



Yuba-Sutter Transit Authority Next Generation Transit Facility

Project Manual

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Delivering a better world

Prepared for:

Yuba-Sutter Transit Authority



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Glossary and List of Acronyms

ABA	Architectural Barriers Act
ACS	Access Control System
ADA	Americans with Disabilities Act
AHJ	authority having jurisdiction
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASTM	American Society for Testing and Materials
A/V	audio-visual
BAS	Building Automation System
BEB	battery electric bus
BESS	battery energy storage system
BFP	backflow preventer
BOD	basis of design
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBC	California Building Code
CCMS	charging cord management system
CCTV	closed-circuit television
CEC	California Energy Commission
CFC	California Fire Code
cfs	cubic feet per second
CMC	California Mechanical Code
CMS	charge management system
CMU	concrete masonry unit
CPC	California Plumbing Code
DC	direct current
DDC	direct digital control
DER	Distributed Energy Resource
DOAS	Dedicated Outdoor Air Systems
DX	direct expansion
EPA	Environmental Protection Agency
EV	electric vehicle
FCEV	fuel cell electric vehicle
FCU	fan coil unit
FDC	fire department connection
FDCM	Final Design Criteria Manual
FDS	Functional Design Specification
FPM	feet per minute
FPS	feet per second
gpm	gallons per minute

HMI	Human-Machine Interface
HVAC	heating, ventilation, and air conditioning
ITC	Investment Tax Credit
kWh	kilowatt-hour
LAN	Local Area Network
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
LV	low voltage
MV	medium voltage
NC	Noise Criteria
NEC	National Electrical Code
NEM3	Net Energy Metering 3.0
NERC CIP	North American Electric Reliability Corporation Critical Infrastructure Protection
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PG&E	Pacific Gas and Electric Company
PIV	post-indicator valve
PPA	Power Purchase Agreement
psf	pounds per square foot
psi	pounds per square inch
psig	pounds per square gauge
PV	photovoltaic
RTU	rooftop packaged unit
SAT	Site Acceptance Test
SFRM	spray-applied fire resistive material
SGIP	Self-Generation Incentive Program
SOC	State of Charge
UL	Underwriters Laboratories
V	volt
VAV	variable air volume
VEMS	Vehicle Emissions Management System
VRF	variable refrigerant flow
WAN	Wide Area Network
W/cm ²	watt per square centimeter
wg	water gauge
ZEB	zero-emission bus

1 Introduction and Background

1.1 Background

In 1996, the Yuba-Sutter Transit Authority (YSTA or Owner) purchased and renovated its existing 3.2-acre site and former 7-Up bottling plant for use as a transit operations, maintenance, and administration facility. It was expanded and remodeled again in 2011 to its current and ultimate capacity. The facility has served the growing transit system well over the years, but a potential Highway 70 widening project will impact the existing YSTA facility by reducing the northern bus parking area. To address the fleet capacity and operational impacts, a new site was selected for a new YSTA Next Generation Transit Facility (Next Gen Facility). The proposed project is to include the following facilities and functions:

- Administration and Operations Building
- Vehicle Maintenance Building
- Revenue fuel and wash facilities
- Agency revenue vehicle parking
- Agency non-revenue vehicle parking
- Mobility hub with vanpool parking and enhanced bus stop on North Beale Road
- A new signalized traffic signal at the intersection of North Beale Road and Avondale Avenue
- Employee / visitor parking
- Site and street lighting, including new streetlighting and road and sidewalk improvements on Avondale Avenue

In 2021, YSTA conducted a site selection analysis of potential new sites. The result of that analysis was 6035 Avondale Avenue. The site scored “Excellent” on the matrix in wildfire risk, emergency response, public accessibility, and low acquisition cost, and it has sufficient space to accommodate future system growth, an ideal facility layout, available building area, and drive-through bus parking; has space to accommodate the future fleet and infrastructure. The site is 19.72 acres, which will accommodate future system growth, and has more than enough space for the estimated 2040 build-out as well as co-development potential. The site is located on an arterial road, North Beale Road, with direct access to YSTA Routes 1, 3, and 6. The site is located near a bus stop – North Beale and Lowe Avenue – and has active transportation infrastructure, which allows for good public access.

1.2 Project Goals and Vision

The following project goals were developed with Yuba-Sutter Transit staff during programming interviews and from returned programming questionnaires. The project goals are listed in no particular order or priority:

- The facility shall be designed with resiliency in mind.
- Provide back-up operations for designated facility functions during emergencies.
- Facility design based on surrounding climate conditions.

- Location of the new facility on-site shall be considered based on minimizing operating costs, reducing on-site vehicle circulation, and activating and establishing a strong presence along North Beale Road.
- The new facility shall be designed with planned growth in mind and shall be flexible.
- Design shall provide ease of access to the public for transit related needs such as ID photo cards and application for services.
- Utilize energy generated on-site to minimize PG&E's demand charges.
- Design of facility shall provide for upgraded work conditions compared to current facility.
- Enhanced office spaces shall be considered for the new design.
- Consideration shall be taken for facility environmental impacts.
- Secure and adequate private parking for employees.
- Safe site and facility circulation for staff and vehicles.
- Integration of driver and bus change out at facility.
- Access control with automatic gates for visitors and deliveries entering site.
- Secure site against trespassers
- Design for adequate natural lighting into facility.
- Job creation and economic development
- Local air quality improvement
- Long-term cost savings
- Future preparedness in terms of regulatory changes

1.3 Project Phasing and Naming Conventions

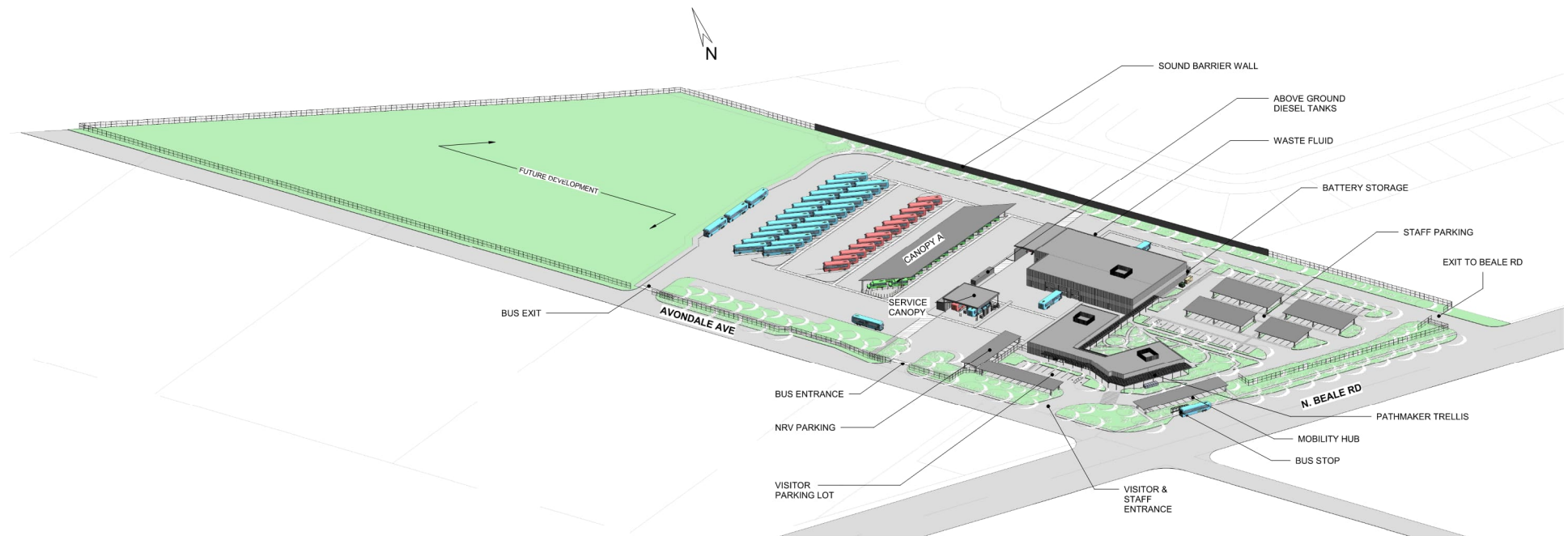
During this project manual design development and cost estimating, it was determined that the full site plan was not financially feasible and therefore was phased to provide the Initial Buildout as the Basis of Design (BOD). This base scope is shown in Figure 1-1, described throughout Chapter 2, and includes the following key elements:

- Administration and Operations Building
- Maintenance Building
- Fuel and wash facilities
- Bus and revenue shuttle parking
- One canopy over the first and second row of bus/shuttle parking, with underground conduit to that canopy and planned for expansion to two additional canopies on other rows of bus parking
- Visitor and staff parking lots with canopies for shading requirements
- Mobility hub with canopy

Betterments are considered for construction at the time of the base scope, with the potential betterments described in Chapter 3 (and Appendix A, drawings CS-501B). The Ultimate Buildout is the long-term vision for the Next Gen Facility and includes a solar farm and the additional site work needed to expand to the future development section. This is shown in Appendix A, drawings CS-502B.

Additionally, during the value engineering efforts, the Administration and Operations Buildings were slightly truncated as well as the configuration of the Maintenance Building went from six bays side-by-side to three stacked bays. The drawings included in Appendix A shall be used as the BOD for the base scope (Chapter 2) and betterments (Chapter 3).

Figure 1-1: Base Scope 3D Site Diagram



2 Base Scope

2.1 Site Analysis

2.1.1 Site Context

6035 Avondale Avenue, Linda, California 95901 is a 19.11 -acre project site located north of North Beale Road, east of Avondale Avenue, south of Levy Road, and west of Jason Drive and it's surrounded by single-family residences. The site is a combination of five lots and had past use as a former agricultural and log storage facility. No existing structures, occupants, or ongoing business are on-site, and as such, no phased or work around plans is anticipated. The entire site is anticipated to be available to the developer for construction activities, storing, or materials and equipment.

2.1.1.1 Physiogeographic Setting

The project area is in the north central part of California Central Valley in Environmental Protection Agency (EPA) Level IV Ecoregion 7e—Sacramento / Feather Riverine Alluvium. This ecoregion consists of nearly level floodplains and levees associated with the Sacramento, Feather, lower Yuba, and Bear rivers. Affected in places by historical mining practices in the Sierra Nevada, the riverine region includes areas of gold field tailings on the Yuba and Feather rivers. The Yuba River is about 1 mile north of the site. It flows down from the high Sierra Nevada Range and slows down east of the project site near the Yuba Goldfields, a section of the Yuba River Valley consisting of dredged sediments washed down by hydraulic mining in the nineteenth century. The river then turns southwest, flowing through irrigated farmlands on a floodplain near the project site. It skirts the south side of Marysville and reaches its destination at the Feather River between the cities of Marysville, Yuba City, and Linda. Flows are highest in winter and spring, decreasing quickly in late spring. They can range from winter peaks at 180,000 cubic feet per second (cfs) to 15 cfs in the summer with average flows around 2,400 cfs. The Yuba River Watershed contains a significant amount of sediment and mercury because of hydraulic mining that occurred in the mid- to late 1900s. The Sutter Buttes, a small range of volcanic origin, are visible to the northwest of the site.

2.1.1.2 Soil and Vegetation Types

Much of the unweathered gravel, sand, and silt deposits are in contact with the present-day riverine systems and have constantly changing morphologies. Flows of the major rivers are artificially controlled and confined by built levees. Entisols, mollisols, and alfisols are more common compared to the vertisols typical of the adjacent basins. The xeric soils are moderately well to somewhat poorly drained and support pasture, wheat, fruit and nut orchards, and woody wetlands. Cottonwoods and mixed willows are present, along with some grasslands.

The project site has a hot-summer Mediterranean climate (Köppen climate classification), which has mild, wet winters and hot, dry summers. The annual precipitation is about 20 inches, and the potential evapotranspiration is 57 inches. January is usually the wettest month, July the driest and hottest. The wet season starts from mid-October and ends in mid-April when the region sees frequent rain and is usually under the tule fog. Heavy rain or too much mountain snow from winter storms can cause major flooding in the spring. Snow is rare in the valley, but cold waves from the north bring some light snow and ice. Spring is wet in the beginning but becomes drier and warmer as summer months approach. April is the wettest month of spring. May has some rain but usually from thunderstorms rather than winter storms. Spring orchards and fields become filled with flowers and tree blossoms during this time. June-to-September is the dry and hot season. Rain usually does not fall at all, except for very rare southwest monsoon thunderstorms. July and August are the hottest months, with temperatures in the upper 90s. The delta breeze, which comes from the Bay Area on summer nights, helps cool temperatures and add humidity. At times this delta breeze is strong enough

to bring coastal fog inland to the Sacramento Valley. Autumn starts out warm but begins to become cooler, wetter, and foggy. From September to mid-October temperatures begin to cool down rapidly, bringing rain and fog, which become more frequent from mid-October into November. The landscape zones for the site falls under zone 9b (25°F to 30°F) of the U.S. Department of Agriculture Plant Hardiness Zone Map classified to be having a hot-summer Mediterranean climate. The table below (Figure 2-1) summarizes the climate for the City of Marysville, which lies 2 miles north of the project site across the Yuba River. The dominant vegetation communities near the project site are riparian woodlands with an understory of annual grasslands, often dominated by invasive exotic forbs and grasses such as ripgut grass and red brome (NVCS).

Figure 2-1: Climate near the Yuba-Sutter Next Gen Facility

Climate data for Marysville, California (Yuba County Airport), 1991–2020 normals, extremes 2000–present													[hide]
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	76 (24)	80 (27)	88 (31)	96 (36)	107 (42)	111 (44)	113 (45)	110 (43)	115 (46)	104 (40)	86 (30)	73 (23)	115 (46)
Mean maximum °F (°C)	67.7 (19.8)	72.5 (22.5)	78.7 (25.9)	89.1 (31.7)	96.9 (36.1)	106.5 (41.4)	106.9 (41.6)	105.1 (40.6)	102.8 (39.3)	90.8 (32.7)	78.3 (25.7)	66.1 (18.9)	108.4 (42.4)
Mean daily maximum °F (°C)	55.5 (13.1)	60.4 (15.8)	66.2 (19.0)	72.6 (22.6)	81.9 (27.7)	90.1 (32.3)	96.2 (35.7)	94.6 (34.8)	89.6 (32.0)	79.0 (26.1)	64.2 (17.9)	55.4 (13.0)	75.5 (24.2)
Daily mean °F (°C)	46.8 (8.2)	50.8 (10.4)	54.8 (12.7)	59.5 (15.3)	67.1 (19.5)	74.0 (23.3)	78.5 (25.8)	77.0 (25.0)	72.7 (22.6)	64.2 (17.9)	52.7 (11.5)	46.6 (8.1)	62.1 (16.7)
Mean daily minimum °F (°C)	38.2 (3.4)	41.1 (5.1)	43.4 (6.3)	46.4 (8.0)	52.4 (11.3)	57.9 (14.4)	60.7 (15.9)	59.5 (15.3)	55.7 (13.2)	49.4 (9.7)	41.3 (5.2)	37.7 (3.2)	48.6 (9.3)
Mean minimum °F (°C)	27.3 (−2.6)	30.3 (−0.9)	34.2 (1.2)	37.1 (2.8)	44.3 (6.8)	50.1 (10.1)	53.9 (12.2)	53.0 (11.7)	47.9 (8.8)	39.3 (4.1)	31.4 (−0.3)	25.8 (−3.4)	24.1 (−4.4)
Record low °F (°C)	19 (−7)	24 (−4)	29 (−2)	32 (0)	35 (2)	43 (6)	51 (11)	47 (8)	41 (5)	32 (0)	26 (−3)	20 (−7)	19 (−7)
Average precipitation inches (mm)	3.81 (97)	3.65 (93)	2.92 (74)	1.40 (36)	0.93 (24)	0.28 (7.1)	0.00 (0.00)	0.05 (1.3)	0.11 (2.8)	1.03 (26)	2.21 (56)	3.68 (93)	20.07 (510.2)
Average precipitation days (≥ 0.01 in)	10.4	9.0	9.1	6.6	3.9	1.1	0.1	0.3	0.7	3.9	7.1	11.1	63.3
Source 1: NOAA ^[14]													
Source 2: National Weather Service (mean maxima/minima 2006–2020) ^[15]													

2.1.1.3 Physiographic Site Overview and Analysis

The approximately 19-acre project site is in a rural-industrial area. The site is relatively flat with elevations ranging from 50 feet above sea level along North Beale Road to about 80 feet at the northwest corner where the Yuba River levee forms the project site's north property line. The site neighbors a residential area on the northeast property line, a vacant parcel that previously had a sand and gravel supplier company on the southeast side, and an agricultural area in the Yuba River floodplain beyond the levee to the north. It is bound by Avondale Avenue along its southwest property line and fronts North Beale Road along the south side. The industrial lot across Avondale Avenue is a concrete plant (CEMEX), and Union Pacific railroad tracks run on its west side towards Marysville, California. The natural dry and seasonal dusty environment with the added airborne debris from the adjacent concrete plant shall be considered for building orientations, materials, openings, and ability to access and clean site elements on a regular basis.

2.1.2 Site Layout and Circulation

The site, 6035 Avondale Avenue, Linda, California 95901, is a combination of five lots and had past use as a former agricultural and log storage facility. No existing structures, occupants, or ongoing businesses are on-site, and as such no phased or workaround plans are anticipated. The entire site is anticipated to be available to developers for construction activities and storing materials and equipment. This section describes the anticipated daily activities and bus, vehicle, and pedestrian circulation needs. Subsequent sections describe how the design will address these needs.

2.1.2.1 Daily Activities

The daily activities will involve site design with a focus on both the construction and ongoing maintenance phases to ensure smooth integration and operation of the facility. During the construction phase, the site design team will oversee the installation of key elements such as pavement, drainage, and structures. Additional components will include lighting, landscaping, and utilities, with a focus on affirming that the facility is constructed according to the plans.

2.1.2.1.1 Operations

Operators responsible for driving the morning service arrive in the early morning hours and park their private vehicles in the designated parking area. They report and receive their assignments and instruction from the dispatcher. They proceed to the bus parking area and perform a pre-trip inspection of the vehicle prior to leaving on their route. When operators return to the site in the evening at the end of daily bus service, they will stop at the service canopy to queue buses for service personnel. Operators then return to Operations to file necessary reports with the dispatcher. Service personnel will pull the fares every Tuesday and Thursday to be taken to the coin room for counting. Fueling may occur at this time from dispensers located on a raised curb alongside each fueling position. All buses will be interior cleaned including sweeping and vacuuming of the interior of the bus and collection of Bad Order messages left by operators for service crew and maintenance staff of bus issues found during the route. The service personnel will then run the buses through wash and return them to their designated parking spaces. Once parked, diesel buses will remain in place until morning pull out. The fuel lanes will also serve as the detail lanes for cleaning buses when the lanes are not being used for fueling vehicles in addition to the wash bay when the gantry washer is not being used to wash vehicles.

As an alternative to queued parking upon inbound, buses are parked in their specific assigned parking spaces. Operators then fuel their assigned vehicles as needed prior to leaving the site in the morning or during midday returns at the bus yard. Note that this operation description is predicated on having site space for dedicated assigned bus parking with access to every bus.

Beginning and ending of shifts generate considerable transit vehicle and automobile traffic on and around the site. Moving vehicles for maintenance, inspection, fuel and wash, and other related repairs generates additional on-site traffic. The greatest amount of intra-site traffic will occur in the evening hours between 6:00

p.m. and 10:00 p.m. During this time, service personnel will drive vehicles through the fuel service island, bus wash, and into maintenance for repairs or inspections, or to the designated parking area. Separation of bus and personnel traffic is desirable for safety.

2.1.2.1.2 Maintenance

Maintenance personnel will work on multiple shifts performing varied tasks 6 days per week between 3:30am and 11:00pm. The facility will house general maintenance, inspection, tire, brake, parts distribution, and other daily maintenance functions. During all shifts, all maintenance activities will be performed. During the evening shift, personnel assigned to Fuel and Wash sweep out the interiors of vehicles, replenish engine oil and coolant levels, fill the fuel tanks, and perform a visual inspection of the vehicle exterior, noting defects that require immediate attention. After sweeping out the interior, fueling, and topping off lubricants, the service worker drives the vehicle through the vehicle washer. If the vehicle requires repair or is scheduled for inspection, it will be parked in a designated down line parking area. If no work is required, the vehicle will be returned to the regular parking area, ready line, and the service worker begins the process again with the next vehicle. Note that the facility design shall provide flexibility to allow all maintenance activities to be performed on all shifts.

Vehicles awaiting repair will be cycled through maintenance bays based on work orders generated from defect reports, road calls, accidents, and warranty problems. Items found during scheduled preventative maintenance repairs are addressed before the bus is returned to service. By preference, most repairs shall be performed on a scheduled basis, but there will always be a certain level of ongoing repair work required by failures and incidents.

Inspections are performed on a scheduled basis established by mileage intervals and seasonal requirements. A vehicle has its engine cleaned in the chassis wash prior to inspection or other service, allowing sufficient time for leaks to become apparent. Shall a vehicle need additional repair based upon inspection findings, it will remain in the bay until the repairs are made.

2.1.2.2 Transit Circulation

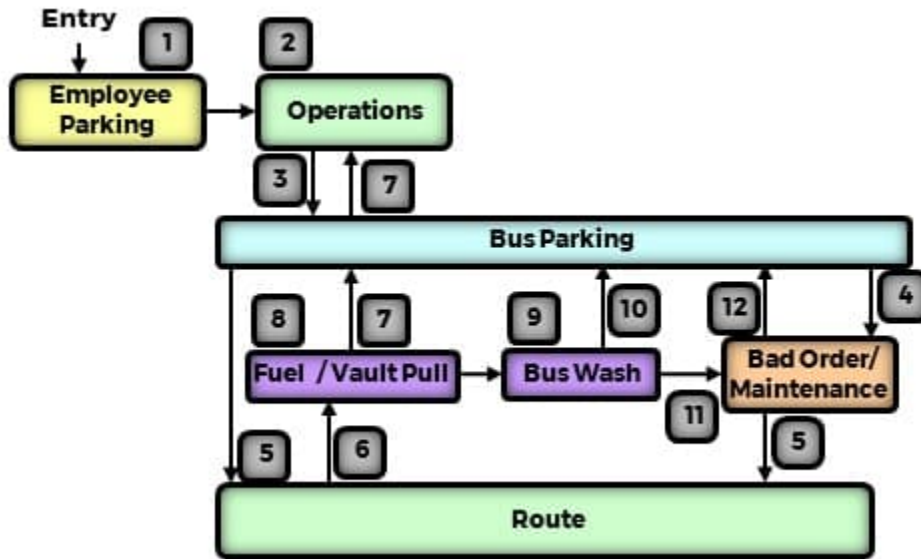
The transit flow and circulation plan for the Next Gen Facility prioritizes operational efficiency, safety, and scalability. By combining insights from the site analysis and best practices, the narrative below outlines a comprehensive approach to transit circulation management.

Overview of Transit Flow Design

The mixing of moving vehicles and employees on the site must be carefully considered and incorporated into the overall traffic pattern. Pedestrian walkways must be safely and efficiently located and readily identifiable to promote effective management and the enforcement of safety standards. This section identifies many of the areas where vehicles and pedestrians mingle. Transit vehicles, delivery trucks, service vehicles, forklifts, and the privately owned vehicles of staff personnel are assigned to parking or staging areas around the site. An explanation of how vehicles will be parked and staged follows.

Transit vehicles enter the site and are staged for fuel and wash activities. Vehicles move from Fuel and Wash to repair, inspection, and other maintenance areas or are moved to the bus parking area as shown on the following graphic. Careful consideration shall be given to reduce backing movements wherever possible. If backing movements are required, they shall be limited to times when the vehicle is being driven by service personnel.

Figure 2-2 illustrates the overall flow of vehicles and pedestrian traffic on- and off-site that shall be accommodated at the new facility.

Figure 2-2: Transit Vehicle Traffic Flow

1. Operator arrives on-site and parks in employee parking area.
2. Operator picks up route information at Dispatch.
3. Operator gets bus assignment from the dispatcher and proceeds to the bus parking area. Operator performs a pre-trip inspection in the agency vehicle parking area to check lights, brakes, tires, and cleanliness. The wheelchair lift and bike rack are cycled in the bus parking spot.
4. If a problem is found with the bus, it is taken to maintenance for immediate repairs.
5. After immediate repairs or if no pre-check issues are found, the bus leaves the site and goes on route.
6. At the end of the daily run and upon entering the site, the buses queue at fuel and vault pull where the fares are collected every Tuesday and Thursday.
7. Operator reports to the dispatcher and typically leaves the site.
8. Service worker fuels the vehicle and tops off fluids. Bus interior is also cleaned in this area.
9. Bus is taken through the wash area for exterior cleaning.
10. If no problems are reported, the bus is moved to ready line area in bus parking.
11. If a problem is reported or service is scheduled, the bus is parked in a designated down line space for maintenance within bus parking.
12. After maintenance, the bus returns to the bus parking area.

Counterclockwise Flow

The facility adopts a counterclockwise traffic flow, a best practice for transit facilities, which minimizes complex maneuvers like reversing and ensures a consistent, efficient movement of vehicles.

This layout supports streamlined transitions between key facility areas, including fueling, washing, maintenance, and parking zones.

Segregated Traffic Zones

The site design separates the following types of traffic:

- **Agency Vehicles:** Dedicated lanes for buses to access fueling, wash, maintenance, and parking.
- **Employee Vehicles:** Defined parking areas near Administrative/Operations and Maintenance buildings to reduce overlap with bus operations.
- **Support and Service Vehicles:** Forklifts, delivery trucks, off-site agency vehicles servicing site, and private non-agency service vehicles have specific circulation paths to minimize interaction with buses and pedestrians.

Queuing Areas

Designated queuing lanes are located to manage peak-hour congestion without disrupting overall site operations.

Isolation Areas

Designated isolation areas are located away from buildings and structures to ensure staff safety without disrupting overall site operations.

2.1.2.3 Transit Vehicle Circulation

2.1.2.3.1 Ingress and Egress

Separate Entry and Exit Points

- Buses enter and exit through separate gates, reducing conflicts and supporting high-volume movement during peak hours.
- One bus entrance and one bus exit are provided on Avondale Avenue; one secondary exit provided on North Beale Road.

2.1.2.3.2 Flow Through Facility

Sequential Pathing

- Upon entry, buses follow a clear sequence: fueling, washing, maintenance (if required), and finally, parking.
- The sequence minimizes backtracking and idle time.

Peak Traffic Management

- Morning pullouts and evening pull-ins generate significant vehicle activity
- During pullouts, buses proceed directly from charging/parking areas to the exit, following pre-assigned routes.
- Evening pull-ins are directed first to fueling and washing stations before proceeding to designated parking spots.
- If queuing is required, buses are queued in the queuing lane.

2.1.2.4 Pedestrian Circulation

Routine activities generate a substantial volume of pedestrian traffic. Many of these trips require maintenance personnel to walk the length of the bus parking area to pick up a vehicle or return to a workstation after parking a vehicle. Pedestrian walkways shall be designed to minimize walking distances, trip times, and exposure of personnel to vehicular traffic. Those areas personnel most frequently walk to or through are:

- From the employee parking area to the entrance doors of Maintenance
- From the employee parking area to the entrance door of the Drivers' Room
- From the Drivers' Room to the agency vehicle parking area
- From Maintenance to Fuel and Wash
- From Fuel and Wash to the agency vehicle parking area
- From the maintenance area to the agency vehicle parking area

Safe Pathways

- Pedestrian walkways are clearly marked and located away from high-traffic zones.
- Crosswalks and traffic calming measures, such as speed humps, ensure safety near high-traffic intersections.

Direct Access

- Employees have safe and direct access to:
 - o The Drivers' Room from parking areas
 - o Maintenance and administrative offices from service zones

2.1.2.5 Other Vehicle Type Circulation

Traffic other than transit vehicles (forklifts, delivery trucks, off-site agency vehicles servicing site, and private non-agency service vehicles) circulates between designated parking areas and the maintenance, service, and any yard storage.

Delivery Trucks

- Delivery trucks have dedicated access points near parts storage and maintenance facilities to reduce interaction with transit vehicles.

Service Vehicles

- Forklifts and yard vehicles operate in segregated lanes, ensuring safe operation without interference with bus or pedestrian movement.

Employee Vehicular Traffic

- Employee vehicles shall be restricted to employee parking areas. Employee parking areas shall be located on the site near their respective entrances to the Drivers' Room in Operations and to the restroom areas in Maintenance.

Commercial Vehicular Traffic

- Commercial vehicles must be directed onto and from the site by appropriate signs, following the same traffic flow as transit vehicles. Those vehicles delivering to Parts Storage require off-loading at the Shipping and Receiving area of Parts Storage. Other vehicles delivering bulk consumables, such as fuels and engine oil, require off-loading adjacent to the tank farm or adjacent to the Lube Room. Tanker trucks may also arrive to evacuate tanks and collect recyclable liquids. Vehicles will pick up trash from dumpsters located on the site. Scrap dealers may enter the site to pick up segregated and non-segregated metal scrap.
- Other companies providing services, products, or a combination of both may create additional traffic, e.g., delivery of tires, delivery of advertising materials for the exterior and interior of vehicles, laundry service, bulk storage, and service contracts with companies maintaining specific facility equipment.

2.1.2.6 Traffic Flow Optimization Strategies

2.1.2.6.1 Dynamic Traffic Management

Real-Time Monitoring

- Use surveillance cameras and sensors to monitor vehicle movements and identify bottlenecks in real time.

Digital Scheduling Systems

- A centralized scheduling system assigns buses to specific fueling and washing lanes to reduce queuing time.

2.1.2.6.2 Reduced Vehicle Movement

Strategic Equipment Placement

- Fueling and washing facilities are located along the main circulation path, minimizing unnecessary detours.

Efficient Parking Configurations

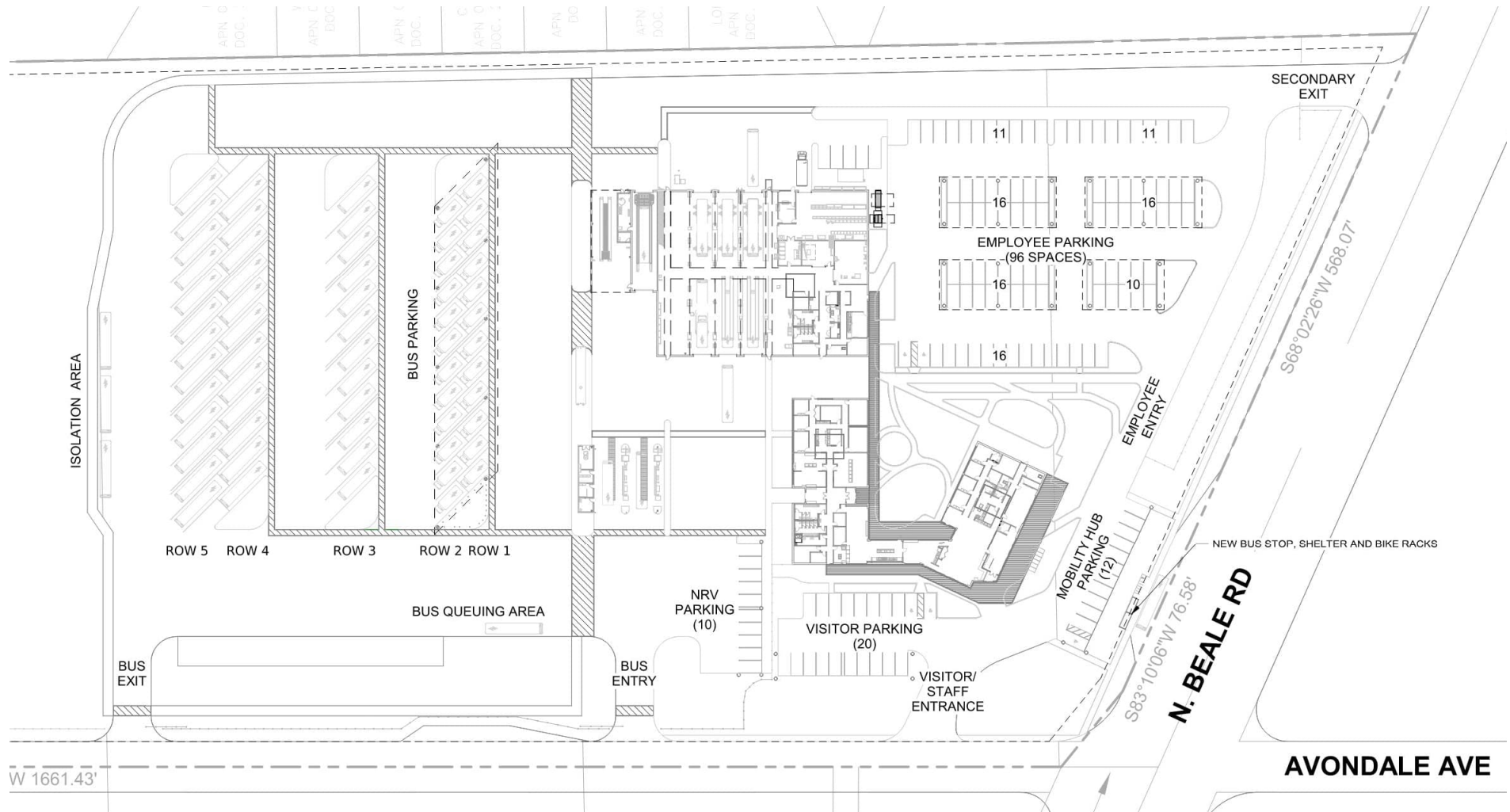
- Parking spaces are designed to accommodate buses without requiring reversing maneuvers.
- Wide turning radii and straight-through parking lanes improve ease of access.

The Next Gen Facility's transit flow and circulation design effectively address the operational needs of a modern fleet. By incorporating best practices like counterclockwise flow, segregated traffic zones, and dynamic traffic management systems, the facility ensures safety, efficiency, and scalability. These measures will support current operations and adapt to future growth, positioning the facility as a model for sustainable transit infrastructure.

2.1.2.7 Parking Layout and Site Circulation Plan

The proposed agency revenue vehicle parking layout features five organized rows, each accommodating up to 12 vehicles with the last row able to accommodate 13, resulting in a total capacity of 61 vehicles (shown in Figure 2-3). The layout is designed for optimal circulation, safety, and efficiency, with wide drive aisles to allow for smooth ingress and egress of buses at all hours of operation. Each parking bay is dimensioned to meet or exceed standard transit vehicle clearance requirements, including turning radii and door swing zones, to facilitate safe maneuvering and maintenance access. Clear directional signage, striping, and bollards will ensure orderly flow and maximize operational clarity for both drivers and maintenance personnel. This layout supports high-throughput operations while accommodating sustainability and future expansion goals.

Figure 2-3: Parking Layout and Site Circulation Plan



In addition to the dedicated agency vehicle parking, the site layout includes well-defined parking zones to support a range of operational and community needs. A designated area near the Operations and Maintenance buildings provides ten parking stalls for non-revenue fleet vehicles such as service trucks, staff shuttles, or supervisory cars, ensuring quick access to transit infrastructure.

Adjacent to the main entrance, 20 visitor parking stalls are clearly marked and conveniently located for short-term access to administrative offices, enhancing accessibility and wayfinding. Additionally, 12 stalls are designated for a “mobility hub” area to enhance the site's role as a multimodal transportation node.

Finally, 96 employee parking stalls are located within the secured perimeter of the facility, accessible via gated entry to ensure safety and controlled access for authorized personnel only. This parking area is strategically positioned near the maintenance, operations, and administration buildings, providing convenient and efficient access for staff across all departments. The secure location minimizes walking distances and enhances shift-change logistics, while also maintaining a clear separation from bus movement zones to ensure operational safety. Lighting, signage, and pedestrian pathways will be incorporated to support visibility, comfort, and safety during all hours of operation.

2.1.2.8 Vehicle Canopies

The canopy structures covering the fleet vehicle parking will be designed to provide weather-protective shelter for agency revenue vehicles and must be able to structurally support the dead and live load requirements defined in Section 2.4.2.8. These canopies shield vehicles from sun, rain, and environmental wear.

The canopy structure will be constructed using a durable, steel-framed system engineered to meet local structural, seismic, and wind load requirements. Foundations will consist of reinforced concrete footings or piers, precisely placed to support the canopy columns without obstructing bus circulation. Pre-fabricated steel components will be delivered and assembled on-site, with a focus on efficient installation to minimize disruption to transit operations. The structure will feature a sloped roof design, while not precluding integrated raceways and cable management systems. The canopy structures will include a metal deck on top of the steel, or may use a similar material to act as a vertical covering and lateral diaphragm; this roof system must have an allowance for dead load and live load support. The dead load shall have an allowance for 10psf of collateral load in addition to self-weight of the structure. The Live Load shall provide for a typical 20 psf allowance commensurate with a typical roof load condition. The canopies must also be capable of resisting wind and seismic forces as dictated by the building code.

Only the canopy for Rows 1 and 2 is included in the base scope. Underground conduit with stub ups to the other rows of revenue vehicle parking is included in the base scope so those canopies can be easily added over time.

The base scope also includes canopy structures over the employee parking, visitor parking, non-revenue vehicle parking area, and mobility hub to satisfy the local shading ordinance (as discussed in Section 2.1.5).

2.1.3 Site Organization and Principles

2.1.3.1 Parti Development

The architectural parti was developed through a series of design workshops with Yuba-Sutter Transit to arrive at the ideal site configuration. The site diagram evolved from a desire to locate the buildings as close to North Beale Road as possible on the south portion of the site while concentrating all the bus parking and maintenance functions on the north portion of the site. The maintenance block and the office building block were initially two isolated structures on the site (Figure 2-4-A). While functionally the maintenance building location was ideal, the office building presented an opportunity to try different configurations. A more elongated figure emerged by maximizing southern frontage while splitting the office building in half to represent the two user groups separated by a shared outdoor promenade space (Figure 2-4-B). The main public-facing segment was then rotated to acknowledge the orientation of North Beale Road and create a more generous outdoor space between the two office building user groups (Figure 2-4-C). Finally, these two segments were rejoined as a single building with a connector piece, resulting in a U-shaped figure that provided environmental advantages (Figure 2-4-D). The functional and programmatic efficiency of having the two office building user groups under one roof could be balanced with a shared outdoor space, which emerged as the primary design driver for the building layout.

Figure 2-4: Development of Configuration and Building Layout using Entire Site

Figure 2-4-A

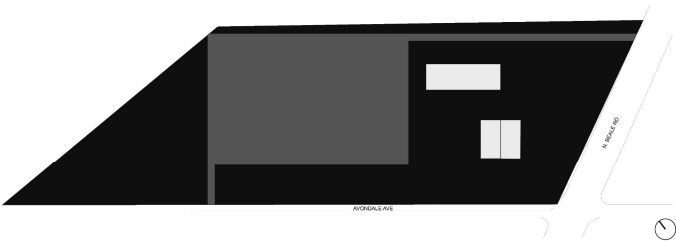


Figure 2-4-B

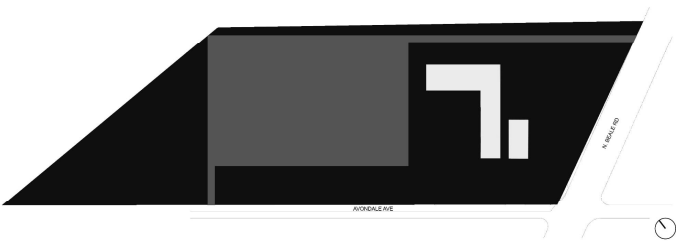


Figure 2-4-C

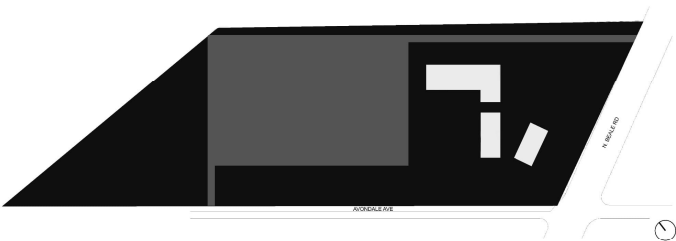


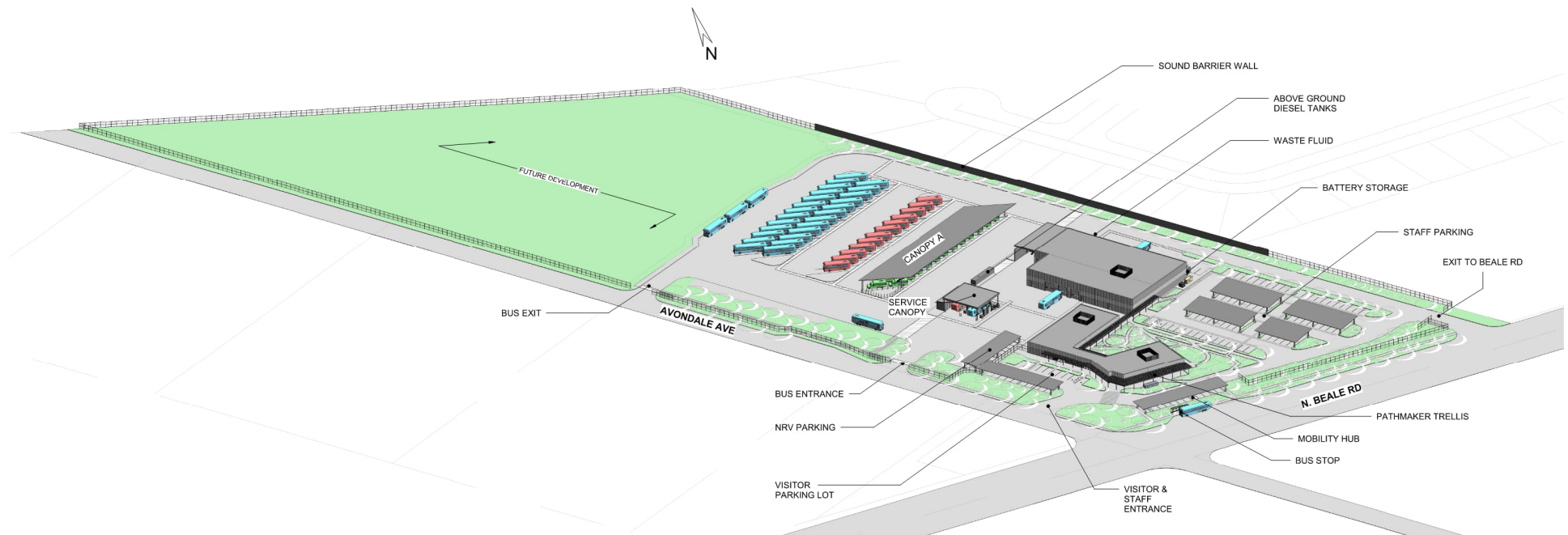
Figure 2-4-D



2.1.4 Site Components

The following graphic shows the proposed configuration of the site components for the Next Gen Facility.

Figure 2-5: 3D Site Diagram



2.1.5 Landscape Site Plan

2.1.5.1 Landscape and Irrigation Goals and Objectives

The key goals for the landscape and irrigation design are to create aesthetically and environmentally pleasing outdoor spaces that are ecologically compatible with the adjacent landscape, conserve water, reduce fire hazard, promote on-site rainwater infiltration, minimize impacts to neighbors and the public, and minimize landscape maintenance. These goals were broken down into the following specific objectives:

- Provide landscaped areas that are aesthetically inviting with year-round interest and variation.
- Provide aesthetically pleasing transition from the building architecture to the street and adjacent land.
- Provide shade over frequently used pedestrian and parking areas.

- Use locally native, drought-tolerant, fire-resistant, and self-sustainable plants.
- Provide a highly efficient, automatic, low-maintenance irrigation system with drip emitters, bubblers, and low-angled spray heads, compliant with the County Water Efficient Landscape Ordinance.
- Group plants into hydrozones based on their similar water, soil, and solar exposure requirements.
- Provide a separate irrigation valve circuit for each hydrozone and groupings of trees, shrubs, and groundcovers with similar water demands.
- Provide defensible landscape both regarding plant selection and the plant layout compliant with National Fire Protection Association (NFPA), California Public Resource Code, and County Fire Department requirements for fire-resistant landscaping.
- Maximize outdoor soft- and hardscape areas that promote rainwater infiltration and slow down runoff.
- Use pervious hardscape materials such as decomposed granite, sand-set stone or brick, gravel, and pervious concrete instead of impervious paving.
- Minimize privacy, noise, and visual impacts to the neighbors and public.
- Utilize organic and mineral mulches over pervious landscape fabric to reduce water loss and soil temperatures.
- Use only light-colored mulches such as decomposed granite, calcine clay, rock, gravel, cobbles, and wood chips to reduce soil temperature, evapotranspiration, and plant mortality.
- Vegetation shall be placed to avoid conflict with visibility needs for vehicle circulation, ingress, and egress.
- Vegetation shall be thorny where possible and shall not provide hiding places.
- Consideration shall be given to perimeter vegetation selection and placement to avoid its use as a screen for criminal or undesirable social activities.
- Consideration will be given to the size of fully mature plantings with respect to site lighting and parking lot safety concerns.
- Underground piping circuit lengths shall be minimized and sized to reduce required water delivery time to appropriate durations.
- Irrigation shall be provided with an automatic controller, separate water meter, water backflow devices, control valves, zones, pipe irrigations system, and rain sensor with automatic shutoffs.
- Design of monument sign shall be by the agency.
- Comply with all applicable codes, ordinances, and regulations.

The Next Gen Facility is in Linda, Yuba County, California, classified to be in a Public Facilities (PF) District zone. Therefore, the following titles of the Yuba County Code of Ordinances related to landscaping and irrigation apply:

- Yuba County Code of Ordinances, Title XI—Development Code, Division II—Zoning and Overlay Districts, Chapter 11.24—Landscape, Sections 11.24.050 to 11.24.110
- Yuba County Code of Ordinances, Title X—Building and Construction, Chapter 10.15—Firebreaks, for fire setback requirements
- Yuba County Code of Ordinances, Title XI—Development Code, Division II—Zoning and Overlay Districts, Chapter 11.25—Parking and Loading, Section 13—Parking Lot Landscaping, for Planting Island and Parking Shade requirements
- Yuba County approved tree and shrub species list
- Yuba County Water Efficient Landscape Ordinance (Chapter 11.24—Landscape, Section 11.24.070—Water Efficient Landscape Requirements)

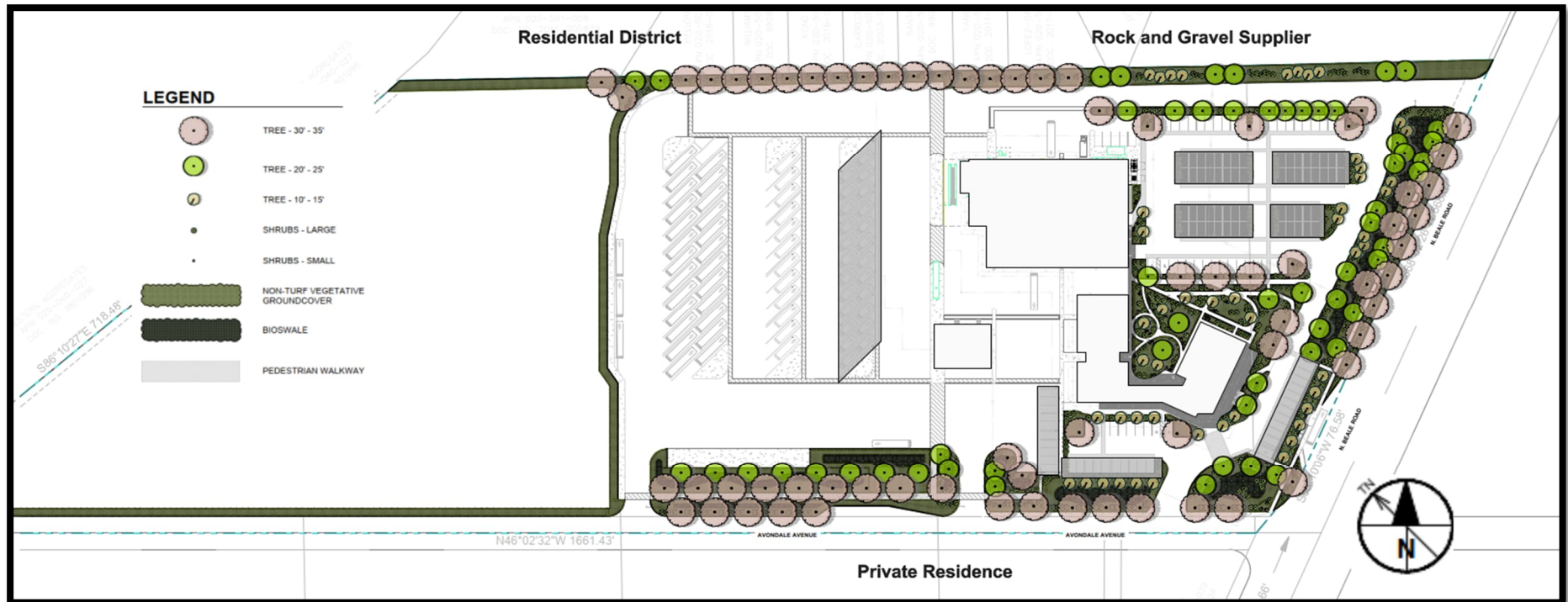
There is a minimum requirement per the Parking Lot Landscaping Ordinance to provide 50% shading of the parking lot within 15 years. This can be achieved through additional landscaping over the parking lot and/or through canopy structures. The Design-Builder in coordination with YSTA during Final Design will need to consider these options to achieve the minimum requirement but could be impacted by potential future funding opportunities for solar panels to be installed as

betterments. If a betterment for solar panels is pursued (discussed more in Chapter 3), then those panels would help achieve the shading requirement and the design can be altered, but coordination with Yuba County shall be had to confirm compliance with the applicable ordinances and find a reason exemption (if needed).

2.1.5.2 Landscape and Irrigation Design

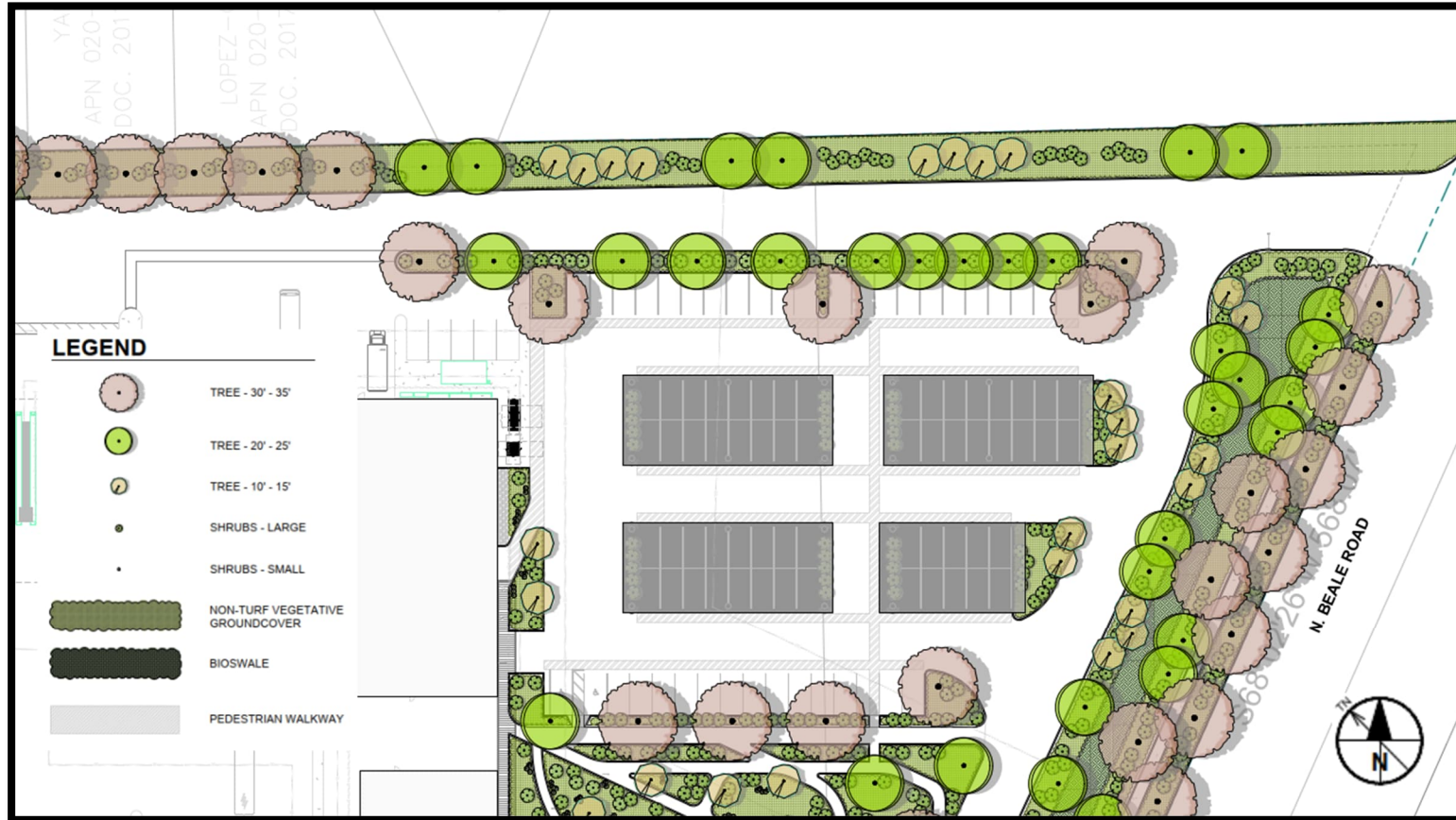
The project site landscaping consists of six distinct areas: the North Beale Road Street frontage landscaping, the Avondale Avenue landscaping, landscaping along the residential district along the northeast property line, employee parking area landscaping and/or canopies, public parking area landscaping, and the inner courtyard landscaping (Figure 2-6). The landscaping plan under the baseline scenario is shown where no solar panels over employee parking areas is provided, but those solar panels are potential betterments and therefore could change the design to accommodate canopies with solar panels, which could towards the County's shading ordinance. Coordination with Yuba County shall occur during Final Design to discuss the tree and shading requirements based on betterments chosen.

Figure 2-6: Conceptual Landscaping Plan



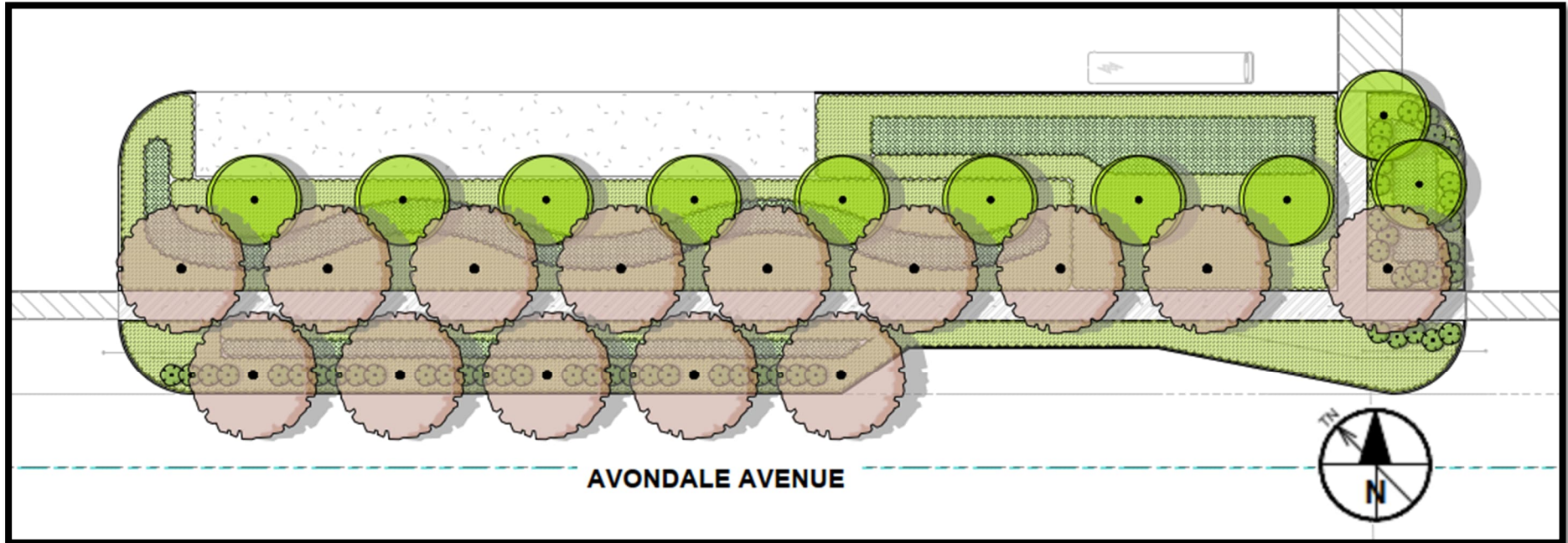
The front landscape area along North Beale Road includes street shade trees spaced at 40 feet on center as required by Yuba County landscape ordinance. It also includes a large bioswale that will handle the runoff from the large adjacent employee parking lot. The street frontage landscaping transitions seamlessly to a large employee parking area planted densely with broad canopy shade trees. The county requires that 50% of the parking lot area be shaded in 15 years, which can be achieved through canopy structures and/or mature trees with one shade tree planting island for every eight parking stalls (Figure 2-7).

Figure 2-7: Part of North Beale Road Frontage and Employee Parking Landscaping



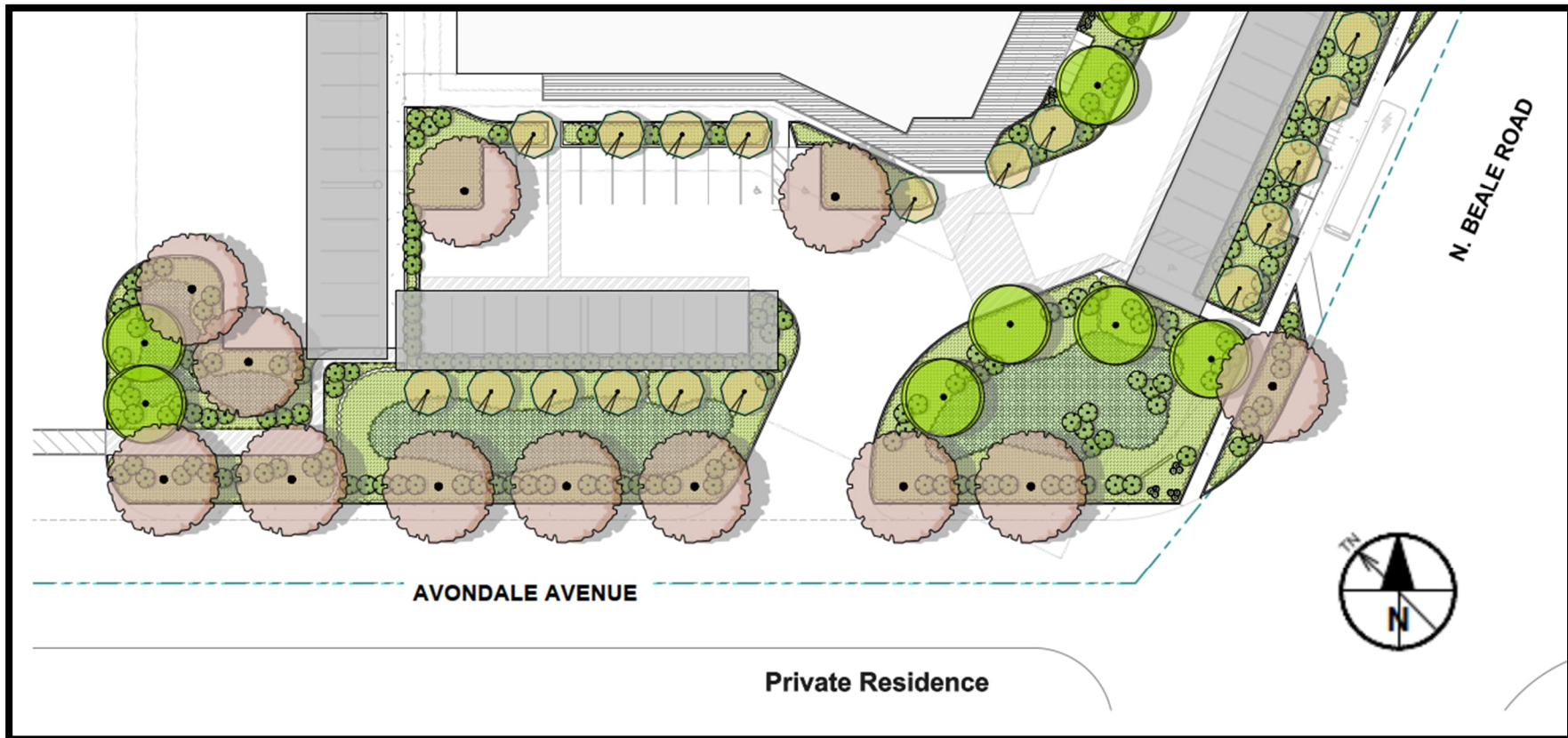
The landscaping along Avondale Avenue also includes some of the county-required street trees at 40 feet on center. The trees will be installed only where feasible, since they would shade the solar collectors at the back of the property. A large bioswale will be included in this landscaping area to help slow down and pre-treat the stormwater runoff from the adjacent large, paved areas (Figure 2-8). A concrete pad (as shown in the figure) is included for bus parking training as well as underground conduit and utilities shown in Appendix A, Drawing C201.

Figure 2-8: Avondale Avenue Landscaping



The residential district landscape buffer includes the 10-foot minimum width landscape strip with evergreen trees at 30 feet on center along the entire northeast property line segment shared with the residential properties. The small public parking area next to Avondale Avenue includes the required shade trees and parking lot tree islands, a bioswale area and shrubbery that will screen the parking lot from the street. Avondale Avenue Street trees are part of this landscape (Figure 2-9).

Figure 2-9: Public Parking Landscaping



A small, landscaped courtyard will be built in the area between the Administrative and Operations buildings. It will include native, low-water, drought-tolerant and fire-resistant trees and shrubs spaced in a way that they do not promote the spread of fire (Figure 2-10).

Figure 2-10: Courtyard Landscaping



2.1.6 Site Furnishings

A number of site furnishings will be provided as part of the project by the design-builder. The key furnishings will be bicycle racks, bicycle storage bins, and several benches along the proposed system of paved trails. A BBQ grill shall be furnished and installed in the courtyard. Furnishings shall be permanently attached to the concrete with vandal-resistant stainless-steel bolts. They shall be ADA compliant and shall have durable, corrosion resistant surfaces. Benches shall have wooden seating surfaces and back supports. Several options of furnishings design lines shall be submitted by the design-builder to the Owner for final selection. The type of site furnishings shown in the drawings are for representative purposes only.

2.1.7 Utilities

The Next Gen Facility is designed to ultimately house, operate, and maintain up to seventy (70) revenue vehicles. At initial construction, YSTA anticipates operating the facility with approximately fifty-five (55) revenue vehicles. The local utility provider is Pacific Gas & Electric (PG&E).

A **pad-mounted transformer** will provide metered service, dedicated to “house” power. This service will feed a main LV switchboard located in the Maintenance Building electrical room.

The house power system shall serve:

- Site lighting
- Site power
- Administration facility
- Operations facility
- Vehicle maintenance facility
- Vehicle Service Island

This metered service will handle all administration, operations, and maintenance loads.

2.1.8 Use Permit Requirements

YSTA has applied for a Minor Use Permit for this facility. The Draft Conditions of Approval by the Yuba County Development Review Committee are included as Appendix G and are applicable to the Design-Build Contractor for the design and commissioning of the Next Gen Transit Facility. Conditions include, but are not limited to: dedicating specified right-of-way and/or easements for the County of Yuba, performing a traffic study, providing a streetlight plan, submitting a drainage plan and other control plans, trip generation/distribution info for buses using SR70 on/off ramps. The Design-Build Contractor must consider and adhere to these requirements in coordination with YSTA.

2.2 Building Organization and Architecture

The architectural design of the Next Gen Facility has as the Basis for Design the following project provisions and other design reference documents. This section summarizes the architectural design concepts and the criteria for which the project will be designed. The facility consists of two main buildings: 1) the Office and Amenity Building comprising 12,765 gross square feet that houses the Operations and Administration departments in two opposite wings joined in the center by an exterior courtyard and an interior social area and 2) the Bus Maintenance Building comprising 21,070 gross square feet. Other buildings or structures supporting bus operations and maintenance include solar canopies for parking, wash and service stations, and a public mobility hub.

2.2.1 Architectural Guidelines and Approaches

The project aesthetic will be based on a contemporary industrial style. An emphasis on providing a strong presence and visual identity for the transit agency will guide the architectural design. The quality and durability of architectural materials and finishes will be chosen for cost control, thermal and noise control, fire ratings, longevity, low maintenance, and sustainability. This facility will be designed to withstand a high level of wear and abuse common to bus and vehicle maintenance and operations facilities. It will provide durable, easily cleaned, and repairable material finishes at building surfaces that will be subjected to physical and mechanical contact, particularly in shop and maintenance areas.

2.2.1.1 General Considerations

- Aesthetics shall convey a strong presence, visual identity, and unity through proper relationships of components.
- Quality and durability shall be primary design drivers.
- Buildings must be accessibility-compliant as required by code and Americans with Disabilities Act (ADA) standards.
- Maximize the use of natural light wherever possible through vertical glazing and clerestories.
- Avoid skylights to minimize waterproofing issues.
- Implement high ceilings at maintenance bays.
- Implement high-volume, low-speed fans in maintenance bay areas.
- No-smoking or vaping facility except at designated exterior smoking area.
- Provide employee amenities that convey a sense of pride and professionalism.
- Provide necessary occupancy separations required by code.
- Provide open structures for service facilities per the Project drawings such that lighter than air gases are not trapped below the roof.
- Avoid “air pockets” in vehicle bays where explosive gases could accumulate at the ceiling.

2.2.1.2 Design Dimensions and Clearances

The design of the facility must allow for safe and efficient movement of personnel, equipment, agency vehicles, and delivery vehicles. To provide proper unobstructed clearances, the following minimum dimensions must be maintained. Note that “unobstructed clearance” means structure, lighting, mechanical ductwork, and any other obstructions must be above the minimum vertical clearances indicated.

- Hallways, doorways, interior grade changes, and restrooms: per ADA standards and as required by code
- Minimum ceiling clearances above finished floor:
 - o Private Offices: 9 feet
 - o Open Office Areas: 10 feet
 - o Meeting Rooms: 10 feet
 - o Parts Rooms: 12 feet
 - o Shops: 14 feet
 - o Repair Bays: 19 feet
 - o Vehicle Washer: 16 feet
- Minimum door openings (width by height):
 - o Parts Rooms: 10 feet by 10 feet (interior) 12 feet by 14 feet (exterior at loading dock)
 - o Shops: 10 feet by 10 feet (for forklift access)
 - o Repair Bays: 14 feet by 14 feet
 - o Vehicle Washer: 14 feet by 14 feet
 - o Any door to accommodate vehicle traffic: 14 feet by 14 feet
- Circulation (minimum width):
 - o Pedestrian corridors: 6 feet
 - o Forklift aisles: 10 feet
 - o Corridors in office spaces: 5 feet
- Work Area:
 - o Engine end of vehicle: 10 feet
 - o Opposite end of vehicle: 5 feet
- Minimum bay (width by depth):
 - o Repair Bays: 20 feet by 60 feet for 45-foot buses (25 feet when adjacent to wall)
 - o Steam Clean Bay: 20 feet by 70 feet
- Minimum parking dimensions (width by length):
 - o 45 feet over the road commuter coaches: 14 feet by 50 feet. Spaces shall be designed as such to allow for flexibility and accommodate all vehicle lengths, including the 35-foot transit coaches.
 - o Support/employee/visitor vehicles: 10 feet by 20 feet
 - o Handicap Parking Stall: per ADA standards and as required by code
- Turning and circulation requirements (90-degree turn):
 - o Medium vehicle (auto, light truck, van): 25 feet
 - o Transit coaches: 70 feet
 - o Forklift: 12 feet

2.2.1.3 Sustainable Building Design

Yuba-Sutter Transit has indicated a desire to incorporate environmentally sustainable features into their project, and therefore, it will be the intent to build a high-quality project that is environmentally sensitive and energy-efficient and uses sustainable building methods. The project will meet many of these objectives by complying with the California Green Building Code in the development of the project design and in the selection and specification of materials. The project will not pursue Leadership in Energy and Environmental Design (LEED) certification.

The sustainable design can be implemented during the planning phase with an integrated design approach, including materials selection, energy efficiency, site design, and resilience planning by incorporating climate adaptation measures. During the construction phase, the Contractor will implement energy-efficient practices, erosion and sediment control, and other sustainable practices. The Contractor will maintain a strong focus on green alternatives and technology integration.

Acoustic design will consider the industrial nature of the project and sound levels generated by bus operations. Consideration will also be given to controlling noise generated by operational and heating, ventilation, and air conditioning (HVAC) equipment located in each building. Noise-level control will be provided using appropriate sound insulating building materials and/or sound barriers such as sound walls, double-glazed windows, space separation, and landscaping.

Design of sound barrier construction assemblies will provide sufficient sound attenuation to minimize the noise impact on adjacent workspaces. Ambient noise within interior workspaces will be maintained at levels to support the efficient operation by terminal staff.

2.2.1.4 Entrances and Outdoor Spaces

The southwest corner of the facility site will be a point of high visibility, as most entrants to the site will use the main entrance at the corner of North Beale Road and Avondale Avenue. The building architecture shall be addressed to create a lasting first impression.

Private main entrances into the operations and administration wings through the private courtyard shall reinforce the connection from exterior to interior. Wayfinding from the main employee parking lot to these entrances shall feel intuitive and be reinforced by the landscaping and outdoor shading. Similarly, emphasis shall be placed at the southwest corner of the Office and Amenity Building as the main public entrance.

The private courtyard is located to become the centerpiece of the facility and shall create a sense of cohesion between users and occupants of the facility.

Provide bulkheads and/or separation walls and doors between vehicle and non-vehicle areas.

Door motors shall be Division 1 rated and on the emergency stand-by power system.

2.2.1.5 Building Materials and Finishes

The facility design shall utilize materials that are aesthetically pleasing, durable, and cost-effective. The materials shall be used in a way that reinforces the structural organization of the building program and the building structure itself. The durability of materials is essential in this setting with high traffic. A 75-year life expectancy of any material on the building shall be considered the minimum.

The materials shall also be appropriate for the functional area in which they are used. Some of the areas in which careful selection of materials is very important due to the specialized functions are the vehicle washers, steam clean bay, and lube/compressor room. If a composite wall system is used, concrete masonry unit (CMU), or another hard surface shall be used at least up to 8 feet above finished floors. Mechanical fasteners that are exposed to weather conditions or a wet

environment shall be constructed from stainless steel. The materials shall also provide a visual counterpoint to the landscape design, i.e. primarily in a neutral palette to enhance the experience of the courtyard. On the main south and west public faces of the facility, the materials shall assert a strong and appealing visual presence as visitors approach the main entrance at the intersection of North Beale Road and Avondale Avenue.

Even though the project is not pursuing LEED certification, Yuba-Sutter Transit has requested that materials shall be selected for recycled content, regional availability, and low emitting properties to meet or exceed LEED requirements.

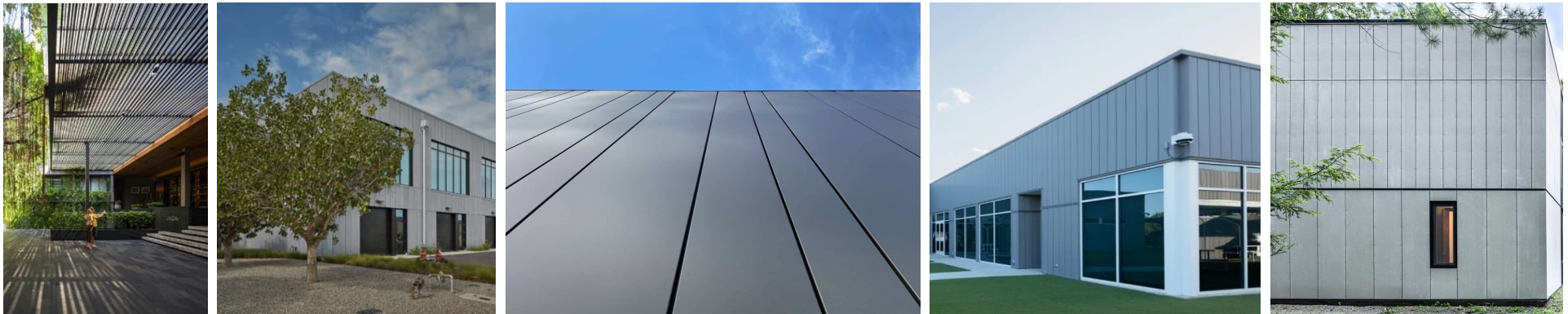
Materials that are encouraged include:

- Pre-finished aluminum or patinated zinc metal wall panel
- Fiber-cement board
- Pre-finished or clear anodized aluminum storefront
- Insulating glass, with Low-E and a high level of visible light transmittance shall be the priority, with low reflectivity to promote transparency and avoid heat reflections into the public space.

Wood for projections, sunshades (brises soleil), canopies, etc.

Figure 2-11: Reference Images Showing a Range of Applications with Preferred Materials

Note: Refer to Section 2.2. for Exterior Material Application



Materials that are discouraged include:

- Cement plaster and exterior insulation and finish systems
- Painted metal cladding in bright or saturated colors
- Natural stone
- Mirrored or reflective glazing

At the roof, screening is required for all equipment or vents to obstruct the view from the ground or from the prominent views of other buildings. Screen materials that are acceptable include:

- Metal panel
- Perforated metal panel
- Corrugated metal, painted
- Mechanical louvers, painted

All metals exposed to the exterior air, including that in open and semi-open repair bays and shops, shall be factory or shop galvanized, and any field damage to the galvanization must be repaired. Except where specifically noted that field priming and/or finishing is acceptable, all such metal must be factory or shop primed and finished. All galvanized metals must be primed *and* finished, unless the drawings specifically call for exposed 8-mil galvanized finish. Special seal coatings shall be used to facilitate cleaning in those areas that are subject to oil and grease exposure.

Foundations, floor slabs, and structural frames are described in the *Structural Design Criteria*.

Floors in all repair bays and shops shall be flat with no slope. Floors in wash bays shall slope to the trench drains. Floor loads shall be determined by occupancy per accepted codes and standards. Where practical, floor loads shall be consistent for all occupancies on a given floor.

For exterior walls, steel framing and secondary cold-formed steel stud framing shall be the dominant structural element for the main buildings. A combination of factory-finished metal panel and fiber-cement board shall comprise the primary exterior cladding of the main buildings, punctuated by composite wood as an accent material. The exterior finish cladding shall be typically attached to z-girts within a layer of rigid insulation installed over a weather barrier over exterior sheathing. The sheathing shall be directly attached to the secondary steel framing.

For the storefront framing, frames will be aluminum with a factory-applied high-performance organic coating or anodized finish. For glazing, glass shall be tinted to reduce glare. Low-E dual glazing will be used for thermal and acoustic separation.

All door types and materials shall be standardized throughout the facility except in spaces that have hostile, corrosive environments, such as wash areas and chemical storage. Doors and doorways shall meet applicable accessibility requirements. Exterior swing doors and doorframes will be steel or aluminum construction. Doors opening onto unconditioned or semi-conditioned spaces, such as service bays, will be constructed as exterior doors. All shop doors entering into corridors shall have automatic fire closures. Exterior overhead coiling doors shall be insulated with a high lift and constructed of factory-finished steel or aluminum with full view glass panels.

Doors shall open completely. All overhead doors shall have a manual override and ability to be raised and lowered manually. Door thresholds shall be avoided in maintenance and shop areas unless necessary. If thresholds are required, they shall be of industrial grade in maintenance and shop areas. Doorframes shall all be welded. Knockdown type frames are not acceptable.

Protective bollards shall be provided at all overhead doors and where protection of personnel, structures, and equipment is deemed necessary. Steel curb faces and corner edges shall be provided at all raised concrete islands associated with protecting the building or equipment.

Housekeeping pads and isolation pads shall be provided for appropriate electrical, mechanical and plumbing equipment. Other housekeeping pads may be functionally necessary for some shop equipment. Their design shall be coordinated with the structural engineer to ensure pad strength and uniformity throughout the facility. Exposed housekeeping pad surfaces shall drain away from the equipment supported on them. Housekeeping pad surface finishes shall be consistent with room floor finishes.

Interior partitions shall be designed as non-load bearing. Sufficient space shall be provided within partitions for the conveyance of utilities, including electricity, telephone, data and plumbing. Maintenance facility walls shall be in accordance with the designer's selection of material finishes and shall consider the industrial environment of the site. Water-resistant gypsum boards shall be provided in toilet rooms, shower rooms, near sinks in kitchens and break rooms, and where used in unconditioned or semi-conditioned space, such as service bays. Washable vinyl coverings shall be provided in high-use areas.

Typical interior office-area doors shall be stain-grade wood solid-core construction set in steel or aluminum frames. Interior fire-rated overhead coiling doors may be required by code at openings between office spaces and repair bays; these doors shall be of the same construction as that used for the exterior roll-up doors.

