-PLASTIC FINES	
	GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES, PLASTIC FINES	
	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
	SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES	
	SM	SILTY SANDS, SAND-SILT MIXTURES, NON-PLASTIC FINES	
	SC	CLAYEY SANDS, SAND-CLAY MIXTURES, PLASTIC FINES	
FINE GRAINED SOILS (HALF OR MORE OF MATERIAL IS SMALLER THAN #200 SIEVE SIZE)	ML	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
	CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS	
	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	PT	PEAT AND OTHER HIGHLY ORGANIC SOILS	

OBSERVED MOISTURE CONDITION

DRY	SLIGHTLY MOIST	MOIST	VERY MOIST	WET (SATURATED)

CONSISTENCY

COARSE GRAINED SOILS			FINE GRAINED SOILS		
BLOWS/FOOT		DESCRIPTIVE TERM	BLOWS/FOOT		DESCRIPTIVE TERM
SPT	CA SAMPLER		SPT	CA SAMPLER	
0-10	0-16	LOOSE	0-2	0-3	VERY SOFT
11-30	17-50	MEDIUM DENSE	3-4	4-7	SOFT
31-50	51-83	DENSE	5-8	8-13	MEDIUM STIFF
OVER 50	OVER 83	VERY DENSE	9-15	14-25	STIFF
			16-30	26-50	VERY STIFF
			OVER 30	OVER 50	HARD

GRAIN SIZES

U.S. STANDARD SERIES SIEVE				CLEAR SQUARE SIEVE OPENING		
# 200	# 40	# 10	# 4	3/4"	3"	12"

SILT & CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

TYPICAL BEDROCK HARDNESS

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
EXTREMELY HARD	CORE, FRAGMENT, OR EXPOSURE CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CAN ONLY BE CHIPPED WITH REPEATED HEAVY HAMMER BLOWS
VERY HARD	CANNOT BE SCRATCHED WITH KNIFE OR SHARP PICK; CORE OR FRAGMENT BREAKS WITH REPEATED HEAVY HAMMER BLOWS
HARD	CAN BE SCRATCHED WITH KNIFE OR SHARP PICK WITH DIFFICULTY (HEAVY PRESSURE); HEAVY HAMMER BLOW REQUIRED TO BREAK SPECIMEN
MODERATELY HARD	CAN BE GROOVED 1/16 INCH DEEP BY KNIFE OR SHARP PICK WITH MODERATE OR HEAVY PRESSURE; CORE OR FRAGMENT BREAKS WITH LIGHT HAMMER BLOW OR HEAVY MANUAL PRESSURE
SOFT	CAN BE GROOVED OR GOUGED EASILY BY KNIFE OR SHARP PICK WITH LIGHT PRESSURE, CAN BE SCRATCHED WITH FINGERNAIL; BREAKS WITH LIGHT TO MODERATE MANUAL PRESSURE
VERY SOFT	CAN BE READILY INDENTED, GROOVED OR GOUGED WITH FINGERNAIL, OR CARVED WITH KNIFE; BREAKS WITH LIGHT MANUAL PRESSURE

TYPICAL BEDROCK WEATHERING

MAJOR DIVISIONS	TYPICAL DESCRIPTIONS
UNWEATHERED	NO DISCOLORATION, NOT OXIDIZED
SLIGHTLY WEATHERED	DISCOLORATION OR OXIDATION IS LIMITED TO SURFACE OF, OR SHORT DISTANCE FROM, FRACTURES: SOME FELDSPAR CRYSTALS ARE DULL
MODERATELY WEATHERED	DISCOLORATION OR OXIDATION EXTENDS FROM FRACTURES, USUALLY THROUGHOUT; Fe-Mg MINERALS ARE "RUSTY", FELDSPAR CRYSTALS ARE "CLOUDY"
HIGHLY WEATHERED	DISCOLORATION OR OXIDATION THROUGHOUT; FELDSPAR AND Fe-Mg MINERALS ARE ALTERED TO CLAY TO SOME EXTENT, OR CHEMICAL ALTERATION PRODUCES IN SITU DISAGGREGATION
DECOMPOSED	DISCOLORATION OR OXIDATION THROUGHOUT, BUT RESISTANT MINERALS SUCH AS QUARTZ MAY BE UNALTERED; FELDSPAR AND Fe-Mg MINERALS ARE COMPLETELY ALTERED TO CLAY

drafting/masters/Boring Log Legend 062719.dwg

Earth Systems Pacific

Boring No. 1

LOGGED BY: S. Hemmer
DRILL RIG: SIMCO
AUGER TYPE: 6" Solid Stem

JOB NO.: 303212-002
DATE: 11/23/2020

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			1.75" AC / NO BASE					
1 - 4	SC		CLAYEY SAND WITH GRAVEL: light brown, dense, slightly moist					
5			End of Boring @ 5.0' No subsurface water encountered					
6 - 26								

LEGEND: ■ Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 2

LOGGED BY: S. Hemmer
DRILL RIG: SIMCO
AUGER TYPE: 6" Solid Stem

JOB NO.: 303212-002
DATE: 11/23/2020

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	2.0" AC / NO BASE					
1 - 5	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist	1.0 - 5.0	◯			
5			End of Boring @ 5.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 3

LOGGED BY: S. Hemmer
DRILL RIG: SIMCO
AUGER TYPE: 6" Solid Stem

JOB NO.: 303212-002
DATE: 11/23/2020

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0			1.5" AC / 4.0" BASE					
1	SC		CLAYEY SAND: brown, medium dense, moist					
5			End of Boring @ 5.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ○ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Earth Systems Pacific

Boring No. 4

LOGGED BY: S. Hemmer
DRILL RIG: SIMCO
AUGER TYPE: 6" Solid Stem

JOB NO.: 303212-002
DATE: 11/23/2020

Camp Roberts Gymnasium Parking Area
New Mexico Avenue
Camp Roberts, California

DEPTH (feet)	USCS CLASS	SYMBOL	SOIL DESCRIPTION	SAMPLE DATA: INTERVAL (feet)	SAMPLE TYPE	DRY DENSITY (pcf)	MOISTURE (%)	BLOWS PER 6 IN.
0		■	1.75" AC / 2.0" BASE					
1	CL	▨	SANDY LEAN CLAY: brown, medium stiff, moist	1.0 - 5.0	◯			
5			End of Boring @ 5.0' No subsurface water encountered					

LEGEND: ■ Ring Sample ◯ Grab Sample ▭ Shelby Tube Sample ● SPT

NOTE: This log of subsurface conditions is a simplification of actual conditions encountered. It applies at the location and time of drilling. Subsurface conditions may differ at other locations and times.

Camp Roberts
Gym Parking Lot

303212-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

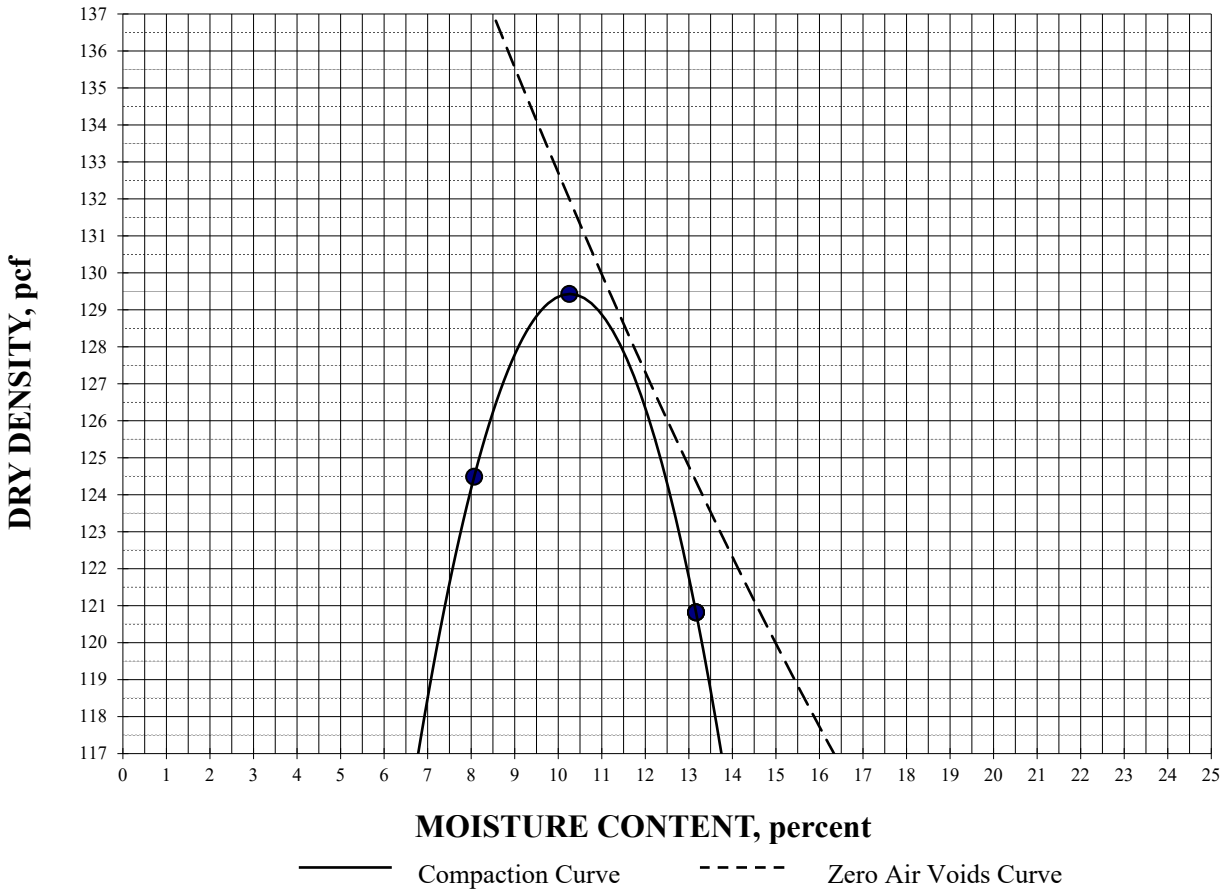
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

December 21, 2020
Boring #4 @ 1.0 - 5.0'
Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 129.4 pcf
OPTIMUM MOISTURE: 10.3%



Camp Roberts
Gym Parking Lot

303212-002

MOISTURE-DENSITY COMPACTION TEST

ASTM D 1557-12 (Modified)

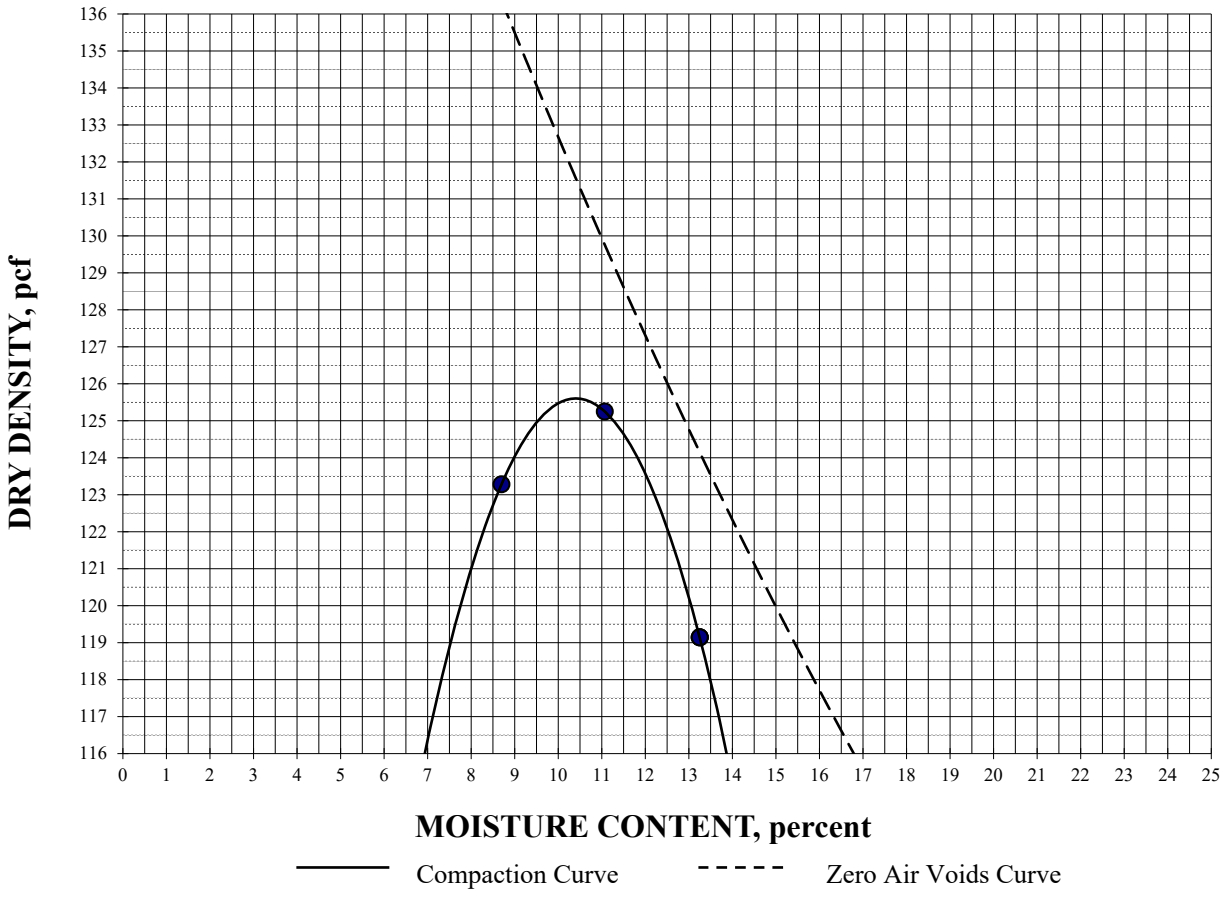
PROCEDURE USED: A
PREPARATION METHOD: Moist
RAMMER TYPE: Mechanical
SPECIFIC GRAVITY: 2.70 (assumed)

December 21, 2020
Boring #2 @ 1.0 - 5.0'
Brown Sandy Lean Clay (CL)

SIEVE DATA:

Sieve Size	% Retained (Cumulative)
3/4"	0
3/8"	0
#4	0

MAXIMUM DRY DENSITY: 125.6 pcf
OPTIMUM MOISTURE: 10.4%



Camp Roberts
Gym Parking Lot

303212-002

RESISTANCE '*R* ' VALUE AND EXPANSION PRESSURE

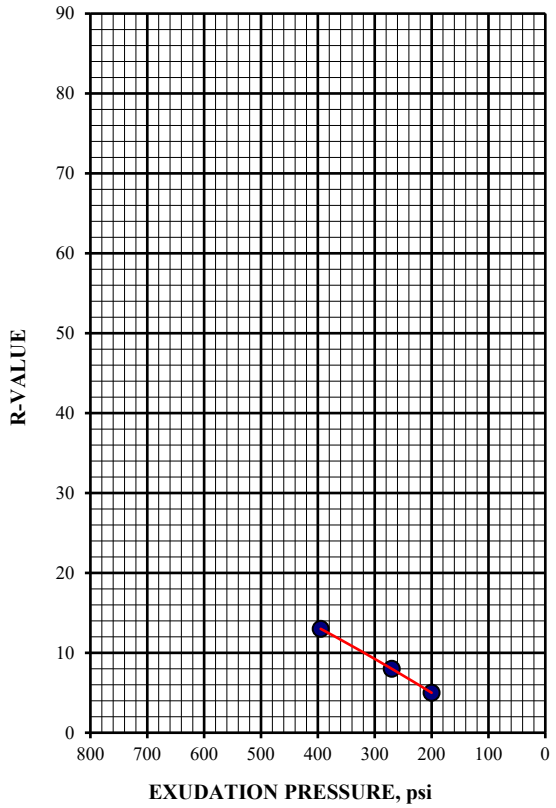
ASTM D 2844/D2844M-18

December 21, 2020

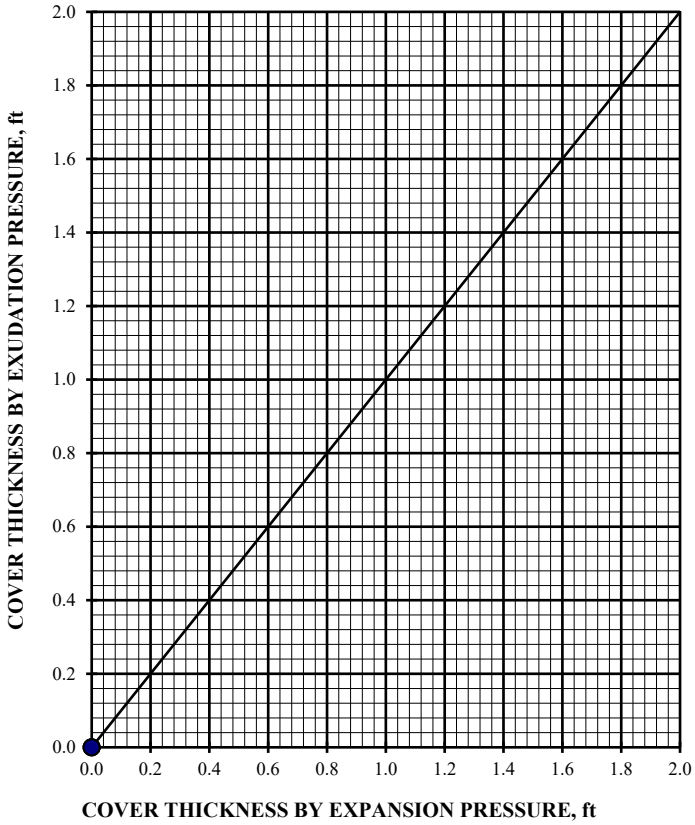
Boring #4 @ 1.0 - 5.0'
Brown Sandy Lean Clay (CL)

Dry Density @ 300 psi Exudation Pressure: 119.8-pcf
%Moisture @ 300 psi Exudation Pressure: 15.4%
R-Value - Exudation Pressure: 9
R-Value - Expansion Pressure: N/A
R-Value @ Equilibrium: 9

EXUDATION PRESSURE CHART



EXPANSION PRESSURE CHART



Attachment G
Heating Load Calculations

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CMD Camp Roberts B7020

Location	**CMD Camp Roberts B7020**
Building owner	**CMD**
Program user	**HAFIZULLAH NOORI**
Company	**YEI ENGINEERS INC**
Comments	

By	**YEI Engineers Inc.**
Dataset name	**F:\X_Projects\2021\2111-PM-JCA Cal Guard IDIQ\2111C-PM-Cal Guard Camp Roberts B7020 Renovation\02_Documents\04_Calculations\Mechanical\L**
Calculation time	**04:24 PM on 03/30/2023**
TRACE® 700 version	**6.3.5**

Location	**Paso Robles, California**	
Latitude	**35.0**	**deg**
Longitude	**120.0**	**deg**
Time Zone	**8**	
Elevation	**765**	**ft**
Barometric pressure	**29.1**	**in. Hg**
Air density	**0.0738**	**lb/cu ft**
Air specific heat	**0.2444**	**Btu/lb·°F**
Density-specific heat product	**1.0829**	**Btu/h·cfm·°F**
Latent heat factor	**4,766.9**	**Btu·min/h·cu ft**
Enthalpy factor	**4.4302**	**lb·min/hr·cu ft**
Summer design dry bulb	**104.0**	**°F**
Summer design wet bulb	**67.5**	**°F**
Winter design dry bulb	**27.0**	**°F**
Summer clearness number	**1.05**	
Winter clearness number	**0.95**	
Summer ground reflectance	**0.20**	
Winter ground reflectance	**0.20**	
Carbon Dioxide Level	**400**	**ppm**
Design simulation period	**July - July**	
Cooling load methodology	**TETD-TA1**	
Heating load methodology	**UATD**	

System Checksums

By YEI Engineers Inc.

Gas Fired Package ACU-1

System 3 - 2007/2010 - Packaged Rooftop Air Conditioner

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	1,013	0	1,013	2
Glass Solar	7,896	0	7,896	15
Glass/Door Cond	1,625	0	1,625	3
Wall Cond	9,010	0	9,010	17
Partition/Door	1,324		1,324	3
Floor	317		317	1
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	21,185	0	21,185	41
Internal Loads				
Lights	4,725	0	4,725	9
People	11,006	0	11,006	21
Misc	6,236	0	6,236	12
Sub Total ==>	21,966	0	21,966	43
Ceiling Load	0	0	0	0
Ventilation Load	0	0	8,027	16
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	415		415	1
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	43,566	0	51,593	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	1,013	3
Glass Solar	7,896	20
Glass/Door Cond	1,625	4
Wall Cond	9,010	23
Partition/Door	1,324	3
Floor	316.97	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	21,185	54
Internal Loads		
Lights	4,725	12
People	6,566	17
Misc	6,236	16
Sub Total ==>	17,527	45
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	415	1
Grand Total ==>	39,127	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-1,355	-1,355	2.90
Glass Solar	0	0	0.00
Glass/Door Cond	-2,534	-2,534	5.43
Wall Cond	-3,774	-3,774	8.09
Partition/Door	-2,947	-2,947	6.31
Floor	-3,660	-3,660	7.84
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-14,271	-14,271	30.57
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-17,757	38.04
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-14,649	-14,649	31.38
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-28,920	-46,677	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	84.6	57.6
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	1,571	1,571
Terminal	1,571	1,571
Main Fan	1,571	1,571
Sec Fan	0	0
Nom Vent	400	400
AHU Vent	400	400
Infil	0	0
MinStop/Rh	0	0
Return	1,571	1,571
Exhaust	400	400
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	25.5	25.5
cfm/ft²	1.25	1.25
cfm/ton	304.90	
ft²/ton	243.97	
Btu/hr·ft²	49.19	-49.11
No. People	27	

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	5.2	61.8	50.4	1,571	84.6	62.8	53.3	55.0	48.7	42.5
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	5.2	61.8								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	1,257		
Part	220		
Int Door	1		
ExFlr	992		
Roof	1,257	0	0
Wall	1,294	99	8
Ext Door	21	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-61.7	1,571	53.5	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-61.7			

Room Checksums

By YEI Engineers Inc.