Selected flooring systems shall be appropriate for use in each type of space, providing the highest degree of wear resistance and comfort possible. Refer to Appendix A (Project Drawing Package, A-104 FINISH PLAN) for recommendations for specific uses listed here:

- Repair bays, shops, storage, and utility spaces: ChemRex Masterplate 200 (light reflective) concrete hardener
- Office spaces and conference rooms: Carpeting (for noise reduction)
- Staff office spaces: Resilient flooring or carpeting
- Meeting rooms: Carpeting
- Computer room and related office spaces: Static dissipating resilient flooring
- Kitchens and toilet rooms: Ceramic tile or resilient flooring
- Locker rooms: Resilient flooring
- Break rooms and lounges: Resilient flooring
- Storage, file, and work rooms: Resilient flooring or carpeting
- Courtyard and outdoor spaces: Concrete pavers

The following are specialized finishes inherent with maintenance functions:

- Epoxy-painted CMU walls in all repair bays and maintenance shops
- Epoxy-painted CMU walls or glazed block with epoxy grout in vehicle wash areas
- Soil- and grease-resistant walls
- Painted exposed ceiling structure (light-reflective color)
- Soil-, grease-, and water-resistant concrete floors with an integral non-metallic hardener, light-reflective coloring and sealer

For ceiling finishes, provide suspended grid acoustic lay-in tile or equivalent for noise reduction in office areas. Provide painted, water-resistant gypsum board ceilings in toilet rooms and shower rooms. Ceilings will be exposed structure, with fireproofing or sound absorbing where needed, in repair bays and shops.

Cabinets shall be constructed of plywood, except for a particleboard (MDF) countertop substrate. Finishes shall be high-pressure laminated plastic.

Interior paint shall be durable and washable. A primer/sealer and two coats of finish are required. Paint or other coating systems shall protect all exposed structure, unless otherwise noted. Exposed vertical concrete in office areas shall be treated with a sealer and two coats of industrial-quality paint. Resistant epoxy paint shall be used in the repair bays.

Standard porcelain plumbing fixtures shall be provided. Toilet accessories shall be of stainless-steel construction of sufficient gage to resist damage.

2.2.1.6 Form, Massing, and Fenestration

Building massing, fenestration, and shading devices shall be optimized to the specific climate and orientation of the site in order to:

- Limit solar heat gain on the façade, especially between May and October, and reduce interior glare.
- Maximize year-round outdoor thermal comfort for occupants and pedestrians.
- Promote outdoor interaction/activity between the users.
- Maximize transparency in the Office and Amenity Building by creating visual corridors that promote connectivity.

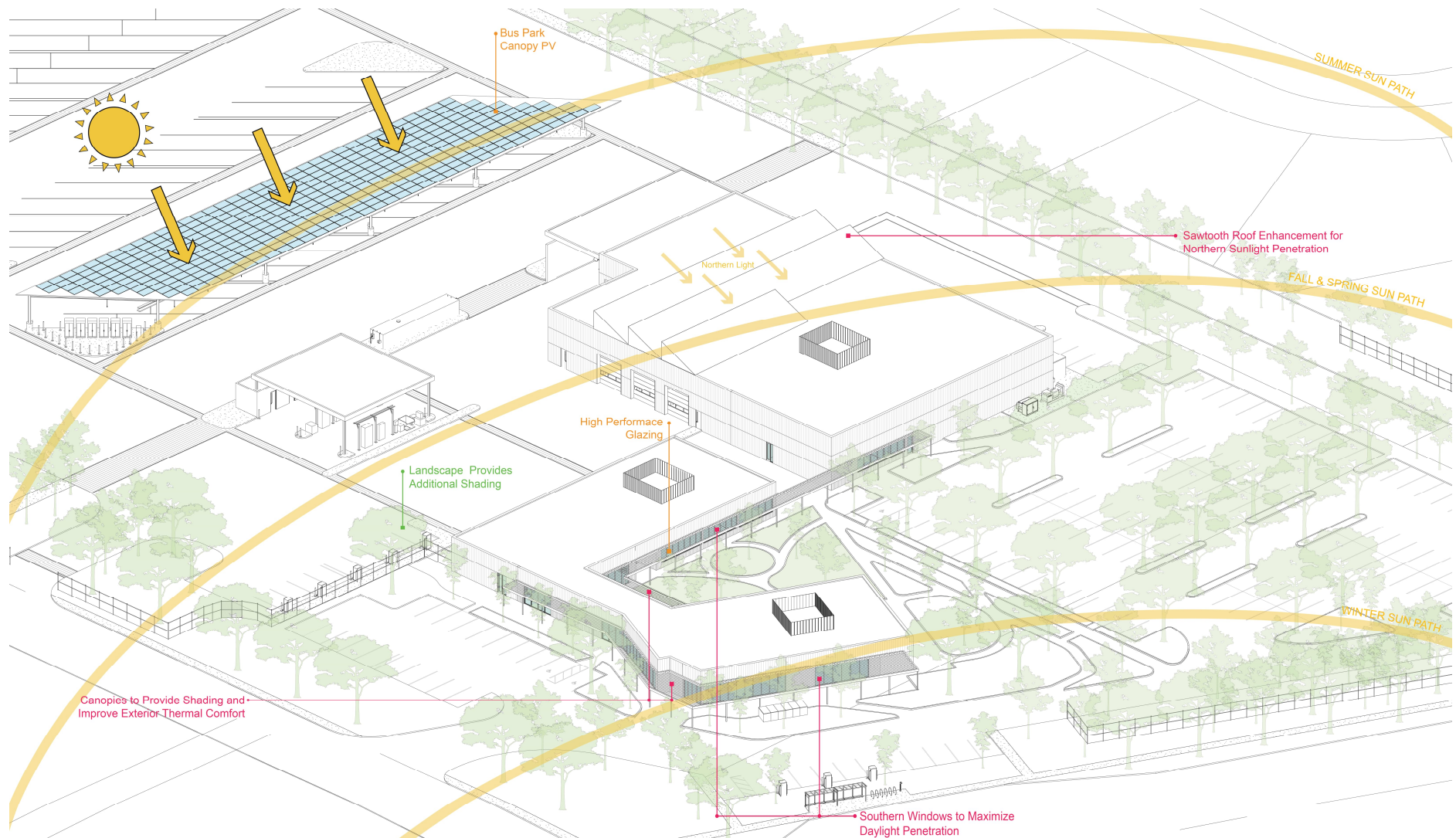
Building elevations shall reflect the different characteristics related to internal program, external solar orientation, and building relationships. Building massing shall be articulated to promote wayfinding and provide appropriate view/privacy to each distinct space. It shall also provide a differentiation of scales according to the varying program characteristics, i.e., large-scale Maintenance Building versus smaller-scale office environment.

Building massing also provides an opportunity to architecturally express the separation between public and private areas of the transit facility. It shall be articulated by the expression of major exterior and interior gathering spaces (such as the courtyard and break rooms) and departmental breakdown (such as locating operations and administration in their own wing).

Flat roofs shall be used, and any equipment must be screened from view in any direction. Parapets shall be minimized to maintain expression of the roof slab as a clear element of the building composition. There is an option of a sawtooth roof betterment that would help bring in northern daylight into the maintenance bays. Refer to Figure 2-16 for diagrams illustrating the roof design studies and placement of the sawtooth roof. The sawtooth option would require approximately twice the amount of steel compared to the alternative, including additional steel trusses and framing to support the roof configuration.

East, west, and south solar orientations shall incorporate external shading devices to eliminate heat gain before it touches the glass and to maximize daylight and views.

Figure 2-12: Diagram Showing Sun Shading, Façade Transparency, and Massing Hierarchy



This diagram showcases the sun shading strategies used to minimize heat gains using canopies and carefully placed landscape. The diagram also highlights the placement of windows that not only maximize daylight penetration but also provide views and facilitate an indoor-outdoor relationship while maintaining privacy and security.

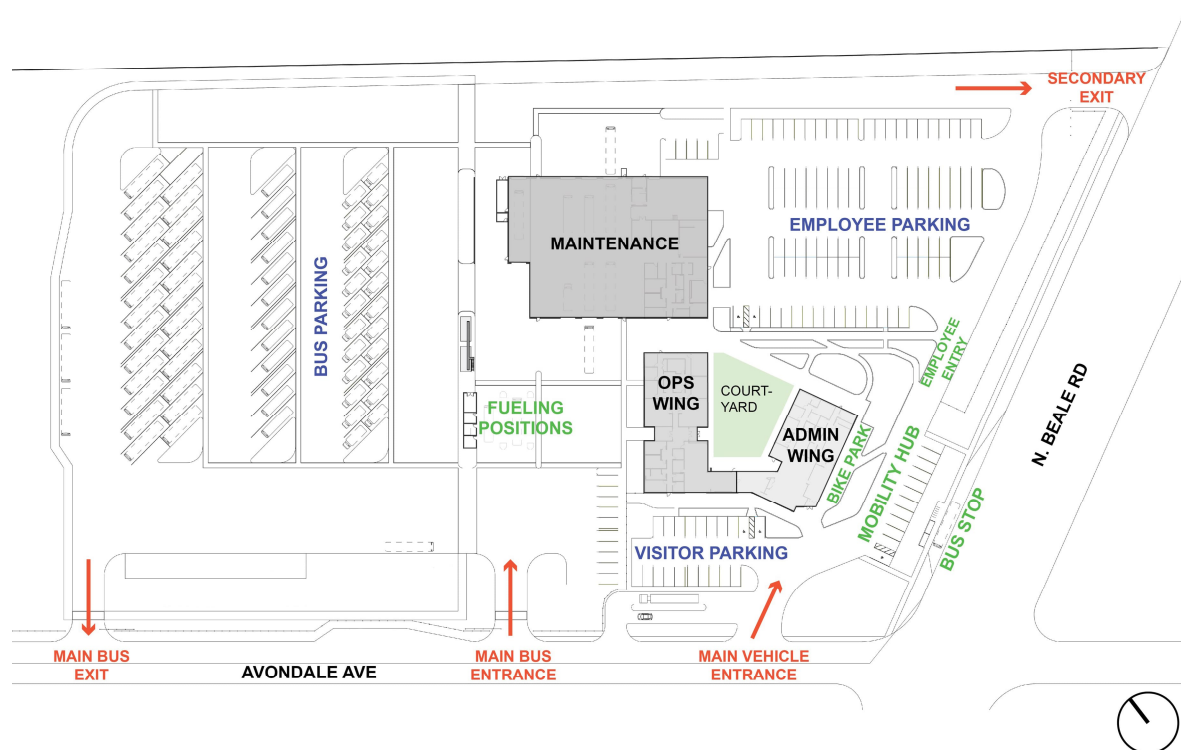
2.2.2 Conceptual Planning

The conceptual planning for the Next Gen Facility was developed based on the preliminary space needs program in the final design criteria document developed with input from Yuba-Sutter Transit staff as well as a series of design workshops and meetings.

2.2.2.1 Plan Organization

This diagram shows the relationship and planar organization of the two building volumes in context with the bus and vehicle parking, other maintenance facilities provided on-site, and the main streets surrounding the site.

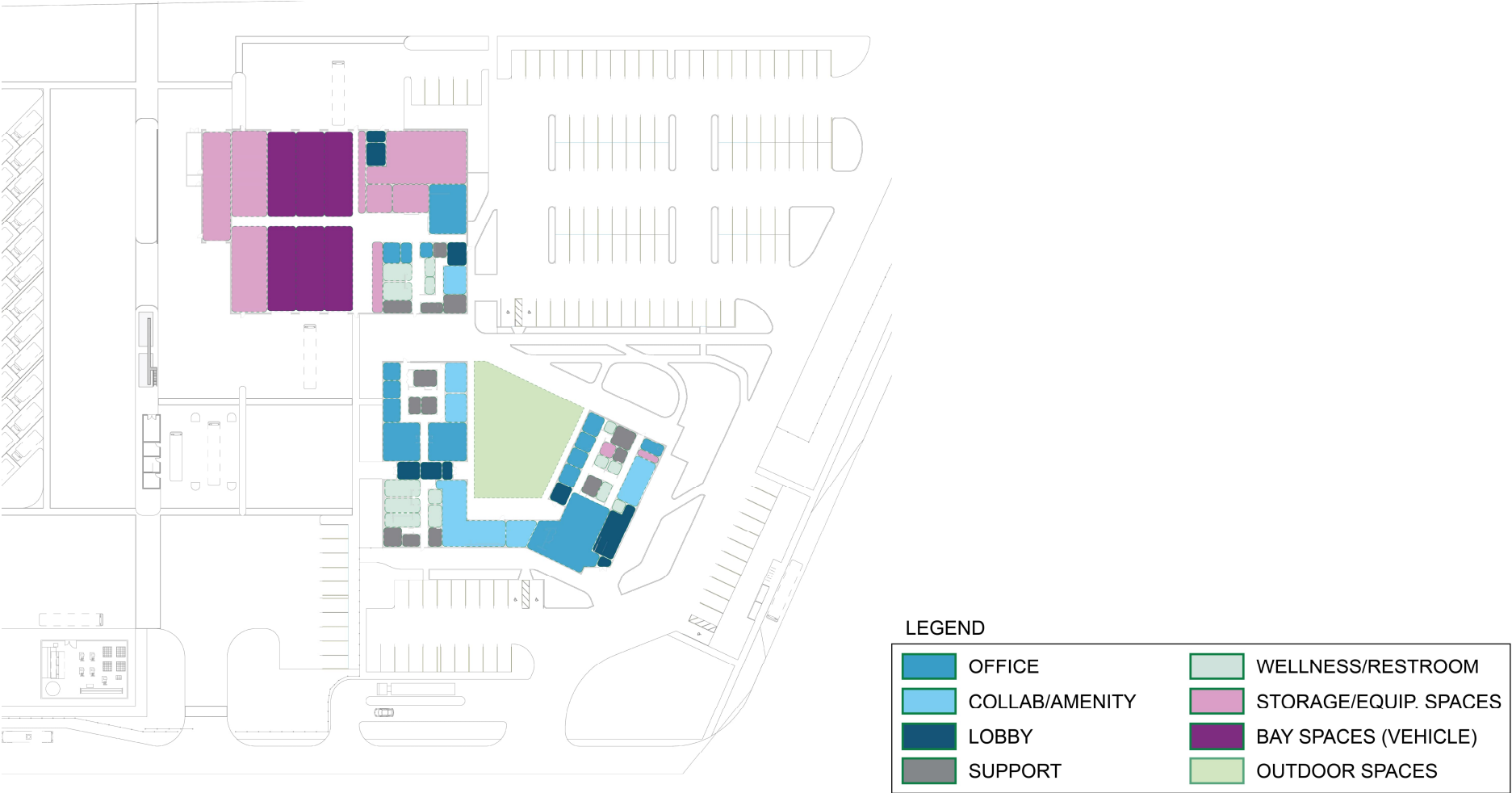
Figure 2-13: Plan Hierarchy Diagram



2.2.2.2 Adjacencies

This diagram highlights the adjacencies between the various programs. The organization of these programs has been informed by their functional needs, for instance, keeping the office and working spaces together, ensuring amenities are accessible to them, providing wellness spaces in central locations, and so on.

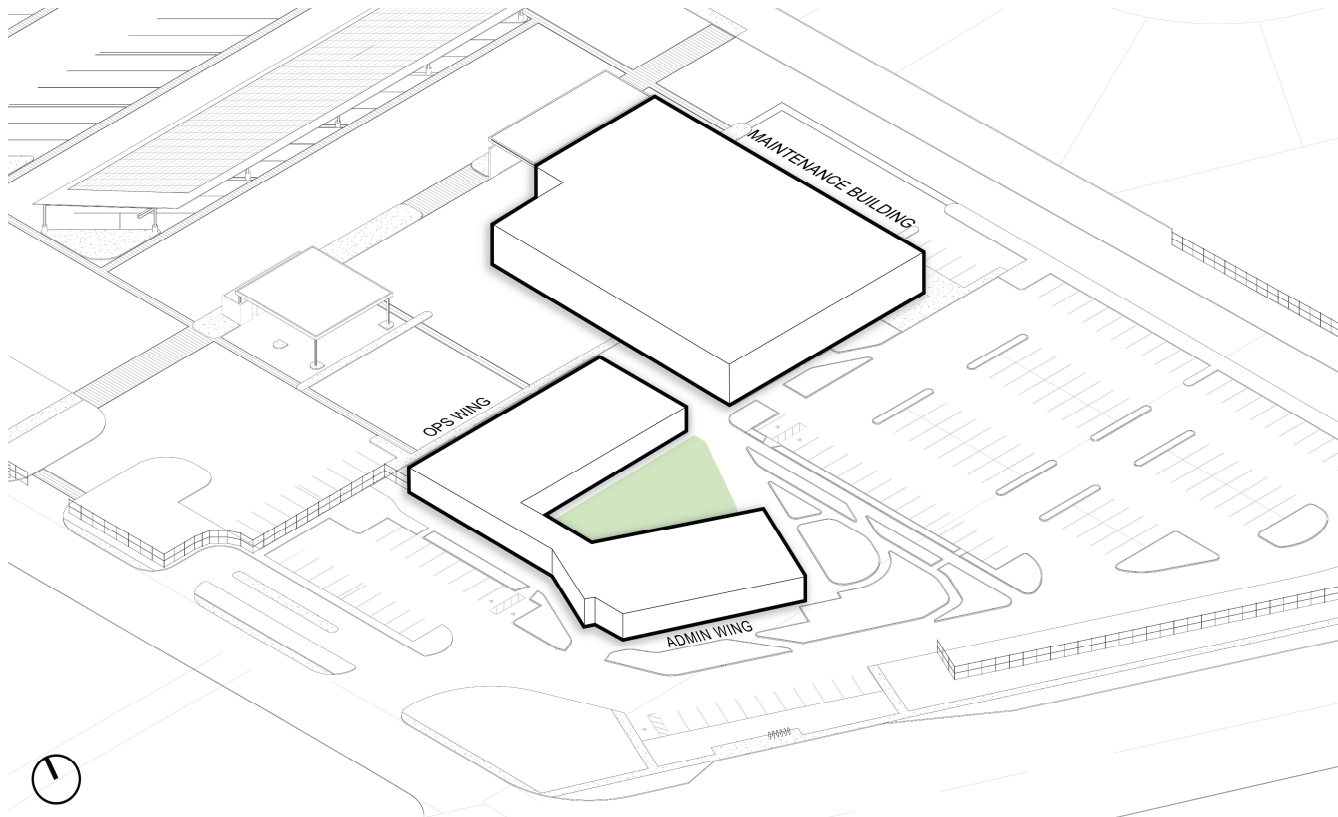
Figure 2-14: Adjacency Plan



2.2.3 Conceptual Massing

The diagram below displays the massing design, highlighting the two volumes serving the two main functions: the Maintenance building and the Admin & Ops building. The diagram also showcases the placement of the shared courtyard in context with the Admin and Ops wings.

Figure 2-15: Massing Diagram



Some roof studies were performed to test different approaches to massing and to arrive at an optimal balance between visual interest and environmental performance.

- Roof A shows flat roofs throughout the facility.
- Roof B shows a combination of flat roofs in most areas and sawtooth clerestories (betterment) over the maintenance bays.

These roof designs are shown in the Figure 2-16 series of graphics below.

Figure 2-16: Roof Studies Designs

Figure 2-16-A: Flat Roof

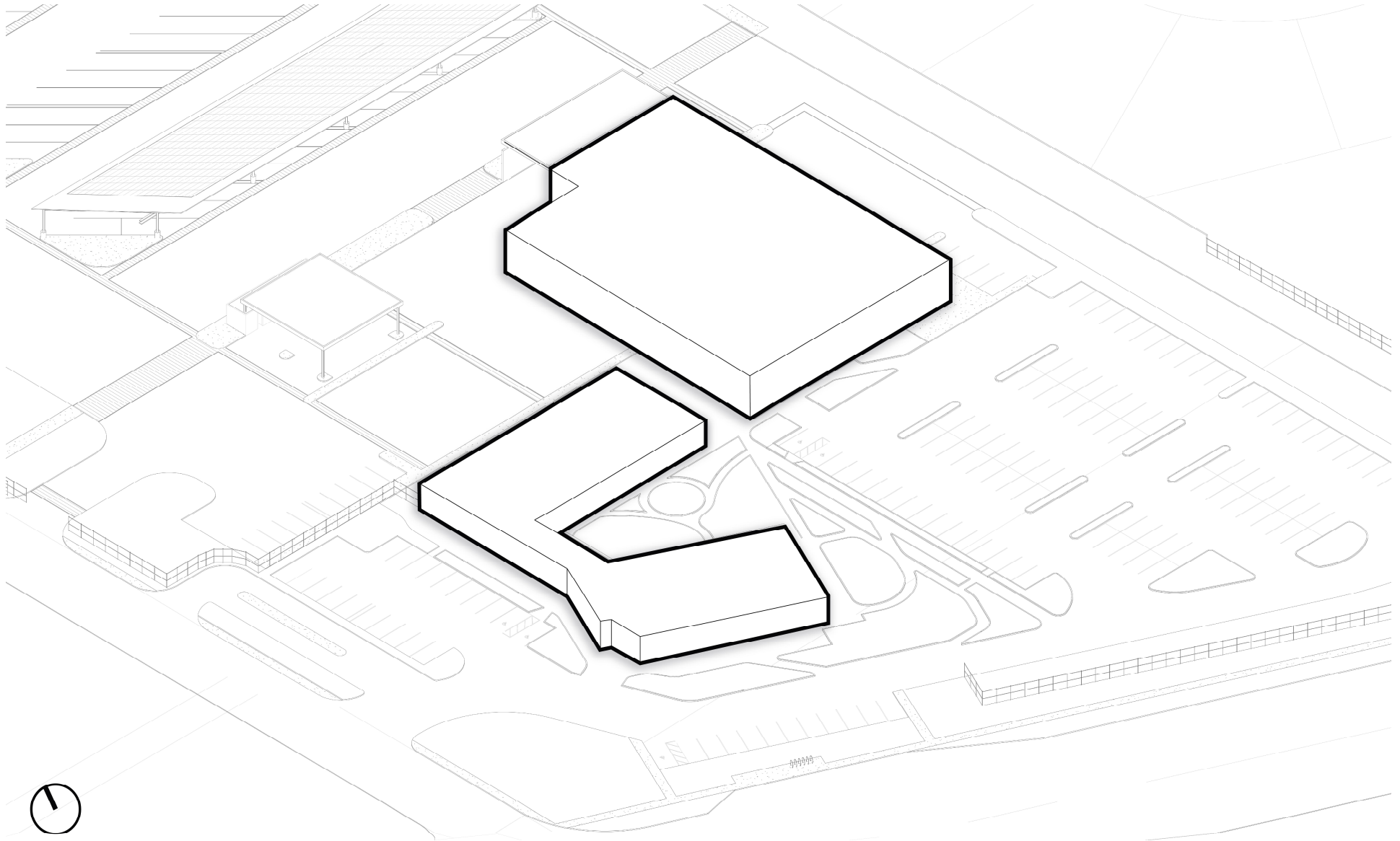
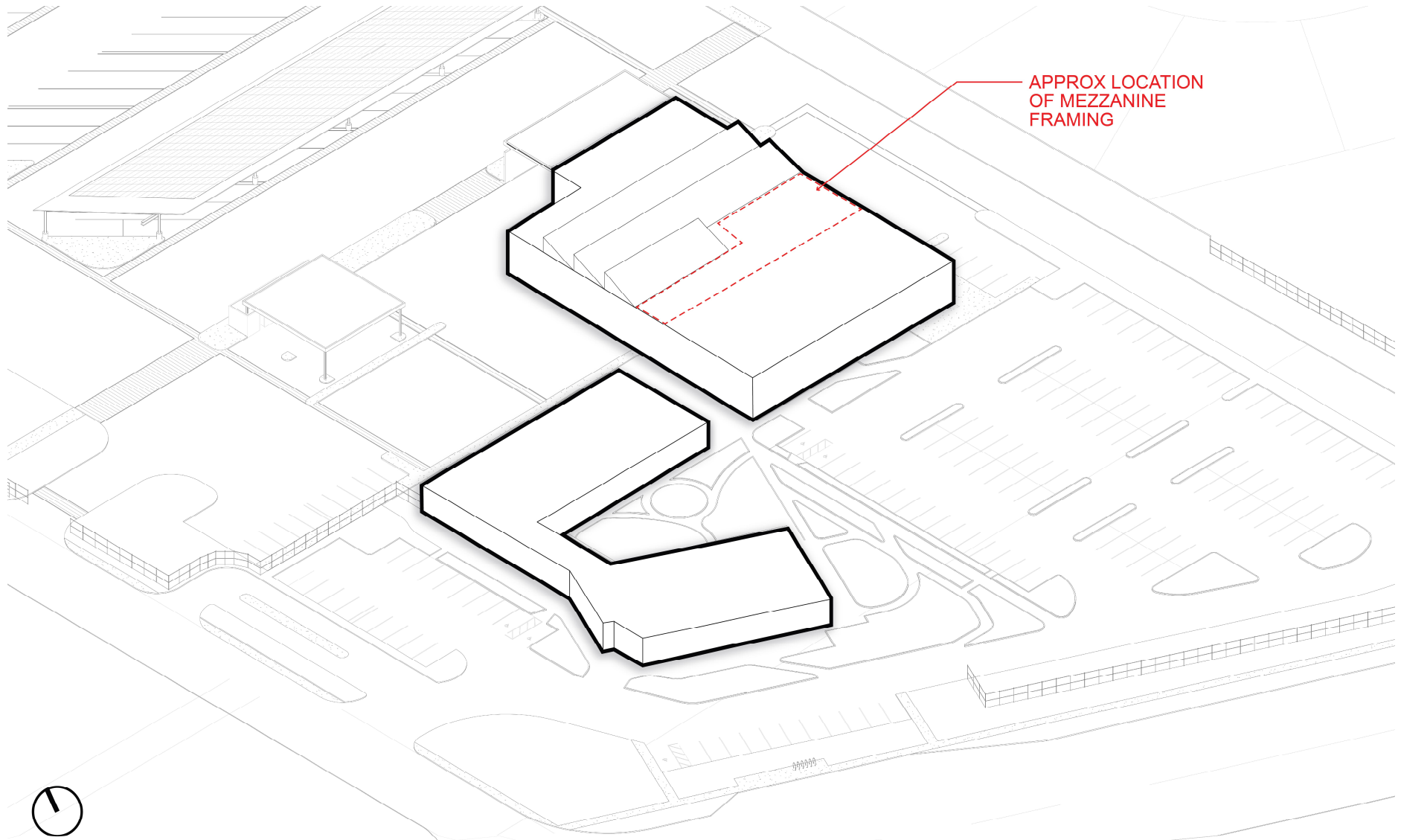


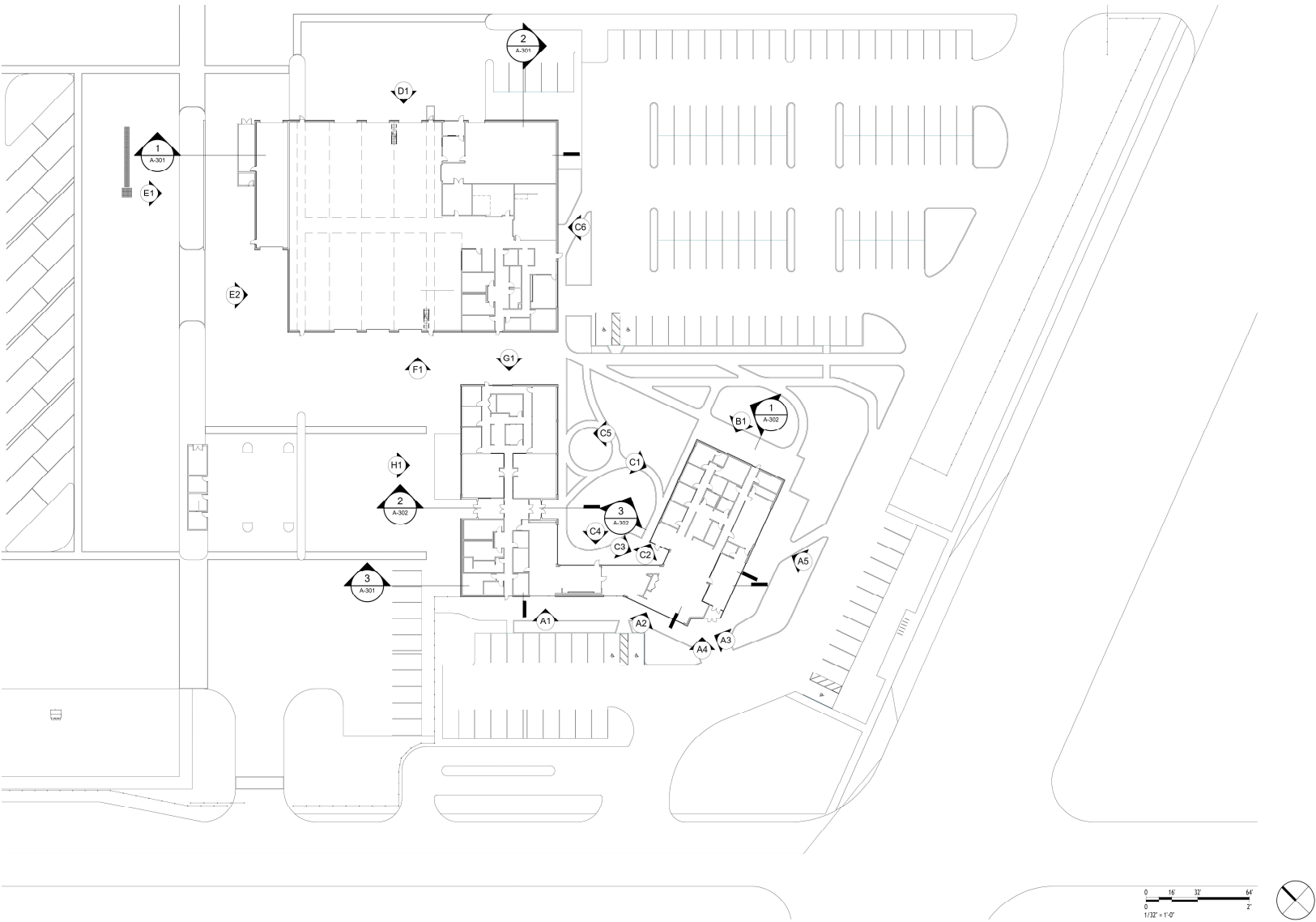
Figure 2-16-B: Sawtooth Roof Betterment

Note: Avoid sawtooth over mezzanine.



2.2.4 Exterior Materials Application

Figure 2-17: Exterior Material Reference Plan

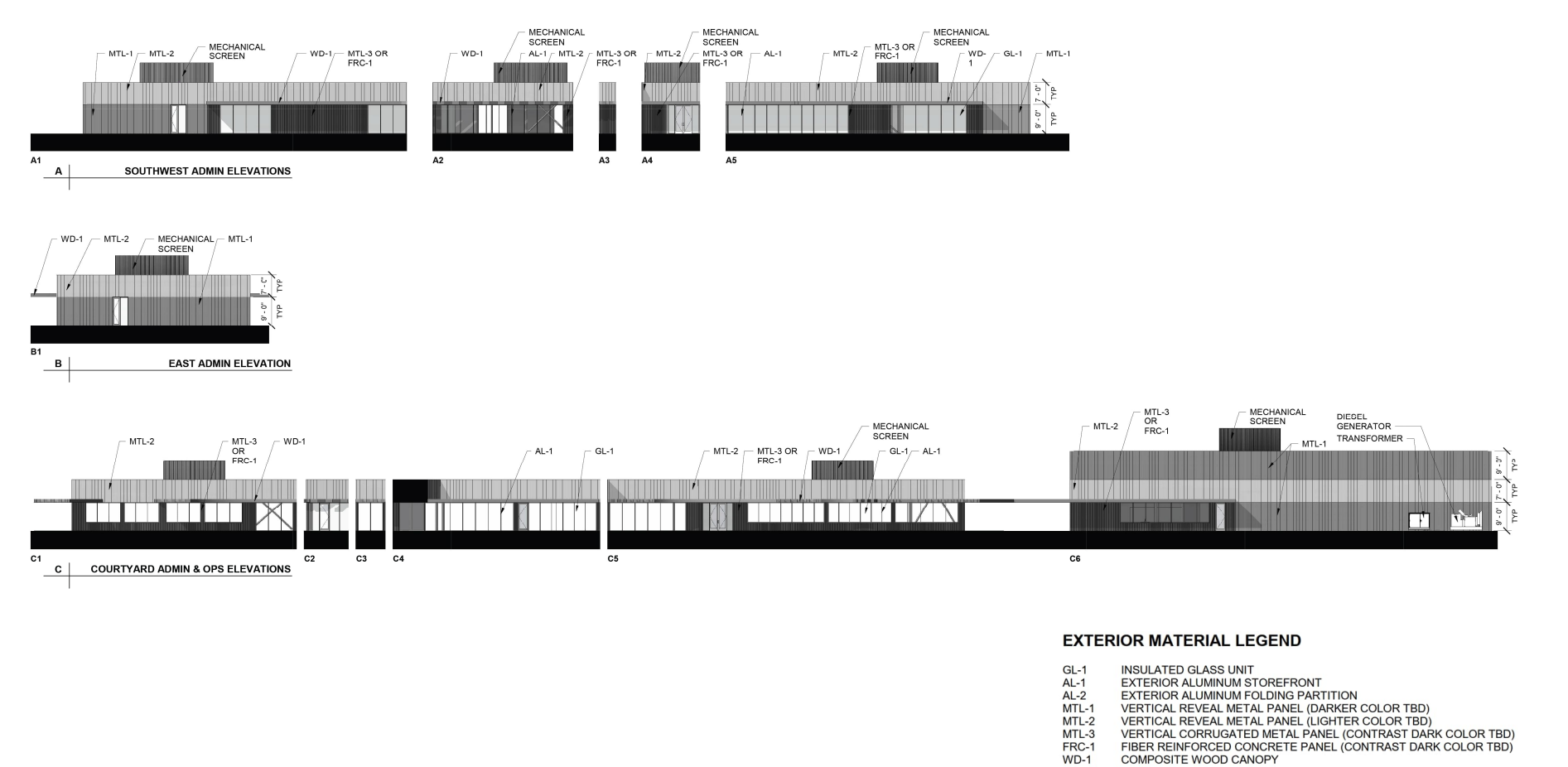


2.2.4.1 Three-toned Finish

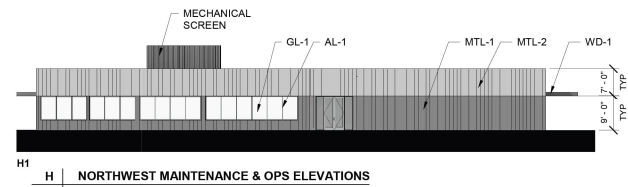
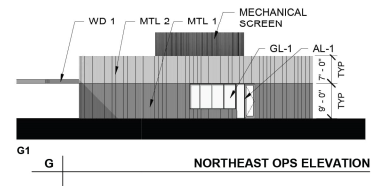
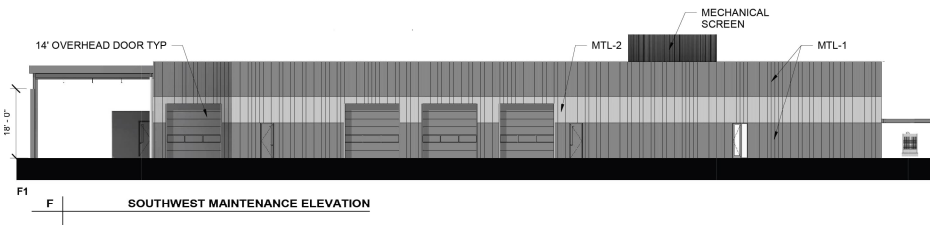
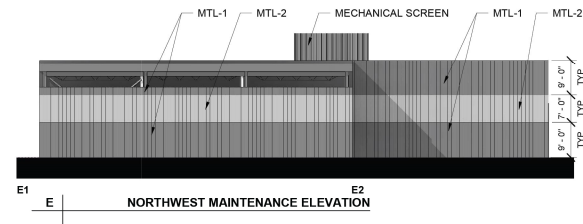
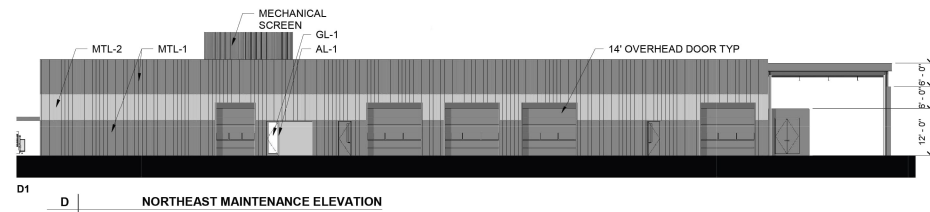
This finish scheme uses two kinds of cladding materials and three tones to create visual interest where the wall areas under canopy have the option to be either Corrugated Metal Panel or Fiber Cement Board in a different color than the metal panels. The rest of the façade is clad in two tones of vertical metal panels creating a horizontal band around both buildings that helps create interest and a cohesive expression, connecting both buildings visually.

Figure 2-18: Three-toned Finish Elevations

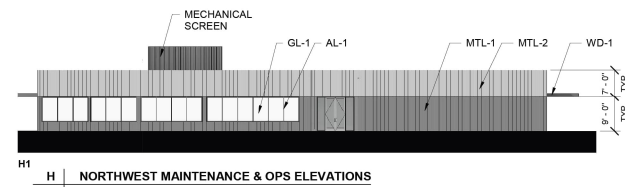
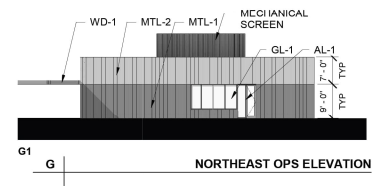
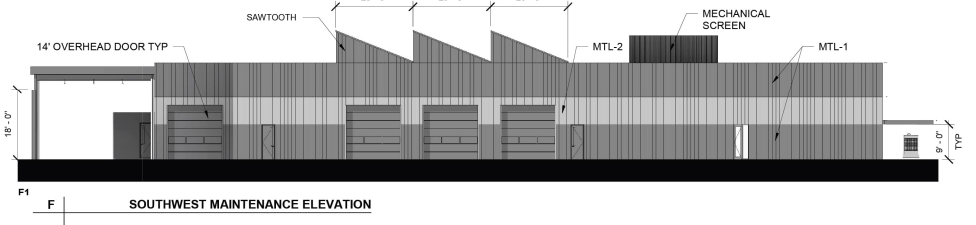
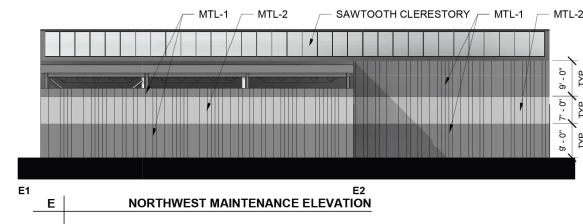
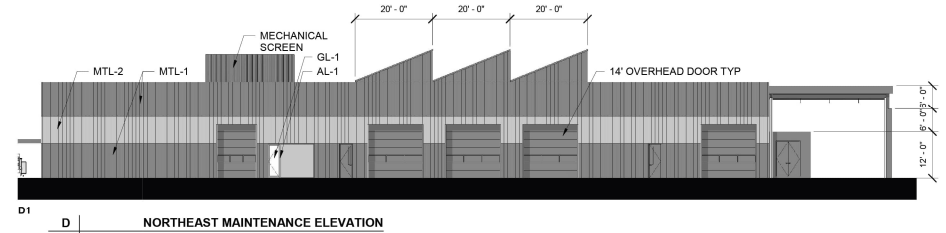
Note: The elevations are not to scale.



Note: This image shows the design without the sawtooth betterment.



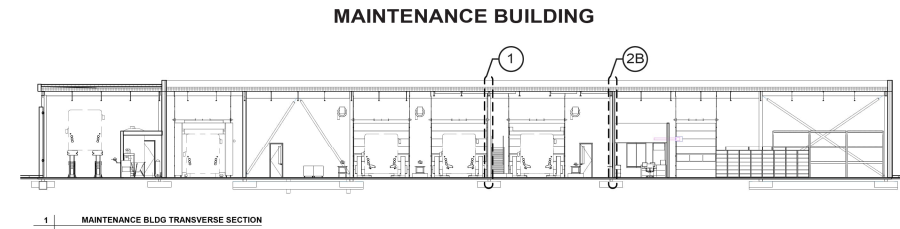
Note: This image shows the design with the sawtooth betterment.



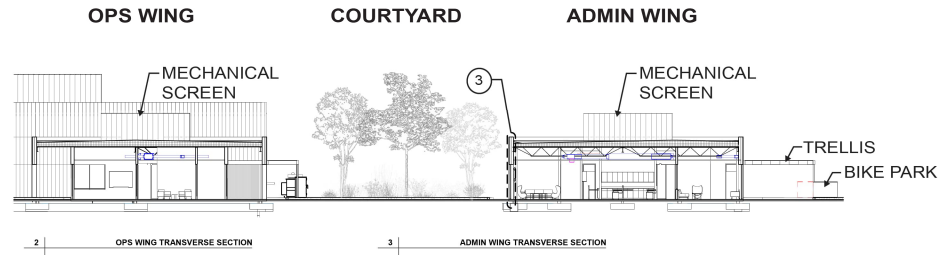
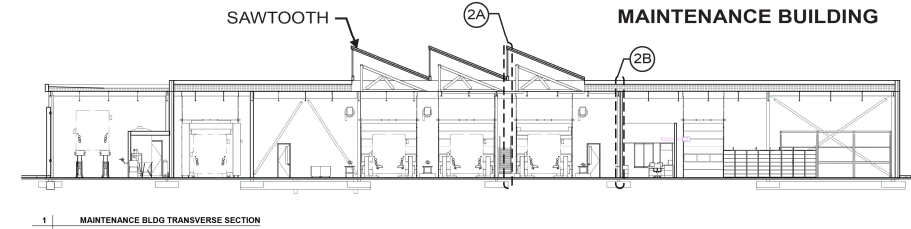
Building Section Drawings

These drawings show the material assembly for the exterior material studies shown in the images earlier. These section drawings also highlight the indoor-outdoor relationship between the Admin and Ops Wings with the Courtyard along with the sawtooth betterment.

Note: This image shows the design without the sawtooth betterment.

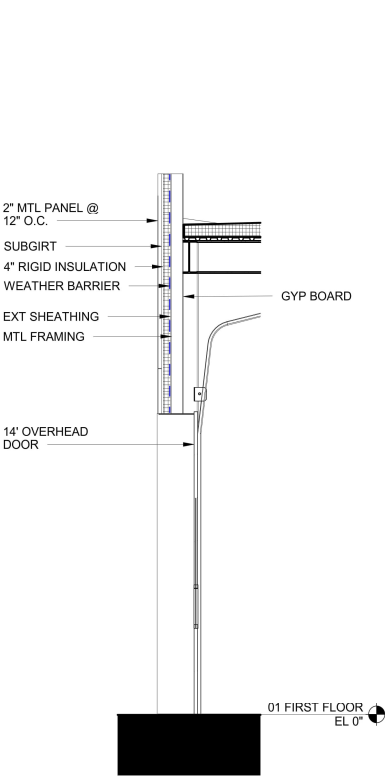


Note: This image shows the design with the sawtooth betterment.

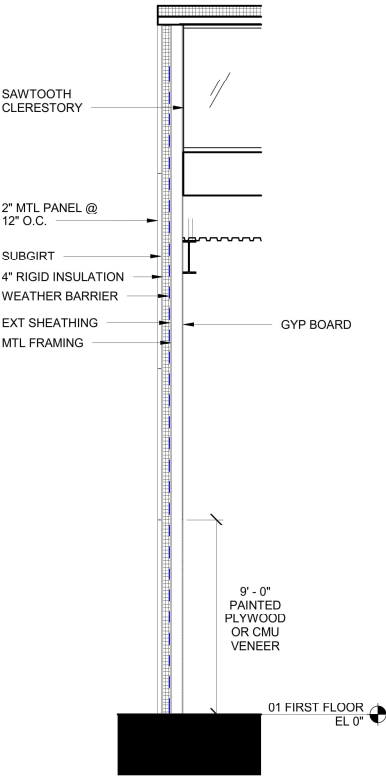


Typical Wall Section Drawings

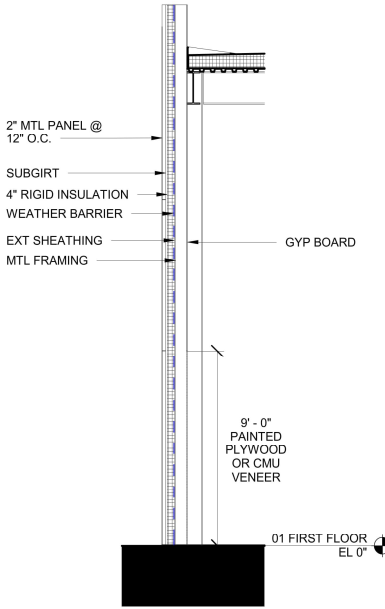
These drawings show in detail the typical wall assemblies called out in the Building Section Drawings.



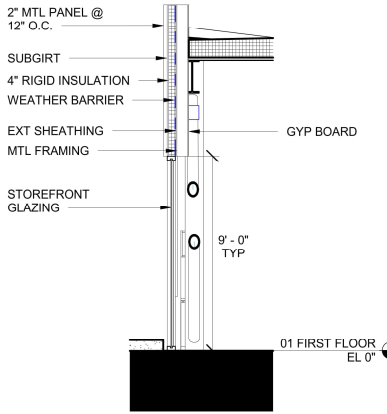
1 | TYP WALL WITH OVERHEAD DOOR
MAINTENANCE BUILDING



2A | TYP WALL WITH SAWTOOTH CLERESTORY
MAINTENANCE BUILDING



2B | TYP WALL
MAINTENANCE BUILDING



3 | TYP WALL
ADMIN & OPS BUILDING

2.3 Space Criteria and Program

2.3.1 Space Program

The preliminary space program presented herein was developed based on detailed interviews with Yuba-Sutter Transit staff regarding the functional requirements and operating characteristics of the bus operating garage.

The space requirements shown for each function are net usable area. A circulation factor is applied to the total net usable area to arrive at a gross square footage requirement. In addition to circulation, the factor provides for spaces such as mechanical and electrical chases, structure, width of walls, and stairs. The Space Program begins with an overall summary followed by a detailed program for each functional area.

The program includes the following information for each space.

Space Name: The name of the space.

[A] - Alcove Space

[C] - Canopy Covered

[E] - Enclosed Space

[O] - Open Office or Shop Space

[X] - Exterior Space

Space Standard: The standard for each space based on the function, equipment, and furnishings to be accommodated. The standards are given in square feet. Where the configuration of the space is critical, dimensions are given for the space. The size of the repair bays are commonly accepted industry standards.

Reference: Indicates the page number in Chapter 2 that fully describes the functional requirements of the space.

Remarks: Lists additional information about the space.

Existing: Shown to provide a quick comparison of total existing space versus proposed area. Includes existing staff and quantity and size of spaces as counted and measured from the existing facility as-builts.

Staffing: Anticipated staff to be accommodated during the specific time period.

Quantity: Identifies the number of spaces to be accommodated during a specific time period.

Space: Area for the proposed space in square feet. Note that where a space standard is given, the area equals the space standard times the quantity.

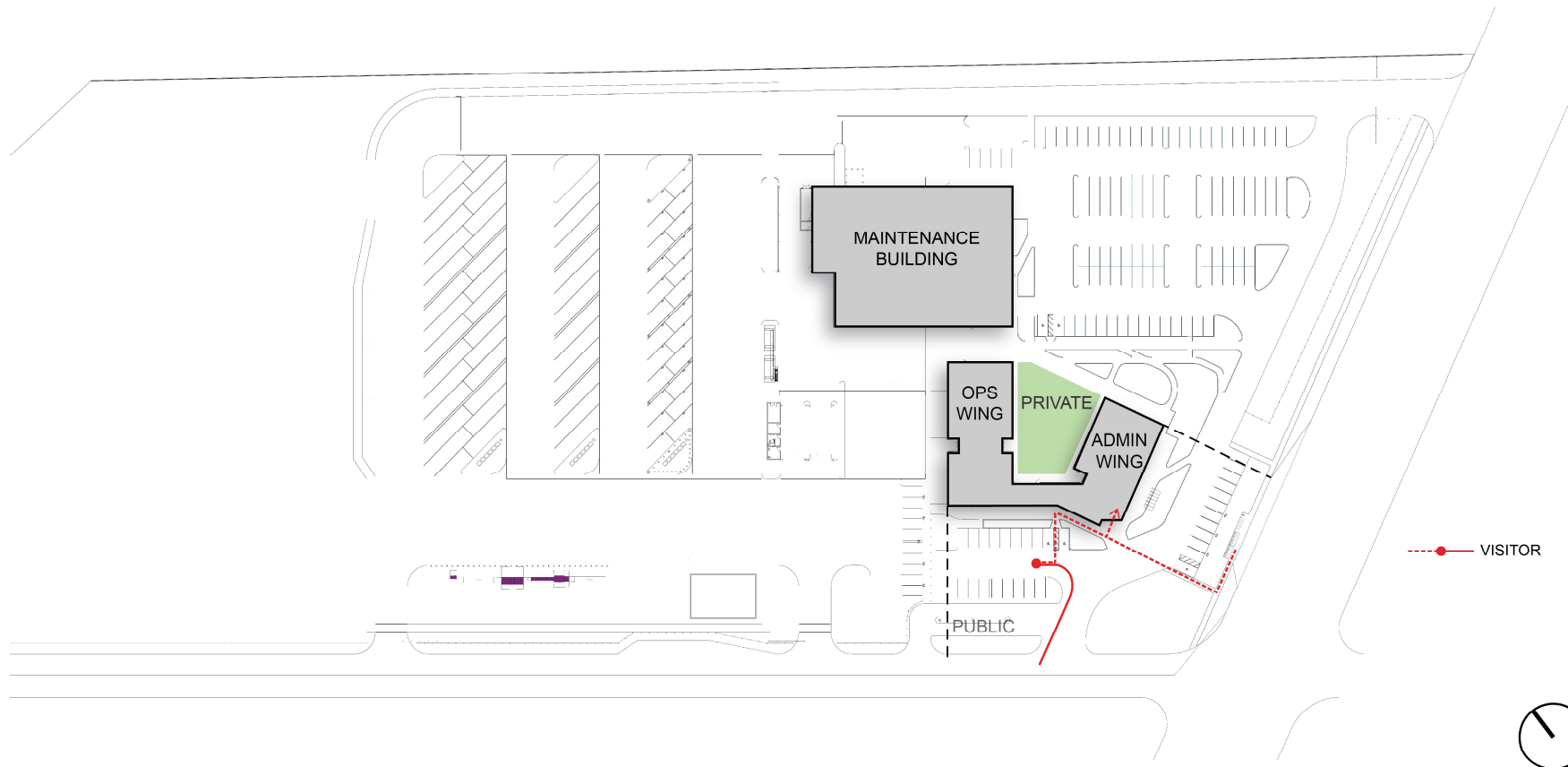
Refer to **Appendix B** for the Space Program.

2.3.2 On-Site Circulation

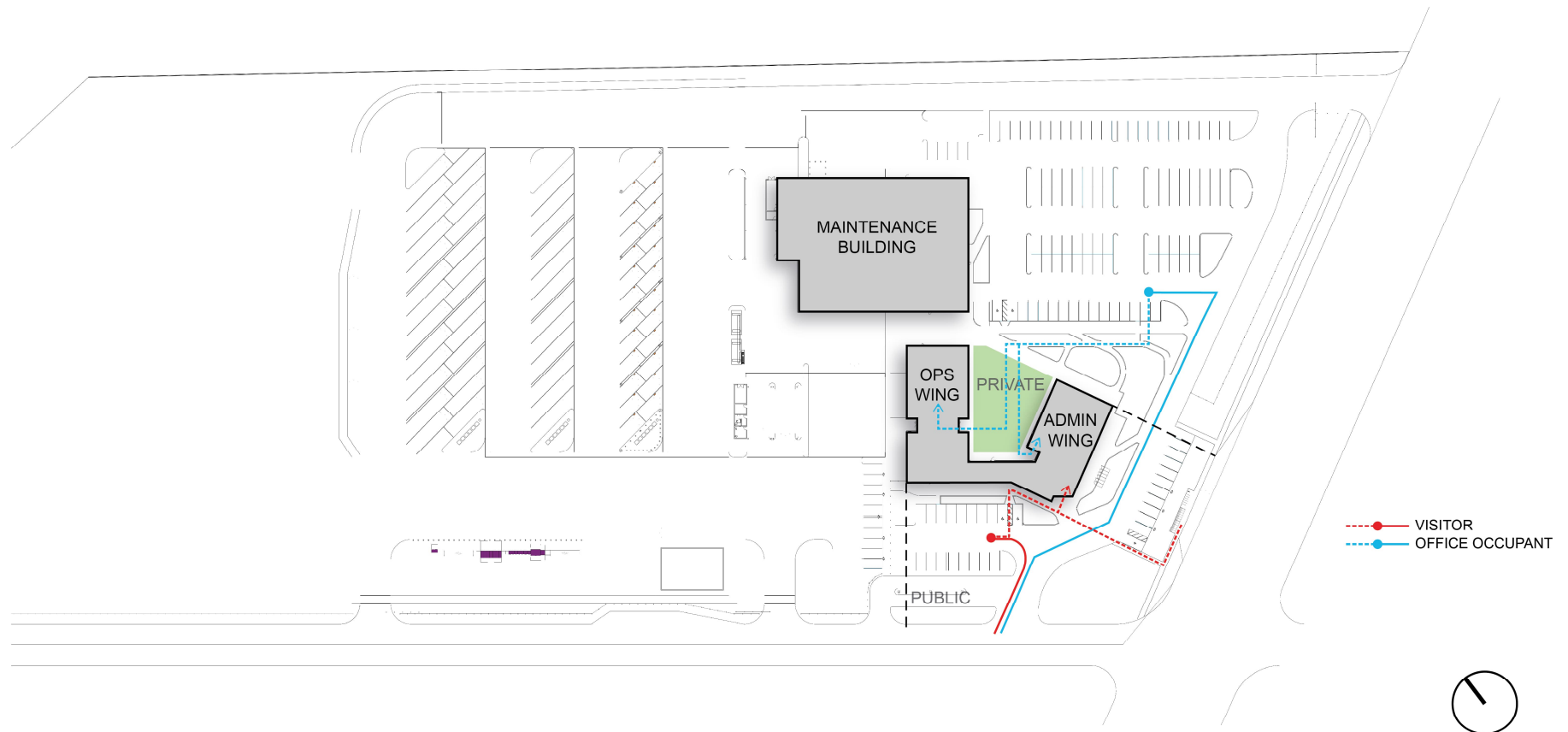
The Office and Amenity Building's position on the site serves two primary purposes:

1. To anchor the facility's public face and create a strong visual presence at the corner of North Beale Road and Avondale Avenue
2. To provide an architectural separation between public and private areas.

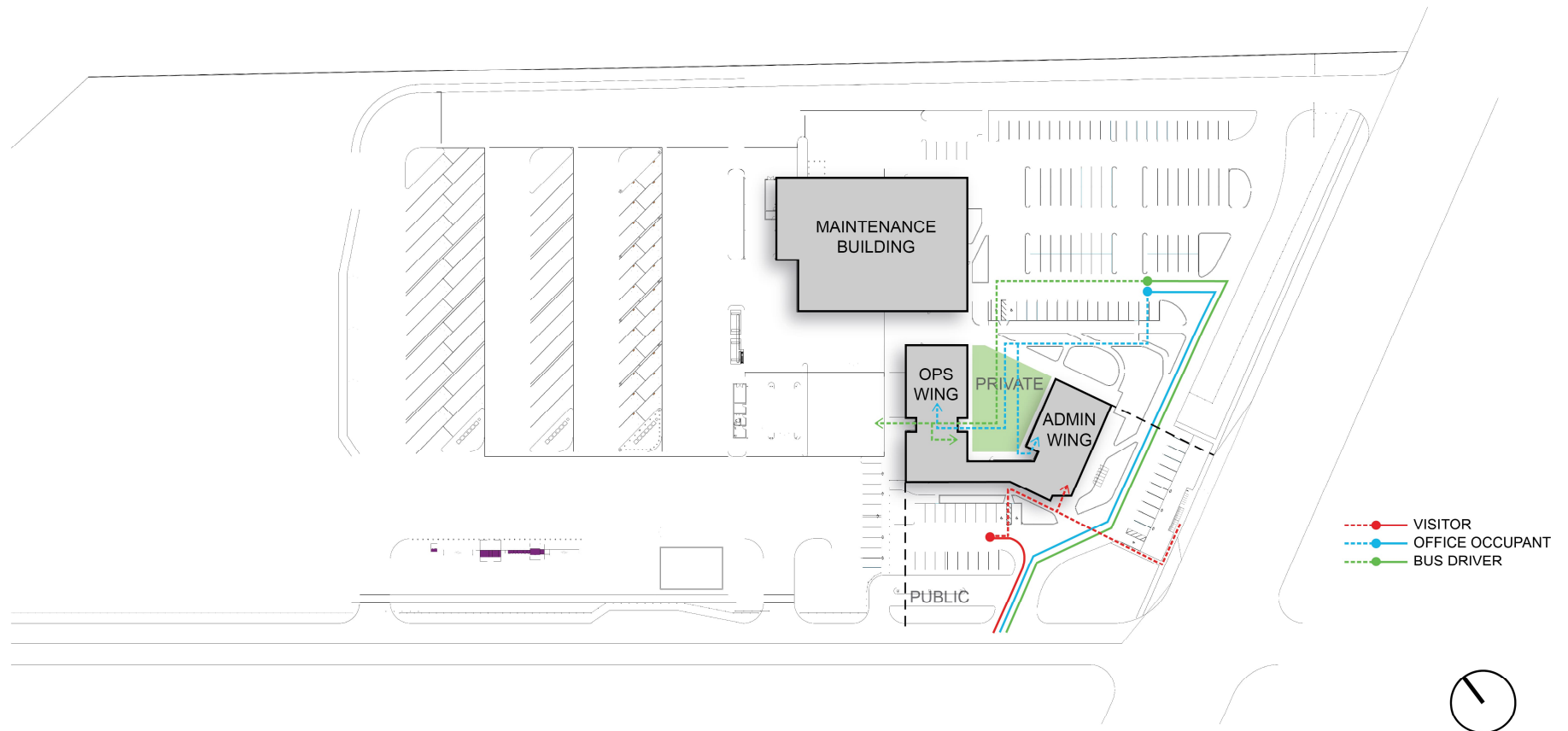
A public visitor will arrive at the site by either taking public transportation and getting off at the bus stop located on North Beale Road in front of the building or by driving and parking in the visitor lot located off Avondale Avenue. Access to the lobby in the southwest of the building is highlighted architecturally with a chamfered corner that creates an outdoor shaded alcove. Visitors access the building through this alcove; physical fences prevent access into the private areas further east and north of the building so that public access is limited to the southwest corner of the site. Refer to Figure 2-19.

Figure 2-19: Visitor On-site Circulation

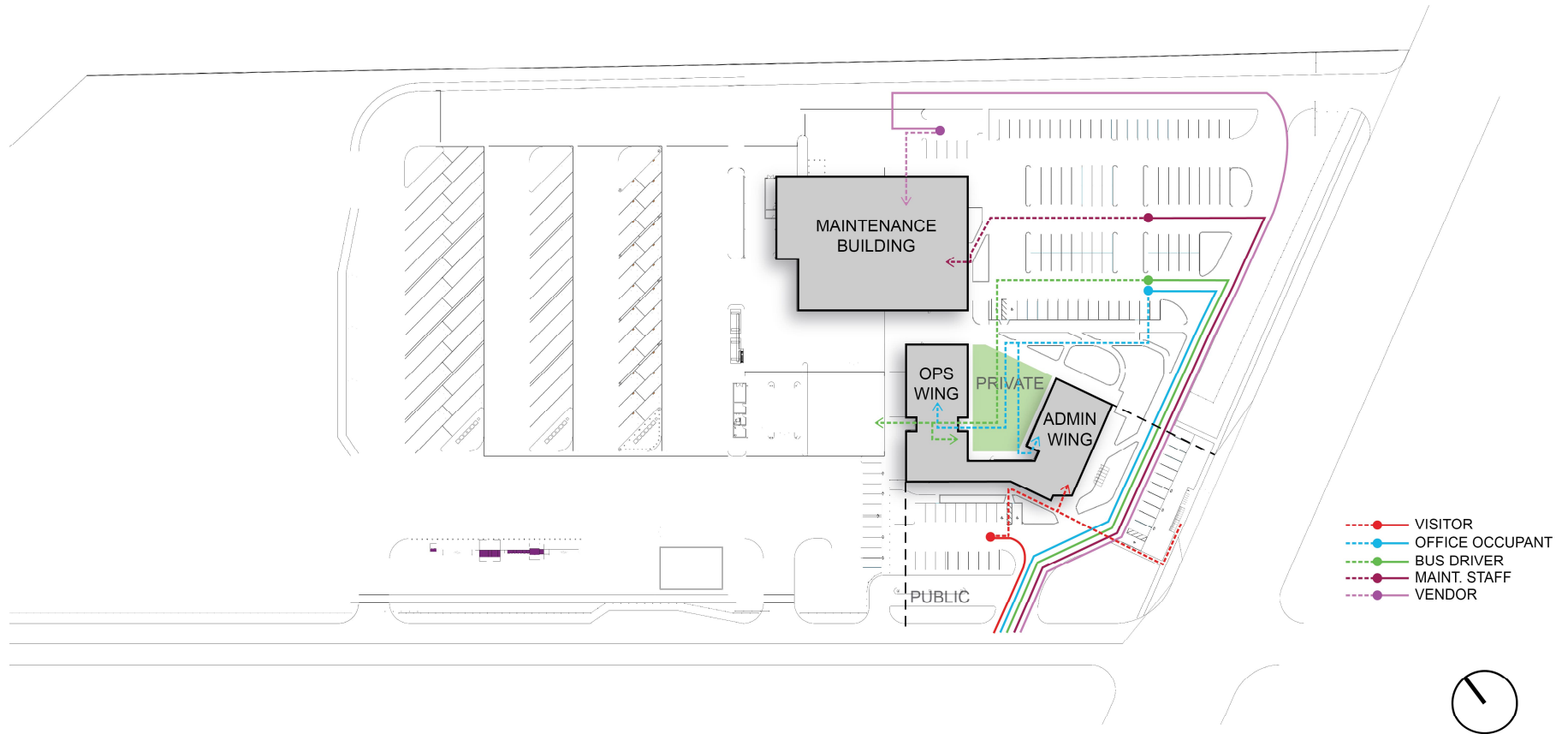
Employees access the site in the same way as visitors, except they continue beyond the public/private fence and into the large parking lot located on the southeast corner of the site. Employees are divided into three main categories: 1) office occupants, 2) bus drivers, and 3) maintenance staff. Office occupants and bus drivers park in the main lot and walk through the shared courtyard from which they can either enter the administration wing or the operations wing of the Office and Amenity Building. Refer to Figure 2-20.

Figure 2-20: Employee On-site Circulation

Driver movement through the Operations Building is streamlined by locating the driver check-in area immediately after the lobby. After receiving their assignment from the dispatcher, they proceed outside to the bus parking area. Alternatively, when not on assignment, bus drivers can utilize the break room located in the shared amenity area connecting the two wings of the building (see Amenity Connector Design Criteria). Refer to Figure 2-21.

Figure 2-21: Bus Driver On-site Circulation

Maintenance staff will also utilize the main parking lot and enter directly into the Maintenance Building. Authorized vendors will use the small parking lot on the east side of the Maintenance Building and enter through the loading area in a designated lobby. Refer to Figure 2-22.

Figure 2-22: Maintenance Staff and Authorized Vendor On-Site Circulation

2.3.3 Interior Circulation

As outlined in the previous section, the Office and Amenity Building has two primary private entrances serving each of the operations and administration wings. At both entry points there is a vestibule adjacent to a lobby space. The building also has two primary exit doors, one leading drivers to the bus parking lot and another leading office occupants outside to the courtyard from the social connector where the main break room is located. Other doors used for emergency egress could be card-reader activated for secondary access into the building.

A public entrance into the administration wing is located on the southwest corner of the building and will be used exclusively by visitors. This door leads into a small vestibule and into a public lobby. A staffed check-in counter in the lobby is the single interface between administration staff and the public. A single-user restroom is located within the lobby. For community meetings and events, a large boardroom has an access door leading directly from the lobby into this room.

Primary entrances into the Maintenance Building are located on the south and east sides, one leading maintenance staff into a lobby and office area connected directly to the parts storeroom and repair bays and another one by the loading area for authorized outside vendors. Both doors also serve as a means of egress.

Figure 2-23: Interior Circulation



Note: Furniture shown for reference only.

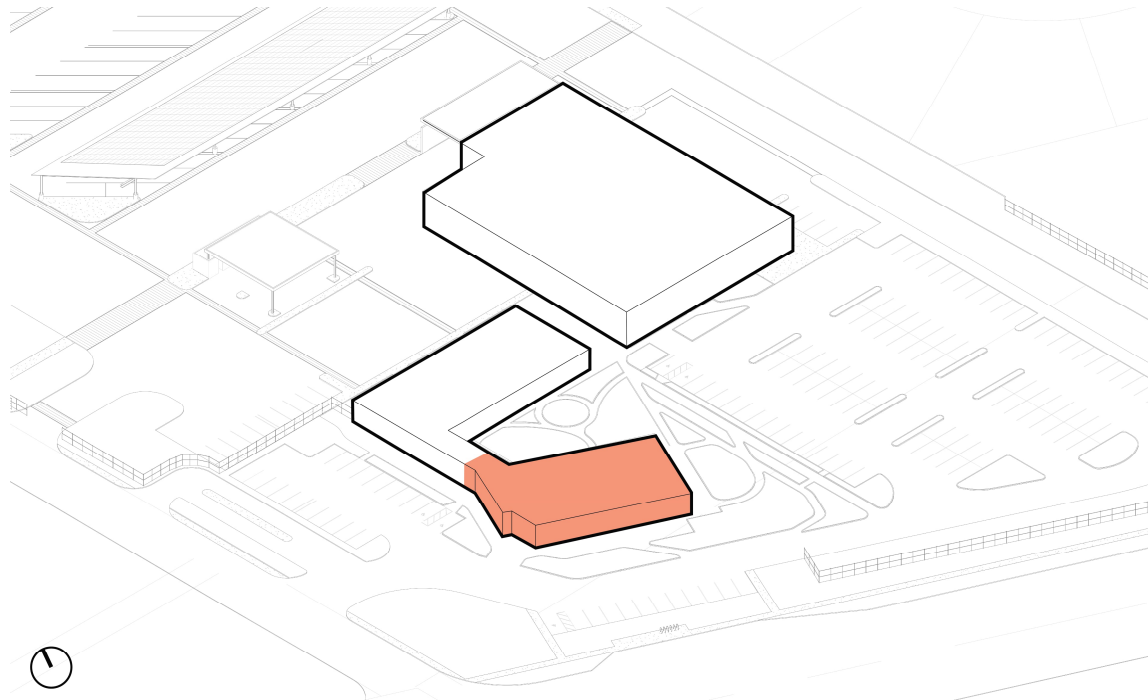
2.3.4 Space Plan

Refer to A-102 in Project Drawings for the basis of design space plan for the Maintenance Building and the Office and Amenity Building housing the Operations and Administration departments. Refer to the room schedule for room names and room areas.

2.3.5 Administration Design Criteria

The administration wing of the Office and Amenity Building is envisioned to be the facility's interface between public and private. In addition to the lobby, a large conference room will be the public face of the transit agency where community meetings and events can take place. The open office space adjacent to the lobby is intended to be flexible and adaptable. Private offices will benefit from facing north, with views of the courtyard and across to the operations wing and plentiful indirect sunlight. A significant amount of glazing will be implemented in programmatically advantageous and energy-efficient ways along the west, south, and north faces. This in combination with interior storefronts in offices, lobby, and conference room will create view corridors through the wing from one end to the other to maximize transparency and natural light penetration. A typical visitor will be able to look into the open office area or the lobby and beyond into the courtyard. The wing is punctuated by several support spaces, such as copy/print and storage areas.

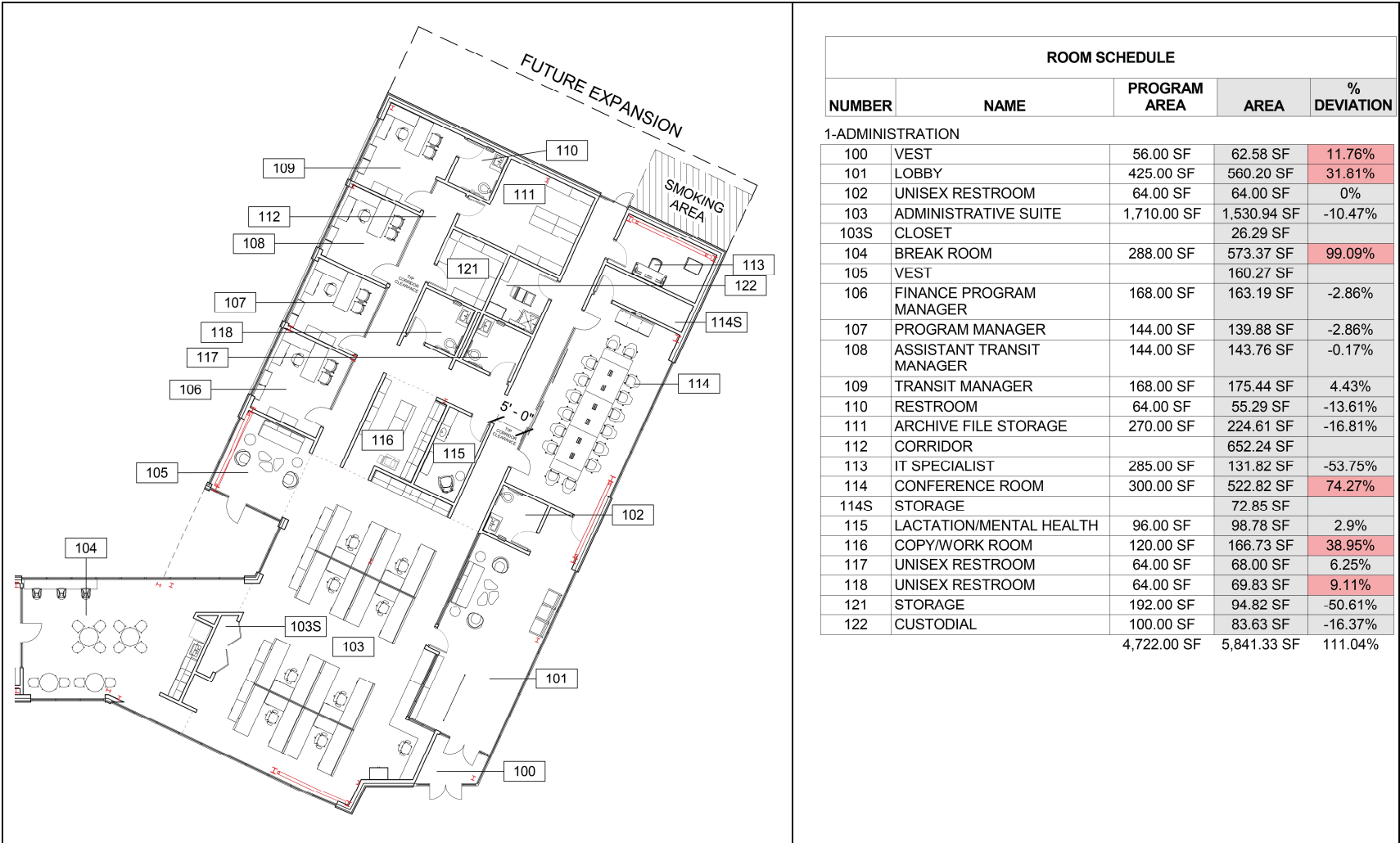
Figure 2-24: Administration Wing in context



2.3.5.1 Floor Plan

Figure 2-25: Enlarged floor plan of Administration Wing with room schedule

Refer to A102 in the drawing set for the entire floor plan.

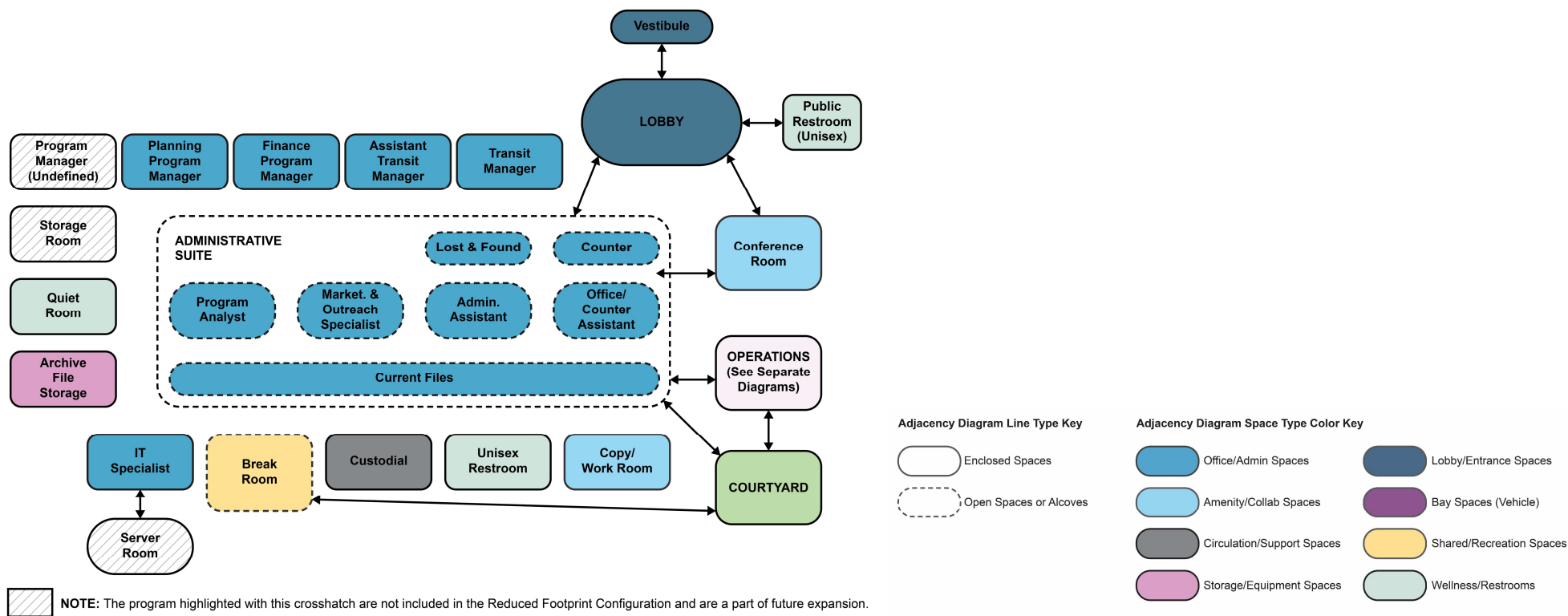


Note: Furniture shown for reference only.

2.3.5.2 Functional Relationship Diagram

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan. It serves only as a representational relationship diagram.

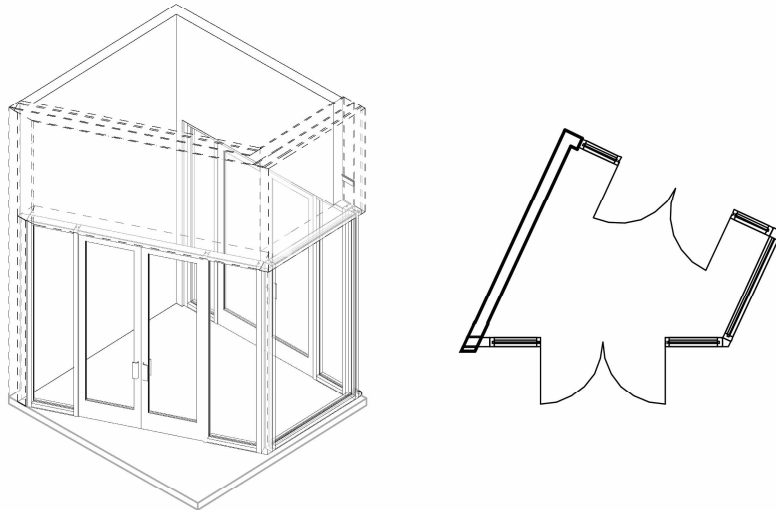
Figure 2-26: Functional Relationship Diagram for the Administration Building



2.3.5.3 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas and other information received during interviews with Yuba-Sutter Transit staff.

Entry Vestibule



Function

- Entry area before lobby

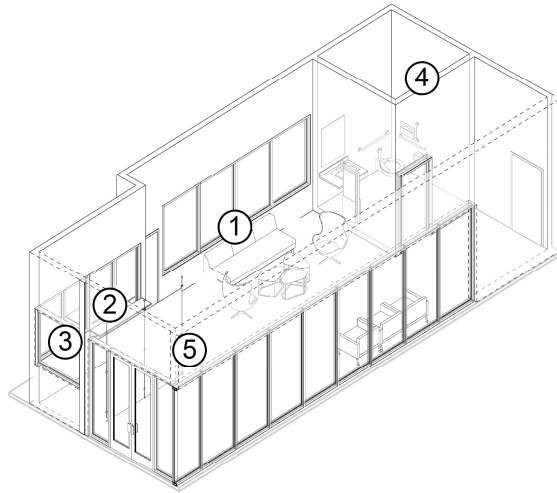
Relationship to other Areas

- At entrance of Administration

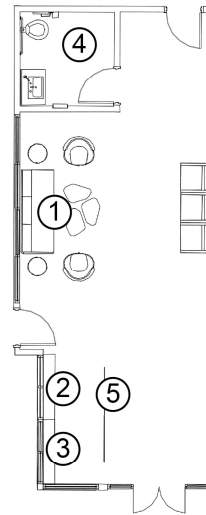
Comments/Characteristics

- Furnishings: None.
- Utility requirements: Grounded electrical convenience outlets, air conditioned and heated
- Window to outside. Windows to be fixed
- Floor finishes: Resilient flooring with non-drained recess floor mat
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Lobby



- ① Waiting Area
- ② Stand up Counter
- ③ ADA Counter
- ④ Unisex Restroom



- ⑤ Privacy Screen

Function

- Administration lobby area with seating power chairs

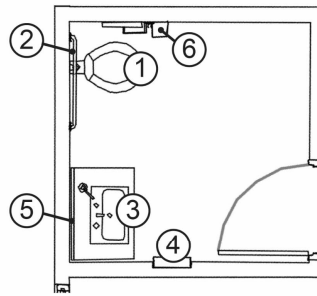
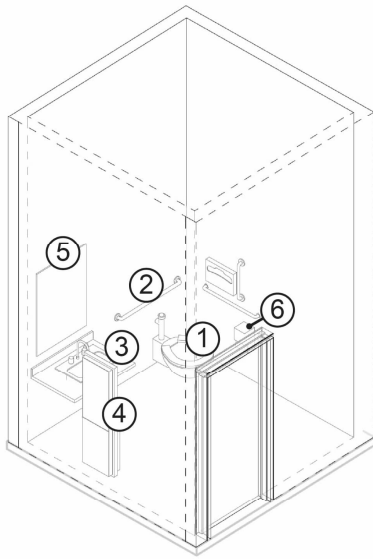
Relationship to other Areas

- Adjacent to administration counter
- Adjacent to vestibule
- Adjacent to small conference room
- Adjacent to unisex restroom

Comments/Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system, air conditioned and heated
- Window to outside if possible. Windows to be fixed
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Open split-level counter with rolling security screen for after-hours securement.

Unisex Restroom



- | | |
|---------------------------------|---------------------------|
| ① Toilet | ⑤ Mirror |
| ② Grab Bars | ⑥ Toilet Tissue Dispenser |
| ③ Lavatory | |
| ④ Paper Towel Dispenser / Waste | |

Function

- Unisex restroom facilities for Administration visitors

Relationship to other Areas

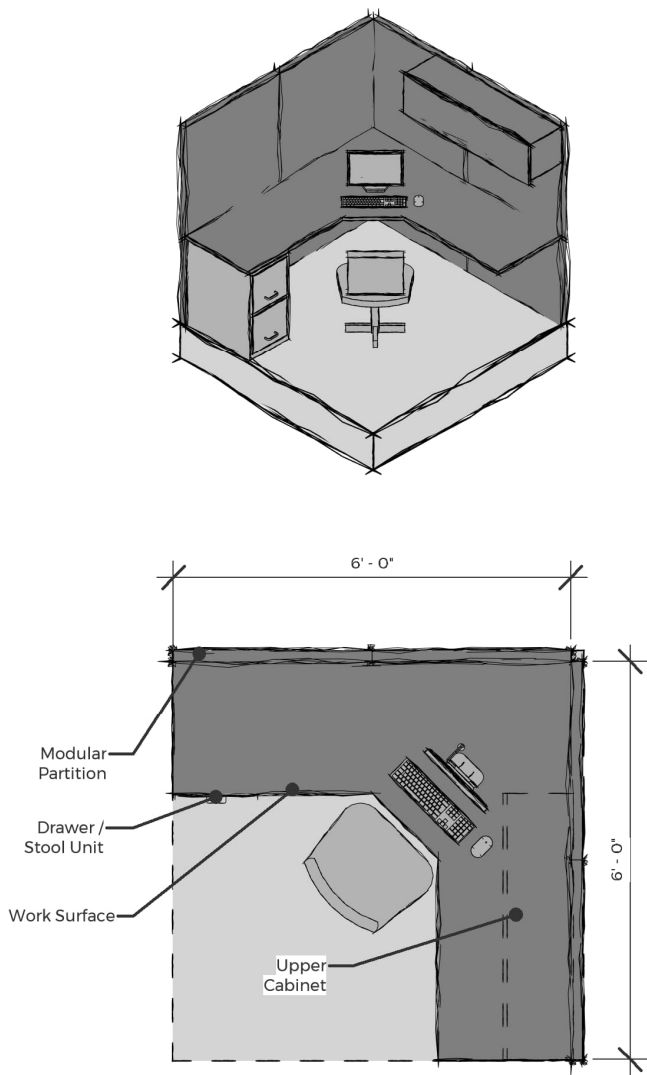
- Adjacent to lobby

Comments / Characteristics

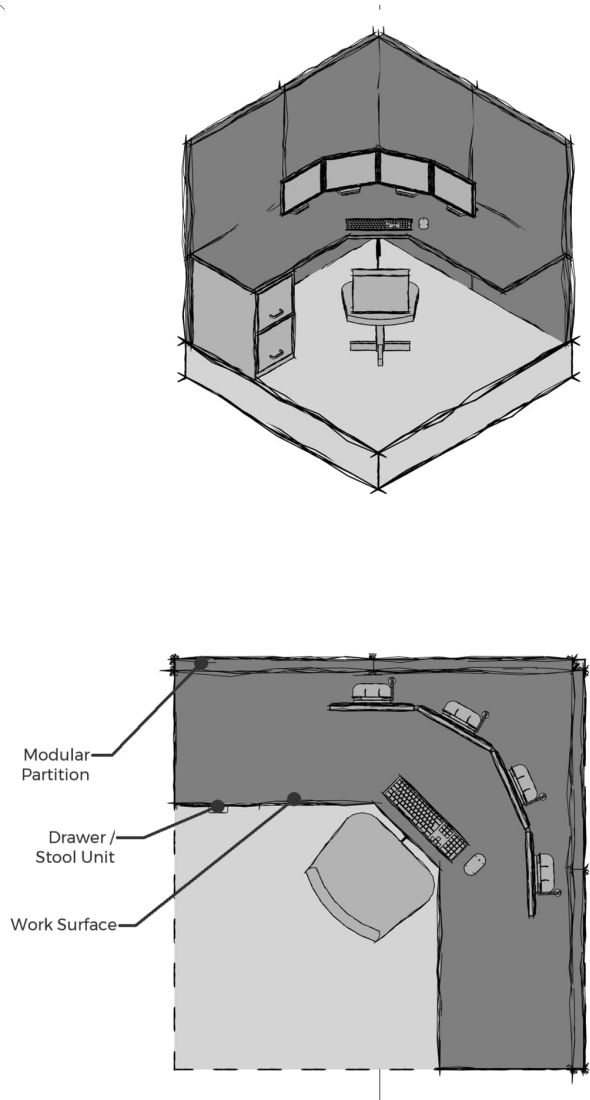
- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated
- Floor finishes: Porcelain tile
- Wall finishes: Porcelain tile on all wet walls and 60 inches minimum above finish floor to sides of toilet and lavatory. Paint or porcelain tile on gypsum board all other wall surfaces
- Ceiling finishes: Painted gypsum board
- Lighting: Wet location sealed fixtures and indirect light over mirror. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Workstations

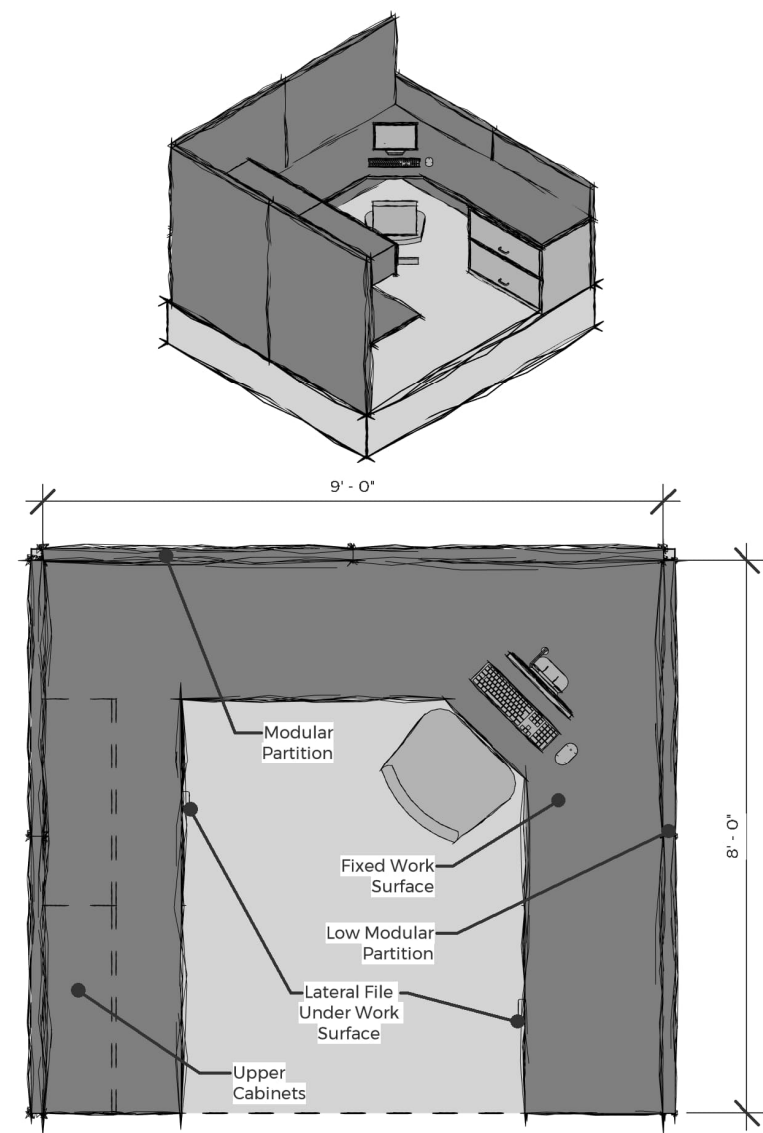
Workstation 1A, 6 x 6



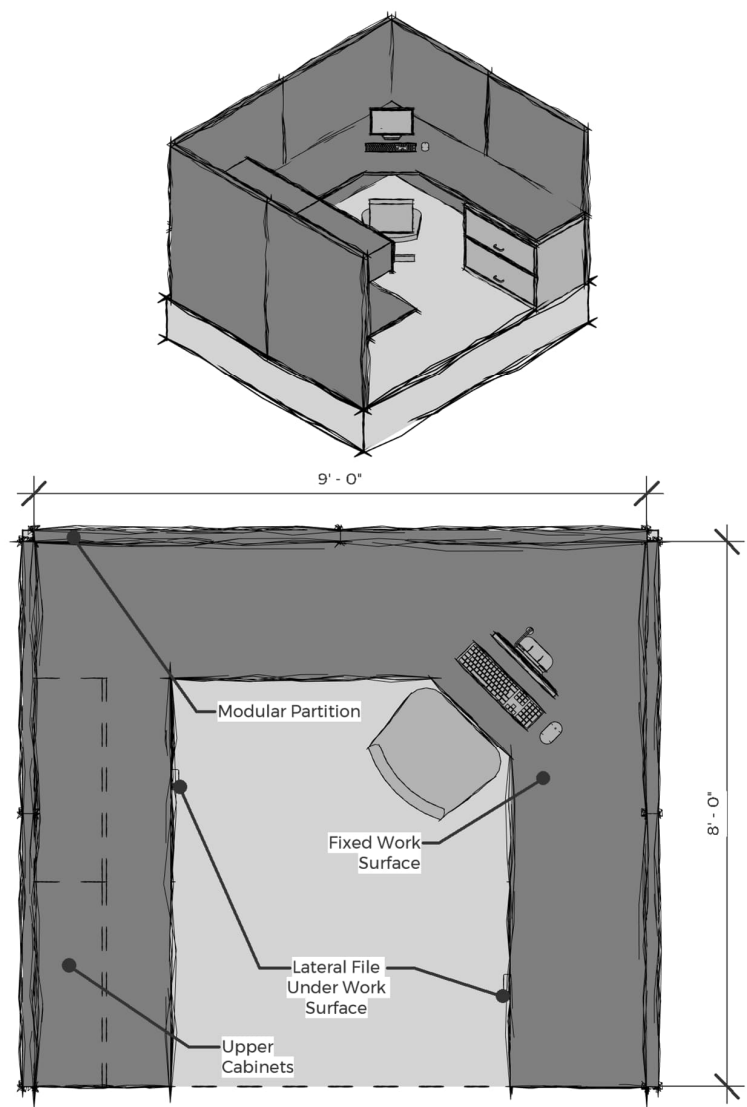
Workstation 1B, 6 x 6



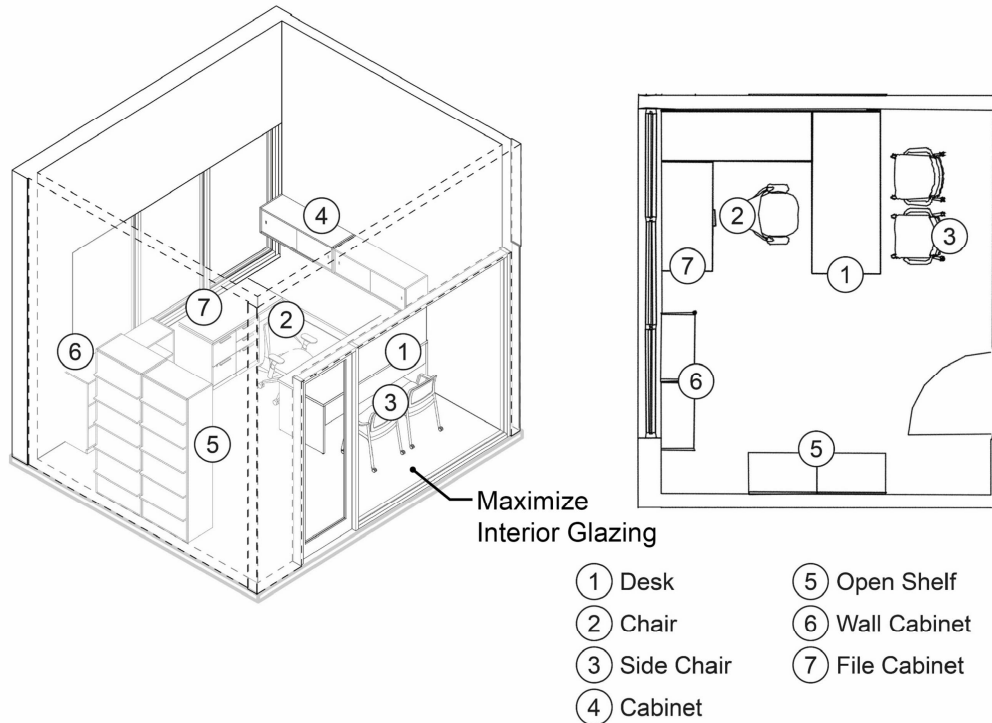
Workstation 2A, 9 x 8



Module 2B, 9 x 8



Typical Office (Large)



Function

- Enclosed private office for transit manager and finance program manager

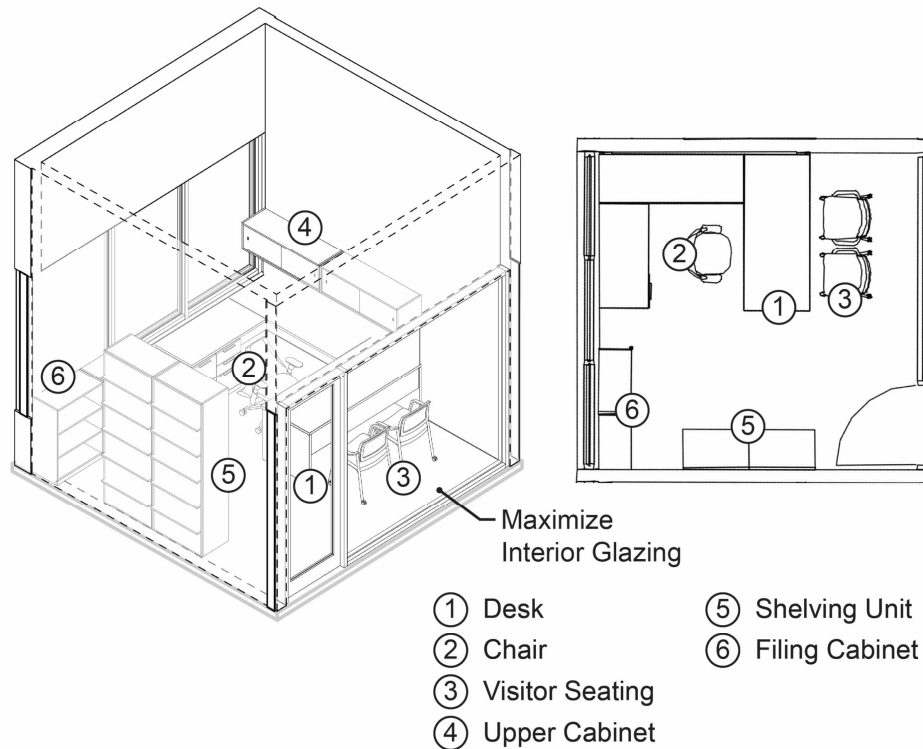
Relationship to other Areas

- Adjacent to other offices
- Facing courtyard

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned, and heated. Window to outside. Windows to be operable.
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically separated from surrounding spaces.

Typical Office (Medium)



Function

- Enclosed private office for assistant transit manager and planning program manager

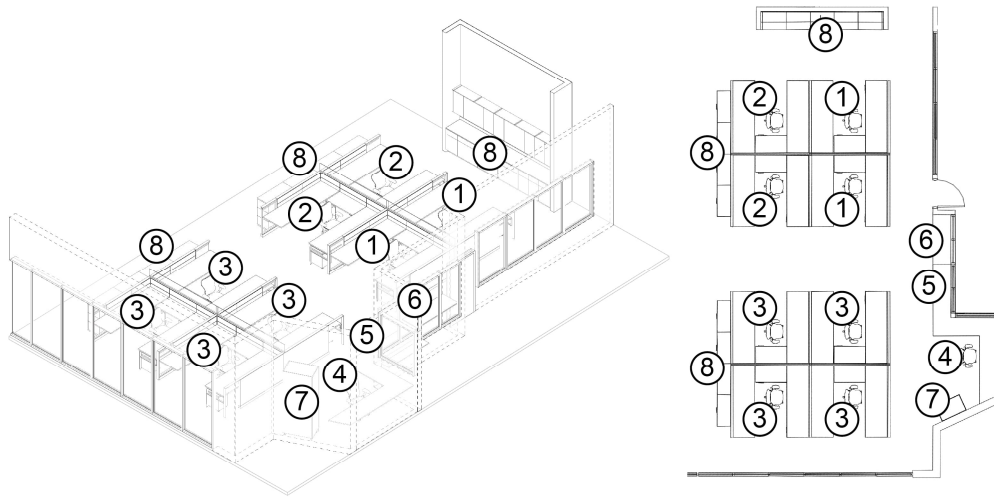
Relationship to other Areas

- Adjacent to other offices
- Facing courtyard

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned, and heated. Window to outside. Windows to be operable.
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically separated from surrounding spaces.

Administrative Suite



① Office/Counter Assistant

② Admin Assistant

③ Program Analyst

④ Marketing & Outreach Specialist

⑤ ADA Counter

⑥ Stand up Counter

⑦ Lost and Found Cabinet

⑧ File Cabinet

Function

- Suite to house public service counter, program analyst, administrative assistants, office/counter assistant, and marketing and outreach specialist workstations and shared administrative files

Relationship to other Areas

- Adjacent to lobby
- Near transit, planning program, and finance managers

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, J-boxes in wall behind workstations with power and data to allow connections for powered workstations, utility whips, data connections for printer, air conditioned, and heated
- Electrical power at counter for cash drawer, credit card reader, connect card ID card printer
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Office/Counter Assistant

Function

- Open workspace for the office/counter assistant

Relationship to Other Areas

- Adjacent to the lobby and counter, direct view to counter
- Near the transit manager

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high side and back modular office partitions and 42-inch-high (low side) front modular office partition facing the counter to allow visual monitoring of the counter.

Administrative Assistant

Function

- Open workspace for the administrative assistant

Relationship to Other Areas

- Adjacent to program analyst
- Close by administrative managers

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling

- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Program Analyst

Function

- Open workspace for the program analyst

Relationship to Other Areas

- Adjacent to administrative assistant
- Near planning program manager and program manager

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Marketing and Outreach Specialist

Function

- Open workspace for the marketing and outreach specialist

Relationship to Other Areas

- Convenient access to managers and copy/work room

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling

- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Counter

Function

- Counter area for the public to take photos for new fare cards, apply for paratransit services, and general interaction with administrative staff.

Relationship to other Areas

- Adjacent to lobby
- Near office/counter assistant

Comments / Characteristics

- Furnishings: Refer to administrative suite graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, dedicated data connection for credit card reader, air conditioned and heated. Electrical power at counter for cash drawer, credit card reader, and connect card ID card printer.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Lost and Found Cabinet

Function

- Secure and lockable cabinet for lost and found items to be distributed at counter to public in the lobby

Relationship to Other Areas

- Adjacent to counter
- Near lobby

Comments / Characteristics

- Furnishings: Refer to graphic. Lockable two-door cabinet
- Utility Requirements: None
- Floor Finishes: None
- Wall Finishes: None
- Ceiling Finishes: None

- Lighting: None

Current Files

Function

- Open area within the administrative suite for file cabinets

Relationship to Other Areas

- Near administrative office and workstations.

Comments / Characteristics

- Furnishings: Refer to graphic. Six lockable four-drawer lateral file cabinets
- Utility Requirements: Air conditioned and heated
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture—common area. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Program Manager (Undefined)

Function

- Enclosed private office for the program manager

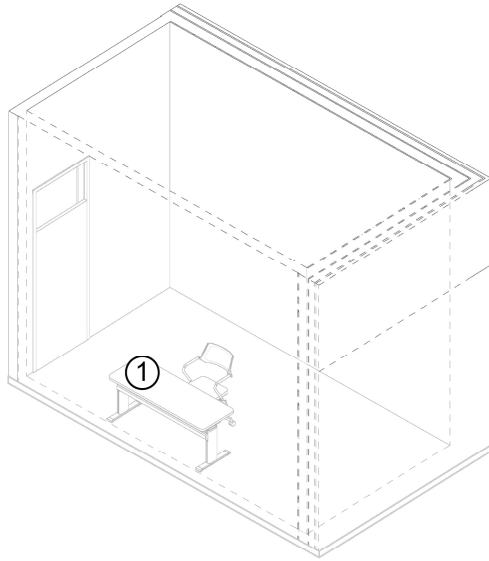
Relationship to Other Areas

- Adjacent to planning program manager
- Near transit manager

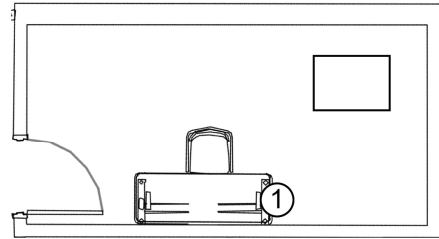
Comments / Characteristics

- Furnishings: Refer to module graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Window to outside if possible. Windows to be operable.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Telephone / Server / Audio-Visual Equipment Room



① Computer Workstation



Function

- Enclosed, separately secured area for telephone, computer server, and A/V equipment

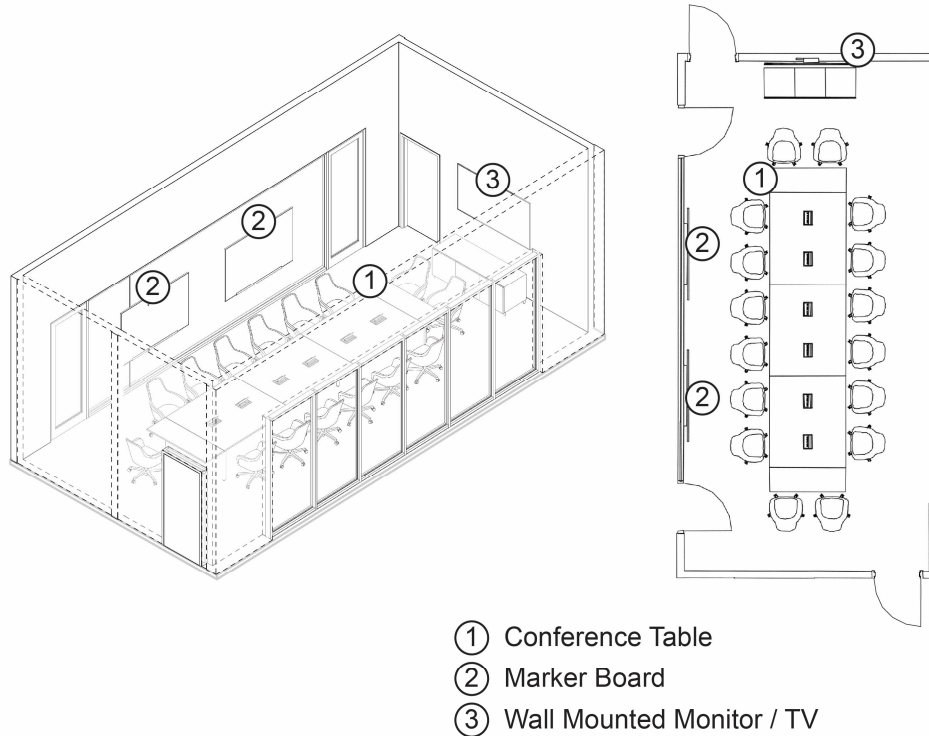
Relationship to other Areas

- Adjacent to IT specialist suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page. Include a UPS in the room.
- Utility requirements: Grounded electrical convenience outlets, conduit for network computer system, air conditioned and heated. Provide dedicated air conditioning unit for cooling temperature of IT equipment.
- Floor finishes: Static dissipative flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Painted exposed structure
- Lighting: Service Light Fixture—Shop. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Meeting Room



Function

- Large room for meetings for up to 16 people

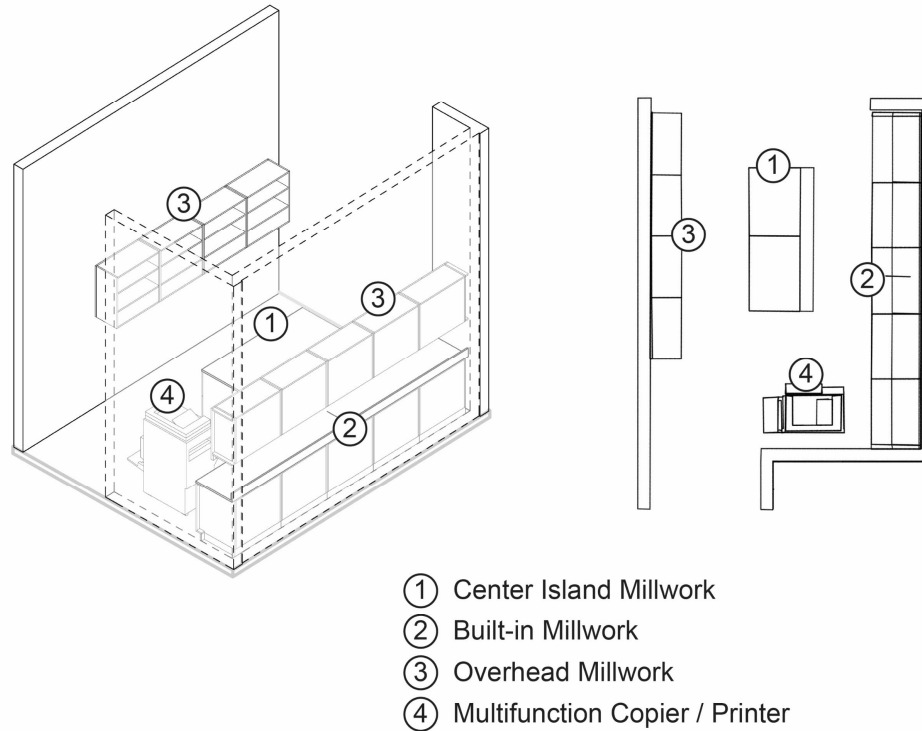
Relationship to other Areas

- Adjacent to lobby
- Near administrative suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system tied from ceiling projection to wall below television to floor box below table to allow laptop on table to connect, air conditioned and heated
- Window to outside if possible. Windows to be operable with black out shade.
- Floor finishes: Carpet or resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Dimmable. Refer to Section 2.4.5.3 for foot candle and fixture requirements. and dimmable downlights to either/both television or projection screen. Lighting design shall have ability to dim the front area near projection screen.
- Acoustically separated from surrounding spaces

Copy/Work Room



Function

- Designated area for multi-function copier/scanner/printer, cutting board, supply storage, and work surfaces

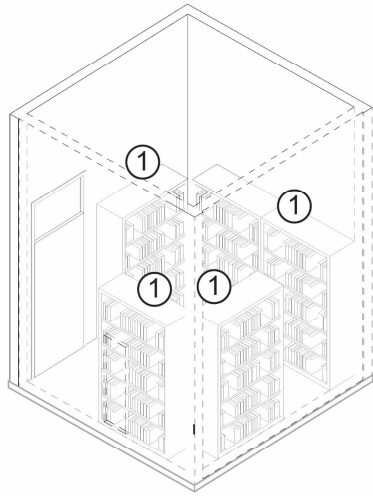
Relationship to other Areas

- Centrally located within office

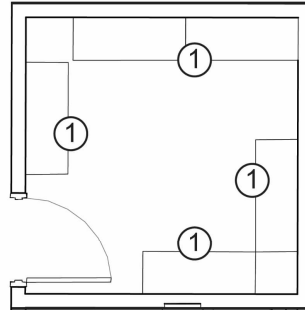
Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Storage Room



① Shelving Unit



Function

- Enclosed area for files and other sensitive materials stored on shelves

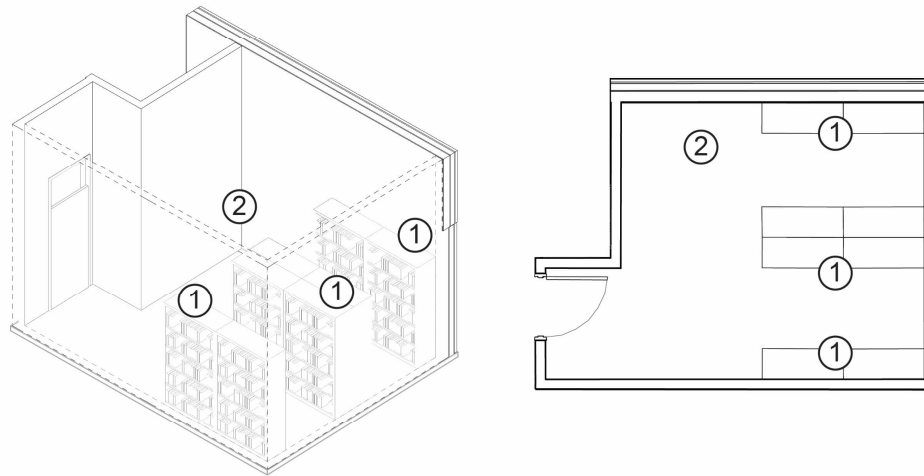
Relationship to other Areas

- Adjacent to administrative suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page. 6 shelving units to accommodate up to 21 storage boxes per shelving unit for up to 126 file storage boxes total.
- Utility requirements: Grounded electrical convenience outlet near door, air conditioned and heated
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture—storage rooms. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Archive File Storage



- ① Shelving Unit
- ② Floor Space for Marketing Materials / Bus Stop Signs / Folding Tables / Canopies, etc.

Function

- Enclosed area for storage of record files and storage of marketing materials, bus stop signs, folding tables, pop-up canopies and other special occasion materials

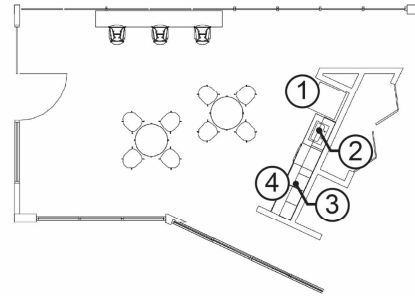
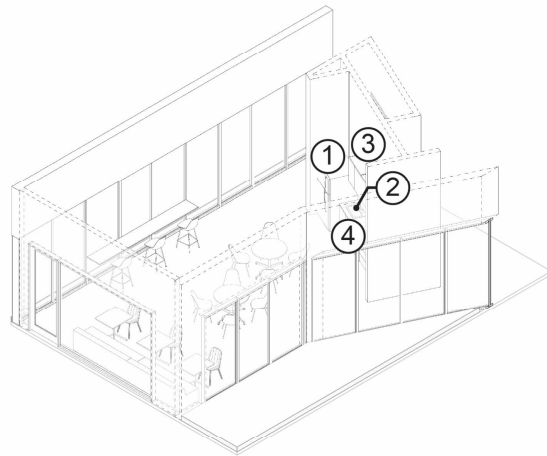
Relationship to other Areas

- Adjacent to administrative suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page. 8 shelving units to accommodate up to 21 storage boxes per shelving unit for up to 168 file storage boxes total.
- Utility requirements: Grounded electrical convenience outlet near door, air conditioned and heated
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture—common area. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Break Room



- ① Refrigerator
- ② Sink
- ③ Overhead Millwork
- ④ Built-in Millwork

Function

- Open area for administrative personnel to take breaks

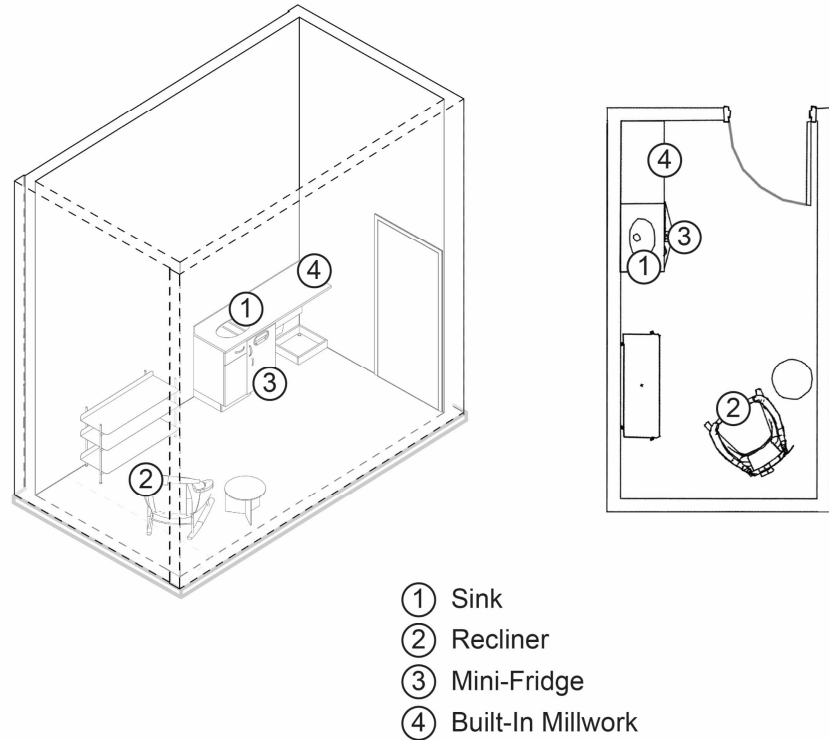
Relationship to other Areas

- Adjacent to administrative suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, air conditioned and heated. Dedicated water line to ice maker in refrigerator and to coffee makers. Dedicated isolated outlet to each microwave. Provide above counter back splash electrical outlets.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture—common area. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Quiet Room



Function

- Enclosed area for administrative use between and after shifts

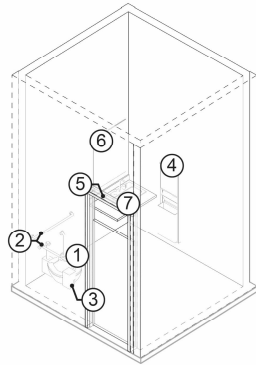
Relationship to other Areas

- Adjacent to administrative suite

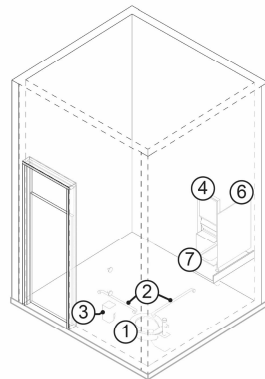
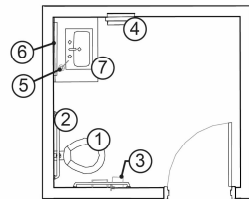
Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, air conditioned and heated
- Floor finishes: Carpet tile
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture and dimmable down lights. Lighting design shall have the ability to dim. Refer to Section 2.4.5.3 for foot candle and fixture requirements. Task lighting provided at each recliner for reading without disturbing people in adjacent recliners. Provide floor lighting to keep light levels down.
- Acoustically isolated from surrounding spaces.
- Door to have narrow light for visibility inside room from exterior.

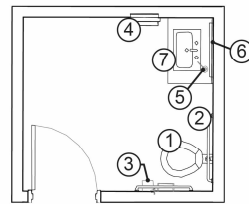
Unisex Restroom



- | | |
|---------------------------------|------------------|
| ① Toilet | ⑤ Soap Dispenser |
| ② Grab Bars | ⑥ Mirror |
| ③ Toilet Tissue Dispenser | ⑦ Lavatory |
| ④ Paper Towel Dispenser / Waste | |



- | | |
|---------------------------------|------------------|
| ① Toilet | ⑤ Soap Dispenser |
| ② Grab Bars | ⑥ Mirror |
| ③ Toilet Tissue Dispenser | ⑦ Lavatory |
| ④ Paper Towel Dispenser / Waste | |



Function

- Unisex restroom facilities for administration staff

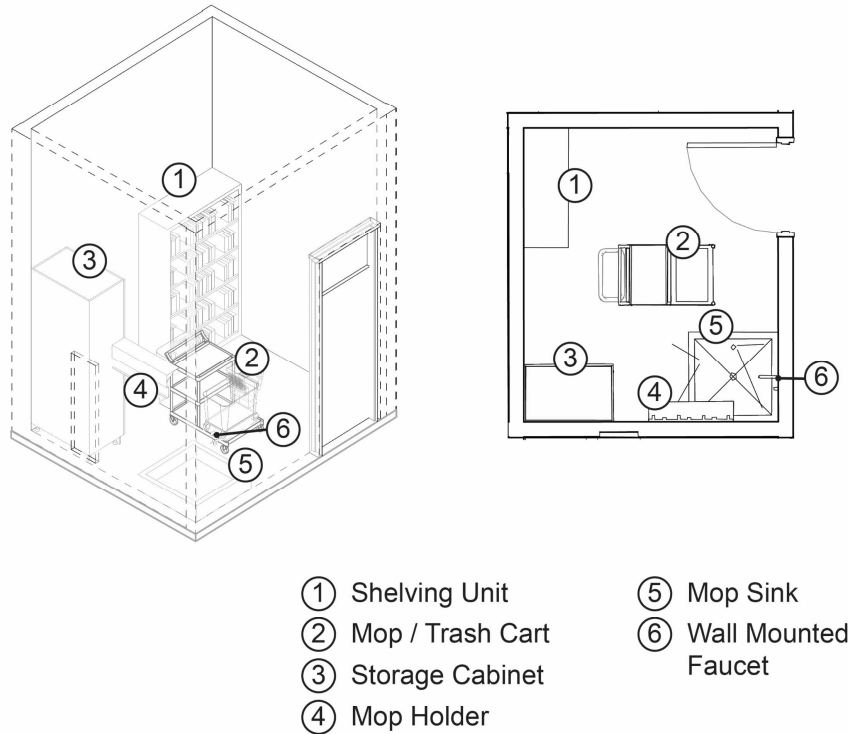
Relationship to other Areas

- Adjacent to administrative suite

Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Utility requirements: Grounded electrical convenience outlets; intercom/paging system; air conditioned, ventilated, and heated
- Floor finishes: Porcelain tile
- Wall finishes: Porcelain tile on all wet walls and 60 inches minimum above finish floor to sides of toilet and lavatory. Paint or porcelain tile on gypsum board all other wall surfaces.
- Ceiling finishes: Painted gypsum board
- Lighting: Wet location sealed fixtures and indirect light over mirror. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Custodial



Function

- Enclosed area for storage of janitorial and cleaning supplies

Relationship to other Areas

- Located conveniently within administrative suite.

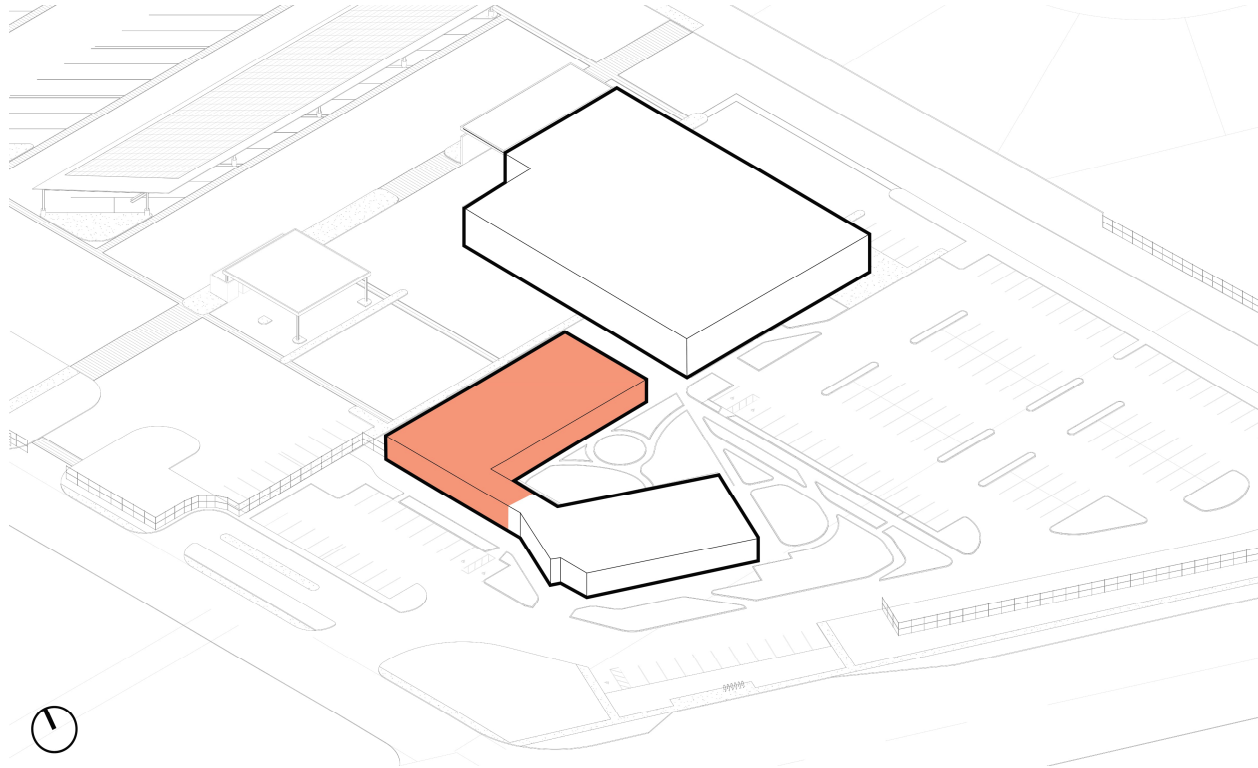
Comments / Characteristics

- Furnishings: Refer to graphic on this page.
- Floor-mounted mop sink with wall-mounted faucet and bucket hook
- Utility requirements: Grounded electrical convenience outlets, ventilated and heated
- Floor finishes: Porcelain tile or sealed concrete
- Wall finishes: Porcelain tile on gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling where appropriate
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

2.3.6 Operations Design Criteria

The operations wing of the Office and Amenity Building is envisioned to be the facility's interface between the courtyard and the bus parking and services to the north, providing a buffer between the quieter areas of the facility and those where intense activity is expected. The wing is bifurcated by the lobby and driver check-in, which will streamline the drivers' access in and out of the building. The east portion of the wing consolidates all open office suites and private offices with support spaces, including a meeting room and training room separated by a movable partition that can be drawn up to combine both spaces into a single space. These rooms face south, with views of the courtyard and across to the administration wing. Private offices will benefit from indirect sunlight facing north and, along with the dispatch suite, will have unobstructed views of the bus parking lot. A combination of exterior glazing and interior storefronts in offices spaces and the meeting and training rooms will maximize transparency and natural light penetration. The west portion of the wing consolidates building services along with the drivers' break room and recreation space (see *Amenity Connector Design Criteria*).

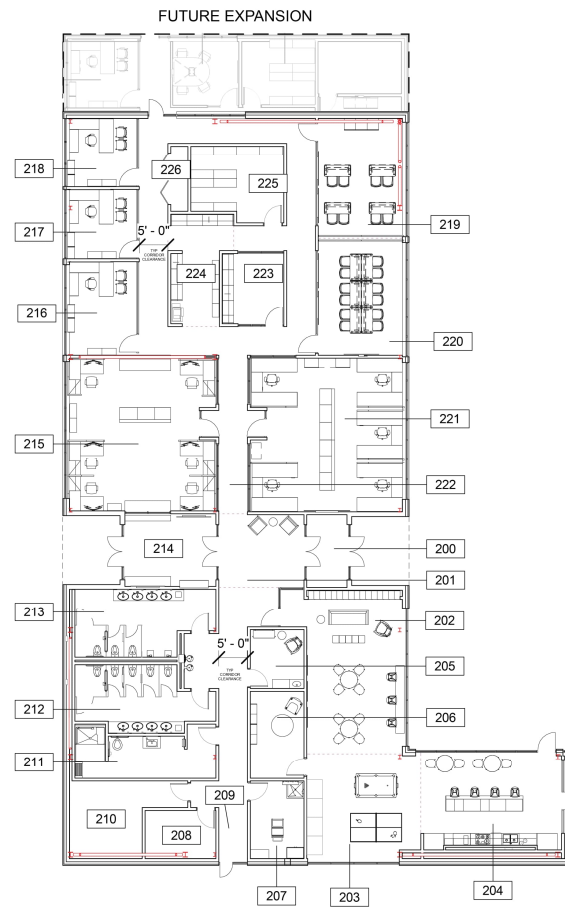
Figure 2-27: The Operations Wing in Context



2.3.6.1 Floor Plan

Figure 2-28: Enlarged Floor Plan of Operations Wing with Room Schedule

Refer to A102 in the drawing set for the entire floor plan.



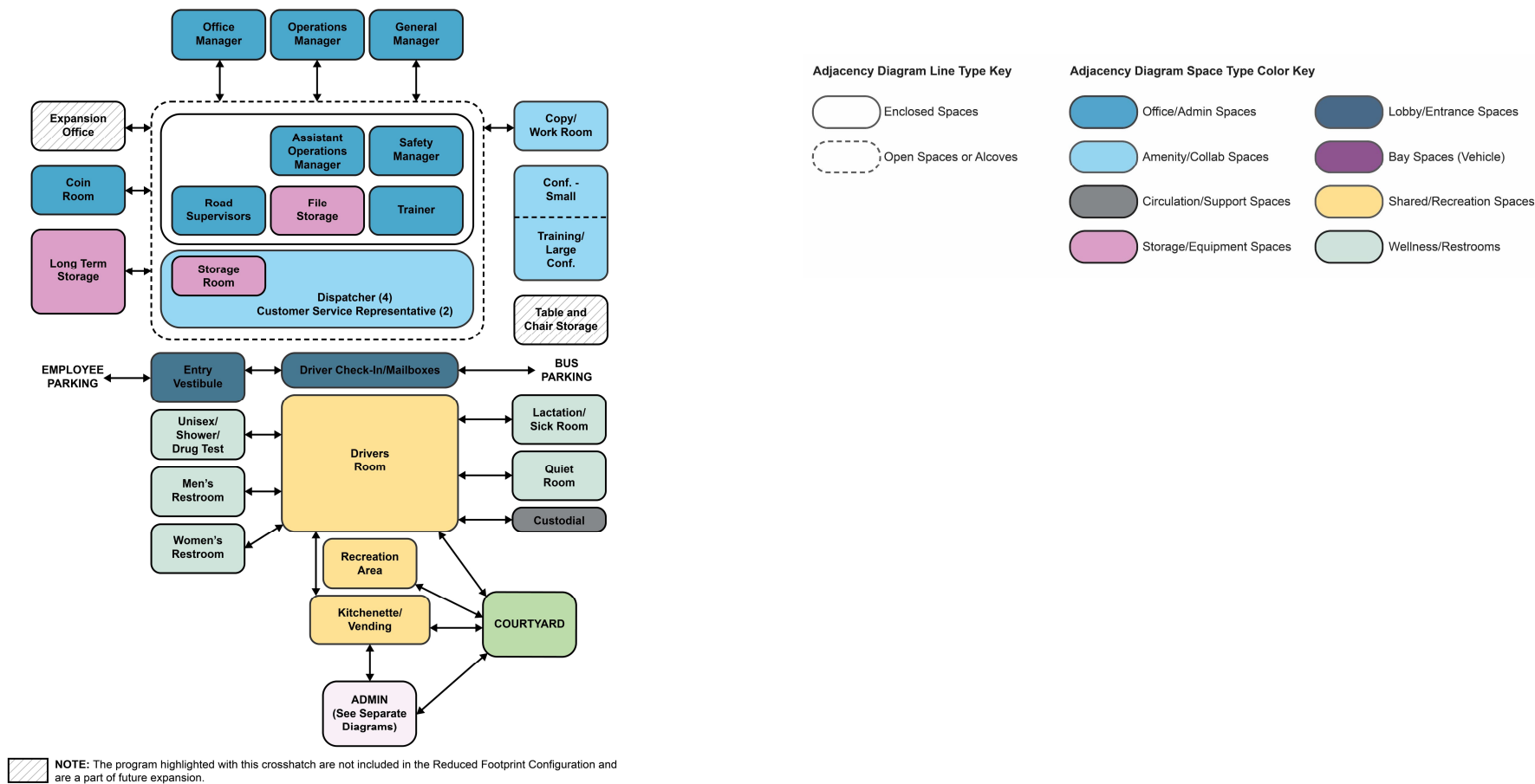
ROOM SCHEDULE				
NUMBER	NAME	PROGRAM AREA	AREA	% DEVIATION
2-OPERATIONS				
200	VEST	56.00 SF	88.67 SF	58.33%
201	LOBBY	100.00 SF	190.37 SF	90.37%
202	DRIVERS ROOM	540.00 SF	479.38 SF	-11.23%
203	RECREATION	400.00 SF	355.95 SF	-11.01%
204	KITCHENETTE	350.00 SF	387.45 SF	10.7%
205	LACTATION/SICK ROOM	100.00 SF	95.25 SF	-4.75%
206	QUIET ROOM	120.00 SF	141.72 SF	18.1%
207	CUSTODIAL	150.00 SF	125.40 SF	-16.4%
208	ELECTRICAL	100.00 SF	102.42 SF	2.42%
209	CORRIDOR		355.19 SF	
210	MECHANICAL	200.00 SF	221.14 SF	10.57%
211	UNISEX RR/DRUG TEST	200.00 SF	200.11 SF	0.06%
212	WOMEN'S RESTROOM	240.00 SF	236.83 SF	-1.32%
213	MEN'S RESTROOM	240.00 SF	262.18 SF	9.24%
214	DRIVERS CHECK-IN	112.00 SF	201.14 SF	79.59%
215	DISPATCH SUITE	672.00 SF	666.49 SF	-0.82%
216	GENERAL MANAGER	192.00 SF	195.50 SF	1.82%
217	OPERATIONS MANAGER	144.00 SF	142.88 SF	-0.78%
218	OFFICE MANAGER	144.00 SF	142.88 SF	-0.78%
219	TRAINING ROOM	300.00 SF	306.76 SF	2.25%
220	CONFERENCE ROOM - SMALL	150.00 SF	300.30 SF	100.2%
221	OPERATIONS SUITE	728.00 SF	697.07 SF	-4.25%
222	CORRIDOR		825.45 SF	
223	COIN ROOM	120.00 SF	132.58 SF	10.49%
224	COPY/WORK ROOM	120.00 SF	182.64 SF	52.2%
225	LONG TERM STORAGE	168.00 SF	201.03 SF	19.66%
226	CLOSET		34.16 SF	
		5,646.00 SF	7,270.93 SF	414.67%

Note: Furniture shown for reference only.

2.3.6.2 Functional Relationship Diagram

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan. It serves only as a representational relationship diagram.

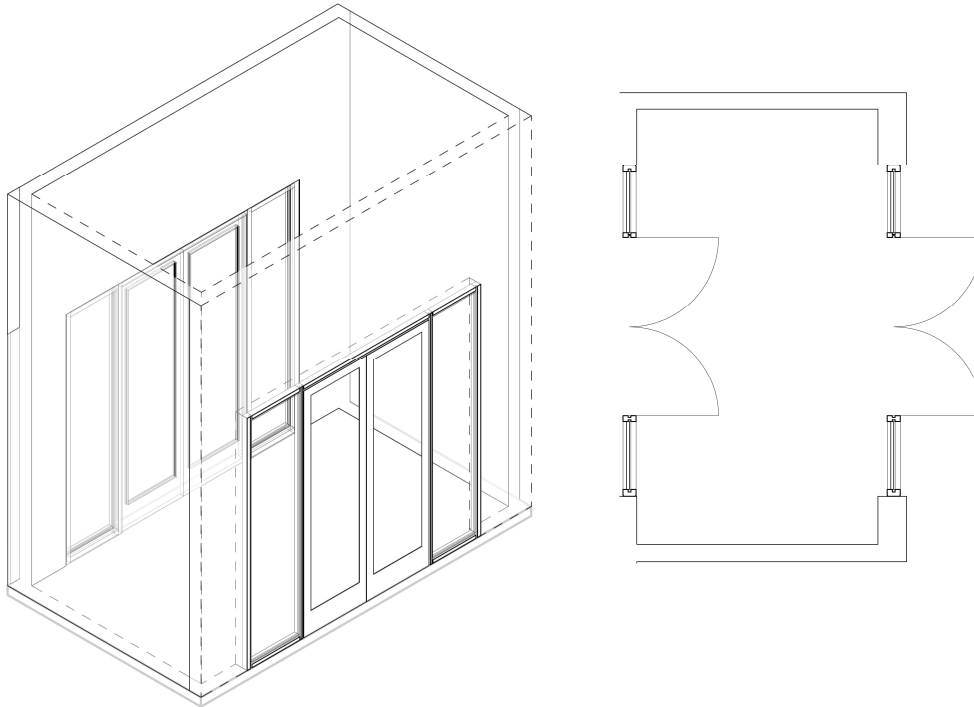
Figure 2-29: Functional Relationship Diagram for the Operations Building



2.3.6.3 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas, and other information received during interviews with Yuba-Sutter Transit staff.

Entry Vestibule



Function

- Entry area before lobby

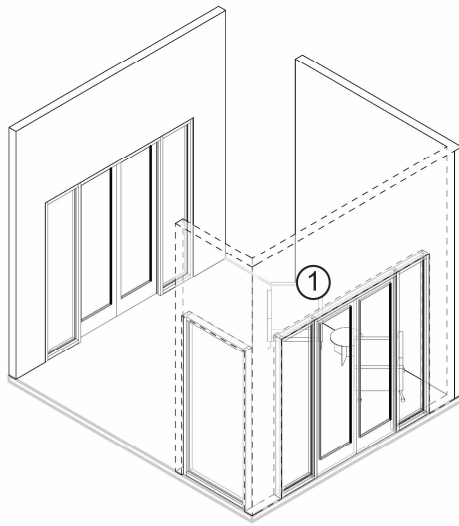
Relationship to other Areas

- At entrance of Dispatch

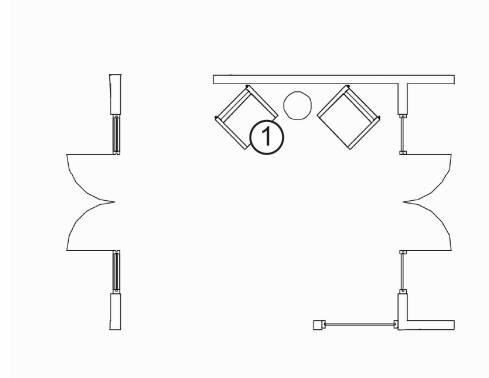
Comments / Characteristics

- Furnishings: None
- Utility requirements: Grounded electrical convenience outlets, air conditioned and heated.
- Window to outside. Windows to be fixed.
- Floor finishes: Resilient flooring with non-drained recess floor mat.
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Lobby



① Waiting Area



Function

- Dispatch lobby area with seating for up to 2 people

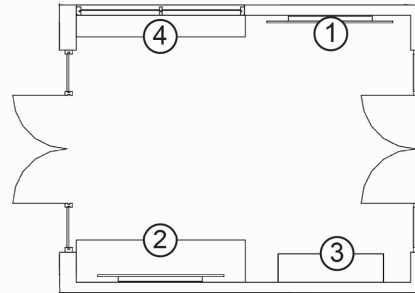
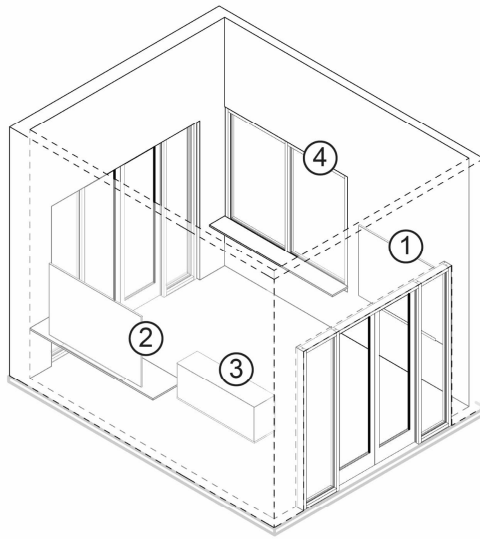
Relationship to other Areas

- Adjacent to Dispatch window
- Adjacent to vestibule

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system, air conditioned and heated
- Window to outside if possible. Window to be fixed.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Driver Check-In



- ① Bulletin Board
- ② Driver Check-In
- ③ Driver Mailboxes
- ④ Dispatch Window

Function

- Open area for drivers to check in at Dispatch window.

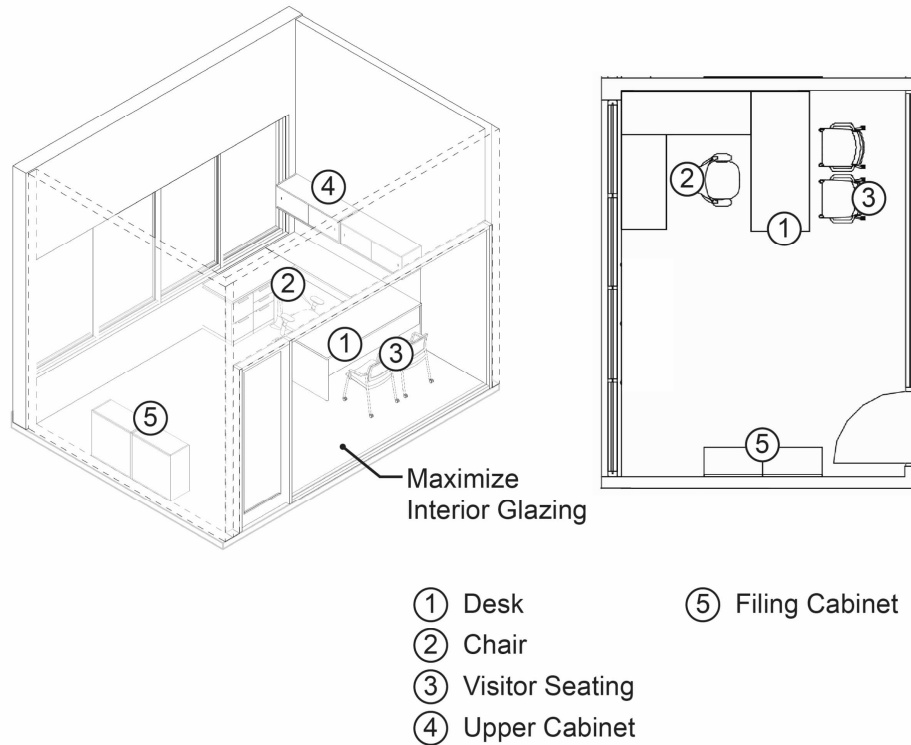
Relationship to other Areas

- Adjacent to Dispatch window and Drivers' Room
- Exits to employee parking and bus parking

Comments / Characteristics

- Furnishings: See graphic. Must include 100 locking secure mailboxes, accessible from front.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for 2 network computer systems, air conditioned and heated
- Window to outside. Windows to be fixed.
- Schedule racks, document board, 2 computer stations
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Typical Office (Large)



Function

- Enclosed private office for general manager

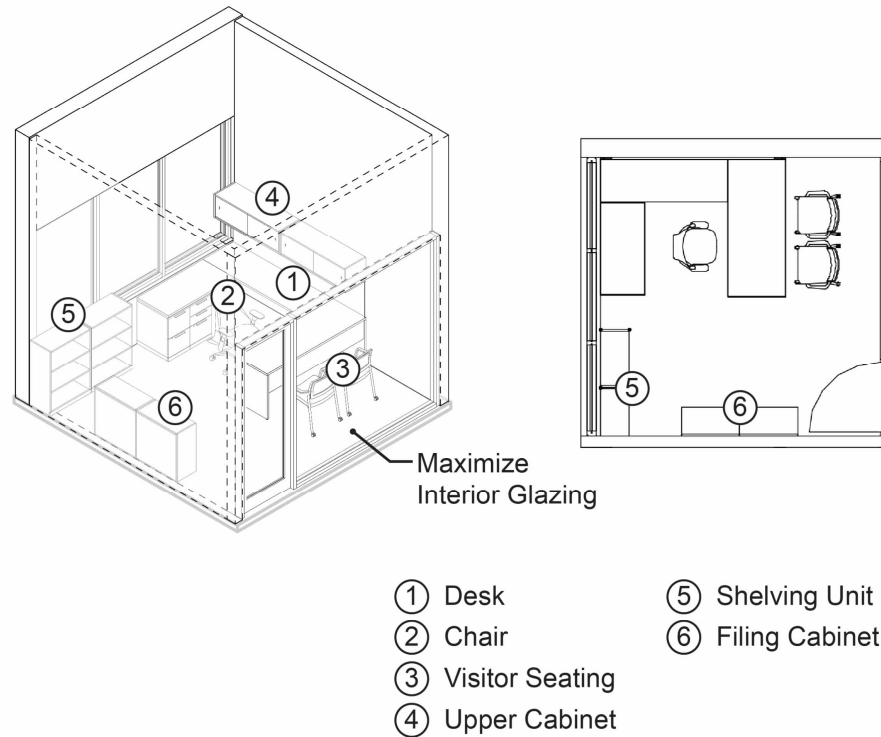
Relationship to other Areas

- Adjacent to other offices and near Operations and Dispatch suites.
- Facing bus parking

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Window to outside. Windows to be operable.
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically separated from surround spaces

Typical Office (Medium)



Function

- Enclosed private office for operations manager, office manager, and expansion office

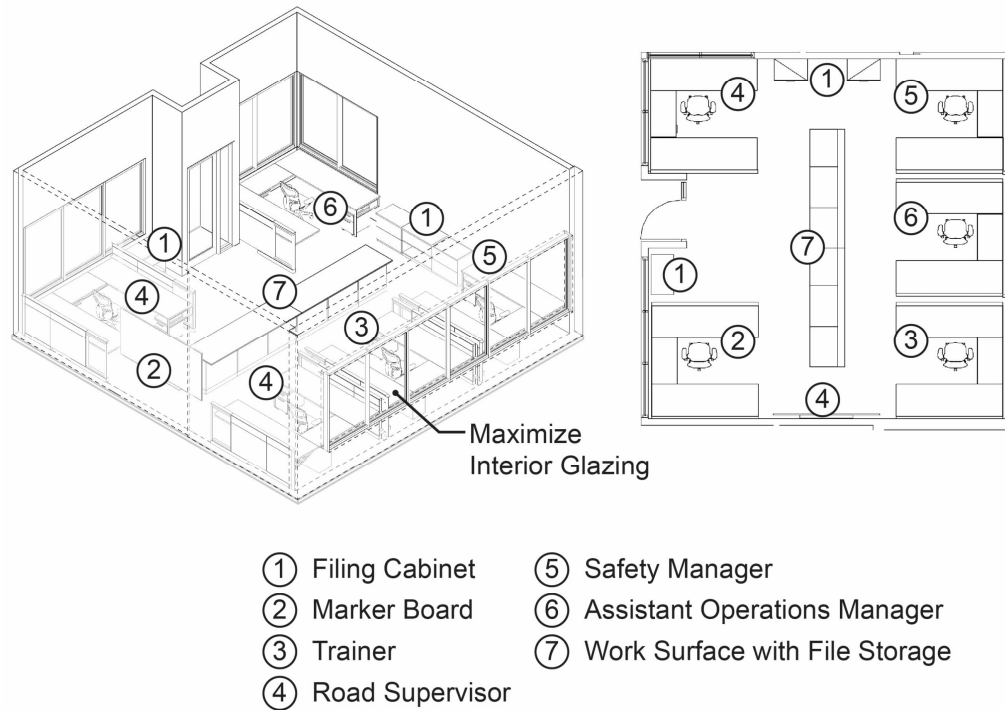
Relationship to other Areas

- Adjacent to other offices and near Operations and Dispatch suites.
- Facing bus parking

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Window to outside. Windows to be operable.
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically separated from surround spaces

Operations Suite



Function

- Enclosed office suite for the assistant operations manager, safety manager, trainer, and road supervisors' workstations and shared Operations file storage.

Relationship to other Areas

- Adjacent to Drivers' Room
- Near Dispatch suite

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Floor finishes: Carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Trainer

Function

- Open workspace for the trainer

Relationship to Other Areas

- Adjacent to Drivers' Room
- Near dispatch suite
- Near training/large conference room

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Road Supervisor

Function

- Open workspace for the road supervisors

Relationship to Other Areas

- Adjacent to Drivers' Room
- Near dispatch suite

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet

- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Safety Manager

Function

- Open workspace for the safety manager

Relationship to Other Areas

- Adjacent to Drivers' Room
- Near dispatch suite

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Assistant Operations Manager

Function

- Open workspace for the assistant operations manager.

Relationship to Other Areas

- Adjacent to Drivers' Room
- Near dispatch suite

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

File Storage**Function**

- Open area for files and other sensitive materials stored in filing cabinets

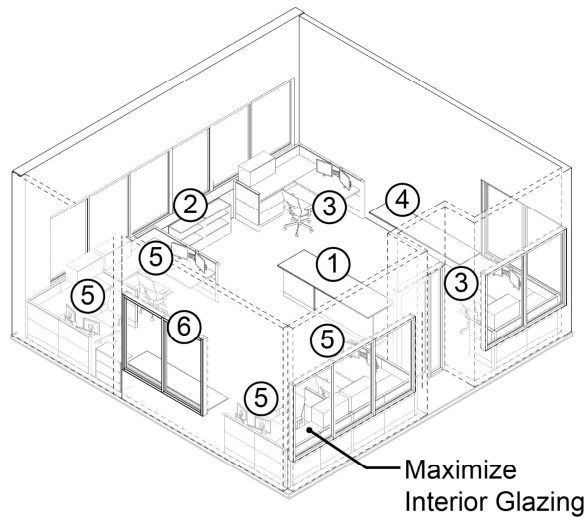
Relationship to Other Areas

- Adjacent to operations suite

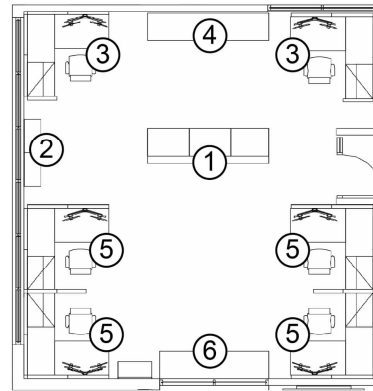
Comments / Characteristics

- Furnishings: Two four-drawer filing cabinets
- Utility Requirements: Air conditioned and heated.
- Floor Finishes: Carpet or resilient flooring
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Dispatch Suite



- | | |
|------------------------------|-------------------|
| ① Work Table & Storage | ⑤ Dispatcher |
| ② Radio Charging | ⑥ Dispatch Window |
| ③ Customer Service Rep | |
| ④ Lost & Found Daily Collect | |



Function

- Enclosed room to house dispatching functions, dispatching workstations, and support areas.

Relationship to other Areas

- Near Drivers' Room and adjacent to Dispatch lobby
- Near Operations suite

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Window to outside with view of bus parking, bus site entry/exit if possible. Window to be fixed. View of Dispatch lobby to allow secure access via remote lock control into Drivers' Room.
- Floor finishes: Resilient flooring or carpet
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Storage

Function

- Enclosed area for storage of files for access by dispatch personnel

Relationship to Other Areas

- Adjacent to dispatch suite

Comments / Characteristics

- Furnishings: Built-in shelving into closet
- Utility Requirements: None
- Floor Finishes: Resilient flooring
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Service light fixture—storage rooms: Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Customer Service Representative

Function

- Open workspace for the customer service representative

Relationship to Other Areas

- Adjacent to operations suite
- Near Drivers' Room

Comments / Characteristics

- Furnishings: Refer to workstation graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Defined space with 66-inch-high modular office partitions.

Lost & Found Daily Collect

Function

- Shelving unit to hold lost and found items collected daily from returning bus routes

Relationship to Other Areas

- Adjacent to dispatch

Comments / Characteristics

- Furnishings: Shelving unit with plastic bins for storage of items
- Utility Requirements: None
- Floor Finishes: None
- Wall Finishes: None
- Ceiling Finishes: None
- Lighting: None

Dispatch Window (Dispatcher)

Function

- Counter space for driver interaction with dispatcher

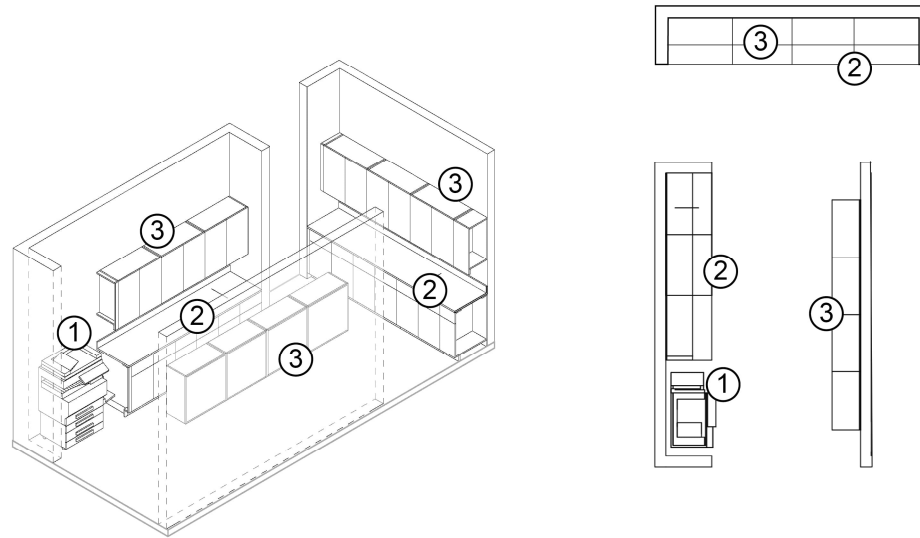
Relationship to Other Areas

- Adjacent to Driver Check-In
- Adjacent to Drivers' Room
- Near operations suite

Comments / Characteristics

- Furnishings: Refer to graphic on previous page.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Resilient flooring or carpet
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Copy/Work Room



- ① Multifunction Copier / Printer
- ② Built-in Millwork
- ③ Overhead Millwork

Function

- Designated area for multi-function copier/scanner/printer, cutting board, supply storage, and work surfaces

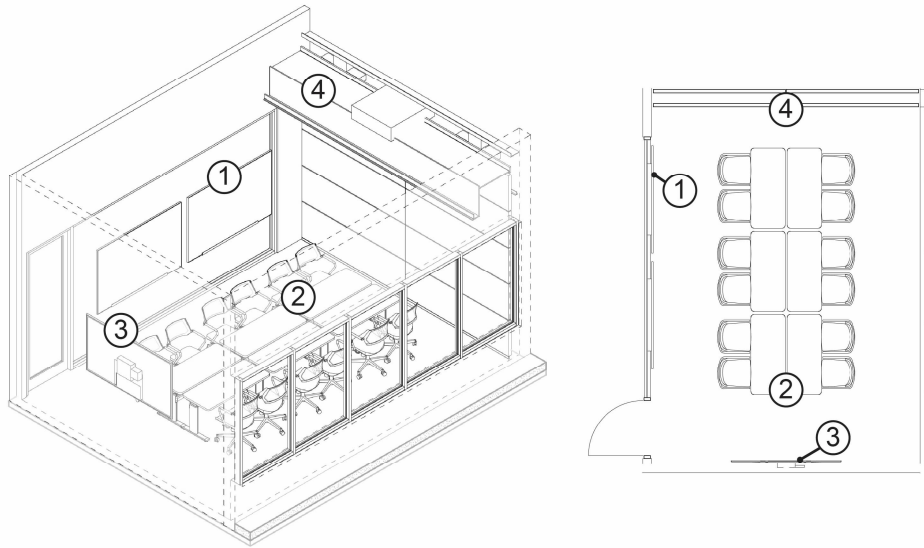
Relationship to other Areas

- Centrally located within office.
- Convenient access to Dispatch personnel

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Conference Room (Small)



- ① Marker Board
- ② Conference Table
- ③ Wall Mounted Monitor / TV
- ④ Acoustic Vertical Retractable Partition

Function

- Room for meetings for up to 10 people

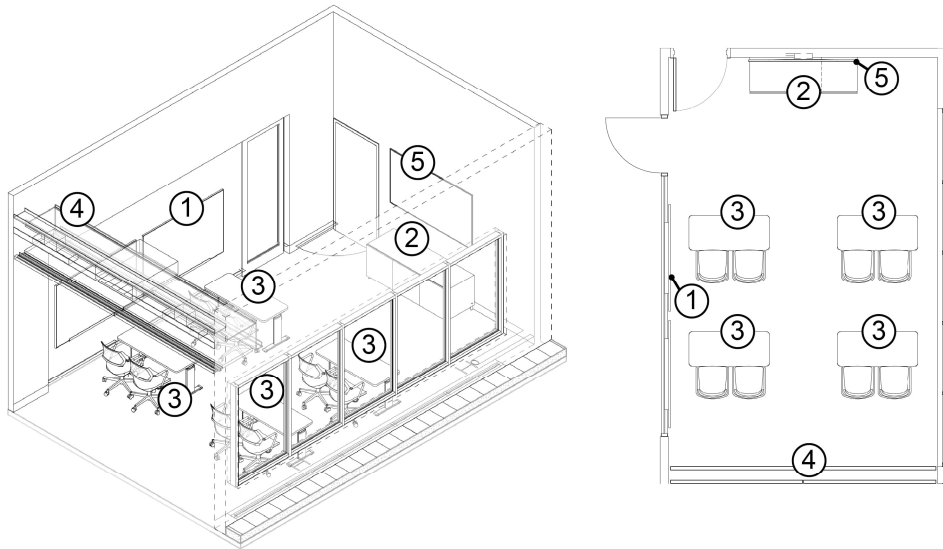
Relationship to other Areas

- Adjacent to training room with ceiling-mounted acoustical movable partition to create a large, combined space.
- Convenient access to Operations suite and Dispatch suite.

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system tied from ceiling projection to wall below television to floor box below table to allow laptop on table to connect, air conditioned and heated
- Window to outside if possible. Windows to be operable with black out shade.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture dimmable. Refer to Section 2.4.5.3 for foot candle and fixture requirements and dimmable down-lights to either/both television or projection screen. Lighting design shall have ability to dim the front area near projection screen.
- Acoustically separated from surrounding spaces.

Training Room



- ① Marker Board
- ② Credenza
- ③ Individual Training Tables
- ④ Acoustic Vertical Retractable Partition
- ⑤ Wall Mounted Monitor / TV

Function

- Enclosed area for training sessions, comfortably accommodating up to 8 at tables.