Breack Room

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	36	0	36	1
Glass Solar	0	0	0	0
Glass/Door Cond	0	0	0	0
Wall Cond	1,405	0	1,405	30
Partition/Door	0		0	0
Floor	27		27	1
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	1,468	0	1,468	32
Internal Loads				
Lights	237	0	237	5
People	1,540	0	1,540	33
Misc	263	0	263	6
Sub Total ==>	2,039	0	2,039	44
Ceiling Load	0	0	0	0
Ventilation Load	0	0	1,103	24
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	3,507	0	4,610	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	36	1
Glass Solar	0	0
Glass/Door Cond	0	0
Wall Cond	1,405	48
Partition/Door	0	0
Floor	26.73	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	1,468	50
Internal Loads		
Lights	237	8
People	943	32
Misc	263	9
Sub Total ==>	1,443	50
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	2,910	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-83	-83	1.76
Glass Solar	0	0	0.00
Glass/Door Cond	0	0	0.00
Wall Cond	-557	-557	11.82
Partition/Door	0	0	0.00
Floor	-284	-284	6.03
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-924	-924	19.60
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-2,564	54.38
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-1,227	-1,227	26.02
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-2,151	-4,715	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	90.9	47.7
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	117	117
Terminal	117	117
Main Fan	117	117
Sec Fan	0	0
Nom Vent	58	58
AHU Vent	58	58
Infil	0	0
MinStop/Rh	0	0
Return	117	117
Exhaust	58	58
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	49.4	49.4
cfm/ft²	1.52	1.52
cfm/ton	253.48	
ft²/ton	167.03	
Btu/hr·ft²	71.84	-70.42
No. People	3.9	50.0/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.5	5.5	4.5	117	90.9	64.7	52.1	55.0	47.8	39.4
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.5	5.5								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	77		
Part	0		
Int Door	1		
ExFlr	77		
Roof	77	0	0
Wall	177	0	0
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-5.4	117	47.7	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	-0.9	117	47.7	55.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-5.4			

Room Checksums

By YEI Engineers Inc.

CONFERENCE ROOM

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	101	0	101	1
Glass Solar	4,024	0	4,024	24
Glass/Door Cond	985	0	985	6
Wall Cond	1,695	0	1,695	10
Partition/Door	636		636	4
Floor	63		63	0
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	7,504	0	7,504	45
Internal Loads				
Lights	1,154	0	1,154	7
People	4,000	0	4,000	24
Misc	887	0	887	5
Sub Total ==>	6,041	0	6,041	36
Ceiling Load	0	0	0	0
Ventilation Load	0	0	3,038	18
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	13,544	0	16,582	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	101	1
Glass Solar	4,024	34
Glass/Door Cond	985	8
Wall Cond	1,695	14
Partition/Door	636	5
Floor	62.90	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	7,504	63
Internal Loads		
Lights	1,154	10
People	2,450	20
Misc	887	7
Sub Total ==>	4,491	37
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	11,994	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-280	-280	1.81
Glass Solar	0	0	0.00
Glass/Door Cond	-1,551	-1,551	9.99
Wall Cond	-690	-690	4.45
Partition/Door	-1,320	-1,320	8.50
Floor	-959	-959	6.18
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-4,801	-4,801	30.92
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-6,660	42.90
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-4,064	-4,064	26.18
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-8,866	-15,525	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	86.1	55.2
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	482	482
Terminal	482	482
Main Fan	482	482
Sec Fan	0	0
Nom Vent	150	150
AHU Vent	150	150
Infil	0	0
MinStop/Rh	0	0
Return	482	482
Exhaust	150	150
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	31.1	31.1
cfm/ft²	1.85	1.85
cfm/ton	290.42	
ft²/ton	156.79	
Btu/hr·ft²	76.53	-68.67
No. People	10.0	38.5/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	1.7	19.9	16.2	482	86.1	63.3	53.3	55.0	48.6	42.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.7	19.9								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	260		
Part	83		
Int Door	1		
ExFlr	260		
Roof	260	0	0
Wall	268	49	18
Ext Door	21	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-17.9	482	55.2	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-17.9			

Room Checksums

By YEI Engineers Inc.

Office Room#1

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	166	0	166	3
Glass Solar	968	0	968	19
Glass/Door Cond	160	0	160	3
Wall Cond	658	0	658	13
Partition/Door	0		0	0
Floor	35		35	1
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	1,987	0	1,987	38
Internal Loads				
Lights	375	0	375	7
People	1,200	0	1,200	23
Misc	683	0	683	13
Sub Total ==>	2,258	0	2,258	44
Ceiling Load	0	0	0	0
Ventilation Load	0	0	917	18
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	4,245	0	5,162	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	166	4
Glass Solar	968	26
Glass/Door Cond	160	4
Wall Cond	658	17
Partition/Door	0	0
Floor	34.71	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	1,987	53
Internal Loads		
Lights	375	10
People	735	19
Misc	683	18
Sub Total ==>	1,793	47
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Exhaust Heat		
OA Preheat Diff.		
RA Preheat Diff.		
Additional Reheat		
System Plenum Heat		
Underflr Sup Ht Pkup		
Supply Air Leakage		
Grand Total ==>	3,780	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-108	-108	2.25
Glass Solar	0	0	0.00
Glass/Door Cond	-246	-246	5.13
Wall Cond	-261	-261	5.45
Partition/Door	0	0	0.00
Floor	-369	-369	7.70
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-984	-984	20.53
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-1,998	41.70
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-1,810	-1,810	37.78
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-2,794	-4,792	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	85.7	55.8
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	152	152
Terminal	152	152
Main Fan	152	152
Sec Fan	0	0
Nom Vent	45	45
AHU Vent	45	45
Infil	0	0
MinStop/Rh	0	0
Return	152	152
Exhaust	45	45
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	29.7	29.7
cfm/ft²	1.52	1.52
cfm/ton	294.00	
ft²/ton	193.72	
Btu/hr·ft²	61.94	-55.11
No. People	3.0	30.0/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.5	6.2	5.1	152	85.7	63.2	53.4	55.0	48.6	42.1
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.5	6.2								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	100		
Part	0		
Int Door	1		
ExFlr	100		
Roof	100	0	0
Wall	95	12	13
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-5.5	152	55.8	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-5.5			

Room Checksums

By YEI Engineers Inc.

Office Room#2

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	166	0	166	3
Glass Solar	968	0	968	17
Glass/Door Cond	160	0	160	3
Wall Cond	1,045	0	1,045	19
Partition/Door	0		0	0
Floor	35		35	1
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	2,374	0	2,374	43
Internal Loads				
Lights	375	0	375	7
People	1,200	0	1,200	22
Misc	683	0	683	12
Sub Total ==>	2,258	0	2,258	41
Ceiling Load	0	0	0	0
Ventilation Load	0	0	928	17
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	4,632	0	5,560	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	166	4
Glass Solar	968	23
Glass/Door Cond	160	4
Wall Cond	1,045	25
Partition/Door	0	0
Floor	34.71	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	2,374	57
Internal Loads		
Lights	375	9
People	735	18
Misc	683	16
Sub Total ==>	1,793	43
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	4,167	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-108	-108	2.12
Glass Solar	0	0	0.00
Glass/Door Cond	-246	-246	4.84
Wall Cond	-597	-597	11.76
Partition/Door	0	0	0.00
Floor	-369	-369	7.27
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-1,320	-1,320	25.99
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-1,998	39.35
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-1,760	-1,760	34.66
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-3,080	-5,078	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	85.0	57.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	167	167
Terminal	167	167
Main Fan	167	167
Sec Fan	0	0
Nom Vent	45	45
AHU Vent	45	45
Infil	0	0
MinStop/Rh	0	0
Return	167	167
Exhaust	45	45
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	26.9	26.9
cfm/ft²	1.67	1.67
cfm/ton	300.88	
ft²/ton	179.85	
Btu/hr·ft²	66.72	-58.39
No. People	3.0	30.0/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.6	6.7	5.4	167	85.0	63.0	53.4	55.0	48.7	42.4
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.6	6.7								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	100		
Part	0		
Int Door	1		
ExFlr	100		
Roof	100	0	0
Wall	202	12	6
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-5.8	167	57.0	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-5.8			

Room Checksums

By YEI Engineers Inc.

Open Office

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	254	0	254	2
Glass Solar	1,936	0	1,936	12
Glass/Door Cond	320	0	320	2
Wall Cond	2,495	0	2,495	15
Partition/Door	493		493	3
Floor	97		97	1
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	5,596	0	5,596	34
Internal Loads				
Lights	2,046	0	2,046	12
People	3,066	0	3,066	19
Misc	3,720	0	3,720	23
Sub Total ==>	8,832	0	8,832	54
Ceiling Load	0	0	0	0
Ventilation Load	0	0	2,041	12
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	14,428	0	16,469	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	254	2
Glass Solar	1,936	15
Glass/Door Cond	320	2
Wall Cond	2,495	19
Partition/Door	493	4
Floor	97.18	1
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	5,596	43
Internal Loads		
Lights	2,046	16
People	1,703	13
Misc	3,720	28
Sub Total ==>	7,469	57
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	13,066	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-588	-588	4.14
Glass Solar	0	0	0.00
Glass/Door Cond	-492	-492	3.46
Wall Cond	-989	-989	6.97
Partition/Door	-954	-954	6.72
Floor	-1,033	-1,033	7.28
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-4,056	-4,056	28.58
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	-4,537	31.96
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-5,601	-5,601	39.46
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-9,657	-14,194	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	83.1	60.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	525	525
Terminal	525	525
Main Fan	525	525
Sec Fan	0	0
Nom Vent	102	102
AHU Vent	102	102
Infil	0	0
MinStop/Rh	0	0
Return	525	525
Exhaust	102	102
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	19.5	19.5
cfm/ft²	0.96	0.96
cfm/ton	318.53	
ft²/ton	330.93	
Btu/hr·ft²	36.26	-29.95
No. People	6.8	12.5/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	1.7	19.8	15.9	525	83.1	62.7	55.0	55.0	49.2	44.2
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	1.7	19.8								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	545		
Part	60		
Int Door	1		
ExFlr	280		
Roof	545	0	0
Wall	338	25	7
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-16.3	525	60.0	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-16.3			

Room Checksums

By YEI Engineers Inc.

Restroom 107

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	149	0	149	8
Glass Solar	0	0	0	0
Glass/Door Cond	0	0	0	0
Wall Cond	916	0	916	46
Partition/Door	195		195	10
Floor	31		31	2
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	1,290	0	1,290	65
Internal Loads				
Lights	276	0	276	14
People	0	0	0	0
Misc	0	0	0	0
Sub Total ==>	276	0	276	14
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	415		415	21
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	1,982	0	1,982	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	149	8
Glass Solar	0	0
Glass/Door Cond	0	0
Wall Cond	916	46
Partition/Door	195	10
Floor	31.24	2
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	1,290	65
Internal Loads		
Lights	276	14
People	0	0
Misc	0	0
Sub Total ==>	276	14
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	415	21
Grand Total ==>	1,982	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-97	-97	6.62
Glass Solar	0	0	0.00
Glass/Door Cond	0	0	0.00
Wall Cond	-363	-363	24.78
Partition/Door	-673	-673	45.93
Floor	-332	-332	22.67
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-1,465	-1,465	100.00
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	0	0	0.00
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-1,465	-1,465	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	78.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	80	80
Terminal	80	80
Main Fan	80	80
Sec Fan	0	0
Nom Vent	0	0
AHU Vent	0	0
Infil	0	0
MinStop/Rh	0	0
Return	80	80
Exhaust	0	0
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.88	0.88
cfm/ton	416.03	
ft²/ton	470.47	
Btu/hr·ft²	25.51	-18.72
No. People	0.0	0.0/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.2	2.3	2.0	80	78.0	59.1	46.9	55.0	48.3	41.0
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.2	2.3								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	90		
Part	77		
Int Door	1		
ExFlr	90		
Roof	90	0	0
Wall	115	0	0
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.7	80	68.0	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-1.7			

Room Checksums

By YEI Engineers Inc.

Restroom 108

COOLING COIL PEAK

Peaked at Time: Mo/Hr: 7 / 15
Outside Air: OADB/WB/HR: 104 / 67 / 45

	Space Sens. + Lat. Btu/h	Plenum Sens. + Lat Btu/h	Net Total Btu/h	Percent Of Total (%)
Envelope Loads				
Skylite Solar	0	0	0	0
Skylite Cond	0	0	0	0
Roof Cond	141	0	141	11
Glass Solar	0	0	0	0
Glass/Door Cond	0	0	0	0
Wall Cond	796	0	796	65
Partition/Door	0		0	0
Floor	30		30	2
Adjacent Floor	0.00	0.00	0.00	0.00
Infiltration	0		0	0
Sub Total ==>	966	0	966	79
Internal Loads				
Lights	261	0	261	21
People	0	0	0	0
Misc	0	0	0	0
Sub Total ==>	261	0	261	21
Ceiling Load	0	0	0	0
Ventilation Load	0	0	0	0
Adj Air Trans Heat	0		0	0
Dehumid. Ov Sizing			0	0
Ov/Undr Sizing	0		0	0
Exhaust Heat		0	0	0
Sup. Fan Heat			0	0
Ret. Fan Heat		0	0	0
Duct Heat Pkup		0	0	0
Underflr Sup Ht Pkup			0	0
Supply Air Leakage		0	0	0
Grand Total ==>	1,228	0	1,228	100.00

CLG SPACE PEAK

Mo/Hr: 7 / 15
OADB: 104

	Space Sensible Btu/h	Percent Of Total (%)
Envelope Loads		
Skylite Solar	0	0
Skylite Cond	0	0
Roof Cond	141	11
Glass Solar	0	0
Glass/Door Cond	0	0
Wall Cond	796	65
Partition/Door	0	0
Floor	29.50	2
Adjacent Floor	0.00	0.00
Infiltration	0	0
Sub Total ==>	966	79
Internal Loads		
Lights	261	21
People	0	0
Misc	0	0
Sub Total ==>	261	21
Ceiling Load	0	0
Ventilation Load	0	0
Adj Air Trans Heat	0	0
Ov/Undr Sizing	0	0
Grand Total ==>	1,228	100.00

HEATING COIL PEAK

Mo/Hr: Heating Design
OADB: 27

	Space Peak Space Sens Btu/h	Coil Peak Tot Sens Btu/h	Percent Of Total (%)
Envelope Loads			
Skylite Solar	0	0	0.00
Skylite Cond	0	0	0.00
Roof Cond	-92	-92	10.10
Glass Solar	0	0	0.00
Glass/Door Cond	0	0	0.00
Wall Cond	-316	-316	34.79
Partition/Door	0	0	0.00
Floor	-314	-314	34.57
Adjacent Floor	0.00	0.00	0.00
Infiltration	0	0	0.00
Sub Total ==>	-721	-721	79.46
Internal Loads			
Lights	0	0	0.00
People	0	0	0.00
Misc	0	0	0.00
Sub Total ==>	0	0	0.00
Ceiling Load	0	0	0.00
Ventilation Load	0	0	0.00
Adj Air Trans Heat	0	0	0
Ov/Undr Sizing	-186	-186	20.54
Exhaust Heat		0	0.00
OA Preheat Diff.		0	0.00
RA Preheat Diff.		0	0.00
Additional Reheat		0	0.00
System Plenum Heat		0	0.00
Underflr Sup Ht Pkup		0	0.00
Supply Air Leakage		0	0.00
Grand Total ==>	-907	-907	100.00

TEMPERATURES

	Cooling	Heating
SADB	55.0	85.0
Ra Plenum	78.0	68.0
Return	78.0	68.0
Ret/OA	78.0	68.0
Fn MtrTD	0.0	0.0
Fn BldTD	0.0	0.0
Fn Frict	0.0	0.0

AIRFLOWS

	Cooling	Heating
Diffuser	49	49
Terminal	49	49
Main Fan	49	49
Sec Fan	0	0
Nom Vent	0	0
AHU Vent	0	0
Infil	0	0
MinStop/Rh	0	0
Return	49	49
Exhaust	0	0
Rm Exh	0	0
Auxiliary	0	0
Leakage Dwn	0	0
Leakage Ups	0	0

ENGINEERING CKS

	Cooling	Heating
% OA	0.0	0.0
cfm/ft²	0.58	0.58
cfm/ton	401.51	
ft²/ton	692.44	
Btu/hr·ft²	17.33	-12.28
No. People	0.0	0.0/1000 ft²

COOLING COIL SELECTION

	Total Capacity ton	Total Capacity MBh	Sens Cap. MBh	Coil Airflow cfm	Enter DB °F	Enter WB °F	Enter HR gr/lb	Leave DB °F	Leave WB °F	Leave HR gr/lb
Main Clg	0.1	1.5	1.2	49	78.0	59.1	46.9	55.0	47.8	39.4
Aux Clg	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Opt Vent	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
Total	0.1	1.5								

AREAS

	Gross Total	Glass ft²	Glass (%)
Floor	85		
Part	0		
Int Door	1		
ExFlr	85		
Roof	85	0	0
Wall	100	0	0
Ext Door	0	0	0

HEATING COIL SELECTION

	Capacity MBh	Coil Airflow cfm	Ent °F	Lvg °F
Main Htg	-1.0	49	68.0	85.0
Aux Htg	0.0	0	0.0	0.0
Preheat	0.0	0	0.0	0.0
Humidif	0.0	0	0.0	0.0
Opt Vent	0.0	0	0.0	0.0
Total	-1.0			

ENGINEERING CHECKS

By YEI Engineers Inc.

System	Zone	Room	Type	Floor Area ft²	COOLING % OA	COOLING cfm/ft²	COOLING cfm/ton	COOLING ft²/ton	COOLING Btu/hr·ft²	HEATING % OA	HEATING cfm/ft²	HEATING Btu/hr·ft²
Alternative 1												
	Breack Room		Zone	77	49.42	1.52	253.5	167.0	71.84	49.42	1.52	-70.42
	CONFERENCE ROOM		Zone	260	31.15	1.85	290.4	156.8	76.53	31.15	1.85	-68.67
	Office Room#1		Zone	100	29.65	1.52	294.0	193.7	61.94	29.65	1.52	-55.11
	Office Room#2		Zone	100	26.90	1.67	300.9	179.9	66.72	26.90	1.67	-58.39
	Open Office		Zone	545	19.48	0.96	318.5	330.9	36.26	19.48	0.96	-29.95
	Restroom 107		Zone	90	0.00	0.88	416.0	470.5	25.51	0.00	0.88	-18.72
	Restroom 108		Zone	85	0.00	0.58	401.5	692.4	17.33	0.00	0.58	-12.28
Gas Fired Package ACU-1			**System - System 3 - 2007/2010 - Packaged Rooftop Air Conditioner**	**1,257**	**25.46**	**1.25**	**304.9**	**244.0**	**49.19**	**25.46**	**1.25**	**-49.11**

Attachment H
Pest Report

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WOOD DESTROYING PESTS AND ORGANISMS INSPECTION REPORT

Building No.	Street	City	Zip	Date of Inspection	Number of Pages
	Hwy 101	San Miguel	93451	06/07/2023	1 of 6

Brezden Pest Control Inc.
3261 S Higuera St
Suite 100, San Luis Obispo, CA 93401-2021
Tel 805-544-9446 Fax 805-544-2807
Registration #: PR30

A LICENSED PEST CONTROL OPERATOR IS AN EXPERT IN HIS/HER FIELD. QUESTIONS RELATIVE TO THIS REPORT SHOULD BE REFERRED TO HIM/HER.

Report #: 11698

Ordered by:	Property Owner and Party of Interest:	Report sent to:
Camp Roberts Hwy 101 San Miguel, CA 93451	Camp Roberts Hwy 101 San Miguel, CA 93451	Camp Roberts Hwy 101 San Miguel, CA 93451

COMPLETE REPORT ☒ LIMITED REPORT ☐ SUPPLEMENTAL REPORT ☐ REINSPECTION REPORT ☐

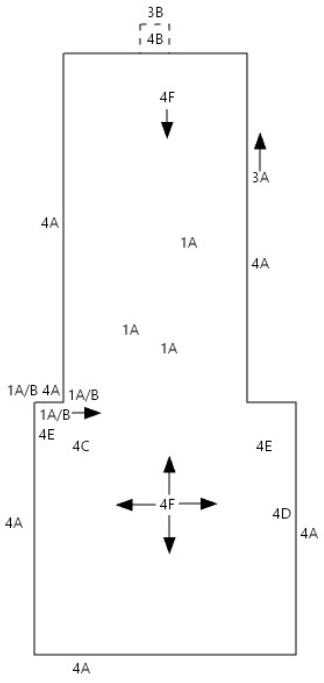
General Description:	Inspection Tag Posted:
Single story, slab and raised foundation, comp roof, wood siding, unoccupied	Exterior
	Other Tags Posted:

An inspection has been made of the structure(s) shown on the diagram in accordance with the Structural Pest Control Act. Detached porches, detached steps, detached decks and any other structures not on the diagram were not inspected.

Subterranean Termites ☒ Drywood Termites ☐ Fungus/Dryrot ☒ Other Findings ☒ Further Inspection ☐

If any of the above boxes are checked, it indicates that there were visible problems in accessible areas. Read the report for details on checked items.

Key: 1 = Subterranean Termites 2 = Drywood Termites 3 = Fungus/Dryrot 4 = Other Findings 5 = Unknown Further Inspection



Inspected By: James Byon State License No.: FR51027 Signature:

You are entitled to obtain copies of all reports and completion notices on this property reported to the Structural Pest Control Board during the preceding two years. To obtain copies contact: Structural Pest Control Board, 2005 Evergreen Street, Suite 1500, Sacramento, CA 95815

NOTE: Questions or problems concerning the above report should be directed to the manager of the company. Unresolved questions or problems with services performed may be directed to the Structural Pest Control Board at (916) 561-8708, (800) 737-8188 or www.pestboard.ca.gov. 43M-41 (REV. 04/2015)

General Comments

At the time of this inspection the Owner/Agent stated to our Brezden Pest Control Representative Inc. that this inspection report would NOT be used for the purpose of selling the property and/or to procure a loan on the property. Upon request Brezden Pest Control, Inc. will perform an inspection for the above mentioned purposes. Cost for this inspection given upon request.