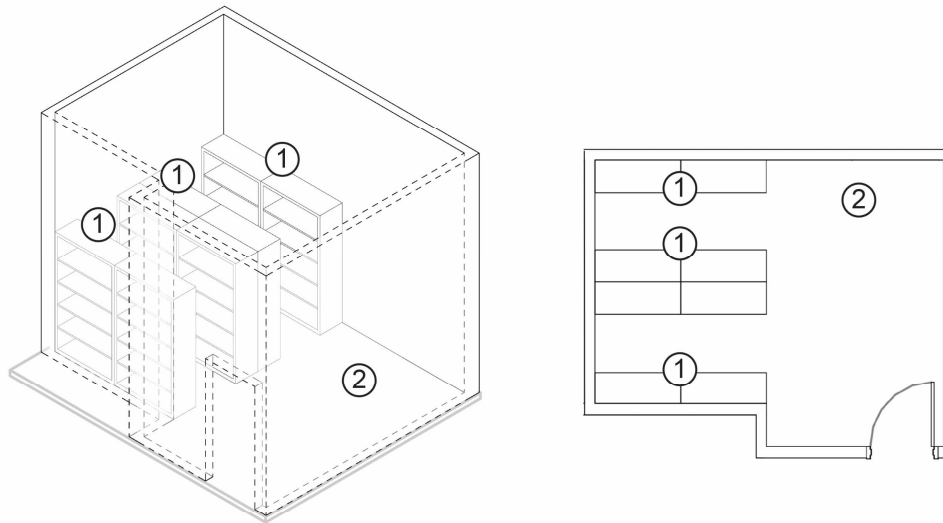
Relationship to other Areas

- Adjacent to meeting room with ceiling-mounted acoustical movable partition to create a large, combined space.
- Convenient access to Operations suite and Dispatch suite.

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, television cable, conduit for network computer system, including conduit tied from ceiling mounted projector to wall behind trainer/presenter desk, air conditioned and heated
- Window to outside if possible. Windows to be operable with black out shade.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture dimmable. Refer to Section 2.4.5.3 for foot candle and fixture requirements and dimmable down-lights to either/both television or projection screen. Lighting design shall have ability to dim the front area near projection screen.
- Acoustically separated from surrounding spaces.

Long-Term Storage



- ① Shelving Unit
- ② Space to store Tables and Chairs

Function

- Enclosed area for storage of archive files for intermittent access

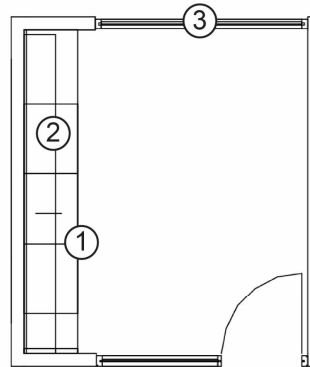
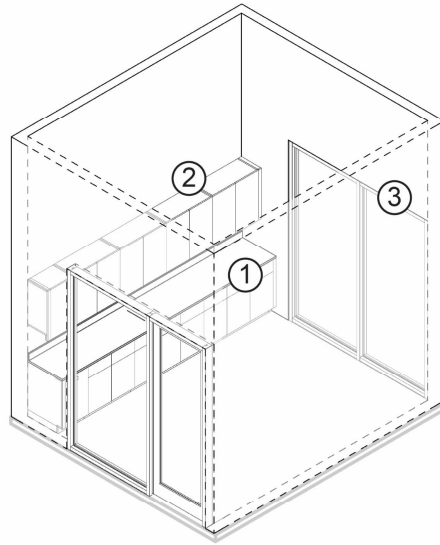
Relationship to other Areas

- Adjacent to Operations areas

Comments / Characteristics

- Furnishings: See graphic. 9 shelving units to accommodate up to 21 storage boxes per shelving unit for up to 189 file storage boxes total.
- Utility requirements: Grounded electrical convenience outlet near door, air conditioned and heated
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Service light fixture—storage rooms. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Coin Room



- ① Built-in Millwork
- ② Overhead Millwork
- ③ Window for Supervision

Function

- Enclosed secure area for counting money retrieved from bus vaults and for pulled vault storage

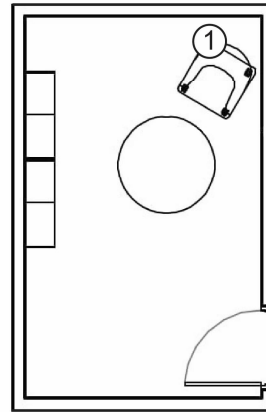
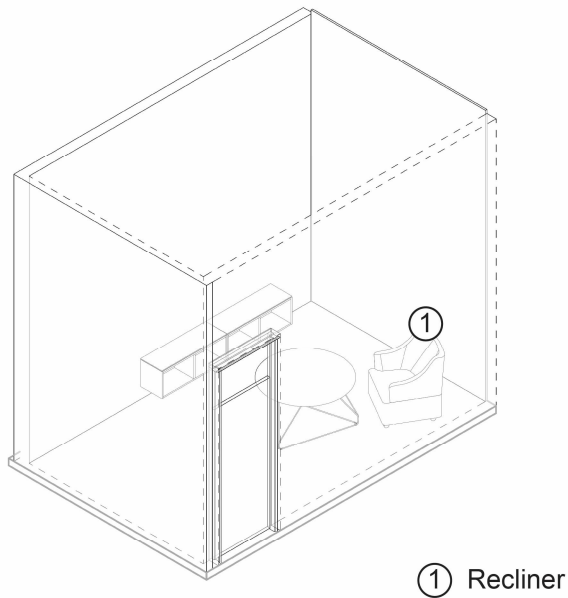
Relationship to other Areas

- Adjacent to Operations areas

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, air conditioned, and heated. Provide dedicated air conditioning unit.
- Floor finishes: Resilient flooring
- Wall finishes: Abrasion-resistant painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically separated from surround spaces.

Quiet Room



Function

- Enclosed area for driver use between and after shifts

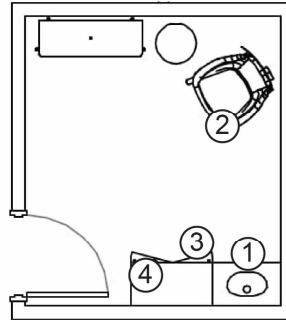
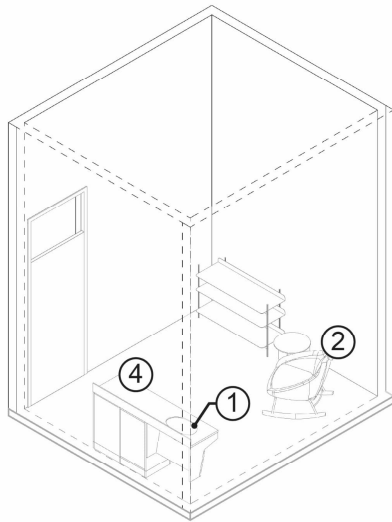
Relationship to other Areas

- Near Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, air conditioned and heated
- Floor finishes: Carpet tile
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture and dimmable down lights. Lighting design shall have the ability to dim. Refer to Section 2.4.5.3 for foot candle and fixture requirements. Task lighting provided at each recliner for reading without disturbing people in adjacent recliners. Provide floor lighting to keep light levels down.
- Acoustically isolated from surrounding spaces.
- Door to have narrow light for visibility inside room from exterior.

Lactation/Sick Room



- ① Sink
- ② Recliner
- ③ Mini-Fridge
- ④ Built-In Millwork

Function

- Enclosed private room for use of lactating mothers or sick personnel

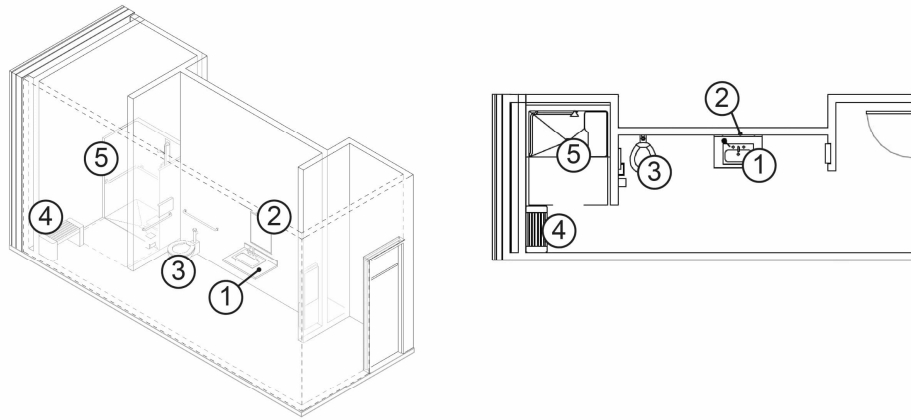
Relationship to other Areas

- Adjacent to Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, air conditioned and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture dimmable. Lighting design shall have the ability to dim. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically isolated from surrounding spaces.

Unisex Toilet / Shower / Drug Test Room



- ① Lavatory
- ② Mirror
- ③ Toilet
- ④ ADA Shower Bench
- ⑤ Shower

Function

- Unisex restroom and shower facilities for Operations staff and for drug testing

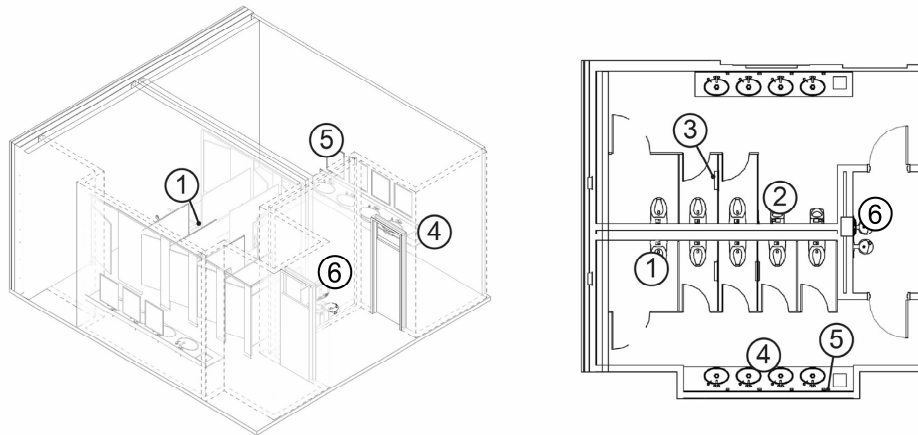
Relationship to other Areas

- Near Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated. Provide water cut-off valves on outside of room to allow drug testing monitor to turn off water to room and fixtures.
- Floor finishes: Porcelain tile
- Wall finishes: Paint or porcelain tile on gypsum board
- Ceiling finishes: Painted gypsum board
- Lighting: Wet location sealed fixtures and indirect light over mirror. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Restrooms



- | | |
|--------------------------|----------------------|
| ① Toilet | ⑤ Mirror |
| ② Urinal | ⑥ Drinking Fountains |
| ③ Toilet Paper Dispenser | |
| ④ Lavatory | |

Function

- Restroom facilities serving the building

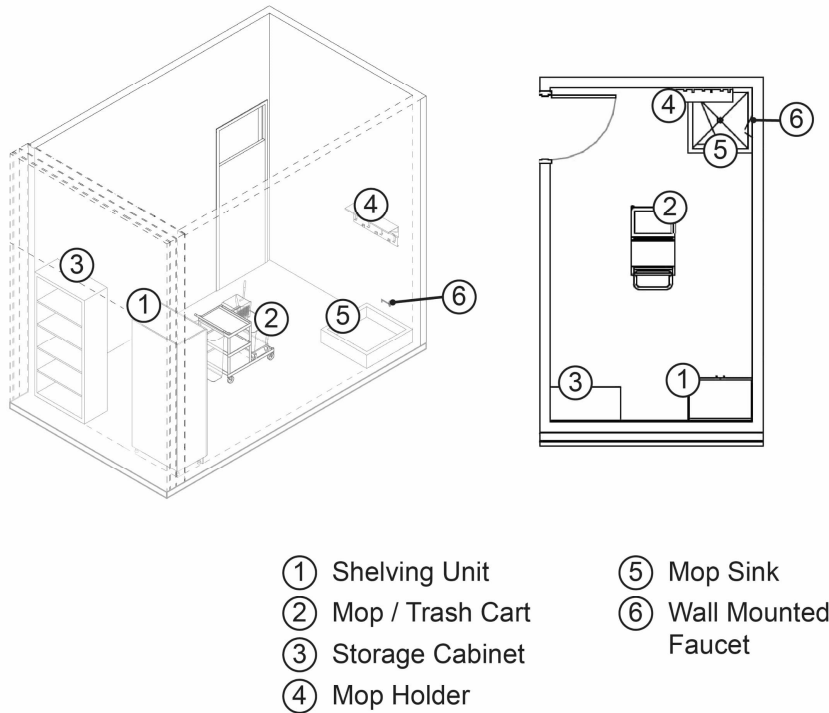
Relationship to other Areas

- Near Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated
- Floor finishes: Porcelain tile
- Wall finishes: Painted gypsum board with porcelain tile on cement backer board at wet wall locations behind and a minimum of 3 feet to the sides of fixtures
- Ceiling finishes: Acoustical tile ceiling where appropriate
- Lighting: Wet location sealed fixtures and indirect light over mirrors. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Custodial



Function

- Enclosed area for storage of janitorial and cleaning supplies

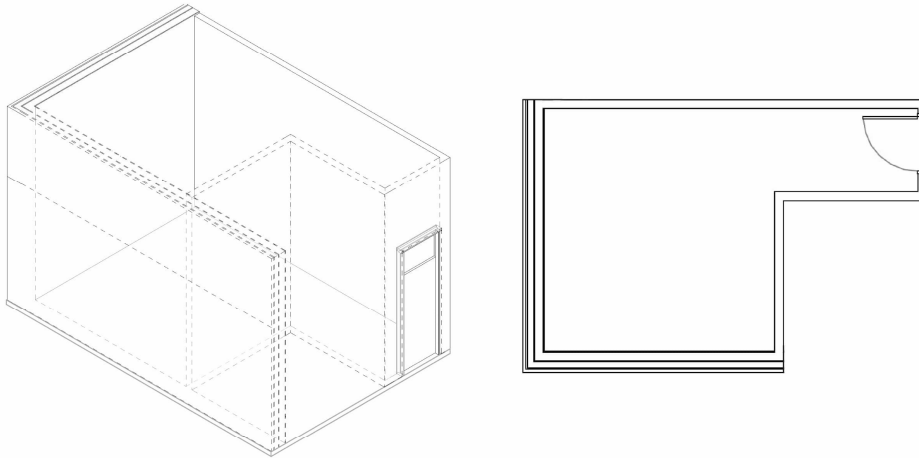
Relationship to other Areas

- Near restrooms

Comments / Characteristics

- Furnishings: See graphic.
- Floor-mounted mop sink with wall-mounted faucet and bucket hook
- Utility requirements: Grounded electrical convenience outlets, ventilated and heated
- Floor finishes: Porcelain tile or sealed concrete
- Wall finishes: Porcelain tile on gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling where appropriate
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Mechanical Room



Function

- Enclosed, separately secured space designated for mechanical building support systems

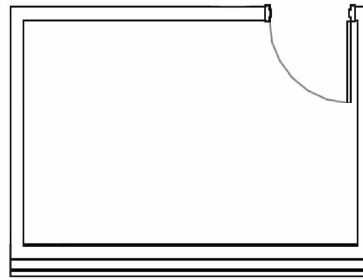
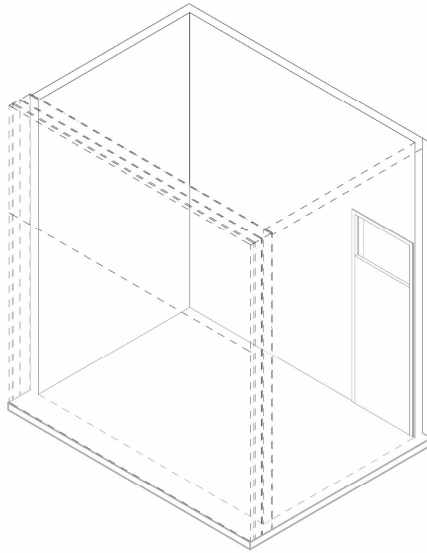
Relationship to other Areas

- Adjacent to or near Operations electrical room

Comments / Characteristics

- Provide double doors as needed for access to equipment.
- Furnishings: Mechanical equipment
- Utility requirements: As required by equipment.
- Floor finishes: Sealed concrete
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Painted exposed structure
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Electrical Room



Function

- Designated space for electrical building support equipment

Relationship to other Areas

- Adjacent to or near mechanical room

Comments / Characteristics

- Provide double doors as needed for access to equipment.
- Furnishings: Electrical equipment
- Utility requirements: As required by equipment.
- Floor finishes: Sealed concrete
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Painted exposed structure
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

2.3.7 Amenity Connector Design Criteria

The amenity connector is envisioned to be the facility's main social area containing a shared kitchenette with a glass sliding partition that opens to an outdoor patio and the courtyard. This piece will physically connect the two wings and enable interactions between the two teams by linking the drivers' break room and the administration break room via the shared kitchenette and outdoor patio. Plenty of glazing will provide views of the courtyard and natural light penetration.

Figure 2-30: The Amenity Connector in Context

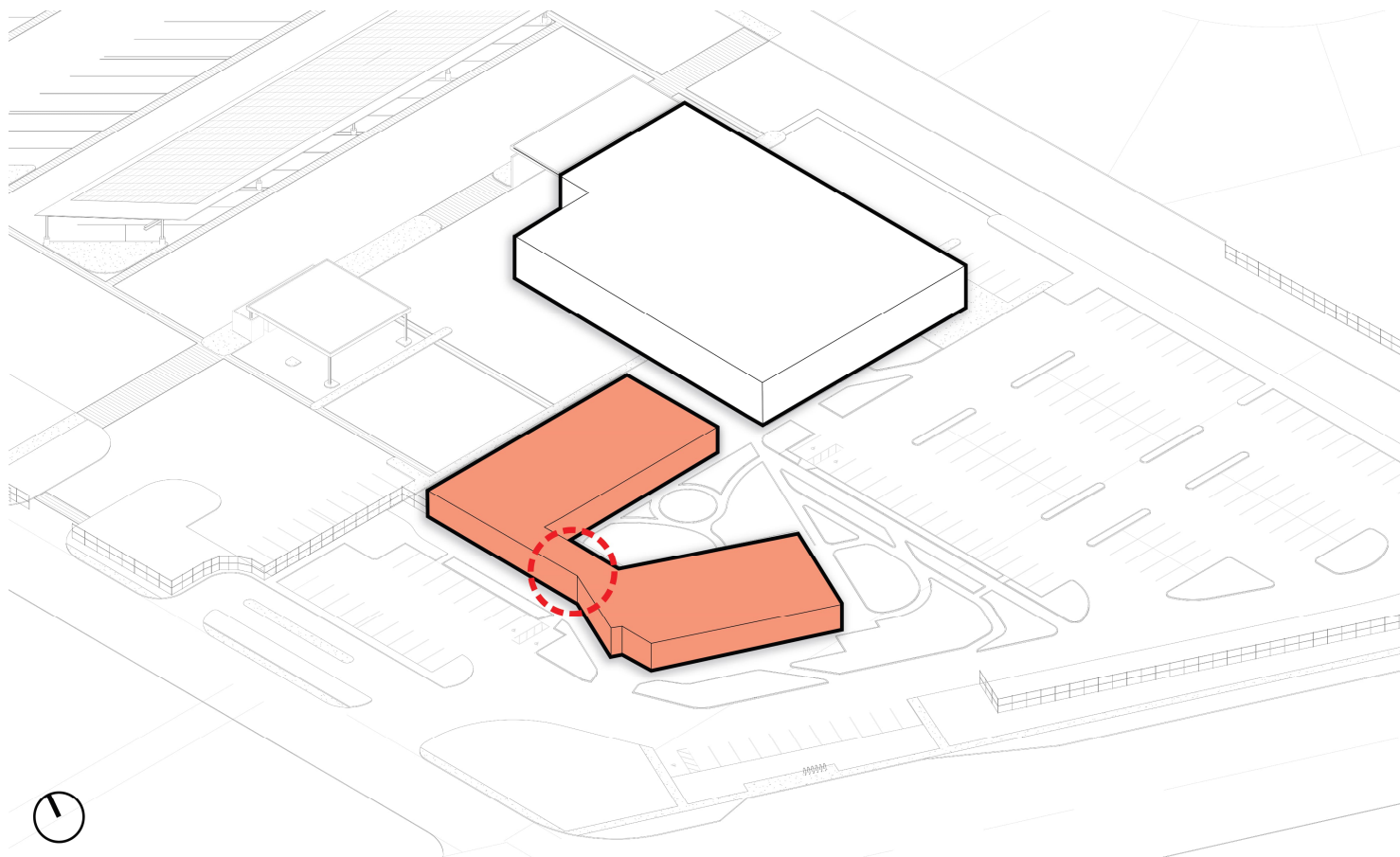
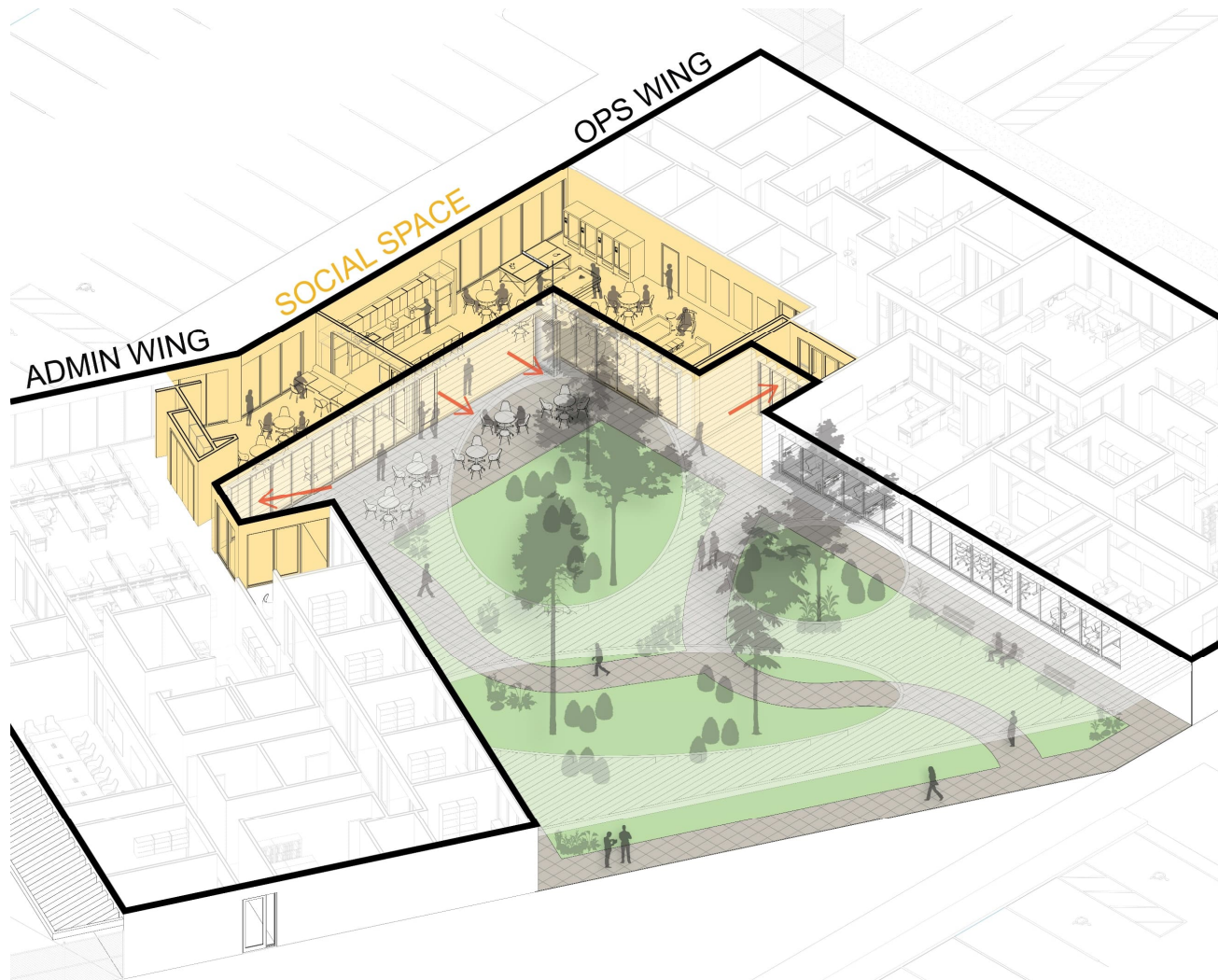


Figure 2-31: Diagram of Courtyard

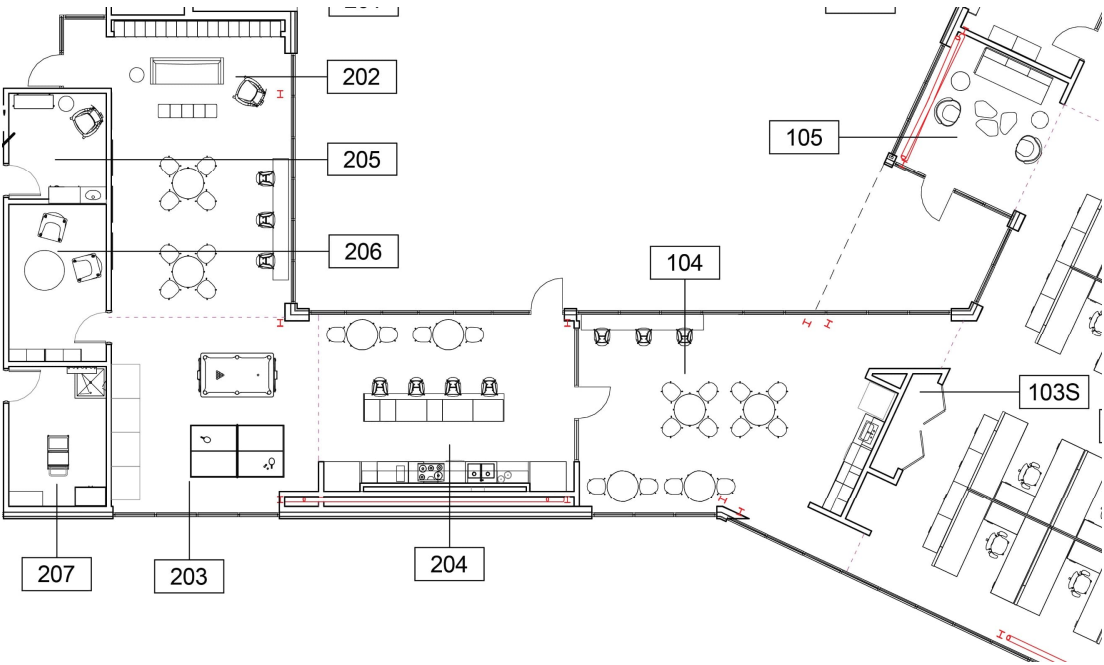


Note: See Section 2.3.9 for more information.

2.3.7.1 Floor Plan

Figure 2-32: Floor Plan of the Shared Amenities and Room Schedule

Refer to A102 in the Drawing Set for the entire floor plan.



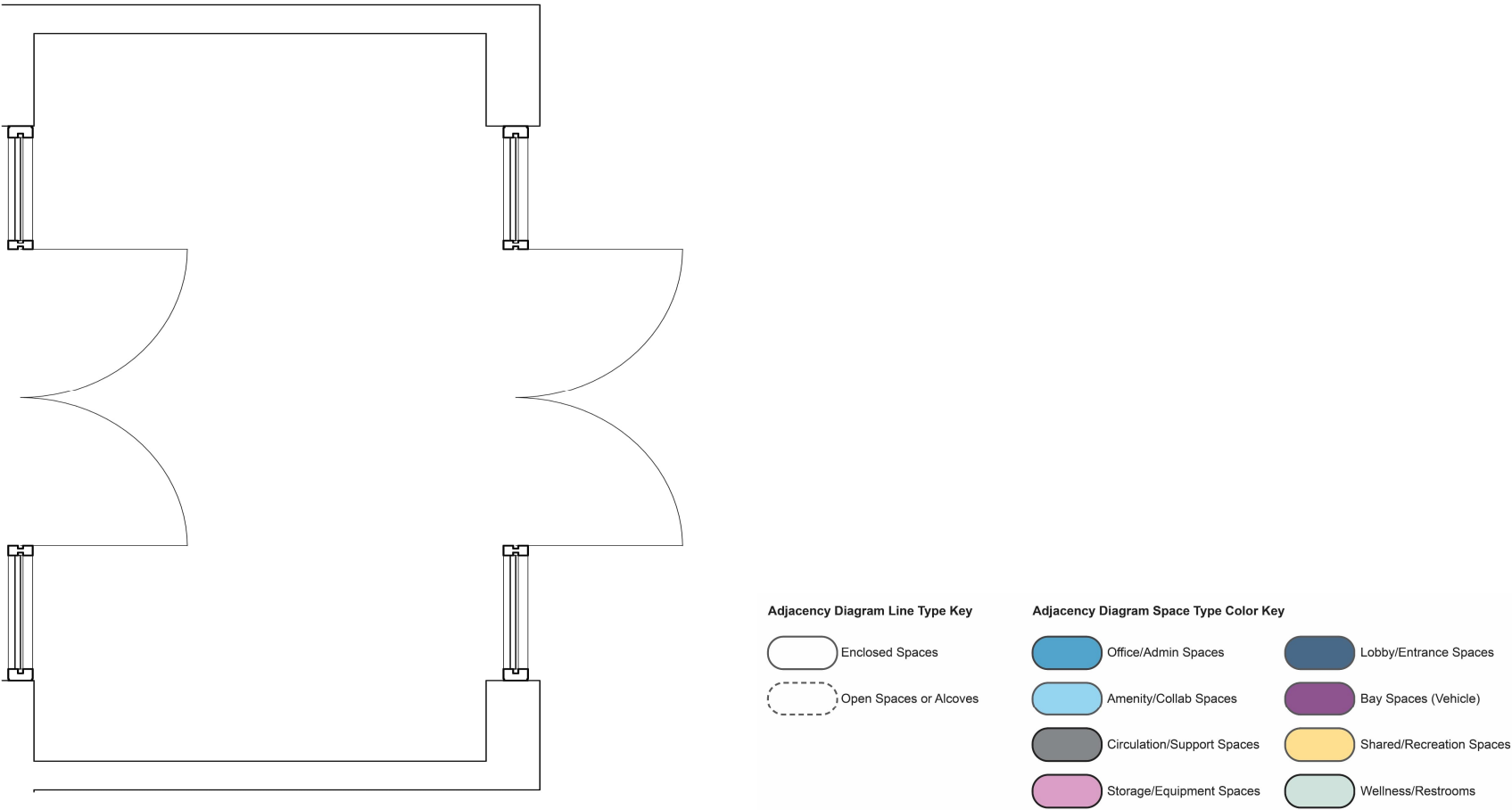
NUMBER	NAME	PROGRAM AREA	AREA	% DEVIATION
104	BREAK ROOM	288.00 SF	595.41 SF	106.74%
202	DRIVERS ROOM	540.00 SF	584.46 SF	8.23%
203	RECREATION	400.00 SF	452.62 SF	13.16%
204	KITCHENETTE	350.00 SF	440.43 SF	25.84%

Note: Furniture shown for reference only.

2.3.7.2 Functional Relationship Diagram

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan. It serves only as a representational relationship diagram.

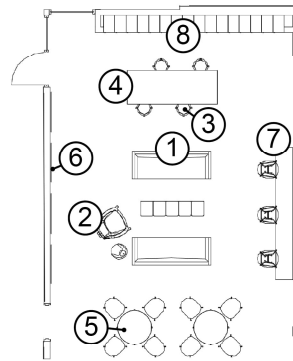
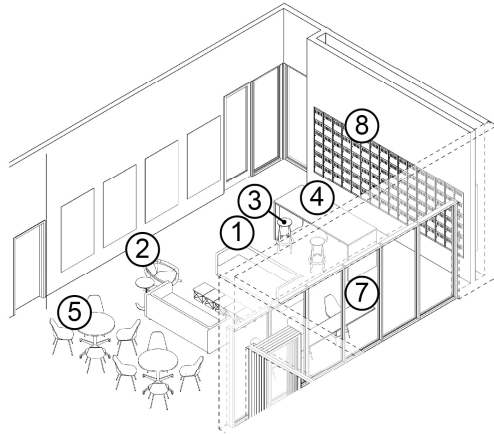
Figure 2-33: Functional Relationship Diagram for the Amenity Connector



2.3.7.3 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas, and other information received during interviews with Yuba-Sutter Transit staff.

Drivers' Room (Operations)



- ① Sofa
- ② Chair
- ③ Bar Stool
- ④ Island Counter

- ⑤ Table
- ⑥ Cork Boards
- ⑦ Counter with Electrical Outlets
- ⑧ Mailboxes

Function

- Enclosed area for drivers' use before, between, and after shifts

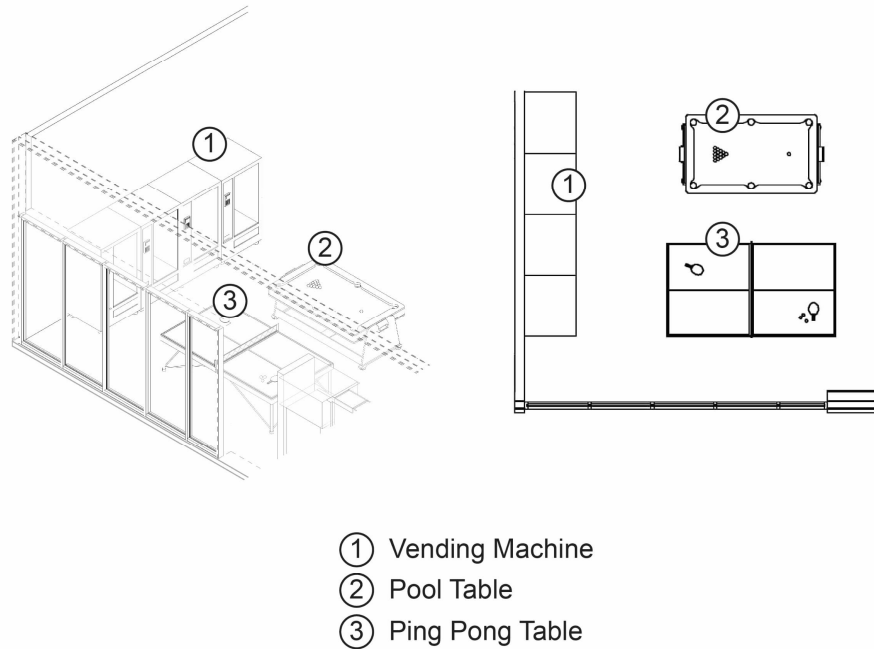
Relationship to other Areas

- Convenient access to check-in area, recreation area, kitchenette/vending, and restrooms

Comments / Characteristics

- Operable glazed partition, such as Nanawall, opening to the courtyard
- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, air conditioned and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and lighting requirements.

Recreation Area (Operations)



Function

- Open area for recreational activities and space for vending machines

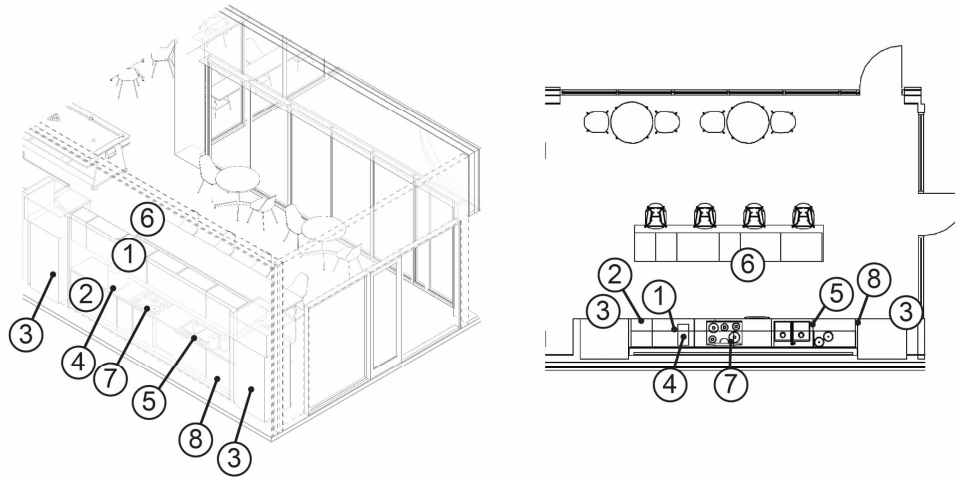
Relationship to other Areas

- Shared space with Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, telephone, air conditioned and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and lighting requirements.
- Acoustically isolated from surrounding spaces

Kitchenette



- | | |
|---------------------|-----------------------------|
| ① Overhead Millwork | ⑤ Handwash Sink |
| ② Built-in Millwork | ⑥ Island Counter |
| ③ Refrigerator | ⑦ Stovetop with Vent Hood |
| ④ Coffee Maker | ⑧ Microwave in base Cabinet |

Function

- Enclosed area for minor food preparation

Relationship to other Areas

- Shared space with Drivers' Room

Comments / Characteristics

- Furnishings: See graphic.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system, air conditioned and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and lighting requirements.
- Separate network and Wi-Fi for vendor maintained vending machines

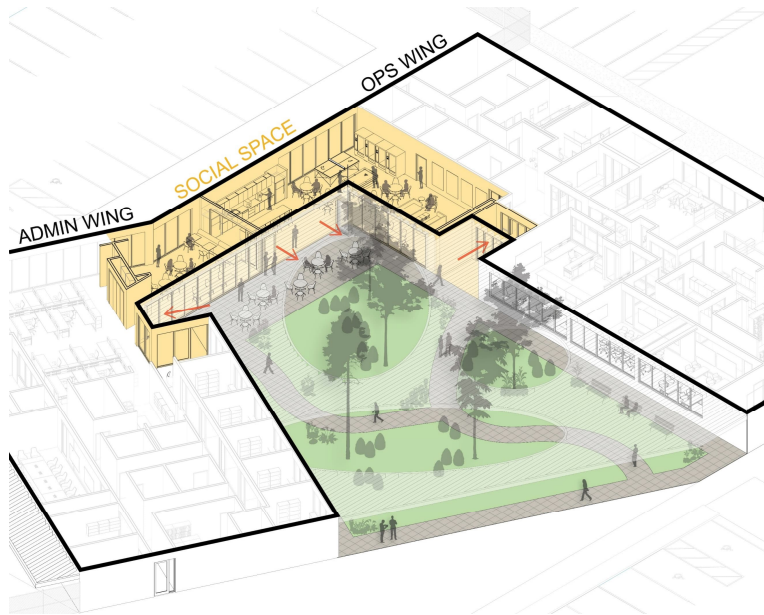
2.3.8 Courtyard Design Criteria

The courtyard space is at the heart of the facility. It will have a direct connection to each wing's entry vestibule and to amenity spaces. It will also lead office occupants into each wing via shaded walkways punctuated by landscaped areas. Plenty of glazing in the spaces surrounding the courtyard will provide views of the courtyard and filtered natural light into the wings, creating a symbiotic relationship between indoor and outdoor spaces.

Plenty of shade shall be provided in the courtyard space using trellises or canopies to filter natural light. It shall also have plenty of seating in the outdoor patio and around landscaped areas to provide respite from the hot weather during the summer and encourage office occupants to spend time outdoors. The options below show different configurations, a simple approach and a betterment option. The betterment #10 (Figure 2-35), covers the entire surface of the courtyard with closely spaced wood or metal battens and creates visual interest through large openings that highlight the landscaped areas. The base scope (Figure 2-46), the simpler approach, focuses on the southern exposures and main paths only.

Pole-mounted fixtures or bollard-type lighting shall be provided for pedestrian walkways in the courtyard area.

Figure 2-34: Bird's Eye View of Courtyard Space and Amenity Connector



Note: This diagram shows two potential betterment: a movable partition between the social space and the outdoor patio (i.e., nanawall) as well as the Spacemaker Trellis option that punctuates the landscaped areas and spans a larger area (see Figure 2-46).

Figure 2-35: Trellis A - Spacemaker

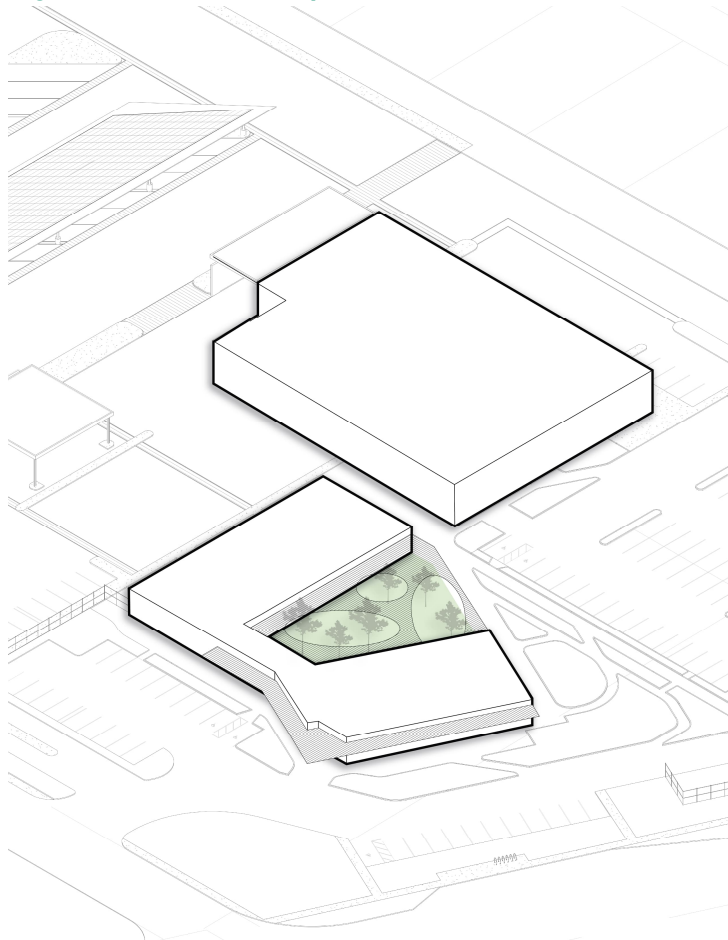
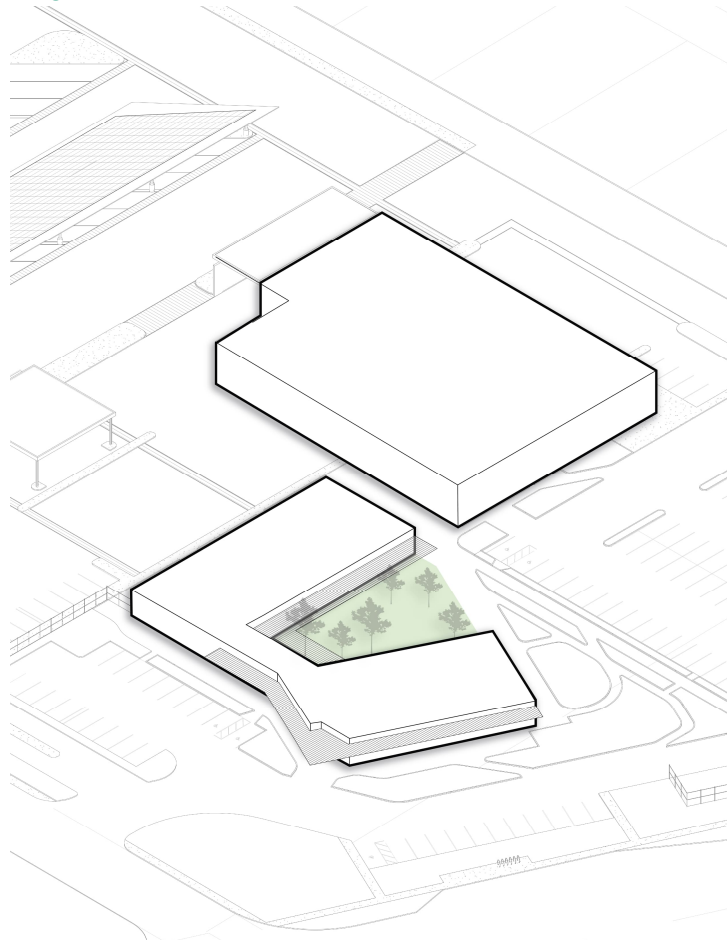


Figure 2-36: Trellis B - Pathmaker

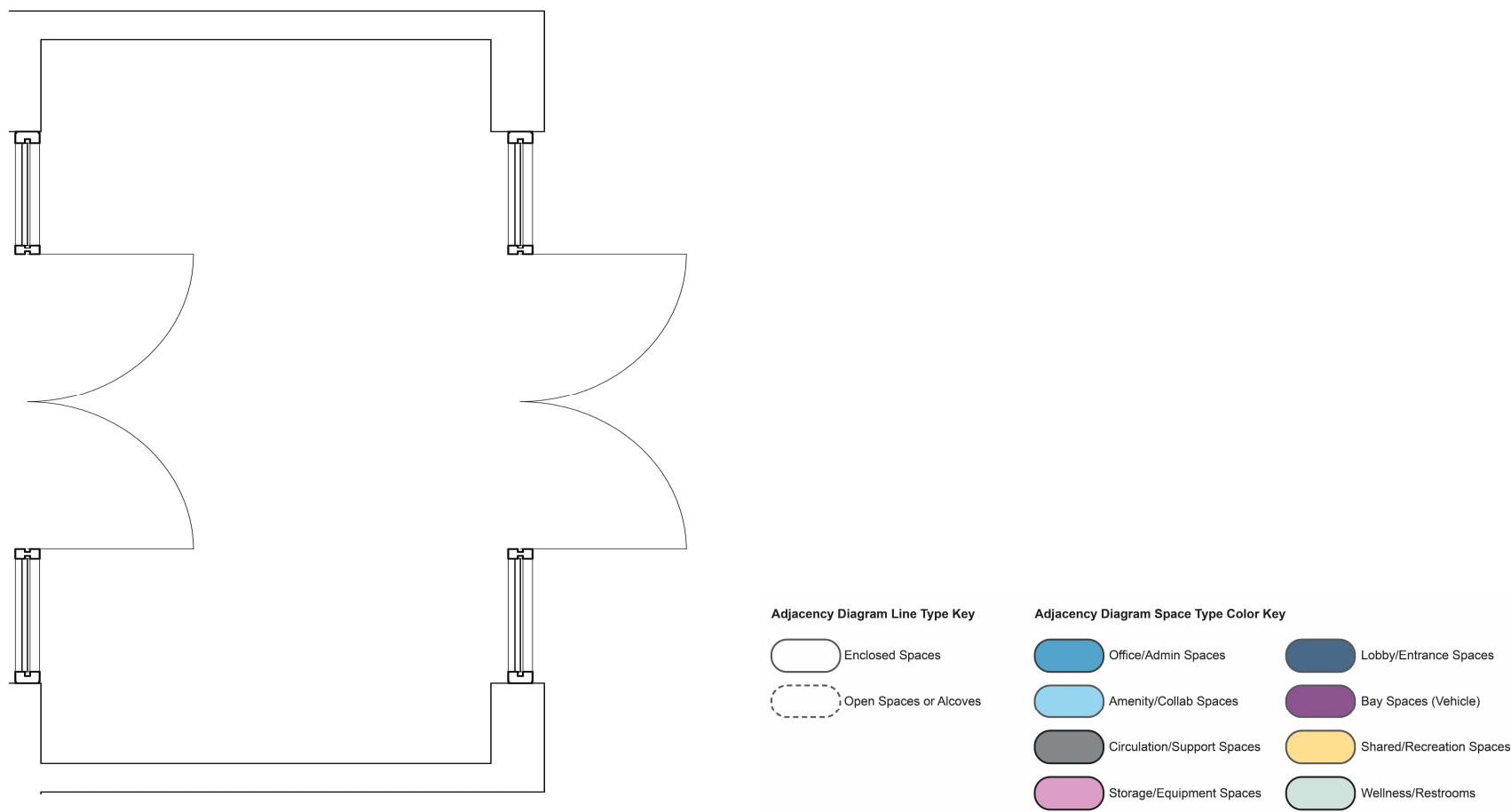


Note: The Trellis A – Spacemaker option is a betterment.

2.3.8.1 Functional Relationship Diagram

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan. It serves only as a representational relationship diagram.

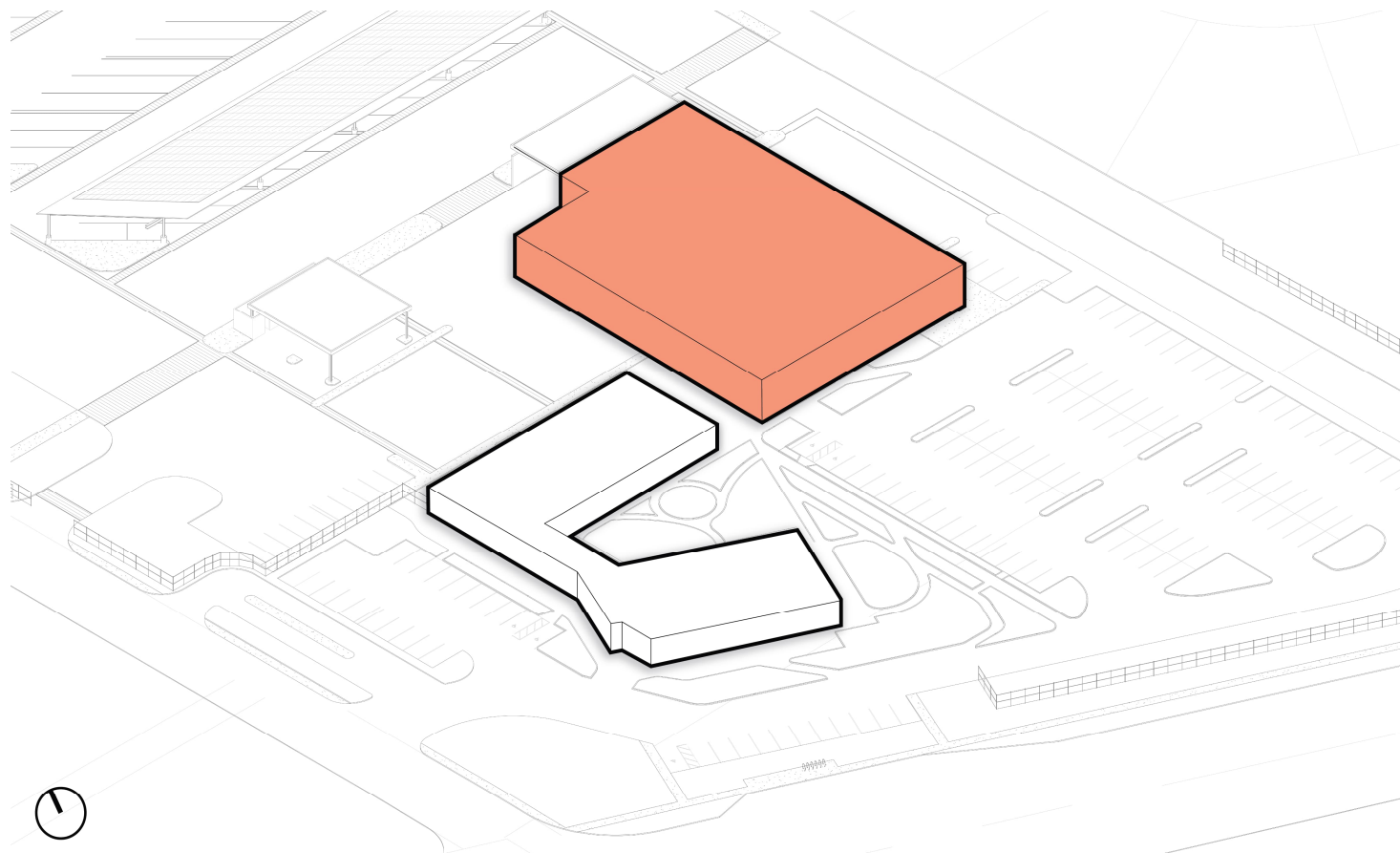
Figure 2-37: Functional Relationship Diagram for the Courtyard



2.3.9 Maintenance and Service Design Criteria

The maintenance building located on the east end of the site will be primarily comprised of repair bays, parts storeroom, and office spaces. It will have a higher roof line and stand out volumetrically from the other structures. The southern portion of the building houses the office spaces. The rest of the building houses all the support and maintenance spaces.

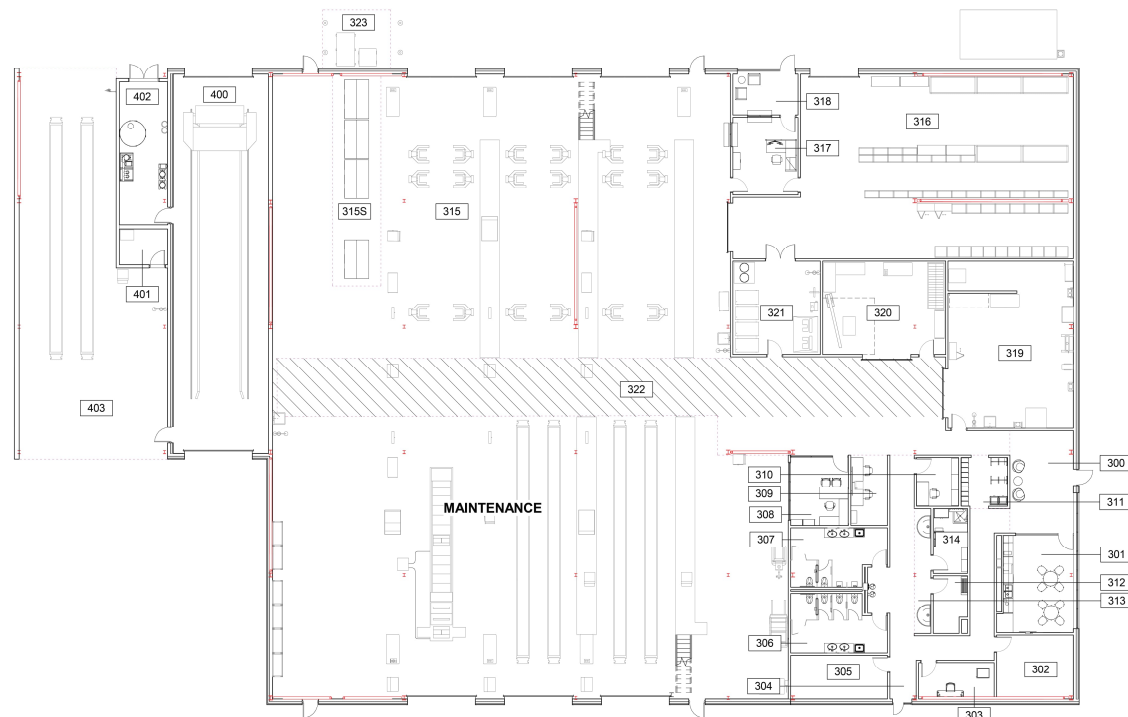
Figure 2-38: The Maintenance Building in Context



2.3.9.1 Floor Plan

Figure 2-39: Enlarged Floor Plan of Maintenance Building and Service Areas with Room Schedule

Refer to A102 in the Drawing Set for the entire floor plan.



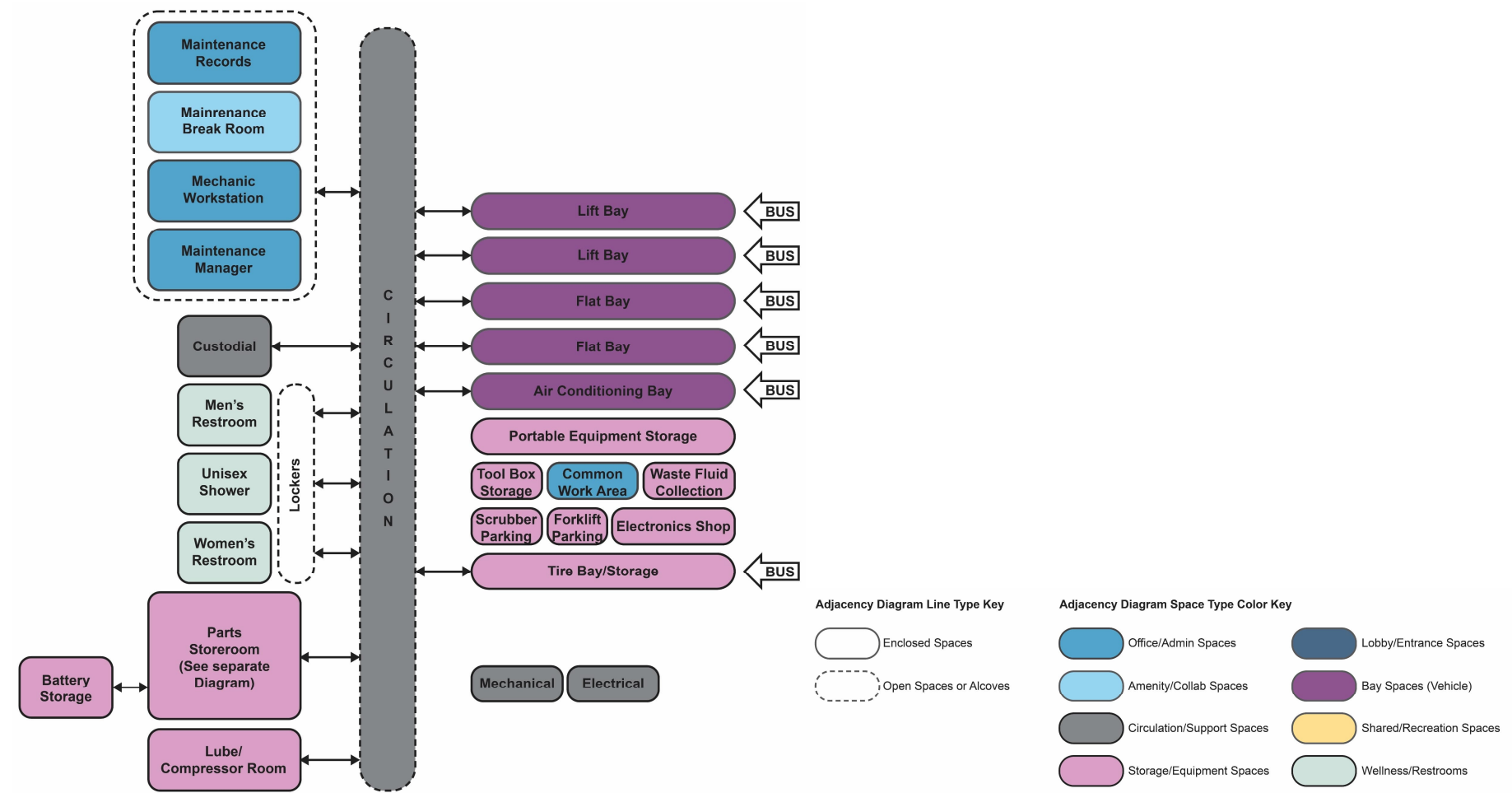
ROOM SCHEDULE				
NUMBER	NAME	PROGRAM AREA	AREA	% DEVIATION
3-MAINTENANCE				
300	VEST		275.25 SF	
301	BREAK ROOM	288.00 SF	295.57 SF	2.63%
302	MECHANICAL	200.00 SF	208.22 SF	4.11%
303	SERVER / AV ROOM		116.77 SF	
304	CORRIDOR		528.28 SF	
305	ELECTRICAL	100.00 SF	179.84 SF	79.84%
306	WOMEN'S RESTROOM	140.00 SF	220.44 SF	57.46%
307	MEN'S RESTROOM	240.00 SF	220.22 SF	-8.24%
308	MAINTENANCE MANAGER	168.00 SF	166.74 SF	-0.75%
309	MECHANIC WORKSTATION	72.00 SF	109.72 SF	52.38%
310	MAINT. RECORDS	80.00 SF	87.09 SF	8.87%
311	LOCKERS	100.00 SF	100.10 SF	0.1%
312	UNISEX SHOWER	64.00 SF	78.23 SF	22.24%
313	EYE WASH		88.63 SF	
314	CUSTODIAL	100.00 SF	94.27 SF	-5.73%
315	REPAIR BAYS	7,200.00 SF	11,214.61 SF	55.76%
315S	TOOLBOX STORAGE	400.00 SF	436.80 SF	9.2%
316	PARTS STOREROOM	1,800.00 SF	2,320.06 SF	28.89%
317	PARTS CLERK	180.00 SF	215.58 SF	19.77%
318	PARTS STOREROOM LOBBY	100.00 SF	112.92 SF	12.92%
319	COMMON WORK AREA	750.00 SF	889.70 SF	18.63%
320	ELEC SHOP	540.00 SF	490.51 SF	-9.16%
321	LUBE/COMPRESSOR ROOM	360.00 SF	349.47 SF	-2.93%
322	CIRCULATION		2,102.56 SF	
323	WASTE FLUID COLL.		168.00 SF	
		12,882.00 SF	21,069.58 SF	345.98%
4-SERVICE				
400	BUS WASH	1,430.00 SF	1,541.81 SF	7.82%
401	WASH EQUIPMENT RM		73.55 SF	
402	WATER RECLAMATION EQUIP	200.00 SF	292.54 SF	46.27%
403	CHASSIS WASH	1,300.00 SF	2,035.24 SF	56.56%

Note: Furniture shown for reference only

2.3.9.2 Functional Relationship Diagram: Maintenance

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan; it serves only as a representational relationship diagram.

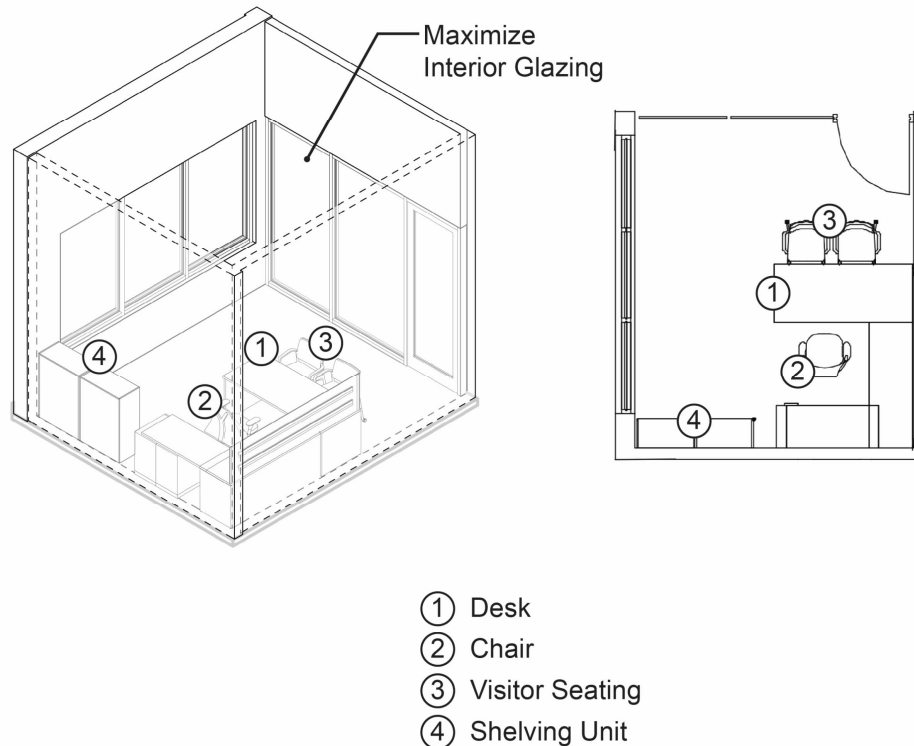
Figure 2-40: Functional Relationship Diagram for the Maintenance Building



2.3.9.3 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas, and other information received during interviews with Yuba-Sutter Transit staff.

Maintenance Manager



Function

- Enclosed private office for maintenance manager

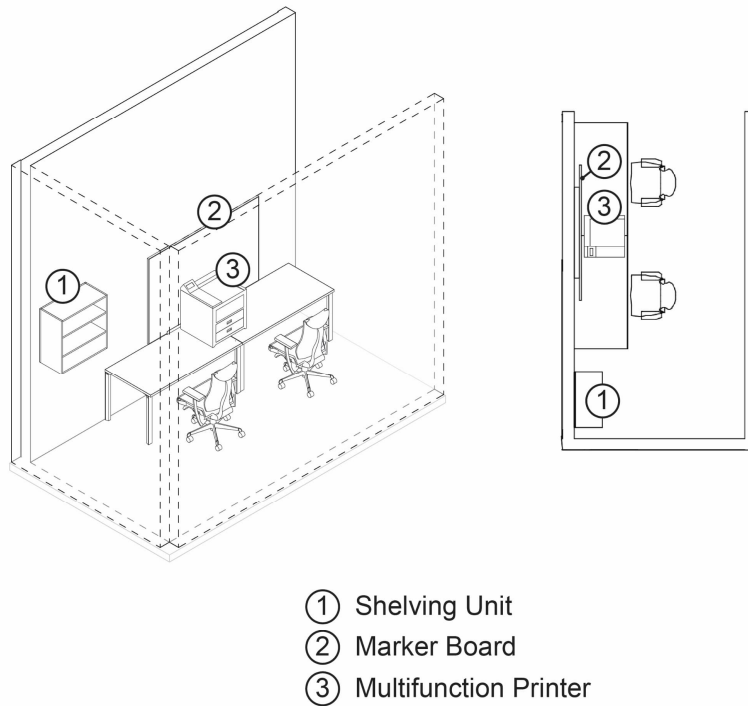
Relationship to other Areas

- Adjacent to mechanic workstation
- Facing bus parking
- View of repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Window: Operable window to outside.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and lighting requirements.

Mechanical Workstation



Function

- Open workstation area for mechanics to perform computer and paperwork

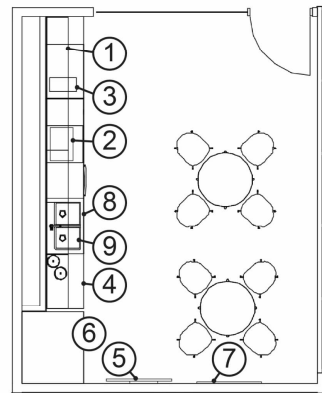
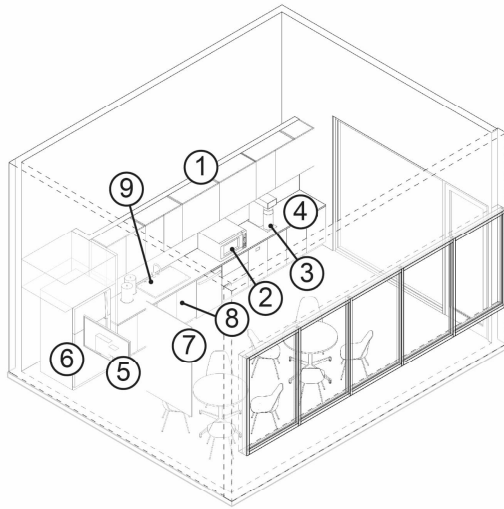
Relationship to other Areas

- Adjacent to maintenance manager and repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor finishes: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
- Wall finishes: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
- Ceiling finishes: Painted exposed structure
- Lighting: Office light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Maintenance Break Room



- | | | |
|---------------------|-----------------------------|--------|
| ① Overhead Millwork | ⑤ Wall Mounted TV | ⑨ Sink |
| ② Microwave | ⑥ Refrigerator | |
| ③ Coffee Maker | ⑦ Bulletin Board | |
| ④ Built-in Millwork | ⑧ Trash, Recycle, & Compost | |

Function

- Open area for maintenance personnel breaks

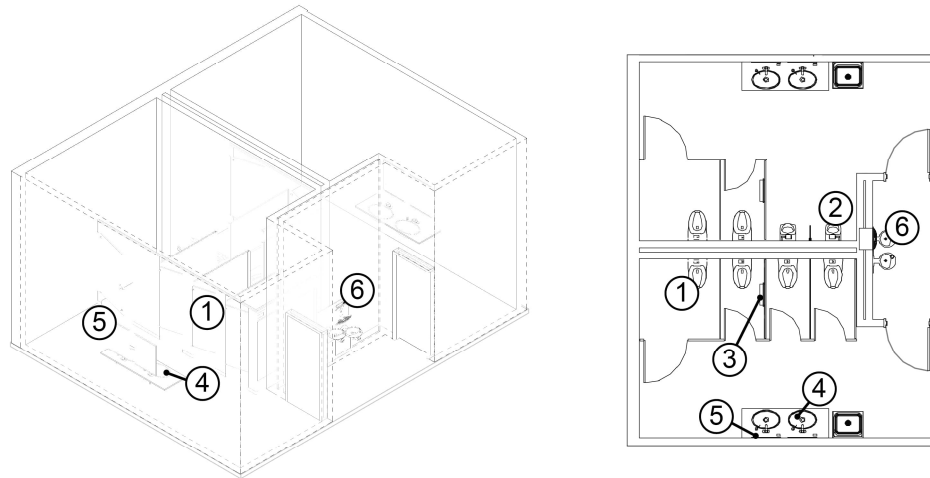
Relationship to other Areas

- Adjacent to maintenance office spaces.
- Convenient access from repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, air conditioned and heated. Floor drain near vending machines
- Window to outside if possible
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Restrooms



- | | |
|--------------------------|----------------------|
| ① Toilet | ⑤ Mirror |
| ② Urinal | ⑥ Drinking Fountains |
| ③ Toilet Paper Dispenser | |
| ④ Lavatory | |

Function

- Restroom facility for mechanics

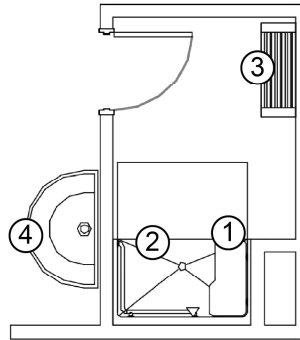
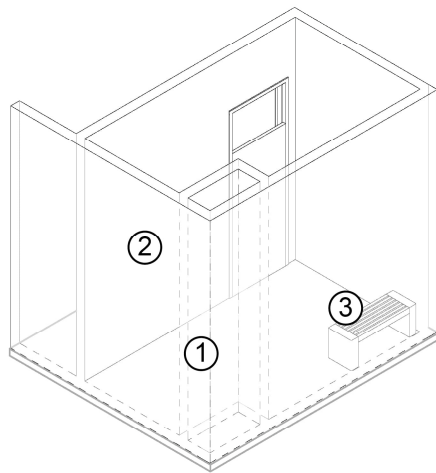
Relationship to other Areas

- Adjacent to maintenance break room
- Convenient access from repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated.
- Floor finishes: Porcelain tile
- Wall finishes: Painted gypsum board with porcelain tile on gypsum board and wet areas
- Ceiling finishes: Acoustical tile ceiling where appropriate
- Lighting: Wet location sealed fixtures and indirect light over mirrors. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Unisex Shower



- ① Folding ADA Shower Seat
- ② Shower
- ③ Bench
- ④ Bradley Sink

Function

- Unisex shower facility for male and female mechanics

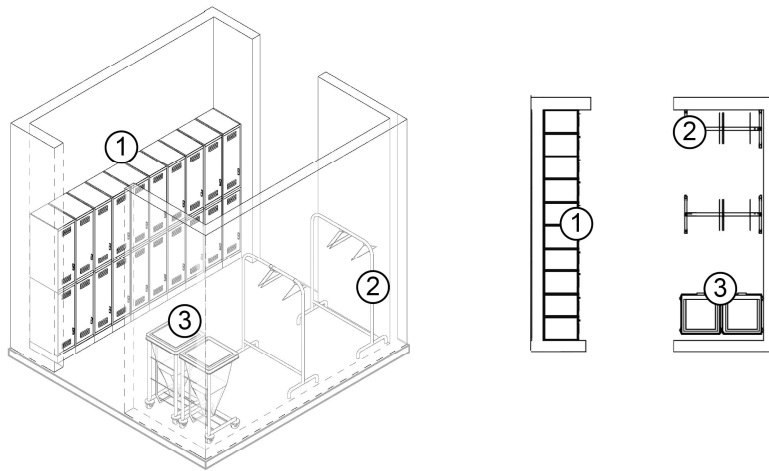
Relationship to other Areas

- Adjacent to restrooms

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling or plaster ceiling
- Lighting: Service light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Lockers



- ① Stacked Half-lockers
- ② Clothes Rack
- ③ Laundry Hamper

Function

- Open alcove area to accommodate male and female mechanics.
- Intended for storage of personal items, not intended for full dressing/ undressing.

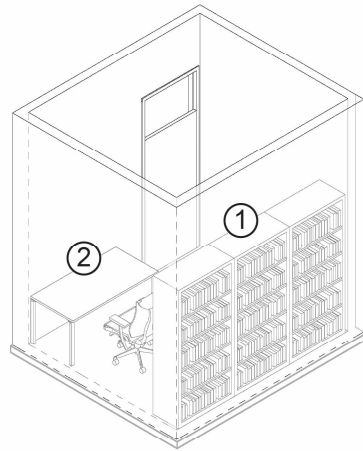
Relationship to other Areas

- Adjacent to restrooms
- Near repair bays

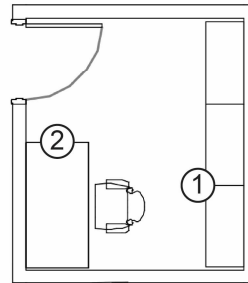
Comments / Characteristics

- Furnishings: 20 half-height stacked lockers and bench
- Utility requirements: Ground electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated.
- Floor finishes: Porcelain tile or resilient flooring
- Wall finishes: Painted gypsum
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Maintenance Records



- ① Shelving
- ② Workstation



Function

- Enclosed area for maintenance record storage

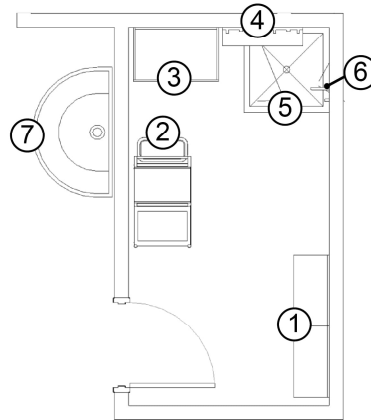
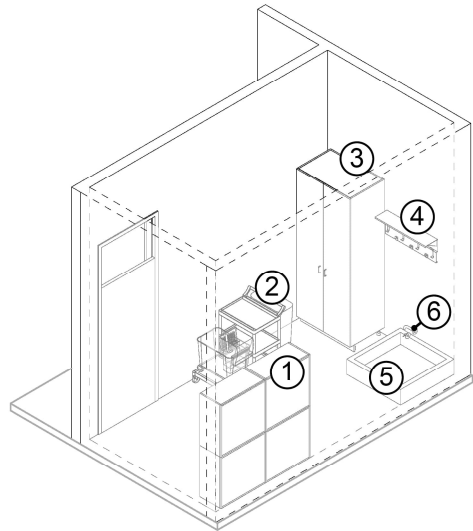
Relationship to other Areas

- Adjacent to maintenance office spaces
- Convenient access from repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page. 3 shelving units to accommodate approximately 42 file storage boxes or boxes and manuals.
- Utility requirements: Grounded electrical convenience outlet near door, air conditioned and heated.
- Floor finishes: Resilient flooring
- Wall finishes: Painted gypsum board
- Ceiling finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Custodial



- ① Shelving Unit
- ② Mop / Trash Cart
- ③ Storage Cabinet
- ④ Mop Holder

- ⑤ Mop Sink
- ⑥ Wall Mounted Faucet
- ⑦ Bradley Sink

Function

- Enclosed area for storage of janitorial and cleaning supplies

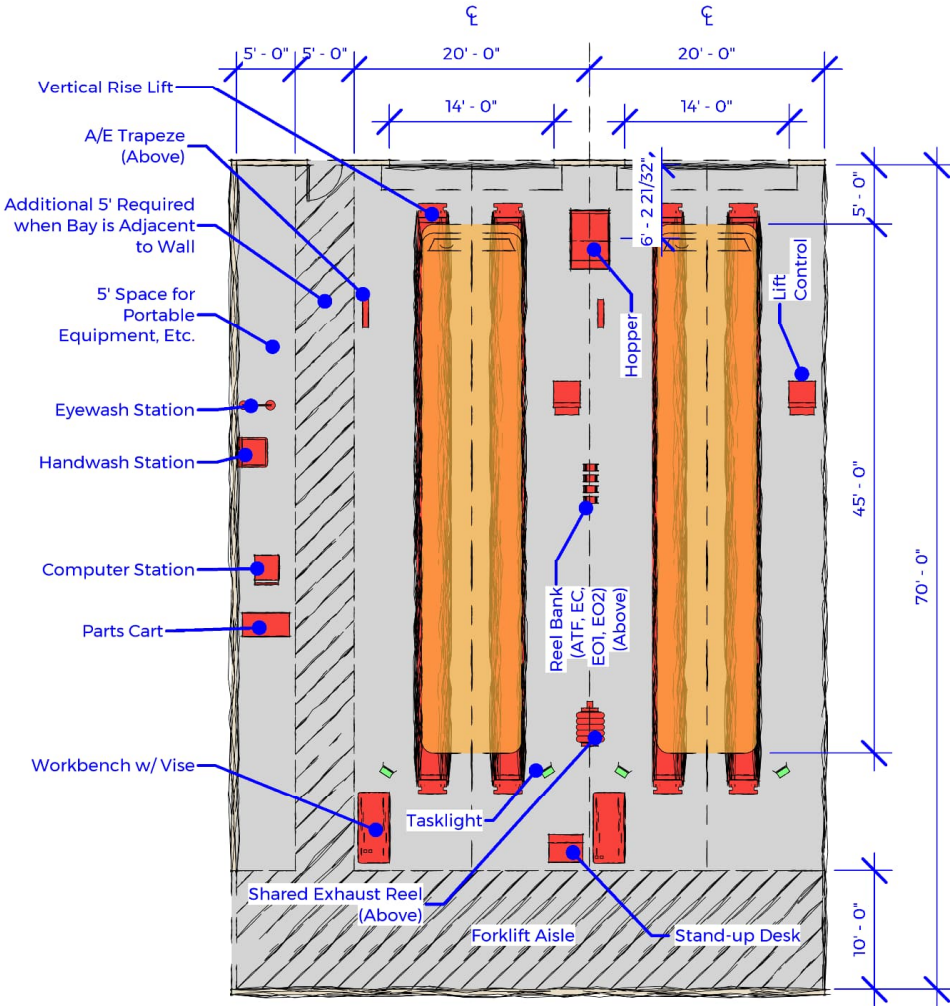
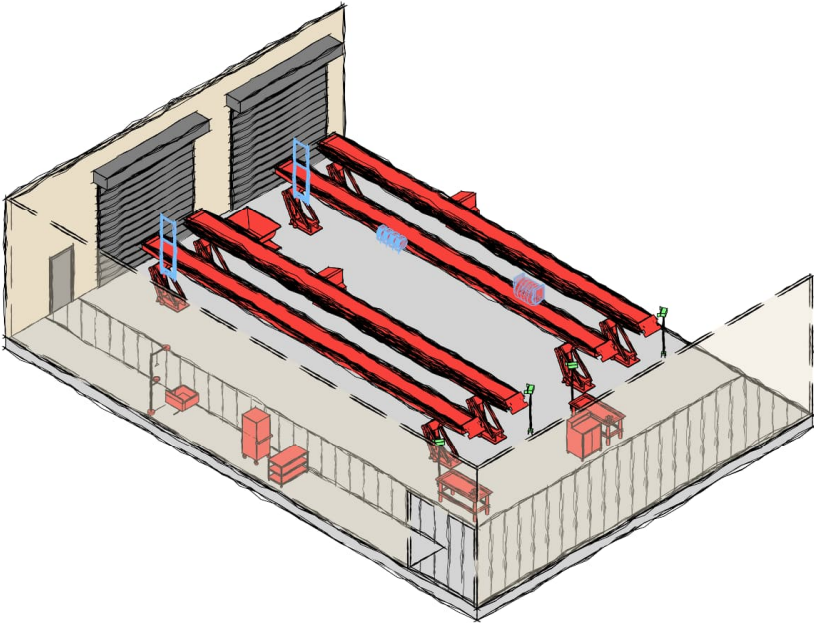
Relationship to other Areas

- Near restrooms

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Floor-mounted mop sink with wall-mounted faucet and bucket hook
- Utility requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor finishes: Porcelain tile or sealed concrete
- Wall finishes: Porcelain tile on gypsum board and/or concrete block
- Ceiling finishes: Acoustical tile ceiling where appropriate
- Lighting: Service light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.