This is a Wood Destroying Pests and Organisms Report. This is not a Pest Control Report that includes such common non-wood destroying pests such as ants, earwigs, cockroaches, silverfish, fleas, rodent, bats, etc. If you would like this property inspected for non-destroying pests, Brezden Pest Control Inc. will perform the inspection at your request at an additional charge. This Wood Destroying Pests and Organisms Report does not include mold or any mold like condition. No reference will be made to mold or mold like condition. Mold is not a Wood Destroying Organism and is outside the scope of this report as defined by the Structural Pest Control Act. If you wish your property to be inspected for mold or mold like conditions, please contact the appropriate mold professional.
A Wood Destroying Pests and Organisms Report contains findings as to the absence or presence of evidence of wood destroying pests and organisms in the visible and accessible areas and contains recommendations for correcting any infestations or infections found.
The Structural Pest Control Act, Rules and Regulations govern the contents of a Wood Destroying Pest & Organism Inspection Reports. Some structures do not comply with the building code requirements or may have structural, plumbing, electrical, heating, air conditioning or other defects that do not pertain to wood destroying organisms. This Report will not contain information on such defects, if any, as they are not within the scope of the licenses of either the inspector or Brezden Pest Control Inc. Recommendations in this report are designed to eliminate damage as a result of wood destroying pests, organisms and adverse conditions that lead to same. This inspection report is not designed to bring structure(s) into existing local code compliance. The Structural Pest Control Act requires inspection of these areas that are visible and accessible at the time of inspection. Some areas of the structure are not accessible to inspection, such as interior of hollow walls, spaces between floors, areas concealed by carpeting, and/or other types of floor coverings, insulation, built-in appliances, or cabinet work. Infestations, infections and conditions that may lead to same, may be active in these areas without visible and accessible evidence. Areas not inspected are noted in the report. If you desire information about the areas that were not inspected, a further inspection will be performed upon request and at an additional cost. We cannot guarantee work done by the owner, his agent or other trades. We make no guarantee against future infestations, infections, adverse conditions or conditions present but not evident at the time of our inspection.
After four months from an original inspection, all inspections shall be original inspections and not reinspections. (8516, 13). This company will reinspect repairs done by others within four months of the Original inspection. A charge, if any, can be no greater than the Original inspection fee for each reinspection. The reinspection must be done within ten (10) working days of request. The reinspection is a visual inspection and if inspection of concealed areas is desired, inspection of work in progress will be necessary. Any guarantee must be received from parties performing repairs (1991.1).
NOTICE: Reports on this structure prepared by various registered companies should list the same findings, (i.e. termite infestations, termite damage, fungus damage, etc.). However, recommendations to correct these findings may vary from company to company. You have a right to seek a second opinion from another company.
The exterior surface of the roof will not be inspected. If you want water tightness of the roof determined, you should contact a roofing contractor who is licensed by the Contractors' State Licensed Board.
NOTICE: The charge for service that this company subcontracts to another registered company may include the company's charges for arranging and administering such services that are in addition to the direct costs associated with paying the subcontractor. You may accept Brezden Pest Control Inc.'s bid or you may contract directly with another registered company licensed to perform the work. If you choose to contract directly with another registered company, Brezden Pest Control Inc. will not be responsible for any act or omission in the performance of work that you directly contract with another to perform.
Areas not inspected: Areas were found to be inaccessible for inspection. These included but are not limited to, stucco columns, plumbing access voids, areas concealed by plant growth, the areas inside finished walls, boxes eaves and ceilings, areas behind and under cabinets, fixed furniture and appliances, areas under surface coverings, spaces between a floor or porch or deck and the ceiling or soffit below. We do not move furniture during our inspection. Routine inspection does not include opening windows, opening all exterior doors or inspecting interior of cabinets. Due to height and safety reason, surfaces higher than 10 feet from the ground level are visually inspected only. Surfaces above 10 feet are not picked or pry tested. Infestation, infection and conditions that may lead to the same may develop in areas where plumbing pipes and cold joints or cracks exist where concealed by concrete, walls, ceilings and insulation. This firm assumes no responsibility for infestation, infection, or conditions that may lead to the same, not evident or visible at the time of this inspection. Upon request and at an additional charge, Brezden Pest Control Inc. will perform further inspection to areas not inspected.
CAUTION: PESTICIDES ARE TOXIC CHEMICALS. Structural Pest Control companies are registered and regulated by the Structural Pest Control Board and apply pesticides which are registered and approved for use by the California Department of Pesticide Regulation and the United States Environmental Agency. Registration is granted when the state finds that based on existing scientific evidence there are no appreciable risks if proper use conditions are followed or that the risks are outweighed by the benefits. The degree of risk depends upon the degree of exposure, so exposure should be minimized. If within 24 hours following application you experience symptoms similar to common seasonal illness comparable to the flu, contact your physician or poison control center and

your pest control operator immediately. For further information contact, any of the following: Brezden Pest Control 805-544-9446-Poison Control Center 800-662-9886-Structural Pest Control Board 916-263-2540-San Luis Obispo Co. Agricultural Commissioner 805-781-5910 and Health Dept. 805-781-5500-Santa Barbara Co. Agricultural Commissioner 805-681-5600 and Health Dept. 805-681-5488-Monterey Co. Agricultural Commissioner 831-647-7629 and Health Dept. 831-647-7650

This is a separated report which is defined as Section I/Section II conditions evident on the date of the inspection. Section I contains items where there is visible evidence of active infestation, infection or conditions that have resulted in or from infestation of infection. Section II items are conditions deemed likely to lead to infestation or infection but where no visible evidence of such was found. Further inspection items are defined as recommendations to inspect area(s) which during the original inspection did not allow the inspector access to complete the inspection and cannot be defined as Section I or Section II.

Description of Findings

SECTION: I

SUBTERRANEAN TERMITES

Finding: 1A — Evidence of Subterranean Termite infestation found at the beam, post, wall framing and the Cellulose debris . This indicates a Subterranean infestation in the adjacent soil below.

Recommendation: Chemically treat soil in areas of Subterranean Termite activity using Termidor (fipronil).for the control of Subterranean Termite. Material to be applied: Termidor (fipronil). IN ADDITION, an application will be made to the soil adjacent to the exterior wall around the complete perimeter of the structure. Holes may be drilled through concrete, paving, or masonry adjacent to the foundation in areas such as, but not limited to; patios, sidewalks, porches and driveways, to allow for chemical treatment of soil below. We will exercise reasonable caution when drilling but assume no liability for damage to hidden plumbing, electrical, or other utility below these areas. The location of such utilities should be identified prior to our arrival. Regardless of locations of Subterranean Termite infestation found, control of the entire structure is guaranteed. Control is guaranteed by Brezden Pest Control Pest Control for a period of 5 years from the date of treatment.

Finding: 1B — Subterranean Termite damage was noted at the wall framing, beam and post.

Recommendation: Remove, replace and/or resupport damaged wood member(s). Our firm will apply one coat of primer paint to all appropriate wood members installed. Additional painting will be performed upon request at an additional cost.

FUNGUS/DRYROT

Finding: 3A — Fungus damage and infection noted to the skirt framing.

Recommendation: Remove and replace or resupport damaged and infected wood members. Our firm will apply one coat of primer paint to all appropriate wood members installed.

Finding: 3B — Fungus damage and infection noted to the stair framing, landing and hand railing.

Recommendation: Remove and replace or resupport damaged and infected wood members. Our firm will apply one coat of primer paint to all appropriate wood members installed.

SECTION: II

OTHER FINDINGS

Finding: 4A — Excessive moisture damage noted to siding.

Recommendation: Remove and replace or resupport damaged and infected wood members. Our firm will apply one coat of primer paint to all appropriate wood members installed.

Finding: 4B — Earth to wood contact noted to the deck framing.

Recommendation: Owner/agent to contact a qualified tradesperson to inspect and make any necessary repairs to correct this finding.

Finding: 4C — Dry water stains noted at the interior ceiling.

Recommendation: Owner/agent to contact a qualified tradesperson to inspect and make any necessary repairs to correct this finding.

Finding: 4D — Dry water stains noted at the interior wall.

Recommendation:		Owner/agent to contact a qualified tradesperson to inspect and make any necessary repairs to correct this finding.
Finding:	4E	An excessive moisture condition noted to the bathroom due to leaky plumbing.
Recommendation:		Owner/agent to contact a qualified tradesperson to inspect and make any necessary repairs to correct this finding.
Finding:	4F	Dry water stains noted at attic framing.
Recommendation:		Owner/agent to contact a qualified tradesperson to inspect and make any necessary repairs to correct this finding.

Disclaimer

Our firm has been informed by www.Zillow.com that the structure(s) inspected, the subject(s) of this report, was/were constructed in 19(NOT AVAILABLE). If this is incorrect please notify us immediately. It is very important that we have accurate information on the date of construction to properly evaluate the needed repair procedures.
Pre 1978 buildings. Homes and other buildings constructed prior to 1978 are presumed to have lead paint that may cause serious health issues if disturbed during repairs. Special procedures are required by the US EPA in repairing painted areas where more than 6 square feet in the interior or 20 square feet on the exterior are disturbed. Local and state requirements may be more restrictive. Those doing the repairs are required by the EPA to be licensed Lead Renovators and must follow strict testing, containment, repair, clean up and debris disposal practices. The penalties for violations of the EPA regulations are severe. You will be provided with the EPA pamphlet entitled Renovate Right Important Lead Hazard Information for Families prior to the start of repairs. You will be notified of the additional costs of compliance. If you have any questions, please contact us.

NOTE: FINDINGS MAY HAVE OR MAY NOT HAVE BEEN PHYSICALLY MARKED BY OUR INSPECTOR.

CONSULTATION
A minimum charge of $75.00 per visit will be charged for on-sight consultation to assist others performing repairs/work.

REPAIR POLICY: Prices for structural repair include replacement of damaged wood members visible at the time of this inspection. Structural improvements required to upgrade construction to current building code or corrections of hidden conditions exposed during repairs will be completed at additional expense. This company assumes no liability for improper or noncompliant structure(s) on which we complete repairs. Parties in interest should contact the city/county building department and/or qualified home inspector concerning the structure compliance with building code. The property owner is responsible to obtain and pay for all costs associated with building permits and engineering fees needed. During the removal of damaged, infested, infected material(s) or scraping of wood members to remove Surface Fungus, areas will be exposed that were not visible and/or accessible during our Original inspection. If damage, infestation, infection, and/or conditions that may lead to same are found during the course of our repairs, that were not visible and/or accessible during our previous inspection(s), a Supplemental Report outlining our findings, recommendations and additional costs will be issued.
When repairs are recommended there may be health related issues associated with the structural repairs reflected in this inspection report. These health issues include but are not limited to the possible release of mold spores during the course of repairs. Brezden Pest Control is not qualified to and does not render any opinion concerning such health issues or any special precautions. Any questions concerning health issues or any special precautions to be taken prior to or during the course of such repairs should be directed to a Certified Industrial Hygienist before any such repairs are undertaken.