Lift Bay (45-Foot Bus)



Function

- Designated maintenance bay for scheduled or unscheduled preventive maintenance, inspection tire servicing, and major repairs on 25- to 45-foot transit buses and non-revenue vehicles

Relationship to other Areas

- Adjacent to repair bays, equipment storage, and tool box storage
- Convenient access to maintenance break room, restrooms, shower, and lockers
- Near common work area

Critical Dimensions

- 19'-0" vertical clearance
- 20'-0" wide by 60'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Forklift access

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish. No epoxy cover.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure.
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.
 - o Exterior sectional overhead door: 14- by 14-foot motor-operated with interior push button controls, and lockout on exterior.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing.
- Structural columns must not be located at the sides between bays.
- Bay to have level floor with warps to slope to drain at intersection to interior drive aisle.
- Structure as needed to support equipment.

Mechanical

- Overhead vehicle exhaust system with 8-inch exhaust hose on a motorized reel with integral exhaust fan and automatic fan switch at rear of vehicle position shared between bays.
- Heating system must be compatible with possible future use of alternative fueled vehicles.
- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- High-volume, low-speed fan coordinated with bay equipment for maintenance bay comfort.
- General ventilation as required by codes.
- As required by equipment.

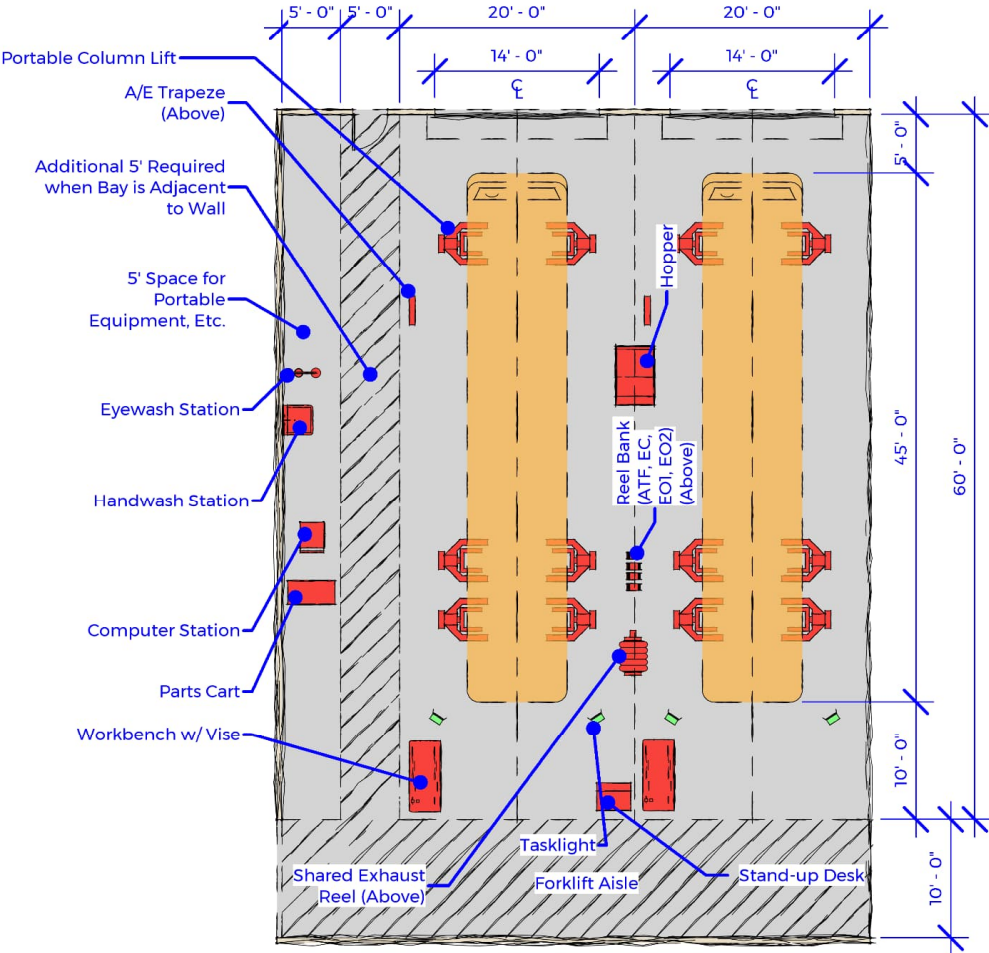
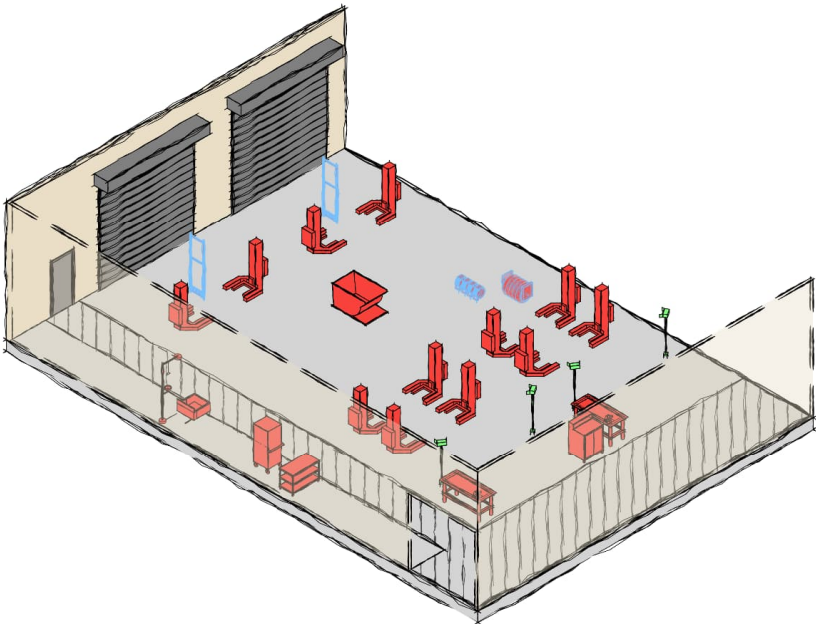
Electrical

- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power
 - o Air/electric drop trapeze-mounted quad receptacle, 120VAC, 20A, GFI protected between bays.
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls, columns, and between overhead doors at 3'-6" AFF, as required by equipment.
- Communications
 - o Paging/intercom system speakers in bay
 - o Data port in each repair bay at columns and/or on air/electric trapeze at workbench locations in bay.

Plumbing

- Trench drain just inside overhead doors
- Overhead lube reel banks with automatic transmission fluid, engine coolant, engine oil 1, and engine oil 2 at rear of vehicle position (reel banks shared with adjacent bays). Overhead reel bank for WWF at front of vehicle position (reel banks shared with adjacent bays).
- 3/4" water hose bib with standard faucet between bay doors at 4'-0" AFF (1 per 3 bays).
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects at 4'-0" AFF (between bay doors) and on air/electric drop "trapeze" between bays at mid-bay (shared with adjacent bays).
- Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design
- As required by equipment.

Flat Bay (45-Foot Bus)



Function

- Designated maintenance bay for scheduled or unscheduled preventive maintenance, inspection tire servicing, and major repairs on 25- to 45-foot transit buses and non-revenue vehicles.

Relationship to other Areas

- Adjacent to repair bays, equipment storage, and tool box storage
- Convenient access to maintenance break room, restrooms, shower, and lockers
- Near common work area

Critical Dimensions

- 19'-0" vertical clearance
- 20'-0" wide by 60'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Forklift access

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish. No epoxy cover.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.
 - o Exterior sectional overhead door: 14' by 14' motor operated with interior push button controls and lockout on exterior.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing
- Structural columns must not be located at the sides between bays.
- Bay to have level floor with warps to slope to drain at intersection to interior drive aisle.
- Structure as needed to support equipment.
- Betterment: Structure to support future suspended overhead access platform and suspended crane. Refer to Appendix A. Drawings Q-102 & Q-502.

Mechanical

- Overhead vehicle exhaust system with 8-inch exhaust hose on a motorized reel with integral exhaust fan and automatic fan switch at rear of vehicle position shared between bays.
- Heating system must be compatible with possible future use of alternative fueled vehicles.
- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- Big fans shall be used (instead of air conditioning)
- High-volume, low-speed fan coordinated with bay equipment for maintenance bay comfort.
- General ventilation as required by codes.
- As required by equipment.

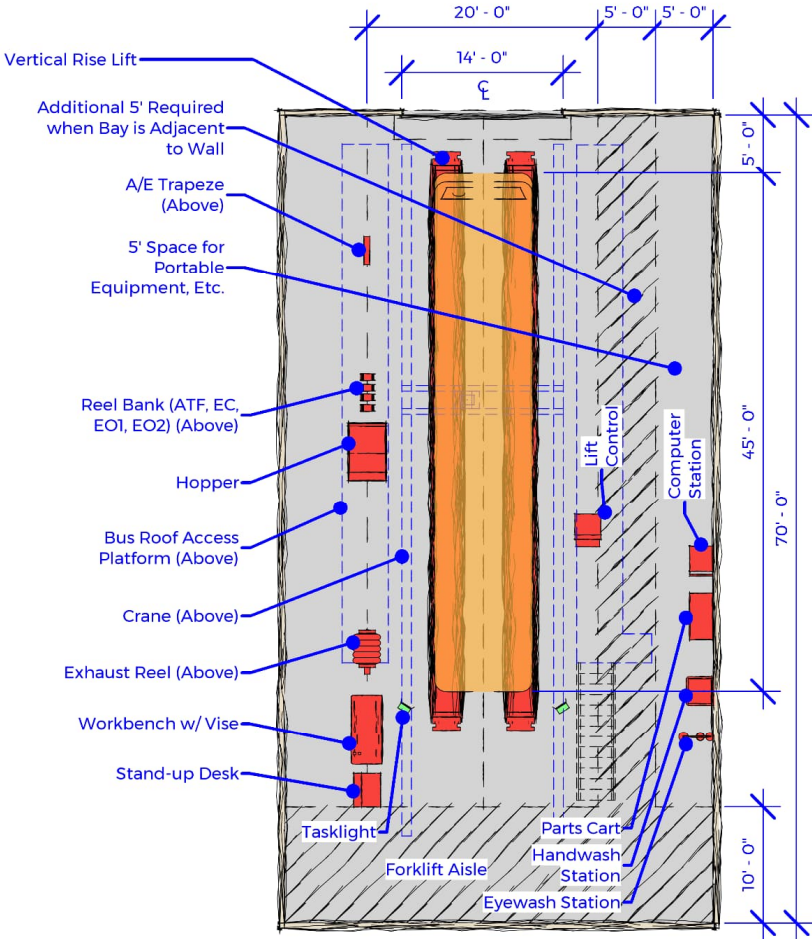
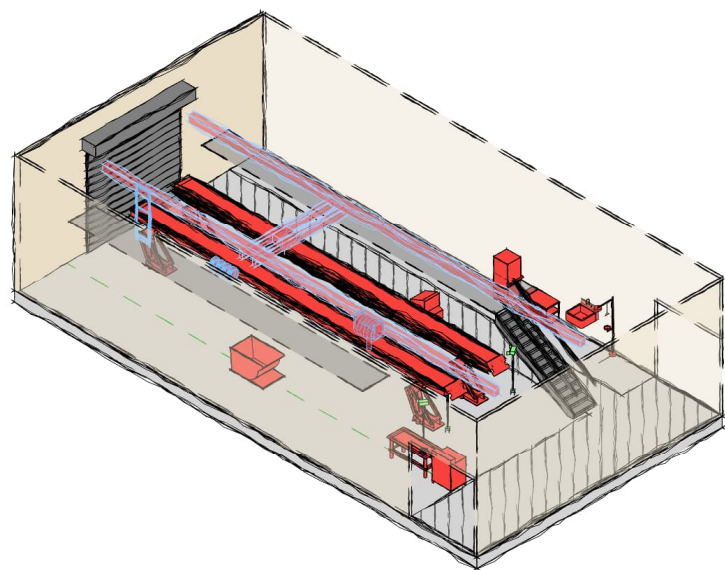
Electrical

- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power
 - o Air/electric drop trapeze-mounted quad receptacle, 120VAC, 20A, GFI protected between bays.
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls, columns, and between overhead doors at 3'-6" AFF.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers in bay.
 - o Data port in each repair bay at columns and/or on air/electric trapeze at workbench locations in bay.

Plumbing

- Trench drain just inside overhead doors.
- Overhead lube reel banks with automatic transmission fluid, engine coolant, engine oil 1, and engine oil 2 at rear of vehicle position (reel banks shared with adjacent bays). Overhead reel bank for WWF at front of vehicle position (reel banks shared with adjacent bays).
- 3/4" water hose bib with standard faucet between bay doors at 4'-0" AFF (1 per 3 bays).
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects at 4'-0" AFF (between bay doors) and on air/electric drop "trapeze" between bays at mid-bay (shared with adjacent bays). Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design.
- As required by equipment

Air Conditioning Bay (45-Foot Bus)



Function

- Designated enclosed bay for air conditioning repair 25- to 45-foot transit buses and non-revenue vehicles

Relationship to other Areas

- Near common work area and portable equipment storage
- Convenient access to maintenance break room, restrooms, shower, and lockers

Critical Dimensions

- 19'-0" vertical clearance
- 20'-0" wide by 60'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Forklift access

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish. No epoxy cover.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.
 - o Exterior sectional overhead door: 14' by 14' motor operated with interior push button controls and lockout on exterior.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing
- Structural columns must not be located at the sides between bays.
- Bay to have level floor with warps to slope to drain at intersection to interior drive aisle.
- Structure as needed to support equipment.
- Betterment: Overhead support platform and crane with associated structure to support. Refer to Appendix A, Drawings Q-102 & Q-502.

Mechanical

- Overhead vehicle exhaust system with 8-inch exhaust hose on a motorized reel with integral exhaust fan and automatic fan switch at rear of vehicle position shared between bays.

- Heating system must be compatible with possible future use of alternative fueled vehicles.
- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- High-volume, low-speed fan coordinated with bay equipment for maintenance bay comfort (not air conditioning).
- General ventilation as required by codes.
- As required by equipment.

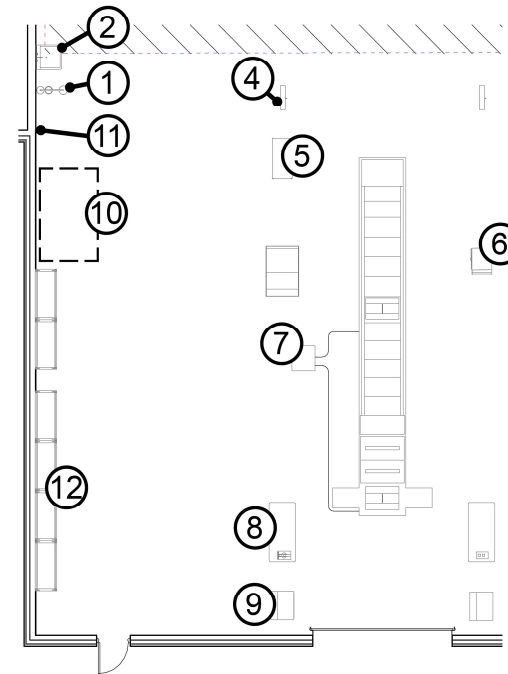
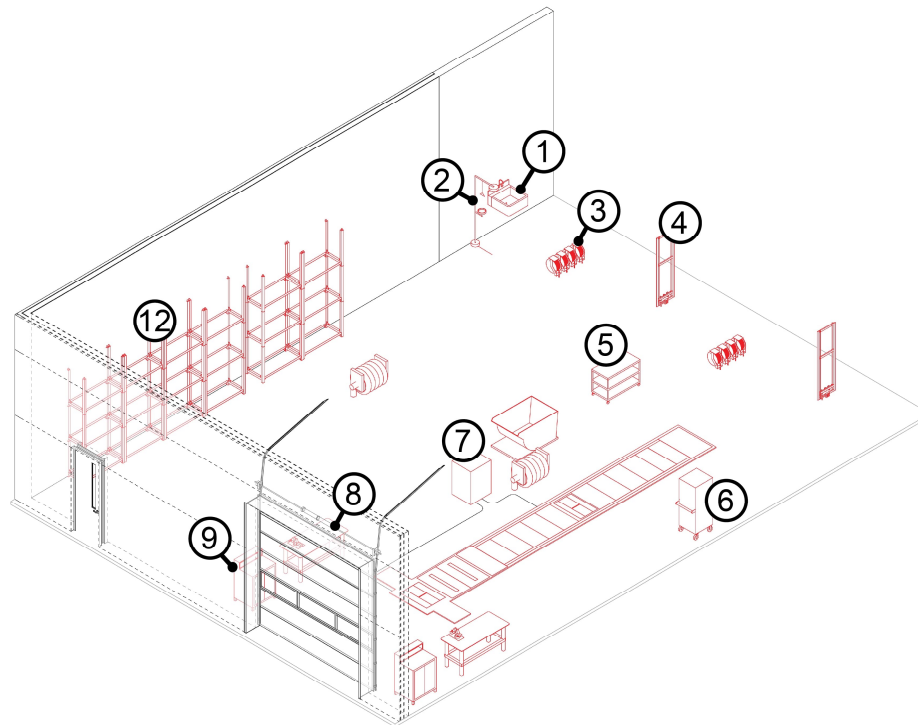
Electrical

- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power
 - o Air/electric drop trapeze-mounted quad receptacle, 120VAC, 20A, GFI protected between bays.
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls, columns, and between overhead doors at 3'-6" AFF.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers in bay.
 - o Data port in each repair bay at columns and/or on air/electric trapeze at workbench locations in bay.

Plumbing

- Trench drain just inside overhead doors.
- Overhead Lube reel banks with automatic transmission fluid, engine coolant, engine oil 1, and engine oil 2 at rear of vehicle position. Overhead reel bank for WWF at front of vehicle position.
- 3/4" water hose bib with standard faucet between bay doors at 4'-0" AFF (1 per 3 bays).
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects at 4'-0" AFF (between bay doors) and on air/electric drop "trapeze" between bays at mid-bay (shared with adjacent bays). Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design.
- As required by equipment

Tire Bay / Storage



- | | | |
|-----------------------|---------------------|---|
| ① Handwash Station | ⑤ Parts Cart | ⑨ Stand-Up Desk |
| ② Eyewash Station | ⑥ Computer Desk | ⑩ Narrow Aisle Stand-Up Forklift For
Tire Rack Access if Bus is in Bay |
| ③ Reel Bank (Above) | ⑦ 2-Post Lift | ⑪ Wall Mounted Tire Fill/FRL
Compressed Air Connections |
| ④ A/E Trapeze (Above) | ⑧ Workbench w/ Vise | ⑫ 18 Stackable Tire Racks, Stacked 3
High to Accommodate up to 72 Tires, 4
Tires per Rack |

Function

- Dedicated bay for tire servicing and repairs

Relationship to other Areas

- Adjacent to repair bays
- Convenient access to break room, restrooms, shower, and lockers

Critical Dimensions

- 19'-0" vertical clearance
- 20'-0" wide by 60'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Forklift access
- Tire bay and storage to be acoustically isolated from other functions.

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure.
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.
 - o Exterior sectional overhead door: 14' by 14' motor operated with interior push button controls and lockout on exterior.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing
- Structural columns must not be located at the sides between bays.
- Bay to have level floor with warps to slope to drain at intersection to interior drive aisle.
- Structure as needed to support equipment.

Mechanical

- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- General ventilation as required by codes.

- As required by equipment.

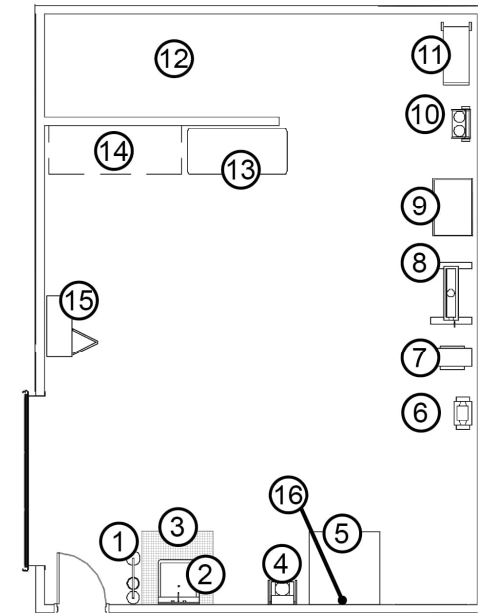
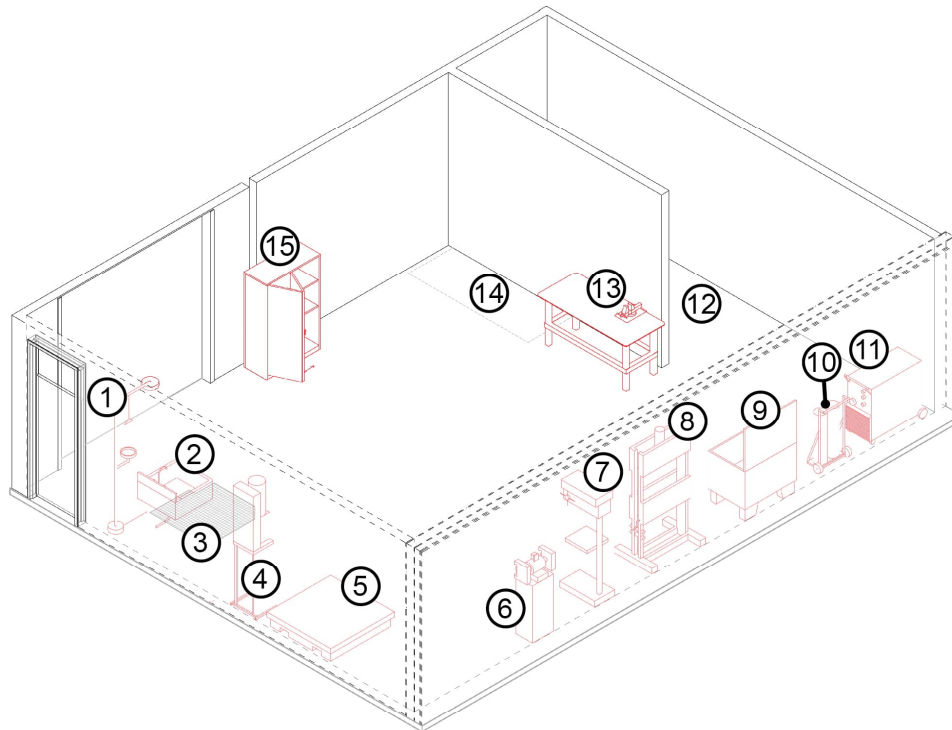
Electrical

- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power
 - o Air/electric drop trapeze-mounted quad receptacle, 120VAC, 20A, GFI protected between bays.
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls, columns, and between overhead doors at 3'-6" AFF.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers in bay
 - o Data port at workbench locations

Plumbing

- Trench drain just inside overhead doors
- 3/4" water hose bib with standard faucet between bay doors at 4'-0" AFF (1 per 3 bays).
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects at 4'-0" AFF (between bay doors) and on air/electric drop "trapeze" between bays at mid-bay (shared with adjacent bays). Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design.
- As required by equipment.

Common Work Area



① Eyewash Station

② Hand Wash Sink

③ Grated Sump

④ Filter Press

⑤ Hazardous Containment
Pallet

⑥ Buffer / Grinder

⑦ Drill Press

⑧ Hydraulic Press

⑨ Parts Cleaning Tank

⑩ Oxyacetylene Welder

⑪ MIG Welder

⑫ DFP Cleaning Equipment

⑬ Workbench w/ Vise

⑭ Portable Drain Pan Storage

⑮ Flammable Materials Cabinet

⑯ Wall Mounted Transfer Hoses
and Remote Start / Stop for
Waste Tank Mounted Pumps

Function

- Designated area for bench work and shop equipment that supports the repair bays

Relationship to Other Areas

- Convenient access from repair bays

Critical Dimensions

- 14'-0" vertical clearance

Comments / Characteristics

- Furnishings: Refer to graphics on previous page.
- Forklift access

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.
 - o Interior overhead door: 10' by 10' motor operated with interior push button controls.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment.

Mechanical

- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- General ventilation as required by codes.
- As required by equipment.

Electrical

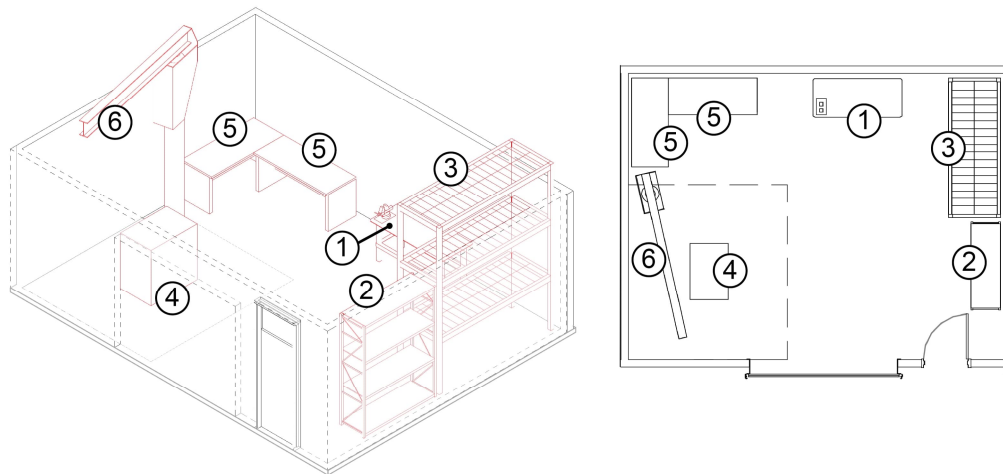
- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.

- Power
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls, columns, and between overhead doors at 3'-6" AFF.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers in shop
 - o Data port on columns and at workbench locations in shop

Plumbing

- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects on walls at 4'-0" AFF. Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design.
- As required by equipment.

Electronics Shop



- | | |
|----------------------|--|
| ① Workbench w/ Vise | ⑤ Anti-static Workbench w/ Cabinets |
| ② Bulk Storage Rack | ⑥ 2 Ton Jib Crane w/ Manual Trolley Movement and Power Up and Down Hoist |
| ③ Pallet Rack | |
| ④ BEB Change Cabinet | |

Function

- Secure enclosed space for repair of bus electrical components

Relationship to Other Areas

- Adjacent to repair bays

Critical Dimensions

- 14'-0" vertical clearance minimum

Comments / Characteristics

- Furnishings: Refer to graphics on previous page.

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements
 - o Interior overhead door: 10' by 10' motor operated with interior push button controls
- Bollards on interior and exterior at jambs of overhead door

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment

Mechanical

- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- General ventilation as required by codes.
- As required by equipment.

Electrical

- Lighting
 - o Maximize day lighting.
 - o High bay LED fixture. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power

- o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls at 3'-6" AFF.
- o 480V 3 Phase switched disconnect.
- o As required by equipment.
- Communications
 - o Paging/intercom system speakers

Plumbing

- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects on walls at 3'-6" AFF. Provide disconnects at locations to be determined during detailed design.
- As required by equipment.

Tool Box Storage

Function

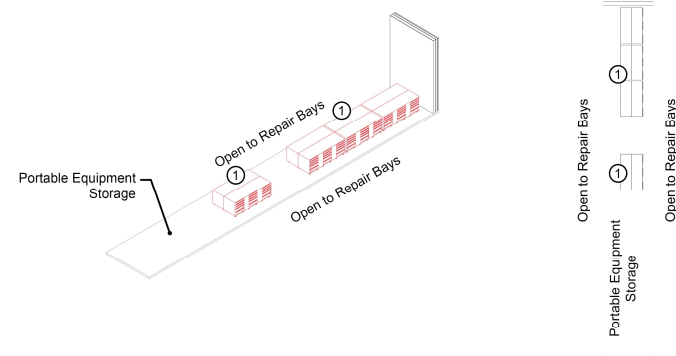
- Enclosed secure area for storage of mechanic tool boxes

Relationship to other Areas

- Between repair bays

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility Requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Soil and grease resistant. Epoxy painted CMU to 8'-0" AFF. Chain-link fence to 8'-0" AFF.
- Ceiling Finishes: Painted exposed structure
- Lighting: High bay fixture or service light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.



① Tool Box (assumed 2'-6" x 8'-0")

Forklift Parking

Function

- Parking for non-revenue support vehicle, 1 forklift

Relationship to other Areas

- Near repair bays and shops

Comments / Characteristics

- Furnishings: Charging station for forklift
- Utility Requirements: Grounded electrical convenience outlets and heated
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirement.

Floor Scrubber Parking

Function

- Parking for non-revenue support vehicle, 1 floor scrubber

Relationship to other Areas

- Near repair bays and shops

Comments / Characteristics

- Furnishings: Charging station for floor scrubber
- Utility Requirements: 480V 3 phase disconnect for wall mounted charger and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirement.

Portable Equipment Storage

Function

- Designated area for the storage of portable repair bay equipment

Relationship to other Areas

- Adjacent to repair bays

Comments / Characteristics

- Furnishings: None
- Utility Requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirement.

Waste Fluid Collection

Function

- Canopy covered area for storage of waste collection tanks

Relationship to other Areas

- Adjacent to repair bays

Comments / Characteristics

- Furnishings: None
- Utility Requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: Waterproof service light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirement.

Battery Room

Function

- Pre-engineered secure portable container for the storage and charging of batteries

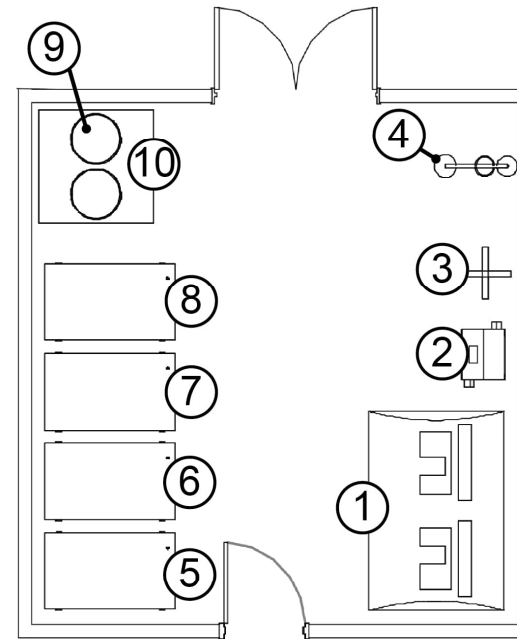
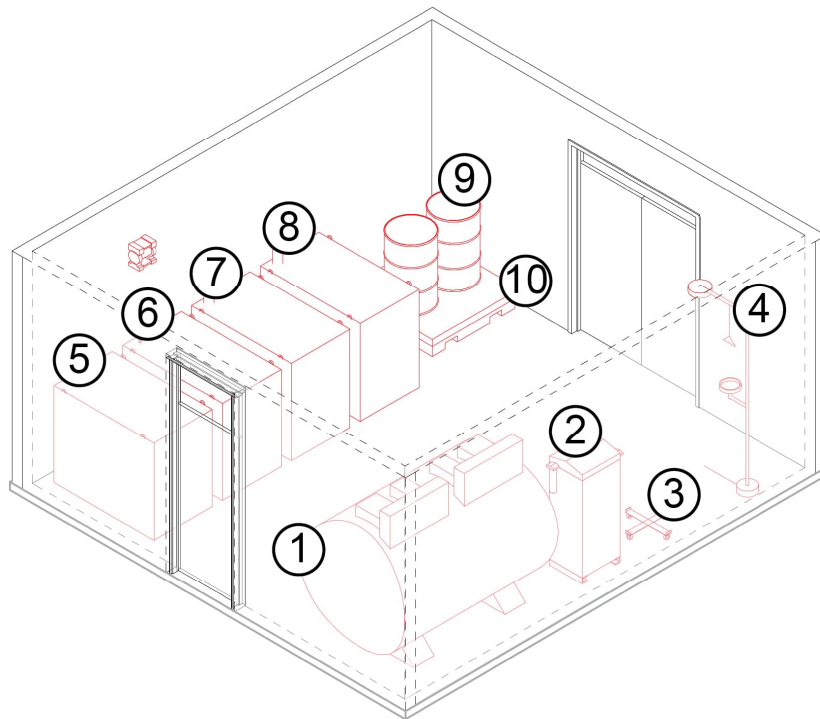
Relationship to other Areas

- Adjacent to repair bays

Comments / Characteristics

- Furnishings: Hardwood bench for 10 batteries (12V), battery charger, battery cart, battery load tester, jumper cart, battery lift cart, battery storage containment pallet, hand wash sink, and emergency eye wash safety shower with alarm
- Utility Requirements: Water, drain, electrical power as required by container and equipment.
- Floor Finishes: Acid resistant grating (removable) with containment sump
- Wall Finishes: Acid/chemical-resistant coating
- Ceiling Finishes: Acid/chemical-resistant coating
- Lighting: Fluorescent strip by container manufacturer
- Forklift access to insert/remove pallets of batteries.
- Provide for charging up to 10 batteries at a time.
- Drain from sink to be acid neutralized.
- Provide concrete slab on which to set pre-engineered container.
- 8'-0" vertical clearance inside container.

Lube / Compressor Room



- ① Air Compressor
- ② Air Dryer
- ③ Drum Dolly
- ④ Eyewash / Safety Shower

- ⑤ ATF (280 Gal)
- ⑥ EC (280 Gal)
- ⑦ EO1 (280 Gal)
- ⑧ EO2 (280 Gal)

- ⑨ Drum Dolly
- ⑩ Containment Pallets

Function

- Enclosed room for the purpose of storage and distribution of lubricants to the facility

Relationship to Other Areas

- Centrally located to minimize piping runs
- Accessible from exterior for deliveries

Critical Dimensions

- 12'-0" vertical clearance

Comments / Characteristics

- Furnishings: Refer to graphics on previous page.
- Acoustically and physically separated from personnel areas to prevent migration of noise, dirt, and fumes.
- Provide for easy cleaning below grating.
- Forklift accessible

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to full height.
 - o Ceiling: Painted exposed structure.
- Doors
 - o Double 3'-0" wide hollow metal door with interior exit device. Provide fire separation between this space and adjacent spaces, where required by code. Make liquid-tight joints where all walls join the floor. Provide placards in a conspicuous location outside of the room indicating the presence of flammable/combustible liquids and the quantities of each.

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment
- Containment sumps (below storage drums) covered with grating (110% of capacity of stored and used drums)
- Provide seismic bracing for equipment, where required by code.

Mechanical

- General ventilation as required by codes.
- As required by equipment.

Electrical

- Lighting
 - o Service light fixture—shop. Refer to Section 2.4.5.3 for foot candle lighting requirements.
- Power
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls at 3'-6" AFF.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers
- Bond and ground all tanks, piping, and discharge equipment

Plumbing

- 3/4" water hose bib with standard faucet at 3'-6" AFF.
- Compressed air line with cut-off valve, separator, regulator with gauge, lubricator, cleanout valve, and quick disconnects on wall at 3'-6" AFF for each lubricant pump.
- Regulator and pressure relief valve in compressed air line to lube pumps. Provide vent piping from tank to exterior of building for tanks with combustible and/or flammable fluids, as required by code.

As required by equipment.

Mechanical Room

Function

- Enclosed separately secured space designated for mechanical building support systems

Relationship to other Areas

- Adjacent to electrical room

Comments / Characteristics

- Provide double doors as needed for access to equipment.
- Furnishings: Mechanical equipment
- Utility Requirements: As required by equipment.
- Floor Finishes: Sealed concrete
- Wall Finishes: Painted gypsum board and/or concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

Electrical Room

Function

- Designated space for electrical building support equipment

Relationship to other Areas

- Adjacent to mechanical room

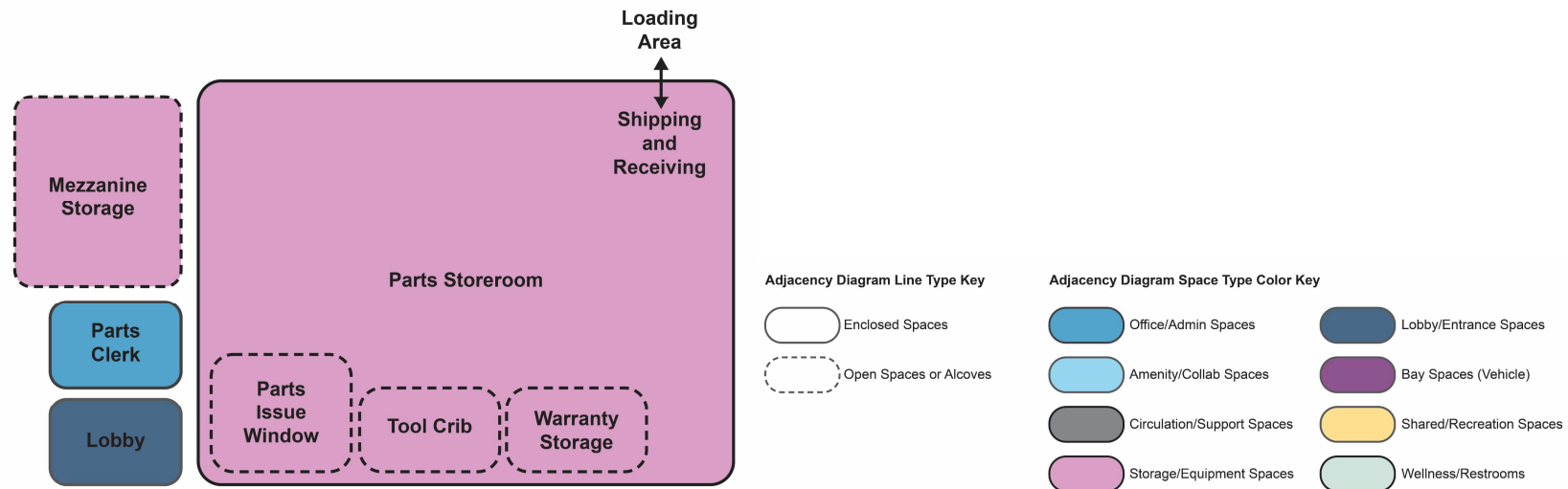
Comments / Characteristics

- Provide double doors as needed for access to equipment.
- Furnishings: Electrical equipment
- Utility Requirements: As required by equipment.
- Floor Finishes: Sealed concrete
- Wall Finishes: Painted gypsum board and/or concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: Service light fixture—utility spaces. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

2.3.9.4 Functional Relationship Diagram: Parts Storeroom

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan; it serves only as a representational relationship diagram. The parts storeroom shall be acoustically separated from surrounding spaces.

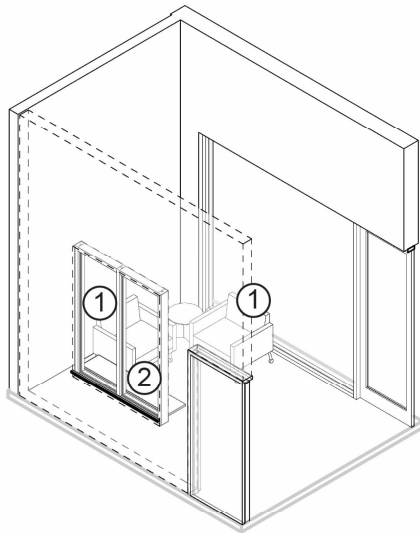
Figure 2-41: Functional Relationship Diagram for the Parts Storeroom



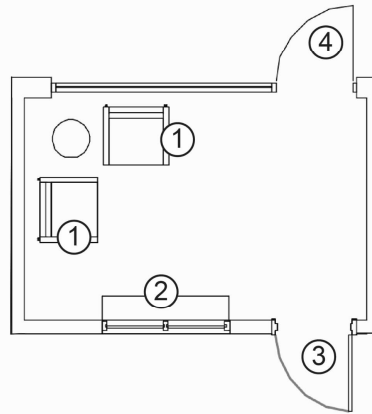
2.3.9.5 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas, and other information received during interviews with Yuba-Sutter Transit staff.

Parts Storeroom Lobby



- ① Chair
- ② Parts Counter
- ③ Parts Clerk
- ④ Outside



Function

- Parts lobby area with seating for up to 2 people

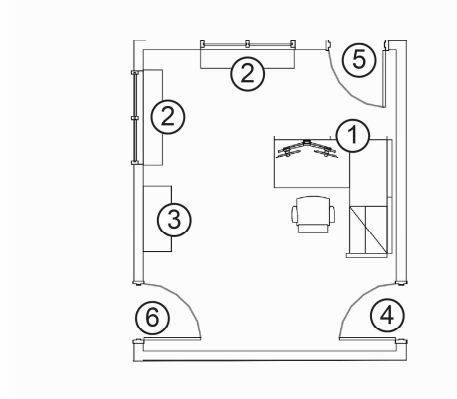
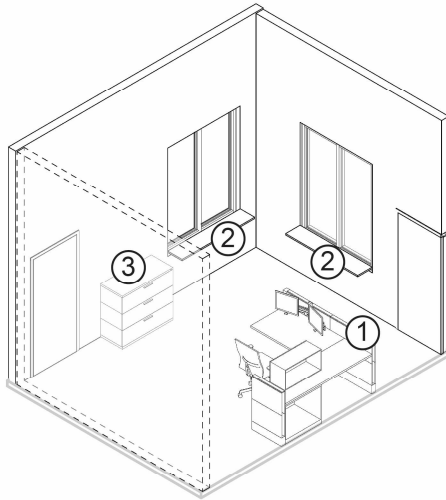
Relationship to other Areas

- Adjacent to parts clerk

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system, air conditioned and heated.
- Window to outside if possible. Window to be fixed.
- Floor Finishes: Resilient flooring
- Wall Finishes: Painted gypsum board and/or concrete block
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Parts Clerk



- ① Workstation
- ② Parts Counter
- ③ Filing Cabinet
- ④ Parts Storeroom

- ⑤ Parts Lobby
- ⑥ Maintenance Bays

Function

- Enclosed private office for parts clerk

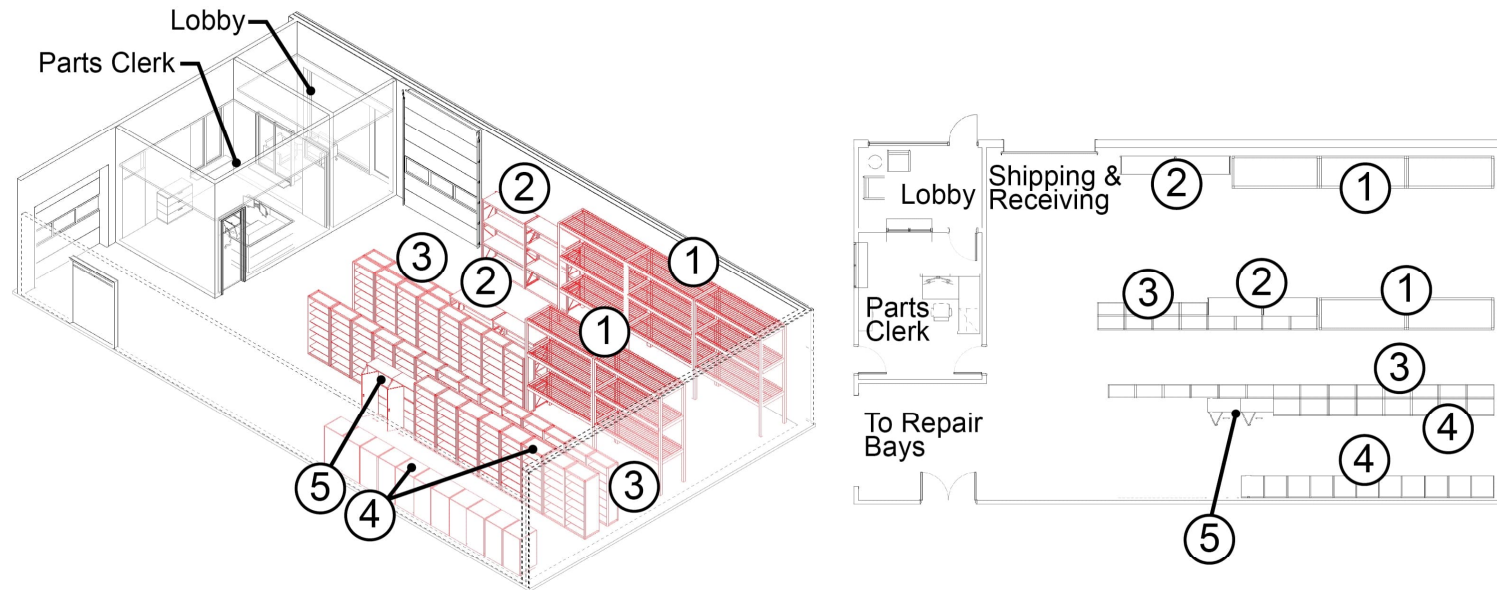
Relationship to other Areas

- Adjacent to lobby and storeroom

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system, air conditioned and heated.
- Window counter to lobby and to repair bays.
- Floor Finishes: Resilient flooring
- Wall Finishes: Painted gypsum board and/or concrete block
- Ceiling Finishes: Acoustical tile ceiling
- Lighting: Office light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Parts Storeroom



- ① Bulk Storage Racks
- ② Pallet Racks
- ③ Drawer Units
- ④ Shelving Units
- ⑤ Flammable Materials Cabinet

Function

- Dedicated secure area for receiving, storing, and issuing of parts and materials

Relationship to Other Areas

- Adjacent to parts clerk and shipping and receiving
- Near repair bays and shops

Critical Dimensions

- 19'-0" vertical clearance

Comments / Characteristics

- Furnishings:
 - o Storage Equivalent Capacity – WxDxH
 - o 40 FPE Full Pallet Equivalent 4'x4'x4'
 - o (160) BBE Bulk Box Equivalent 20"x24"x24"
 - o (40) SBE Small Box Equivalent 15"x27"x12"
 - o (168) FSE Full Shelf Equivalent 36"x18"x12"
 - o (2) FMC Flammable Materials Cabinet
 - o (2) LDC Locking Door Cabinet
 - o (90) DCE Drawer Cabinet Equivalent 30"x27" xN
- Forklift accessible
- Exterior access
- Card access control
- Include dedicated area for warranty storage and tool crib cabinet within parts storeroom.

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide white, slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to 8'-0" AFF.
 - o Ceiling: Painted exposed structure
- Doors
 - o Personnel doors to meet applicable codes and exiting requirements.

- o Exterior overhead door: High lift aluminum frame with full view glass panels, 10'x10', automatic operator, interior push button controls, and lockout on exterior.
 - o 10'x10' overhead coiling door for forklift access
- Bollards on interior and exterior jambs of overhead doors (4 per door).

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment

Mechanical

- General ventilation as required by codes.
- As required by equipment.

Electrical

- Lighting
 - o High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
 - o Orient lighting at 45°F to room walls to reduce shadows and dark areas resulting from future modified racking configurations.
- Power
 - o General-purpose duplex receptacles, 120VAC, 20A, GFI protected, on walls and columns at 3'-6" AFF.
 - o 480 VAC 3 Phase with disconnect for forklift charging point.
 - o As required by equipment.
- Communications
 - o Paging/intercom system speakers

Plumbing

- 24-inch-wide trench drain just inside overhead door with removable grating to oil/water separator and waste water treatment plant (WWTP).
- 3/4" water hose bib with standard faucet at 3'-6" AFF.
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, and quick disconnects on walls at 1066.8 mm (3'-6") AFF. Provide disconnects at locations to be determined during detailed design.
- As required by equipment.

Warranty Storage

Function

- Designated shelving racks for storage of warranty items

Relationship to other Areas

- Near parts clerk

Comments / Characteristics

- Furnishings: Refer to *Parts Storeroom* graphics.
- Utility Requirements: None
- Floor Finishes: None
- Wall Finishes: None
- Ceiling Finishes: None
- Lighting: High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Tool Crib

Function

- Secure cabinet for the storage of maintained tools and equipment

Relationship to other Areas

- Adjacent to repair bays and shops

Comments / Characteristics

- Furnishings: None
- Utility Requirements: None
- Floor Finishes: None
- Wall Finishes: None
- Ceiling Finishes: None
- Lighting: High bay fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements

Shipping And Receiving

Function

- Designated area within the parts storeroom for staging received parts and parts waiting to be shipped

Relationship to other Areas

- Within parts storeroom

Comments / Characteristics

- Furnishings: Wood-top check-in table
- Utility Reequipments: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer, and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete, with clear epoxy sealer. Provide white slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: High bay fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

Loading Area

Function

- Level paved area for parking vehicles loading and unloading into parts storeroom

Relationship to other Areas

- Near and within close visual view of parts clerk

Comments / Characteristics

- Furnishings: None
- Utility Requirements: Grounded electrical convenience outlets
- Floor Finishes: Asphalt. Minimum 12'-0" wide x 12'-0" long concrete pavement section at forklift vehicle loading/unloading area
- Wall Finishes: None
- Ceiling Finishes: Provide 8-foot-deep canopy over exterior overhead door to cover rear of delivery vehicle when loading/unloading.

Lighting: High bay fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

Mezzanine Storage

Function

- Designated storage area above the parts storeroom for storage of less frequently used large parts

Relationship to other Areas

- Above parts storeroom

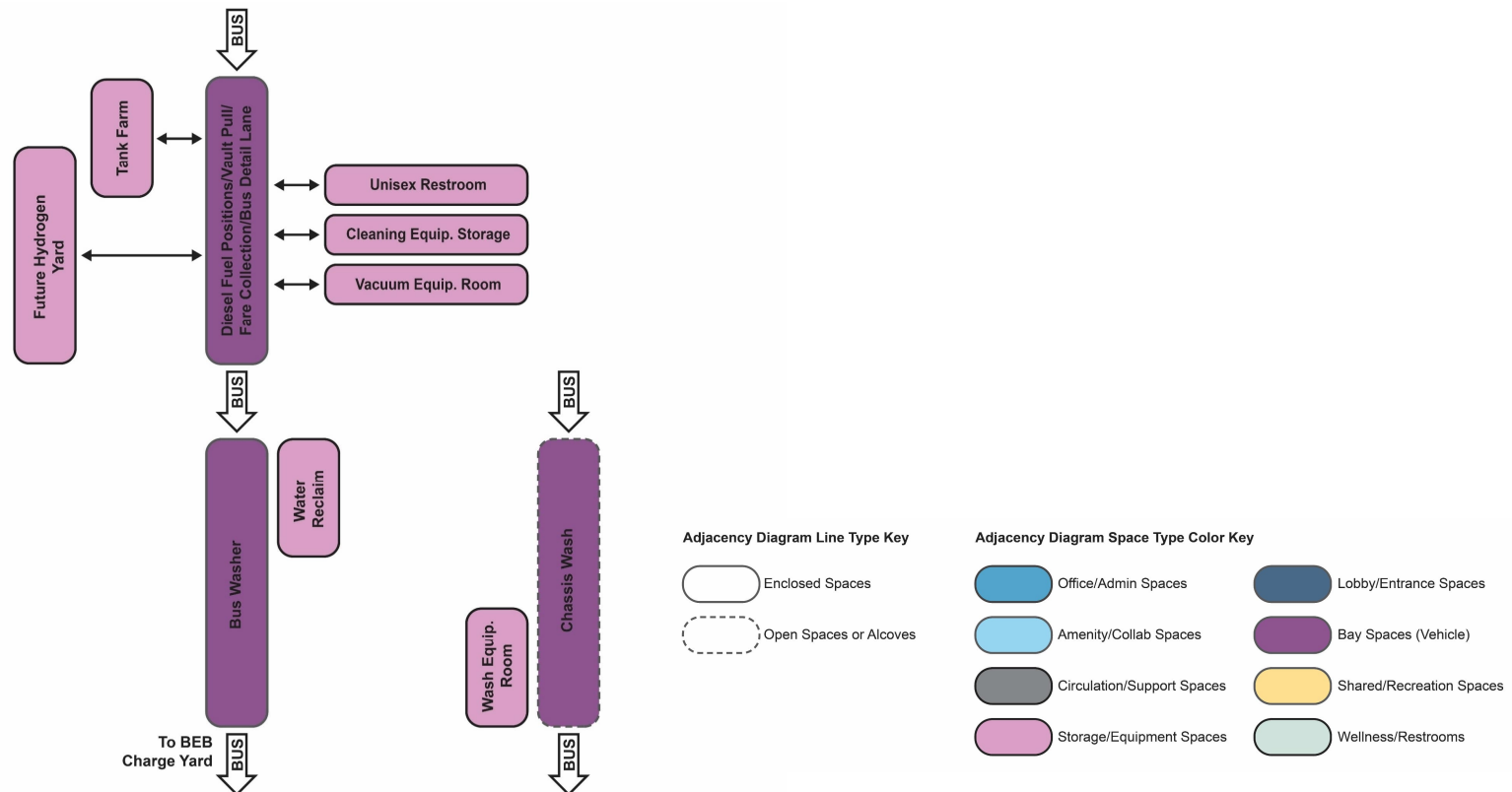
Comments / Characteristics

- Furnishings: Shelving racks
- Utility Requirements: Grounded electrical convenience outlets, ventilated, and heated.
- Floor Finishes: Sealed concrete
- Wall Finishes: Painted gypsum board
- Ceiling Finishes: Painted exposed structure
- Lighting: Service light fixture—storage rooms. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

2.3.9.6 Functional Relationship Diagram: Service Lanes

The relationships between the spaces within this section are shown below. The design shall accommodate these relationships to maximize operational efficiency. This diagram is not meant to be a floor plan; it serves only as a representational relationship diagram.

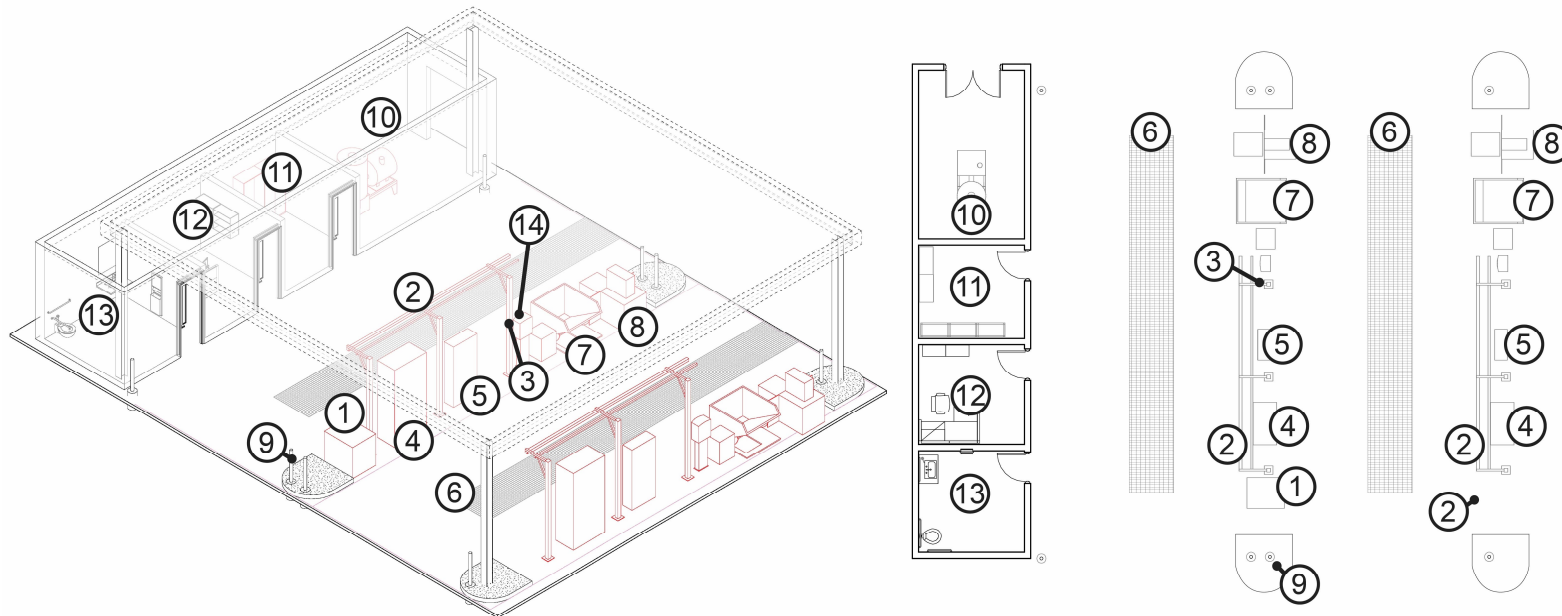
Figure 2-42: Functional Relationship Diagram for the Service Lanes



2.3.9.7 Functional Area Modules

Each functional area within this section has been individually defined as a module. Each module has information regarding the function of the space, relationships to other areas, and other information received during interviews with Yuba-Sutter Transit staff.

Fueling Positions



- | | | | |
|-----------------------------|-------------------------|-----------------------|--------------------------|
| ① DEF Tote | ⑤ Diesel Dispenser | ⑨ Bollard | ⑬ Unisex RR |
| ② Fuel Gantry | ⑥ Trench Drain | ⑩ Central Vac | ⑭ Fuel Management System |
| ③ Vacuum Outlet | ⑦ Trash Hopper | ⑪ Cleaning Equipment | |
| ④ Future Hydrogen Dispenser | ⑧ Mobile Fare Retrieval | ⑫ Utility Workstation | |

Function

- Canopy-covered drive-thru lanes for fueling of buses and non-revenue vehicles as needed. Space to be used for covered detail clean position.

Relationship to Other Areas

- Convenient access to/from vehicle parking
- Efficiently located within site traffic flow

Critical Dimensions

- 17'-6" to allow for future high-capacity overhead pantograph charging, vertical clearance to underside of canopy structure.
- Bay size: 20'x55'

Comments / Characteristics

- Furnishings: Refer to graphics on previous page. Pipe to 15,000 gallon above ground tank.
- Forklift accessible
- Drive-thru configuration

Architectural

- Finishes
 - o Floor: Concrete sloped to trench drains
 - o Walls: None
 - o Ceiling: Painted exposed structure or prefinished metal panels
- Doors
 - o None
- Bollards at each end of island and at fuel dispensers

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment

Mechanical

- Heated within the canopy area
- Natural cross ventilation

Electrical

- Lighting
 - o Watertight fixture located between fuel island and centerline of lane
 - o All lighting on emergency power circuit
 - o Explosion proof sealed fixture with diffuser. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.
- Power
 - o Fuel dispensers and submersible pumps on emergency power circuit
 - o Fuel pumps to have emergency shut-off conveniently located in fueling lanes
 - o As required by equipment.
- Communications
 - o Paging/intercom system waterproof speakers
 - o Provide signal conduit for fuel management system.

Plumbing

- Trench drain perpendicular to bus circulation at either end of fuel lane to oil/water separator.
- Trench drain down the center of the fuel lane
- Product and vapor recovery piping as required to and from fuel tanks and dispensers.
- As required by equipment.

Vault Pull / Fare Collection**Function**

- Canopy-covered drive-thru lanes for vault pull/fare collection operation

Relationship to other Areas

- Shared space with fueling position

Comments / Characteristics

- Furnishings: Remote farebox receiver and probe
- Utility requirements: Waterproof grounded electrical convenience outlets
- Floor Finishes: Concrete sloped to trench drains
- Wall Finishes: None
- Ceiling Finishes: Painted exposed structure
- Lighting: Watertight fixture located between fuel island and centerline of lane. All lighting on emergency power circuit. Explosion-proof sealed fixture with diffuser. Refer to Section 2.4.5.3 of the Project Manual for foot candle and lighting requirements.
- Heated within the canopy area

- Natural cross ventilation

Utility Workstation

Function

- Open workstation for the utility supervisor and utility technicians. Refer to Section 2.3.5.3 Module 1 graphic.

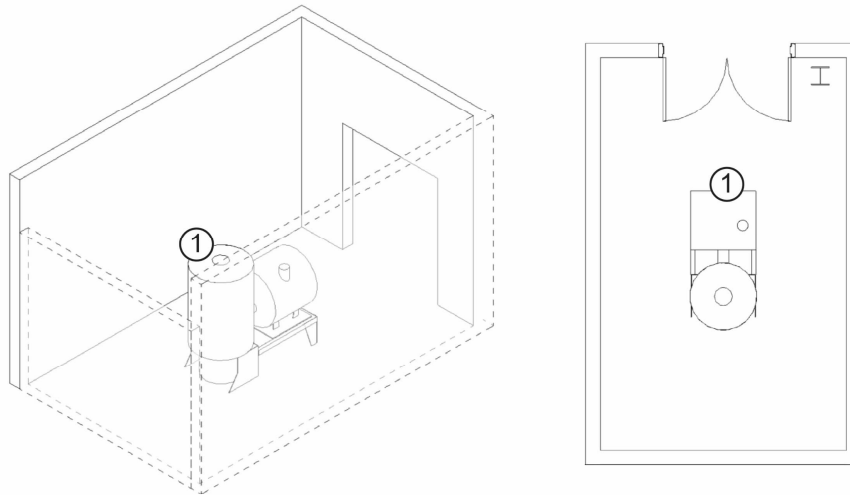
Relationship to other Areas

- Near repair bays

Comments / Characteristics

- Furnishings: Refer to Section 2.3.5.3 Module 1 graphic.
- Utility Requirements: Grounded electrical convenience outlets, telephone, intercom/paging system, conduit for network computer system, air conditioned and heated.
- Floor Finishes: Sealed concrete
- Wall Finishes: Painted concrete block
- Ceiling Finish: Painted exposed structure
- Lighting: Explosion-proof sealed fixture with diffuser. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.
- Define space with 66-inch-high modular office partitions.

Central Vacuum



① 4 Station Vacuum System

Function

- Enclosed area for the central vacuum system

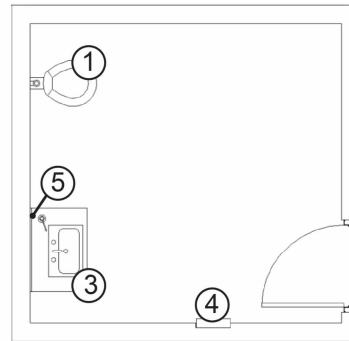
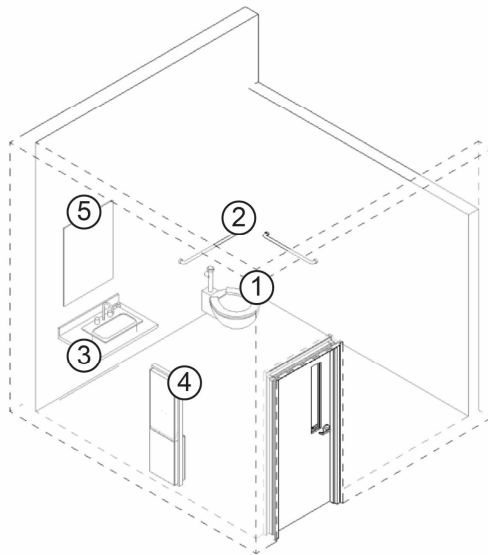
Relationship to other Areas

- Adjacent to fueling positions and bus detail lanes

Comments / Characteristics

- Furnishings: Central vacuum system
- Utility requirements: Grounded electrical convenience outlets and electrical service as required equipment
- Floor Finishes: Sealed concrete
- Wall Finishes: Painted concrete block with insulation
- Ceiling Finishes: Painted exposed structure
- Lighting: Service light fixture. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Acoustically isolated from surrounding areas
- Vent through roof and expelled above fuel canopies and roof
- Positive air pressure to prevent explosive mixture of lighter than air fumes to accumulate in room

Unisex Restroom



- ① Toilet
- ② Grab Bars
- ③ Lavatory
- ④ Paper Towel Dispenser / Waste
- ⑤ Mirror

Function

- Restroom facility for fueling and detail clean staff

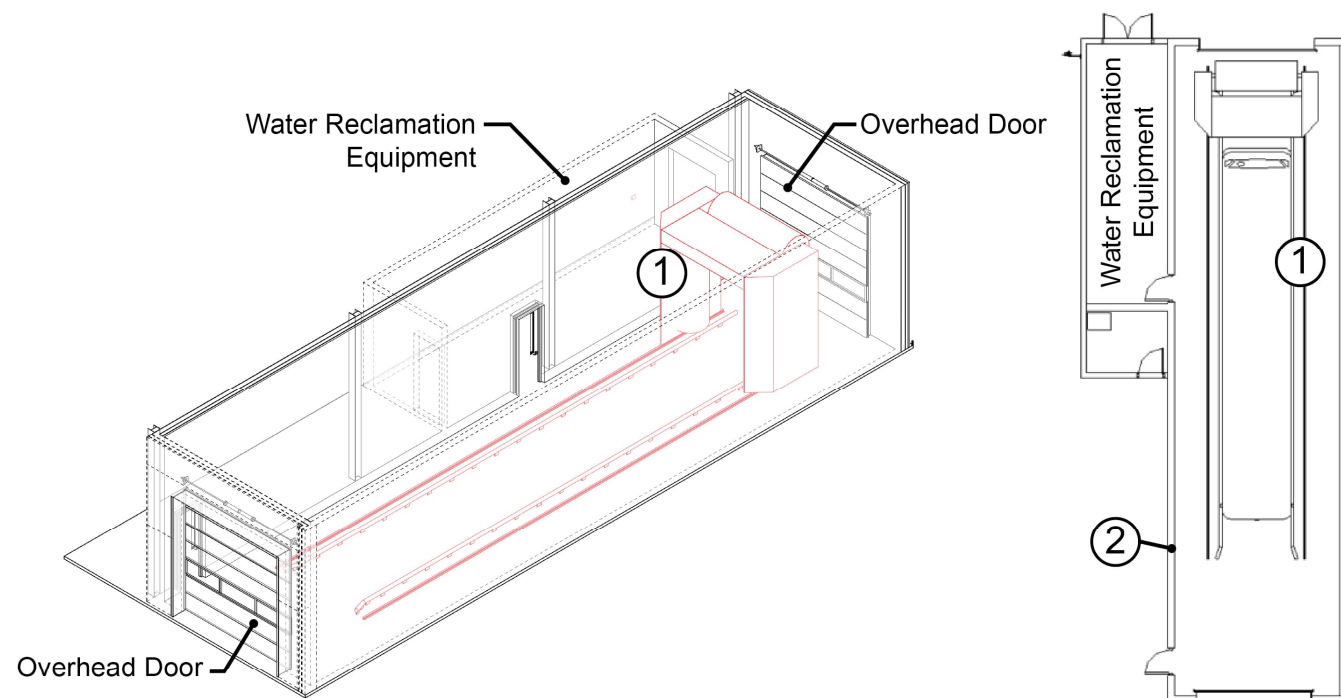
Relationship to other Areas

- Convenient to fueling positions and bus detail lanes

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, intercom/paging system; air conditioned, ventilated, and heated.
- Floor Finishes: Porcelain tile
- Wall Finishes: Paint or porcelain tile on gypsum board
- Ceiling Finishes: Painted gypsum board
- Lighting: Wet location sealed fixtures and indirect light over mirror. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

Automatic Bus Washer / Detail Clean



- ① Gantry Washer
- ② Low Wall Mounted Task Light - 48" AFF

Function

- Drive-thru gantry wash area for the automatic cleaning of vehicle exteriors. Floor space not occupied by gantry washer when wash not in use. Space to be used for secondary detail clean position.

Relationship to Other Areas

- Convenient access to/from vehicle parking
- Efficiently located within site traffic flow

Critical Dimensions

- 16'-0" vertical clearance
- 20'-0" wide by 65'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on previous page.
- Drive-thru configuration

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Soil and grease resistant. Epoxy painted to full height.
 - o Ceiling: Painted exposed structure
- Doors
 - o Exterior sectional overhead door: 14' x 14' motor operated with interior push button controls and lockout on exterior.
- Bollards on interior and exterior at jambs of overhead door (2 per door).

Structural

- Control joints in floor slab at adequate spacing
- All exposed steel galvanized structure as needed to support equipment

Mechanical

- Heating system must be compatible with possible future use of alternative fueled vehicles.
- Ventilation as required by codes to prevent accumulation of explosive mixtures.
- General ventilation as required by codes.

- As required by equipment.

Electrical

- Lighting
 - o Waterproof high bay sealed fixture located between wall and centerline of lane. Refer to Section 2.4.5.3 of the Project Manual for foot candle lighting requirements.
 - o Task light: Chassis wash/detail clean. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.
- Power
 - o Waterproof duplex receptacles, 120VAC, 20A, GFI protected, on walls at 3'-0" AFF.
 - o As required by equipment.
- Communications
 - o Watertight paging/intercom system speakers

Plumbing

- 2-foot-wide and 2-foot-deep drain at mid-bay (with removable cover) to water reclaim. Overflow to sediment and oil interceptor.
- 3/4" water hose bib with standard faucet at 4'-0" AFF.
- As required by equipment.

Water Reclaim

Function

- Dedicated space for water reclaim equipment that serves the bus washer

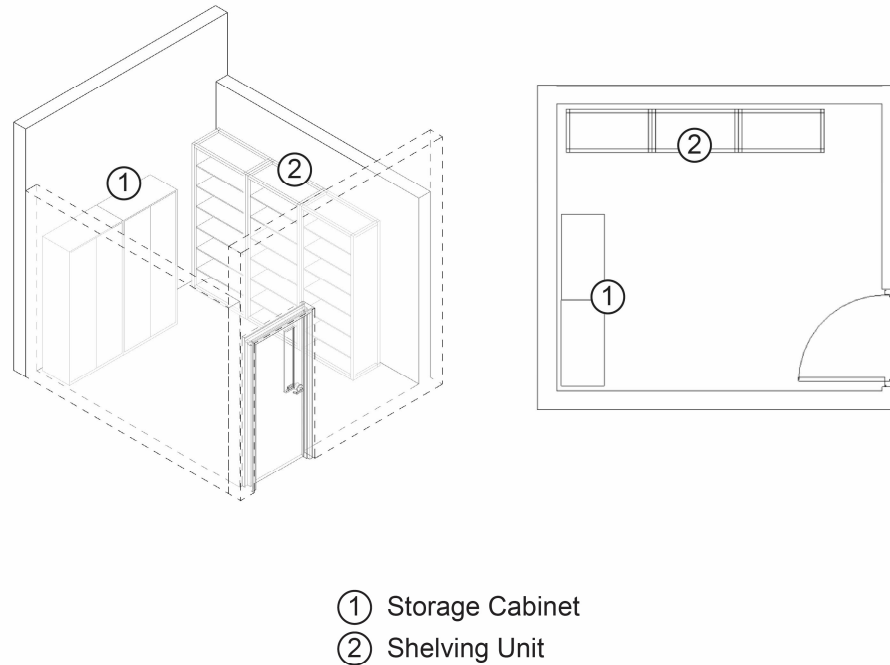
Relationship to other Areas

- Adjacent to bus washer

Comments / Characteristics

- Furnishings: Reclaim equipment to support the gantry washer. Include reverse osmosis system for soft water.
- Utility requirements: Waterproof grounded electrical convenience outlets, water and electrical connections as required by equipment
- Floor Finishes: Soil-, grease-, and water-resistant concrete, with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: Waterproof service light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.
- 16'-0" vertical clearance to roof structure
- Separate from bus wash by CMU wall.
- Good ventilation
- Cast-in-place or buried separation sumps required.
- Overflow through oil/water separator and then on to sanitary sewer

Cleaning Storage



Function

- Room for storage of cleaning equipment

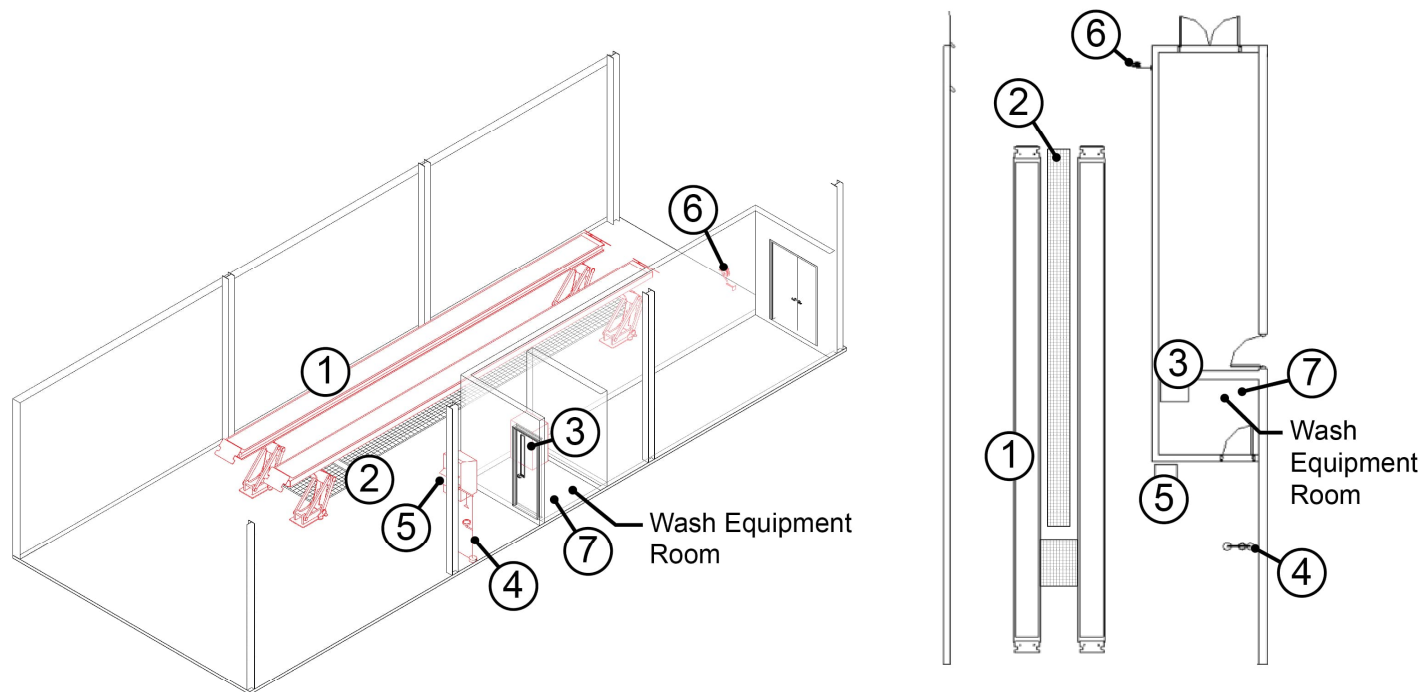
Relationship to other Areas

- Adjacent to detail lane positions and fueling positions

Comments / Characteristics

- Furnishings: Refer to graphics on this page.
- Utility requirements: Grounded electrical convenience outlets, ventilated and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block
- Ceiling Finishes: Painted exposed structure
- Lighting: Service light fixture—storage rooms. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements

Chassis Wash



- ① Vertical Rise Lift
- ② Grated Sump
- ③ Pressure Washer
- ④ Eyewash/Shower

- ⑤ Lift Control Station
- ⑥ Wash Hose Reel
- ⑦ Floor Space for Detergent Tote

Function

- Canopy-covered area for washing of bus undercarriages, engine compartments, and components

Relationship to Other Areas

- Convenient access to repair bays

Critical Dimensions

- 21'-0" vertical clearance
- 20'-0" wide by 65'-0" long

Comments / Characteristics

- Furnishings: Refer to graphics on previous page.