SECTION 1 CERTIFICATION POLICY WHEN REPAIRS ARE COMPLETED BY OTHERS When others perform work/repairs for escrow purposes, our firm requires that Owner/Agent request a Reinspection once damage and infection is removed but before the new material is installed. If new material is in place during our Reinspection, our firm will not be responsible for any infestation, and infection or damage concealed. Newly painted surfaces or repairs in some instances can conceal evidence of damage and/or infestation. This firm does not assume any responsibility for hidden defects if a structure has recently been painted or any repair work by others has been done deliberately or inadvertently to conceal adverse conditions or infections. Our firm does not guarantee work or quality of work completed by others. BREZDEN PEST CONTROL will not Certify Termiticide, Fungicide or any other material applied by Others concerning the Recommendation in this Report or related Report(s).

REINSPECTION REPORT
A Reinspection Report will be issued for each reinspection and the charge will not exceed the cost of the original report.

When applicable, one coat of prime paint will be applied to all new wood material. Does not included window units, varnish or staining. All repair work completed by our firm is guaranteed one year and material 90 days from the date of completion, unless otherwise stated.

Attachment I
Meeting Minutes

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Joseph Chow & Associates, Inc.

Meeting Minutes

PROJECT NAME: BUILDING 7020 RENOVATION
Camp Roberts, California

KICK OFF MEETING

MEETING DATE: October 21, 2022 at 11:00 AM

MEETING PLACE: Building 7020 – Camp Roberts, CA

PRESENT:

Name	**Organization**
Maj. Brian Woods (BW)	CMD - Project Manager G9
Cpt. Levi Rowley (LR)	Camp Roberts Environmental
Joseph Westcott (JW)	CMD – COR Area III Fresno
Vince Hindly (VH)	Camp Roberts DPW
Mike Stonecipher (MS)	Camp Roberts DPW-EPS
Sgt. Robert Cazares (RC)	233rd Seaside
Daniel Parecles (DP)	233rd Seaside
Joyce Chow (JC)	Joseph Chow & Associates, Inc.
Ha Anh (HA)	Joseph Chow & Associates, Inc.
Patrick Mallillin (PM)	YEI Engineers, Inc.
Tim Le (TM)	YEI Engineers, Inc.
Tin Lengyel (TL)	Brokaw Engineering
Damon Morelli (DM)	EBA Engineers

ITEM #	DESCRIPTION	ACTION
1.0	**GENERAL**	
1.1	The purpose of this meeting is to kick off the project.	
2.0	**ITEMS OF DISCUSSION**	
2.1	Contract administration standards and procedures where discussed. Several forms were discussed and signed by BW and JC. • Any requests for work outside the scope of work must be provided in writing from the contracting officer. • Per the contract, invoices should be submitted per submittal completion. Monthly billing may be possible, but will require a contract modification. JC stated invoices based on submissions is acceptable. • Proposed projects schedule shall be modified to include the Award Date and the contract completion date of May 16, 2023.	

Joseph Chow & Associates, Inc. 650 Delancey Street, Suite 211 San Francisco, California 94107 415.777.1288 415.777.2552 fax

	• Project will use Procore. RFIs can be submitted via Procore.	
2.2	A field survey was complete by the AE team on October 20 and 21, 2022**.**	
2.3	**Hazardous Materials Investigation** • Much of the paint sampled in the field has high levels of lead. Most if not all the exterior and interior finishes will need to be removed. • Samples of suspected asbestos containing materials were taken and will be sent to a testing lab for verification. • The mastic used for the roof top vents will be considered hazardous since access was not possible due to the existing bee hives.	
2.4	**Architectural Observations** • The building was built using a "kit of parts" created by the Department of the Army. Additional drawings of similar building configurations were found at DPW's office. • There are two active beehives. Due to safety concerns the project team did not survey the areas with bee activity. JC recommended the bee hives be relocated prior to a pest inspection. • The Base does not have the ability to remove the bee hive. BW requested JC investigate hiring a bee removal expert as an additional service. Base Environmental will confirm if the bee hives need to be relocated somewhere on Base or if they can be removed offsite. • The design team speculates that the wood framing where there are bee hives is compromised and will have to be replaced. • The is ½" gypsum board behind the existing exterior wood siding. Anecdotally, the presence of gypsum board may indicate the building was built in the 1950's or was renovated in the 1950's. Gypsum board was not a common building material until the 1950's, however there is historical documentation that the military used gypsum board in the 1940's. • The building's interior ramp, path of travel, and restroom are not accessible. The project will provide an accessible path of travel, restrooms, and one standard parking space. • The construction budget has not been determined. CMD to provide a current PRV to the design team. • Wall finishes in the Storage Bay can be plywood. • The building will be used as an Administration building. Program spaces include: • Space for 8 people • Two private offices • Open work area • Open meeting area • Equipment storage • Garage door for standard vehicle. • Charging station for 8-10 radios. Charging stations can be in the Office area. • Washer (Extractor) and Dryer for turnouts. • Air compressor for tanks (existing will be relocated by Users) • Two single use restrooms with shower • Janitor's closet/mop sink • Kitchenette with garbage disposal	JC/CMD CMD

	• Consider removal windows to allow for more interior wall space to provide storage/shelving	
2.5	**Structural Observations** • The existing building has four different levels. Access to each level does not meet accessibility codes. Several options were discussed to make the building more efficient and allow for accessibility. • Make the building one level throughout. Raise or drop existing floor levels. • Provide two levels – Keep the front area and back area at the existing elevations and raise up portions as needed. • Provide two levels – Raise and drop levels as needed for accessibility. Provide internal accessible ramp. • The amount of structural work will be driven by the cost and PRV. If CMD can classify this project as a modernization project, there may be more money available to spend on the project.	
2.6	**Civil Observations** • The existing sewer, water, and gas lines were identified in the field and match very closely to the utility drawings provided by CMD. • The front driveway will most likely need to be replace to provide the correct drainage and to provide one accessible parking spot. • The sewer laterals to the main will be replaced. • Existing water pressure is 91 psi. • Backflow preventor will be added. • Provide, power, water, and gas meter. The Base does not have any metering standards but will required a seismic valve.	
2.7	**Mechanical/Plumbing Observations** • Building is uninsulated and will need to be insulated for energy efficiency. • Base uses Trane equipment. • Base standard is a gas fired, centralized system. • CMD to confirm if heating is required in the Storage Bay. • DDC is not required. BOD shall indicate reason why DDC is not required.	CMD
2.8	**Electrical Observations** • Existing transformer is 75 KVA, single phase. It currently feeds the barracks across the street. Per PWD, the on barrack is used infrequently and the other is not used at all. • No new transformer is needed. • New panel can be located outside or inside. • Project will provide communication drops to the workstations and run to the Comm panel. Base will provide the switch and termination. Project provides the comm rack. Base to provide rack standard. Rack will need two plugs for the switch. • Occupancy sensors will be mounted on the ceiling.	CMD
2.9	JC to send an email requesting confirmation if Title 24 calculations are required.	JC
2.10	Roof may be a separate project due to funding. CMD to confirm.	CMD
	End of Meeting	

The above represents Joseph Chow & Associates, Inc.'s understanding of the comments and decisions made in this meeting. If your understanding differs from this, please advise us within three (3) working days of receipt of this document.

BY: Joyce Chow - Joseph Chow & Associates, Inc.

Joseph Chow & Associates, Inc.

Meeting Minutes

PROJECT NAME: BUILDING 7020 RENOVATION
Camp Roberts, California

10% REVIEW SUBMITTAL MEETING

MEETING DATE: December 2, 2022 at 11:30 AM

MEETING PLACE: MATES Conference Room – Camp Roberts, CA

PRESENT:

Name	**Organization**
Maj. Brian Woods (BW)	CMD - Project Manager G9
Joseph Westcott (JW)	CMD – COR Area III Fresno
Vince Hindly (VH)	Camp Roberts DPW
Mike Stonecipher (MS)	Camp Roberts DPW-EPS
Mark Williams (MW)	Camp Roberts Environmental
SSG Dimas Velasquez (DV)	233rd Seaside
Joyce Chow (JC)	Joseph Chow & Associates, Inc.
Patrick Mallillin (PM)	YEI Engineers, Inc.
Bryan Hayes (BH)	YEI Engineers, Inc.
Tim Le (TM)	YEI Engineers, Inc.
Tin Lengyel (TL)	Brokaw Engineering *(Via Phone)*
Damon Morelli (DM)	EBA Engineers *(Via Phone)*

ITEM #	DESCRIPTION	ACTION
1.0	**GENERAL**	
1.1	The purpose of this meeting is to discuss the 10% Submittal.	
2.0	**ITEMS OF DISCUSSION**	
2.1	The proposed design Options 1 through 3 were discussed. • Option 1 tries to keep the existing floor levels the same to minimize renovation. In this scheme there needs to be two ramps. • Option 2 raises the front portion of the building 9” while keeping the Administration portion at its current level. One ramp is needed in this scheme. • Option 3 provide a one level design. The need for an accessible ramp(s) is not required in this scheme. • The structural design for Option 1 and 2 is the same. Option 3 includes more stem walls. It is the best Option from a structural point of view.	

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	• The mechanical room size will be adjusted to meet the needs of the preferred design. The Base prefers a package unit which will be located outside. The mechanical room will only need to house the boiler and any ancillary equipment. • The preferred design option is the Floor Plan of Option 2 with the Structural Design of Option 3.	
2.2	Suggested design changes • Remove Electrical Room. Panel(s) can be mounted on the exterior. • Provide 2 garage doors. • No garbage disposal is needed. • Include Roof gutters with covers. • Main entrance can be relocated closer to the front of the building. • Laundry room is not needed. • Add double door to the Storage Room. • Telcom room should have air conditioned per the UFC. • Provide an undercounter refrigerator. See revised floor plan, Option 4 for suggested changes.	
2.3	Programming • There will be 2 full time staff with an additional 8 staff, non-full time. During drills, staff using the building will exceed 11 persons. CDM to confirm if this building shall be considered "occupied" or "unoccupied." If this building is considered "occupied," ATFP may be required. • The new PRV should be established to determine if the structural work is required or voluntary. CMD to provide a new PRV. • The building will not be used as a fire station. • CMD to provide air compressor requirements.	CMD CMD CMD
2.4	Construction Funding • The Base has not procured construction funds for the project, therefore CMD will hold off from giving final approval of the preferred Conceptual Plan. Once funding has been determined along with the ATFP requirements, CMD will confirm which Conception Design Option is preferred. The project schedule may have to be adjusted to shift the date as to when the 35% Submittal is due.	CMD
	End of Meeting	

The above represents Joseph Chow & Associates, Inc.'s understanding of the comments and decisions made in this meeting. If your understanding differs from this, please advise us within three (3) working days of receipt of this document.

BY: Joyce Chow - Joseph Chow & Associates, Inc.