Architectural

- Finishes
 - o Floor: Soil-, grease-, and water-resistant concrete with integral non-metallic hardener. Provide slip-resistant finish.
 - o Walls: Painted steel columns
 - o Ceiling: Painted exposed structure
- Doors
 - o None
- Bollards at each end of canopy at columns and building exterior corners

Structural

- Control joints in floor slab at adequate spacing
- Structure as needed to support equipment

Mechanical

- Heated and ventilated area within the canopy structure

Electrical

- Lighting
 - o Waterproof high bay sealed fixture located between wall and centerline of lane. Refer to Section 2.4.5.3 of the Project Manual for foot candle lighting requirements.
 - o Task light: Chassis wash/detail clean. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

- Power
 - o Waterproof duplex receptacles, 120VAC, 20A, GFI protected, on walls at 3'-0" AFF.
 - o As required by equipment.
- Communications
 - o Watertight paging/intercom system speakers

Plumbing

- 3/4" water hose bib with standard faucet at 4'-0" AFF.
- Compressed air line with cut-off valve, filter, regulator with gauge, lubricator, cleanout valve, and quick disconnects at 4'-0" AFF. Provide disconnects for 1/2" and 1" impact tools at locations to be determined during detailed design.
- All piping trenches shall be drained to an oil/water separator.
- As required by equipment.

Chassis Wash Equipment

Function

- Enclosed area for the high pressure/hot water washer (electric)

Relationship to other Areas

- Adjacent to chassis wash

Comments / Characteristics

- Furnishings: High-pressure hot water washer (electric)
- Utility requirements: Grounded electrical convenience outlets, water, drain, and heated.
- Floor Finishes: Soil-, grease-, and water-resistant concrete with clear epoxy sealer. Provide slip-resistant finish.
- Wall Finishes: Epoxy-painted concrete block. Full walls
- Ceiling Finishes: Painted exposed structure
- Lighting: Wet location sealed light fixture. Refer to Section 2.4.5.3 of the Project Manual for foot candle and fixture requirements.

Ready Line

Function

- Designated area for 25-foot, 35-foot, and 45-foot buses ready for service.

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows.

Comments / Characteristics

- Furnishings: None.
- Utility requirements: Intercom/paging system.
- Floor Finishes: Concrete or asphalt paving.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – agency vehicle parking. Refer to Chapter 4 for foot candle and fixture requirements.
- Parking spaces shall be numbered. Numbering system shall be coordinated with the agency.
- Parking spaces shall be 14' x 50' for 45-foot buses.
- Parking spaces shall be 14' x 40' for 35-foot buses.
- Parking spaces shall be 14' x 30' for 25-foot buses.
- Option = 12' wide as fleet grows.
- NOTE: 14'-0" wide parking spaces allow for in-place testing of bus ADA ramps.
- NOTE: 14'-0" wide parking spaces allow for overhead electric bus charging support structure or in pavement charging.

Down Line**Function**

- Designated area for buses and shuttles waiting for maintenance

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows.
- Accessible to Repair Bays.

Comments / Characteristics

- Furnishings: None.
- Utility Requirements: Intercom/paging system.
- Floor Finishes: Concrete.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – Agency Vehicle parking, circulation, and Agency
- Service areas. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

- Parking rows (columns) to be numbered with painted graphics.
- Wireless network accessible.

Non-Revenue Vehicles

Function

- Designated area for non-revenue vehicles.

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows

Comments / Characteristics

- Furnishings: None.
- Utility Requirements: Intercom/paging system.
- Floor Finishes: Asphalt or concrete.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – Agency Vehicle parking, circulation, and Agency Service areas. Refer to Section 2.4.5.3 for foot candle and fixture requirements.
- Parking rows (columns) to be numbered with painted graphics.
- Wireless network accessible.

Employee Parking

Function

- Designated outdoor area for employee vehicles.

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows

Comments / Characteristics

- Furnishings: None.
- Utility Requirements: Intercom/paging system.
- Floor Finishes: Concrete or asphalt.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – Yard Storage, Employee and other parking and circulation areas. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Visitor Parking

Function

- Designated outdoor parking area for visitors.

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows

Comments / Characteristics

- Furnishings: None.
- Utility Requirements: Intercom/paging system.
- Floor Finishes: Concrete or asphalt.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – Yard Storage, Employee and other parking and circulation areas. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

Bicycle Parking**Function**

- Designated outdoor parking area for visitors.

Relationship to other Areas

- Located to optimize vehicle and pedestrian traffic flows

Comments / Characteristics

- Furnishings: Bicycle rack.
- Utility Requirements: Intercom/paging system.
- Floor Finishes: Asphalt or concrete.
- Wall Finishes: None.
- Ceiling Finishes: None.
- Lighting: Site lighting fixture – Yard Storage, Employee and other parking and circulation areas. Refer to Section 2.4.5.3 for foot candle and fixture requirements.

2.3.10 Design Concept Views

The views in this section illustrate the design concept and serve to highlight the spatial and visual experience at key areas of the project. In the final design priority shall be placed on the welcome experience, especially along the public-facing facades and the courtyard, and on maximizing indoor-outdoor connections while enhancing visual corridors through material expression and transparency.

Figure 2-43: Design Concept for Approach and Courtyard Experience



Prepared for: Yuba-Sutter Transit Authority

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Figure 2-44: Design Concept for Admin and Operations



1 | ADMIN WING ENTRANCE



2 | ADMIN SUITE



3 | OPS WING ENTRANCE



4 | OPS WING KITCHENETTE

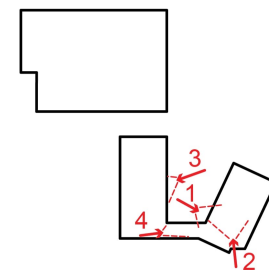


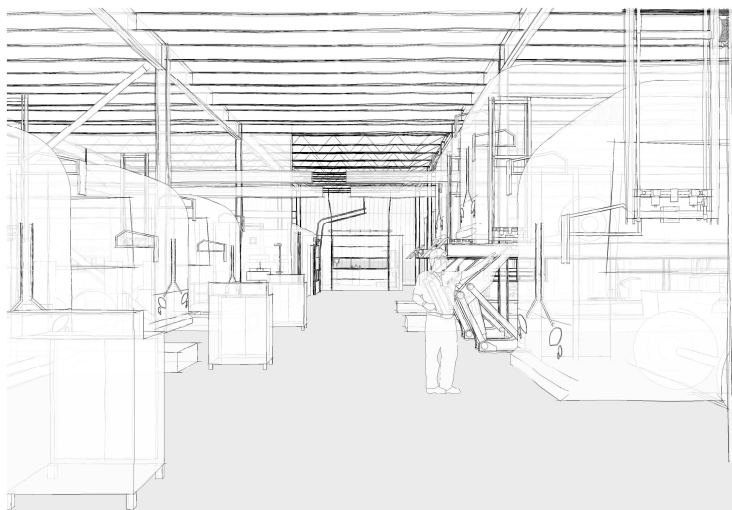
Figure 2-45: Design Concept for Maintenance Building



1 | MAINTENANCE BLDG ENTRANCE



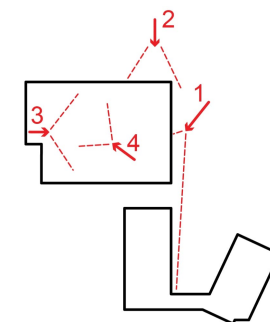
2 | PARTS STOREROOM LOBBY ENTRANCE



3 | MAINTENANCE REPAIR BAYS



4 | MAINTENANCE REPAIR BAYS



2.4 Systems Design and Performance

2.4.1 Civil Site Design Criteria

The design shall be in accordance with local governing standards and requirements. The following standards shall be used to establish minimum requirements. If conflicts exist between the different codes and standards, then the more stringent shall be used.

- California Department of Transportation (Caltrans) Highway Design Manual (HDM)
- Americans with Disabilities Act (ADA) Accessibility Standards
- Yuba County Public Works Improvement Standards
- Yuba County Post Construction Standards Plan
- Permits with the Yuba County, Linda County Water District and PG&E

2.4.1.1 Surveys

A topographical survey of the site including the adjacent roads (reference survey) is provided to show all pertinent existing boundaries, property lines, above- and belowground utilities, easements, and topography. Underground utility location shall be verified by potholing where necessary.

2.4.1.2 Soils, Earth Relocation, and Other Considerations

A geotechnical investigation was performed to gain detailed information regarding surface and subsurface soil conditions. Recommendations from the geotechnical investigation shall be utilized in site development design. The report includes borehole logs, percolation test and recommendation for pavement design.

See Appendix F for the full Geotechnical Report. "Foundation Report". The report shall be considered final. No additional investigation is required unless unexpected ground conditions are encountered during construction or if design changes warrant further geotechnical evaluation.

2.4.1.3 Pavement (Parking Lot, Driveway, Curb, Gutter, Accessibility)

Concrete shall be provided for all driveways and agency vehicle parking areas. Concrete shall also be provided for all fueling positions, vehicle washing, vehicle details, and dumpster areas. Asphalt paving with concrete curbs is sufficient for exterior employee/visitor parking areas. However, the conceptual design drawings provided assume the entire site will be paved with concrete.

Pavement must be sufficient to accommodate heavy bus loading and traffic loading. The bus weights and frequency of pullouts are provided below:

- Dial-A-Ride Small cutaways: 14,200 GVWR; pullouts 20 per day
- Fixed Route Gillig: 39,600 GVWR; pullouts 12 per day
- Commuter Buses: 50,000 GVWR; pullouts 13 per day

The rigid pavement design recommendation in the Foundation Report is based on a Traffic Index of 12.9. Two options with jointed plan concrete pavement. Refer to Table 7 in the Foundation Report for the detailed structural pavement section proposed. The design-builder shall verify such information and confirm bus models with Yuba-Sutter Transit to determine the axle loading for pavement design. The design-builder shall incorporate the findings from the geotechnical report. In line with the Caltrans *Highway Design Manual*, Chapter 610 Pavement Engineering, the pavement design life for new construction and reconstruction projects shall be no less than 40 years; for roadside facilities such as parking lots and rest areas, 20-year pavement design life may be used.

Concrete wheel stops and/or curbs shall be furnished in parking lots only where required for physical protection of buildings, landscaping, fencing, and as needed for storm drainage. The use of curbs shall be limited, allowing as much stormwater as possible to return to the ground. A concrete apron shall be provided for access to all bays, fueling lanes, and vehicle washers. Concrete bypass lanes shall also be provided around these facilities where practical.

Where practical, slopes shall be perpendicular to vehicle parking.

Markings, Street Furniture, and Accessibility

Vehicle parking areas shall include pavement markings, signs, sidewalks, and lighting as required for safe and efficient operations.

White pavement markings shall be painted striping with no projections so that the surface can be easily swept and cleaned. Pavement markings shall be thermoplastic. Low-profile, fully adhered raised pavement markers with reflective surfaces shall be utilized on crosswalks, handicap spaces, and circulation routes. Directional arrows shall be painted on the pavement to guide bus flow and parking. Bollards shall be installed to protect all equipment within the yard from potential bus impacts.

Lighting will be provided either pole-mounted, canopy-mounted, or building-mounted light fixtures to meet lighting level requirements. Light fixtures will be LED, rated IP66, for outdoor applications. Wattage and distribution types will vary based on the lighting application and location. Light fixtures shall comply with dark sky regulations and Title 24 requirements for outdoor lighting. Site lighting level requirements will be as indicated in Table 2-8 and Section 2.4.5.3. The contractor will be responsible for foundation calculations for all the lighting fixtures.

Parking spaces and passenger loading zones shall be provided to comply with Americans with Disabilities Act (ADA) Accessibility Standards and Yuba County Public Works Standards.

High mast and pole-mounted parking lot lighting fixtures shall be equipped with house side shield to minimize glare. House side shields shall also be provided for street lighting along Avondale Avenue.

2.4.1.4 Street Improvements

The proposed site is bordered on two sides by North Beale Road and Avondale Avenue, with direct access planned from both roadways. North Beale Road is a two-lane road divided by a median, with an 8-foot-wide sidewalk along its frontage and one proposed access point to the site. Avondale Avenue is a local roadway, 20 feet wide, with 2-foot gravel shoulders and no existing striping. Two access points are proposed from Avondale Avenue.

The proposed access street and any improvements required for existing streets, shall be designed to conform to applicable Yuba County Public Works Standards and Caltrans Standards and shall be approved by Yuba County. Sidewalks impacted by construction must remain open and operable, or

appropriate signage and detours shall be implemented before disruptions occur. Street lighting design will conform with Yuba County's standard requirements and will conform to Caltrans Standard drawings. Roadway lighting level requirements will be per IESNA RP-08-22.

Service to street lighting shall be via existing street lighting circuit. The existing street lighting circuit shall be intercepted and extend to the proposed street lights as shown on Plans. The existing conductors shall be removed back to the nearest undisturbed junction and replaced with new conductors; exact size and quantity of conductors shall match existing ones removed. The existing point of service along North Beale Road shall be identified in the field.

Load analysis of the existing point of service shall be made to verify available capacity to accommodate the proposed street lighting. Photometric calculations and streetlight plans will be required.

North Beale Road (Roadway Class Minor Arterial)

The existing sidewalk, curb and gutter along North Beale Road will remain in place. A new entrance to the site is proposed at the northeast corner, which will require demolition of the portion of existing sidewalk and will impact pedestrian access during construction. The contractor must coordinate with the County to ensure safe pedestrian access throughout construction activities and obtain any necessary permits to access the site.

Currently, the intersection of Avondale and Beale Road is stop controlled on the minor street. With anticipated traffic increases from the Yuba Transit Facility, a traffic study shall be conducted to determine whether a signalized intersection is warranted at this location. The contractor must coordinate with Yuba County to perform the necessary studies, develop plans, and obtain the required permits. Additional fees will apply.

The existing streetlights along North Beale Street shall remain in place. If any streetlight relocations are required, the contractor must conduct a photometric analysis to ensure compliance with the required lighting performance standards. All lighting fixtures shall meet Yuba County's lighting standards and complement the existing traffic corridor aesthetic. Intersection safety lighting shall be provided and coordinated with traffic signal plans. A new electrical service may be required to support the traffic signal system. This service shall be used to support the intersection safety lighting.

The project requires putting in a bus stop on North Beale Road. An Encroachment Permit and a Grading Permit shall be prepared for any work to be undertaken on the road. Yuba County Public Works Department will review the bus stop location (distance to the intersection), and road and sidewalk improvements through the Encroachment Permit and Grading Permit submission.

Avondale Ave (Roadway Class Local)

Avondale Avenue is a local roadway, allowing for two access points to the site. Initial conversation with Yuba County PW determined it would be appropriate to include and extend curb, gutter and sidewalk on Avondale Ave down to the last entrance to the site. Avondale Ave currently supports concrete truck traffic. Road and sidewalk improvements shall be provided until the last entrance. The improvements shall consider road width that will support trucks and buses in the future and will be reviewed by Yuba County Public Works Department through permit submission. The improvements shall also consider vehicle ingress and egress and turning circles. It is currently assumed that half-width paving will be required, and road widening is not required. The design-builder shall conduct traffic study and review the outcome with Yuba County PW to determine the detailed improvement requirements before detailed plans are developed.

There are currently no streetlights along Avondale Avenue. New streetlighting shall be provided on Avondale Avenue until the last entrance. Lighting shall be equipped with house side shield to avoid disturbing the residents across the street.

Improvement scopes are described as per the above and shown in the site plan. Shall the traffic study and the subsequent Yuba County PW's review have determined more extensive improvement scopes, cost will increase

2.4.1.5 Drainage

Stormwater shall be diverted, collected and conveyed through a combination of site grading, curbs, gutters, pipes, catch basins, bio-swales or other nature-based solutions. Site drainage shall include oil/water separation and retention/detention as required by state and local codes prior to discharge into storm sewer, sanitary sewer, or natural outlet location. Yuba County's Stormwater Management Ordinance requires controls which may include source control measures to prevent pollution of stormwater, treatment controls designed to remove pollutants from stormwater, low impact development measures and/or hydromodification measures to offset the difference between the pre- and post-construction peak flow runoff rates and volumes.

Stormwater Conveyance

To prevent adverse impacts on the downstream system, the development must meet the 100-year storm attenuation capacity. Yuba County Public Works (PWs) has conducted several studies in the area, including:

- As-built East Linda Drainage, Phase I, County of Yuba, October 17, 1977
- North Beale Road Preliminary Drainage Report, Yuba County Public Works Department, January 20, 2012
- As-built North Beale Road – Road Improvements Phase I – Lindhurst to Hammonton – Smartsville, County of Yuba Department of Public Works, February 21, 2017
- Climate Change Vulnerability Report, Yuba County, March 2023

Early engagement with Yuba County PWs identified two potential compliance options specified below. Final approval of the proposed design and peak discharge must be obtained from Yuba County PWs.

- Option 1: Limit impervious surfaces to no more than 40% of the total plot area, as outlined in the North Beale Road Preliminary Drainage Report.
- Option 2: Conduct hydraulic modeling and submit a drainage memorandum demonstrating that the proposed discharge will not exceed system capacity or compromise public safety, particularly downstream.

The current design proposes an impervious area that exceeds the 40% threshold and the assumed peak discharge. Therefore, additional hydraulic studies or enhanced on-site water retention measures—beyond the bio-swales shown in the plans—will be required. The design-builder is responsible for preparing the drainage plans and coordinating with Yuba County PWs to obtain the necessary approvals based on the Final Design of the facility.

Stormwater Quality

The development is categorized as a regulated project. It is required to meet the design standards specified in the State of California Phase II MS4 NPDES Permit as well as the Post Construction Standards Plan Submittal (PCSP) to provide stormwater treatment for a 2-year, 24-hour event. The PCSP is a storm water treatment requirement which is separate from the discharge requirements. The PCSP shall accompany the improvement/grading plan submittal. All storm drains shall be routed to a central sampling point in a location to be agreed with Yuba County Public Works before the tie-in to the storm drain

manhole. The project is also within Reclamation District 784 and requires RD784 review and approval of plans. Erosion and Sediment Control and associated permits will be required. The design builder shall coordinate all necessary deliverables with Yuba County PWs to ensure compliance.

Site Drainage During Construction

Temporary site drainage during construction shall also be managed by appropriate pollution prevention plan and control measures to meet the stormwater management ordinance. Erosion and Sediment Control measures will be required according to Yuba County Standards; this may include erosion and sediment control plans. These plans must identify potential sources of erosion and sedimentation and outline the control measures (BMPs) to be implemented. Contractors must coordinate with Yuba County PWs to ensure that all BMPs are in place before construction begins and are maintained throughout the project duration to prevent sediment from leaving the site.

Site Grading

New pavement grades shall be established with an attempt to maintain a minimal grade of 1.00% (asphalt) and an absolute minimum grade of 0.25% (concrete) in line with Yuba County Public Works standards. Maximum pavement grades shall be limited to 6%. If greater slopes are required, care must be taken to ensure that vehicles will not bottom-out due to abrupt grade changes. Adequate quantities and sizes of catch basins and drains shall be provided to keep paved areas free of standing water during normal rainfall. Building foundation elevations shall be integrated to the site drainage to avoid the need for stairways at personnel entrances and excessive grades at vehicle entrances. Drainage shall always be directed away from buildings and facilities. No off-site water is expected to flow onto the site, and no water shall be draining to adjacent lots. The site grading plan will ensure that all stormwater is managed on-site through appropriate drainage systems, preventing any impact on neighboring properties. For the portion of the site near the levee, please refer to 2.4.1.7. Runoff will flow from the levee towards the site. As shown in C-401 Drainage Plan and Conceptual Proposal section below, an infiltration trench is proposed along the site access road to prevent runoff further drains towards the parking yard. The design builder shall verify the attenuation volume of the trench to ensure its size is adequate to mitigate the flow from the levee and undeveloped portion of the site, to avoid flooding the facility.

If trench and sump grates are to be used, grates are to be a manageable and readily removable size. Do not install equipment and fixtures in such a way as to limit the ability to remove grating for trench and sump cleaning and maintenance.

Conceptual Proposal

The conceptual drainage design is shown in C-301 Grading Plan and C-401 Drainage Plan. The reference design assumes the undeveloped portion will remain a greenfield and therefore, remain pervious. No grading or improvements are proposed under the base scope for the northern part of the parcel (as shown on the site plan). An additional infiltration trench will be built between the boundary of the undeveloped field and the access road to receive surface runoff. The reference design divides the rest of the impervious area into four Drainage Management Areas (DMAs). The runoff from each DMAs follows the site grading and drains into four bioretention basins. Speed bumps are added along the entrances and exits to prevent runoff draining from the nearby roads and to help divert the runoff into the basins. The runoff from the admin building roof and the maintenance building roof drains towards the basins through drainage pipes. The bioretention basins are designed to attenuate and to treat runoff volumes for a 2-year 24-hour storm event. The basins are connected with overflow pipes that drain towards the final sampling chamber. A drainage pipe also links the bottom of the infiltration trench (near the site entrance on Avondale Ave) to the final sampling chamber to prevent overflow during severe storm events. The courtyard area next to the admin building is equipped with underground perforated drainage pipes that divert additional water into the final sampling chamber when soil is saturated. The sampling chamber is connected to the nearby storm drain manhole on Avondale Ave.

A percolation test was conducted in the proposed Bioretention Basin No. 1 area. The test recommended a design percolation rate of 21.3 minute per inch. The bore hole logs showed similar soil composition across the development plot, suggesting a similar percolation rate.

2.4.1.6 Utility

Existing utility plan is included in C-100. The proposed site utilities are shown in C-201.

The project requires a comprehensive approach to utility assessment, coordination, and upgrades. Key underground utility elements/components of the project include stormwater, potable water, firefighting water, irrigation water, sanitary sewer, electrical, and tele-communications. Utilities availability, capacity, and characteristics shall be determined by the detailed design team.

All utility services shall conform to local codes and requirements. All utility services shall be underground, including identified conduits.

The design-builder shall coordinate the proposed tie-in locations with YSTA and the appropriate utility agency. If any additional utility information is required, the design-builder shall request an additional survey. The design-builder shall coordinate with Linda County Water District for tie-in to sanitary sewer and potable water main and Yuba County Public Works for tie-in to storm drain. The Linda County Water District requires a separate tap-in for fire protection. The design-builder is to pay for permit fees and tap-in fees. Utility routing must coordinate with structural to avoid loading paths and structural elements.

The conceptual utility design shows the proposed potable water main tie-in on North Beale Road and the sanitary sewer tie-in on Avondale Avenue. Electrical tap to the utility overhead distribution is assumed to be located near the intersection of Avondale Avenue and North Beale Road, with final confirmation to be provided by PG&E once an application has been accepted and utility planners can confirm. An underground feeder will then run along North Beale Road to an assumed pad-mounted PMH-switch or elbow-box and split to feed the MV switchgear and house power transformer near the maintenance building.

2.4.1.7 Working Near a Levee

The development plot is located adjacent to a levee operated by RD 784. An easement agreement is to be established between YSTA and RD 784, allowing a 20-foot corridor from the toe of the levee for maintenance and operation of the levee. Site fencing can be erected 20 feet away from the toe. Any structures need to be 50 feet away from the toe. The site grading must show free draining away from the levee (no ponding water along the levee).

2.4.1.8 Sound Wall

To mitigate the potential for a sound impact to the adjacent residential properties on the east side of the property, a sound wall is proposed in the current design. The minimum requirements for length along the property line are based on the following:

- In the northeast corner: the wall along the property line must start at least 100' from the new roadway center line; anything within 100' must be protected by a sound wall
- In the southeast corner: identify the line between the center of the southern residential parcel and where 100' to the nearby driveway centerline is located, with the sound wall along the property line that is north of that identified line's intersection with the property line.

The sound wall shall be solid that it will block any sounds with no gaps or openings. Material currently included in the design and cost estimate is a Concrete Masonry Unit (CMU) wall that is 703' in length and 10' tall.

Final Design of the wall will be determined by D/B Contractor based on any design changes conducted, which could include shifting the eastern driveway to the west to move the noise emitters further from the receptors. If the site layout and design changes, the sound wall requirements could change and shall be verified by the D/B Contractor for what height and/or length of soundwall is required.

2.4.2 Structural Design Criteria

2.4.2.1 Design Criteria

Table 2-1: Structural Design Criteria

Criteria Type	Criteria Name	Date
ASCE 7-16	Minimum Design Loads for Buildings and Other Structures	2016
ACI 318-19	Building Code Requirements for Structural Concrete and Commentary	2019
AISC	American Institute of Steel Construction, Steel Construction Manual	15th Edition
AISC 360-16	Specification for Structural Steel Buildings	2016
AISC 341-16	Seismic Provisions for Structural Steel Buildings	2016
AISI S100	North American Standard for Cold—Formed Steel Structural Framing – Design	2016
AISI S240-15	American Iron and Steel Institute, North American Standard for Cold—Formed Steel Structural Framing	2015
AISI S400	North American Standard for Cold—Formed Steel Structural Framing – Lateral Design	2015
AWS D1.1, D1.4, D1.8	American Welding Society—Steel Structural Welding Codes	Current
CBC	California Building Code (CBC)	2022
ER 1110-345-700	Design Analysis, Drawings, and Specifications	30 May 1997
IBC	International Building Code	2021
SDI RD-2017	Standard for Steel Roof Deck	2017
SDI C-2017	Standard for Composite Steel Floor Deck	2017
SDI QAQC-2017	Standard for Quality Control and Quality Assurance for Installation of Steel Deck	2017

Criteria Type	Criteria Name	Date
TMS 402 and 602 (16)	Building Code Requirements for Masonry Structures and Specification for Masonry Structures	2016

2.4.2.2 Overview

This structure is being designed to meet a program that highlights a variety of balanced requirements, including maintenance criteria, office space layouts, and material storage.

The system selected for this structure is intended to deal with multiple conditions. Seismic design will govern many of the design decisions, but wind loading must be considered as well. The maintenance area will have an allowance for special load conditions related to adjustable maintenance platforms that are forecast to be supported from the roof when they are added in future projects. The slabs require trenches and increased slab loading requirements. Trenches shall be sized and sloped as required for any services and drainage criteria identified by architectural or plumbing disciplines. Trench grating covers shall be sized and located to allow ease of access as required.

All the above are challenges that must be met, without compromising on the importance of keeping to a construction budget and maintaining the overall schedule. For these reasons, a structural steel framing system with special concentric braced frames and shallow foundations (with accommodations for frost depth where applicable) is the system chosen. A special moment-resisting frame system is not currently being shown but may be considered at the connection between the office buildings if needed. Additionally, this system may be required at the high bay maintenance area if brace frames in line with the overhead doors are not possible. Roof height and diaphragm continuity will impact these decisions.

Steel support beams and angles or nosing shall be imbedded in the trench or sump mouth to support the trench covers and prevent trench wall spalling. Trench and sump walls and floor finishes shall be epoxy coated to prevent excursions of the piping fluids into or through the concrete.

Provide bulkheads and/or separation walls and doors between vehicle and non-vehicle areas.

The elements of the structure are identified in the following sections. These selections are intended to meet the challenges above and help ensure that the project meets all project requirements in the most flexible and cost-effective manner possible.

2.4.2.3 Building / Structure Type

The site will include two distinct buildings. One building has its primary focus on maintenance, storage, and related tasks. The other structure is more administrative with office spaces and similar supporting areas. See other discipline sections for specific program layouts and requirements. Associated ancillary structures include pre-engineered shade canopies to support PV panels and small site structures (where shown in Project Drawings for initial build out).

Given these criteria, both structures are steel structures using hot rolled steel or open web joists for roof framing and special concentric brace frames as the main lateral system. Roof members support a steel deck roof diaphragm. Shallow foundations make up the substructure system. If a sawtooth roof or similar discontinuous roof is selected for the maintenance areas, an additional horizontal diaphragm of steel members is expected.

Roof live loads are typical for a non-occupied roof at 20 pounds per square foot (psf) with design for concentrated loads as required to support equipment and related hanging structures. Floor live loads range from 100 psf (typical office and corridor spaces on the first floor) to 250 psf (heavy storage and maintenance spaces as applicable) depending on the occupancy and use of the specific spaces.

2.4.2.4 Substructure General Requirements

This site is not known to have any specific frost conditions, but the geotechnical report did note that minor settlement of up to 2.5" due to liquefaction following a seismic event may occur. It is expected that the standard foundation type for this project will be a shallow foundation system, with continuous perimeter and grade beams at the braced and/or moment frames. Foundations will meet local building code requirements. Control joints in the ground floor slab shall be spaced to mitigate cracking concerns.

Civil grade variations must be considered and addressed in the foundation design process.

2.4.2.5 Superstructure and Roof General Requirements

The new buildings will be designed to comply with the 2021 IBC and 2019 CBC as modified by local code requirements. The facility will be designed to Risk Category II, as it is not currently required, by function or occupancy, to be treated as an essential or critical facility by the IBC definitions. See 2021 IBC, Table 1604.5 for Risk Category descriptions. Design loads will refer to 2021 IBC as applicable for minimum floor live loads, ground snow loads, wind speeds, and seismic data. The design must include all design loads, engineering material properties, and structural calculations into the design analysis. These shall be shown on construction documents for reference.

The structural system consists of a steel gravity frame (beams and/or open web joists), steel lateral frames (braced and/or moment), and roof deck that spans to the beams/joists. The roof system is to be designed for live/snow load, wind uplift, seismic diaphragm considerations, and typical gravity loading. The roof deck is metal as required for live and seismic loads. The diaphragm shall be sized and lateral force-resisting braces located so that the deck will be sufficient without the addition of rod bracing.

Roof loading will include typical live load and may include support for rooftop equipment.

Use of open frame structural members will facilitate air movement and prevent accumulation of flammable gases.

The exterior wall finish will be a metal panel system as indicated by the architectural section. In areas where maintenance activities are occurring, a durable partial height wall will be used at the building interior to protect walls and framing from incidental damage. Cold-formed metal stud supports or girts shall be sized and spaced as deemed necessary to meet wind loading requirements.

A 5-inch ground-bearing slab at the offices and similar occupancies is expected. A thicker slab (between 8 and 12 inches) may be required where large storage and maintenance activities occur. Final slab design shall include provisions to address increased loading for wheeled traffic, any allowances for trenches, and flatness criteria where applicable.

All construction material and testing must be specified to the American Society for Testing and Materials (ASTM) standards in accordance with IBC/CBC requirements. The design must follow and address minimum concrete clear cover requirements and take steps to address galvanic action/corrosion.

Table 2-2: Proposed Materials

Structural Material	Strength
Reinforced Concrete Footings, f'c	5,000 psi NW
Concrete exposed to weather, f'c	5,000 psi NW
All other Concrete, f'c	4,000 psi NW
Structural Steel, fy	50 ksi
Concrete Reinforcement, fy	60 ksi

f'c = compressive strength of concrete after 28 days | NW = normal weight | fy = yield stress | ksi = kips per square inch | psi = pounds per square inch

2.4.2.6 Seismic and Wind Design Requirements

As noted in a previous section, this facility will be classified as Risk Category II, which is used to identify standard structures without a code requirement to be considered a Critical or Essential Facility in regard to service immediately following a design level wind or seismic event. The design parameters reflect typical design requirements for similar structures in the region. Per the American Society of Civil Engineers (ASCE) Design Hazard Map tool and the geotechnical report, the seismic design must account for an $S_1 = 0.247g$ and an $S_s = 0.516g$. The soil site class is D according to the geotechnical report. With the design spectral accelerations, it is expected that this will trigger a Seismic Design Category of C. As the S_1 value is less than 0.3, a site-specific response spectra may not be required.

The design wind speed is 94 miles per hour using Exposure C per accepted Hazard Data website resources. These resources include the ASCE Hazard Design Tool (ascehazardtool.org). These design values are considered a minimum, and the design team shall account for other design criteria as required.

Lateral loads will be resisted by a system that incorporates metal deck on steel framing to act as a diaphragm that carries the loads to a vertical system that utilizes both special concentric braced frame and special moment resisting frames where required. The frames occur at the perimeter and at selected interior grid lines. Foundations will be designed to accommodate these lateral load forces (including uplift) in addition to the standard gravity forces. Braced frames are the preferred lateral system where allowed by building geometry due to cost and performance advantages. It is recommended that buckling restrained brace frames may be considered in lieu of special concentric brace frames for improved performance and durability and to limit downtime in the event of a large seismic event.

2.4.2.7 Structural Antiterrorism Requirements

Not applicable.

2.4.2.8 Special Structural Requirements

Large equipment, maintenance structures, and storage areas will be required in some parts of these structures, resulting in larger beams and additional seismic considerations. The current design accounts for these concentrated areas of mass.

Design of roof steel provides an allowance for special maintenance platforms to be suspended from the roof to provide flexibility for bus placement within the maintenance bays. The maintenance platforms themselves are not a part of this current program; the intent is to have them installed in a future project. Roof beam sizing, placement, and lateral support are influenced by these platforms and their function. Structural considerations must account for the dynamic loads imposed by these platforms during operation, including any potential seismic activity.

Additionally, the platform design shall incorporate fall protection and arrest systems as part of the safety criteria, ensuring compliance with occupational safety standards for personnel working on or near the platforms.

The design will include seismic bracing to ensure stability in the event of an earthquake. The roof beams and lateral support systems must be sufficiently robust to handle both the static and dynamic loads. The lateral system and columns shall factor in crane system requirements for any equipment handling or heavy lifting that may occur during maintenance.

Structural members shall be provided with corrosion-protective coatings based on the functions of the spaces in which they are exposed. Exposed joists and other structural members shall be provided with ample future loading for miscellaneous support loads.

Snow loading is not considered to be a critical loading condition. Ground snow load design value is designed to be 8 psf at allowable design levels. A minimum roof live load will govern this condition even when load reductions are considered.

Exterior isolated canopies are identified in the program. These canopies can be prefabricated and provided to meet performance requirements identified by the design team that are suitable for the purpose of acting as a weather -protective shelter for vehicles with a deck on top with additional dead load and live load capabilities. The canopies will include a metal deck on top of the steel or may use a similar material to act as a vertical covering and lateral diaphragm; this roof system must have an allowance for dead load and live load support. The dead load shall have an allowance for 10psf of collateral load in addition to self-weight of the structure. The live load shall provide for a typical 20 psf allowance commensurate with a typical roof load condition. The canopies must also be capable of resisting wind and seismic forces as dictated by the building code.

2.4.3 Mechanical Design Criteria

2.4.3.1 General Information

This section describes the general expectations of the HVAC systems for this project. The information in this section includes applicable criteria, concepts, and objectives.

The final HVAC system types, configurations, and quantities shall be incorporated as described within this document and be in alignment with the proposed phasing plan to be determined at later design stages.

2.4.3.2 Codes, Regulations, and Standards

The systems shall be designed in accordance with local governing codes and requirements. In addition to local governing codes and requirements, the following standards shall be used to establish minimum system requirements. If conflicts exist between the different codes and standards, then the more stringent shall be used.

Codes:

- CBC, 2022 Edition
- California Mechanical Code (CMC), 2022 Edition
- California Energy Conservation Code (Title 24), 2022 Edition
- California Green Building Code, 2022 Edition
- California Energy Code, 2022 Edition

Standards:

- American National Standards Institute (ANSI)
- ASTM
- American Society of Mechanical Engineers
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- Sheet Metal and Air Conditioning Contractors' National Association
- NFPA 90A, Installation of Air-Conditioning and Ventilating Systems
- ASHRAE 15-2022, Safety Standard for Refrigeration Systems
- ASHRAE 55-2020, Thermal Environmental Conditions for Human Occupancy
- ASHRAE 62.1-2022, Ventilation for Acceptable Indoor Air Quality
- Occupational Safety and Health Administration (OSHA)
- Underwriters Laboratories, Inc. (UL)
- ADA
- National Institute for Occupational Safety and Health Guidelines

2.4.3.3 Energy and Sustainability Design Concepts

The mechanical systems shall be provided in compliance with the 2022 California Energy Code for Climate Zone 11 as well as the 2022 California Green Building Code. This approach shall be used for demonstrating compliance with the energy code and as a baseline for energy performance measure analysis. The building HVAC system shall be designed to be as energy efficient as possible while keeping factors such as maintenance, initial cost, and feasibility in mind. The following concepts are planned to be implemented into the project:

- Variable Refrigerant Flow (VRF) Air conditioning systems
- Dedicated Outdoor Air Systems (DOAS)
- High-efficiency rooftop packaged units (RTU)
- MERV 13 filters for HVAC equipment
- Airside Economizer

- Airside Energy Recovery
- Variable Speed Fans
- Variable Speed Compressors
- Building Energy Metering
- Refrigerant Energy Recovery
- High Efficiency Motors
- Duty Cycling of HVAC systems (rotating “off” periods)
- Deman Load Shedding Controllers for Non-Essential HVAC Motors

The following concepts require further evaluation for inclusion into the project:

- Demand Controlled Ventilation
- Duct Static Pressure Reset
- Supply Air Temperature Reset

2.4.3.4 Seismic Protection

The site has a Risk Category of II and a Seismic Design Category of D and, therefore, requires seismic restraints of mechanical systems. Seismic protection shall be designed in accordance with the direction provided on the structural engineering documents.

2.4.3.5 Design Criteria

Outdoor Design Conditions

The project site is located in Marysville, California. Per the 2022 California Energy Code, the site is in Climate Zone 11 and at an elevation of 60 feet. The outdoor design conditions will be based on the latest published version of the California Energy Code—Title 24 Design Day Data for California Cities data. The buildings shall be designed to accommodate the 1% value for the summer design dry bulb/wet bulb temperatures. The winter median of extremes value for the winter design dry bulb/dew point shall be used. Any other weather-related design criteria shall follow ASHRAE handbooks.

Table 2-3: 2022 California Energy Code—Title 24 Design Day Data for California Cities: Marysville

Design Day Data	
Latitude	39.2° N
Longitude	121.6° W
Elevation	60 Feet
Cooling Dry Bulb / Mean Coincident Wet Bulb (MCWB) (1% values)	101°F / 70°F

Design Day Data

Design Wet bulb (0.50% value)	72°F
Heating Dry Bulb (Winter Median of Extremes)	27°F

Source: 2022 California Energy Code—Title 24 Design Day Data for California Cities

Indoor Design Conditions

All space temperatures shall be controlled to $\pm 2^{\circ}\text{F}$ of the setpoint table.

Table 2-4: Space Temp Setpoint Table

Space Type	Space Temp Summer (Deg °F)	Space Temp Winter (Deg °F)	Space Humidity (%RH)
Administrative Office Spaces	75	70	60% max
Conference/Meeting Room	75	70	60% max
Restrooms	75	70	60% max
Office Area Break Room	75	70	60% max
Electrical Rooms	78	60	--
Mechanical / Support Rooms	80	60	--
Fire Riser Room	--	50	--
Maintenance Bay	--	55	--
IT/AV/Comm Room	75	68	60% max

Source: AECOM 2025

Indoor Relative Humidity

During the cooling cycle, the relative humidity shall not exceed 50%, coincident with the maximum inside temperature. No active humidity control is anticipated. Instead, humidity control is passively managed via air conditioning coils. As such, the intent is to maintain the humidity range between $\pm 10\%$ for regularly occupied spaces.

Building Pressurization

The building shall be maintained positively with respect to outdoors when the HVAC system is operating. The indoor pressure with respect to outdoors shall be maintained between 0.01 and 0.05 inches w.c. through either an airflow or a differential pressure offset relative to the exterior. The relative relationship of interior spaces, with respect to other interior spaces, shall be neutral, except toilet rooms and janitor closets shall be negative with respect to adjacent spaces.

Positive pressure must be maintained in all offices and break rooms adjacent to repair bays to preclude migration of fumes into these areas. Ventilation of repair bays shall include a portion of supply air inlets near the floor and exhaust inlets near the ceiling.

Outdoor Air Ventilation

Ventilation air shall be provided per the 2022 CMC or the 2022 California Energy Code—Title 24, whichever is more stringent. The ventilation design assumes that all indoor heated, ventilated, and/or cooled spaces are nonsmoking areas. There are no provisions for smoking indoors. Careful consideration shall also be made to provide enough ventilation to account for exhaust air plus air for building pressurization.

Outside air intakes shall be away from sources of contamination, odors, and exhaust sources. A minimum separation distance of 10 feet between outside air intakes and exhaust air sources shall be maintained.

Supply Air Ventilation

The design supply air ventilation to each space shall be the greater of:

- The calculated sensible cooling load using a 20°F temperature difference between the supply air and the room air.
- That is required to comply with ASHRAE 55.

Exhaust Air Ventilation

The design exhaust air ventilation rate for toilet rooms and janitor closets shall be provided per the 2022 CMC.

Noise Control

Noise control shall be designed to limit the ambient sound levels caused by the HVAC systems to the Noise Criteria (NC) levels indicated by the ASHRAE *HVAC Applications Handbook* for a specific space type. In general, sound levels for the various areas are indicated below:

- Offices: NC 30
- Conference Rooms: NC 30
- Lobbies, Corridors, and Waiting Areas: NC 40
- Public Spaces: NC 40-45

All ducts, pipe, and conduit penetrations shall be sealed airtight to limit sound propagation. All fluid-carrying pipe (liquid or gas) routed above or through noise sensitive spaces shall be provided with commercially available resilient connectors.

Close coordination will be required to reduce noise levels for equipment installed at the exterior of the buildings to reduce impacts to the nearby neighborhood. Additional noise abatement considerations shall be determined at later design stages.

Vibration Isolation

Spring and/or neoprene isolators shall be provided for all HVAC equipment with rotating parts, excluding packaged equipment with internal isolation. Provide flexible duct, piping, and conduit connections at all equipment with external isolation. All piping connected to externally isolated equipment shall have spring-isolated piping hangers for a minimum of 50 feet horizontal from the equipment served. Piping installed below or adjacent to noise sensitive areas shall be supported on spring and neoprene hangers or mounts as applicable. Mechanical equipment shall not be located above meeting/conference rooms or noise-sensitive areas.

Equipment Access

Equipment access shall be properly evaluated, including required access doors in locations containing hard ceilings, chases, and/or shafts, to provide a pathway for maintenance and inspection of equipment, valves, and dampers. Equipment maintenance requirements, including pull spaces for equipment/component removal and reinstallation, shall be considered during space planning and design.

2.4.3.6 Heating, Ventilation, and Air Conditioning System Requirements

Air handling central systems shall be provided as scheduled on plans. Refer to area-specific requirements section below for additional information. The following information is provided for reference only and shall be verified in later design phases.

Table 2-5: Air Handling Equipment Schedule

Mark	Areas Served	Tons	CFM	Unit Type
RTU-1 (Option 1)	Administration Building	19	8000	MZ VAV - CC, HGHR, HP
RTU-2 (Option 1)	Operations Building	22	8750	MZ VAV - CC, HGHR, HP
RTU-3 (Option 1)	Maintenance Building	18	7100	MZ VAV - CC, HGHR, HP
DOAS-1 (Option 2)	Admin/Operations Building	15	3810	PH, CC, HGRH, HP w/ Energy Recovery
DOAS-2 (Option 2)	Maintenance Building	7	1675	PH, CC, HGRH, HP w/ Energy Recovery
VRF-1 (Option 2)	Administration Building	15	-	VRF – HRHP
VRF-2 (Option 2)	Operations Building	16	-	VRF – HRHP
VRF-3 (Option 2)	Maintenance Building	13	-	VRF – HRHP

Unit Type Notes

System Operation:

MZ VAV—Multizone Variable Volume with zone level Terminal Units

SZ VAV—Single-Zone Variable Volume

Mark	Areas Served	Tons	CFM	Unit Type
CV—Constant Volume				
VRF—Variable Refrigerant Flow				
<u>Unit Features:</u>				
PH—Preheat Coil				
CC—Cooling Coil				
RH—Reheat Coil				
HR— Exhaust Air Heat Recovery				
HGR— Hot Gas Reheat				
HP—Heat Pump				
HRHP—Heat Recovery Heat Pump (requires Branch Control Boxes)				

2.4.3.7 Heating and Cooling Loads

Internal Design Loads

Lighting

The anticipated general lighting power density is indicated below. These values shall be compared against equipment data sheets during later design phases, and the higher value shall be used to calculate the space cooling load.

- Office areas: 0.60 watt/square foot
- Support rooms: 0.40 watt/square foot
- Telecom equipment rooms: 0.40 watt/square foot

People

The heat generated due to people shall be based on ASHRAE values for the various areas being occupied. The density of people for various functional areas shall be defined based on the proposed floor plan, overall square footage, and proposed seating.

User Equipment

The density of heat generated due to user equipment is indicated below. These values shall be compared against equipment data sheets during later design phases, and the higher value shall be used to calculate the space cooling load.

- Office areas: 0.5 watt/square foot
- Conference room: 1 watt/square foot.
- Break room: 2.5 watts/square feet.

- IT/AV/Comm Room: 25 watts/square feet

Building Envelope Thermal Performance

The building envelope will be provided in compliance with the 2022 California Energy Conservation Code (Title 24) for Climate Zone 11. This approach shall be used for demonstrating compliance with the energy code and as a baseline for energy performance measure analysis.

2.4.3.8 Cooling Systems

General Heating, Ventilation, and Air Conditioning System Description

The preferred system type to serve the administrative and regularly occupied project areas include utilizing VRF systems. Alternatively, rooftop packaged HVAC units (RTUs) for mechanical heating and cooling as described below shall also be considered. Cooling shall be provided by direct expansion (DX) systems utilizing condensing units with refrigerant compressors. Although use of VRF systems is preferred, staged equipment shall also be acceptable. A minimum of three stages of mechanical cooling per system shall be provided for capacity modulation and load matching. Condensing units shall be air cooled. Condenser coils shall be provided with hail guards for protection from damage.

Generally, the Maintenance Building work areas shall be heated and ventilated only.

Heating may be provided via heat pump operation of DX system or electric heating coils where allowed per local code.

Variable Refrigerant Flow

Air-cooled condensing units mounted outdoors shall be connected to multiple indoor fan coil units (FCUs) with refrigerant piping. Systems will provide both heating and cooling operation to spaces through heat pump operation.

Systems serving areas with simultaneous heating and cooling needs will be provided with heat recovery units with branch controller boxes to allow for the transfer of heat between spaces.

Outdoor Condensing Units

Condensing units to be provided with hail guards.

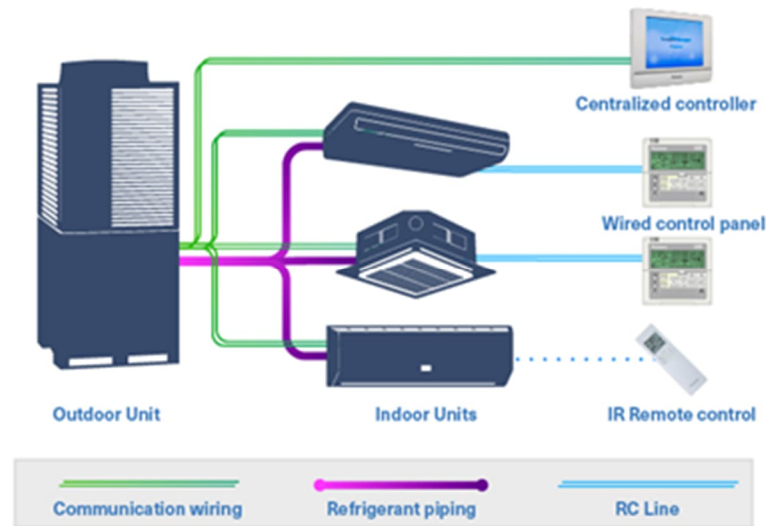
Indoor Fan Coil Units

FCUs will be provided with filters, DX coil with drain pan, supply fan, and unit-mounted controls.

Concealed, ducted units shall be provided in areas with ceilings. Units will be ducted to ceiling diffusers to deliver air to the spaces served. Wall-mounted units can be provided in IT/AV spaces, electrical rooms, storage rooms, and other back of house areas without ceilings. Other FCU types (i.e., ceiling mounted, floor console, surface mounted, vertical AHU, etc.) can be considered based on the overall space configuration requirements. FCUs may be provided with electric duct heaters as needed for space heating if allowed per local code.

- Outdoor ventilation air shall be provided as described below to meet space ventilation requirements. Multiple strategies may be utilized as needed.
- A DOAS will deliver ventilation air directly to each ventilation zone or to indoor FCUs.
- VRF outdoor air processing units will deliver ventilation air directly to each ventilation zone or to indoor FCUs. Outdoor air processing units will be connected to dedicated VRF CUs.
- A dedicated outdoor air supply fan will be ducted from an outdoor intake louver directly to indoor FCUs.
- Outdoor air will be ducted directly to indoor FCUs via outdoor intake louvers.

Figure 2-46: VRF System Schematic



Variable Refrigerant Flow System Schematic

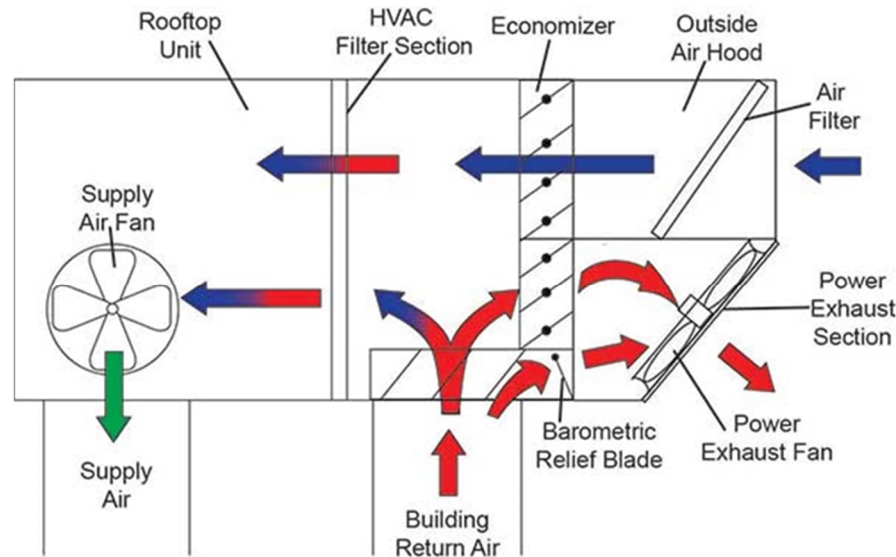
Packaged Rooftop Units

Units shall be provided with exterior-rated casing with insulation, piano-hinged access panels/doors, pre-filter section, final filter section, supply fan(s) with VFDs, mixed-air section, sound attenuation section (if required), return air fans with VFDs (if required), powered exhaust air fans with VFDs (if required), cooling coil with drain pan, economizer operation, and unit-mounted direct digital control (DDC). Units shall be mounted on roof curbs. Units shall be provided with factory-mounted low leakage return air and outside air control dampers. Outside airstreams shall be provided with airflow monitoring stations for ventilation air control and outside air flow verification. Space ventilation air shall be provided through the RTU outside air intake opening. Rooftop units may be of the single zone variable air volume or multizone variable air volume type. Temperature control for the spaces shall be accomplished using zone dampers for similar exposures and/or room types.

Single-zone variable air volume (VAV) RTU systems shall modulate supply airflow and heating/cooling to meet space temperature and humidity requirements. Multizone VAV RTU systems shall modulate supply airflow and heating/cooling to meet supply air temperature and pressure setpoints. RTU supply air shall be ducted to zone terminal units (VAV, fan-powered, etc.) for space temperature and humidity control.

Rooftop Packaged Unit Schematic

Figure 2-47: Rooftop Packaged Unit Schematic



Indoor Fan Coil Units

FCUs shall be provided with filters, DX coil with drain pan, supply fan, and unit-mounted controls. Concealed, ducted units shall be provided in areas with ceilings. Units shall be ducted to ceiling diffusers to deliver air to the spaces served. Wall-mounted units shall be provided in IT/AV spaces, electrical rooms, storage rooms, and other back of house areas without ceilings. Heating shall be provided via heat pump operation. Use of electric duct heaters for space heating shall be avoided as best possible.

Outdoor ventilation air shall be provided as described below to meet space ventilation requirements. Multiple strategies may be utilized as needed.

- A DOAS shall deliver ventilation air directly to each ventilation zone or directly to the indoor FCUs.
- A dedicated outdoor air supply fan shall be ducted from an outdoor intake louver directly to indoor FCUs.
- Outdoor air shall be ducted directly to indoor FCUs via outdoor intake louvers.

- Units with ducted outside air for ventilation shall be provided with mixing box with outside air motorized control damper.

Terminal Units

Supply Air Terminal Units

VAV units shall be provided for each temperature control zone on multizone VAV air handling systems with the following features:

- Pressure independent type with DDC control package
- Integral disconnect switch
- Zone sizing criteria:
 - o Max 2500 CFM per box
 - o Maximum of 2 individual use spaces, such as offices, per box
 - o Dedicated box per multi-use space, such as conference room, meeting room, etc.

Fan-powered units shall be provided for each temperature control zone with exterior exposures on multizone VAV air handling systems with the following features:

- Series type units
- ECM fan motor
- Pressure independent type with DDC control package
- Integral disconnect switch
- Zone sizing criteria:
 - o Max 2500 CFM per box
 - o Maximum of 2 individual use spaces, such as offices, per box
 - o Dedicated box per multi-use space, such as conference room, meeting room, etc.

Split Direct Expansion Systems

Provide an independent split DX system to serve IT rooms. Systems shall be sized to serve the cooling load in the room and maintain a 75-degree temperature. A/C systems serving main/large IT rooms shall be provided with N+1 redundancy. Smaller/satellite IT rooms shall be provided with cooling via the base building system and an exhaust fan to provide tempering during periods where cooling is not available. The electrical power source for the split A/C systems that serve these rooms shall be supplied by the emergency power distribution system integrated into the facility.

Air Devices—Diffusers, Grilles, and Registers

Devices shall be selected for a maximum pressure drop of 0.1 inch and maximum NC of 30.

Air devices mounted in hard ceilings or other similar assemblies without permanent access shall be provided with cable-operated dampers in the branch duct. Cable-operated dampers will be provided with adjustment from the face of the device via cable operator mounted to device.

Various types of diffusers are to be considered based on architectural input. Consideration shall be given to quality, durability, capacity, aesthetics, throw, and noise level. Linear slot diffusers shall be individual, 4-foot maximum sections with individual insulated supply air plenums. Air device types shall be determined in later design stages.

Maintenance Area Cooling Equipment

Portable spot cooling equipment via the use of portable swamp coolers shall be provided for the maintenance areas. These units shall provide for a velocity of 200 feet per minute (FPM) across the worker. Additionally, wall- or column-mounted circulations fans shall also be provided for the maintenance area for air circulation throughout the space.

2.4.3.9 Heating Systems

RTUs may be equipped with heat pump heating coils or electric heating coils where permitted per code to provide space heating. The fire riser room shall include a wall-mounted electric cabinet heater for freeze protection. Hydronic baseboard heaters may be provided at exterior glazing locations. Baseboard heaters shall be controlled by the Building Automation System (BAS).

Maintenance Area Heating Equipment

In addition to overall space heating equipment, the maintenance area shall be provided by infrared space heaters for localized heating provisions. The fuel dispensing bay shall also include heating at the canopy level for localized heating provisions. The bus washer area shall also include infrared space heaters for localized heating in addition to space heating equipment. Due to the high ventilation rate needed to make up exhaust air, supplemental heat may be necessary to maintain comfort. Using the infrared type reduces excessive heat loss by heating surfaces rather than dumping the heat into the air.

2.4.3.10 Heating, Ventilation, and Air Conditioning System Requirements

Primary air handling units serving occupied spaces shall be provided with 2-inch-thick MERV 8 pre-filters, upstream of 2-inch-thick MERV 13 filters. FCUs serving occupied spaces shall be provided with MERV 13 filters. FCUs serving unoccupied spaces shall be provided with MERV 8 filters.

Supply and/or return air duct smoke detectors shall be provided on each air handling unit that is over 2,000 CFM or shares a common air plenum over 2,000 CFM as required by local code. All HVAC units with cooling capability shall be provided with an auxiliary drain pan with flood detector for unit shutdown and BAS alarm. All outdoor air, exhaust air, and relief air ducts shall be provided with a motorized control damper for positive shutoff from the outdoors.

The return air path for the facility shall be ducted at minimum to each level or zone served. The maximum velocity for the return air system shall be 500 FPM. Shafts shall not be utilized as air pathways. Z- or U-type transfer boots sized at 350 FPM shall be provided in walls above all spaces to communicate with the common plenum.

Life Safety Dampers

- Fire dampers (UL555) shall be provided at all duct penetrations of fire-rated wall and floor assemblies.

- Smoke dampers (UL555S) shall be provided at all duct penetration of smoke-rated wall and floor assemblies.
- Fire/smoke dampers (UL555/555s) shall be provided at all duct penetrations of shaft walls, shaft floors, egress corridors, elevator hoist ways, and other locations as required by code.
- Access shall be provided through walls, floors, ceilings, and ducts as required for maintenance of life safety dampers.
- Damper materials shall match adjacent duct construction.
- Smoke and fire/smoke dampers shall be provided with electric actuator, end switches, test switch, and smoke detector.

2.4.3.11 Outside Air Systems

Outdoor air shall be pretreated (filtered and conditioned) before it enters the building via the air handling units. The outdoor air shall be drawn into each air handling unit after being mixed with building return air and passing through the filters and cooling/heating coil sections. Alternatively, outdoor air shall be delivered directly to the occupied zone as previously described.

Outside air intakes shall be located high and away from landside vehicle traffic to the greatest extent possible, a minimum of 7 feet above grade. In addition, provide the following minimum separation distance between exhaust outlets and outside air intakes as indicated on the following table.

Table 2-6: Minimum Separation Distance Between Exhaust and Outside Air Intake

Exhaust Discharge	Distance to Nearest Outside Air Intake (feet)
Fan Exhaust	10
Plumbing Vents	10
Generator Stack	25

Source: AECOM 2025

The duct pressure class shall be as follows:

- Outdoor Air Ducts: 2 inches water gauge (wg), negative pressure
- Outside air ductwork will be sized at 0.08-inch wg per 100 feet of duct, unless otherwise directed.

2.4.3.12 Supply Air Systems

Ductwork shall be constructed of G-90 galvanized sheet metal. The pressure class rating of the ductwork shall exceed the maximum operating pressure of the system. For supply air ductwork upstream of VAV units, the pressure class shall be 3 inches, and all other supply ductwork shall be 2 inches. Ductwork shall be sealed to limit the air leakage to less than 1% of the system airflow. UL listed Class 1 or 2 flexible ductwork, a maximum of 5 feet long, shall be permitted to connect air outlets located in accessible ceilings.

Duct systems shall be provided with fire and smoke dampers, as required where penetrating fire-rated assemblies.

Duct systems shall be provided with duct accessories including but not limited to volume dampers, access doors, flexible connections, instrument test ports, and other accessories required to comply with codes and standards and as necessary to make the system complete and functional.

The duct pressure class shall be as follows:

- Supply Air Ducts: 3 inches wg
- Primary Supply Air Ducts (upstream of terminal boxes): 4 inches wg
- Secondary Supply Air Ducts (downstream of terminal boxes): 2 inches wg
- Return Air Ducts: 2 inches wg, negative pressure

All medium-pressure ductwork shall be sized based on the static regain method. All low-pressure ductwork shall be sized using either the static regain method or the equal friction method. Ductwork air velocities and characteristics shall not exceed the following limits:

- Mains (equipment rooms and non-occupied spaces): 3000 FPM
- Mains (occupied spaces): 2000 FPM
- Branch (or mains w/diffuser connection): 1200 FPM
- Branch with diffusers: 1000 FPM
- Aspect ratios shall not exceed 4:1 for mains.

2.4.3.13 Exhaust Air Systems

The exhaust rate for all toilet room facilities shall be based on the 2022 CMC.

Toilet rooms and janitor closets shall be exhausted through exhaust ducts via roof-mounted exhaust air fans. The fan(s) shall be furnished with a backdraft damper to provide closure from outdoors when the fan is not operating and shall be software interlocked to operate when the rooftop unit serving the space is operating. Air being exhausted shall enter ceiling-mounted perforated face diffusers in areas with ceilings or sidewall registers in areas without ceilings.

The duct pressure class shall be as follows:

- Exhaust Air Ducts: 2 inches wg, negative pressure
- General exhaust ductwork will be sized at 0.08-inch wg per 100 feet of duct, unless otherwise directed.

Repair and inspection areas shall be ventilated by at-floor exhaust and shall conform to the ventilation requirements of NFPA 513 and NFPA 30A. These systems will remove vapors that are heavier than air. Provide smoke, carbon dioxide, and nitrogen oxide detectors in vehicle areas to adjust ventilation rates in response to vehicle activity.

2.4.3.14 Vehicle Emissions Management System

A Vehicle Emissions Management System (VEMS) will be provided for all enclosed areas where vehicle operation is expected. The VEMS will consist of a main control panel with BAS interface, remote carbon monoxide and nitrogen dioxide gas sensors, exhaust fan(s), makeup air fan(s), or natural makeup air via wall-mounted intake louvers or roof-mounted gravity intake hoods. All fans will be provided with VFDs for variable airflow operation to reduce airflows during low-use periods. Enclosed vehicle areas will be exhausted at a rate of 0.75 cubic feet per minute per square foot as required by code.

A vehicle source capture system for engine emissions shall also be provided to capture exhaust gases directly at the point of release. The system shall consist of high-temperature-resistant flexible hose assemblies equipped with tailpipe adapters, compatible with the anticipated range of vehicle exhaust configurations. Economies shall be reviewed for service of many exhaust reels by a single, variable speed exhaust fan as compared to multiple exhaust fans (i.e., one per reel). The system shall be designed to comply with applicable ASHRAE and OSHA standards, with airflow rates and system components selected to accommodate the expected vehicle types, exhaust temperatures, and maintenance operations while maintaining energy efficiency and operational reliability.

2.4.3.15 Controls

The building shall be provided with a fully automated BAS with DDC for all HVAC equipment. The BAS system shall be an open protocol, web-based setup capable of being adjusted/monitored through a web-based application. The system shall be password protected but can be adjusted from any computer with an internet connection. The system shall be graphical in nature and represent the as-built building floor plan and be able to monitor and control all pieces of equipment. Zone level thermostats shall be sensors only with controllers.

An Energy Management Control System shall also be provided to complete the following:

- Ability to conform to peak load criteria for energy cost savings.
- Conduct automated equipment maintenance scheduling, resulting in lower anticipated equipment life cycle costs.
- Monitor equipment performance to be within acceptable limits.
- Identify utility usage patterns.
- Identify and implement temperature setbacks corresponding to occupancy and utilization patterns.
- Identify and implement uniform and limited control of temperature settings.
- Provide filter performance monitoring and replacement pattern data accumulation.
- Ability to monitor and record indoor and outdoor conditions affecting HVAC systems, as well as alarms, failures, and abnormal operating conditions.
- Ability to automatically control selected equipment such as condensing units, air handlers, fans, heaters, and automated dampers, as well as lighting in selected areas.
- Ability to perform energy accounting by displaying/recording electrical load.

2.4.4 Plumbing Design Criteria

2.4.4.1 General Information

This section describes the general expectations of the plumbing systems for this project. The information in this section includes applicable criteria, concepts, and objectives.

All plumbing components shall be lead-free and comply with NSF 61. The plumbing system shall include plumbing fixtures, potable cold and hot water piping and insulation, potable water heating equipment, sanitary waste, drain and vent piping systems, roof drain systems, and other process water piping and equipment within 5 feet of the building.

2.4.4.2 Codes, Regulations, and Standards

The systems shall be designed in accordance with local governing codes and requirements. In addition to local governing codes and requirements, the following standards shall be used to establish minimum system requirements. If conflicts exist between the different codes and standards, then the more stringent shall be used.

Codes

- CBC, 2022 Edition
- California Plumbing Code (CPC), 2022 Edition
- California Energy Conservation Code (Title 24), 2022 Edition
- California Green Building Code, 2022 Edition
- California Energy Code, 2022 Edition

Standards

- ANSI
- ASTM
- American Society of Mechanical Engineers
- American Society of Plumbing Engineers
- NFPA 54, National Fuel Gas Code, 2021 Edition
- National Sanitation Foundation 61, Drinking Water System Components—Health Effects, 2022 Edition

2.4.4.3 Energy and Sustainability Design Concepts

The plumbing systems shall be provided in compliance with the 2022 California Energy Code for Climate Zone 11, demonstrating compliance with the energy code and as a baseline for energy performance measure analysis. The building plumbing system shall be designed to be as energy efficient as

possible while keeping factors such as maintenance, initial cost, and feasibility in mind. The following concepts are planned to be implemented into the project:

- High-efficiency water heaters
- Variable speed pumps
- Low-flow plumbing fixtures

Plumbing fixtures shall be controlled both manually and automatically as well be EPA WaterSense labeled. Automatic fixtures shall be hard wired. Low-flow fixtures shall be selected as listed below to reduce water consumption:

- Water Closet: 1.28 gallons per flush (GPF)
- Wall-mounted urinal: 0.125 GPF
- Lavatories: 0.5 gallons per minute (gpm)
- Kitchen (break room) Faucets: 1.5 gpm
- Metering faucets shall not deliver more than 0.2 gallon per cycle.

2.4.4.4 Domestic Water Service

A domestic water service to serve the building shall be provided and shall be installed from a point 5 feet outside of the building. A reduced-pressure principal zone backflow preventer (BFP), water meter, and associated valves shall be installed. If required, a domestic water booster pump system shall be provided to ensure a working pressure of 35 pounds per square inch (psi) at the most remote flush valve. A pressure-reducing valve assembly shall be provided if the incoming domestic water pressure exceeds 80 psi. The anticipated demand for the building shall be calculated at later design stages for predominantly flush valve plumbing fixtures.

2.4.4.5 Domestic Cold-Water System

Potable domestic cold water shall be provided for all domestic plumbing fixtures and process water equipment as required. Aboveground Type "L" copper water distribution piping shall be sized for a maximum velocity of 8 feet per second (FPS). Provisions shall be made to arrest water hammer. Branch piping shall be sized to maintain a minimum pressure of 35 pounds per square gauge (psig) at the most remote flush valve. System capacities shall be based on fixture unit values with appropriate factors and actual equipment demands as prescribed in the CPC. The potable water system pipes shall be sized for a maximum friction loss of 4 psi per 100 feet. Drip pans will be provided below all plumbing piping routed above electrical, telecom, A/V, etc. spaces.

A non-potable, processed cold-water system shall be provided to accommodate all make-up water requirements associated with the mechanical/HVAC systems serving the building. The process water system shall be provided with a separate BFP to provide a non-potable cold-water supply for these systems. The processed water branch piping shall be sized to maintain 20 psig at the most remote equipment connections. The maximum water velocity in the potable water distribution piping shall not exceed 8 FPS. The non-potable water system pipes shall be sized for a maximum friction loss of 4 psi per 100 feet.

2.4.4.6 Domestic Hot-Water System

Domestic hot water for the building may be provided by either electric tank type or electric instantaneous-type water heaters for fixtures in remote areas. The hot water distribution piping shall be sized for a maximum velocity of 5 FPS. Domestic hot water shall be heated and stored to 140°F to limit the potential for growth of Legionella. Point of use thermostatic mixing valves shall be installed for kitchen sinks, hand sinks, and lavatories to provide 110°F water temperature at the plumbing fixtures. Storage-type domestic hot water systems shall be provided with a recirculation pump configuration located near the water heater. All hot water piping shall be insulated with mineral fiber or elastomeric type insulation. System capacities shall be based on fixture unit values with appropriate factors and actual equipment demands as prescribed in the CPC.

2.4.4.7 Natural Gas Service

Natural gas service is not available around the site and will not be provided for this property.

2.4.4.8 Sanitary Drain, Waste, and Vent System

A sanitary waste drain and vent system shall be provided to serve all plumbing fixtures throughout the building. Floor drains shall be provided with trap primers and access doors for routine service and maintenance. Trap guards may be used with owner's approval. Underground building soil, waste, and vent piping shall be PVC drain waste vent pipes and fittings. Aboveground soil, waste, and vent piping shall be hubless cast iron piping and fittings. Multiple sanitary, waste, and vent stacks shall serve the restrooms, mechanical rooms, and other support spaces as required. Piping that contains soil-contaminating fluids shall not be direct buried in earth. There shall be no drains in lubricant containment areas.

The sanitary system shall be sized based on a uniform 2% slope for piping 3 inches and smaller and uniform 1% slope for piping 4 inches and larger. All portions of the sanitary waste system are intended to flow by gravity into the site system. Backwater valves shall be provided to serve gravity systems where the flood rim is below the upstream manhole.

Sand/oil interceptor(s) shall be installed to serve various fixtures associated with the Maintenance Building to limit the potential for sand, oil, and other debris from entering the sewer system.

If portions of the sanitary waste system cannot flow by gravity into the site system, then a duplex sewage ejector shall be provided. No grease waste interceptors are anticipated.

Some areas such as lift pits and vehicle wash require special drains, traps, and sumps. These components shall be identified and coordinated early in the detailed design. Drains shall be located away from maintenance activities, where possible, so as not to impede movement of toolboxes and portable equipment. Vehicle wash water and all trench drains must connect to an oil/water separator, unless the treatment plant design and drain configuration address this issue. Outflow from oil interceptor shall connect to the sanitary sewer.

2.4.4.9 Condensate Drainage System

Floor sinks and/or funnel receptors shall be designed to receive condensate drainage from air conditioning equipment. If slope is not available to drain by gravity at 1/8 inch per foot, then a condensate pump shall be used. All equipment condensate discharges are intended to be clear water waste. All condensate discharge shall be routed to the sanitary drainage system.

2.4.4.10 Storm Drainage System

A complete storm drainage system including primary and secondary drainage systems shall be provided. The building storm drainage system shall be sized in accordance with rain flow rates identified by the CPC for the region, 1.5 inch per hour. The primary drainage systems shall be connected directly to the underground site storm drainage system. The overflow storm drain system shall terminate at the face of the building and spill to grade, away from public view and sidewalks, through a downspout nozzle provided at the termination point. Both the underbody of roof drains and associated storm drainage piping shall be insulated to prevent condensation.

2.4.4.11 Specialty Plumbing Systems

The following piping systems may be incorporated within buildings, as applicable:

- Compressed air
- Automatic transmission fluid
- Engine coolant
- Engine oil
- Fuel gas
- Vehicle wash water
- Diesel fuel
- Diesel exhaust fluid
- Windshield washing solution

Piping that contains soil-contaminating fluids shall not be direct buried in earth. Piping that is required to communicate with services across floors and vehicle traffic areas shall be routed in trenches. All piping shall be readily accessible and available for visual inspection. The plumbing discipline shall provide the structural discipline with trench width and turning area requirements with attention given to wrench clearances between fittings and pipes where appropriate or necessary for safe maintenance practices.

The preferred methods for supporting pipes shall be detailed along with their arrangement and routing. Piping supports shall allow for the possible modest addition of future services and piping. Each piping system shall have shut-off valves overhead except for gravity-forced systems. All piping sizes shall be based on maximum expected flows.

A set of pipe specifications shall be developed such that at least one specification section exists for each fluid service type with design pressures and temperatures not to exceed the expected operating pressure and temperature extremes of the system in question. The pipe specification shall detail the material, design conditions, suitable valves, and fittings in the appropriate size ranges, minimum pipe wall thickness, and required insulation, if any.

Where required by code, piping shall have secondary containment with leak detection.

2.4.4.12 Compressed Air System

A compressed air system shall be provided to all maintenance work areas and other, owner-designated locations. The designer shall evaluate cost, reliability, and benefits of regenerative, refrigerated, and combination refrigerated and deliquescent air dryers to obtain compressed air with a suitable pressure dew point to prevent condensation under winter ambient design conditions.

Compressed air shall be distributed through a looped piping system constructed of corrosion-resistant aluminum pipe (minimum pressure rating of 150 psig), with pipe sizes based on system pressure drops not exceeding 5 psig at peak flow. Drops to workstations shall include ball shut-off valve, filter, regulator with gauge, lubricator, 1/4-inch quick disconnect, and a 6-inch drip leg with an automatic drain. Quick connect fittings for different services, such as lubricated air, paint/blast air, and breathing air shall be color-coded and non-interchangeable.

Compressed air shall be suitable in quality, quantity, and pressure for tool operation, including pneumatic engine starters, and tire pressurization. The compressed air system design shall account for simultaneous use of tools.

The compressed air system shall have appropriately sized air receivers located in the compressor room. The receivers shall have automatic drains. A separator and filter shall be mounted between the air receiver and the air dryer. The air dryer, as well as the upstream separator and filter, shall be designed to handle the maximum surge flow from the receiver or the compressor-rated flow, whichever is greater. All receivers shall be equipped with automatic condensate drain traps that shall discharge to the industrial recyclable system.

All branch lines for the compressed air header shall exit from the top of the header, except drip legs to condensate drain traps, which shall exit from the bottom. All lines, including main header, shall be sloped to drain to drip legs with condensate drain traps. A pressure switch shall be mounted in the main air header and shall activate an audible and visual alarm when the switch detects pressure at or below 90 PSI.

2.4.4.13 Liquid/Bulk Storage System

The facility intends on purchasing and storing liquid consumables in bulk. Recyclable liquids shall also be handled in bulk. Storage capacities that are to be provided at the facility are listed under the appropriate space.

Fuel tanks and fuel delivery piping shall be equipped with leak detection and alarm and automatic gauging devices. Alarm location shall be identified at a later design stage. Leak detection and alarm equipment must be computer controlled with compatible connection to the agency's network. Each tank will be separately vented at a safe distance from grade and from site facilities and equipment.

All tanks containing environmentally hazardous materials shall be of the double-wall type, thus providing secondary containment in the event of inner wall failure. A leak detector shall be located in the annulus between the inner and outer shells.

The facility shall be provided with a central lubricant system. Operating pressures of liquid consumables distributed throughout the facility via the central lubricant system shall be verified at a later design stage to be compatible with the pressures generated by the pumps.

This system shall provide a variety of lubricants to the appropriate location by utilizing the following components:

- Air piston lubricant pumps, wall-mounted whenever possible
- Compressed air to operate lubricant system
- Lubricant and fluid hose reel banks mounted overhead or on specially fabricated racks
- Bulk lubricant and fluid storage tanks and associated piping
- Lubricant and fuel dispensers

The floor below the lubrication pumps and storage tanks shall be a grating-covered containment sump with a manually operated drainage valve normally closed except during wash down. Note that a containment sump is not required under double-wall tanks.

Air piston pumps shall be used to transfer lubricants. Noise from the pumps and lubrication system must be isolated from all mechanical work areas and adjacent spaces. All storage tanks shall be equipped with relief valves or devices to protect from over or under pressure conditions.

Operating pressures of liquid consumables distributed throughout the facility via the central lubricant system shall be verified during detailed design to be compatible with the pressures generated by the pumps.

2.4.4.14 Fuel Management Systems

A fuel management system shall be provided at the fueling area to monitor use of all fuels and lubricants dispensed. Consideration shall be given to installation of a fully automated system, using radio frequency or similar data transfer techniques.

Final installation details may vary based on the approved fuel management system manufacturer.

Fuel management system performance during fire alarm situations shall be coordinated and specified. Provisions for premature vehicle pull-out shall be included in the design. Examples include breakaway hoses and traffic signals tied to the fuel dispenser solenoid.

2.4.4.15 Leak Detection/Inventory Monitoring Systems

Fuel storage tanks, pump/piping manholes, dispenser boxes, and fuel supply piping will be equipped with automatic leak-detection monitoring and alarm, automatic gauging/inventory monitoring, and overflow monitoring and alarm.

Bulk oil lubrication tanks will be provided with leak detection monitoring and alarm leak detection/inventory monitoring system monitoring and alarm panel location will be identified at a later design stage.

The emergency generator fuel system, including primary and any secondary containment tanks, shall be equipped with leak detection and low-fuel-level monitoring. These monitoring signals shall be tied into the facility-wide leak detection and inventory monitoring system, ensuring that alarms, alerts, and status indications from the generator fuel system are visible and actionable at the main monitoring panel alongside other fuel storage and dispensing systems.

2.4.4.16 Plumbing Fixtures

Plumbing fixtures shall be EPA WaterSense labeled. Appropriate “barrier-free” fixtures shall be provided in accordance with the ADA. All plumbing fixtures shall maintain the following water consumption values:

- Water closet: 1.28 GPF
- Wall-mounted urinal: 0.125 GPF
- Lavatories: 0.5 gpm
- Kitchen faucets: 1.8 gpm

Metering faucets shall not deliver more than 0.2 gallon per cycle.

Water closets shall be wall-mount vitreous china with automatically operated flush valves using motion sensors. Where shown on architectural plan, fixtures shall be mounted at ADA-accessible elevation. Urinals shall be wall-hung vitreous china with automatically operated flush valves using motion sensors. Where shown on architectural plans, fixtures shall be mounted at ADA-accessible elevation. Lavatories shall be wall-hung or counter-mounted vitreous china type. Where shown on architectural plans, fixtures shall be mounted at ADA-accessible elevation and provided with ADA insulation kits.

Hand-washing stations shall be provided in shop areas. Two types of hand-washing stations shall be provided, with one being a trough type, stainless steel sink with gooseneck faucets and long handles and the second being of semi-circular stainless-steel design with either foot-activated bar for water flow activation or infrared sensor operation. Automatic faucet controls shall be hard wired.

Sinks in break rooms shall be stainless steel single- or double-compartment type with ADA-compliant faucets. Where shown on architectural plans, fixtures shall be mounted at ADA-accessible elevation. Electric water coolers shall be dual height, wall hung, push button operated, and stainless-steel construction with integral chiller units and integral bottle fillers. One fountain shall be mounted at ADA-accessible elevation. Janitor’s mop sinks shall be floor-mounted type.

General-purpose floor drains shall be provided in each mechanical room at a ratio of 1 per every 500 square feet or as required to drain equipment and alleviate tripping hazards. General-purpose floor drains with removable nickel bronze heel-proof grates shall be provided in each toilet room.

Wall hydrants shall be recessed box type freeze proof and located on the exterior of the building so that the entire perimeter can be watered without crossing main building entrances at a maximum of every 100 feet. Wash down hose bibbs shall be provided in the mechanical rooms. A non-freeze roof hydrant shall be provided at each roof access point.

Emergency eye/face/shower fixtures shall be provided in the Maintenance Building as required. An emergency thermostatic mixing valve will be included to provide 80°F tempered water at each emergency fixture.

Trench drains, if required, shall be provided with heavy-duty, heel-proof, vandal-resistant removable gratings. Fixtures shall be provided with chromium plated brass trim and individual stop valves. Appropriate “barrier-free” fixtures shall be provided in accordance with the ADA.

Fixtures will be provided with chromium-plated brass trim and individual stop valves. Appropriate “barrier-free” fixtures will be provided in accordance with the Architectural Barriers Act (ABA).

Emergency drench showers and eye/face washes shall be provided as required. All stations shall be provided with ASSE 1071-compliant emergency mixing valves to provide 80°F tempered water at each emergency fixture.

Floor scrubber pits shall be provided with a dedicated deep sump floor drain and hose bibb. Outflow from the floor drain shall route to a sand/oil interceptor.

2.4.4.17 **Vibration Isolation**

Spring and/or neoprene isolators shall be provided for all plumbing equipment with rotating parts. Provide flexible piping connections at all equipment with external isolation. All piping connected to externally isolated equipment shall have spring isolated piping hangers for a minimum of 50 feet horizontal from the equipment served. Piping installed below or adjacent to noise sensitive areas shall be supported on spring and neoprene hangers or mounts as applicable.

2.4.4.18 **Piping Materials**

Table 2-7: Proposed Piping Materials

System	Materials
Waste/vent underground	Schedule 40 “solid wall” PVC DWV pipe
Waste/vent aboveground	No-hub cast-iron pipe with heavy-duty couplings on all piping
Stormwater underground	Schedule 40 “solid wall” PVC DWV pipe
Stormwater aboveground	No-hub cast-iron pipe with heavy-duty stainless-steel couplings
Indirect waste	DWV copper (3 inches and smaller)
Domestic water underground	Type K copper in PE encasement
Domestic water aboveground	Type L hard copper
Compressed air	Aluminum

Source: AECOM 2025

2.4.4.19 **Piping Identification**

Identify piping systems with color-coded labels in accordance with ANSI A13.1. Place labels at intervals no greater than 50 feet or 25 feet in congested areas, adjacent to each valve and each side of penetrations of structure or enclosure.

2.4.4.20 **Piping Insulation**

Piping insulation shall be provided in thickness and with conductivity rating as required by energy code for system operating temperature. Insulation types shall comply with ASTM and UL standards, meeting UL flame spread and smoke developed ratings. All interior exposed insulated piping and fittings shall be PVC jacketed. All exterior exposed insulated piping and fittings shall be aluminum jacketed.

2.4.5 Electrical Building and Site Design Criteria

2.4.5.1 Narrative

The Next Gen Facility electrical system shall be designed and engineered to serve the demanding needs of an administrative operations, vehicle maintenance, and public transportation services. Key electrical needs include:

- Reliable power supply for the Administration and Maintenance buildings
- If betterments are chosen, then resiliency via integration of renewable energy sources (PV arrays on gantries, battery energy storage (BESS) for energy management, and microgrid control to manage all renewable elements and ensure seamless operation during power outages.
- Non-BEB EV charging infrastructure for employee and public use; the number of EV-capable and EV-ready parking spaces must meet the latest version of the CalGreen Tier 1 EV requirements based on the final number of parking spaces determined in Final Design. All EV-capable spaces shall be accounted for in the load calculations for the site.
- Site lighting for safety and security

2.4.5.2 Service Voltage and Distribution Topology

PG&E is the electrical utility providing service to this area and has 12.47-kV overhead circuits along adjacent streets. The service to the buildings, site lighting, and other auxiliary loads are described below.

Building and Site Service

- Service Voltage: The administration and maintenance facility will be served by the aforementioned 12.47kV utility service, metered at a 480V main service switchboard, with provisions for serving both 480/277V, three phase loads, as well as 208/120V for distribution within the site.
- Service Transformer:
 - o Primary (MV): 12,470V, 3-phase, 3-wire
 - o Secondary (LV): 480Y/277V, 3-phase, 4-wire and 208Y/120V, 3-phase, 4-wire
- Branch Circuits: 120V, 1-phase
- General Use Receptacles: 120V, 1-phase
- Special Purpose Receptacles: 208V, 1- or 3-phase
- Exterior LED Lighting: 277V, 1-phase
- Interior LED Lighting: 120V, 1-phase
- Motors 1/3 HP and smaller: 120V, 1-phase
- Motors 1/2 HP and larger: 480V, 3-phase or 208V, 3-phase
- Vendor Equipment: 208V, 3-phase only when 480V, 3-phase equipment not available

- Electrical load calculations and equipment capacities presented herein are preliminary and based on typical load densities and historical usage factors.

Distribution Topology: A radial distribution system will be used, with dedicated feeders for the Administration Building, Maintenance Building, site lighting, and gantry structures.

2.4.5.3 Lighting Types and Lighting Levels

- Table 2-8 shows recommended lighting fixture types and lighting levels for various areas of the facility. All lighting levels shall be equal to those suggested by the Illuminating Engineers Society (IES) Handbook and the Authority Having Jurisdiction (AHJ). Exact mounting heights, fixture wattages, and distribution types shall be determined through photometric calculations (point-by-point method) using a computer-based lighting program. Input data shall incorporate light loss factors.
- Site lighting (exterior only) shall be centrally controlled via lighting control panels equipped with hand-off auto switch photocell and astronomical clock.
 - o Lighting control panels located outdoors shall be rated Nema 3R for outdoor use.
- Light poles in the agency vehicle parking area shall be limited to the perimeter if possible.
- Site lighting shall comply with California Green Building Standards Code – Part 11, Title 24, California Code of Regulations, (i.e., “CalGreen”), California Energy Code, and any other local light pollution regulations.
- Employee parking and agency vehicle parking areas must meet the City / County standard lighting levels for security and the prevention of accidents.
- Exterior lighting shall be LED, 4000K CCT, 70 CRI min, and glass optics. Fixtures shall be provided with 7-pin receptacle and dimming capability.
- Poles for lighting shall be steel galvanized, round, and tapered.
- Light pole foundations shall extend 3 feet above finished grade in parking lot and vehicle traffic areas. Lighting pole foundation installed in landscape areas shall extend 2 feet above grade.
- Street lighting poles and installation shall comply with City Standards in conformance with Caltrans standards. Controls for street lighting shall be via fixture-mounted photocell.
 - o Street lighting poles installed on North Beale Road shall be decorative type matching existing
 - o Intersection of Avondale Avenue and North Beale Road safety lighting shall be provided to meet IESNA RP-8 Section 5.1.3 lighting requirements for roadway class type. Safety lighting shall be LED pole-mounted fixtures conforming with Caltrans standard details. Controls for safety lighting shall be via fixture-mounted photocell.

The project shall comply with Title 24, Part 6 of the California Energy Code, requiring comprehensive lighting power density (LPD) calculations and lighting controls compliance documentation. The design team must provide detailed Title 24 lighting calculations, including indoor and outdoor lighting power allowances, automatic shutoff and daylighting controls, and multilevel lighting requirements, ensuring the proposed lighting system meets or exceeds energy efficiency thresholds. All calculations shall be performed using approved compliance software and submitted as part of the permit documentation. The final design must be verified through acceptance testing by a certified lighting controls acceptance tester before occupancy.

Table 2-8: Recommended Lighting Fixture Types and Lighting Levels (IESNA Recommended Levels)

Fixture	Description	Foot Candle (FC)
Office Light Fixture	Use color corrected LED lamps with energy efficient dimmable drivers and parabolic reflectors. Fixture mounted in acoustic ceiling tile grid.	50
Office Light Fixture Dimmable	Down-light with color corrected LED lamps with energy efficient dimmable drivers capable of being dimmed with no flickering or discernable noise (hum) from fixture. Fixture recessed in ceiling.	50 to 2
Service Light Fixture - Shop	Color corrected LED lamps with energy efficient dimmable driver and acrylic diffuser. Fixture mounted in acoustic ceiling tile grid or surface mounted to exposed structure.	50
Service Light Fixture – Utility spaces	Color corrected LED lamps with energy efficient dimmable driver and acrylic diffuser or lamp protective metal grid diffuser. Fixture mounted in acoustic ceiling tile grid or surface mounted to exposed structure.	20
Service Light Fixture – Storage rooms	Color corrected LED lamps. Fixture mounted in acoustic ceiling tile grid or surface mounted to exposed structure. Single light fixture.	20
Waterproof service light fixture	LED lamps with energy efficient dimmable driver and acrylic diffuser. Fixture surface mounted to exposed structure.	20
Wet location sealed light fixture	Color corrected LED lamps with energy efficient dimmable driver and acrylic diffuser. Fixture recessed mounted in ceiling / soffit or surfaced mounted to exposed structure.	30
Wet location sealed fixture w/ diffusers	Non-ferrous light fixture body with LED lamps with energy efficient dimmable driver and indirect reflector or acrylic diffuser. Fixture recessed mounted in ceiling. 3 lamp fixture.	30
Indirect light fixture over mirror	Color corrected LED lamps with energy efficient dimmable driver and indirect reflector. Fixture recessed mounted in ceiling. 3 lamp fixture.	30
High Bay Fixture	High output color corrected LED lamps with energy efficient dimmable driver. Lamp protection by either clear lamp wrap or impact resistant diffuser. Fixture surface mounted or suspended from exposed structure.	70
Waterproof High Bay Sealed Fixture	High output non-ferrous light fixture body with LED lamps with energy efficient dimmable driver. Lamp protection by clear lens. Fixture surface mounted or suspended from exposed structure.	70
Explosion proof sealed fixture w/ diffusers	Color corrected LED lamps with energy efficient dimmable driver and indirect reflector or acrylic diffuser. Fixture recessed mounted in ceiling.	50
Task Light – Shops	Color corrected LED lamps with energy efficient dimmable driver. Fixture surface mounted to wall / column on swivel mounts to allow light to be direct / adjusted by users. Individually switched fixture controlled by user independent from room / space lighting.	100

Fixture	Description	Foot Candle (FC)
Task Light – Chassis Wash / Detail Clean	High output color corrected LED lamps with energy efficient dimmable driver. Sealed waterproof fixture surface mounted low on wall / column on swivel mounts to allow light to be direct / adjusted by users. All tasks light in Chassis Wash and Gantry Washer floor area, doubled used as Detail Clean, controlled by single switch and independent from room / space lighting.	100
Site lighting fixture – Vehicle Circulation Areas	LED lamps with energy efficient dimmable driver. Pole mounted or surface mounted to building / structure walls. Sealed clear lens with adjustable light cutoff and “Dark Sky” compliant fixture.	0.2
Site lighting fixture – Parking Areas, Yard Storage	LED lamps with energy efficient dimmable driver. Pole mounted or surface mounted to building / structure walls. Sealed clear lens with adjustable light cutoff and “Dark Sky” compliant fixture.	0.5
Fleet Vehicle Canopy – Parking Area	LED lamps with energy efficient dimmable driver. Ceiling or pendant mounted to underside of canopy / structure over parking. Sealed clear lens with adjustable light cutoff and “Dark Sky”-compliant fixture.	0.5
Site lighting fixture – Agency Service Areas	LED lamps with energy efficient dimmable driver. Pole mounted or surface mounted to building / structure walls. Sealed clear lens with adjustable light cutoff and “Dark Sky” compliant fixture.	20
Site lighting fixture – Bus Parking	LED lamps with energy efficient dimmable driver. Ceiling or pendant mounted to underside of canopy / structure over bus parking. Sealed clear lens with adjustable light cutoff and “Dark Sky” compliant fixture.	20
Roadway Lighting	LED lamps with energy efficient dimmable driver. Pole mounted. Sealed clear lens and “Dark Sky” compliant fixture.	Per RP-8-22
High Mast Lighting – Maintenance Area	LED lamps with energy efficient dimmable driver and 180-degree house side shield. 60-foot pole mounted.	5.0
Courtyard Walkways	LED lamps with energy efficient dimmable driver pole mounted fixture or lighted bollard.	0.3

2.4.5.4 Electrical Room Layouts, Equipment Clearances, and Safety Provisions

- **Electrical Room Sizing:** Electrical rooms shall be sized to accommodate all necessary service panels, transformers, switchboards, and other equipment, ensuring adequate space for maintenance and future expansion.
- **Clearances:** Provide clearances to all service panels and equipment in accordance with NEC 110. This includes:
 - o Minimum working space of 3 feet in front of electrical equipment.
 - o Minimum headroom clearance of 6.5 feet.
 - o Side and rear clearances as required by equipment manufacturer specifications and NEC guidelines.
- **Ventilation and Cooling:** Electrical rooms shall be equipped with adequate ventilation and cooling systems to maintain safe operating temperatures for all equipment.
- **Lighting:** Provide sufficient lighting in electrical rooms to ensure visibility for maintenance and inspection activities. Emergency lighting shall be installed to ensure safety during power outages. See Table 2-8 for lighting levels.
- **Safety Provisions:**

- o Install arc flash protection equipment and signage in accordance with NFPA 70E.
- o Grounding and bonding of all electrical equipment shall be performed as per NEC requirements.
- o Emergency shut-off switches shall be installed in accessible locations for quick power disconnection in case of emergencies.
- o Fire suppression systems shall be installed in electrical rooms to protect equipment and personnel.

2.4.5.5 Receptacles and Power Outlets

General

Receptacle and power outlet installations shall conform to the National Electrical Code (NEC 2023) and local amendments. Outlets shall be located to support the functional requirements of each space as defined in Sections 2.3.5 through 2.3.9. Unless otherwise indicated, provide 125-volt, 20-ampere duplex receptacles for general use and dedicated 208/240-volt outlets for equipment and maintenance tools. All receptacles shall be grounded, tamper-resistant in public areas, and GFCI-protected where required by code or exposure.

Design Intent

The intent of this section is to ensure sufficient, accessible power for office, operations, maintenance, and vehicle charging functions. Receptacle quantity and placement shall reflect the anticipated occupancy, equipment layout, and maintenance access described in Sections 2.3.5 (Administration Design Criteria), 2.3.6 (Operations Design Criteria), 2.3.7 (Amenity Connector Design Criteria), 2.3.8 (Courtyard Design Criteria), and 2.3.9 (Maintenance and Service Design Criteria).

Administration Building and Office Areas

Purpose: Convenience power for office, conference, and support spaces.

- Provide outlets along perimeter walls such that no point is more than 12 ft from a receptacle, or at least one duplex outlet per 12 linear ft of wall.
- Provide one duplex receptacle per workstation minimum; coordinate final locations with furniture and IT layouts.
- In meeting and conference rooms, comply with NEC 210.71:
 - o Provide outlets such that no point along the floor line is more than 6 ft from a receptacle.
 - o Where furniture restricts wall access, provide floor outlets.
- Provide dedicated receptacles and circuits for printers, copiers, and office equipment exceeding 1.5 kVA load.
- Break rooms and kitchenettes shall have GFCI-protected countertop outlets and dedicated circuits for appliances.
- Mount receptacles are typically 18 inches above finished floor (AFF) unless coordinated with casework or accessibility requirements.

Operations Building and Electrical/IT Rooms

Purpose: Maintenance and servicing of building systems and operational equipment.

- Provide at least one 125 V, 15 A or 20 A service receptacle in each room containing switchgear, switchboards, panelboards, MCCs, UPS, or IT racks, per NEC 210.64.
 - o Locate within 25 ft of the equipment and on the same level.
 - o Do not connect the receptacle to the load side of the equipment served.
- For mechanical and HVAC equipment requiring service, provide a 125 V, 15/20 A GFCI-protected receptacle within 25 ft and on the same level, per NEC 210.63.
- Provide convenience outlets in operations spaces per Section 2.3.6 to support tools, diagnostic devices, and portable maintenance equipment.
- Where electrical equipment is located outdoors, provide WR-rated (Weather Resistant) GFCI receptacles in accordance with NEC 406.9(B).

Maintenance Facility and Shop Areas

Purpose: Power for tools, fabrication, and equipment service.

- Provide a mix of 125 V, 20 A duplex and 240 V, 30 A single- or three-phase receptacles to serve welders, lifts, compressors, and other high-power shop tools.
- Locate receptacles based on the equipment layout shown in Section 2.3.7; include both wall-mounted and ceiling-mounted outlets or retractable cord reels to minimize tripping hazards.
- All receptacles in maintenance bays and damp locations shall be industrial-grade and GFCI-protected.
- Provide at least one service receptacle within 25 ft of each fixed piece of shop or HVAC equipment (NEC 210.63).
- Provide locking-type outlets where portable 240 V tools are used.

Exterior Service Areas

Purpose: Convenience power for tools, testing, and maintenance near bus parking area.

- Provide WR-rated, GFCI-protected 125 V, 20 A duplex receptacles at each charging bay for portable equipment and maintenance needs.
- Receptacles shall be included.

- Provide at least one 240 V, 30 A receptacle per charging zone for diagnostic or heavy-duty service equipment.
- Receptacles shall be installed in in-use weatherproof covers (NEC 406.9(B)) and clearly labeled for maintenance use.
- Where inverters, switchgear, or BESS equipment are located outdoors, provide a service receptacle within 25 ft per NEC 210.65, 690.31(A), and 706.10(B) as applicable.

Accessibility, Mounting, and Identification

- Typical mounting height: 18 in. AFF unless coordinated otherwise.
- ADA reach range shall be maintained (15 - 48 in. AFF).
- Floor outlets shall be recessed, gasketed, and rated for expected foot or equipment traffic.
- Dedicated and specialty receptacles shall be labeled with panel and circuit number.

Circuiting and Power Distribution

- General-use receptacles: 20 A, 120 V branch circuits, max 6 - 8 duplex outlets per circuit.
- Dedicated circuits: Required for high-load or sensitive equipment (≥ 1.5 kVA).
- Balance receptacle circuits across all phases of distribution panelboards.
- Provide arc-fault and ground-fault protection per NEC 210.12 and 210.8.
- Coordinate all receptacle circuiting with Sections 2.3.5 through 2.3.9 to ensure outlets align with final room functions and equipment layouts.

2.4.5.6 Building Standby Generator and Emergency Loads

- The emergency power system will be composed of both uninterruptible loads and interruptible loads. Uninterruptible loads are those that must remain operational due to a life safety issue or is of a critical nature or in the case of some computers, where unwanted data loss or damage may occur. Interruptible loads are those that can tolerate a momentary interruption of power while power is being transferred by the automatic transfer switch. Uninterruptible power systems (UPS) shall be provided for these loads as identified by the customer.
- A standby generator is currently in use at YSTA's existing facility. This generator will be evaluated for size of facility needs by the design-builder, and if deemed sufficient, shall be removed and reinstalled at the new facility to provide immediate backup power in the event of an electric service outage.
- This generator has a capacity of 150kW, an output voltage of 240V, and will connect via automatic transfer switches to the emergency distribution panels that serve emergency loads such as emergency and egress lighting, fire systems, and critical communication systems of both the Administration and Maintenance buildings for life safety and optional standby loads.

- Regulatory approval and permits to construct/operate the emergency generator shall be provided prior to final authority having jurisdiction. For acceptance and operation. This includes air quality permitting through the Feather River Air Quality District (FRAQMD). An operations plan shall be generated that ensures compliance with federal, CARB, and FRAQMD regulations governing the operation of the emergency engine. The plan shall establish protocols for emergency engine activation during outages and disasters beyond the owner's control, including Public Safety Power Shutoffs (PSPS), which are classified as emergency situations by CARB. It shall outline procedures for monitoring and recording operational hours using a non-resettable hour meter, ensuring accurate documentation of both emergency and non-emergency usage. The plan shall also address the annual 100-hour limit for non-emergency operation and compliance with FRAQMD restrictions on generator use beyond specified thresholds unless written authorization is obtained. Additionally, for engines operating more than 200 hours per year, the plan shall incorporate provisions for emission monitoring, inspection, and stack testing to meet regulatory requirements.

2.4.6 Communications, Access Control, and Closed-Circuit Television Systems

2.4.6.1 Communication Systems

- Conduits and Outlet Boxes: Empty conduits, outlet boxes, and terminal backboards are required in each building and between buildings.
- Pulling Ropes: Conduits shall include pulling ropes.
- Network Wiring: Computer network wiring schemes must be coordinated with the agency.
- Telephone Restrictions: Most telephones shall have long-distance restrictions on outgoing lines.
- HVAC for Equipment Rooms: Equipment rooms with computerized equipment must have an appropriate HVAC system to monitor the proper temperature. HVAC system to provide proper cooling of equipment with thermostats to monitor and control for the proper temperature.
- Workstation Conduits: One-inch conduit shall be provided to every workstation for up to 2 voice and 2 data lines, verified during detailed design.
- Future Growth: A minimum of 150% of actual requirements shall be provided for conduit between buildings to accommodate future growth and spares.
- Gel Fill Cabling: Only gel fill cabling shall be used for feed cabling between buildings and from closet to closet.
- Current Technology: Use current cabling technology.
- Coverage: A paging/public address system shall provide service to all offices, shops, repair bays, and outdoor work areas around the Maintenance Building and vehicle parking area.
- Speakers: System speakers shall be of a type suitable for areas of high ambient noise. The volume level of individual speakers shall be adjustable without sacrificing system performance.
- Control Equipment: The control equipment shall be complete with provisions to permit interfacing with the telephone system to allow origination of paging from telephone instruments by dialing an assigned number.

2.4.6.2 Closed-Circuit Television and Site Security

- Routing: The closed-circuit television (CCTV) system shall be routed to the appropriate location within the facility to be determined by Yuba-Sutter Transit.

- Conduit: Conduit for communication cabling shall be provided to all CCTV cameras.
- Camera Locations: Cameras, at a minimum, shall be provided at the front of all bay doors, employee parking lot, vault pull, shipping and receiving areas, the reception desk, vehicle parking area, and at any money-handling location. Camera shall cover the specified areas, focusing on ingress and egress points.
- Camera Capabilities: Cameras covering the public/employee entrance shall be able to identify license plates.
- Power Source: A non-switched electrical source shall be provided to the CCTV system.
- Design Coordination: Specific CCTV camera locations shall be identified early in the detailed design process and shall be coordinated with security.
- Perimeter Security: Utilize CCTV cameras around the perimeter, fed by remote media converters and connected via fiber optic cables from the main communications room.
- Onsite Recording: Implement the latest cloud-based infrastructure for on-site recording and storage of CCTV footage. Video storage must comply with the State of California Government Code Section 34090.8.
- Emergency Call Boxes: Located within the employee parking lots, interfacing with telephone, access control, and CCTV systems. An alarm condition will ring the phone at the dispatch center, send an alarm to the access control system (ACS), and cause the CCTV camera near the call box to view that area.

2.4.6.3 Security and Card Access Control

- System Integration: The facility shall be equipped with a card key access system connected to the agency's internal network system.
- Access Points: Card access locks, at a minimum, shall be provided at all storage rooms, manager's offices, outside doors, the lobby vestibule inner door, and parking access gates.
- ACS:
 - o The ACS shall consist of card readers, door contact alarms, passive infrared sensors, door contact switches, exit pushbuttons, duress pushbuttons, electromagnetic door locks, and proximity type electronic key cards.
 - o Cabling from ACS equipment shall be routed to the nearest telecommunications room. Cabling from exterior ACS equipment or routed between buildings shall pass through and terminate at transient voltage surge protector equipment prior to being terminated at ACS headend equipment.
 - o ACS cabling shall be terminated at wall-mounted intelligent field panels. These panels shall be connected via the fiber optic backbone into an alarm monitoring workstation/headend system server.
 - o ACS system equipment shall be powered from building emergency power.
 - o The ACS shall interface with the new CCTV system to provide video recording of ACS alarm points.
- Emergency Call Boxes: Emergency call boxes will be located within the employee parking lots. The boxes will interface with telephone, access control, and CCTV systems. An alarm condition will ring the phone at the dispatch center, send an alarm to the ACS, and cause the CCTV camera near the call box to view that area.

2.4.7 Mobility Hub

The mobility hub will help to facilitate multimodal connections and be located next to the bus stop, vanpool parking, and near to the Administration Building (as shown in previous figures, Figure 2-5). Space has been allocated on the site plan for identified elements, but the final list of elements and layout will be determined during Final Design by the design-builder in coordination with YSTA:

- Secure bicycle storage for at least six bicycles
- Bicycle repair station that can hold a suspended bike with clamp, compressed air, and tools on a chain
- Bus stop with large shelter designed to YST's standard shelter design
- 120V power outlets
- Power and data connect to the bus shelter (for potential power for next bus signage information)
- Parking for vanpool vehicles and/or other carpool vehicles
- Sufficient lighting for safety and security purposes

2.5 Fire Protection and Life Safety

2.5.1 Design Criteria—Administrative/Operations, Maintenance, and Vehicle Service Buildings

The following documents form the minimum basis-of-design fire protection and life safety requirements for the Yuba-Sutter Transit facilities per CBC Chapter 35 adopted codes and standards:

- CBC, Title 24, Part 2 with July 2024 Supplement, 2022 Edition
- California Fire Code (CFC), Title 24, Part 9 with July 2024 Supplement, 2022 Edition
- NFPA 2—Hydrogen Technologies Code, 2023 Edition
- NFPA 10—Standard for Portable Fire Extinguishers, 2022 Edition
- NFPA 13—Standard for the Installation of Sprinkler Systems, 2022 Edition
- NFPA 17A—Standard for Wet Chemical Extinguishing Systems, 2021 Edition
- NFPA 20—Standard for the Installation of Stationary Pumps for Fire Protection, 2019 Edition
- NFPA 24—Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 2019 Edition
- NFPA 30—Flammable and Combustible Liquids Code, 2021 Edition
- NFPA 30A—Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, 2021 Edition
- NFPA 37—Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines, 2018 Edition

- NFPA 51B—Standard for Fire Prevention During Welding, Cutting, and Other Hot Work, 2024 Edition
- NFPA 55—Compressed Gases and Cryogenic Fluids Code, 2023 Edition
- NFPA 68—Standard on Explosion Protection by Deflagration Venting, 2013 Edition
- NFPA 69—Standard on Explosion Prevention Systems, 2024 Edition
- NFPA 70—National Electrical Code (NEC), 2020 Edition
- NFPA 72—National Fire Alarm and Signaling Code, 2022 Edition
- NFPA 75—Standard for the Protection of Information Technology Equipment, 2024 Edition
- NFPA 80—Standard for Fire Doors and Other Opening Protectives, 2019 Edition
- NFPA 90A—Standard for the Installation of Air-Conditioning and Ventilating Systems, 2024 Edition
- NFPA 101—Life Safety Code, 2021 Edition
- NFPA 110—Standard for Emergency and Standby Power Systems, 2019 Edition
- NFPA 220—Standard on Types of Construction, 2024 Edition
- NFPA 221—Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls, 2021 Edition
- NFPA 286—Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Fire Room Growth, 2015 Edition
- NFPA 291—Recommended Practice for Water Flow Testing and Marking of Hydrants, 2025 Edition
- NFPA 400—Hazardous Materials Code, 2025 Edition
- NFPA 484—Standard for Combustible Metals, 2019 Edition
- NFPA 652—Standard on the Fundamentals of Combustible Dust, 2019 Edition
- NFPA 855—Standard for the Installation of Stationary Energy Storage Systems, 2023 Edition
- NFPA 2001—Standard on Clean Agent Fire Extinguishing Systems, 2018 Edition
- ABA 2015
- ASCE 7-16—Minimum Design Loads and Associated Criteria for Buildings and Other Structures, 2017 Edition

2.5.2 Building Code for Fire Protection and Life Safety

The Administration/Operations, Maintenance, and Vehicle Refueling Island buildings will follow building code requirements of the 2022 CBC, Title 24 and the fire code requirements of the 2022 CFC, Title 24.

2.5.3 Administration/Operations Building

2.5.3.1 Use and Occupancy

The single-story Administration/Operations Building includes one primary occupancy type as classified by the CBC: Business Group B. The Group B areas within the building include training rooms, break room, individual offices, open office spaces, restrooms, small conference rooms, server room, and general circulation areas.

2.5.3.2 Construction Type

The required construction type is a minimum of Type II-B or Type II (000) as defined by NFPA 220 consisting of unprotected, non-combustible materials. The provided construction type meets this requirement and is classified as Type II-B/Type II (000).

2.5.3.3 Building Height and Area

The building is single story, a height of approximately 16 feet, with a floor area of approximately 12,800 SF. This area measurement is based off the CBC definition of building area and is different from gross square footage used by architecture. The building will be sprinklered, Type II-B construction.

For the calculation of maximum allowable height and area, CBC Chapter 5 is used. The CBC occupancy classification is used as related to allowable number of stories, construction type, building height, building area, building separation distance, occupancy separation, and associated requirements.

Building height limit for a sprinklered Group B occupancy of Type II-B construction, without area increase, is 75 feet per CBC Table 504.3. The provided building height is approximately 16 feet, and the building complies with the limits.

The allowable area for a sprinklered Group B occupancy of Type II-B construction, without height increase, is 92,000 SF per floor in accordance CBC Table 506.2. The provided building area complies with the limits. No credit will be taken for frontage increase for a sprinklered building.

The allowable number of stories above grade plane for a sprinklered Group B occupancy of Type II-B construction, without area increase, is 4 stories per CBC Table 504.4. The provided building is 1 story and complies with the limits.

2.5.3.4 Type of Construction—Fire Resistance Rating

The building will be constructed of non-combustible materials throughout and meet the fire resistance requirements for Type II-B construction.

Structural building elements and assemblies for use such as beams, columns, walls, floor, and roof construction comply with CBC Section 602 and Table 601.

Protective openings will have fire doors and all required hardware, anchorage, frames, and sills necessary for the satisfactory performance of fire doors or fire damper assemblies (refer to section below for opening protective ratings). Additional opening protective requirements can be found in CBC Section 716 and Table 716.1(2).

The table below represents the fire resistance ratings for the various building elements and their required protective openings. The collection of these fire resistance ratings and protective openings are based on the construction type and occupancy separations.

Table 2-9: Type of Construction Fire Rating

Element	Required Rating	Provided Rating	Reference
Structural frame	0	0	CBC Table 601
Interior bearing walls	0	0	CBC Table 601
Exterior bearing walls	0	0	CBC Table 601
Interior non-bearing walls	0	0	CBC Table 601
Exterior non-bearing walls	0	0	CBC Table 705.5
Shaft and stair enclosures	1	1	CBC Sections 713.4 and 1023.2
Floor construction	0	0	CBC Table 601
Roof construction	0	0	CBC Table 601
Roof covering	0	0	CBC Table 1505.1

Required fire separation distance is 10 feet for the building per CBC Table 705.5, for a Type II-B construction building with occupancies other than Group H. The provided fire separation distance is compliant.

Corridors are not required to be rated in accordance with CBC Section 1020.1, Table 1020.2.

Fire and smoke protection features will comply with the requirements of applicable Sections of CBC Chapter 7.

Fire barriers will comply with CBC Section 707. The fire barriers provided in this facility have a 1-hour or 2-hour fire resistance rating and will be constructed in accordance with the requirements of NFPA 221. Openings in fire barriers will be in accordance with CBC Section 707.6, with doors having a 3/4-hour or 1 1/2-hour rating as tested per NFPA 252 or UL 10B and installed in accordance with NFPA 80. Doors into 1-hour rated stair shafts must have a 1-hour rating. Penetrations of fire barriers will comply with CBC Section 714.1 and must be provided with listed through-penetration firestopping systems with an F rating of not less than that of the assembly penetrated and a T rating of at least that of the assembly where penetrating rated horizontal assemblies. Air transfer openings will be protected in accordance with CBC Section 717 and NFPA 90A. Ducted penetrations through 1-hour fire barriers are not required to be provided with fire dampers per NFPA 90A Section 9.2.1.1. Ducts passing through the floor ceiling slab must either be enclosed in shafts or provided with a fire damper per NFPA 90A Sections 6.8.1 and 9.2.2.1. Fire dampers must have a 90-minute rating per NFPA 90A Section 9.4.1.1.

Smoke partitions will be constructed in accordance with CBC Section 710.3. Smoke partitions will extend from floor to underside of floor or roof deck above. Smoke partitions are permitted to extend to the underside of a monolithic or suspended ceiling when the ceiling system forms a continuous membrane, a smoke-tight joint is provided between the top of the smoke partition and bottom of suspended ceiling, and the space above the ceiling is not used as a

plenum. Doors in smoke partitions will not include louvers and will be self-closing. Penetrations through smoke partitions and joints must be protected by a system capable of limiting the transfer of smoke. Non-ducted air transfer openings must be provided with smoke dampers per CBC Sections 717.5.3 and 717.6. Spaces used for general storage must be protected by a smoke partition in accordance with CBC Section 710.1.

Penetrations through the smoke barrier must be protected by an approved through-penetration firestop system installed and tested in accordance with the requirements of UL 1479 and have either a maximum 5 cubic feet/minute per SF (0.025 cubic meter/second per square meter) of penetration opening for each through-penetration firestop system or a maximum total cumulative leakage of 50 cubic feet/minute (0.024 cubic meter/second) for any 100 SF (9.3 square meters) of wall area or floor area. Joints made within, between, or at the perimeter of smoke barriers must be protected with a joint system that is tested in accordance with the requirements of UL 2079, and the L rating of the joint system must not exceed 5 cubic feet/minute per foot (0.00775 cubic meter/second per meter) of the joint.

In accordance with CBC Sections 704.4 and 704.4.1, supporting construction for rooms with fire resistive construction must be protected to afford the required fire-resistance rating of the room or horizontal assembly supported. Spray-applied fire resistive material (SFRM) will be used to provide a 1-hour or 2-hour protection of structural members.

Protection from hazards must be in accordance with CBC Section 509.1 and Table 509. Rooms containing boilers and large transformers must be provided with 1-hour fire separation. High-hazard occupancies and hazardous materials are addressed in CBC Sections 307 and 414, respectively.

2.5.3.5 Means of Egress

The means of egress requirements for this building include the location of exits, determination of exit requirements, number of exits, capacity access requirements, and exit types.

Exits, in combination with the exit access and exit discharge as designed, provide safe and continuous means of egress to the street or open space with direct access to a public way, as required by the CBC. In all areas that require two exits, the 1/3 of room diagonal minimum separation distance required of remote exits in sprinklered buildings will be met on all floors per CBC Section 1007.1.1. The provided exit separation varies by room and will be shown on the life safety plans as the design progresses.

Single exits from support rooms and areas with limited occupant loads and having a common path of travel within the allowable limits are permitted where allowed by individual occupancy chapters in the CBC and Section 1006.2.1.

Minimum number of exits from room and areas not complying with the above must be no less than two exits per CBC Section 1006.2.1. At least three exits are required where occupant loads exceed 500 and at least four exits are required where occupant loads exceed 1000 per CBC Section 1006.3 and Table 1006.3.3.

The following table indicates CBC Sections 1006.2.1, 1017.2, and 1020.5 and Tables 1006.2.1 and 1017.2 means of egress requirements for a sprinklered Group B occupancy.

Table 2-10: Means of Egress Components

Occupancy	Maximum Exit Access Travel Distance	Maximum Common Path of Travel	Maximum Dead End Corridor Length
Group B	300 feet	100 feet	50 feet

Occupant Load

The planned occupant load factors for multiple occupancies are shown below, based on CBC Section 1004.5 and Table 1004.5. The occupant load factors used for the building are listed in the table below:

Table 2-11: Occupant Load Factors

Use	Square feet /Person	Reference
Assembly without fixed seats, unconcentrated (tables and chairs)	15 net	CBC Table 1004.5
Training/classroom area	20 net	CBC Table 1004.5
Storage, mechanical, electrical	300 gross	CBC Table 1004.5
Business areas	150 gross	CBC Table 1004.5

Occupant loads will be calculated on the life safety plans as the design progresses.

The overall business areas include training rooms, break room, individual offices, open office spaces, restrooms, small conference rooms, server room, storage rooms, and general circulation areas.

Based on the occupancies present, the following table indicates the required means of egress capacity factors that will be used for determining the egress capacity of the exits on each floor per CBC Sections 1005.3.1 and 1005.3.2. The building will be sprinklered, and an emergency voice/alarm communication system is not required and will not be provided; therefore, the capacity factors of 0.15 and 0.2 inch are not used. The provided egress components vary and are shown on the life safety plans.

Egress Capacity Factors

Table 2-12: Egress Capacity Factors

Egress Component Type	Capacity Factor (Width/Person)	Reference
Other egress components	0.2 inch	CBC Section 1005.3.2
Stairways	0.3 inch	CBC Section 1005.3.1

Exit Signage

Means of egress must be marked in accordance with CBC Section 1013.1. Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. The path of egress travel to exits shall be marked by exit signs to clearly indicate the direction of egress travel. Exit signs are also required such that no point in an exit access corridor is more than 100 feet from the nearest sign per CBC 1013.1. The provided exit signs will be shown on the life safety plans by the design builder.

The bottom of new egress markings must be located at a vertical distance of not more than 6 feet, 8 inches above the top edge of the egress opening intended for designation by that marking. Egress markings must be located at a horizontal distance of not more than the required width of the egress opening, as measured from the edge of the egress opening intended for designation by that marking to the nearest edge of the marking.

Illumination of Means of Egress

Illumination of means of egress is required for designated stairs, aisles, corridors, ramps, and passageways and will be provided. The illumination level under normal power shall be not less than 1 footcandle (11 lux) at the walking surface. Along exit access stairways, exit stairways, and at their required landings, the illumination level shall be not less than 10 footcandles (108 lux) when the stairway is in use.

Emergency Lighting

Emergency lighting is required for designated interior and exterior exit access stairways, aisles, corridors, ramps, and passageways and will be provided. Emergency lighting shall maintain a minimum illumination level of 1 footcandle (11 lux) initially and shall not fall below 0.6 footcandle (6.4 lux) at the walking surface throughout the required emergency duration of 90 minutes.

2.5.3.6 Interior Finishes

Interior finishes will comply with CBC Section 803. Credit for a sprinklered building is taken in accordance with CBC Table 803.13.

Interior wall and ceiling finishes based on a sprinklered Group B occupancy will be per CBC Table 803.13. Enclosed exits will have Class B wall and ceiling finish materials. Exit access corridors will have Class B wall and ceiling materials. Rooms and enclosed spaces will have Class C wall and ceiling materials.

Interior floor finish will be based CBC Section 804.4 requirements. Floor finish in exit enclosures and exit access corridors will have minimum critical radiant flux of 0.1 watt per square centimeter (W/cm²). Floor finish requirements in other spaces are not limited.

2.5.3.7 Fire Protection Systems

Fire Alarm

An addressable-type system fire alarm system will be provided per the Final Design Criteria Manual (FDCM) and NFPA 72 design and installation requirements. An emergency voice/alarm system is not required by code for this facility. The new fire alarm system will be UL listed and will transmit signals to an approved central station per CFC Section 903.4.1. The building is fully sprinklered, and a manual fire alarm system is not required per CFC Section 907.2.2; however, per the FDCM, manual pull stations will be provided.

A full fire alarm system will be provided and will consist of materials and equipment such as control panels, batteries, wiring, conduit, strobes, horns, smoke detectors, duct detectors, and monitor modules, all of which will be UL listed or FM approved.

All notification appliance circuits and signaling line circuits will be Class B types. The signaling line circuits will be designed to have at least 50% spare capacity with no additional hardware required.

The fire alarm system will provide complete audible notification throughout the building and visual notification in all public areas. The fire alarm system will provide monitoring for all fire sprinkler system valves, water flow alarms, smoke detectors, and any other supplemental system devices/equipment, as required.

The fire alarm system shall have the option for testing individual alarm function.

A map of the entire fire suppression system shall be installed in the control panel location. Also, an evacuation route map (behind gas) shall be provided in appropriate locations.

It is not anticipated that combustible fuel burning equipment is planned for this facility. If the design process determines that combustible fuel burning equipment will be provided, then carbon monoxide detection will be required in accordance with CFC Section 915.1 and will be provided in accordance with the requirements of NFPA 72 as modified by CFC Section 915.1.

Fire Suppression

The fire suppression system for the Administration/Operations Building will consist of an automatic wet-pipe fire sprinkler system per the requirements of CFC Section 903.2. The design of the sprinkler system will be in accordance with CBC, CFC, NFPA 13, and applicable local codes and amendments.

The design of the automatic fire sprinkler system will be in accordance with NFPA 13 (design area, density, remote areas with allowable reductions, hose stream allowance, etc.). Design density and remote area calculations shall match the hazard classification of the building's occupancy (i.e., light hazard for offices, ordinary hazard for repair garages). The fire sprinkler system will be designed and incorporated into this project per the requirements of the CBC, CFC, NFPA 13, and applicable local codes. The automatic fire sprinkler system will consist of materials and equipment such as piping, valves, fittings, hangers, drains, test connections, fire department connections (FDCs), waterflow alarms, valve tamper switches, pressure gauges, and sprinklers, all of

which will be UL listed or Factory Mutual approved and CSFM listed for use in an automatic fire sprinkler system. It is not anticipated that there will be any unconditioned spaces that would require dry-pipe systems.

For the wet-pipe fire sprinkler system, sprinkler piping will be black steel Schedule 40, using grooved or screwed type fittings. Sprinklers used for the wet-pipe fire sprinkler system will be quick response type.

A new 8-inch dedicated underground fire water service from the municipal water supply system will be provided to serve the facility and will comply with NFPA 24 requirements. A post-indicator valve (PIV) will be required on the service lateral to the building. A fire department connection (FDC) is required and will be provided for fire department use. A BFP will be installed on the municipal water supply system.

Fire hydrant waterflow tests are required to confirm the available water supply for fire sprinkler demand requirements. Remote area sprinkler calculations will be required to determine if the available water supply is sufficient for the sprinkler demand. If water pressure is determined to be insufficient, then an electric motor-driven fire pump may be necessary.

The building will be classified as Seismic Design Category D or higher. General seismic category design and protection compliance measures per NFPA 13 will include bracing and restraint, use of flexible couplings, and ensuring sufficient clearance around sprinkler system components due to potential building movement.

The fire flow and flow duration requirements for this facility are determined based on CFC Section 507.3 and Appendix B, specifically Tables B105.1(2) and B105.2. For a building with 12,800 SF of Type II-B construction, Table B105.1(2) specifies a required fire flow of 2,500 gpm for a duration of 2 hours. If the building is fully sprinklered, Table B105.2 permits a reduction to 25% of the minimum fire flow specified in Table B105.1(2), resulting in a required fire flow of 625 gpm. However, per CFC Table B105.2, the fire flow cannot be reduced below 1,000 gpm for a duration of 2 hours, ensuring sufficient water supply for fire protection.

Clean Agent Suppression

A NOVEC 1230 clean agent suppression system will be installed in the server room within the Administration Building, designed and installed in compliance with NFPA 2001, NFPA 70, NFPA 72, and CFC Section 904. The system will include a control panel, alarms and strobes, detectors, nozzles, a piping network, cylinders, a manual release, and an abort switch to ensure comprehensive fire protection.

Residential Range Hood Suppression

A residential range hood suppression system will be installed in the Administration Building's operations area to protect the cooking appliances within the designated residential kitchen. The system will be designed and installed in accordance with NFPA 17A and NFPA 72 to ensure compliance with fire safety standards and local regulations.

Portable Fire Extinguishers

Portable fire extinguishers are required to be provided in accordance with CFC Section 906 and NFPA 10. Fire extinguishers will be provided in accordance with CFC Tables 906.1, 906.3(1), and 906.3(2). Extinguisher placement distances will be based on occupancy hazard classifications per CFC Section 906.3. Signage will be provided next to each extinguisher to indicate the type of fire for which it is intended. Portable fire extinguishers will be mounted on brackets in utility rooms and cabinets in public spaces. Portable fire extinguishers will be in cabinets that are semi- or fully recessed. They are not permitted to

protrude more than 4 inches into a public area per ADA/ABA criteria. Fire extinguisher type and locations will be depicted on the life safety plans as the design process continues.

2.5.4 Maintenance Building

2.5.4.1 Use and Occupancy

The single-story Maintenance Building is classified as Group S-1 occupancy use per CBC Sections 311.2.2 and 406.8 motor vehicle repair garage complying with the maximum allowable quantities of hazardous materials specified in Table 307.1(1). The building will be classified as non-separated mixed use per CBC Section 508.3.

- Occupancy Details:
 - o The Group B occupancy includes business areas and exceeds 10% of the total floor area; therefore, it is not considered an accessory occupancy.
 - o The Group S-1 occupancy includes a motor vehicle repair garage and associated equipment storage rooms.

As a non-separated mixed-use building, the Maintenance Building must comply with the most restrictive requirements for construction type, building height, building area, building separation distance, and occupancy separation. It must also meet the applicable provisions of Chapter 9 for fire protection and life safety systems. These requirements, as outlined in CBC Sections 508.3.1 and 508.3.2, apply to the entire building.

2.5.4.2 Construction Type

The required construction type is a minimum of Type II-B or Type II (000) as defined by NFPA 220, consisting of unprotected, non-combustible materials. The provided construction type meets this requirement and is classified as Type II-B / Type II (000). The maximum allowable area will be determined by the predominant S-1 occupancy per IBC Section 508.3.2.

2.5.4.3 Building Height and Area

The building is single-story with a maximum height of 24 feet and a footprint of 23,000 SF. This area measurement is based off the CBC definition of building area and is different from gross square footage used by architecture. The building will be sprinklered, Type II-B construction.

For the calculation of maximum allowable height and area, CBC Chapter 5 is used. The CBC occupancy classification is used as related to allowable number of stories, construction type, building height, building area, building separation distance, occupancy separation, and associated requirements. The most restrictive allowances are the S-1 occupancy and will apply throughout the building per CBC Section 508.3.2.

Building height limit for a sprinklered Group S occupancy of Type II-B construction is 75 feet per CBC Table 504.3. The provided building height complies with the limits.

The allowable area for a sprinklered Group S-1 occupancy of Type II-B construction is 70,000 SF in accordance CBC Section 506.2.2 and Table 506.2. The provided building area is 23,000 SF and complies with the limits. No credit will be taken for frontage increase for a sprinklered building.

The allowable number of stories above grade plane for a sprinklered Group S-1 occupancy of Type II-B construction is 4 stories per CBC Table 504.4. The building is single story and complies with the limits.

2.5.4.4 Type of Construction—Fire Resistance Rating

The building will be constructed of non-combustible materials throughout and meet the fire resistance requirements for Type II-B construction.

Structural building elements and assemblies for use, such as beams, columns, walls, floor, and roof construction, comply with CBC Section 602 and Table 601.

Protective openings will have fire doors and all required hardware, anchorage, frames, and sills necessary for the satisfactory performance of fire doors or fire damper assemblies (refer to section below for opening protective ratings). Additional opening protective requirements can be found in CBC Section 716 and Table 716.1(2).

The table below represents the fire resistance ratings for the various building elements and their required protective openings. The collection of these fire resistance ratings and protective openings are based on the construction type and occupancy separations.

Table 2-13: Type of Construction Fire Rating

Element	Required Rating	Provided Rating	Reference
Structural frame	0	0	CBC Table 601
Interior bearing walls	0	0	CBC Table 601
Exterior bearing walls	0	0	CBC Table 601
Interior non-bearing walls	0	0	CBC Table 601
Exterior non-bearing walls	0	0	CBC Table 705.5
Shaft and stair enclosures	1	1	CBC Sections 713.4 and 1023.2
Floor construction	0	0	CBC Table 601
Roof construction	0	0	CBC Table 601
Roof covering	0	0	CBC Table 1505.1

Required fire separation distance is 10 feet for the building per CBC Table 705.5 for a Type II-B construction building with occupancies other than Group H. The provided fire separation distance is compliant.

Corridors are not required to be rated in accordance with CBC Section 1020.1, Table 1020.2.

Fire and smoke protection features will comply with the requirements of applicable Sections of CBC Chapter 7.

Fire barriers will comply with CBC Section 707. The fire barriers provided in this facility have a 1-hour or 2-hour fire resistance rating and will be constructed in accordance with the requirements of NFPA 221. Openings in fire barriers will be in accordance with CBC Section 707.6, with doors having a 3/4-hour or 1-1/2-hour rating as tested per NFPA 252 or UL 10B and installed in accordance with NFPA 80. Doors into 1-hour rated stair shafts must have a 1-hour rating. Penetrations of fire barriers will comply with CBC Section 714.1 and must be provided with listed through-penetration firestopping systems with an F rating of not less than that of the assembly penetrated and a T rating of at least that of the assembly where penetrating rated horizontal assemblies. Air transfer openings will be protected in accordance with CBC Section 717 and NFPA 90A. Ducted penetrations through 1-hour fire barriers are not required to be provided with fire dampers per NFPA 90A Section 9.2.1.1. Ducts passing through the floor ceiling slab must either be enclosed in shafts or provided with a fire damper per NFPA 90A Sections 6.8.1 and 9.2.2.1. Fire dampers must have a 90-minute rating per NFPA 90A Section 9.4.1.1.

Smoke partitions will be constructed in accordance with CBC Section 710.3. Smoke partitions will extend from floor to underside of floor or roof deck above. Smoke partitions are permitted to extend to the underside of a monolithic or suspended ceiling when the ceiling system forms a continuous membrane, a smoke-tight joint is provided between the top of the smoke partition and bottom of suspended ceiling, and the space above the ceiling is not used as a plenum. Doors in smoke partitions will not include louvers and will be self-closing. Penetrations through smoke partitions and joints must be protected by a system capable of limiting the transfer of smoke. Non-ducted air transfer openings must be provided with smoke dampers per CBC Sections 717.5.3 and 717.6. Spaces used for general storage must be protected by a smoke partition in accordance with CBC Section 710.1.

Penetrations through the smoke barrier must be protected by an approved through-penetration firestop system installed and tested in accordance with the requirements of UL 1479 and have either a maximum 5 cubic feet/minute per SF (0.025 cubic meter/second per square meter) of penetration opening for each through-penetration firestop system, or a maximum total cumulative leakage of 50 cubic feet/minute (0.024 cubic meter/second) for any 100 SF (9.3 square meters) of wall area or floor area. Joints made within, between, or at the perimeter of smoke barriers must be protected with a joint system that is tested in accordance with the requirements of UL 2079, and the L rating of the joint system must not exceed 5 cubic feet/minute per foot (0.00775 cubic meter/second per meter) of the joint.

In accordance with CBC Sections 704.4 and 704.4.1, supporting construction for rooms with fire resistive construction must be protected to afford the required fire-resistance rating of the room or horizontal assembly supported. SFRM will be used to provide 1-hour or 2-hour protection of structural members.

Protection from hazards must be in accordance with CBC Section 509.1 and Table 509. Rooms containing boilers and large transformers must be provided with 1-hour fire separation. High-hazard occupancies and Hazardous materials are addressed in CBC Sections 307 and 414, respectively.

2.5.4.5 Means of Egress

The means of egress requirements for this building include the location of exits, determination of exit requirements, number of exits, capacity access requirements, and exit types.

Exits, in combination with the exit access and exit discharge as designed, provide safe and continuous means of egress to the street or open space with direct access to a public way, as required by the CBC. In all areas that require two exits, the 1/3 of room diagonal minimum separation distance required of remote exits in sprinklered buildings will be met on all floors per CBC Section 1007.1.1. The provided exit separation varies by room and will be shown on the life safety plans as the design progresses.

Single exits from support rooms and areas with limited occupant loads and having a common path of travel within the allowable limits are permitted where allowed by individual occupancy chapters in the CBC and Section 1006.2.1.

Minimum number of exits from rooms and areas not complying with the above must be no less than two exits per CBC Section 1006.2.1. At least three exits are required where occupant loads exceed 500, and at least four exits are required where occupant loads exceed 1,000 per CBC Section 1006.3 and Table 1006.3.3.

The following table indicates CBC Sections 1006.2.1, 1017.2, and 1020.5 and Tables 1006.2.1 and 1017.2 means of egress requirements for a sprinklered Group S occupancy. The Group S-1 occupancy has stricter means of egress requirements than the Group B occupancy and will be applied to the whole building.

Table 2-14: Means of Egress Components

Occupancy	Maximum Exit Access Travel Distance	Maximum Common Path of Travel	Maximum Dead End Corridor Length
Group S-1	250 feet	100 feet OL ≤ 29 75 feet OL > 29	50 feet

2.5.4.6 Occupant Load

The planned occupant load factors for multiple occupancies are shown below, based on CBC Section 1004.5 and Table 1004.5. The occupant load factors used for the building are listed in the table below:

Table 2-15: Occupant Load Factors

Use	Square feet /Person	Reference
Storage, mechanical, electrical	300 gross	CBC Table 1004.5
Business areas	150 gross	CBC Table 1004.5

Occupant loads will be calculated on the life safety plans as the design progresses.

The overall business occupant load is calculated based on gross area includes interior circulation areas, break room, offices, lobby, restrooms, etc.

2.5.4.7 Exit Capacity

Based on the occupancies present, the following table indicates the required means of egress capacity factors that will be used for determining the egress capacity of the exits on each floor, per CBC Sections 1005.3.1 and 1005.3.2. The building will be sprinklered, and an emergency voice/alarm communication system is not required; therefore, the capacity factors of 0.15 and 0.2 inch will not be used. It is not anticipated there will be any stairs in the building; however, their requirements are listed in the table below. The provided stair widths and other egress components vary and will be shown on the life safety plans as the design progresses.

Table 2-16: Egress Capacity Factors

Egress Component Type	Capacity Factor (Width/Person)	Reference
Other egress components	0.2 inch	CBC Section 1005.3.2
Stairways	0.3 inch	CBC Section 1005.3.1

2.5.4.8 Exit Signage

Means of egress must be marked in accordance with CBC Section 1013.1. Exits and exit access doors shall be marked by an approved exit sign readily visible from any direction of egress travel. The path of egress travel to exits shall be marked by exit signs to clearly indicate the direction of egress travel. Exit signs are also required such that no point in an exit access corridor is more than 100 feet from the nearest sign per CBC 1013.1. The provided exit signs will be shown on the life safety by the design-builder.

The bottom of new egress markings must be located at a vertical distance of not more than 6 feet, 8 inches above the top edge of the egress opening intended for designation by that marking. Egress markings must be located at a horizontal distance of not more than the required width of the egress opening, as measured from the edge of the egress opening intended for designation by that marking to the nearest edge of the marking.

2.5.4.9 Illumination of Means of Egress

Illumination of means of egress is required for designated stairs, aisles, corridors, ramps, and passageways and will be provided. The illumination level under normal power shall be not less than 1 footcandle (11 lux) at the walking surface. Along exit access stairways, exit stairways, and at their required landings, the illumination level shall be not less than 10 footcandles (108 lux) when the stairway is in use.

2.5.4.10 Emergency Lighting

Emergency lighting is required for designated interior and exterior exit access stairways, aisles, corridors, ramps, and passageways and will be provided. Emergency lighting shall maintain a minimum illumination level of 1 footcandle (11 lux) initially and shall not fall below 0.6 footcandle (6.4 lux) at the walking surface throughout the required emergency duration of 90 minutes.

2.5.4.11 Interior Finishes

Interior finishes will comply with CBC Section 803. Credit for a sprinklered building is taken in accordance with CBC Table 803.13.

Interior wall and ceiling finishes based on the stricter requirements for a sprinklered Group B occupancy will be per CBC Table 803.13. Enclosed exits will have Class B wall and ceiling finish materials. Exit access corridors will have Class B wall and ceiling materials. Rooms and enclosed spaces will have Class C wall and ceiling materials.

Interior floor finish will be based CBC Section 804.4 requirements. Floor finish in exit enclosures and exit access corridors will have minimum critical radiant flux of 0.1 W/cm². Floor finish requirements in other spaces are not limited.

2.5.4.12 Combustible Metal Dust and Welding Operations

The Maintenance Building includes operations involving combustible metal dust generated by grinding processes and welding activities, both of which present significant fire and explosion hazards. To mitigate these risks, fire protection systems and procedures will be implemented in accordance with NFPA 484, NFPA 652, NFPA 51B, and the CFC.

Combustible metal dust will be controlled using compliant dust collection systems designed to capture and contain dust at its source. The systems will include explosion venting or suppression features per NFPA 68, and ductwork will be constructed from noncombustible materials. Routine housekeeping protocols will ensure dust accumulation is minimized, while electrical equipment will comply with NFPA 70 standards for dust hazard areas. Fire detection and suppression systems, such as heat and smoke detectors and clean agent systems, will protect dust collection areas, with water-based suppression avoided for reactive metals as required by NFPA 484.

Welding and hot work activities will adhere to NFPA 51B and CFC Chapter 35 through the implementation of a hot work permit program. Fire watches will be conducted during and after welding, and portable fire extinguishers and noncombustible shields will protect against ignition from sparks. Adequate ventilation will also be provided to prevent the buildup of flammable gases or vapors in welding areas.

All systems and safety measures will comply with applicable codes, including NFPA 10, NFPA 72, and local regulations. Detailed plans will be submitted to the AHJ, and ongoing inspections and engineering analyses will ensure fire safety remains a priority. These efforts will minimize the risk of fire and explosion while maintaining a safe environment for all operations.

2.5.4.13 Fire Protection Systems

Fire Alarm

For the Maintenance Building, an addressable-type system fire alarm system will be provided per the FDCM and NFPA 72 design and installation requirements. An emergency voice/alarm system is not required by code for this facility. The new fire alarm system will be UL listed and will transmit signals to an approved central station per CFC Section 903.4.1. The building will be fully sprinklered, and a manual fire alarm system is not required per CFC Section 907.2.10, as this section is not applicable to motor vehicle repair garages. However, per the FDCM, manual pull stations will be provided.

It is not anticipated that combustible fuel burning equipment is planned for this facility. If the design process determines that combustible fuel burning equipment will be provided, then carbon monoxide detection will be required in accordance with CFC Section 915.1 and will be provided in accordance with the requirements of NFPA 72 as modified by CFC Section 915.1.

The FDCM specifies that the fire alarm system in the Maintenance Building must include functionality to shut down the flow of process fluids by activating an automatic fuel shutoff mechanism. This requirement ensures that, in the event of a fire or emergency, the fire alarm system triggers the termination of fuel flow to prevent the escalation of hazards. This functionality aligns with the requirements of NFPA 72, NFPA 30, IFC, IBC, and other relevant codes governing the protection of buildings and systems handling flammable or hazardous materials.

Fire Suppression

The fire suppression system for the Maintenance Building will consist of an automatic wet-pipe fire sprinkler system per the requirements of CFC Section 903.2. The design of the sprinkler system will be in accordance with CBC, CFC, NFPA 13, and applicable local codes and amendments.

The design of the automatic fire sprinkler system will be in accordance with NFPA 13 (design area, density, remote areas with allowable reductions, hose stream allowance, etc.). Design density and remote area calculations shall match the hazard classification of the building's occupancy (i.e., light hazard for offices, ordinary hazard for repair garages). The fire sprinkler system will be designed and incorporated into this project per the requirements of the CBC, CFC, NFPA 13, and applicable local codes. The automatic fire sprinkler system will consist of materials and equipment such as piping, valves, fittings, hangers, drains, test connections, FDCs, waterflow alarms, valve tamper switches, pressure gauges, and sprinklers, all of which will be UL listed or Factory Mutual approved and CSFM listed for use in an automatic fire sprinkler system. It is not anticipated that there will be any unconditioned spaces that would require dry-pipe systems.

For the wet-pipe fire sprinkler system, sprinkler piping will be black steel Schedule 40, using grooved or screwed type fittings. Sprinklers used for the wet-pipe fire sprinkler system will be quick response type.

A new 8-inch dedicated underground fire water service from the municipal water supply system will be provided to serve the facility and will comply with NFPA 24 requirements. A PIV will be required on the service lateral to the building. An FDC is required and will be provided for their use. A BFP will be installed on the municipal water supply system.

Fire hydrant waterflow tests are required to confirm the available water supply for fire sprinkler demand requirements. Remote area sprinkler calculations will be required to determine if the available water supply is sufficient for the sprinkler demand. If water pressure is determined to be insufficient, then an electric motor-driven fire pump may be necessary. The fire protection measures for high-piled storage areas will be designed to provide robust life safety and property protection. Compliance with CFC Chapter 32, NFPA 13, and applicable local codes will ensure effective fire detection, suppression, and firefighting operations. Design details, including commodity classification, storage configurations, and fire protection system specifications, will be finalized and submitted for AHJ review during the design phase.

The building will be classified as Seismic Design Category D or higher. General seismic category design and protection compliance measures per NFPA 13 will include bracing and restraint, use of flexible couplings, and ensuring sufficient clearance around sprinkler system components due to potential building movement.

The fire flow and flow duration requirements for this facility are determined based on CFC Section 507.3 and Appendix B, specifically Tables B105.1(2) and B105.2. For a building with 23,000 sf of Type II-B construction, Table B105.1(2) specifies a fire flow of 3,250 gpm for a duration of 3 hours. If the building is equipped with an approved automatic sprinkler system, Table B105.2 allows the fire flow to be reduced to 25% of the minimum value from Table B105.1(2). This reduction results in a minimum required fire flow of 812 gpm. However, per CFC Table B105.2, the fire flow cannot be reduced below 1,000 gpm for a duration of 2 hours, ensuring adequate water supply for fire protection.

2.5.4.14 Clean Agent Suppression

A NOVEC 1230 clean agent suppression system will be installed in the server room within the Maintenance Building, designed and installed in compliance with NFPA 2001, NFPA 70, NFPA 72, and CFC Section 904. The system will include a control panel, alarms and strobes, detectors, nozzles, a piping network, cylinders, a manual release, and an abort switch to ensure comprehensive fire protection.

Portable Fire Extinguishers

Portable fire extinguishers are required to be provided in accordance with CFC Section 906 and NFPA 10. Fire extinguishers will be provided in accordance with CFC Tables 906.1, 906.3(1), and 906.3(2). Extinguisher placement distances will be based on occupancy hazard classifications per CFC Section 906.3. Signage will be provided next to each extinguisher to indicate the type of fire for which it is intended. Portable fire extinguishers will be mounted on brackets in utility rooms and cabinets in public spaces. Portable fire extinguishers will be in cabinets that are semi- or fully recessed. They are not permitted to protrude more than 4 inches into a public area per ADA/ABA criteria. Fire extinguisher type and locations will be depicted on the life safety plans as the design process continues.

2.5.5 Vehicle Service Island

2.5.5.1 Use and Occupancy

The single-story Vehicle Service Island contains two occupancy types as classified by the CBC: Group S-1 and Group B. The building is classified as non-separated mixed use per CBC Section 508.3.

- Occupancy Details:
 - o The Group B occupancy encompasses business areas, including offices, a mechanical/electrical room, and a fuel monitoring control room. As it constitutes more than 10% of the total floor area, it is not classified as an accessory occupancy.
 - o The Group S-1 occupancy includes a canopy under which buses park for diesel refueling operations.

As a non-separated mixed-use building, the Vehicle Service Island must comply with the most restrictive requirements for construction type, building height, building area, building separation distance, and occupancy separation. It must also meet the applicable provisions of Chapter 9 for fire protection and life safety systems. These requirements, as outlined in CBC Sections 508.3.1 and 508.3.2, apply to the entire building.

2.5.5.2 Construction Type

The required construction type is a minimum of Type II-B or Type II (000), as defined by NFPA 220, consisting of unprotected, noncombustible materials. The provided construction type is classified as Type II-B/Type II (000). The maximum allowable area for the building will be determined based on the predominant Group S-1 occupancy, in accordance with IBC Section 508.3.2.

2.5.5.3 Building Height and Area

The building is single story with a maximum height of approximately 18 feet and a footprint of approximately 3,500 SF. This area measurement is based off the CBC definition of building area and is different from gross square footage used by architecture. The building will be sprinklered, Type II-B construction.

For the calculation of maximum allowable height and area, CBC Chapter 5 is used. The CBC occupancy classification is used as related to allowable number of stories, construction type, building height, building area, building separation distance, occupancy separation, and associated requirements. The most restrictive allowances are the S-1 occupancy and will apply throughout the building per CBC Section 508.3.2.

Building height limit for a sprinklered Group S occupancy of Type II-B construction is 75 feet per CBC Table 504.3. The provided building height is approximately 18 feet, and the building complies with the limits.

The allowable area for a sprinklered Group S-1 occupancy of Type II-B construction is 70,000 SF in accordance CBC Section 506.2.2 and Table 506.2. The provided building area is approximately 3,500 SF and complies with the limits. No credit will be taken for frontage increase for a sprinklered building.

The allowable number of stories above grade plane for a sprinklered Group S-1 occupancy of Type II-B construction is 4 stories per CBC Table 504.4. The building is single-story and complies with the limits.

2.5.5.4 Type of Construction—Fire Resistance Rating

The building will be constructed of non-combustible materials throughout and meet the fire resistance requirements for Type II-B construction.

Structural building elements and assemblies for use, such as beams, columns, walls, floor, and roof construction, comply with CBC Section 602 and Table 601.

Protective openings will have fire doors and all required hardware, anchorage, frames, and sills necessary for the satisfactory performance of fire doors or fire damper assemblies (refer to section below for opening protective ratings). Additional opening protective requirements can be found in CBC Section 716 and Table 716.1(2).

The table below represents the fire resistance ratings for the various building elements and their required protective openings. The collection of these fire resistance ratings and protective openings are based on the construction type and occupancy separations.

Table 2-17: Type of Construction Fire Rating

Element	Required Rating	Provided Rating	Reference
Structural frame	0	0	CBC Table 601
Interior bearing walls	0	0	CBC Table 601
Exterior bearing walls	0	0	CBC Table 601
Interior non-bearing walls	0	0	CBC Table 601
Exterior non-bearing walls	0	0	CBC Table 705.5
Shaft and stair enclosures	1	1	CBC Sections 713.4 and 1023.2
Floor construction	0	0	CBC Table 601
Roof construction	0	0	CBC Table 601
Roof covering	0	0	CBC Table 1505.1

Required fire separation distance is 10 feet for the building per CBC Table 705.5 for a Type II-B construction building with occupancies other than Group H. The provided fire separation distance is compliant.

Fire and smoke protection features will comply with the requirements of applicable Sections of CBC Chapter 7. Fire barriers will comply with CBC Section 707. The provided fire barriers in this facility have a 1-hour or 2-hour fire resistance rating and will be constructed in accordance with the requirements of NFPA 221. Openings in fire barriers will be in accordance with CBC Section 707.6, with doors having a 3/4-hour or 1-1/2-hour rating as tested per NFPA 252 or UL 10B and installed in accordance with NFPA 80. Doors into 1-hour rated stair shafts must have a 1-hour rating. Penetrations of fire barriers will comply with CBC Section 714.1 and must be provided with listed through-penetration firestopping systems with an F rating of not less than that of the assembly penetrated and a T rating of at least that of the assembly where penetrating rated horizontal assemblies. Air transfer openings will be protected in accordance with CBC Section 717 and NFPA 90A. Ducted penetrations through 1-hour fire barriers are not required to be provided with fire dampers per NFPA 90A Section 9.2.1.1. Ducts passing through the floor ceiling slab must either be enclosed in shafts or provided with a fire damper per NFPA 90A Sections 6.8.1 and 9.2.2.1. Fire dampers must have a 90-minute rating per NFPA 90A Section 9.4.1.1.

Smoke partitions will be constructed in accordance with CBC Section 710.3. Smoke partitions will extend from floor to underside of floor or roof deck above. Smoke partitions are permitted to extend to the underside of a monolithic or suspended ceiling when the ceiling system forms a continuous membrane, a smoke-tight joint is provided between the top of the smoke partition and bottom of suspended ceiling, and the space above the ceiling is not used as a plenum. Doors in smoke partitions will not include louvers and will be self-closing. Penetrations through smoke partitions and joints must be protected by a system capable of limiting the transfer of smoke. Non-ducted air transfer openings must be provided with smoke dampers per CBC Sections 717.5.3 and 717.6. Spaces used for general storage must be protected by a smoke partition in accordance with CBC Section 710.1.

Penetrations through the smoke barrier must be protected by an approved through-penetration firestop system installed and tested in accordance with the requirements of UL 1479 and have either a maximum 5 cubic feet/minute per SF (0.025 cubic meter/second per square meter) of penetration opening for each through-penetration firestop system or a maximum total cumulative leakage of 50 cubic feet/minute (0.024 cubic meter/second) for any 100 SF (9.3 square meters) of wall area or floor area. Joints made within, between, or at the perimeter of smoke barriers must be protected with a joint system that is tested in accordance with the requirements of UL 2079, and the L rating of the joint system must not exceed 5 cubic feet/minute per foot (0.00775 cubic meter/second per meter) of the joint.

In accordance with CBC Sections 704.4 and 704.4.1, supporting construction for rooms with fire-resistive construction must be protected to afford the required fire-resistance rating of the room or horizontal assembly supported. SFRM will be used to provide a 1-hour or 2-hour protection of structural members.

Protection from hazards must be in accordance with CBC Section 509.1 and Table 509. Rooms containing boilers and large transformers must be provided with 1-hour fire separation. High-hazard occupancies and Hazardous materials are addressed in CBC Sections 307 and 414, respectively.

2.5.5.5 Means of Egress

The means of egress requirements for this building include the location of exits, determination of exit requirements, number of exits, capacity access requirements, and exit types.

Exits, in combination with the exit access and exit discharge as designed, provide safe and continuous means of egress to the street or open space with direct access to a public way, as required by the CBC. In all areas that require two exits, the 1/3 of room diagonal minimum separation distance required of remote exits in sprinklered buildings will be met on all floors per CBC Section 1007.1.1. The provided exit separation varies by room and will be shown on the life safety plans as the design progresses.

Single exits from support rooms and areas with limited occupant loads and having a common path of travel within the allowable limits are permitted where allowed by individual occupancy chapters in the CBC and Section 1006.2.1.

The minimum number of exits from rooms and areas not complying with the above must be no less than two exits per CBC Section 1006.2.1. At least three exits are required where occupant loads exceed 500, and at least four exits are required where occupant loads exceed 1,000 per CBC Section 1006.3 and Table 1006.3.3.

The following table outlines the CBC Sections 1006.2.1, 1017.2, and 1020.5, along with Tables 1006.2.1 and 1017.2, regarding means of egress requirements for a sprinklered Group S occupancy. Since the Group S-1 occupancy has stricter egress requirements compared to the Group B occupancy, these stricter requirements will be applied to the entire building. The building's design will ensure full compliance with these more stringent egress standards.

Table 2-18: Means of Egress Components

Occupancy	Maximum Exit Access Travel Distance	Maximum Common Path of Travel	Maximum Dead End Corridor Length
Group S-1	250 feet	100 feet	50 feet

2.5.5.6 Occupant Load

The planned occupant load factors for multiple occupancies are shown below, based on CBC Section 1004.5 and Table 1004.5. The occupant load factors used for the building are listed in the table below:

Table 2-19: Occupant Load Factors

Use	Square feet /Person	Reference
Storage, mechanical, electrical	300 gross	CBC Table 1004.5
Business areas	150 gross	CBC Table 1004.5

Occupant loads will be calculated on the life safety plans as the design progresses.

The business area encompasses offices, a mechanical/electrical room, and a fuel monitoring control room.

The following table outlines the required means of egress capacity factors, which will be used to calculate the egress capacity of exits on each floor, in accordance with CBC Sections 1005.3.1 and 1005.3.2. Since the building will be sprinklered and an emergency voice/alarm communication system is not required, the capacity factors of 0.15 inch and 0.2 inch will not apply. While stairs are not anticipated for this building, their requirements are included in the table for reference. The specific stair widths and other egress components will be detailed in the life safety plans as the design progresses.

Table 2-20: Egress Capacity Factors

Egress Component Type	Capacity Factor (Width/Person)	Reference
Other egress components	0.2 inch	CBC Section 1005.3.2
Stairways	0.3 inch	CBC Section 1005.3.1

2.5.5.7 Illumination of Means of Egress

Illumination of means of egress is required for designated stairs, aisles, corridors, ramps, and passageways and will be provided. The illumination level under normal power shall be not less than 1 footcandle (11 lux) at the walking surface. Along exit access stairways, exit stairways, and at their required landings, the illumination level shall be not less than 10 footcandles (108 lux) when the stairway is in use.

2.5.5.8 Emergency Lighting

Emergency lighting is required for designated interior and exterior exit access stairways, aisles, corridors, ramps, and passageways and will be provided. Emergency lighting shall maintain a minimum illumination level of 1 footcandle (11 lux) initially and shall not fall below 0.6 footcandle (6.4 lux) at the walking surface throughout the required emergency duration of 90 minutes.

2.5.5.9 Interior Finishes

Interior finishes will comply with CBC Section 803. Credit for a sprinklered building is taken in accordance with CBC Table 803.13.

Interior wall and ceiling finishes based on a sprinklered Group B occupancy will be per CBC Table 803.13. Enclosed exits will have Class B wall and ceiling finish materials. Exit access corridors will have Class B wall and ceiling materials. Rooms and enclosed spaces will have Class C wall and ceiling materials.

Interior floor finish will be based CBC Section 804.4 requirements. Floor finish in exit enclosures and exit access corridors will have minimum critical radiant flux of 0.1 W/cm². Floor finish requirements in other spaces are not limited.

2.5.5.10 Fire Protection Systems

Fire Alarm

CFC Section 907.2.10, which applies to Group S occupancies, is limited to public and self-storage facilities that are three or more stories in height and does not address fire alarm requirements for a Group S-1 motor vehicle repair garage. Additionally, CFC Section 907.2.2, which pertains to Group B occupancies, is not applicable to this building since the occupant load is less than 500 people.

As the Vehicle Service Island is fully sprinklered per CFC Section 903.2.9.1, an addressable fire alarm supervisory control panel will be installed to monitor waterflow switches and supervise sprinkler system valves as required by CFC Section 903.4. Additional fire alarm initiating devices, such as smoke detectors, and manual pull stations, will be monitored by the supervisory panel. These design details will be finalized and submitted during the design phase.

A full fire alarm system will be provided and will consist of materials and equipment such as control panels, batteries, wiring, conduit, strobes, horns, smoke detectors, and monitor modules, all of which will be UL listed or FM approved.

All notification appliance circuits and signaling line circuits will be Class B types. The signaling line circuits will be designed to have at least 50% spare capacity with no additional hardware required.

The fire alarm system will provide complete audible notification throughout the building and visual notification in all public areas. The fire alarm system will provide monitoring for all fire sprinkler system valves, water flow alarms, smoke detectors, and any other supplemental system devices/equipment, as

required. The fire alarm system shall have the option for testing individual alarm function. Alarm, supervisory, and trouble signals from the fire alarm panel will be automatically transmitted to a supervising station and will also trigger an audible signal at a constantly attended location, as required by CFC Section 903.4.1.

It is not anticipated that combustible fuel burning equipment is planned for this facility. If the design process determines that combustible fuel burning equipment will be provided, then carbon monoxide detection will be required in accordance with LAFC Section 915.1 and will be provided in accordance with the requirements of NFPA 72 as modified by CFC Section 915.1.

Fire Suppression

The fire suppression system for the Vehicle Service Island will consist of an automatic wet-pipe fire sprinkler system in areas where temperatures are consistently maintained above 40°F, per the requirements of CFC Section 903.2. In locations where temperatures may drop below 40°F, such as under the canopy or other unheated areas, a dry-pipe fire sprinkler system will be installed to prevent freezing, in compliance with NFPA 13 and CFC Section 903.3.1.1.

The design of the fire sprinkler system will adhere to the requirements of the CBC, CFC, NFPA 13, and all applicable local codes and amendments. The system will be engineered to provide adequate fire protection while addressing temperature variations across different areas of the facility.

The design of the automatic fire sprinkler system will be in accordance with NFPA 13 (design area, density, remote areas with allowable reductions, hose stream allowance, etc.). Design density and remote area calculations shall match the hazard classification of the building's occupancy (i.e., light hazard for offices, ordinary hazard for repair garages). The fire sprinkler system will be designed and incorporated into this project per the requirements of the CBC, CFC, NFPA 13, and applicable local codes. The automatic fire sprinkler system will consist of materials and equipment such as piping, valves, fittings, hangers, drains, test connections, FDCs, waterflow alarms, valve tamper switches, pressure gauges and sprinklers, all of which will be UL listed or Factory Mutual approved and CSFM listed for use in an automatic fire sprinkler system.