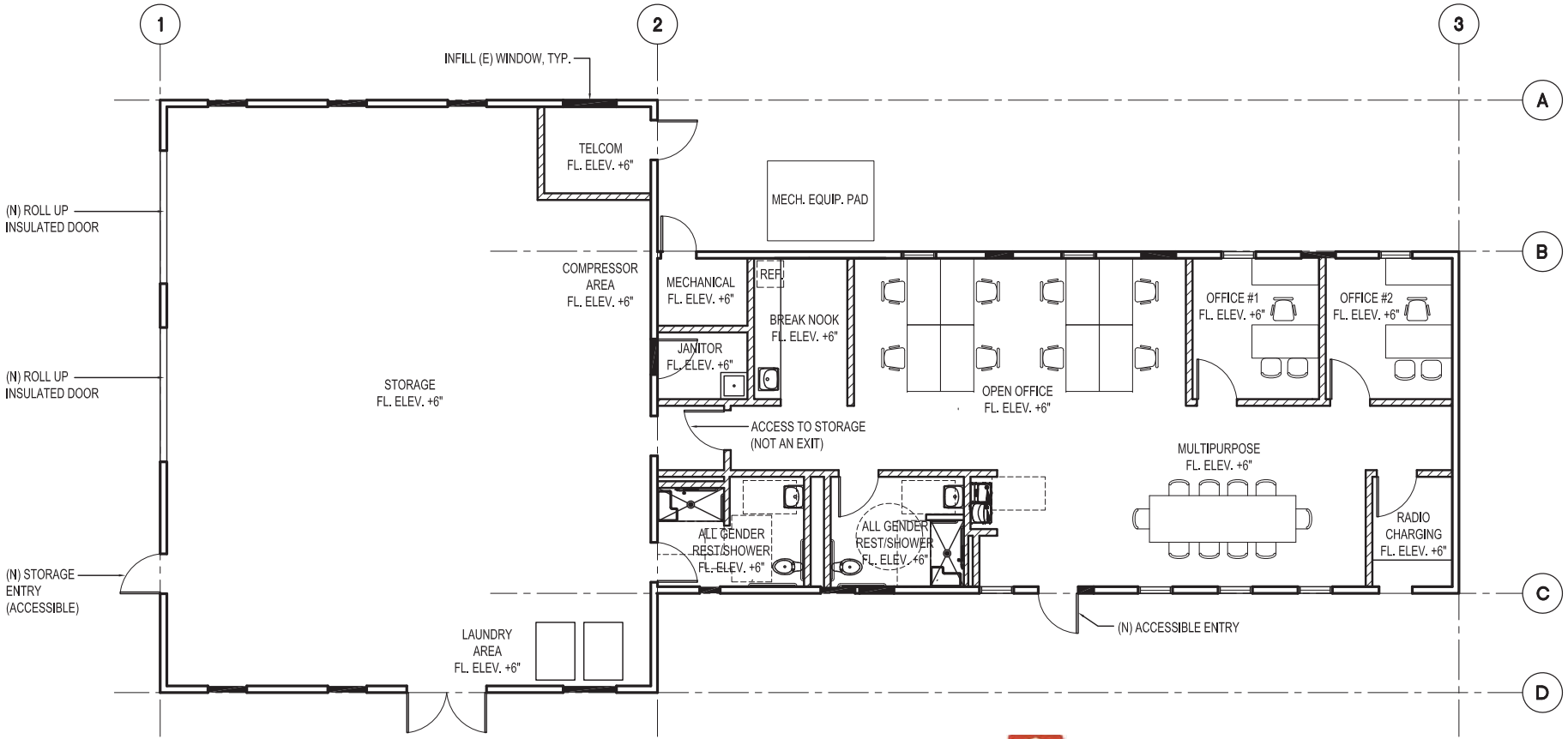
Attachments:
- Sign-In List
- Proposed Option 4 Floor Plan

STATE OF CALIFORNIA — Gavin C. Newsom, Governor

MILITARY DEPARTMENT
OFFICE OF THE ADJUTANT GENERAL
9800 Goethe Road
Sacramento, California 95827-3561

PROJECT	Building 7020 Type A&B Design
DATE	02 December 2022 / 1100Hrs
LOCATION	Building 25021, Camp Roberts, CA
PURPOSE	10% Design Review Meeting

NAME	REPRESENTING	PHONE CONTACT	EMAIL CONTACT
MAJ Brian Woods	CANG F&I-DPM	805-748-1232	brian.d.woods26.mil@army.mil
TIMOTHY LE	YEI ENGINEERS	510 957 1609	TLE@YEIENGINEERS.COM
JOYCE CHOW	JOSEPH CHOW & ASSO. INC.	415-531-4914	jchow@jcaarchitects.com
TIM LENGYEL	BROKAW DESIGN	415-999-0323	tim.lengyel@brokawdesign.com
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Vince Hindley	CR-DPW	805-238-8570	vince.m.hindley.nfg@army.mil
Mark Williams	CR-ENV	805-238-8332	mark.e.williams3.nfg@army.mil
Joseph Westcott	F/I COR	559-308-6546	joseph.westcott@cmd.ca.gov
SSG Velasquez, Dimas	233rd EN	510.871.7286	Dimas.Velasquez@airgas.com



BUILDING 7020 - NEW FLOOR PLAN - OPTION #4

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

JOSEPH CHOW & ASSOCIATES, INC.

Joseph Chow & Associates, Inc.

Meeting Minutes

PROJECT NAME: BUILDING 7020 RENOVATION
Camp Roberts, California

35% REVIEW SUBMITTAL MEETING

MEETING DATE: February 22, 2023 at 10:00 AM

MEETING PLACE: B3019 Conference Room – Camp Roberts, CA

PRESENT:

Name	**Organization**
Maj. Brian Woods (BW)	CMD - Project Manager G9
Sherif Hanna (SH)	CMD – Mechanical/Plumbing *(Via Phone)*
Antonio Rossetti (AR)	CMD- Structural *(Via Phone)*
Joaquin Carrasco (JC)	Camp Roberts – Safety
Mike Stonecipher (MS)	Camp Roberts DPW-EPS
Mark Williams (MW)	Camp Roberts Environmental
Kevin Stephens (KS)	CANG Real Property
ILT Kathleen Poet (KP)	340th BSB *(Via Phone)*
CPT Melissa Casillas (MC)	340th BSB *(Via Phone)*
Joyce Chow (JC)	Joseph Chow & Associates, Inc.
Patrick Mallillin (PM)	YEI Engineers, Inc.
Bryan Hayes (BH)	YEI Engineers, Inc. *(Via Phone)*
Tim Le (TM)	YEI Engineers, Inc. *(Via Phone)*
Tin Lengyel (TL)	Brokaw Engineering
Damon Morelli (DM)	EBA Engineers *(Via Phone)*

ITEM #	DESCRIPTION	ACTION
1.0	**GENERAL**	
1.1	The purpose of this meeting is to discuss the 35% Submittal and conduct a page turn.	
2.0	**ITEMS OF DISCUSSION**	
2.1	Civil • Design includes raising the finish grade in the building to provide positive surface drainage. • Providing a drivable curb for overflow parking. • Design includes gravel parking lot, concrete driveway, sidewalks, and utility work. • Providing a new sanitary line. The line will be routed around the existing trees to stay away from the drip line.	

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	• Water will be connected to the existing service along Utah Avenue. A new domestic backflow preventor will be added. o Water meter shall be provided by the contractor. A double check valve will be added per code. o Contractor shall be required to conduct a backflow test to make sure everything is working properly. o Locate backflow preventor closer to the building and out of the way from vehicles. Provide frost protection. • A new gas line and meter will be provided. CMD will provide the Base Meter Standard to A/E. Meter shall have a seismic valve. • Existing abandoned gas line will be removed. • Base controls gas once it gets on Base property. • Where the rolled curb ends, Base wants it to have a standard curb so a new sidewalk can be easily added in the future. • Base will confirm if the existing trees will remain or be removed.	CMD CMD
2.2	Structural • Entire foundation will be replaced with new in order to provide a level floor throughout building. • All new framing will be provided. • Roof framing will remain. There may be some parts that need to be repaired. • Columns in the Storage Area will remain. • There will be a foundation curb along the exterior walls to address the grade. Consideration was given to the interior and exterior of the curb. The interior side of the curb will be aligned with the inside finishes for a more finished look.	
2.3	Architectural • Users will remove the existing equipment in the building before construction starts. • Base would like access to one of the Restrooms from both the Storage Area and the Administration space. JCA will try and accommodate. • A Life Safety Plan will be included in the next submittal. • Base would like a wider opening between the Storage Bay and the Admin Area. JCA will accommodate if the structural design is not impacted. • Storage Bay does not have any special ventilation requirements. No heating is required. • New windows will be provided. Windows will be per the Base Standard. Windows have been used throughout Base and are acceptable to be used as an ATFP compliant window. Shades will be provided at each window. • The Storage Area will have a finished gypsum board ceiling. Insulation will be added. • The design can either include roof ridge vents or gable vents. • Ventilation for the Janitor's Room and Bathrooms may be accommodated with door undercuts instead of louvers. • Roll up doors will be manual, insulated doors, lockable on the inside only. • Interior and exterior signage will be per Base standards. • Fire extinguishers will be included in the next submittal • Furniture shown is for reference only. Customer will purchase and install furniture.	CMD JCA JCA JCA JCA

2.4	ATFP • Per the UFC, we are supposed to provide Mass Notification as this building is considered Inhabited. Due to the size of the building and the fact the Base does not have a base wide notification system, installing a mass notification system may not function as intended an may not be cost effective. Design team cannot find an exception to the UFC requirement. CMD to confirm requirement.	CMD
2.5	Mechanical • Design was developed using Option 1 as stated in the Basis of Design. Option 1 meets Base requirements while also minimizing the electrical loads. • A spoke detector for the mechanical system is not required by code but one will be installed per Base's request. • PM will look into providing a sensor or some type of control to keep the system off until building is occupied. The building may not be occupied for months at a time and do not want the mechanical system operating to save money. o Base will provide drawings from a Barracks to be used as a control design reference. • A split unit will be provided for the telcom room. • Mechanical system will include the following: o Ducted system. o ATFP shut off. Location as shown is acceptable. o Branches will have dampers. o No maintenance in the attic space will be required. o Add extra supply in the restrooms. o CO2 sensors will be added. o Provide VAV diffusers in the offices for more control. o SH prefers control through thermostats.	YEI YEI CMD
2.6	Plumbing • Floor mounted water closets will be provided. • Hose bibs will be provided for the front and sides of the building. • In lieu of a center floor drain int the restrooms provide a French drain in front of the showers. • A drain well will be included for the AC unit.	
2.7	Electrical • The existing will be demolished. The existing utility feed from the pole will be maintained. • A floor outlet with a brass cover will be provided under the conference table. • Conduit will be provided in walls and ceilings. • Add additional power and telcom in the plan south wall. Assume they may be office furniture in the future. • Provide a dedicate outlet for a printer. • Provide additional power and telcom in the alcove near the front door for possible radio charging. • Load calculations will be provided in the next submittal. • Lighting o Lighting will be on occupancy sensors. o Exterior lighting will be on one photometric control. A light switch is not	YEI

	needed. Lighting will be placed around the entire building. o All light fixtures will be dimmable.	
2.8	Anticipated midpoint of construction is April 2024.	
	End of Meeting	

The above represents Joseph Chow & Associates, Inc.'s understanding of the comments and decisions made in this meeting. If your understanding differs from this, please advise us within three (3) working days of receipt of this document.