The wet-pipe fire sprinkler system will utilize black steel Schedule 40 piping, assembled with grooved or threaded fittings. Quick-response sprinklers will be installed for enhanced performance. In areas where temperatures are expected to drop below 40°F, a dry-pipe fire sprinkler system will be utilized to prevent freezing.

A new 6-inch dedicated underground fire water service from the municipal water supply system will be provided to serve the facility and will comply with NFPA 24 requirements. A PIV will be required on the service lateral to the building. An FDC is required and will be provided for their use. A BFP will be installed on the municipal water supply system. Fire hydrant waterflow tests are required to confirm the available water supply.

The building will be classified as Seismic Design Category D or higher. General seismic category design and protection compliance measures per NFPA 13 will include, bracing and restraint, use of flexible couplings, and ensuring sufficient clearance around sprinkler system components due to potential building movement.

The fire flow and flow duration requirements for this facility are determined based on CFC Section 507.3 and Appendix B, specifically Tables B105.1(2) and B105.2. For a building with 3,500 square feet of Type II-B construction, Table B105.1(2) specifies a required fire flow of 1,500 gpm for a duration of 2 hours. If the building is fully sprinklered, Table B105.2 permits a reduction to 25% of the minimum fire flow specified in Table B105.1(2), resulting in a required fire

flow of 375 gpm. However, per CFC Table B105.2, the fire flow cannot be reduced below 1,000 gpm for a duration of 2 hours, ensuring sufficient water supply for fire protection.

Portable Fire Extinguishers

Portable fire extinguishers are required to be provided in accordance with CFC Section 906 and NFPA 10. Fire extinguishers will be provided in accordance with CFC Tables 906.1, 906.3(1), and 906.3(2). Extinguisher placement distances will be based on occupancy hazard classifications per CFC Section 906.3. Signage will be provided next to each extinguisher to indicate the type of fire for which it is intended. Portable fire extinguishers will be mounted on brackets in utility rooms and cabinets in public spaces. Portable fire extinguishers will be in cabinets that are semi- or fully recessed. They are not permitted to protrude more than 4 inches into a public area per ADA/ABA criteria. Fire extinguisher type and locations will be depicted on the life safety plans as the design process continues.

2.5.6 Hazardous Materials Storage—Site Exterior

Diesel fuel outdoor dispensing tanks will be located at various site locations. The actual distances between these tanks and nearby buildings or property lines will be confirmed as the design process progresses. Dispensing operations will comply with CFC Chapters 22 and 57, NFPA 30, NFPA 30A, and relevant local ordinances and standards. Secondary containment systems and spill control measures will be designed to meet the requirements of NFPA 30 Chapter 21 and applicable environmental regulations. Specific design details for the dispensing tanks, including containment features and fire protection systems, will be finalized and submitted for approval during the design phase.

In addition to diesel fuel, the site may store and handle other potential hazardous materials, including automotive grease, lubricating oils, antifreeze, and hydraulic fluids, which are commonly used in vehicle maintenance and fueling operations. These materials are classified as Class III combustible liquids per NFPA 30, and their storage will comply with the requirements of CFC Chapter 57, NFPA 30, and local environmental protection regulations.

Storage of automotive grease and oil:

- Grease and oil cubes or drums used for vehicle maintenance will be stored in dedicated areas with secondary containment to prevent spills or leaks from reaching the environment.
- Spill kits and absorbent materials will be readily available near storage areas as a precautionary measure.
- Indoor storage of these materials will comply with ventilation and fire-rated storage room requirements as outlined in CFC Chapter 57 and NFPA 30 Chapter 16.

Fire Protection for Combustible Liquid Storage:

- Fire extinguishers rated for flammable and combustible liquids (Class B) will be provided in proximity to all storage and dispensing areas, per NFPA 10 and CFC Section 906.
- Areas storing larger quantities of automotive fluids may require automatic fire suppression systems, such as sprinklers, depending on the storage configuration and quantity.

- The design of all storage and handling areas will prioritize spill prevention, fire protection, and compliance with local environmental and fire safety regulations. All hazardous materials and associated fire protection features will be documented and depicted in the site's life safety plans. As the design progresses, further engineering analysis will ensure compliance with the CFC, NFPA 30, NFPA 30A, and other applicable codes and standards.

2.5.7 Fire Apparatus Access Roads

Fire department access will be provided in accordance with the CBC, CFC, NFPA 101, NFPA 1, and applicable local fire department requirements. At least one means of all-weather ground access will be provided, terminating no less than 50 feet from an exterior door accessible for fire department ingress, unless otherwise approved by the AHJ. Fire department access to the project site is via Avondale Avenue and North Beale Road.

Fire lanes and turnarounds will be dimensioned and configured to comply with NFPA 1, CFC Appendix D, and any applicable local amendments. Fire apparatus access roads will be designed such that any portion of the exterior walls of the facility is located no more than 450 feet from a fire apparatus access road, as specified in NFPA 1 Section 18.2.3.2.2, and no more than 150 feet from all portions of the exterior walls of the first story of the building as measured along an approved route, per CFC Section 503.1.1. Access roads will have an unobstructed width of at least 20 feet and a vertical clearance of at least 13 feet, 6 inches.

Dead-end fire apparatus access roads exceeding 150 feet in length will be provided with an approved turnaround. Turnaround dimensions will comply with NFPA 1 Section 18.2.3.4.4 and CFC Appendix D Section D103.4, including options such as T-turns, Y-turns, or cul-de-sacs. Minimum inside turning radius will be 28 feet, and minimum outside turning radius will be 50 feet, per CFC Appendix D Section D103.3.

Fire department vehicle access will be provided within 100 feet of each FDC, as required by NFPA 1 Section 18.2.3.2.1 and CFC Section 912.2.1. Fire lanes serving the FDC will be marked and maintained clear of obstructions, and fire hydrants will be placed per local requirements and NFPA 1 Section 18.3.4.

Access key boxes will be installed at perimeter gates and other locations to provide emergency responders with rapid access to the site. The placement and configuration of key boxes will require positioning approval by the responding fire department. All fire department access road configurations, including fire lane markings, turnarounds, and hydrant locations, will be clearly depicted on the life safety plans submitted for AHJ review.

If provided, security gates across fire apparatus access roads shall be approved by the fire code official and shall have an approved means of emergency operation. Electric gate operators shall be listed in accordance with UL 325.

2.5.8 Fire Hydrants

Fire hydrants must be located along fire apparatus access roads and positioned to ensure they are accessible for fire department use, as required by CFC Section 507.5.1. The number and placement of fire hydrants will be determined by the fire flow demand of the building or facility, as calculated using CFC Appendix B. Fire flow requirements are based on the size, construction type, and hazard classification of the building, and higher fire flow demands require either more hydrants or reduced spacing between hydrants.

Hydrants must generally be spaced no more than 500 feet apart along fire apparatus access roads, as specified in CFC Appendix C, Section C103.2, unless modified by the AHJ. For buildings equipped throughout with an approved automatic sprinkler system, fire hydrants must be located within 400 feet of the building, measured along an approved route, per CFC Section 507.5.1.1. Fire hydrants are typically located within 100 feet of the FDC as adopted by local jurisdictions, measured along an approved route.

All hydrants must be installed and maintained in compliance with NFPA 24 (Standard for the Installation of Private Fire Service Mains and Their Appurtenances) and local jurisdiction requirements.

2.6 Energy Management System

2.6.1 General Description

The Energy Management System (EMS) shall provide a centralized, real-time platform for **monitoring, visualization, data acquisition, and supervisory control** of the facility electrical distribution system.

The EMS shall serve as the primary interface between facility operators and the electrical infrastructure, enabling:

- Continuous monitoring of system performance and status
- Real-time alarm detection and event notification
- Historical data collection for diagnostics and analysis
- Supervisory-level control of selected system components

The EMS shall be designed as a **scalable and modular system architecture**, capable of accommodating future system expansion, additional devices, and integration with external systems without requiring significant reconfiguration.

The energy management system adheres to the following standards:

- IEEE 1547: Governing the interconnection and interoperability of DERs with electric power systems interfaces
- IEEE 1588: Standards for Precision Time Protocol in networked measurement and control systems
- IEEE 2030.7: Specifications for microgrid controllers
- IEEE 2030.8: Standards for testing microgrid controllers
- ISA 5.1: Instrumentation symbols and identification
- ISA 5.4: Standards for instrument loop diagrams
- NIST Pub 800-63-1: Guidelines for electronic authentication
- NIST Pub 800-82: Guide to industrial control system security
- NISTIR 7628: Guidelines for smart grid cybersecurity
- UL 508A: Standards for industrial control panels

- IEC 61508: Functional safety of electrical/electronic/programmable electronic safety-related systems
- IEC 60950-22: Safety standards for outdoor-installed information technology equipment
- IEC/TS 62351: Standards for data and communications security in power systems management
- IEC 62443: Security standards for industrial automation and control systems
- IEC 60870-5-104: Transmission protocols for network access using standard transport profiles
- IEC 60870-5-101: Transmission protocols for basic telecontrol tasks

2.6.2 System Architecture and Integration

The EMS shall be structured as a centralized control and data acquisition platform integrating EMS-specific components with facility electrical equipment.

2.6.2.1 External System Interfaces

The EMS shall interface with the following systems and devices:

- Protection relays
- Electrical metering devices
- Circuit breakers and switchgear
- System I/O and alarm signals
- Facility SCADA system (if provided)

The EMS shall:

- Acquire real-time operational data from all connected devices
- Transmit supervisory control commands where permitted
- Maintain coordinated system awareness through centralized data aggregation

This integration shall be achieved through a data concentrator architecture, where field devices communicate to the EMS controller through intermediate aggregation layers.

2.6.2.2 Communication Protocols

The EMS shall support the following communication protocols at a minimum:

- **IEC 61850** – for protection relays and intelligent electronic devices
- **Modbus TCP/IP** – for meters and general-purpose devices
- **DNP3** – for SCADA integration and remote monitoring
- **NTP / IRIG-B** – for time synchronization

The EMS shall be capable of supporting additional protocols as required for integration with future systems.

2.6.2.3 Time Synchronization

All EMS-connected devices shall be synchronized using:

- A primary GPS-based time source
- Network Time Protocol (NTP) servers
- Backup system clocks

Time synchronization shall ensure:

- Accurate event sequencing
- Reliable alarm logging
- Consistent data across all devices

2.6.3 Communication Network Requirements

The EMS communication network shall provide secure, high-speed, and reliable data exchange between all system components.

2.6.3.1 Main EMS Network

The primary EMS network shall include:

- EMS controller
- Human-Machine Interface (HMI)
- Historian server
- Data concentrators
- Network switches, routers, and firewall

Requirements:

- Network Type: LAN with optional WAN access
- Topology: Star configuration
- Speed: 100/1000 Mbps minimum
- Interfaces:
 - o Ethernet CAT5/CAT6
 - o Fiber optic (multi-mode LC)
- Clock Signal:

- o Primary: GPS clock
- o Backup: System clock

Devices (minimum configuration):

- EMS computer
- Historian server
- Data concentrators (minimum 2 for redundancy)
- GPS clock
- Router and firewall
- Managed switches
- Patch panels

Redundancy:

- Dual data concentrators for failover
- Redundant communication paths for critical devices

2.6.3.2 Protection Relay Network

A dedicated communication network shall be provided for protection relays.

Requirements:

- Protocols: IEC 61850, Modbus TCP/IP, DNP3, IRIG-B
- Topology: Star
- Speed: 100 Mbps minimum
- Interfaces:
 - o Ethernet
 - o Fiber optic
- Redundancy: Backup managed switch

This network shall support:

- Relay coordination
- Status monitoring
- Event logging

2.6.3.3 Meter Network

The EMS shall include a dedicated network for energy meters.

Requirements:

- Protocols: IEC 61850, Modbus TCP/IP, DNP3
- Topology: Star
- Speed: 100 Mbps minimum
- Interfaces:
 - o Ethernet
 - o Fiber optic

This network shall support:

- Real-time metering data acquisition
- Energy usage tracking
- System performance analysis

2.6.3.4 Network Security

The EMS network shall include:

- Firewall protection
- VPN capability for remote access
- Encrypted communication channels
- Role-based authentication

Unused network ports shall be disabled to minimize cybersecurity risk.

2.6.4 EMS Components

The EMS shall include the following core components forming the backbone of the system:

2.6.4.1 EMS Controller

- Central processing unit for all EMS functions
- Responsible for data processing, monitoring, and control coordination

Minimum Requirements:

- Processor: Quad-core 1.8 GHz or higher
- Memory: 16 GB RAM
- Storage: 256 GB SSD
- Operating System: Industrial-grade (Linux-based RTOS or equivalent)

2.6.4.2 Data Concentrators

- Aggregate data from field devices
- Interface with EMS controller

Capabilities:

- Protocol support: Modbus, IEC 61850, DNP3, NTP, IRIG-B
- Connectivity: Ethernet, RS485, RS232

Minimum quantity: Two (2) for redundancy

2.6.4.3 Human-Machine Interface (HMI)

- Provides operator interface for monitoring and control
- Displays system status, alarms, and analytics

Minimum Requirements:

- 24" display
- 1920x1080 resolution
- Integrated KVM functionality

2.6.4.4 Historian Server

- Dedicated system for long-term data storage
- Stores all digital and analog system data

2.6.4.5 Network Infrastructure

Includes:

- Managed communication switches
- Routers
- Firewall
- Patch panels

Requirements:

- Gigabit Ethernet capability
- VLAN and QoS support
- Redundancy support

2.6.4.6 Time Synchronization System

- GPS-based clock system
- Provides IRIG-B and NTP outputs

Accuracy: ± 1 microsecond

2.6.4.7 Control and Communication Panels

- Main EMS control panel
- Auxiliary communication panels

Requirements:

- Modular design with minimum 10% spare capacity
- Organized cable management
- Compliance with UL 508A and NEMA enclosure standards

2.6.5 Functional Requirements

2.6.5.1 Real-Time Data Acquisition

The EMS shall acquire real-time data from:

- Circuit breakers
- Protection relays
- Electrical meters
- System I/O signals
- Network devices

Data Types:

- Digital signals:
 - o Status indicators
 - o Alarm conditions
 - o Device states
- Analog signals:
 - o Voltage
 - o Current
 - o Power
 - o Energy

All data shall be:

- Time-stamped
- Logged in the historian
- Available for real-time display

2.6.5.2 Breaker Monitoring and Control

The EMS shall:

- Monitor breaker status (open/closed/tripped)
- Record breaker events
- Provide supervisory control where permitted

Breaker classifications:

1. **Topology Breakers** – monitored only
2. **Generation Breakers** – not applicable in base scope
3. **Load Breakers** – controllable for load management

The EMS shall not override protection functions.

2.6.5.3 Alarm Management

The EMS shall provide:

- Real-time alarm detection
- Alarm prioritization
- Historical alarm logging

Alarm types shall include:

- Breaker trips
- Equipment faults
- Communication failures
- System abnormalities

2.6.5.4 Visualization and HMI

The EMS shall provide the following minimum screens:

- One-line diagram (with live system data)
- Alarm screen (real-time and historical)
- Trend analysis screen
- Device status screens
- Communication network status

Each device displayed shall allow drill-down to detailed data and control functions.

2.6.5.5 Historian and Data Management

The historian shall:

- Store minimum one (1) year of data

- Record all digital and analog signals
- Support high-speed data logging

Features shall include:

- Data query tools
- Reporting functionality
- Trend visualization
- Data redundancy

2.6.6 Performance and Reliability

The EMS shall meet the following requirements:

- Uptime: $\geq 99.8\%$
- Response time: ≤ 2 seconds
- Mean Time Between Failures: $\geq 15,000$ hours
- Mean Time to Repair: ≤ 4 hours

Redundancy shall be provided for:

- Data concentrators
- Communication networks
- Critical system components

2.6.7 Scalability and Expandability

The EMS shall include:

- Minimum 20% spare processing capacity
- Minimum 20% spare I/O capacity
- Minimum 10% spare network capacity

The system shall support:

- Additional devices
- Expanded monitoring points

- Future system integration

2.6.8 Testing and Commissioning

The EMS shall undergo:

Factory Acceptance Testing (FAT)

- Functional verification
- Integration testing

Site Acceptance Testing (SAT)

- System operation under real conditions
- Integration with facility systems

System Availability Testing

- Demonstration of required uptime

Documentation shall include:

- Test reports
- Configuration settings
- Training materials

3 Betterments

This chapter discusses the betterments identified for the Yuba Sutter Transit Next Generation Transit Facility. The items discussed here are not included in the base scope but could be pursued as additional to the base scope and should be priced separately. should considered for the eventual full facility master plan (identified in Appendix A Drawing CS-501B).

A summary of the betterments is shown in Table 3-1 below with the subsequent sections providing additional detail related to each betterment.

Table 3-1: List of Betterments vs Base Scope

#	Item	Base Scope	Betterment	Discussed in Project Manual Section #
1	Charging Infrastructure	All underground electrical conduit up to (but not including) the chargers. Landscaped area along Avondale Avenue in northwest part of developed parcel, with exception of identified concrete pad.	Chargers, dispensers, cord management, cable trays for DC and AC charging cabinet output, and any energy management systems so this can be evaluated for potential for Charging-as-a-Service. This includes the bus canopy chargers, mobility hub chargers, maintenance building charger, and NRV chargers. In the landscaped area with concrete pad along Avondale Avenue, EV Charging service equipment will be housed on the concrete pad with this betterment.	3.1
2	BESS	Not included	BESS unit(s) included	3.2
3	Solar/PV	Not included	Four different betterments are being explored to add solar/PV to: A. Canopy over Rows 1 and 2 of revenue vehicle parking (251 kW system)	3.3

#	Item	Base Scope	Betterment	Discussed in Project Manual Section #
			B. Employee parking canopies (totaling an approximately 288 kW system) C. NRV, Visitor, and Mobility Hub parking (totaling an approximately 158 kW system, but this area could be redesigned based on solar panel betterments to combine the parking areas, but shall not reduce the number of parking spaces at those locations) D. Ground mounted solar farm on the northern triangle of the site (totaling an approximately 1 MW system); this can be evaluated with and without a BESS and/or tie into the building loads if the demand dictates that.	
4	Generator	Not included	Generator included	3.4
5	Pick-up/Drop-off Zone & Potential Future Fueling Yard	Basic landscaping with conduit for future fueler	Pave this designated area and classify it as a pick-up/drop-off zone. This betterment must include curb and sidewalks to connect it to the Administrative Building via an ADA accessible pathway. The betterment design shall not preclude the ability to change this area if desired later. Include a 480V 3-phase plug.	3.5
6	Charge Management System (CMS)	Ensure EMS has expandable capability for future addition of CMS	Necessary software and hardware for CMS that allows for the monitoring, controlling, and optimization of the charging for fleet electric vehicles, managed by the facility EMS.	2.6 and 3.6
7	Sawtooth Roof on Maintenance Building	Flat roof	Sawtooth roof that does not preclude the ability to add a hanging mezzanine at a future date.	2.2.3
8	Hanging Mezzanine in	Structural support for a hanging mezzanine and/or	A. Add optional hanging mezzanine B. Add second crane in Maintenance Building	Appendix A, Drawing Q-202

#	Item	Base Scope	Betterment	Discussed in Project Manual Section #
	Maintenance Building	crane to be constructed at a future date.		
9	Nanawall in Admin/Ops break room	No movable partition between the social space and the outdoor patio	Include a movable partition between the social space and the outdoor patio	2.3.8
10	Spacemaker Trellis	Pathmaker trellis	Spacemaker trellis	2.3.8

3.1 Charging Infrastructure

This section discusses the charging infrastructure requirements (if chosen as a betterment). The base scope includes all electrical conduits up to (but not including) the charging cabinets. The betterment to be priced shall include the chargers, dispensers, cord management, and any charge management systems. Yuba Sutter Transit Agency is also open to procuring charging-as-a-service to provide the charging equipment, charge management. This would include the chargers and dispensers for the revenue vehicles, non-revenue vehicles, and mobility hub.

The Design-Builder shall consider the Owner's intent to participate in PG&E's EV Fleet Program or other utility support programs to reduce utility service upgrade costs and accelerate interconnection timelines. While PG&E's Interconnection Capacity Allocation (ICA) map indicates a maximum available capacity of approximately 3.73 MW, the projected full buildout electrical load of the facility exceeds this value. The electrical design shall incorporate demand mitigation strategies—including the use of battery energy storage, on-site PV, phased charger deployment, and smart load scheduling—to reduce peak demand and align with existing grid capacity constraints. If this betterment is chosen, then a separate utility service will be added to the site, which will be medium-voltage (MV) service and metering switchgear dedicated solely to all on-site EV charging infrastructure.

For YSTA revenue vehicles (BEBs and shuttles), furnish, install, test, and commission a complete and operational vehicle charging system consisting of a 200 kW DC power charging cabinet-mounted, overhead corded charging plug-in dispensers with a Charging Cord Management System (CCMS) for automated and manual control of retraction/extension of the charging cord and a Charge Management System (CMS) to allow charging system control and

monitoring. The table below indicates the approximate schedule of installation and deployment of charging cabinets that will support YSTA's future electrified fleet. This schedule has been used to inform the electrical power distribution design but may change as YSTA's needs come into focus throughout the phasing in of battery-electric and fuel cell-based vehicles.

Table 3-2: Charger Deployment Plan

DEPLOYMENT YEAR	CHARGER (EVSE) MAKE**	CHARGER (EVSE) MODEL	POWER LEVEL PER CHARGER (KW)	CHARGER QTY.	TOTAL # OF DISPENSERS	FULL LOAD OF CHARGERS
2025						
2026						
2027						
2028	ABB (or eq)	HVC200	200	6	24	1.2 MW
2029						
2030						
2031	ABB (or eq)	HVC200	200	6	24	1.2 MW
TOTAL				12		2.4 MW

3.1.1 System Design and Performance

If the Charging Infrastructure betterment is chosen, the transition to a ZEB fleet requires robust and scalable charging infrastructure to support operational efficiency and future growth. The design criteria for the Next Gen Facility charging infrastructure prioritizes:

- Integration of charging systems for BEBs.
- Accommodation for hydrogen FCEVs as a potential alternative.
- Future-proofing to support growing fleet sizes and technological advancements.

3.1.1.1 Key Components of Battery Electric Bus Charging Infrastructure

Power Supply and Distribution System

- **Electrical Service:** A robust electrical system is necessary to support high-power charging needs. This includes an MV switchgear designed for added future capacity and renewables integration under heavy-duty transit operations.
- **Backup Systems:** Redundant power systems such as solar, stationary storage (BESS), potential backup ICE generator, and microgrid controls, all operating to ensure uninterrupted charging during outages.

Charging Station Technologies

Types of Chargers

- Depot Chargers: Overnight charging for buses in designated parking spaces utilizing charge management systems and power sharing distribution to optimally charge battery electric buses.

Charge Management Systems

Smart charging software optimizes energy usage, reduces peak demand, and lowers operational costs.

3.1.1.2 Design and Layout

Charging Station Placement

- Chargers are distributed within the bus parking area, ensuring efficient connectivity to each bus. A phased approach for charger installation is implemented to align with fleet growth.
- Solar canopies installed over charging stations provide shade while supporting renewable energy integration.
- One Level 3 charger will be provided in one of the bays for the Maintenance Building and be tied into the building's power, so vehicles can charge while being worked on.

Scalability and Future Expansion

- Infrastructure is designed with modularity, allowing for additional chargers as the fleet expands.

Optimized bus parking configuration is a critical element in designing infrastructure for a BEB fleet. It involves strategically arranging bus parking spaces, charging equipment, and traffic flow patterns to ensure seamless operations, enhance safety, and maximize the efficiency of the facility. The parking configuration directly influences the daily workflows of the transit facility, including charging schedules, maintenance routines, and bus dispatching.

3.1.1.3 Operational and Maintenance Considerations

Maintenance Protocols

- Regular diagnostics and servicing ensure charger reliability.
- Maintenance bays within the facility accommodate repairs for electrical components.

Training and Workforce Readiness

- Staff training programs focus on charger operation, troubleshooting, and safety protocols.

3.1.1.4 Compliance and Standards

- Compliance with NEC Article 625 and other applicable codes ensures safe and reliable operations.

- Safety measures include:
 - o Emergency cut-off systems for high-voltage circuits
 - o Clear signage and barrier protections around chargers

3.1.2 Revenue Vehicle Charging Cabinet (Charger)

The basis of design for the BEB chargers is the 200kW ABB HVC200-4D DC power charging cabinet with accessories, capable of energizing four remote dispensers concurrently (or dynamically).

Concurrent / Dynamic Charging: During a concurrent controlled and powered charging session, four shared remote charging dispensers (Dispenser A, B, C and D) are connected to a single DC power cabinet. The first connected BEB to the dispenser will be able to draw up to the nominal maximum capacity of power from the DC power cabinet; this is the “first connected charging session/A Session” for the shared DC power cabinet. As additional BEBs are connected to the shared outputs from the DC charging cabinet, they become sequentially the “second connected charging session / B Session”, “third connected charging session / C Session”, and “fourth connected charging session / D Session”. Concurrent Charging refers to the ability for the nominal output (voltage, current, power, charging telemetrics, and controls) from the DC power cabinet to be split and shared between the one to four connected dispensers. Dynamic Charging refers to the ability for the DC power cabinet to automatically and without end user intervention or manual plugging / unplugging of the connected BEBs to allow for the ability for one to four BEBs to be connected and charging and If one of the multiple connected dispenser's buses becomes fully energized, the charging cabinet's output power is combined and split again and the full power of the DC power cabinet is available for the remaining two, three or one dispenser still connected to and charging its bus. After the BEBs' initial plug-in / connection to corded charge connector at the beginning of the charging process, no manual re-plugging/disconnection or re-plugging/reconnection of charge connector will be necessary if power is lost or to start, restart charging process.

Critical charging cabinet features to include:

- Compatible with the revenue vehicle remote charging dispenser unit
- SAE J1772 compliant (with adapter available for NACS)
- Open Charge Point Protocol OCPP 1.6 or higher to allow charger control and monitoring by a third-party charge management system
- Two (2) DC outlets minimum to two separate remote dispensers
- While not required, owner preference is for chargers that can energize both SAEJ 1772 plug dispenser and a future SAE J3105 Conductive Dispenser (inverse pantograph / pantograph down) to maximize future flexibility as future chargers are added and existing chargers and dispensers are modified.
- Capable of charging a minimum of two BEBs with standard 480 kWh capacity C2 rated bus batteries from an initial 10% nominal state of charge (SOC) to 80% nominal SOC, sequentially over a 6-hour period. Trickle and/or topping charging shall occur simultaneously to all connected bus batteries, thereafter, bringing each battery up to near 100% nominal capacity within a 2-hour period. All charging shall be accomplished through the connected remote dispenser(s) without the need to detach and reattach manually the charge connectors.
- Includes an on-board rectifier, allowing the DC power cabinet to receive an alternating current input power connection from the facility electrical supply and convert it to DC electrical output to the remote dispenser unit and connected bus.

- Capable of being connected to other computer networks, including networks with CMS, through ethernet and/or wireless connection. The DC power cabinet shall be capable of communicating to that charge management system by means of an open source, non-proprietary, communication protocol utilizing the OCPP 1.6 or higher standard and 3G/4G+ cellular connection.
- While cellular connectivity capability of the charging cabinets is required, Owner preference is to have charging cabinets interconnected via data cabling back to their respective localized canopy CMS data cabinet containing a data switch(s) and a fiber optic termination panel. Localized CMS data cabinets to be connected back to IT/data room within the Operations/Administration Building's server rack where the charging system data can then exit the site via the Owner's data connection to the internet. This configuration shall allow for full virtual monitoring, controlling, and operating of the charging system and connections to the CMS but negate the need for monthly cellular costs per charging cabinet and its CMS interface.
- Capable of being remote controlled by third-party CMS, including priority output to specific outputs/dispensers, throttle up or down of output power, and remote charge start and stop.
- Includes on-board computer and/or programmable logic devices, software, and switchgear that, at a minimum, provide the following functionality to the DC power cabinet:
 - o To initiate signal with, receive signal from, and "handshake" with any bus connected by means of the charge connector while the charge connector is plugged into the charging port of a bus.
 - o To automatically start, stop, and regulate any charge to any bus battery connected by means of the charge connector while the charge connector is plugged into the charging port of a bus.
 - o To request, receive, and store bus battery information such as ID, charge status, temperature, etc. from the bus by means of the connected charge connector while the charge connector is plugged into the charging port of a bus.
 - o To communicate wirelessly collected bus information to a CMS regardless of whether the charge connector is plugged into or disconnected from the charging port of a bus.
- Cabinet enclosure shall be NEMA 3R/IP-54 and IK-10, per ANSI/IEC 60529, suitable for uncovered exposed exterior or interior covered locations.
 - o Rated for exterior sunny and dusty environments.
 - o Operating temperature range: -35 to 45 degree Celsius / -31 to 113°F
- Includes all other components for necessary and proper function of the unit in a bus parking/charging environment including, but not necessarily limited to, metal support frame and protective panel enclosure, foundation elevated support base, air intake and exhaust vents, forced air cooling fans, air filters, grounding devices and connections, cables, cords, connectors, etc.
- Cabinet to have exterior visible charger readiness status indicator lights.
- Finish: Exterior panels of DC power cabinet to be of stainless steel with protective powder coat finish in Owner's choice of manufacturer's standard colors.
- Accessories:
 - o E-Stop to quickly de-energize the cabinet and dispenser in the event of a need to quickly and safely stop the charging process.
 - Individual E-Stop either integrated with the charging cabinet or as remote accessory within reach of the cabinet itself.
 - Localized canopy E-Stop. One master E-Stop located at each end of the bus charging canopies to allow a single E-Stop activation to control all charging at a single localized charging canopy.

- o Charger cabinet stand—OEM accessory or custom metal fabrication to elevate the bottom of the charging cabinet a minimum of 9 inches above charger pad to allow for extra conductor slack to be and stored under charger—minimum twenty-four (24) inches of slack between conductor existing embedded conduit and connection gland on charger.
- o The sides of elevated stand and or bottom of charging cabinet to be sealed from dust and animal and insect inclusion.
- o Non-corrosion metal or finishes

3.1.3 Revenue Vehicle Remote Charging Dispenser (Dispenser)

The basis of design for the BEB chargers is the ABB CCS1 Control Box with Accessories (or equal). A stationary overhead facility-mounted cabinet with a flexible power cord and corded handheld plug (charge connector) capable of being manually connected to the charging port of buses in the Owner's electric bus fleet and then automatically charging the connected bus utilizing DC electrical power output generated from the connected charging cabinet.

Critical dispenser features to include:

- Compatible with the revenue vehicle remote charging cabinet unit
- SAE J1772 compliant (with adapter available for NACS)
- Open Charge Point Protocol OCPP 1.6 or higher to allow charger control and monitoring by a third-party CMS
- Charging Connector—SAE J1772 CCS1 Level 3 plug-in connector with strain relief
- Remote dispenser unit shall be connected to and receive power output (voltage, current, power, charging telemetrics, and controls) from the DC power charger cabinet, then regulate and transmit that output to the bus when manually connected by the charging connector.
- Include glass fiber (or similar) communications lines between the DC power cabinet and remote dispenser, as well as all necessary protective conduits, seals, and fasteners.
- Terminate with connectors at all ends of fiber in fiber bundle whether utilized or not.
- Remote dispenser enclosure shall be rated IP65 protection, per ANSI/IEC 60529 and IK10 impact rated per IEC 62262
 - o Rated for exterior sunny and dusty environments.
 - o Operating temperature range: -35 to 45 degree Celsius / -31 to 113°F
- Charging connector and attached cord shall be capable of being manually connected to, and disconnected from, the dispenser cabinet for replacement and maintenance purposes.
- Charger status indicator light on bottom or side of remote dispenser cabinet and visible to an operator below the overhead-mounted remote dispenser. Three (3) color or more to indicate via color and blinking the following:
 - o Charger Energized and Ready
 - o Charger Connected and waiting/communicating with bus—pre-charging
 - o Charger Connected and Charging
 - o Charger Connected and Charge Complete—post-charging
 - o Charger Not Ready/Not Charging/Warning Indicator

- Coordinate installation of the dispenser cord, the dispenser cabinet, and the charging connector in the field so that, once installed, there is minimal bending and/or twisting of the dispenser cord or “flipping” of the charge connector, when personnel attempt to plug the charge connector into a BEB
- Finish: Exterior panels of charger box to be constructed from stainless steel and have protective powder coat finish in Owner's choice of manufacturer's standard colors
- Accessories:
 - o Contractor designed modular metal framing systems to provide support and stability to items suspended from roof structure. Configuration, quantity, and spacing to be determined as part of Contractor's final means and method of installation.
 - Kindorf/Unistrut or equal
 - o External LED Tower Light—Three different color lights suspended from overhead structure to allow the charge dispenser and charger cabinet status, as shown on the status beacon on the CCS1 side cabinet, to be replicated and visible from all different directions.
 - o Connection and controlled by the remote facility emergency stop button (E-Stop) as described in the charger cabinet narrative.
 - o Charging cord management control box

3.1.3.1 Labeling for Revenue Vehicle Charging Cabinet, Charging Dispenser, and Charging Cord Management

Matching labels on each charging cabinet, overhead charging dispenser, charging dispenser accessories, and charging cord management accessories that clearly identify which overhead charging dispenser(s) are paired (connected) with each charging cabinet and which charging dispenser accessories and cord management system accessories are interconnected.

Labels must be black background with white lettered phenolic label riveted to the equipment located to maximized visibility. All labels shall be easily read from ground level.

3.1.4 Revenue Vehicle Charging Cord Management System (CCMS)

The basis of design for the CCMS is the Vengenz Dynamic Cable Deployment System (or equal). The CCMS is an automated remote charging dispenser cord management system allowing for a retracted cord to be extended and deployed automatically down beside a bus and retracted back to a store cord position (retracted) above the bus. The automatic extension down of the charging cord is activated by CCMS sensors at the front and rear of an individual bus parking/charging position. After a bus has been detected by the cord management system parked below a remote charging dispenser location, and after an Owner-defined (programmable) amount of time, the charging cord extends down automatically beside the bus near the bus's onboard charging port. Staff plug-in the extended charging cord into the charging port on the bus to investigate charging. No manual “start” or other manual controls are needed to start the charging process in conformance with SAE J1772.

The cord retraction button and control wiring are wrapped to the charging cord with the primary hoist control toggle switch located near the charge connector. After charging is complete and when the cord is ready to be stored, the charge connector is removed from the bus and the primary hoist control toggle switch is activating retracting the cord up into the underside of the parking canopy's structure at a clear height to not have any portion of the retracted cord and charge controller be impacted by the bus. Keep retracted cord and charge connector a minimum of 11 feet, 6 inches above top finish of bus parking lot

paving. The CCMS shall include a secondary additional manual retraction switch to each controlled cord, allowing user to manual activate switch to retract/extend the cord via motorized hoist mounted above the bus's charging position.

Operational CCMS use and features:

1. Suspended from the underside of the bus parking canopy structure, a combination of front and rear vehicle photocell sensors is used to recognize a bus parking in a designated bus parking/charging position within a bus parking/charging space.
2. Once a parked bus is detected parked in a charging position, the charging dispenser cord is automatically extended down via a suspended overhead hoist to a set extended position to allow users at ground level to reach the charging cord and plug-in the charge connector to the BEB.
 - a. Fixed suspended manual-activated cord retraction/extension switches that remain extended below 11 feet above the finish floor and are able to be impacted by circulating buses are not acceptable.
 - b. Column-mounted manual-activated cord retraction/extension switches that are located away from directly adjacent to the bus parking/charging position they control as the primary means to extend/retract the charging cord are not acceptable.
3. If additional charging cord length is needed, the primary hoist control switch attached to the charging cord adjacent to the charge connector is activated to extend more charging cord.
4. After charging is complete and the charge connector is disconnected from the bus, the cord management -provided primary hoist control switch attached to the outside of the charging cord is activated to retract the cord via an overhead cable hoist to a raised position above the parked bus.
5. A secondary means of manually activating the hoist to lower/raise the charging cord is provided by a switch on the cord management main control box that is canopy column mounted accessible to Owner charging end users at ground level.
6. A main CCMS control box shall be provided for up to every four charging dispensers.
7. Interlock primary cord-mounted hoist control switch and secondary manual hoist control switch to CMS via custom API to prevent hoist activation to raise or lower when the charging dispenser status is detected as "connected" to the bus.

3.1.5 Charging Cord Management Hoist (Hoist)

A cable hoist shall be provided for each charging dispenser. Hoists will be suspended from an overhead structure and positioned as indicated on contract documents. The hoist receives power from connected cord management main control box. Each overhead-mounted hoist requires an electrical junction box mounted overhead and adjacent to the hoist. Critical hoist features:

- Hoist to have adjustable mechanical limit "stop" switches to automatically stop the raising and lower of the charging cord once the hoist is activated by either the primary photocell vehicle detection sensors or the secondary manual controls.
- Hoist connected to charging cord by a charging bun that wraps the cord securely without physical penetrations, attachments, or causing deformation of the charging cord protective insulation jacket.
- Primary Hoist Activation Switch, Charging Cord Mounted.
 - o User activated "single click" and hold for five (5) second of switch will activate cord and retract charging cord to fully overhead stored position.

- o Switch and flexible cord management control wiring to be attached to a length of charging cord by continuous wrapping without physical penetrations, attachments, or causing deformation of the charging cord protective insulation jacket.

Provide a CCMS cord position sensor to be attached with each primary hoist control switch:

- Cord position sensor status to be integrated via API into CMS.
- CMS to indicate cord status as:
 - o Raised—when cord is stored overhead and hoist is stopped
 - o Lowered—when cord is extended toward floor and hoist is stopped
 - o Active—when hoist is in motion in either the up or down position
 - o Error—when hoist is detected not in Raised or Lowered or Active state

Provide a CCMS charge connector task light near each CCMS primary hoist controller. Charge connector task light critical features to include:

- White LED light and associated wiring attached to charging cord on and adjacent to the charge connector
- Light to have manual user activated on/off switch
- Power to LED provided by cord management main control box. Battery-powered lights are not acceptable.

CCMS photocell vehicle proximity sensor:

Provide two photocell vehicle sensors per bus parking/charging position.

- Front sensor
- Rear sensor

3.1.6 Public, Non-Revenue Vehicle, and Mobility Hub Charging Cabinet (P-Charger)

For Yuba-Sutter Transit non-revenue vehicles' charging spaces, including vehicle chargers located in staff parking lots, public parking lots, the Mobility Hub, and at Owner's non-revenue automotive charging locations, furnish, install, test, and commission a complete and operational Level 2 vehicle charging system consisting of an all-in-one small-footprint, ground-mounted pedestal with dual charging ports and integrated cable management system. The chargers shall be connected to the same CMS as the revenue vehicle chargers to allow centralized charging system control and monitoring.

The basis of design for the non-revenue vehicle chargers is the **ChargePoint CP6000** Level 2 dual-port AC charging pedestal (or equal). Critical features to the chargers are:

- Dual SAE J1772 connectors (NACS compatibility available through adapter solutions as required).
- Retail interface and display to allow both private and public access, with options to enter program/Owner vehicle ID for Yuba-Sutter Transit non-revenue and Mobility Hub program vehicles, or to enable credit/debit card payment for staff, public, and Mobility Hub charging sessions.

- RFID capability compliant with Mifare ISO 14443 A/B to Part 4 and ISO/IEC 15693 standards, allowing for connection to third-party retail payment and charge session management systems.
- Dual charging cords nominal twenty (20) feet per cord integrated with automatic cable management to keep all portions of the charging cord off the pavement when not in use.
- Support for industry-standard protocols including NFC, Calypso, Ultralight, and PayPass for payment flexibility.
- Open Charge Point Protocol (OCPP) 1.6J compliant for interoperability with the Owner's CMS.

Provide hardwired data connections from charger to localized CMS data cabinets and or direct connections back to Operations/Administration IT/data room to connection to cloud base CMS and retail payment systems.

3.1.7 Charge Management System for Revenue, Non-Revenue Vehicle, and Public and Mobility Hub Chargers

Furnish subscriptions, labor, materials, tools, equipment, software, wiring, technology, and incidentals necessary for providing, installing, and commissioning a complete and functional vehicle CMS consisting of a facilities-installed physical interconnecting communications and control network to control and manage a system of vehicle chargers and their dispensers via a subscription-based internet virtual cloud-hosted software program.

CMS will include the creation of a new subscription account with Yuba-Sutter Transit as the subscriber and allow access to parts or all of the system to their contract operators. Initial CMS subscription term including payment, subscription, and licensing will likely be for three (3) years with options for the Owner to continue to renew on a yearly basis. Different terms can be proposed, including extension options. A CMS with no hardware is preferred but not required. Critical components and features of the CMS system are:

- Providing equipment, wiring, controllers, communication switches, and weather-rated enclosures.
- All cellular connections, hardware, and subscriptions to gain access to the internet subscription hosting service if required as part of the submitted CMS.
 - o Note that Owner preference is to utilize a single point of access to cloud networks/internet through the Owner's on-site data/communications system at the Operations/Administration IT/data/communications server room and not rely on multiple cellular connections or required multiple monthly cellular subscriptions to connect charging cabinets and infrastructure to the CMS cloud server and system.

CMS system to monitor and control the following components:

- Revenue vehicle charging cabinets
- Revenue Charging dispensers
- Public and mobility hub charging cabinets

CMS system will be integrated to receive data and transmit data through either data communication or customized API programming as necessary to the following components and systems:

- Revenue CCMS
- EMS
- Owner operational bus, shuttle, and mobility hub dispatch systems

The CMS will be a monitoring and charge management system for the Owner's revenue BEBs and cutaway shuttles and vans, non-revenue battery EV and public chargers (6-charging positions) serving private EVs (public and staff), and their charging systems installed at the facility in which the BEBs and EVs are stored and charged. The system shall be capable of wirelessly and wired connecting to, communicating with, and monitoring each BEB vehicle in the Owner's fleet and EV that is connected to a charging dispenser, as well as the revenue charger cabinets, revenue charging dispensers, revenue CCMS, and public charger (P-charger) located within the facility site. The system shall be able to capture, retain, and generate reports from historic and live BEB/EV, charger and revenue dispenser cord management system data. Collected data shall be used by the CMS over time to continually suggest adjustments to charging order, duration, time of day of charging, and amount of charge to predictively optimize the revenue and public cabinet chargers' usage with the entire actual revenue vehicle fleet operated and actual energy usage of the revenue and non-revenue fleet from the facility. The system will share and receive data with the revenue CCMS, including the minimum requirements:

- Charging cabinet active status and dispenser active and connection status will be shared with the cord management system
- The cord position sensor data and status will be shared for display within the charger management system as Raised, Lowered, and Partial Deployed.
- Cord management system active status "Ready" and "Alert" and control mode "Automatic" and "Manual" will be shared with the CMS.

3.1.7.1 Charge Management System General Performance and Minimum Functionality

- CMS system is a subscription hosting/charge management system with access to web-based subscription software for monitoring BEB and EV charging sessions and both revenue and non-revenue charger cabinets, as well as automatically and remotely controlling both revenue and non-revenue charger cabinets to optimize charging and power usage.
- Charge management system shall be able to engage in two-way communication with each of the Owner's revenue and non-revenue charger cabinets and optimize charging capabilities for the full array of charging cabinets.
- The owner shall be able to access specified information gathered through the CMS manufacturer's/service provider's web-based software system and generate reports as needed.
- CMS to have bi-directional communications with Owner's operations software systems.
- Communications:
 - o Open Charge Point Protocol OCPP 1.6 or higher
 - o I/O line: CAT 6 cable to network switch
- On-Site Charge Controller/CMS Data Cabinet
 - o Input Power: 12-480 VAC 20 Watts / 50 Watts maximum.
- Subscription hosting service shall offer storage and analysis of Owner's data on the manufacturer's/service provider's server(s) and secure, unlimited Owner access to that data 24 hours a day, 365 days a year.

- o Access shall be by means of online web-based software, compatible with a wide array of both desktop and mobile devices.
 - o The system shall allow the Owner to set various levels of hierarchal user access, restricting and allowing certain information to the various levels.
 - o Information collected from both BEB and EV charging systems shall be accessible through the same web-based software.
 - o There will be no limit to the number of Owner-authorized users able to access the CMS and Owner's data.
- Subscription hosting service shall be able to automatically connect and establish two-way communication (per OCPP 1.6 protocol) to each component of the revenue and non-revenue charger cabinets installed at the Owner's site via network wired and wireless connection through the Owner's network.
- Once the charging dispenser is connected to the BEB or EV, the subscription hosting service shall be able to automatically read, analyze, store, and monitor information from the cabinet, as well as automatically control the charging functions of the charging cabinet remotely based on that information, all in real time. Categories of this service shall include, at a minimum, the following for revenue, non-revenue, and mobility hub vehicles:
 - o Vehicle Identification Number
 - o API interconnection to provide this data to Owner's operations software
 - o Vehicle energy usage (consumption, kWh/miles)
 - o Vehicle odometer reading
 - o Vehicle battery SOC pre- and post-charging
 - API interconnection to provide this data to Owner's operations software
 - o Remaining range of the BEB in miles and operations time depending on the route
 - API interconnection required to Owner's operations software to calculate
 - o Faults, warnings, and diagnostic messages per vehicle
 - o Vehicle state (in service, not in service, charging)
 - o API interconnection to provide this data to Owner's operations software to monitor and record charging power
 - o Monitor and record charging current
 - o Monitor and record charging voltage
 - o Monitor and record battery SOC
 - o Monitor and record charging status (charging, not charging, error state)
 - o Remote reset/reboot vehicle charging system individually or by groupings
 - o Record and generate live and historical logs of chargers
 - o Generate charger session overview
 - o Store utility rate structuring configuration for generating reports
 - o Record uptime monitoring per charger unit and per site
 - o Remotely change the availability of chargers
 - o Diagnostics messaging

- o Upload firmware updates to the charger
 - o Edit charge status configuration
- The subscription hosting service shall be able to analyze the collected information and generate statistical reports on each charger, on demand or in Owner-defined groupings or the entire site. Bi-directional information sharing with the Owner's operational software is required. At a minimum, statistical reports shall include information on revenue, non-revenue, and mobility hub vehicles:
 - o Driven miles per bus/fleet per day/month/year
 - o Used energy and SOC per vehicle/fleet per day/month/year
 - o Driven routes and usage per route
 - o API interconnection required to Owner's operations software to collect specific routes driven by specific BEBs/EVs
 - o Recorded amount of charged energy per charging session
 - o Determine efficiency of each charging session by comparing the charged energy measured at the bus side to the AC input at the charge cabinet
 - o Recorded charge sessions per day
 - o Charging cost per bus
 - o Charging cost per day
 - o Recorded automated incidents (flags and triggers)
- The subscription hosting service shall, by means of two-way communication, be able to automatically control functions of each charging cabinet to dynamically "smart" charge the BEB/EV fleet. The hosting service shall be able to automatically collect, analyze, and store the following information in real time from each charging cabinet and the Owner's computer network:
 - o Owner's schedule of the buses, including blocks and routes
 - o API interconnection required to Owner's operations software to allow individual BEB schedule, blocks, and routes data in to CMS
 - o Analyze and re-distribute load balance between charger cabinets
 - o Avoid peak time-of-use periods set by the utility
 - o Programmed data entry into CMS, live data collection from utility not required
 - o Set maximum demand limit
 - o Programmed data entry into CMS, live data collection from utility not required
 - o Prioritize charge sessions manually
 - o Implement charge window and duration
 - o Energy rate structure response
 - o Programmed data entry into CMS, live or dynamic rate data collection from utility not required
 - o Analyze and calculate a charging response based on received utility demand limits
 - o Analyze and calculate a charging response based on received renewable energy requirements

- o Programmed data entry into CMS, live or dynamic renewable entry requirements data collection from utility, AHI/regulatory agency or Owner not required
 - o Predict optimal energy required based on BEB battery state of health and battery life cycle cost estimates
 - o Compile and provide summary reporting
 - o Provide actionable insights based on recorded information
 - o Provide remote diagnostics of buses and charging system
 - o Record and compile battery statistics
 - o Balance load between all chargers
 - o Set number of maximum power peaks within a set time period
- Prioritize chargers based on collected information

3.2 BESS (Battery Energy Storage System/Microgrid) Design Criteria

This section defines the design criteria for the BESS at the Yuba-Sutter Transit depot. The BESS is a betterment and would be designed to optimize operational energy efficiency, support fleet electrification, and provide resilient grid disruptions. The system will:

- Offset peak energy demand by storing energy from the solar PV system during the day and discharging it to recharge the bus fleet overnight.
- Reduce dependency on grid electricity, thereby lowering operational costs and stabilizing energy consumption.
- Serve as a backup power source for bus charging in the event of a grid outage.

The basis of design for the BESS is a Tesla Megapack (or equivalent).

Below are the BESS system design and operational requirements.

3.2.1 Energy Storage Capacity and Charging Strategy

- The BESS shall have sufficient storage capacity to supplement overnight bus recharging operations based on energy demand projections for the electrified fleet, as well as provide a resiliency mechanism during unplanned utility outages.
- It will be integrated with the solar PV system to store excess renewable energy during daylight hours and discharge stored energy as needed to maintain optimal charging cycles.
- The system shall be capable of dynamic energy management, responding to real-time load conditions and utility grid fluctuations.

3.2.2 Integration with Microgrid and Emergency Power Supply

- The BESS shall be an integral part of the depot's microgrid, operating in coordination with on-site solar generation and grid interconnection.

- The energy management system (detailed in Section 3.5) shall orchestrate load prioritization, ensuring seamless transitions between the BESS and solar PV.
- PV systems shall be connected to a BESS via a dedicated transformer and DER switchboard feeding into the MV switchgear.
- The DER system shall also support resiliency objectives by enabling islanding capability during utility outages, providing backup power to charging systems and critical loads. The design shall allocate sufficient space and interconnection infrastructure for future PV and BESS expansion and shall preserve these areas from encroachment by other utilities or uses that would impede expansion. More details about these DER resources are discussed in Section 3.3

3.2.3 Grid Stability and Demand Response

- The system shall be designed to participate in demand response programs, where feasible, to enhance grid reliability and optimize utility cost savings.
- The energy management system will enable peak shaving functionality, ensuring that stored energy is deployed to offset high-demand periods and minimize expensive peak-hour electricity consumption.

3.2.4 Scalability and Future Expansion:

- The BESS must be modular and scalable, allowing for future capacity expansion in alignment with fleet electrification growth projections.
- The system must support industry-standard communication protocols to accommodate advancements in energy storage technology and integration with future renewable energy assets.
- The system shall include future-ready provisions for a second BESS unit to double storage capacity and extend the duration of load offset (targeting 4 hours of full fleet charging at 100% battery state-of-charge).

3.2.5 Performance and Reliability Standards:

- The BESS shall comply with all applicable codes and standards, including but not limited to NFPA 855 (Standard for the Installation of Stationary Energy Storage Systems), UL 9540, and IEEE 1547 (Standard for Interconnecting Distributed Resources with Electric Power Systems).
- The system shall include remote monitoring and diagnostics capabilities to enable predictive maintenance and performance optimization.

3.2.6 Monitoring, Control, and Cybersecurity:

- The BESS must be integrated into the facility's EMS system for real-time monitoring and operational control.
- Cybersecurity measures must be in place to protect the energy management infrastructure from unauthorized access and potential cyber threats.
- Historical performance data shall be logged and analyzed to optimize system efficiency and enhance predictive maintenance capabilities.

3.2.7 BESS System Cabinets and Fire Detection/Suppression Considerations

- The BESS cabinets will be equipped with integrated fire detection and suppression systems, including smoke or heat detectors monitored by a supervising station, as required by NFPA 72 and NFPA 855. For systems exceeding 20 kWh, fire protection measures are implemented in accordance with NFPA 855 and CFC Section 1207. Clean-agent suppression systems, such as NOVEC 1230, will be installed to address potential thermal runaway events, which are a known hazard of lithium-ion batteries. Cabinets will be spaced a minimum of 3 feet apart per NFPA 855 Table 4.1 and CFC Section 1207.4.6, with a 10-foot clearance from property lines and nearby structures. For systems exceeding 600 kWh, additional requirements, including enhanced fire-rated barriers or greater spacing, will be implemented as specified by NFPA 855 and local regulations. Where necessary, 1-hour fire-rated barriers will be provided to reduce exposure risks to adjacent areas.
- Ventilation for the BESS cabinets will comply with CFC Section 1207.4.3, ensuring flammable gases, such as hydrogen, do not accumulate. Explosion venting will be integrated per NFPA 69, and emergency disconnects will be installed in accessible locations per CFC Section 1207.4.5 and NFPA 855. Clear and durable signage identifying battery chemistry, emergency contact information, and firefighting instructions will be displayed per NFPA 855 Section 4.10.2.
- An emergency response plan detailing firefighting procedures, thermal runaway mitigation, and system shutdown protocols will be submitted to the AHJ by the design-builder. Fire protection systems undergo initial commissioning and periodic maintenance per NFPA 855 Sections 8.3 and 8.4, ensuring continuous compliance. Testing includes functionality checks of fire detection, suppression, and ventilation systems to maintain operational readiness and safety standards.

3.2.8 Contractor Implementation Guidelines

- The design-build contractor shall ensure full compliance with the specifications outlined above and provide detailed system design documentation, including:
 - One-line diagrams illustrating system architecture and integration points.
 - Control logic and energy management system operational sequences for seamless energy flow management.
 - Commissioning and testing plans to validate performance before full deployment.
- The contractor must coordinate with the utility provider and relevant regulatory bodies to ensure smooth interconnection and compliance with all permitting requirements.

3.2.8.1 Batteries

- Type: Lithium-ion, Lithium-Iron, or other deployment-proven advanced chemistries
- Temperature Range: -25°C to 50°C (operating); -40°C to 60°C (storage)

- Capacity: Sized based on the desired storage capacity (MWh)
- Cycle Life: $\geq 5,000$ cycles at 80% Depth of Discharge
- Warranty: Minimum 10 years or more (15+ years preferred)
- Grid Compliance: UL 1973, UL 9540, UL 1741 SB, IEC 62619, IEEE1547
 - o Optional Compliance: UL 9540A

3.2.8.2 Battery Energy Management System

- Function: Monitors and manages battery health, charge/discharge rates, and thermal conditions. Refer to Section 3.5 for more energy management system information.
- Temperature Range: Same as the battery system
- Accuracy: High precision in voltage and temperature measurements

3.2.8.3 Power Conversion System

- Type: Inverters specifically designed for BESS
- Efficiency: $\geq 93\%$ (round-trip efficiency)
- Temperature Range: -25°C to 50°C
- Warranty: 5 to 10 years

3.3 Solar Panel Design Criteria

This section presents the design criteria for the solar renewable energy systems to be implemented at the Next Gen Facility. Designed to optimize operational energy efficiency, site resiliency, and energy savings across the facility, if selected the renewable energy system will serve as the backbone of the DER. This system is capable of potentially offsetting YSTA's future fleet electrification, stabilizing their grid energy consumption, and acting as an emergency power source when the utility grid is not available.

By incorporating renewable energy power systems such as PV panels and BESS, YSTA will help play a critical role in meeting California's goal of reaching 60% renewable energy by 2030. Additionally, the PV and BESS system will facilitate proactive maintenance, streamline resource allocation, and ensure efficient energy utilization. In doing so, it will not only maximize Yuba-Sutter Transit's operational capabilities but also maintain compliance with industry regulations and environmental standards.

The following sections detail the functional, operational, and design requirements of the solar renewable energy system, outlining how the system will integrate with existing and new infrastructure and how it will support future expansions or upgrades. This comprehensive approach ensures that the proposed energy management system is robust, scalable, and capable of adapting to evolving industry demands and technological advancements.

Where PV betterments are pursued and placed on top of canopies, the deck on top of the canopy can be replaced with a PV array to provide the weather protection and/or shading requirements at those locations. However, a shading study shall be conducted by the DBC to confirm that mature trees along the perimeter would not block future PV panels that would reduce the efficiency of the PV system.

No PV systems are included in the base design. Four betterments are being considered related to adding solar panels at the following locations (and discuss:

Betterment 3A) PV panels on the canopies over the first section of revenue vehicle parking.

Betterment 3B) PV panels on the canopies over the employee parking lot (totaling an approximately 288 kW system)

Betterment 3C) PV panels on the canopies over the non-revenue parking, visitor parking, and mobility hub parking (totaling an approximately 158 kW system, but this area could be redesigned based on PV system betterments to combine the parking areas, but shall not preclude the public hydrogen fueling lanes to be built at a later date nor reduce the number of parking spaces at those locations)

Betterment 3D) Ground-mounted PV array on the northern triangle of the site (totaling an approximately 1 MW system); this can be evaluated with and without a BESS and/or tie into the building loads if the demand dictates that.

3.3.1 Purpose of the Solar Renewable Energy System

The renewable energy system at the Yuba-Sutter Transit facility is designed to provide a reliable, resilient, and environmentally friendly energy asset to offset the facility's energy demand. This includes efficient management of DERs, load demands, and system stability. Once full build-out of all phases is complete, the total key DER components and load management elements shall include:

- BESS: 1,958 kW AC / 7,800KWh capacity
- Solar PV Inverters: 186.0 kW AC
- Solar PV Modules: 250.8 KW DC

3.3.2 Scalability and Flexibility

This segment highlights the design considerations and capabilities of the energy management system to accommodate future expansions and evolving operational requirements.

- Load Management and Spare Capacity: The solar renewable energy system's energy architecture is designed with spare capacity for signal processing, data transmission, and control commands. This allows for the seamless integration of new DERs, additional meters, and increased energy demands without system upgrades.
- Network Capacity and Spares: The energy management system communication network, including managed switches, incorporates at least 10% spare capacity in ports and bandwidth. This ensures that new devices such as sensors and relays can be added without requiring major changes to the network infrastructure.

- **Interoperability and Integration:** The energy management system supports a wide range of communication protocols to ensure compatibility with existing systems and future integration needs.

3.3.3 Fire Suppression Considerations for PV Array Canopies

PV array canopies (if chosen as a betterment), classified as open structures under Group S-2, per CBC Section 406.5.2 (requiring at least two sides open to the atmosphere), do not require sprinklers per CFC Section 903.2.10, provided they are constructed of noncombustible materials, remain open to the atmosphere, and do not involve hazardous materials stored or used beneath the canopy per CFC 903.3.1.1.3. Fire apparatus access will be provided via a minimum 20-foot-wide access road capable of supporting 75,000 pounds, designed and maintained in compliance with CFC Section 503 and Appendix D. A clearance of at least 10 feet will be maintained between the canopy and adjacent structures to ensure fire department access and facilitate firefighting operations.

3.3.4 Photovoltaic System Compliance and Regulations

This section outlines the compliance and regulatory requirements that the solar renewable energy system must meet to enable participation in energy trading markets, qualify for government incentives, ensure seamless utility grid connection and compliance with system installation. These requirements are critical for aligning the system with industry standards, regulatory frameworks, and financial incentive programs.

3.3.4.1 Compliance and Regulatory Requirements for Government Incentives

To qualify for government incentives such as the Self-Generation Incentive Program (SGIP), the energy management system must comply with specific regulatory and technical requirements. This incentive aims to promote renewable energy adoption, energy storage integration, and grid reliability, offering financial benefits to projects that meet their criteria.

SGIP

- **Description:** SGIP is a California program that provides rebates for energy storage systems to support grid stability and reduce greenhouse gas emissions.
- **Compliance requirements:**
 - o **CARB Certification:** Systems must comply with CARB emission standards for eligible generators.
 - o **California Rule 21:** Compliance for interconnection, advanced inverter functionalities, and grid interaction.
 - o **Energy Efficiency Standards:** Adherence to SGIP efficiency requirements, including round-trip efficiency benchmarks for energy storage systems.
 - o **Monitoring and Reporting:** Integration with platforms for ongoing performance and emissions monitoring to validate program eligibility.

3.3.4.2 Utility Grid Connection: Regulations and Compliance

This section outlines the regulatory and compatibility requirements that the energy management system must meet to ensure seamless and compliant utility grid connection.

- System Design: Detailed plans and specifications for the entire PV system
- Equipment: Solar panels, inverters, racking, wiring, and other components
- Electrical Components: Circuit breakers, disconnects, grounding, and overcurrent protection devices
- Grid Interconnection
- Anti-islanding Protection: Ensures power system is safely islanded under microgrid control during a utility outage. Essential to prevent the PV system back feeding grid if the grid connection is lost.
- Voltage and Frequency Compliance: The system must operate within acceptable utility voltage and frequency limits to maintain grid stability.
- Point of Interconnection: Clearly defined location where the PV system connects to the PG&E grid.
- Equipment Quality: Use of high-quality, UL-certified equipment is mandatory. For PV panels and inverter equipment, it is preferred that they are listed on the California Energy Commission (CEC) or Bloomberg Teir 1 list of approved manufacturers.

3.3.4.3 Key Interconnection and Regulatory Compliance

Energy trading involves buying, selling, and exchanging energy to optimize cost-efficiency and resource utilization. To participate in energy markets such as Power Purchase Agreements (PPAs) and California's Net Energy Metering 3.0 (NEM3), the energy management system must adhere to strict regulatory and compliance requirements:

- Inverter Capabilities: Requires inverters with grid-supporting features (voltage and frequency support, reactive power control).
- Time-of-Use Rates: Encourages shifting energy consumption to off-peak hours. Can be achieved with use of BESS.
- Application Process: Per PG&E
- Application Submission: Submit a complete application to PG&E, including all required documentation (plans, specifications, permits).
- Review and Approval: PG&E engineers will review the application and may request modifications.
- Inspection: On-site inspection of the installed system to verify compliance.
- Metering: Installation of appropriate metering equipment to track energy production and consumption.

3.3.4.4 Key Items Needed for Interconnection Application:

All generation-type systems are required to submit a Utility Interconnection Application with PG&E. The application will vary in size and scope depending on the AC system size and the type of generating equipment being installed. The following items are required for a successful PG&E Utility Interconnection Application:

- Completed Application: All sections of the application must be accurately and completely filled out. Failure to do so will prompt an application rejection and require a resubmittal.

- Detailed System Design: At a minimum the following drawings must be supplied: 1.) a PV site plan highlighting the PV point of interconnection location, PV utility AC disconnect switch location, and main utility meter; 2.) a PV spec sheet highlighting the proposed PV equipment such as inverters and modules to be used; 3.) a single line diagram defining the PV interconnection point; 4.) a PV warning labels page indicating any placards and gear locations.
- Electrical Calculations: Load calculations, voltage drop calculations, and other relevant electrical calculations.
- Equipment Specifications: Detailed information on all equipment used in the system, specifically, make, model, and output of the PV module, PV inverters, BESS battery modules, and BESS inverters.

3.3.4.5 Key Items Needed for Interconnection

All requirements listed in Section 3.3.4.2 as well as the following:

1. Rule 21 Compliance and Advanced Functions
 - Advanced interconnection capabilities:
 - o The solar PV system must support the functionalities required under California Rule 21, including:
 - Volt/VAR support
 - Frequency-Watt support
 - Ride-through capabilities for voltage and frequency disturbances
 - Anti-islanding protection to ensure safe grid operation—this is a standard feature built into all Teir 1 inverter systems that are UL listed and CEC listed for use on the American grid.
 - o These features are essential for DER integration and grid reliability.
2. Certifications and Safety Standards
 - Mandatory certifications:
 - o The solar PV system and associated equipment must meet the following standards:
 - UL 9540: Safety standard for energy storage systems
 - UL 1741-SA: Certification for grid-support functionality in inverters
 - IEEE 1547-2018: Standard for DER interconnection and interoperability
 - California Rule 21: Specific interconnection requirements for DERs in California
 - NEC (2023): Compliance with the NEC, particularly:
 - Section 706: Energy Storage Systems
 - Section 480: Battery Storage
3. Compliance with PG&E Blue Book
 - Blue Book Standards:
 - o Adherence to PG&E "Electric Transmission Interconnection Handbook" (commonly referred to as the Blue Book) is required for:
 - Connection specifications for DERs and load systems

- Guidelines on protection schemes, communication interfaces, and operational criteria for safe interconnection
- o This compliance ensures the energy management system aligns with utility-specific requirements for interconnection and operational safety.

3.3.4.6 California Building Compliance

California Building Standards Code (Title 24)

- Ensure compliance with the California Building Standards Code, particularly:
 - o CEC: Align with the CEC (Title 24, Part 3) for electrical installations, grounding, and wiring methods.
 - o CEC: Fulfill Title 24, Part 6 requirements for energy efficiency, demand response readiness, and renewable integration.
 - o CEC: Fulfill Title 24, Part 6, exterior lighting requirements which will need to be applied to the lighting fixtures under the PV canopy structures as well as the buss ports.
 - o CFC: Adhere to fire safety standards (Title 24, Part 9) regarding energy storage system installations, including fire suppression systems and clearance requirements.
- Seismic Standards:
 - o Comply with California's seismic design standards, ensuring energy management system and associated hardware meet the requirements of the CBC Title 24, Part 2, Chapter 16 for seismic safety and structural anchoring.
- Environmental Regulations:
 - o Meet California Environmental Quality Act requirements for emissions, noise, and other environmental considerations.
 - o Ensure proper handling and disposal of batteries and hazardous materials in alignment with local environmental laws.
- Cybersecurity and Data Protection:
 - o Fulfill California Consumer Privacy Act requirements for systems managing energy usage and customer data.
- Inspection and Certification Processes:
 - o Pass inspections by the local AHJ for compliance with building, safety, and electrical codes.

3.3.4.7 Photovoltaic Recommended Technical Specifications to Consider

Solar Modules:

- Module Size Category:
 - o Commercial and industrial PV modules (medium-scale industrial sites; 500 watts to 650 watts)
- Maximum System Voltage: 1000V or 1500V (depending on location 1000V on roof tops, 1500V on ground mounts).
- Type: Monocrystalline or polycrystalline silicon, or thin-film (CdTe, CIGS), or bifacial modules
- Temperature Coefficient: $\leq -0.4\%/^{\circ}\text{C}$ (for better performance in high temperatures). Typical range ($-0.26\%/^{\circ}\text{C}$ to $-0.36\%/^{\circ}\text{C}$) for crystalline modules (Mono or Poly) and bifacial modules. Typical range ($-0.2\%/^{\circ}\text{C}$ to $-0.4\%/^{\circ}\text{C}$) for thin-film modules.

- Operational Temperature Ranges -40°C to +85°C
- Efficiency: ~22% to +25% for crystalline modules, $\geq 22\%$ for bifacial modules (front side), ~10% to +19% for thin-film modules
- Warranty: 25 years for performance (linear output warranty) and 10 to 15 years for product (minimum warranty periods)
- Degradation Rates:
 - o Year 1 Degradation: The maximum allowable degradation in the first year shall not exceed 2 to 3%.
 - o Annual Degradation After Year 1: The degradation rate shall not exceed 0.45 to 0.55% per year.
 - o Performance at Year 25: By the end of the 25-year period, the modules shall retain at least 80 to 84% of their original power output.
- Fire Safety Classification: Modules shall be classified as Class A, Class B, or Class C based on the installation requirements and local fire safety codes.
- Accessories and Fittings:
 - o Connectors: Standard MC4 or compatible connectors.

3.3.4.8 Additional Considerations

- Interoperability:
 - o The solar renewable energy system must integrate seamlessly with existing utility infrastructure and support future grid modernization initiatives.

3.4 Backup Standby Generator

3.4.1 General Requirements

A potential improvement to the Next Generation Facility includes the installation of a standby generator, either natural gas or diesel-fueled, to provide an additional layer of resiliency once YSTA has converted most of its fleet to battery-electric buses. This generator is anticipated to be 1MW and would serve as the final measure of redundancy to ensure continuity of operations during extended utility outages or system contingencies. A dedicated space has been reserved near the electrical yard to accommodate a generator of appropriate capacity, and cabinet space has been allocated within the medium-voltage (MV) metering switchgear for a future connection.

Installation of a backup generator shall be executed under a separate contract by others. AECOM holds no responsibility for the design, procurement, or construction of the generator system beyond the provision of physical and electrical space allowances noted above. Any generator installation will require coordination with the local air quality management district, fire marshal, and building department to obtain the necessary permits and approvals related to emissions, fuel storage, and life-safety compliance.

When implemented, the generator shall be integrated into the facility's energy management system and configured as a generation resource within the overall microgrid. This will enable coordinated operation with the on-site BESS, solar photovoltaic arrays, and utility service to maximize resiliency, efficiency, and safe system operation.

3.4.2 Emergency Generator and Electric Transformer Exposures (Fire Detection/Suppression)

Diesel fuel is classified as a Class II combustible liquid per NFPA 30. The required separation distances for Class II combustible liquids are designed to minimize fire hazards due to proximity between storage tanks, property lines, and other buildings or structures. Specifically, NFPA 30 Table 22.4.1.1(b) outlines the minimum separation distances for aboveground storage tanks containing Class II and other combustible liquids. These distances are determined by factors such as tank capacity, construction type (e.g., protected or unprotected), and whether additional fire protection measures are in place. Tables 22.4.1.1(a) and 22.4.1.3 provide additional details based on tank size, diameter, and type.

As per NFPA 37 Section 4.1.4, engines and their weatherproof housings located outdoors must maintain at least 5 feet of clearance from openings in walls (e.g., doors, windows, or vents) and at least 5 feet from structures. However, if the adjacent wall has a fire-resistance rating of at least 1 hour, no minimum separation distance is required. These requirements aim to reduce fire spread and allow for proper ventilation around the equipment.

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The locations of the emergency generators will be reviewed for compliance with the CFC, NFPA 30, and NFPA 37, as indicated on the life safety plans. Further engineering analysis will be conducted as the design progresses to ensure compliance with all applicable codes and site-specific considerations.

Outdoor electric transformer locations will also be reviewed to ensure compliance with the CBC, NFPA 70, NFPA 101, and NFPA 850. Additional analysis will be performed during the design process to address separation distances, fire protection, and environmental considerations.

3.5 Pick-up/Drop-off Zone & Potential Future Public Hydrogen Fueling Yard

There is space currently designated along Avondale Avenue (just north of Beale Road and adjacent to the visitor parking lot) for a future fueling area, such as a public hydrogen fueling lane. The base scope assumes this space will be reserved for future use and will have underground sleeve / conduit with stub ups from the location reserved for the Future Fueling Yard equipment so it can be easily expanded to later.

An alternate smaller step to provide YSTA the ability to pilot or operate a smaller H2 fuel cell bus is for the use of a portable liquid hydrogen fueling tank with integral LH2 tank, compressor and dispenser. Provide as part of base contract conduits from the new switchgear to a capped stub-up or pull box suitable for connecting a 480v 3p power connection to energize the portable LH2 fueler trailer.

Provide as part of the base contract conduits / sleeves for electrical line for the potential public fueling hub back to the main Administration building's electrical roof to support future fuel canopy lights and dispensers. In the base scope, this area will be a minimally landscaped area.

A betterment for this area includes paving this designated area and classifying it as a pick-up/drop-off zone. This betterment must include curb and sidewalks to connect it to the Administrative Building via an ADA accessible pathway. The betterment design shall not preclude the ability to change this area into a public hydrogen fueling lane if desired later.

3.6 Energy Management System Betterments

3.6.1 General Description

This section describes potential future enhancements to the Energy Management System (EMS) to support advanced energy system operation, including distributed energy resources (DERs), microgrid functionality, and optimized energy utilization.

These enhancements expand the EMS from a monitoring and supervisory platform into a fully integrated energy management and control system, capable of:

- Coordinating multiple energy sources and loads
- Managing system stability during grid-connected and islanded operation
- Optimizing energy performance and operational costs

These features are not included in the base contract but shall be considered in the design to allow future integration without major system modifications.

3.6.2 Distributed Energy Resource (DER) Integration

Future EMS capabilities shall include integration with DER systems such as:

- Battery Energy Storage Systems (BESS)
- Solar photovoltaic (PV) systems and inverters
- Generator systems (e.g., natural gas or diesel)
- Additional distributed generation resources

Functional Integration

The EMS shall:

- Acquire real-time operational data from all DER systems
- Transmit control commands to DER controllers and inverters
- Coordinate DER operation to maintain system balance and stability

Communication Requirements

DER integration shall utilize:

- Modbus TCP/IP (primary for inverters and storage systems)
- IEC 61850 (where applicable)
- IEEE 2030.5 (for advanced grid interaction and utility communication)

The EMS shall support interoperability across multiple vendors and device types.

3.6.3 DER Communication Networks

Dedicated communication networks shall be provided for DER systems.

3.6.3.1 DER Network Requirements

- Network Type: LAN with WAN access capability
- Topology: Ring configuration (for redundancy and resilience)
- Network Speed: 1000 Mbps minimum
- Interfaces:
 - o Ethernet CAT6
 - o Fiber optic (single-mode LC)

3.6.3.2 Devices (typical future configuration)

- BESS units
- Solar inverters
- Managed switches
- Patch panels

3.6.3.3 Redundancy

- Redundant communication paths via ring topology
- Backup managed switch capability

3.6.4 Advanced Energy Control Functions

The EMS shall be capable of executing advanced control functions to support microgrid operation.

3.6.4.1 Frequency and Voltage Control

The EMS shall regulate system frequency and voltage to maintain stability.

Island Mode:

- Actively controls DER outputs to maintain frequency and voltage
- Utilizes adaptive control algorithms to respond to load and generation changes

Grid-Connected Mode:

- Synchronizes system parameters with the utility grid
- Provides reactive power and voltage support

3.6.4.2 Generation Control

The EMS shall coordinate all generation sources to balance supply and demand.

Functions:

- Real-time adjustment of DER output
- Load forecasting integration
- Renewable generation optimization

3.6.4.3 Islanding and Transitioning

The EMS shall support seamless transition between:

- Grid-connected mode
- Islanded mode

Capabilities:

- Black start functionality
- Automated transition without disruption to critical loads
- Controlled reconnection to the grid

3.6.4.4 Grid Synchronization

The EMS shall:

- Continuously monitor grid parameters (voltage, frequency, phase)
- Align system conditions prior to reconnection
- Execute automated synchronization procedures

3.6.4.5 Load Shedding

The EMS shall implement intelligent load shedding based on:

- Available generation capacity
- System conditions
- Operator-defined priority lists

The system shall:

- Automatically disconnect non-critical loads
- Maintain operation of critical systems

3.6.4.6 Peak Shaving

The EMS shall:

- Reduce peak demand through coordinated use of DERs
- Shift load away from peak periods
- Minimize demand charges

3.6.4.7 Energy Arbitrage

The EMS shall:

- Optimize energy storage usage based on time-of-use pricing
- Charge and discharge storage systems strategically
- Minimize operational energy costs

3.6.5 DER Equipment Control

3.6.5.1 Battery Energy Storage System (BESS)

The EMS shall provide:

- State of Charge (SOC) monitoring and control
- Dynamic charge/discharge control
- Thermal monitoring and management
- Fault detection and alarm generation
- Capability curve control and safe operating limits

Additional functions:

- Droop control and inertia emulation
- Run-back mechanisms during system constraints

3.6.5.2 Solar PV Inverters

The EMS shall provide:

- Power output control based on irradiance and demand
- Maximum Power Point Tracking (MPPT) optimization
- Reactive power and voltage support
- Grid synchronization

3.6.5.3 Generator Systems

The EMS shall provide:

- Load-following control
- Startup and shutdown automation
- Frequency and voltage support
- Fuel monitoring and operational status

3.6.5.4 Electric Vehicle Charging Integration

Future EMS integration shall include EV charging systems.

Functions:

- Charging schedule management
- Dynamic load allocation across chargers
- Fault detection and diagnostics
- Load prioritization based on operational needs

Communication:

- Open Charge Point Protocol (OCPP) or equivalent

Network Requirements:

- Ring topology
- Fiber optic communication
- Dedicated charger communication network

3.6.6 Advanced Data Acquisition and Signals

The EMS shall acquire detailed operational signals from all integrated systems.

Example Signals:**BESS:**

- SOC, voltage, current, temperature
- Operational status and alarms

Solar PV:

- DC/AC voltage and current
- Power output
- Fault conditions

Generators:

- Output power
- Fuel consumption
- Engine parameters

EV Chargers:

- Charging status
- Energy delivered
- Fault conditions

Additional Systems:

- Weather station data (irradiance, temperature, wind)
- Network performance metrics

3.6.7 Advanced Visualization and HMI

The EMS shall provide enhanced visualization tools, including:

- DER control dashboards
- Charging system interfaces
- Energy forecasting screens
- Power generation control views
- Microgrid operating mode displays

Additional Screens:

- Energy trading interface
- Weather and solar forecasting
- System analytics and reporting

3.6.8 Regulatory and Utility Integration

The EMS shall support compliance with applicable standards and programs, including:

- California Rule 21 interconnection requirements
- IEEE 2030.5 communication standards
- Net Energy Metering (NEM) programs
- Power Purchase Agreements (PPA)

Required Capabilities:

- Revenue-grade metering (ANSI C12.20)
- Real-time data reporting
- Time-of-use energy calculations
- Grid support functions (Volt/VAR, Frequency-Watt)

3.6.9 Expandability and Future Integration

The base EMS design shall allow for:

- Integration of DER systems without major reconfiguration
- Expansion of communication networks
- Addition of advanced control functions

The system shall maintain:

- Interoperability with multiple vendors
- Support for evolving industry standards
- Scalability for increased system capacity

Appendix A (Project Drawing Package)

Appendix B (Space Program)

Appendix C (Equipment List)

Appendix D (Equipment Cutsheet Package)

Appendix E (Equipment Inventory)

Appendix F (Geotechnical Report)

Appendix G (Use Permit Draft Conditions of Approval)