BY: Joyce Chow - Joseph Chow & Associates, Inc.

Attachment
- Sign-In Sheet

STATE OF CALIFORNIA — Gavin C. Newsom, Governor

MILITARY DEPARTMENT
OFFICE OF THE ADJUTANT GENERAL
9800 Goethe Road
Sacramento, California 95827-3561

PROJECT	Building 7020 Type A&B Design
DATE	21 February 2023 / 1000Hrs
LOCATION	Building 3019, Camp Roberts, CA
PURPOSE	35% Design Review Meeting

NAME	REPRESENTING	PHONE CONTACT	EMAIL CONTACT
MAJ Brian Woods BW	CANG F&I-DPM	805-748-1232	brian.d.woods26.mil@army.mil
Tim Lengyel	Biokraw Design	415-999-0323	Tim.Lengyel@Biokraw Design.com
Patrick Mallillin	YEI Engineers, Inc	510-957-1613	Pmallillin@yeiengineers.com
Joyce Chow	Joseph Chow Assoc. Inc.	415-531-4914	jchow@jcaarchitects.com
SFC(CA) Stephens, Kevin	CANG Real Property	805-710-6230	Kevin.S.Stephens.nfg@army.mil
Sherif Hanna	Mech/Plumb CMD FSI		Sherif.Hanna@cmd.ca.gov
Antonio Rossetti	Struct. CMD FSI		Antonio.Rossetti@cmd.ca.gov
~~Parviz~~			
1LT Poet, Kathleen	340th BSB	(831) 393-8407	Kathleen.l.poet.mil@army.mil
CPT Casillas	340th BSB	(951) 623-3057	Melissa.m.casillas2.mil@army.mil
Damon Morelli	EBA (Civil)		
Timothy Le	YEI (Elect)		
Bryan Hayes	YEI (Mech)		

STATE OF CALIFORNIA

Gavin C. Newsom, Governor

MILITARY DEPARTMENT
OFFICE OF THE ADJUTANT GENERAL
9800 Goethe Road
Sacramento, California 95827-3561

Mark Williams	CR-Env	805.238.8332	mark.e.williams3.nfg@army.mil
Joaquin R Carrasco	CR-Safety	530 517 0864	Joaquin.R.Carrasco.mil@army.mil

Joseph Chow & Associates, Inc.

Meeting Minutes

PROJECT NAME: BUILDING 7020 RENOVATION
Camp Roberts, California

65% REVIEW SUBMITTAL MEETING

MEETING DATE: May 8, 2023 at 9:30 AM

MEETING PLACE: B3019 Conference Room – Camp Roberts, CA

PRESENT:

Name	**Organization**
Maj. Brian Woods (BW)	CMD - Project Manager G9
Mike Stonecipher (MS)	Camp Roberts DPW-EPS
SSG Justin Brown (JB)	Camp Roberts DOIM
SSG Dylan Renshaw (DR)	Camp Roberts DOIM
Joseph Westcott (JW)	CMD – COR Area III Fresno
Trent Lloyd (TL)	Camp Roberts *(Via Phone)*
CPT Melissa Casillas (MC)	340th BSB *(Via Phone)*
Joyce Chow (JC)	Joseph Chow & Associates, Inc.
Patrick Mallillin (PM)	YEI Engineers, Inc.
Bryan Hayes (BH)	YEI Engineers, Inc.
Tim Le (TM)	YEI Engineers, Inc. *(Via Phone)*
Tin Lengyel (TL)	Brokaw Engineering *(Via Phone)*
Damon Morelli (DM)	EBA Engineers *(Via Phone)*

ITEM #	DESCRIPTION	ACTION
1.0	**GENERAL**	
1.1	The purpose of this meeting is to discuss the 65% Submittal.	
2.0	**ITEMS OF DISCUSSION**	
2.1	Telecommunications • Provide ¾" fire rated plywood, full sheet, unpainted on all walls. • Provide a weather head for fiber optics on the exterior of the Telcom Room. Penetrate the existing wall or roof. Penetration will be coordinated with the architect. • Network cabinet shall be provided and installed by the Contractor. CMD to provide cabinet model/manufacturer information. • Remove one port on the south wall to reduce the ports to 12. • Locate the outlet for the monitor 5'-0" above floor finish and center on wall.	CMD

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	• The Contractor will pull and terminate all telcom wiring. Contractor shall also test the system. This requirement should be added to the specifications. • Telcom cable shall be blue. • It is acceptable to run exposed data cable above the ceiling with j-hooks and conduit in the walls. • Additional comments will be posted in Procore.	CMD
2.2	Electrical • Show exterior lights on the elevations. • A new transformer is being added to support new three phase mechanical equipment. The existing power appears to be single phase. The power will be verified on site to confirm if single phase is being provided. The mechanical equipment may be able to reduce in size if the calculations prove it can be done so we can specify single phase mechanical equipment and remove the transformer. *Note: Based on our site visit the power appears to be three phase not single phase. The label in the field was incorrect. The Based confirmed the power is three phase.* • Provide a NEMA 4 box on the exterior and underground the power from the pole to the building.	
2.3	Mechanical • Remove "Rooftop" from the Uni Schedule on Sheet M-003. • Fix CAD background issues on Sheet M-101. All the diffusers will be removed. • Move mechanical equipment away from the top of the boiler. • Restrooms fan are on timers, not occupancy sensors to simplify the system.	
2.4	Plumbing • Either provide an enlarged plumbing plans or edit drawings to make them easier to read. • Provide a seismic valve on the gas meter. • Meters shall be provided on all utilities with remote monitoring capabilities.	
2.5	Civil • CMD confirmed there is not need to add a sidewalk to the mechanical equipment located in the rear of the building. • Blanket shown on backflow is acceptable. • On sheet C-502 provide a two way cleanout.	
2.6	Architectural • In the Storage Bay finish the walls with 8'-0" high plywood, unpainted. Conduit and boxes shall not be surface mounted. • Add a credenza and 65" monitor. • JCA will review the plan to make the area around the Storage Room more efficient if possible.	JCA
2.7	The anticipated bee relocation will be on 5/20/23. The pest inspection and additional structural survey was postponed until the bees have been relocated. *Update: Bees were relocated on 5/20/23.*	
	End of Meeting	

The above represents Joseph Chow & Associates, Inc.'s understanding of the comments and decisions made in this meeting. If your understanding differs from this, please advise us within three (3) working days of receipt of this document.

BY: Joyce Chow - Joseph Chow & Associates, Inc.

Attachment
- Sign-In Sheet

STATE OF CALIFORNIA — Gavin C. Newsom, Governor

MILITARY DEPARTMENT

OFFICE OF THE ADJUTANT GENERAL
9800 Goethe Road
Sacramento, California 95827-3561

PROJECT	Building 7020 Type A&B Design
DATE	08 May 2023 / 0930Hrs
LOCATION	Building 3019, Camp Roberts, CA
PURPOSE	65% Design Review Meeting

NAME	REPRESENTING	PHONE CONTACT	EMAIL CONTACT
MAJ Brian Woods BW	CANG F&I-DPM	805-748-1232	brian.d.woods26.mil@army.mil
Mike Stonecipher	CR-DPW	805-238-8987	michael.r.stonecipher.nfs@army.mil
556 Brown Justin	CR-DOIM	805-503-4958	justin.d.brown81.mil@army.mil
SSG RENSHAW DYLAN	CR DOIM	805 218 0153	DYLAN.R.RENSHAW.MIL@ARMY.MIL
BRYAN HAYES	YEI ENGS-MECH	209 814 4930	bhayes@yeiengineers.com
Patrick Mallillin	YEI Engineers	510-957-1613	pmallillin@yeiengineers.com
Joyce Chan	JCA	415-531-4914	jchan@jcarchitects.com
TIMOTHY LE	YEI ENGINEERS	510-957-1609	TLE@YEIENGINEERS.COM
Tim Lengyel (Phone)	Brokaw Engineers		
Damon Moretti (Phone)	EBA		
Joseph Wescott (Phone)			
Trent Lloyd (Phone)			
Melissa Casillas (Phone			

Joseph Chow & Associates, Inc.

Meeting Minutes

PROJECT NAME: BUILDING 7020 RENOVATION
Camp Roberts, California

95% REVIEW SUBMITTAL MEETING

MEETING DATE: August 7, 2023 at 10:00 AM

MEETING PLACE: MS Teams – Virtual Meeting

PRESENT:

Name	**Organization**
Maj. Brian Woods (BW)	CMD - Project Manager G9
Sherif Hanna (SH)	CMD – Mechanical/Plumbing
James Kerr (JK)	CMD
MAJ Juan Ortiz (JO)	Camp Roberts - USARMY NG CAARNG
MSG Kingrey Retuta (KR)	Camp Roberts - USARMY
Kevin Stephens (KS)	Camp Roberts - NFG NG CAARNG
CPT Melissa Casillas (MC)	340th BSB
Joyce Chow (JC)	Joseph Chow & Associates, Inc.
Bryan Hayes (BH)	YEI Engineers, Inc.
Tim Le (TM)	YEI Engineers, Inc.
Tin Lengyel (TL)	Brokaw Engineering
Damon Morelli (DM)	EBA Engineers

ITEM #	DESCRIPTION	ACTION
1.0	**GENERAL**	
1.1	The purpose of this meeting is to discuss the 95% Submittal.	
2.0	**ITEMS OF DISCUSSION**	
2.1	Changes made from the 65% submittal to the 95% submittal. • Additional design information was added to the 95% submittal. • Civil – No major changes except for a few design clarifications that were added. • Structural – No major changes. Still continuing to develop the drawings. • Architectural – Will reswing the Storage Door to create more space in the storage room and eliminate some unused space. • Mechanical/Plumbing – Adding more details to the drawings set. Coordinated the meters with civil. • Electrical – Changed power to three phased power. • Responses to Government comments have been published in Procore.	

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2.2	Architectural • The TV monitor will be purchased and installed by the contractor. • Will add ceiling height information to RCP for clarity. • High Bay Storage will receive an unfinished plywood ceiling finish, in lieu of gypsum board. Provide a new standard access hatch. *Please note, the hatch will be in the existing access hatch location to reuse the existing framing.* • No plywood maintenance flooring is needed in the attic space. • Add "No Storage in Attic" signage in the High Bay. • No lights will be added in the attic. • Attic will have ridge vented. Details are included in the 95% submittal.	
2.3	Mechanical • In the breakroom a timer will be added to the fan. • Will show dimensions of roof penetrations in the sections.	
2.4	Electrical • 65% comments are showing up on the 95% submittal in Procore. Electrical has addressed the 65% comments in the 95% submittal. • CAD work for the site plan will be cleaned up for clarity.	
2.5	Project will not be submitted to the State Fire Marshall.	
2.6	CMD plans to bid the project by December 2023.	
	End of Meeting	

The above represents Joseph Chow & Associates, Inc.'s understanding of the comments and decisions made in this meeting. If your understanding differs from this, please advise us within three (3) working days of receipt of this document.

BY: Joyce Chow - Joseph Chow & Associates, Inc.